

CENTRAL MASSACHUSETTS
METROPOLITAN PLANNING ORGANIZATION



Worcester & Auburn Southbridge Street Corridor Profile

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1.0 INTRODUCTION

1.1 Transportation Management Systems Integration: “Corridor Profile”

A *Corridor Profile* combines the information produced by the transportation Management Systems along a particular highway corridor, often in multiple host communities, and analyzes performance-based data, suggests both operational and physical improvements, and may identify candidate projects for further study.

Utilizing the range of data and analyses produced by the ongoing transportation Management Systems maintained by the staff of the Central Massachusetts Regional Planning Commission (CMRPC) and overseen by the Central Massachusetts Metropolitan Planning Organization (CMMPO), Corridor Profile efforts allow for comprehensive integration through the consideration of a broad range of key transportation planning factors.

Ultimately, a range of suggested improvement options are compiled for the consideration of the host communities and MassDOT-Highway Division. When local consensus is reached, proposed improvement projects accepted by the community eligible for federal-aid funding have the potential to be selected by the CMMPO for programming in the annual Transportation Improvement Program (TIP) document. At this time, the highly competitive TIP is essentially fully proscribed for the fiscal years 2018 to 2022.

As the Corridor Profile series has evolved, it has become increasingly multi-modal and intermodal. The Management Systems have also served as the basis for the transition to performance-based planning. Performance-based planning seeks to measure the value of investments made in the nation’s transportation infrastructure. Focus areas include reducing congestion, improving pavement, reducing vehicle crashes and, in the spirit of the state’s Healthy Transportation initiative, increasing the use of the other modes of transit, bicycling, and walking. The Southbridge Street Corridor Profile includes the analysis and interpretation of Management System data, including the following:

Traffic Counting: Daily Automatic Traffic Recorder (ATR) counts and MassDOT Highway Division count data

Congestion Management Process (CMP): Current Travel Time & Delay studies along Southbridge Street; current and future projected peak-hour Turning Movement Counts (TMC) at focus intersections and associated Level of Service (LOS) analyses

Freight Planning: Peak hour percentage of heavy vehicles utilizing Southbridge Street focus intersections

Transportation Safety Planning Program: In-depth vehicle crash research using crash data received from the Massachusetts Department of Transportation (MassDOT), utilizing a three-year history of reported crashes and subsequent analysis.

Pavement Management System (PMS): Observation of pavement surface distress and extent in the field along with subsequent analysis and calculated Overall Condition Index (OCI)

Bridge Management System (BMS): Bridge condition data available through MassDOT Highway Division; GIS-based inventory of major roadway drainage structures, if any, as well as local observations in the field

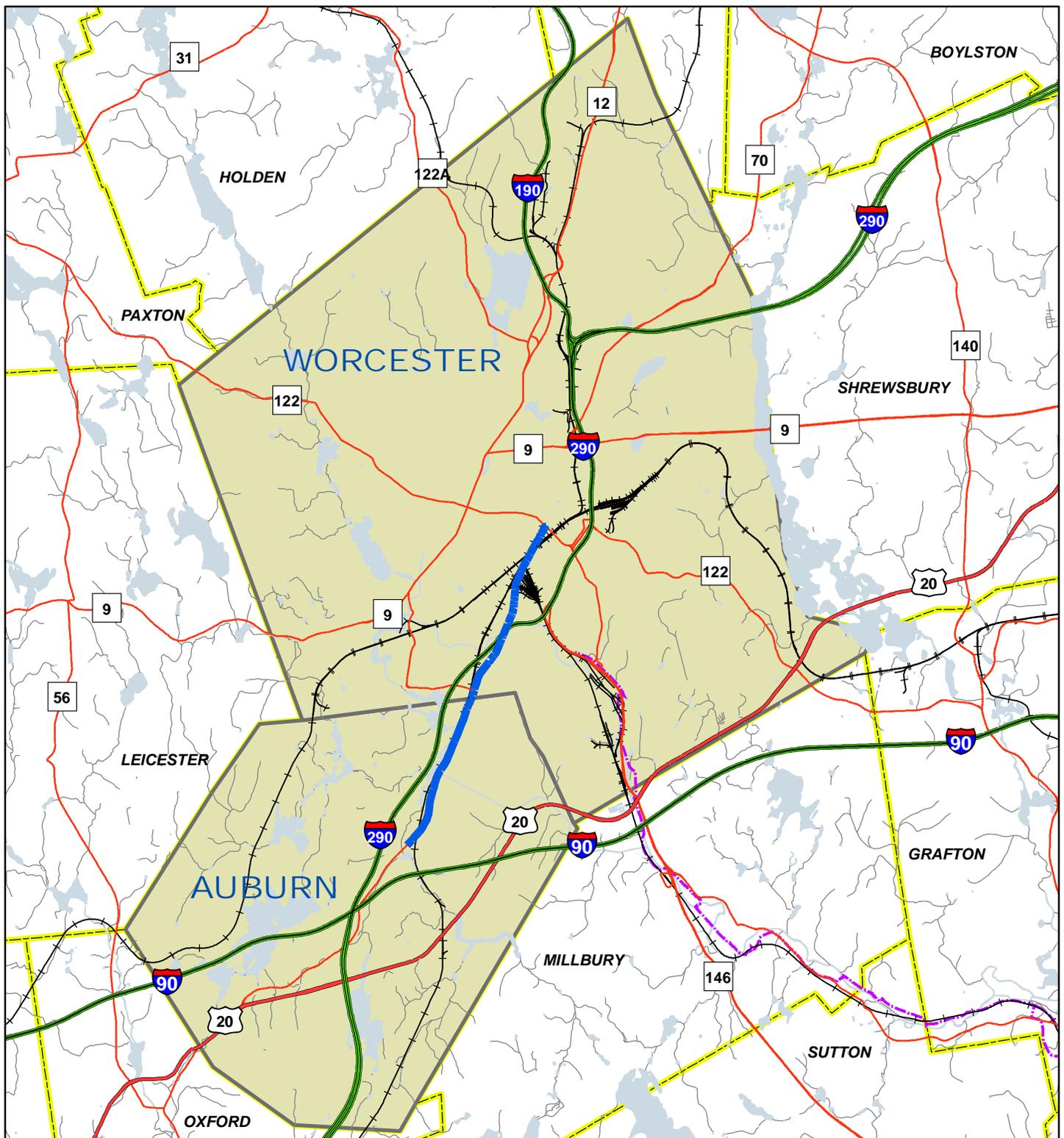
Depending on local sentiment and available funding, the technical work necessary to compile a Corridor Profile is supplemented by customized public outreach efforts. This can range from basic meetings with local officials to the formation of a *Technical Advisory Group* or study Task Force to guide the effort. As determined necessary, special meetings can also be held with various stakeholder groups in a range of venues.

Following the completion of the Draft Southbridge Street study, “*Study Overview Meetings*” will be held with host community officials from both Auburn and Worcester.

1.2 Southbridge Street Corridor Profile: Worcester and Auburn

The Southbridge Street Corridor Profile was competitively selected by the CMMPO as a worthy candidate to analyze and study. Southbridge Street is a roadway that is eligible for federal-aid funding for improvements. Since the corridor is heavily traveled the goals of this Corridor Profile include improving roadway safety, reducing congestion, preserving and improving roadway pavement, maintaining major bridge and drainage structures as well as suggesting how to improve the roadway for bicycle and pedestrian accommodations. The Southbridge Street study corridor is shown in **Figure 1** along with other major aspects of the region’s multi-modal transportation network including railroads and long distance trails. The WRTA’s fixed-route buses are also a frequent user of the Southbridge Street corridor.

In Worcester, the roadway has a mixture of businesses and residential homes. The I-290 Interchange #11 is located just south of Cambridge Street. The G&W Railroad freight yard is across the street from Hammond Street and the College of Holy Cross is located in the vicinity of the I-290 Interchange. Additionally, the Polar Beverage Company is located just north of Hope Avenue. Part of this company’s operations are also located nearby in the town of Auburn. Similar to Worcester, Auburn also has a mixture of businesses and residential homes. At the Auburn Street intersection, which is the end of the study corridor, both the Auburn Mall and Auburn High School are located nearby.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Host communities of Worcester and Auburn

Figure 1

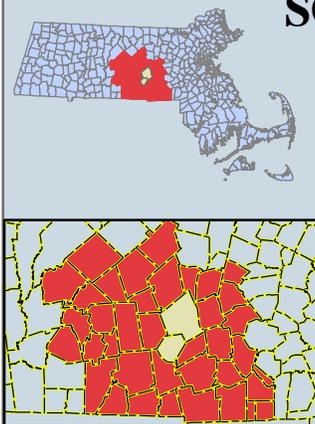
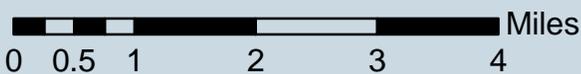
Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Streams
- +— Railroad
- - - Blackstone River Bikeway



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

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The roadway segments of Southbridge Street in Worcester (2.2 miles) and Auburn (1.8 miles) combine for a total length of 4.0 miles. Southbridge Street is locally-maintained within the City of Worcester and state-maintained in the town of Auburn.

The MassDOT Roadway Inventory File (RIF) indicates that the right-of-way for Southbridge Street is 60 feet in width within Worcester. In Auburn, the RIF indicates an available right-of-way of mostly 60 feet, with some minor exceptions.

1.3 Corridor Profile Work Activities Defined in UPWP

This Corridor Profile effort has been completed as part of a previously CMMPO Endorsed Unified Planning Work Program (UPWP). The following provides an overview of the major tasks that were included within the defined scope of the Southbridge Street Corridor Profile effort:

- CMRPC coordination on an entire range of Corridor Profile aspects including data collection and analysis.
- Vehicle crash analyses completed using MassDOT maintained vehicle crash data.
- Completion of an “Environmental Profile” for the entire Southbridge Street study corridor in Worcester and Auburn. Consists of GIS-based maps highlighting overlays developed by DCR, DEP, and NHESP.
- Range of suggested improvement options compiled for host community consideration.
- Preparation of report document, complete with color graphics and maps, along with accompanying Technical Appendix.
- Hosting of meetings with both communities involved in study.

1.4 Corridor-Wide Observations & Existing Deficiencies

The following corridor-wide existing deficiencies, also shown in **Figure 2**, were observed along the entire length of the Southbridge Street study area:

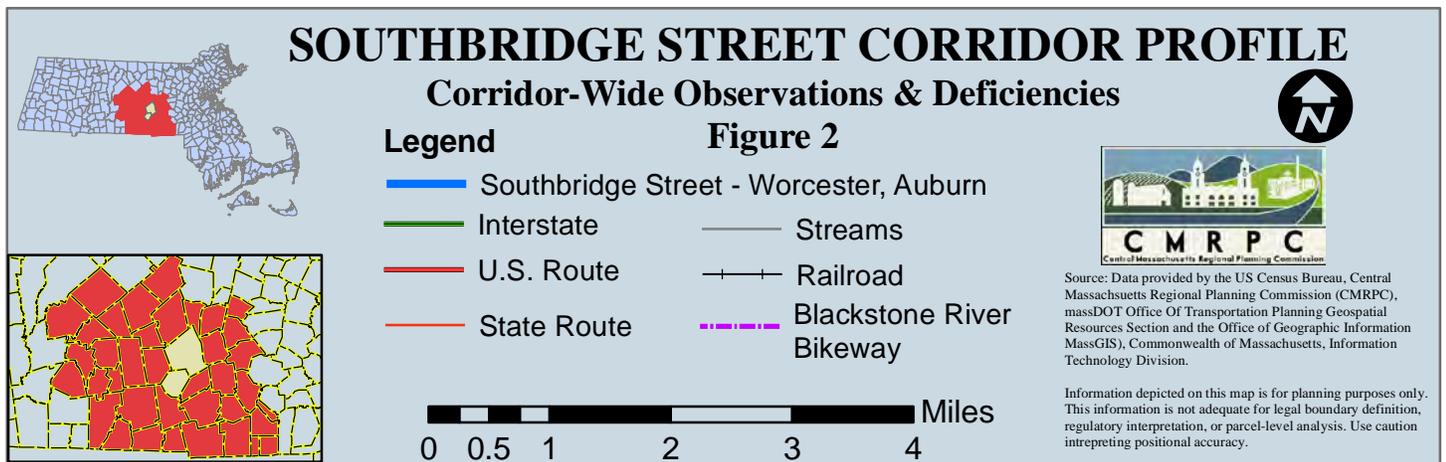
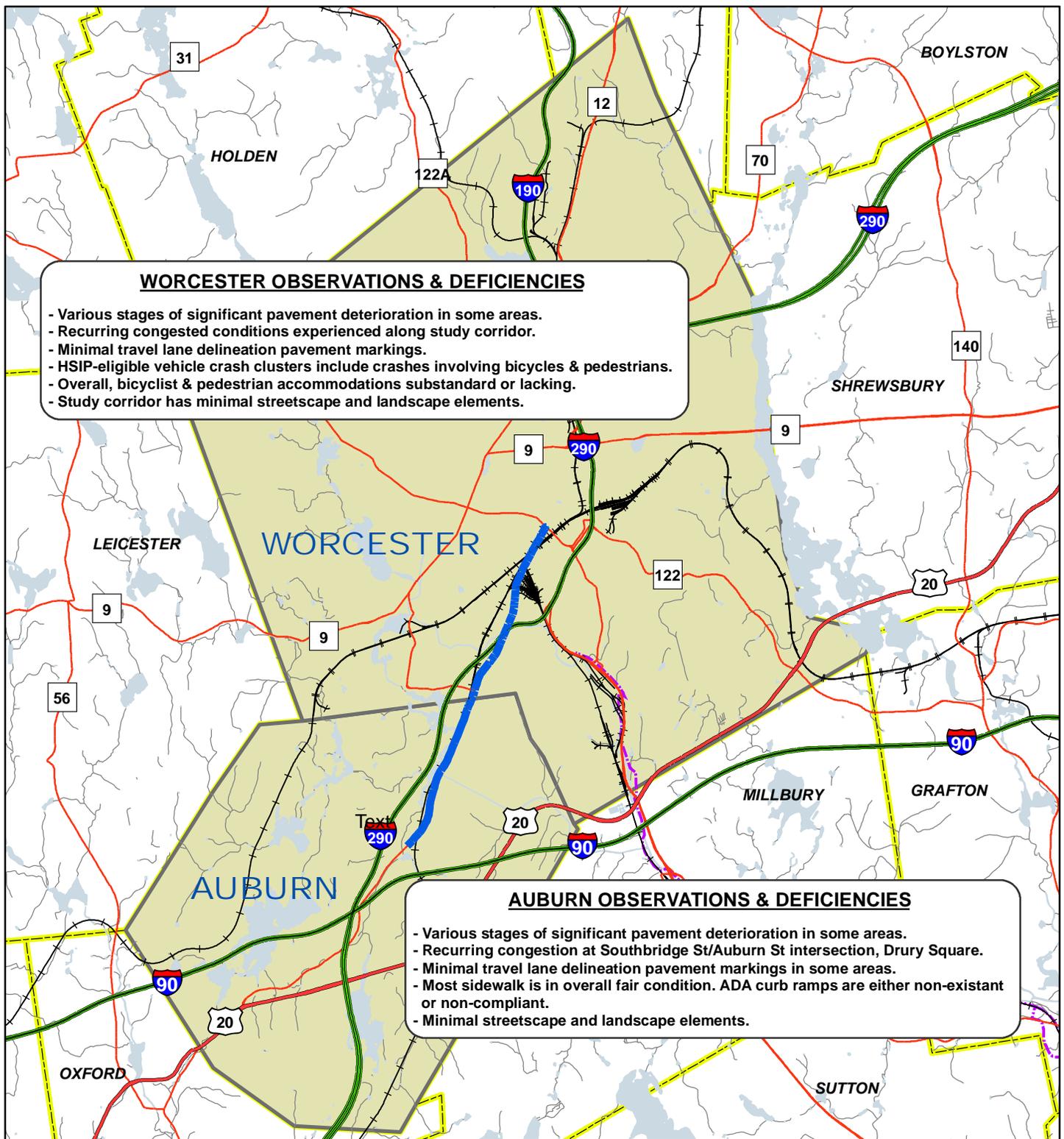
Worcester

- Various stages of significant pavement deterioration have been observed in some areas.
- Recurring congested conditions experienced at major study intersections and along various segments of Southbridge Street.

- Minimal travel lane delineation pavement markings along various segments of Southbridge Street.
- Federal-aid Highway Safety Improvement Program (HSIP)-eligible vehicle crash clusters, identified along the Worcester study segment, include a number of crashes involving bicycles & pedestrians. The following intersection/approach roadway segments in the city have been identified as eligible for (HSIP) funding:
 - Southbridge Street/Madison Street intersection (bicycle crashes)
 - Southbridge Street/Hammond Street intersection (pedestrian crashes)
 - Southbridge Street/Cambridge Street intersection (westbound Cambridge Street approach)
 - Southbridge Street/Riverside Street intersection (bicycle crashes)
 - Southbridge Street/Hope Avenue intersection (prior to installation of signalized traffic control)
- Along a number of segments of Southbridge Street, both bicyclist and pedestrian accommodations are substandard or lacking. However, the section of Southbridge Street between Hammond Street and Cambridge Street was previously restriped to a “Complete Streets” configuration which includes the delineation of on-street bicycle lanes along with curb side vehicle parking and smooth, unobstructed sidewalks.
- The Southbridge Street study corridor has minimal streetscape and landscape elements.

Auburn

- Various stages of significant pavement deterioration have been observed in some areas.
- Recurring congested conditions experienced at the major study intersection of Southbridge Street with Auburn Street, known as Drury Square.
- Minimal travel lane delineation pavement markings along various segments of Southbridge Street.
- Based on data collected in the field by the CMRPC staff, much of the sidewalk along the Auburn study segment is in overall fair condition. However, necessary ADA curb ramps are either non-existent or non-compliant, although some exist at Drury Square.
- The Southbridge Street study corridor has minimal streetscape and landscape elements.



1.5 City of Worcester Site-Specific Observations & Existing Deficiencies

The following site-specific existing deficiencies, also shown in **Figure 3**, were observed along the Worcester segment of the Southbridge Street study corridor:

Southbridge Street/Madison Street Intersection

- Northern terminus of the study corridor. Adjacent to downtown Worcester's Central Business District (CDB) and variety of cultural attractions.
- Existing intersection operations at this study location typically indicate minimal encountered delay for Southbridge Street traffic volumes. Notably, significant additional peak hour volumes are either infused or removed from Southbridge Street at the Francis J. McGrath Boulevard crossover situated just to the south.

Southbridge Street/Francis J. McGrath Boulevard Intersection

- Currently a one-way pairing with a crossover/weave area north of the Worcester Fire Department station.
- The crossover/weave area has peak hour traffic volumes observed to be in excess of 1,000 vehicles, crossing paths, northbound versus southbound, during the peak travel periods.
- The fairly unique, substandard roadway geometry of the crossover/weave area likely contributes to the occurrence of vehicle crashes at this study location.

Southbridge Street/Hermon Street Intersection

- The fairly unique roadway geometry of this intersection likely contributes to the occurrence of vehicle crashes at this study location.
- Observed to be difficult for pedestrians attempting to cross this Southbridge Street roadway segment.

CSX/G&W Dual Railroad Bridge (north)

- Located between Jackson Street and Quinsigamond Avenue, the overhead dual railroad bridge structure is owned by CSX (southeast side) and Genesee & Wyoming (G&W) Railroad (northwest side).
- Inadequate lighting conditions observed beneath the large, twin bridge structure. No sidewalk present on western side of Southbridge Street under the bridge.

Southbridge Street/Quinsigamond Avenue Intersection

- Unsignalized location with significant delay for the minor Quinsigamond Avenue approach that operates under “Stop” sign control. Marginal lane delineation as well as minimal pedestrian accommodation observed in the field.

Quinsigamond Avenue: “Gateway I, Phase 1”

The “Quinsigamond Avenue Gateway”, which included proposed roadway improvements to both Quinsigamond Avenue and Southbridge Street, was originally envisioned nearly 30 years ago as mitigation for the then planned Route 146 Connector Project that was completed nearly 20 years ago. The Quinsigamond Avenue Gateway was part of a series of “Gateway” projects in the city of Worcester that included the North Main Street Gateway as well as the Central Street Gateway, now known as MLK Boulevard. Improvements in the North Main Street Gateway led to redevelopment of the former Boys Trade School campus and the expansion of the WPI campus. Similarly, earlier completed improvements on MLK Boulevard provide a direct connection to the downtown Worcester area, particularly the DCU Center, St. Vincent Hospital and Main Street.

Like the other two mentioned Gateway projects, the completion of the Quinsigamond Avenue Gateway is intended to provide a fairly easily traveled, direct route into downtown Worcester’s Central Business District (CBD) and cultural attractions from the terminus of Route 146 at Brosnihan Square and I-290. Beyond the study area, one block north of Madison Street, Southbridge Street provides direct access to Myrtle Street. Two blocks north, Southbridge Street comes to a terminus at Federal Square adjacent to the Hanover Theater property. Identified Brownfield areas adjacent to Quinsigamond Avenue delayed this improvement effort for a number of years, until the city secured a state-funded “MassWorks” grant in 2015.

The 2015 MassWorks grant allowed for the construction of Phase 1 improvements along Quinsigamond Avenue that were implemented during the 2017 construction season that included:

- Milling & resurfacing between Southbridge Street & Ashmont Avenue, a distance of ~2,300 feet.
- Installation of new signalized traffic control at the Southbridge Street/Quinsigamond Avenue intersection.
- Improvements to existing signalized traffic control at both the Southbridge Street/Lafayette Street & Quinsigamond Avenue/Lafayette Street intersections as well as milling & resurfacing the segment of Lafayette Street between these two locations.
- New traffic control signs and pavement markings.
- Complete reconstruction of all adjacent sidewalks along with improved on-street bicycle accommodation. On-street parking adjacent to Crompton Park reconstructed and delineated with improved pavement markings.

- The addition of landscape and streetscape elements to improve the pedestrian experience along Quinsigamond Avenue.
- Various utility improvements and maintenance.

The previously mentioned Brownfield areas, caused by a former gas manufacturing operation, were recently remediated through the environmental cleanup effort conducted for the construction of the Worcester Regional Transit Authority's (WRTA) new Maintenance and Operations (M&O) Center located at 42 Quinsigamond Avenue. At this time, Quinsigamond Avenue, Southbridge Street and Francis J. McGrath Boulevard provide the critical, primary access route for transit vehicles between the WRTA's M&O facility and the WRTA Hub passenger facility at 60 Foster Street, adjacent to Union Station in the downtown area.

Southbridge Street/Lafayette Street Intersection

- Marginal lane delineation, minimal pedestrian accommodation. Existing sidewalks in varying stages of deterioration. No sidewalk on the western side of Southbridge Street. Distressed roadway pavement observed at this study location.
- On the Southbridge Street northbound approach, the exclusive right turn lane at this location is fairly narrow. Further, its length is also restricted by the Genesee & Wyoming (G&W) Railroad bridge.

Lafayette Street to Hammond Street Roadway Segment

- Marginal lane delineation, minimal pedestrian accommodation. Existing sidewalks in varying stages of deterioration. No sidewalk on the western side of Southbridge Street. Distressed roadway pavement observed at this study location.
- The twin railroad bridge structure, located between Lafayette Street and Hammond Street, is owned exclusively by the Genesee & Wyoming (G&W) Railroad. South of the bridge are the site drives to the G&W's public truck scale, locomotive maintenance building and bulk transfer facility.
- Sufficient clearance for unrestricted truck passage, 14'-6", is provided beneath the G&W Railroad bridge (south) due to an earlier roadway lowering project completed by the city of Worcester. It should be noted that the existing bridge abutments limit the width of Southbridge Street beneath this aging structure.
- The elevated pedestrian sidewalk that exists along on the southeastern side of Southbridge Street is in excess of 7 feet in width. A pipe railing is provided for pedestrian safety.

Southbridge Street/Hammond Street Intersection

- Study location is a “T-type” intersection operating under signalized control.
- The Southbridge Street/Hammond Street intersection has been identified as a high crash cluster location eligible for federal-aid Highway Safety Improvement Program (HSIP) funding. This location appears to have the greatest number of vehicle crashes along the Southbridge Street study corridor.
- The Hammond Street approach to this study location is fairly narrow in width, restricted by the stone abutments of the Genesee & Wyoming (G&W) Railroad bridge constructed in the 1800’s.
- No sidewalks exist beneath the Hammond Street railroad bridge. Pedestrian passage is barely accommodated on the narrow, raised area between the roadway curb and the stone bridge abutments.
- Gasoline station/convenience store located on the northwest corner of this study location generates a significant number of entering/exiting vehicles.

Southbridge Street/Southgate Street Intersection

- It has been reported that the Genesee & Wyoming (G&W) Railroad bridge columns obscure lines of sight to the south of the bridge from the minor Southgate Street approach, which operates under “STOP” sign control. The columns serve to screen oncoming traffic.

Southbridge Street/Cambridge Street Intersection

- The previous, fairly recent reconstruction of this entire location, completed during 2010, utilized Congestion Mitigation Air Quality (CMAQ) funding through the regional Transportation Improvement Program (TIP). As part of this project, signalized control was also installed at the nearby Southbridge Street/Riverside Street intersection. Existing operations during the peak hour periods are mostly acceptable during the morning but are often highly congested during the evening.
- As observed in the field, there is no protected left turn phase within the signal cycle for volumes on the westbound approach of Cambridge Street. During the peak hour periods, especially PM, vehicles on the westbound approach were observed to make a left turn onto McKeon Road and then a right turn onto Riverside Street in order to turn left onto Southbridge Street at the signalized Southbridge Street/Riverside Street intersection. *This convenient diversion route appears to pose less risk to westbound*

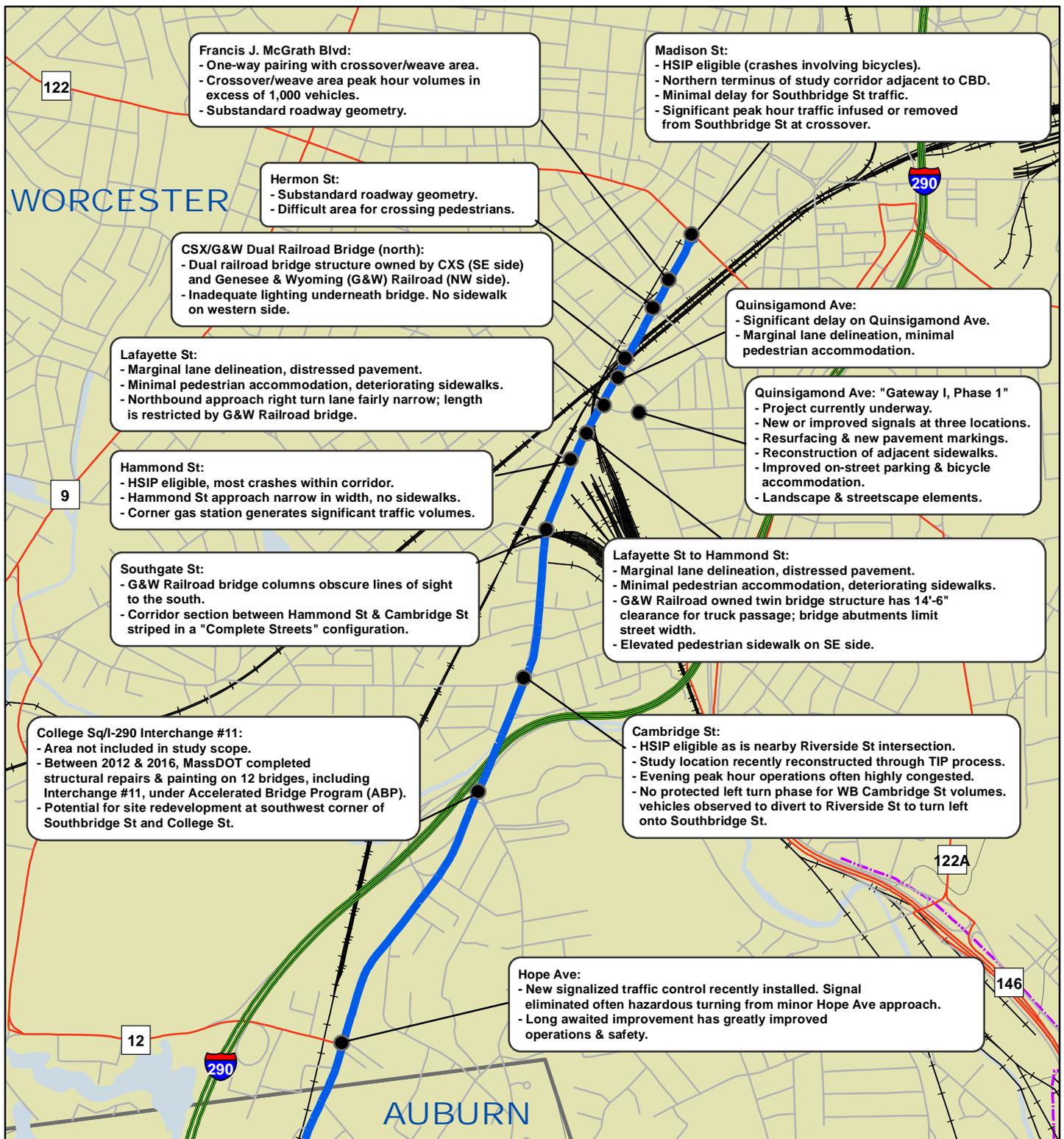
vehicles on Cambridge Street attempting to make the left turn at the Southbridge Street signal.

Southbridge Street/College Square Intersection/I-290 Interchange #11

- The roadway intersections associated with the I-290 Interchange #11 area with Southbridge Street at College Square were **not** included in the scope of the Corridor Profile study. College Street provides primary access to the College of the Holy Cross.
- Recently, starting in the summer of 2012 and essentially finished in the autumn of 2016, MassDOT completed structural repairs & painting on 12 bridges at or in vicinity of Interchange #11 on Interstate 290. This project included the bridges carrying I-290 over Southbridge Street. Originally constructed in the mid-1960's, the 12 bridges were combined into a single construction contract that was funding with over \$20 million from MassDOT's Accelerated Bridge Program (ABP). The repair work that was performed on each bridge structure varied. All were renovated and strengthened with minor steel repairs completed on ten of the structures. Overall, improvement work included the rehabilitation of steel superstructures, the replacement of bridge expansion joints, drainage system replacements, electrical repairs associated with overhead highway lighting, repainting the structural steel as well as milling & resurfacing pavement wearing surfaces.
- It should be noted that there is the potential for site redevelopment at the southwest corner of Southbridge Street and College Street, former site of a Howard Johnson restaurant and hotel.

Southbridge Street/Hope Avenue Intersection

- The city of Worcester recently installed new signalized traffic control at this study location. This action eliminated the potentially hazardous situation for minor approach volumes on Hope Avenue attempting to exit onto Southbridge Street, particularly left-turning vehicles. This long-awaited improvement has greatly improved operations and safety at this study location. *(It should be noted that the vehicle crash data available during the compilation of this study had yet to reflect "before & after" conditions resulting from the installation of the new traffic signal.)*



SOUTHBRIDGE STREET CORRIDOR PROFILE

Worcester Site-Specific Observations & Deficiencies

Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Route
- Roads
- Streams
- Railroad
- - - Blackstone River Bikeway

Figure 3



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

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1.6 Town of Auburn Site-Specific Observations & Existing Deficiencies

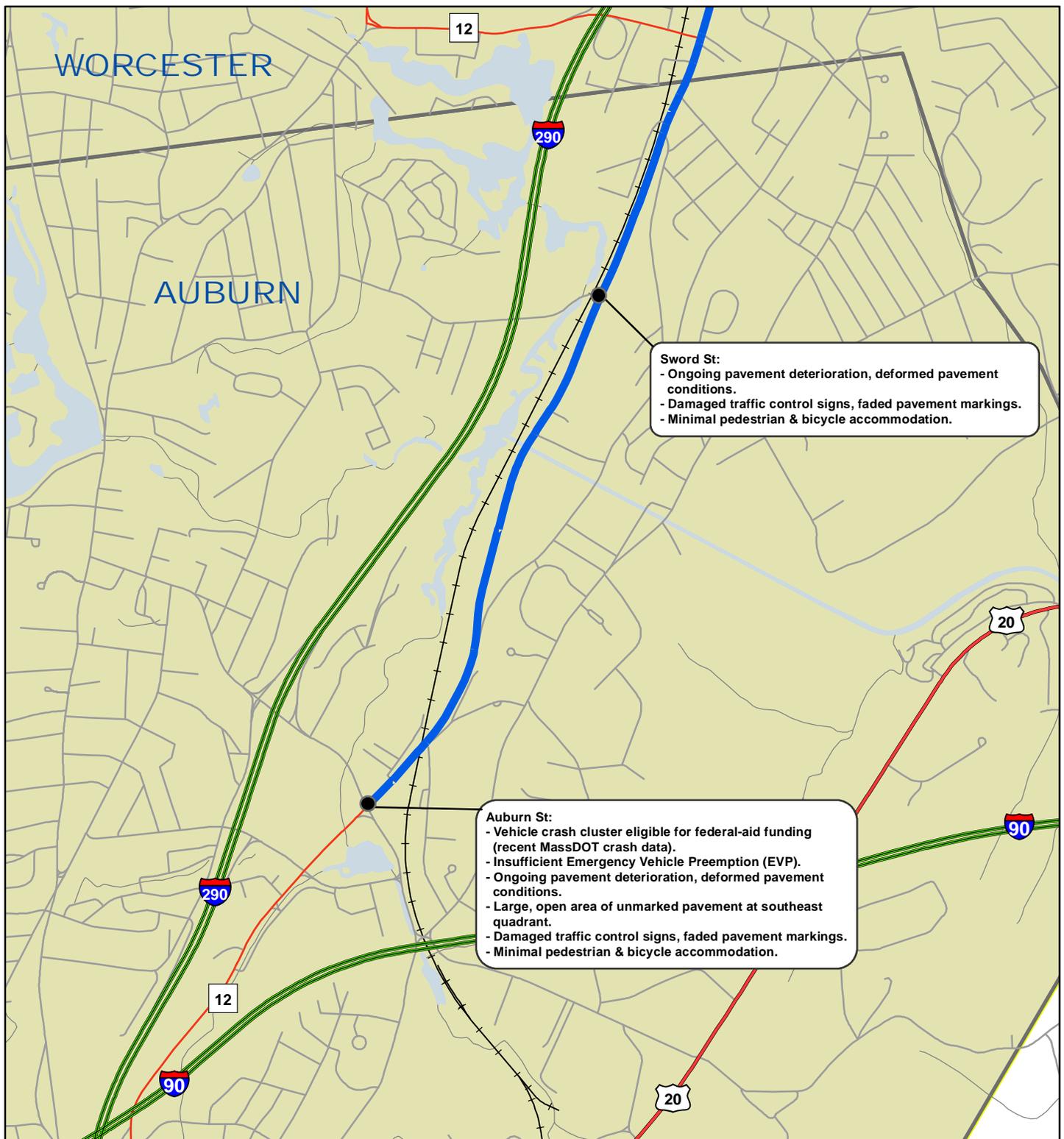
The following site-specific deficiencies, also shown in **Figure 4**, were observed along the Auburn segment of the Southbridge Street study corridor:

Southbridge Street/Sword Street Intersection

- Ongoing pavement deterioration, deformed pavement conditions.
- Damaged traffic control signs, faded pavement markings.
- Insufficient pedestrian and bicycle accommodation.

Southbridge Street/Auburn Street Intersection

- Crash data analyzed for Drury Square as part of this CP effort was dated between 2011 & 2013. It should be noted that more recent crash data obtained from MassDOT identified a vehicle crash cluster at the Southbridge Street/Auburn Street intersection that is in fact eligible for federal-aid Highway Safety Improvement Program (HSIP) funding.
- Insufficient Emergency Vehicle Preemption (EVP) at the existing Drury Square traffic signal.
- Ongoing pavement deterioration, deformed pavement conditions.
- Large, open area of unmarked pavement at the intersection's southeast quadrant.
- Damaged traffic control signs, faded pavement markings.
- Insufficient pedestrian and bicycle accommodation.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Auburn Site-Specific Observations & Deficiencies

Legend

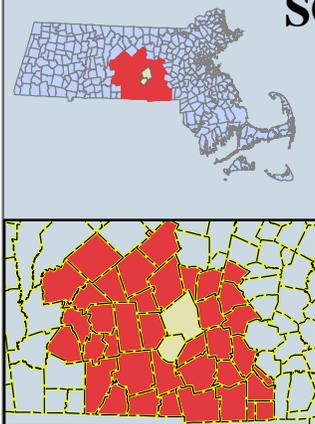
- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Streams
- +— Railroad
- Roads

Figure 4



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

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1.7 Overview of Background Development Activity

Using reference materials available from host community officials in both Auburn and Worcester, this section of the Corridor Profile effort provides a brief overview of significant background development activities in the general area, either on or in close proximity the Southbridge Street corridor. A number of major commercial, residential and mixed-use developments are under construction or planned for construction in the near future. These major development or redevelopment activities along Southbridge Street have the strong potential to benefit from the roadway improvement options that are suggested for all users. The location of these development activities are shown in **Figure 5**.

Worcester

A. Downtown Theatre District

A Downtown Theatre District is envisioned as an active, mixed-use, 18-hour neighborhood with significant institutional and residential growth supporting a vibrant entertainment and cultural environment drawing residents, businesses, and visitors to downtown Worcester. Key corridors, including Main Street, Federal Street, and Front Street will serve to tie District-wide venues together to make a walkable, inviting center of activity. Federal Street, the heart of the District, will be a tightly compressed pedestrian street plaza serving as a public gathering space complete with food, entertainment and retail activity.

Key destinations within the District, including City Hall, the Hanover Theatre for the Performing Arts, the YWCA, and the Worcester Public Library, as well as destinations outside the District, such as Union Station, the DCU Center, and Mechanics Hall, will link to continue the ongoing transformation of downtown Worcester. One of the proposed increased connections in the plan is to build a pedestrian walkway that would extend through the former Bancroft Nissan garage on Portland Street to Salem Street. That walkway will be necessary for many Worcester Public Library patrons if the master plan is realized, as the plan calls for the redevelopment of the McGrath Municipal Parking Lot next to the library.

B. Beacon/Federal Neighborhood Revitalization

A three-point approach to renewal has been adopted by the city of Worcester for the Beacon Street/Federal Street neighborhood adjacent to the Southbridge Street corridor:

1. Street, curb, sidewalk and open space improvements are critical. Using public funding based on the growth potential and future tax revenues of that growth, street appearances can be changed from neglect and disrepair to an atmosphere of quality public space that is well maintained and inviting for use. This will better link residents with employment opportunities and businesses with the goal to make living in the neighborhood an attractive proposition.

2. Privately-funded projects can use, renovate, and occupy identified abandoned buildings, and in the process add living spaces, jobs and vitality. Financing for these privately directed projects will need to be supported with creative assistance from city, state, and federal governments, including tax credit programs.
3. A partnership between the Community Policing Division of the Police Department and the residents would help restore the level of safety and the perception of civility on the sidewalks needed for a revitalized neighborhood. An active neighborhood organization committed to improving this specific neighborhood is critical.

These program elements will support and benefit from other significant public investments being made such as the Neighborhood Stabilization Program, the City's SAVE, Buy Worcester Now, Problem Property, and Foreclosure Intervention and Education programs, as well as the city/state partnership "Worcester Communities Count."

C. WRTA Maintenance & Operations Facility

The Worcester Regional Transit Authority (WRTA) has constructed a new 156K SF Maintenance & Operations (M&O) facility at 42 Quinsigamond Avenue to house its growing operational and maintenance needs. The new facility replaces the former Grove Street facility constructed in 1928. The building site is located about one mile from the WRTA's Hub at Union Station. A groundbreaking ceremony was held in June 2014, and the new facility was opened and dedicated in October 2016. Total project cost, including environmental site remediation, was approximately \$90 million. The new M&O includes storage for the entire fleet of WRTA vehicles as well as offices for administration and dispatching.

D. South Worcester Industrial Park

The South Worcester Industrial Park (SWIP) is an 11-acre brownfield site located on Southgate Street, west of Southbridge Street. The city owns approximately 8 acres within the redevelopment area. The SWIP project consists of infrastructure improvements, demolition, and environmental remediation to create pad-ready parcels for light manufacturing, industrial, and commercial use. Located one-half of a mile from the Port of Worcester, the SWIP has excellent access to freight rail, major highways [I-290, Route 146, MassPike (I-90)] and downtown Worcester. Up to six new development parcels will eventually be made available for disposition and development. This, in turn, could generate approximately 180K SF of new industrial and commercial space. The Worcester City Council has approved an Economic Development Plan for the area. This plan, which prioritizes the area for redevelopment, enables the administration to engage in direct negotiation for the land disposition. *During the compilation of this study, Table Talk Pies began construction of a new 50K SF factory building at 25 Southgate Street and 17 Southgate Place.*

E. Worcester Regional Mobility Study

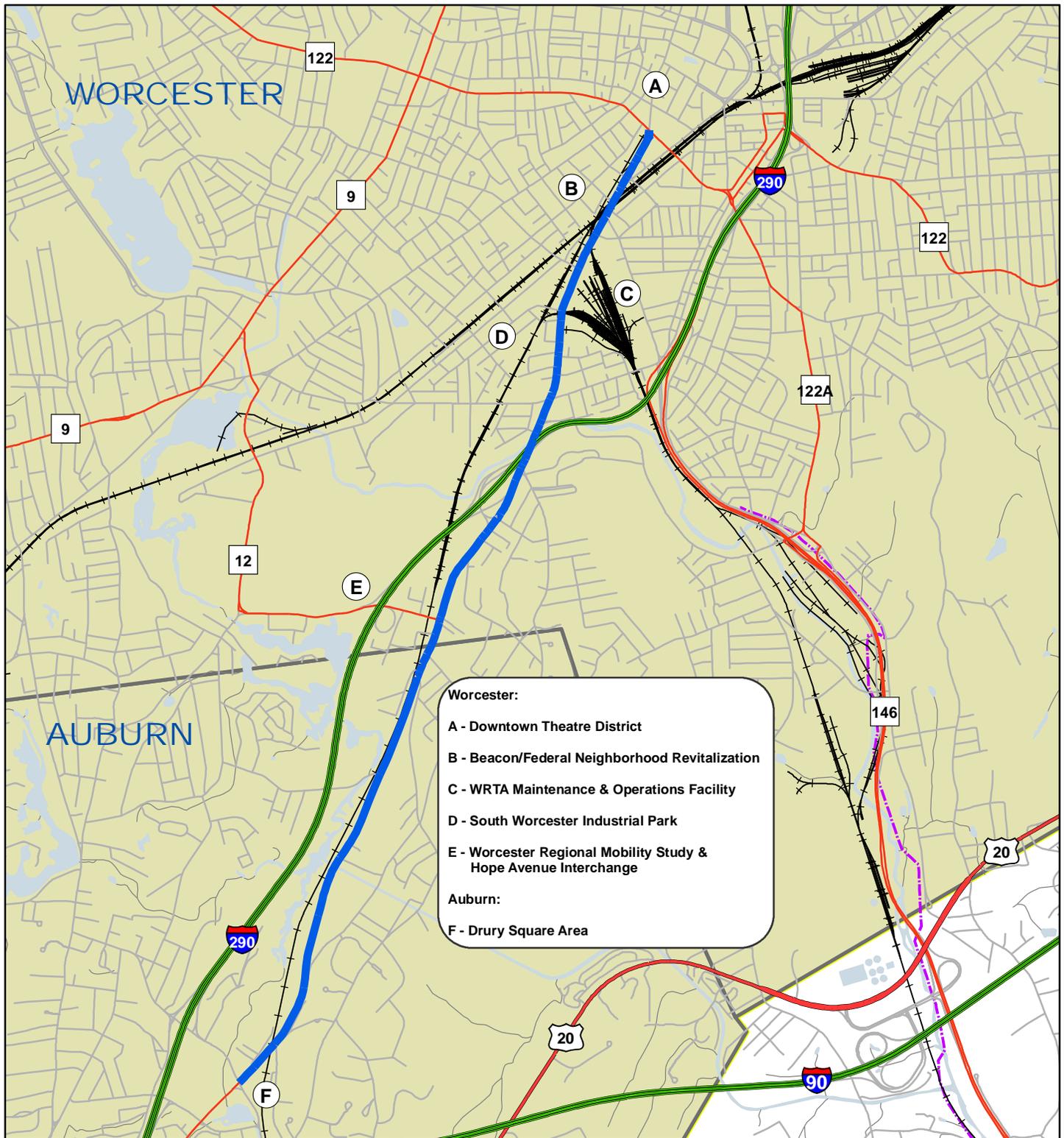
The Worcester Regional Mobility Study (WRMS), dated May 2011, suggested improvement options include a reconstructed, full-access interchange at I-290/Hope Avenue (“Alternative 8”) as well as intersection upgrades to existing surface roads including Hope Avenue, Webster Street, and Main Street into Webster Square (“South Corridor”). Since that time, the city has installed a roundabout at the intersection of Hope Avenue/Webster Street. This location was designed and signed to emphasize the travel corridor from Hope Avenue to Webster Street to Webster Square. The “South Corridor”, defined by Alternative 8, was initially studied in the early 2000’s. Suggested improvement options were included as part of the “City of Worcester East-West Corridor Projects” advanced by MassDOT predecessor agency in the early 2000’s. *MassDOT has since indicated that potential improvements at the partial I-290/Hope Avenue interchange are not a major priority in consideration of the full I-290 Interchange #11 at nearby College Square.*

Auburn

F. Drury Square Area

Beyond the multi-modal transportation improvements planned under the Auburn Street Rehabilitation project programmed on the CMMPO TIP, another effort is underway in the host community to implement a Drury Square area beautification & landscaping effort. Town officials anticipate working with CMRPC staff in the fall of 2017 to further investigate the potential for enhancing the area as a town center. A long-envisioned effort, it would include the implementation of a range of aesthetic enhancements and practical improvements that could be achieved within the town’s current zoning bylaws.

The future potential redevelopment of the Auburn Mall and other nearby “big box” properties could serve to increase the number of visitors to the Drury Square area, promoting extra economic growth benefiting both existing and new businesses. Further, easier access to the Southbridge Street business corridor could potentially increase transit ridership which could also increase pedestrians within the study area. Notably, all WRTA fixed route buses are equipped with bicycle racks, thus encouraging an increase in this mode as well.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Background Development Activity

Figure 5

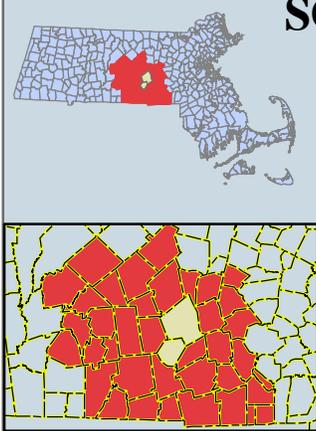
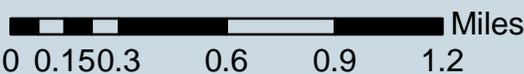
Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- A Site Location
- Streams
- +— Railroad
- - - Blackstone River
- Bikeway
- Roads



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

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2.0 SOUTHBRIDGE STREET ENVIRONS

2.1 Natural Environment

Major features of the natural environment were also identified as part of the Southbridge Street Corridor Profile effort and were used to create Environmental Profile maps for this study area. Such maps are included in many Corridor Profile Reports and allows the user to view major environmental systems beyond the corridor study area that have impacts on such things as drainage, water quality and wildlife migration. These maps of the study area showing major environmental features were compiled from the following key resources.

Department of Conservation and Recreation (DCR)

The mission of DCR is to protect, promote and enhance our common wealth of natural, cultural and recreational resources. Geographic Data layers are managed by divisions within DCR.

- **Division of State Parks and Recreation** -This division protects land and resources on privately and municipally held land through technical assistance, grant and planning programs, policy development, and other services.
- **Forest Stewardship Program** - This non-regulatory program is designed to help landowners protect the inherent ecosystem values of their forest.
- **Division of Water Supply Protection** - Manages and protects the drinking water supply watersheds for Greater Boston.

Department of Environmental Protection (DEP)

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

- **Division of Watershed Management (DWM)**
- **Watershed Planning Program (WPP)** - Contaminated water eliminates drinking water supplies, degrades our recreational water resources and destroys wildlife habitat. Water that does not soak into the ground is called runoff. Proper manure management and runoff management will protect or improve water quality in any community and watershed. Geographic data layers are from an integrated list from DWM and WPP and include:
 - ***Impaired Waterways (typically due to phosphorous, metals, and pathogens from sewage and farming's use of manure as well as other contaminants)***
 - ***Impaired Waterbodies***
 - ***Monitored Waterways***
 - ***Zone II (Wellhead Protection Areas)***

- **Bureau of Resource Protection (BRP)** - The Wetlands Protection Act protects wetlands and the public interests they serve, including flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat. These public interests are protected by requiring a careful review of proposed work that may alter wetlands or buffer zones.

National Heritage & Endangered Species Program (NHESP)

The overall goal of the NHESP is the protection of the state's wide range of native biological diversity. NHESP is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state. Available geographic data layers include:

- **Certified Vernal Pools**
- **Potential Vernal Pools**
- **BioMap Core Habitat** - This depicts the most viable habitats for rare species in Massachusetts.
- **BioMap Supporting Natural Landscape**
- **Priority Habitats of Rare Species** – These are the geographical extents of habitat for all state-listed rare species, both plants and animals. They are officially used under the Massachusetts Endangered Species Act (MESA).

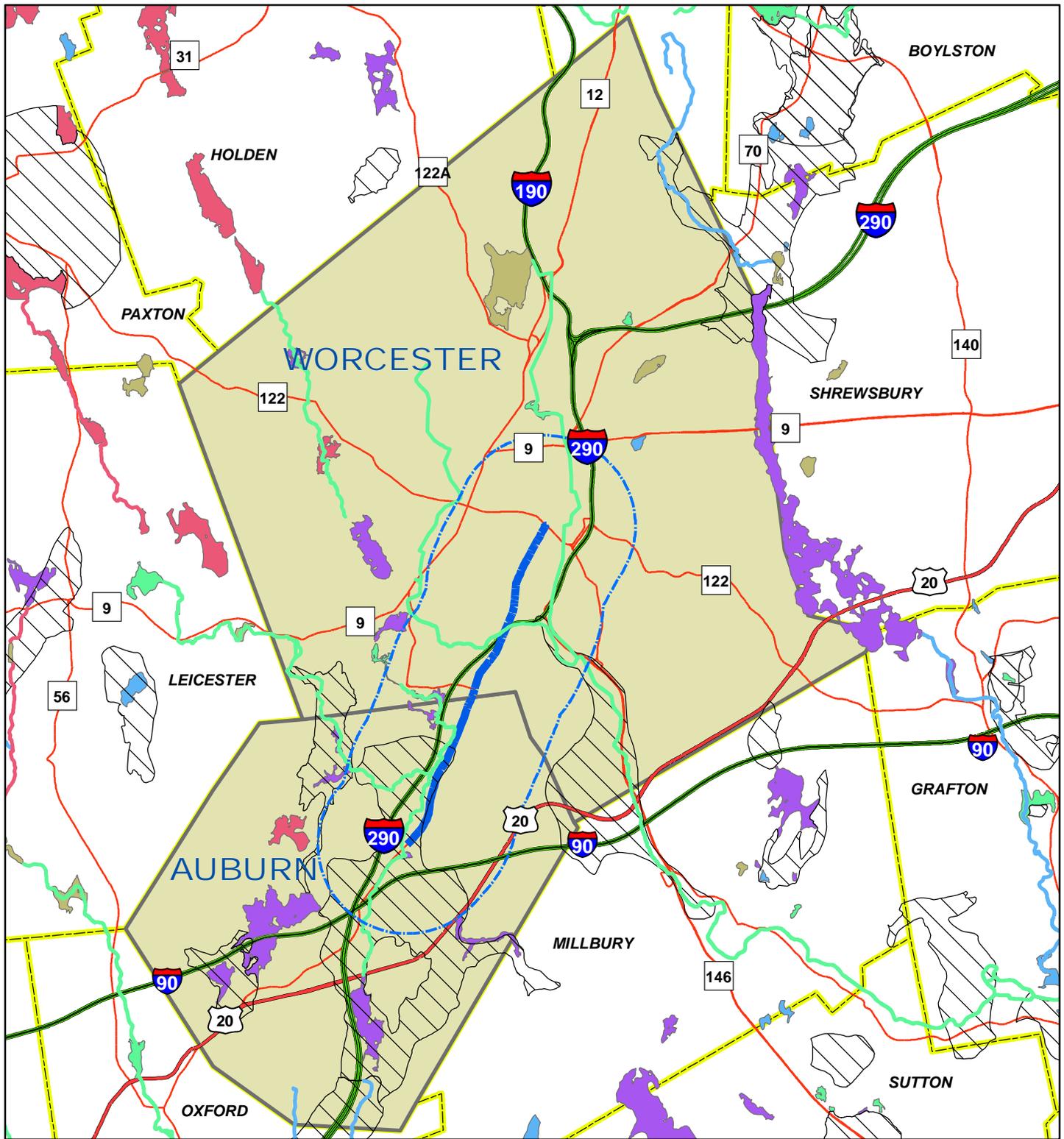
Environmental Profile Maps

The following Environmental Profile Maps for the Southbridge Street Corridor study include environmental features such as vernal pools, wetlands, impaired waters and wellhead protection areas. Vernal pools are small, shallow ponds characterized by lack of fish and by periods of dryness. Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year. Under the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waterways. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by states, territories, or authorized tribes. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop a Total Maximum Daily Load (TMDL) for these waters. A TMDL is a calculation of the maximum amount of pollutant that a waterbody can receive and still safely meet water quality standards. A wellhead protection area is that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated.

Figure 6 shows impaired waterways and wellhead protection areas in the study area. Located just south of Hope Avenue, Leesville Pond has an impairment that is not caused by a pollutant. The Middle River and Ramshorn Brook are waters near the Corridor Profile that require a TMDL. There is a small wellhead protection area in Worcester, located east of Southbridge

Street, near the Middle River. This map also depicts the town of Auburn's water supply wells and wellhead protection area near the study corridor.

Figure 7 shows major watershed areas, vernal pools, and wetlands within the Southbridge Street study area. The entire length of the study area is included in the Blackstone River watershed. There are not many wetlands within the City of Worcester except for a small area along the Middle River, just east of Southbridge Street. In Auburn, there are wetlands located along Ramshorn Brook, just north of Auburn Street on the western side of Southbridge Street. There are no certified vernal pools within the one mile buffer zone of Southbridge Street, but there are a few potential vernal pools. Most of the potential vernal pools are located in Auburn on the west side of Southbridge Street. Further study is needed to investigate the types of species that inhabit the wetlands and vernal pools in this study, and if any of the proposed improvements would be detrimental to their existence.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Impaired Waters and Wellhead Protection Areas

Figure 6

Legend

- Southbridge Street Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Southbridge Street 1-Mi Buffer Zone
- DEP Approved Zone II's

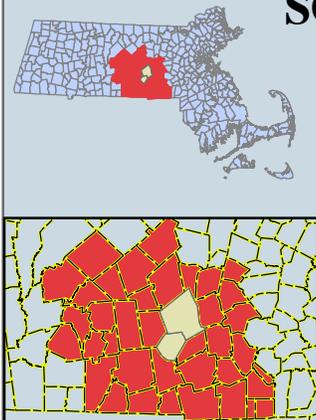
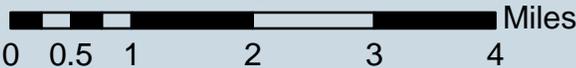
Water Body (Rivers, Lakes and Ponds) Category

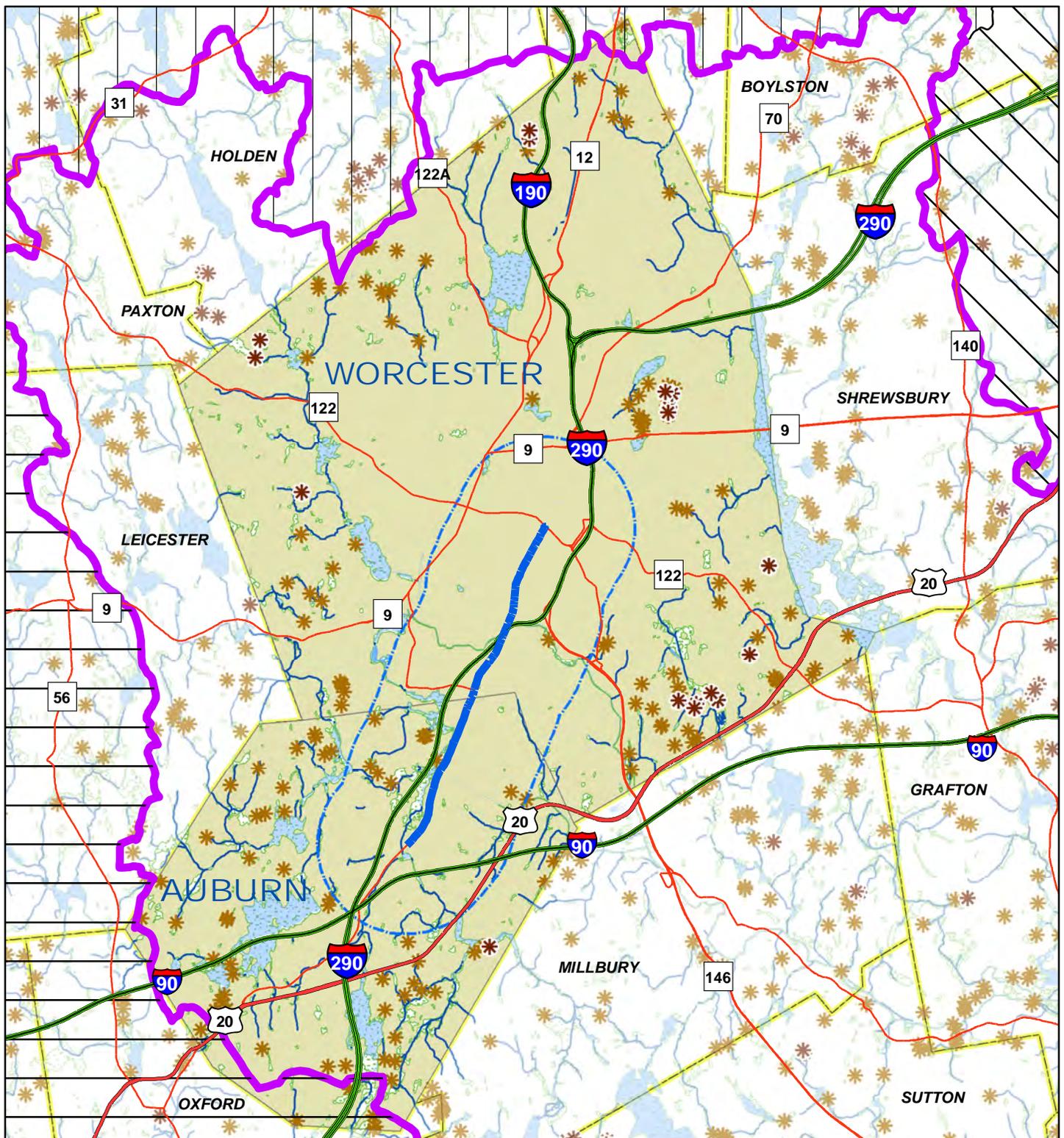
- 2 Attaining Some Uses
- 3 No Uses Assessed
- 4A TMDL is Completed
- 4C Impairment not Caused by a Pollutant
- 5 Waters Requiring a TMDL



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

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Major Watersheds, Vernal Pools and Wetlands

Figure 7

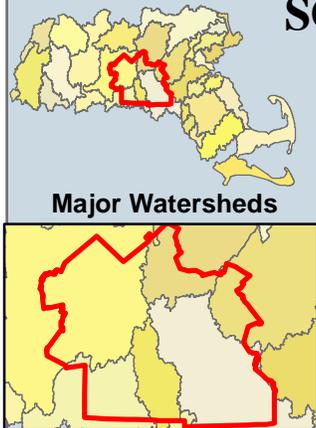
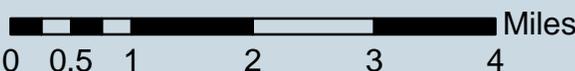
Legend

- Southbridge Street
- Worcester, Auburn
- Southbridge Street 1-Mi Buffer Zone
- Streams
- Water Bodies
- NHESP Certified Vernal Pools
- Potential Vernal Pools
- DEP Wetlands (Jan. 2009)
- Blackstone River Watershed
- Concord River Watershed
- French River Watershed
- Nashua River Watershed



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

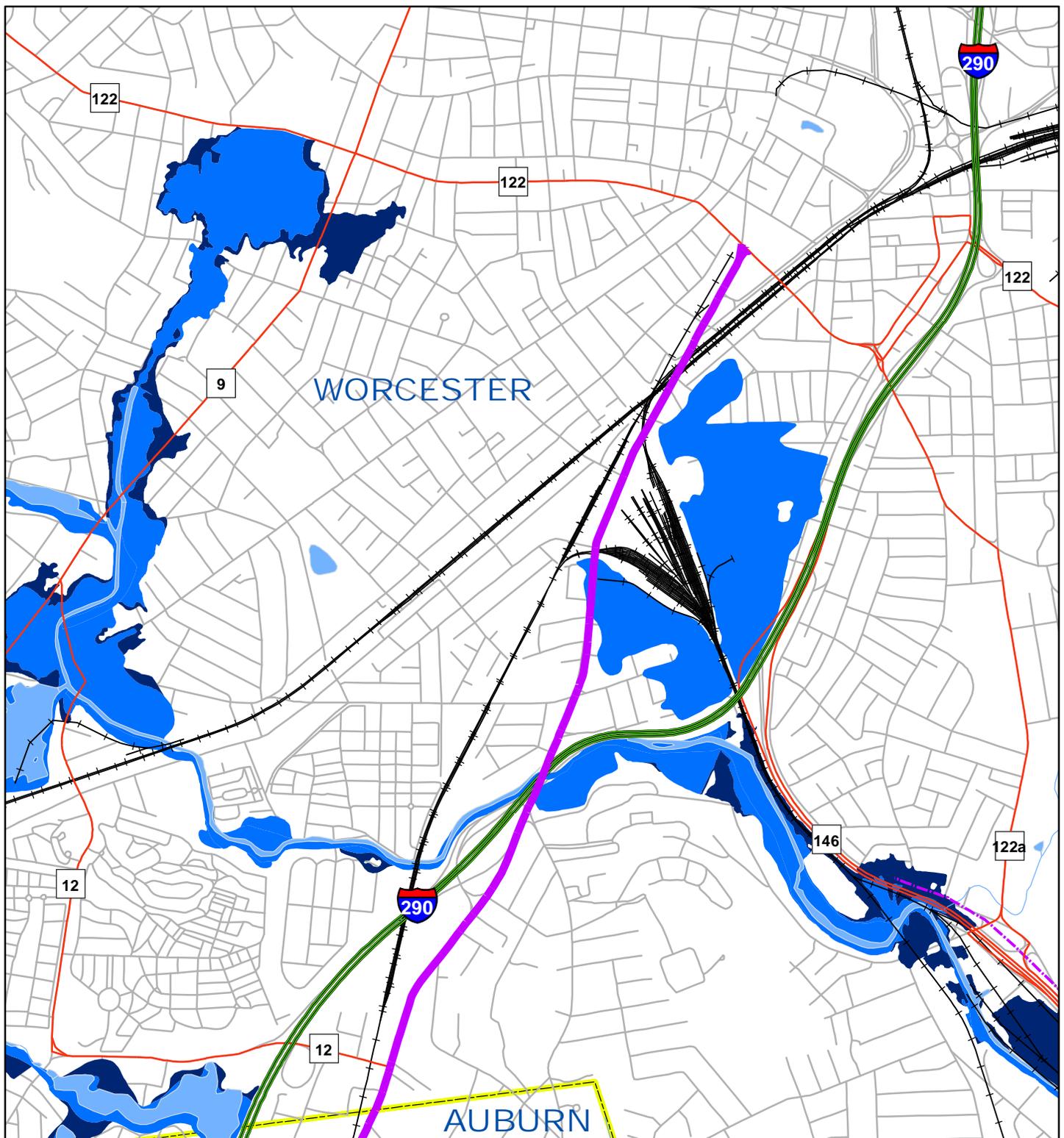
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2.2 Flood Zones

Figures 8 & 9 show the 100 and 500 year flood zone near the study area. The 100 year flood zone means that there is a one percent annual chance of a flood within that defined area. The 500 year flood zone means that there is a 0.2 percent annual chance for a flood. The closer something is to the flooding source (e.g. river, stream, pond, etc.) the greater the risk of flooding. Flood zones can also be used to calculate flood insurance rates for homes and businesses.

Within the City of Worcester, from I-290 to just south of Madison Street, there is a large area that is considered a 100 year flood zone. This flood zone is on the east side of the Southbridge Street, mainly at the G&W Railroad yard and along Quinsigamond Avenue. Because of a low elevation of surrounding neighborhoods, heavy rain events cause this area to flood. There are also a few small areas near the Middle River that are considered a 500 year flood zone. In Auburn, all the flood zones are on the west side of Southbridge Street. These zones are around the Leesville Pond, Kettle Brook, and the Ramshorn Brook. Most of the flood zones are 100 year, but there are some 500 year mixed in.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Worcester Flood Zones

Figure 8

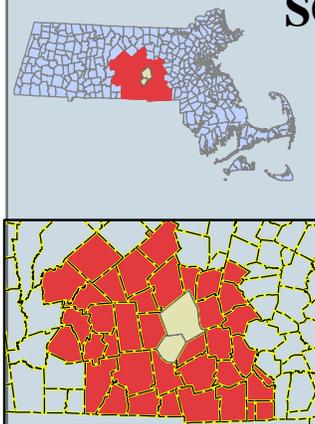
Legend

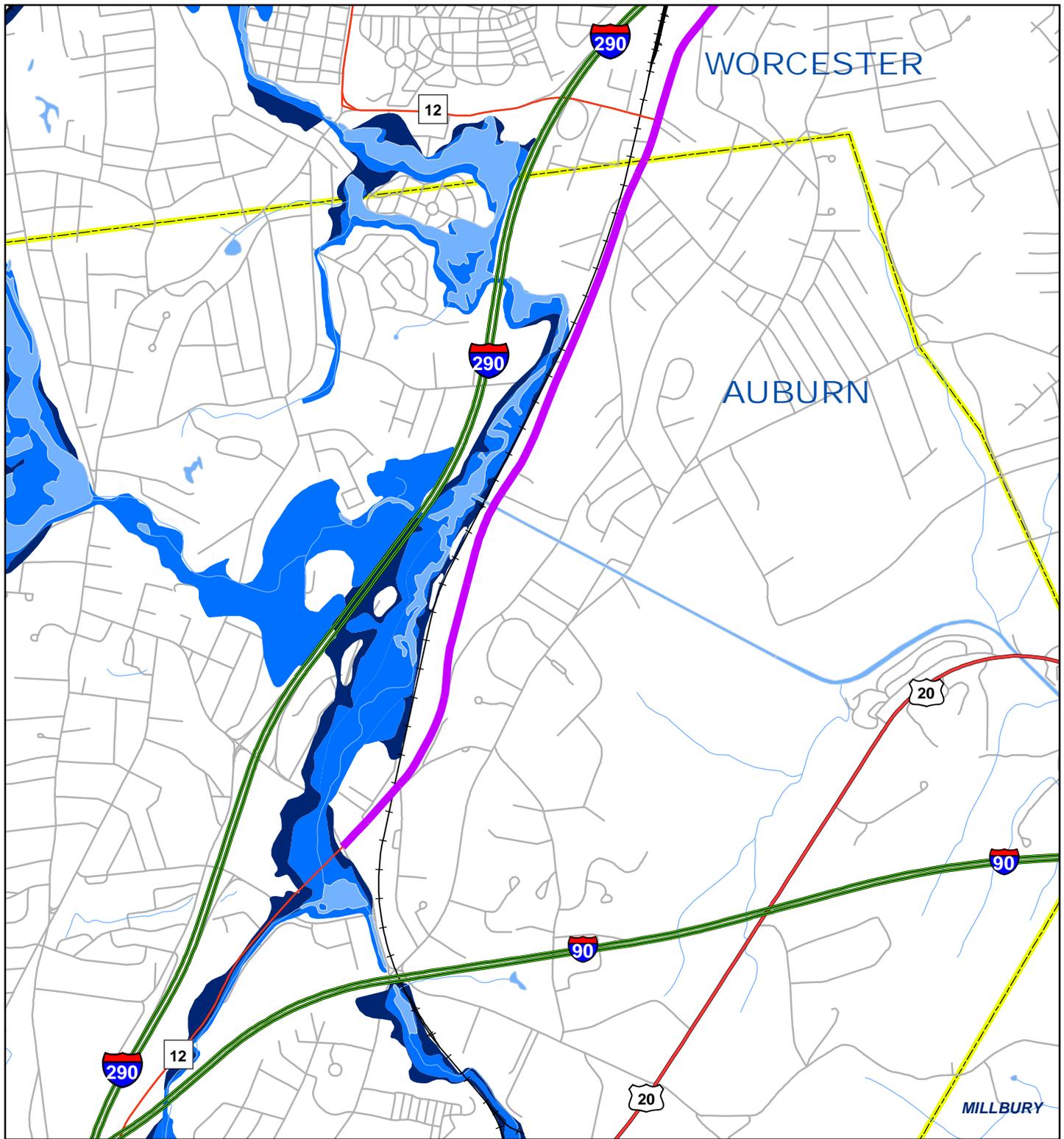
-  Southbridge Street - Worcester, Auburn
-  Interstate
-  State Route
-  Roads
-  Streams
-  Water Bodies
-  100 Year Flood Zone
-  500 Year Flood Zone



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

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Auburn Flood Zones

Figure 9

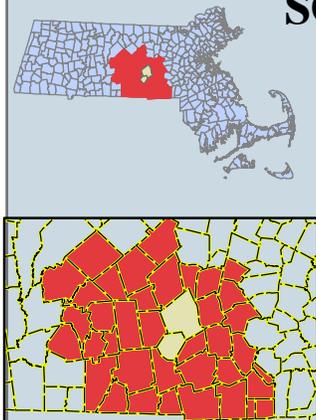
Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Roads
- Streams
- Water Bodies
- 100 Year Flood Zone
- 500 Year Flood Zone



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

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3.0 CONGESTION MANAGEMENT PROCESS (CMP)

3.1 Overview of the Central Massachusetts CMP

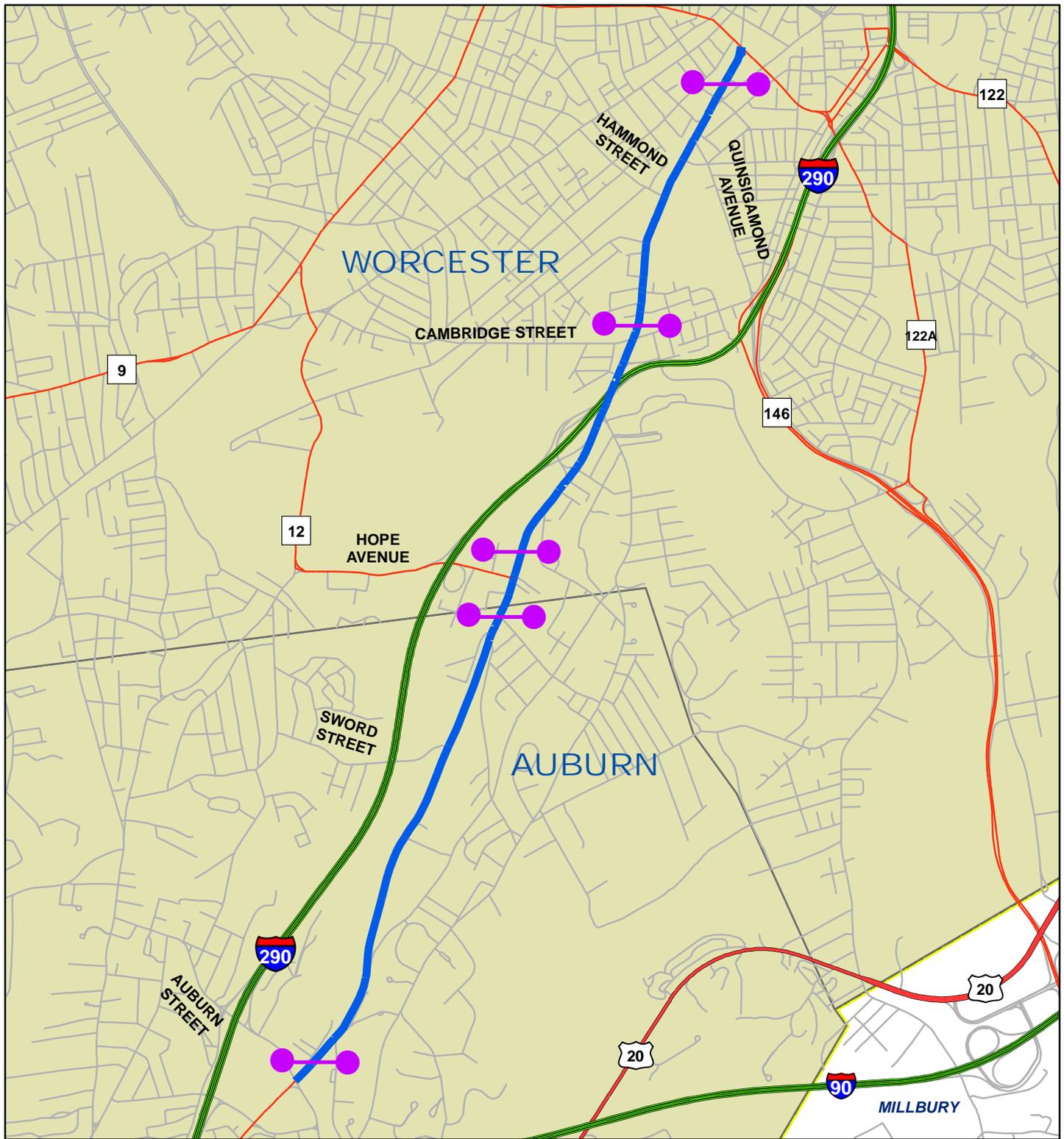
The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) required urban areas across the country to assess traffic congestion using a management system approach. Briefly, a management system approach is one where issues are identified through a systematic process of data collection and analysis, recommendations are developed to address the issues, solutions are implemented, and their effectiveness is monitored. For the Central Massachusetts Metropolitan Planning Organization (CMMPO), staff at CMRPC began developing the region's Congestion Management System (CMS) in 1994.

The first step was to identify "focus segments," roadways where the traffic volume on the roadway was exceeding the operational capacity. According to the Highway Capacity Manual, 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." Beginning in 1995, CMRPC staff proceeded to verify and monitor the congested conditions in the field by conducting a series of travel time and delay studies along roadways and turning movement counts at intersections. The location of these data collection activities could be indicated by CMRPC's Traffic Demand Model or as suggested by one of the communities in the CMRPC region.

The 2006 **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, as does 2015's successor legislation **Fixing America's Surface Transportation (FAST) Act**. Staff will continue to follow the evolution of applicable CMP performance measures by U.S. DOT. This Corridor Profile provides the baseline data needed to coordinate such improvements with the MassDOT District #3 office as well as with the communities through which the roadway travels.

3.2 Daily Traffic Volumes

Figure 10 shows locations along Southbridge Street in the city of Worcester and the town of Auburn where CMRPC set Automatic Traffic Recorders (ATRs) to gather the volume of traffic. The majority of the locations were completed in September and October of 2015. The ATRs were installed along the roadway and left down for at least 48 hours. There were five locations completed for this Corridor Profile. **Table 1** shows the volume results from the Southbridge Street ATR locations. As the data shows, the highest and lowest traffic volumes are in the city of Worcester. The lowest is located south of Madison Street and the highest is north of Cambridge Street. The volumes in the town of Auburn are between 10,000 and 12,000 vehicles a day.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Traffic Count Locations

Figure 10

Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Route
- State Route
- Local Roads
- ATR Locations



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

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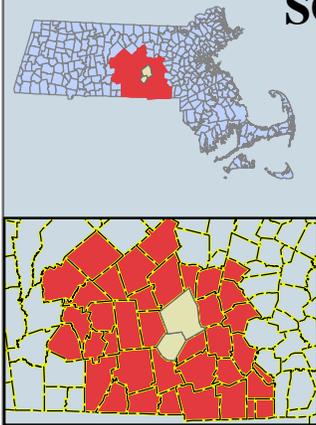


Table 1

**Southbridge Street Corridor Profile
Existing Daily Traffic Volumes**

| <u>Town</u> | <u>ATR Location</u> | <u>Date</u> | <u>Volume*</u> |
|------------------|--|-------------|----------------|
| Worcester | Southbridge St south of Madison Street | 9/15/2015 | 9,250 |
| | Southbridge Street north of Cambridge Street | 8/27/2015 | 15,050 |
| | Southbridge Street north of Hope Ave | 9/15/2015 | 11,525 |
| <hr/> | | | |
| Auburn | Southbridge Street at Worcester City Line | 9/15/2015 | 12,000 |
| | Southbridge Street north of Auburn Street | 10/28/2014 | 10,000 |
| <hr/> | | | |

*Vehicles Per Day (VPD)

3.3 Southbridge Street Travel Time and Delay Studies

CMRPC staff conducted a travel time and delay study in 2015 for this Corridor Profile. The travel time data was collected by CMRPC using a Global Positioning System (GPS) unit. After the field data was collected, it was downloaded into “TravTime” software (developed by Geo Stats) in order to analyze the data. As indicated in **Table 2**, traveling in each direction took an average of nine minutes. The travel times were a minute or two longer during the PM.

Table 2
Southbridge Street Travel Time and Delay Study Results

| Peak Period | Direction | Study Year | Distance | Travel Time (average minutes) |
|---------------------|------------|------------|-----------|-------------------------------|
| AM-Auburn/Worcester | Northbound | 2015 | 4.0 miles | 8.5 |
| AM-Auburn/Worcester | Southbound | 2015 | 4.0 miles | 7.9 |
| PM-Auburn/Worcester | Northbound | 2015 | 4.0 miles | 9.3 |
| PM-Auburn/Worcester | Southbound | 2015 | 4.0 miles | 10.3 |

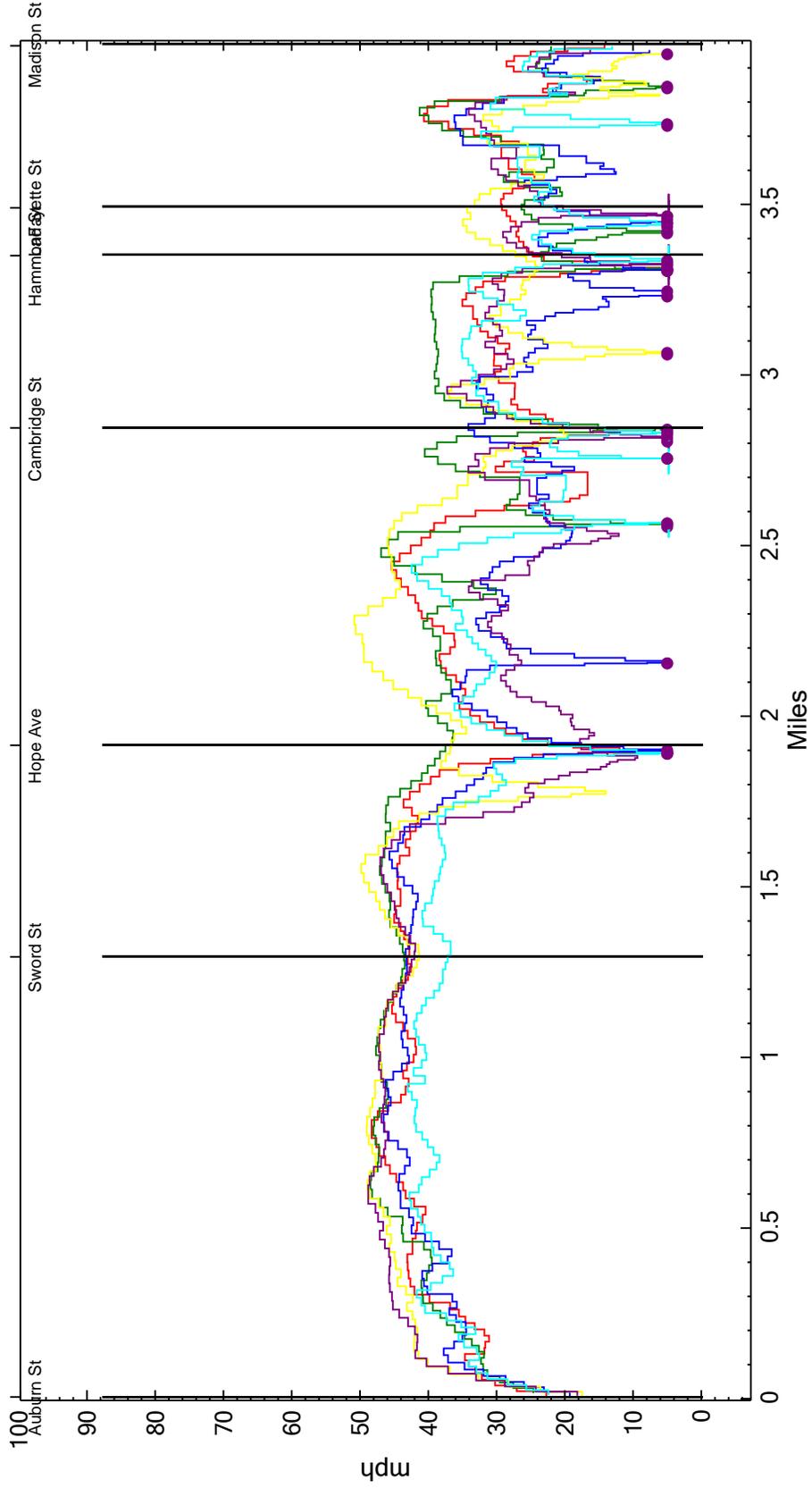
Figures 11 through 14 illustrate the vehicle speeds for each separate northbound and southbound trip along Southbridge Street observed in 2015. The average vehicle speed observed for the northbound direction was 28 mph in the AM and 26 mph during the PM. The slowest speeds were located between Hammond Street and LaFayette Street. For the southbound direction, the average vehicle speeds were 30 mph in the AM and 23 mph in the PM. In the AM vehicle speeds were the slowest near Hope Avenue. During the PM peak hours vehicle speeds were slowest between Madison Street and Hammond Street.

Speed Profile - Southbridge St NB

ScaleX: 1 in = 0.5 Miles
ScaleY: 1 in = 25 mph

Figure 11

2015 - AM

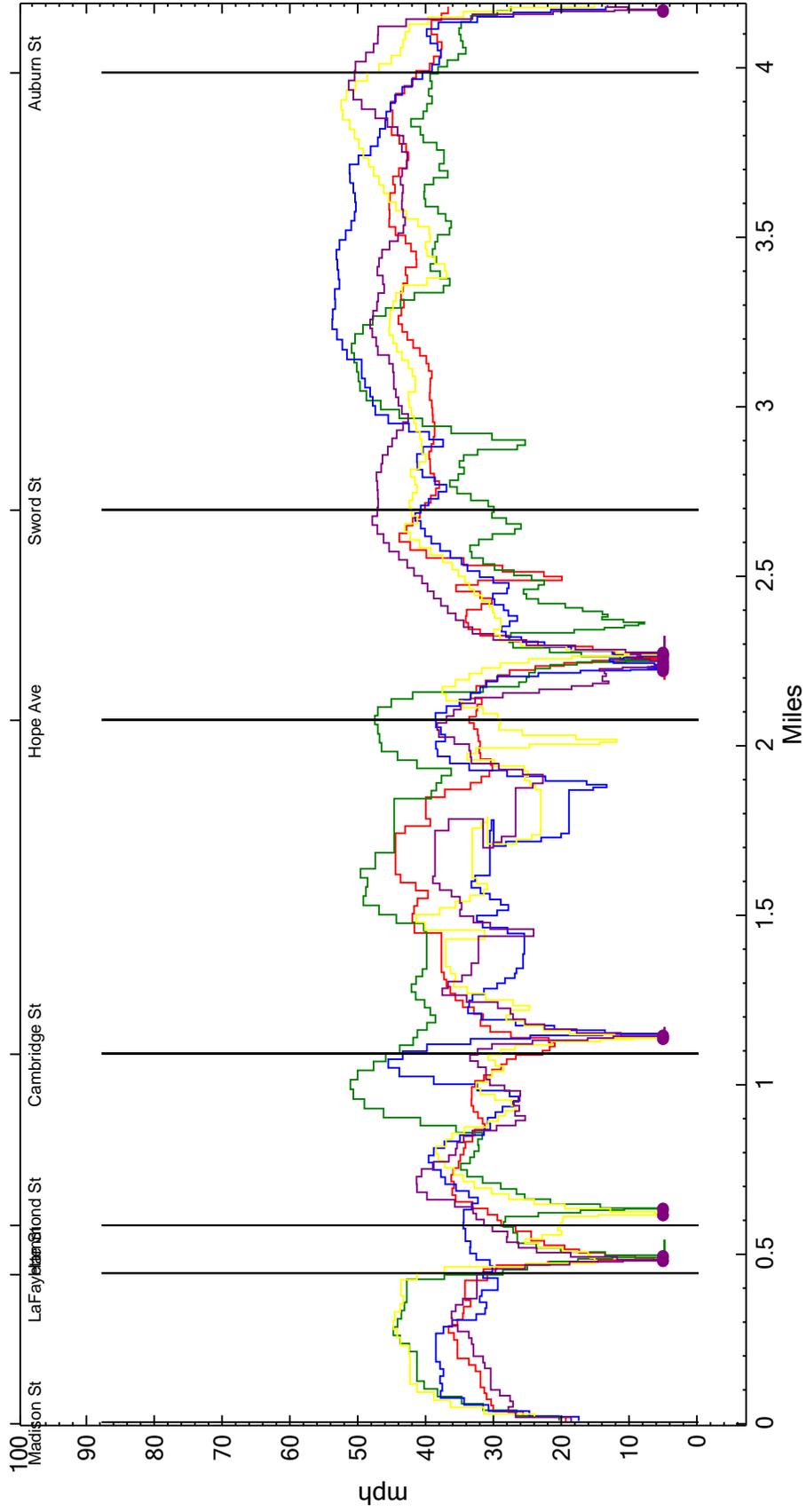


2015 - AM

Figure 12

Speed Profile - Southbridge St SB

ScaleX: 1 in = 0.5 Miles
ScaleY: 1 in = 25 mph

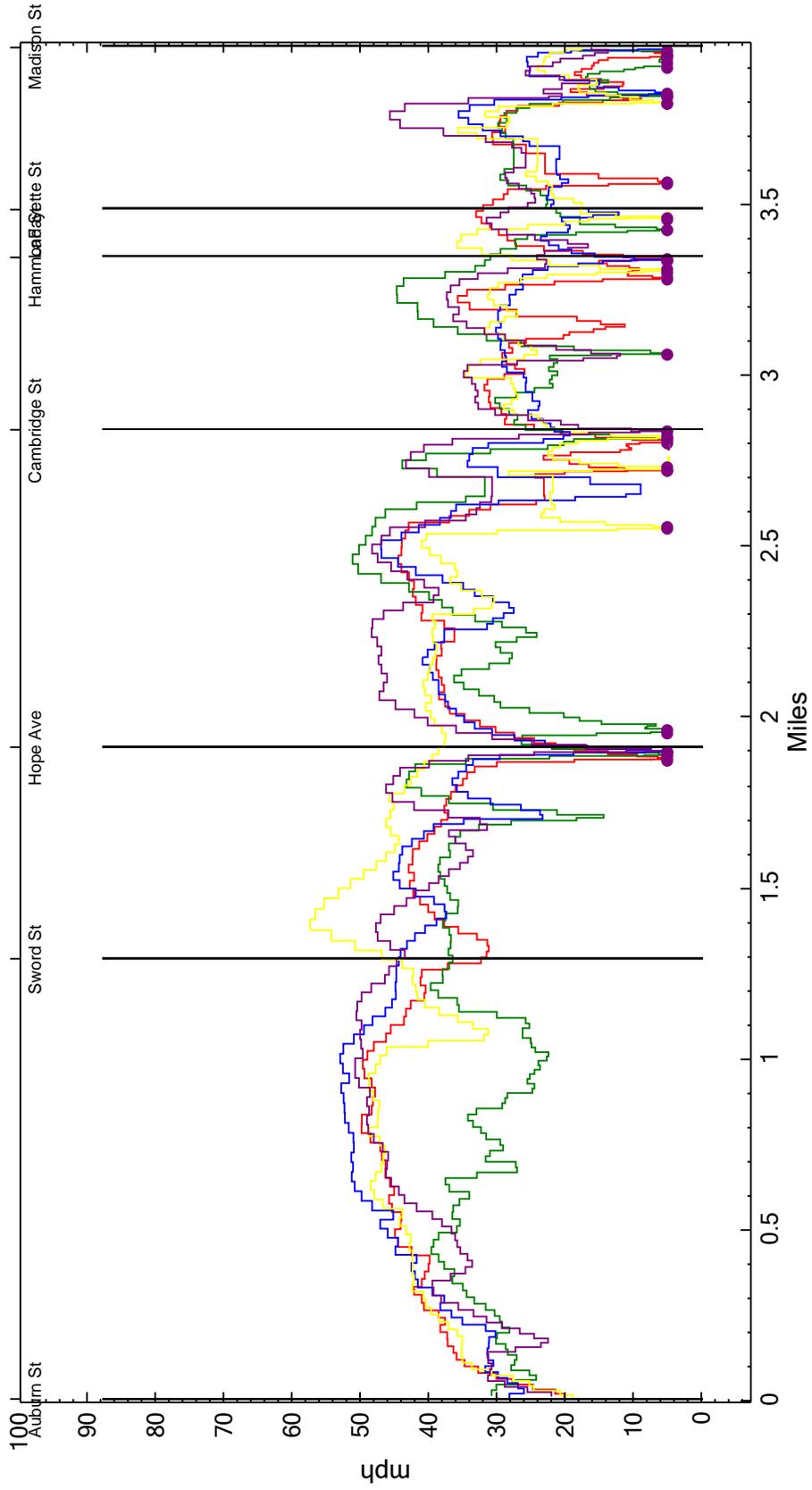


2015 - PM

Figure 13

Speed Profile - Southbridge St NB

ScaleX: 1 in = 0.5 Miles
ScaleY: 1 in = 25 mph



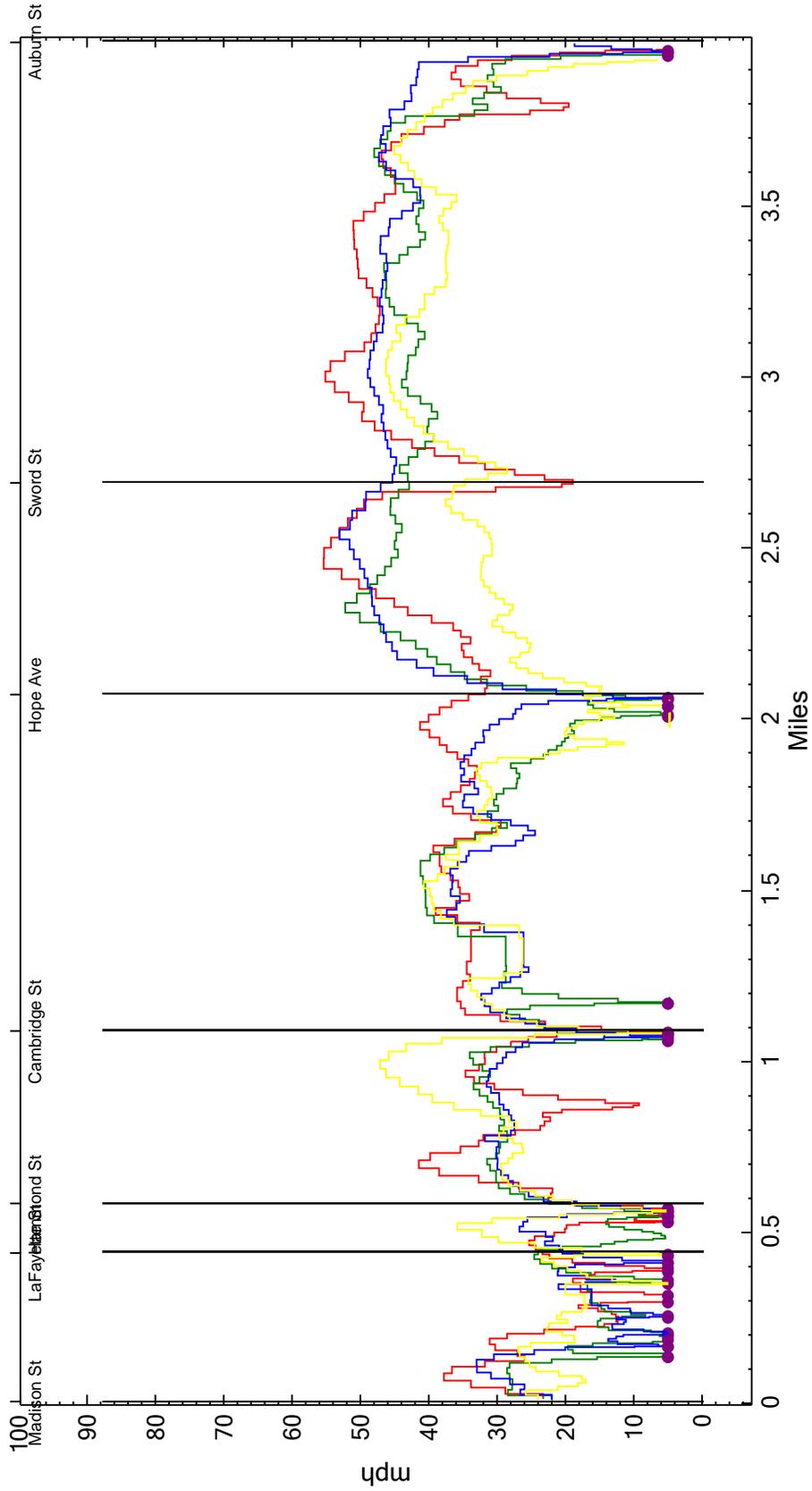
Generated 12/30/2015 10:26 AM

2015 - PM

Figure 14

Speed Profile - Southbridge St SB

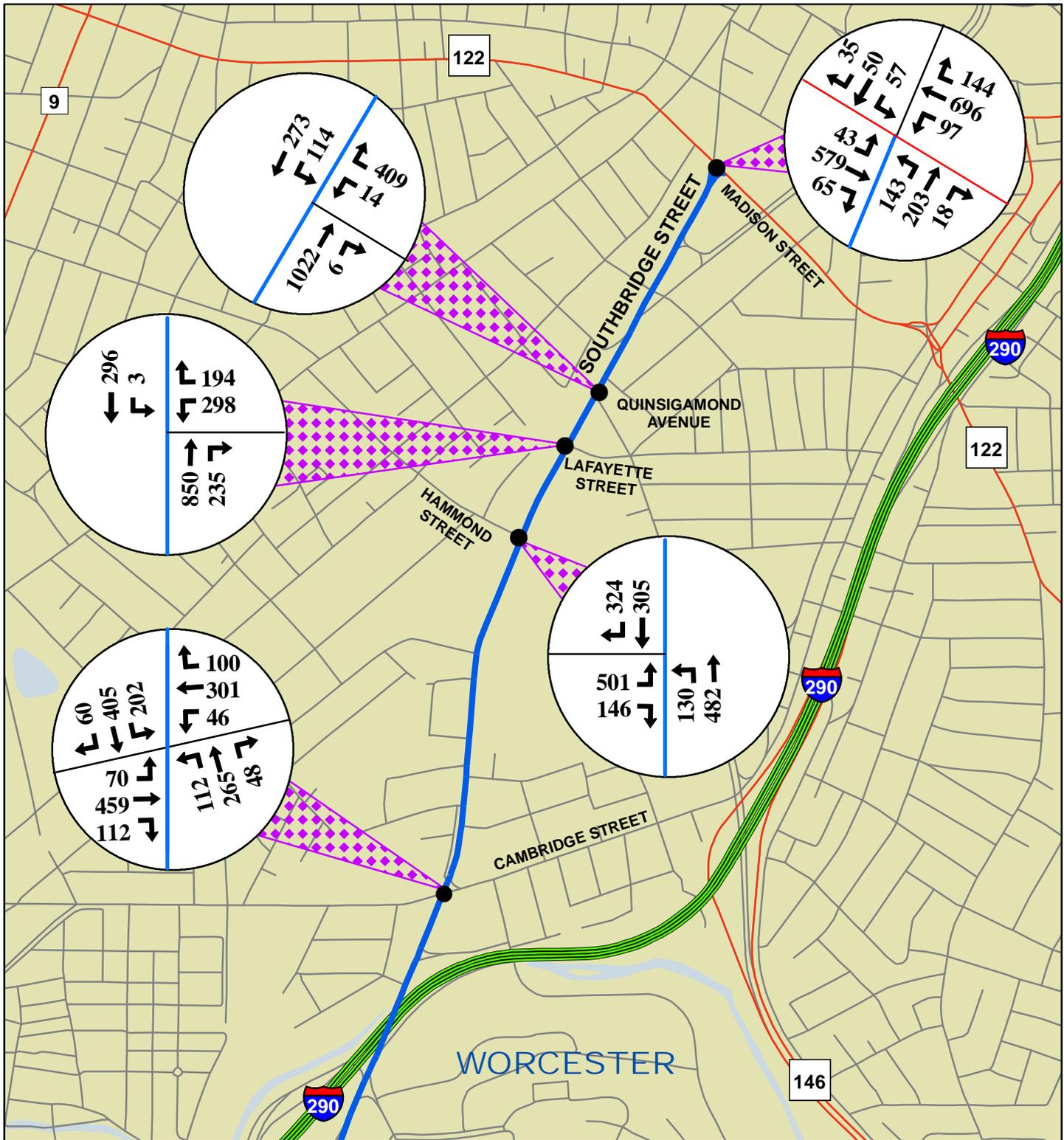
ScaleX: 1 in = 0.5 Miles
ScaleY: 1 in = 25 mph



Generated 12/30/2015 10:26 AM

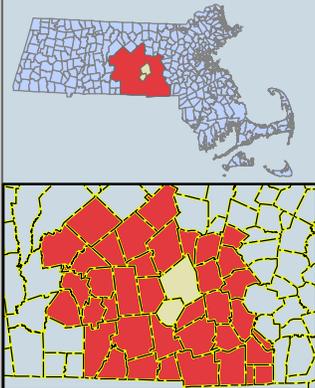
3.4 Southbridge Street Intersections Existing Peak Hour Traffic Volumes

CMRPC conducted Turning Movement Counts (TMCs) at numerous focus intersections for this Corridor Study. Most counts were done in 2013 and 2014. Every effort was made to complete these TMCs during peak flow months while school was in session. In displaying these counts as a network, a “balancing” exercise was conducted to account for the typical addition and loss of traffic between adjacent study intersections (due to local streets, site drives serving major land uses, and other private driveways) and natural statistical variation encountered when turning movement counts are conducted on different days. These adjusted volumes are shown in **Figures 15 and 16** as existing AM and PM peak hour traffic flows. The complete TMC datasheets have been provided in the document’s Technical Appendix.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Existing Traffic Flows
 AM Peak Hour Period
 Figure 15A



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways

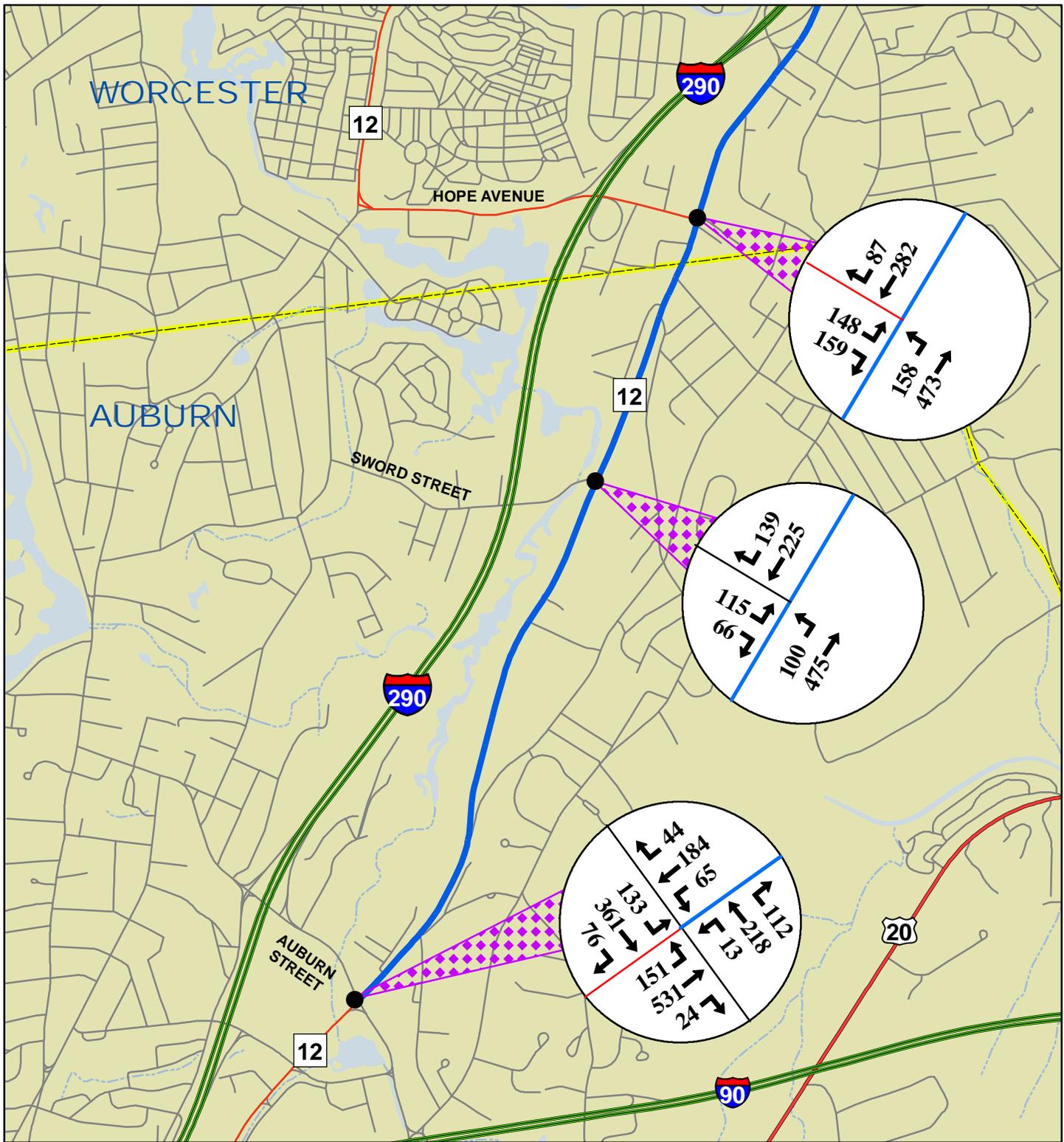


1 in = 0.2 miles



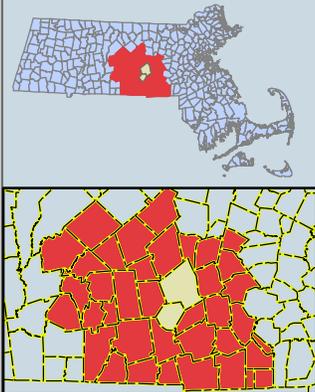
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Existing Traffic Flows
AM Peak Hour Period
Figure 15B



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways

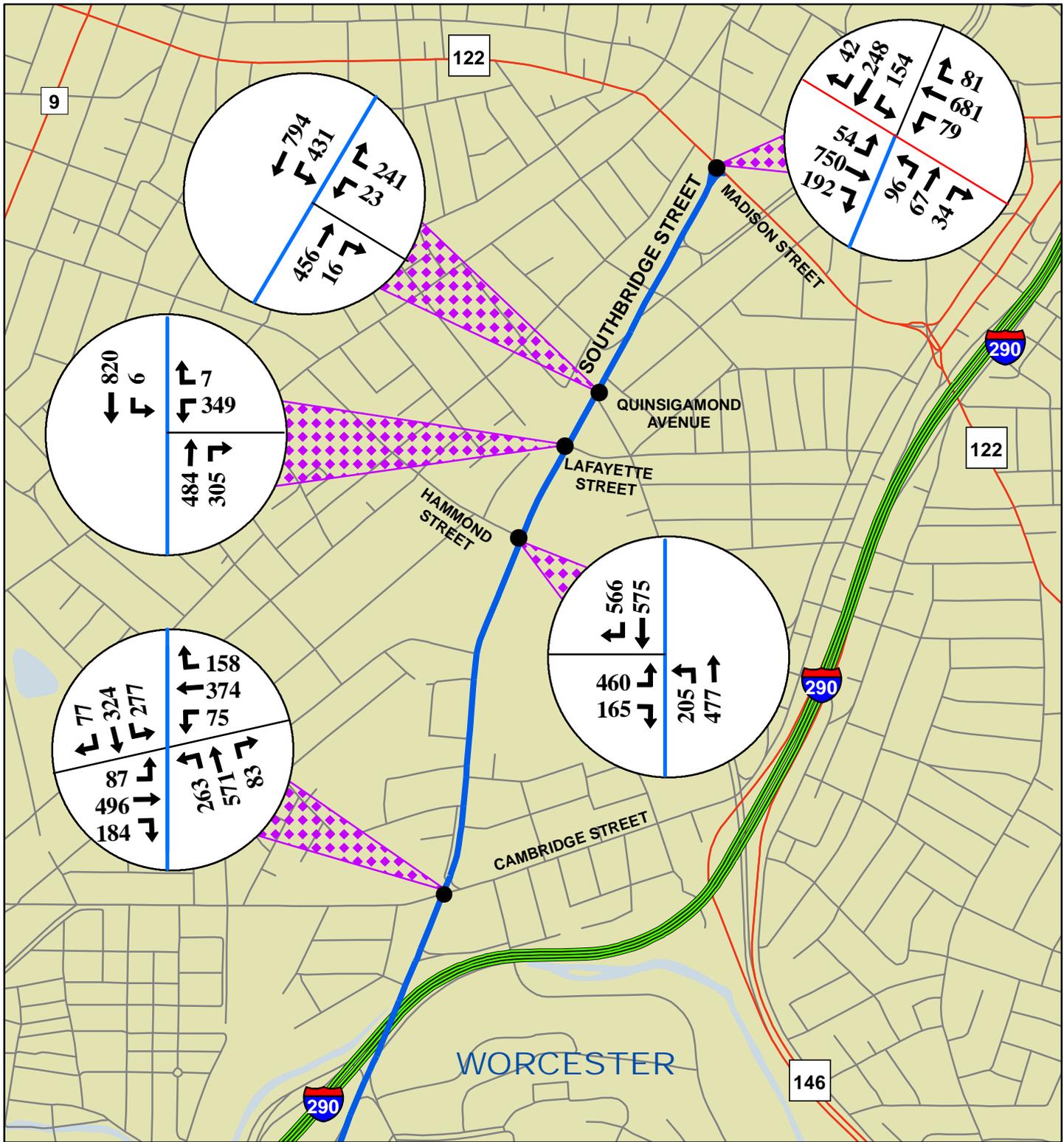


1 in = 0.32 miles



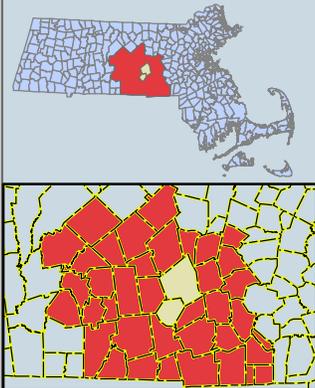
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Existing Traffic Flows
PM Peak Hour Period
Figure 16A



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways

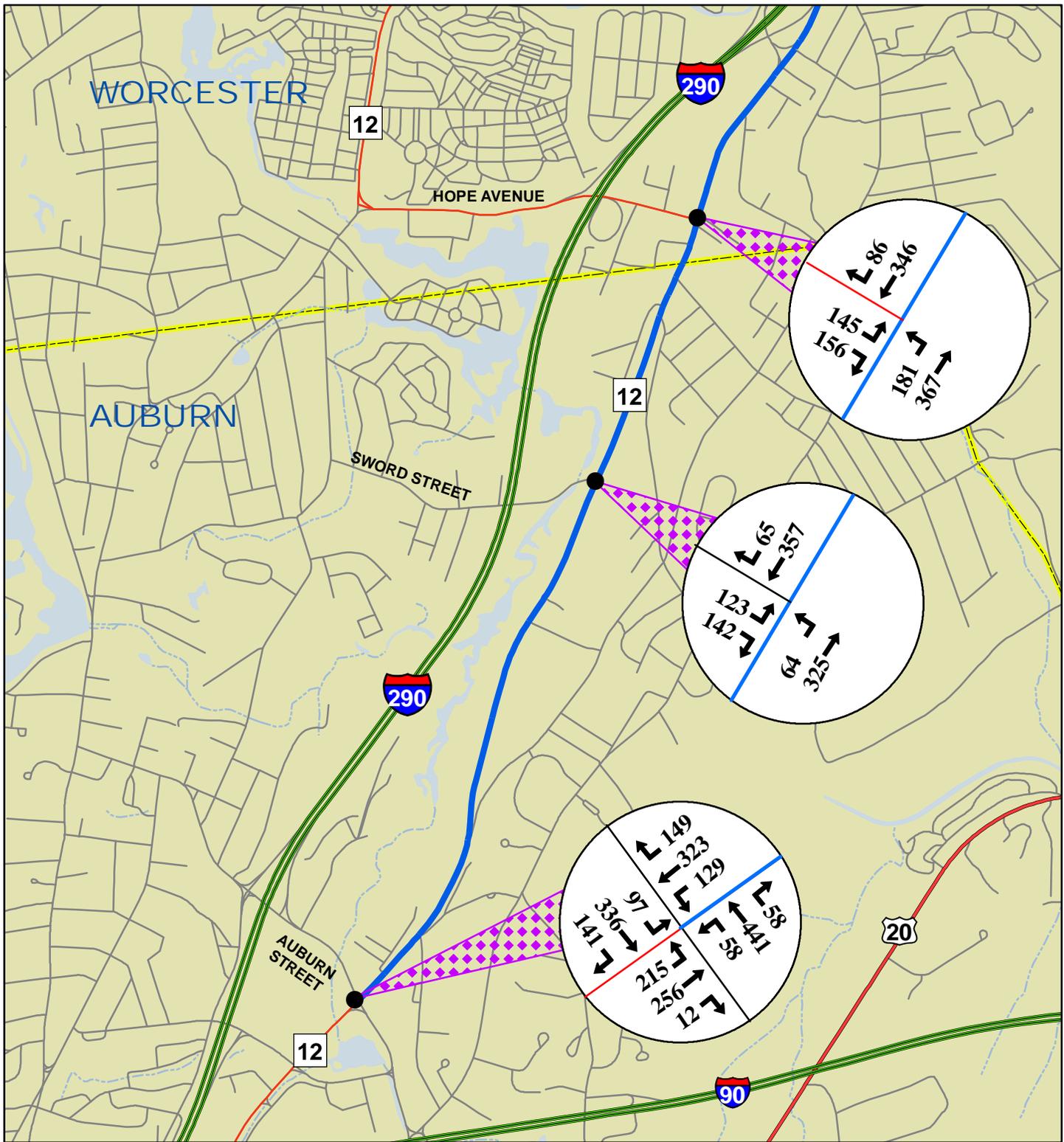


1 in = 0.2 miles



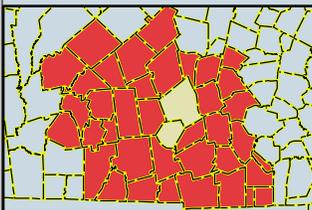
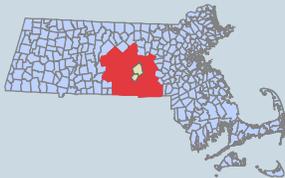
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Existing Traffic Flows
PM Peak Hour Period
Figure 16B



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways



1 in = 0.32 miles



CMRPC
Central Massachusetts Regional Planning Commission

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

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3.5 Percentage of Heavy Vehicles Utilizing Southbridge Street Focus Intersections

According to the Highway Capacity Manual (HCM), heavy vehicles are vehicles that have more than four tires touching the pavement. Trucks, buses, and recreational vehicles (RVs) are the three primary groups of heavy vehicles. Heavy vehicles adversely affect traffic in two ways: 1) they are larger than passenger cars and occupy more roadway space and 2) they have worse operating capabilities than passenger cars, particularly with respect to acceleration, deceleration, and the ability to maintain speed on upgrades.

Table 3 lists the percentage of heavy vehicles that was observed at each of the focus intersections. The Worcester peak hour averages were 4.4% in the AM and 2.0% in the PM. The town of Auburn had higher averages with 8.3% in the AM and 3.7% in the PM. The intersection of Southbridge Street & Cambridge Street had a low heavy vehicle percentage during the most recent count compared to the other Worcester locations. However, looking at historical data for this location, AM averages have been consistently at 5% with PM at 1.5%. The highest recorded heavy vehicle percentage in the AM was 9.8% at the Sword Street intersection in Auburn. The highest PM location was Hope Avenue in Worcester with a total of 4.6%. This is likely related to the nearby Auburn Industrial Park and other manufacturing activities in the general area. Observers in the field noted that school buses accounted for some of the heavy vehicle traffic.

It should be noted that the heavy vehicle percentages shown in the table were observed on one random weekday. The numbers are, by nature, subject to variation due to sample size and temporary or permanent local conditions as well as other factors, such as weather. As such, the figures in the table should be used as a general indicator of trends and conditions only, as opposed to absolute statements of prevailing circumstance.

Trucking concerns were noted by Auburn host community officials along Southbridge Street at the Auburn-Worcester town line. Being addressed on the local level, manufacturing operations in the area with separate, nearby properties need to courier materials between buildings. The number of heavy vehicle movements as well as the 24/7 nature of operations has concerned nearby neighborhood dwellers. The potential for a truck-only bypass route in this area fully mitigated to shield nearby residences may continue to receive local focus.

TABLE 3

**Percentage of Heavy Vehicles
Utilizing Southbridge Street Focus Intersections**

| | <u>Study Intersection</u> | <u>Date of Count</u> | <u>Morning Peak Hour %</u> | <u>Evening Peak Hour %</u> |
|------------------|-------------------------------------|----------------------|--------------------------------|--------------------------------|
| Worcester | Southbridge St / Madison St | August '13 | 3.7% | 1.6% |
| | Southbridge St / Quinsigamond Ave | May '14 | 4.1% | 1.0% |
| | Southbridge St / LaFayette St | June '14 | 4.4% | 1.9% |
| | Southbridge St / Hammond St | August '13 | 4.2% | 1.9% |
| | Southbridge St / Cambridge St | August '11 | 1.8% | 0.7% |
| | Southbridge St / Hope Ave | June '13 | 8.5% | 4.6% |
| | Worcester Peak Hour Averages | | | 4.4% |
| Auburn | Southbridge St / Sword St | May '14 | 9.8% | 4.3% |
| | Southbridge St / Auburn St | May '14 | 6.9% | 3.2% |
| | Auburn Peak Hour Averages | | | 8.3% |

Urban Primary Freight Route: Southbridge Street, Worcester

Southbridge Street in Worcester between Quinsigamond Avenue & Cambridge Street (0.73 miles) has been designated as a primary urban freight route as part of the Central Massachusetts' "Rural & Urban Primary Freight Routes" approved by the CMMPO in the spring to 2017. Importantly, this segment of the study corridor provides direct access to the Genesee & Wyoming (G&W) Railroad's Classification Yard & Engine Maintenance Facility shown in **Figure 17**. Here, a variety of 24/7 rail-to-truck intermodal transfer activity exists, including bulk and hazmat materials movement.

Designated by the CMMPO, the Southbridge Street roadway segment, one of a total of eight (8) in the planning region, will be included in MassDOT's statewide Freight Plan (*under development during compilation of this document*). Of the four identified primary freight routes in the urbanized area, Southbridge Street ranks third (3rd) in priority. G&W Railroad activity at this site is surpassed by CSX-related operations (1st) along Grafton & Summer Streets as well as Intransit Container Incorporated (ICI, 2nd) located along Blackstone River Road, both in the city of Worcester.



SOUTHBRIDGE STREET CORRIDOR PROFILE

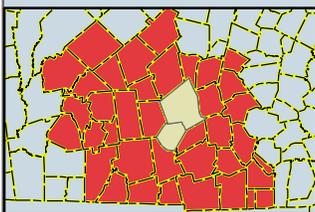
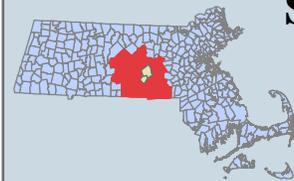
Genesee & Wyoming Railroad
Classification Yard and Engine
Maintenance Facility

Figure 17



Legend

— Southbridge Street - Worcester, Auburn



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

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3.6 Southbridge Street Intersections Projected 2025 Peak Hour Traffic Volumes

As this is a planning document, meant to be used to suggest and help design improvements that may not be built or implemented for several years, it is proper to attempt to estimate or “project” future conditions in the study area. Transportation changes and solutions will not be made instantly, and pertinent area circumstances can change. More specifically, here we attempt to modify current levels of traffic to reflect what might be expected to be seen in ten years – reasonable lead time for planning.

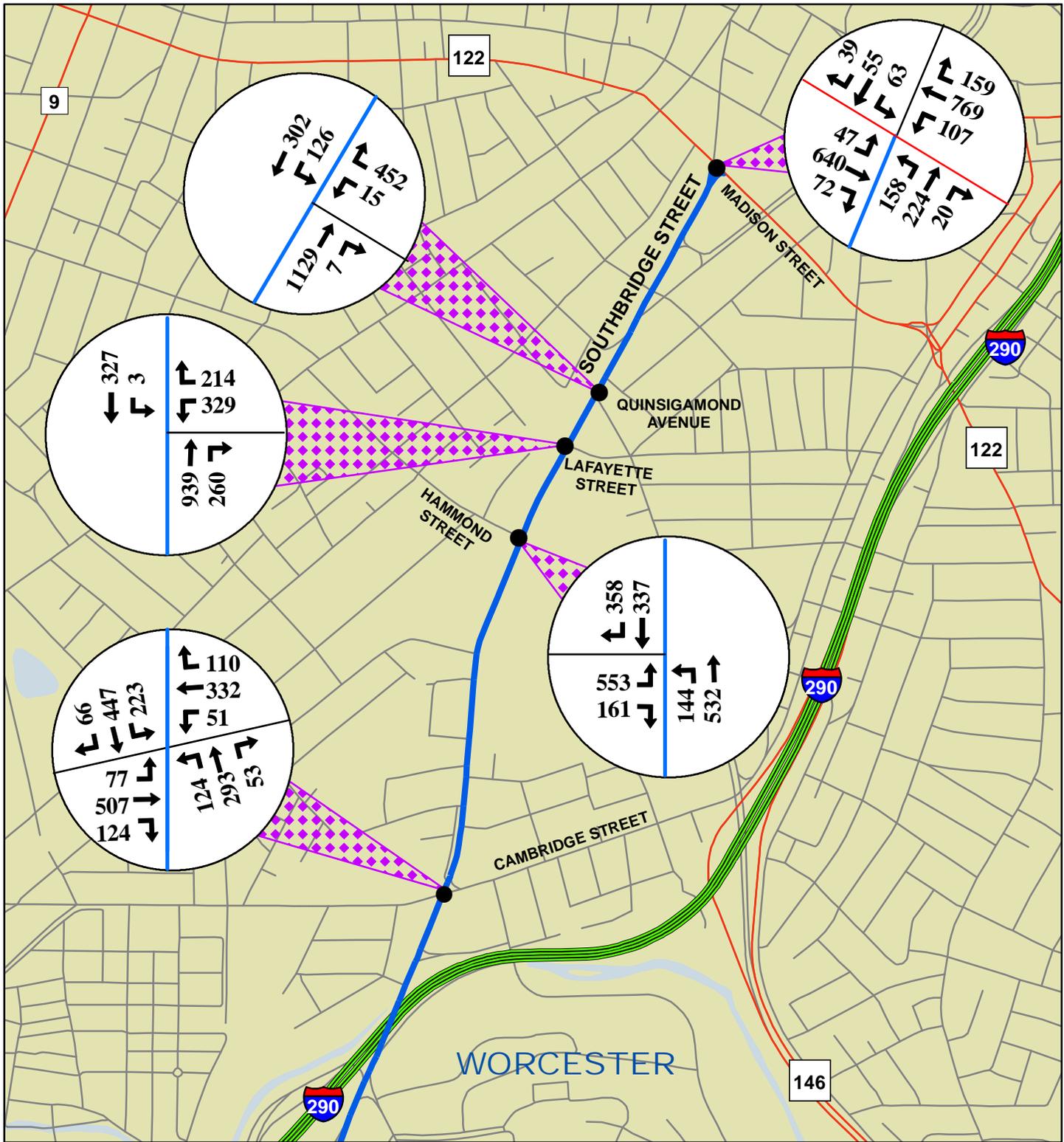
Regional Travel Demand Model

The Regional Travel Demand Model is an advanced computer simulation of the region’s network of major highways that is maintained by the CMRPC transportation staff. It considers the greater region’s population, housing stock, and employment. For this corridor profile, anticipated overall growth in subregional traffic volumes was examined.

We seek to look ahead 10 years to estimate year 2025 projected traffic increases. We can then assess operational conditions and potential improvements appropriately.

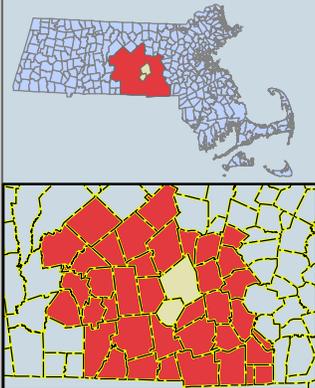
The model currently projects roughly 1% to 1.5% per year growth over the next decade in the general corridor profile study area, resulting in about an overall 10% to 15% increase in Southbridge Street traffic volumes in the 10 year period between 2015 and 2025. We thus applied this increase levels to all traffic levels in the region as a starting point for planning.

The resulting 2025 traffic flow networks for the AM and PM peak flow periods were then analyzed to characterize future operating conditions. **Figures 18 and 19** illustrate 10-year projections of the existing volumes, assuming an annual growth rate of 1% for everything north of Cambridge Street and 1.5% south of Cambridge Street. The complete TMC datasheets have been provided in the document’s Technical Appendix.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Projected 2025 Traffic Flows
AM Peak Hour Period
Figure 18A



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways

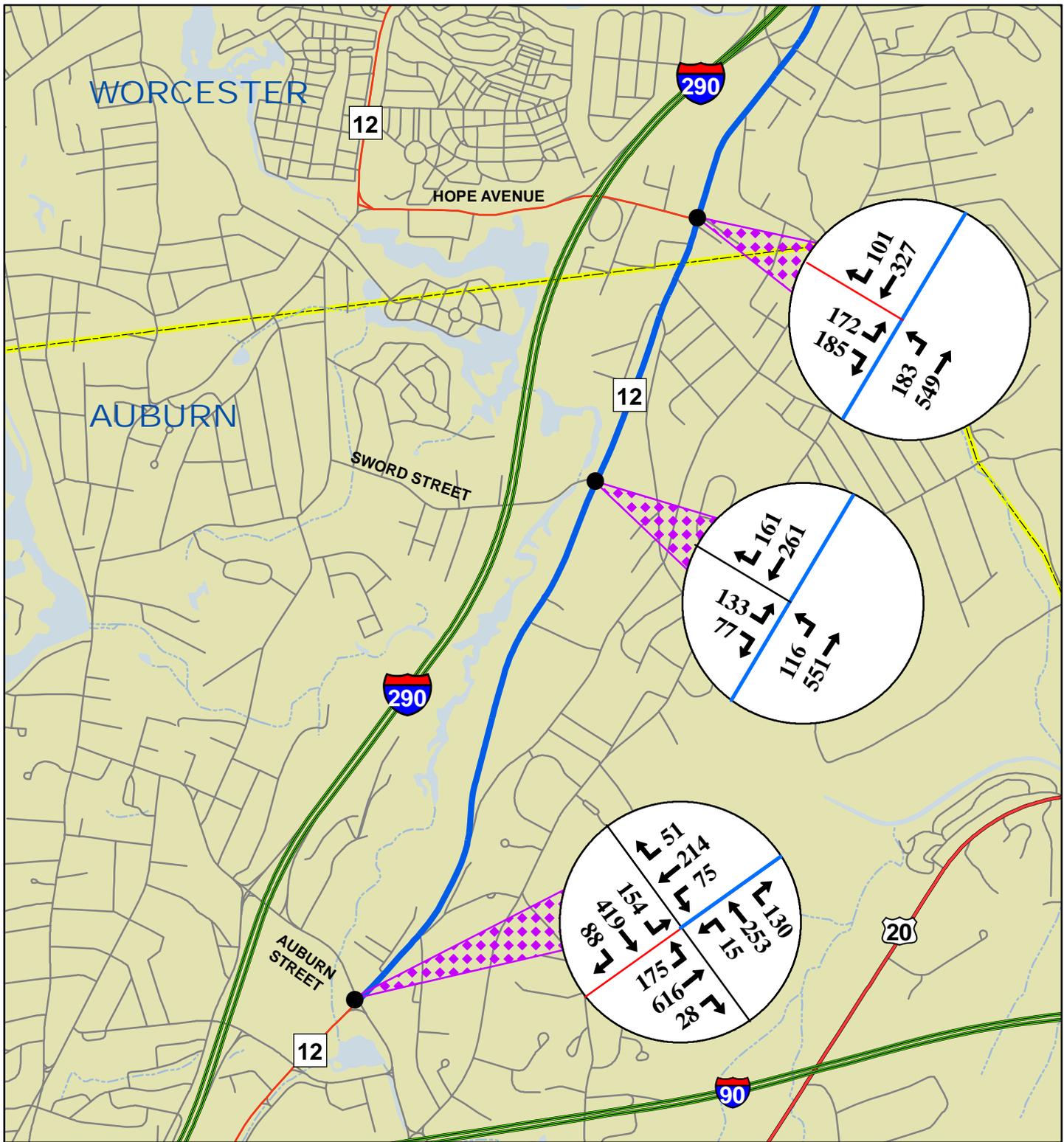


1 in = 0.2 miles



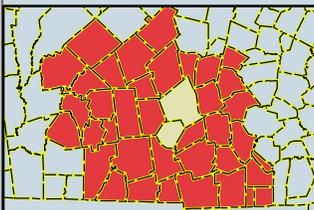
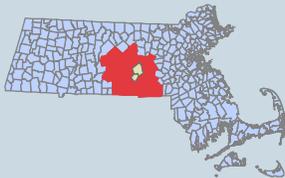
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Projected 2025 Traffic Flows
AM Peak Hour Period
Figure 18B



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways



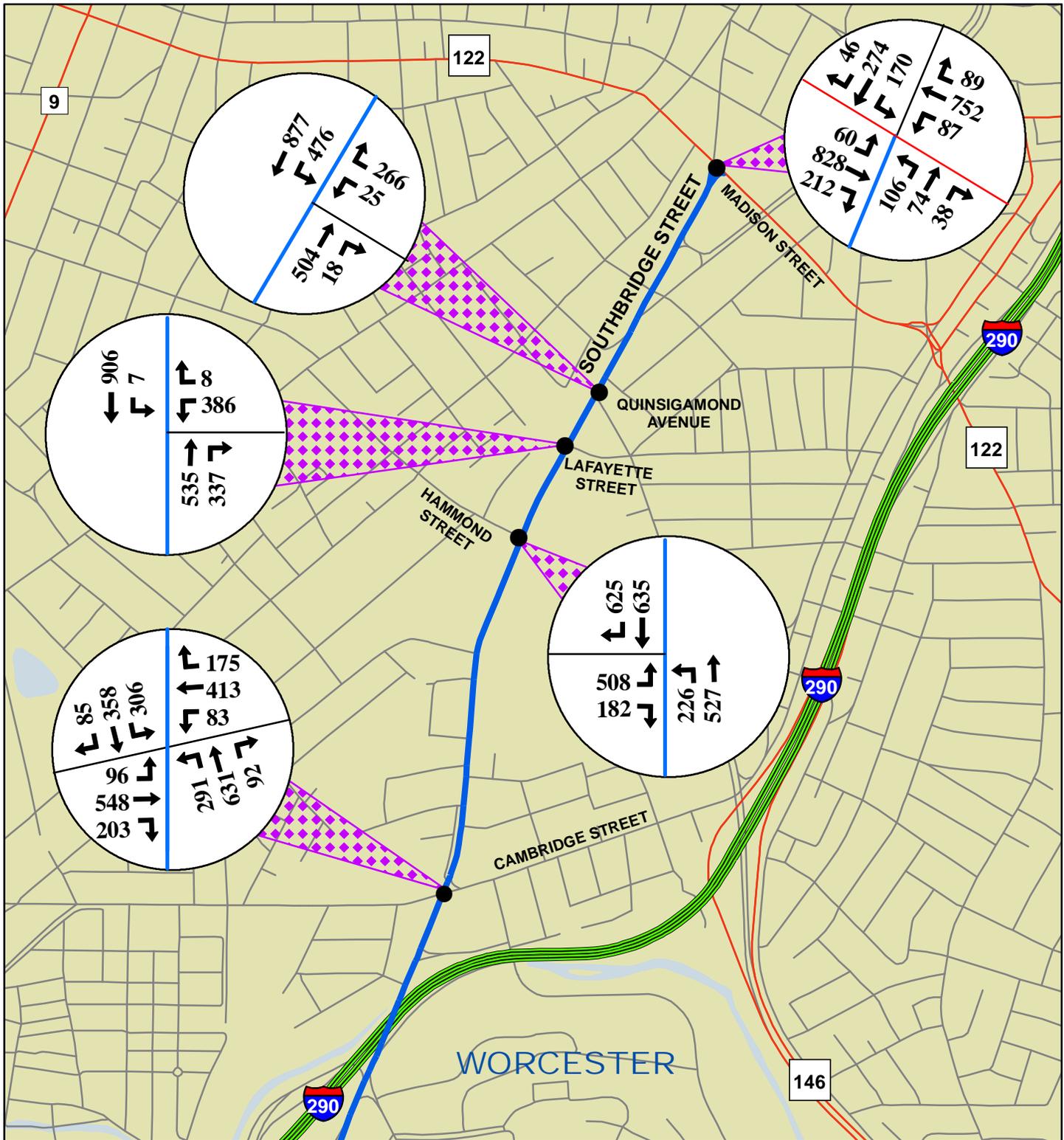
1 in = 0.32 miles



Central Massachusetts Regional Planning Commission

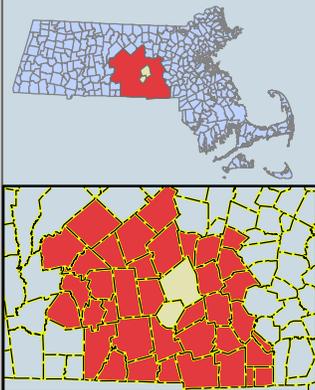
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Projected 2025 Traffic Flows
PM Peak Hour Period
Figure 19A



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways

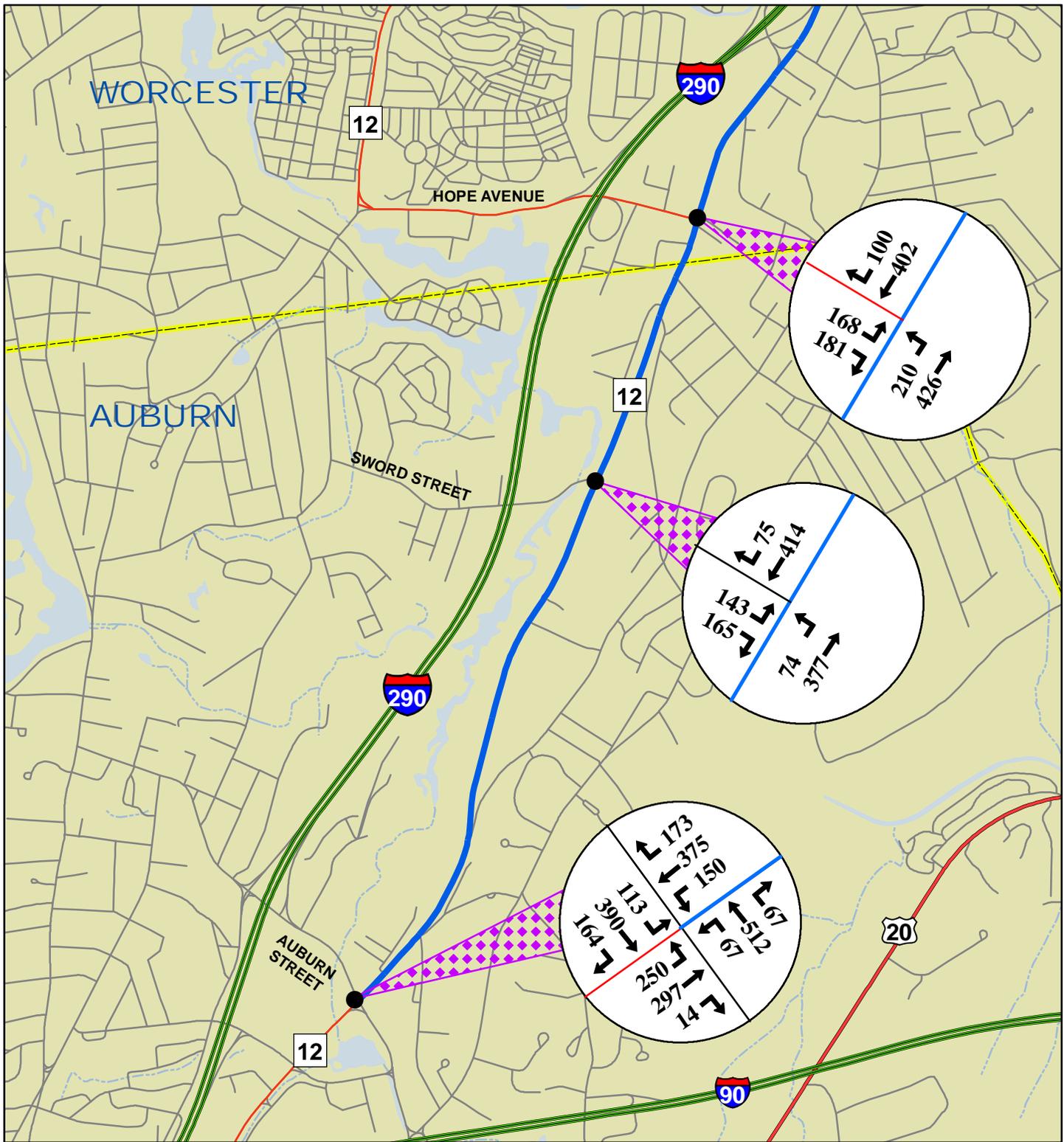


1 in = 0.2 miles



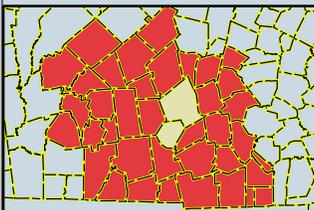
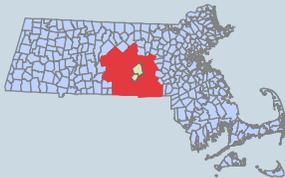
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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SOUTHBRIDGE STREET CORRIDOR PROFILE

Projected 2025 Traffic Flows
PM Peak Hour Period
Figure 19B



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Numbered Routes
- Other Roadways



1 in = 0.32 miles



CMRPC
Central Massachusetts Regional Planning Commission

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3.7 Southbridge Street Intersections Peak Hour Level of Service (LOS) Analyses

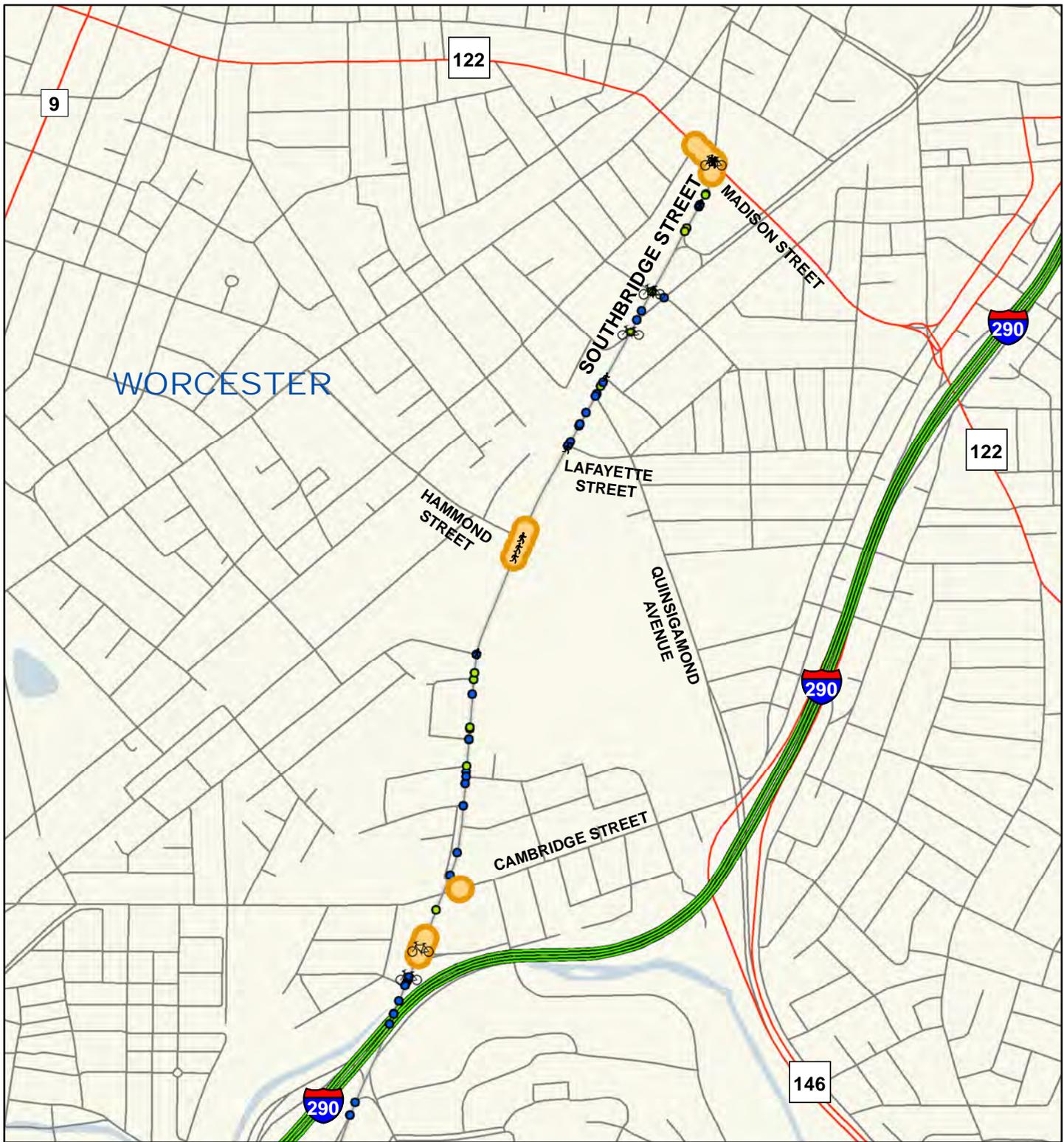
Table 4 lists the existing and projected Levels of Service (LOS) for the focus intersections. The complete LOS worksheets have been provided in the document's Technical Appendix. The following notable trends are observed:

- The signalized intersection with the worst LOS was Southbridge Street & Cambridge Street in Worcester. For existing conditions, it has a LOS of "C" in the AM and "F" in the PM. The LOS was "D" in the AM and "F" in the PM for the projected 2025 conditions. The remaining signalized intersections had a LOS of either "B" or "C" for existing and projected 2025 conditions.
- Southbridge Street & Cambridge Street also had the longest delays in the PM for existing and projected 2025 conditions. This intersection had a volume to capacity (V/C) of 3.55 in the PM for the 2025 projection. The higher the V/C, especially when over 1, the longer it takes for vehicles to travel through an intersection. This intersection's congestion as projected depicts a serious impedance of traffic flow.
- For existing conditions, both unsignalized intersections had a LOS of "D" or worse. The LOS results are only for the minor street approach. The Southbridge Street & Sword Street intersection becomes a LOS "F" in both the AM and PM for the projected 2025 conditions. Southbridge Street & Quinsigamond Avenue exhibits severe delays for projected 2025 conditions and will only get worse.

4.0 SAFETY MANAGEMENT SYSTEM (SMS)

For this Corridor Profile, CMRPC staff obtained crash data from the Massachusetts Department of Transportation (MassDOT). On a yearly basis MassDOT receives crash data from the Registry of Motor Vehicles (RMV). Before the data is released to the public a quality control analysis is conducted on the crash records. MassDOT then releases the three most recent years of data. For bicycle and pedestrian, a 10-year period is used. The crash information used for this Corridor Profile is from the three-year period from 2011 to 2013. This chapter will discuss the results of the data gathered for the City of Worcester and the town of Auburn.

Figures 20 and 21 show the location of the crashes that occurred in Worcester and Auburn between 2011 and 2013. The colored dots on the maps indicate whether an incident was a fatal injury, non-fatal injury, or property damage-only type crash. Also included are pedestrian and bicycle incidents. The total count of each crash type is shown in the legend. In addition, the locations of Highway Safety Improvement Program (HSIP) eligible crash clusters are shown on the maps. These clusters are defined based on the number of crashes adjacent to one another within a defined radius that has a high incidence of crash severity. MassDOT has developed an automated procedure for processing, standardizing, matching and aggregating the crash data collected from the RMV by geographical location using Geographic Information System (GIS) tools and procedures resulting in crash clusters, bike clusters and pedestrian clusters. There are a total of five HSIP locations included in this study area and all of them are located in the City of Worcester.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Safety Conditions North Section Figure 20

Legend

-  Pedestrian Crashes (17)
-  Bicycle Crashes (9)
-  HSIP Eligible Crash Clusters (Auto)
-  Fatal Injury (1)
-  Non-Fatal Injury (84)
-  Property Damage (169)

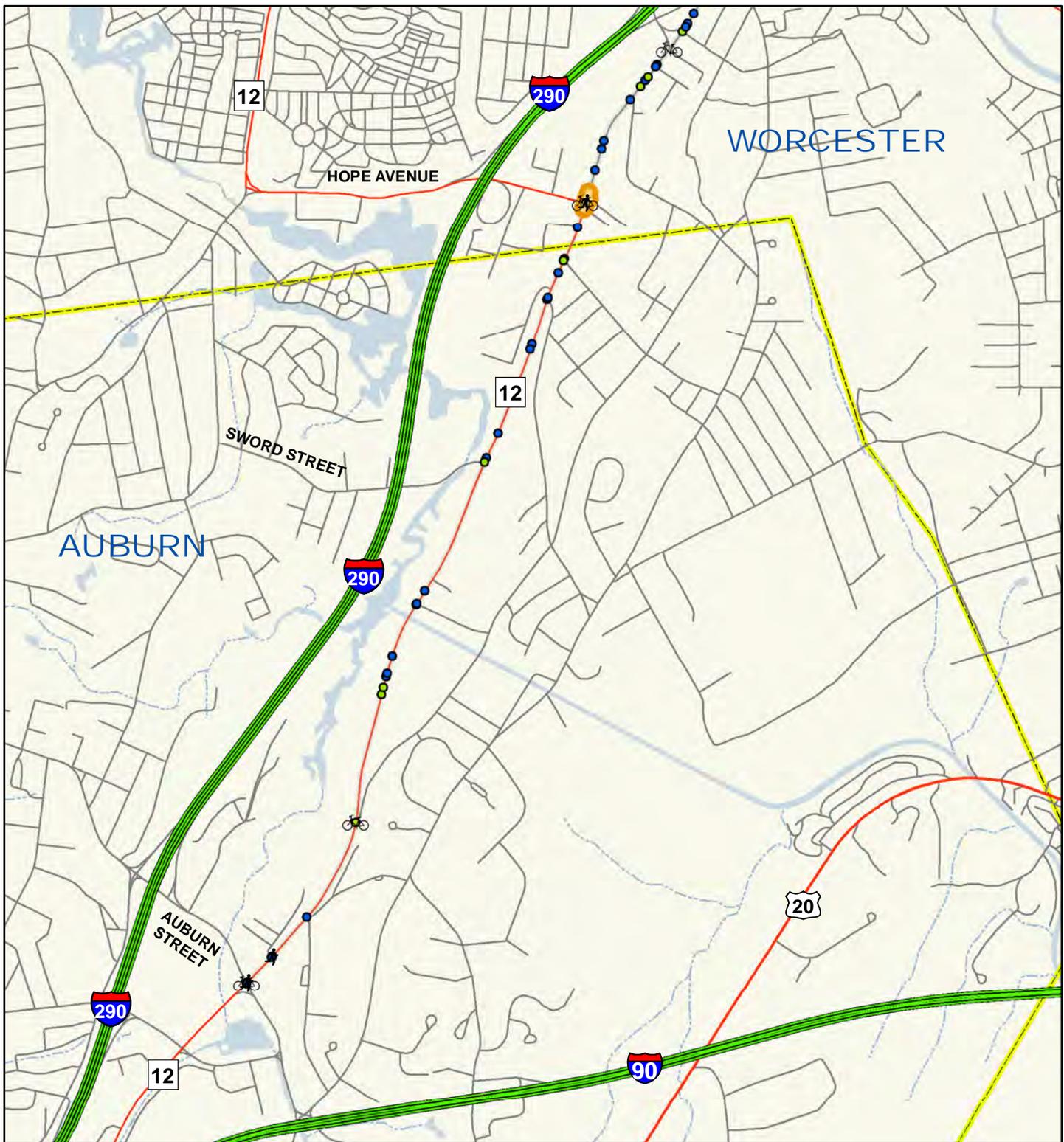


1 in = 0.2 miles



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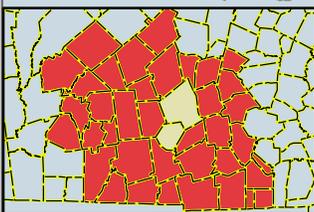
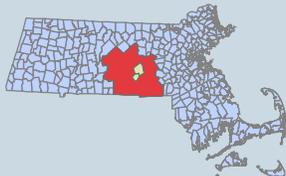


SOUTHBRIDGE STREET CORRIDOR PROFILE

Safety Conditions

South Section

Figure 21



Legend

-  Pedestrian Crashes (2)
-  Bicycle Crashes (2)
-  HSIP Eligible Crash Clusters (Auto)
-  Fatal Injury (0)
-  Non-Fatal Injury (13)
-  Property Damage (48)



1 in = 0.32 miles



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

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4.1 City of Worcester Crash Analysis

For the City of Worcester, vehicle crash records were analyzed for a three-year period. All crashes along Southbridge Street from Madison Street to the Auburn town line were tabulated. Also, incidents on minor streets that were close to or at Southbridge Street were also included. All important information from the crash reports was organized and included in the various tables that follow.

There were a total of 291 reported study area crashes in the City of Worcester between 2011 and 2013. **Table 5** shows a summary of crashes. Details are shown in a variety of ways. Property damage only crashes accounted for 58% of the total. There was one fatality. Angle crashes were the most prevalent with a total of 118. Rear ends were the second most with 67. The two intersections with the most crashes were at Hammond Street and Madison Street. Most crashes occurred during dry road conditions, in daylight, and in clear weather. However, 20% of crashes happened on a wet surface, during darkness, and under cloudy conditions. 25% of the crashes occurred between 12pm and 4pm. With regard to the month during which most crashes occurred, incidents were largely evenly split over the three years. December had the most with over 12%.

Table 5

**Summary of Reported Crashes
On Southbridge Street Corridor in the City of Worcester
January 1, 2011 - December 31, 2013**

| Crash Severity | | |
|-----------------------|---------------|----------------|
| | Number | Percent |
| Property Damage Only | 169 | 58.1% |
| Non-Fatal Injury | 84 | 28.9% |
| Fatal Injury | 1 | 0.3% |
| Not Reported | 37 | 12.7% |
| Total | 291 | 100.0% |

| Manner of Collision | | |
|-------------------------------|---------------|----------------|
| | Number | Percent |
| Angle | 118 | 40.5% |
| Rear-end | 67 | 23.0% |
| Rear-to-rear | 1 | 0.3% |
| Head-on | 12 | 4.1% |
| Sideswipe, opposite direction | 6 | 2.1% |
| Sideswipe, same direction | 39 | 13.4% |
| Single vehicle crash | 43 | 14.8% |
| Unknown / Not Reported | 5 | 1.7% |
| Total | 291 | 100.0% |

| Type of Collision | | |
|--|---------------|----------------|
| | Number | Percent |
| Collision with a motor vehicle in traffic | 220 | 75.6% |
| Collision with pedestrian | 4 | 1.4% |
| Collision with cyclist | 1 | 0.3% |
| Collision with ditch / fence/ guardrail | 6 | 2.1% |
| Collision with parked motor vehicle | 7 | 2.4% |
| Collision with work zone maintenance equipment | 1 | 0.3% |
| Collision with light pole or other post | 18 | 6.2% |
| Other / Unknown / Not Reported | 34 | 11.7% |
| Total | 291 | 100.0% |

| Locations with the highest number of crashes | |
|---|---------------|
| | Number |
| SOUTHBRIDGE STREET / HAMMOND STREET | 47 |
| SOUTHBRIDGE STREET / MADISON STREET | 35 |
| SOUTHBRIDGE STREET / HOPE AVENUE | 16 |
| SOUTHBRIDGE STREET / LAFAYETTE STREET | 16 |
| SOUTHBRIDGE STREET / CROMPTON STREET | 11 |

| Road Surface Condition | | |
|-------------------------------|---------------|----------------|
| | Number | Percent |
| Dry | 206 | 70.8% |
| Wet | 65 | 22.3% |
| Snow | 10 | 3.4% |
| Icy | 4 | 1.4% |
| Sand, mud, dirt, oil, gravel | 1 | 0.3% |
| Unknown / Not Reported | 5 | 1.7% |
| Total | 291 | 100.0% |

| Time of Day | | |
|--------------------|---------------|----------------|
| | Number | Percent |
| Before 7 AM | 47 | 16.2% |
| 7 AM - 9 AM | 35 | 12.0% |
| 10 AM - 12 PM | 38 | 13.1% |
| 12 PM - 4 PM | 73 | 25.1% |
| 4 PM - 6 PM | 46 | 15.8% |
| 6 PM - 9 PM | 34 | 11.7% |
| 9 PM - 12 AM | 18 | 6.2% |
| Total | 291 | 100.0% |

| Light Conditions | | |
|-------------------------|---------------|----------------|
| | Number | Percent |
| Daylight | 190 | 65.3% |
| Dark | 93 | 32.0% |
| Dusk | 6 | 2.1% |
| Dawn | 1 | 0.3% |
| Unknown | 1 | 0.3% |
| Total | 291 | 100.0% |

| Weather Conditions | | |
|---------------------------|---------------|----------------|
| | Number | Percent |
| Clear | 176 | 60.5% |
| Snow | 11 | 3.8% |
| Rain | 43 | 14.8% |
| Cloudy | 59 | 20.3% |
| Fog | 2 | 0.7% |
| Total | 291 | 100.0% |

| Month of the Year | | |
|--------------------------|---------------|----------------|
| | Number | Percent |
| January | 28 | 9.6% |
| February | 21 | 7.2% |
| March | 21 | 7.2% |
| April | 16 | 5.5% |
| May | 25 | 8.6% |
| June | 26 | 8.9% |
| July | 19 | 6.5% |
| August | 20 | 6.9% |
| September | 26 | 8.9% |
| October | 28 | 9.6% |
| November | 25 | 8.6% |
| December | 36 | 12.4% |
| Total | 291 | 100.0% |

Table 6 shows the collision type by study area location in the City of Worcester. The table lists the total crashes at each intersection and at other Southbridge Street locations (non-intersection crashes) and what type of crash occurred. There were 106 non-intersection crashes and 185 located at an intersection. There were 118 angle crashes along the Southbridge Street corridor. There were 25 at Hammond Street, 21 at Madison Street, and 29 at non-intersections. One reason for so many angle crashes at an intersection is the high volume of left turning vehicles, whether turning in/out of a business at the intersection or turning in/out of a minor street. Drivers underestimate the speed and distance of oncoming vehicles (or become impatient when insufficient safe gaps occur) and turn right in front of the oncoming vehicles, leaving them very little time to stop. Rear ends were the second highest type of crash with 21 of them occurring at non-intersection locations. One of these rear end crashes resulted in a fatality. There were also ten crashes at the Madison Street intersection. Rear ends occur during congested roadway conditions and from driver inattention. Roadway surface conditions can also be a factor.

Single vehicle and sideswipe crashes are also prevalent along the corridor. Most of these occurred on roadway segments between the intersections. Sideswipes generally occur on multi-lane roadways. Drivers try to make quick lane changes or upcoming lanes quickly merge without sufficient warning. When only one vehicle is involved it is labeled as a single vehicle crash. Some single vehicle crashes include vehicles that run off the roadway or collides with a fixed object at or near the road.

TABLE 6
Collision Type by Location in Worcester, 2011-2013

| Location | Total | Type | | | | | | | |
|---|------------|------------|-----------|--------------|-----------|-------------------------------|---------------------------|----------------------|-------------------------------|
| | | Angle | Rear-End | Rear-to-rear | Head-on | Sideswipe, opposite direction | Sideswipe, same direction | Single vehicle crash | Other (Unknown, Not reported) |
| SOUTHBRIDGE STREET / BELISLE AVENUE | 1 | 1 | | | | | | | |
| SOUTHBRIDGE STREET / BOYDEN STREET | 1 | | | | | | | 1 | |
| SOUTHBRIDGE STREET / CROMPTON STREET | 11 | 5 | 4 | | | | 2 | | |
| SOUTHBRIDGE STREET / FORTIER STREET | 3 | 1 | | | | | 2 | | |
| SOUTHBRIDGE STREET / FOSTER STREET | 1 | | | | | | | 1 | |
| SOUTHBRIDGE STREET / FRANCIS J. MCGRATH BOULEVARD | 5 | 2 | 1 | | | | | 2 | |
| SOUTHBRIDGE STREET/FRANCIS J. MCGRATH BOULEVARD/HERMON ST | 3 | 2 | | | | | 1 | | |
| SOUTHBRIDGE STREET / GLADSTONE STREET | 1 | | | | | | 1 | | |
| SOUTHBRIDGE STREET / HAMMOND STREET | 47 | 25 | 9 | | 3 | 2 | 4 | 3 | 1 |
| SOUTHBRIDGE STREET / HERMON STREET | 9 | 4 | 1 | | 2 | | | 1 | 1 |
| SOUTHBRIDGE STREET / HOMESTEAD AVENUE / PRINCETON STREET | 1 | | | | | | | 1 | |
| SOUTHBRIDGE STREET / HOPE AVENUE | 16 | 9 | 1 | | | 1 | 3 | 2 | |
| SOUTHBRIDGE STREET / I 290 W | 5 | 1 | 2 | | | | 1 | 1 | |
| SOUTHBRIDGE STREET / I 290 EB RAMP | 1 | | 1 | | | | | | |
| SOUTHBRIDGE STREET / JACKSON STREET | 4 | 3 | 1 | | | | | | |
| SOUTHBRIDGE STREET / KENDIG STREET | 1 | | | | | | | 1 | |
| SOUTHBRIDGE STREET / LAFAYETTE STREET | 16 | 5 | 8 | | 1 | 1 | | | 1 |
| SOUTHBRIDGE STREET / LEWIS STREET | 1 | 1 | | | | | | | |
| SOUTHBRIDGE STREET / MADISON STREET | 35 | 21 | 10 | | | | 2 | 2 | |
| SOUTHBRIDGE STREET / QUINSIGAMOND AVENUE | 7 | 3 | | | | | 2 | 2 | |
| SOUTHBRIDGE STREET / RIVERSIDE STREET | 7 | 2 | 4 | | | | 1 | | |
| SOUTHBRIDGE STREET / SOUTHGATE STREET | 8 | 4 | 1 | | 1 | | | 2 | |
| SOUTHBRIDGE STREET / WASHBURN STREET | 1 | | 1 | | | | | | |
| OTHER SOUTHBRIDGE STREET LOCATIONS | 106 | 29 | 21* | 1 | 5 | 2 | 20 | 24 | 2 |
| TOTAL | 291 | 118 | 67 | 1 | 12 | 6 | 39 | 43 | 5 |

* One of the rear-end crashes in this location ended with a fatality.

Table 7 below shows the types of collision that occurred and the severity of those types of crashes. Over half of the crashes caused property damage only. Angle crashes caused the most property damage with a total of 71, followed by rear ends with a total of 42. Of the 82 crashes that caused a non-fatal injury, angle crashes were the most prevalent with a total of 38 and rear ends were second with a total of 19. There was also one fatality that resulted from a rear end collision.

TABLE 7

Worcester Crashes by Severity and Type of Collision, 2011-2013

| Type of Collision | Severity | | | |
|-------------------------------------|---------------------|-------------------------|-----------------------------|--|
| | <i>Fatal Injury</i> | <i>Non-fatal Injury</i> | <i>Property Damage Only</i> | <i>Other (not reported, unknown, etc.)</i> |
| Angle | 0 | 38 | 71 | 9 |
| Head-on | 0 | 6 | 6 | 0 |
| Rear-end | 1 | 19 | 42 | 5 |
| Rear to rear | 0 | 0 | 1 | 0 |
| Sideswipe, opposite direction | 0 | 4 | 1 | 1 |
| Sideswipe, same direction | 0 | 6 | 27 | 6 |
| Single vehicle crash | 0 | 9 | 20 | 14 |
| Other (not reported, unknown, etc.) | 0 | 0 | 0 | 5 |
| Total number of crashes | 1 | 82 | 168 | 40 |

Table 8 shows the bicycle and pedestrian crashes by severity for the study area in the City of Worcester. This table shows the number of crashes within a 10-year period from 2004 to 2013. This is the timeframe that MassDOT uses so that is how this data has been presented. According to the data, there were no bicyclist or pedestrian fatalities along Southbridge Street. There were 13 non-fatal pedestrian crashes and six bicycle crashes. Also, four pedestrian and two bicycle crashes were property damage only. The location of these crashes is shown on the previous **Figure 20**.

TABLE 8

**Bicyclist and Pedestrian Crashes by Severity
Fatal, Non-Fatal and Property Damage, 2004-2013**

| | Worcester | |
|----------------------|--------------------|-----------------|
| | Pedestrian Crashes | Bicycle Crashes |
| Fatal | 0 | 0 |
| Non-Fatal | 13 | 6 |
| Property Damage Only | 4 | 2 |
| Non Reported | 0 | 1 |
| Total | 17 | 9 |

Next, **Table 9** shows crashes by vehicle type. Over 80% of the crashes involved passenger cars or light trucks. The vehicle types shaded in grey are considered heavy vehicles. There were 29 crashes involving heavy vehicles, which is 12% of the total. Additionally, there were two moped crashes, one motorcycle crash, and 12 uncategorized.

TABLE 9
Crashes by Vehicle Type, 2011-2013

| Vehicle Type | Worcester | |
|--|------------|---------------|
| | Number | Percentage |
| Passenger car | 133 | 45.7% |
| Light truck (van, mini-van, panel, pickup, sport utility) with only four tires | 114 | 39.2% |
| Single-unit truck (2-axle, 6 tire) | 8 | 2.7% |
| Tractor / Semi-trailer | 9 | 3.1% |
| Unknown heavy truck, cannot classify | 7 | 2.4% |
| Tractor / Doubles | 1 | 0.3% |
| Truck Tractor (bobtail) | 1 | 0.3% |
| Truck / Trailer | 3 | 1.0% |
| Moped | 2 | 0.7% |
| Motorcycle | 1 | 0.3% |
| Non Reported | 12 | 4.1% |
| Total Number of Crashes | 291 | 100.0% |

Table 10 shows five HSIP eligible locations located along Southbridge Street. The cluster with the most crashes was at Hammond Street with a total of 56. There was only one fatality; it was included in the Cambridge Street crash cluster. The Hammond Street cluster had the most non-fatal injuries with a total of 37. The equivalent property damage only (EPDO) number included in the table is based on a scoring method in which each crash is assigned a value based on the severity of the crash. The higher the EPDO number the worse the crash impact. Based on EPDO score, Hammond Street is the most severe crash area with a score of 132. Hope Avenue has the lowest score with a 45.

TABLE 10
City of Worcester HSIP Locations, 2011-2013

| Location | Number of Crashes | Number of Fatal Injuries | Number of Non-Fatal Injuries | EPDO* |
|---------------------------------------|-------------------|--------------------------|------------------------------|-------|
| Southbridge Street / Hope Avenue | 21 | 0 | 15 | 45 |
| Southbridge Street / Riverside Street | 22 | 0 | 17 | 42 |
| Southbridge Street / Cambridge Street | 33 | 1 | 24 | 74 |
| Southbridge Street / Madison Street | 52 | 0 | 35 | 120 |
| Southbridge Street / Hammond Street | 56 | 0 | 37 | 132 |

** EPDO refers to the "Equivalent Property Damage Only" scoring method that considers frequency and severity of crashes at a given location over three to five year period.*

4.2 Town of Auburn Crash Analysis

For the town of Auburn, vehicle crash records were analyzed for a period of three years. All crashes along Southbridge Street from the Worcester city line to Auburn Street were tabulated. Also, crashes on minor streets that were close to or at Southbridge Street were included. Pertinent information from the crash reports was organized and included in the various tables that follow.

As shown in **Table 11**, there were a total of 66 crashes reported between 2011 and 2013. Similar to the Worcester data, the most common types were angle and rear end crashes. There were also more than ten sideswipe crashes, which are more common on multi-lane roadways. All of Southbridge Street through the town of Auburn is two lanes except on the approach to the Auburn Street intersection. The majority of the crashes in Auburn caused property damage. The location with the highest number of crashes was the Auburn Street intersection with a total of 19. Further, most crashes occurred during clear weather, on a dry roadway surface, and during daylight hours. The hours between 12 pm and 4 pm were when most of the crashes happened. The three highest months for crashes were January, March, and October, with all three containing over 10% of the total crashes.

Table 11

**Summary of Reported Crashes
On Southbridge Street Corridor in the Town of Auburn
January 1, 2011 - December 31, 2013**

| Crash Severity | | |
|-----------------------|---------------|----------------|
| | Number | Percent |
| Property Damage Only | 48 | 72.7% |
| Non-Fatal Injury | 13 | 19.7% |
| Fatal Injury | 0 | 0.0% |
| Not Reported | 5 | 7.6% |
| Total | 66 | 100.0% |

| Manner of Collision | | |
|-------------------------------|---------------|----------------|
| | Number | Percent |
| Angle | 24 | 36.4% |
| Rear-end | 19 | 28.8% |
| Rear-to-rear | 0 | 0.0% |
| Head-on | 3 | 4.5% |
| Sideswipe, opposite direction | 2 | 3.0% |
| Sideswipe, same direction | 11 | 16.7% |
| Single vehicle crash | 6 | 9.1% |
| Unknown/not reported | 1 | 1.5% |
| Total | 66 | 100.0% |

| Type of Collision | | |
|---|---------------|----------------|
| | Number | Percent |
| Collision with a motor vehicle in traffic | 56 | 84.8% |
| Collision with animal | 1 | 1.5% |
| Collision with cyclist | 1 | 1.5% |
| Collision with ditch | 1 | 1.5% |
| Collision with parked motor vehicle | 1 | 1.5% |
| Collision with unknown fixed object | 1 | 1.5% |
| Collision with utility pole | 2 | 3.0% |
| Other / Unknown | 3 | 4.5% |
| Total | 66 | 100.0% |

| Locations with the highest number of crashes | |
|---|---------------|
| | Number |
| SOUTHBRIDGE STREET / AUBURN STREET | 19 |
| SOUTHBRIDGE STREET / HAMPTON STREET | 4 |
| SOUTHBRIDGE STREET / HARRISON AVENUE | 3 |
| SOUTHBRIDGE STREET / SWORD STREET | 3 |
| 161 SOUTHBRIDGE STREET | 2 |

| Road Surface Condition | | |
|-------------------------------|---------------|----------------|
| | Number | Percent |
| Dry | 57 | 86.4% |
| Wet | 6 | 9.1% |
| Snow | 2 | 3.0% |
| Icy | 0 | 0.0% |
| Sand, mud, dirt, oil, gravel | 1 | 1.5% |
| Total | 66 | 100.0% |

| Time of Day | | |
|--------------------|---------------|----------------|
| | Number | Percent |
| Before 7 AM | 3 | 4.5% |
| 7 AM - 9 AM | 8 | 12.1% |
| 10 AM - 12 PM | 8 | 12.1% |
| 12 PM - 4 PM | 22 | 33.3% |
| 4 PM - 6 PM | 11 | 16.7% |
| 6 PM - 9 PM | 10 | 15.2% |
| After 9 PM | 4 | 6.1% |
| Total | 66 | 100.0% |

| Light Conditions | | |
|-------------------------|---------------|----------------|
| | Number | Percent |
| Daylight | 51 | 77.3% |
| Dark | 12 | 18.2% |
| Dusk | 2 | 3.0% |
| Dawn | 1 | 1.5% |
| Total | 66 | 100.0% |

| Weather Conditions | | |
|---------------------------|---------------|----------------|
| | Number | Percent |
| Clear | 38 | 57.6% |
| Snow | 3 | 4.5% |
| Rain | 4 | 6.1% |
| Cloudy | 21 | 31.8% |
| Fog | 0 | 0.0% |
| Total | 66 | 100.0% |

| Month of the Year | | |
|--------------------------|---------------|----------------|
| | Number | Percent |
| January | 8 | 12.1% |
| February | 6 | 9.1% |
| March | 9 | 13.6% |
| April | 6 | 9.1% |
| May | 5 | 7.6% |
| June | 2 | 3.0% |
| July | 4 | 6.1% |
| August | 6 | 9.1% |
| September | 3 | 4.5% |
| October | 7 | 10.6% |
| November | 5 | 7.6% |
| December | 5 | 7.6% |
| Total | 66 | 100.0% |

Table 12 shows the collision type by location in the town of Auburn. The table lists the total crashes and the type of crashes at each intersection and at other Southbridge Street locations that are non-intersection areas. There were 34 non-intersection crashes and 32 crashes located at an intersection. Similar to Worcester, angle and rear ends are the majority of crashes in Auburn. The Auburn Street location had the most crashes with a total of 19. Besides angle and rear end crashes it had one head-on collision and five sideswipes. There were also two other head-on crashes along the corridor. Head-on collisions tend to happen when a vehicle crosses over the yellow center line, usually due to driver error/distraction or road conditions. With these types of crashes there is a higher chance for injury to occur and in extreme cases a fatality. There were also a few single vehicle crashes along the corridor, with two of them occurring at the Hampton Street intersection and the remaining four crashes happening at non-intersection locations.

TABLE 12

Collision Type by Location in Auburn, 2011-2013

| Location | Total | Type | | | | | | | |
|--------------------------------------|-----------|-----------|-----------|--------------|----------|-------------------------------|---------------------------|----------------------|-------------------------------|
| | | Angle | Rear-End | Rear-to-rear | Head-on | Sideswipe, opposite direction | Sideswipe, same direction | Single vehicle crash | Other (Unknown, Not reported) |
| SOUTHBRIDGE STREET / AUBURN STREET | 19 | 6 | 7 | | 1 | | 5 | | |
| SOUTHBRIDGE STREET / HARRISON AVENUE | 3 | 3 | | | | | | | |
| SOUTHBRIDGE STREET / BURNAP STREET | 1 | 1 | | | | | | | |
| SOUTHBRIDGE STREET / HAMPTON STREET | 4 | | | | 1 | | 1 | 2 | |
| SOUTHBRIDGE STREET / SWORD STREET | 3 | | 1 | | | 1 | 1 | | |
| SOUTHBRIDGE STREET / ELMWOOD STREET | 1 | | 1 | | | | | | |
| SOUTHBRIDGE STREET / EATON AVENUE | 1 | | | | | | 1 | | |
| OTHER SOUTHBRIDGE STREET LOCATIONS | 34 | 14 | 10 | 0 | 1 | 1 | 3 | 4 | 1 |
| TOTAL | 66 | 24 | 19 | 0 | 3 | 2 | 11 | 6 | 1 |

The following **Table 13** shows the crash severity by the type of collision. There were no fatalities along Southbridge Street between 2011 and 2013. There were a total of 14 non-fatal injuries, 47 property damage only, and five crashes in which the severity was not reported or unknown. Most of the injuries were from angle crashes; all three head-on crashes resulted in injury. The majority of property damage only crashes were caused by angle and rear ends.

TABLE 13

Auburn Crashes by Severity and Type of Collision, 2011-2013

| Manner of Collision | Severity | | | |
|-------------------------------------|---------------------|-------------------------|-----------------------------|--|
| | <i>Fatal Injury</i> | <i>Non-fatal Injury</i> | <i>Property Damage Only</i> | <i>Other (not reported, unknown, etc.)</i> |
| Angle | 0 | 6 | 16 | 2 |
| Head-on | 0 | 3 | 0 | 0 |
| Rear-end | 0 | 2 | 17 | 0 |
| Rear to rear | 0 | 0 | 0 | 0 |
| Sideswipe, opposite direction | 0 | 1 | 1 | 0 |
| Sideswipe, same direction | 0 | 1 | 8 | 2 |
| Single vehicle crash | 0 | 1 | 5 | 0 |
| Other (not reported, unknown, etc.) | 0 | 0 | 0 | 1 |
| Total number of crashes | 0 | 14 | 47 | 5 |

Included in **Table 14** is the number of bicycle and pedestrian crashes by severity between 2004 and 2013. Compared to the City of Worcester there are very few of these types of crashes in the town of Auburn. There were only four. Two of them involved bicyclists and two involved pedestrians. Both pedestrian crashes caused non-fatal injuries. The bicycle crashes caused one injury and one property damage only.

TABLE 14

**Bicyclist and Pedestrian Crashes by Severity
Fatal, Non-Fatal and Property Damage, 2004-
2013**

| | Auburn | |
|----------------------|--------------------|-----------------|
| | Pedestrian Crashes | Bicycle Crashes |
| Fatal | 0 | 0 |
| Non-Fatal | 2 | 1 |
| Property Damage Only | 0 | 1 |
| Non Reported | 0 | 0 |
| Total | 2 | 2 |

Table 15 shows crashes by vehicle type. Over 80% of the crashes involved passenger cars or light trucks. The vehicle types shaded in grey are considered heavy vehicles. There were eight crashes involving heavy vehicles, which is 12% of the total. Additionally, there were two motorcycle crashes.

TABLE 15

Crashes by Vehicle Type, 2011-2013

| Vehicle Type | Auburn | |
|--|---------------|-------------------|
| | Number | Percentage |
| Passenger car | 43 | 65.2% |
| Light truck (van, mini-van, panel, pickup, sport utility) with only four tires | 12 | 18.2% |
| Single-unit truck (2-axle, 6 tire) | 2 | 3.0% |
| Tractor / Semi-trailer | 4 | 6.1% |
| Unknown heavy truck, cannot classify | 1 | 1.5% |
| Tractor / Doubles | 1 | 1.5% |
| Truck Tractor (bobtail) | 0 | 0.0% |
| Truck / Trailer | 0 | 0.0% |
| Moped | 0 | 0.0% |
| Motorcycle | 2 | 3.0% |
| Non Reported | 1 | 1.5% |
| Total Number of Crashes | 66 | 100.0% |

5.0 PAVEMENT MANAGEMENT SYSTEM (PMS)

5.1 Pavement Management Concepts

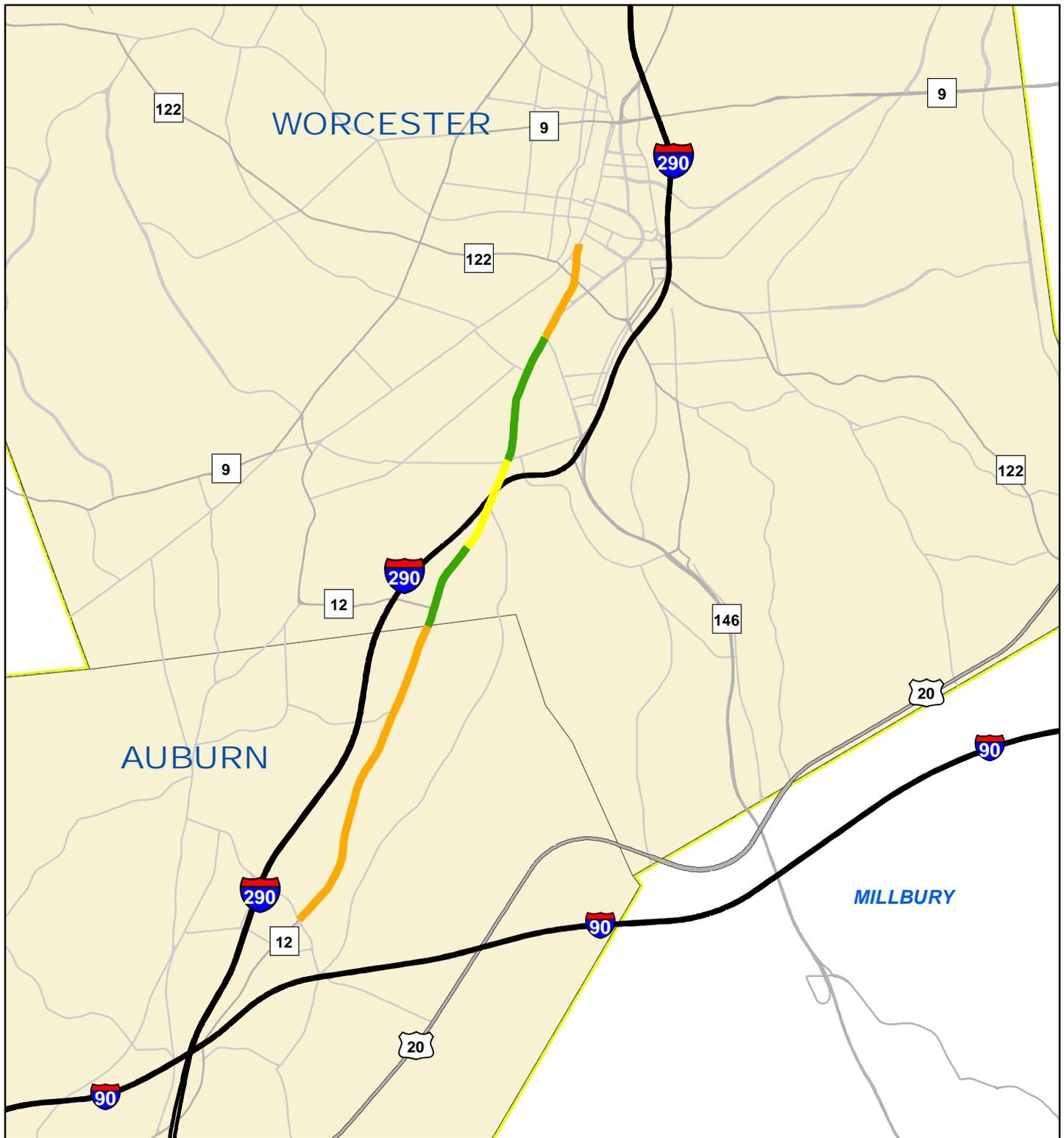
Pavement management is an asset management system designed to assist decision-makers in determining the most cost-effective strategies to address poor or failing roadway conditions. In general, a successful Pavement Management System (PMS) defines a roadway network, identifies the condition of each segment of the network, develops a list of needed improvements, and balances those needs with the available resources of the party responsible for maintaining the defined roadway network. *Cartegraph*, a software package developed and supported by Cartegraph Systems Incorporated, is used by CMRPC in its pavement management program to assess overall pavement condition and to assist in developing a cost effective strategy for addressing any observed pavement distress.

For this Corridor Profile, pavement distress information was collected for Southbridge Street from Madison Street in the city of Worcester to Auburn Street in the town of Auburn. The pavement data was collected by conducting “windshield surveys.” A team of two CMRPC representatives inspected Southbridge Street, taking note of the severity and extent of the following pavement distresses:

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

Based on the observed distresses, an Overall Condition Index (OCI) was calculated for each surveyed roadway segment. The OCI is used to rate each segment on a scale of 0 to 100. An OCI of 100 indicates optimal pavement conditions, usually a newly paved roadway segment. Conversely, a score of 0 indicates a roadway that has failed entirely and is likely impassable for an average passenger vehicle. Starting at a top index rating of 100, the OCI is calculated by subtracting a series of deduct values, each associated with the severity and extent of the various pavement distresses described above. *Cartegraph’s* deduct values are determined through a series of deduct curves, which were developed by pavement engineers using years of research on pavement performance. The resulting OCI is a quantified rating of pavement condition.

Figure 22 displays the current pavement conditions for Southbridge Street represented by Overall Condition Index (OCI) Recommended Action. *Cartegraph* produced OCI Recommended Action categories that suggest the type of action necessary to bring a road segment to “Excellent” condition. **Table 16** shows the OCI and Recommended Action for each roadway segment.



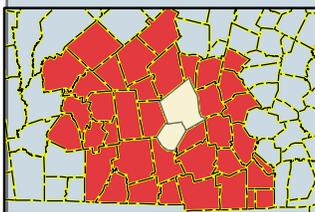
SOUTHBRIDGE STREET CORRIDOR PROFILE

Pavement Condition

Figure 22



- █ Excellent
- █ Fair
- █ Very Poor
- █ Good
- █ Poor



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

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

Table 16

Southbridge Street Pavement Analysis Recommendations

| City/Town | Street | From | To | Length | Plan Activity | OCI |
|------------------|--------------------|---------------------|---------------------|---------------|----------------------|------------|
| WORCESTER | SOUTHBRIDGE STREET | MADISON STREET | QUINSIGAMOND AVENUE | 0.36 mi | STRUCTURAL | 42.5 |
| WORCESTER | SOUTHBRIDGE STREET | QUINSIGAMOND | CAMBRIDGE STREET | 0.75 mi | ROUTINE MAINTENANCE | 83.5 |
| WORCESTER | SOUTHBRIDGE STREET | CAMBRIDGE STREET | I-290 WB RAMP | 0.54 mi | PREVENTATIVE | 57.7 |
| WORCESTER | SOUTHBRIDGE STREET | I-290 WB RAMP | AUBURN TOWN LINE | 0.50 mi | ROUTINE MAINTENANCE | 75.3 |
| AUBURN | SOUTHBRIDGE STREET | WORCESTER CITY LINE | EATON AVENUE | 0.87 mi | STRUCTURAL | 36.4 |
| AUBURN | SOUTHBRIDGE STREET | EATON AVENUE | AUBURN STREET | 0.95 mi | STRUCTURAL | 34.3 |

The Recommended Action category definitions are as follows:

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

The Recommended Actions found in the previous table each have an associated cost, which includes the design, materials, and labor to complete such action. As a roadway's OCI drops, the associated Recommended Action becomes more demanding, and the cost of repair increases. Therefore, the cost of "Routine Maintenance," which categorically falls right under "Do Nothing," is only a fraction of the cost of "Base Rehabilitation," the most financially demanding Recommended Action category. For a practical example, the cost of applying crack seal to alligator cracking over a half mile segment of road is significantly less than the cost to fully reconstruct a half mile of impassable roadway. Therefore, it is better do "Routine Maintenance" on a roadway to prevent the deterioration of the pavement.

5.2 City of Worcester Overall Condition Index (OCI)

The latest pavement data for Southbridge Street was collected in 2015. As the map depicts, Southbridge Street has a mix of recommended action categories. The worst segment in Worcester was found between Madison Street and Quinsigamond Avenue with an OCI rating of 42.5. In this section there was a high extent of moderate severity potholes. Also included were moderate extents of alligator cracking, surface wear, rutting, and transverse and longitudinal cracking. The segment between Cambridge Street and the I-290 WB Ramp was the second lowest in the city with an OCI of 57.7. In this section there was a high extent of alligator cracking and also transverse and longitudinal cracking. Alligator cracking is typically caused by aging pavement combined with weather elements. In the early stages, this distress type can be treated with a crack sealant. If left neglected, these cracks will lead to surface wear and potholes as pavement pieces are pulled out of the cracks from repeated traffic loads and exposure to the freeze-thaw cycle.

5.3 Town of Auburn Overall Condition Index (OCI)

For the town of Auburn pavement data was collected in 2014. Conditions might be different now; this depends how much road maintenance has been done by the town over the last year. The map shows that all of Southbridge Street in the study area falls in the “Structural Improvement” category. Both segments have an OCI rating in the 30s. These are ratings which are approaching roadway failure and high improvement costs.

Both segments in Auburn are nearly a mile in length. Between the Worcester city line and Eaton Avenue, there are high extents of alligator cracking and block cracking. There is also a high severity of surface wear, especially along the edges of the roadway. The second segment from Eaton Avenue to Auburn Street also has a high extent of alligator cracking and block cracking, but also has many distortions. Distortions are bumps in the road, often a result of other distresses. Distortions affect the rideability of the road and may cause drivers to slow their traveling speed or even prevent them from traveling the posted speed. All three of these distresses are of medium severity. The rest of the distresses in this segment include potholes, surface wear, and rutting.

6.0 BRIDGES

6.1 Statewide Bridge Management System

MassDOT collects bridge condition data on an ongoing basis using consistent federal standards in various structural categories including bridge deck, superstructures (the physical condition of the bridge), substructures (condition of the piers, abutments, piles, girders, footings, or other related components), retaining walls, deck geometry, and roadway approach alignment. According to MassDOT, in order to be defined as a bridge, the structure must be at least 20 feet or greater in length. The resulting inventory is used to calculate a condition rating, which is used to classify substandard bridges as either Structurally Deficient or Functionally Obsolete. Bridges that do not fall into one of those categories are ineligible for the Highway Bridge Replacement and Rehabilitation Program funded by the Federal Highway Administration (FHWA).

A “Structurally Deficient” (SD) bridge is defined as a bridge whose condition has been rated no better than poor in any of these five areas: bridge deck, superstructures, substructures, culverts, and retaining walls. A “Functionally Obsolete” (FO) bridge is defined as a bridge that is considered in serious condition in any of these three categories: deck geometry, underclearances, or approach roadway alignment. Additionally, if the structural condition or waterway adequacy is in serious condition (but better than that for a structurally deficient bridge), the bridge would be identified as being functionally obsolete. Essentially, a functionally obsolete bridge is one that is not built in accordance with or does not meet currently accepted design standards.

6.2 Southbridge Street Corridor Profile Bridges

As shown in **Table 17**, most of the bridges along the study corridor are above Southbridge Street. The data included in the bridge table are split into two types, highway and railroad. All but one of the highway bridges is located in Worcester. The bridge over the G&W Railroad in Auburn is the oldest bridge. It was originally built in 1934 and then rebuilt in 1983. Similarly, in Worcester, the bridge that travels over the Middle River was built in 1956 and rebuilt in 1993. The remaining highway bridges are at I-290 Interchange #11 and all of them were rebuilt in a project completed in 2015. According to the AASHTO ratings for the bridges, they are all rated 78 and above.

There are four railroad bridges along the study corridor. Three are owned by the G&W Railroad while CSX owns one. It is unknown what the overall condition is of the dual structures at Quinsigamond Avenue. The G&W RR twin bridges between LaFayette & Hammond Streets were constructed in 1892 and 1911. The railroad was recently awarded \$2 Million to reconstruct the worst structure. The last bridge at Southgate Street is also owned by G&W and was constructed in 1926. It is currently in fair condition, but could be a potential candidate for rehabilitation.

**Table 17
Southbridge Street
Corridor Profile Bridges**

Highway Bridges

| Host Community | MassDOT Bridge # | Facility Name (Over) | Facility or Waterbody Name (Under) | Year Built/ or Rebuilt | AASHTO Rating | Deficiency* |
|----------------|------------------|---------------------------|------------------------------------|------------------------|---------------|-------------|
| Auburn | A17004 | Southbridge St | G&W RR | 1934/1983 | 94 | |
| Worcester | W44012 | Southbridge St | Middle River | 1956/1993 | 94.7 | |
| Worcester | W44105 | I-290 EB | Southbridge St | 1966/2015 | 80.3 | |
| Worcester | W44105 | I-290 WB | Southbridge St | 1966/2015 | 82.5 | |
| Worcester | W44106 | I-290 Ramp B (College Sq) | Southbridge St | 1966/2015 | 91.2 | FO |
| Worcester | W44107 | I-290 EB | Southbridge St & Middle River | 1966/2015 | 78.9 | FO |
| Worcester | W44107 | I-290 WB | Southbridge St & Middle River | 1966/2015 | 79.9 | FO |

*FO: Functionally Obsolete

Railroad Bridges

| Host Community | Owner | Facility Name (Over) | Facility or Waterbody Name (Under) | Location | Information | Comments |
|----------------|--|----------------------|------------------------------------|------------------------------|---|---|
| Worcester | G&W RR | G&W Mainline | Southbridge St | At Quisigamond Ave | Constructed in the 1890's. | Inadequate lighting beneath bridge |
| Worcester | CSX | CSX Boston Line | Southbridge St | At Quisigamond Ave | Constructed in 1912. | Inadequate lighting beneath bridge |
| Worcester | G&W RR Twin Structures, Bridge #42.48ML, 861586K | G&W Yard & Mainline | Southbridge St | Btwn LaFayette & Hammond Sts | Constructed 1892 & 1911. Both need replacement; structures would perhaps be lengthened to remove travel lane drop on Southbridge St. | Recent MassDOT IRAP recipient for \$2M to reconstruct worst structure |
| Worcester | G&W RR Bridge #69.74A, 504176E | G&W Yard & Mainline | Southbridge St | At Southgate St | Constructed 1926. Overall "Fair" condition. Potential candidate for rehabilitation. Piers adjacent to Southbridge Street curbing would be modified. | Bridge accommodates track connected with recently reconstructed yard switches funded through MassDOT IRAP |

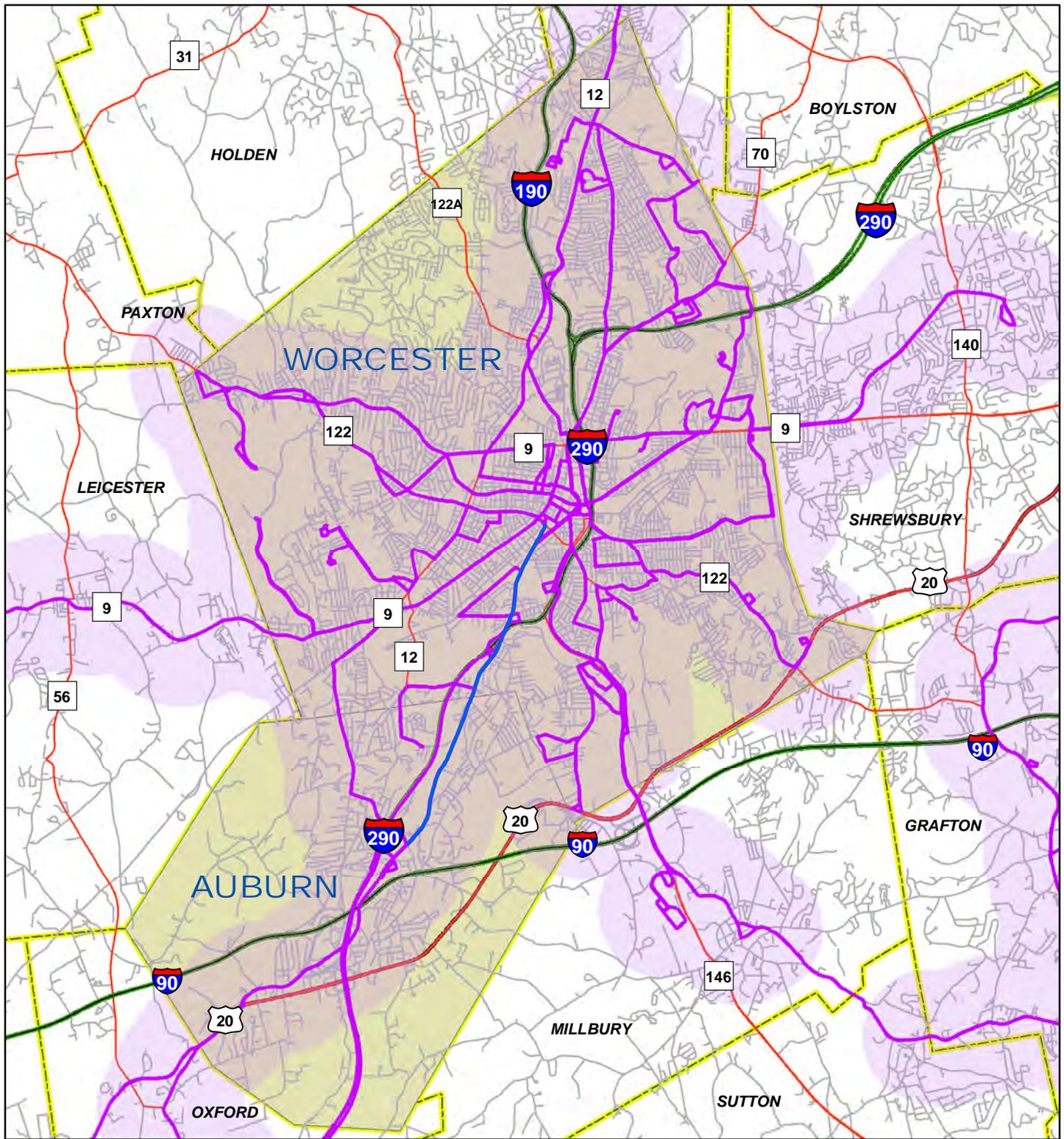
7.0 PUBLIC TRANSPORTATION

7.1 Regional and Profile Area Services

The Worcester Regional Transit Authority (WRTA) provides transit service for the greater Worcester region. Fixed-route service is provided within thirteen communities, and flex-route community shuttle service is available in three communities. Paratransit service is available to eligible individuals, including Americans with Disabilities Act (ADA) complementary paratransit service. ADA paratransit services operate within a 3/4 mile “buffer” surrounding the fixed-route service and are available during the route timetable. Non-ADA paratransit service is available for elders and people with disabilities, with service hours varying by community or eligibility. These services are generally provided by local Councils on Aging or other contractors, and are subsidized by the WRTA. Additionally, Yellow Cab and Red Cab companies also provide public transportation opportunities within the area.

Figure 23 shows WRTA fixed route service and complementary paratransit service areas within the Southbridge Street Corridor host communities.

All WRTA transit vehicles that provide fixed route service are equipped with bicycle racks. Thus, the potential utility of future bicycle racks in the various communities is enhanced. The WRTA fleet operates six environmentally-friendly, all-electric zero-emission buses at this time. Currently, Route 25 is one of four WRTA routes that provides service to Southbridge Street and uses an all-electric vehicle.



SOUTHBRIDGE STREET CORRIDOR PROFILE

WRTA Fixed-Route System

Figure 23

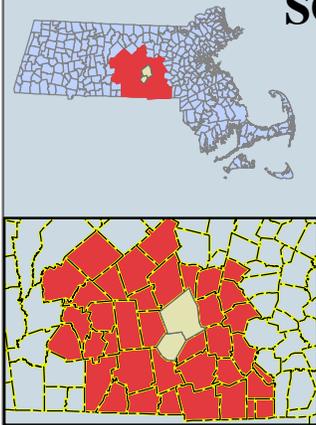
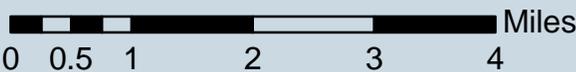
Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Local Roads
- WRTA Routes
- ADA Buffer



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

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



7.2 City of Worcester

Existing Service

The WRTA's main transit hub is located in the City of Worcester at Union Station. Routes servicing the Southbridge Street corridor are: Route 10, Route 25, Route 29, and Route 42. Routes 25 (weekends only), 29, and 42 service the Auburn Mall, which is one of the top five passenger boarding locations in the WRTA system.

Route 10 started service on August 29, 2015 to provide access to the following institutions: Assumption College, College of the Holy Cross, and Worcester State University. This route provided ten round trips on weekdays only starting at 7:00 AM and ending at 7:55 PM. This route no longer operates as of June 24, 2017.

Route 25 provides 16 round trips on weekdays. It begins from the WRTA Hub and ends at the Auburn Industrial Park starting at 6:10 AM and ending at 9:40PM. This route also has Saturday and Sunday service, with eight round trips starting from the WRTA Hub and ending at the Auburn Mall. Service on Saturdays runs from 9:35 AM to 5:25 PM and Sunday service starts at 9:50 AM and ends at 5:05 PM.

Route 29 operates on Southbridge Street and provides service to Auburn, Charlton, and ends in downtown Southbridge. With seven round trips, weekday service starts at 5:35 AM and ends at 7:35 PM. Saturday service launched in January 2016 and has six round trips starting at 8:00 AM and ending at 8:00 PM. There is currently no Sunday service.

Route 42 operates through the towns of Auburn, Oxford, and Webster with eight round trips on weekdays from 5:30 AM to 8:25 PM. Saturday service offers seven outbound trips, six inbound trips, and one express trip from Webster Center to Worcester from 7:00 AM until 8:15 PM. There is currently no Sunday service.

The WRTA paratransit zone covers Worcester in its entirety, allowing eligible individuals to travel anywhere within Worcester and within the 3/4 mile buffer surrounding each WRTA bus route outside of the city. The service is available to individuals determined eligible under the American with Disabilities Act guidelines. The service is in effect on weekdays between 4:50 AM to 9:40 PM in Worcester. Saturday service runs from 5:50 AM to 9:40 PM and Sunday service runs from 9:35 AM to 7:35 PM.

Future Outlook

The WRTA underwent a Comprehensive Service Analysis (CSA)/Regional Transit Plan of its entire fixed-route system by consultant URS Corporation/AECOM in 2015. In the CSA, individual route recommendations were proposed with implementation into a three-phase approach based on availability of resources and funding. Some of the Phase 1 service

recommendations were implemented by the WRTA during a service change (January 2016). The following is a list of the improvements to the routes along the Southbridge Street corridor:

- Route 25: extended Saturday schedule to provide service until 5:25 PM, established Sunday service to the Auburn Mall from 9:50 AM to 5:05 PM.
- Route 42: added additional trips to Saturday schedule.

Though not identified in the CSA, Saturday service was established on Route 29 based on requests from previous public outreach efforts. Route 10 was not included in the CSA, as it had not been created until after the document was completed. At this time, there are no future plans for additional service changes on the aforementioned routes.

7.3 Town of Auburn

Existing Service

Besides Routes 25, 29, and 42 as previously mentioned, Route 27 provides service on a brief segment of Southbridge Street (Route 12) to access the Auburn Mall. Within Auburn, Route 27 operates on Pinehurst Avenue, Oxford Street North, and Auburn Street. It consistently ranks as one of the routes with the highest ridership in the WRTA system.

Paratransit services are available to eligible individuals through the Auburn Senior Center/Elder Affairs Division and are provided through a contract with the WRTA. Detailed information regarding the service is available on the Auburn Senior Center website.

Future Outlook

In the CSA, Route 27 was identified as a potential candidate for further analysis on establishing the route as a 'light' version of Bus Rapid Transit (BRT). BRT uses buses on roadways similar to a light rail system that operate faster than typical bus routes. The proposal would short turn the current routing within Worcester just before the Auburn town line, thus eliminating service to the Auburn Mall. The public has expressed their opposition to truncate this route in Worcester and at this time there are no plans to institute the 'light' BRT. Aside from the service improvements completed on Routes 25, 29, and 42, there are no future plans for additional service changes at this time.

7.4 WRTA Fixed-Route Running Times

The WRTA has deployed "Automatic Vehicle Location" (AVL) technology on its fixed-route fleet as a means to automatically determine the geographic location of a vehicle. This technology allows the WRTA to have a clear idea of where the vehicles are and the time it takes to complete a given trip. This technology also had proven to be beneficial for the riders as they can plan ahead their trips by knowing where the bus is located and how long it will take the bus

to arrive to their stop. AVL systems have been instrumental to improve WRTA's on-time performance.

Data from the WRTA vehicles can also assist highway planners to have a broader idea of the congestion in a given corridor by means of the time it takes to complete a given segment and observed delays in transit service. As mentioned before, there are four WRTA routes that run through the Southbridge Street corridor and Route 27 only running from Auburn Street, and ending at the Auburn Mall.

It is important to note, that the WRTA divides its routes in timepoint segments. These segments are useful for passengers; because they are given an indication of the scheduled time the bus should be arriving a specific timepoint, and it is useful for the WRTA because it allows the agency to adjust route timing per individual route segments. Each route has a specific running time for each timepoint segment as shown in the below **Table 18**. The WRTA assumes a bus is on time as long as it arrives in the timeframe of 1 minute early to 5 minutes late.

As an example, Route 42 has 2 timepoint segments in this corridor (inbound trip):

- Auburn Mall towards Southbridge Street / Cambridge Street – segment A
- Southbridge Street / Cambridge Street towards the Hub – segment B

The first segment, the running times for segment A is 10 minutes in the morning and 10 minutes in the afternoon. A year's worth of data (WRTA's Fiscal Year 2016) shows that it could take from 6.7 minutes to 14.5 minutes to complete this segment. The peak times are 6:32 AM and 5:22 PM. It implies that in the morning there will be some trips late if the running time exceeds the 10 minutes allotted to complete this segment. In the same fashion, Segment B running time is 8 minutes. Peak times are at 6:37 AM and 5:32 PM and it could take the bus as few as 5.3 minutes and up to 11.8 minutes to complete this segment.

Table 18

| Running Time and Peak Times by Timepoint Pair in Southbridge Street Corridor - Inbound Routes | | | | | | | | |
|---|---------------------------------------|---------------------------------------|--------------------------------------|-------------------------------|-------------------|-------------------|-----------------|-----------------|
| Route | Segment | | Scheduled Running Time | Actual Running Time (average) | Peak Times AM | Peak Times PM | Min Time (mins) | Max Time (mins) |
| | Timepoint 1 | Timepoint 2 | | | | | | |
| 25 | Auburn Industrial Park | Hope Avenue | 5 mins | 4.98 mins | 7:45 AM, 7:50 AM* | 4:05 PM, 4:45 PM* | 3.3 | 7.5 |
| 25 | Hope Avenue | Cambridge Street / Southbridge Street | 7 mins | 6.67 mins | 7:52 AM, 7:57 AM* | 4:12 PM, 4:52 PM* | 4.7 | 10.4 |
| 29 | Auburn Mall | WRTA Hub | 20 mins | 15.25 mins | 7:15 AM | 3:15 PM | 13.3 | 22.5 |
| 42 | Auburn Mall | Southbridge Street / Cambridge Street | 5 mins (1st AM trip) 10 mins (PM) | 8.81 mins | 6:32 AM | 5:22 PM | 6.7 | 14.5 |
| 42 | Cambridge Street / Southbridge Street | WRTA Hub | 8 mins | 6.29 mins | 6:37 AM | 5:32 PM | 5.3 | 11.8 |
| Running Time and Peak Times by Timepoint Pair in Southbridge Street Corridor - Outbound Routes | | | | | | | | |
| Route | Segment | | Scheduled Running Time | Actual Running Time (average) | Peak Times AM | Peak Times PM | Min Time (mins) | Max Time (mins) |
| | Timepoint 1 | Timepoint 2 | | | | | | |
| 25 | Cambridge Street / Southbridge Street | Auburn Industrial Park | 8 mins, 12 mins* | 7.4 | 7:25 AM, 7:34 AM* | 4:25 PM, 4:44 PM* | 5.3 | 17.4 |
| 29 | WRTA Hub | Auburn Mall | 15 | 18.64 | 9:35 AM | 3:35 PM | 12.4 | 22.5 |
| 42 | Southbridge Street / Cambridge Street | Auburn Mall | 10 | 10.87 | 8:55 AM | 3:55 PM | 7.7 | 14.7 |
| 42 | WRTA Hub | Southbridge Street / Cambridge Street | 10 | 9.58 | 8:45 AM | 3:45 PM | 6.7 | 15 |
| Running Time data from Ridecheck Plus, "Run Time by Timepoint Pair". All records. Weekday only. Fiscal Year 2016 (7/1/15 - 6/30/16) | | | | | | | | |
| Peak Times data from Ridecheck Plus, "Boardings by Time of Day". All records. Weekday only. Fiscal Year 2016 (7/1/15 - 6/30/16) | | | | | | | | |
| *Schedule change between August 15 and January 16 schedule periods. | | | | | | | | |

8.0 OTHER MODES

8.1 Introduction

Traffic jams and congestion occurs when demand for our infrastructure exceeds supply. Because of this, various state initiatives, design criteria revisions, funding opportunities and compacts have guided the design of our region's transportation and physical infrastructure so that alternatives to driving alone are naturally encouraged. These other modes include public transit (detailed in another section of this CP), bicycling and walking. This section includes examples of the aforementioned statewide initiatives and their applicability for the Southbridge Street Corridor Profile. The scope for this Corridor Profile effort also included long distance hiking trails – namely, the Blackstone River Bikeway – as well as traditional pedestrian access.

8.2 MassDOT Healthy Transportation Compact

The Transportation Reform Law (2009) established the Healthy Transportation Compact (HTC) which promotes improved public health through active transportation. Active transportation refers to walk, bike and transit. The HTC is an interagency initiative co-chaired by the Secretary of Transportation and the Secretary of Health and Human Services, including the Secretary of Energy and Environmental Affairs, MassDOT Highway Administrator, MassDOT Transit Administrator, the Commissioner of Public Health and the Secretary of Housing and Economic Development. The HTC goals are to facilitate transportation decisions that balance the needs of all users, expand mobility, improve public health, support a cleaner environment and create stronger communities. The intent is to adopt best practices to increase efficiency in achieving positive health outcomes through the coordination of land use, transportation and public health policy.

Some of the programs and/or initiatives promoted by MassDOT and its partners that are currently in place, making the connection between health and transportation, are: Mass in Motion, Safe Routes to School, Healthy Transportation Policy Directive, and the Healthy Transportation Engineering Directive.

8.3 Healthy Transportation Policy Directive

MassDOT's Healthy Transportation Policy Directive requires all state transportation projects to increase bicycling, transit and walking options. This Directive is intended to promote multimodal access for all transportation customers. MassDOT has indicated that everyone in Massachusetts must be given the opportunity to bike, walk, or take transit instead of driving a motor vehicle.

All MassDOT facilities will consider adjacent land uses and, as applicable, be designed to include wider sidewalks, landscaping, crossing opportunities and other features to enhance healthy transportation options. Reviews will be conducted of cluster sites where incidents have

occurred with healthy-mode transportation users. MassDOT will also develop a guide to assist communities proposing shared use paths on or along rail beds in order to accelerate the path design process.

8.4 Community Health Improvement Plan (CHIP)

The City of Worcester Division of Public Health in collaboration with community partners has in place a Community Health Improvement Plan (CHIP). The CHIP identifies major health priorities for the Greater Worcester region and includes specific objectives and strategies. The city of Worcester is part of the Central Massachusetts Regional Public Health Alliance, but the town of Auburn is not. One of the topics included in the CHIP is Healthy Eating/Active Living; one of the strategies within this domain is to increase the consideration of pedestrian and bicycle accommodation in routine decision making through the adoption of the Complete Streets transportation policy throughout the region.

Goals include an increase in the number of municipalities adopting Complete Streets policies and the number of completed assessments for parks/open spaces, including the development of prioritization criteria. Additionally, the partners seek an increase in miles of bicycle lanes and in the number of schools that have adopted a Safe Routes to School policy. If there is a need for funding, the Transportation Alternatives Program (TAP) could be used to fund projects through the Transportation Improvement Program (TIP).

8.5 Complete Streets

What is now known as the Complete Streets approach was first included in the 2006 *Project Development and Design Guide*. Multimodal design guidelines are part of MassDOT's current policy for Context Sensitive Design. In a Complete Streets approach, roadway projects accommodate all users, not only auto traffic. All highway projects shall, from the earliest design stages, provide safe access and connectivity for pedestrians and bicyclists. The Healthy Transportation Policy Directive expands on how, when and where these accommodations should be provided, including ADA design compliance. The *Complete Streets initiative*, which requires roadway designs that accommodate all users, calls for bicycle & pedestrian accommodation as part of most highway projects, a major exception being limited access highways.

The 2014 Transportation Bond Bill authorized a new Complete Streets Funding Program. It offers Massachusetts municipalities incentives to adopt complete streets policies and practices. To aid in the program MassDOT launched an interactive web portal to assist municipalities through the policy development, prioritization planning, and project approval steps of the application process. The website address is <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/LocalAidPrograms/CompleteStreets.aspx>. For a community to be eligible for funding from this program it must meet three primary requirements. These requirements include:

1. Attendance of a municipal employee at a Complete Streets training and develop a Complete Streets Policy that scores 80 or above out of a possible 100 points.
2. Development of a Complete Streets Prioritization Plan.
3. Apply for the construction funding available for projects in the towns with a completed Prioritization Plan.

Once these requirements are met, the host communities are eligible for up to \$35,000 in technical assistance and up to \$400,000 in construction funding. There was \$12.5M in funding available for FY16 and FY17, but it needed to be spent by June 30, 2017. Future year funding will be available for the next several years, but the exact amount has not been determined. Representatives from both Auburn & Worcester have attended a Complete Streets training, but neither community has developed a Complete Streets Policy. Both communities have expressed interest, but have yet to move forward on the process.

8.6 Bicycling in the Corridor

Paved shoulders reduce passing conflicts between motor vehicles, bicyclists and pedestrians while also making the crossing pedestrian more visible. They also provide for storm water discharge from outside the travel lanes, reducing hydroplaning, along with splash and spray to following vehicles, pedestrians and bicyclists. In rural areas, they provide space for bicyclists to ride at their own pace.

In Worcester, there are dedicated bicycle lanes along both directions of travel on Southbridge Street between Hammond Street and Princeton Street just to the north of Cambridge Street. There is minimal shoulder width along the remainder of the study corridor so an adequate bicycle lane has yet to be marked. Safety concerns may be a deterrent for bicyclists wanting to ride on Southbridge Street. Within Auburn, there are no dedicated bike lanes; however, the shoulder width is suitable for bicycle accommodations along most of Southbridge Street.

In the vicinity of the Corridor Profile study area there is the Blackstone River Bikeway (Segment 7) project that is currently programmed in FY18 of the 2018-2022 Transportation Improvement Program (TIP). The estimated cost of the project is \$6 Million. Segment 7 extends from Quinsigamond Avenue along Lamartine Street, Hermon Street, and Francis J. McGrath Boulevard to the intersection of Franklin Street and Green Street in Worcester, a distance of 0.82 miles. There it will connect to an existing paved pathway to Union Station. The actual bikeway only touches a small part of the study area, but Southbridge Street could certainly be used as a way to access the bikeway.

8.7 Pedestrian Facilities and Activity in the Corridor

There are sidewalks on at least one side of Southbridge Street for the entire length of the study corridor. In Worcester, there are some areas where there are sidewalks on both sides of the street. There are many pedestrian crosswalks along the corridor located at many intersections, especially those operating under signalized control. Most of the traffic signals have dedicated

pedestrian phases. In Auburn, there are no crosswalks on Southbridge Street except at the Auburn Street intersection. As observed in the field, existing sidewalks alternate between each side of the road. The sidewalks are on the east side of Southbridge Street in the northern part of Auburn while on the southern half they are on the west side.

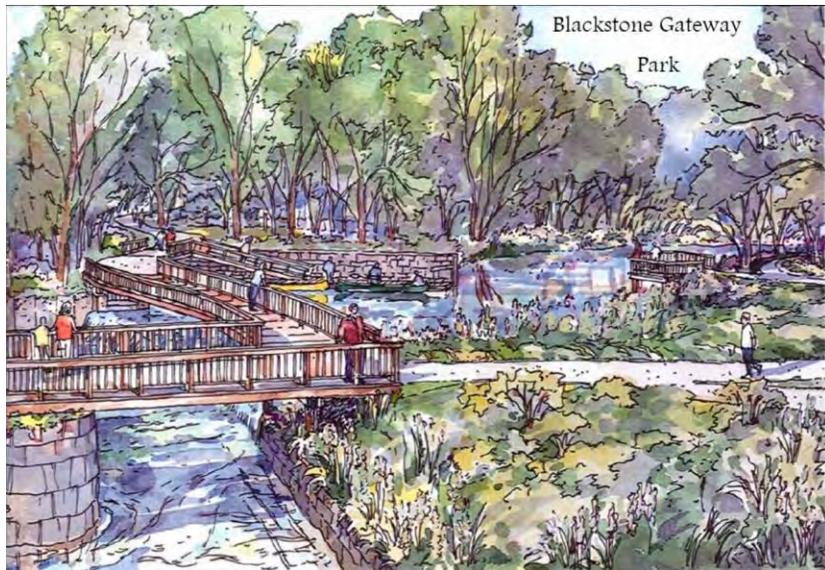
It should be mentioned that Neighborhood SAFE studies are brief interactive courses that involve learning the basics, touring an area on foot to identify issues, and cooperatively determining a plan for making improvements. Special topics may include schools, major roads, land use, neighborhood design and the needs of the mobility impaired. These studies provide communities with small area infrastructure assessments from a pedestrian and bicyclist safety perspective. Perhaps at some point the host communities of Auburn/Worcester may seek to be involved in this program.

8.8 Regional Trails in the Corridor

Besides on-road facilities like sidewalks and marked bicycle lanes, regional trails are also used by hikers and bikers. In the winter time trails can also be used by cross-country skiers. These trails can be built on old rail lines as well as through forests, recreational areas, and parks. **Figure 24** displays community trails, bikeways and open space areas in both Worcester and Auburn. The open space layer is basically public and private-owned recreational and conservation lands. These lands include, but are not limited to, town parks, commons, playing fields, school fields, golf courses, bike paths, scout camps, cemeteries, and fish & game clubs.

As seen on the map, there are a number of bikeways/trails within the City of Worcester and some are located near Southbridge Street. These facilities are along roadways and through adjacent neighborhoods and parks. Also shown on the map is the Blackstone River Bikeway, which travels from Main Street in Millbury to the Blackstone Visitor Center site in Worcester. Additionally, from “The Depot” in Blackstone to southern Uxbridge is another completed section of the bikeway in Massachusetts. Also, a long completed portion of the bikeway is located in Rhode Island. It has been proposed and it is the long-term vision to connect all the completed segments, but a proposed alignment has not been finalized at this time.

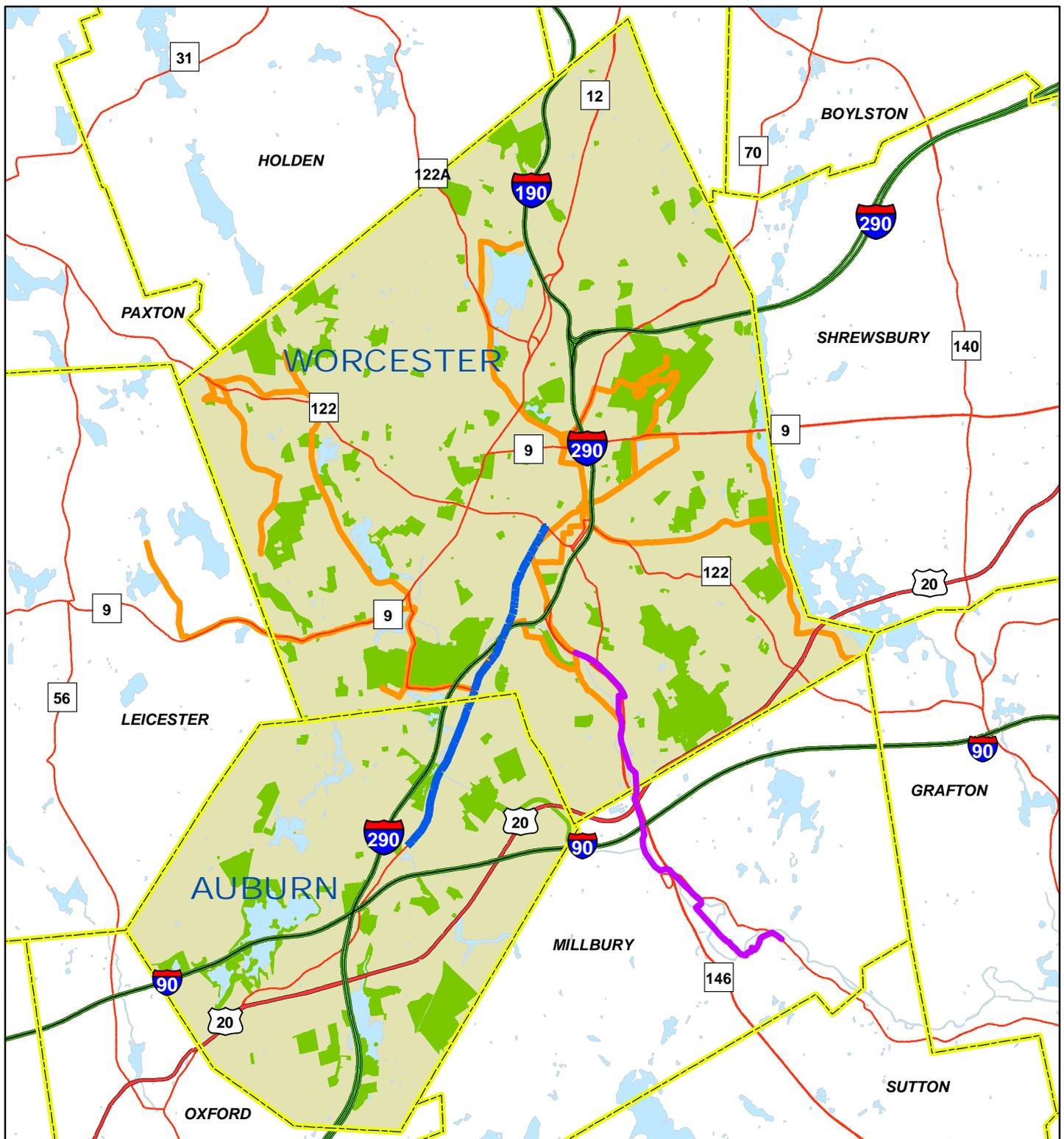
Located off of Worcester’s McKeon Road, just east of Southbridge Street, will be the Blackstone Gateway Park that will feature 3,000 linear feet of walking paths, elevated boardwalks, with three bridges crossing over the river. Included along the trails and boardwalks will be observational platforms, interpretive signage, and kiosks providing historical and ecological information about the Blackstone River and the role it played in the history of Worcester and the Blackstone Valley Corridor. The park will provide connectivity to the Blackstone River Bikeway, Worcester’s Blackstone Visitor Center, College of the Holy Cross, and Quinsigamond Village. A ground breaking ceremony was held on June 1, 2017 to kick off the project. Construction is expected to be completed by May 2018 and the cost of the project is approximately \$4 Million. Shown below is an artist’s rendering of the planned Blackstone Gateway Park.



Blackstone Gateway Park

Although the Town of Auburn currently has no active trail systems, there are some potential alignments & sites within the town that could be developed in the future. As shown on the map, most of the open space areas within Auburn are located south of the Corridor Profile study area.

Looking to the future, the CMRPC recently received a grant through the District Local Technical Assistance (DLTA) program to update the existing inventory and maps of the region's trail system. CMRPC will have discussions with the host communities, land trusts, and various trail groups to identify what resources, maps, and information are currently available. Once it is determined what type of data is available, staff can look to identify gaps in the trail network and also decide how the end product will be used, whether a regional map is produced or the information is used for tourism. This project should be completed by the beginning of 2018. Additionally, CMRPC staff will be working on updates to both the regional Bicycle and Pedestrian Plans. The Bicycle Plan mainly consists of on-street facilities and major bikeways, however some current and potential trails could be discussed. This Bicycle Plan is expected to be completed by October/November 2017 while the Pedestrian Plan should be completed sometime in the spring of 2018.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Community Trails, Bikeways and Open Space

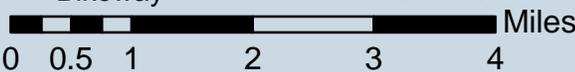
Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Blackstone River Bikeway
- Water Bodies
- Worcester Bikeway/Trail System
- Public/Private Open Space

Figure 24



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



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

9.0 OVERALL CORRIDOR PROFILE FINDINGS

The Corridor Profile effort considers the results of all Management System and environmental analyses and, in conjunction with the public process, selects those improvement options viewed as acceptable to the host community. Based on all the analysis completed and discussed previously, this section of the study summarizes the Corridor Profile findings for both intersections and roadway segments.

9.1 Southbridge Street Intersections

Tables 19 and 20 summarize the findings for intersections, which includes study intersection locations, calculated intersection Level of Service (LOS), number of documented vehicle crashes, the availability of public transit, the percentage of heavy vehicles using the intersections during the morning and evening peak hour periods, environmental considerations adjacent to Southbridge Street and beyond and other considerations such as obstructed lines of sight or the need for bicycle and pedestrian accommodations.

The following are Southbridge Street observations from the included tables:

- In Worcester, the Southbridge Street/Madison Street and Southbridge Street/Hope Avenue intersections operate with a LOS of “B” in current and future volumes. These two intersections have the least amount of delay. Conversely, the worst intersection is Southbridge Street & Quinsigamond Avenue. It has a LOS of “F” in both the AM and PM. The town of Auburn has two focus intersections. Southbridge Street & Auburn Street operates the best with a LOS of “C” for the AM and PM. Southbridge Street & Sword Street has a LOS of “D” in the existing AM and PM, but it is a “F” in projected 2025.
- There were a total of 154 reported vehicle crashes at the six study intersections in the City of Worcester and 22 crashes at the two intersections in the town of Auburn. The intersection that had the highest amount of crashes was Hammond Street, with a total of 47. The Madison Street and Cambridge Street intersections were close behind with a total of 35 and 33 respectively. Quinsigamond Avenue had the fewest crashes with only seven. In Auburn, there were 19 crashes at Auburn Street yet only three crashes at Sword Street.
- The Southbridge Street corridor is a heavily traveled route for public transit. The Worcester Regional Transit Authority (WRTA) has three bus routes (25, 29, & 42) that travel the entire length of the Corridor Profile study area. Route 25 only travels as far as Sword Street during the week. All fixed route buses are also equipped with bicycle racks. In addition to the fixed route transit buses, the Paratransit Brokerage Services TM (PBSTM) also serves Southbridge Street in Worcester and Auburn. They provide service

to the elderly and disabled. Also, the Auburn Council on Aging (COA) provides service to the elderly throughout the town of Auburn.

- The percentage of heavy vehicles using the Southbridge Street study intersections, as is typically the case in the region, was higher during the morning peak hour than in the evening peak. Often trucking activities follow a 7 AM to 3 PM shift, leading to a drop in activity in the evening. Morning percentages were as high as 9.8 (Sword Street) and evening percentages were as high as 4.6 (Hope Avenue).
- As shown in previous figures, the table shows what environmental concerns are near the study intersections. Most of the intersections in Worcester show no environmental impacts, but there are two intersections that have nearby waters requiring a Total Maximum Daily Load (TMDL). In Auburn, both intersections are in a DEP Approved Zone II area and also have nearby waters requiring a TMDL. Additionally, the Sword Street intersection has potential vernal pools that are nearby.
- At Quinsigamond Avenue it is difficult for both turning and through vehicles. The Southbridge Street northbound approach is fairly narrow at LaFayette Street and the Hammond Street approach is also narrow while lacking full provision for pedestrians. At Cambridge Street it is very congested during the PM peak hour. In Auburn, there is no exclusive turning lane on Southbridge Street northbound and long delays are experienced on Sword Street. At Auburn Street there are planned improvements included in the Auburn Street TIP project, currently scheduled for 2021.

Table 19

**City of Worcester
Southbridge Street Focus Intersections:
Overall Corridor Profile Findings**

| Study Intersection Location | CMP Intersection Level-of-Service(LOS)* | Safety Analysis** | Public Transit*** | Freight Movement Heavy Vehicle % | Environmental Consultation Analysis | Other Considerations |
|-------------------------------------|---|-------------------|--|----------------------------------|-------------------------------------|---|
| Southbridge St/Madison St | AM = B (B) PM = B (B) | 35 | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | AM = 3.7% PM = 1.6% | Nearby waters requiring a TMDL | Entrance to Worcester CBD, cultural attractions |
| Southbridge St/ Quinsigamond Ave | AM = F (F) PM = F (F) | 7 | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | AM = 4.1% PM = 1.0% | No identified impacts | Difficult conditions for both turning and through vehicles |
| Southbridge St/LaFayette St | AM = C (D) PM = B (B) | 16 | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | AM = 4.4% PM = 1.9% | No identified impacts | Fairly narrow northbound approach on Southbridge Street |
| Southbridge St/Hammond St | AM = C (C) PM = C (C) | 47 | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | AM = 4.2% PM = 1.9% | No identified impacts | Very narrow Hammond Street approach, no provision for pedestrians |
| Southbridge St/Cambridge St | AM = C (D) PM = F (F) | 33 | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | AM = 1.8% PM = 0.7% | Nearby waters requiring a TMDL | Constrained operating conditions during peak hour periods, challenging for bicyclists |
| Southbridge St/Hope Ave | AM = B (B) PM = B (B) | 16 | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | AM = 8.5% PM = 4.6% | No identified impacts | Signalized traffic controller recently installed |

*Intersection Level-of-Service Existing (Projected 2025)

**Total number of crashes

***All WRTA fixed route buses have bicycle racks

Table 20
Town of Auburn
Southbridge Street Focus Intersections:
Overall Corridor Profile Findings

| Study Intersection Location | CMP Intersection Level-of-Service(LOS)* | Safety Analysis** | Public Transit*** | Freight Movement Heavy Vehicle % | Environmental Consultation Analysis | Other Considerations |
|------------------------------------|--|--------------------------|---|---|---|--|
| Southbridge St/Sword St | AM = D (F) PM = D (F) | 3 | Routes 25, 29 & 42 Auburn COA & PBSTM also provides service to elders | AM = 9.8% PM = 4.3% | DEP Approved Zone II area, Nearby water requiring a TMDL, Potential vernal Pool | Lack of exclusive turning lane on Southbridge Street. Long delays for vehicles on Sword Street |
| Southbridge St/Auburn St | AM = C (C) PM = C (C) | 19 | Routes 25, 29 & 42 Auburn COA & PBSTM also provides service to elders | AM = 6.9% PM = 3.2% | DEP Approved Zone II area, Nearby water requiring a TMDL | Planned improvements to this location included in Auburn Street rehabilitation programmed TIP project |

*Intersection Level-of-Service Existing (Projected 2025)

**Total number of crashes

***All WRTA fixed route buses have bicycle racks

9.2 Southbridge Street Roadway Segments

The Corridor Profile findings for Southbridge Street roadway segments are summarized in **Tables 21 and 22**. Similar to the previous tables, the roadway segment tables list each Southbridge Street study segment, number of documented vehicle crashes, the field observed condition of the paved roadway surface, whether there are highway or railroad bridges, the availability of public transit, the daily percentage of heavy vehicles using the Southbridge Street segments, environmental considerations adjacent to Southbridge Street and beyond and other considerations including the need to maintain lines of sight and the need to accommodate both bicycles and pedestrians.

As summarized in the tables, the following observations are provided:

- There were 105 roadway segment crashes in Worcester and 34 crashes in Auburn. The segment between Cambridge Street and Hope Avenue had the most crashes with a total of 53. There were no reported crashes between Hope Avenue and the Auburn town line. In Auburn, there were eight crashes between the Worcester city line and Sword Street and 26 crashes between Sword Street and Auburn Street.
- Roadway pavement condition along Southbridge Street in Worcester and Auburn is based on a calculated “Overall Condition Index” (OCI) which is derived from the pavement distresses (cracking, distortions, etc) observed in the field. The OCI scale ranges from 100, indicative of a new roadway, down to zero, where total failure of the paved surface is evident. The majority of Southbridge Street through Worcester is in good condition and only requires “Routine Maintenance”. The OCI rating for these segments ranges from 68 to 88. The worst segment is between Madison Street and Quinsigamond Avenue. This segment has an OCI rating of 42.5 and requires “Structural Improvement” to reach excellent condition. In Auburn, the entire study segment has an OCI rating in the 30’s and requires “Structural Improvement”.
- In Worcester, there are highway or railroad bridges located on all roadway segments except for two. The railroad bridges are either owned by CSX or the G&W Railroad. All of the highway bridges are located between Cambridge Street and Hope Avenue, specifically within the I-290 Interchange #11 area. Auburn has one bridge and it is located just north of the Auburn Street intersection, carrying Southbridge Street over the G&W Railroad.
- As indicated in the intersection findings, the WRTA provides service on the entire length of the Corridor Profile. Routes 25, 29, and 42 serve Southbridge Street. PBSTM also provides service for the elderly and disabled in Worcester and Auburn. Additionally, the Auburn Council on Aging (COA) provides service to the elderly throughout the town of Auburn.

- Using data through the CMRPC traffic count program, staff was able to gather heavy vehicle percentages along Southbridge Street for a 24-hour period. The data listed in the table is the percentage of heavy vehicles traveling through the focus segments during the time frame mentioned. Throughout the entire study corridor, the percentages range between 9% and 16%, with the highest being near the Worcester/Auburn line. The lowest percentages are located north of Cambridge Street.
- Similar to the previous intersection findings tables, there are few environmental impacts along the roadway segments in the City of Worcester. There are two segments that have nearby waters requiring a Total Maximum Daily Load (TMDL). Both roadway segments in Auburn have nearby waters requiring a TMDL and have wetlands in close proximity of the corridor. Further, there is also a DEP approved Zone II area between Sword Street and Auburn Street. As can be realized, the need to protect and preserve sensitive adjacent properties will need to be part of the design process for any future improvement options.
- In Worcester, there is substandard roadway geometry at Francis J. McGrath Boulevard and there is no lighting underneath the railroad bridges located between Hermon Street and Quisigamond Avenue. Between LaFayette Street and Hammond Street there is a lane drop southbound due to the G&W Railroad Bridge. On-street bicycle lanes and on-street parking exist between Hammond Street and Cambridge Street. There is a high presence of heavy vehicle at the Auburn/Worcester line. In Auburn, Southbridge Street has a fairly wide R-O-W and road surface and could be a candidate for a “Roadway Diet”. Additionally, there is a need for improved ADA treatments to Auburn’s sidewalks and ramps.

Table 21

**City of Worcester
Southbridge Street Roadway Segments:
Overall Corridor Profile Findings**

| Southbridge Street Roadway Segments | Safety Analysis* | Pavement Condition** | Highway Bridges/ Railroad Bridges | Public Transit*** | Freight Movement Daily % of Heavy Vehicles | Environmental Consultation Analysis | Other Considerations |
|-------------------------------------|------------------|---|---|--|--|-------------------------------------|--|
| Madison St to Quinsigamond Ave | 24 | OCI = 42.5 <i>Structural Improvement</i> | CSX & G&W RR Bridges | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | 9.8% | Nearby waters requiring a TMDL | Southbridge Street/McGrath Blvd cross-over substandard roadway geometry, darkness beneath railroad bridges |
| Quinsigamond Ave to LaFayette St | 4 | OCI = 83.5 <i>Routine Maintenance</i> | None | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | 9.7% | No identified impacts | None |
| LaFayette St to Hammond St | 11 | OCI = 83.5 <i>Routine Maintenance</i> | G&W Twin Bridge Structures | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | 9.7% | No identified impacts | Southbridge Street lane drop due to G&W railroad bridge structures |
| Hammond St to Cambridge St | 13 | OCI = 83.5 <i>Routine Maintenance</i> | G&W RR Bridge | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | 9.7% | No identified impacts | Previously installed "Complete Streets" pavement markings define travel lanes, bicycle lanes & on-street parking |
| Cambridge St to Hope Ave | 53 | OCI = 57.7 <i>Preventative Maintenance</i> OCI = 75.3 <i>Routine Maintenance</i> | All I-290 Structures & Bridge over Middle River | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | 13.7% | Nearby waters requiring a TMDL | I-290 Interchange #11 area |
| Hope Ave to Auburn Town Line | None | 75.3 <i>Routine Maintenance</i> | None | Routes 25, 29 & 42 PBSTM provides service to the elderly and disabled | 15.8% | No identified impacts | High presence of heavy vehicles |

*Total number of crashes

**OCI = Overall Condition Index, Ranging From 0 - 100

***All WRTA fixed route buses have bicycle racks

Table 22

Town of Auburn
 Southbridge Street Roadway Segments:
 Overall Corridor Profile Findings

| Southbridge Street Roadway Segments | Safety Analysis* | Pavement Condition** | Highway Bridges/ Railroad Bridges | Public Transit*** | Freight Movement Daily % of Heavy Vehicles | Environmental Consultation Analysis | Other Considerations |
|-------------------------------------|------------------|---|--------------------------------------|---|--|--|--|
| Worcester City Line to Sword St | 8 | OCI = 36.4 <i>Structural Improvement</i> | None | Routes 25, 29 & 42 Auburn COA & PBSTM also provides service to elders | 15.8% | Nearby waters requiring a TMDL, Small wetland area | Fairly wide R-O-W and roadway surface; candidate for "Roadway Diet", limited streetscaping |
| Sword St to Auburn St | 26 | OCI = 34.3 <i>Structural Improvement</i> | G&W RR Bridge | Routes 25, 29 & 42 Auburn COA & PBSTM also provides service to elders | 10.1% | DEP approved Zone II, Nearby waters requiring a TMDL, Wetlands | Need for improved ADA treatments |

*Total number of crashes

**OCI = Overall Condition Index, Ranging From 0 - 100

***All WRTA fixed route buses have bicycle racks

10.0 SUGGESTED IMPROVEMENT OPTIONS

Reaffirmed by the Fixing America's Infrastructure (FAST) Act, the CMMPO is continuing the evolution of the development of performance-driven, multimodal TIP projects. Performance Based Planning & Programming (PBP&P) is intended to improve public transparency, fiscal accountability, and investment decisions affecting the condition and performance of the transportation system.

The CMMPO's Performance Management program includes 18 goals and objectives across ten federal transportation planning emphasis areas. Each goal and objective has corresponding performance metrics that are monitored and progress towards the established goals is reported annually. A Performance Measures Scoresheet was created to assess current and candidate future year TIP projects and to what extent they address regional goals. TIP projects that rank high are often projects that can provide substantive measurable outcomes for each goal, thus having increased regional impact.

Further, beyond the programmed Auburn project and potential future candidate Worcester project, this Corridor Profile report includes a range of suggested improvement options for host community consideration. Many of the suggested improvement options could be included in future candidate TIP projects that could produce higher Performance Management scores. Higher scores increase the likelihood of CMMPO programming.

10.1 City of Worcester

The following suggested improvement options, meant to address general overall deficiencies observed along the Worcester segment of the Southbridge Street study corridor, have been compiled for host community consideration. These improvement options are also shown in **Figure 25**.

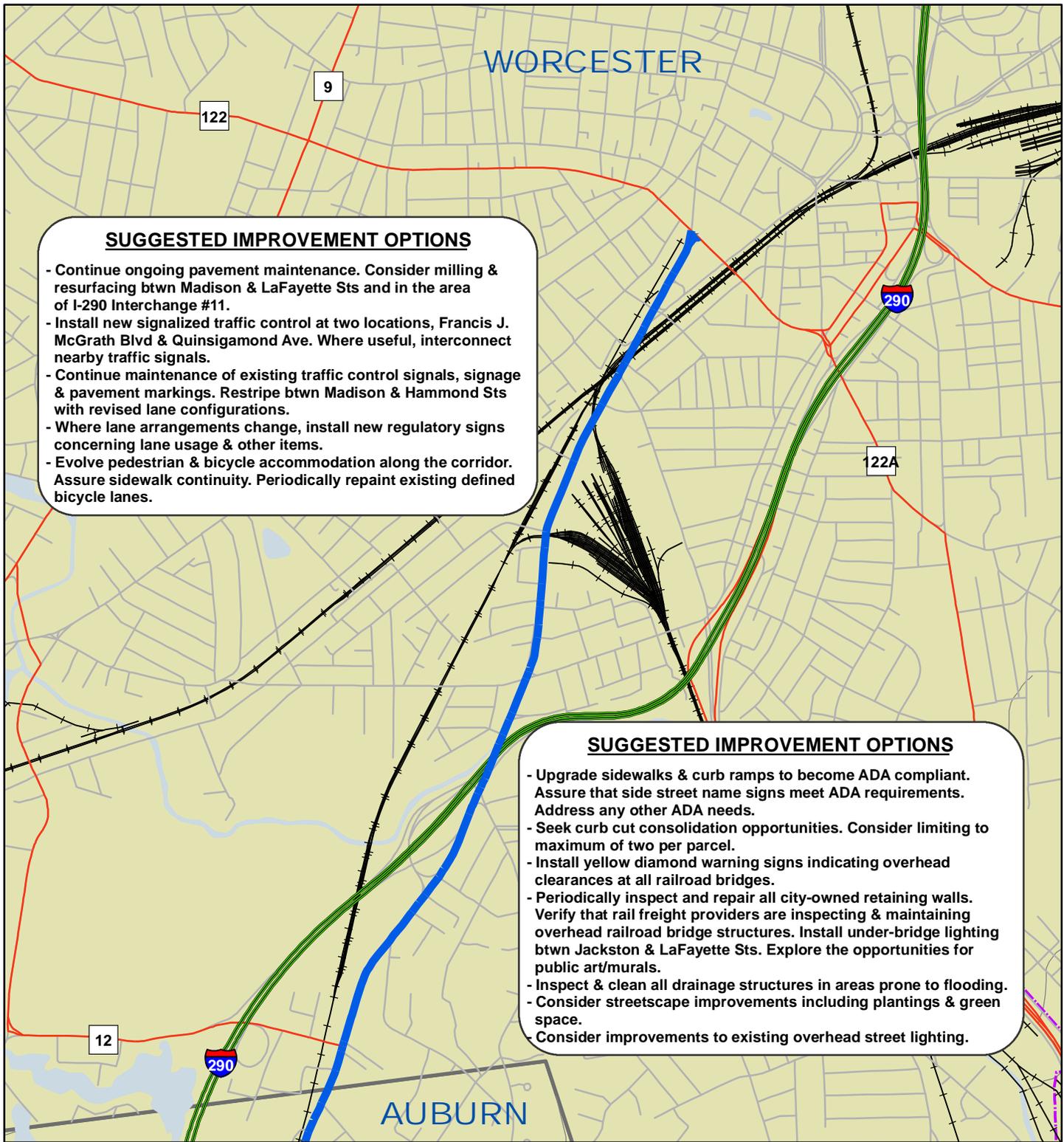
- Continue regular, ongoing pavement surface maintenance. Consider milling and resurfacing where necessary along the study corridor in the city of Worcester, particularly between Madison Street and Lafayette Street as well as roadway segments in the area of I-290 Interchange #11. The remainder of the Worcester segment appeared to be in sufficient condition. Also, repair or replace any existing roadway guardrail noted to be in disrepair.
- Upgrade existing traffic signal equipment. Install new signalized traffic control at two locations, Southbridge Street/Francis J. McGrath Boulevard and Southbridge Street/Quinsigamond Avenue, in order to improve traffic flows along the Worcester segment of the study corridor. Further, where determined useful, interconnect adjacent/nearby traffic signals to improve vehicle progression and overall operations.

Consider the interconnection of Southbridge Street traffic signals at the following locations:

- Hammond Street
 - Lafayette Street
 - Quinsigamond Avenue
 - Francis J. McGrath Boulevard (future)
 - Madison Street
 - *In addition: Quinsigamond Avenue at Lafayette Street.*
- Continue periodic maintenance of existing traffic control signals, signage and pavement markings. Restripe Southbridge Street between Madison Street and Hammond Street. Consider revised lane configurations along with improved delineation. Where possible, continue preservation as well as refinement of existing on-street parking opportunities.
 - Where travel and turning lane arrangements are to change from existing conditions with the implementation of improvements, upgrade existing and, as necessary, install new regulatory signs-white signs with black lettering-concerning intended lane usage and other items emphasizing the established rules of the road.
 - Continue and evolve pedestrian & bicycle accommodation along the entirety of the study corridor. Assure sidewalk continuity for pedestrians by addressing any identified deteriorated sections or gaps in the existing sidewalk network along Southbridge Street. Under existing conditions, on-street bicycle lanes are striped between Hammond Street and Princeton Street (just north of Cambridge Street). These existing defined bicycle lanes should be periodically repainted to remain visible.
 - Where necessary, upgrade all existing sidewalks and curb ramps to become compliant with Americans with Disabilities (ADA) design standards. Similarly, assure that corridor side street name signs meet ADA requirements for both size and placement. Address other necessitated host community-specific ADA needs along the study corridor.
 - Seek curb cut consolidation opportunities where advantageous and/or to eliminate long-standing access issues. Consider limiting number of site drives to maximum of two per parcel, preferably one with adequate/appropriate curb radius. Opportunities for common/shared access drives should be explored.
 - As deemed necessary, install new yellow diamond warning signs indicating overhead bridge clearances-in both English and Metric units-at all railroad bridges along the Worcester segment of the study corridor.
 - The city is encouraged to periodically inspect and repair as necessary all Worcester-owned retaining walls along the length of the study corridor. Further, it should be

verified by the host community that rail freight providers CSX and Genesee & Wyoming (G&W) Railroad are periodically inspecting and continually maintaining the railroad bridge structures over Southbridge Street. Continue efforts with both CSX and G&W Railroad to install under-bridge highway lighting between Jackson Street and Lafayette Street. Prior, it should also be noted, the city was communicating with the respective railroads to explore the opportunities for public art/murals.

- Culverts, drainage pipes and other related structures along the entirety of the corridor, if not already done so, need to be inventoried and also assessed for potential future repairs or upgrades deemed necessary. Further, periodically inspect and clean all roadway drainage structures in areas prone to reoccurring flooding, particularly south of the G&W railyard in Worcester.
- Consider a range of streetscape improvements, including plantings and/or green space along the entirety of the study corridor in both host communities.
- Consider improvements to existing overhead street lighting along the length of the study corridor.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Worcester Corridor-Wide Suggested Improvement Options

Figure 25

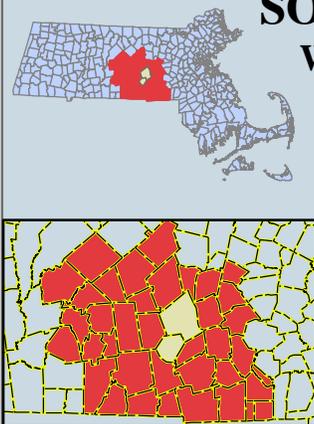
Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Route
- Roads
- Streams
- Railroad
- - - Blackstone River Bikeway



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

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



The following suggested improvement options, meant to address existing site-specific deficiencies observed along the Worcester segment of the Southbridge Street study corridor, have been compiled for host community consideration. These improvement options are shown in **Figure 26**.

Proposed “Gateway I, Phase 2” Southbridge Street Roadway Improvements

Considered a continuance of the work nearing completion under Gateway I, Phase 1, the city of Worcester is seeking future year Transportation Improvement Program (TIP) funding to complete additional needed improvements along Southbridge Street valued at approximately \$5 million. This project is considered regionally significant with its Performance Management score of 21, meaning it addressed 21 performance measures out of 30. Worcester’s adoption of a Complete Streets Policy and improving a structurally deficient bridge are the only two areas this project does not address. Aspects of the proposed “Gateway I, Phase 2” project along Southbridge Street, as detailed in earlier presentation materials provided by Worcester DPW&P, include:

- Improving safety by reducing vehicle crash frequency at both signalized intersections and other locations along the roadway.
- Improving both operations and safety at the intersections of Southbridge Street/Francis J. McGrath Boulevard and Southbridge Street/Hermon Street.
- Improving accommodation for the disabled community with the installation of new ADA-approved ramps and sidewalks with improved walking surfaces.
- Revised roadway cross-sections improving accommodation for bicyclists with delineated shoulder lanes with improved pavement.
- The addition of streetscape elements along Southbridge Street including landscaping to improve the pedestrian experience, encouraging an increase of the pedestrian walk mode.
- Improving access to the commercial activities located along Southbridge Street. This includes the numerous light industrial and transportation-related land uses along the street, including the Genesee & Wyoming (G&W) Railroad freight yard and intermodal transfer facility.

At this time (summer 2017), according to staff at the MassDOT District #3 Highway Division office, existing plans previously prepared (circa 2005) for the proposed “Gateway I, Phase 2”, Southbridge Street roadway improvement project must be revised to current MassDOT design standards. Should project development, through the revision of project plans, continue in a satisfactory manner, the Central Massachusetts Metropolitan Planning Organization (CMMPO)

may decide to consider the project for federal-aid TIP programming for FY 2023 or beyond. The city of Worcester has indicated a commitment to fund the project design as well as any necessary right-of-way acquisitions.

(It should be noted that the Southbridge Street intersections with Madison Street, Francis J. McGrath Boulevard and Hermon Street are included within the scope of the proposed “Gateway I, Phase 2” roadway improvement project.)

Southbridge Street/Madison Street Intersection

- Proposed improvement plans indicate that Southbridge Street traffic signals will be interconnected where necessary to improve operations.

Southbridge Street/Francis J. McGrath Boulevard Intersection

- Restore Southbridge Street to 2-way traffic flow between Hermon Street and Francis J. McGrath Boulevard southbound (west of fire station). Simultaneously, realign southbound McGrath Boulevard to meet Southbridge Street in a “T-type” intersection under new signalized control (north of fire station).
- Improve roadway geometry with refined vehicle channelization at the Hermon Street intersections with both Southbridge Street and northbound Francis J. McGrath Boulevard (south of fire station).



Francis J. McGrath Intersection Aerial View

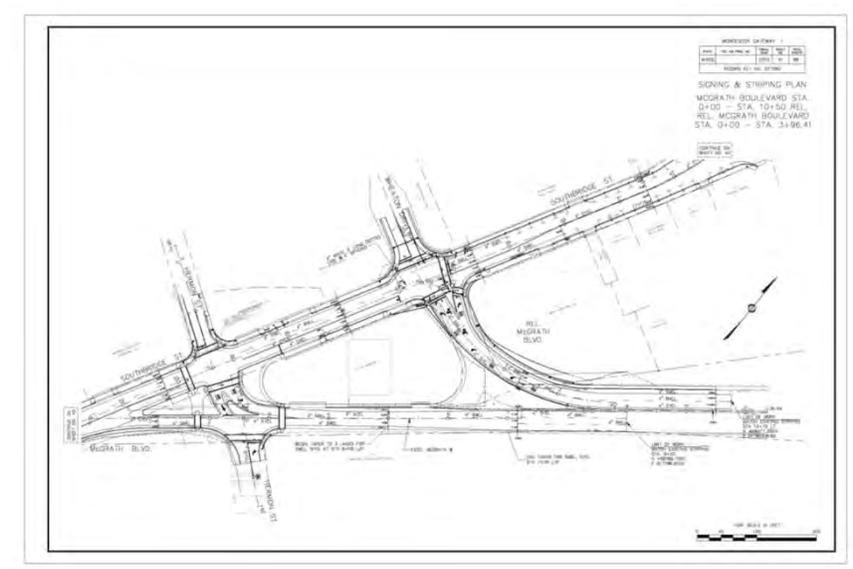
- The existing northbound lanes of Francis J. McGrath Boulevard, adjacent to the Hermon Street arch bridge will remain. With the eliminated left turn to Southbridge Street,

volumes simply continue northbound on McGrath Boulevard, the next intersection being Myrtle Street, which operates under signalized control.

- Southbridge Street traffic signals will be interconnected where necessary to improve operations.
- The installation of a new signalized traffic control is typically an eligible activity under the federal-aid Congestion Mitigation Air Quality (CMAQ) program funded through the CMMPO's Transportation Improvement Program (TIP).

Southbridge Street/Hermon Street Intersection

- Improve existing intersection geometry through reconfigured traffic island channelization. In the future, this location will remain (*unsignalized*) under "STOP" sign control.



Hermon Street Signing & Striping Plan

CSX/G&W Dual Railroad Bridge (north)

- Implement a three-lane roadway cross-section on Southbridge Street beneath the twin railroad bridge. This would be comprised of a single northbound travel lane and two southbound travel lanes. One southbound lane would be for flows continuing through on Southbridge Street, the other an exclusive southbound left turn lane into Quinsigamond Avenue.

- Reduce sidewalk size on the east side of Southbridge Street to a five-foot width while more fully accommodating bicycles in marked lanes along the roadway shoulder.
- Install bright highway lighting on the bridge walls to illuminate Southbridge Street beneath the railroad bridge, lessening the darkness for vehicles, bicycles and pedestrians, especially during daylight conditions. *[This improvement option was previously approved by G&W Railroad predecessor Providence & Worcester (P&W) Railroad].*

Southbridge Street/Quinsigamond Avenue Intersection

- Install signalized traffic control at this critical intersection location. Further, proposed improvement plans indicate that Southbridge Street traffic signals will be interconnected where necessary to improve operations.
- Improve lane delineation with installation of a southbound exclusive left turn lane on Southbridge Street for volumes entering Quinsigamond Avenue.

Southbridge Street/Lafayette Street Intersection

- Install new mast arm mounted signal equipment along with a new controller box. Also, proposed improvement plans for Southbridge Street indicate that adjacent traffic signals will be interconnected where appropriate to improve operations.
- Roadway widening proposed to accommodate an exclusive right turn lane of increased width and length on the northbound approach of Southbridge Street for volumes entering Lafayette Street.
- Install new yellow diamond warning signs indicating both the lane drop and narrow width of Southbridge Street in the southbound direction of travel prior to the traffic signal at Lafayette Street as well as between the G&W Railroad bridge and the traffic signal at Hammond Street.

Lafayette Street to Hammond Street Roadway Segment

- Improve the roadway cross-section of Southbridge Street by restriping between Lafayette Street and Hammond Street. Revise roadway pavement markings to clearly delineate the travel lanes for vehicles along with bicycle accommodation along the roadway shoulders.
- Upgrade all existing sidewalks and curb ramps to become compliant with ADA design standards.

- One of the twin G&W Railroad's bridge structures is planned for reconstruction using MassDOT Industrial Rail Access Program (IRAP) funding in the amount of \$2 million along with an anticipated private match from owner G&W Railroad. *(Prior owner of the bridge, Providence & Worcester (P&W) Railroad, had previously secured funding to modernize the existing structure to carry 286K pound railcars. At this time, railcar speed and weight must be monitored when crossing this structure.)*

Southbridge Street/Hammond Street Intersection

- Upgrade/improve traffic signal equipment at Hammond Street intersection with mast arm-mounted signal equipment along with a modern signal controller box that can be reactive to fluctuations in traffic flows. Further, improved travel lane delineation could result in improved intersection operations. Proposed improvement plans indicate that Southbridge Street traffic signals will be interconnected where necessary to improve corridor operations.
- Improve cross-section of Hammond Street approach to intersection in order to accommodate bicycle & pedestrian passage beneath the G&W Railroad bridge. A sidewalk 4 feet in width is proposed along the southern side of Hammond Street.

Southbridge Street/Southgate Street Intersection

- Maintain lines of sight to the south from the minor Southgate Street approach. Prior bridge owner Providence & Worcester (P&W) Railroad indicated perhaps removing columns at the curb line in conjunction with a future bridge improvement project; plans of new owner G&W Railroad are unknown.

Southbridge Street/Cambridge Street Intersection

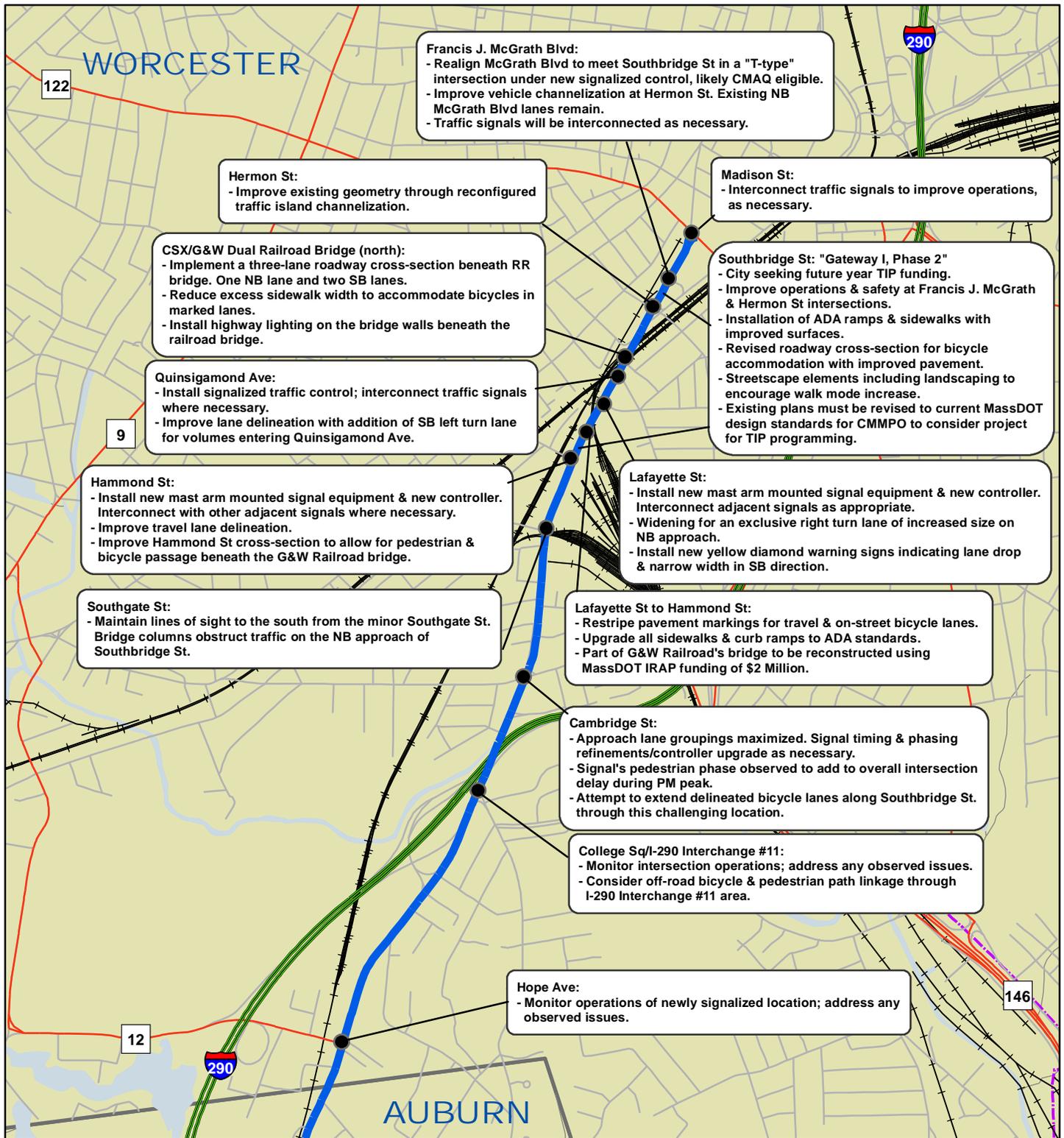
- As lane groupings on each approach to this heavily utilized location appear to have been maximized under the prior improvement project, perhaps a signal controller upgrade, along with timing & phasing refinements can be implemented as determined necessary.
- It should be noted that when the traffic signal's pedestrian phase is activated, with the need for bicycle and pedestrian accommodation through this location, lengthy delays will continue to be encountered, especially during the evening peak period.
- Delineated bicycle lanes along Southbridge Street end just to the north of this study location at Princeton Street. Future efforts to extend these lanes through this location will likely be challenging. Perhaps an alternate, off road linkage through this heavily utilized location, as well as the adjacent I-290 Interchange #11 area, can be aligned along this segment of the study corridor.

Southbridge Street/College Square Intersection/I-290 Interchange #11

- Continue to periodically monitor intersection operations, particularly signalized intersection operations. Address any issues observed in the field.

Southbridge Street/Hope Avenue Intersection

- Continue to periodically monitor the operations of this newly signalized intersection. Address any issues observed in the field as necessary, perhaps through signal timing & phasing adjustments.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Worcester Site-Specific Suggested Improvement Options

Figure 26

Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- State Route
- Roads
- Streams
- Railroad
- Blackstone River Bikeway



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

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10.2 Town of Auburn

The following suggested improvement options, meant to address both existing overall and site-specific deficiencies observed along the Auburn segment of the Southbridge Street study corridor, have been compiled. Improvement suggestions provided by Auburn town officials for the length of Southbridge Street between the Worcester city line and Drury Square were also incorporated in this suggested listing for further host community consideration. These improvement options are also shown in **Figures 27 & 28**.

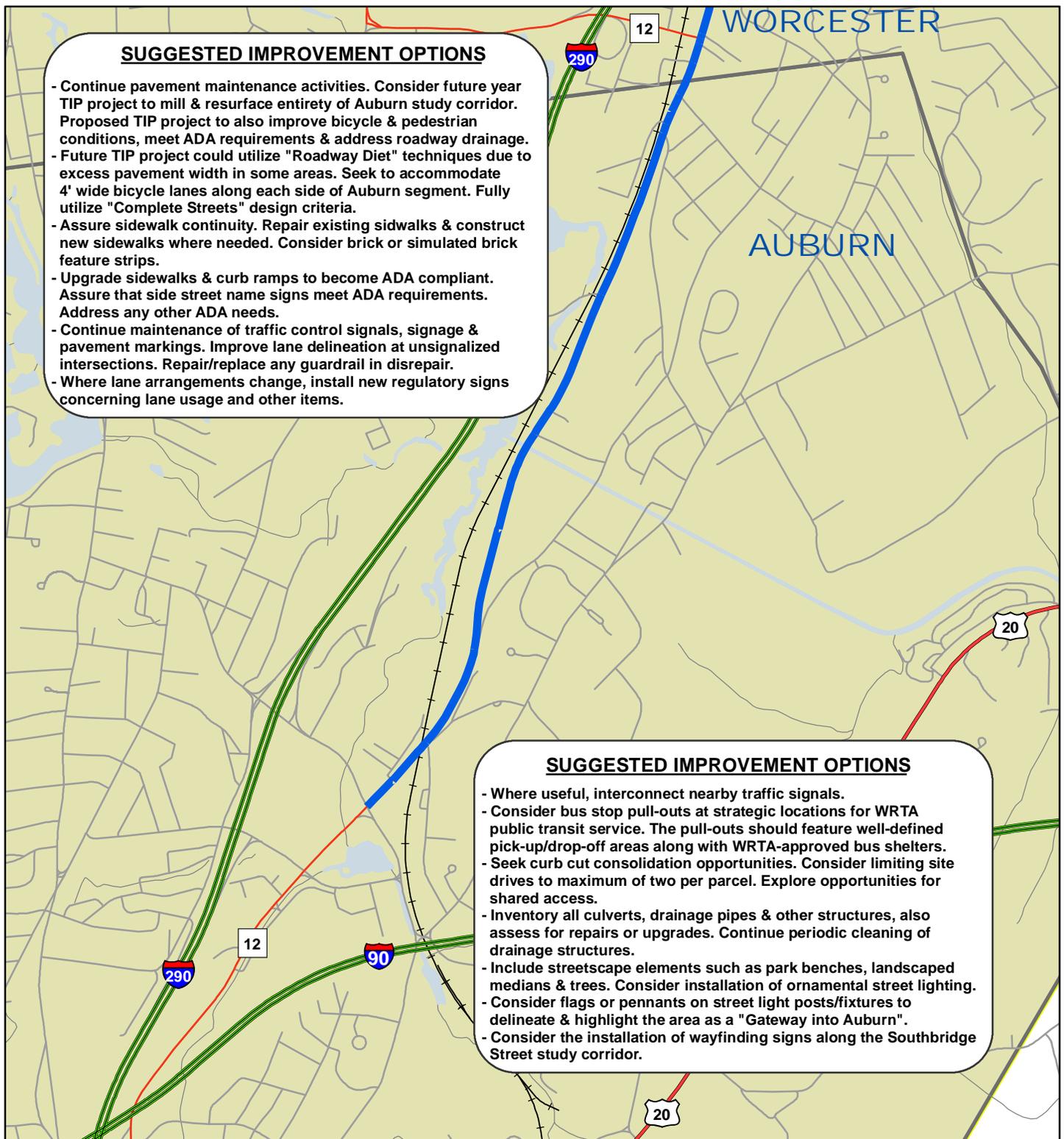
Corridor-Wide

- Continue ongoing pavement maintenance activities. Further, consider a future year Transportation Improvement Program (TIP) project that would include the milling & resurfacing of the entirety of the Auburn section of the study corridor. In addition to a new pavement surface, such a TIP project could also improve bicycle & pedestrian accommodation, meet necessary ADA requirements as well as address any observed roadway drainage deficiencies.
- Part of the proposed scope for a future TIP project, “Roadway Diet” techniques are suggested for areas of Auburn’s corridor segment due to excess existing pavement width. Optimally, in the future, 4-foot wide bicycle lanes could be accommodated along each side of the Auburn study segment. Fully utilize “Complete Streets” design criteria to improve accommodation for all roadway users, particularly bicycles and pedestrians.
- Assure sidewalk continuity. Where either old sidewalks need repair or new sidewalks need to be installed, consider Auburn town official-suggested brick (or simulated imprinted brick/pressed asphalt) feature strips.
- Where necessary, upgrade all existing sidewalks and curb ramps to become compliant with Americans with Disabilities (ADA) design standards. Similarly, assure that corridor side street name signs meet ADA requirements for both size and placement. Address other necessitated host community-specific ADA needs along the study corridor.
- Continue periodic maintenance of all traffic control signals, signage and pavement markings. Further, consider various measures aimed at improving unsignalized intersection operations, including better lane delineation. Also, repair or replace any existing roadway guardrail noted to be in disrepair.
- Where travel and turning lane arrangements are to change from existing conditions with the implementation of improvements, upgrade existing and, as necessary, install new regulatory signs-white signs with black lettering-concerning intended lane usage and other items emphasizing the established rules of the road.

- Where advantageous, interconnect adjacent/nearby traffic signals where useful to improve corridor traffic flows.
- Consider bus stop pull-outs at strategic locations along the Auburn segment of the study corridor for Worcester Regional Transit Authority (WRTA) public transit service. The pull-outs should feature well-defined pick-up/drop-off areas along with WRTA-approved bus shelters. It should be noted that the purchase, installation and ongoing maintenance of bus shelters are often funded by the host community. The host community could consider the provision of bus shelters where WRTA transit routes are in close proximity to such “sensitive receptors” as public buildings, hospitals and nursing homes, as examples.
- The Corridor Profile study area is served by the Worcester Regional Transit Authority (WRTA). According to host community officials, proposed overall roadway improvements for Southbridge Street have the potential to improve conditions for transit use. Easier access to the Southbridge Street business corridor could potentially increase transit ridership which could also increase pedestrians within the study area, benefiting both existing and new businesses. In addition, all WRTA fixed route buses are equipped with bicycle racks.
- Seek curb cut consolidation opportunities where advantageous and/or to eliminate long-standing access issues. Consider limiting number of site drives to maximum of two per parcel, preferably one with adequate/appropriate curb radius. Opportunities for common/shared access drives should be explored. Similarly, WRTA fixed route bus operations could potentially make use of available off-street parking that can easily be accessed for dwelling vehicles.
- Culverts, drainage pipes and other related structures along the entirety of the corridor, if not already done so, need to be inventoried and also assessed for potential future repairs or upgrades deemed necessary. Continue periodic cleaning of Southbridge Street drainage structures, especially in any areas prone to recurring flooding/standing water.
- Include various streetscape elements along the entire length of the Auburn segment, such as park benches, landscaped medians and trees. Consider installation of ornamental street lighting.
- As Auburn town officials consider Southbridge Street (Route 12) as a “Gateway into Auburn”, the installation of flags or pennants on street light posts/fixtures, for example, would be a favorable way to delineate and highlight the area. *(The town of Holden has used similar treatments along their Main Street, Route 122A. Often, the “Gateway” treatments being suggested - streetscape, signs, banners/flags, ornamental street*

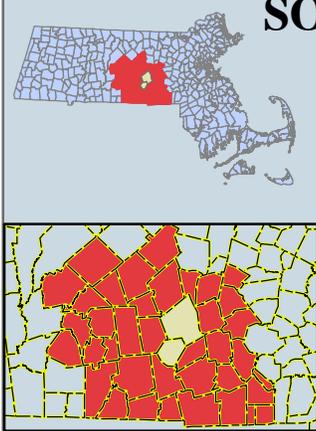
lighting would be a non-participating expense that would be the responsibility of the host community.)

- Further, Auburn officials would like to fully consider the installation of *wayfinding signs* along the Southbridge Street study corridor. These would include signs that recognize the town of Auburn as part of the John H. Chaffee Blackstone River Valley National Heritage Corridor Commission (JHCBRVNHCC). Other potential examples include signs directing vehicles and pedestrians to host community retail, restaurants, industrial areas, as well as local sporting venues such as the Pakachoag Golf Course and Pappas Recreational Complex. In addition, signs for the MBTA Commuter Rail at Union Station in Worcester should be considered as well.



SOUTHBRIDGE STREET CORRIDOR PROFILE

Auburn Corridor-Wide Suggested Improvement Options



Legend

- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Streams
- +— Railroad
- Roads

Figure 27



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

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Site-Specific Locations

Southbridge Street/Sword Street Intersection

- Establish exclusive turning lanes on each approach to the intersection. Assure safe conditions at the adjacent at-grade railroad crossing. Sword Street provides primary access to the nearby Auburn Industrial Park immediately to the west.



Aerial View of Sword Street Intersection

Southbridge Street/Auburn Street Intersection

The Southbridge Street (Route 12)/Auburn Street intersection, known locally as “Drury Square”, is included in the Auburn Street Rehabilitation project that is programmed for regional federal-aid target funding as part of the CMMPO Endorsed 2018-2022 Transportation Improvement Program (TIP). The existing signalized intersection will be improved and upgraded as part of Project # 607733 programmed on the fiscal year 2021 for a total of \$2.362 million.



Aerial View of Drury Square

Host community Auburn's TIP project scores in the high range (15) for Performance Management – addressing critical issues such as safety, constructing new sidewalks and ADA compliant ramps, improving access to bicycle, pedestrian and transit modes and drainage and environmental improvements.

The project is planned to begin at the edge of the I-290 State Highway Layout at Walsh Avenue, continue through the Southbridge Street (Route 12) intersection at Drury Square, and continue to Millbury Street at Central Square, a total length of approximately 0.6 miles or 3,000 feet. Auburn Street is functionally classified as an Urban Minor Arterial between I-290 and Route 12. Between Route 12 and Central Square, Auburn Street is functionally classified as an Urban Collector. Average Daily Traffic (ADT) for Auburn Street typically ranges from 10,000 to 12,500 vehicles per day (vpd).

Auburn town officials are confident that the Auburn Street Rehabilitation project will provide both local and regional benefits. This project is considered by the host community as a continuation of the earlier, TIP-funded *Millbury Street* roadway improvement project that addressed the roadway segment between Central Square (intersection of Millbury, Central and Pakachoag Streets) and US Route 20. The pending reconstruction of Auburn Street will complete improvements to this critical arterial between the Interstate System, I-290, and the National Highway System, Route 20. The town of Auburn has indicated a commitment to fund the project design as well as any necessary right-of-way acquisitions. *At this time, design consultant VHB is under contract to the community.*

The Auburn Street Rehabilitation project scope includes:

- Mill and overlay pavement for entire length of the project area. Reconstructed/resurfaced roadway will provide adequate shoulders for bicycle accommodation. This will include new and restored granite curbing. Provide new traffic control signage and pavement markings/stripping, including the delineation of bicycle lanes.
- Improve/upgrade existing traffic signals at both the Southbridge Street/Auburn Street intersection (*Drury Square*) as well as the Auburn Street/Brotherton Way intersection. Upgraded signal equipment, such as a modernized controller box, will have the capability to better react to fluctuations in traffic flows. Improvements are planned to include fire station access and emergency connections to the traffic signal system, such as “**Opticom**” Emergency Vehicle Preemption (EVP).
- Significant upgrades to existing traffic control signals are typically an eligible activity under the federal-aid Congestion Mitigation Air Quality (CMAQ) program funded through the CMMPO's Transportation Improvement Program (TIP).
- At the time vehicle crash research was initially conducted for the Auburn segment of the study corridor, there were *no* vehicle crash clusters identified that would be deemed eligible for federal-aid Highway Safety Improvement Program (HSIP) funding. However, although the earlier crash research did *not* meet HSIP criteria, based on more recent

MassDOT data obtained by staff, the Southbridge Street/Auburn Street intersection is now considered to be HSIP-eligible. As such, the CMMPO TIP-programmed Auburn Street Rehabilitation project will likely utilize HSIP target funding available to the planning region.

- Reconstructed sidewalks along with new sidewalks where none currently exist, improving pedestrian accessibility while fully meeting ADA requirements. One benefit of the project is to improve pedestrian access between Central Square, the Auburn Mall and the Auburn High School.

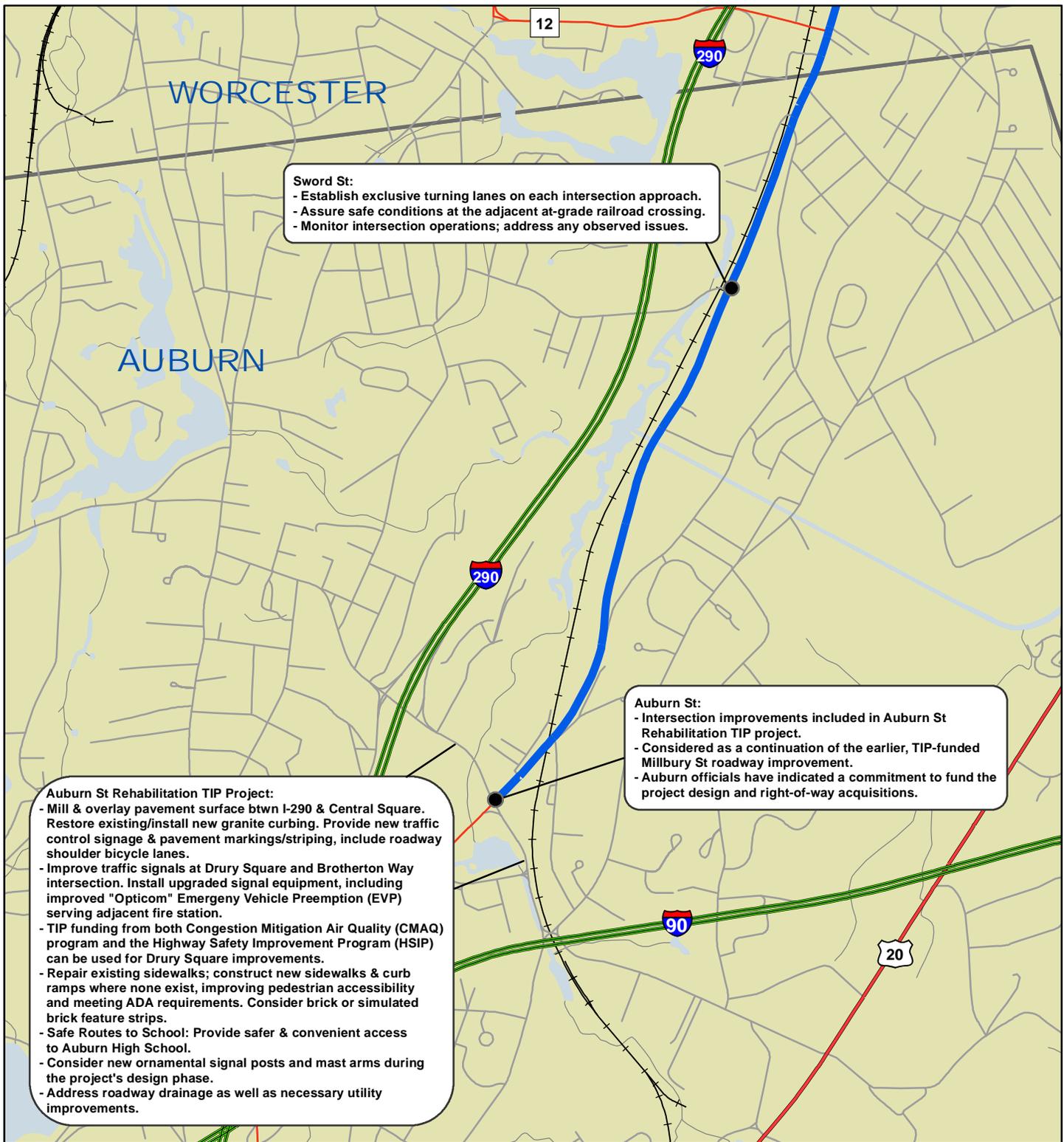


Auburn St Pavement Condition & Lack of Sidewalk

- Safe Routes to School: Provide both safer and more convenient access to the Auburn High School. Auburn High School is the venue for many civic events, including the annual Fall Festival, Homecoming and the Special Olympics.
- The host community intends to fully consider the inclusion of new ornamental signal posts and mast arms during the project's design phase. *The funding of ornamental posts and street lighting is often the responsibility of the host community.*
- Relatively minor roadway drainage as well as utility improvements are planned. *Early coordination among involved stakeholders is suggested.*



Auburn St Drainage Conditions



SOUTHBRIDGE STREET CORRIDOR PROFILE

Auburn Site-Specific Suggested Improvement Options

Legend

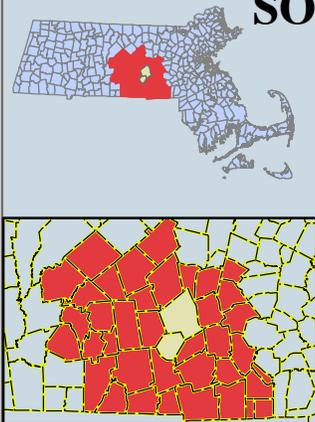
- Southbridge Street - Worcester, Auburn
- Interstate
- U.S. Route
- State Route
- Streams
- Railroad
- Roads

Figure 28



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

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Central Massachusetts Regional Planning Commission

Member Communities

| | |
|------------------|-----------------|
| Auburn | Northborough |
| Barre | Northbridge |
| Berlin | Oakham |
| Blackstone | Oxford |
| Boylston | Paxton |
| Charlton | Princeton |
| Douglas | Rutland |
| Dudley | Shrewsbury |
| East Brookfield | Southbridge |
| Grafton | Spencer |
| Hardwick | Sturbridge |
| Holden | Sutton |
| Hopedale | Upton |
| Leicester | Uxbridge |
| Mendon | Warren |
| Millbury | Webster |
| Millville | West Boylston |
| New Braintree | West Brookfield |
| North Brookfield | Westborough |
| Worcester | |

Central Mass Regional Planning Commission



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