CENTRAL MASSACHUSETTS

METROPOLITAN PLANNING ORGANIZATION

2025 Congestion Management Process Progress Report

April 2026

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Executive Summary

A Congestion Management Process (CMP) is a systematic and regionally accepted approach for managing congestion that provides accurate, up to date information on transportation system performance and assesses alternative strategies for congestion management that meet both state and local needs. As defined in federal regulation, it is intended to serve as a systematic process that provides for safe and effective integrated management and operation of the multimodal transportation system. Following Federal Highway Administration (FHWA) guidance, staff reformatted the region's CMP to align with FHWA requirements. This CMP document follows the FHWA guidebook for congestion management that includes a process model for an objectives-driven, performance-based approach. The following eight actions are discussed in this document:

1. Develop regional objectives
2. Define the CMP network
3. Develop multimodal performance measures
4. Monitor and collect data
5. Analyze congestion problems and needs
6. Identify and assess strategies
7. Program and implement strategies
8. Evaluate strategy effectiveness

Chapter 1 is an introduction to the CMP document. **Chapter 2** lists the CMP regional goals and objectives. The CMP network is defined in **Chapter 3** by listing the existing and projected roadway segments in the CMRPC region. **Chapter 4** discusses the Performance Measures that are related to congestion. **Chapter 5** contains the data collection and analysis of various types which include TMCs, Travel Time & Delay studies, Park and Ride lots, bicycle & pedestrian counts, and others. The timeframe of the data is between 2016 and 2025. In **Chapter 6**, congestion problems and needs are summarized. Basically, the top congestion locations for the various types of data are shown. Next, **Chapter 7** is about identifying and assessing strategies. This chapter lists the different types of strategies that can be implemented and the different methods that can determine if those strategies reduced congestion. **Chapter 8** discusses programming and implementing strategies. This chapter lists the currently programmed congestion-related TIP projects and what types of improvements are incorporated in the projects. Lastly, **Chapter 9** evaluates the effectiveness of the strategies. Data collection results from previous TIP projects are compared for intersections and roadway segments before and after the implementation of improvements to determine if congested time, delays, crashes, and LOTTR have been reduced. A list of current and future TIP projects is also provided.

1.0 Introduction

1.1 What is a Congestion Management Process (CMP)

Congestion management is the application of strategies to improve transportation system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods. A Congestion Management Process (CMP) is a systematic and regionally-accepted approach for managing congestion that provides accurate, up to date information on transportation system performance and assesses alternative strategies for congestion management that meet both state and local needs. The CMP is intended to move these congestion management strategies into the funding and implementation stages.

The CMP, as defined in federal regulation, is intended to serve as a systematic process that provides for safe and effective integrated management and operation of the multimodal transportation system. The process includes:

- Development of congestion management objectives
- Establishment of measures of multimodal transportation system performance
- Collection of data and system performance monitoring to define the extent and duration of congestion and determine the causes of congestion
- Identification of congestion management strategies
- Implementation activities, including identification of an implementation schedule and possible funding sources for each strategy
- Evaluation of the effectiveness of implemented strategies

1.2 History of the Planning Region's CMP

The Congestion Management System (CMS) was first introduced by the **Intermodal Surface Transportation Efficiency Act** (ISTEA) of 1991 and continued under the successor law, the **Transportation Equity Act for the 21st Century** (TEA-21). The CMS was intended to augment and support effective decision making as part of the overall metropolitan planning process. In 2006, the **Safe, Accountable, Flexible, Efficient Transportation Equity Act**: A Legacy for Users (SAFETEA-LU) called for the CMS to be evolved into a Congestion Management Process (CMP), with a greater focus on implementation of operational improvements to the highway system to mitigate congestion. In 2012, the **Moving Ahead for Progress in the 21st Century Act** (MAP-21) called for the continuation of the CMP program while also requiring a transition to performance-based planning, reaffirmed by 2015's successor national legislation **Fixing America's Surface Transportation** (FAST) **Act** and the 2021 **Infrastructure Investment and Jobs Act** (IIJA).

MassDOT predecessor agencies, the MPOs, the MBTA, other RTAs and a prior ride share contractor to the state initially developed the Massachusetts Congestion Management Process (CMP) (then called a Congestion Management "System") as a cooperative effort. CMRPC staff served on the first Congestion Technical Team established in 1994. The team was charged with the responsibility for the overall design of the Commonwealth's CMP as well as the development and evaluation of various "strategies" or improvement options. At that time, the Technical Team also selected standard performance measures and congestion monitoring techniques to be used statewide.

Although considered a statewide system, CMRPC has been responsible for both developing and maintaining the planning region's CMP within the flexible framework originally established by the Technical Team. MassDOT-Office of Transportation Planning (OTP) and other participating state agencies have and are expected to continue providing technical support to the MPOs. The CMP is completed for the CMMPO on an annual basis. Data is collected, analyzed, and a summary document is produced. As needed, the CMMPO Advisory Committee advises the CMMPO on ongoing CMP activities. It should be emphasized that the results of the region's ongoing CMP efforts have been considered in the development of CMRPC's LRTP and TIP documents since 1995.

1.3 Federal Highway Administration (FHWA) Guidelines

Staff continue to follow the FHWA guidebook for congestion management that includes a process model for an objectives-driven, performance-based approach. This model includes the following eight actions:

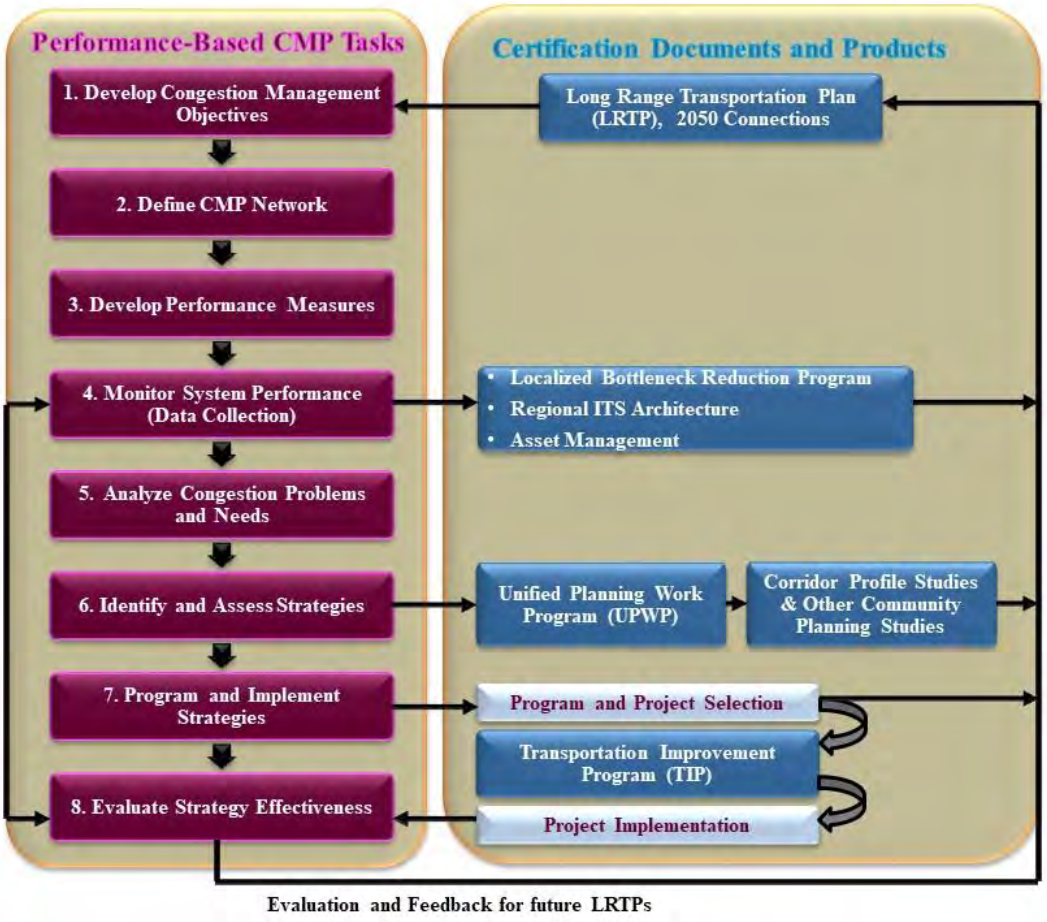
1. Develop regional objectives
2. Define the CMP network
3. Develop multimodal performance measures
4. Monitor and Collect Data
5. Analyze congestion problems and needs
6. Identify and assess strategies
7. Program and implement strategies
8. Evaluate strategy effectiveness

The CMMPO's CMP meets the federal requirements for performance-based planning. The performance goals in the CMP reflect local conditions and support transportation system goals through the Long-Range Transportation Plan (LRTP), 2050 Connections. It should also be mentioned that this updated CMP does not require the CMMPO to change its methods for identifying priority projects or the performance-based Transportation Improvement Program (TIP) project selection process.

1.4 Integrating CMP with the CMMPO Planning Process

Figure 1 shows how the US DOT model is used by the CMMPO and how it is related and directly linked with other major elements of the CMMPO's transportation process.

Figure 1 – Integration of CMP and CMMPO Planning Process



As shown in **Figure 1**, the integration of the CMP is linked with the essential functions of the overall CMMPO planning process. The CMP steps 1) Develop CMP Objectives, 2) Define CMP Network, 3) Develop Performance Measures, 6) Identify and Assess Strategies, and 8) Evaluate Strategy Effectiveness are directly related to elements of the LRTP that discuss needs assessment, performance management, goals & objectives, and scenario planning. The CMP step 4) Monitor System Performance (Data Collection) relates to the CMMPO's Localized Bottleneck Reduction Program, the installation of components of the State's established ITS architecture to monitor congestion, and Asset Management Report. Information from these and other studies also feeds into the "Needs Assessment" section of the LRTP. The CMP steps, 5) Analyze Congestion Problems & Needs and 6) Identify and Assess Strategies, provides input for the UPWP and inspires corridor studies and other planning studies. 7) Programming and Implementing Strategies relates to the CMP influence in the selection of projects for funding in the TIP. Monitoring data from the CMP are used in the evaluation of potential TIP projects and their prioritization for funding. 8) Evaluate Strategy Effectiveness evaluates the impacts or results of implementing the strategies in the planning region. This step receives input from TIP projects that have recently been implemented in order to monitor their strategy effectiveness, which, in turn, feeds into management & operations and other CMP recommendations for future LRTPs.

2.0 Congestion Management Regional Objectives

The goals and objectives of the CMP are consistent with the goals and objectives of the LRTP which express the values and vision for transportation planning in the region through 2050.

The CMMPO's visions and policies are organized in several categories relating to various aspects of the future of transportation in the region. Of those categories, the CMP relates directly to the following:

- Reduce Congestion and Improve Mobility
- Increase Transportation Options
- Safety and Security

The CMP has three goals, corresponding to the three LRTP categories of vision and policies listed above. Each of the goals listed below also includes the objectives for those goals.

Goal 1: Improve efficiency and reliability

Objective: Address existing congestion and prevent congestion from occurring elsewhere.

Goal 2: Increase availability of transportation options

Objective: Expand the bicycle, pedestrian and transit networks in the region and work with member communities to implement Complete Street Policies.

Goal 3: Improve safety

Objective: Reduce the number of and rate of fatal and serious injury crashes in the region for all transportation modes.

3.0 CMP Network

3.1 Highway Network Development

The intent of the CMP is to not only address existing congestion, but to prevent congestion from occurring elsewhere. The first step in establishing a CMP for the planning region was to identify roadway "focus segments," where the traffic volume on the roadway was exceeding the operational capacity. According to the Highway Capacity Manual (HCM), a roadway's capacity is defined as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic and control conditions." The region's major roadways were screened using a computer-based Travel Demand Model maintained by staff to determine those highway segments with volume-to-capacity (V/C) ratio greater than or equal 1.0 for at least one time period and have an average of 0.75 or greater. Critical intersections, often under signalized control, are then selected along the identified focus segments.

3.2 Network Features

The region's CMP program includes focus roadway segments, critical intersections and Park and Ride facilities that have been identified utilizing the criteria initially developed for statewide use. In addition, the usage of these identified segments and intersections will also be analyzed for bicycles, pedestrians, transit, safety, accessibility, reliability, and heavy vehicles. An ongoing component of the region's work program, CMMPO staff plans to continue the refinement of the established focus segment network through future updates of the regional Travel Demand Model (recently updated for 2020) as well as through public outreach activities. CMP locations are also considered from local commentary provided at such public venues as local host community meetings. Periodically, staff discusses the annual CMP Progress Report results to the CMMPO and MPO Advisory Committee while seeking feedback.

The following **Figure 2** and **Table 1** shows the roadway segments in each of the communities in the planning region that have existing congestion or are projected to have congestion in future years based on the most recent results of the Travel Demand Model.

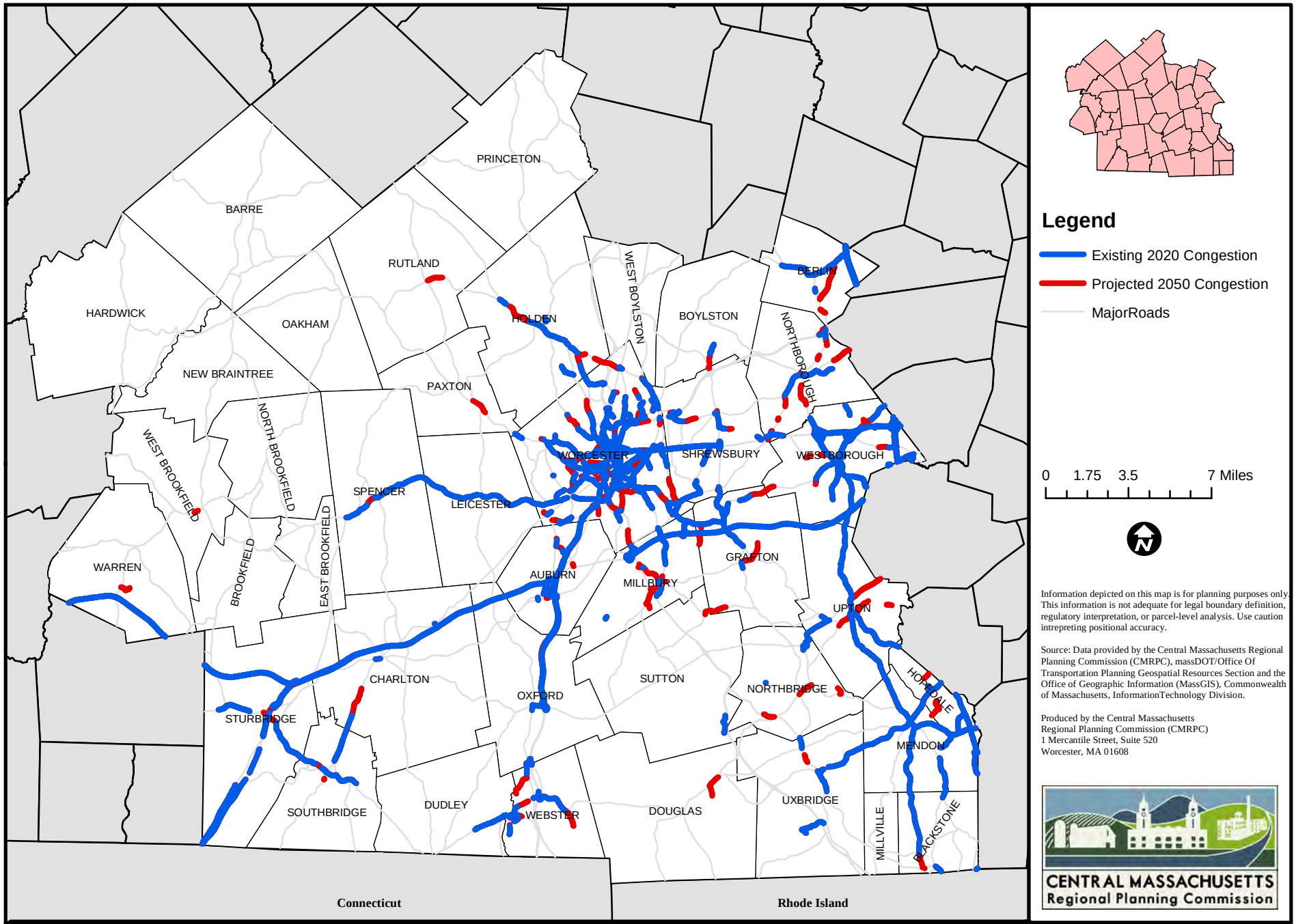


Figure 2 - CMP Network

Date: 7/31/2025

TABLE 1
EXISTING AND PROJECTED CONGESTED CMP FOCUS SEGMENTS

CMRPC Community	Identified Year	Existing or Projected	Facility Name	From	To
Auburn	2020	Existing	Auburn Street	I-290	Rockland Rd
	2020	Existing	I-290/I-395	Worcester CL	Oxford TL
	2020	Existing	I-90	I-290	Oxford TL
	2020	Existing	Oxford Street N	Auburn Street	Zabelle Ave
	2020	Existing	Prospect Street	Route 12	Route 20
	2020	Existing	Vine Street	Brotherton Way	Jay St
	2050	Projected	Auburn Street	Rockland Rd	Bryn Mawr Ave
	2050	Projected	Auburn Street	Brotherton Way	Central St
	2050	Projected	Oxford Street N	Zabelle Ave	Pinehurst Ave
	2050	Projected	Route 20	Hillcrest St	Oxford St
Barre	No congested focus segments identified at this time				
Berlin	2020	Existing	I-495	Bolton TL	Hudson TL
	2020	Existing	Pleasant St		
	2020	Existing	Route 62	I-495	Derby Rd
	2050	Projected	Sawyer Hill Rd	Route 62	Pleasant Street
	2050	Projected	South St	Pleasant Street	Whitney Rd
Blackstone	2020	Existing	Blackstone St	Elm Street	Mendon TL
	2020	Existing	Route 122	St. Paul Street	RI Stateline
	2020	Existing	Mendon Street	Lincoln St	Mendon TL
	2020	Existing	Route 126	Rhode Island SL	Bellingham TL
	2050	Projected	Mendon Street	Route 122	Lincoln St
Boylston	2020	Existing	Cross Street	East Temple St	Adams Street
	2050	Projected	Cross Street	East Temple St	School St
Brookfield	No congested focus segments identified at this time				
Charlton	2020	Existing	I-90	Oxford TL	Sturbridge TL
	2020	Existing	Route 20	Route 169	Stafford Street
	2020	Existing	Route 169	Sherwood Ln	Southbridge TL
	2050	Projected	Route 169	Sherwood Ln	Snakehill Rd
Douglas	2050	Projected	Route 169	Cook St	Franklin St
	2050	Projected	Franklin St	Route 16	Maple Street
Dudley	2020	Existing	Route 12	Webster TL	Route 197
	2020	Existing	Route 197	Route 12	Airport Rd
East Brookfield	No congested focus segments identified at this time				
Grafton	2020	Existing	Route 122	Route 140	Millbury TL
	2020	Existing	Route 122	Millbury St	Pleasant Street
	2020	Existing	Route 122/140	Route 140	Route 140
	2020	Existing	Route 140	Grafton TL	Route 122
	2020	Existing	Route 30	Route 140	Westboro Rd
	2020	Existing	Route 30	Institute Rd	Discovery Dr
	2020	Existing	I-90	Millbury TL	Westborough TL
	2050	Projected	Brigham Hill Rd	Route 122	Deernolm Street
	2050	Projected	Millbury St	Route 122	Route 140
	2050	Projected	North St	Route 140	Old Westboro Rd
	2050	Projected	Route 122A	Pleasant St	Sutton TL
	2050	Projected	Route 30	Discovery Dr	Westborough TL
Hardwick	No congested focus segments identified at this time				
Holden	2020	Existing	Holden St	Sunnyside Ave	Worcester CL
	2020	Existing	Route 122A	Shrewsbury St	Sunnyside Ave
	2020	Existing	Route 122A	Mt. Pleasant Ave	Route 68
	2020	Existing	Shrewsbury St	Route 122A	Holden St
	2050	Projected	Holden St	Johnson St	Shrewsbury St
	2050	Projected	Route 122A	Sunnyside Ave	Causeway St
	2050	Projected	Shrewsbury St	Holden St	Doyle Rd
	2050	Projected	Doyle Road	Nelson St	Worcester CL

TABLE 1
EXISTING AND PROJECTED CONGESTED CMP FOCUS SEGMENTS

CMRPC Community	Identified Year	Existing or Projected	Facility Name	From	To
Hopedale	2020	Existing	Mellen St	Route 140	Hartford Ave E
	2020	Existing	Route 16	Mendon TL	Milford TL
	2020	Existing	Route 140	Upton TL	Milford TL
	2020	Existing	Route 140	Milford TL	Mendon TL
Leicester	2020	Existing	Route 9	Worcester CL	Spencer TL
Mendon	2020	Existing	Bates St	Bellingham St	Bellingham TL
	2020	Existing	Bellingham St	Bates St	Route 140
	2020	Existing	George St	Main St	Neck Hill Rd
	2020	Existing	Hartford Ave E	Cemetery Rd	Route 140
	2020	Existing	Main St	Route 16	George St
	2020	Existing	Millville St	Route 16	Millville TL
	2020	Existing	Neck Hill Rd	George St	Hartford Ave E
	2020	Existing	North Ave	Route 16	Upton TL
	2020	Existing	Providence St	Cemetery Rd	Blackston TL
	2020	Existing	Route 16	Uxbridge TL	Hopedale TL
	2020	Existing	Route 140	Hartford Ave E	Bellingham TL
Millbury	2020	Existing	Canal St	Howe Ave	Main St
	2020	Existing	S Main St	Canal St	Elm St
	2020	Existing	Millbury Ave	Worcester CL	Howe Ave
	2020	Existing	Route 122	Worcester CL	Grafton TL
	2020	Existing	Sycamore St	S Main St	Route 146
	2020	Existing	I-90	Route 146	Grafton TL
	2050	Projected	Canal St	Elm St	Grafton St
	2050	Projected	Elm St	Elmwood St	River St
	2050	Projected	Howe Ave	Canal St	Lincoln Ave
	2050	Projected	W Main St	Route 146	Sutton Rd
	2050	Projected	Route 122A	McCracken Rd	Hamilton St
Millville	No congested focus segments identified at this time				
New Braintree	No congested focus segments identified at this time				
North Brookfield	No congested focus segments identified at this time				
Northborough	2020	Existing	Maple Street	Route 20	Bartlett St
	2020	Existing	Route 20	Southwest Cutoff	Maple St
	2020	Existing	Route 9	Shrewsbury TL	Westborough TL
	2020	Existing	Solomon Pond Road	Marlborough TL	Bearfoot Road
	2050	Projected	Church Street	Whitney St	Route 20
	2050	Projected	Hudson St	Allen St	Dunia Ln
	2050	Projected	Route 20	Davis St	West Main St
	2050	Projected	Route 20	Shrewsbury TL	Northborough Crossing
	2050	Projected	Route 20	E Main St	Marlborough TL
	2050	Projected	Route 135	Cedar Hill Rd	Longfellow Rd
	2050	Projected	Solomon Pond Road	Bearfoot Rd	Hudson St
Northbridge	2050	Projected	Church St	Route 122	Quaker St
	2050	Projected	Main St	Hill St	Lake St
Oakham	No congested focus segments identified at this time				
Oxford	2020	Existing	I-395	Sutton Avenue	Auburn TL
	2020	Existing	I-90	Auburn TL	Charlton TL
	2020	Existing	Route 12	Cudworth Rd	Webster TL
	2020	Existing	Route 12	Sutton Ave	Quabaug Ave
	2020	Existing	Sutton Avenue	I-395	Route 12
Paxton	2050	Projected	Route 122	Grove St	Briar Ln
Princeton	No congested focus segments identified at this time				
Rutland	2050	Projected	Route 122A	Route 56	Glenwood Rd

TABLE 1
EXISTING AND PROJECTED CONGESTED CMP FOCUS SEGMENTS

CMRPC Community	Identified Year	Existing or Projected	Facility Name	From	To
Shrewsbury	2020	Existing	Lake St	Route 20	S Quinsigamond Ave
	2020	Existing	Lake St	Route 9	Harris Ave
	2020	Existing	Main Street	N Quinsigamond Ave	Old Mill Rd
	2020	Existing	Main St	Maple Ave	Route 140
	2020	Existing	Old Brook Road	Route 140	Francis Ave
	2020	Existing	Route 140	Main St	Old Brook Rd
	2020	Existing	Route 140	Route 20	Grafton TL
	2020	Existing	Route 20	Worcester CL	Lake Avenue
	2020	Existing	Route 9	Worcester CL	Route 140
	2020	Existing	Walnut Street	Route 9	Tennis Dr
	2050	Projected	Main Street	Monadknock Dr	Old Mill Rd
	2050	Projected	Old Brook Rd	Francis Ave	South St
	2050	Projected	Route 140	Prospect St	Main St
Southbridge	2020	Existing	Route 131	Sturbrige TL	Sayles St
	2020	Existing	Route 131	South St	Dresser Hill Rd
	2020	Existing	Route 169	Charlton TL	Central St
	2050	Projected	Route 131	Sayles St	Oakes Ave
Spencer	2020	Existing	Route 9	Route 49	Water St
	2020	Existing	Route 9	High St	Leicester TL
	2050	Projected	Route 9	High St	Water St
Sturbridge	2020	Existing	I-90	Brimfield TL	Charlton TL
	2020	Existing	I-84	Connecticut SL	I-90
	2020	Existing	Route 131	Hall Rd	Southbridge TL
	2020	Existing	Route 20	Laflamme Ln	Cedar St
	2050	Projected	Route 131	Route 20	Hall Rd
Sutton	2020	Existing	Gilmore Dr	Whitins Rd	
	2050	Projected	Route 122A	Grafton TL	Boston Rd
	2050	Projected	Boston Rd	Route 122A	Hartness Rd
Upton	2020	Existing	Grove St	Route 140	Mendon St
	2020	Existing	Hartford Ave S	Route 140	Northbridge TL
	2020	Existing	I-90	Westborough TL	Westborough TL
	2020	Existing	Mendon St	Grove St	Mendon TL
	2020	Existing	N Main St	School St	Route 140
	2020	Existing	Route 140	Merriam Wy	Hartford Ave
	2020	Existing	Route 140	Grove St	Hopedale TL
	2020	Existing	Westboro Rd	Westborough TL	Hopkinton Rd
	2050	Projected	Elm St	Route 140	Taft St
	2050	Projected	Hartford Ave	Westboro Rd	Hopkinton TL
	2050	Projected	Pleasant St	Route 140	Mendon St
	2050	Projected	Route 140	Pleasant St	Grove St
Uxbridge	2020	Existing	Chocolog Rd	Route 146A	Chestnut St
	2020	Existing	Route 16	Route 122	Oak Street
	2020	Existing	Route 16	Cross St	Mendon TL
	2020	Existing	Route 122	Route 16	Route 146A
	2020	Existing	Route 122	Northbridge TL	Hartford Ave
	2050	Projected	Route 122	Rivulet St	Blanchard Ave
Warren	2020	Existing	I-90	Brimfield TL	Brimfield TL

TABLE 1
EXISTING AND PROJECTED CONGESTED CMP FOCUS SEGMENTS

CMRPC Community	Identified Year	Existing or Projected	Facility Name	From	To
Webster	2020	Existing	Bigelow Rd	Route 12	N Main St
	2020	Existing	N Main St	Bigelow Rd	Slater St
	2020	Existing	Route 12	Maynard Ave	Dudley TL
	2020	Existing	Route 12	Oxford TL	Bigelow Rd
	2020	Existing	Route 16	Route 12	Lower Gore Rd
	2020	Existing	School St	Brandon Rd	Klebart Ave
	2050	Projected	Lower Gore Rd	Route 16	West Wind Dr
	2050	Projected	Route 12	Maynard Ave	Hillside Ave
West Boylston	No congested focus segments identified at this time				
West Brookfield	No congested focus segments identified at this time				
Westborough	2020	Existing	Flanders Road	Walkup Drive	I-495
	2020	Existing	I-495	Hopkinton TL	Southborough TL
	2020	Existing	I-90	Upton TL	Hopkinton TL
	2020	Existing	I-90	Hopkinton TL	Flanders Road
	2020	Existing	Lyman St	Route 9	Route 30
	2020	Existing	Oak St	Route 135	Park St
	2020	Existing	Park Street	Route 135	Oak Street
	2020	Existing	Route 135	Northborough TL	Oak St
	2020	Existing	Route 135	Route 9	Fisher St
	2020	Existing	Route 135	Route 30	Hopkinton TL
	2020	Existing	Route 30	W Main St	Route 9
	2020	Existing	Route 30	Thomas Newton Dr	Southborough TL
	2020	Existing	Route 9	Route 135	Southborough TL
	2020	Existing	Ruggles St	Route 30	Wayside Rd
	2020	Existing	Upton Rd	Route 135	Upton TL
	2050	Projected	Fisher St	Otis St	Mill Rd
	2050	Projected	Fisher St	Gary Circle	Route 135
	2050	Projected	Flanders Road	New Flanders Rd	Walkup Dr
	2050	Projected	Route 30	Grafton TL	Glen St
	2050	Projected	Route 30	Route 9	Thomas Newton Dr
	2050	Projected	Route 135	Oak St	Route 9
	2050	Projected	W Main St	Route 30	Eli Whitney St
Worcester	2020	Existing	Adams St	Belmont Street(9)	Shrewsbury St
	2020	Existing	Ararat Street	I-190	Brattle Street
	2020	Existing	Belmont Street(9)	Shrewsbury Street	Shrewsbury TL
	2020	Existing	Belmont Street(9)	Lincoln Street(70)	Adams St
	2020	Existing	Blackstone River Road	McKeon Road	Greenwood Street
	2020	Existing	Brattle St	Holden St	Ararat St
	2020	Existing	Burncoat Street	Access Rd	Clark St
	2020	Existing	Cambridge Street	McKeon Road	Main Street
	2020	Existing	Catharine Street	Lincoln Street(70)	Rodney St
	2020	Existing	Chandler Street(122)	Pleasant St	Main St
	2020	Existing	Clover Street	Knox Street	S Ludlow St
	2020	Existing	Converse Street	Belmont Street(9)	Kendall Street
	2020	Existing	Country Club Blvd	Lincoln Street(70)	Erie Ave
	2020	Existing	Dorchester Street	Vernon St	Grafton St (122)
	2020	Existing	Elm St	West St	Linden St
	2020	Existing	Endicott St	Millbury St	Vernon St
	2020	Existing	Forest St	Salisbury St	Grove St
	2020	Existing	Franklin St	Grafton Street(122)	Ascension St
	2020	Existing	Front St	Foster St	Washington Square
	2020	Existing	Gates Ln	Main St (9)	Mill St
	2020	Existing	Gold Start Blvd	Grove St	Millbrook St
	2020	Existing	Grafton Street(122)	Washington Square	Almeda Rd

TABLE 1
EXISTING AND PROJECTED CONGESTED CMP FOCUS SEGMENTS

CMRPC Community	Identified Year	Existing or Projected	Facility Name	From	To
Worcester	2020	Existing	Grafton Street(122)	Sunderland Rd	Millbury TL
	2020	Existing	Green Street	Foster Street	Winter Street
	2020	Existing	Greenwood St	Blackstone River Rd	Halmstad St
	2020	Existing	Grove St	Holden St	Forest St
	2020	Existing	Grove St	West Boylston St	Park Ave
	2020	Existing	Hadwen St	Woodlawn Rd	June St
	2020	Existing	Hamilton Street	Grafton Street(122)	Plantation Street
	2020	Existing	Hammond Street	Main St	Southbridge Street
	2020	Existing	Harding Street	Ashmont Avenue	Quinsigamond Avenue
	2020	Existing	Harrington Wy	Plantation St	Bigelow Ln
	2020	Existing	Hermon St	Main St	Southbridge St
	2020	Existing	Highland Street(9)	Lincoln St	June Street
	2020	Existing	Holden St	Holden TL	Brattle St
	2020	Existing	Houghton St	Grafton Street(122)	Dorchester St
	2020	Existing	I-290	Auburn TL	Plantation St
	2020	Existing	Institute Road	Lancaster St	Park Avenue(12/122a)
	2020	Existing	Lake Ave	Wigwam Ave	Nonquit St
	2020	Existing	Lancaster St	Salisbury St	Highland Street
	2020	Existing	Lincoln Street	Catherine St	Burncoat St
	2020	Existing	Lincoln Street(70)	Goldsberry Street	Belmont Street(9)
	2020	Existing	Lincoln Street (70)	Burncoat St	Marsh Ave
	2020	Existing	Linden St	Elm St	William St
	2020	Existing	Lovell St	May St	Maywood St
	2020	Existing	Madison Street	Main Street	Southbridge St
	2020	Existing	Main Street	Highland Street(9)	Thomas St
	2020	Existing	Main Street(9)	Park Avenue(9/12)	Leicester TL
	2020	Existing	Major Taylor Blvd	School St	Foster St
	2020	Existing	Massasoit Road	Grafton Street(122)	Trenton St
	2020	Existing	May St	Park Ave (9/12)	Main St
	2020	Existing	McKeon Rd	Blackstone River Rd	Millbury St
	2020	Existing	Melrose Street	Burncoat Street	Lincoln Street(70)
	2020	Existing	Millbrook St	Gold Star Blvd	Burncoat St
	2020	Existing	Mountain Street East	W.Boylston St(12)	Burncoat St
	2020	Existing	Mountain Street East	Cobblestone Ln	NE Cutoff
	2020	Existing	Mountain St West	Malden St	W.Boylston St(12)
	2020	Existing	North Parkway	Burncoat St	Access Rd
	2020	Existing	Northeast Cutoff	Mountain Street E	Boylston Street(70)
	2020	Existing	Park Avenue(12/122a)	Grove Street	Salisbury St
	2020	Existing	Park Avenue(12/122a)	Institute Rd	Highland St (9)
	2020	Existing	Park Avenue(12/122a)	Pleasant St	Mill St
	2020	Existing	Plantation Street	Boylston Street(70)	Bowditch Dr
	2020	Existing	Plantation Street	I-290 Off Ramp	I-290 On Ramp
	2020	Existing	Plantation Street	South Rd	Village St
	2020	Existing	Pleasant Street(122)	Paxton TL	Airport Drive
	2020	Existing	Pleasant Street	Mower Street	Highland Street
	2020	Existing	Pleasant Street	Copley Rd	Main St
	2020	Existing	Quinsigamond Ave	Southbridge St	Cambridge St
	2020	Existing	Salisbury Street	Lincoln St	Moreland St
	2020	Existing	Shrewsbury Street	Washington Square	Belmont Street(9)
	2020	Existing	Southbridge Street	Hermon St	Cambridge St
	2020	Existing	Southwest Cutoff (20)	Graton St (122)	Shrewsbury TL
	2020	Existing	Stafford Street	Grandview Avenue	Ludlow Street
	2020	Existing	Sunderland Road	Grafton Street(122)	Southwest Cutoff (20)

TABLE 1
EXISTING AND PROJECTED CONGESTED CMP FOCUS SEGMENTS

CMRPC Community	Identified Year	Existing or Projected	Facility Name	From	To
Worcester	2020	Existing	Tacoma Street	Boylston Street(70)	Brookview Ave
	2020	Existing	Vernon Street(122a)	Harding Street	Winthrop Street
	2020	Existing	Water St	Grafton Street(122)	I-290 Off Ramp
	2020	Existing	Webster Street(12)	Hope Avenue(12)	Boyce Street
	2020	Existing	W Boylston Street(12)	New Bond St	Francis St
	2020	Existing	W Boylston Street(12)	Grove St	Merril Rd
	2050	Projected	Boylston St(70)	Lincoln St	Tacoma St
	2050	Projected	Cambridge Street	Southbridge St	Quinsigamond Avenue
	2050	Projected	College St	Southbridge St	Dutton St
	2050	Projected	Elm St	Park Ave	West St
	2050	Projected	Erie Avenue	Clark St	Squantum St
	2050	Projected	Franklin St	Plantation St	Bloomingdale Ct
	2050	Projected	Grafton Street(122)	Sunderland Rd	Dalton St
	2050	Projected	Green St	Madison St	Winter St
	2050	Projected	Grove St	Holden St	Drummond Ave
	2050	Projected	Hadwen St	Chandler Street(122)	Woodman Rd
	2050	Projected	Heywood St	Granite St	Massasoit Rd
	2050	Projected	June St	Pleasant St	Hadwen St
	2050	Projected	Lake Avennue	Sunderland Rd	Coburn Ave
	2050	Projected	Lancaster Street	Highland Street(9)	Linden Street
	2050	Projected	Lovell Street	Park Ave	Maywood St
	2050	Projected	Ludlow St	Hyatt Ct	Stafford St
	2050	Projected	Main St	Hammond St	Hermon St
	2050	Projected	May Street	June St	Lovell St
	2050	Projected	May St	Fairfield St	Park Ave
	2050	Projected	Mountain St West	Holden TL	Route 12
	2050	Projected	Myrtle St	Main St	Francis J McGrath
	2050	Projected	Park Avenue(12/122a)	Pleasant St	Elm St
	2050	Projected	Park Avenue(12/122a)	Highland Street(9)	Salisbury St
	2050	Projected	Pleasant Street	June St	Copley Rd
	2050	Projected	Plantation Street	Natural History Rd	I-290
	2050	Projected	Providence Street	Jefferson St	Merion Ave
	2050	Projected	Providence St (122A)	Millbury St	Holcombe St
	2050	Projected	Route 146	I-290	Mckeon Rd
	2050	Projected	Salisbury Street	Flagg Street	Valley Hill Drive
	2050	Projected	Winthrop Street	Vernon St	Granite St

4.0 Performance Measures

4.1 Performance Measures Overview

Performance-Based Planning and Programming (PBPP) refers to a transportation agency's application of performance management in their ongoing planning and programming process. The requirements for PBPP were initially federally legislated through Moving Ahead for Progress in the 21st Century (MAP-21) and subsequently reaffirmed in the Fixing America's Surface Transportation Act (FAST Act) and the current Infrastructure Investment and Jobs Act (IIJA). CMRPC staff continue to work with the MassDOT Office of Transportation Planning (OTP) and regional stakeholders to establish short-term regional performance targets for the federally mandated congestion and system reliability performance measures (PM3). Currently, 2-year (2024) and 4-year (2026) statewide targets for PM3 were established by MassDOT and the CMMPO voted to support them at their 3/15/23 meeting. The following is a summary of the targets:

- **Travel Time Reliability (LOTTR)**: This performance measure is for Interstate and non-Interstate National Highway System (NHS). It is defined as the ratio of longer travel times (80th percentile) to a "normal" travel time (50th percentile). This is measured as the percentage of person-miles travelled that are reliable. The current targets are 74% Interstate and 85% Non-Interstate for 2024 and 76% Interstate & 87% Non-Interstate for 2026.
- **Truck Travel Time Reliability (TTTR)**: The ratio is calculated by dividing the 95th percentile times by the 50th percentile times. This measure is only for the Interstate System. The targets are 1.80 for 2024 and 1.75 for 2026.
- **Peak Hour Excessive Delay (PHED)**. This will be measured by the annual hours of peak hour excessive delay per capita on the NHS. The threshold for excessive delay is based on the travel time at 20 miles per hour or 60% of the posted speed limit, whichever is greater, during peak travel times. This measure is only for Urbanized Areas (UZAs) and the CMMPO is part of the Boston and Worcester UZAs. For the Boston UZA, the targets are 24.0 in 2024 and 22.0 in 2026. The Worcester UZA targets are 7.0 in 2024 and 5.0 in 2026.
- **Non-Single Occupancy Vehicle (SOV)Travel**: The metric for non-SOV travel is based on the percentage of people commuting to work using a mode other than a single occupancy vehicle. Like the PHED targets, this measure is also only for UZAs. The Boston UZA targets are 38.8% in 2024 and 39.8% in 2026. For the Worcester UZA, the targets are 25.4% in 2024 and 26.1% in 2026.

The region's CMP program includes focus roadway segments, critical intersections, Park and Ride facilities, bottlenecks, traffic volumes, and high crash locations. During the data collection phase, data are matched to performance measures, many of which are associated with thresholds. Depending on the situation, selected performance measures are mapped, tabulated, or used as input for Level of Service (LOS) analysis to estimate performance-based delays, utilization rates, speed indices, crash rates, and other measures.

Based on performance measures, congested locations are prioritized for recommendations for planning studies in the Unified Planning Work Program (UPWP), for project evaluation and prioritizing in the Transportation Improvement Program (TIP), and for the Needs Assessment in the Long-Range Transportation Plan (LRTP).

Staff continues to propose and evaluate improvement strategies to meet the identified needs for each congested corridor, intersection or Park and Ride facility. These strategies may include Transportation Systems Management (TSM) improvements, capital investments, Transportation Demand Management (TDM) techniques, and the deployment of Intelligent Transportation Systems (ITS) technologies within the State's established architecture. All will be applied to the region's evolving Performance-Based Planning & Programming (PBPP) efforts.

The performance measures used by the CMMPO are listed below in **Table 2:**

Table 2 Performance Measures

Facility	Performance Measure
Roadways, Intersections, and Interchanges	Observed Travel Speed
	Average Congested Time
	Delay
	Volume-to-Capacity Ratio (V/C)
	Traffic Volume
	Level-of-Service
	Fixed-Route Bus On-Time Performance
	Bicycle & Pedestrian Volumes
	Fatal Crashes
	Fatal Crash Rate
	Serious Injury Rate
	Access to Jobs Congestion Impact
	Travel Time Reliability
Park and Ride Facilities	Lot Capacity and Utilization

4.2 Regional Congestion Definition

In the CMMPO region, it is generally accepted that the definition of a congested roadway segment is a Volume-to-Capacity (V/C) ratio of more than 1.0. All the region's major roadways

have been screened using a computer-based Travel Demand Model maintained by staff that calculates the V/C ratios of highway segments (see Chapter 3).

In addition to the V/C ratio, there are CMP performance measures with associated thresholds that are used to identify when congestion is occurring, or to otherwise distinguish between undesirable and desirable outcomes. If the thresholds are surpassed, the transportation facility may be identified as a congested corridor. **Table 3** shows the congestion thresholds and related performance measures.

Table 3 Congestion Thresholds

Performance Measure	Threshold
Observed Travel Speed	Indicators of congestion:
	< 50 mph (limited-access roadways)
	≤ 21 mph (partially limited-access arterials)
	≤ 14 mph (other arterials)
Average Congested Time	< 20 mph indicates congestion
Delay	≥ 55 seconds (arterials) indicates congestion
Volume-to-Capacity Ratio (V/C)	> 1.0 indicates congestion
Traffic Volume	Depends on functional class roadway capacity
Level of Service	LOS "E" or "F" indicates congestion
Fixed-Route Bus On-Time Performance	80% or greater system-wide
Bicycle & Pedestrian Activity	>50 bicycles + pedestrian during peak periods
Fatal Crashes	To follow trendline of 5-year rolling averages
Fatal Crash Rate	To follow trendline of 5-year rolling averages
Serious Injury Rate	To follow trendline of 5-year rolling averages
Accessibility	High Congestion Impact Area
Travel Time Reliability	Travel Time Reliability Ratio (LOTTR) >1.50
Lot Capacity and Utilization	>85% is full <50% is underutilized

Previous iterations of the CMP and other planning documents have proposed congestion performance measures that were used to identify congested corridors and to monitor system performance. Many of these were developed prior to MAP-21 guidance which provides specific rules and measures for states and MPOs to follow to meet federal congestion management requirements. The CMMPO continues to adopt the state's targets for congestion and system reliability (PM3), which are federally required. **Table 4** shows the relationship of all the Goals, Targets and Measures for the CMP and other MPO plans, products, and policies.

Table 4: Relationship between CMP Goals & Objectives and CMMPO Planning Documents Goals & Objectives

	CMP Goals & Objectives	LRTP Goals & Objectives	Annual Performance Management Goals & Objectives	Performance Measures
EFFICIENCY & RELIABILITY	**Goal**: Improve Efficiency and Reliability • **Objective** – Address existing congestion and prevent congestion from occurring elsewhere	**Goal**: Reduce Congestion and Improve Mobility for All Modes • **Objective 1** – Enhanced Traveler Information (ITS) • **Objective 2** – Improve Corridor Management Integration	**Goal**: Achieve a Significant Reduction in Congestion on the National Highway System • **Objective 1** – Increase travel time reliability for all vehicles • **Objective 2** – Reduce % of non-single occupancy vehicles • **Objective 3** – Reduce peak hour excessive delay (PHED) • **Objective 4** – Reduce emissions	• Travel speed • Average congested time • Delay • Traffic volume • Level of service • V/C ratio • Transit on-time performance • Reliability • Accessibility
MOBILITY	**Goal**: Increase Availability of Transportation Options • **Objective** - Expand the bicycle, pedestrian and transit networks in the region and work with member communities to implement Complete Streets Policies	**Goal**: Reduce Congestion and Improve Mobility for All Modes • **Objective 1** – Improved transportation accessibility for all modes • **Objective 2** – Increase share of transit, bicycle and walking in region • **Objective 3** – Expand the walk/bike network in the region • **Objective 4** – Work with member communities to implement Complete Streets Policies	**Goal**: Improve and/or Expand the Transportation Accessibility for all Modes • **Objective 1** – Increase the mileage of sidewalks in good condition • **Objective 2** – Increase the number of ADA ramps in good condition • **Objective 3** – Increase mileage of bicycle facilities • **Objective 4** – Increase ridership on the WRTA fixed-route system	• Sidewalk miles & condition • ADA Ramp condition • Bicycle facility miles • Vehicle occupancy • Park and Ride lot capacity and utilization
SAFETY	**Goal**: Improve safety • **Objective** – Reduce crashes for all modes and improve safety for bicyclists and pedestrians	**Goal**: Improve the safety and security of the region • **Objective 1** – Reduce the number and rate of fatal and injury crashes in the region • **Objective 2** – Achieve industry standards for preventable accidents for transit	**Goal**: Improve the safety and security of the region • **Objective 1** – Reduce number and rate of fatal and serious injury crashes in the region	• Number of Fatalities • Number of Serious Injuries • Fatality rates • Serious Injury Rates • Non-Motorized Fatalities & Serious Injuries

5.0 Data Collection & Analysis

5.1 Introduction

CMRPC staff conducts the preparatory work and scheduling needed to collect all pertinent data necessary to maintain the region's ongoing CMP program. Travel Time and Delay studies are conducted on identified CMP focus roadway segments, defined either analytically or through the public outreach process. A limited number of roadways where congestion is projected to occur as well as select monitoring locations are also included in this activity. Through observations made in the field, the presence of congested conditions is either confirmed or disproved. Data included in this CMP document was collected and analyzed between 2016 and 2025 (data collection activities did not occur in 2020 due to the Covid-19 pandemic).

Data needed to analyze the operations of the critical intersections identified along the focus roadway segments is also collected through the CMP effort. Peak period Turning Movement Counts (TMCs) are conducted at the critical intersections in the planning region. The timing and phasing of locations under signalized control is also observed in the field and is also checked against the intended parameters set forth in the intersection's MassDOT timing and phasing permit when needed. Bicycle and Pedestrian counts are also conducted during TMCs, and the data is included in this chapter.

MassDOT maintains multiple Park and Ride facilities within the CMRPC region. CMRPC checks the usage at each lot monthly. In addition, staff checks the usage at the MBTA commuter rail lots in the region. MBTA ridership data is also included in this chapter for the stations in the CMRPC region. Further, staff consider potential bottlenecks on the region's roadways. Additionally, on-time performance is studied for the WRTA's fixed-route buses, traffic volume data and heavy vehicle percentages are shown along federal-aid roadways, and safety data is also analyzed to determine the top vehicle crash locations in the region. Top crash locations can contribute to congestion due to a high frequency of crashes.

5.2 Geographic Information Systems (GIS)

Geographic Information Systems (GIS) technology is utilized to maintain, map, and analyze information for the various transportation management systems, including the region's ongoing CMP efforts. GIS provides the platform for spatial organization and analysis of the transportation data from the CMP, Pavement Management, Transportation Safety, Freight Planning and Traffic Monitoring programs. Access to this information through a geographic interface is used to support the development of the LRTP and TIP documents and serves as a resource for other planning activities.

Each year staff updates the traffic count database and the regional traffic volume map with the most current CMRPC traffic count data and MassDOT Roadway Inventory Files. Also updated to the CMRPC archive are new TMCs and Travel Time data. These maps assist in analyzing various datasets such as congestion, pavement condition, crash locations, etc.

The GIS component of CMP activities includes the following ongoing tasks:

- Update and maintain the CMP GIS database and shapefiles containing data collected for the CMP program.
- Develop data dictionaries and metadata records for management systems information.
- Refine and/or develop data collection procedures, as appropriate, to optimize the ability to store the information within GIS applications.
- Refine geographic interfaces for use in integrating, displaying, and querying the transportation management system database for both internal agency and region-wide community uses.

5.3 Travel Time & Delay Studies

To measure congestion on the region's highway facilities, travel time and delay studies have been conducted on identified CMP focus roadway segments. Data is collected between 7am and 9am and from 4pm to 6pm on a single randomly selected weekday. In addition to determining average travel speeds, travel time and delay studies on a particular roadway assist in the identification of critical delay locations as well as the length of encountered delays or congestion.

The "average car" technique is used in collecting pertinent data. In this procedure, a test vehicle travels according to the driver's judgment of the average speed of existing traffic flows. A Global Positioning System (GPS) device is used to collect travel time data. Once the data is collected, it is then downloaded into a software program called "TravTime", which was created by GeoStats. Additional information is entered, including the definition of which roadways are included in the focus segment as well as specific checkpoint intersections that will be included in the analysis. The travel time data is then analyzed, and the results can either be displayed in a tabular or graphic format. GIS is also used to create maps that show data beyond the capability of the TravTime software.

Table 5 lists the travel time and delay data collected between 2016 and 2025. The table includes the location of the travel time study, the year it was completed, average travel time, average travel speed, and the average congested time for the study corridor. As for congested time, it generally occurs when travel speeds are below 20 mph. Following the table, **Figures 3**

& 4 show average congested times for both directions of travel during the AM and PM peak periods for each travel time study completed between 2016 and 2025. The first map shows the AM data, and the second map shows the PM data.

Table 5
Travel Time & Delay Studies
2016 - 2025

Community	Street	From	To	Time Period	Study Year	Travel Direction	Average Travel Time*	Average Travel Speed**	Average Congested Time***
Auburn	Auburn St	Oxford St	Central St	AM (PM)	2023	EB	3.5 (4.3)	21 (17)	1.3 (2.1)
						WB	3.8 (4.5)	19 (16)	1.5 (2.2)
Auburn	I-290/I-395	Worcester CL	Oxford TL	AM (PM)	2018	NB	6.1 (4.6)	50 (66)	1.2 (0.0)
						SB	4.7 (4.6)	64 (65)	0.0 (0.0)
Auburn	Route 20	Oxford TL	Worcester CL	AM (PM)	2017	EB	8.9 (9.1)	35 (34)	1.3 (1.7)
						WB	8.6 (10.1)	36 (34)	1.3 (2.1)
Berlin	Route 62	Clinton TL	Hudson TL	AM (PM)	2022	EB	8.4 (7.9)	32 (34)	1.3 (0.9)
						WB	7.4 (7.6)	36 (35)	0.5 (0.3)
Boylston/Shrewsbury	Route 70	Clinton TL	Worcester CL	AM (PM)	2022	NB	11.9 (11.8)	39 (39)	0.7 (0.6)
						SB	12.5 (11.6)	37 (40)	1.1 (0.5)
Charlton/Oxford	Route 20	Richardson Corner Rd	Route 12	AM (PM)	2019	EB	4.7 (4.8)	38 (39)	0.9 (0.9)
						WB	4.6 (5.2)	39 (35)	0.7 (1.3)
Douglas	Route 16	Webster TL	Uxbridge TL	AM (PM)	2023	EB	12.8 (13.5)	39 (37)	0.2 (0.7)
						WB	14.1 (14.2)	35 (35)	1.3 (1.2)
Grafton	Route 122	Millbury TL	Northbridge TL	AM (PM)	2024	NB	11.8 (11.5)	32 (33)	1.5 (1.2)
						SB	11.4 (12.0)	34 (32)	0.8 (1.8)
Grafton/Upton	Route 140	South St	Hopedale TL	AM (PM)	2023	NB	12.8 (13.7)	38 (36)	0.8 (0.9)
						SB	12.3 (12.7)	40 (39)	0.5 (0.3)
Holden	Route 122A	Worcester CL	Rutland TL	AM (PM)	2016	NB	12.4 (12.6)	33 (33)	1.6 (1.3)
						SB	16.3 (12.6)	25 (33)	5.7 (1.3)
Holden	Shrewsbury St/Doyle Rd	Route 122A	Brattle St	AM (PM)	2021	EB	3.5 (2.4)	17 (25)	1.9 (0.6)
						WB	3.0 (3.3)	21 (19)	1.2 (1.6)
Hopedale/Mendon	Route 16	Uxbridge TL	Milford TL	AM (PM)	2023	EB	7.8 (7.8)	34 (34)	1.3 (0.5)
						WB	7.4 (8.2)	36 (32)	0.7 (1.0)
Leicester	Route 9	Spencer TL	Worcester CL	AM (PM)	2017	EB	9.3 (8.5)	33 (36)	1.5 (0.4)
						WB	8.6 (8.5)	36 (36)	0.4 (0.3)
Leicester/Oxford/Paxton	Route 56	Route 12	Route 122	AM (PM)	2019	NB	16.9 (16.8)	36 (36)	2.2 (2.0)
						SB	18.2 (17.9)	33 (34)	3.3 (3.5)
Millbury	McCracken Rd	Auburn TL	Main St	AM (PM)	2021	EB	3.0 (3.0)	30 (30)	0.3 (0.3)
						WB	3.1 (3.2)	29 (29)	0.3 (0.4)
Northborough/Marlborough	I-290	Boylston TL	I-495	AM (PM)	2018	EB	6.3 (5.4)	51 (59)	0.7 (0.1)
						WB	4.9 (5.7)	65 (56)	0.0 (0.2)
Northbridge	Route 122	Grafton TL	Uxbridge TL	AM (PM)	2019	NB	10.2 (9.8)	31 (33)	1.3 (1.0)
						SB	9.9 (9.6)	32 (34)	1.1 (0.8)
Oxford	Route 12	Auburn TL	Webster TL	AM (PM)	2018	NB	11.5 (12.5)	37 (34)	0.7 (2.1)
						SB	11.5 (13.0)	37 (33)	0.6 (1.6)
Oxford/Webster	I-395	Auburn TL	Connecticut SL	AM (PM)	2018	NB	8.9 (8.5)	65 (68)	0.0 (0.0)
						SB	8.7 (8.8)	66 (65)	0.0 (0.0)
Oxford/Sutton	Sutton Ave & Central Tnpk	I-395	Route 146	AM (PM)	2021	EB	11.9 (11.6)	38 (39)	1.1 (1.0)
						WB	11.2 (11.6)	39 (39)	0.9 (0.7)
Paxton	Route 122	Worcester CL	Rutland TL	AM (PM)	2019	NB	7.7 (7.9)	41 (40)	0.1 (0.5)
						SB	8.3 (8.0)	38 (39)	0.4 (0.3)
Rutland	Route 122A	Route 122	Holden TL	AM (PM)	2025	EB	6.5 (5.9)	38 (42)	0.5 (0.2)
						WB	6.6 (6.0)	37 (41)	0.9 (0.3)
Shrewsbury	I-290	Worcester CL	Northborough TL	AM (PM)	2018	EB	4.1 (4.1)	67 (67)	0.0 (0.0)
						WB	4.1 (4.5)	67 (62)	0.0 (0.1)
Shrewsbury	Main St	Worcester CL	Northborough TL	AM (PM)	2021	EB	9.1 (11.9)	29 (22)	2.1 (4.9)
						WB	9.3 (12.5)	29 (21)	2.3 (5.7)
Shrewsbury	Route 20	Worcester CL	Northborough TL	AM (PM)	2025	EB	11.3 (7.5)	24 (36)	4.9 (1.1)
						WB	8.2 (10.8)	33 (25)	1.1 (3.9)
Shrewsbury	Route 9	Worcester CL	Northborough TL	AM (PM)	2016	EB	8.8 (9.6)	28 (26)	2.8 (3.4)
						WB	9.0 (9.9)	28 (25)	3.0 (3.7)
Southbridge	Route 131	Sturbridge TL	Dudley TL	AM (PM)	2017	EB	10.1 (11.2)	26 (23)	2.8 (4.3)
						WB	10.6 (10.2)	25 (26)	3.4 (2.9)

Community	Street	From	To	Time Period	Study Year	Travel Direction	Average Travel Time*	Average Travel Speed**	Average Congested Time***
Spencer	Route 9	East Brookfield TL	Leicester TL	AM (PM)	2019	EB	8.2 (8.1)	31 (32)	1.3 (1.5)
						WB	7.9 (7.8)	32 (33)	1.3 (1.2)
Sturbridge	Route 20	Route 148	Route 131	AM (PM)	2018	EB	3.7 (3.8)	26 (26)	0.9 (0.9)
						WB	3.6 (5.1)	26 (19)	0.9 (2.6)
Sutton/Uxbridge	Route 146	Central Tnpk	Rhode Island SL	AM (PM)	2019	NB	11.9 (11.9)	62 (63)	0.3 (0.0)
						SB	11.5 (11.3)	65 (66)	0.0 (0.0)
Upton	Hartford/High/Hopkinton	Route 140	Hopkinton TL	AM (PM)	2019	NB	5.3 (4.4)	31 (38)	1.0 (0.1)
						SB	4.7 (4.6)	36 (36)	0.3 (0.7)
Upton	Hartford/High/Hopkinton	Route 140	Hopkinton TL	AM (PM)	2023	NB	5.3 (4.6)	31 (35)	1.1 (0.5)
						SB	4.5 (5.7)	37 (29)	0.6 (1.5)
Uxbridge	Route 16	Douglas TL	Mendon TL	AM (PM)	2025	EB	10.2 (10.8)	32 (31)	1.6 (2.5)
						WB	9.8 (9.7)	33 (34)	1.4 (1.4)
Uxbridge	Route 122	Northbridge TL	Millville TL	AM (PM)	2019	NB	10.7 (10.6)	31 (32)	2.1 (1.3)
						SB	9.8 (10.9)	34 (31)	0.9 (1.9)
Webster	Route 12/16	Douglas TL	Dudley TL	AM (PM)	2017	EB	9.3 (10.4)	28 (25)	2.4 (3.7)
						WB	9.6 (12.9)	27 (20)	2.7 (6.4)
Webster	Route 12/193	Oxford TL	Connecticut SL	AM (PM)	2019	NB	9.2 (8.2)	27 (30)	2.9 (1.7)
						SB	9.9 (8.9)	25 (28)	3.7 (2.4)
West Boylston	Route 12	Worcester CL	Sterling TL	AM (PM)	2019	NB	8.1 (9.7)	32 (27)	1.4 (3.0)
						SB	7.8 (8.3)	33 (31)	0.8 (1.4)
West Boylston	Route 140	Central St	Sterling TL	AM (PM)	2017	NB	5.2 (5.3)	34 (34)	0.5 (0.5)
						SB	5.1 (5.2)	35 (35)	0.4 (0.4)
Westborough	Route 135/Upton Rd	Northborough TL	Upton TL	AM (PM)	2017	NB	26.5 (10.4)	12 (31)	6.5 (1.6)
						SB	21.7 (10.1)	15 (32)	3.0 (1.2)
Westborough	Route 9	Northborough TL	Southborough TL	AM (PM)	2021	EB	7.2 (7.2)	41 (41)	1.1 (1.2)
						WB	6.8 (8.7)	43 (33)	0.8 (2.3)
Worcester	Belmont St	Lincoln Sq	Plantation St	AM (PM)	2018	EB	5.1 (5.4)	18 (17)	2.5 (2.8)
						WB	4.6 (4.8)	20 (19)	2.0 (2.3)
Worcester	Burncoat St	Lincoln St	E Mountain St	AM (PM)	2025	NB	6.7 (6.8)	23 (23)	2.5 (2.3)
						SB	6.6 (9.3)	23 (17)	1.9 (5.0)
Worcester	Chandler St	Pleasant St	Park Ave	AM (PM)	2017	EB	7.6 (7.3)	17 (17)	3.5 (1.9)
						WB	7.1 (7.3)	18 (17)	3.3 (3.8)
Worcester	Chandler St	Main St	Park Ave	AM (PM)	2023	EB	3.4 (4.3)	14 (11)	2.2 (3.3)
						WB	3.9 (4.0)	12 (11)	2.7 (2.9)
Worcester	Highland St	Newton Sq	Lincoln Sq	AM (PM)	2016	EB	6.0 (6.9)	13 (11)	3.9 (5.2)
						WB	5.4 (10.8)	15 (7)	3.1 (9.3)
Worcester	I-290	Shrewsbury TL	Auburn TL	AM (PM)	2018	EB	13.9 (6.8)	29 (59)	6.7 (0.0)
						WB	6.8 (15.4)	59 (26)	0.0 (8.1)
Worcester	Lake Ave	Route 9	Sunderland Rd	AM (PM)	2025	NB	4.2 (4.6)	33 (31)	0.2 (0.6)
						SB	4.0 (4.5)	35 (31)	0.1 (0.3)
Worcester	Lincoln St	Burncoat St	Shrewsbury TL	AM (PM)	2025	EB	5.7 (6.7)	19 (16)	2.3 (3.5)
						WB	5.6 (6.7)	20 (16)	2.5 (3.8)
Worcester	Main St	Thomas St	Park Ave	AM (PM)	2024	NB	9.6 (12.0)	16 (13)	5.4 (8.6)
						SB	10.4 (13.5)	15 (11)	6.3 (10.0)
Worcester	Park Ave	Main St	Grove St	AM (PM)	2017	NB	15.3 (13.2)	13 (14)	10.0 (8.0)
						SB	11.2 (18.6)	17 (10)	5.7 (13.8)
Worcester	Plantation St	Route 9	Route 70	AM (PM)	2025	NB	5.0 (6.9)	25 (18)	1.8 (3.6)
						SB	5.8 (6.1)	21 (20)	2.4 (2.8)
Worcester	Pleasant St	Mower St	Newton Sq	AM (PM)	2016	EB	9.2 (5.5)	15 (25)	5.8 (1.4)
						WB	5.8 (5.9)	24 (23)	1.9 (1.9)
Worcester	Route 12	G&W RR	West Boylston TL	AM (PM)	2023	NB	7.7 (7.5)	22 (22)	2.9 (2.5)
						SB	6.7 (7.8)	25 (21)	1.8 (3.0)
Worcester	Route 122	Washington Sq	Millbury TL	AM (PM)	2018	NB	12.7 (11.3)	17 (19)	6.9 (4.6)
						SB	10.9 (11.4)	20 (18)	4.3 (5.3)
Worcester	Route 122	Washington Sq	Millbury TL	AM (PM)	2023	NB	11.6 (13.5)	18 (16)	5.5 (7.1)
						SB	10.9 (11.7)	19 (18)	4.7 (5.4)
Worcester	Route 9	Leicester TL	Park Ave	AM (PM)	2025	EB	6.0 (4.3)	14 (19)	3.7 (2.0)
						WB	3.8 (4.0)	22 (21)	1.3 (1.5)
Worcester	Shrewsbury St	Washington Sq	Belmont St	AM (PM)	2018	EB	3.4 (4.1)	24 (19)	0.9 (1.5)
						WB	3.4 (4.0)	24 (20)	0.9 (1.5)

Community	Street	From	To	Time Period	Study Year	Travel Direction	Average Travel Time*	Average Travel Speed**	Average Congested Time***
Worcester	West Boylston St	Park Ave	West Boylston TL	AM (PM)	2019	NB	9.3 (10.0)	25 (24)	2.6 (3.2)
						SB	10.3 (11.8)	23 (20)	3.5 (5.2)
Worcester/Millbury/Sutton	Route 146	Cambridge St	Central Tnpk	AM (PM)	2019	NB	10.3 (10.1)	47 (48)	0.9 (0.8)
						SB	9.6 (9.7)	50 (49)	0.3 (0.3)

*Average travel time in minutes
**Average travel speed in miles per hour (mph)
***Average time in minutes for which a vehicle travels below 20 mph

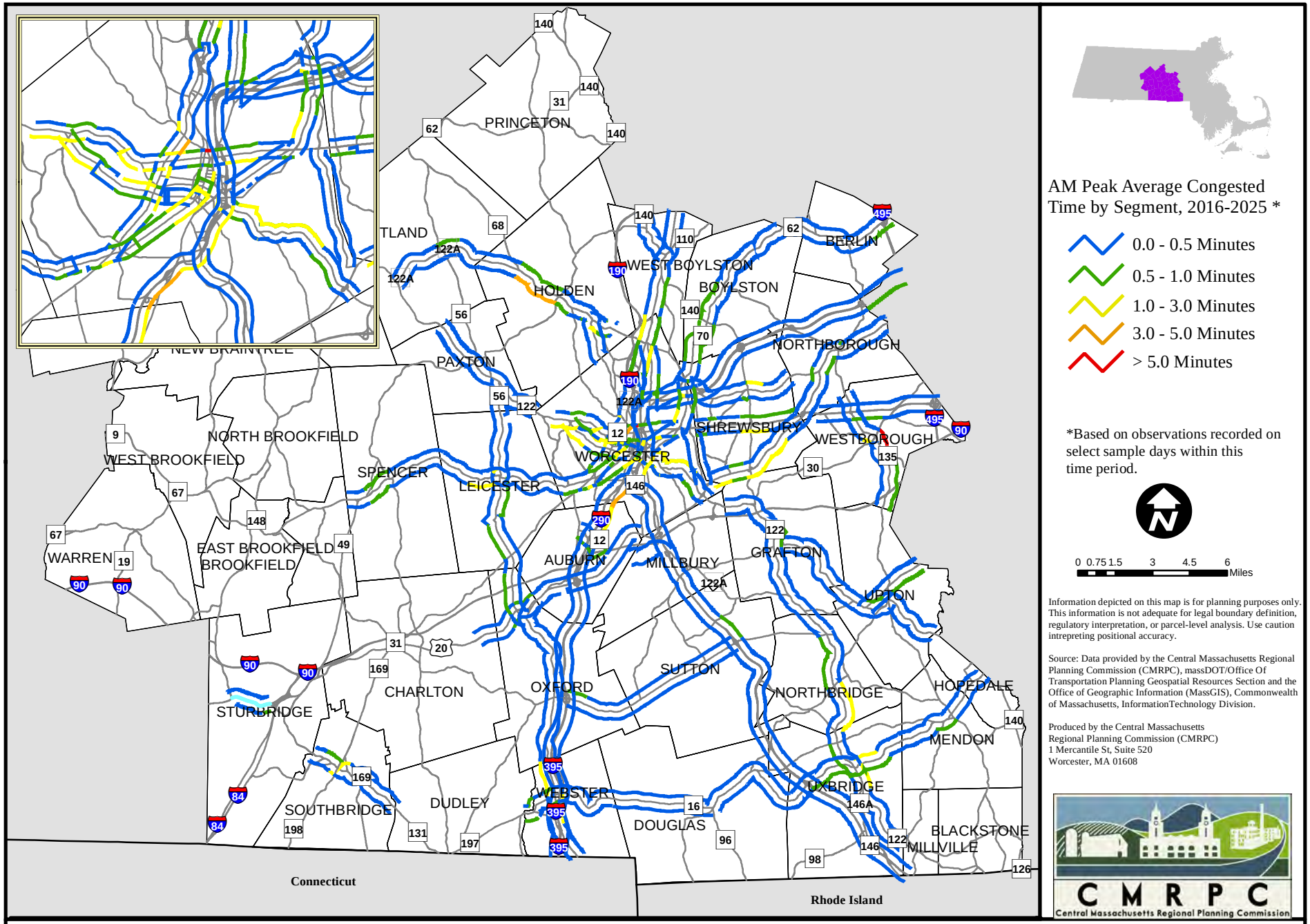


Figure 3 - AM Peak Average Congested Time, 2016-2025

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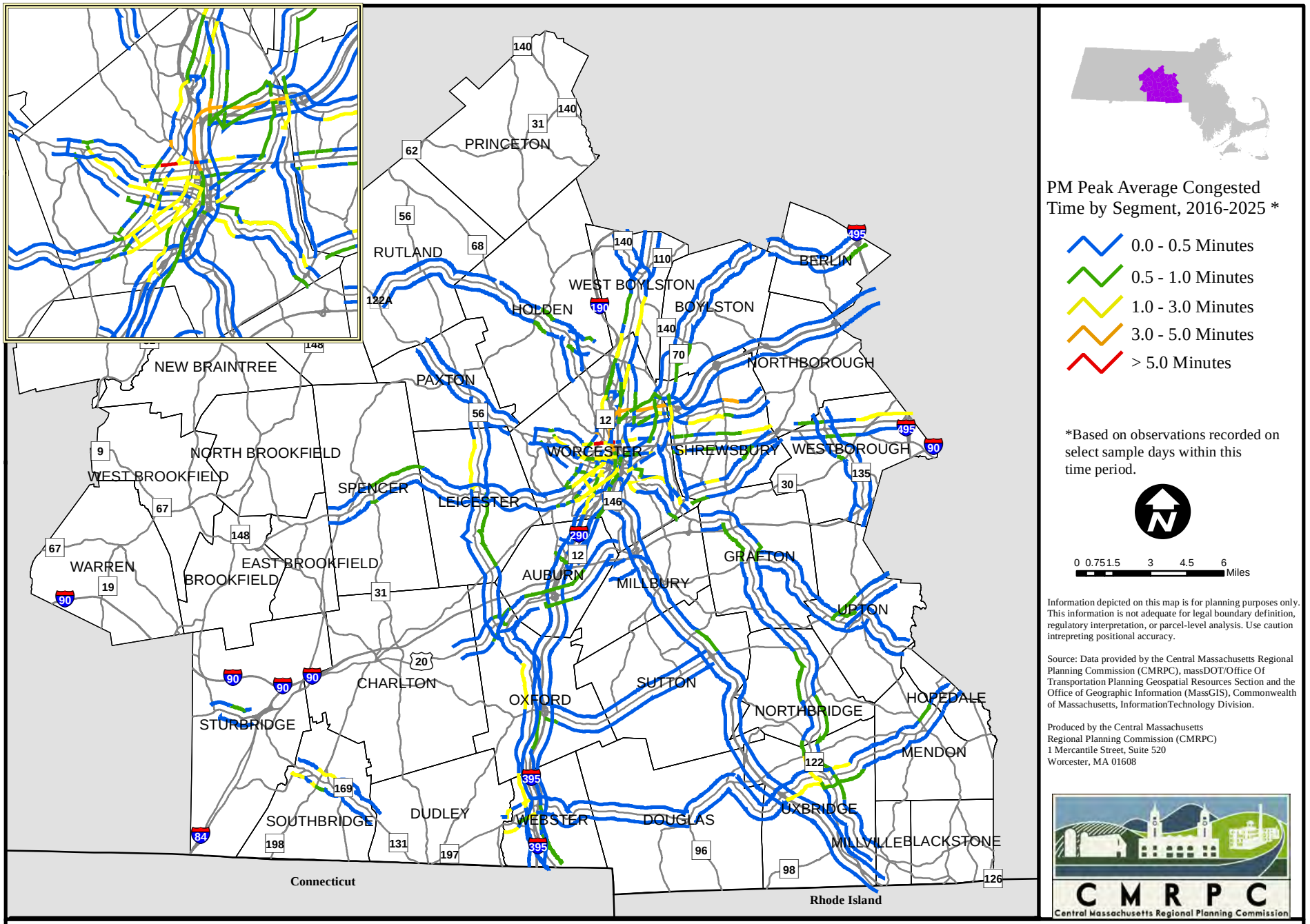

Figure 4 - PM Peak Average Congested Time, 2016-2025

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5.4 Turning Movement Counts

Turning Movement Counts (TMCs) are conducted at CMP identified intersections. These intersections are mainly under "Stop" sign or signalized control; roundabouts are also included. The TMCs are conducted on random weekdays between the hours of 7am to 9am and from 4pm to 6pm, optimally when local schools are in session. The number of vehicles that travel through the intersection are recorded as well as the turning movements of each of those vehicles. Further, the number of heavy vehicles that travel through the intersection are also documented.

The purpose of the intersection TMCs is to summarize the number of vehicle movements through an intersection during peak flow time periods. This type of volume summary is used in making decisions regarding the geometric design of the roadway, sign and signal installation, signal timing, pavement markings, traffic circulation patterns, capacity analysis, parking and loading zones, and vehicle classification. This data is also used in making decisions at the planning level (e.g., traffic impact analyses), as well as the operational analyses-level (e.g., signal installation and timing). Pedestrian and bicycle activity are also counted during the intersection volume studies.

Once the TMC is completed, the data is used to obtain the Level of Service (LOS) results using the Highway Capacity Software (HCS) from McTrans at the University of Florida. A letter grade is given to each intersection based on the average seconds of calculated delay for the AM and PM time periods. The range of delay parameters for these letter grades is different for signalized and unsignalized intersections. The following chart shows the difference:

Signalized		**Unsignalized**	
Delay in Seconds	**LOS Grade**	**Delay in Seconds**	**LOS Grade**
< 10	A	< 10	A
10 - 20	B	10 - 15	B
20 - 35	C	15 - 25	C
35 - 55	D	25 - 35	D
55 - 80	E	35 - 50	E
> 80	F	> 50	F

Table 6 lists the TMCs completed between 2016 and 2025. The table includes the community where the count was conducted, the location, and the AM and PM delay and LOS letter grade.

TABLE 6
COMPLETED TMC LOCATIONS (2016-2025)

CMRPC Community	Turning Movement Count Locations	Count Year[3]	AM Peak Hour Delay[1]	AM Peak Hour LOS[2]	PM Peak Hour Delay	PM Peak Hour LOS
Auburn	Auburn St/Brotherton Way	2019 & 2023	11.1	B	15.3	B
	Auburn St/Vine St/I-290 Off Ramp	2023	26	C	30.9	C
	Auburn St/Oxford St North	2023	16.5	C	27.5	D
	Route 12/Auburn St	2023	35.1	D	40.3	D
	Route 12/Faith Ave/Goulding Dr	2018	12.9	B	55.2	E
	Route 12/Prospect St	2021	8.3	A	9.2	A
	Route 12/Swanson Rd/Brotherton Wy	2019	275.3	F	48.2	D
	Route 12/Oxford Street North	2019	16.9	B	31.3	C
	Route 20/Prospect St	2018	17.5	B	61.5	E
	Route 20/Route 12 (E junct)	2017	18.5	B	16.4	B
Barre	No Recently Completed TMCs					
Berlin	Route 62/Barnes Rd/Derby Rd/West St	2022	195.6	F	59.5	F
	Route 62/Gates Pond Rd	2022	23.3	C	85	F
	Route 62/I-495 NB Ramps	2022	13.5	B	15	B
	Route 62/I-495 SB Ramps	2022	23.2	C	18.6	B
	Route 62/Linden St	2022	30.5	D	93.6	F
	Route 62/Pleasant St	2022	23.3	C	150.4	F
Blackstone	Blackstone St/Summer St	2018	13.8	B	11.9	B
	Lincoln St/Mendon St	2018	13.1	B	11.1	B
	Route 122/Saint Paul St	2019	16	B	18.2	B
Boylston	Central St/Cross St	2018	10.7	B	12.5	B
	Route 140/Route 70	2025	35.7	D	42.1	D
Brookfield	No Recently Completed TMCs					
Charlton	Route 20/Route 31	2016	18.3	B	17.1	B
	Route 20/Route 169	2016	99.6	F	22.3	C
Douglas	Gilboa St/North St	2021	13.9	B	57.1	F
Dudley	Route 12/Route 197/Village St	2018 & 2023	31.9	C	29	C
	Dudley Hill Rd/Tanyard Rd/Airport Rd	2023	9.4	A	9	A
	Dudley-Oxford Rd/Shepard Hill HS & MS Driveway	2023	300	F	11	B
East Brookfield	Route 9/North Brookfield Rd	2016	17.7	C	19	C
Grafton	Route 122/Milford Rd	2017	13.8	B	20	C
	Route 140/Route 30	2016	7.8	A	13.7	B
Hardwick	No Recently Completed TMCs					
Holden	Route 122A/Route 68	2016	78.5	F	37.7	E
	Route 122A/Salisbury St	2016	13.5	B	9.4	A
	Route 31/Manning St	2019	46.4	E	99.1	F
Hopedale	Route 16/Hopedale St	2023	12.5	B	14.9	B
Leicester	Route 9/Route 56	2021	15.1	B	15.5	B
	Route 9/Main St	2017	50.1	F	54.5	F
	Route 56/Pleasant St	2017	9.7	A	11.7	B
	Route 56/Stafford St	2017	13.3	B	15.1	B
	Route 56/Marshall St	2016	16.1	C	26.3	D
Mendon	Providence St/Hartford Ave E	2023	135.7	F	29.4	D
	Route 16/North Ave/Main St	2021	15.6	B	15.9	B
	Route 140/Hartford Avenue East	2016	22.5	C	200.7	F
	Route 16/Hartford Avenue West	2017	300	F	268.6	F
Millbury	Main St/McCracken Rd/Route 146 SB Ramps/Shoppe	2018	37.8	D	162.4	F
	Main St/Route 146 NB Ramps	2018	9.2	A	18.9	B
	Route 122/I-90 Ramps	2016	139.8	F	165	F
	Route 122/Wheelock Ave	2016	9.6	A	11.4	B
Millville	No Recently Completed TMCs					
New Braintree	No Recently Completed TMCs					
North Brookfield	No Recently Completed TMCs					

TABLE 6
COMPLETED TMC LOCATIONS (2016-2025)

CMRPC Community	Turning Movement Count Locations	Count Year[3]	AM Peak Hour Delay[1]	AM Peak Hour LOS[2]	PM Peak Hour Delay	PM Peak Hour LOS
Northborough	Route 20/Church Street	2023	76.2	E	29	C
	Route 20/Route 135	2023	14.8	B	15.1	B
	Route 20/Hudson St/Patty Ln	2023	59.2	E	17.7	B
	Route 20/West Main St	2017	12.8	B	14.3	B
Northbridge	Hill St/Main St	2017	16.6	B	17	B
	Linwood Ave/Church St/Main St	2017	9.1	A	10	A
	Route 122/Sutton St/Upton St	2016	13.7	B	17.8	C
	Route 122/School St	2016	11.3	B	10.8	B
	Route 122/Church St	2016	20.2	C	36.6	D
Oakham	No Recently Completed TMCs					
Oxford	Route 12/Charlton St/Sutton Ave	2025	27.1	C	53.9	D
	Route 12/Cudworth Rd	2025	9.8	A	49.2	D
	Route 20/Route 12	2017	26	C	20.7	C
	Sutton Ave/Joe Jenny Rd	2021	12.6	B	14.5	B
	Sutton Ave/Lovett Rd/Plaza	2021	38.8	D	52.9	D
Paxton	Route 122/Route 31	2018	17.4	B	14.2	B
Princeton	No Recently Completed TMCs					
Rutland	Route 122A/Route 56 (Maple Ave)	2016 & 2025	38	E	164	F
	Route 122A/Route 56 (Pommogussett Rd)	2016 & 2025	200.7	F	289.9	F
	Route 122A/Fishermans Rd	2025	12.1	B	12.6	B
	Route 122A/Glenwood Rd	2025	22.2	C	20.4	C
	Route 122A/Kenwood Dr	2025	12.5	B	14.5	B
	Route 122A/Pleasantdale Rd	2025	11.4	B	10	A
	Route 122A/Route 122	2025	17.9	C	8.8	A
Shrewsbury	Main St/N Quinsigamond Ave/Holden St	2021	38.4	D	29.4	C
	Main St/Maple St	2022	15.9	B	23.8	C
	Main St/Old Mill Rd/Ireta St	2022	52.2	D	27.6	C
	Route 140/Prospect St	2015	77.8	F	136	F
	Route 140/Main St	2024	44	D	34.9	C
	Route 140/Grafton St	2024	8.8	A	16.4	B
	Route 20/Grafton St	2016 & 2024	10.4	B	10.2	B
	Route 20/Cherry St/Centech Blvd	2024	13.8	B	18	B
	Route 20/Green St/South St	2025	30.9	C	44.1	D
	Route 20/Lake St	2017 & 2024	67.5	E	83.8	F
	Route 20/Valente Dr/Plaza	2024	16.7	C	58	F
	Route 20/Walnut St	2024	116	F	282.1	F
	Route 9/Harrington Ave/Svenson Rd	2018	39.3	D	58.3	E
	Route 9/Maple Ave	2022	9.5	A	18	B
	Route 9/Oak St	2017	18	B	22.6	C
	Route 9/Lake St	2021	30.4	C	41.3	D
	Route 9/South St	2018	52.4	D	54.7	D
	Route 9/N & S Quinsigamond Ave	2017	35.6	D	45.7	D
Southbridge	Route 131/Central St/Route 198	2016	42.5	D	35.8	D
	Route 131/Marcy St	2018	8.9	A	11.8	B
	Route 131/South St	2018	52.4	D	54.7	D
Spencer	Route 9/Route 31/Wall St	2021	111.3	F	161.6	F
	Route 9/Route 31 (Maple St)	2021	9.3	A	10.4	B
Sturbridge	Route 20/Arnold Rd	2018	41.3	E	78.2	F
	Route 20/Cedar St	2018	10.7	B	8.9	A
	Route 20/Fairground Rd	2018	4.5	A	3.9	A
	Route 20/Holland Rd/Route 148	2018	29.9	C	27.3	C
	Route 20/Route 131	2018	22.7	C	45.8	D
	Route 20/Stallion Hill Rd	2018	9.5	A	13.8	B

TABLE 6
COMPLETED TMC LOCATIONS (2016-2025)

CMRPC Community	Turning Movement Count Locations	Count Year[3]	AM Peak Hour Delay[1]	AM Peak Hour LOS[2]	PM Peak Hour Delay	PM Peak Hour LOS
Sutton	Central Tnpk/Purgatory Rd	2021	12.3	B	13.0	B
	Central Tnpk/Putnam Hill Rd	2021	9.9	A	10.3	B
	Central Tnpk/West Sutton Rd	2021	14.5	B	11.6	B
	Route 122A/Boston Rd	2016	8.9	A	12	B
	Route 146/Boston Rd	2017	35.6	D	35.2	D
Upton	High St/Hopkinton Rd/School St/Westboro Rd	2022	34.4	C	42.7	D
	Maple Ave/Pleasant St	2025	9	A	15.9	B
	Route 140/Hartford Ave/Maple St	2022	71.8	E	24.5	C
Uxbridge	Route 122/Hartford Ave	2022	27.9	C	27.9	C
	Route 122/Route 16 (Mendon Rd)	2019	28.8	C	17.8	B
	Route 122/Route 16 (Douglas St)	2019	13.3	B	11.7	B
	Route 122/Route 146A	2018	35.5	E	16.8	C
Warren	No Recently Completed TMCs					
Webster	Route 12/Park Ave/Slater St	2018	14.5	B	27.5	C
	Route 12/Lake St	2023	16.9	B	14	B
West Boylston	Route 12/Woodland St	2017	10.3	B	12.1	B
	Route 12/Franklin St	2018	23.7	C	300	F
	Route 12/Route 140/Central St	2018	40.7	D	48.3	D
	Route 12/Route 110	2017	11.5	B	13.1	B
	Route 140/Franklin St	2018	21.2	C	12.7	B
	Route 140/Laurel St	2016	12.3	B	10.9	B
West Brookfield	No Recently Completed TMCs					
Westborough	Connector Rd/ Research Dr	2017	37	D	69.6	E
	Route 135/Fisher St	2018	156.1	F	137.9	F
	Route 135/Upton Rd	2016	47.8	E	76.9	F
	Route 30/Church St/School St	2017	300	F	190.8	F
	Route 30/Flanders Rd	2018	290.9	F	289.9	F
	Route 30/Lyman St	2022 & 2025	12.4	B	14.3	B
	Route 30/Prospect St/Bay State Commons	2017	81.2	F	-	-
	Route 30/State St/Bay State Commons	2017	295.1	F	12.9	B
	Route 30/Union St	2017	23.4	C	12	B
	Route 30/West Main St	2012	166.5	F	31.8	D
	Route 9/Otis Street	2022	31.6	C	49.2	D
	Route 9/Lyman St	2022	45	D	66.4	E
Worcester	Chandler St/May St (north intersection)	2023	60.2	F	44.2	E
	Chandler St/May St (south intersection)	2023	70.3	F	49.5	E
	Chandler St/Mill St	2016	11.6	B	17	B
	Chandler St/Pleasant St/Mower St	2016	21.5	C	21.9	C
	Forest St/Salisbury St	2018	300	F	289.5	F
	Foster St/Front St	2019	163.9	F	79.3	E
	Foster St/Franklin St/Francis J McGrath/Green St	2025	40.8	D	39.1	D
	Grafton St/Franklin St	2023	29.3	C	33.5	C
	Holden St/Drummond Ave/Shore Dr	2023	18.5	B	12	B
	Lake Ave/Sunderland Rd	2025	32.3	C	62.2	E
	McKeon Rd/Millbury St/Providence St	2025	19.1	B	19.9	B
	Park Ave/Highland St	2018	40.4	D	24.2	C
	Park Ave/Mill St	2017	23.9	C	26.6	C
	Route 12/Bourne St	2024	11.1	B	8.3	A
	Route 12/New Bond St	2024	13.5	B	10	B
	Route 12/Brooks St/Greendale Ave	2024	24	C	25.7	C
	Route 12/QCC	2024	4.6	A	5.9	A
	Route 12/E & W Mountain St	2024	27.4	C	32	C

TABLE 6
COMPLETED TMC LOCATIONS (2016-2025)

CMRPC Community	Turning Movement Count Locations	Count Year[3]	AM Peak Hour Delay[1]	AM Peak Hour LOS[2]	PM Peak Hour Delay	PM Peak Hour LOS
Worcester	Route 12/Walgreens/Stop & Shop	2024	9.5	A	13.2	B
	Route 12/I-190 Ramps	2024	19.9	B	16.1	B
	Route 9/Lake Ave	2016	42	D	49.1	D
	Route 9/Ludlow St	2025	23.3	C	37.5	D
	Southbridge St/Cambridge St	2019	41.3	D	85.8	F
	Southbridge St/Hammond St	2025	22.2	C	44.7	D
	Southbridge St/Riverside St	2017	13.9	B	20.4	C

(1) Average delay in seconds.

(2) LOS calculated using HCS7 from McTrans. LOS is based on average intersection delay for signalized intersections. For unsignalized locations, it is based on delay time for the highest volume direction under "stop" sign control.

(3) If a location has been counted multiple times since 2015 then the most recent Delay and LOS is shown.

TMC Intersections Encountered Delay

For all intersections where TMCs are obtained, it is possible to analyze the total delay encountered during the examined peak hour periods. A byproduct of the process that results in intersection LOS ratings is the "average delay encountered for entering vehicles". When multiplied by the number of vehicles to which the delay pertains, one can arrive at a total amount of delay, or time in "car-minutes". A car-minute is one car waiting for one minute, presumably idling and producing emissions as well as adding to total social and economic costs. Five cars waiting for a minute each, or one car waiting for a total of five minutes, results in the same theoretical total waiting time cost and would be measured and quantified by a total net delay of five car-minutes. **Table 7** shows these delay totals for observed intersections throughout the CMRPC planning region between 2016 and 2025. **Figure 5** displays the total peak hour delays in graphic form along with the location of each intersection.

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

TABLE 7
CONGESTION MANAGEMENT PROCESS(CMP)
ENCOUNTERED DELAY AT CRITICAL INTERSECTIONS
2016 - 2025

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
1	Sturbridge	Route 20 / Route 148 / Holland Rd	Signal	7:00 - 8:00am 4:45 - 5:45pm	10/10/2018	465978 256456	**12040**
2	Millbury	Route 122 / Mass Pike	Signal	7:15 - 8:15am 5:00 - 6:00pm	6/14/2016	308259 390555	**11647**
3	Westborough	Route 9 / Lyman St	Signal	7:30 - 8:30am 4:45 - 5:45pm	4/13/2022	196020 326887	**8715**
4	Auburn	Route 12 / Swanson Rd / Brotherton Wy	Signal	8:00 - 9:00am 4:30 - 5:30pm	10/8/2019	432221 86133	**8639**
5	Worcester	Foster St / Front St	Signal	7:30 - 8:30am 4:30 - 5:30pm	6/4/2019	329603 174301	**8398**
6	Mendon	Route 140 / Hartford Ave	Signal	7:15 - 8:15am 4:30 - 5:30pm	7/12/2016	43740 419463	**7720**
7	Millbury	Main St / McCracken Rd / Rte 146 SB Ramp / Shoppes	Signal	8:00 - 9:00am 5:00 - 6:00pm	5/24/2018	30694 428898	**7660**
8	Shrewsbury	Route 20 / Lake St	Signal	7:30 - 8:30am 4:30 - 5:30pm	9/17/2024	180427 267741	**7469**
9	Spencer	Route 9 / Route 31 (Pleasants St)	Signal	7:45 - 8:45am 5:00 - 6:00pm	9/8/2021	145135 280861	**7100**
10	Shrewsbury	Route 9 / South St	Signal	8:00 - 9:00am 4:30 - 5:30pm	9/27/2018	185810 219347	**6752**
11	Worcester	Cambridge St / Southbridge St	Signal	7:30 - 8:30am 4:30 - 5:30pm	11/6/2019	104696 239039	**5729**
12	Westborough	Route 9 / Otis St	Signal	7:30 - 8:30am 5:00 - 6:00pm	9/21/2022	123904 216972	**5681**
13	Worcester	Belmont St / Lake Ave	Signal	7:15 - 8:15am 4:15 - 5:15pm	7/26/2016	144774 193454	**5637**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
14	Sutton	Route 146 / Boston Rd	Signal	7:15 - 8:15am 5:00 - 6:00pm	10/5/2017	154896 167094	**5367**
15	Shrewsbury	Route 9 / Harrington Ave / Svenson Rd	Signal	7:15 - 8:15am 4:30 - 5:30pm	9/19/2018	117507 203059	**5342**
16	Shrewsbury	Route 9 / N & S Quinsigamond Ave	Signal	7:15 - 8:15am 5:00 - 6:00pm	8/24/2017	106373 183348	**4829**
17	Worcester	Forest St / Salisbury St	Stop Sign	8:00 - 9:00am 4:30 - 5:30pm	5/8/2018	174725 108850	**4726**
18	Shrewsbury	Route 9 / Lake St	Signal	8:00 - 9:00am 5:00 - 6:00pm	10/20/2021	86579 136166	**3712**
19	Shrewsbury	Route 140 / Main St	Signal	7:30 - 8:30am 4:30 - 5:30pm	9/17/2024	125840 96603	**3707**
20	Westborough	Connector Rd / Research Dr	Signal	7:45 - 8:45am 4:45 - 5:45pm	6/22/2017	76442 145394	**3697**
21	Charlton	Route 20 / Route 169	Signal	7:30 - 8:30am 4:00 - 5:00pm	6/21/2016	169818 48770	**3643**
22	Northborough	Route 20 / Church St	Signal	7:30 - 8:30am 4:30 - 5:30pm	2/9/2023	150114 61393	**3525**
23	Auburn	Route 20 / Prospect St	Signal	7:00 - 8:00am 4:30 - 5:30pm	5/22/2018	35140 164205	**3322**
24	Oxford	Route 12 / Charlton St / Sutton Ave	Signal	7:00 - 8:00am 4:30 - 5:30pm	10/21/2025	56070 135990	**3201**
25	Upton	Route 140 / Hartford Ave / Maple St	Signal	7:00 - 8:00am 4:45 - 5:45pm	11/2/2022	137353 42802	**3003**
26	West Boylston	Route 12 / Route 140 / Central St	Signal	7:15 - 8:15am 4:45 - 5:45pm	6/12/2018	75499 100029	**2925**
27	Auburn	Route 12 / Goulding Dr / Faith Ave	Signal	7:00 - 8:00am 4:15 - 5:15pm	10/4/2018	28058 145231	**2888**
28	Worcester	Lake Ave / Sunderland Rd	Signal	7:30 - 8:30am 5:00 - 6:00pm	9/24/2025	52326 118304	**2844**
29	Shrewsbury	Route 20 / Green St / South St	Signal	7:45 - 8:45am 4:45 - 5:45pm	6/4/2025	66188 102136	**2805**
30	Shrewsbury	Main St / N Quinsigamond Ave / Holden St	Signal	7:00 - 8:00am 4:45 - 5:45pm	9/16/2021	87245 77910	**2753**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
31	Sturbridge	Route 20 / Route 131	Signal	7:45 - 8:45am 4:30 - 5:30pm	11/8/2018	41382 118027	**2657**
32	Westborough	Route 30 / Church St / School St	Stop Sign	7:00 - 8:00am 3:30 - 4:30pm	11/2/2017	119229 38147	**2622**
33	Worcester	Highland St / Park Ave	Signal	8:00 - 9:00am 5:00 - 6:00pm	5/31/2018	94374 61202	**2593**
34	Shrewsbury	Ireta Rd / Main St / Old Mill Rd	Signal	7:15 - 8:15am 4:00 - 5:00pm	3/17/2022	97196 57712	**2582**
35	Worcester	Foster St / Francis J McGrath / Franklin St / Green St	Signal	8:00 - 9:00am 4:30 - 5:30pm	7/17/2025	63118 77027	**2336**
36	Auburn	Route 12 / Auburn St	Signal	7:15 - 8:15am 4:30 - 5:30pm	10/19/2023	60126 79592	**2328**
37	Worcester	Hammond St / Southbridge St	Signal	8:00 - 9:00am 4:45 - 5:45pm	10/9/2025	43734 95077	**2314**
38	Upton	High St / Hopkinton Rd / School St / Westboro Rd	Signal	7:00 - 8:00am 4:45 - 5:45pm	10/13/2022	55487 81600	**2285**
39	Oxford	Sutton Ave / Lovett Rd / Plaza	Signal	7:45 - 8:45am 4:15 - 5:15pm	6/16/2021	45939 88502	**2241**
40	Boylston	Route 140 / Route 70	Signal	7:15 - 8:15am 4:30 - 5:30pm	10/16/2025	57513 76706	**2237**
41	Worcester	Route 12 / E & W Mountain St	Signal	7:30 - 8:30am 4:00 - 5:00pm	5/8/2024	54608 78176	**2213**
42	Mendon	Route 16 / Hartford Ave West	Stop Sign	7:15 - 8:15am 4:45 - 5:45pm	6/27/2017	86765 40683	**2124**
43	Westborough	Route 30 / Flanders Rd	Stop Sign	7:45 - 8:45am 4:45 - 5:45pm	5/17/2018	47441 79579	**2117**
44	Worcester	Franklin St / Grafton St	Signal	7:45 - 8:45am 4:15 - 5:15pm	5/18/2023	50132 72494	**2043**
45	Northborough	Route 20 / Hudson St / Patty Ln	Signal	7:30 - 8:30am 4:30 - 5:30pm	1/5/2023	89096 26939	**1933**
46	Oxford	Route 12 / Route 20 (W junction)	Signal	7:15 - 8:15am 4:45 - 5:45pm	7/27/2017	57434 57670	**1918**
47	Shrewsbury	Route 9 / Oak St	Signal	7:30 - 8:30am 5:00 - 6:00pm	8/22/2017	45936 67642	**1893**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
48	Southbridge	Route 131 / Route 198 / Central St	Signal	7:30 - 8:30am 4:00 - 5:00pm	8/2/2016	54485 55418	**1832**
49	Berlin	Route 62 / Barnes Rd / Derby Rd / West St	Stop Sign	7:15 - 8:15am 4:45 - 5:45pm	6/7/2022	93331 14312	**1794**
50	Auburn	Route 12 / Oxford St	Signal	7:15 - 8:15am 4:45 - 5:45pm	9/5/2019	34797 70644	**1757**
51	Shrewsbury	Route 20 / Cherry St / Centech Blvd	Signal	7:15 - 8:15am 4:45 - 5:45pm	9/19/2024	28345 42498	**1181**
52	Northbridge	Route 122 / Church St	Signal	7:30 - 8:30am 5:00 - 6:00pm	7/14/2016	30623 73749	**1740**
53	Rutland	Route 122A / Route 56 (Pommogussett Rd)	Stop Sign	8:00 - 9:00am 4:00 - 5:00pm	5/1/2025	45646 58205	**1731**
54	Dudley	Dudley-Oxford Rd / Shepard Hill HS	Stop Sign	7:45 - 8:45am 4:15 - 5:15pm	5/31/2023	100316 2102	**1706**
55	Uxbridge	Route 122 / Hartford Ave	Signal	7:00 - 8:00am 4:30 - 5:30pm	10/12/2022	44891 48853	**1562**
56	Auburn	Auburn St / I-290 Off Ramp / Vine St	Signal	7:00 - 8:00am 4:15 - 5:15pm	10/17/2023	35880 55032	**1515**
57	Worcester	Park Ave / Mill St	Signal	7:30 - 8:30am 4:45 - 5:45pm	8/29/2017	45482 45406	**1515**
58	Auburn	Route 12 / Route 20 (E junction)	Signal	7:15 - 8:15am 4:30 - 5:30pm	7/18/2017	40552 48577	**1485**
59	Mendon	Hartford Ave East / Providence St	Stop Sign	7:00 - 8:00am 4:15 - 5:15pm	4/5/2023	77761 7652	**1423**
60	Dudley	Route 12/ Route 197 / Village St	Signal	7:45 - 8:45am 4:15 - 5:15pm	5/23/2023	38216 44718	**1382**
61	Worcester	Route 12 / Brooks St / Greendale St	Signal	7:45 - 8:45am 4:15 - 5:15pm	5/30/2024	34272 46671	**1349**
62	Oxford	Route 12 / Cudworth St	Signal	7:15 - 8:15am 4:30 - 5:30pm	10/22/2025	7820 72422	**1337**
63	Millbury	Canal St / Grafton St / Riverlin St	Signal	7:15 - 8:15am 4:30 - 5:30pm	7/21/2015	16598 62612	**1320**
64	Worcester	Chandler St / Mower St / Pleasant St	Signal	7:15 - 8:15am 4:15 - 5:15pm	8/30/2016	38313 40690	**1317**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
65	Westborough	Route 135 / Fisher St	Stop Sign	8:00 - 9:00am 5:00 - 6:00pm	6/21/2018	54459 23223	**1295**
66	Uxbridge	Rte 122 / Mendon St	Signal	7:45 - 845am 5:00 - 6:00pm	10/1/2019	47923 29085	**1283**
67	Shrewsbury	Route 9 / Maple Ave	Signal	7:00 - 8:00am 4:45 - 5:45pm	9/22/2022	24092 50472	**1243**
68	Berlin	Route 62 / I-495 SB Ramps	Signal	7:30 - 8:30am 4:45 - 5:45pm	6/1/2022	35658 35117	**1180**
69	Charlton	Route 20 / Route 31	Signal	7:15 - 8:15am 4:30 - 5:30pm	6/28/2016	30726 37620	**1139**
70	Worcester	Route 12 / I-190 Ramps	Signal	7:15 - 8:15am 4:00 - 5:00pm	6/5/2024	30447 37674	**1135**
71	Worcester	Route 9 / Ludlow St	Signal	7:15 - 8:15am 4:00 - 5:00pm	10/23/2025	33692 62663	**1106**
72	Shrewsbury	Route 20 / Walnut St	Stop Sign	7:15 - 8:15am 4:45 - 5:45pm	10/8/2024	19990 45706	**1095**
73	Shrewsbury	Main St / Maple St	Signal	7:30 - 8:30am 4:45 - 5:45pm	9/22/2022	23930 41531	**1091**
74	Webster	Route 12 / Park Ave / Slater St	Signal	7:30 - 8:30am 4:45 - 5:45pm	6/21/2018	20503 43505	**1067**
75	Holden	Route 31 / Manning St	Stop Sign	7:00 - 8:00am 4:30 - 5:30pm	10/8/2019	11982 51307	**1055**
76	Worcester	Southbridge St / Riverside St	Signal	7:15 - 8:15am 4:45 - 5:45pm	9/7/2017	20822 40882	**1028**
77	Worcester	McKeon Rd / Millbury St / Providence Rd	Signal	8:00 - 9:00am 4:45 - 5:45pm	7/24/2025	24582 33949	**976**
78	Sturbridge	Route 20 / Stallion Hill Rd	Signal	7:00 - 8:00am 4:30 - 5:30pm	10/18/2018	18800 39454	**971**
79	Leicester	Route 56 / Route 9	Signal	7:15 - 8:15am 4:15 - 5:15pm	6/9/2021	25564 31419	**950**
80	Northborough	Route 135 / Route 20	Signal	7:30 - 8:30am 5:00 - 6:00pm	1/5/2023	27572 23193	**846**
81	Westborough	Route 30 / Lyman St	Signal	7:30 - 8:30am 4:00 - 5:00pm	10/7/2025	22990 27213	**837**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
82	Worcester	Chandler St / Mill St	Signal	7:30 - 8:30am 5:00 - 6:00pm	5/17/2016	17980 31450	**824**
83	Berlin	Route 62 / I-495 NB Ramps	Signal	7:30 - 8:30am 4:45 - 5:45pm	5/4/2022	19548 29385	**816**
84	Mendon	Route 16 / Main St / North Ave	Signal	7:00 - 8:00am 5:00 - 6:00pm	9/15/2021	22214 26458	**811**
85	Northbridge	Douglas Rd / Hill St / Main St	Signal	8:00 - 9:00am 4:15 - 5:15pm	8/1/2017	21099 26248	**789**
86	Worcester	Drummond Ave / Holden St / Shore Dr	Signal	7:30 - 8:30am 4:00 - 5:00pm	12/6/2023	26677 18036	**745**
87	Northborough	Route 20 / W Main St	Signal	7:45 - 8:45am 4:45 - 5:45pm	6/20/2017	20019 24610	**743**
88	Shrewsbury	Route 20 / Grafton St	Signal	7:45 - 8:45am 4:15 - 5:15pm	11/14/2024	21133 23368	**742**
89	Blackstone	Route 122 / St. Paul St	Signal	7:00 - 8:00am 4:45 - 5:45pm	9/10/2019	19840 24351	**737**
90	Millbury	Main St / Route 146 NB Ramps	Signal	7:15 - 8:15am 5:00 - 6:00pm	5/16/2018	10120 33850	**733**
91	Douglas	Gilboa St/North St	Stop Sign	7:45 - 8:45am 4:00 - 5:00pm	6/17/2021	8978 34826	**730**
92	Rutland	Route 122A / Route 56 (Maple Ave)	Stop Sign	7:15 - 8:15am 4:00 - 5:00pm	5/1/2025	7543 35741	**721**
93	Sturbridge	Route 20 / Cedar St	Signal	7:45 - 8:45am 4:45 - 5:45pm	10/16/2018	21379 21244	**710**
94	Shrewsbury	Route 140 / Grafton St	Signal	7:30 - 8:30am 4:45 - 5:45pm	11/14/2024	13376 28388	**696**
95	Holden	Route 122A / Salisbury St	Signal	7:30 - 8:30am 4:00 - 5:00pm	8/25/2016	24503 16723	**687**
96	Millbury	Route 122 / Wheelock Ave	Signal	7:30 - 8:30am 4:30 - 5:30pm	6/15/2016	17194 23678	**681**
97	Webster	Route 12 / Lake St	Signal	7:15 - 8:15am 4:00 - 5:00pm	6/6/2023	21513 18914	**673**
98	Southbridge	Route 131 / South St	Signal	7:45 - 8:45am 4:45 - 5:45pm	5/30/2018	27489 11512	**650**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
99	Hopedale	Route 16 / Hopedale St	Signal	7:15 - 8:15am 4:30 - 5:30pm	5/4/2023	18212 20636	**647**
100	Paxton	Route 122 / Route 31	Signal	7:30 - 8:30am 4:45 - 5:45pm	10/4/2018	20323 17963	**638**
101	Berlin	Route 62 / Pleasant St	Stop Sign	7:15 - 8:15am 4:15 - 5:15pm	5/17/2022	3016 33207	**604**
102	Worcester	Route 12 / New Bond St	Signal	7:00 - 8:00am 4:00 - 5:00pm	6/6/2024	20614 15190	**597**
103	Uxbridge	Route 122 / Douglas St	Signal	7:45 - 8:45am 4:00 - 5:00pm	10/1/2019	18221 16790	**584**
104	Leicester	Route 56 / Stafford St	Signal	7:30 - 8:30am 5:00 - 6:00pm	6/14/2017	14071 20521	**577**
105	Worcester	Route 12 / Bourne St	Signal	7:00 - 8:00am 4:30 - 5:30pm	4/9/2024	19303 15297	**577**
106	West Boylston	Route 12 / Woodland St	Signal	7:45 - 8:45am 4:15 - 5:15pm	7/11/2017	13060 20921	**566**
107	Auburn	Auburn St / Oxford St North	Stop Sign	7:45 - 8:45am 4:15 - 5:15pm	9/21/2023	10187 23201	**556**
108	Grafton	Route 140 / Route 30	Signal	7:30 - 8:30am 5:00 - 6:00pm	6/30/2016	11443 20783	**537**
109	Westborough	Route 135 / Upton Rd	Stop Sign	7:45 - 8:45am 4:45 - 5:45pm	6/23/2016	16699 13993	**512**
110	Auburn	Route 12 / Prospect St	Signal	7:00 - 8:0am 4:00 - 5:00pm	9/9/2021	12641 16956	**493**
111	Spencer	Route 9 / Route 31 (Maple St)	Signal	7:15 - 8:15am 4:30 - 5:30pm	9/8/2021	12323 16661	**483**
112	Upton	Maple Ave / Pleasant St	Signal	7:00 - 8:00am 4:15 - 5:15pm	6/4/2025	10755 17665	**474**
113	West Boylston	Route 12 / Route 110	Stop Sign	7:45 - 8:45am 4:30 - 5:30pm	6/28/2017	11397 16820	**470**
114	Southbridge	Route 131 / Marcy St	Signal	7:45 - 8:45am 4:15 - 5:15pm	6/13/2018	11027 15942	**449**
115	Westborough	Route 30 / State St / Bay State Commons	Stop Sign	7:15 - 8:15am 4:00 - 5:00pm	11/29/2017	24463 2231	**445**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
116	Auburn	Auburn St / Brotherton Way	Signal	7:15 - 8:15am 4:15 - 5:15pm	10/26/2023	1314 23546	**414**
117	Worcester	Chandler St / May St (south intersection)	Stop Sign	8:00 - 9:00am 4:00 - 5:00pm	5/16/2023	11882 12237	**401**
118	Worcester	Route 12 / Walgreens / Stop & Shop Plaza	Signal	7:45 - 8:45am 4:30 - 5:30pm	5/22/2024	6802 16447	**387**
119	Holden	Route 122A / Route 68	Stop Sign	7:15 - 8:15am 4:45 - 5:45pm	7/19/2016	18118 3831	**366**
120	Berlin	Route 62 / Linden St	Stop Sign	7:15 - 8:15am 4:30 - 5:30pm	6/7/2022	4055 17599	**361**
121	Blackstone	Blackstone St / Summer St	Stop Sign	7:00 - 8:00am 5:00 - 6:00pm	5/29/2018	10667 9729	**340**
122	Northbridge	Church St / Linwood Ave / Main St	Signal	8:00 - 9:00am 4:15 - 5:15pm	8/10/2017	8672 11300	**333**
123	Berlin	Route 62 / Gates Pond Rd	Stop Sign	8:00 - 9:00am 4:15 - 5:15pm	5/24/2022	3909 15132	**317**
124	Uxbridge	Route 122 / Route 146A	Stop Sign	7:00 - 8:00am 4:45 - 5:45pm	6/19/2018	13537 5433	**316**
125	Sturbridge	Route 20 / Fairground Rd	Signal	7:45 - 8:45am 4:30 - 5:30pm	11/8/2018	8424 10023	**307**
126	West Boylston	Route 12 / Franklin St	Stop Sign	7:00 - 8:00am 5:00 - 6:00pm	6/7/2018	5168 11375	**276**
127	Worcester	Chandler St / May St (north intersection)	Stop Sign	7:45 - 8:45am 4:00 - 5:00pm	5/16/2023	9203 7244	**274**
128	Blackstone	Lincoln St / Mendon St	Stop Sign	7:00 - 8:00am 5:00 - 6:00pm	10/16/2018	7418 6978	**240**
129	Leicester	Route 56 / Marshall St	Stop Sign	7:30 - 8:30am 4:45 - 5:45pm	7/28/2016	4455 8735	**220**
130	Sutton	Central Tnpk / Putnam Hill Rd	Stop Sign	7:00 - 8:00am 4:15 - 5:15pm	6/9/2021	5851 6973	**214**
131	Grafton	Route 122 / Milford Rd	Stop Sign	7:00 - 8:00am 4:45 - 5:45pm	5/31/2017	4777 7559	**206**
132	Worcester	Route 12 / QCC	Signal	8:00 - 9:00am 4:00 - 5:00pm	5/9/2024	4287 7062	**189**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
133	Leicester	Route 9 / Main St	Stop Sign	7:00 - 8:00am 4:45 - 5:45pm	8/30/2017	6814 4043	**181**
134	Leicester	Route 56 / Pleasant St	Stop Sign	7:30 - 8:30am 4:45 - 5:45pm	8/1/2017	3906 6061	**166**
135	Northbridge	Route 122 / Sutton St / Upton St	Stop Sign	7:30 - 8:30am 4:30 - 5:30pm	8/9/2016	3912 5549	**158**
136	Rutland	Route 122A / Glenwood Rd	Stop Sign	7:00 - 8:00am 4:30 - 5:30pm	5/20/2025	2946 6170	**151**
137	Sutton	Route 122A / Boston Rd	Stop Sign	7:15 - 8:15am 4:45 - 5:45pm	5/19/2016	3677 4628	**138**
138	Sturbridge	Route 20 / Arnold Rd	Stop Sign	7:00 - 8:00am 5:00 - 6:00pm	10/10/2018	3114 4734	**131**
139	Shrewsbury	Route 20 / Valente Dr / Plaza	Stop Sign	7:45 - 8:45am 4:30 - 5:30pm	11/14/2024	1336 6053	**123**
140	Dudley	Airport Rd / Dudley Hill Rd / Tanyard Rd	Stop Sign	7:00 - 8:00am 4:00 - 5:00pm	5/23/2023	3623 3415	**117**
141	East Brookfield	Route 9 / North Brookfield Rd	Stop Sign	7:15 - 8:15am 4:45 - 5:45pm	7/7/2016	4160 2593	**113**
142	Rutland	Route 122 / Route 122A	Stop Sign	7:00 - 8:00am 4:15 - 5:15pm	5/29/2025	3877 2817	**112**
143	West Boylston	Route 140 / Franklin St	Stop Sign	7:15 - 8:15am 4:30 - 5:30pm	6/7/2018	3753 2233	**100**
144	West Boylston	Route 140 / Laurel St	Stop Sign	7:00 - 8:00am 4:45 - 5:45pm	5/24/2016	2774 2297	**85**
145	Rutland	Route 122A / Pleasandale Rd	Stop Sign	7:15 - 8:15am 4:30 - 5:30pm	5/21/2025	2165 2548	**78**
146	Northbridge	Rte 122 / School St	Stop Sign	7:45 - 8:45am 4:00 -56:00pm	8/11/2016	2303 2084	**73**
147	Rutland	Route 122A / Fishermans Rd	Stop Sign	7:00 - 8:00am 4:15 - 5:15pm	5/21/2025	2504 1498	**67**
148	Sutton	Central Tnpk / West Sutton Rd	Stop Sign	7:30 - 8:30am 4:30 - 5:30pm	5/19/2021	2646 1295	**66**
149	Oxford	Sutton Ave / Joe Jenny Rd	Stop Sign	7:00 - 8:00am 4:45 - 5:45pm	6/2/2021	1639 1978	**60**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
150	Boylston	Central St / Cross St	Stop Sign	7:00 - 8:00am 4:45 - 5:45pm	5/10/2018	1562 1715	**55**
151	Rutland	Route 122A / Kenwood Dr	Stop Sign	7:15 - 8:15am 4:30 - 5:30pm	5/20/2025	677 591	**21**
152	Sutton	Central Tnpk / Purgatory Rd	Stop Sign	7:15 - 8:15am 4:30 - 5:30pm	5/13/2021	517 718	**21**
153	Westborough	Route 30 / Union St	Stop Sign	7:15 - 8:15am 5:00 - 6:00pm	11/7/2017	328 84	**7**

(1) In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM + PM peak hours.

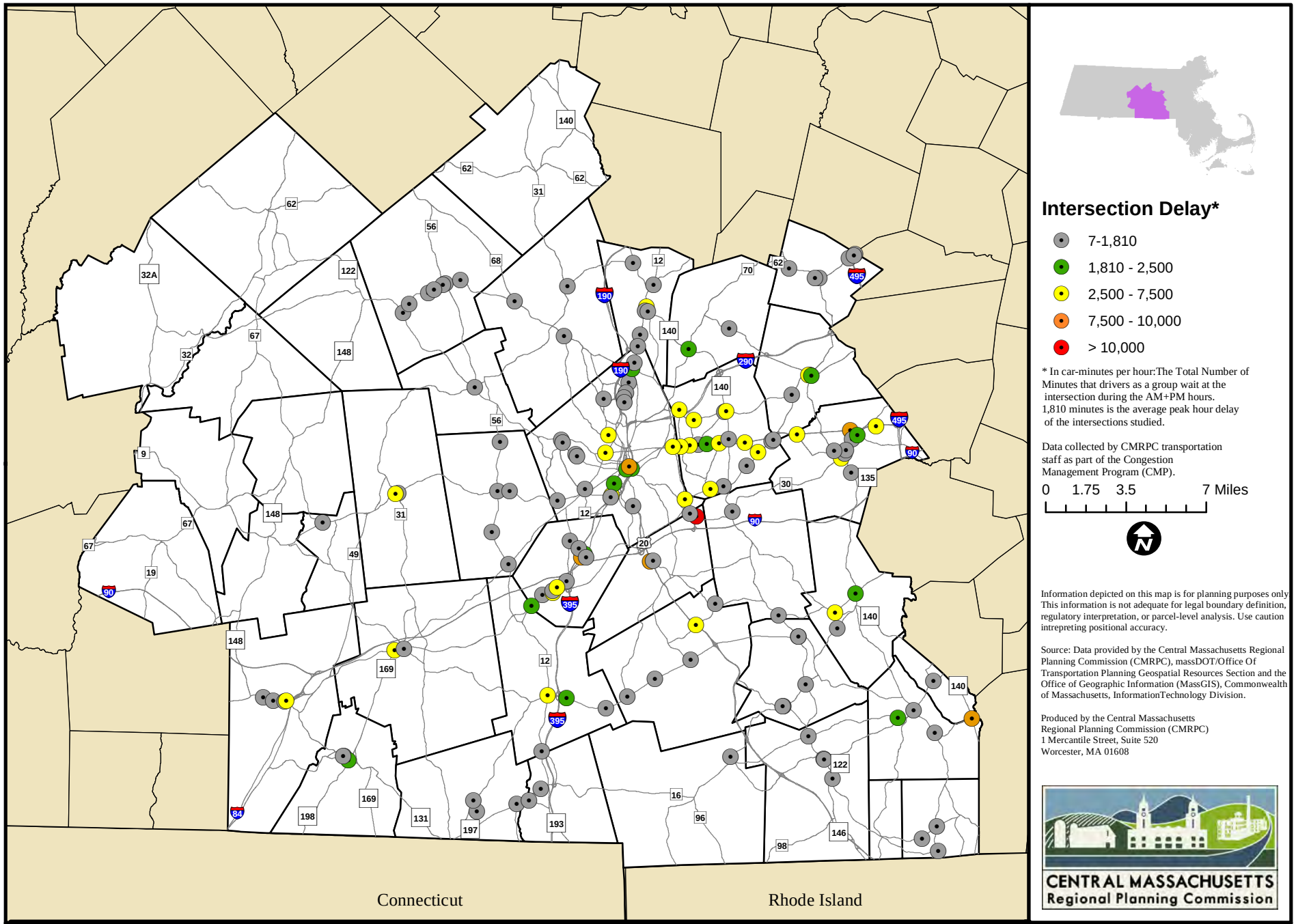


Figure 5 - Encountered Peak Hour Delay at Critical Intersections (2016 - 2025)

Date: 1/14/2026

5.5 Park and Ride Facilities & MBTA Commuter Rail Lots in the Region

MassDOT-Maintained Park and Ride Facilities

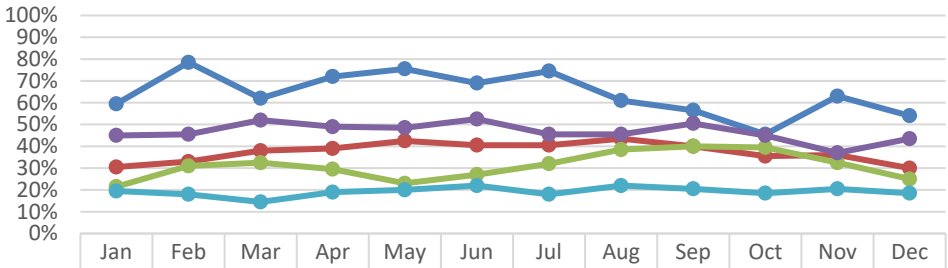
There are five Park and Ride lots located within the CMRPC region. They are in the towns of Auburn, Berlin, Millbury, and Sturbridge. Since 2021, staff have monitored each Park and Ride lot once a month by checking the number of vehicles in each lot sometime between 10:00am and 2:00pm. Shown below, **Table 8** includes the current status of all MassDOT maintained Park and Ride lots in the CMRPC region. Further, a complete list of Park and Ride lots in the state can be found here https://www.mass.gov/park-and-ride.

Table 8
MassDOT Maintained
Park and Ride Lots in the CMRPC Region

Community	Location	Capacity	Current Status	Comments
Auburn	Mid State Drive Adjacent to I-90, Exit #10	146	Open	Expanded in 2017
Berlin	Rte 62 at I-495, Exit #26	45	Open	
Millbury	Rte 122 at I-90, Exit #11	122	Open	Rebuilt in 2017
Millbury	Rte 20 at I-90, Exit #10A	285	Open	Tandem Truck Parking Available
Sturbridge	Rte 131 at I-84, Exit #3 (Bethlehem Lutheran Church Lot)	75	Open	

Each month the number of vehicles were noted for each lot, and a percentage was calculated to determine the amount usage at each lot. **Figure 6** shows each Park and Ride lot location and the average percentage of the lot usage from data collected each month for the last two years (2024-2025). As shown, most of the lots are less than 50% utilized except for the Route 62 lot in Berlin. The Millbury Route 20 lot also was above 50% utilization for a few months. **Figure 7** shows where the Park and Ride lots are located within the CMRPC region.

Figure 6 - MassDOT-Maintained Park and Ride Lot Average Usage



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Auburn: Mid State Drive	31%	33%	38%	39%	43%	41%	41%	44%	40%	36%	36%	30%
Berlin: Route 62	60%	79%	62%	72%	76%	69%	75%	61%	57%	46%	63%	54%
Millbury: Route 122	22%	31%	33%	30%	23%	27%	32%	39%	40%	40%	33%	25%
Millbury: Route 20	45%	46%	52%	49%	49%	53%	46%	46%	51%	45%	37%	44%
Sturbridge: Route 131	20%	18%	15%	19%	20%	22%	18%	22%	21%	19%	21%	19%

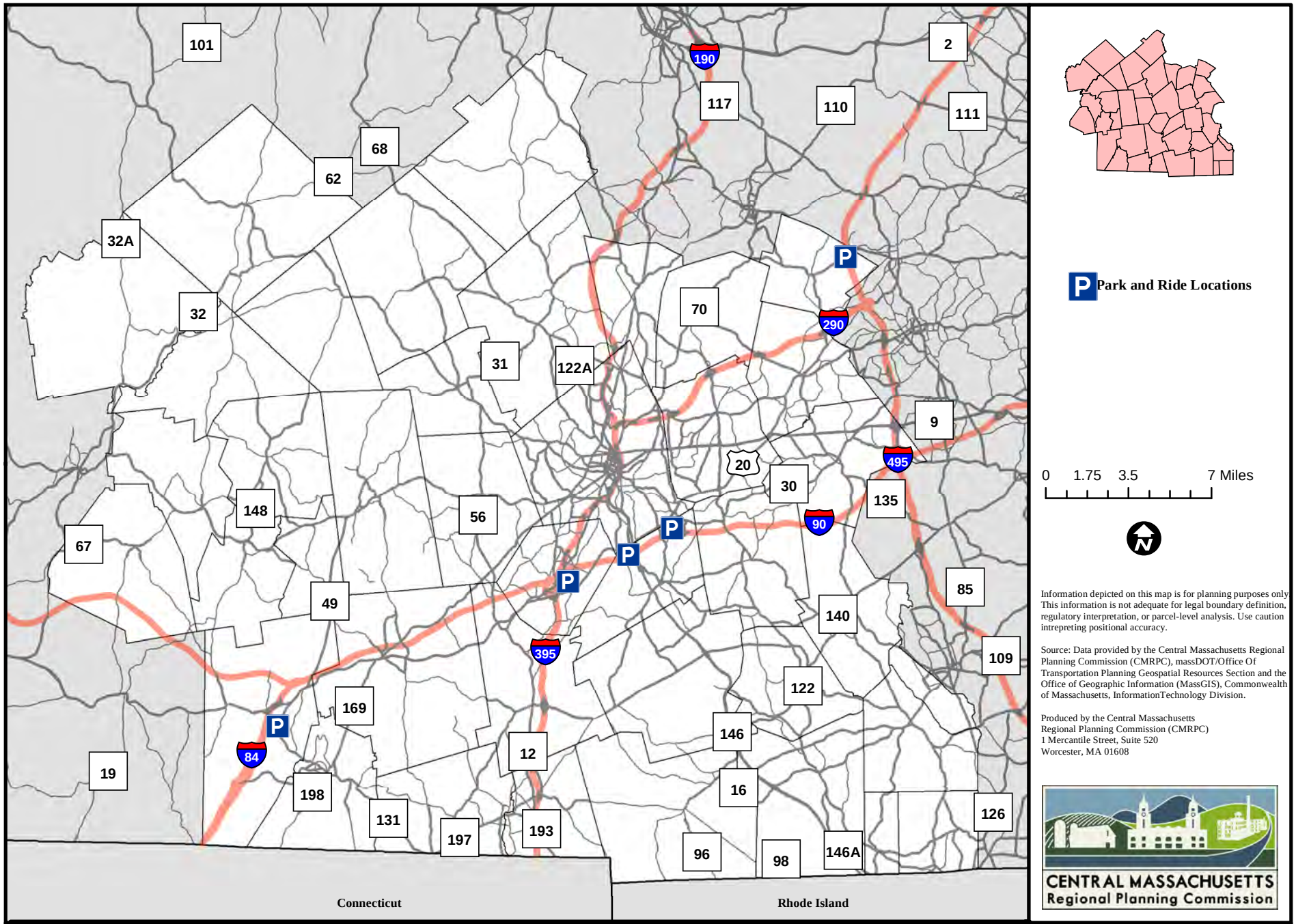


Figure 7 - MassDOT-Maintained Park and Ride Lot Locations

Date: 10/22/2025

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MBTA Commuter Rail Lots

In addition to the MassDOT-maintained Park and Ride lots, staff have also monitored usage at the MBTA Commuter Rail lots in the CMRPC region. During the Pandemic in 2020, staff started to monitor the usage at three MBTA Commuter Rail lots to determine if anyone was using the commuter rail service. Since 2021, staff have continued to monitor the MBTA lots monthly. Once a month, staff visited each lot and noted how many vehicles were in the lot. Each visit was done on Monday through Thursday and sometime between 10:00am and 2:00pm. The Worcester lot was not monitored as it is a public parking lot and not just used for the MBTA. The Southborough lot is not in the CMRPC region, but staff decided to include it in its monitoring program.

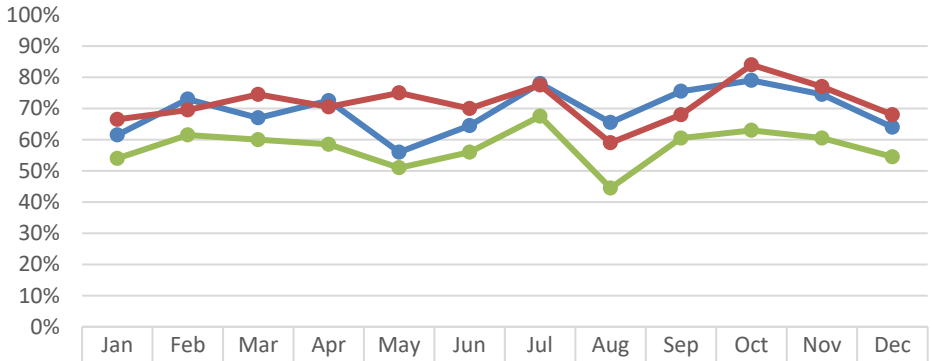
Shown below, **Table 9** includes the location and capacity of each MBTA Commuter Rail lot in the CMRPC region. Further, the complete list of MBTA Commuter Rail lots can be found here https://www.mbta.com/parking. The below MBTA lots are not free to park and have different costs. The Grafton lot costs $4 per day and the Southborough & Westborough lots cost $6 per day. As for the Worcester location, it costs $4 for the first hour and $1 each additional hour.

Table 9
MBTA Commuter Rail Lots in the CMRPC Region

Community	Location	Capacity	Current Status	Comments
Grafton	1 Pine St, Grafton MA	386	Open	
Southborough	87 Southville Rd, Southborough MA	375	Open	Not in CMRPC Region
Westborough	Smith Pkwy and Fisher St, Westborough MA	448	Open	
Worcester	2 Washington Sq, Union Station, Worcester MA	500	Open	Not Monitored

Since 2021, staff have monitored the three MBTA Commuter Rail lots. **Figure 8** shows each MBTA Commuter Rail lot average usage for each month over the last two years (2024-2025). All three lots are mostly between 50% and 80% capacity. The Westborough lot dipped below 50% usage in August while the Southborough lot went above 80% usage in October. **Figure 9** shows where the MBTA Commuter Rail lots are located within the CMRPC region.

Figure 8 - MBTA Commuter Rail Lot Average Usage



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Grafton	62%	73%	67%	73%	56%	65%	78%	66%	76%	79%	75%	64%
Southborough	67%	70%	75%	71%	75%	70%	78%	59%	68%	84%	77%	68%
Westborough	54%	62%	60%	59%	51%	56%	68%	45%	61%	63%	61%	55%

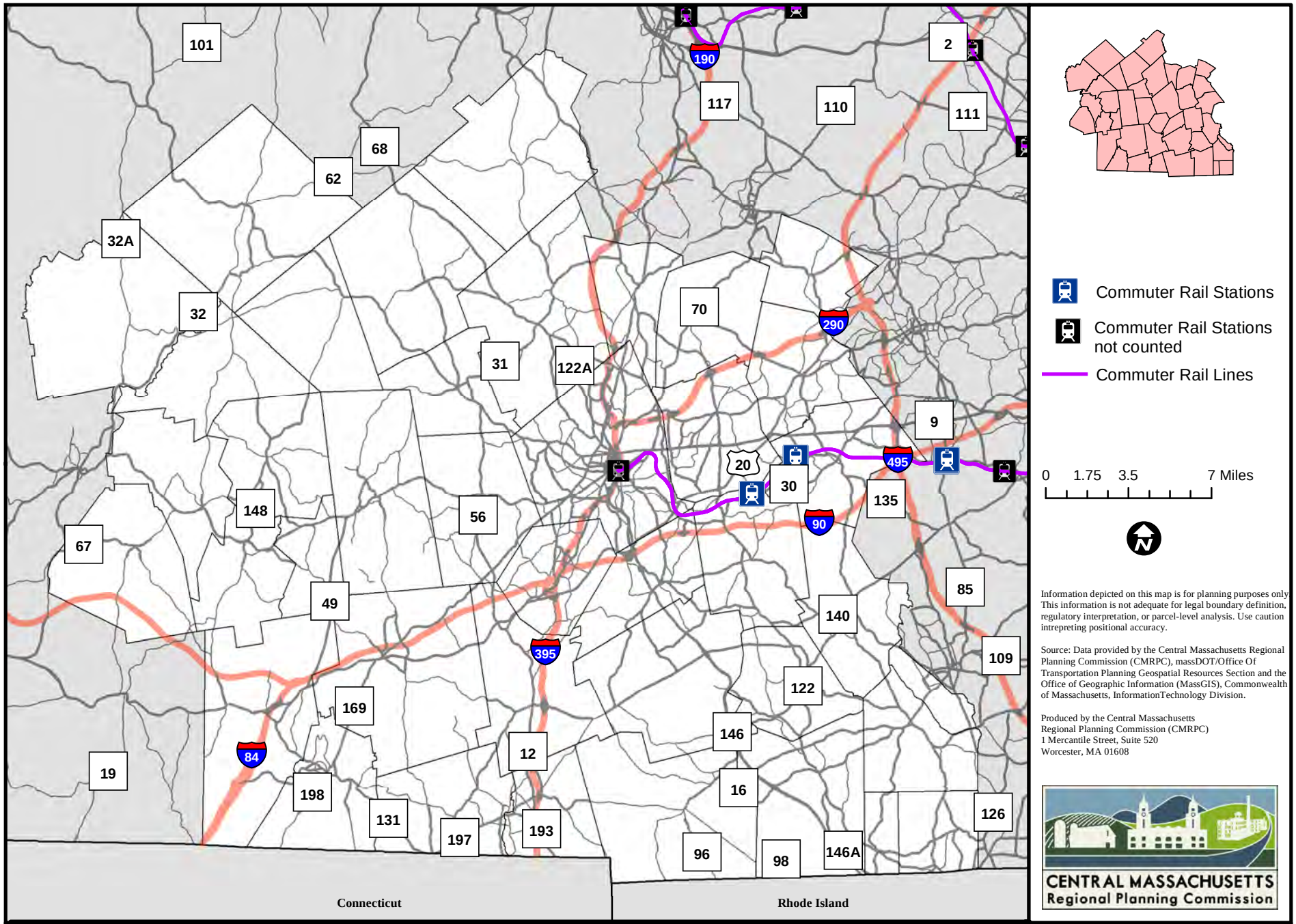


Figure 9 - MBTA Commuter Rail Lots

Date: 10/22/2025

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5.6 Localized Bottleneck Reduction Program

FHWA and FTA guidance have long recommended that the nation's MPOs identify the top roadway bottleneck areas in their regions. Based on the federal guidance, a Localized Bottleneck Reduction Program (LBRP) pilot effort was first developed in 2011 to complement the region's established and ongoing Congestion Management Process (CMP). At that time, the region's entire federal-aid highway system was screened as part of this effort. The LBRP is now an established component of the CMMPO's annual CMP development process.

Definition

A Traffic Bottleneck is defined by FHWA as a localized constriction of traffic flow, often on a highway segment that experiences reduced speeds and inherent delays, due to recurring operational influence or a nonrecurring impacting event. Further, a bottleneck is an area of poor LOS or high V/C ratio which ends at a point, has a recurring cause and, most importantly, exhibits a return to free flow speeds after the bottleneck end point.

FHWA further indicates that "a bottleneck has congestion, but congestion is often more than a bottleneck", citing an example of a wide highway with a narrow bridge that restricts traffic flow on a regular basis. It should also be noted for differentiation purposes that a road that has a high V/C or poor LOS for an extended length, or for its entire length, is *not* a bottleneck, but rather is considered a chronically congested roadway, where demand routinely exceeds capacity.

Elements that typically exist in a bottleneck situation include:

- A traffic queue upstream of the bottleneck
- A beginning point for the traffic queue
- Free flow traffic conditions downstream of the bottleneck
- A predictable recurring cause

The Transportation Management Systems, along with their respective GIS components, maintained by the CMMPO staff (congestion, pavement, safety, freight planning, public transit planning, evacuation planning) and MassDOT (bridge and pavement) have been referenced in attempting to determine the "root causes" of recurring Traffic Bottleneck locations. As indicated by FHWA, there are often other root causes, beyond congestion, that lead to recurring bottleneck conditions at various locations.

Location Identification

The Travel Demand Model software, or "Model", was used to help identify potential "Bottleneck" segments of the region's federal-aid highway and other major locally maintained roads. The Model simulates the operations of the major highways in the planning region and has a wide variety of applications in transportation planning. This analysis is based on the number of "Origin/Destination" (O/D) pairs using the highway network. The "Origin" is the location of the beginning of a vehicle trip, and the "Destination" is the location of the end of the vehicle trip. This analysis is customized to the CMRPC region's Model which has a definitive number of O/D pairs.

Three (3) scenarios were analyzed: "Stage 1", "Stage 2", and "Stage 3". The "Stage 1" scenario Model results indicate where there are over 5,000 O/D pairs estimated to be using a particular segment of highway. Under the "Stage 2" scenario, Model results identify where there are over 7,500 O/D pairs using a particular highway segment. Finally, a "Stage 3" scenario shows where there are over 10,000 O/D pairs using a highway segment. There are 955 transportation analysis zones (TAZs) in the Model which translates to 912,025 O/D pairs. Roads in "Stage 3" serve approximately 1% of the O/D pairs.

The results of the three (3) analyzed scenarios are shown in **Figure 10**. The figure shows potential Model-derived highway Bottleneck segments in the CMRPC planning region. The identified potential Bottleneck segments affect all traffic using the highway network, including the range of heavy vehicles transporting a wide array of freight. As a note, Interstates are not included in the bottleneck analysis.

Following the map, **Table 10** lists the bottleneck locations in the CMRPC region. Data in the table includes the community, the roadway name, the from and to where the bottleneck exists, the "Stage #". With "Stage 3" segments having the highest O/D pairs, they are located at the top of the table, followed by "Stage 2" and then "Stage 3" segments.

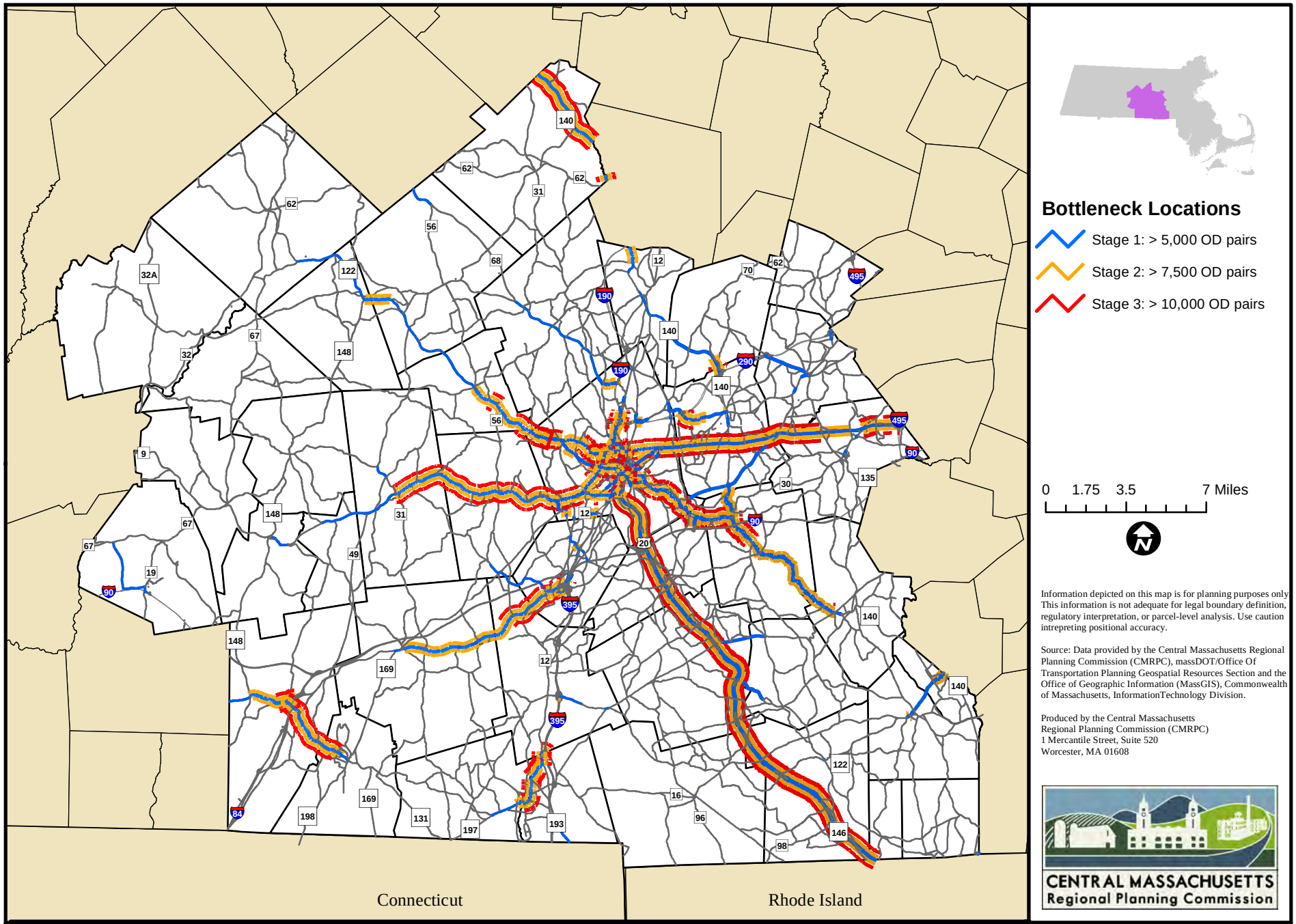

Figure 10 - Bottleneck Locations

Date: 10/22/2025

Table 10
Bottleneck Location by Stage

Community	Roadway	From	To	Stage #
Auburn	Oxford St N	Route 12	I-290 Off Ramp	3
Auburn	Route 12	Oxford St N	I-90 Ramp	3
Auburn	Route 12	Prospect St	I-290 Ramp	3
Auburn	Route 20	Routes 12/20	Prospect St	3
Auburn	Routes 12/20	Oxford TL	Routes 12/20	3
Douglas	Route 146	Uxbridge TL	Sutton TL	3
Grafton	Route 122	Millbury TL	Bridge St	3
Grafton	Route 140	Route 30	Bridge St	3
Grafton	Routes 122/140	Route 140	Route 122	3
Leicester	Route 9	Spencer TL	Worcester CL	3
Millbury	Route 122	Worcester CL	Grafton TL	3
Millbury	Route 146	Sutton TL	Route 20	3
Northborough	Route 9	Shrewsbury TL	Westborough TL	3
Oxford	Cudworth Rd	Route 12	I-395	3
Oxford	Route 12	Webster TL	Cudworth Rd	3
Oxford	Route 20	Pioneer Dr	Auburn TL	3
Paxton	Route 122	Indian Hill Rd	Worcester CL	3
Paxton	Routes 122/56	Grove St	Route 56	3
Princeton	Route 140	Westminster TL	Sterling TL	3
Shrewsbury	Main St	I-290	Old Mill Rd	3
Shrewsbury	Route 9	Worcester CL	Northborough TL	3
Southbridge	Route 131	Sturbridge TL	Hamilton St	3
Spencer	Route 9	Route 31	Leicester TL	3
Sturbridge	Route 131	Route 20	Southbridge TL	3
Sturbridge	Route 20	Stallion Hill Rd	I-90/I-84	3
Sutton	Route 146	Douglas TL	Millbury TL	3
Uxbridge	Route 146	Rhode Island SL	Douglas TL	3
Webster	Bigelow Rd	N Main St	Old Worcester Rd	3
Webster	N Main St	Upland Ave	Bigelow Rd	3
Webster	N Main St	Route 12	E Main St	3
Webster	Old Worcester Rd	Bigelow Rd	Route 12	3
Webster	Route 12	School St	N Main St	3
Webster	Route 12	Old Worcester Rd	Oxford TL	3
Westborough	Route 9	Northborough TL	Route 135	3
Westborough	Route 9	Route 30	I-495	3
Worcester	Cambridge St	Richard St	Canterbury St	3

Community	Roadway	From	To	Stage #
Worcester	Chandler St	Park Ave	Main St	3
Worcester	Foster St	Green St	Front St	3
Worcester	Francis J McGrath	Myrtle St	Green St	3
Worcester	Gold Star Blvd	Ruthven St	Chadwick St	3
Worcester	Grove St	West Boylston St	Chadwick St	3
Worcester	Hammond St	Southbridge St	Canterbury St	3
Worcester	Highland St	Pleasant St	Park Ave	3
Worcester	Lancaster St	Institute Rd	Salisbury St	3
Worcester	Lincoln St	Route 9	Goldsberry St	3
Worcester	Madison St	Main St	Vernon St	3
Worcester	Park Ave	Highland St	Institute Rd	3
Worcester	Park Ave	Pleasant St	Maywood St	3
Worcester	Pleasant St	Kenilworth Rd	June St	3
Worcester	Route 122	Water St	Millbury TL	3
Worcester	Route 122	Paxton TL	Chandler St	3
Worcester	Route 146	I-290	Millbury TL	3
Worcester	Route 9	Park Ave	Shrewsbury TL	3
Worcester	Route 9	Leicester St	Park Ave	3
Worcester	Salisbury St	Lancaster St	Lincoln St	3
Worcester	Southbridge St	Quinsigamond Ave	Hammond St	3
Worcester	Vernon St	Madison St	Dorchester St	3
Worcester	West Boylston St	West Boylston Dr	Grove St	3
Auburn	Auburn St	Rockland Rd	Vine St	2
Auburn	Route 12	West St	Prospect St	2
Auburn	Route 12	I-290 NB/I-395 SB	I-90 ramp	2
Auburn	Route 20	Prospect St	I-395 SB Ramp	2
Boylston	Route 140	Cross St	Shrewsbury TL	2
Charlton	Route 20	Route 31	Oxford TL	2
Dudley	Route 12	Route 197	Webster TL	2
Grafton	Bridge St	Route 122	Route 140	2
Grafton	Route 122	Bridge St	Route 140	2
Grafton	Route 140	Shrewsbury TL	Route 30	2
Grafton	Route 140	Route 122	Upton TL	2
Hopedale	Route 16	Milford TL	Hopedale St	2
Oakham	Route 122	Route 148	Rutland TL	2
Oxford	Route 20	Charlton TL	Pioneer Dr	2
Oxford	Sutton Ave	I-395 NB Ramps	I-395 SB Ramps	2
Paxton	Route 122	Route 56	Indian Hill Rd	2
Paxton	Routes 122/56	Route 31	Grove St	2
Rutland	Route 122	Oakham TL	Rutland State Park Rd	2

Community	Roadway	From	To	Stage #
Shrewsbury	Main St	Maple Ave	Route 140	2
Shrewsbury	Main St	Old Mill Rd	Monadnock Dr	2
Shrewsbury	Route 140	Boylston TL	I-290	2
Shrewsbury	Route 140	Route 20	Grafton TL	2
Southbridge	Route 131	Hamilton St	Oakes Ave	2
Sturbridge	Route 20	Route 148	Stallion Hill Rd	2
Upton	Route 140	Upton TL	Hartford Ave	2
Webster	N Main St	E Main St	Upland Ave	2
Webster	Route 12	Dudley TL	School St	2
West Boylston	Route 140	Sterling TL	Laurel St	2
Westborough	Route 9	Route 135	Lyman St	2
Worcester	Cambridge St	Main St	Richards St	2
Worcester	Cambridge St	Canterbury St	Quinsigamond Ave	2
Worcester	Dorchester St	Vernon St	Houghton St	2
Worcester	Francis J McGrath	Myrtle St	Southbridge St	2
Worcester	Gold Star Blvd	Ruthven St	I-190	2
Worcester	Gold Star Blvd	Chadwick St	Grove St	2
Worcester	Grove St	Chadwick St	Park Ave	2
Worcester	Hope Ave	Webster St	I-290	2
Worcester	Institute Rd	Park Ave	Lancaster St	2
Worcester	James St	Stafford St	Clover St	2
Worcester	Lancaster St	Institute Rd	Highland St	2
Worcester	Main St	Park Ave	Mill St	2
Worcester	Main St	Park Ave	Mill St	2
Worcester	Major Taylor Blvd	Martin Luther King Blvd	Route 9	2
Worcester	Melrose St	Burncoat St	Lincoln St	2
Worcester	Park Ave	Mill St	Maywood St	2
Worcester	Park Ave	Grove St	Institute Rd	2
Worcester	Pleasant St	Mill St	Kenilworth Rd	2
Worcester	Route 122	Manhattan Rd	May St	2
Worcester	Route 122	Pleasant St	Mill St	2
Worcester	Route 122	Fiske St	June St	2
Worcester	Route 122	Geneva St	Park Ave	2
Worcester	Salisbury St	Park Ave	Massachusetts Ave	2
Worcester	Shore Dr	Brattle St	Frontage Rd	2
Worcester	Shrewsbury St	East Central St	Casco St	2
Worcester	Southbridge St	Francis J McGrath	Quinsigamond Ave	2

Community	Roadway	From	To	Stage #
Worcester	Stafford St	Ludlow St	James St	2
Worcester	Water St	Route 122	I-290 Off Ramp	2
Worcester	Webster St	Knox St	Hope Ave	2
Auburn	Auburn St	Oxford St N	Rockland Rd	1
Auburn	Auburn St	Vine St	I-290 On Ramp	1
Auburn	Auburn St	I-290 On Ramp	Route 12	1
Auburn	Auburn St	Brotherton Wy	Millbury St	1
Auburn	Brotherton Wy	Vine St	I-290 SB Ramp	1
Auburn	Oxford St N	I-290 Off Ramp	Leicester St	1
Auburn	Oxford St N	Auburn St	Pinehurst Ave	1
Auburn	Rochdale St	Oxford TL	West St	1
Auburn	Route 12	Oxford St N	Water St	1
Auburn	Vine St	Auburn St	Swanson Rd	1
Auburn	West St	Rochdale St	Route 12	1
Barre	Route 122	Vernon Ave	Oakham TL	1
Boylston	Route 140	West Boylston TL	Cross St	1
Brookfield	Route 9	Route 148	Quaboag St	1
Charlton	Route 20	Route 169	Stafford St	1
Dudley	Route 197	Airport Rd	Route 12	1
East Brookfield	Route 9	N Brookfield Rd	Spencer TL	1
Holden	Route 122A	Route 68	Worcester CL	1
Hopedale	Route 16	Hopedale St	Mendon TL	1
Leicester	Mill St	Stafford St	Oxford TL	1
Leicester	Pleasant St	Stafford St	River St	1
Leicester	Stafford St	Pleasant St	Mill St	1
Mendon	Route 16	Hopedale TL	Millville St	1
Northborough	Church St	I-290	Route 20	1
Northborough	Route 20	Route 135	Monument Dr	1
Northborough	Route 20	Lincoln St	Haven Dr	1
Northborough	Route 20	Northborough Crossing	Route 9	1
Northborough	Solomon Pond Rd	Marlborough TL	Bearfoot Rd	1
Northbridge	Purgatory Rd	Sutton TL	Crescent St	1
Northbridge	Sutton St	Sutton TL	Route 122	1
Oakham	Route 122	Barre TL	Route 148	1
Oxford	Comins Rd	Route 56	Auburn TL	1
Oxford	Mill St	Leicester TL	Route 56	1
Oxford	Sutton Ave	Orchard Hill Dr	I-395 NB Ramps	1
Paxton	Route 122	Rutland TL	Route 31	1
Rutland	Route 122	Rutland State Park	Paxton TL	1

Community	Roadway	From	To	Stage #
		Rd		
Rutland	Route 68	Route 56	Hubbardston TL	1
Shrewsbury	Main St	Worcester CL	I-290	1
Shrewsbury	Main St	Monadnock Dr	Maple Ave	1
Shrewsbury	Route 140	I-290	Rawson Pl	1
Shrewsbury	Route 140	Prospect St	Old Brook Rd	1
Shrewsbury	Route 20	Worcester CL	South St	1
Southbridge	Route 131	Oakes Ave	Route 198	1
Spencer	Route 31	Meadow Rd	N Brookfield Rd	1
Spencer	Route 9	E Brookfield TL	Route 31	1
Sturbridge	Route 20	Brimfield TL	Route 148	1
Sutton	Central Turnpike	Route 146	Northbridge TL	1
Upton	Route 140	Hartford Ave	Mendon St	1
Warren	Brook Rd	South St	Route 19	1
Warren	South St	Route 67	Brook Rd	1
Webster	Route 193	I-395	Connecticut SL	1
West Boylston	Crescent St	Thomas St	Route 140	1
West Boylston	Route 140	Route 12	Boylston TL	1
West Boylston	Route 140	Laurel St	Thomas St	1
West Boylston	Thomas St	Route 140	River Rd	1
Westborough	Route 30	Route 135	Prospect St	1
Westborough	Route 9	Lyman St	Route 30	1
Worcester	Burncoat St	Millbrook St	Randolph Rd	1
Worcester	Canterbury St	Hammond St	Grand St	1
Worcester	Dorchester St	Houghton St	Route 122	1
Worcester	East Mountain St	Malden St	Burncoat St	1
Worcester	Foster St	Front St	Mercantile St	1
Worcester	Franklin St	Route 122	Bloomingdale Ct	1
Worcester	Front St	Washington Sq	Foster St	1
Worcester	Hamilton St	Route 122	Plantation St	1
Worcester	Hammond St	Canterbury St	Beacon St	1
Worcester	Heard St	Royal Rd	Clover St	1
Worcester	Holden St	Holden TL	Brattle St	1
Worcester	Lancaster St	Route 9	Elm St	1
Worcester	Lincoln St	Plantation St	Shrewsbury TL	1
Worcester	Ludlow St	Route 9	Stafford St	1
Worcester	Major Taylor Blvd	Foster St	Martin Luther King Blvd	1

Community	Roadway	From	To	Stage #
Worcester	N Service Rd	Burncoat St	Lincoln St	1
Worcester	Park Ave	Mill St	Main St	1
Worcester	Plantation St	Route 70	Lincoln St	1
Worcester	Plantation St	I-290 Off Ramp	I-290 On Ramp	1
Worcester	Pleasant St	Chandler St	Mill St	1
Worcester	Route 12	Bourne St	New Bond St	1
Worcester	Route 12	West Boylston Dr	Neponset St	1
Worcester	Route 122	Manhattan Rd	Mill St	1
Worcester	Route 122	May St	Fiske St	1
Worcester	Route 122	June St	Geneva St	1
Worcester	Route 20	Shrewsbury TL	Sunderland Rd	1
Worcester	Salisbury St	Massachusetts Ave	Forest St	1
Worcester	Salisbury St	Park Ave	Lancaster St	1
Worcester	Shrewsbury St	Washington Sq	East Central St	1
Worcester	Shrewsbury St	Casco St	Route 9	1
Worcester	Southbridge St	Hammond St	College St	1
Worcester	Vernon St	Dorchester St	Winthrop St	1

Field Verification: Observations & Analyses

Moving forward, observations in the field will periodically be used to verify the above-listed Traffic Bottleneck locations in the region. Primarily, Travel Time & Delay studies will be used to verify the Traffic Bottleneck locations targeted by the regional travel demand model. Additionally, if needed, staff will collect field data and conduct various planning analyses for the identified Traffic Bottleneck locations. The resulting products could include:

- Intersection Turning Movement Counts (TMCs) during the peak travel periods
- Signalized intersection LOS analysis
- Travel Time & Delay Studies, GPS-based
- Intersection inventories including field-observed signal timing & phasing
- Digital photographs and/or drone imagery taken in the field (visualization purposes)

Observations in the field and subsequent analyses could potentially result in the development of a range of suggested improvement options for further consideration by MassDOT and the host communities.

Suggested Improvement Options

After reviewing the LBRP analysis results for a given location, suggested improvement options aimed at reducing and eliminating the identified bottlenecks will be formulated for consideration by MassDOT and the host communities. Based on FHWA/FTA's call for "low-cost

countermeasures" or solutions, a broad range of improvement options would be considered, with the primary intent of identifying workable, low-cost Transportation System Management (TSM) improvements eligible for federal-aid funding. TSM improvements are low-cost by nature, ranging from $100 to $500K, and can often be implemented within the existing right-of-way.

Other generalized approaches to reducing and eliminating bottleneck conditions include the following:

- Provide alternatives as to how, when, where and whether to travel through established traveler information outlets.
- Improve management and operation of the highway system, as well as intermodal connections, including consideration of access management techniques.
- Consider highway capacity expansion such as intersection turning lanes or general-purpose travel lanes of minimal length.

Next Steps: CMMPO TIP Development Process

The results of the LBRP may lead to the development of projects funded through the CMMPO's annual Transportation Improvement Program (TIP). These potential improvement projects would need to compete with others deemed eligible for programming on the TIP's highway-related project listing. Further, performance-based planning requirements will seek those projects with the highest potential measurable return for invested improvement funding. Additionally, the "Complete Streets" approach will also be employed to consider all roadway users.

The intent of seeking low-cost solutions is that projects generated by the LBRP could use the balance of any unencumbered regional federal-aid target funding. The CMMPO strives to effectively spend all target funding available to the region each fiscal year. Certainly, depending on prevailing conditions, high-cost solutions may be the only viable improvement alternatives. When the annual TIP project listing is developed and amended/adjusted, the CMMPO considers a range of factors, including, as mentioned, performance-based screening as well as project cost and readiness status.

5.7 Bicycle and Pedestrian Counts

When conducting a TMC, in addition to vehicles, bicycle and pedestrian activity is also recorded at an intersection. **Table 11** includes data from 2016 to 2025 and shows the number of bicycles and pedestrians that traveled through the CMP study intersections during the count. In the field, data is collected for each street included in the TMC. However, the table simply shows the overall numbers in the AM and PM time periods. This data is important to capture because it can affect vehicle delays at the study intersection. The bicycles and pedestrians crossing the roadways can often cause vehicles to stop and allow them to cross. Additionally, a lot of signalized intersections have dedicated pedestrian phases as part of the traffic signal cycle that, if triggered, could potentially reduce the green time available to the vehicles.

Table 11
Bicycle & Pedestrian Activity at TMC Locations

Community	Count Location	Date of Count	AM 7:00 - 9:00		PM 4:00 - 6:00		Total Bikes	Total Pedestrians
			Bikes	Pedestrians	Bikes	Pedestrians		
Auburn	Auburn Street/Brotherton Way	10/26/2023	0	2	0	6	0	8
Auburn	Auburn Street & Oxford Street North	9/21/2023	0	8	1	15	1	23
Auburn	Auburn Street & Vine Street & I-290 Off Ramp	10/17/2023	1	9	14	9	15	18
Auburn	Route 12 & Auburn Street	10/19/2023	0	2	0	6	0	8
Auburn	Route 12/Brotherton Way/Swanson Road	10/8/2019	0	4	1	17	1	21
Auburn	Route 12/Faith Avenue/Goulding Street	10/4/2018	1	1	1	4	2	5
Auburn	Route 12/Oxford Street	9/5/2019	1	6	0	4	1	10
Auburn	Route 12 & Prospect Street	9/9/2021	0	0	0	0	0	0
Auburn	Route 12/Route 20 (eastern section)	7/18/2017	0	0	0	0	0	0
Auburn	Route 20/Prospect Street	5/22/2018	0	0	0	0	0	0
Berlin	Route 62 & Gates Pond Road	5/24/2022	0	0	0	3	0	3
Berlin	Route 62 & I-495 NB Ramps	5/4/2022	0	2	1	1	1	3
Berlin	Route 62 & I-495 SB Ramps	6/1/2022	0	0	2	3	2	3
Berlin	Route 62 & Linden Street	6/7/2022	3	1	13	23	16	24
Berlin	Route 62 & Pleasant Street	5/17/2022	0	1	1	0	1	1
Berlin	Route 62 & Barnes Rd & Derby Rd & West St	6/7/2022	2	6	6	4	8	10
Blackstone	Blackstone Street/Summer Street	5/29/2018	0	2	1	1	1	3
Blackstone	Lincoln Street/Mendon Street	10/16/2018	1	3	13	5	14	8
Blackstone	Route 122/St Paul Street	9/10/2019	0	11	3	18	3	29
Boylston	Central Street/Cross Street	5/10/2018	2	4	2	2	4	6
Boylston	Route 140 & Route 70	10/16/2025	1	0	2	0	3	0
Charlton	Route 169/Route 20	6/21/2016	0	0	0	0	0	0
Charlton	Route 20/Route 31	6/28/2016	0	1	0	0	0	1
Douglas	Gilboa Street & North Street	6/17/2021	0	3	2	2	2	5
Dudley	Airport Road & Dudley Hill Road & Tanyard Road	5/23/2023	0	1	2	7	2	8
Dudley	Dudley-Oxford Road & Sheppard Hill HS	5/31/2023	0	3	0	2	0	5
Dudley	Route 12/Route 197/Village Street	5/23/2023	1	1	3	2	4	3
East Brookfield	Route 9/North Brookfield Road	7/7/2016	1	5	1	6	2	11
Grafton	Route 122/Milford Road	5/31/2017	1	0	0	1	1	1
Grafton	Route 140/Route 30	6/30/2016	3	9	2	6	5	15
Holden	Route 122A/Route 68	7/19/2016	3	2	4	4	7	6
Holden	Route 122A/Salisbury Street	8/25/2016	2	9	2	7	4	16
Holden	Route 31/Manning Street	10/8/2019	1	0	2	0	3	0
Hopedale	Route 16 & Hopedale Street	5/4/2023	0	4	3	16	3	20
Leicester	Route 56/Marshall Street	7/28/2016	2	0	4	1	6	1
Leicester	Route 56/Pleasant Street	8/1/2017	0	0	1	0	1	0
Leicester	Route 56/Stafford Street	6/14/2017	1	0	1	2	2	2
Leicester	Route 9/North Main Street	8/30/2017	1	1	2	4	3	5
Leicester	Route 9 & Route 56	6/9/2021	2	10	2	13	4	23
Mendon	Providence Road & Hartford Avenue East	4/5/2023	3	4	1	0	4	4
Mendon	Route 140/Hartford Avenue East	7/12/2016	1	0	3	0	4	0
Mendon	Route 16/Hartford Avenue West	6/27/2017	0	0	1	0	1	0
Mendon	Route 16 & Main Street & North Street	9/15/2021	0	5	0	5	0	10
Millbury	Route 146 SB Ramp/Main St/McCracken Rd	5/24/2018	0	2	0	2	0	4
Millbury	Route 146 NB Ramp/Main Street	5/16/2018	0	10	12	15	12	25
Millbury	Route 122/MassPike Entrance	6/14/2016	1	3	0	3	1	6
Millbury	Route 122/Wheelock Avenue	6/15/2016	0	13	1	2	1	15
Northborough	Route 20/West Main Street	6/20/2017	0	1	4	2	4	3
Northborough	Route 20 & Church Street	2/9/2023	1	9	0	3	1	12
Northborough	Route 20 & Hudson Street & Patty Lane	1/5/2023	0	2	0	8	0	10
Northborough	Route 20 & Route 135	1/5/2023	0	2	0	2	0	4
Northbridge	Church Street/Linwood Street/Main Street	8/10/2017	1	6	4	12	5	18
Northbridge	Douglas Street/Hill Street/Main Street	8/1/2017	6	10	4	9	10	19
Northbridge	Route 122/Church Street	7/14/2016	4	1	2	4	6	5
Northbridge	Route 122/School Street	8/11/2016	3	4	3	8	6	12
Northbridge	Route 122/Sutton Street/Upton Street	8/9/2016	2	4	1	5	3	9
Oxford	Route 12/Route 20 (western section)	7/27/2017	0	0	0	0	0	0
Oxford	Route 12 & Charlton Street & Sutton Avenue	10/21/2025	0	13	14	18	14	31
Oxford	Route 12 & Cudworth Road	10/22/2025	0	1	0	3	0	4
Oxford	Sutton Avenue & Joe Jenny Road	6/2/2021	0	0	0	0	0	0

Community	Count Location	Date of Count	AM 7:00 - 9:00		PM 4:00 - 6:00		Total Bikes	Total Pedestrians
			Bikes	Pedestrians	Bikes	Pedestrians		
Oxford	Sutton Avenue & Lovett Road & Plaza	6/16/2021	0	5	1	0	1	5
Paxton	Route 122/Route 31	10/4/2018	0	9	0	0	0	9
Rutland	Route 122A & Fishermans Road	5/21/2025	0	0	0	0	0	0
Rutland	Route 122A & Glenwood Road	5/20/2025	0	0	0	0	0	0
Rutland	Route 122A & Kenwood Drive	5/20/2025	0	1	2	1	2	2
Rutland	Route 122A & Pleasantdale Road	5/21/2025	0	0	0	0	0	0
Rutland	Route 122A & Route 56 (Maple Avenue)	5/1/2025	0	4	0	2	0	6
Rutland	Route 122A & Route 56 (Pommogussett Road)	5/1/2025	0	18	10	20	10	38
Rutland	Route 122A & Route 122	5/29/2025	0	0	0	0	0	0
Shrewsbury	Main Street & N Quisig Ave & Holden Street	9/16/2021	2	2	1	1	3	3
Shrewsbury	Main Street & Maple Avenue	9/22/2022	1	11	1	4	2	15
Shrewsbury	Main Street & Ireta Road & Old Mill Road	3/17/2022	0	3	0	10	0	13
Shrewsbury	Route 140 & Grafton Street	11/14/2024	0	0	2	4	2	4
Shrewsbury	Route 140 & Main Street	9/17/2024	3	11	9	23	12	34
Shrewsbury	Route 20 & Cherry Street & Centech Boulevard	9/19/2024	0	0	0	1	0	1
Shrewsbury	Route 20/Grafton Street	11/14/2024	0	1	0	4	0	5
Shrewsbury	Route 20 & Lake Street	9/17/2024	9	2	1	6	10	8
Shrewsbury	Route 20 & Valente Drive & Plaza	11/14/2024	0	1	0	1	0	2
Shrewsbury	Route 20 & Walnut Street	10/8/2024	0	0	0	1	0	1
Shrewsbury	Route 20 & Green Street & South Street	6/4/2025	0	0	0	0	0	0
Shrewsbury	Route 9/Harrington Avenue/Svenson Road	9/20/2018	3	6	11	23	14	29
Shrewsbury	Route 9 & Lake Street	10/20/2021	0	0	0	5	0	5
Shrewsbury	Route 9 & Maple Avenue	9/22/2022	0	3	0	2	0	5
Shrewsbury	Route 9/N&S Quinsigamond Avenue	8/24/2017	3	15	4	33	7	48
Shrewsbury	Route 9/Oak Street	8/22/2017	0	2	1	6	1	8
Shrewsbury	Route 9/South Street	9/27/2018	0	1	1	7	1	8
Southbridge	Route 131/Marcy Street	6/13/2018	1	44	7	85	8	129
Southbridge	Route 131/South Street	5/30/2018	0	11	1	38	1	49
Southbridge	Route 131/Route 198/Central Street	8/2/2016	1	33	14	62	15	95
Spencer	Route 9 & Route 31 (Maple Street)	9/8/2021	1	13	1	11	2	22
Spencer	Route 9 & Route 31 (Pleasant Street)	9/8/2021	0	21	0	23	0	44
Sturbridge	Route 20/Route 148/Holland Road	9/1/2016	0	0	2	8	2	8
Sturbridge	Route 20/Route 148/Holland Road	10/10/2018	0	4	3	4	3	8
Sturbridge	Route 20/Arnold Road	10/10/2018	1	6	4	11	5	17
Sturbridge	Route 20/Route 131/Fairground Road	11/8/2018	0	3	1	5	1	8
Sturbridge	Route 20/Stallion Hill Road	10/18/2018	0	9	3	5	3	14
Sturbridge	Route 30/Cedar Street	10/16/2018	0	4	1	3	1	7
Sutton	Central Turnpike & Purgatory Road	5/13/2021	0	0	2	1	2	1
Sutton	Central Turnpike & Putnam Hill Road	6/9/2021	0	0	3	0	3	0
Sutton	Central Turnpike & West Sutton Road	5/19/2021	2	2	3	2	5	4
Sutton	Route 122A/Boston Road	5/19/2016	2	0	3	3	5	3
Sutton	Route 146/Boston Road	10/5/2017	0	0	0	0	0	0
Upton	Hight / Hopkinton / School / Westboro	10/13/2022	2	0	1	0	3	0
Upton	Maple Avenue & Pleasant Street	6/4/2025	1	3	6	8	7	11
Upton	Route 140 & Hartford Avenue & Maple Street	11/2/2022	2	5	10	13	12	18
Uxbridge	Route 122 & Hartford Avenue	10/12/2022	0	3	3	3	3	6
Uxbridge	Route 122/Route 146A	6/19/2018	0	0	0	0	0	0
Uxbridge	Route 122/Route 16 (Mendon Street)	10/1/2019	2	1	5	22	7	23
Uxbridge	Route 122/Route 16 Douglas Street)	10/1/2019	1	7	6	5	7	12
Webster	Route 12 & Lake Street	6/6/2023	3	8	0	9	3	17
Webster	Route 12/Park Avenue/Slater Street	6/21/2018	6	8	16	55	22	63
West Boylston	Route 12/Franklin Street	6/7/2018	11	3	4	0	15	3
West Boylston	Route 12/Route 110	7/11/2017	0	0	3	3	3	3
West Boylston	Route 12/Route 140/Central Street	6/12/2018	1	0	4	5	5	5
West Boylston	Route 12/Woodland Street	6/28/2017	1	0	5	0	6	0
West Boylston	Route 140/Laurel Street	5/24/2016	0	0	0	0	0	0
West Boylston	Route 140/Franklin Street	6/7/2018	3	1	5	3	8	4
Westborough	Connector Road/Research Drive	6/22/2017	0	3	0	0	0	3
Westborough	Route 135/Upton Road	6/23/2016	2	1	6	0	8	1
Westborough	Route 135/Fisher Street	6/21/2018	1	5	5	21	6	26
Westborough	Route 30/Flanders Road	5/17/2018	5	14	4	12	9	26
Westborough	Route 30/Bay State Commons/Prospect Street	11/8/2017	3	13	2	24	5	37
Westborough	Route 30/Bay State Commons/State Street	11/29/2017	1	9	0	8	1	17

Community	Count Location	Date of Count	AM 7:00 - 9:00		PM 4:00 - 6:00		Total Bikes	Total Pedestrians
			Bikes	Pedestrians	Bikes	Pedestrians		
Westborough	Route 30/Union Street	11/7/2017	0	9	0	16	0	25
Westborough*	Route 30/Church Street/School Street	11/2/2017	2	36	7	44	9	80
Westborough	Route 30 & Lyman Street	10/7/2025	3	17	12	18	15	35
Westborough	Route 9 & Lyman Street	4/13/2022	0	6	2	7	2	13
Westborough	Route 9 & Otis Street	9/21/2022	2	1	2	2	4	3
Worcester	Cambridge Street/Southbridge Street	11/6/2019	4	15	13	29	17	44
Worcester	Chandler Street & May Street (North Intersection)	5/16/2023	0	6	1	6	1	12
Worcester	Chandler Street & May Street (South Intersection)	5/16/2023	0	0	4	7	4	7
Worcester	Chandler Street/Mill Street	5/17/2016	1	42	9	21	10	63
Worcester	Chandler Street/Mower Street/Pleasant St	8/30/2016	3	23	7	17	10	40
Worcester	Drummond Avenue & Holden Street & Shore Drive	12/6/2023	0	3	0	3	0	6
Worcester	Franklin Street & Grafton Street (Route 122)	5/18/2023	4	48	4	63	8	111
Worcester	Foster Street/Front Street	6/4/2019	12	125	19	119	31	244
Worcester	Foster St & Franklin St & Green St & Francis J	7/17/2025	20	143	9	105	29	248
Worcester	Forest Street/Salisbury Street	5/8/2018	0	4	3	0	3	7
Worcester	Hammond Street & Southbridge Street	10/9/2025	2	30	14	46	16	76
Worcester	Highland Street/Park Avenue	5/31/2018	5	42	11	38	16	58
Worcester	Lake Avenue & Sunderland Road	9/24/2025	0	5	1	7	1	12
Worcester	Mill Street/Park Avenue	8/29/2017	1	20	10	34	11	54
Worcester	Millbury Street & McKeon Road & Providence St	7/24/2025	0	11	0	18	0	29
Worcester	Riverside Street/Southbridge Street	9/7/2017	2	6	7	20	9	26
Worcester	Route 12 & Bourne Street	4/9/2024	5	6	0	15	5	21
Worcester	Route 12 & Brooks Street & Greendale Avenue	5/30/2024	0	4	7	15	7	19
Worcester	Route 12 & E & W Mountain Street	5/8/2024	1	5	0	9	1	14
Worcester	Route 12 & I-190 Ramps	6/5/2024	0	0	0	0	0	0
Worcester	Route 12 & New Bond Street	6/6/2024	0	9	2	10	2	19
Worcester	Route 12 & QCC	5/9/2024	1	3	1	15	2	18
Worcester	Route 12 & Walgreens & Stop and Shop Plaza	5/22/2024	0	7	1	14	1	21
Worcester	Route 9/Lake Avenue	7/26/2016	13	27	12	31	25	58
Worcester	Route 9 & Ludlow Street	10/23/2025	0	7	1	5	1	12

*This count was completed between 6-9am & 3-6pm

5.8 WRTA Fixed-Route Transit

For transit data, staff used on-time performance of the fixed-route buses to further determine congested roadway segments. In the Fall 2025, the WRTA implemented a new CAD/AVL system in their fixed route buses. The data looks at the on-time performance for each bus route and both the inbound and outbound directions. The WRTA's goal is to have 80% on-time performance system wide. Once the new CAD/AVL has been fully integrated and has been in operation for six months, the new AVL data will be used to re-adjust routes if needed. A table showing that on-time performance for each route is included in Chapter 6.

5.9 Traffic Volumes

CMRPC conducts mechanical traffic counts on numerous federal-aid roadways within the Central Massachusetts region. These Automatic Traffic Recorders (ATRs) can collect volume data, as well as vehicle classification data. **Figure 11** shows the most recent overall traffic volume flows for the CMRPC region. Each color on the map represents a different level of volume. Interstate volumes are not included.

As previously noted, staff also collect vehicle classification data while conducting volume counts. **Figure 12** shows the percentage of heavy vehicles on the major roadway network in the CMRPC region. Each color represents a different range of heavy vehicle percentages. Heavy vehicles are slower than typical cars so the higher number of heavy vehicles could potentially cause congestion.

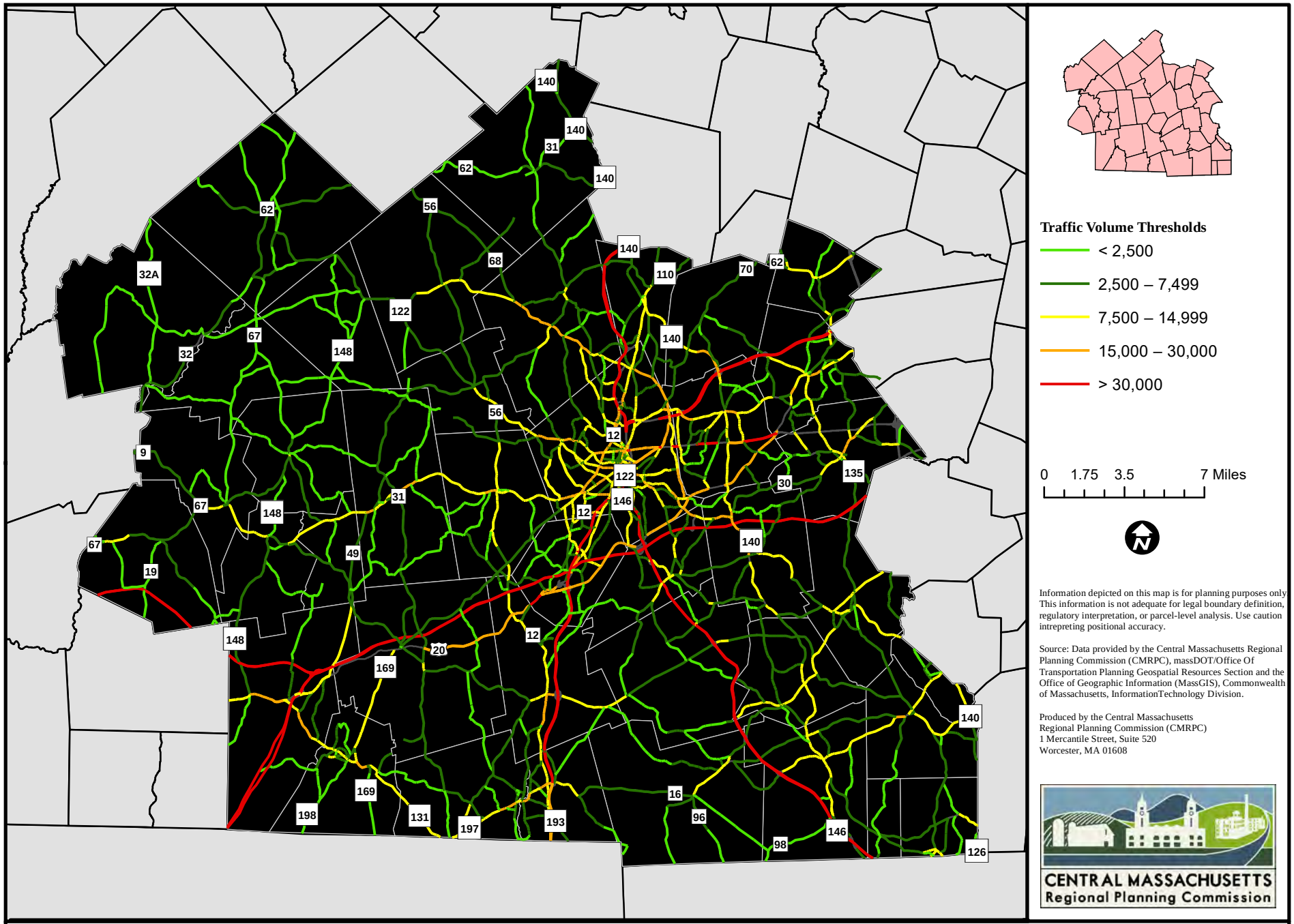

Figure 11: Most Recent Traffic Volume Flows, CMRPC Region

Date: 3/11/2026

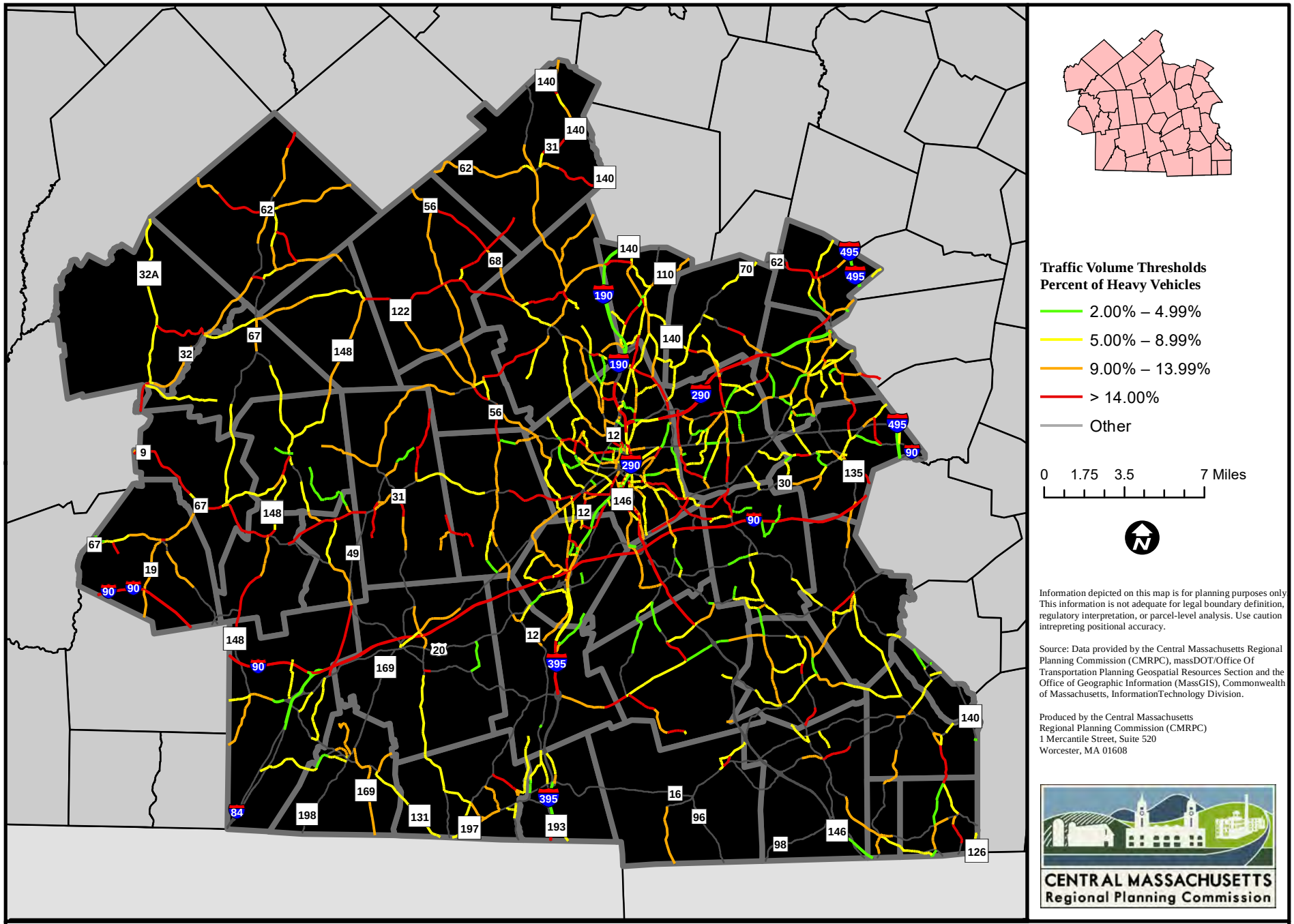

Figure 12: Heavy Vehicle Percentages, CMRPC Region

Date: 3/11/2026

5.10 Safety

Safety data can also be used to identify congested roadways. Vehicle crashes can cause congestion along roadways or at intersections due to other vehicles not being able to pass by the vehicles involved in the crash. Depending on the severity of the crash, police and/or paramedics might need to respond, so that will also add to the possibility of congestion. For this document, staff decided to use the State's "Top 200 Crash Locations" to identify congested areas. The intersections included on the list located in Central Massachusetts are shown in Chapter 6.

5.11 Accessibility

In terms of economic impacts in the region, access to jobs data can be used to determine how congestion affects access to jobs. Congestion impedes accessibility by making it harder to travel and reach places in a reasonable amount of time. This means people have less access to jobs and the other things they want or need within a reasonable amount of time. This is true both for those cars and for those on surface transit vehicles like buses. The more congestion there is on the roadways the shorter the distance a vehicle can travel in the desired amount of time and jobs could be lost because of the long travel times.

For this CMP, data was analyzed based on the number of jobs accessible from each Census block group in the state. The data used was the difference between jobs reachable within a 45-minute trip time via auto at 2am (during free flow conditions) and jobs reachable at 8am (during the peak period). The results from this analysis are shown in Chapter 6.

5.12 Travel Time Reliability

Travel time reliability is another data set that can be used to identify congestion. The data used comes from the National Performance Management Research Data Set (NPMRDS) and it is a vehicle probe-based travel time data set that was acquired by the Federal Highway Administration (FHWA) for its use in various performance measurement programs, such as its Freight Performance Measures, Urban Congestion Report, and other programs. The NPMRDS is also provided to state departments of transportation (DOTs) and metropolitan planning organizations (MPOs) for their performance management activities.

INRIX is responsible for creating the NPMRDS dataset of calculated speeds and travel times for over 400,000 specific road segments across the NPMRDS Road Network every 5-minutes of each day. INRIX leverages its existing source data that includes millions of connected vehicles, trucks, and mobile devices that anonymously supply location and movement data that is used by INRIX to generate real-time traffic speeds and travel times across the nation's key roadways.

The Level of Travel Time Reliability (LOTTR) is based on the amount of time it takes to drive the length of a road segment and is defined as the ratio of the 80th percentile travel time of a reporting segment to a "normal" travel time (50th percentile), using the NPMRDS data. Data is collected in 15-minute segments between 6am and 8pm. If the calculated ratio for all time periods is below 1.50 then the segment is considered reliable. The graphic below is an example of how segments are calculated for their reliability.

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 the time periods		**Segment is not reliable**

The following **Figure 13** shows the LOTTR ratio for each roadway segment on Interstate and Non-Interstate National Highway System (NHS) roadways in the CMPRC region that contains data from the NPMRDS. The data is also shown for each travel direction. The reliability analysis is based on data from 2025. In the next chapter, the roadway segments that are not reliable will be discussed.

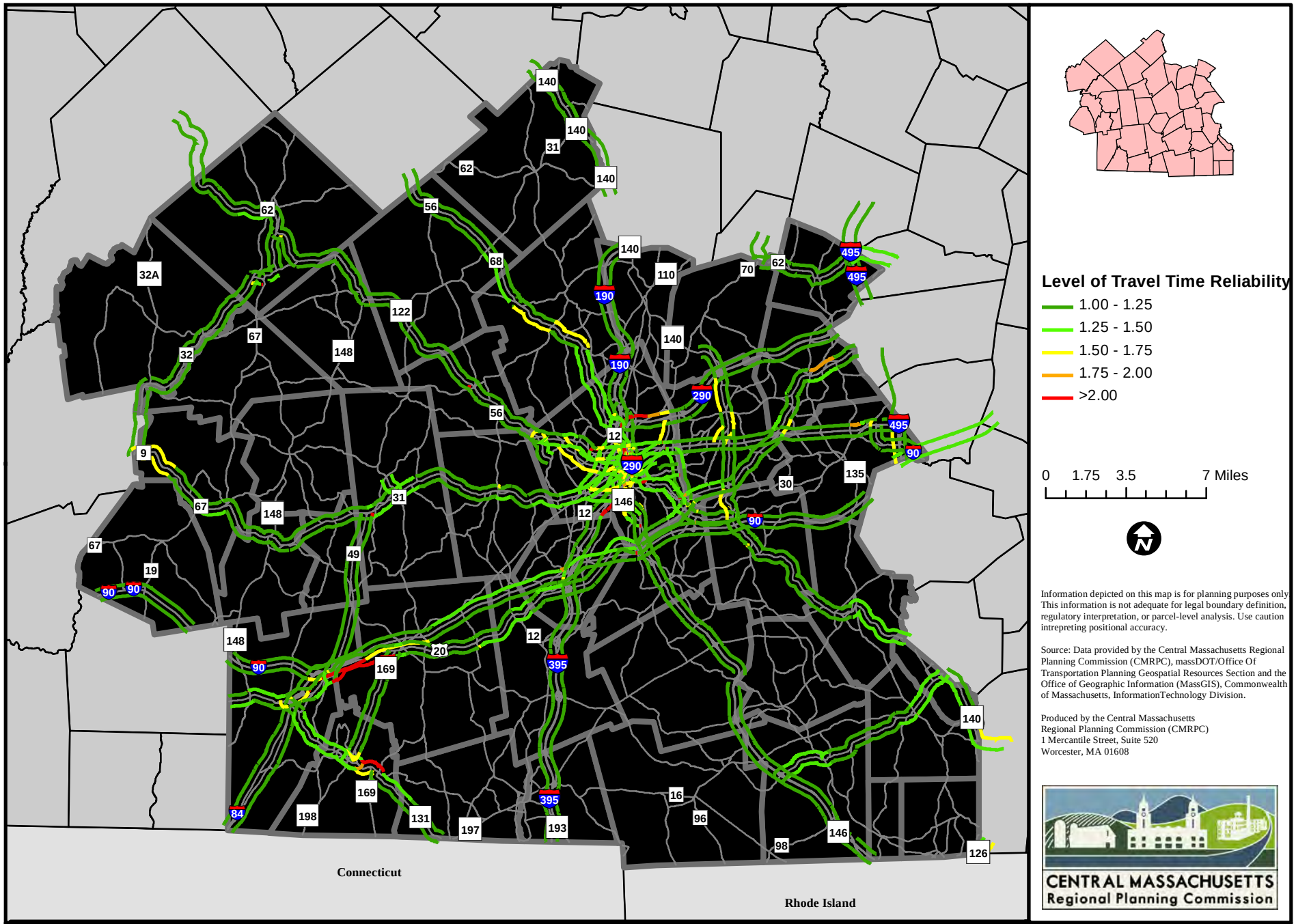

Figure 13: Level of Travel Time Reliability in the CMRPC Region

Date: 1/5/2026

5.13 MBTA Ridership

In addition to the bicycle, pedestrian, safety, WRTA, and several types of vehicle data, MBTA ridership data is included in this CMP. Logically, the higher the ridership is on the MBTA train, the fewer vehicles that are on the road. Providing other travel options instead of cars can be helpful in determining and alleviating congestion. There are numerous trains heading from Worcester to Boston each day during the week. **Table 12** includes the average weekday inbound ridership data from Fall 2024 for the MBTA stations in Worcester, Grafton, Westborough, and Southborough. As the data shows, the majority of the boardings are at the Worcester station.

Table 12
MBTA Average Weekday Inbound Ridership Data

Station Location	Average Weekday Inbound Boardings
Worcester	1,139
Grafton	337
Westborough	370
Southborough	404

6.0 Congestion Problems & Needs

Once collected, raw data must be translated into meaningful measures of performance. Before congestion management strategies can be identified, it is necessary to identify what the problems are, where they are located, and why they are occurring. These actions serve as a critical link between data collection and strategy identification. There are several challenges that should be considered when analyzing data for the purpose of defining or locating congestion problems. They include the location of major trip generators, seasonal traffic variations, time of day traffic variations, and work trips vs. non-work trips. Once the data has been analyzed to allow for comparisons between the various levels of congestion, staff will begin to apply the threshold levels from the performance measures chapter to determine congested locations.

6.1 Travel Time and Delay Studies: Roadway Segments

Based on travel time data collected between 2016 and 2025, **Table 13** shows those roadways that have at least one peak period exceeding five minutes of average congested time for one direction of travel. Congested time is when vehicle speeds are below 20 mph or 60% of the posted speed limit. Of the 58 CMP-identified roadway segments studied during the 10-year period, there were 11 segments found to fit the screening criteria. Eight of the congested roadways are in the City of Worcester as well as one each in Holden, Webster, and Westborough. Even though most of the travel time and delays studies have at least some measurable amounts of congested time, staff decided to use a five-minute threshold to identify those roadways with the highest amount observed congestion.

Table 13
Travel Time & Delay Studies
Top Congested Roadway Segments
2016 - 2025

Community	Street	From	To	Time Period	Study Year	Travel Direction	Average Travel Time*	Average Travel Speed**	Average Congested Time***
Holden	Route 122A	Worcester CL	Rutland TL	AM (PM)	2016	NB	12.4 (12.6)	33 (33)	1.6 (1.3)
						SB	16.3 (12.6)	25 (33)	5.7 (1.3)
Webster	Route 12/16	Douglas TL	Dudley TL	AM (PM)	2017	EB	9.3 (10.4)	28 (25)	2.4 (3.7)
						WB	9.6 (12.9)	27 (20)	2.7 (6.4)
Westborough	Route 135/Upton Rd	Northborough TL	Upton TL	AM (PM)	2017	NB	26.5 (10.4)	12 (31)	6.5 (1.6)
						SB	21.7 (10.1)	15 (32)	3.0 (1.2)
Worcester	Burncoat St	Lincoln St	E Mountain St	AM (PM)	2025	NB	6.7 (6.8)	23 (23)	2.5 (2.3)
						SB	6.6 (9.3)	23 (17)	1.9 (5.0)
Worcester	Highland St	Newton Sq	Lincoln Sq	AM (PM)	2016	EB	6.0 (6.9)	13 (11)	3.9 (5.2)
						WB	5.4 (10.8)	15 (7)	3.1 (9.3)
Worcester	I-290	Shrewsbury TL	Auburn TL	AM (PM)	2018	EB	13.9 (6.8)	29 (59)	6.7 (0.0)
						WB	6.8 (15.4)	59 (26)	0.0 (8.1)
Worcester	Main St	Thomas St	Park Ave	AM (PM)	2024	NB	9.6 (12.0)	16 (13)	5.4 (8.6)
						SB	10.4 (13.5)	15 (11)	6.3 (10.0)
Worcester	Park Ave	Main St	Grove St	AM (PM)	2017	NB	15.3 (13.2)	13 (14)	10.0 (8.0)
						SB	11.2 (18.6)	17 (10)	5.7 (13.8)
Worcester	Pleasant St	Mower St	Newton Sq	AM (PM)	2016	EB	9.2 (5.5)	15 (25)	5.8 (1.4)
						WB	5.8 (5.9)	24 (23)	1.9 (1.9)
Worcester	Route 122	Washington Sq	Millbury TL	AM (PM)	2023	NB	11.6 (13.5)	18 (16)	5.5 (7.1)
						SB	10.9 (11.7)	19 (18)	4.7 (5.4)
Worcester	West Boylston St	Park Ave	West Boylston TL	AM (PM)	2019	NB	9.3 (10.0)	25 (24)	2.6 (3.2)
						SB	10.3 (11.8)	23 (20)	3.5 (5.2)

*Average travel time in minutes
**Average travel speed in miles per hour (mph)
***Average time in minutes for which a vehicle travels below 20 mph

6.2 Turning Movement Counts: Intersections

For all intersections where Turning Movement Counts are obtained, it is possible to analyze the total delay encountered during the examined peak hour periods. A byproduct of the process that results in intersection LOS grades is the "average delay encountered for entering vehicles". When multiplied by the number of vehicles to which the delay pertains, one can arrive at a total amount of delay, or time in "car-minutes". A car-minute is one car waiting for one minute, presumably idling and producing emissions as well as adding to total social and economic costs. Five cars waiting for a minute each, or one car waiting for a total of five minutes, results in the same theoretical total waiting time cost and would be measured and quantified by a total net delay of five car-minutes. **Table 14** shows the top 20 critical intersections with the most encountered delay. Of the 20 intersections listed, 19 are controlled by traffic signals while only one is "Stop" sign controlled. The top two intersections have more than 10,000 car-minutes of total peak hour delay. In comparison, the 20th ranked intersection has 3,697 car-minutes of total peak hour delay, which is more than 7,000 minutes less than the 1st ranked intersection. The communities of Millbury, Shrewsbury, Westborough, and Worcester each have more than one intersection on the list.

Another technique used to analyze congestion is calculating Level of Service (LOS). This is a way to determine how efficiently an intersection processes vehicles through the intersection. Data is analyzed for both the AM and PM peak flow periods. A LOS of "E" or "F" is considered congested. **Table 15** shows only those intersections that have a LOS of "E" or "F" for either the AM or PM peak period. The listed intersections are separated between signalized and "Stop" sign controlled. The LOS grade and amount of delay is for the highest volume direction under "Stop" sign control. For signalized intersections, the LOS grade and delay is an average of the whole intersection. There are a total of 46 intersections included in the table of which 19 exhibit a LOS of "E" or "F" for both peak periods.

TABLE 14
TOP 20 CRITICAL INTERSECTIONS OF ENCOUNTERED DELAY

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
1	Sturbridge	Route 20 / Route 148 / Holland Rd	Signal	7:00 - 8:00am 4:45 - 5:45pm	10/10/2018	465978 256456	**12040**
2	Millbury	Route 122 / Mass Pike	Signal	7:15 - 8:15am 5:00 - 6:00pm	6/14/2016	308259 390555	**11647**
3	Westborough	Route 9 / Lyman St	Signal	7:30 - 8:30am 4:45 - 5:45pm	4/13/2022	196020 326887	**8715**
4	Auburn	Route 12 / Swanson Rd / Brotherton Wy	Signal	8:00 - 9:00am 4:30 - 5:30pm	10/8/2019	432221 86133	**8639**
5	Worcester	Foster St / Front St	Signal	7:30 - 8:30am 4:30 - 5:30pm	6/4/2019	329603 174301	**8398**
6	Mendon	Route 140 / Hartford Ave	Signal	7:15 - 8:15am 4:30 - 5:30pm	7/12/2016	43740 419463	**7720**
7	Millbury	Main St / McCracken Rd / Rte 146 SB Ramp / Shoppes	Signal	8:00 - 9:00am 5:00 - 6:00pm	5/24/2018	30694 428898	**7660**
8	Shrewsbury	Route 20 / Lake St	Signal	7:30 - 8:30am 4:30 - 5:30pm	9/17/2024	180427 267741	**7469**
9	Spencer	Route 9 / Route 31 (Pleasants St)	Signal	7:45 - 8:45am 5:00 - 6:00pm	9/8/2021	145135 280861	**7100**
10	Shrewsbury	Route 9 / South St	Signal	8:00 - 9:00am 4:30 - 5:30pm	9/27/2018	185810 219347	**6752**
11	Worcester	Cambridge St / Southbridge St	Signal	7:30 - 8:30am 4:30 - 5:30pm	11/6/2019	104696 239039	**5729**
12	Westborough	Route 9 / Otis St	Signal	7:30 - 8:30am 5:00 - 6:00pm	9/21/2022	123904 216972	**5681**
13	Worcester	Belmont St / Lake Ave	Signal	7:15 - 8:15am 4:15 - 5:15pm	7/26/2016	144774 193454	**5637**
14	Sutton	Route 146 / Boston Rd	Signal	7:15 - 8:15am 5:00 - 6:00pm	10/5/2017	154896 167094	**5367**

(1) In car-minutes per hour: The total number of minutes that motorists as a group wait at the intersection during the AM + PM peak hours.

	Community	Intersection	Traffic Control	Identified Peak Hours	Date Counted	Peak Hour Delay	Total Peak Hour Delay[1]
15	Shrewsbury	Route 9 / Harrington Ave / Svenson Rd	Signal	7:15 - 8:15am 4:30 - 5:30pm	9/19/2018	117507 203059	**5342**
16	Shrewsbury	Route 9 / N & S Quinsigamond Ave	Signal	7:15 - 8:15am 5:00 - 6:00pm	8/24/2017	106373 183348	**4829**
17	Worcester	Forest St / Salisbury St	Stop Sign	8:00 - 9:00am 4:30 - 5:30pm	5/8/2018	174725 108850	**4726**
18	Shrewsbury	Route 9 / Lake St	Signal	8:00 - 9:00am 5:00 - 6:00pm	10/20/2021	86579 136166	**3712**
19	Shrewsbury	Route 140 / Main St	Signal	7:30 - 8:30am 4:30 - 5:30pm	9/17/2024	125840 96603	**3707**
20	Westborough	Connector Rd / Research Dr	Signal	7:45 - 8:45am 4:45 - 5:45pm	6/22/2017	76442 145394	**3697**

(1) In car-minutes per hour: The total number of minutes that motorists as a group wait at the intersection during the AM + PM peak hours.

TABLE 15
TMC LOCATIONS WITH A LEVEL OF SERVICE OF "E" OR "F"

CMRPC Community	Turning Movement Count Locations	Count Year[3]	AM Peak Hour Delay[1]	AM Peak Hour LOS[2]	PM Peak Hour Delay	PM Peak Hour LOS
Signalized Intersections						
Auburn	Route 12/Faith Ave/Goulding Dr	2018	12.9	B	55.2	E
	Route 12/Swanson Rd/Brotherton Wy	2019	275.3	F	48.2	D
	Route 20/Prospect St	2018	17.5	B	61.5	E
Charlton	Route 20/Route 169	2016	99.6	F	22.3	C
Mendon	Route 140/Hartford Avenue East	2016	22.5	C	200.7	F
Millbury	Main St/McCracken Rd/Route 146 SB Ramps/Shoppes	2018	37.8	D	162.4	F
	Route 122/I-90 Ramps	2016	139.8	F	165	F
Northborough	Route 20/Church Street	2023	76.2	E	29	C
	Route 20/Hudson St/Patty Ln	2023	59.2	E	17.7	B
Shrewsbury	Route 20/Lake St	2017 & 2024	67.5	E	83.8	F
	Route 9/Harrington Ave/Svenson Rd	2018	39.3	D	58.3	E
Spencer	Route 9/Route 31/Wall St	2021	111.3	F	161.6	F
Upton	Route 140/Hartford Ave/Maple St	2022	71.8	E	24.5	C
Westborough	Connector Rd/ Research Dr	2017	37	D	69.6	E
	Route 30/Prospect St/Bay State Commons	2017	81.2	F	-	-
	Route 9/Lyman St	2022	45	D	66.4	E
Worcester	Foster St/Front St	2019	163.9	F	79.3	E
	Lake Ave/Sunderland Rd	2025	32.3	C	62.2	E
	Southbridge St/Cambridge St	2019	41.3	D	85.8	F
Stop Sign Intersections						
Berlin	Route 62/Barnes Rd/Derby Rd/West St	2022	195.6	F	59.5	F
	Route 62/Gates Pond Rd	2022	23.3	C	85	F
	Route 62/Linden St	2022	30.5	D	93.6	F
	Route 62/Pleasant St	2022	23.3	C	150.4	F
Douglas	Gilboa St/North St	2021	13.9	B	57.1	F
Dudley	Dudley-Oxford Rd/Shepard Hill HS & MS Driveway	2023	300	F	11	B
Holden	Route 122A/Route 68	2016	78.5	F	37.7	E
	Route 31/Manning St	2019	46.4	E	99.1	F
Leicester	Route 9/Main St	2017	50.1	F	54.5	F
Mendon	Providence St/Hartford Ave E	2023	135.7	F	29.4	D
	Route 16/Hartford Avenue West	2017	300	F	268.6	F
Rutland	Route 122A/Route 56 (Maple Ave)	2016 & 2025	38	E	164	F
	Route 122A/Route 56 (Pommogussett Rd)	2016 & 2025	200.7	F	289.9	F
Shrewsbury	Route 20/Valente Dr/Plaza	2024	16.7	C	58	F
	Route 20/Walnut St	2024	116	F	282.1	F
Sturbridge	Route 20/Arnold Rd	2018	41.3	E	78.2	F
Uxbridge	Route 122/Route 146A	2018	35.5	E	16.8	C
West Boylston	Route 12/Franklin St	2018	23.7	C	300	F
Westborough	Route 135/Fisher St	2018	156.1	F	137.9	F
	Route 135/Upton Rd	2016	47.8	E	76.9	F
	Route 30/Church St/School St	2017	300	F	190.8	F
	Route 30/Flanders Rd	2018	290.9	F	289.9	F
	Route 30/State St/Bay State Commons	2017	295.1	F	12.9	B
Worcester	Chandler St/May St (north intersection)	2023	60.2	F	44.2	E
	Chandler St/May St (south intersection)	2023	70.3	F	49.5	E
	Forest St/Salisbury St	2018	300	F	289.5	F

(1) Average delay in seconds.

(2) LOS calculated using HCS7 from McTrans. LOS is based on average intersection delay for signalized intersections. For unsignalized locations, it is based on delay time for the highest volume direction under "Stop" sign control.

(3) If a location has been counted multiple times since 2015 then the most recent Delay and LOS is shown.

6.3 Park and Ride Facilities & MBTA Commuter Rail Lots in the Region

MassDOT-Maintained Park and Ride Facilities

As mentioned in Chapter 5, staff monitors five MassDOT-maintained Park and Ride lots in the CMRPC region. Each lot is checked monthly, and the number of vehicles is recorded to determine the percentage of usage at each lot. Within the last two years (2024-2025), only the Berlin lot has an average usage of over 50% for most of the twelve months, but that lot also has the lowest number of parking spaces with only 45. Based on the measures used in the CMP, none of the Park and Ride lots are considered congested. The lot with the lowest usage is the Sturbridge lot. Since all five Park and Ride lots are well below capacity there is currently no need to increase lot capacity.

MBTA Commuter Rail Lots

As previously mentioned in Chapter 5, staff also collect MBTA Commuter Rail parking lot usage data monthly. The data collection started during the Covid pandemic so staff could monitor the commuter rail usage and continued into 2025. The last two years (2024-2025) of data has shown an increase from previous years. Currently, these three lots are also not considered congested based on the performance measures, with average usage mostly between 50% and 80% for all three lots. Staff will continue to monitor these lots monthly.

6.4 Bottlenecks

As mentioned in Chapter 5, the Travel Demand Model software was used to help identify bottlenecks in the CMRPC region. The analysis was based on the number of "Origin/Destination" (O/D) pairs using the highway network. As the entire listing of potential bottleneck locations were shown in Chapter 5, **Table 16** only includes the "Stage 3" roadway segments, which would be the priority locations. The table includes the community, roadway, and the segment location. Additionally, **Figure 14** shows the locations of the "Stage 3" roadway segment on a map.

In 2021, MassDOT launched a Local Bottleneck Reduction Program to fund innovative solutions to modernize traffic signals and address congestion bottlenecks on local roadways to improve traffic flow. Every municipality in the Commonwealth is eligible to apply. Selection is based primarily on bottleneck related congestion and delay metrics along with other site information such as the age of signal equipment, the state of bicycle and pedestrian infrastructure as it pertains to congestion alleviation, and the frequency of maintenance calls at the proposed intersection. Project design for selected applicants is performed by MassDOT-led consultants funded through the program. Project implementation is conducted entirely by the municipality.

Only roadways and intersections owned and operated entirely by municipalities may be considered. The maximum funding to be provided to a municipality in a single fiscal year is $1,000,000. Municipalities are responsible for any additional costs beyond the awarded amount. Design costs do not count against the construction funding limit. For more information on the program, the website link is located in the previous paragraph.

Table 16

Bottleneck Stage 3 Roadway Segments

Community	Roadway	From	To	Stage #
Auburn	Oxford St N	Route 12	I-290 Off Ramp	3
Auburn	Route 12	Oxford St N	I-90 Ramp	3
Auburn	Route 12	Prospect St	I-290 Ramp	3
Auburn	Route 20	Routes 12/20	Prospect St	3
Auburn	Routes 12/20	Oxford TL	Routes 12/20	3
Douglas	Route 146	Uxbridge TL	Sutton TL	3
Grafton	Route 122	Millbury TL	Bridge St	3
Grafton	Route 140	Route 30	Bridge St	3
Grafton	Routes 122/140	Route 140	Route 122	3
Leicester	Route 9	Spencer TL	Worcester CL	3
Millbury	Route 122	Worcester CL	Grafton TL	3
Millbury	Route 146	Sutton TL	Route 20	3

Community	Roadway	From	To	Stage #
Northborough	Route 9	Shrewsbury TL	Westborough TL	3
Oxford	Cudworth Rd	Route 12	I-395	3
Oxford	Route 12	Webster TL	Cudworth Rd	3
Oxford	Route 20	Pioneer Dr	Auburn TL	3
Paxton	Route 122	Indian Hill Rd	Worcester CL	3
Paxton	Routes 122/56	Grove St	Route 56	3
Princeton	Route 140	Westminster TL	Sterling TL	3
Shrewsbury	Main St	I-290	Old Mill Rd	3
Shrewsbury	Route 9	Worcester CL	Northborough TL	3
Southbridge	Route 131	Sturbridge TL	Hamilton St	3
Spencer	Route 9	Route 31	Leicester TL	3
Sturbridge	Route 131	Route 20	Southbridge TL	3
Sturbridge	Route 20	Stallion Hill Rd	I-90/I-84	3
Sutton	Route 146	Douglas TL	Millbury TL	3
Uxbridge	Route 146	Rhode Island SL	Douglas TL	3
Webster	Bigelow Rd	N Main St	Old Worcester Rd	3
Webster	N Main St	Upland Ave	Bigelow Rd	3
Webster	N Main St	Route 12	E Main St	3
Webster	Old Worcester Rd	Bigelow Rd	Route 12	3
Webster	Route 12	School St	N Main St	3
Webster	Route 12	Old Worcester Rd	Oxford TL	3
Westborough	Route 9	Northborough TL	Route 135	3
Westborough	Route 9	Route 30	I-495	3
Worcester	Cambridge St	Richard St	Canterbury St	3
Worcester	Chandler St	Park Ave	Main St	3
Worcester	Foster St	Green St	Front St	3
Worcester	Francis J McGrath	Myrtle St	Green St	3
Worcester	Gold Star Blvd	Ruthven St	Chadwick St	3
Worcester	Grove St	West Boylston St	Chadwick St	3
Worcester	Hammond St	Southbridge St	Canterbury St	3
Worcester	Highland St	Pleasant St	Park Ave	3
Worcester	Lancaster St	Institute Rd	Salisbury St	3
Worcester	Lincoln St	Route 9	Goldsberry St	3
Worcester	Madison St	Main St	Vernon St	3
Worcester	Park Ave	Highland St	Institute Rd	3
Worcester	Park Ave	Pleasant St	Maywood St	3
Worcester	Pleasant St	Kenilworth Rd	June St	3
Worcester	Route 122	Water St	Millbury TL	3

Community	Roadway	From	To	Stage #
Worcester	Route 122	Paxton TL	Chandler St	3
Worcester	Route 146	I-290	Millbury TL	3
Worcester	Route 9	Park Ave	Shrewsbury TL	3
Worcester	Route 9	Leicester St	Park Ave	3
Worcester	Salisbury St	Lancaster St	Lincoln St	3
Worcester	Southbridge St	Quinsigamond Ave	Hammond St	3
Worcester	Vernon St	Madison St	Dorchester St	3
Worcester	West Boylston St	West Boylston Dr	Grove St	3

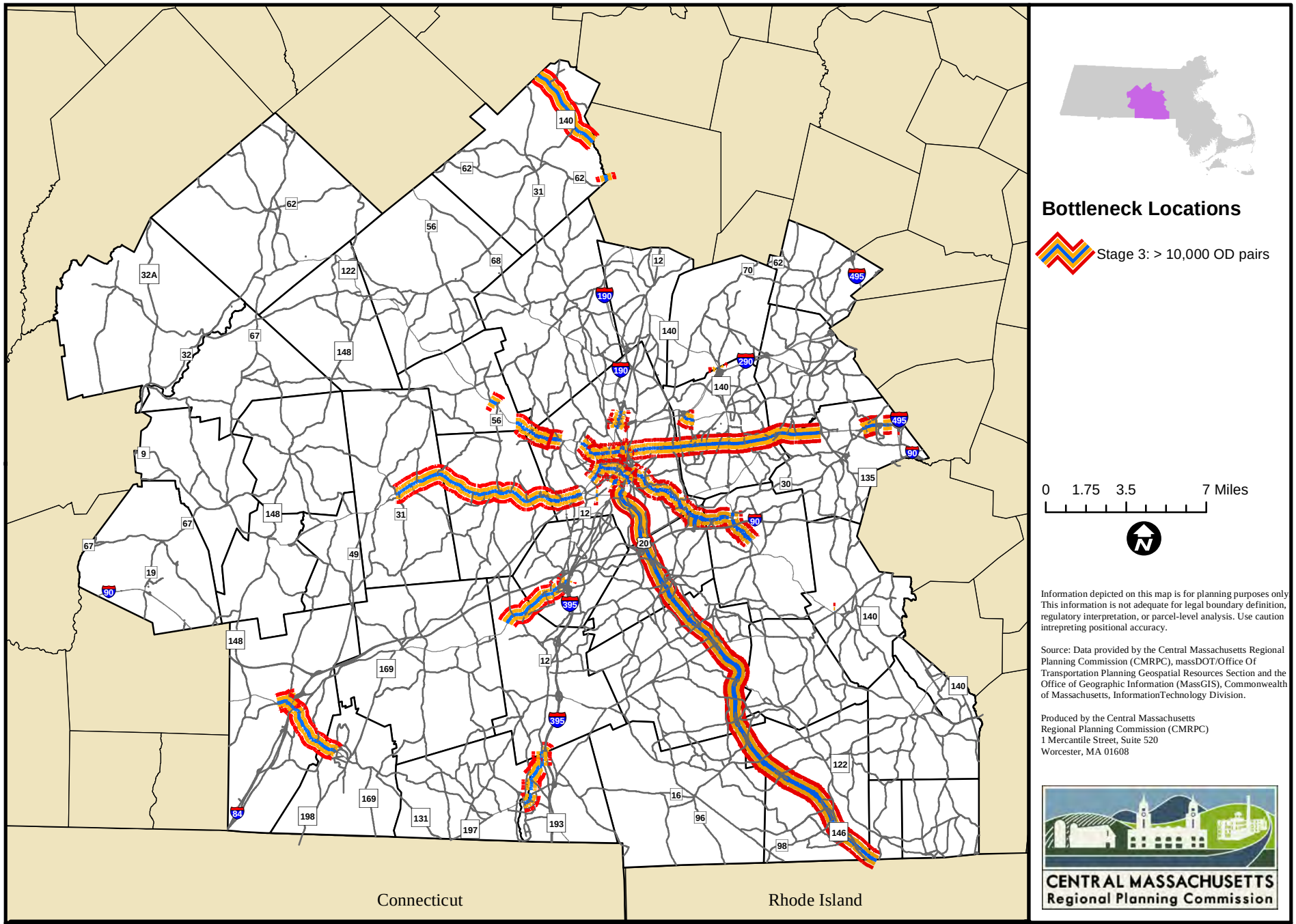

Figure 14 - Bottleneck Priority "Stage 3" Locations

Date: 12/16/2025

6.5 Bicycle & Pedestrian

Bicycle and pedestrian activity at intersections can cause vehicle delays. At signalized intersections, a pedestrian signal could be present to allow pedestrians to cross the roadway during their own phase of the light cycle. Not all signalized intersections have a pedestrian signal. The more frequent a pedestrian phase is activated, the less green time there is for vehicles. Depending on the size of the intersection, the pedestrian phase can typically last anywhere between 10 and 30 seconds. For "Stop" sign-controlled intersections, pedestrians or bicyclists that cross one of the roadways causes vehicles to stop and wait while they finish crossing.

In the previous chapter, there is a table showing the total amount of bicyclists and pedestrians observed at an intersection during a TMC between 2016 and 2025. For this chapter, staff is focusing on the highest activity locations. Any intersection with a total of 50 or more bicyclists and/or pedestrians is included in **Table 17** below. There are 16 intersections included in the table. There are three in Southbridge, two in Westborough, one in Shrewsbury and Webster, while Worcester has nine. All intersections are controlled by a traffic signal except the Route 30/Church Street/School Street intersection in Westborough.

Table 17
Highest Bicycle & Pedestrian Activity Intersections

			AM 7:00 - 9:00		PM 4:00 - 6:00			
Community	Count Location	Date of Count	Bikes	Pedestrians	Bikes	Pedestrians	Total Bikes	Total Pedestrians
Worcester	Foster Street/Front Street	6/4/2019	12	125	19	119	31	244
Southbridge	Route 131/Marcy St	6/13/2018	1	44	7	85	8	129
Worcester	Franklin St & Grafton St (Rte 122)	5/18/2023	4	48	4	63	8	111
Southbridge	Route 131/Route 198/Central St	8/2/2016	1	33	14	62	15	95
Worcester	Hammond Street & Southbridge Str	10/9/2025	2	30	14	46	16	76
Westborough*	Route 30/Church St/School St	11/2/2017	2	36	7	44	9	80
Webster	Route 12/Slater St/Park Ave	6/21/2018	6	8	16	55	22	63
Worcester	Cambridge Street/Southbridge St	11/6/2019	4	15	13	29	17	44
Worcester	Route 9/Lake Ave	7/26/2016	13	27	12	31	25	58
Worcester	Park Ave/Highland St	5/31/2018	5	42	11	38	16	58
Worcester	Chandler St/Mill St	5/17/2016	1	42	9	21	10	63
Worcester	Park Ave/Mill St	8/29/2017	1	20	10	34	11	54
Shrewsbury	Route 9/N&S Quinsigamond Ave	8/24/2017	3	15	4	33	7	48
Southbridge	Route 131/South St	5/30/2018	0	11	1	38	1	49
Westborough	Route 30 & Lyman Street	10/7/2025	3	17	12	18	15	35
Worcester	Chandler St/Mower St/Pleasant St	8/30/2016	3	23	7	17	10	40

*This count was completed between 6-9am & 3-6pm

6.6 WRTA Transit

For transit data, on-time performance of the WRTA fixed-route bus service is used to potentially identify congestion. As mentioned in the previous chapter, the WRTA recently upgraded its CAD/AVL system. **Table 18** shows the on-time performance data for all the bus routes between November 1, 2025 through February 28, 2026. The table includes Route number, Route direction, Average Speed, Average Travel Time, and On-Time Performance Percentage. There are likely numerous factors causing on-time performance results but a couple of could be the amount of ridership for each route and the congestion along the roadway on which the bus routes travel. The goal of the WRTA is to have an 80% on-time performance system wide. The average on-time performance of the system based on the data in the table is 66%. The highest on-time performance is the outbound direction for Route 3 at 81% while the lowest is the outbound direction of Route 7 at 46%.

Table 18
WRTA Fixed-Route On-Time Performance

Route	Route Direction	Avg. Speed (MPH)	Avg. Travel Time (Min.)	On-Time Performance (%)
1	Outbound	12.7	19:07	76%
	Inbound	14.0	21:26	78%
2	Outbound	16.0	19:38	71%
	Inbound	10.7	28:28	69%
3	Outbound	13.3	15:56	72%
	Inbound	12.3	16:30	81%
4	Outbound	18.3	29:11	67%
	Inbound	17.8	30:42	74%
5	Outbound	14.5	18:13	71%
	Inbound	13.9	19:42	78%
6	Outbound	11.8	21:59	67%
	Inbound	11.7	19:39	78%
7	Outbound	11.5	26:13	46%
	Inbound	11.5	24:04	73%
825	Outbound	13.5	40:45	65%
	Inbound	14.3	39:25	54%
11	Outbound	14.4	25:08	61%
	Inbound	14.0	25:47	62%
12	Outbound	13.3	22:34	52%

Route	Route Direction	Avg. Speed (MPH)	Avg. Travel Time (Min.)	On-Time Performance (%)
	Inbound	13.0	23:02	62%
14	Outbound	14.2	27:55	63%
	Inbound	15.0	22:09	64%
15	Outbound	14.3	28:16	67%
	Inbound	15.1	27:43	74%
16	Outbound	15.2	31:31	78%
	Inbound	14.8	29:19	70%
19	Outbound	9.9	23:06	62%
	Inbound	9.3	23:59	65%
23	Outbound	14.3	23:02	68%
	Inbound	13.1	24:44	65%
24	Outbound	12.2	23:10	56%
	Inbound	10.6	26:32	63%
26	Outbound	13.7	20:53	75%
	Inbound	11.7	23:33	74%
27	Outbound	13.0	31:40	69%
	Inbound	12.4	31:19	79%
29	Outbound	24.2	55:03	65%
	Inbound	24.5	51:32	48%
30	Outbound	17.7	24:49	61%
	Inbound	16.5	26:08	61%
31	Outbound	15.7	36:18	60%
	Inbound	15.0	37:56	64%
33	Outbound	17.2	50:58	53%
	Inbound	17.1	51:10	63%
42	Outbound	21.7	52:09	56%
	Inbound	22.3	48:24	69%

6.7 Traffic Volumes and Heavy Vehicle Percentages

Figure 15 shows federal-aid roadways that have traffic volumes of over 15,000 Vehicles Per Day (VPD). The orange lines represent volumes between 15,000 and 30,000 VPD and the red lines are roadways that have volumes of over 30,000 VPD. Most roadways are in the City of Worcester or the adjoining urban communities. The interstates along with sections of Route 9 and US Route 20 as well as the entirety of Route 146 have volumes of over 30,000 VPD. These roadways might not be regularly congested at this time, but due to the high volume of vehicles, there is more probability of recurring congestion than lower volume roads.

Figure 16 shows heavy vehicle traffic volume flow percentages over 10% on non-Interstate highways in the CMRPC region. Unlike the previous traffic volumes map, these roadways are not just located in urban areas. There are roadways in most of the CMRPC communities that have a high percentage of heavy vehicles.

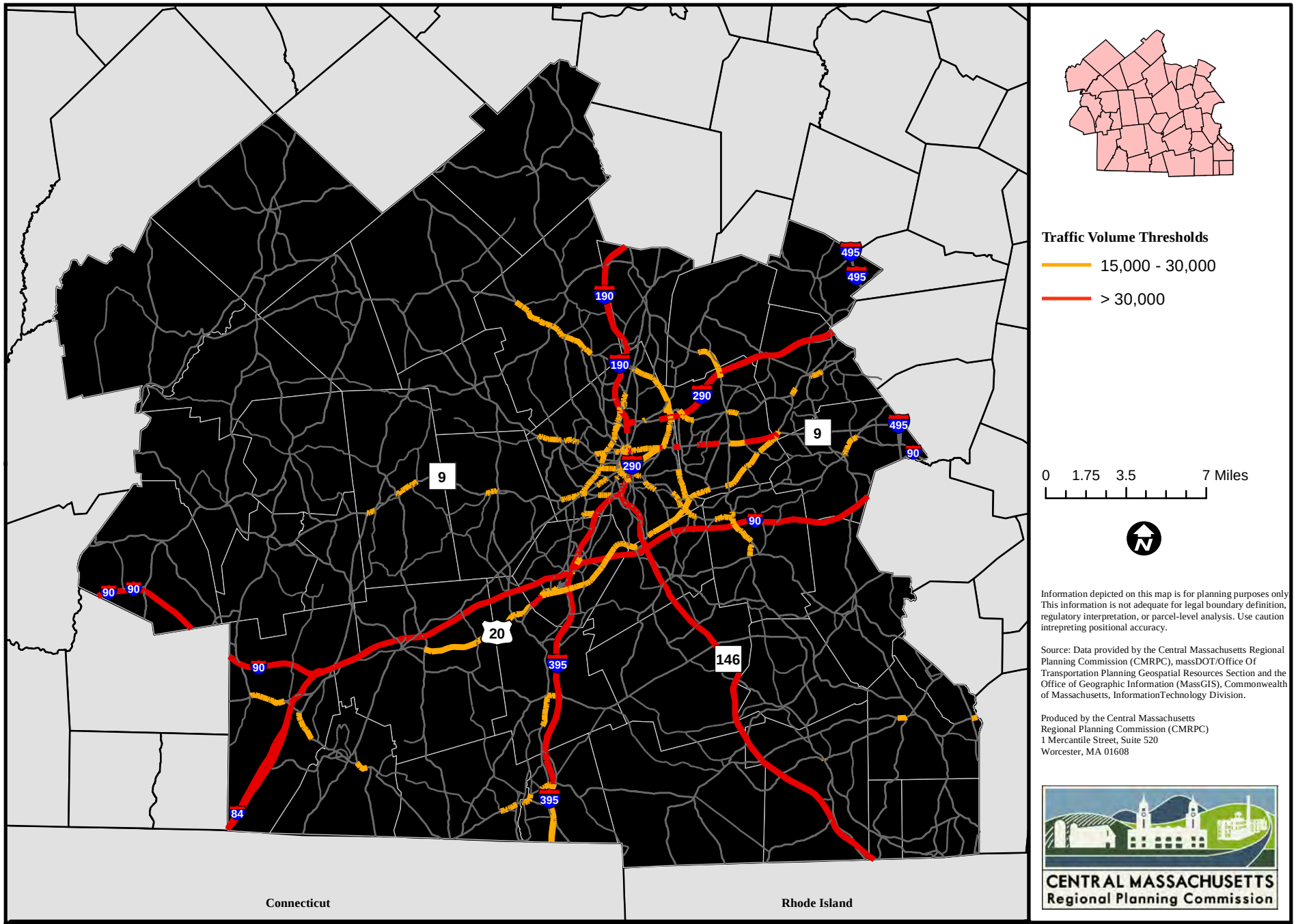

Figure 15: Federal-Aid Roadways with > 15,000 Traffic Volumes

Date: 3/11/2026

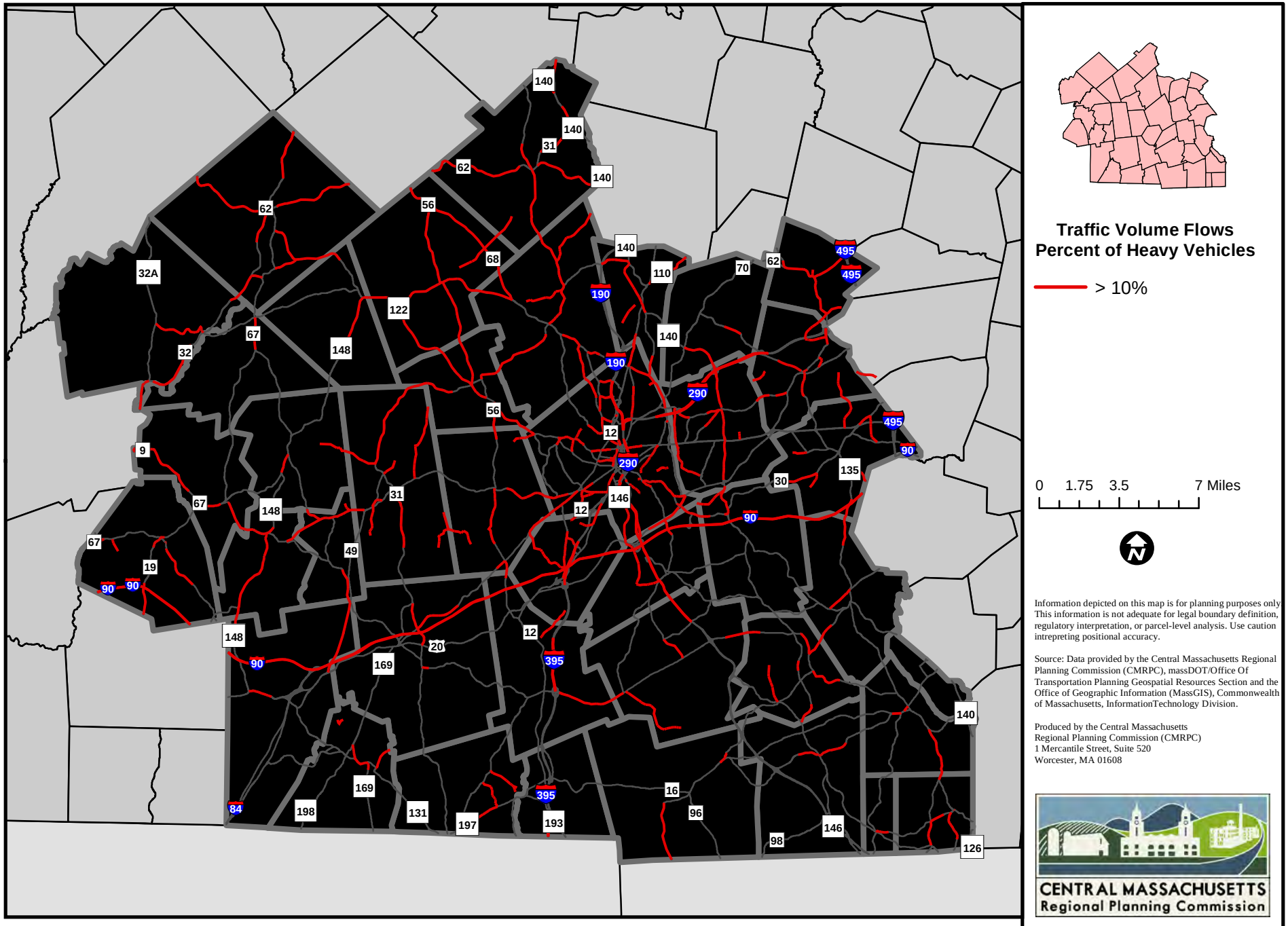

Figure 16: Heavy Vehicle Traffic Volume Flow Percentages > 10%

Date: 3/11/2026

6.8 Safety

Table 19 contains a list of intersections that are included in MassDOT's "Top 200 Crash Locations" between 2019 and 2021. As the table shows, 18 of the top 200 intersections are within the CMRPC region. Most of the top locations in the CMRPC region are in the City of Worcester, with a total of 13. The intersection of Park Avenue and May Street is the highest ranked location in the CMRPC region at #21. Other communities in the CMRPC region that have intersections included in the top 200 are Charlton, Millbury, Sutton, and Westborough.

This table contains the following information:

- The number ranking in the top 200
- The town where the intersection is located
- The Regional Planning Agency
- The MassDOT district
- The streets included in the intersection along with the Route number (if applicable)
- The total number of crashes
- The total number of fatal crashes & serious injuries
- The total number of non-serious injury crashes
- The total number of property damage only and the non-reported crashes
- The EPDO rating refers to the "Equivalent Property Damage Only" scoring method that considers frequency and severity of crashes at a given location over a three to five year period. Fatal & Injury crashes = 21pts and Property Damage Only crashes = 1pt.

Table 19
CMRPC Top Crash Locations Included in the State's Top 200

Rank	Community	RPA	MassDOT District	Street 1	Route 1	Street 2	Route 2	Total Crashes	Fatal Crashes & Serious Injuries	Non-Serious Injury Crashes	No Apparent Injury	EPDO
21	Worcester	CMRPC	3	Park Avenue	9	May Street		48	3	17	28	**448**
30	Worcester	CMRPC	3	Belmont Street	9	Ramp-I-290 EB		51	0	18	33	**411**
33	Charlton	CMRPC	3	Stafford Street		Center Depot Road		42	1	17	24	**402**
56	Sutton	CMRPC	3	Worcester-Providence Turnpike	146	Boston Road		42	0	15	27	**342**
72	Worcester	CMRPC	3	Chandler Street	122	Mason Street		32	2	12	18	**312**
75	Worcester	CMRPC	3	Belmont Street	9	Elizabeth Street		31	1	13	17	**311**
96	Westborough	CMRPC	3	Turnpike Road	9	Lyman Street		48	0	12	36	**288**
101	Worcester	CMRPC	3	Southbridge Street		Hammond Street		43	1	11	31	**283**
113	Worcester	CMRPC	3	Park Avenue	9	Maywood Street		30	1	11	18	**270**
139	Worcester	CMRPC	3	Mountain Street West		I-190 SB CD Road		30	0	11	19	**250**
142	Worcester	CMRPC	3	Burncoat Street		Millbrook Street		29	0	11	18	**249**
165	Millbury	CMRPC	3	Greenwood Street		McCracken Road		40	0	10	30	**240**
171	Worcester	CMRPC	3	Chandler Street	122	Piedmont Street		38	0	10	28	**238**
182	Worcester	CMRPC	3	East Central Street		Martin Luther King		28	1	9	18	**228**
191	Worcester	CMRPC	3	Cambridge Street		Southbridge Street		24	1	9	14	**224**
191	Worcester	CMRPC	3	Purple Heart Highway	146	McKeon Road		24	0	10	14	**224**
198	Worcester	CMRPC	3	Lincoln Square	9	Lincoln Street	70	43	2	7	34	**198**
200	Charlton	CMRPC	3	Southbridge Road	169	Worcester Road	20	41	0	9	32	**221**

6.9 Accessibility

Accessibility is another quantitative method that can be used to show where congestion is located. Access to jobs data is currently used by staff as scoring criteria for Transportation Improvement Program (TIP) projects. The hope is that a TIP project will improve a roadway to potentially reduce travel time to and from jobs. Based on the data between jobs reachable within a 45-minute trip time via auto at 2am (during free flow conditions) and jobs reachable at 8am (during the peak period), **Figure 17** shows the CMRPC region as a low, medium, or high impact area by census blocks. For this chapter, the high impact areas are the focus. As the map shows, there are 14 communities included within the high impact area.

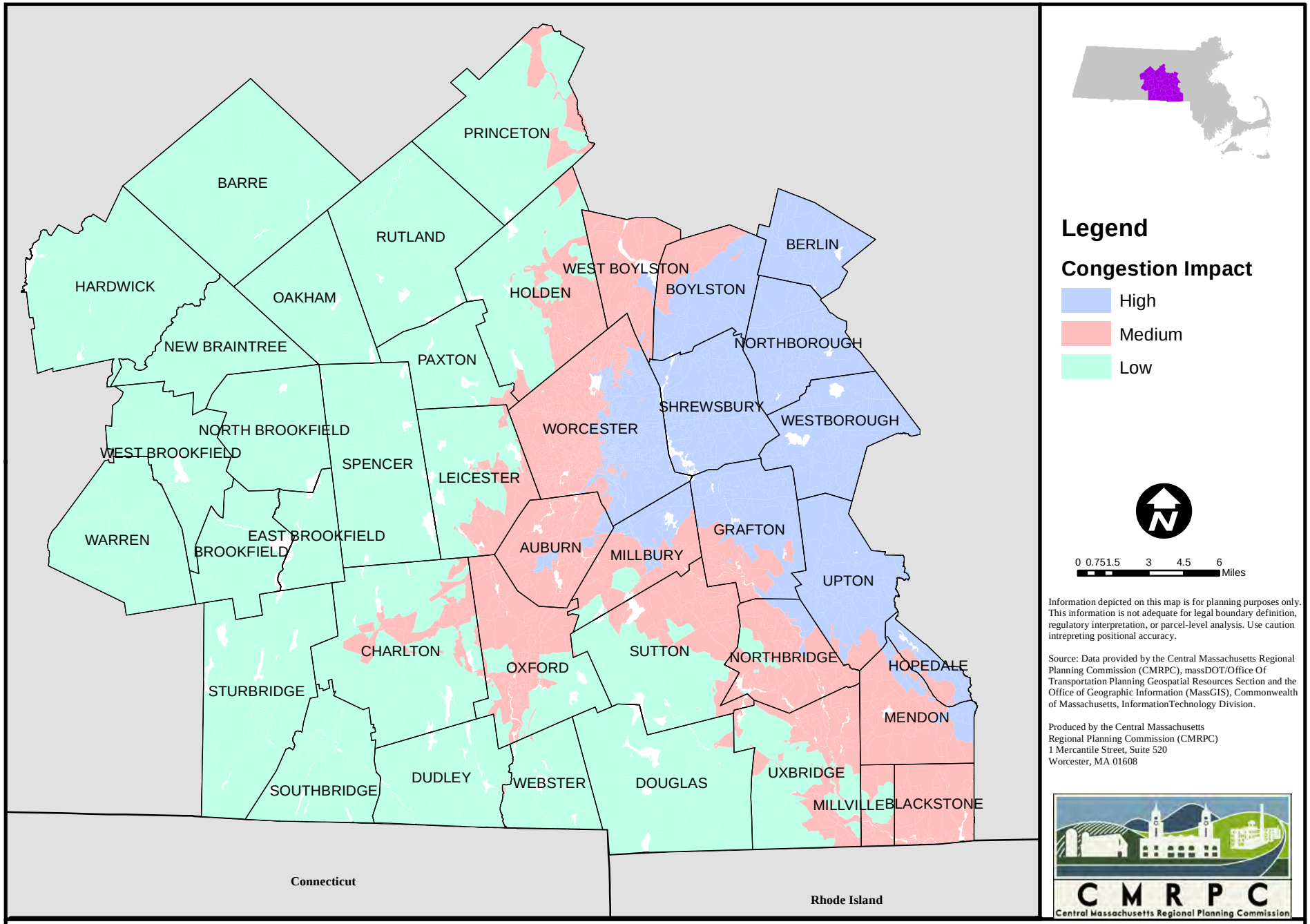

Figure 17 - Accessibility to Jobs Data by Block

Document Path: K:\2.2 Congestion Management Process Data Collection & Analysis\2025 Program\CMP Document\Figures\Figure 19_Access to Jobs Data.mxd

6.10 Travel Time Reliability

In the previous chapter, the overall travel time reliability for the CMPRC region was discussed. In addition, the previous chapter talked about how the data was collected and how the Level of Travel Time Reliability (LOTTR) ratio is calculated for each NHS roadway segment. For this chapter, only the roadway segments that are considered unreliable are discussed. As shown in **Figure 18**, only the segments that have a LOTTR ratio higher than 1.50 are included. The higher the ratio, the less reliable the roadway segment. Most segments that are not reliable are within the City of Worcester. Besides the City of Worcester, other NHS roadway segments that are unreliable are within the communities of Auburn, Barre, Charlton, Grafton, Holden, Millbury, Northborough, Paxton, Shrewsbury, Southbridge, Spencer, Sturbridge, West Brookfield, and Westborough.

As for another resource for reliability, MassDOT's Congestion in the Commonwealth 2019 report details congestion in the state. Some key congested corridors in Central Massachusetts included in the report are sections of Route 9, Route 146, Interstate 290, and Interstate 395. Access to jobs impacts is also discussed in the report. Numerous data are analyzed to determine why and where congestion occurs and recommendations for next steps to address the congestion are made.

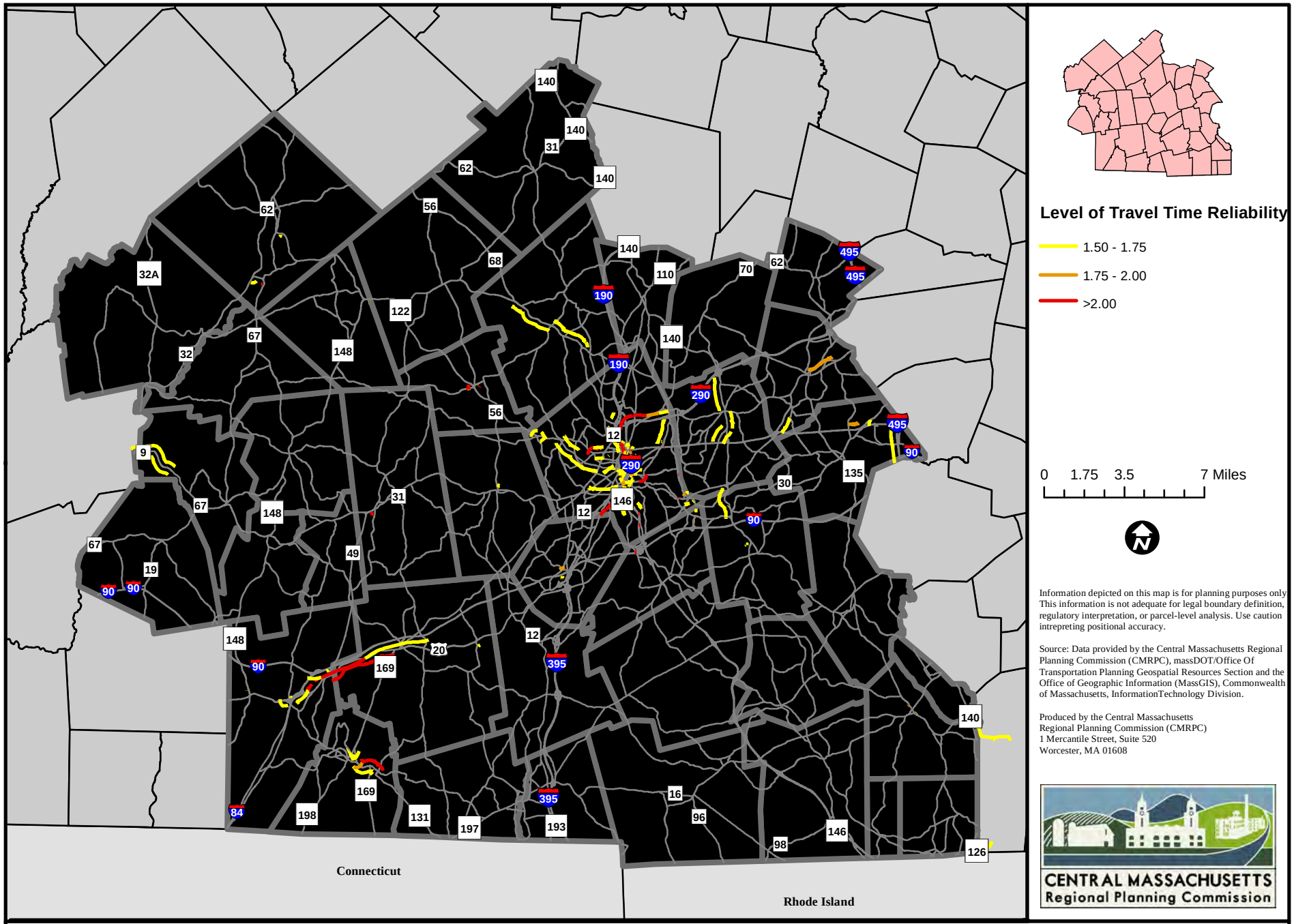

Figure 18: Unreliable Roadway Segments in the CMRPC Region

Date: 1/20/2026

6.11 CMP Data Integration Analysis

The top priorities have been developed through a Management Systems approach, resulting in several roadway segments that demonstrate the greatest need for improvement. The segments used in the following analyses are based on staff's pavement data collection defined segments, which are only federal-aid eligible roadways. These segments are usually less than one mile in length and are between two selected minor streets. All data were analyzed based on these defined segments. For this analysis, the following data was used:

- Top congested Travel Time roadway segments.
- Top 20 intersection encountered delays
- Intersections with a Level-of-Service of "E" or "F"
- Bottlenecks "Stage 3" roadway segments
- Intersections with high bicycle and pedestrian activity (50+)
- Roadways with more than 15,000 vehicles per day
- Roadways with more than 10% heavy vehicles
- Top 200 crash locations
- High congestion impact communities (access to jobs data)
- Roadway segments with a LOTTR ration greater than 1.50 (considered unreliable)

Each defined roadway segment is given a point for each type of data listed above that is included within the segment. The highest total a segment can have is 10 points. **Figure 19** shows the results of the data integration analysis.

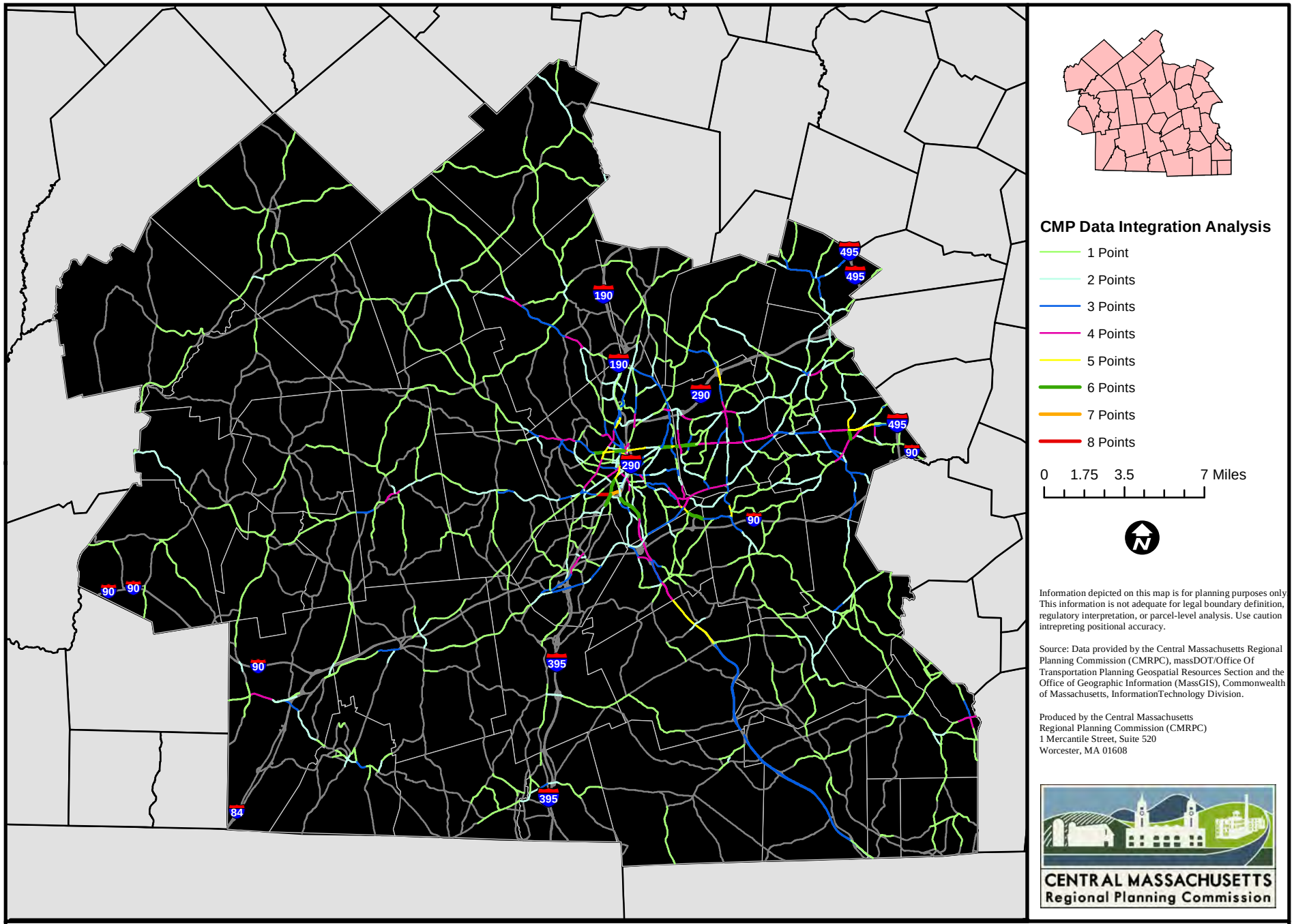

Figure 19: CMP Data Integration Analysis

Date: 3/31/2026

In addition to the map, below is **Table 20** that includes the top scoring roadway segments from the integration analysis. These segments scored at least six (6) points or higher. Of the top 13 segments, only four (4) of them are outside the City of Worcester. The highest scoring segment was Cambridge Street, from Southbridge Street to Canterbury Street, in the City of Worcester. This segment scored eight (8) out of ten (10) points. Next, there were two (2) segments that scored seven (7) points, both located in Worcester. Of remaining segments that scored six (6) points, one was in Millbury, one was in Westborough, two were in Shrewsbury, and six were in Worcester.

Table 20

Top Scoring Data Integration Segments

Community	Roadway	From	To	Score
Worcester	Cambridge Street	Southbridge St	Canterbury St	8
Worcester	Foster St	Franklin St	Main St	7
Worcester	Cambridge St	Quinsigamond Ave	Southbridge St	7
Millbury	Grafton Rd (Route 122)	Worcester CL	Grafton TL	6
Worcester	Highland St	Park Ave	Pleasant St	6
Worcester	Southbridge St	Quinsigamond Ave	Cambridge St	6
Westborough	Lyman St	Route 30	Route 9	6
Worcester	Route 9 (Belmont St)	Lake Ave North	Shrewsbury St	6
Worcester	Route 9 (Highland St)	Main St	West St	6
Worcester	Southbridge St	Cambridge St	I-290 WB Ramp	6
Worcester	Route 146 SB	Quinsigamond Ave	Blackstone River Rd	6
Shrewsbury	Route 9 EB	Worcester CL	Maple Ave	6
Shrewsbury	Route 9 WB	Maple Ave	Worcester CL	6

6.12 Non-Recurring Congestion

In addition to being able to identify and analyze recurring congestion, the need to identify and analyze non-recurring congestion is also necessary. Non-recurring congestion varies from motor vehicle crashes, road construction, special events, and weather-related events such as snow or flooding. Unfortunately, it is difficult to prepare for non-recurring congestion compared to recurring congestion. The best way to handle non-recurring congestion is to create policies or guidelines that can be used for non-recurring congestion events to lessen the incident clearance time, such as an enhanced incident response to clear crashes and reduce the time to return to normal conditions. Another policy could be the geographic placement of message signs that exist on highways to alert drivers to any necessary information and notify them of one or more detours that should be used so that traffic can be safely rerouted.

For motor vehicle crashes that could potentially cause non-recurring congestion, please refer to Section 6.8 which lists the top crash locations within the CMRPC region listed in the State's TOP 200. Additionally, for non-recurring events related to road construction, please refer to CMRPC's Transportation Improvement Program (TIP) page for a list of upcoming roadway projects that are currently programmed and what year they will be constructed.

7.0 Identifying & Assessing Strategies

This chapter addresses identifying strategies to alleviate congestion and assessing how well those strategies work. The identification and assessment of appropriate congestion mitigation strategies is a key component of the CMP. At this stage, the data and analysis are used to recommend solutions to effectively manage congestion and achieve congestion management objectives. The identification of strategies requires several important considerations such as meeting regional CMP objectives, local context, other goals & objectives, and the jurisdiction over CMP strategies. Further, these strategies should support the regional objectives that were discussed in Chapter 2.

7.1 Identifying CMP Strategies

A wide range of strategies are available and can be broadly grouped into the following categories:

Demand Management: These types of strategies substitute communication for travel or encourage regional cooperation to change development patterns or reduce sprawl. Instead of using personal vehicles, promote programs that encourage transit use or ridesharing or improve bicycle and pedestrian amenities to promote non-motorized travel. Other strategies include managing and pricing assets such as roadway and parking spaces or increasing freight rail to reduce truck use on highways. Regarding work patterns, employers that have flexible work hours and telecommuting programs are contributing to congestion reduction.

Traffic Operations: These strategies focus on getting more out of what we have rather than building new infrastructure. These strategies are often supported using enhanced technologies or Intelligent Transportation Systems (ITS). For highway/freeway operations, some options include metering onto freeways, access management, reversible commuter lanes, and automated toll collection improvements. Arterial and local roads strategies include optimizing signal timing, geometric improvements, transit signal priority, access management, traffic calming, and road diets. In addition, incident management, travel information systems, work zone management, and better freight management could be considered.

Public Transportation: Improving transit operations, improving access to transit, and expansion of transit services can help reduce the number of vehicles on the road. As with traffic operations, transit operations are often enhanced by ITS. Some operations strategies are transit signal priority, bus rapid transit, enhanced transit amenities and safety, realigning transit service schedules, and providing real-time information on transit schedules and arrivals. Potential capacity strategies are reserved travel lanes for transit operators, more frequent

service, expanded hours of service, and expanding the transit network. Additional strategies for public transit could include improvements to bicycle and pedestrian facilities to provide access to transit stops as well as provisions to allow bicycles on transit vehicles.

Road Capacity: These strategies address adding more capacity to the road network, such as adding additional lanes and building new highways. Given the expense and possible adverse environmental impacts of the new single-occupant vehicle capacity, management and operations strategies should be given due consideration before any additional capacity is considered. Examples of these strategies are constructing HOV lanes, intersection improvements, center turn lanes, new overpasses or underpasses at intersections, or adding travel lanes on major highways and streets.

In 2013, staff compiled a CMP Mitigation Toolbox for the communities in the CMPRC region to reference in order to assess the causes of vehicle delay and make plans to remedy them. The CMP Toolbox is available on the CMRPC's website for anyone to access. The toolbox incorporates past CMP recommendations that were included in previous annual CMP progress reports. Most suggested recommendations usually pertain to specific intersections or to a section of roadway containing multiple intersections. There are some general suggestions that staff commonly make for intersections and roadways. These include:

- Review the signal timing and phasing operations of traffic signals and optimize them if needed.
- Improve pavement markings and traffic control signage along the roadway and intersections.
- Adjust lane configurations where necessary.
- Consider access management techniques. Including curb cut consolidation.
- Upgrade traffic signal equipment such as the controller box.
- Conduct further traffic analysis at some locations to acquire more data.

Other recommendations, not typically made on a regular basis, include mid to long-term upgrades to intersections or sections of roadway. Such proposals might include:

- Widening of a roadway to provide additional lanes and/or bicycle & pedestrian accommodations.
- The realignment of a roadway or intersection.
- Install new traffic signals at intersections where warranted.
- Installation of a modern roundabout.
- Incorporate Intelligent Transportation Systems (ITS) components into the roadway network such as speed monitoring devices or flashing pedestrian crossing signs.
- Coordinate traffic signals where feasible and appropriate.

7.2 Assessing CMP Strategies

Information collected through the monitoring of implemented strategies can be most helpful in evaluating the success of individual strategies. This allows for determining which specific strategies can be targeted to applications where they have demonstrated success. This information also provides for a continuous refinement of the strategies considered for congestion management in different situations.

Some example tools and methods for assessing the potential effectiveness of congestion management strategies include the following:[1]

Travel Demand Models: Travel demand models are the primary software-based tools used in regional travel forecasting and are used to predict future travel patterns based on current conditions and projections of future household and employment patterns. This method has limited capabilities to accurately estimate changes in operational characteristics, such as speed, delay, and queuing resulting from implementation of operations strategies.

Sketch Planning Tools: Sketch planning methodologies typically produce general estimates of changes in travel demand and/or speeds in response to different types of transportation strategies and are commonly used to estimate the effects of Travel Demand Management strategies (TDM).

Past Experience or Evaluations of Strategies: Information about the use and effectiveness of previously implemented strategies may provide information on the effectiveness of strategies such as traffic signal operational adjustments that may not be easily analyzed using travel demand forecasting models.

Analytical/Deterministic Tools (HCM-Based): Most analytical/deterministic tools implement the procedures of the Highway Capacity Manual (HCM). These tools predict capacity, density, speed, delay, and queuing on a variety of transportation facilities and are validated with field data. These tools are good for analyzing the performance of isolated or small-scale transportation facilities; however, they are limited in their ability to analyze networks or system effects.

Traffic Signal Optimization Tools: Traffic signal optimization tools are primarily designed to develop optimal signal timing and phasing plans for isolated intersections, arterial streets, or signal networks. This may include capacity calculations, cycle length, splits optimization and coordination plans.

[1] FHWA Congestion Management Process: A Guidebook, April 2011

Simulation Models: Simulation tools may be used to analyze the impact of operational strategies. These tools provide information relating to analysis of incidents and real-time diversion patterns.

Dynamic Traffic Assignment (DTA): DTA models supplement existing travel demand forecasting models and micro area traffic simulation models. Travel forecasting models represent the static regional travel analysis capability, whereas micro area traffic simulation models are superior for dynamic corridor-level travel analysis. DTA models fill the gap between these by enabling dynamic traffic to be modeled at a range of scales from corridors to regions, with expanded and unique functional capabilities enabled by the DTA methodology.

7.3 Next Steps

After deciding which strategies to use to alleviate congestion, they are included in the programming and implementation schedule that will be discussed in Chapter 8. The tools and methods for assessing the effectiveness of the chosen strategies previously discussed will be used in Chapter 9 to measure the results of the improvements to determine if the strategies were effective in reducing congestion.

8.0 Programming & Implementing Strategies

Implementation of CMP strategies occurs on three levels: system or regional, corridor, and project. Regional-level implementation of congestion management strategies occurs through inclusion of strategies in the fiscally constrained Long Range Transportation Plan (LRTP) and the Transportation Improvement Program (TIP). At the corridor level, more specific strategies such as bicycle and pedestrian improvements and operational improvements can be assessed in studies and implemented using a variety of funding sources. For larger projects, particularly capacity-adding projects, demand management and operational strategies should also be analyzed for incorporation into the project as part of the project development process.

The programming of projects and implementation of strategies is a critical step in the CMP process. **Table 21** shows congestion reduction-related projects that are currently programmed in the CMMPO 2026 – 2030 TIP. The table also includes the proposed improvements and the funding sources for the projects. Funding sources for these TIP projects include Surface Transportation Block Grant Program (STBG), Highway Safety Improvement Program (HSIP), Congestion Mitigation & Air Quality (CMAQ) Program, and the Transportation Alternatives Program (TAP). All CMMPO target projects programmed in the TIP are screened and ranked using Performance Measure criteria that are based on the federal transportation planning emphasis areas, which includes congestion management.

Table 21

Current Programmed Congestion Reduction TIP Projects (2026 – 2030)

Year	Community	Project ID#	Project Description	Proposed Improvements	Funding Source
2026	Worcester	608961	Intersection improvements at Chandler St & May St	New roundabout at one intersection and either a traffic signal or realignment at the other intersection.	CMAQ / HSIP / STBG
2026 - 2030	Shrewsbury	610825	Rehabilitation & box widening on Route 20, from Route 9 to South St	Intersection improvements. New shared-used path construction. Potential roundabout consideration.	NHPP
2027	Sturbridge	611933	Roundabout construction at the Route 20 & 131 intersection	A new roundabout will replace the current traffic signals. New shared-use path.	STBG

Year	Community	Project ID#	Project Description	Proposed Improvements	Funding Source
2028 - 2029	Worcester	608990	Intersection improvements & resurfacing on Chandler St, from Main St to Park Ave	Traffic signal upgrades and coordination. Potential transit signal priority installed. Bike & Ped improvements Potential roadway diet.	HSIP / STBG
2028 - 2029	Oxford	611988	Roadway rehabilitation on Route 12 (Main St)	Complete Streets improvements. Intersection improvements at Sutton Ave/Charlton St.	STBG
2028	Spencer / East Brookfield	613097	Intersection Improvements at Route 9 & Route 49	Construction of a cement concrete roundabout. Bicycle & pedestrian accommodations.	STBG
2030	Shrewsbury	607764	Intersection improvements at US 20 at Grafton St	Intersection improvements and new sidewalks.	NHPP
2030	Westborough	613242	Roadway improvements on Route 30, from Hastings Elementary to Thomas Newton Dr	Intersection improvements and bike and pedestrian improvements.	STBG

9.0 Evaluation of Strategy Effectiveness

Evaluation of strategy effectiveness can be seen as either a sequential step within the CMP process or as an ongoing process. The primary goal is to ensure that implemented strategies are effective at addressing congestion as intended, and to make further changes based on the findings as necessary. Two general approaches are used for this type of analysis[1]:

1. **System-level performance evaluation** – Regional analysis of historical trends to identify improvement or degradation in system performance, in relation to objectives; and
2. **Strategy effectiveness evaluation** – Project-level or program-level analysis of conditions before and after the implementation of a congestion mitigation effort.

Findings that show improvement in congested conditions due to specific implemented strategies can be used to encourage further implementation of these strategies, while negative findings may be useful for discouraging the use of such strategies in similar situations due to minimal effectiveness. The information learned from these evaluations should be used to inform both the TIP and LRTP.

9.1 TIP Projects Analysis (2016 – 2025)

This section discusses the strategy effectiveness of TIP projects that have been advertised and constructed between 2016 and 2025. Some of these projects are complete while others are still currently under construction. To determine the strategy effectiveness for each of these projects, comparative data needed to be collected *before* the implementation of improvements. If no prior data is available, staff are unable to conduct a before and after analysis for that roadway or intersection. The data comparison scenarios included in this section are:

- **Congested Time**: Congested time is provided in minutes and is calculated for roadway segments.
- **Intersection Level of Service (LOS) & Delay**: The LOS is shown with a letter grade "A" through "F", with an "A" indicating very little encountered vehicle delay while "F" indicating significant delay. The length of delay at each intersection is measured in seconds.
- **Number of Crashes**: The MassDOT Impact Crash Portal was used to determine the total number of vehicle crashes within the project area by analyzing the previous three years of available crash data before the project was advertised. The average number of crashes is also shown for the three-year period after project completion.

[1]FHWA Congestion Management Process: A Guidebook, April 2011

- **Level of Travel Time Reliability (LOTTR)**: LOTTR data is obtained from the Regional Integrated Transportation Information System (RITIS) website. LOTTR data is only available on National Highway System (NHS) roadways. A LOTTR below 1.50 is considered reliable while over 1.50 is seen as not reliable.

Available data comparison results as well as a summary of improvements have been completed for each example project and are included below. The improvement assessment results are shown in three colors. The color codes are:

- Green= Improvements made the roadway or intersection better.
- Red= Improvements made the roadway or intersection worse.
- Black= Improvements made the roadway or intersection about the same or essentially unchanged.

Roadway segments or intersections labeled as "Need Data" indicate data still needs to be collected for an analysis to be completed. Construction is still ongoing at several locations, therefore no new data will be available until following project completion. Once after-project implementation data is available the results will be added to this section. Notably, at this time, there is no comparison data for projects that improve bicycle & pedestrian infrastructure or transit infrastructure. The overall intent is that such improvements would provide additional safe travel options for people and, in turn, take cars off the road, reducing chronic congestion.

2016: Spencer (606207) – Rehabilitation on Route 9, from High Street to Grove Street

Project improvements included new traffic signal equipment and vehicle detection at both Route 9/Route 31 intersections. The Route 9/Route 31 (Pleasant Street) intersection was also realigned to include the Wall Street approach. New striping of the travel lanes was included as well as the implementation of dedicated bicycle lanes for both directions of travel within the project limits. Below are the analysis results from before and after the project.

The Route 9 segment was analyzed and the results showed a minimal decrease in average congested time for AM eastbound and PM westbound. However, concurrently, congested time increased for AM westbound and PM eastbound. Both Route 9/Route 31 intersections were also analyzed. The delays at the Route 9/Route 31 (Maple Street) intersection were reduced while the delays at the Route 9/Route 31 (Pleasant Street) intersection increased significantly, likely due to the volume of Route 31 southbound traffic. Crash data revealed about 20 crashes per year prior to improvements and 25 crashes per year after improvements. The number of serious injuries also increased slightly after improvements. Lastly, the LOTTR analysis showed that Route 9 was *not* reliable before the project improvements but did in fact become reliable following the implementation of improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 9 EB	1.5	1.0	1.3	1.5
Route 9 WB	1.2	1.5	1.3	1.2

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 9/Route 31 (Pleasant St)	B (17)	C (24)	F (111)	F (161)
Route 9/Route 31 (Maple St)	B (15)	B (16)	A (9)	B (10)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2013-2015)	After Improvements (2019-2021)
Route 9	20	25

Roadway Segment	Level Of Travel Time Reliability (LOTTR)	
	Before Improvements	After Improvements
Route 9	1.60 – 1.70	1.20 – 1.30

2016: Westborough (604864) – Intersection & signal improvements at Route 9 & Lyman Street

Project improvements included upgraded traffic signals and the widening of Route 9 to add an additional travel lane in both the eastbound and westbound directions. There were also lane configuration adjustments and bicycle & pedestrian improvements.

The Route 9/Lyman Street intersection has been analyzed and the results showed travel improvement in the AM, however, increased vehicle delays are experienced in the PM. Crash data showed about 25 vehicle crashes per year prior to improvements, falling to 20 crashes per year after improvements. However, the number of serious injuries over the three-year analysis period increased from 9 to 14 after improvements. The LOTTR analysis showed that Route 9 improved on both approaches to the Lyman Street intersection after the implementation of improvements.

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 9/Lyman St	D (55)	D (44)	D (45)	E (66)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2013-2015)	After Improvements (2019-2021)
Route 9 / Lyman St	25	20

Roadway Segment	Level Of Travel Time Reliability (LOTTR)	
	Before Improvements	After Improvements
Route 9	1.5 (EB Approach) – 1.94 (WB Approach)	1.45 (EB Approach) 1.69 (WB Approach)

2017: Shrewsbury (602740) – Resurfacing & related work on Main Street, from I-290 ramps easterly to Maple Avenue

Improvements within the scope of this project included a new traffic signal controller and vehicle detection at the Main Street/Old Mill Road/Ireta Road intersection. Further, a westbound left turn lane was added. Bicycle and pedestrian improvements were also included as part of the project.

The Main Street roadway segment was analyzed, and the results show a minimal decrease in average congested time for AM eastbound. However, encountered congested time increased slightly for AM westbound and, in the PM, both eastbound and westbound. The Main Street/Old Mill Road/Ireta Road intersection was analyzed and shows an increase in delay during both the AM and PM peak travel periods. Crash data indicated approximately 28 crashes per year prior to improvements, remaining the same with 28 crashes per year after improvements. Notably, the number of serious injuries over the three-year analysis period decreased significantly from 16 to 7 following improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Main St EB	1.1	1.3	1.0	2.1
Main St WB	0.6	0.6	0.8	0.9

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Main St/Old Mill Rd/Ireta Rd	B (15)	B (17)	D (52)	C (28)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2014-2016)	After Improvements (2020-2022)
Main St	28	28

2019: Uxbridge (604948) – Reconstruction of Route 122 (North Main Street) and 2024: (608171) - Reconstruction of Route 122 (South Main Street), from Susan Parkway to Route 16

The North Main Street project includes traffic signal improvements at the Hartford Avenue intersection and new traffic control signs and pavement markings. Bicycle and pedestrian improvements are also included. As part of the South Main Street project, improvements include the installation of new sidewalks and ADA ramp as well as five-foot bicycle lanes in each direction of travel.

An analysis of congested time for Route 122 will be completed once the southern portion of the project has been completed. The Route 122/Hartford Avenue intersection was analyzed after improvements and calculated delays are slightly worse. Crash data for Route 122 (North Main Street) showed about 45 crashes per year prior to improvements and, following improvements, a decrease to 35 crashes per year. The number of serious injuries over a three-year period decreased from 22 to 14 after improvements. On the Route 122 (South Main Street) project area there was an average of 17 crashes per year - 15 with serious injuries - prior to the improvements. As this project is currently under construction, the vehicle crash data will be checked again following completion.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 122 NB	0.3	0.8	Need Data	Need Data
Route 122 SB	0.8	1.8	Need Data	Need Data

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 122/ Hartford Ave	B (18)	B (18)	C (28)	C (28)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2016-2018)	After Improvements (2022-2024)
Route 122 (N Main St)	45	35

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2021-2023)	After Improvements (TBD)
Route 122 (S Main St)	17	Need Data

2019: Upton (606125) – Reconstruction of High Street and Hopkinton Road, Phase I

Improvements implemented with this project included a new traffic signal at the High Street/Hopkinton Road/Westboro Road/School Street intersection as well as bicycle accommodations and some new sidewalks.

The Hopkinton Road segment was analyzed and shows a slight increase in encountered congested time for both directions of travel. The High Street/Hopkinton Road/Westboro Road/School Street intersection was analyzed after improvements and indicates a significant reduction in experienced vehicle delay from over 300 seconds to under 50 seconds for both the AM & PM peak hour periods. Vehicle crash data for High Street and Hopkinton Road reflected about 20 crashes per year prior to improvements with 17 crashes per year after improvements. However, the number of serious injuries over a three-year period increased from 5 to 12 after the installation of the new traffic signal.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Hopkinton Rd NB	0.8	0.0	0.8	0.1
Hopkinton Rd SB	0.1	0.0	0.4	0.9

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
High St / Hopkinton Rd / Westboro Rd / School St	F (300)	F (300)	C (34)	D (43)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2016-2018)	After Improvements (2022-2024)
High St / Hopkinton Rd	20	17

2019: Worcester (603251) – Intersection improvements at Holden Street, Drummond Avenue, and Shore Drive

This project featured significant geometric improvements with the realignment of two adjacent "T-type" intersections into a single new 4-way intersection with a fully actuated traffic signal, including dedicated turn lanes. Bicycle and pedestrian accommodations were also included within the project scope.

The Holden Street/Drummond Avenue/Shore Drive intersection was analyzed, and the results show a significant reduction in vehicle delay after the roadways were realigned and a traffic signal was added. Crash data for the Drummond Avenue and Shore Drive intersection had about 6 crashes per year prior to improvements and 3 crashes per year after improvements. The number of serious injuries stayed essentially the same following the improvements.

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Holden St / Drummond Ave	F (142)	D (30)	B (18)	B (12)
Holden St / Shore Dr	F (110)	F (300)		

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2016-2018)	After Improvements (2022-2024)
Drummond Ave / Shore Dr	6	3

2019: Worcester (601368) – Reconstruction of Route 122 (Grafton Street)

This improvement project included traffic signal upgrades at four intersections and the installation of a new modern roundabout at the Grafton Street/Hamilton Street/Orient Street intersection. There were also bicycle and pedestrian accommodation improvements as well as significant geometric changes at the Winter Street/Water Street intersection to allow access to Winter Street from Grafton Street (Route 122).

The Route 122 roadway segment was analyzed and showed an overall increase in congested time with the exception of the northbound direction of travel during the AM peak period. The

only intersection with before and after data that could be compared was Grafton Street & Franklin Street. The results showed a minimal increase in delays during both the AM & PM peak periods. Crash data indicated about 108 crashes per year prior to improvements and 100 crashes per year after improvements. Further, the number of serious injuries also decreased slightly following improvements. The LOTTR analysis showed that Route 122 was considered reliable before and after improvements, with the ratio decreasing slightly.

Roadway Segment	**Average Congested Time**			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 122 NB	6.9	4.6	4.7	7.1
Route 122 SB	4.3	5.3	5.5	5.4

Intersection	**Average LOS & Delay**			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 122 / Franklin St	B (20)	C (31)	C (29)	C (33)

Intersection / Roadway Segment	**Average Number of Crashes**	
	Before Improvements (2016-2018)	After Improvements (2022-2024)
Route 122 (Grafton St)	108	100

Roadway Segment	**Level Of Travel Time Reliability (LOTTR)**	
	Before Improvements	After Improvements
Route 122 (Grafton St)	1.40	1.35

2020: Upton (608764) – Reconstruction of Hartford Avenue and High Street (Phase II)

This project included an upgraded traffic signal at the Route 140 intersection along with an adjusted lane configuration. Bicycle and pedestrian improvements were also included within the project scope.

The Hartford Avenue & High Street segment showed a minor decrease in congested time during the AM peak period in the southbound direction and during the PM peak period in the northbound direction. Concurrently, minimal increases in encountered delay are shown during the AM peak period in the northbound direction and during the PM peak period in the southbound direction. The Route 140/Hartford Avenue/Maple Avenue intersection was analyzed and showed a significant reduction in vehicle delay following improvements. Crash data showed 10 crashes per year prior to improvements and 15 crashes per year after

improvements. The number of serious injuries did, however, decrease slightly after improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Hartford Ave / High St NB	0.1	0.5	0.3	0.4
Hartford Ave / High St SB	0.3	0.2	0.2	0.5

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 140 / Hartford Ave / Maple Ave	F (148)	F (165)	E (72)	C (25)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2017-2019)	After Improvements (2023-2025)
Hartford Ave / High St	10	15

2020: Auburn (607733) – Rehabilitation of Auburn Street

This project included traffic signals and improvements at the Route 12 and Brotherton Way intersections. Bicycle and pedestrian infrastructure were also improved.

The Auburn Street segment was analyzed, and the results showed a minimal increase in congested time with the exception of the westbound direction during the PM peak period. Both the Route 12/Auburn Street and Auburn Street/Brotherton Way intersections were analyzed and showed minor increases in encountered delay. Vehicle crash data showed 17 crashes per year both before and after improvements. The number of serious injuries also increased slightly following the implemented improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Auburn St EB	1.0	1.2	1.3	2.1
Auburn St WB	1.2	2.4	1.5	2.2

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Auburn St / Route 12	C (21)	C (26)	D (35)	D (40)
Auburn St / Brotherton Way	A (9)	B (14)	B (11)	B (15)

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2017-2019)	After Improvements (2023-2025)
Auburn St	17	17

2022: Charlton/Oxford (602659) – Reconstruction on Route 20, from Richardson Corner easterly to Route 12

This project included major geometric and traffic signal improvements at Route 56, Richardson Corner, and Route 12 intersections and included a raised center median to separate opposing traffic flows. The median is anticipated to greatly reduce crashes along this heavily traveled, high speed corridor. Further, a new modern roundabout was installed at the Oxbow Road intersection. A new shared-use path was also constructed from Route 12 to Oxbow Road on the north side of US Route 20. New sidewalks were also added to the south side of Route 20 between Route 12 and Route 56.

This project was recently completed in Fall 2025. Comparison data for congested time and LOS & delay will be obtained sometime during the 2026 data collection season. Subsequently, the anticipated analysis results will be included in the next update of the CMP. Crash data showed about 80 reported vehicle crashes per year along this roadway segment prior to improvements. Additional crash data will be analyzed over the coming years to determine the average number of crashes following the major improvements constructed on US Route 20. There were 33 serious injuries reported prior to the improvements. The LOTTR analysis showed that US Route 20 was considered reliable before the improvements with a ratio of 1.20. The LOTTR will be checked again once RITIS data is available to determine what change occurs following the now completed improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 20 EB	0.9	0.9	Need Data	Need Data
Route 20 WB	0.7	1.3	Need Data	Need Data

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 20 / Richardson Corner Rd	C (28)	C (23)	Need Data	Need Data
Route 20 / Route 56	D (44)	E (56)	Need Data	Need Data
Route 20 / Route 12	C (26)	C (21)	Need Data	Need Data

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2019-2021)	After Improvements (TBD)
Route 20	80	Need Data

Roadway Segment	Level Of Travel Time Reliability (LOTTR)	
	Before Improvements	After Improvements
Route 20	1.20	Need Data

2022: Millbury (605377) – Reconstruction on McCracken Road & Greenwood Street

This project included intersection improvements at Route 122A (Main Street) as well as the widening of the bridge on McCracken Road. A new modern roundabout was built at the Greenwood Street intersection and new sidewalks were constructed along the length of McCracken Road.

This project was recently completed in 2025. Comparison data for congested time and LOS & delay will be obtained sometime during the 2026 data collection season. Subsequently, the anticipated analysis results will be included in the next update of the CMP. Vehicle crash data indicated 26 crashes per year before the improvements, which included 21 serious injuries. Also, the Greenwood Street intersection, now the site of the new roundabout , had 46 reported vehicle crashes prior to the improvements. As the project was only recently completed, more current crash data will need to be analyzed to determine what changes have occurred following the implementation of improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
McCracken Rd EB	0.3	0.3	Need Data	Need Data
McCracken Rd WB	0.3	0.4	Need Data	Need Data

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
McCracken Rd / Greenwood Rd	B (11)	D (28)	Need Data	Need Data
McCracken Rd / Route 122A / Shoppes	D (38)	F (162)	Need Data	Need Data

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2019-2021)	After Improvements (TBD)
McCracken Rd	26	Need Data

2023: Holden (609219) – Pavement rehabilitation on Main Street, Shrewsbury Street and Doyle Road, from State Police barracks to Brattle Street

Improvements implemented within the scope of this project included a Complete Streets design which features five-foot sidewalks, five-foot shoulders, and 11-foot travel lanes. Notably, improvements were made to the Route 122A, Chapel Street/Holden Street, and Brattle Street intersections. A new modern roundabout was constructed at the Doyle Road and Mount View Drive intersection.

This project currently remains under construction although it is nearing completion. The necessary range of data will be collected to analyze the impact of improvements following project completion. Crash data showed 17 reported vehicle crashes per year before the implementation of improvements, which included 9 serious injuries. More current crash data will need to be analyzed to determine the overall impact on safety resulting from the improvements.

Roadway Segment	Average Congested Time			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Shrewsbury St / Doyle Rd EB	1.9	0.6	Need Data	Need Data
Shrewsbury St / Doyle Rd WB	1.2	1.6	Need Data	Need Data

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Shrewsbury St / Holden St / Chapel St	B (18)	D (37)	Need Data	Need Data
Shrewsbury St / Mount View Dr / Doyle Rd	D (49)	F (184)	Need Data	Need Data
Doyle Rd / Brattle St	C (17)	D (28)	Need Data	Need Data

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2020-2022)	After Improvements (TBD)
Main St / Shrewsbury St / Doyle Rd	17	Need Data

2024: Webster (608433) – Intersection Improvements at I-395 Ramps (Exit 3) at Route 16 and Sutton Road

Improvements planned within the scope of this project include the installation of a new traffic control signal at the I-395 southbound ramps as well as a new modern roundabout at the I-395 northbound ramps and Sutton Road intersection. Additional work includes widening Route 16 to provide for bicycle and pedestrian accommodation. Existing deteriorated sidewalks will be improved while new sidewalks will also be added within the project limits.

This improvement project is currently under construction. The necessary range of data will be collected to analyze the impact of improvements following project completion. Crash data showed 26 reported vehicle crashes per year prior to planned improvements, which included 14 serious injuries. More current crash data will need to be analyzed to determine the overall impact on safety resulting from the improvements.

Intersection	Average LOS & Delay			
	Before Improvements		After Improvements	
	AM	PM	AM	PM
Route 16 / I-395 SB Off Ramp	E (47)	F (300)	Need Data	Need Data
Route 16 / I-395 NB Ramps / Sutton Rd	F (89)	F (300)	Need Data	Need Data

Intersection / Roadway Segment	Average Number of Crashes	
	Before Improvements (2021-2023)	After Improvements (TBD)
Route 16	26	Need Data

9.2 Current Programmed TIP Projects (2026 – 2030)

A list of TIP projects programmed for advertisement and implementation between 2026 and 2030 are shown below along with the anticipated improvements for each. All of the listed projects have yet to be constructed. As such, the future evaluation of these projects will happen once the improvements are fully implemented and new comparative data can be collected. For those projects where existing data is yet available, the CMRPC staff will seek to collect such data prior to the implementation of planned improvements.

2026: Worcester (608961) – Intersection improvements at Chandler Street & May Street

Proposed improvements include:

- Installation of a modern roundabout at the northwest intersection of May Street & Chandler Street.
- Geometric improvements to the southeast intersection of May Street & Chandler Street. A potential traffic signal is an option.
- Bicycle and pedestrian improvements are also planned.

2026-30: Shrewsbury (610825) – Rehabilitation & Box Widening on Route 20, from Route 9 to South Street

Proposed improvements include:

- Significant roadway widening for an additional eastbound travel lane.
- Intersection improvements at Green Street/South Street.
- Construction of one or two potential modern roundabouts.
- Bicycle & pedestrian improvements that include sidewalks and a share-use path.

2027: Sturbridge (611933) – Roundabout construction at the Route 20 & 131 intersection

Proposed improvements include:

- Installation of a new large modern roundabout at the US Route 20/Route 131 intersection.
- New shared-use path.

2027: Northbridge (609441) – Intersection improvements at Route 122/School Street/Sutton Street/Upton Street

Proposed improvements include:

- Installation of new traffic control signal.
- Sidewalk reconstruction.

2028-29: Worcester (608990) – Intersection improvements & resurfacing on Chandler Street, from Main Street to Park Avenue

Proposed improvements include:

- Traffic control signal upgrades and interconnected coordination.
- Potential Transit Signal Priority (TSP) at key intersections.
- Bicycle & pedestrian improvements.

2028-29: Oxford (611988) – Roadway Rehabilitation on Route 12 (Main Street)

Proposed improvements include:

- Implementation of Complete Street improvements, which include new bicycle accommodation, sidewalks, and ADA ramps.
- Intersection improvements at Sutton Avenue & Charlton Street.

2028: Spencer/East Brookfield (613097) – Intersection Improvements at Route 9 and Route 49

Proposed improvements include:

- New large modern roundabout constructed of concrete.
- Improved pedestrian accommodation consists of five-foot wide sidewalks along Route 9 and a shared use path at the roundabout.
- Proposed bicycle accommodation consists of five-foot buffered bicycle lanes along Route 9 and a shared use path at the roundabout.

2030: Shrewsbury (607764) – Roadway Reconstruction on Route 20, from Purinton Street to the Route 140 Ramp

Proposed improvements include:

- Construction of a new section of sidewalk and a share-use path.
- Improvements at US Route 20 & Grafton Street intersection.

2030: Westborough (613242) – Roadway Improvements on Route 30 (East Main Street), from Hastings Elementary to Thomas Newton Drive

Proposed improvements include:

- Bicycle & pedestrian accommodation improvements.
- Intersection improvements at Flanders Road. Signalized traffic control is an option.

Central Massachusetts Regional Planning Commission

Member Communities

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Berlin	Oakham
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Brookfield	Princeton
Charlton	Rutland
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Hopedale	Uxbridge
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Millville	West Brookfield
New Braintree	Westborough
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