

CENTRAL MASSACHUSETTS  
METROPOLITAN PLANNING ORGANIZATION



# Oxford & Sutton: Sutton Avenue & Central Turnpike Corridor Profile

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(Updated in Summer 2022)



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# 1.0 Introduction

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A Corridor Profile combines the information produced by the transportation Management Systems along a particular highway corridor, most times in multiple host communities, and analyzes performance-based data, suggests both operational and physical improvements, and often identifies 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 the Massachusetts Department of Transportation (MassDOT), Highway Division. When local consensus is achieved, proposed improvement projects supported 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 2022 to 2026.

As the Corridor Profile study series has evolved, it has become increasingly multi-modal and intermodal. The Management Systems have also served as the foundation for the full consideration of performance-based planning. Performance-based planning seeks to measure the value of investments made in the region's transportation infrastructure. US DOT's required national focus areas include reducing congestion, improving pavement, reducing vehicle crashes and, in the spirit of the state's Complete Streets Program, increasing the use of other modes such as transit, bicycling, and walking.

The Sutton Avenue & Central Turnpike Corridor Profile includes the analysis and interpretation of Management System data, which includes 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 Sutton Avenue & Central Turnpike; current and future projected peak-hour Turning Movement Counts (TMC) at focus intersections and associated Level-of-Service (LOS) analyses for intersections and roadway segments.

**Freight Planning:** Peak hour percentages of heavy vehicles utilizing the Sutton Avenue & Central Turnpike focus intersections.

**Transportation Safety Planning Program:** In-depth vehicle crash research using crash data provided by 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, such as culverts, as well as staff observations in the field using standardized condition assessment techniques.

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 to guide the effort. As determined necessary, special meetings can also be held with various stakeholder groups.

## 1.1 Performance Management

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

The CMMPO's evolving Performance Management program includes both federal transportation performance management requirements as well as the MPO's established goals and objectives. These goals and objectives are then integrated through each of the Ten Federal Transportation Planning Emphasis Areas. The areas are safety, security, state of good repair, congestion, multimodality, GHG/sustainability, equity, economic vitality, stormwater management & resiliency, and travel & tourism. Each goal and objective have corresponding performance metrics that are monitored and the progress towards these established goals is reported annually. A Performance Measures Scoresheet was created to assess both currently programmed and candidate future-year TIP projects to determine to what extent they address regional goals. Those projects that rank high often provide substantive measurable outcomes for each goal, and thus have an increased regional impact.

The findings from this Corridor Profile Report resulted in the compilation of a list of suggested improvement options. Ideally, these suggested improvements will encourage a TIP project that can positively influence regional performance. A table integrating the suggested improvements

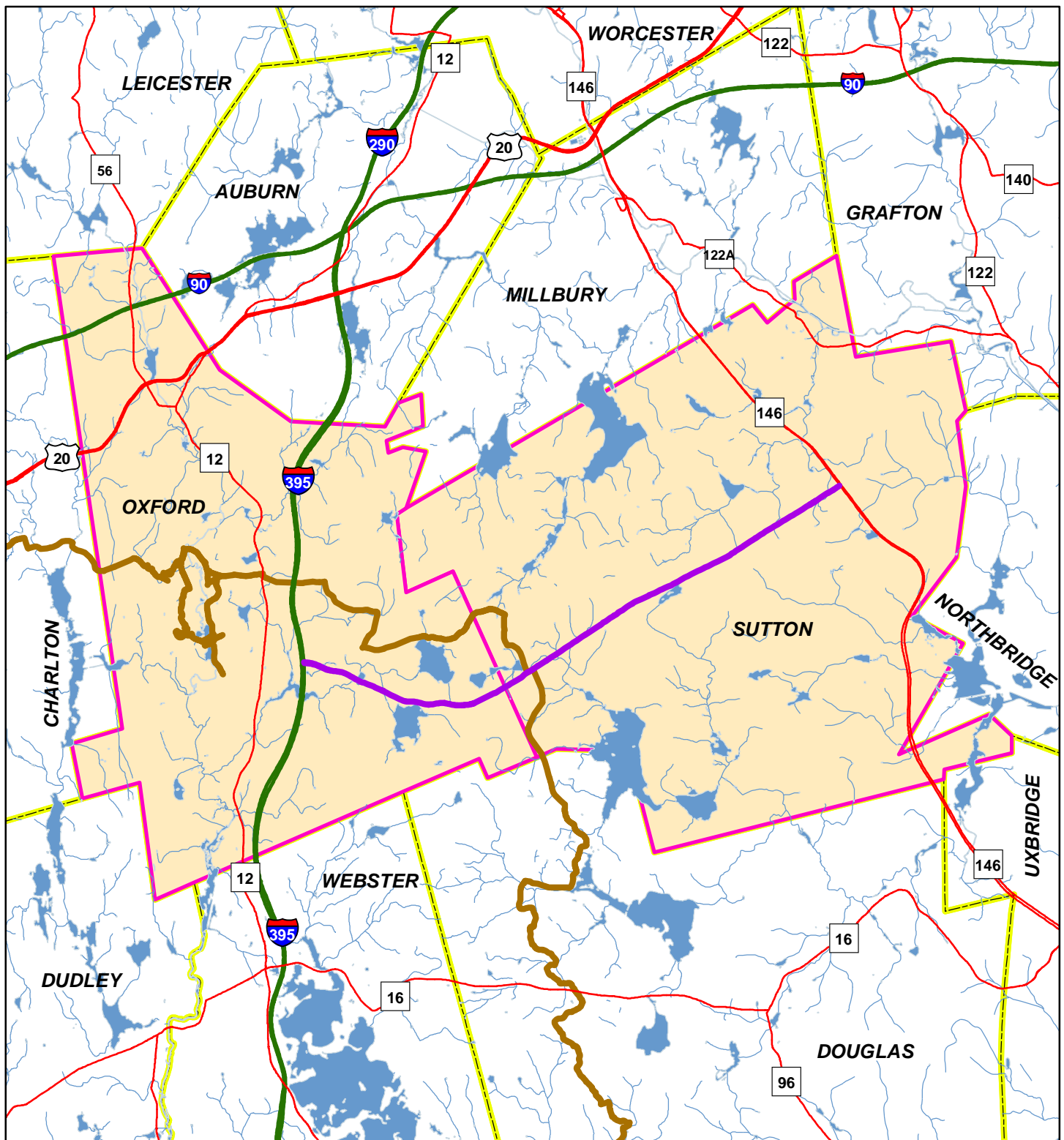
and how they can realistically support the goals and objectives for each federal emphasis area is included in the Overall Findings chapter of this report.

## **1.2 Sutton Avenue & Central Turnpike Corridor Profile: Oxford & Sutton**

The Sutton Avenue & Central Turnpike Corridor Profile was competitively selected by the CMMPO as a worthy candidate to analyze and study. This corridor was also requested as a potential study candidate during the public outreach process for the current Long-Range Transportation Plan (LRTP), Mobility 2040: The Update for 2020. Both Sutton Avenue & Central Turnpike are federal-aid roadways that are eligible for US DOT improvement funding. Since the corridor is fairly heavily traveled, the goals of this Corridor Profile effort include improving roadway safety, reducing congestion, preserving and improving roadway pavement, maintaining drainage structures as well as determining how to improve the roadway for the accommodation of bicycles and pedestrians. The Sutton Avenue & Central Turnpike study corridor is shown in **Figure 1** along with other significant aspects of the region's multi-modal transportation network, including long distance trails.

The study limits of this Corridor Profile are between Interstate 395 in Oxford and State Route 146 in Sutton. Interstate 395 is a major north/south limited access highway that continues into Connecticut to the south and connects to Interstate 290 in the town of Auburn to the north. Route 146 is also a major north/south highway which connects to Worcester to the north and south into Rhode Island. Within the study area, Sutton Avenue & Central Turnpike is mostly a two-lane roadway with only a brief segment near Interstate 395 that has four lanes. Sutton Avenue in Oxford has a mixture of commercial and residential land uses. Just east of Interstate 395 is Oxford Crossing, a large shopping plaza with numerous retail stores. In Sutton, Central Turnpike also has a mixture of commercial and residential land uses.

The roadway study segment of Sutton Avenue & Central Turnpike is 7.8 miles in length. The Sutton Avenue portion in Oxford portion is 2.7 miles and the Central Turnpike portion in Sutton is 5.1 miles. The entire length of the study area is maintained by the respective towns. The MassDOT Roadway Inventory File (RIF) indicates that the right-of-way for the Oxford segment is 40 feet while town records show the Sutton segment is 60 feet.



# SUTTON AVE & CENTRAL TNPBK CORRIDOR PROFILE

Host Communities of Oxford & Sutton

Figure 1

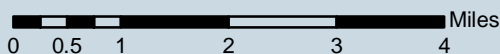
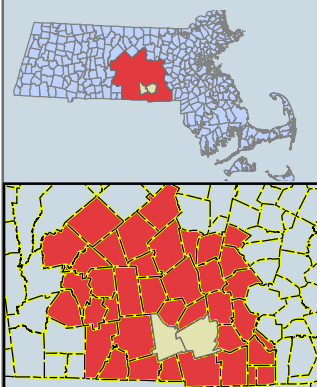
## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- U.S. Route
- State Route
- Water
- Midstate Trail



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.



### 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 Sutton Avenue & Central Turnpike 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 Sutton Avenue & Central Turnpike study corridor in Oxford and Sutton. This consists of GIS-based maps featuring overlays developed by the Massachusetts Department of Conservation & Recreation (DCR), the Massachusetts Department of Environmental Protection (DEP), and the National Heritage & Endangered Species Program (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.
- Attend meetings with host communities involved in study.

### 1.4 Corridor-Wide Observations & Existing Deficiencies

The following corridor-wide observations and existing deficiencies, also shown in **Figure 2**, were observed along the entire length of the Sutton Avenue & Central Turnpike study corridor:

#### Oxford

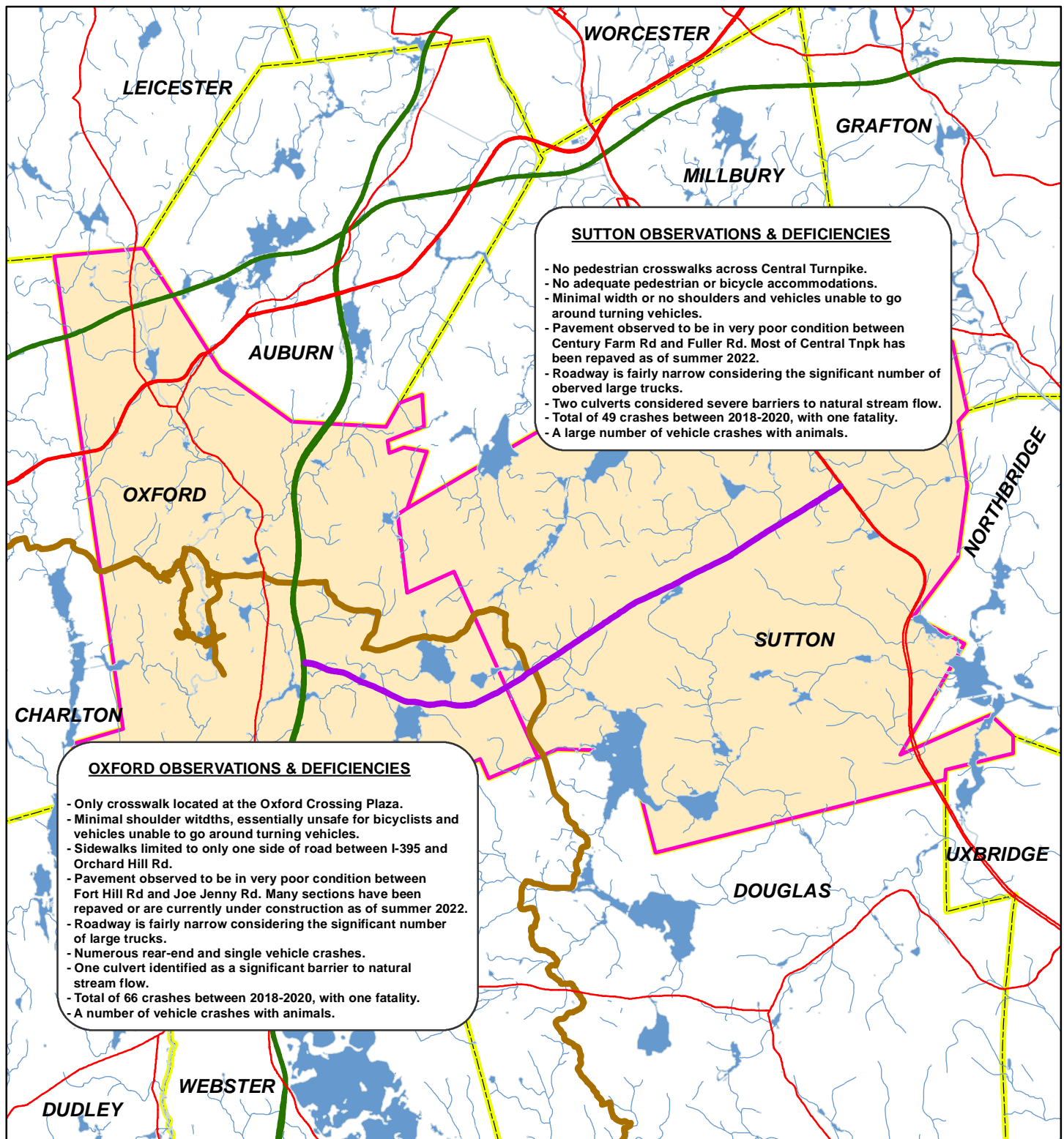
- Only one pedestrian crosswalk across Sutton Avenue. Located at traffic signal for Oxford Crossing shopping plaza.
- Minimal shoulder widths along both sides of Sutton Avenue in Oxford. Essentially unsafe for bicyclists. Further, vehicles unable to go around other turning vehicles.
- Sidewalks located only on one side of Sutton Avenue between Interstate 395 and Orchard Hill Road. Remaining section of Sutton Avenue in Oxford does not have a sidewalk.
- Pavement observed to be in “very poor” condition between Fort Hill Road and Joe Jenny Road. *Update:* since the pavement was analyzed in 2021, most of the “very poor” and “poor” sections were repaved or is currently under construction.
- Roadway is fairly narrow considering the significant number of observed large trucks.
- Numerous rear-end and single vehicle crashes.
- Total of 66 crashes between 2018-2020, with one fatality.



- There are a number of vehicle crashes with animals.
- One culvert along Sutton Avenue identified as a “significant” barrier to natural stream flow.

### Sutton

- No pedestrian crosswalks across Central Turnpike.
- No adequate pedestrian or bicycle accommodations.
- Minimal width or no shoulders along the Central Turnpike study corridor. Vehicles unable to go around other turning vehicles.
- Pavement observed to be in “very poor” condition between Century Farm Road and Fuller Road. *Update:* since the pavement was analyzed in 2021, the “very poor”, “poor”, and “fair” sections were repaved.
- There is a large number of vehicle crashes with animals.
- Roadway is fairly narrow considering the significant number of observed large trucks.
- Two culverts along Central Turnpike identified as “severe” barriers to natural stream flow.
- Total of 49 crashes between 2018-2020, with one fatality.



## CENTRAL TNPK & SUTTON AVE CORRIDOR PROFILE

### Corridor-Wide Observations & Deficiencies

Figure 2

#### Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- U.S. Route
- State Route
- Water
- Mid-State Trail



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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0 0.5 1 2 3 4 Miles

## 1.5 Town of Oxford Site-Specific Observations & Existing Deficiencies

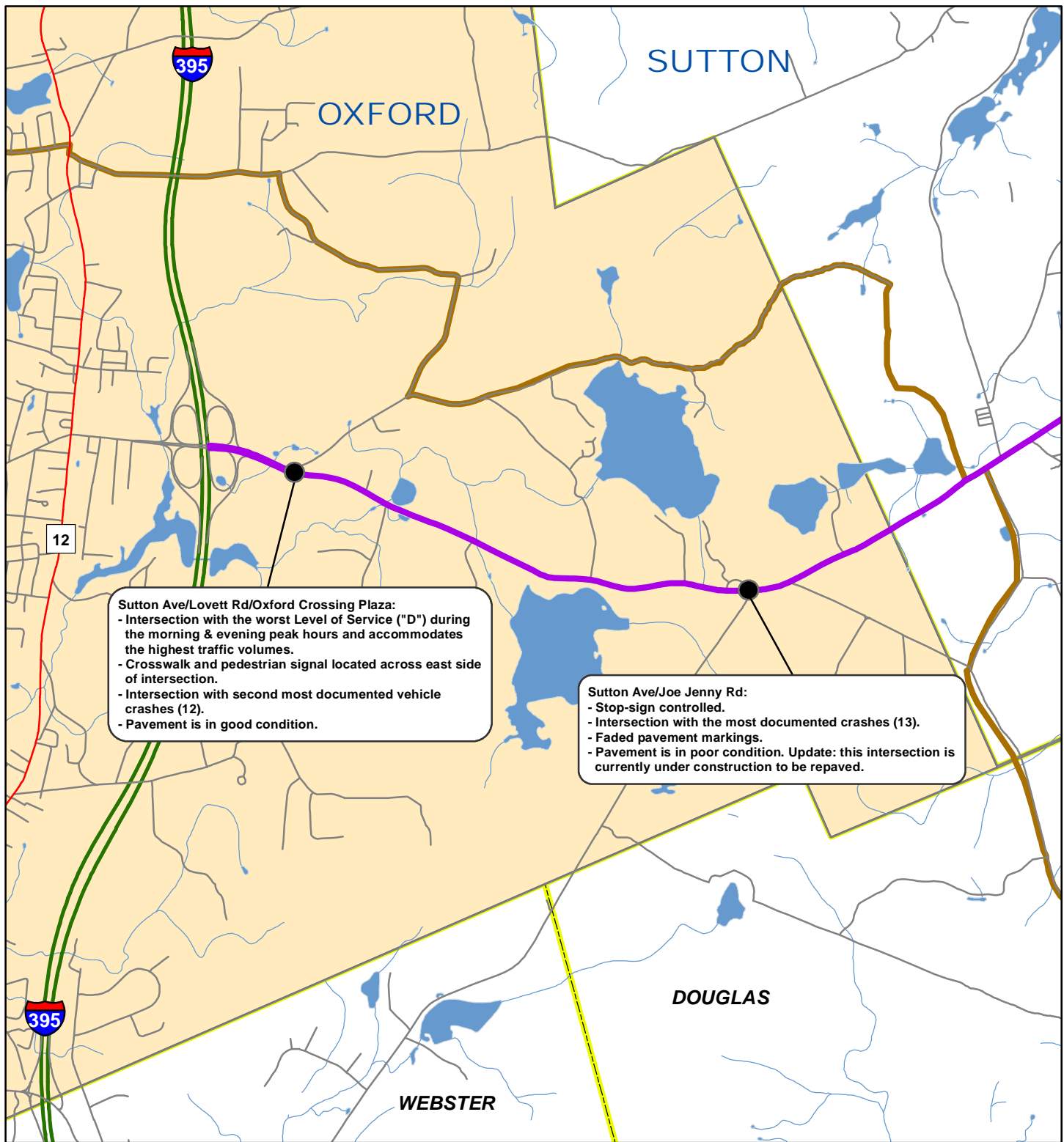
The following site-specific observations and existing deficiencies, also shown in **Figure 3**, were observed along the Oxford's Sutton Avenue segment of the study corridor:

### Sutton Avenue / Lovett Road / Oxford Crossing Plaza

- This signalized intersection has the worst Level of Service ("D") during the morning and evening peak hours and accommodates the highest traffic volumes.
- Crosswalk and pedestrian signal located across east side of intersection.
- Intersection has the second-most documented vehicle crashes (12).
- Pavement observed to be in "good" condition.

### Sutton Avenue / Joe Jenny Road

- Stop-sign controlled.
- Intersection with the most documented crashes (13)
- Faded pavement markings.
- Pavement observed to be in "poor" condition. *Update:* this section of Sutton Avenue is currently under construction to be repaved.



## CENTRAL TNPK & SUTTON AVE CORRIDOR PROFILE

### Oxford Site-Specific Observations & Deficiencies

Figure 3

#### Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- State Route
- U.S. Route
- Roads
- Streams
- Water Bodies
- Mid-State Trail



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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Miles  
0 0.15 0.3 0.6 0.9 1.2

## 1.6 Town of Sutton Site-Specific Observations & Existing Deficiencies

The following site-specific observations and existing deficiencies, also shown in **Figure 4**, were observed along Sutton's Central Turnpike segment of the study corridor:

### Central Turnpike / West Sutton Road

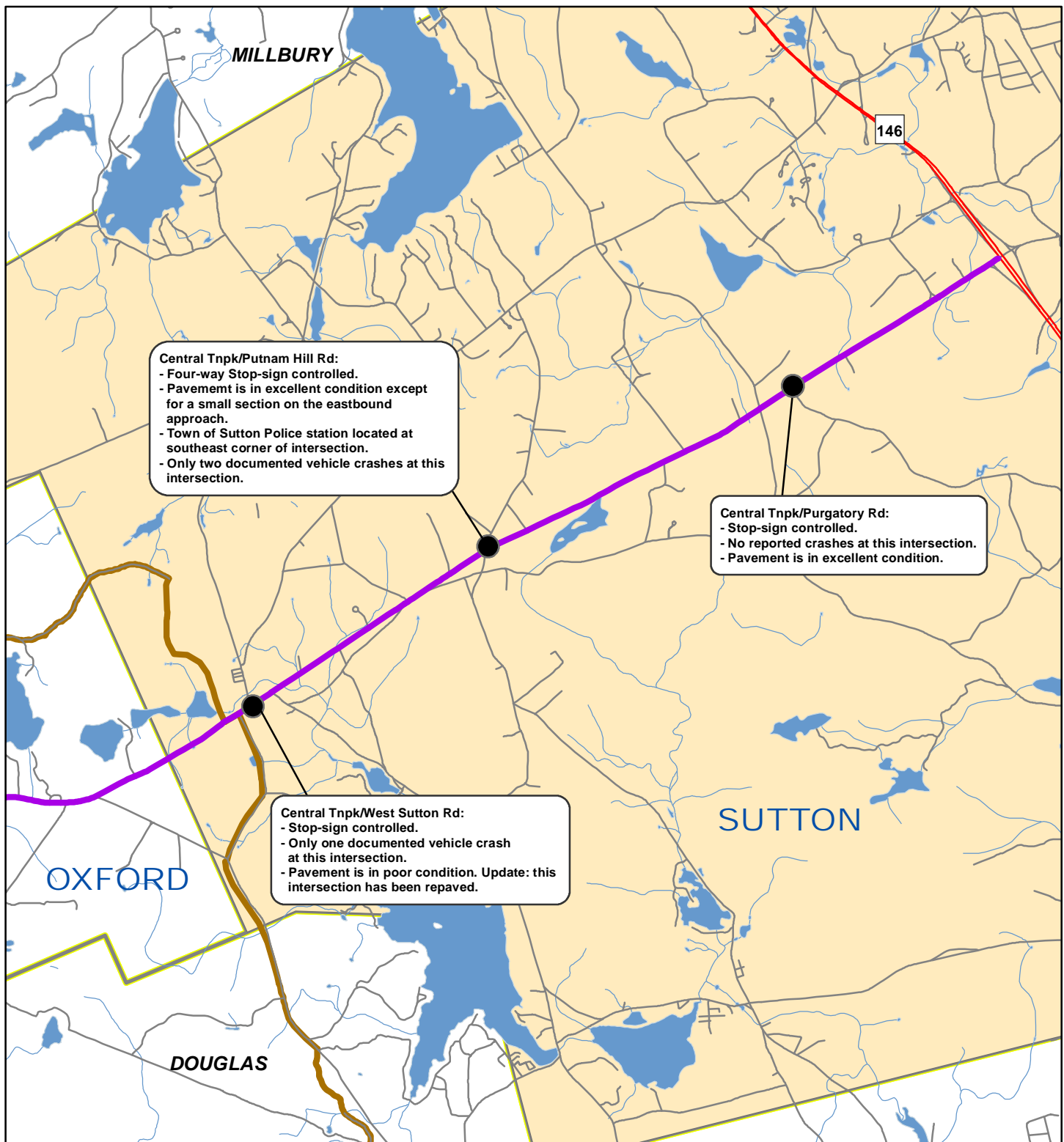
- Stop-sign controlled.
- Only one documented vehicle crash at this location.
- Pavement observed to be in "poor" condition. *Update:* this section of Central Turnpike has been repaved as of summer 2022.

### Central Turnpike / Putnam Hill Road

- Four-way Stop-sign controlled.
- Pavement observed to be in "excellent" condition at intersection except for a small section on the eastbound approach.
- Town of Sutton Police station located at southeast corner of intersection.
- Only two documented vehicle crashes at this intersection.

### Central Turnpike / Purgatory Road

- Stop-sign controlled.
- No reported crashes at this intersection.
- Pavement observed to be in "excellent" condition.



## CENTRAL TNPBK & SUTTON AVE CORRIDOR PROFILE

### Sutton Site-Specific Observations & Deficiencies

Figure 4

#### Legend

- Central TnPk & Sutton Ave Corridor Profile
- Interstate
- State Route
- U.S. Route
- Roads
- Streams
- Water Bodies
- Mid-State Trail



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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0 0.225 0.45 0.9 1.35 1.8 Miles



## 2.0 Sutton Avenue & Central Turnpike Environs

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### 2.1 Natural Environment

Major features of the natural environment were also identified as part of the Sutton Avenue & Central Turnpike Corridor Profile effort and were used to create Environmental Profile maps for the greater study area. Such maps are compiled in order to view major environmental systems beyond the focus roadway that have impacts on such concerns as drainage, water quality and wildlife migration.

The following Environmental Profile Maps produced for the Sutton Avenue & Central Turnpike Corridor Profile 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 the calculated limit of the maximum amount of pollutant that a waterbody can receive on a daily basis and still safely meet water quality standards. A wellhead protection area is that area of an aquifer which contributes water to a given well under the most severe pumping and recharge conditions that can be realistically anticipated.

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 the DCR is to protect, promote and enhance the state's wealth of natural, cultural and recreational resources. Geographic Data layers are managed by various 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 forests.
- **Division of Water Supply Protection** - Manages and protects the drinking water supply watersheds for the greater Boston area.

## Department of Environmental Protection (DEP)

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

- **Division of Watershed Management (DWM)**
- **Watershed Planning Program (WPP)** - Contaminated water adversely impacts drinking water supplies, degrades the state's recreational water resources and destroys wildlife habitat. Water that does not soak into the ground is called runoff. Proper animal manure management and runoff management will protect or improve water quality in any community and watershed. The geographic data layers used 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 & 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 associated buffer zones.

## National Heritage & Endangered Species Program (NHESP)

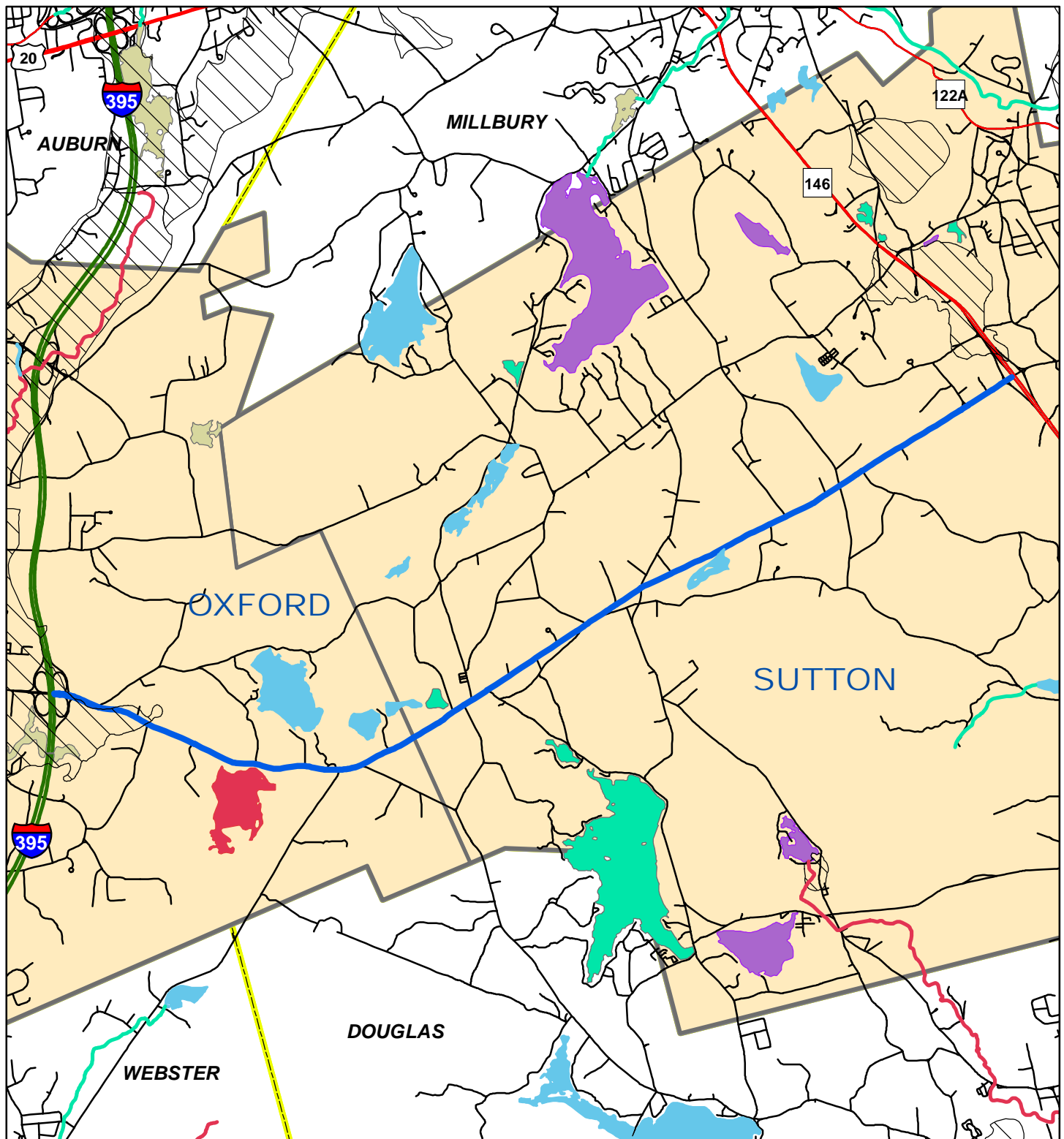
The overall goal of the NHESP is the protection of the state's wide range of native biological diversity. NHESP is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state. Available geographic data layers include:

- **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. Priority habitats are officially referenced under the Massachusetts Endangered Species Act (MESA).



### Impaired Waterways and Wellhead Protection Areas

**Figure 5** shows impaired waterways and wellhead protection areas in the study area for both Oxford and Sutton. In Oxford, the western portion of the study corridor is within a wellhead protection area while the Sutton portion of the study corridor does not contain any wellhead protection areas. As for impaired waters in Oxford, Robinson Pond, located south of Sutton Avenue, is unimpaired for some uses, but not assessed for others. On the northern side of Sutton Avenue, there is insufficient information to make assessments for any possible unimpaired uses for Sacarrappa Pond and Stump Pond. In Sutton, the Number One Pond requires a TMDL and the Number Two Pond, at the Oxford town line, does not have enough information to make an assessment for any possible unimpaired uses. The only other water body near Sutton's Central Turnpike is Pidgeon Hill Pond and, similarly, it also does not have enough information to make an assessment at this time.



# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

Oxford & Sutton Impaired Waters & Wellhead Protection Areas

Figure 5

## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Local Roads
- Interstate
- State Route
- 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



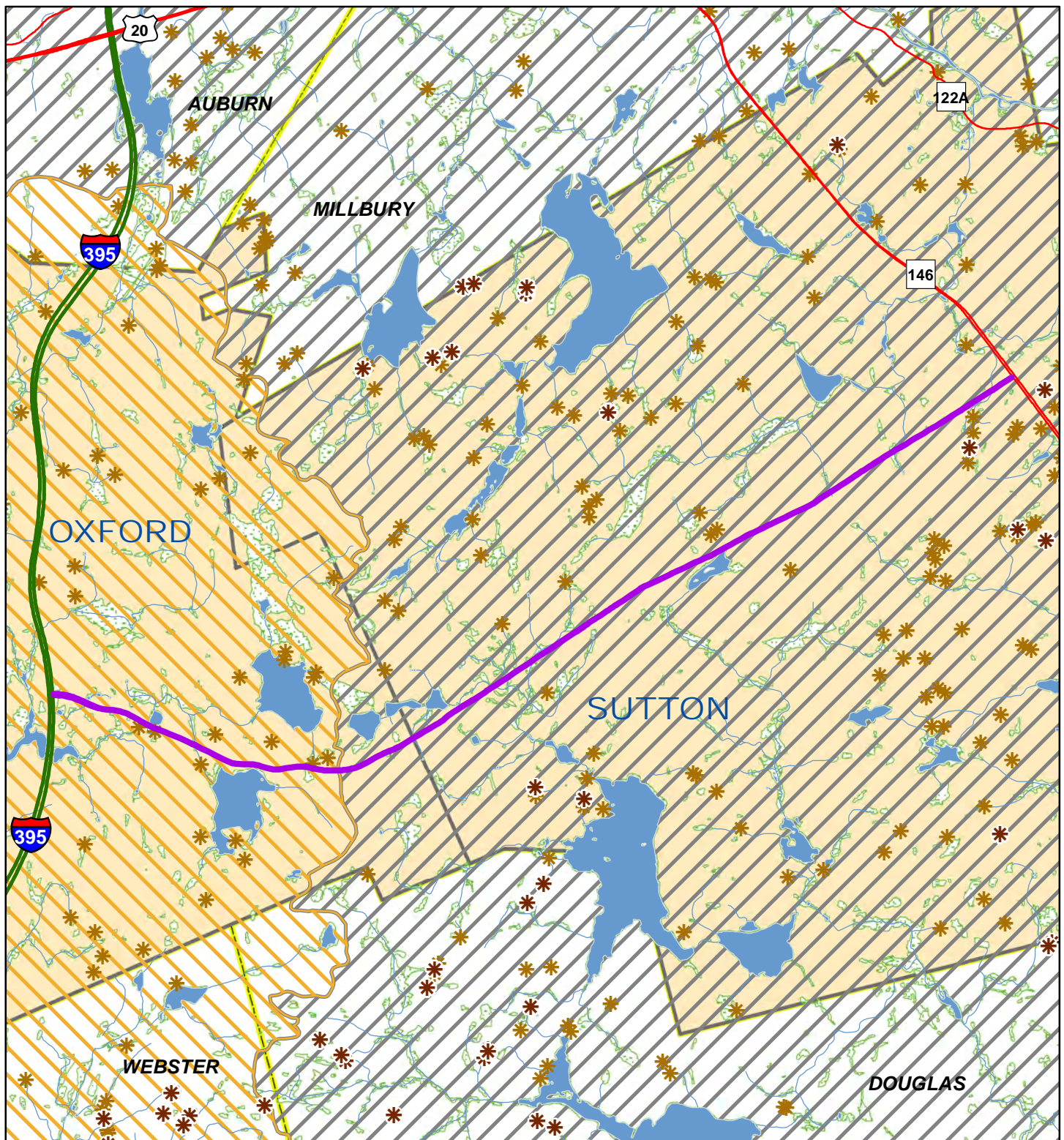
Source: Data provided by the US Census Bureau, Central Massachusetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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.

0 0.35 0.7 1.4 2.1 2.8 Miles

### Major Watershed Areas, Vernal Pools, and Wetlands

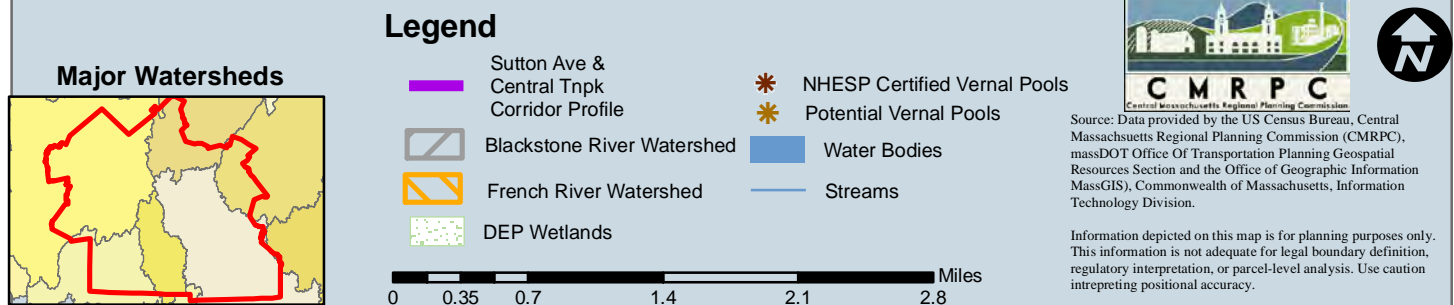
**Figure 6** shows major watershed areas, vernal pools, and wetlands within the Sutton Avenue & Central Turnpike study area for both Oxford and Sutton. In Oxford, the majority of the study corridor is within the French River Watershed while a small portion is in the Blackstone River Watershed. Also in Oxford there are numerous small wetlands near the study corridor as well as a few potential vernal pools. Within Sutton, the entire study corridor is within the Blackstone River Watershed. In addition, there are numerous wetlands and a few nearby potential vernal pools. For both host communities, further study would be needed to investigate the types of species that inhabit both the wetlands and potential vernal pools within the study area, and if any potential suggested improvements would be detrimental to their existence.



# SUTTON AVE & CENTRAL TNPBK CORRIDOR PROFILE

Oxford & Sutton Major Watersheds, Vernal Pools & Wetlands

Figure 6

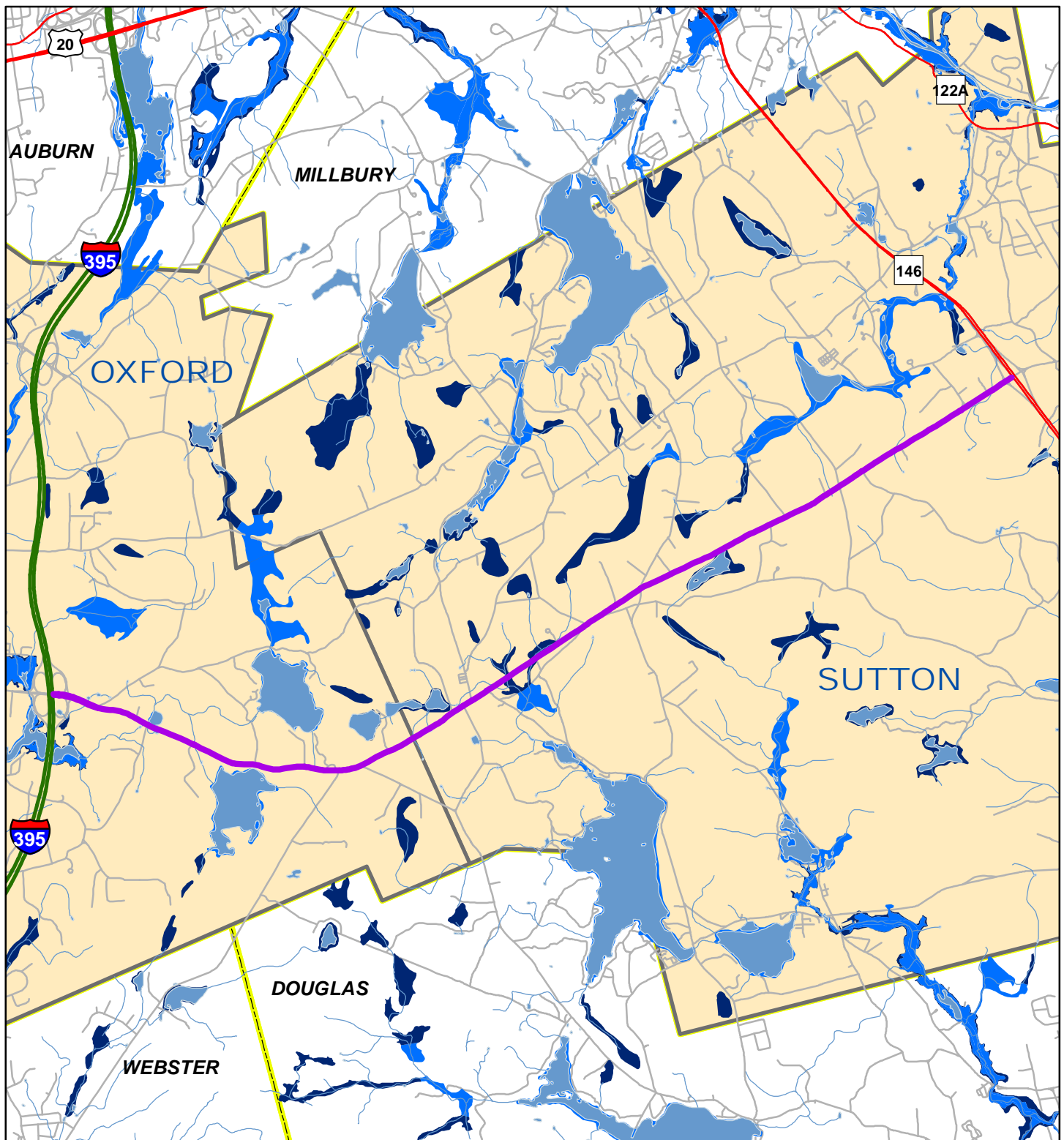




## 2.2 Flood Zones

Created by the Federal Emergency Management Agency (FEMA) in regards to National Flood Insurance Rates, **Figure 7** shows the 100 and 500-year flood zones 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 are also used to calculate flood insurance rates for homes and businesses.

In Oxford, there are 100-year flood zones around Eames Pond, Robinson Pond, and Sacarrappa Pond while there is a 500-year flood zone around Stump Pond. In Sutton, there are 500-year flood zones around Number One and Number Two Ponds, Pidgeon Hill Pond, and around the Mumford River, just east of Manchaug Road. There is also a small area of 100-year flood zone around the Mumford River.



# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

Oxford & Sutton Flood Zones

Figure 7

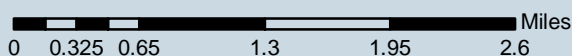
## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- State Route
- Local 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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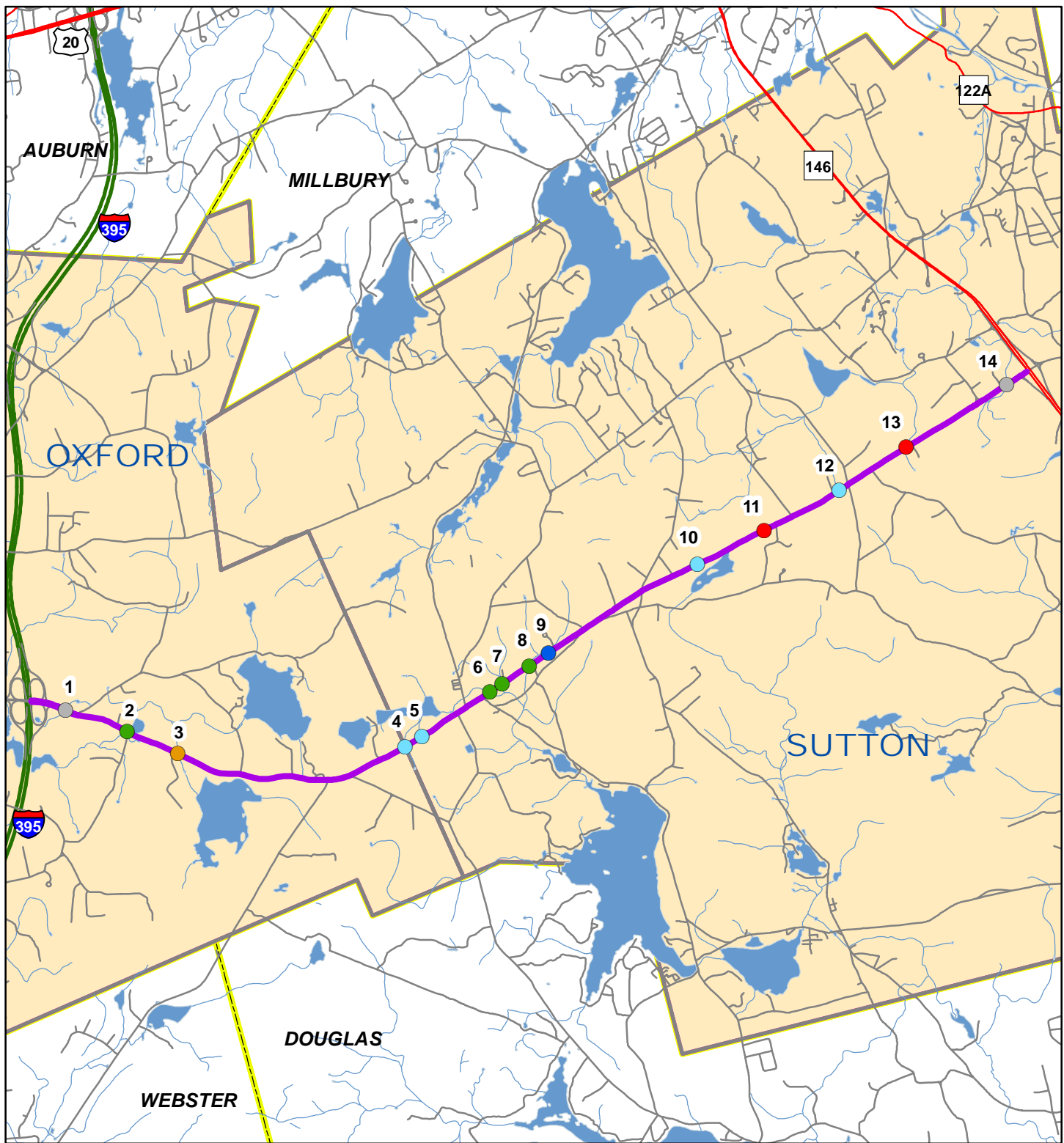
## 2.3 Sutton Avenue & Central Turnpike Major Drainage Structures

Major drainage structures, like culverts and small bridges, play a vital role in the region's transportation network and ecological sustainability, providing the ability to maintain connections within watersheds, as well as protecting property and other infrastructure from floods and storm damage. In coordination with the Massachusetts Department of Environmental Restoration (MassDER) and the North Atlantic Aquatic Connectivity Collaborative (NAACC), multiple CMRPC staff have been trained to assess the condition and non-tidal aquatic passability of culverts based on the established Massachusetts Stream Crossing Standards. Currently, the NAACC has assessed over 6,400 culverts and small bridges (both tidal and non-tidal) across the Commonwealth. These assessments have been used to support many projects that restore both tidal and non-tidal aquatic connectivity while also providing resiliency benefits.

The major drainage structures intersecting Sutton Avenue & Central Turnpike were identified through a GIS analysis. This mapping exercise allowed for the identification of major stream crossings along the length of the study area of Sutton Avenue & Central Turnpike in the towns of Oxford and Sutton. **Figure 8** shows the location and current barrier status of each identified drainage structure. As shown in the figure, the current barrier status is shown for each culvert based on the NAACC passability scores. The breakdown of these scores is shown in **Table 1**.

**Table 1**  
**NAACC Culvert Aquatic Passability Scoring**

<b>Aquatic Passability Score</b>	<b>Barrier Type</b>
1.0	No Barrier
0.80 – 0.99	Insignificant Barrier
0.60 – 0.79	Minor Barrier
0.40 – 0.59	Moderate Barrier
0.20 – 0.39	Significant Barrier
0.00 – 0.19	Severe Barrier



## CENTRAL TNPK & SUTTON AVE CORRIDOR PROFILE

Oxford & Sutton Major Drainage Structures

Figure 8

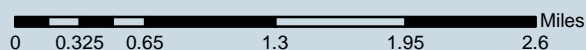
### Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- State Route
- Streams
- Water Bodies
- Severe barrier
- Significant barrier
- Moderate barrier
- Minor barrier
- Insignificant barrier
- No Score/Not Assessed



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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To assess the total of 14 identified drainage structures, staff conducted field visits and filled out the NAACC Non-Tidal Aquatic Connectivity Survey Data Form for each structure . (The completed assessment forms can be found in the study's Technical Appendix.) **Table 2** summarizes key information about each of the major drainage structures surveyed in the field. This information includes: assigned map #, host community, structure materials, pipe diameter and length, NAACC passability score, and any additional observations.

There was a mix of conditions for the 14 structures along the study corridor. There are three structures (#6, #7 & #8) that are considered an insignificant barrier and all three are in the town of Sutton. Next, there are four structures (#4, #5, #10 & #12) that are a minor barrier and three are located in the town of Sutton. There is also one structure (#9) that is a moderate barrier in Sutton and one structure (#3) that is a significant barrier in Oxford. Further, there are two structures (#11 & #13) that are severe barriers. Lastly, there are two structures (#1 & #14) that were unable to be assessed as they were either behind safety fencing or located on private property. All structures are made of either concrete or metal. Following the table, **Figures 9A & 9B** shows photos taken in the field of various major drainage structures along Sutton Avenue & Central Turnpike.

**Table 2**  
**Sutton Avenue & Central Turnpike**  
**Inventory of Major Drainage Structures**

Assigned Map #	Host Community	Structure Materials	Approx. Pipe Size	Approx. Length	NAACC Passability Score	Additional Notes
1	Oxford	Unknown	Unknown	Unknown	Unknown	Culvert was unable to be assessed.
2	Oxford	Concrete	11' x 4'	45'	0.818	Tributary of Eames Pond. Located directly in front of entrance to Fort Hill Rd.
3	Oxford	Concrete	4' x 4'	20'	0.332	Tributary of Robinson Pond. Located just east of Orchard Hill Rd.
4	Oxford	Concrete	2' x 2'	40'	0.747	Tributary from Number 2 Pond. Located on Oxford side of town line. Inlet side is cracked and in poor condition.
5	Sutton	Concrete	2' x 2'	40'	0.634	Located near the "welcome to Sutton" sign. Inlet side is clogged / submerged with sediment.
6	Sutton	Concrete	4' x 6'	39'	0.818	Mumford River culvert.
7	Sutton	Concrete	3' x 3'	47'	0.864	Mumford River culvert. Located near Old Common Rd.
8	Sutton	Concrete	8' x 5'	44'	0.91	Very poor condition, rebar showing, and concrete chunks missing. Large wetland on inlet side, no stream. Two inlet structures & one outlet. Located near Josephson Rd.
9	Sutton	Concrete	3' x 1'	40'	0.521	Dry culvert and in poor condition. Located near house #572. Debris & sediment around culvert.
10	Sutton	Concrete	Unknown	Unknown	0.636	Dry and buried. Fully covered by leaves on one side and completely submerged. Located near house #448.
11	Sutton	Metal	2' x 2'	47'	0.029	Inlet side clogged. Located near house #383. Debris & sediment around culvert.
12	Sutton	Metal	2' x 2'	55'	0.624	Drainage outflow into the inlet side. Located between Sovereign Hts and Uxbridge Rd.
13	Sutton	Metal	2' x 2'	60'	0.016	Large inlet with drop and two outlet structures. Located between Purgatory Rd and Alana Dr.
14	Sutton	Unknown	Unknown	Unknown	Unknown	Culvert was unable to be assessed.

## Figure 9A

Oxford & Sutton

Sutton Avenue & Central Turnpike Major Drainage Structures Photos



Oxford - #2 – Inlet Side



Oxford - #3 – Outlet Side



Oxford - #4 – Outlet Side



Sutton - #5 – Outlet Side



Sutton - #6 – Outlet Side



Sutton - #7 – Inlet Side



**Figure 9B**  
Oxford & Sutton  
Sutton Avenue & Central Turnpike Major Drainage Structures Photos



**Sutton - #8 – Outlet Side**



**Sutton - #9 – Inlet Side**



**Sutton - #10 – Outlet Side**



**Sutton - #11 – Outlet Side**



**Sutton - #12 – Outlet Side**



**Sutton - #13 – Inlet Side**



Based on the observations made in the field, the following provides a brief listing of specific maintenance and suggested improvement options that target the inspected and assessed Sutton Avenue & Central Turnpike drainage structures:

- Regularly inspect & clean.
- Clear trash, vegetation, branches and other blockages.
- Inspect for adverse wildlife activity, ex. animal nests, beaver dams.
- As appropriate, maintain passage for aquatic & land animals.
- Install safety fencing where needed.
- As necessary, institute a planned, prioritized reconstruction and replacement program.
- Consider assessing all culverts in both host communities using the NAACC Non-Tidal Aquatic Connectivity protocol to determine their aquatic passability and condition.

A potential state funding source, MassDEP has a Culvert Replacement Municipal Assistance Grant Program for communities. Information about this program can be found on the [MassDEP Website](#). Currently, the new FY 2023 has started and the deadline to submit projects is March 14, 2022. Awarded funds typically range from \$25,000 to \$400,000, depending on project phase and the scope of work proposed. Eligible projects must be a culvert or bridge replacement on a public way, owned and maintained by the applying municipality, and must cross a natural freshwater, non-tidal river or stream channel. The stream channel may be either intermittent or perennial and the project must meet the Massachusetts Stream Crossing Standards.

## **2.4 Performance Management**

The regional Performance Measure of Stormwater Management & Resiliency pertains to this chapter. The goal is to create a transportation network that is resilient to the impacts of stormwater. For any new CMMPO Transportation Improvement Program (TIP) projects, it is important to consider the use of Green Infrastructure or Nature-Based Solutions to help manage stormwater. Also, older culverts should be upgraded to new, modern structures that can adequately handle the heavy water flows from stronger storms with increasing frequency. A higher priority should be given to areas that are within a 100 or 500-year flood zone. By effectively applying these best-practice approaches, the goal of a stormwater resilient transportation network in the planning region can be obtained.

## 3.0 Congestion Management Process (CMP)

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

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

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

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

### 3.1 Daily Traffic Volumes

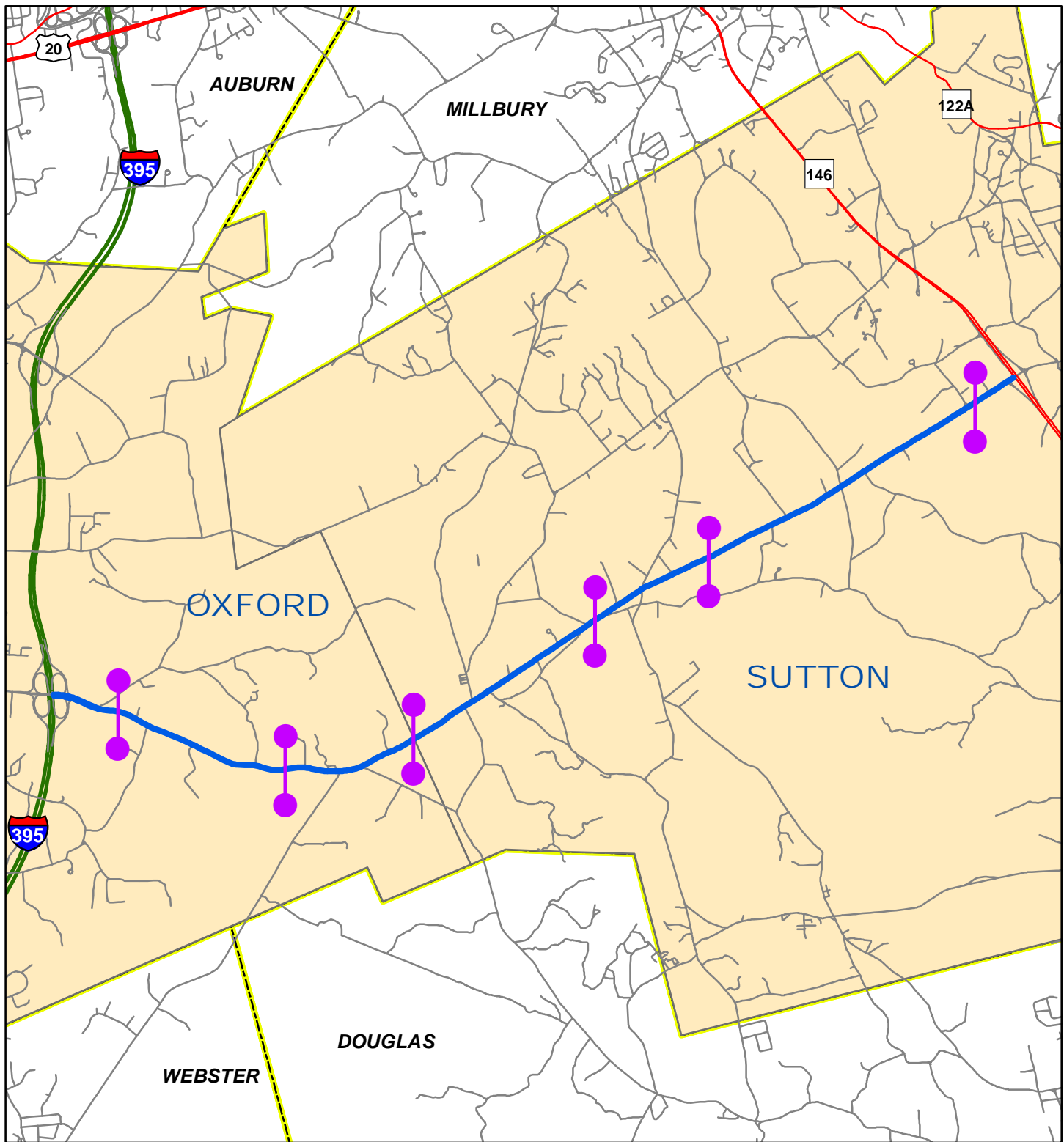
**Figure 10** shows locations along Sutton Avenue & Central Turnpike in the towns of Oxford and Sutton where CMRPC placed Automatic Traffic Recorders (ATRs) to determine the volume of traffic. All counts were completed in June or July 2021. The ATRs were installed along the roadway and left in place for at least 48 hours. There were five count locations completed for

this Corridor Profile. **Table 3** shows the volume results from the Sutton Avenue & Central Turnpike ATR locations. As the data shows, the highest traffic volumes are on Sutton Avenue in the town of Oxford. In comparison, observed daily traffic volumes on Central Turnpike in the town of Sutton are approximately half as much west of the Fort Hill Road location.

**Table 3**  
**Sutton Avenue & Central Turnpike Daily Traffic Volumes**

ATR Location	Date	Volume*
Sutton Avenue west of Fort Hill Road	6/10/2021	10,400
Sutton Avenue west of Joe Jenny Road	7/15/21	8,600
Sutton Avenue at Sutton Town Line	6/10/2021	9,850
Central Turnpike west of Putnam Hill Road	6/23/21	5,550
Central Turnpike east of Putnam Hill Road	6/23/21	5,300
Central Turnpike west of Route 146	6/29/21	5,800

\*Vehicles Per Day (VPD)



# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

Oxford & Sutton Traffic Count Locations

Figure 10

## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- State Route
- US 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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0 0.325 0.65 1.3 1.95 2.6 Miles



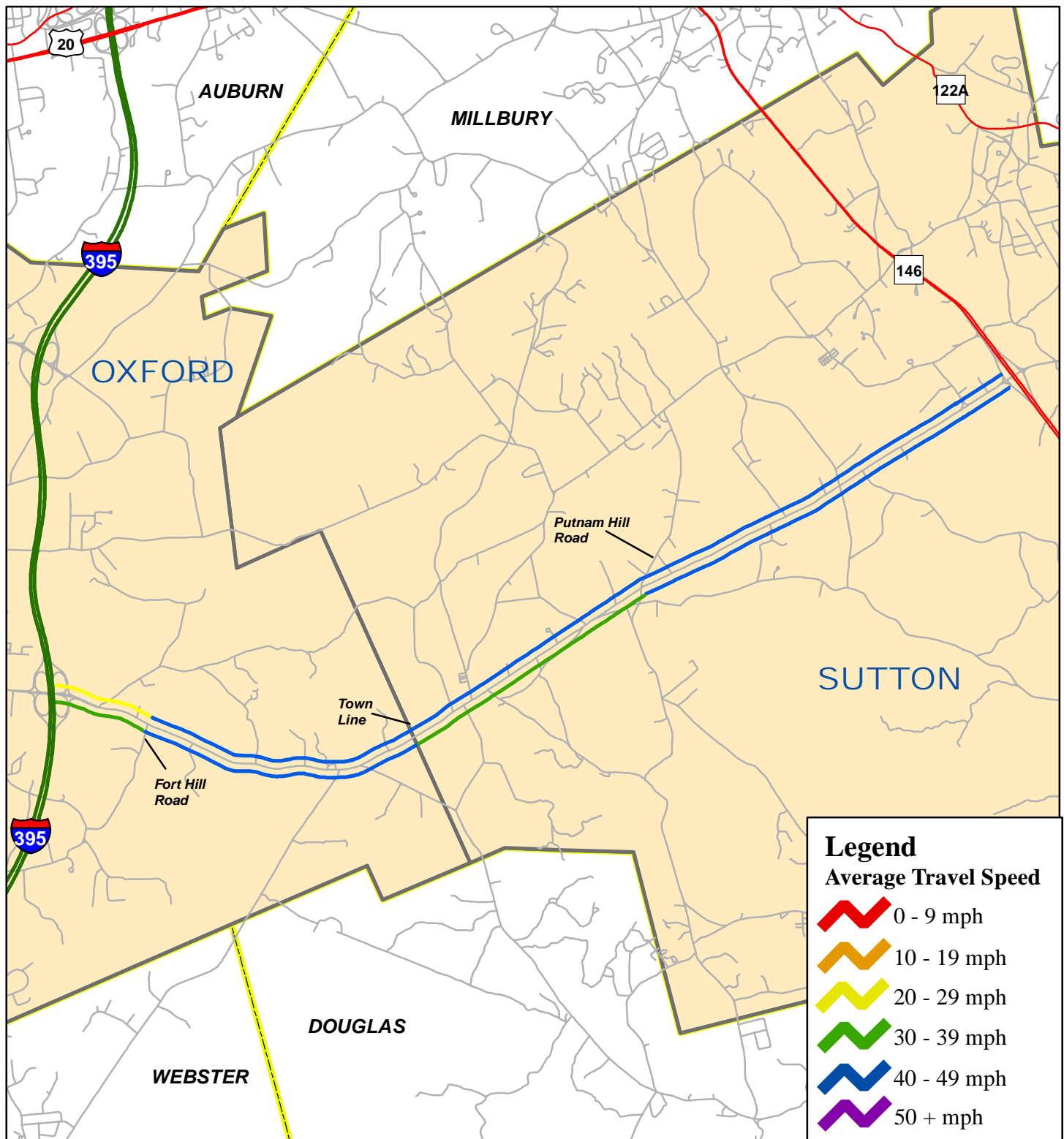
### 3.2 Sutton Avenue & Central Turnpike Travel Time and Delay Study

CMRPC staff conducted one travel time and delay study for this Corridor Profile effort. The travel time data was collected by CMRPC using a Global Positioning System (GPS) unit. The study occurred between 7am – 9am and 4pm – 6pm. 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 4**, it takes between 11 and 12 minutes to travel on Sutton Avenue & Central Turnpike from Interstate 395 to Route 146 for both the AM and PM peak travel periods. Congested time is considered to be when vehicle speeds are below 20 MPH or 60% of the posted speed limit.

**Table 4**  
**Sutton Avenue & Central Turnpike Travel Time and Delay Study Results**

Peak Period	Direction	Study Year	Distance	Travel Time (average minutes)	Average Travel Speed	Congested Time (average minutes)
AM	Eastbound	2021	7.8 miles	11.9	38 mph	1.1
AM	Westbound	2021	7.8 miles	11.2	39 mph	0.9
PM	Eastbound	2021	7.8 miles	11.6	39 mph	1.0
PM	Westbound	2021	7.8 miles	11.6	39 mph	0.7

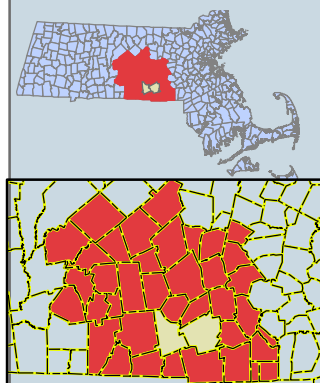
**Figures 11 and 12** show average travel speeds for each section of the study roadway from the travel time and delay study completed in May 2021. According to the above table, the average travel speed for the entire study corridor is either 38 MPH or 39 MPH. Staff created three checkpoints to divide the corridor into four study segments. There are two segments in Oxford and two segments in Sutton. The following maps show the average travel speeds for both directions for each segment. The slowest travel speeds in the AM peak period are heading westbound, between Fort Hill Road and Interstate 395, likely due to the traffic signal at the Oxford Crossing Plaza/Lovett Road intersection. Along most of the segments, travel speeds are between 40 MPH and 49 MPH. For the PM peak period, average travel speeds are relatively the same as the AM period. The lowest speeds are again between Interstate 395 and Fort Hill Road, however during this time period it is traveling in the eastbound direction.



## SUTTON AVE & CENTRAL TNPk CORRIDOR PROFILE

AM Peak Period Average Travel Speed

Figure 11



### Legend

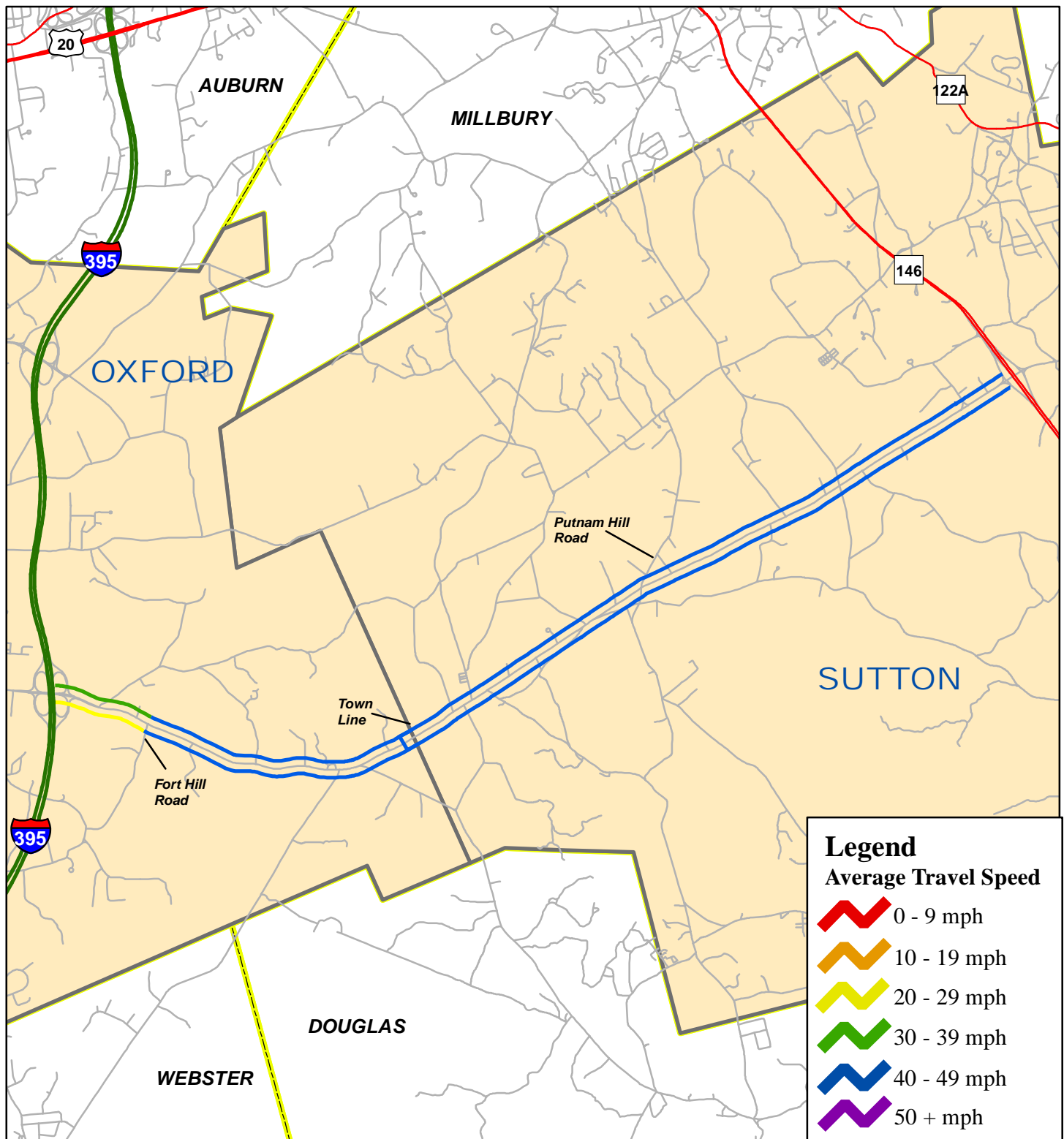
- Interstate
- State Route
- Local Roads



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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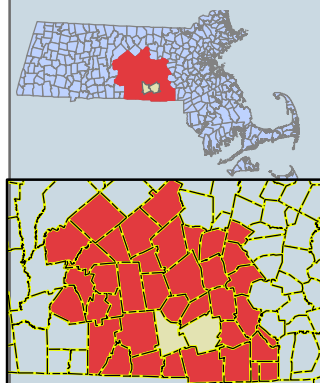
0 0.325 0.65 1.3 1.95 2.6 Miles



## SUTTON AVE & CENTRAL TNPk CORRIDOR PROFILE

PM Peak Period Average Travel Speed

Figure 12



### Legend

- Interstate
- State Route
- Local Roads



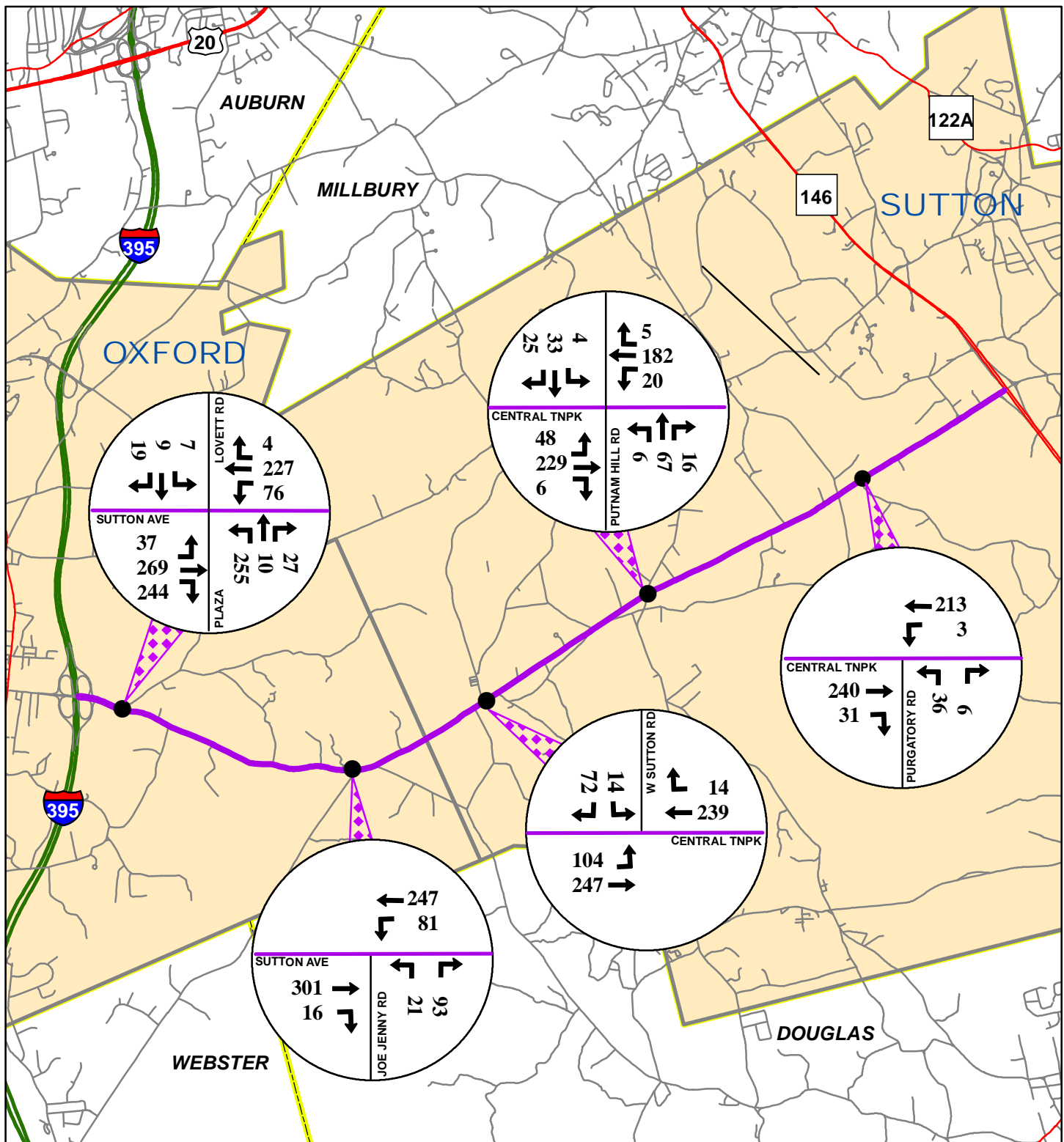
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0 0.325 0.65 1.3 1.95 2.6 Miles

### 3.3 Sutton Avenue & Central Turnpike Intersections Existing Peak Hour Traffic Volumes

CMRPC conducted Turning Movement Counts (TMCs) at five focus intersections for this Corridor Study. All counts were completed in 2021 and during peak flow months while local schools were 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) as well as natural statistical variations encountered when TMCs are conducted on different weekdays. These adjusted volumes are shown in **Figure 13** and **Figure 14** as existing AM and PM peak hour traffic flows. (All TMC datasheets are provided in the document’s Technical Appendix).



# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

Oxford & Sutton Existing Traffic Flows  
AM Peak Hour Period  
Figure 13

## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- State Numbered Routes
- Local Roads

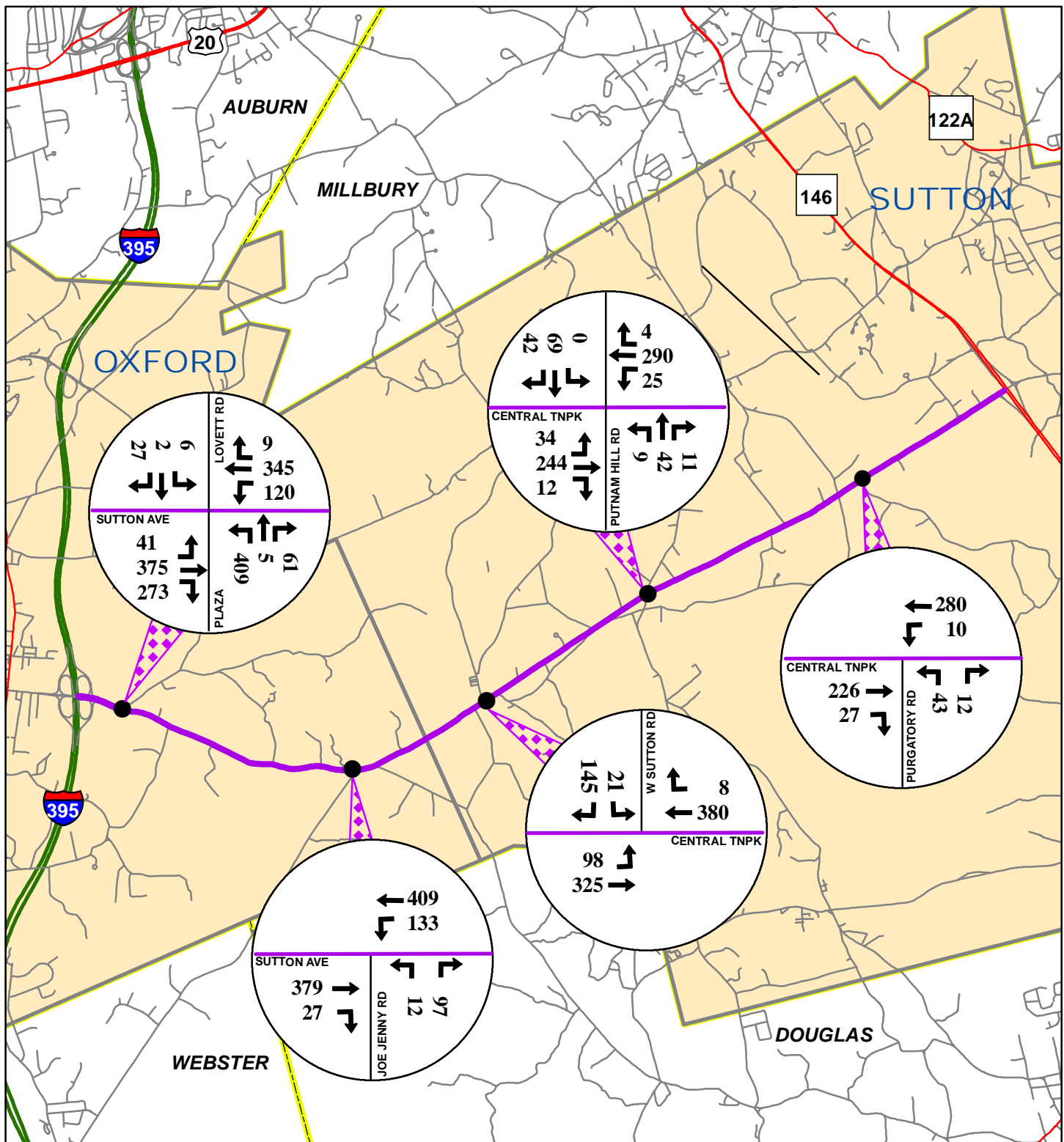


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0 0.3250.65 1.3 1.95 2.6 Miles





# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

Oxford & Sutton Existing Traffic Flows  
PM Peak Hour Period  
Figure 14

## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- State Numbered Routes
- Local 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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0 0.3250.65 1.3 1.95 2.6 Miles

### 3.4 Percentage of Heavy Vehicles Utilizing Sutton Avenue & Central Turnpike 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 often adversely affect traffic flows in two ways: 1) they are larger than passenger cars and occupy more roadway space and 2) they have inferior operating capabilities when compared to passenger cars, particularly with respect to acceleration, deceleration, and the ability to maintain speed on upgrades.

**Table 5** lists the percentage of heavy vehicles that was observed at each of the focus study intersections. The Sutton Avenue & Central Turnpike focus intersections in Oxford & Sutton average 5.8% in the morning peak hour and 1.9% during the evening peak hour. In the AM, the highest heavy vehicle percentage was at West Sutton Road with 7.3% and the lowest was at Joe Jenny Road with 3.6%. In the PM, the highest percentage was at both West Sutton Road and Putnam Hill Road with 2.4% and the lowest was at Joe Jenny Road with 1.3%. Observers in the field noted that school buses accounted for some of the heavy vehicle traffic as well.

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 prevailing 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.

**Table 5**  
**Percentage of Heavy Vehicles Utilizing Sutton Avenue & Central Turnpike**  
**Focus Intersections**

Study Intersection	Date of Count	Morning Peak Hour %	Evening Peak Hour %
Sutton Avenue/Lovett Road/Plaza	June 2021	5.6%	1.7%
Sutton Avenue/Joe Jenny Road	June 2021	3.6%	1.3%
Central Turnpike/West Sutton Road	May 2021	7.3%	2.4%
Central Turnpike/Putnam Hill Road	June 2021	6.6%	2.4%
Central Turnpike/Purgatory Road	May 2021	5.9%	1.7%
Peak Hour Averages:		5.8%	1.9%

### 3.5 Sutton Avenue & Central Turnpike Intersections Projected 2031 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 typical to estimate or “project” future traffic conditions in the study area. Transportation changes and solutions are rarely made instantly, and pertinent area circumstances can change. As such, this is an attempt to modify current levels of traffic volume to reflect what might be anticipated in ten (10) years – reasonable lead time for planning purposes.

#### 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 effort, anticipated overall growth in traffic volumes was estimated by the Model and used by staff to analyze potential future conditions.

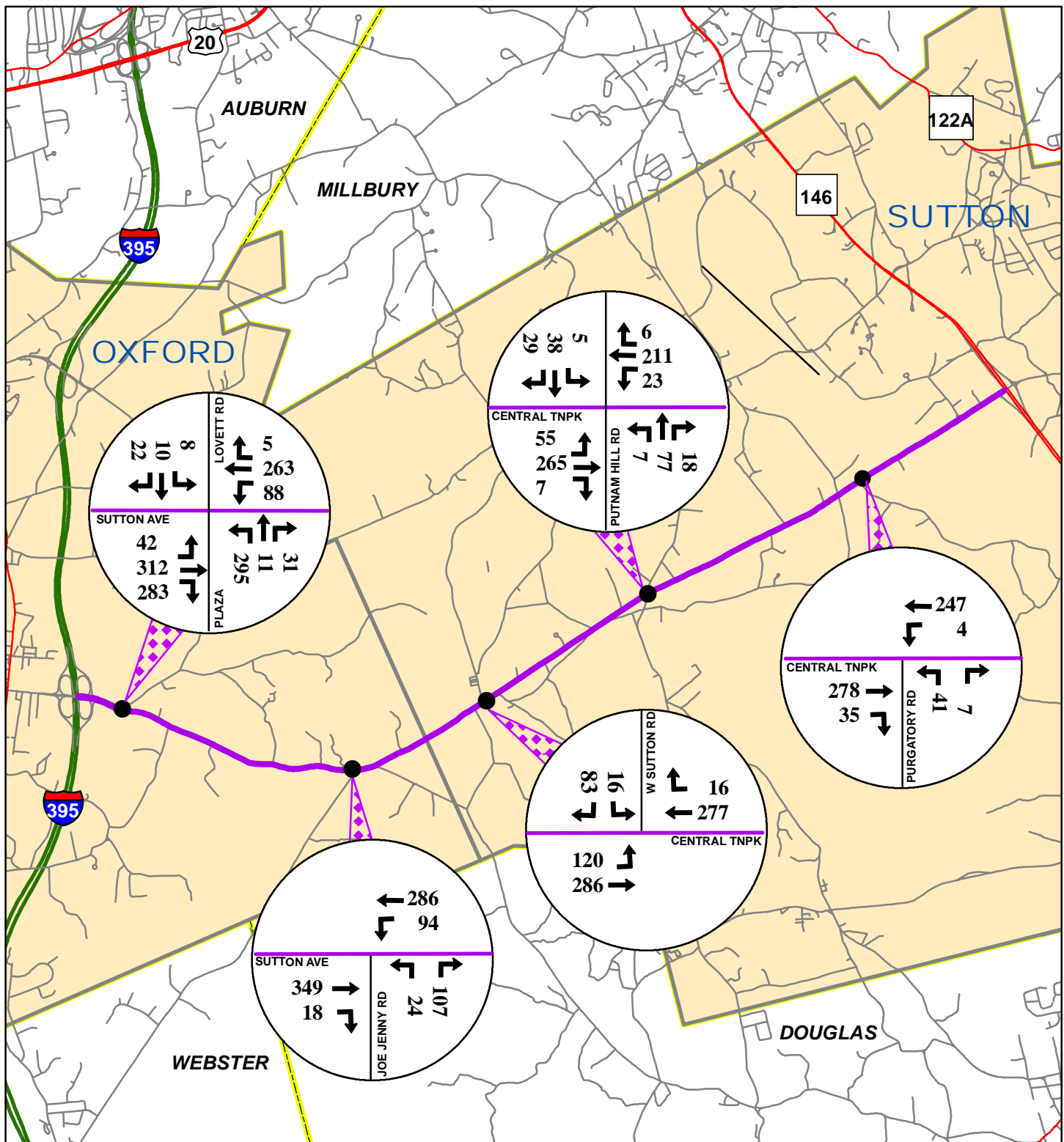
This study looks ten years into the future with estimated year 2031 projected traffic increases. This allows for an assessment of potential future year operational conditions and, if necessary, the suggestion of potential improvement options for host community consideration.

The Model currently projects approximately 1.5% per year growth over the next decade in the general Corridor Profile study area, resulting in about an overall 15% increase in Sutton Avenue & Central Turnpike traffic volumes in the 10-year period between 2021 and 2031. This percentage increase, that accounts for both known and unknown growth, was applied in order to assess potential future year conditions.

It should be mentioned that also considered in the Model analysis was a large development expected to be built at the former Aggragate Industries site, near the Route 146 & Boston Road intersection. In addition, expansion of the existing Market 32 plaza on the northbound side of Route 146 near Boston Road as well as a new distribution site at the Douglas/Sutton/Uxbridge town lines were also included in the Model analysis.

The resulting 2031 traffic flow networks for the AM and PM peak hours were then analyzed to characterize likely future operating conditions. **Figure 15** and **Figure 16** illustrate the 10-year projections of the existing volumes, again applying the calculated annual growth rate of 1.5% for the entire length of Sutton Avenue & Central Turnpike in the towns of Oxford and Sutton.





# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

Oxford & Sutton Projected 2031 Traffic Flows  
AM Peak Hour Period  
Figure 15

## Legend

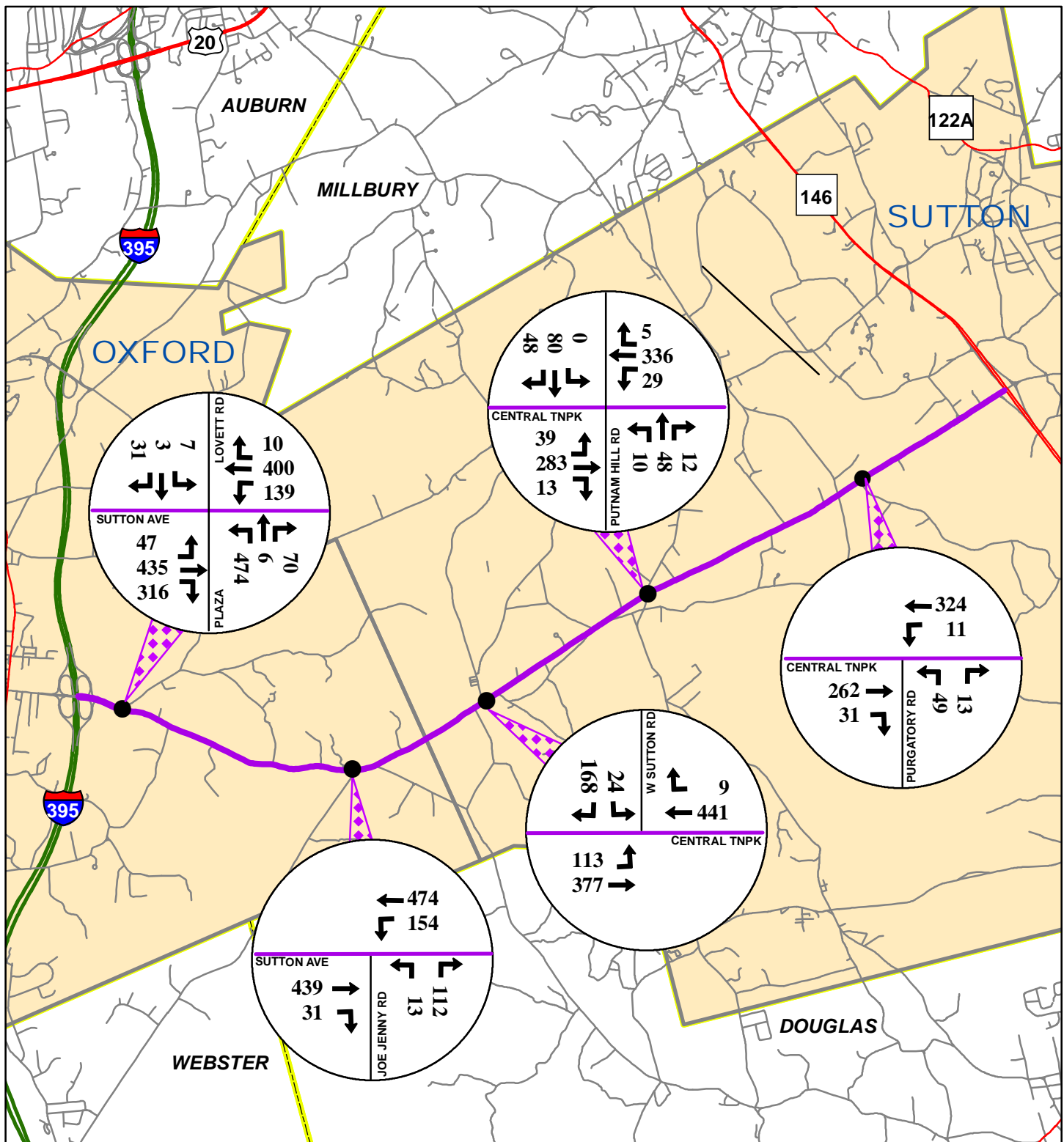
- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- State Numbered Routes
- Local Roads

0 0.3250.65 1.3 1.95 2.6 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.

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.



## SUTTON AVE & CENTRAL TNPBK CORRIDOR PROFILE

Oxford & Sutton Projected 2031 Traffic Flows  
PM Peak Hour Period  
Figure 16

### Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Interstate
- State Numbered Routes
- Local 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.

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.

0 0.3250.65 1.3 1.95 2.6 Miles

### 3.6 Sutton Avenue & Central Turnpike Intersections Peak Hour Level of Service (LOS) Analyses

Using the existing case and projected 2031 traffic increases for Sutton Avenue & Central Turnpike, a Level of Service (LOS) grade was calculated for each focus intersection. The LOS is calculated by using the *Highway Capacity Software* (HCS). The software calculates the amount of delay (in seconds) for each approach and the intersection as a whole. Using the estimated length of delay in seconds, a LOS grade between “A” and “F” is assigned. LOS “A” is indicative of free flow conditions while LOS “F” indicates highly congested conditions. **Table 6** lists both the existing and projected LOS for the Sutton Avenue & Central Turnpike focus intersections. (The complete LOS worksheets are provided in the document’s Technical Appendix). The following notable trends were observed:

- There are five study intersections in the Sutton Avenue & Central Turnpike Corridor Profile. One is signalized and the other four are “Stop” sign controlled.
- Lovett Road/Oxford Crossing Plaza in Oxford is the only signalized intersection and it has a LOS “D” for both the AM and PM under existing conditions. Delays under the future projected conditions are likely to be worse.
- All four of the “Stop” sign-controlled intersections have less than 18 seconds of delay under both existing and future projected conditions.
- Joe Jenny Road is the other focus intersection in Oxford. For existing conditions, it operates at a LOS “B” in the AM and LOS “C” in the PM. Delays are slightly worse under projected 2031 conditions.
- The three focus intersections in Sutton include West Sutton Road, Putnam Hill Road, and Purgatory Road. All three have minimal delays under both existing and projected future conditions. All three intersections have a LOS of either “B” or “C”.

**TABLE 6**  
**Intersection Level Of Service (LOS) Analyses Results:**  
**Existing Conditions & Projected 2031 Conditions**

COMMUNITY	SUTTON AVE/CENTRAL TNPK INTERSECTION	NETWORK											
		Existing Balanced						2031 Projected					
		AM			PM			AM			PM		
		V/C <sup>1</sup>	Delay <sup>2</sup>	LOS	V/C <sup>1</sup>	Delay <sup>2</sup>	LOS	V/C <sup>1</sup>	Delay <sup>2</sup>	LOS	V/C <sup>1</sup>	Delay <sup>2</sup>	LOS
	SIGNALIZED	Overall Intersection Operations											
Oxford	Sutton Avenue/Lovett Road/Plaza	0.94	39	D	1.02	53	D	1.09	50	D	1.18	75	E
	UNSIGNALIZED <sup>3</sup>	Minor Street Approaches under "Stop" Sign Control											
Oxford	Sutton Avenue/Joe Jenny Road	0.20	13	B	0.26	15	C	0.26	14	B	0.34	18	C
	Central Turnpike/West Sutton Road	0.15	12	B	0.30	14	B	0.19	13	B	0.42	18	C
Sutton	Central Turnpike/Putnam Hill Road	n/a	10	B	n/a	12	B	n/a	11	B	n/a	14	B
	Central Turnpike/Purgatory Road	0.09	12	B	0.12	13	B	0.11	13	B	0.15	14	B

1) V(volume)/C(capacity) is for worst lane group; C is maximum flow under prevailing conditions

2) Delay in seconds

3) Delay and LOS are for minor street approach

### 3.7 Performance Management

The Performance Measures related to the Congestion Management Process (CMP) is the federal rule of System Performance & Air Quality (PM3) and the regionally-customized measure of Economic Vitality which deals with freight reliability. The goal of the System Performance & Air Quality (PM3) measure is to achieve a significant reduction in congestion on the National Highway System (NHS). This rule has five measures that are linked to reliability, congestion and emissions. The CMMPO has in fact long supported the five statewide targets in regards to Level of Travel Time Reliability (LOTTR), Level of Truck Travel Time Reliability (TTTR), Percentage of Non-Single Occupancy Vehicle (SOV) Travel, Peak Hour Excessive Delay (PHED), and Total Reduction of On-Road Mobile Source Emissions. As for the Economic Vitality measure, it also deals with accessibility to jobs in the region and the reliability of freight movement.

1. **System Performance & Air Quality (PM3):** As for the measure of LOTTR, neither Sutton Avenue or Central Turnpike are considered part of the NHS so any improvements to travel time reliability would not affect this performance measure. However, when viewed as an important federal-aid eligible highway link in this planning subregion, improvements would be considered beneficial.

The TTTR target only pertains to the Interstate System so improvements on Sutton Avenue & Central Turnpike will not affect this measure, but could improve truck travel times. A significant number of heavy vehicles have been observed to use the study corridor as an east/west connector route between Interstate 395 and Route 146. Based on 24-hour traffic volumes, between 7% and 15% heavy vehicles are using the study corridor on a daily basis.

For the non-SOV travel measure, creating other travel options (e.g. carpool, public transit, walking, bicycling, or telecommuting) through the Complete Streets program or public outreach and awareness would in fact help contribute towards reaching the target.

For the PHED measure, any improvements to Sutton Avenue & Central Turnpike made in regards to the above measures that would help reduce delays would also contribute positively towards this statewide target.

The Reduction of Emissions measure is related to Congestion Mitigation & Air Quality (CMAQ) projects where such TIP projects are intended to reduce emissions. Examples of these types of projects include intersection improvements, bicycle & pedestrian improvements, and new transit services or buses. The calculation is done for all CMAQ projects located in municipalities classified as air quality maintenance areas or non-attainment areas. Since neither Oxford nor Sutton are considered one of these such

areas, any CMAQ projects along the study corridor would not affect the emissions reduction measure.

2. **Economic Vitality:** This measure is used to improve accessibility to jobs in the region. The reliability of freight movement is also important. Since Sutton Avenue & Central Turnpike appear to accommodate a significant number of daily trucks between Interstate 395 and Route 146, roadway improvements would help freight movement as well as passenger vehicles and the bicycling & walking modes.

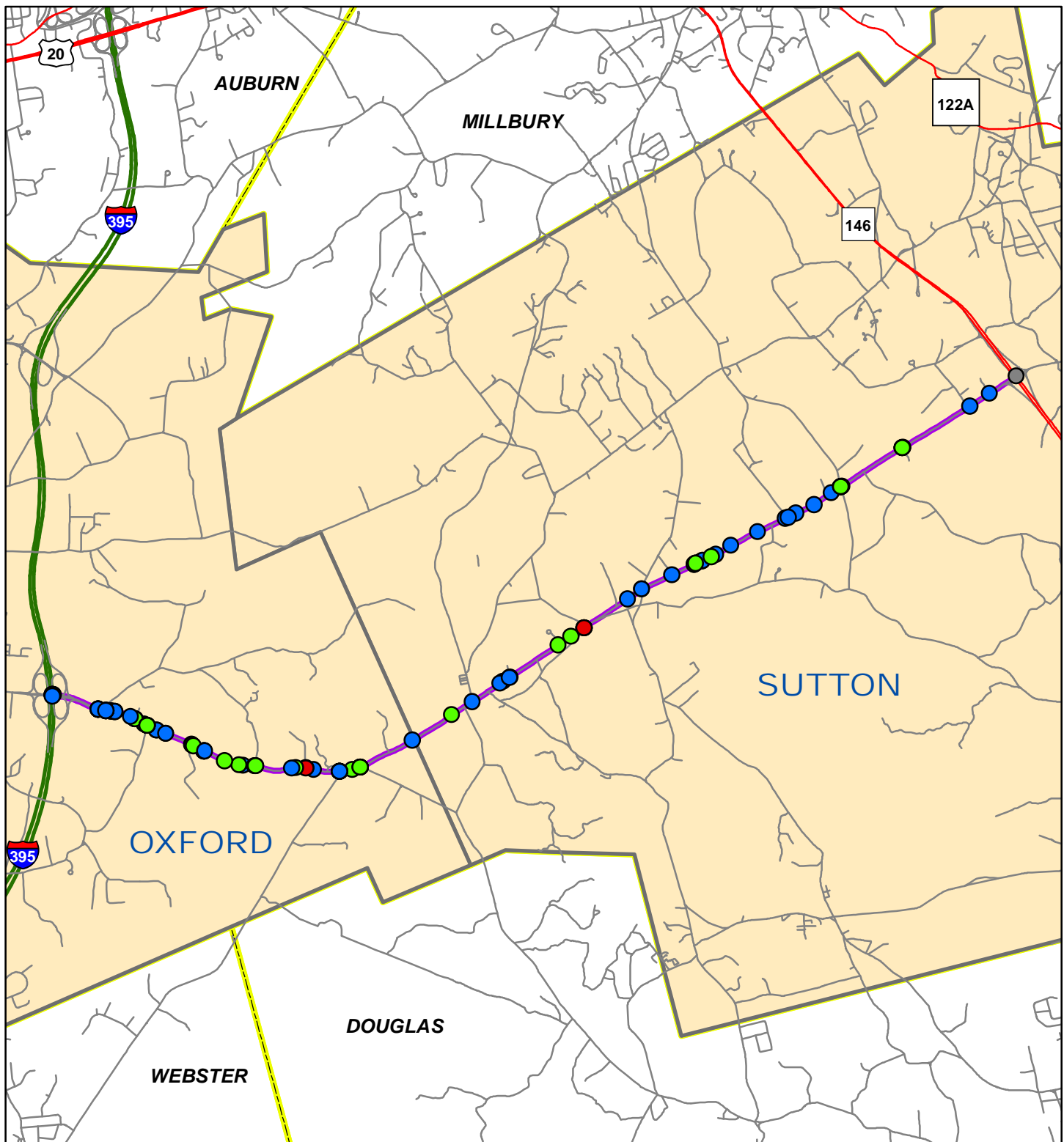


## 4.0 Safety Management System (SMS)

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For this Corridor Profile, CMRPC staff obtained crash data from the Massachusetts Department of Transportation (MassDOT). The crash information used for this Corridor Profile is from the three-year period from 2018 to 2020. This chapter will discuss the results of this data analysis for the communities of Oxford and Sutton.

**Figure 17** shows the location of the crashes that occurred on the Sutton Avenue & Central Turnpike corridor in Oxford and Sutton between 2018 and 2020. The colored dots on the map indicate whether an incident was a fatal injury, non-fatal injury, or property damage-only type crash. 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 map, if any. To be HSIP eligible, the clusters need to be within the top 5% worst documented locations statewide. 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 by the Registry of Motor Vehicles (RMV) branch by geographical location using Geographic Information System (GIS) tools and procedures resulting in vehicle crash clusters, bicycle clusters and pedestrian clusters. As the map shows, there are currently no crash clusters along the study corridor.



# SUTTON AVE & CENTRAL TNPBK CORRIDOR PROFILE

Oxford & Sutton Crash Data

Figure 17

## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- Fatal (2)
- Non-Fatal Injury (33)
- Property Damage (77)
- Unknown (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.

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.

0 0.325 0.65 1.3 1.95 2.6 Miles

#### 4.1 Town of Oxford Crash Analysis

For the town of Oxford, vehicle crash records were analyzed for the three-year period 2018 - 2020. All crashes along Sutton Avenue from Interstate 395 to the Sutton town line were tabulated. Also, incidents on minor streets that were close to or at Sutton Avenue were also included. All important information from the crash reports was summarized and included in the various tables that follow.

There was a total of 66 reported study area crashes in the town of Oxford within the three-year period. **Table 7** shows a summary of the crashes in which the details are shown in a variety of ways. Property damage-only crashes accounted for 58% of the total, while non-fatal injuries accounted for 38%. There was also one fatality during the analysis period. Single vehicle crashes were the most prevalent with a total of 26, with rear-ends the next highest with a total of 22. The two intersections with the most crashes were Lovett Road and Joe Jenny Road. Often the case, most crashes occurred on dry road conditions, in daylight, and in clear weather. The highest number of crashes occurred between 4 PM and 6 PM and the most crashes occurred during the months of January and November.

**Table 7**  
**Summary of Reported Crashes**  
**On Sutton Avenue Corridor in the Town of Oxford**  
**January 1, 2018 - December 31, 2020**

Crash Severity		
	Number	Percent
Property Damage Only	38	57.6%
Non-Fatal Injury	25	37.9%
Fatal Injury	1	1.5%
Unknown	2	3.0%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

Manner of Collision		
	Number	Percent
Angle	10	15.2%
Rear-end	22	33.3%
Head On	2	3.0%
Sideswipe, opposity direction	1	1.5%
Sideswipe, same direction	5	7.6%
Single vehicle crash	26	39.4%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

Type of Collision		
	Number	Percent
Collision with a motor vehicle in traffic	41	62.1%
Collision with animal	7	10.6%
Collision with ditch, embankment or guardrail	5	7.6%
Collision with fixed object	10	15.2%
Other	3	4.5%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

Locations with the highest number of crashes	
	Number
Sutton Avenue / Lovett Road / Plaza	12
Sutton Avenue / Joe Jenny Road	13
Sutton Avenue / Fort Hill Road	6

Road Surface Condition		
	Number	Percent
Dry	43	65.2%
Wet	11	16.7%
Ice	6	9.1%
Snow	6	9.1%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

Time of Day		
	Number	Percent
Before 7 AM	7	10.6%
7 AM - 10 AM	8	12.1%
10 AM - 12 PM	9	13.6%
12 PM - 4 PM	15	22.7%
4 PM - 6 PM	16	24.2%
6 PM - 9 PM	4	6.1%
After 9 PM	7	10.6%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

Light Conditions		
	Number	Percent
Daylight	48	72.7%
Dark	16	24.2%
Dusk	2	3.0%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

Weather Conditions		
	Number	Percent
Clear	45	68.2%
Rain	8	12.1%
Cloudy	6	9.1%
Snow	7	10.6%
<b>Total</b>	<b>66</b>	<b>100.0%</b>

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

**Table 8** shows the collision type by study area location in the town of Oxford. The table lists the total crashes at each intersection and at other Sutton Avenue locations (non-intersection crashes) and what type of crash occurred. There were 31 non-intersection crashes and 35 intersection crashes. There were 10 angle crashes along the study corridor with the majority of these crashes occurring at intersection locations. One potential reason for the number of angle crashes along Sutton Avenue is the high volume of left turning vehicles, whether turning in/out of a business or turning in/out of a minor street or driveway. Drivers often underestimate the speed and distance of oncoming vehicles (or become impatient when insufficient safe gaps occur) and turn in front of the oncoming vehicles, leaving them very little time to stop. Single vehicle crashes were the most prevalent type of crash with a total of 26. Single vehicle crashes normally happen when a vehicle hits a fixed object along the roadway such as a guardrail, tree or utility pole. Also, a number of deer were hit and also included in this category. Rear ends were the second highest type of crash with a total of 22. Rear ends often occur during congested roadway conditions and from driver inattention. Roadway surface conditions can also be a factor. Additionally, there were also six sideswipes as well as two head-on crashes.

**Table 8**  
**Collision Type by Location in Oxford, 2018-2020**

Location	Total	Type				
		Angle	Rear-End	Sideswipe	Head-On	Single Vehicle Crash
Sutton Avenue / Lovett Road	12	3	3	3	1	2
Sutton Avenue / Fort Hill Road	6	-	4	-		2
Sutton Avenue / Orchard Hill Drive	1	-	-	-	-	1
Sutton Avenue / Sacarrappa Road	2	-	1	-	-	1
Sutton Avenue / Turk Hollow Road	1	-	-	-	-	1
Sutton Avenue / Joe Jenny Road	7	3	2	-	-	2
Sutton Avenue / Douglas Road	6	1	1	-	-	4
Other Sutton Avenue Locations	31	3	11	3	1	13
<b>Total</b>	<b>66</b>	<b>10</b>	<b>22</b>	<b>6</b>	<b>2</b>	<b>26</b>

**Table 9** below shows the types of collisions that occurred and the severity. The majority of crashes caused property damage only. Single vehicle crashes caused the most property damage with a total of 15 and rear-end crashes were second with a total of 11. Of the 25 crashes that caused a non-fatal injury, most of them were rear-end and single vehicle crashes. Additionally, there was one, single vehicle, fatal injury crash along the study corridor during the study period.

**Table 9**  
**Oxford Crashes by Severity and Type of Collision, 2018-2020**

Type of Collision	Severity			
	Fatal Injury	Non-Fatal Injury	Property Damage Only	Unknown
Angle	-	2	8	-
Rear-end	-	11	11	-
Sideswipe	-	2	3	1
Head-on	-	1	1	-
Single vehicle crash	1	9	15	1
<b>Total Number of Crashes</b>	<b>1</b>	<b>25</b>	<b>38</b>	<b>2</b>



## 4.2 Town of Sutton Crash Analysis

For the town of Sutton, vehicle crash records were also analyzed for the three-year period 2018 - 2020. All crashes along Central Turnpike from the Oxford town line to Route 146 were tabulated. Also, incidents on minor streets that were close to or at Central Turnpike were also included. All important information from the crash reports was summarized and included in the various tables that follow.

There was a total of 49 reported study area crashes in the town of Sutton during the three-year period. **Table 10** shows the summary details of the reported crashes. Property damage-only crashes accounted for 80% of the total, while non-fatal injuries accounted for 16%. There was also one fatality and one crash with an unknown severity. Single vehicle crashes were the most prevalent with a total of 31. The intersection with the most crashes was at Central Turnpike and Uxbridge Road with a total of nine. Often the case, most crashes occurred on dry road conditions, in daylight, and in clear weather. The highest number of crashes occurred between 12 PM and 4 PM and the most crashes occurred during the months of July and December.

**Table 10**  
**Summary of Reported Crashes**  
**On Central Turnpike Corridor in the Town of Sutton**  
**January 1, 2018 - December 31, 2020**

Crash Severity		
	Number	Percent
Property Damage Only	39	79.6%
Non-Fatal Injury	8	16.3%
Fatal Injury	1	2.0%
Unkown	1	2.0%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Manner of Collision		
	Number	Percent
Angle	9	18.4%
Rear-end	6	12.2%
Head-on	2	4.1%
Single vehicle crash	31	63.3%
Unknown	1	2.0%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Type of Collision		
	Number	Percent
Collision with a motor vehicle in traffic	17	34.7%
Collision with animal - deer	16	32.7%
Collision with fixed object	7	14.3%
Collision with ditch, embankment or guardrail	8	16.3%
Unknown	1	2.0%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Locations with the highest number of crashes	
	Number
Central Turnpike / Uxbridge Road	9
Central Turnpike / Alana Drive	5
Central Turnpike / Mendon Road	3

Road Surface Condition		
	Number	Percent
Dry	36	73.5%
Wet	6	12.2%
Snow/Ice	6	12.2%
Unknown	1	2.0%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Time of Day		
	Number	Percent
Before 7 AM	6	12.2%
7 AM - 10 AM	6	12.2%
10 AM - 12 PM	5	10.2%
12 PM - 4 PM	14	28.6%
4 PM - 6 PM	7	14.3%
6 PM - 9 PM	8	16.3%
After 9 PM	3	6.1%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Light Conditions		
	Number	Percent
Daylight	28	57.1%
Dark	17	34.7%
Dawn/Dusk	3	6.1%
Unknown	1	2.0%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Weather Conditions		
	Number	Percent
Clear	32	65.3%
Cloudy	5	10.2%
Rain	4	8.2%
Snow	7	14.3%
Unknown	1	2.0%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

Month of the Year		
	Number	Percent
January	4	8.2%
February	4	8.2%
March	4	8.2%
April	4	8.2%
May	3	6.1%
June	3	6.1%
July	6	12.2%
August	4	8.2%
September	2	4.1%
October	5	10.2%
November	3	6.1%
December	7	14.3%
<b>Total</b>	<b>49</b>	<b>100.0%</b>

**Table 11** shows the collision type by study area location in the town of Sutton. The table lists the total crashes at each intersection and what type of crash occurred. There were 24 crashes at intersections and 25 roadway segment crashes. Single vehicle crashes had the highest amount with a total of 31. Single vehicle crashes normally happen when a vehicle hits a fixed object along the roadway such as a guardrail, tree or utility pole. Also, a number of deer were hit and included in this category. Lastly, there were nine angle crashes, six rear-end crashes, two head-on crashes, and one unknow crash.

**Table 11**  
**Collision Type by Location in Sutton, 2018-2020**

Location	Total	Type				
		Angle	Rear-End	Head-On	Single Vehicle Crash	Unknown
Central Turnpike / West Sutton Road	1	1	-	-	-	-
Central Turnpike / Old Common Road	1	-	-	-	1	-
Central Turnpike / Glen Court	1	-	-	-	1	-
Central Turnpike / Mendon Road	3	-	-	-	2	1
Central Turnpike / Putnam Hill Road	2	-	1	-	1	-
Central Turnpike / Uxbridge Road	9	6	-	2	1	-
Central Turnpike / Alana Drive	5	1	1	-	3	-
Central Turnpike / Burnap Road	1	-	-	-	1	-
Central Turnpike / Silver Ledge Road	1	-	-	-	1	-
Other Central Turnpike Locations	25	1	4	-	20	-
<b>Total</b>	<b>49</b>	<b>9</b>	<b>6</b>	<b>2</b>	<b>31</b>	<b>1</b>

**Table 12** below shows the types of collisions that occurred and the severity. The majority of the crashes caused property damage only and there was one fatal injury. Single vehicle crashes caused the most property damage with a total of 26. Additionally, there were eight non-fatal injury crashes which occurred from four single vehicle crashes, three angle crashes and one rear-end crash. Lastly, there was one single vehicle crash with an unknown severity.

**Table 12**  
**Sutton Crashes by Severity and Type of Collision, 2018-2020**

Type of Collision	Severity			
	Fatal Injury	Non-Fatal Injury	Property Damage Only	Unknown
Angle	-	3	6	-
Rear-end	-	1	5	-
Head-on	-	-	2	-
Single vehicle crash	-	4	26	1
Unknown	1	-	-	-
<b>Total Number of Crashes</b>	<b>1</b>	<b>8</b>	<b>39</b>	<b>1</b>

### 4.3 Performance Management

There are two Performance Measures related to this chapter. The first is Safety, the goal of which is to reduce the number and rate of fatal and serious injury crashes in the region for all types of vehicles. Non-motorized fatalities and serious injuries are also included. The second measure is Security, where the goal is to enhance the transportation security coordination and preparedness regionwide.

1. **Safety:** In 2021, the CMMPO chose to adopt the statewide Safety Performance Measure targets set by MassDOT for calendar year 2021. The objectives of the safety performance measures are to reduce the total number of fatalities, rate of fatalities per 100 million vehicle miles traveled (VMT), total number of serious injuries, rate of serious injuries per 100 million VMT, and the total number of combined serious injuries and fatalities for non-motorized modes. Currently, all five safety measures are showing a decrease in statewide trends.

In all safety categories, MassDOT has established a long-term target towards “Zero Deaths” and will establish safety targets for the CMMPO to consider for future adoption each calendar year. In regards to the Sutton Avenue & Central Turnpike study corridor, any suggested safety improvements to reduce crashes would potentially help in reaching the safety targets set forth by MassDOT.

2. **Security:** The objective of this measure is to enhance transportation security coordination and preparedness regionwide. One way to measure this is to identify the primary highway evacuation routes in the region. Accordingly, in a previous joint effort between the CMRPC and the Montachusett Regional Planning Commission (MRPC), a Central Region Homeland Security Evacuation Plan was completed in 2013. In this evacuation plan, numerous roadways within the central region were designated as either “primary” or “secondary” evacuation routes. Sutton Avenue & Central Turnpike were both designated as primary evacuation routes so it is critical for this roadway to continue to be both safe and secure.

Another Security goal is for all communities in the CMRPC planning region to have a Hazard Mitigation Plan and/or Municipal Vulnerability Plan (MVP). These plans identify vulnerable or hazardous locations within the community. Staff has worked with both the towns of Oxford and Sutton to develop their respective plans. Oxford’s MVP was approved in 2021 and it noted potential flooding near Turk Hollow Road. Sutton’s MVP was approved in 2017 and indicated that assessing & replacing locally-maintained culverts was a top priority.



## 5.0 Pavement Management System (PMS)

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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 observed pavement distress.

For this Corridor Profile, pavement distress information was collected for Sutton Avenue and Central Turnpike in the towns of Oxford and Sutton between Interstate 395 and Route 146. The pavement data was collected by conducting “windshield surveys.” A team of two CMRPC representatives inspected Sutton Avenue and Central Turnpike, 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

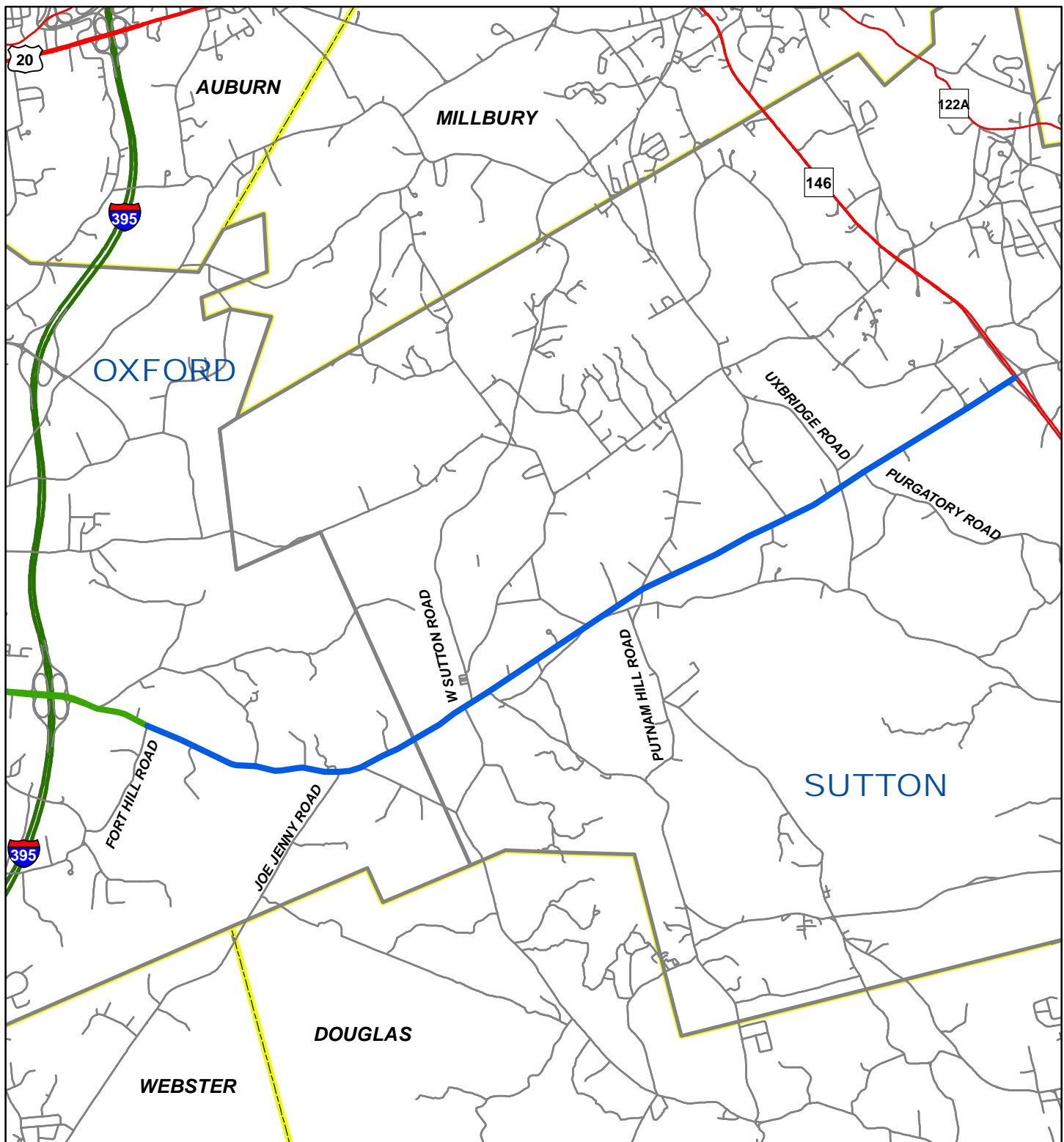
Based on the observed distresses, an Overall Condition Index (OCI) was calculated for each surveyed roadway segment. The OCI is used to rate each segment on a scale of 0 to 100. An OCI of 100 indicates optimal pavement conditions, usually a newly paved roadway segment. Conversely, a score of 0 indicates 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.

*Cartegraph's* 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.

Each Recommended Action category has an associated cost, which includes the design, materials, and labor to complete such action. *Cartegraph* produced OCI Recommended Action categories suggest the type of remedial improvements necessary to bring a road segment to “Excellent” condition. 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 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 prudent to conduct “Routine Maintenance” on a roadway in order to prevent the deterioration of the pavement.

**Figure 18** displays the current pavement condition for Sutton Avenue and Central Turnpike represented by Overall Condition Index (OCI) Recommended Action. Again, *Cartegraph* produced OCI Recommended Action categories suggest the type of action necessary to bring a given roadway segment to “Excellent” condition.



# SUTTON AVE & CENTRAL TNPk CORRIDOR PROFILE

Oxford & Sutton Pavement Condition

Figure 18

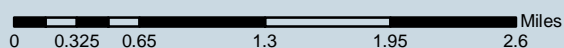
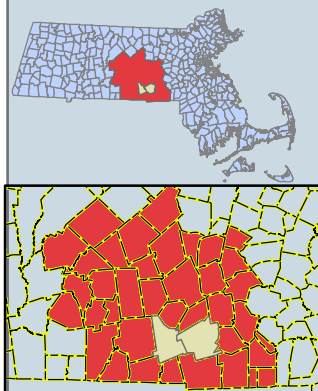
## Legend

- |             |        |
|-------------|--------|
| — Excellent | — Good |
| — Fair      | — Poor |
| — Very 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.



## 5.1 Town of Oxford Overall Condition Index (OCI)

The most recent pavement data for Sutton Avenue in Oxford was collected in September 2022. **Figure 18** shows that Sutton Avenue is either in good or excellent condition for the study corridor. **Table 13** shows each roadway segment, segment length, as well as the suggested plan activity for the segment to reach excellent condition. Starting at Interstate 395, the first two segments have a good rating. Distresses include low extent of surface wear, longitudinal transverse cracking, bleeding, rutting, and distortions. The severity of the distresses was either low or moderate. The next segment between Fort Hill Road and Sacarrappa Road was repaved after staff originally analyzed the pavement for this effort in 2021. The segment is in excellent condition with only low alligator cracking and distortions. The segment between Sacarrappa Road and Joe Jenny Road is also newly paved. There is a small portion of this segment that wasn't repaved and includes low alligator cracking and moderate rutting. Overall, this segment is in excellent condition. A portion of the last segment between Joe Jenny Road and the Sutton Town Line is newly paved. Crack sealant was also applied to the cracks in the older pavement. Distresses include moderate rutting and low alligator cracking.

**Table 13**  
**Oxford Sutton Avenue Pavement Analysis Recommendations**

Street	From	To	Length	Plan Activity	OCI
Sutton Avenue	I-395	Lovett Rd	0.33 mi	Routine Maintenance	76.8
Sutton Ave	Lovett Rd	Fort Hill Rd	0.37 mi	Routine Maintenance	80.4
Sutton Ave	Fort Hill Rd	Sacarrappa Rd	0.82 mi	Do Nothing	90.4
Sutton Ave	Sacarrappa Rd	Joe Jenny Rd	0.60 mi	Do Nothing	90.8
Sutton Ave	Joe Jenny Rd	Sutton TL	0.58 mi	Do Nothing	95.2

## 5.2 Town of Sutton Overall Condition Index (OCI)

The most recent pavement data for Central Turnpike in Sutton was also collected in September 2022. **Figure 18** shows Central Turnpike pavement in excellent condition for the entire study corridor. **Table 14** shows each roadway segment, segment length, and the suggested plan activity needed for the segment to reach excellent condition. The first two segments between the Oxford Town Line and Century Farm Road are newly paved and in excellent condition. The next segment between Century Farm Road and Ray Lane is also in excellent condition. There is a small section of pavement near Putnam Hill Road that contains high distresses of shoving and corrugations. The next three segments between Ray Lane and Burnap Road were similarly observed to be in excellent condition and exhibited minimal distresses. The last segment was

mostly new pavement except just prior to Route 146. This segment was also rated as excellent. The portion of the segment with the older pavement is MassDOT maintained contained and has low potholes and alligator cracking as well as moderate longitudinal transverse cracking and raveling.

**Table 14**  
**Sutton Central Turnpike Pavement Analysis Recommendations**

Street	From	To	Length	Plan Activity	OCI
Central Tnpk	Oxford TL	Manchaug Rd	0.77 mi	Do Nothing	100.0
Central Tnpk	Manchaug Rd	Century Farm Rd	0.83 mi	Do Nothing	100.0
Central Tnpk	Century Farm Rd	Ray Ln	0.71 mi	Do Nothing	98.4
Central Tnpk	Ray Ln	Fuller Rd	0.78 mi	Do Nothing	95.2
Central Tnpk	Fuller Rd	Purgatory Rd	0.75 mi	Do Nothing	91.2
Central Tnpk	Purgatory Rd	Burnap Rd	0.86 mi	Do Nothing	91.2
Central Tnpk	Burnap Rd	Route 146	0.40 mi	Do Nothing	95.2

### 5.3 Performance Management

In regards to pavement, the Performance Measure is from the FHWA State of Good Repair (PM2) rule which is to increase the percentage of non-Interstate NHS roadways in good condition greater than 30% and decrease the percentage of roadways in poor condition to less than 30%. PM2 also pertains to Interstate highways, but for this Corridor Profile the non-Interstate performance targets are only considered since Sutton Avenue & Central Turnpike is a non-Interstate highway.

Currently, there are no segments of Sutton Avenue & Central Turnpike that have been determined to be in poor or very poor condition. By maintaining the study corridor, it will help prevent the roadway from continually degrading at different severities over time.

## 6.0 Bridges

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### 6.1 Statewide Bridge Management System

MassDOT has a Bridge Inspection Management System (BIMS) that inventories the location and available inspection data for bridges in accordance with the National Bridge Inventory (NBI). The NBI is a national database maintained by the Federal Highway Administration (FHWA) that contains the type, condition, and inspection data for any bridge over 20 feet in length. As part of this program, these bridges are inspected on a biannual basis. The condition of bridges is evaluated in four major categories (deck, superstructure, substructure, and culvert) and ranked on a scale of 0-9. If any of these categories receive a ranking of 4 or less, they are considered “Structurally Deficient” (SD), meaning there is a need for further monitoring and/or repair. To date, complete inspections are only available for all NBI bridges in Massachusetts, however inspection and inventory efforts are currently underway for all short span bridges and culverts in Massachusetts.

### 6.2 MassDOT Municipal Small Bridge Program

The MassDOT Municipal Small Bridge Program provides financial support to cities and towns for small bridge replacement, preservation and rehabilitation projects. Originally, it began as a five-year program (2017-2021) to assist cities and towns to replace or preserve bridges with spans between 10 feet and 20 feet. Each participating municipality could qualify for up to \$500,000 per year. These small bridges are not eligible for federal-aid under existing programs. The communities must complete an application with a preliminary cost estimate that includes design costs and an amount for contingencies (suggested 15%). Additional items that are needed include photographs, a description of the structure which includes date of construction/reconstruction and structure type, repair history, summary of known problems, and a discussion of proposed work. At this time, this program is expected to continue at least into fiscal year 2022. Additional information about the program can be found on the MassDOT website at the following link <https://www.mass.gov/municipal-small-bridge-program>.



### 6.3 Sutton Avenue & Central Turnpike Corridor Profile Bridges

Within the Corridor Profile study area there are two bridges owned by MassDOT. Both of these bridges have spans greater than 20 feet. Since these bridges are categorized as National Bridge Inventory (NBI) structures, inspections are completed by MassDOT on a biannual basis. **Table 15** provides some details about these two bridges.

**Table 15**  
**Sutton Avenue & Central Turnpike Bridges**

Host Community	MassDOT Bridge #	Facility Name (Over)	Facility Name (Under)	Year Built/ or Rebuilt	Structurally Deficient
Oxford	O-06-035	Sutton Avenue	Interstate 395	1973	No
Sutton	S-33-014	Central Turnpike	Route 146	1982	No

### 6.4 Performance Management

The Performance Measure related to this chapter is from the FHWA State of Good Repair (PM2) rule which is to maintain at least 16% of NHS bridges by deck area in good condition and have less than 12% of NHS bridges by deck area in poor condition. Since both of the above listed bridges are still in adequate condition and not considered Structurally Deficient, they would be included in the data set for this federal performance measure.

## 7.0 Public Transit (Public and Private Transportation)

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### 7.1 Regional and Profile Study Area Services

#### Worcester Regional Transit Authority

The Worcester Regional Transit Authority (WRTA) provides transit service for the City of Worcester and 36 additional communities within the Central Massachusetts area. Fixed-route service is provided within thirteen (13) communities, and flexible Community Shuttle service is available in six (6) communities. **Figure 19** shows the current fixed-route system map around the study area.

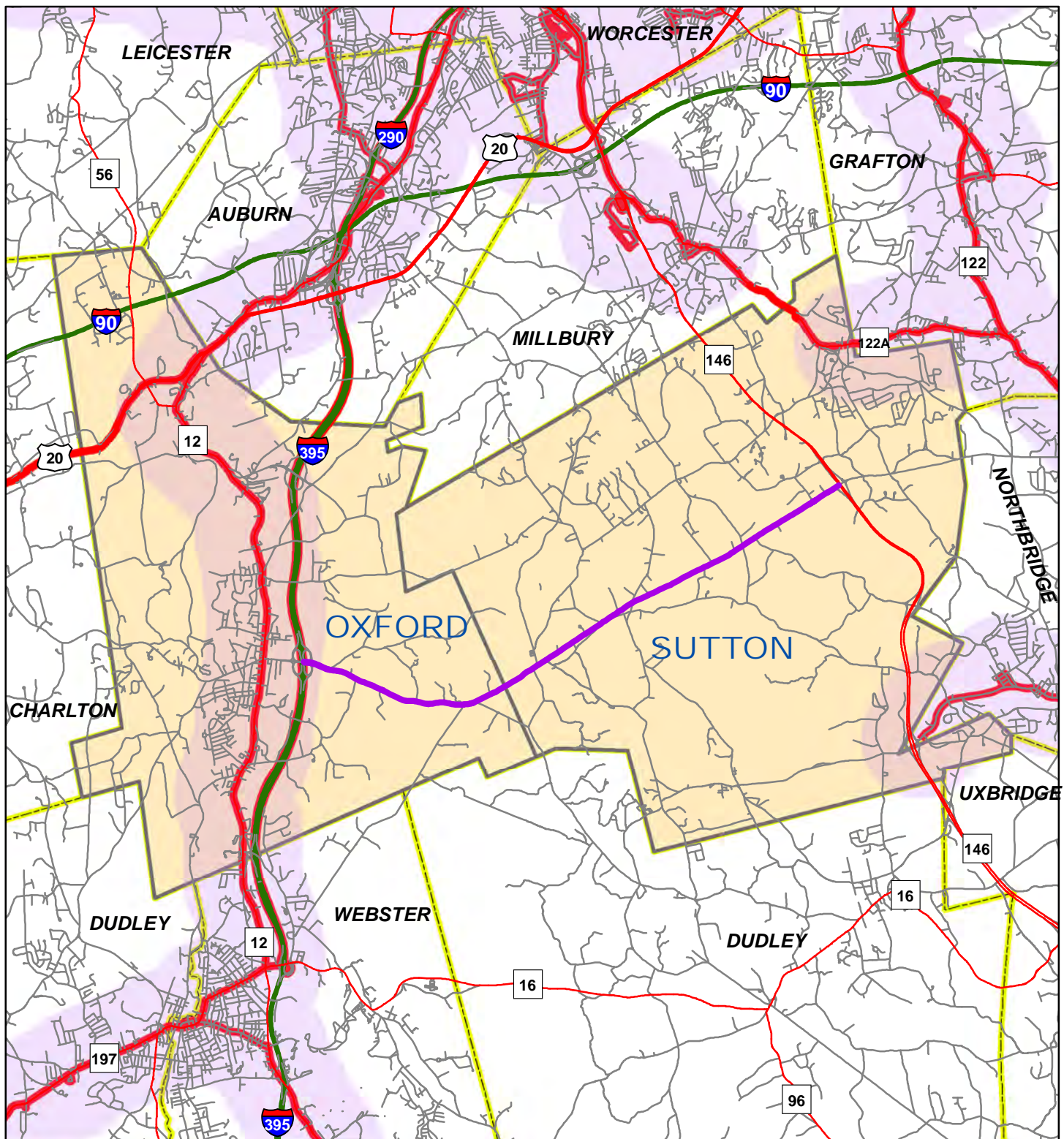
Paratransit service is available to eligible individuals, including Americans with Disabilities Act (ADA) complementary paratransit service. ADA paratransit services operate within a 3/4 mile “buffer” surrounding the fixed-route service and is available during the corresponding fixed-route schedule. 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.

#### Ridesharing/Transportation Network Companies (TNCs)

In Massachusetts, rideshare companies such as Uber and Lyft are referred to as Transportation Network Companies (TNCs). Generally, ridesharing is commonly provided as a curb-to-curb on-demand ride service. Customers can order a ride through various providers using either a smartphone application or other online service. In turn, the operator provides the trip in a privately-owned vehicle. In Central Massachusetts, TNC services are available through both Uber and Lyft.

#### Taxicab and Other Providers

Additionally, Yellow Cab and Red Cab taxicab companies also provide public transportation opportunities within the area. Further, other specialized transportation services are available to eligible individuals within the area, as discussed below.



# SUTTON AVE & CENTRAL TNPK CORRIDOR PROFILE

WRTA Fixed-Route System

Figure 19

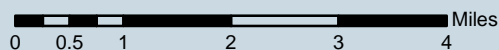
## Legend

- Sutton Ave & Central Tnpk Corridor Profile
- 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 Town of Oxford

### Existing WRTA Services

Although service does not extend to the Sutton Avenue study corridor, there are two WRTA fixed-route buses that serve the town of Oxford. Route 29 travels along Route 20 while Route 42 travels on Route 12. WRTA Route 29 begins at the WRTA Hub at Union Station in downtown Worcester and ends at the Big Bunny Market Plaza on Main Street (Route 131) in Southbridge. On weekdays, Route 29 begins at 5:35 AM and ends at 7:35 PM, providing seven round trips between Worcester and Southbridge. This route also has Saturday service, with six round trips from 8:00 AM to 8:00 PM. Currently, there is no Sunday service on Route 29. WRTA Route 42 also begins at the WRTA Hub at Union Station in downtown Worcester and ends at Davis Street & Main Street in the town of Webster. On weekdays, Route 42 begins at 5:25 AM and ends at 8:20 PM, providing eight round trips between Worcester and Webster. This route also has Saturday service, with seven round trips from 7:00 AM to 8:15 PM. Currently, there is no Sunday service on Route 42.

ADA complementary paratransit service is available in the sections of Oxford, within a 3/4 mile buffer surrounding WRTA Routes 29 & 42. The service is available to individuals determined eligible under the ADA guidelines. The schedule mirrors the existing Route 29 & Route 42 fixed-route schedules. ADA paratransit services are provided by a combination of the WRTA and the Oxford Council on Aging (COA). As **Figure 19** shows, there is only a small portion of the study corridor that is within the 3/4 mile buffer of bus Route 42.

Additional non-ADA paratransit services are offered to all Oxford elders (age 60 and over) and people with disabilities on weekdays between 9:00 AM and 3:00 PM. Non-ADA paratransit services are operated by the Oxford COA, through a contract to the WRTA. The WRTA provides a handicapped-accessible van, and reimburses the Oxford COA for operating expenses. In addition, Oxford has town-owned van which also provides transit service to their seniors. The WRTA does not have any financial or operational control over this van. In Fiscal Year 2021, there were 887 passenger trips in the town of Oxford.

### Existing TNC Services

In 2020, the Massachusetts Department of Public Utilities (DPU) released trip count data provided by Uber, Lyft, and other TNC providers. The data indicated that 6,681 TNC trips originated within Oxford, and 7,117 TNC trips had Oxford as its destination<sup>1</sup>. Of the rides that started in Oxford, 24.8% were within Oxford. Compared to TNC trip count data from 2019<sup>2</sup>, origin trips decreased by 42% (4,837), likely due to the COVID-19 pandemic. In general, the average ride in Massachusetts lasted 15.5 minutes and covered 5.3 miles at 20.5 miles per

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<sup>1</sup> Source: 2020 Data Report: Rideshare in Massachusetts, Massachusetts DPU

<sup>2</sup> Source: 2019 Data Report: Rideshare in Massachusetts, Massachusetts DPU

hours (MPH). Rides in the town of Oxford lasted an average of 18.6 minutes, covered 11.5 miles and averaged 37 MPH in speed.

### 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. Currently, an update to this Plan was initiated as the result of the WRTA's Memorandum of Understanding with MassDOT. This update was also prepared by AECOM and was initiated in January 2021 and released in March 2021. This most recent update analyzes the WRTA's current system, identifies gaps in service and unmet needs, and helps to develop a strategic vision for the next five years. Specific needs identified include fare payment, website redesign, vehicle acquisition and cost efficiencies. Due to the timing of COVID-19 pandemic, much attention was focused on restoring ridership and recovery. None of the service recommendations in the updated Plan included the town of Oxford.

## **7.3 Town of Sutton**

### Existing WRTA Services

There is no fixed-route service available in Sutton, but there is a community shuttle service that travels on Route 122A through the town of Sutton, but it is not near the study corridor. This shuttle service starts at the Wal-Mart in Northbridge and ends at the Shoppes at Blackstone Valley in Millbury. The closest WRTA fixed-route service is available in the neighboring communities of Oxford and Millbury. The Oxford routes were discussed in the previous section while bus Route 4 is part of the WRTA fixed-route service that goes into Millbury.

On weekdays, Sutton's community shuttle begins at 9:10 AM and ends at 4:45 PM, providing five round trips between Northbridge and Millbury. This route has no service on Saturday and Sunday. Bus Route 4 operates on weekdays, Saturday, and Sunday.

ADA complementary paratransit service is available for WRTA fixed-route bus service within a 3/4 mile buffer. The service is available to individuals determined eligible under the Americans with Disabilities Act (ADA) guidelines. The schedule mirrors the existing WRTA fixed-route schedule. ADA paratransit services are not provided in the town of Sutton as there is no fixed-route service in the community.

Additional non-ADA paratransit services are offered to all Sutton elders (aged 60 and over) and people with disabilities on weekdays between 8:00 AM and 4:00 PM. Non-ADA paratransit services are operated by SCM Elderbus, through a contract to the WRTA. The WRTA provides a handicapped-accessible van, and reimburses SCM Elderbus for operating expenses. In Fiscal Year 2021, SCM Elderbus provided nearly 609 passenger trips in Sutton.

### Existing TNC Services



In 2020, the Massachusetts Department of Public Utilities (DPU) released trip count data provided by Uber, Lyft, and other TNC providers. The data indicated that 4,226 TNC trips originated within Sutton, and 4,846 TNC trips had Sutton as its destination<sup>3</sup>. Of the rides that started in Sutton, 17.6% were within Sutton. Compared to TNC trip count data from 2019<sup>4</sup>, origin trips decreased by 37% (2,431) likely due to the COVID-19 pandemic. In general, the average ride in Massachusetts lasted 15.5 minutes and covered 5.3 miles at 20.5 miles per hours (MPH). Rides in the town of Sutton lasted an average of 19.6 minutes, covered 12.1 miles and averaged 37 MPH in speed.

### Future Outlook

Similar to the future outlook for Oxford, none of the recommendations in the Comprehensive Service Analysis Plan update included the town of Sutton.

## **7.4 Performance Management**

There are two Performance Measures related to this chapter, Multimodality and Equity. The Multimodality objective is to expand the transit network in the region and the Equity objective is to increase Environmental Justice (EJ) and vulnerable populations that intersect WRTA fixed-route bus service.

1. **Multimodality:** Although both Oxford & Sutton have some fixed-route services available in their communities, Sutton Avenue and Central Turnpike are not part of the service area. As previously mentioned, there have been no service recommendations for additional service in Oxford or Sutton. In the future, should the WRTA decide to expand their service area to include Sutton Avenue & Central Turnpike, it would help meet the CMMPO's regionally-customized multimodality performance goals.
2. **Equity:** This measure seeks to ensure that all populations benefit from roadway improvements, WRTA service, and any other public transportation services. There is an EJ minority population and a vulnerable population of households with persons 75+ within the study area. Similar to the Multimodality measure, if the WRTA decides to expand fixed-route bus service to Sutton Avenue & Central Turnpike, it would help meet the CMMPO's regionally-customized transit equity goal.

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<sup>3</sup> Source: 2020 Data Report: Rideshare in Massachusetts, Massachusetts DPU

<sup>4</sup> Source: 2019 Data Report: Rideshare in Massachusetts, Massachusetts DPU



## 8.0 Other Modes

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Traffic jams and congestion occur when demand for the highway infrastructure exceeds capacity. Because of this, various state initiatives, design criteria revisions, funding opportunities and compacts have guided the design of the planning region's transportation and physical infrastructure so that alternatives to driving alone are highly encouraged. These other modes include bicycling, public transit (detailed in a separate chapter), and walking. This chapter includes examples of the aforementioned statewide initiatives and their applicability to the Sutton Avenue and Central Turnpike Corridor Profile.

### 8.1 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 bicycling, transit, and walking. The HTC is an interagency initiative co-chaired by the Commonwealth's Secretary of Transportation and Secretary of Health & Human Services, including the Secretary of Energy & Environmental Affairs, MassDOT Highway Administrator, MassDOT Transit Administrator, the Commissioner of Public Health and the Secretary of Housing & 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, in turn, 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
- Healthy Transportation Engineering Directive

### 8.2 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 provided the opportunity to bike, take transit, or walk instead of driving alone in a motor vehicle.

All MassDOT facilities will consider adjacent land uses and, as applicable, be designed to include sidewalks of sufficient width, landscaping, street crossing opportunities and other features to enhance healthy transportation options. Safety audits will be conducted at vehicle crash cluster sites where incidents have occurred with healthy-mode transportation users. MassDOT has also developed a Shared Use Path Planning and Design Guide to assist communities proposing shared use paths on or along former railroad right-of-way in order to accelerate the path design process. To view the guide, click on the following link [Shared Use Path Planning and Design Guide](#). The resources compiled in this guide help communities understand the process of planning, designing, funding, and constructing shared use paths.

### 8.3 Complete Streets

What is widely known as the “Complete Streets” approach was first included in MassDOT’s 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 vehicular 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 state’s 2014 Transportation Bond Bill authorized funding for the creation of the 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. To view the website, click on the following link [Complete Streets Program](#)

For a community to be eligible for funding from this program it must meet three primary requirements as follows:

1. Attendance of a municipal employee at a Complete Streets training and the development of a locally-customized Complete Streets Policy that scores 80 or above out of a possible 100 points.
2. Development of a Complete Streets Prioritization Plan.
3. Submit application for available funding to construct projects in those communities with an approved Prioritization Plan.

Once these primary requirements are met, the host communities are eligible for up to \$38,000 in technical assistance and up to \$400,000 in construction funding. The Transportation Bond Bill stated that 33% of the funds will go to municipalities that are at or below the median household income. Between 2016 and 2020, over 150 Tier 3 construction project grants have been awarded across the Commonwealth totaling \$62 million. Future funding is based on the availability of funds, continued interest as well as the success of the program. Further, through MassDOT's Capital Investment Plan (CIP) additional funding could potentially be directed towards the program.

In 2016, the town of Oxford contracted with CMRPC to assist with the community's Complete Streets policy, but did not assist in their local prioritization plan. Currently, the town has not been awarded any grants, but there is a proposed project in their plan for Sutton Avenue to build new sidewalks between Lovett Road and Orchard Hill Drive. The prioritization plan was approved by MassDOT on 2/27/17. If not yet completed, the next step for Oxford would be to apply for funding for the projects listed in their prioritization plan. As for the town of Sutton, their Complete Streets policy was approved on 8/22/19 and their prioritization plan was approved by MassDOT on 9/19/19. Similar to Oxford, Sutton has yet to receive program funding for projects listed in the town's prioritization plan. Further, at this time, Central Turnpike is not listed as a project in Sutton's prioritization plan.

#### **8.4   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, bicyclists and pedestrians. In rural areas, roadway shoulders provide space for bicyclists to ride at their own pace.

There are no dedicated bicycle lanes along Sutton Avenue in Oxford and Central Turnpike in Sutton within the study area. In addition, the shoulder widths in the study area are not sufficiently wide to be considered safe to ride a bicycle along the roadway. The current shoulder widths are between zero and two feet along both sides of the roadway. Shoulder widths should be at least five feet to safely ride a bicycle.

In 2018, CMRPC staff completed a Regional Bicycle Plan. The main purpose of the plan was to identify opportunities for encouraging and enhancing bicycle travel within the CMRPC region. The recommendations contained in the plan should be used as a guide for local jurisdictions in taking advantage of these opportunities. The implementation of the recommendations will eventually provide for a comprehensive bicycle transportation network in the region that is focused on accessibility, mobility, and safety. For more information, follow this link to the Bicycle Plan on the CMRPC website [2018 Regional Bicycle Plan](#).

Through the public input process, related meetings, and stakeholder outreach, a number of intersections, bridges, interchanges, and other barriers to bicycle travel were identified in the Bicycle Plan. Per the plan, Sutton Avenue and Central Turnpike is considered a major priority as it connects various centers of activity between Route 12 in Oxford and Route 122 in Northbridge. In the longer term, it is envisioned to provide connectivity between jurisdictions across an even larger geographic area.

As a supplement to the Regional Bicycle Plan, A [Bicycle Compatibility Index](#) (BCI) was created to act as a guide to evaluate the capability of urban and rural roadways to accommodate bicyclists. The BCI spotlights individual road segments as it pertains to the larger bicycle network. This includes identifying what infrastructure is currently there and understanding the viability of implementing bicycle facilities on that roadway segment. The BCI provides insight to decision making with stakeholders and town officials on projects along federal-aid eligible highways within their municipality. For the BCI, a rating or grading system is used to help stakeholders make the most informed decisions. Various criteria are used to determine the scoring of the roadway segments. By providing the scores and a rating system, prioritization will help filter funding towards appropriate projects that can meet the goals of the community and/or region.

## **8.5 Pedestrian Facilities and Activity in the Corridor**

As observed in the field, there are sidewalks on the north side of Sutton Avenue between Interstate 395 and Lovett Road and, on the south side, from Lovett Road to Orchard Hill Drive. These sidewalks are either in excellent or good condition. The remainder of Sutton Avenue in Oxford and the entire portion of the Central Turnpike study area in Sutton have no sidewalks. As for ADA ramps in Oxford, most were observed to be in excellent condition while only two that are around a local driveway were observed to be in poor condition. Additionally, the only marked crosswalk is located at the signalized intersection of Lovett Road & Oxford Crossing Plaza.

In 2018, CMRPC staff completed the Regional Pedestrian Plan. This plan was intended to facilitate the expansion and upgrade of the pedestrian network in the region in order to encourage more walking trips and safely link important destinations to where people live. The plan also documented the extensive pedestrian-related planning and project development work being conducted in the CMRPC communities. The recommendations within the plan should be used as a guide for local jurisdictions in taking advantage of the available opportunities. For more information, the plan can be found on the CMRPC website at [2018 Regional Pedestrian Plan](#).

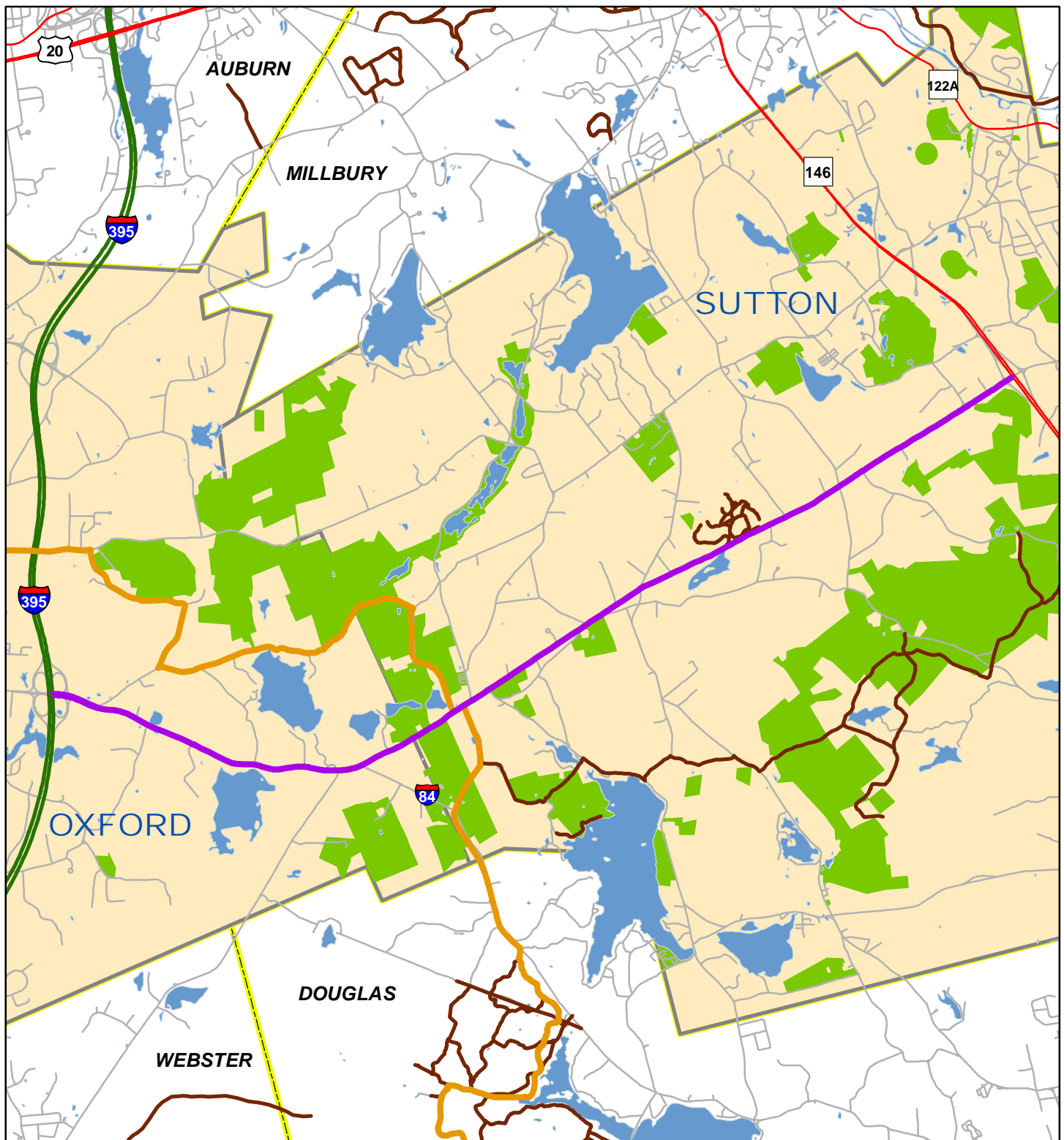
Through the public input process, related meetings, and stakeholder outreach, some overall recommendations included connecting emerging residential development with traditional

village centers while also improving crosstown connectivity such as joining segments of already existing pathways and trails. Some priority recommendations for Oxford and Sutton included continuing Complete Streets development, partnering eligible K-8 grade schools with the MassDOT Safe Routes to School (SRTS) Program to increase safe biking and walking among students, and also to work with MassDOT and the state's Department of Conservation & Recreation (DCR) to ensure that regional multi-use trails and pathways are advanced to meet the needs of subregional and regional travel via other non-motorized modes.

## 8.6 Regional Trails in the Corridor

Besides on-road facilities like sidewalks and marked bicycle lanes, regional trails are also used by hikers and bicyclists. In the winter time, trails can also be used by cross-country skiers. These trails are often built on old former railroad right-of-way as well as through forests, recreational areas, and parks. **Figure 20** features the Midstate Trail, other regional trails, and open space areas in the towns of Oxford and Sutton near the study corridor. The open space layer is essentially 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 shown, the Midstate Trail is a scenic footpath that travels through both the towns of Oxford and Sutton. The Trail crosses the study corridor in Sutton, just east of the Oxford town line. Overall, the Midstate Trail is a 92-mile hiking trail that extends from Rhode Island, crosses into Central Massachusetts and eventually connects to the Wapack Trail in New Hampshire. The Midstate Trail is highly accessible, easy to hike and a great way to enjoy the natural features of the region. The Lake Manchaug Greenway is another regional trail that connects to the Midstate Trail just south of the study corridor in the town of Sutton. In addition, there are a number of other local trails in Sutton just east of Putnam Hill Road on the north side of Central Turnpike.



# CENTRAL TNPK & SUTTON AVE CORRIDOR PROFILE

## Regional Trails & Open Space

Figure 20

### Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- U.S. Route
- Mid-State Trail
- Other Regional Trails
- Open Space



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.

0 0.325 0.65 1.3 1.95 2.6 Miles



## 8.7 Performance Management

The Performance Measure emphasis areas related to this chapter are 1) Multimodal, 2) Economic Vitality, and 3) Travel & Tourism. All three are regionally-customized measures approved by the CMMPO. The goal of the Multimodal measure is to improve and/or expand transportation accessibility for all modes (bicycle, pedestrian, transit) in the region. The goal of the Economic Vitality measure is to make employment opportunities accessible and available allowing for job expansion by improving bicycle, pedestrian, and transit networks near major employment centers. Next, the Travel & Tourism goal is to enhance the access, safety and effectiveness of the region's transportation network that serves places of touristic value.

1. **Multimodal:** The first measure under Multimodal is to increase the miles of sidewalks in good condition on a yearly basis. Sidewalk conditions are rated on a scale of Poor, Fair, Good and Excellent. Any sidewalks within the Good or Excellent categories are included in this measure. The limited sidewalks along the study corridor are already in Good or Excellent condition. If new sidewalks were to be constructed elsewhere along the study corridor, they would be added to this measure since they would be in Excellent condition.

The second measure is to increase the number of ADA ramps in good condition on a yearly basis. ADA ramp conditions are rated on a scale of good, poor, and no ramp. The current Excellent-rated ADA ramps along the study corridor are already included in the analysis. The two ramps observed to be in Poor condition, if improved, would be added into the inventory of ADA ramps in good condition.

The third measure is to increase the bicycle lane miles available in the region. Bicycle data includes dedicated bicycle lanes available on the roadway and roadways that have shoulders on either side that measure a minimum of five feet. Roadways that have sufficiently wide shoulders are considered viable to safely ride a bicycle. Since essentially the entire study corridor has minimal existing shoulder widths, if any, the entirety of the roadway would need to be widened to be considered for safe bicycle use.

2. **Economic Vitality:** the first measure is to improve truck travel time reliability. As the study corridor is somewhat narrow, widening the roadway by adding shoulders would help better accommodate truck traffic.

The second measure is to improve the accessibility to jobs using all modes in the region. By improving accessibility on the roadway for all modes, people are able to drive, walk, ride a bike, and take transit for a greater distance with reduced congestion. As more travel options become increasingly available, there exists the potential for fewer vehicles on the roadway network.

3. **Travel & Tourism:** The goal of this emphasis area is to enhance the access and safety of the transportation network that serves tourist areas. Enhancing and improving the Sutton Avenue and Central Turnpike study corridor will allow for better and safer connections to both local and regional trails like the Mid-State Trail and other nearby tourist locations, such as Purgatory Chasm.

## 9.0 Overall Corridor Profile Findings

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This Corridor Profile effort considers the results of all Management System and environmental analyses and, in conjunction with local public processes, 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 as well applicable Performance Measures related to the Sutton Avenue & Central Turnpike corridor.

### 9.1 Sutton Avenue & Central Turnpike Intersections

**Table 16** summarizes the findings for intersections. It includes study intersection locations, environmental considerations adjacent to Sutton Avenue & Central Turnpike, calculated intersection Level of Service (LOS), the percentage of heavy vehicles during the morning and evening peak hour travel periods, number of documented vehicle crashes, the availability of public transit and other considerations. These could include obstructed lines of sight or the need for bicycle and pedestrian accommodations.

The following observations for both Sutton Avenue & Central Turnpike are based on the table:

- The focus intersections in Oxford are located in the French River Watershed and the intersections in Sutton reside in the Blackstone River Watershed. The Lovett Road intersection is within a wellhead protection area. Both intersections on Sutton Avenue have nearby wetlands and potential vernal pools are also located near the Joe Jenny Road intersection. West Sutton Road is the only intersection with nearby delineated flood zones.
- The worst operating intersection, in terms of Level of Service (LOS), is the Lovett Road/Oxford Crossing Plaza intersection, which is the only signalized focus intersection. The existing LOS is “D” for both the AM & PM, while projected 2031 conditions indicate a LOS “D” in the AM and “E” in the PM. The remaining Stop-sign controlled intersections had a LOS of either “B” or “C” for both the AM & PM under existing and projected 2031 conditions.
- Normally, heavy vehicles travel at slower speeds than passenger cars. As such, the heavier the vehicles using the roadway, the more likely travel times are slower. The percentage of heavy vehicles using the Sutton Avenue & Central Turnpike 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 7AM to 3PM shift, leading to a decrease in activity during the evening peak. Morning percentages were as high as 7.3%

(West Sutton Road) and evening percentages were as high as 2.4% (West Sutton Road & Putnam Hill Road).

- MassDOT crash data from 2018-2020 was used for this Corridor Profile. There was a total of 28 crashes at the five study intersections in the towns of Oxford and Sutton over the three-year period. The intersection that had the highest number of crashes was Joe Jenny Road, with a total of 13. The next highest crash location was Lovett Road with 12. There are no Highway Safety Improvement Program (HSIP) identified crash clusters along the study corridor.
- Currently, the WRTA does not provide fixed route public transit service along the Sutton Avenue & Central Turnpike study corridor in the towns of Oxford and Sutton. However, the Council on Aging does provide service to the elderly and disabled population in Oxford while Elderbus provides similar service in Sutton.
- The intersection with the highest observed traffic volumes is Lovett Road & Oxford Crossing Plaza. A U-turn is available at this intersection for eastbound vehicles. Elsewhere, Joe Jenny Road continues south and connects to Route 16 in Webster. In Sutton, West Sutton Road travels northerly into the town of Millbury. Putnam Hill Road connects to Boston Road to the north and travels into Douglas to the south. Also, Purgatory Road travels south along the highly visited Purgatory Chasm State Reservation.

**Table 16**  
**Oxford & Sutton**  
**Sutton Avenue & Central Turnpike Focus Intersections:**  
**Overall Corridor Profile Findings**

Study Intersection Location	Environmental Consultation Analysis	Level-of-Service (LOS)*	Freight Movement Heavy Vehicle %	Safety Analysis**	Public Transit	Other Considerations
Sutton Avenue / Lovett Road / Plaza	Wellhead protection area. Located in French River Watershed. Nearby wetlands.	AM = D (D) PM = D (E)	AM = 5.6% PM = 1.7%	12	No fixed-route service, but the Oxford Council on Aging provides service to the elderly and disabled.	U-turns available for eastbound vehicles. Highest volume intersection which includes Oxford Crossing Plaza.
Sutton Avenue / Joe Jenny Road	Located in French River Watershed. Nearby wetlands & potential vernal pools.	AM = B (B) PM = C (C)	AM = 3.6% PM = 1.3%	13	No fixed-route service, but the Oxford Council on Aging provides service to the elderly and disabled.	Joe Jenny Road becomes Sutton Road in Webster, which connects to Route 16.
Central Turnpike / West Sutton Road	Located in Blackstone River Watershed. Nearby wetlands & flood zones.	AM = B (B) PM = B (C)	AM = 7.3% PM = 2.4%	1	No fixed-route service, but Elderbus provides service to the elderly an disabled.	West Sutton Road connects to Boston Road, just north of Central Turnpike, and also travels northerly to Millbury.
Central Turnpike / Putnam Hill Road	Located in Blackstone River Watershed.	AM = B (B) PM = B (B)	AM = 6.6% PM = 2.4%	2	No fixed-route service, but Elderbus provides service to the elderly an disabled.	Putnam Hill Road connects to Boston Road to the north and travels into Douglas to the south.
Central Turnpike / Purgatory Road	Located in Blackstone River Watershed.	AM = B (B) PM = B (B)	AM = 5.9% PM = 1.7%	0	No fixed-route service, but Elderbus provides service to the elderly an disabled.	Purgatory Road travels south along Purgatory Chasm State Reservation.

\*Intersection Level-of-Service Existing (Projected 2031)

\*\*Total number of crashes (2018-2020)

## 9.2 Sutton Avenue & Central Turnpike Roadway Segments

The Corridor Profile findings for Sutton Avenue & Central Turnpike roadway segments are summarized in **Table 17**. Similar to the previous intersection table, the roadway segment table lists each Sutton Avenue & Central Turnpike study segment, environmental considerations adjacent to Sutton Avenue & Central Turnpike and beyond, the daily percentage of heavy vehicles, number of documented vehicle crashes, the field-observed condition of the paved roadway surface, any bridges or culverts, the availability of public transit and other considerations, including the need to accommodate both bicycles and pedestrians.

Based on the information summarized in the table, the following observations are provided:

- There is a wellhead protection area within the first two roadway segments in the town of Oxford. The majority of Oxford is within the French River Watershed while the town of Sutton is within the Blackstone River Watershed. The roadway segment between Joe Jenny Road and West Sutton Road has a nearby water body, Number One Pond, requiring a monitored Total Maximum Daily Load (TMDL). All study segments have nearby wetlands and most of the segments also reside within delineated flood zones.
- Using data obtained through the ongoing traffic count program maintained by CMRPC, staff was able to determine the heavy vehicle percentages along Sutton Avenue & Central Turnpike for a 24-hour period. The data listed in the table is the daily percentage of heavy vehicles traveling along the focus roadway segments. The entire study corridor averages about 13% heavy vehicles on a daily basis.
- From 2018 to 2020 there were 93 reported roadway segment crashes on Sutton Avenue & Central Turnpike within the study area. The majority of the crashes (33) occurred between Lovett Road and Joe Jenny Road. The next highest number of crashes (27) happened between Putnam Hill Road and Purgatory Road. The other remaining segments of the Sutton Avenue & Central Turnpike study corridor had a total of 33 crashes.
- Roadway pavement condition along Sutton Avenue & Central Turnpike in Oxford and Sutton 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. As can be seen in the table, most of the study segments have two pavement condition scores as, which is typically the case, the pavement segments are not the same as the CP study roadway segments. As such, only the Interstate 395 to Lovett Road segment has one pavement condition score. Two different pavement condition scores are shown for the remaining roadway segments.



- Sutton Avenue & Central Turnpike has two bridges within the study area. One bridge (O-06-035) is located over Interstate 395 in Oxford and the second bridge (S-33-014) is over Route 146 in Sutton. Regularly inspected by MassDOT, both of these structures are not considered Structurally Deficient and are in good condition. As for culverts, there are a total of 14 along the study corridor; four are in the town of Oxford and the remaining 10 are in the town of Sutton. Based on field observations and subsequent analysis, most of the identified culverts are considered a “minor” or “insignificant” barrier. However, there are two culverts that were determined to be “severe” barriers to stream continuity.
- Similar to that indicated in the intersection findings, there is no fixed-route public transit service along the entire length of the Sutton Avenue & Central Turnpike study corridor. However, the Council on Aging does provide service for the elderly and disabled in Oxford while Elderbus provides similar service in Sutton.
- The majority of Sutton Avenue & Central Turnpike is a two-lane roadway. The segment between Interstate 395 and Lovett Road, in Oxford, is the only 4-lane segment. In Oxford, there is a sidewalk on only one side of the roadway between Interstate 395 and Orchard Hill Drive. There are no sidewalks along the entirety of Central Turnpike in Sutton. Further, there are limited to non-existent bicycle accommodations along the entire study corridor in both Oxford & Sutton.

**Table 17**  
**Oxford & Sutton**  
**Sutton Avenue & Central Turnpike Roadway Segments:**  
**Overall Corridor Profile Findings**

Sutton Ave & Central Tnpk Roadway Segments	Environmental Consultation Analysis*	Freight Movement Daily % of Heavy Vehicles	Safety Analysis**	Pavement Condition***	Bridges / Culverts	Public Transit	Other Considerations
Interstate 395 to Lovett Road	Wellhead protection area. Located in French River Watershed. Nearby wetlands.	13.9%	7	OCI = 76.8 (Good) Routine Maintenance	O-06-035 / Culvert #1	No Fixed Route Service, but the Oxford Council on Aging provides service to the elderly and disabled.	Only section of study roadway that has 4-lanes. Sidewalk located on north side of road.
Lovett Road to Joe Jenny Road	Wellhead protection area. Nearby water (Robinson Pond) attaining some uses. Located in French River Watershed. Nearby wetlands, potential vernal pools, and flood zones.	13.9%	33	OCI = 80.4 (Good) Routine Maintenance OCI = 90.5 (Excellent) Do Nothing	Culverts #2 & #4	No Fixed Route Service, but the Oxford Council on Aging provides service to the elderly and disabled.	Sidewalk on southside between Lovett Road and Orchard Hill Drive. No accommodations for bicycles.
Joe Jenny Road to West Sutton Road	Nearby Water (Number One Pond) requiring a TMDL. Located in Blackstone River Watershed. Nearby wetlands and flood zones.	12.8%	8	OCI = 95.2 (Excellent) Do Nothing OCI = 100 (Excellent) Do Nothing	Culverts #4 & #6	No Fixed Route Service, but the Oxford Council on Aging / Elderbus provides service to the elderly and disabled.	No shoulder to safely accommodate a bicycle and no sidewalks for pedestrians. Midstate Trail crosses over Central Turnpike.
West Sutton Road to Putnam Hill Road	Located in Blackstone River Watershed. Nearby wetlands and flood zones.	15.1%	10	OCI = 100 (Excellent) Do Nothing OCI = 98.4 (Excellent) Do Nothing	Culverts #6, #7, #8 & #9	No Fixed Route Service, but Elderbus provides service to the elderly and disabled.	No shoulder to safely accommodate a bicycle and no sidewalks for pedestrians.
Putnam Hill Road to Purgatory Road	Nearby water (Dark Brook) no uses assessed. Located in Blackstone River Watershed. Nearby wetlands and flood zones.	12.9%	27	OCI = 95.2 (Excellent) Do Nothing OCI = 91.2 (Excellent) Do Nothing	Culverts #10, #11 & #12	No Fixed Route Service, but Elderbus provides service to the elderly and disabled.	No shoulder to safely accommodate a bicycle and no sidewalks for pedestrians.
Purgatory Road to Route 146	Located in Blackstone River Watershed. Nearby wetlands.	7.0%	8	OCI = 91.2 (Excellent) Do Nothing OCI = 95.2 (Excellent) Do Nothing	S-33-014 / Culverts #13 & #14	No Fixed Route Service, but Elderbus provides service to the elderly and disabled.	No shoulder to safely accommodate a bicycle and no sidewalks for pedestrians.

\*Total Maximum Daily Load (TMDL)

\*\*Total number of crashes (2018-2020)

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

### 9.3 Performance Management

**Table 18** shows the integration of the Sutton Avenue & Central Turnpike Corridor Profile findings as they relate to performance management. This table lists each of the ten federal transportation planning emphasis areas and the associated report chapter in which they are discussed. The performance objectives for each of the emphasis areas are also listed in the table. As can be realized, there are multiple performance areas that are included in more than one chapter. The corridor context column describes how the Sutton Avenue & Central Turnpike corridor relates to each of the performance areas and its objective. Further, the last two columns first list the observed deficiencies on Sutton Avenue & Central Turnpike and then what type of suggested improvements to the corridor could likely help obtain the planning region's overall performance objectives.

Associated Chapter	Performance Area	Performance Objective	Corridor Context	Observed Deficiencies	Suggested Improvement and Regional Impact
Chapter 4	<b>SAFETY</b>	Reduce the number and rate of fatal & serious injury crashes in the region for all types of vehicles. Also includes non-motorized fatalities and serious injuries. (PM1)	Sutton Avenue & Central Turnpike are major connector roads between Interstate 395 and Route 146. Safety improvements could reduce vehicle crashes that involve injuries and fatalities along the roadways.	A total of 115 crashes occurred in the host communities along the Sutton Avenue & Central Turnpike study segments between 2018 and 2020. Of those crashes, 33 caused a non-fatal injury and there were also two fatalities.	Improve intersections with a high number of crashes. Improve roadway geometry, pavement markings, and signage, if needed to reduce the number of crashes. Also, cut back overgrown vegetation where needed.
Chapter 4	<b>SECURITY</b>	Enhance the transportation security coordination and preparedness regionwide.	Sutton Avenue & Central Turnpike are both considered a primary evacuation route and it is important for the roadway to be safe and secure. Municipal Vulnerability Plans (MVP) are developed to identify vulnerable or hazardous locations within a community.	MVP's identified a potential flooding hazard near Turk Hollow Road in Oxford and assessing & improving culverts was a priority for the town of Sutton.	See the suggested improvement options from the other performance areas.
Chapters 5 & 6	<b>STATE OF GOOD REPAIR</b>	Maintain the highway infrastructure asset system in a state of good repair (PM2): <b>5)</b> Increase % of pavement in good condition and reduce % of pavement in poor condition. <b>6)</b> Increase % of bridges by deck area in good condition and reduce % of bridge by deck area in poor condition.	<b>5)</b> Study corridor is mainly in good or excellent condition. <b>6)</b> There are two MassDOT-owned bridges along the study corridor. One bridge is over Interstate 395 and the second bridge is over Route 146.	<b>5)</b> There are no pavement segments rated in either poor or very poor condition in both Oxford and Sutton. <b>6)</b> Both MassDOT bridges are in good condition and not considered structurally deficient.	<b>5)</b> Maintain pavement in good to excellent condition. When needed, conduct Preventative Maintenance such as crack sealing, patching and surface treatments along the entire study area so other sections of the roadway will not degrade to a poor condition. <b>6)</b> Continue to inspect the two bridges along the study corridor on a regular basis.
Chapter 3	<b>CONGESTION</b>	To achieve a significant reduction in congestion on the National Highway System (NHS). Travel time reliability, non-SOV travel, peak hour excessive delay, and emissions reduction are the focus of this Performance Measure (PM3).	Sutton Avenue & Central Turnpike are major connector roads between Interstate 395 and Route 146 for both passenger vehicles and heavy trucks.	Most study intersections have a LOS of "B" or "C", but the Lovett Road/Oxford Crossing Plaza intersection in Oxford has a LOS of "D". Average travel speeds are over 30 mph. Minimal congestion along the entire corridor; higher volumes are to the western part of the corridor in Oxford.	Periodically check/adjust timing and phasing of the Lovett Road/Oxford Crossing Plaza intersection to be certain it is working efficiently. Look to encourage other travel options through the Complete Streets program.
Chapters 7 & 8	<b>MULTIMODALITY</b>	Improve and/or expand transportation accessibility for all modes (bicycle, pedestrian, transit) in the region.	<b>7)</b> Currently, there is no fixed-route transit service along Sutton Avenue & Central Turnpike, but there is service in the towns of Oxford and Sutton. Additionally, COA's do provide service to the elderly. <b>8)</b> Limited bicycle and pedestrian accommodations along the corridor.	<b>7)</b> Fixed-route transit does not exist on Sutton Avenue and Central Turnpike. <b>8)</b> Sidewalks only on one side of road on a portion of Oxford and no sidewalks in Sutton. No safe bicycle accommodations as there are limited or no shoulder widths.	<b>7)</b> If there is interest, study the feasibility of transit options within the study corridor. <b>8)</b> Where needed, construct new sidewalks where none currently exist. Widen the study corridor to increase shoulder widths for bicyclists. Potentially use the Complete Streets program to fund these types of improvements.
None	<b>SUSTAINABILITY</b>	Encourage compact and mixed-use development. Make sure a good ratio exists between available housing and jobs.	As there are many forms of sustainability, promoting sustainability through transportation planning can be approached by detailed TIP screening for projects that serve to mitigate environmental impacts and are near identified Priority Development Areas (PDAs). A PDA is located in Oxford, near I-395.	Limited PDA opportunities along the study corridor.	See the suggested improvement options from the other performance areas.
Chapter 7	<b>EQUITY</b>	Achieve geographic and population equity across the region. An increase of EJ & vulnerable population that intersect WRTA fixed-route bus service and also consider all subregions benefit from TIP projects.	The town of Oxford has a minority population and Sutton has a vulnerable population of households with person 75+ within the study area. There is no fixed-route service along the study corridor. Both Sutton Avenue & Central Turnpike are eligible for federal-aid monies through the TIP.	See observed deficiencies from the other performance areas.	Ensure that vulnerable populations have access to transportation services. Proposed projects should consider the benefits and burdens of all populations in the project area.
Chapter 3 & 8	<b>ECONOMIC VITALITY</b>	To improve the accessibility to jobs in the CMMPO region through <b>3)</b> reliable freight movement and to <b>8)</b> improve the accessibility to jobs for all modes in the region.	<b>3)</b> Sutton Avenue & Central Turnpike are frequently used by heavy trucks between I-395 and Route 146. <b>8)</b> Employment centers near I-395 and Route 146 while there is limited bicycle and pedestrian accommodations and no transit.	<b>3)</b> There are between 7% & 15% trucks using the study corridor. <b>8)</b> Minimal or no bicycle and pedestrian accommodations along the corridor. In addition, no transit services.	<b>3)</b> Periodically check/adjust timing and phasing of the Lovett Road/Oxford Crossing Plaza intersection to be certain it is working efficiently. Consider widening roadway to allow for more space for trucks. <b>8)</b> Consider using the Complete Streets program to improve the roadway for all users.
Chapter 2	<b>STORMWATER MGMT &amp; RESILIENCY</b>	Create a transportation network that is resilient to the impacts of stormwater.	There are 14 culverts within the study corridor. In addition, there are two bridges, one at each end of the corridor.	Three of the culverts are considered significant or severe barriers.	Improve/update all culverts according to current standards.
Chapter 8	<b>TRAVEL &amp; TOURISM</b>	To enhance the access, safety and effectiveness of the region's transportation network that serves places of touristic value	The Mid-State Trail travels through both host communities and other local trails are also nearby. Additionally, Purgatory Chasm is located in Sutton, near Route 146.	See observed deficiencies from the other performance areas.	Install or improve wayfinding signs to recreation areas and popular tourist attractions. Improve roadways near and around local tourist attractions.

Table 18 - Integrating Corridor Profile Findings with Performance Management

## 10.0 Suggested Improvement Options

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CMRPC summarizes a broad range of suggested improvement options within each completed Corridor Profile effort. Depending on host community needs, some suggestions can be specific to a certain corridor location or can be applied to the entire length of the study area. Staff will typically meet with each community included in the Corridor Profile scope to discuss and incorporate their ideas for suggested improvements into the study report. Some improvements can be implemented on a short-term basis while others are aimed at the future, perhaps 5 to 10 years from the present.

As a reference, below are some of the short-term improvement options that were suggested in previous Corridor Profiles which can be used at specific intersections or along an entire corridor. These suggestions include:

- Check the traffic signal timing & phasing of signalized intersections.
- Maintain all traffic signals, signs, and pavement markings.
- Trim any overgrown vegetation that is obstructing sight lines of vehicles, signs, or traffic signals.
- Maintain good pavement surfaces.
- Maintain bridges, culverts, and other roadside drainage facilities and features.
- Install new or improve current guide signs for sites of touristic value.
- Consider access management techniques, such as curb cut consolidation.
- Incorporate additional signage for safety purposes, such as yellow diamond warning signs.
- Consider enhancing pedestrian and bicyclist safety where needed.
- Reconfigure the travel lanes at an intersection where appropriate and feasible.
- Use streetscaping for beautification purposes.

Additionally, the following suggested improvements incorporated into prior Corridor Profile efforts were more for the mid-term/long-term time frames. These types of improvements will likely cost more and will take longer to implement or construct. They have been mostly suggested on a community-by-community basis, but can generally be used for more than one location. They include:

- Realignment of intersection approaches.
- Consider the installation of a modern roundabout instead of a traffic signal where appropriate and feasible.
- Widen roadways where additional shoulder width, travel or turning lanes are needed.

- Incorporate Intelligent Transportation Systems (ITS) components into the roadway network, such as dynamic messaging signs.
- Install overhead highway lighting where necessary.
- Utilize a “Complete Streets” approach, designing for all roadway users.
- Coordinate traffic signals where appropriate and feasible.
- Install new traffic signals where warranted or modernize/update existing signal equipment.
- Utilize traffic calming measures along densely settled sections of a roadway, as appropriate and feasible.

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 numerous goals and objectives across ten federal transportation planning emphasis areas. Each goal and objective have 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 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.

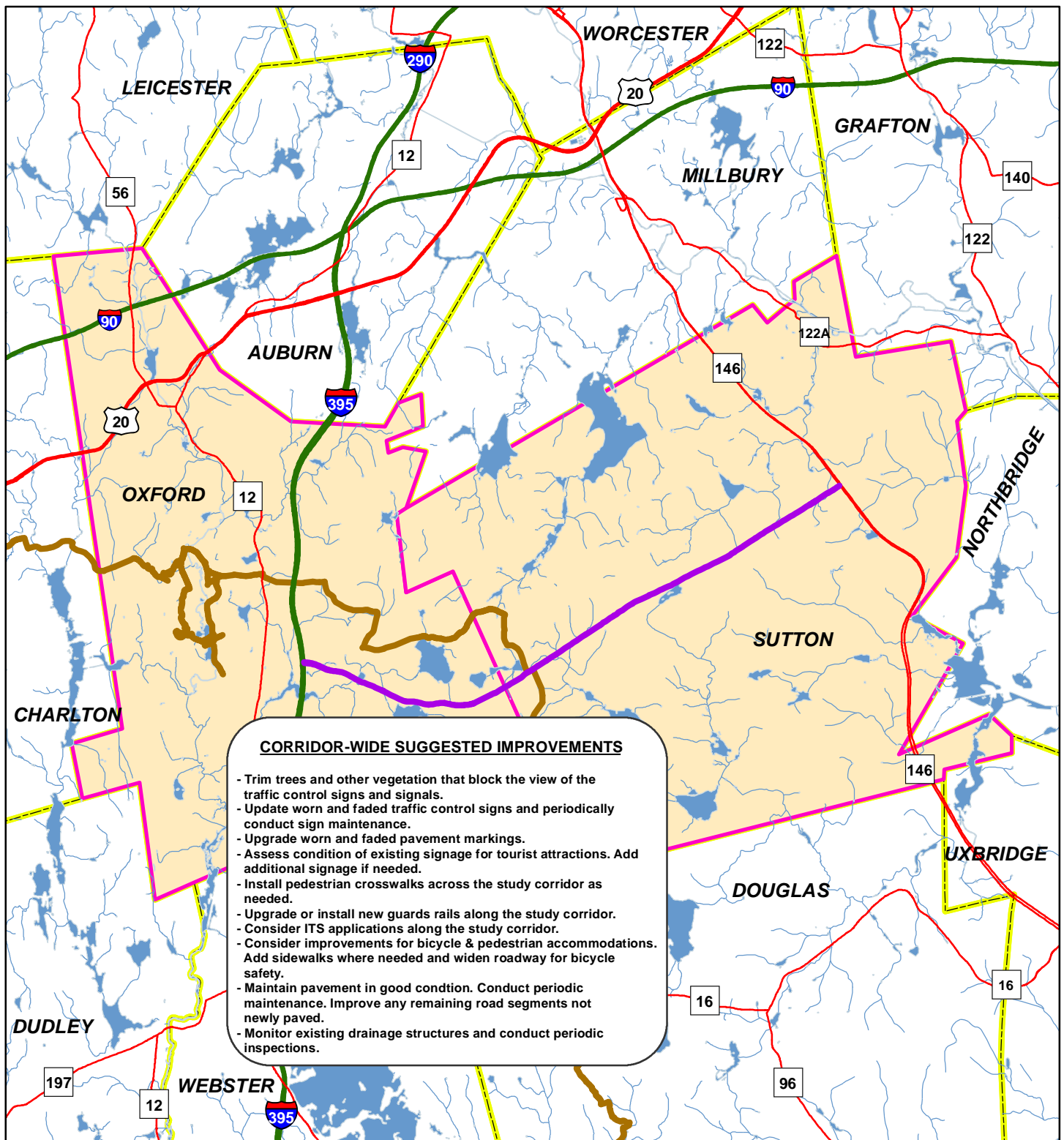
This Corridor Profile report includes a range of suggested improvement options for both MassDOT and host community consideration. Maintained by the host communities, Sutton Avenue & Central Turnpike are both federal-aid eligible, therefore many of the suggested improvement options could be included in future candidate TIP projects that have the potential to produce higher Performance Management scores. Higher scores increase the likelihood of CMMPO programming. Besides the TIP, the MassWorks Infrastructure Program could also be a funding option for some of the suggested improvements on Sutton Avenue & Central Turnpike. For more information on the MassWorks program, click here [MassWorks Program](#).

## 10.1 Corridor-Wide Suggested Improvement Options

The following suggested improvement options, meant to address general overall deficiencies observed along the Sutton Avenue & Central Turnpike study corridor, have been compiled for MassDOT and host community consideration. These improvement options are also shown in **Figure 21**.



- Selectively trim trees and other vegetation that block the view of any traffic control signs and signals.
- Replace worn and faded traffic control signs to ensure nighttime reflectivity and periodically conduct sign maintenance.
- Repaint/upgrade worn pavement markings to enhance travel lane and crosswalk delineation through increased reflectivity.
- Assess condition of existing signage for tourist attractions near the study corridor. Replace/add wayfinding signage as needed.
- Install pedestrian crosswalks in strategically-identified locations along the study corridor as needed. Install appropriate, accompanying warning signs. Consider use of Rectangular Rapid-Flashing Beacons (RRFB).
- Upgrade/install guard rails along those segments of the study corridor where they could potentially help prevent single vehicle crashes including hit fixed-object crashes or vehicles driving off the roadway.
- Consider ITS applications along the study corridor.
- Install animal crossing warning signage in key locations and maintain current signage observed in the field.
- Consider improvements for bicycle and pedestrian accommodations. Add sidewalks where needed and widen the roadway to increase shoulder widths for bicycle safety.
- Maintain pavement in good condition throughout the study corridor. Also, strongly consider periodic pavement maintenance such as crack sealing. Improve any remaining road segments not newly paved.
- Monitor existing drainage structures along the entire corridor to help assure adequate drainage and resiliency for future storm events. Further, conduct periodic inspections & perform necessary maintenance to prevent blockages from debris and wildlife to help prevent storm-scenario over-topping and washouts.



# CENTRAL TNPK & SUTTON AVE CORRIDOR PROFILE

Corridor-Wide Suggested Improvements  
Figure 21

## Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- U.S. Route
- State Route
- Water
- Mid-State Trail



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.

0 0.5 1 2 3 4 Miles

## 10.2 Town of Oxford Suggested Improvement Options

The following suggested improvement options, meant to address general overall deficiencies observed along the Sutton Avenue segment of the study corridor, have been compiled for the consideration of both MassDOT and Oxford. These improvement options are shown in **Figure 22**.

### Sutton Avenue / Lovett Road / Oxford Crossing Plaza

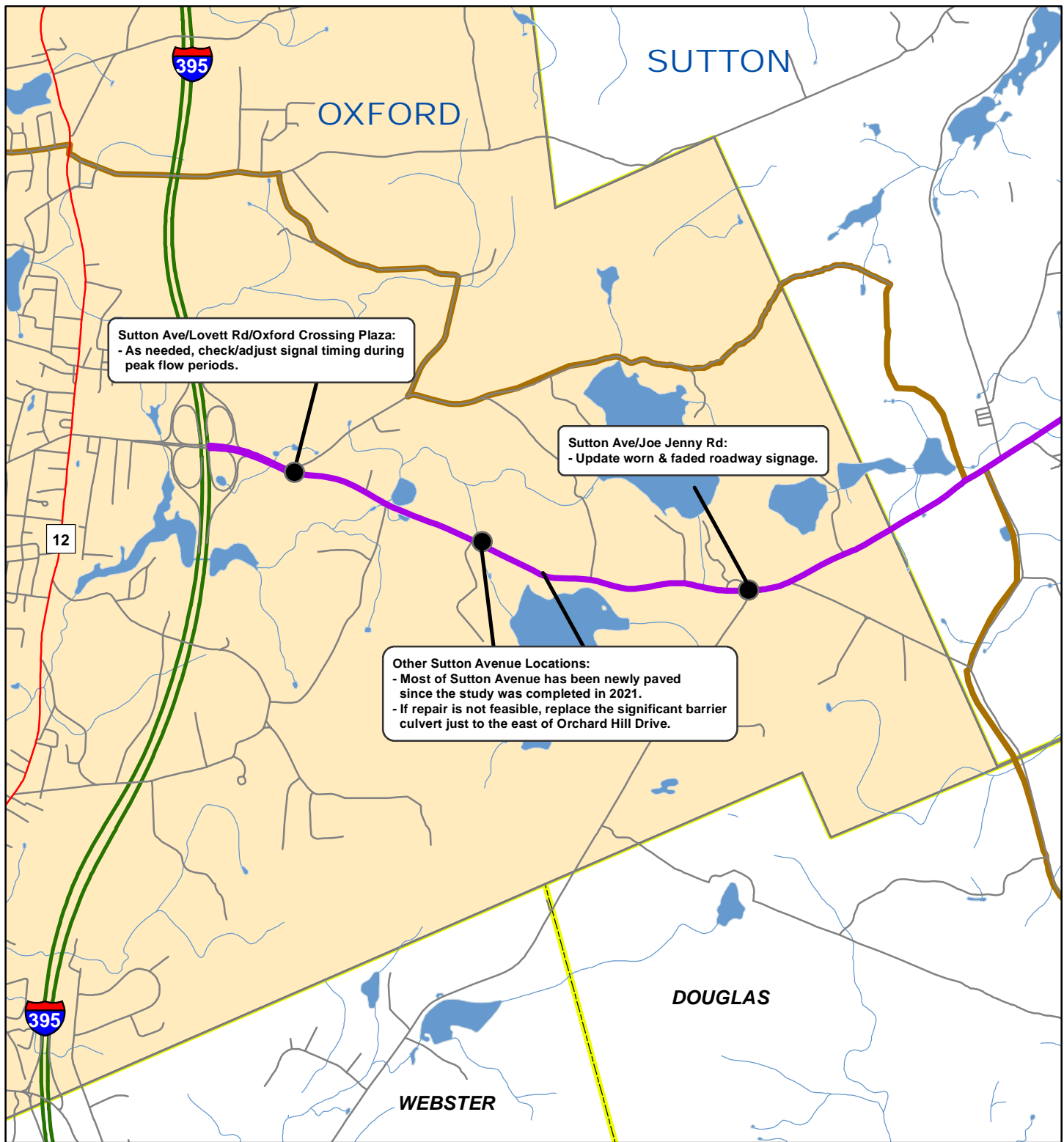
- As needed, check/adjust signal timing to most efficiently accommodate peak flow periods.

### Sutton Avenue / Joe Jenny Road

- Update worn and faded roadway signage.

### Other Sutton Avenue Locations

- Most of Sutton Avenue has been newly paved since the study was completed in 2021.
- If repair is not feasible, replace the identified significant barrier culvert just to the east of Orchard Hill Drive.



## CENTRAL TNP&K & SUTTON AVE CORRIDOR PROFILE

### Oxford Site-Specific Suggested Improvements

Figure 22

#### Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- State Route
- U.S. Route
- Roads
- Streams
- Water Bodies
- Mid-State Trail



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.

0 0.15 0.3 0.6 0.9 1.2 Miles

### 10.3 Town of Sutton Suggested Improvement Options

The following suggested improvement options, meant to address general overall deficiencies observed along the Central Turnpike segment of the study corridor, have been compiled for the consideration of both MassDOT and Sutton. These improvement options are shown in **Figure 23**.

#### Central Turnpike / West Sutton Road

- Based on the current observed conditions there are no recommendations for this intersection at this time.

#### Central Turnpike / Putnam Hill Road

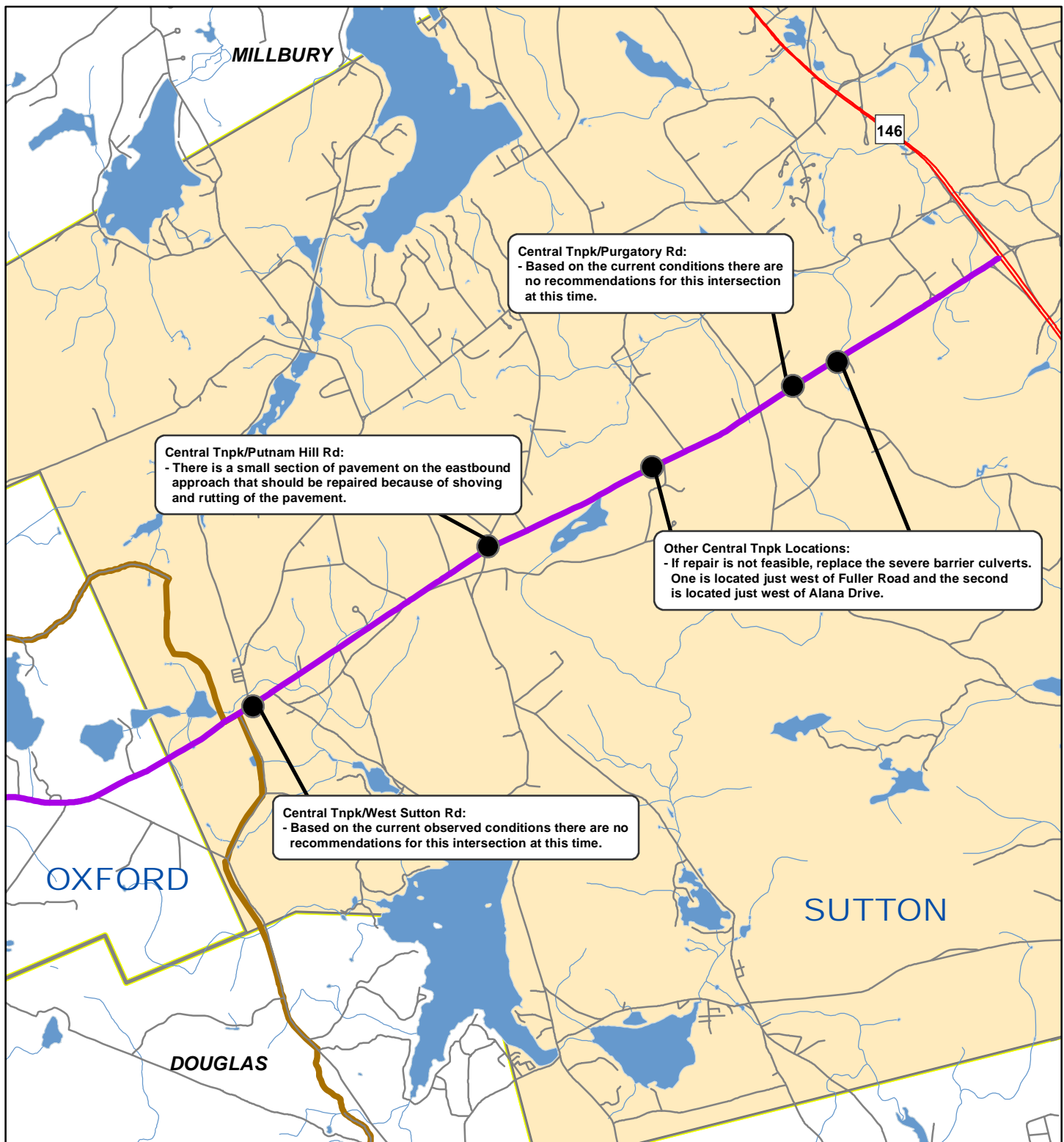
- There is a small section of pavement on the eastbound approach that should be repaired because of shoving and rutting of the pavement

#### Central Turnpike / Purgatory Road

- Based on the current observed conditions there are no recommendations for this intersection at this time.

#### Other Central Turnpike Locations

- If repair is not feasible, replace the two (2) identified severe barrier culverts. One is located just west of Fuller Road and the second is located just west of Alana Drive.



# CENTRAL TNPBK & SUTTON AVE CORRIDOR PROFILE

## Sutton Site-Specific Suggested Improvements

Figure 23

### Legend

- Central Tnpk & Sutton Ave Corridor Profile
- Interstate
- State Route
- U.S. Route
- Roads
- Streams
- Water Bodies
- Mid-State Trail



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.

0 0.225 0.45 0.9 1.35 1.8 Miles



## **Central Massachusetts Regional Planning Commission**

### **Member Communities**

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

### **Central Mass Regional Planning Commission**



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