CENTRAL MASSACHUSETTS METROPOLITAN PLANNING ORGANIZATION (CMMPO)

Highway Freight Accommodation Assessment Study: Southeast Transportation Planning Subregion

CMMPO
Central Massachusetts Metropolitan Planning Organization

CMRPC
Central Massachusetts Regional Planning Commission

March 2024

Prepared in cooperation with the Massachusetts Department of Transportation and the U.S. Department of Transportation – Federal Highway Administration and the Federal Transit Administration. The views and opinions of the Central Massachusetts Regional Planning Commission expressed herein do not necessarily reflect those of the Massachusetts Department of Transportation or the U.S. Department of Transportation. A portion of this document was completed using District Local Technical Assistance (DLTA) funds provided to CMRPC.

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Preface

In order to assure that the federal-aid highway system in each of the Central Massachusetts Regional Planning Commission (CMRPC) transportation planning subregions is adequately accommodating existing trucking needs as well as those projected for the future, the Central Massachusetts Metropolitan Planning Organization (CMMPO) Unified Planning Work Program (UPWP) for FFY 2020 initiated a new study series, "Highway Freight Accommodation Assessments" for federal-aid State Numbered Routes. The first installment focused on the North subregion and was followed by the West and Southwest subregions. This report focuses on the Southeast subregion. Based on both field observations and detailed analyses, this document provides a number of suggested roadway improvement options and local trucking policy considerations to assure the continued flow of freight on the region's major highways while mitigating identified local impacts.

Further, as noted in the MassDOT's 2018 *Massachusetts Freight Plan and reaffirmed in the Draft 2023 Massachusetts Freight Plan*, there is an identified need to improve the Commonwealth's stock of truck parking and servicing areas. The compilation of the *Highway Freight Accommodation Assessment* study series, supported by the Federal Highway Administration (FHWA), is intended to assist in addressing this identified statewide need. Accordingly, in the spirit of Jason's Law, this study examines the potential for wisely located increases in available truck parking at key locations in the region, with a particular focus on rural highway freight movement needs.

The CMMPO Endorsed UPWP for 2024 includes the next installment in this study series that will focus on the ***Northeast*** *transportation planning subregion.*

1.0 Introduction

The CMMPO's Endorsed 2023 UPWP Freight Planning work activity indicates the compilation of a *Highway Freight Accommodation Assessment Study: Highway Trucking on State Numbered Routes*. This study is the fourth in a planned series of subregional *Highway Freight Accommodation Assessment* studies. This trucking-centric study focuses on the region's federal-aid highway network in the Southeast transportation planning subregion. The Southeast subregion includes eleven (11) host communities: Blackstone, Douglas, Grafton, Hopedale, Mendon, Millbury, Millville, Northbridge, Sutton, Upton, and Uxbridge. A map of the Southeast subregion can be found in **Figure 1**.

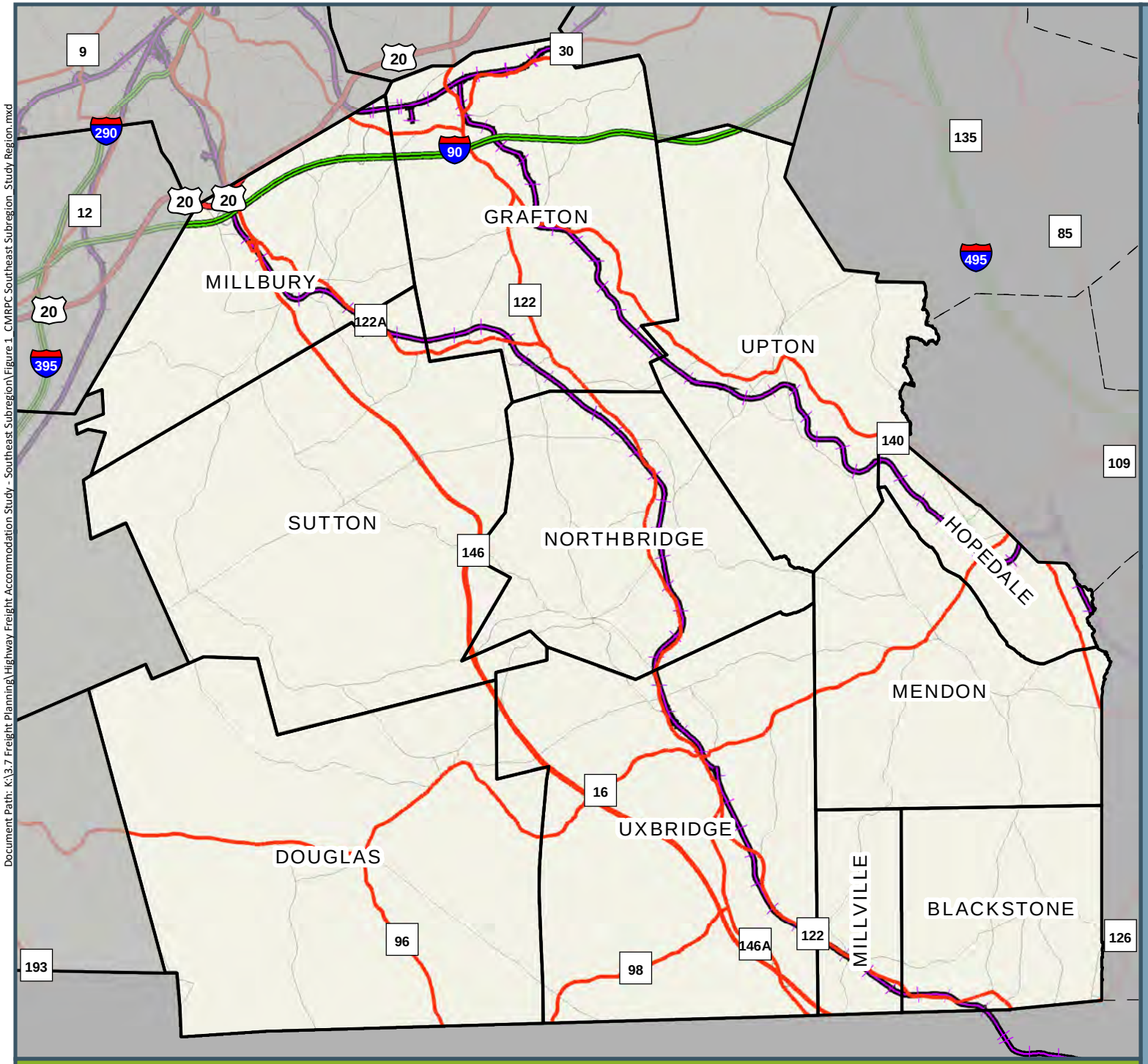
All eligible for federal-aid improvement funding, the following ten (10) State Numbered Routes in the Southeast subregion are the focus of this study effort:

1. Route 16
2. US Route 20
3. Route 30
4. Route 96
5. Route 98
6. Route 122
7. Route 122A
8. Route 140
9. Route 146
10. Route 146A

Major topics addressed in this *Freight Accommodation Assessment Study* include a subregional trucking amenities overview, an inventory of host community bylaws affecting local trucking operations, federal-aid highway network traffic volumes & truck percentages, a range of Management Systems (MS) data & analysis, Performance-Based Planning & Programming (PBPP) considerations, subregional Environmental Consultation maps and local Municipal Vulnerability Preparedness (MVP) Plan findings. In addition, the regional Travel Demand Model, a computerized simulation of the region's multi-modal transportation network, provided future-year volume projections for a range of truck classifications, verifying known highway freight routes as well as identifying areas of concentrated local trucking activity.

Based on this broad range of data, observations and corresponding analysis, a summary of findings table is presented. The *Highway Freight Accommodation Assessment Study* concludes with a series of suggested recommendations for both MassDOT and host community consideration. These include both local policy suggestions as well as options for roadway and bridge improvements. Some identified improvement projects may have the potential to utilize

future-year TIP funding available to the CMMPO to assist state or local implementation. Suggested projects are intended to help assure the continued flow of highway freight throughout the greater planning region while mitigating identified local impacts.



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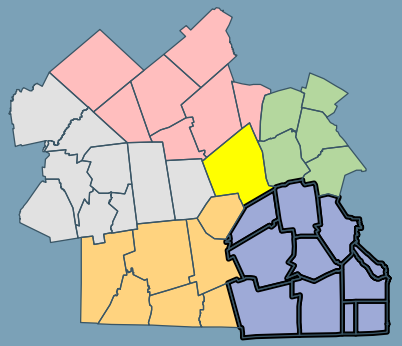

Legend

- Southeast Subregion Towns
- Active Railroads
- Interstate
- US Highway
- State Route
- Other Major Roads

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Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), MassDOT/ Office of Geographic Information (MassGIS), Massachusetts Department of Environmental Protection

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FIGURE 1 - SOUTHEAST SUBREGION STUDY REGION HOST COMMUNITIES

1.1 Area Trucking Amenities

Parking for Long-Distance Highway Trucking

Truck parking issues exist on a wide basis in greater New England. Truck-oriented facilities are somewhat limited in comparison to other areas of the country. Truckers - who must follow federal safety laws requiring mandatory rest periods - need places to park, eat, sleep and bathe. As demand for goods is anticipated to remain high, the needs of the trucking community must be addressed to ensure the continued safe flow of freight on the nation's network of major highways.

Public rest areas on limited access highways contribute little to the truck driver rest location system because of factors such as small size, poor condition, or not being on a key long-distance corridor. Adding or expanding commercial truck stops is an effective method of reducing truck parking at unofficial locations, along with their associated safety challenges. Good design and new technologies can serve to mitigate both the real and perceived negative impacts of a commercial truck stop. Long-term economic growth will continue to place increased demands on the motor freight system and associated rest location system.

Jason's Law federally mandates adequate rest periods for long-distance truck drivers. Adequate truck parking opportunities *must* be available to serve both the Commonwealth's existing and future projected needs. Looking to the future, efforts to increase the available supply of parking for long-distance trucking in the planning region need to continue. Both nationally and statewide, truck parking will continue to be a challenge and will require FHWA's and MassDOT's concerted, ongoing involvement. This could involve state & local policy changes that mandate addressing these needs, through both revised policy & regulation in addition to improved infrastructure. The CMMPO is *serious* concerning the implementation of Jason's Law to provide sufficient truck parking and, as such, encourages MassDOT to continue to address this critical area of concern.

MassDOT's earlier *2018 Massachusetts Freight Plan* indicated the Commonwealth's deficiency in providing enough modern, full-service rest stops catering to trucking. There exists the potential for expanded existing or new additional facilities in the planning region for large truck parking to enable drivers to meet the federally-required rest periods. Parking has the potential to be offered on a guaranteed, reservation-style basis, perhaps with basic amenities. As indicated in the Long-Range Transportation Plan (LRTP) for the region, *2050 Connections*, the CMMPO supports the implementation of additional modern, full-service rest stops throughout the greater region serving the trucking industry.

MassDOT Efforts to Improve Truck Parking Supply

In the spirit of Jason's Law, MassDOT is actively seeking to increase the amount of safe parking available for long-distance trucking activities in the Commonwealth. Initially, an inventory was compiled of the state's truck parking supply as well as parking availability/usage. An analysis of this data allowed for the suggestion of potential new truck parking facilities at 12 sites across 3 target areas of the state. Similarly, the potential also exists to expand the parking supply at an additional 12 sites along both the MassPike (I-90) and I-95 corridors. Further, the potential application of Intelligent Transportation Systems (ITS) will consider the use of available technologies for producing and relaying real-time truck parking occupancy data.

The MassDOT evaluation criteria for potential *new* truck parking included the number of available acres, right-of-way impacts, the distance from the nearest highway interchanges, as well as potential impacts to any nearby historic and environmental resources. High-level cost analysis screening was also conducted for the 12 sites considered in the study effort. Similarly, the MassDOT evaluation criteria for potential *expanded* truck parking evaluation criteria also included the number of available acres, feasibility of constructability, and any likely impacts to nearby environmental resources. Further, the top-ranked six (6) sites were also assessed using available truck probe data and historic traffic volume data.

Within the CMRPC planning region, sites for potential new truck parking are being considered and further analyzed by MassDOT along the I-395 corridor in the host communities of both Oxford and Webster. In addition, in the Northeast planning subregion, MassDOT is considering a site for new truck parking in the town of Berlin. Another new site is being considered in the adjacent town of Bolton, just north of the planning region. Elsewhere, at three (3) existing sites along the MassPike (I-90) corridor, MassDOT has deployed ITS technologies to monitor truck activity. The three (3) sites on the MassPike that are targeted for the potential expansion of the existing parking supply for long-distance trucking are both Charlton rest plazas, eastbound and westbound, within the Southwest planning subregion as well as the eastbound Natick rest plaza, east of the planning region. MassDOT has also developed concept sketches and cost estimates for each potential expansion site on the MassPike.

The new updated state Freight Plan to be completed by MassDOT in 2023 is anticipated to include further recommendations concerning the ongoing effort to increase the supply of safe parking available for long-distance trucking activities throughout the Commonwealth.

MassDOT Weigh Station Truck Parking Opportunities

It is suggested that both underutilized or dormant MassDOT Weigh Station infrastructure along the region's federal-aid highways could potentially assist long-distance truck drivers in meeting the federally-mandated rest period requirements. These paved and gated, yet often-empty,

Weigh Stations could potentially present opportunities for large truck parking. Based on staff's cursory research, not all Weigh Stations are currently in use, as activity levels appear to vary over time. Further, other opportunities for large truck parking may exist on other dormant or surplus MassDOT-owned properties throughout the Commonwealth.

The following is a list of roadside MassDOT Weigh Stations identified in the greater planning region:

Charlton: I-90 (MassPike) Eastbound
Lancaster: Route 2 Eastbound *(currently used for MassDOT construction staging)*
Sturbridge: I-84 (Wilbur Cross Highway) Eastbound
Sturbridge: I-84 (Wilbur Cross Highway) Westbound
Uxbridge: Route 146 Northbound

In addition, based on CMMPO staff research, MassDOT currently maintains six (6) Weigh-in-Motion Stations statewide. The location of the Weigh-in-Motion Stations are as follows:

- **Attleborough**: I-95 north of I-295
- **Hatfield**: I-91 north of Chestnut Street
- **Ludlow/Springfield**: I-90 (MassPike) between exits 6 and 7
- **Methuen**: I-93 north of Routes 110/113
- **Sturbridge**: I-84 Westbound (Wilbur Cross Highway) Connecticut state line
- **Worcester**: I-190 south of West Mountain Street

Truck Parking Opportunities near Trucking Activity Centers

It is considered an ongoing challenge for long-distance truckers to seek and locate modest parking opportunities, especially in the more rural areas of the planning region. The CMMPO staff has considered outputs from the regional Travel Demand Model to assist in identifying trucking "hot spots" in the region, helping to target potential locations for needed future truck parking opportunities. At this time, staff has identified potential truck parking opportunities for federally-required driver rest in the Southeast subregion at the following locations, one in each of the eleven (11) host communities encompassed in this study:

- **Blackstone:** Route 122 Corridor
- **Douglas:** Route 16 Corridor
- **Grafton:** Route 30 Corridor (Centech Park area), Route 122 Corridor (Wyman-Gordon Corp. area)
- **Hopedale:** Route 140 Corridor, Hopedale Airport-Industrial Park area
- **Mendon:** Route 16 Corridor
- **Millbury:** U.S. Route 20 Corridor, Route 146 Corridor, the Shoppes at Blackstone Valley

- **Millville:** Route 122 Corridor
- **Northbridge:** Route 122 Corridor
- **Sutton:** Route 146 Corridor, Market 32 Plaza
- **Upton:** Route 140 Corridor
- **Uxbridge:** Route 146 Corridor, MassDOT Rest Areas
- *OTHERS UNDER REVIEW, To Be Determined*

As an example, staff seeks opportunities for large truck parking 24/7 in underutilized "big box" or shopping plaza parking lots and/or designated loading/maneuvering areas. Staff seeks to suggest local community bylaw refinements/additions to allow for controlled long-distance truck parking when store deliveries meet certain thresholds at various retail & industrial establishments. An example is the Walmart model used elsewhere in the nation: overnight parking welcome, in a supervised/monitored and maintained facility. Common courtesy by users to minimize emissions, noise and trash is expected.

Additionally, the needed expansion/addition of available rest stops for long-distance trucking may have the opportunity to be supported through private sector funding or, alternately, benefit from a "Public-Private Partnership" (PPP) funding scenario, where private funding is used to leverage designated public monies. Future potential PPP arrangements could include the following aspects:

- Rest stop construction & management
- Truck hook-ups for electrical power (vastly reducing idling)
- Diesel & other alternate fuel sales
- Light repair facilities
- Dining options & lavatories
- Other locally-customized features

<u>Availability of Diesel Fuel in the Southeast Subregion</u>

Staff has conducted research to identify existing substantive diesel fueling opportunities in the planning region. This information is useful for long-distance trucking as well as for emergency situations that could strike the region. The Massachusetts Department of Environmental Protection (DEP) maintains a database of permitted locations for diesel storage.

This information for the eleven (11) host communities in the Southeast transportation planning subregion was extracted from the DEP database and is shown in **Table 1**. Based on the DEP information, at this time there are twenty-two (22) commercial outlets in the Southeast transportation planning subregion providing diesel fuel sales. As can be seen from the table, nine (9) of the Southeast subregion communities have diesel stations. Blackstone and Millville are the only two (2) communities without stations for diesel sales.

Table 1

Diesel Fuel Locations in the Southeast Subregion

Facility Name	Facility Address	Host Community
EZ Mart 105	311 Main Street	Douglas
Cumberland Farms #2512	217 Worcester Street	Grafton
Grafton Auto Service Inc.	101 Worcester Street	Grafton
Lake Ripple Xtra Mart	87 Worcester Road	Grafton
Cumberland Farms #2153	115 Mendon Street	Hopedale
Imperial Gas LLC	1 Millville Road	Mendon
Gasco Express Facility	23 Cape Road	Mendon
Riverside Mart	54 Canal Street	Millbury
Millbury Xtra Mart	100 Worcester Providence Turnpike	Millbury
Nydam Oil Co Inc.	205 Providence Road	Northbridge
Peterson Oil Service	191 Providence Road	Northbridge
Speedway #2415	1144 Providence Road	Northbridge
Whitinsville Gas & Market LLC	4 North Main Street	Northbridge
JD Bousquet & Sons Inc.	27 Main Street	Sutton
Sutton North Xtra Mart	27 Worcester-Providence Turnpike	Sutton
Sutton Mini Mart	Route 146 & Boston Road	Sutton
Gasco Express Facility	44 Milford Street	Upton
Cumberland Farms #2531	128 North Main Street	Uxbridge
Hellen Garage Inc.	277 North Main Street	Uxbridge
Nouria #04024	30 Lackey Dam Road	Uxbridge
MA0081	2 Hartford Avenue	Uxbridge
Quaker Diamond	674 Quaker Highway	Uxbridge

1.2 Host Community Bylaws Concerning Trucking

Staff reviewed local community bylaws for the Southeast subregion towns, seeking any pertaining to truck prohibitions, delivery hour restrictions, parking prohibitions or any other locally-defined rules concerning large commercial vehicles, such as local "Jake Brake" use discouragement. *(The phrase "Jake Brake" is slang for engineered safety devices for modern truck tractors that use an engine compression brake that closes the valves in an engine for added slowing ability.)* Based on staff research, it was determined that the towns of Blackstone, Hopedale, Mendon, Millbury, Millville, and Northbridge Southeast subregion have local bylaws governing trucking operations while Douglas, Grafton, Sutton, Upton, and Uxbridge presently do not.

Blackstone – *Truck Requirements (188B-12)*: Trucks to be used in the collection and transporting of solid waste shall be enclosed packer-type, shall be watertight and must have the company name prominently displayed on them.

Hours of Collection (188B-13): Trash trucks are allowed in the Town of Blackstone for collection between the hours of 5:00 AM to 5:00 PM, Monday through Saturday.

Trucking Routes and Methods (109-12): All trucking routes and methods will be subject to approval by the Selectmen after reviews by the Chief of Police.

Hours of Operation (109-11): Removal and truck departures shall take place only between 7:00 AM and 5:00 PM, Monday through Saturday, excluding holidays.

Information to be Submitted with Permit Application (188B-9):

B) Truck routes and delivery days. All changes must be reported to the Board of Health in writing within two weeks of the change.

C) A copy of the registration and insurance certificates for each truck working in the Town of Blackstone must be submitted.

Construction Requirements (191-16):

G) Maintenance of Traffic Plan

2) Construction traffic, at the Board's option, the plan shall include a week-by-week forecast of truck traffic and construction worker trips.

Douglas – None Posted

Grafton – None Posted

Hopedale – *6.1 (b)(5)(ii)*: No more than one (1) business vehicle may be parked on the property including non-commercial trucks and vans with loading capacities not exceeding three-quarter (0.75) ton.

Mendon – *Trucking Regulations (Chapter XIV, Section 7.5)*: The trucks employed by the permittee shall avoid school bus routes whenever possible, shall observe posted speed limits, and shall exercise extreme caution at all times.

The permittee shall be responsible for keeping highways clear of earth spillage from trucks in his/her employ on all roads used by trucks operating under this permit. All trucks must have closed tailgates and must completely cover all earth material during transportation of the said materials.

Millbury – *Protection of Sidewalks and Curbings against Heavy Equipment (13.05.410)*: Power shovels, bulldozers, loaders, trucks, and other equipment shall not operate on or across sidewalks, berms, curbings, etc., until they have been properly protected from damage by planking or other approved means. All damage resulting from the drainlayer's operations shall be repaired by him.

Obstruction of Streets with Vehicles (10.05.030):

> E) No person or persons shall park, for a period longer than 60 minutes where not otherwise prohibited between the hours of 6:00 PM and 6:00 AM, any truck, tractor, bus or trailer with a five-ton registered gross weight or over, upon any highway, street, alley, public way or public space in the town.
>
> No person or persons shall park any trailer or semitrailer upon any highway, street, alley, public way or public space, unless the trailer or semitrailer is, at all times while so parked, attached to a vehicle capable of moving the trailer or semitrailer in a normal manner upon the highway, street, alley, public way or public place.
>
> This subsection E) shall not apply to trucks, tractors, buses or trailers of five-ton registered gross weight or over when in the process of being loaded or unloaded, nor shall it apply to any of the aforementioned vehicles which are disabled in such a manner to such an extent that it is impossible to avoid stopping and temporarily leaving the disabled vehicle on that portion of the highway, street, alley, public way or public space, ordinarily used for vehicular parking.

Millville – *Operating Standard (55-6):*

> A.6 – Routes approved for truck traffic. The routes approved for truck traffic shall be reviewed by the Police/Highway Departments to determine safety and road conditions.

Northbridge – *Truck Prohibition (199-41)*: All trailer trucks are prohibited from using Water Street.

Construction Hours (9-1001): No construction, demolition, paving, alteration of buildings, excavation, loading or unloading of equipment or building materials, including idling trucks, shall be conducted between the hours of 6:00 PM and 8:00 AM, unless approved by the Building Inspector in advance.

Sutton – None Posted

Upton – None Posted

Uxbridge – None Posted

The CMRPC Regional Collaboration & Community Planning (RCCP) staff has broad experience in crafting local community bylaws, village bylaws, and other similar documentation for various host communities. When necessary, these bylaws can be customized to account for local trucking activities, deliveries, and parking as well as other related activities.

2.0 State Numbered Routes

This section of the *Southeast Subregion Highway Freight Accommodation Assessment Study* details the primary focus network of State Numbered Routes owned and maintained by either MassDOT or the host communities. These highways are eligible for federal-aid improvement funding through the CMMPO's Transportation Improvement Program (TIP). Currently programmed TIP projects in the Southeast subregion are also listed. Further, the CMMPO's previously designated Critical Freight Corridors are summarized. Lastly, field-observed traffic volumes and associated truck percentages are presented.

2.1 Analysis Network

As previously stated, all State Numbered Routes eligible for federal-aid improvement funding in the Southeast subregion are the primary focus of the study effort. Other federal-aid town-owned & maintained highway segments have also been also included in the study scope, often serving as connectors between the State Numbered Routes. Again, the following ten (10) State Numbered Routes in the Southeast subregion are the focus of this analysis: Route 16, US Route 20, Route 30, Route 96, Route 98, Route 122, Route 122A, Route 140, Route 146, and Route 146A. Segments of these highways that were previously designated by the CMMPO as Critical Freight Corridors are also identified.

Federal-Aid Eligible Road Classifications & Highway Ownership

Figure 2 shows the federal-aid eligible highways in the Southeast subregion. Funds are allocated from the FHWA to MassDOT to be distributed to the state's MPO's for highway improvement projects through the regional TIPs. A combination of functional classification and urban/rural designation determines if a roadway qualifies for the use of these federal funds. Eligibility includes all Interstates, urban/rural arterials, urban collectors, and rural major collectors. Rural minor collectors and local roads are excluded from this group and thus ineligible for federal-aid highway funding.

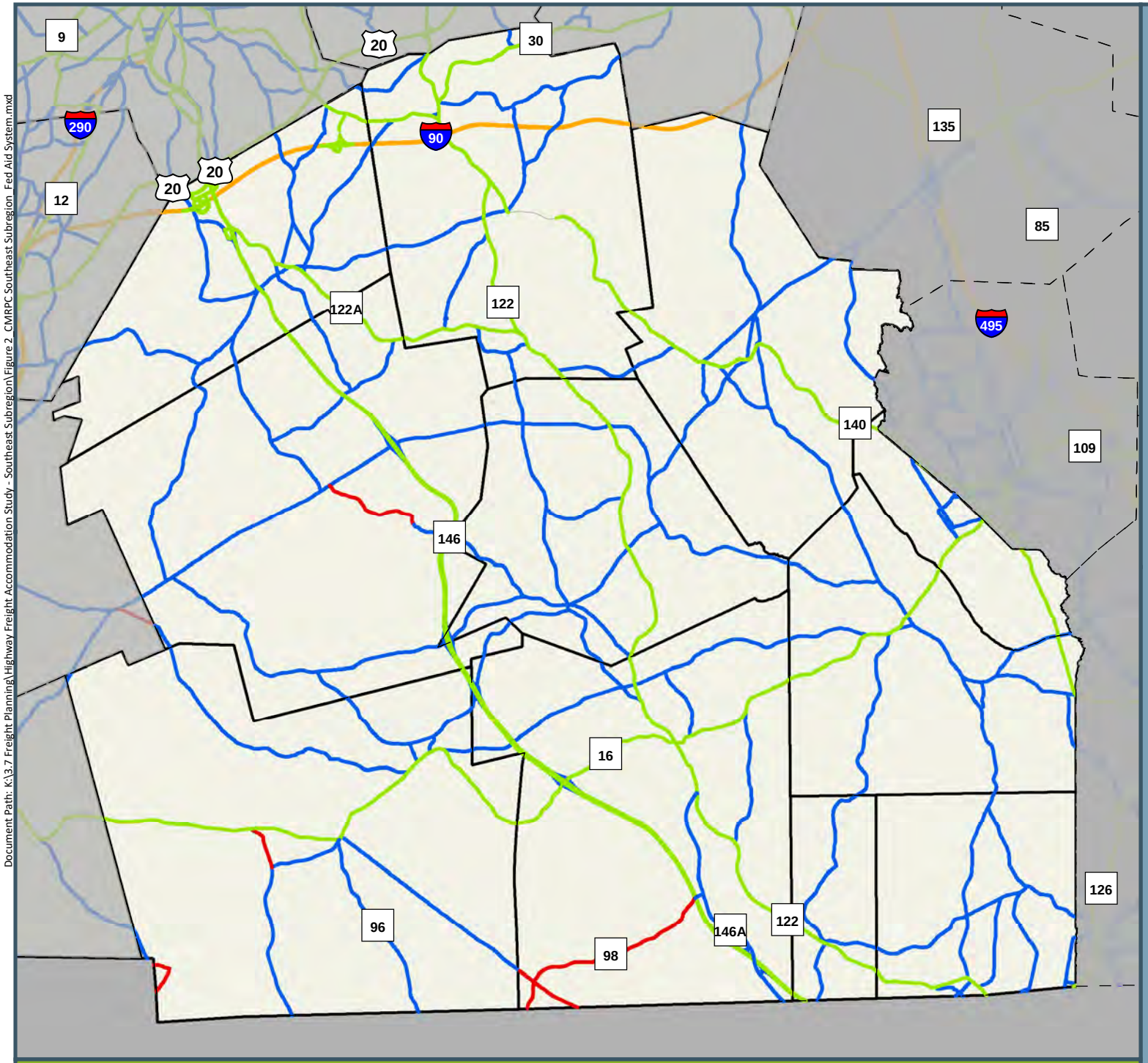
As shown on the map there are four categories of federal-aid eligible roads. There are two (2) National Highway System (NHS) categories and two (2) Surface Transportation Program (STP) categories. The NHS-funded highway network represents all Interstate roadways and principal arterials throughout Massachusetts. In addition, roadways connecting the NHS roadways with military bases are also considered part of the NHS network. Also, NHS passenger & freight terminals are connected to the NHS network by roadways called "NHS Connectors".

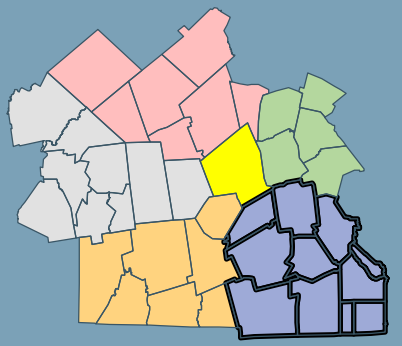
The STP-funded highway network is comprised of any functionally classified roadway. STP-funded roadways include all urban arterials, urban collectors, and rural arterials. As established

in prior national transportation legislation, rural collectors are also STP eligible, but have a limitation on the amount of STP funding allocated to the states that can be used. These types of roads are classified in what is called the "C15" category.

There is only one (1) Interstate NHS highway within the Southeast transportation planning subregion, Interstate 90 (Massachusetts Turnpike). However, being a MassDOT-operated toll road, Interstate 90 in Massachusetts is ineligible for federal-aid. Highways in the Southeast subregion eligible for NHS funding include Routes 16, US 20, 30, 122, 122A, 140, and 146. The remaining State Numbered Routes included in this *Freight Accommodation Assessment Study* are STP-eligible and include Routes 96, 98, and 146A. Other major roadways within the Southeast subregion shown on the figure are classified as either STP-eligible or STP - C15.

In addition, **Figure 3** shows the highway ownership for the State Numbered Routes and other major roadways in the Southeast subregion. As can be seen in the figure most of the highways are owned, and thus maintained, by the eleven (11) host communities. The entirety of Interstate 90 (Massachusetts Turnpike), US Route 20, Route 146, Route 146A as well as portions of Route 16, Route 122, and Route 140 are owned and maintained by MassDOT.





Legend

- Southeast Subregion Towns
- Interstate - NHS
- Other Road - NHS
- STP Eligible
- STP Road - C15

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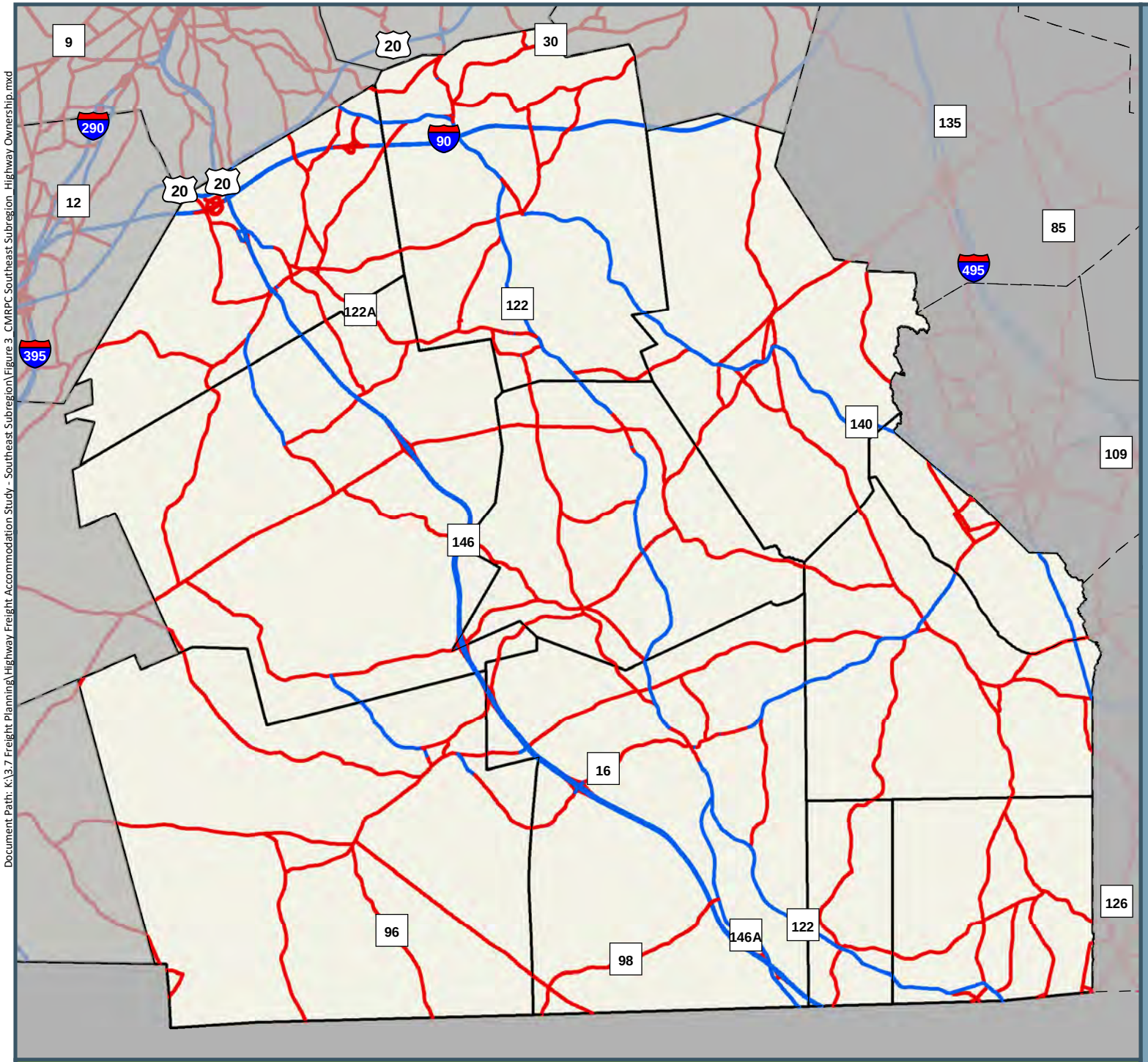
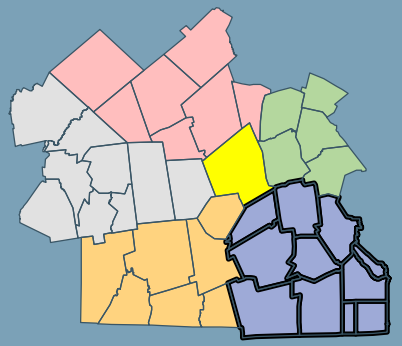
FIGURE 2 - SOUTHEAST SUBREGION FEDERAL-AID ELIGIBLE ROAD CLASSIFICATIONS





Legend

- Southeast Subregion Towns
- City or Town accepted road
- MassDOT Owned

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FIGURE 3 - SOUTHEAST SUBREGION ROADWAY OWNERSHIP

Environmental Justice & Vulnerable Populations

Environmental Justice (EJ) was first noted on the Executive Order 12898 (1994) which mandated all federal agencies to ensure that their programs do not disproportionately cause high and adverse effects on minority and low-income populations and to ensure that all potentially affected populations have the opportunity to full and fair participation in the transportation decision-making process. Moreover, the US Department of Transportation (DOT) Order 5610.2(a) presents DOT policy to consider EJ in all programs, policies, and activities with the US DOT. The guiding principles in DOT's national policy are:

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

To carry out the intent of the federal guidance, it was necessary to identify low income and minority communities or neighborhoods in the planning region. The CMMPO updated and approved the current EJ definition in November 2022 to reflect regional characteristics and demographic changes based on the decennial US Census. With the update, the term EJ is now being referred to as Regional Environmental Justice "Plus" (REJ+) Community. A REJ+ community is a designation assigned to block groups with relatively high shares of residents that are especially impacted by changes and or to transportation networks. This designation is "regional" in nature because the socioeconomic characteristics that designate REJ+ status are considered in relation to regional percentiles (through comparing block group characteristics to MPO-level percentiles rather than statewide percentiles); the designation is called "Plus" because it includes characteristics beyond traditional "environmental justice" definitions to identify the most dominant factor that defines a community's social vulnerabilities. The definition reads as follows:

- To qualify as an REJ+ community, a block group must meet the following thresholds that correspond to traditional EJ criteria. All data used for this analysis was retrieved from the U.S. Census in which the unit of analysis is census block groups (ACS 2021 5-year estimates)
    - **Income**: Annual median household income $\leq$ MPO 25th percentile.
    - **Race & Ethnicity**: Percent of individuals that identify as Hispanic or Latino; Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian or

Other Pacific Islander; Some other race; or Two or more races and do not identify as White alone ≥ MPO 75th percentile.

- **Limited English Proficiency (LEP)**: Percent of households with LEP speaking members ≥ MPO 75th percentile.

- While the community characteristics that traditionally define EJ communities to establish areas that are particularly vulnerable to social, economic, and political pressures are relied upon, it is also recognized that these characteristics do not capture other socio-economic contexts that indicate area of high need with respect to transportation issues. Therefore, the "most dominant factor" that drives transportation and accessibility needs in each community is calculated and identified, the following "Plus" element characteristics are also included for this determination:
  - **Car Ownership**: Percent of households without an available vehicle ≥ MPO 75th percentile.
  - **Disability**: Percent of households with one or more persons with a disability ≥ MPO 75th percentile.
  - **Age**: Percent of individuals aged 65 or older ≥ MPO 75th percentile.

The REJ+ thresholds were developed for each MPO region to control the regional differences in socio-economic and demographic characteristics across the Commonwealth. The thresholds were calculated using the Quartile function in Excel to determine each MPO-specified threshold value within each EJ or "Plus" category. Block group-level values for each of the six characteristics are then compared to their respective MPO thresholds to determine if the block group meets the criteria for REJ+ designation. **Table 2** shows the CMMPO identified thresholds:

Table 2 – CMMPO REJ+ Thresholds

MPO	Income	Nonwhite	LEP	Disability	Zero-Vehicle	Senior
Central Mass	$60,921	41%	8%	32%	14%	21%

For block groups that are identified as REJ+ communities, the "most dominant" of the six characteristics was identified in terms of the greatest dissimilarity or distance from the MPO threshold. This identification provides a deeper sense of the social contexts that shape local transportation needs. Knowing that an REJ+ community's most dominant factor is a lack of automobile access, or a high proportion of individuals with physical disabilities, or a high share of older individuals, provides greater insight into the programs, initiatives, or investments that can be made to promote accessibility and mobility for those who may need extra support. **Figure 4** shows the identified REJ+ populations in the Southeast planning subregion.

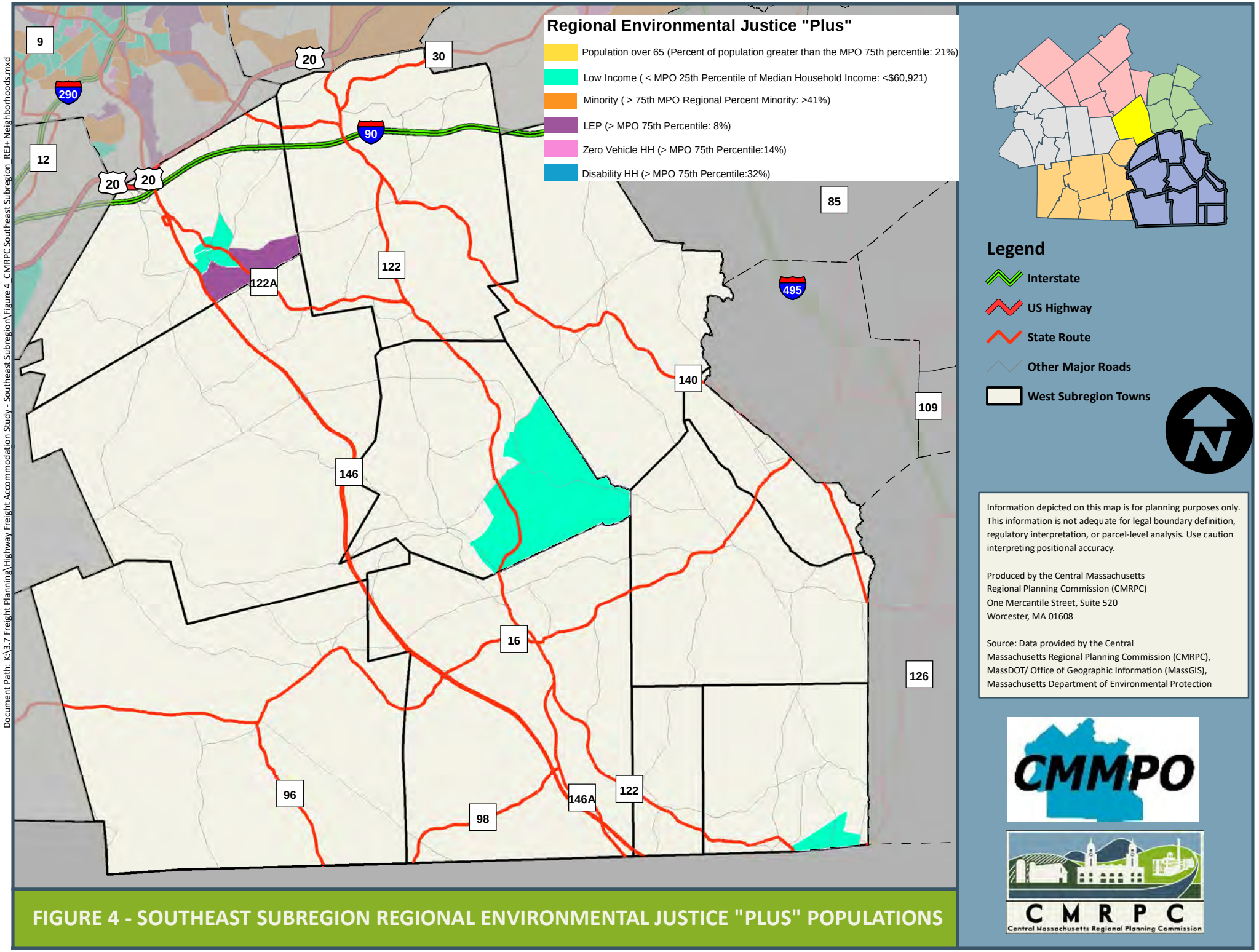
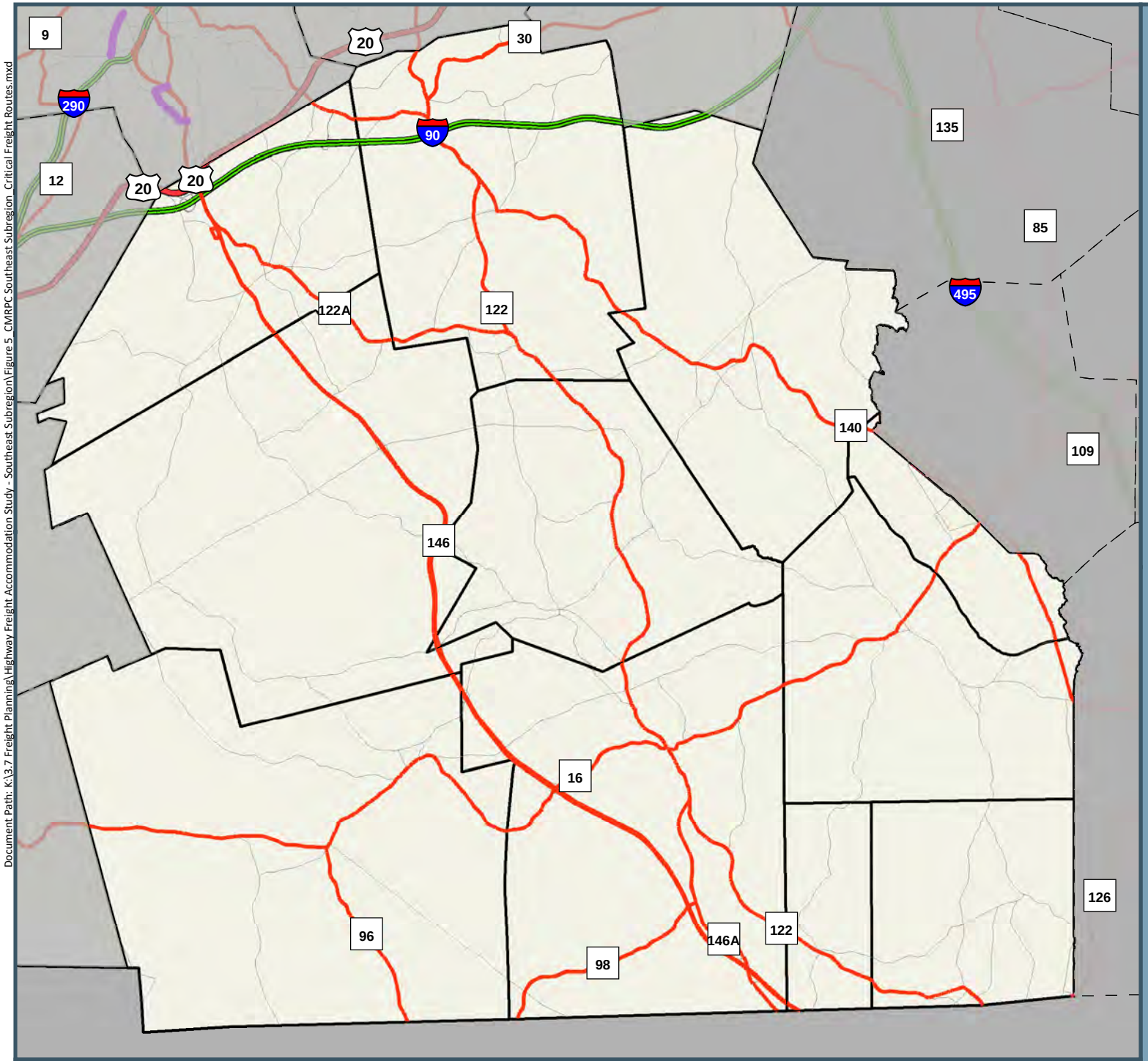
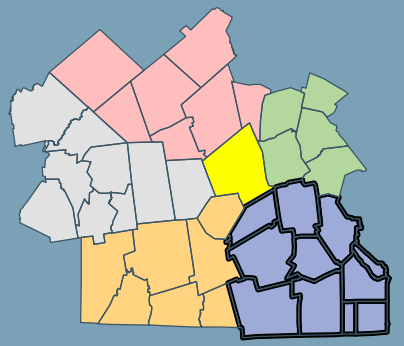


FIGURE 4 - SOUTHEAST SUBREGION REGIONAL ENVIRONMENTAL JUSTICE "PLUS" POPULATIONS

Critical Freight Corridors

As part of the development of the state's 2018 *Massachusetts Freight Plan*, the CMMPO staff took an active role, as requested by MassDOT Office of Transportation Planning (OTP), in designating "Critical Rural & Urban Freight Corridors". This exercise reaffirmed existing, previously designated routes, while also establishing other new major highway freight routes in the planning region connecting to the NHS. As requested by MassDOT OTP, staff completed the process of identifying (reaffirming in many cases) primary highway freight routes throughout the region, delineating between those roadways in the urban and rural areas. As part of this exercise, the region also needed to meet MassDOT OTP-allocated mileage parameters determined for each of the state's planning regions. The CMMPO region was allocated six (6) urban miles and 23 rural miles. As shown in **Figure 5**, there are no Critical Rural Freight Corridors within the Southeast planning subregion.





Legend

- Southeast Subregion Towns
- Critical Rural Freight Corridor
- **Interstate**
- **US Highway**
- **State Route**
- Other Major Roads

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FIGURE 5 - SOUTHEAST SUBREGION CRITICAL RURAL FREIGHT CORRIDORS

2.2 Transportation Improvement Program (TIP) Projects

The TIP is a federally-required planning document that lists all highway, bridge, transit, bicycle & pedestrian, and intermodal projects in the CMMPO's planning region that are programmed to receive federal-aid funding. Projects that improve air quality and safety are included in the TIP as well as projects of regional & statewide significance. Non federal-aid (NFA) projects, fully funded by the state, are also included for information purposes. Aware of limited statewide transportation funding resources, the CMMPO's annual program of projects must demonstrate financial constraint within the federal-aid funding targets provided by MassDOT OTP.

Table 3 lists the Southeast subregion's TIP projects that are programmed in the federal fiscal years 2024 – 2028. As can be seen in the table, there are thirteen (13) projects programmed for federal-aid funding in the Southeast subregion for a total of $97 million. There are three (3) roadway reconstruction projects, two (2) pavement projects, four (4) bridge projects, and one (1) project each for safe routes to school, safety improvements, culvert replacement, and intersection improvements.

Table 3

Central Mass Region TIP Projects (2024-2028)

Year	MassDOT Project ID	MPO	Municipality	MassDOT Project Description	District	Funding Source	Total Programmed Funds	Federal Funds	Non-Federal Funds	Other Information
Roadway Reconstruction										
2024	608171	Central Mass	Uxbridge	UXBRIDGE- RECONSTRUCTION OF ROUTE 122 (SOUTH MAIN STREET), FROM SUSAN PARKWAY TO ROUTE 16	3	STBG	$10,124,014	$8,099,211	$2,024,803	Construction, STBG + TAP Total Project Cost = $10,624,014, Design Status = 100%, PM Score = 11 out of 27
2024	608171	Central Mass	Uxbridge	UXBRIDGE- RECONSTRUCTION OF ROUTE 122 (SOUTH MAIN STREET), FROM SUSAN PARKWAY TO ROUTE 16	3	TAP	$500,000	$400,000	$100,000	Construction, STBG + TAP Total Project Cost = $10,624,014, Design Status = 100%, PM Score = 11 out of 27
Non-Interstate Pavement										
2024	612098	Central Mass	Multiple	UPTON- GRAFTON- RESURFACING AND RELATED WORK ON ROUTE 140	3	NHPP	$5,100,000	$4,080,000	$1,020,000	Construction, Total Project Cost = $5,100,000, Design Status = Approved
Bridge Off-system										
2024	608640	Central Mass	Multiple	SUTTON- GRAFTON- BRIDGE RECONSTRUCTION/REHABILITATION, S-33-004, DEPOT STREET OVER THE BLACKSTONE RIVER	3	STBG-BR-Off	$12,380,610	$9,904,488	$2,476,122	Construction, Total Project Cost = $12,380,610, Design Status = 75%
Safe Routes to School										
2024	609528	Central Mass	Grafton	GRAFTON- MILLBURY STREET IMPROVEMENTS (SRTS)	3	TAP	$1,931,230	$1,544,984	$386,246	Construction, Total Project Cost = $1,931,230, Design Status = 100%
Bridge Off-system Local NB										
2025	610769	Central Mass	Sutton	SUTTON- SUPERSTRUCTURE REPLACEMENT, S-33-002, MANCHAUG ROAD OVER MUMFORD RIVER	3	BROFF	$3,297,091	$3,297,091	$0	Construction, Total Project Cost = $3,297,091, Design Status = Approved, YOE = 4%
Non-Interstate Pavement										
2025	608490	Central Mass	Upton	UPTON- RESURFACING AND RELATED WORK ON ROUTE 140 AND ROUNDABOUT CONSTRUCTION AT ROUTE 140, CHURCH STREET AND GROVE STREET	3	NHPP	$8,050,057	$6,440,046	$1,610,011	Construction, Total Project Cost = $8,050,057, Design Status = 25%, YOE = 4%
Safety Improvements										
2025	610717	Central Mass	Multiple	UXBRIDGE TO WORCESTER- GUIDE AND TRAFFIC SIGN REPLACEMENT ON A SECTION OF ROUTE 146	3	HSIP	$5,987,696	$5,388,926	$598,770	Construction, Total Project Cost = $5,987,696, Design Status = Approved, YOE = 4%
Roadway Reconstruction										

Table 3

Central Mass Region TIP Projects (2024-2028)

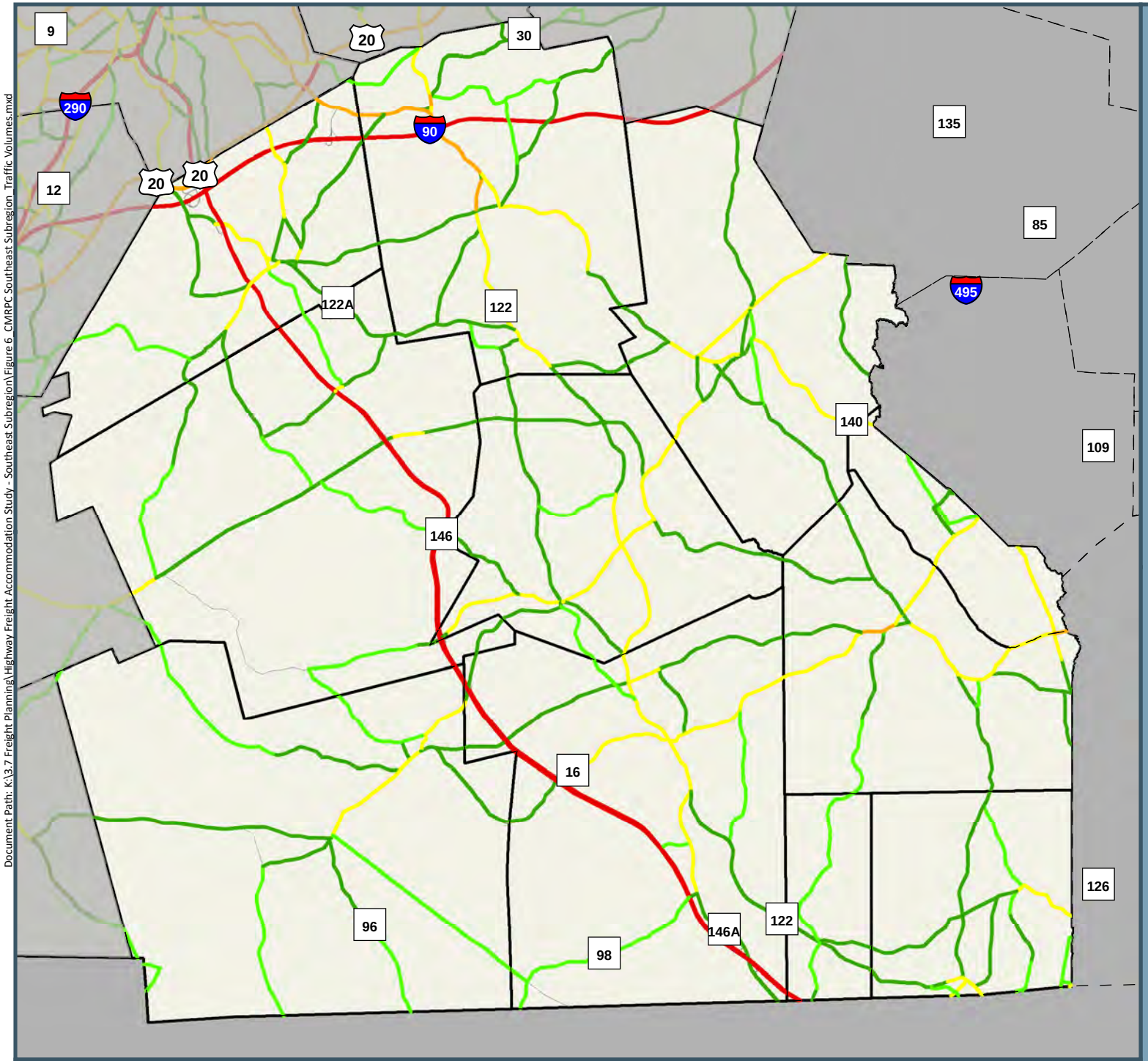
Year	MassDOT Project ID	MPO	Municipality	MassDOT Project Description	District	Funding Source	Total Programmed Funds	Federal Funds	Non-Federal Funds	Other Information
2025	608491	Central Mass	Mendon	MENDON- RESURFACING AND RELATED WORK ON ROUTE 16	3	NHPP	$25,726,097	$20,580,878	$5,145,219	Construction, Total Project Cost = $25,726,097, Design Status = 75%, YOE = 4%
Roadway Improvements										
2026	608456	Central Mass	Upton	UPTON- CULVERT REPLACEMENT, MILFORD STREET (ROUTE 140) OVER UNNAMED TRIBUTARY TO CENTER BROOK	3	STBG	$967,950	$774,360	$193,590	Construction, Total Project Score = $967,950, Design Status = Approved, YOE = 8%, PM Score = 9 out of 27
Intersection Improvements										
2026	609441	Central Mass	Northbridge	NORTHBRIDGE- INTERSECTION IMPROVEMENTS AT ROUTE 122 (PROVIDENCE ROAD), SCHOOL STREET, SUTTON STREET, AND UPTON STREET	3	HSIP	$2,980,800	$2,682,720	$298,080	Construction, Total Project Cost = $2,980,800, Design Status = Approved, YOE = 8%, PM Score = 16 out of 27
Bridge Off-system										
2026	612092	Central Mass	Uxbridge	UXBRIDGE- BRIDGE REPLACEMENT, U-02-051, HOMEWARD AVENUE OVER PROVIDENCE WORCESTER RAILROAD	3	STBG-BR-Off	$4,499,345	$3,599,476	$899,869	Construction, Total Project Cost = $4,499,345, Design Status = Approved, YOE = 8%
Bridge On-system Non-NHS										
2026	612510	Central Mass	Grafton	GRAFTON- BRIDGE REPLACEMENT, G-08-020, (SR 140) SHREWSBURY STREET OVER MBTA/CSX RAILROAD	3	NGBP	$8,731,165	$0	$8,731,165	Construction, Total Project Cost = $8,731,165, Design Status = Approved, YOE = 8%
Roadway Reconstruction										
2027	610931	Central Mass	Uxbridge	UXBRIDGE- REHABILITATION OF ROUTE 16 (DOUGLAS STREET), FROM TAFT HILL ROAD TO 200 FT WEST ON MAIN STREET	3	STBG	$7,000,672	$5,600,538	$1,400,134	Construction, Total Project Cost = $7,000,672, Design Status = Approved, YOE = 12%, PM Score = 13 out of 27

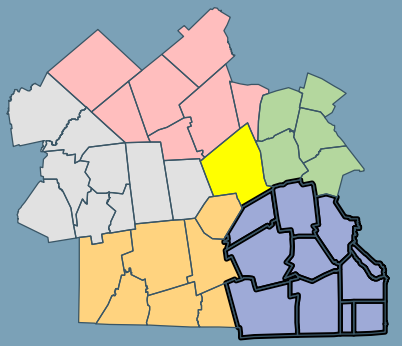
2.3 Traffic Volumes & Truck Percentages

CMRPC conducts mechanical traffic counts on numerous federal-aid highways within the Central Massachusetts planning region. The Automatic Traffic Recorders (ATRs) can collect volume data as well as vehicle classification data. Classification data is separated into 13 categories, established by FHWA, in which more than half of the categories can be considered a heavy vehicle. Heavy vehicle data is only available from 2016 to the present. As such, some of the federal-aid highways monitored by the planning staff have no vehicle classification data at this time. The most current 24-hour traffic volume data available for the federal-aid highways in the Southeast subregion are shown on the following maps.

Figure 6 shows the daily traffic volumes on the federal-aid highways within the Southeast subregion. Most State Numbered Routes and major roadways consist of volumes below 7,500 vehicles per day (VPD). US Route 20 and Routes 16, 122, 140, and 146A have numerous segments carrying over 7,500 VPD while Route 146 accommodates over 30,000 VPD. Notably, Interstate 90 (Massachusetts Turnpike), traversing the northern part of the subregion, carries well in excess of 80,000 VPD.

Figure 7 shows heavy vehicle volumes based on the thickness of the red line. The thicker the line, the higher the observed heavy vehicle volumes. As the map shows there are a number of highways where heavy vehicle volume data is not available at this time. The State Numbered Routes exceeding 1,000 heavy VPD are Route 122 in Millbury, Grafton, and Northbridge, Route 140 in Grafton and Mendon, and Route 16 in Douglas, Uxbridge, and Mendon. Additionally, other major roadways include Central Turnpike in Sutton, Gilboa Street in Douglas, and Hartford Avenue East in Mendon. Similar to the previous figure, **Figures 8 and 9** also show heavy vehicle volumes by direction of travel. The first map shows daily heavy vehicle volumes for the northbound and eastbound directions. The second map shows daily heavy vehicle volumes for the southbound and westbound directions. As can be seen, the heavy vehicle volumes are color-coded in four categories corresponding to the volume totals. In addition to volumes, **Figure 10** shows heavy vehicle volume percentages in the Southeast subregion. Observed percentages have been further separated into four categories, with the color red being the highest (>14%). Most highways where vehicle classification data is available range between 5% and 14% heavy vehicles. There are several roadway segments exceeding 14% in the towns of Millbury, Grafton, Sutton, Douglas, Uxbridge, and Millville.





Legend

- Southeast Subregion Towns
- < 2,500
- 2,500 - 7,499
- 7,499 - 14.999
- 14,999 - 30,000
- > 30,000

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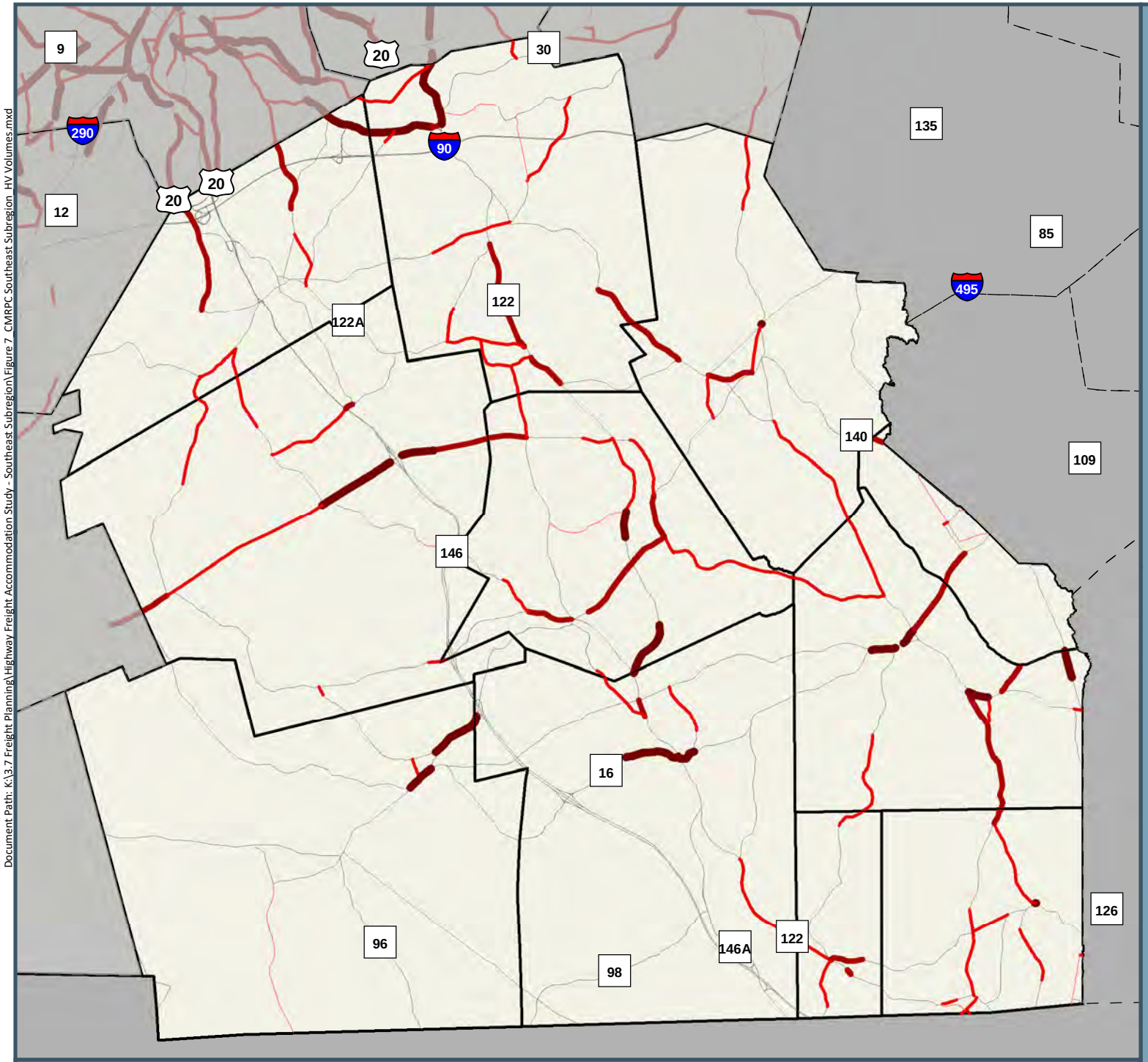
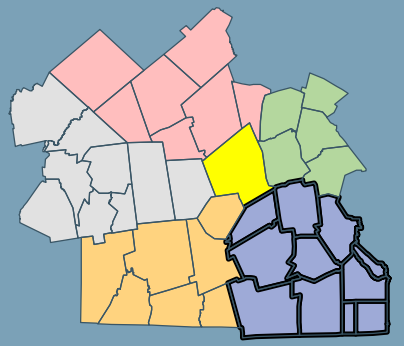
FIGURE 6 - SOUTHEAST SUBREGION TRAFFIC VOLUMES

Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 6_CMRPC Southeast Subregion_Traffic Volumes.mxd





Legend

- Southeast Subregion Towns
- 1 - 100
- 101 - 500
- 501 - 1,000
- > 1,000
- No Data

N

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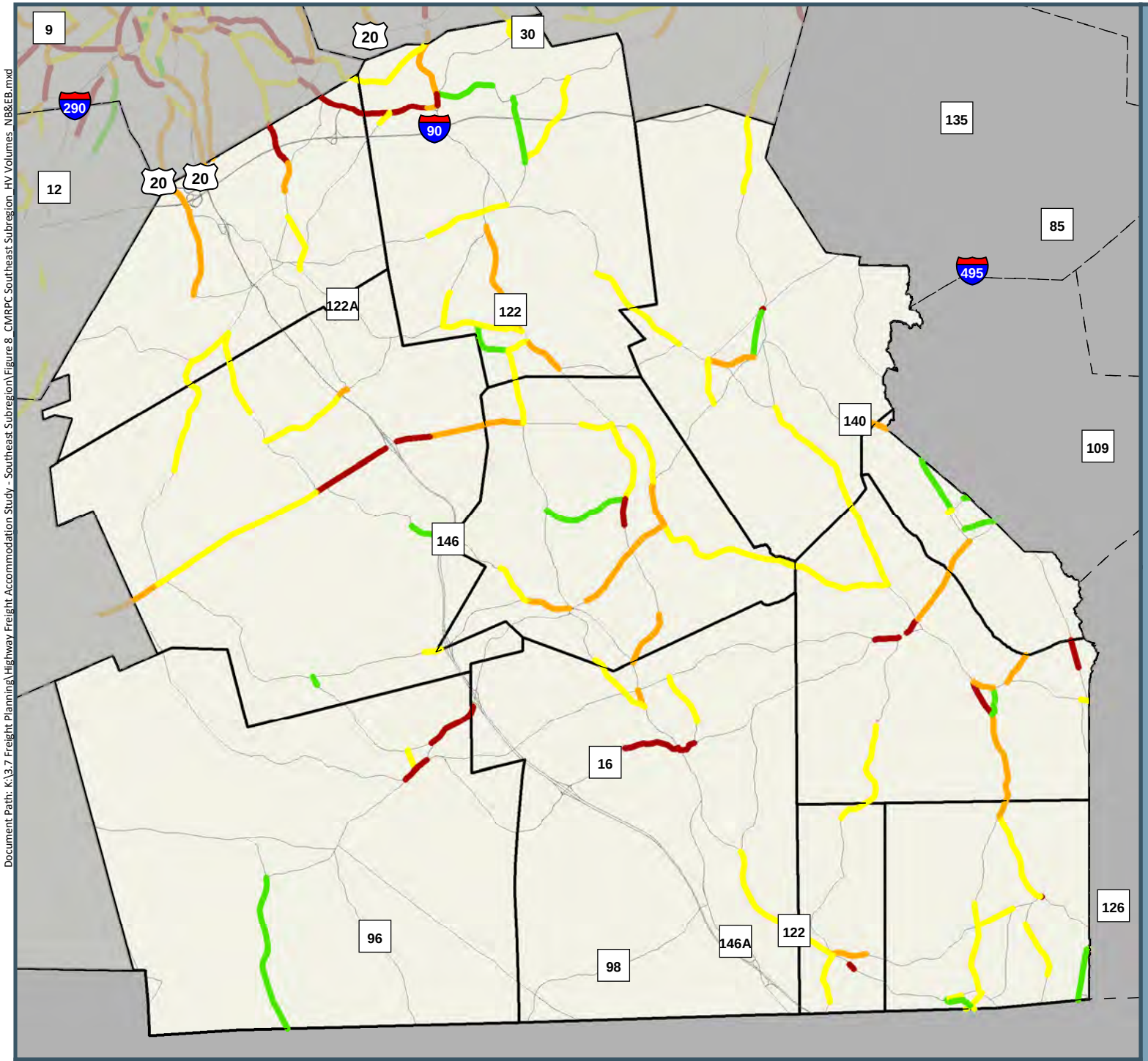
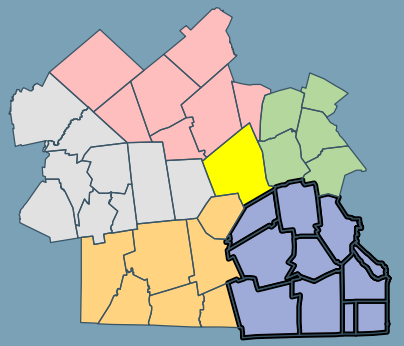
Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 7_CMRPC Southeast Subregion_HV Volumes.mxd

FIGURE 7 - SOUTHEAST SUBREGION HEAVY VEHICLE VOLUMES





Legend

- Southeast Subregion Towns
- 0 - 50
- 51 - 250
- 251 - 500
- > 500
- No Data

N

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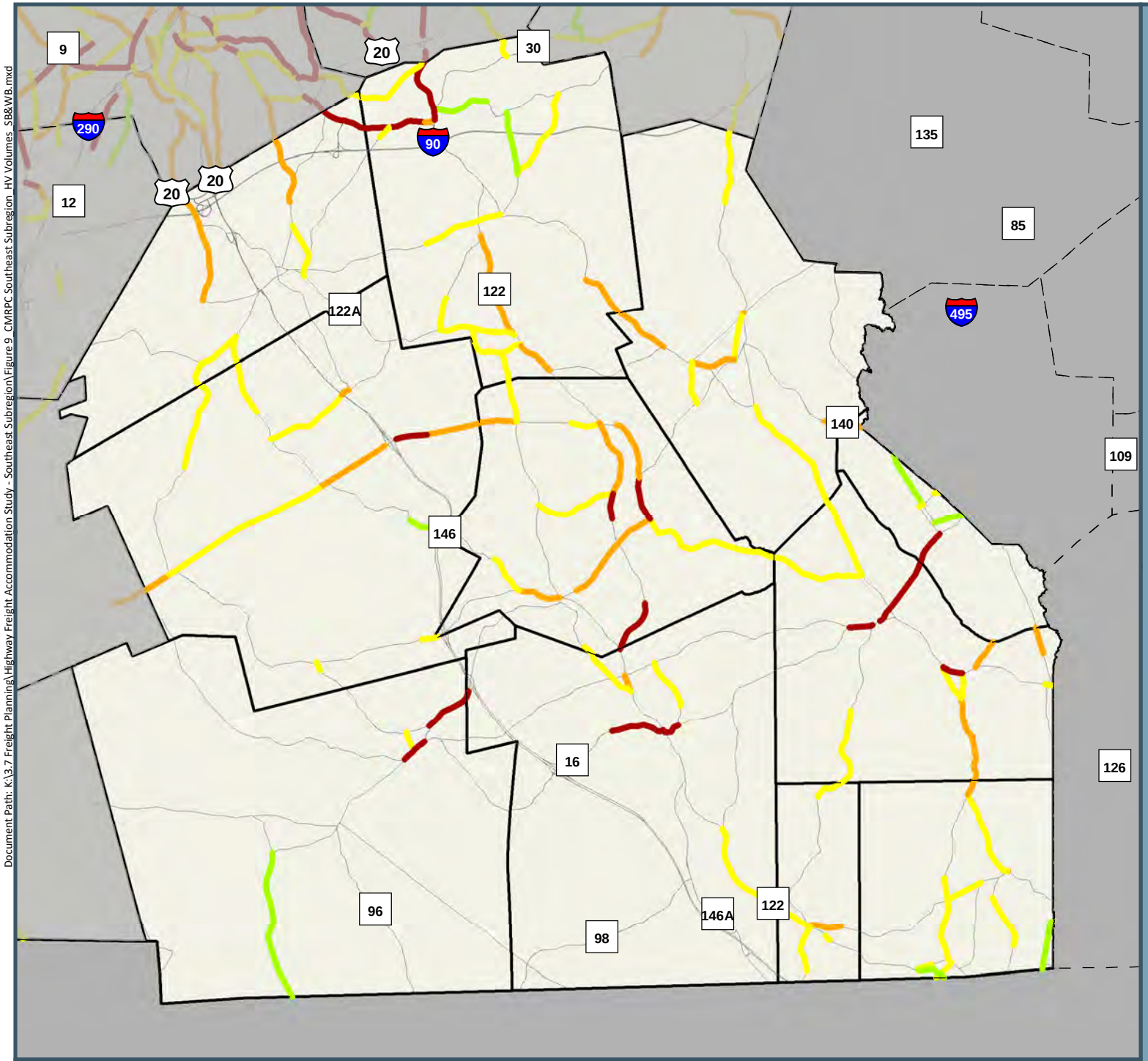
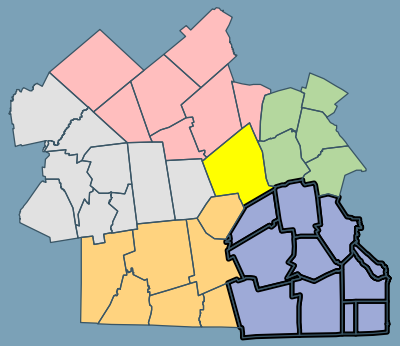
Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 8_CMRPC Southeast Subregion_HV Volumes_NB&EB.mxd

FIGURE 8 - SOUTHEAST SUBREGION HEAVY VEHICLE VOLUMES, NB/EB



Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 9_CMRPC Southeast Subregion_HV Volumes_SB&WB.mxd



Legend

- Southeast Subregion Towns
- 0 - 50
- 51 - 250
- 250 - 500
- > 500
- No Data

N

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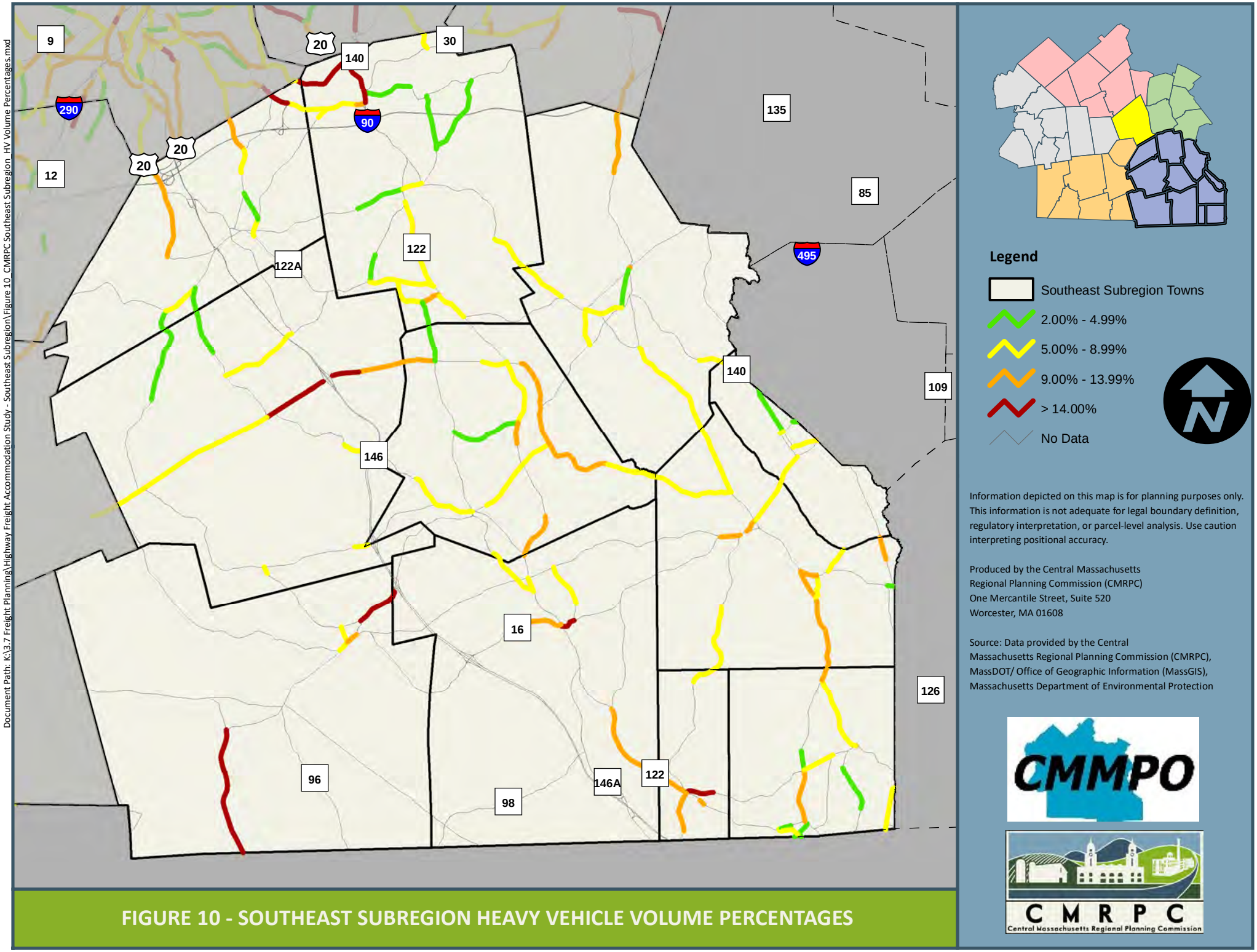
FIGURE 9 - SOUTHEAST SUBREGION HEAVY VEHICLE VOLUMES, SB/WB



Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 10_CMRPC Southeast Subregion_HV Volume Percentages.mxd

FIGURE 10 - SOUTHEAST SUBREGION HEAVY VEHICLE VOLUME PERCENTAGES

3.0 Host Community Management Systems Information

This section discusses the Management Systems data & analyses that is used for this study. Management Systems data includes congestion data such as highway travel speeds and intersection delays, safety data, pavement condition, traffic volumes and bridge conditions. These types of data are each considered separately but are also analyzed together within a data integration exercise, summarized at the end of this section. Knowing the specific highway segments that have multiple identified deficiencies greatly assists in the decision-making process concerning which to potentially improve first while also simultaneously addressing a range of identified issues.

3.1 Congestion Management Process (CMP)

A CMP is an accepted, systematic approach for managing network congestion that provides accurate and current information on transportation system performance and assesses alternate strategies for congestion management that meet both state and local needs. As defined in federal regulation, a planning region's CMP should provide for the safe and effective integrated management and operation of the multimodal transportation system. There are eight (8) recommended actions taken within a CMP, as follows:

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

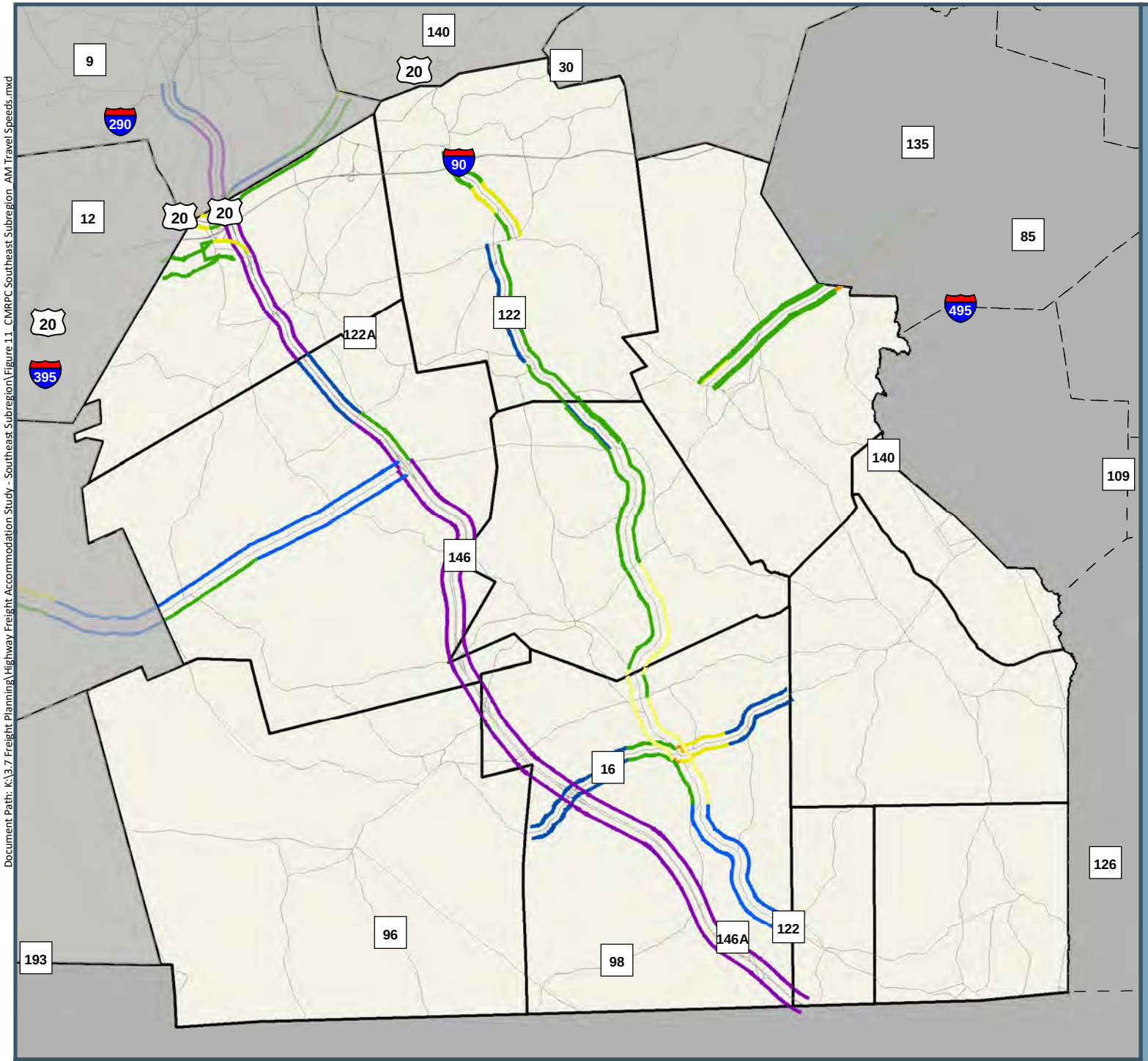
The CMP data included in this section are from both Travel Time & Delay studies and Turning Movement Counts (TMCs) conducted in the field.

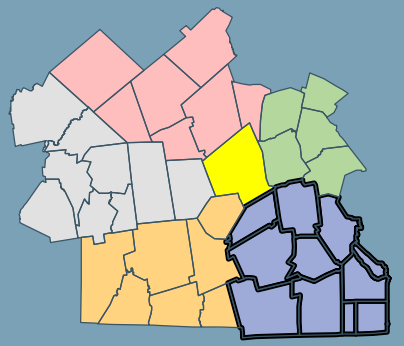
Roadway Segment Travel Speeds

In order to measure congestion on the planning region's highway facilities, Travel Time & Delay studies are periodically conducted on identified CMP focus roadway segments. Data is collected between 7:00 AM and 9:00 AM and from 4:00 PM to 6:00 PM on a single randomly selected weekday. In addition to determining average highway travel speeds, Travel Time &

Delay studies on a particular roadway segment assist in the identification of critical vehicle delay locations as well as length of encountered delays. The “average car” technique is used to collect this data. In this procedure to collect the needed data, a test vehicle travels according to the driver’s judgement of the average speed of existing traffic flows. A Global Positioning System (GPS) device allows for the automated collection of the travel time data.

The following two maps, **Figures 11 and 12**, show average travel speeds for the Southeast subregion in the AM and PM peak hours. Travel speeds are separated into six (6) categories and have been assigned different colors. The observed travel speeds are shown for both directions. Travel speed data was available for segments of Routes 16, US 20, 122, 140, and 146. As shown in both maps, there is a mixture of travels speeds during both the AM and PM peak periods.





Legend

- Southeast Subregion Towns
- < 10 mph
- 10 - 19 mph
- 20 - 29 mph
- 30 - 39 mph
- 40 - 49 mph
- > 49 mph

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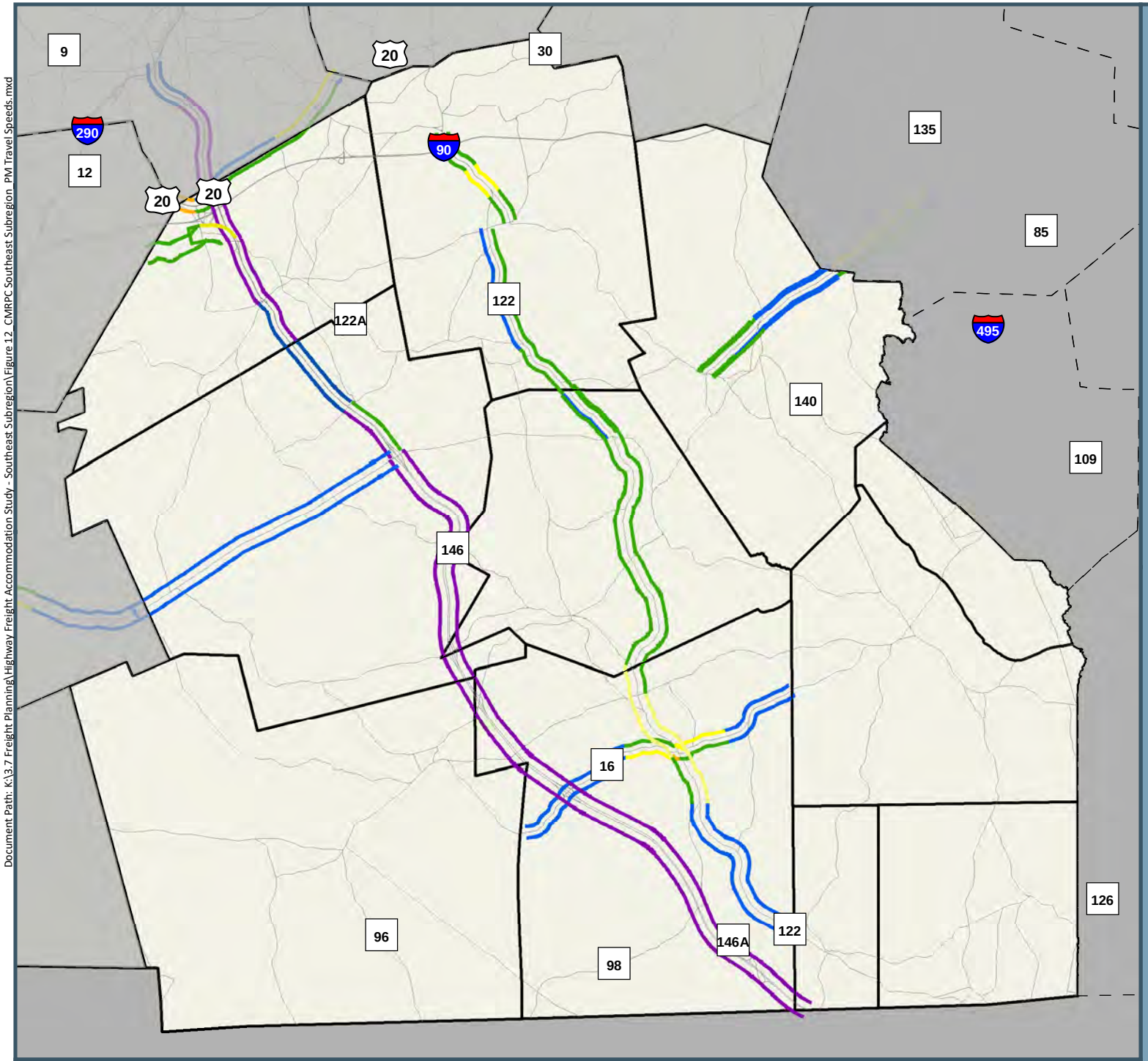
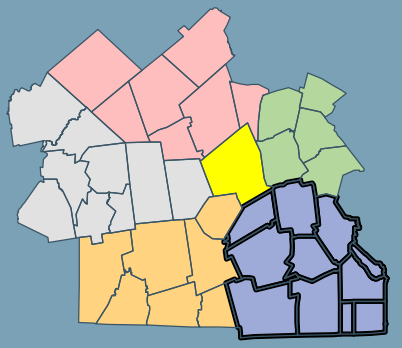
Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 11_CMRPC Southeast Subregion_AM Travel Speeds.mxd

FIGURE 11 - SOUTHEAST SUBREGION OBSERVED AM PEAK HOUR TRAVEL SPEEDS





Legend

- Southeast Subregion Towns
- < 10 mph
- 10 - 19 mph
- 20 - 29 mph
- 30 - 39 mph
- 40 - 49 mph
- > 49 mph

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Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 12_CMRPC Southeast Subregion_PM Travel Speeds.mxd

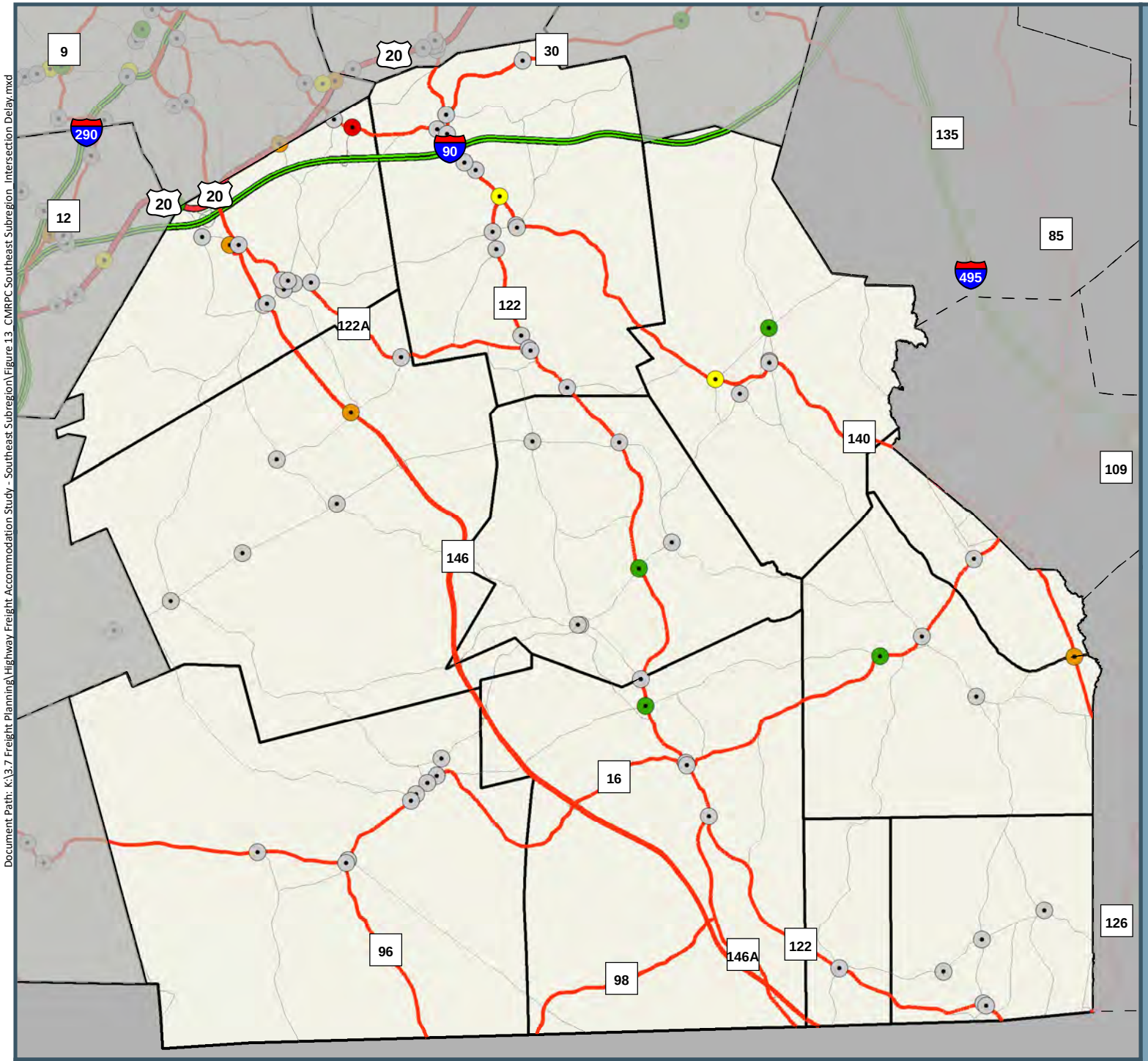
FIGURE 12 - SOUTHEAST SUBREGION OBSERVED PM PEAK HOUR TRAVEL SPEEDS

Intersection Encountered Delays

For all intersections where Turning Movement Counts (TMCs) are obtained, it is possible to analyze the total delay encountered during the examined peak hour travel periods. A byproduct of the process that results in intersection Level-of-Service (LOS) rankings is the "average delay encountered per entering vehicles". When multiplied by the number of vehicles to which the particular delay pertains, one can arrive at a total amount of delay, or time in "car-minutes". A car-minute is one car waiting for one minute, presumably idling and producing emissions as well as adding to total social and economic costs. Five cars waiting for a minute each, or one car waiting for a total of five minutes, results in the same theoretical total waiting time cost and would be measured and quantified by a total net delay of five car-minutes.

Signalized intersections have calculated delays of varying levels on all approaches. "STOP" sign-controlled intersections have delay calculated only for those vehicles arriving on the minor approaches that are required to stop as well as those vehicles on the major approaches waiting to make a left turn. Generally, signalized intersections often exhibit more total delay, however, a busy stop-controlled location (that may not presently meet the warrants for signalization) can exhibit substantial delays if volumes on both minor approaches predominately seek to cross the major approaches. Traffic signals establish orderly traffic flows and increase safety by providing the opportunity for traffic volumes to proceed on both the major and minor intersection approaches, thus balancing encountered vehicle delay. When two heavily traveled streets cross at a major signalized intersection, significant delays often result due to the high traffic volumes that need to be accommodated. Once intersection traffic signal operations are optimized, geometric improvements could potentially be considered, such as the addition of exclusive and/or shared turning lanes.

All eleven (11) of the Southeast subregion host communities have at least one critical intersection that was analyzed. Data has been collected for these intersections from 2010 to the present. If a location was counted multiple years, then the most recent data was used. **Figure 13** shows the Southeast subregion's identified critical intersections in five categories. Most of the intersections are within the lowest category, which have less than 1,525 "car-minutes" of total delay. There are two (2) intersections that have more than 2,500 car-minutes of delay. These intersections are within the towns of Grafton and Upton. There are also three (3) intersections in the Southeast subregion that have over 7,500 car-minutes of delay, one (1) each in the towns of Mendon, Millbury, and Webster. Lastly, the Route 122/I-90 (MassPike) ramps in Millbury exhibit the most total delay with over 10,000 car-minutes.



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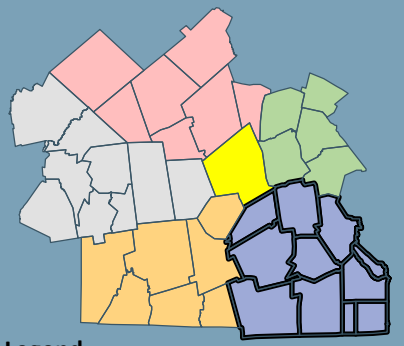

Legend

Southeast Subregion Towns

TotalDelay in Minutes

- 7 - 1,525
- 1,525 - 2,500
- 2,500 - 7,500
- 7,500 - 10,000
- > 10,000

N

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FIGURE 13 - SOUTHEAST SUBREGION ENCOUNTERED DELAY AT CRITICAL INTERSECTIONS

3.2 Safety Management System (SMS)

Vehicle crash data is provided by MassDOT through their web-based crash report tool "IMPACT". MassDOT's Registry of Motor Vehicles (RMV) branch provides the crash records incorporated into the IMPACT website. Notably, a quality control analysis is conducted on all crash records. Besides individual crashes, "crash clusters" that are indicative of numerous reported incidents are also identified for vehicles, bicycles, and pedestrians.

Highway Safety Improvement Program (HSIP) Locations

The purpose of FHWA's HSIP is to reduce the number of fatal and serious injury vehicle crashes by targeting high vehicle crash locations and causes on all public roads. Projects using HSIP funding are required to be data-driven, strategic approaches to improving highway safety that focus on system performance. An overarching requirement is that federal-aid HSIP funds must be used for safety projects that are consistent with MassDOT's established Strategic Highway Safety Plan (SHSP). Such projects are meant to address identified highway safety problems by correcting or improving a hazardous roadway location or feature.

An HSIP-eligible crash cluster is one in which the total number of Equivalent Property Damage Only (EPDO) crashes are within the top 5% in the planning region. The EPDO is a method of combining the number of crashes along with the severity of those crashes based on a weighted scale. Prior to 2016, the weighting factors used were as follows: a fatal crash was worth 10, an injury crash was worth 5 and a property damage-only crash was worth 1. Beginning in 2016, the weighting factors were updated so that fatal and injury crashes are now both worth 21 while a property damage-only crash continues to be worth 1.

As shown in **Figure 14**, there are five (5) HSIP crash clusters in the Southeast subregion identified between 2017 - 2019. There are crash clusters located in four (4) of the Southeast host communities. Northbridge has two (2) HSIP eligible locations while the towns of Mendon, Sutton, and Uxbridge each have one (1). All five (5) HSIP locations are located on State Numbered Routes. The HSIP cluster with the most crashes is the Route 146 & Boston Road intersection in Sutton, with a total of 48 reported incidents.

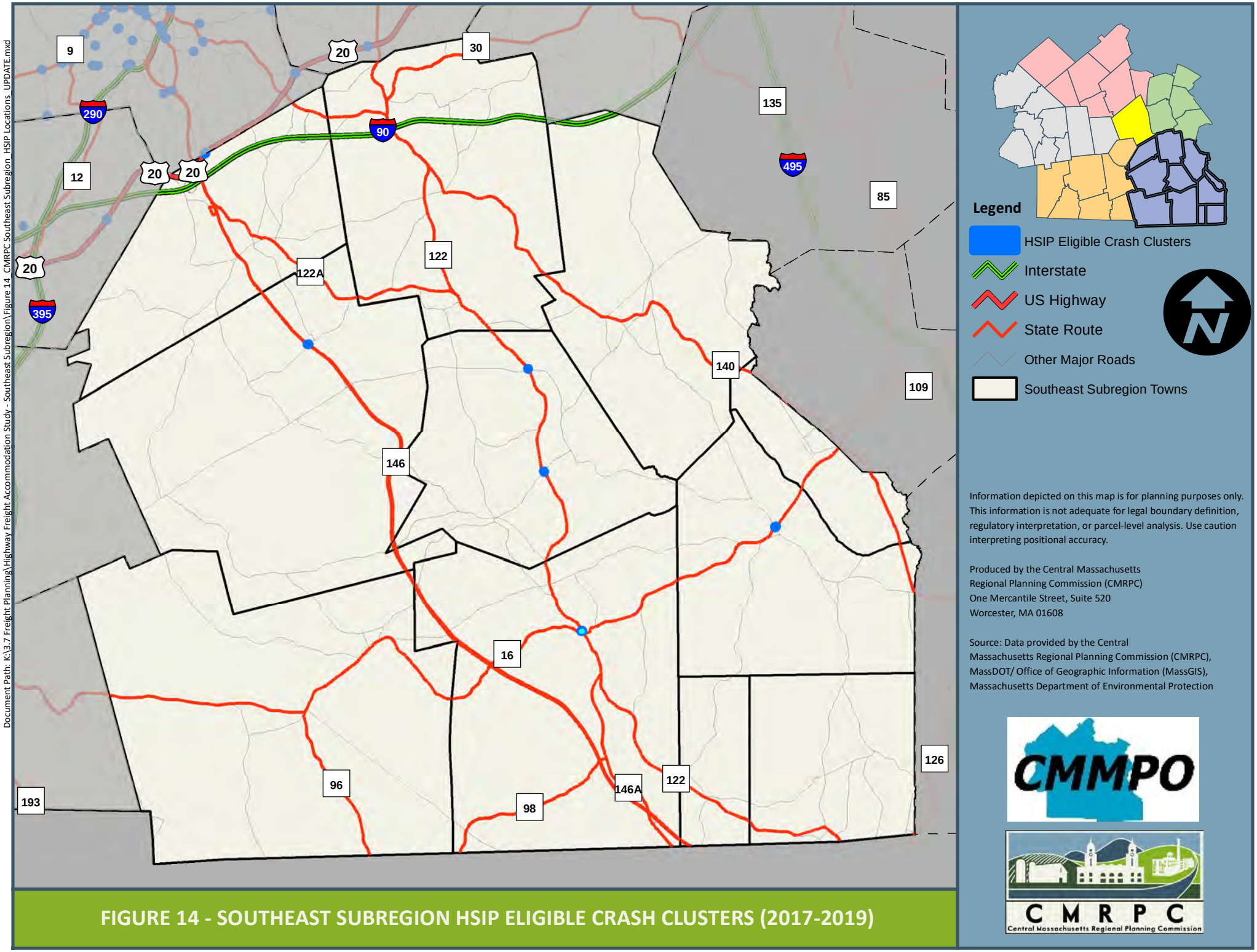


FIGURE 14 - SOUTHEAST SUBREGION HSIP ELIGIBLE CRASH CLUSTERS (2017-2019)

3.3 Pavement Management System (PMS)

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 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 (local, state, or federal) for maintaining the defined roadway network. CMRPC uses *Cartegraph*, a software package developed and supported by Cartegraph Systems Incorporated, for the CMMPO's ongoing pavement management program to assess overall pavement condition in the planning region.

Pavement data has been collected on all federal-aid eligible roadways by conducting "windshield surveys." A team of two CMRPC representatives inspect each roadway segment, 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

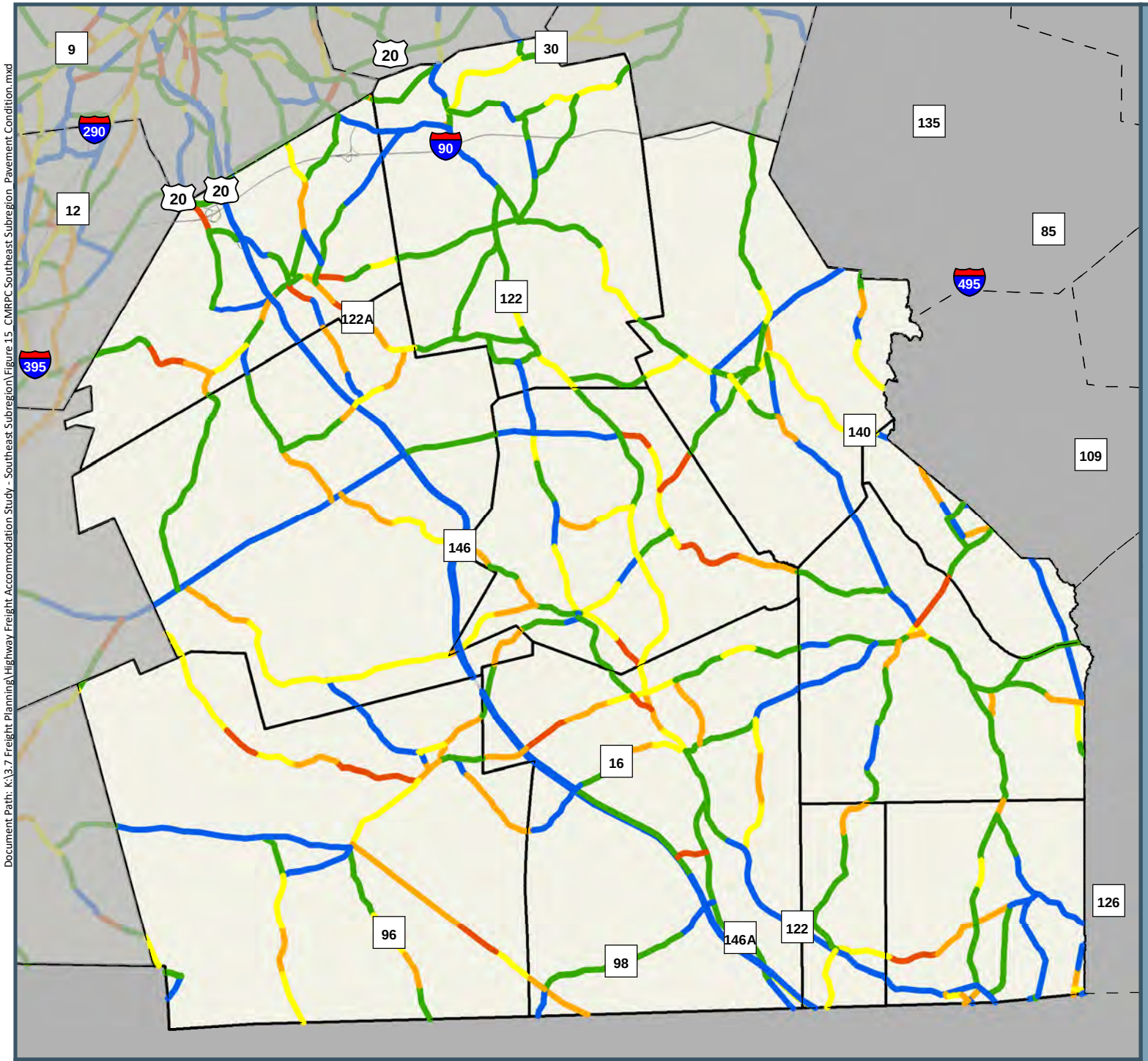
Based on the field-observed pavement distresses, an Overall Condition Index (OCI) was calculated for each surveyed roadway segment. The OCI is used to rate each segment on a scale of 0 to 100. An OCI of 100 indicates optimal pavement conditions, usually a newly paved roadway segment. Conversely, a score of 0 indicates that a roadway has failed entirely and is likely impassable for an average passenger vehicle. Starting at the 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 listed above. The resulting OCI is a quantified rating of observed pavement condition.

Depending on the OCI score, *Cartegraph's* recommended action category definitions are as follows:

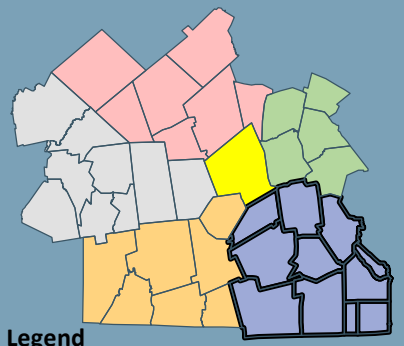
- Do Nothing (OCI 100 – 88) – used when a road is in relatively perfect condition and prescribes no maintenance.

- Routine Maintenance (OCI 88 – 68, good condition) – 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, localized repair, or minor localized leveling.
- Preventative Maintenance (OCI 68 – 48) – used on roads in fair condition that have a 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) – used on poor roads 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 planning and overlay, and hot in-place recycling.
- Base Rehabilitation (OCI 24 – 0) – used for very poor roads that exhibit weakened pavement foundation base layers. Complete reconstruction and full-depth reclamation are indicated.

Figure 15 shows the observed pavement condition on the federal-aid highways in the Southeast subregion. As shown on the map, all roadways have been analyzed except for Interstates, which is the exclusive responsibility of MassDOT. Most communities in the Southeast planning subregion have roadway segments observed to be in both “poor” or “very poor” condition. Overall, however, most roadways in the Southeast subregion were determined to be in “fair” condition or better.



Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 15_CMRPC Southeast Subregion_Pavement Condition.mxd



Legend

- Very Poor
- Poor
- Fair
- Good
- Excellent
- No Data
- Southeast Subregion Towns

N

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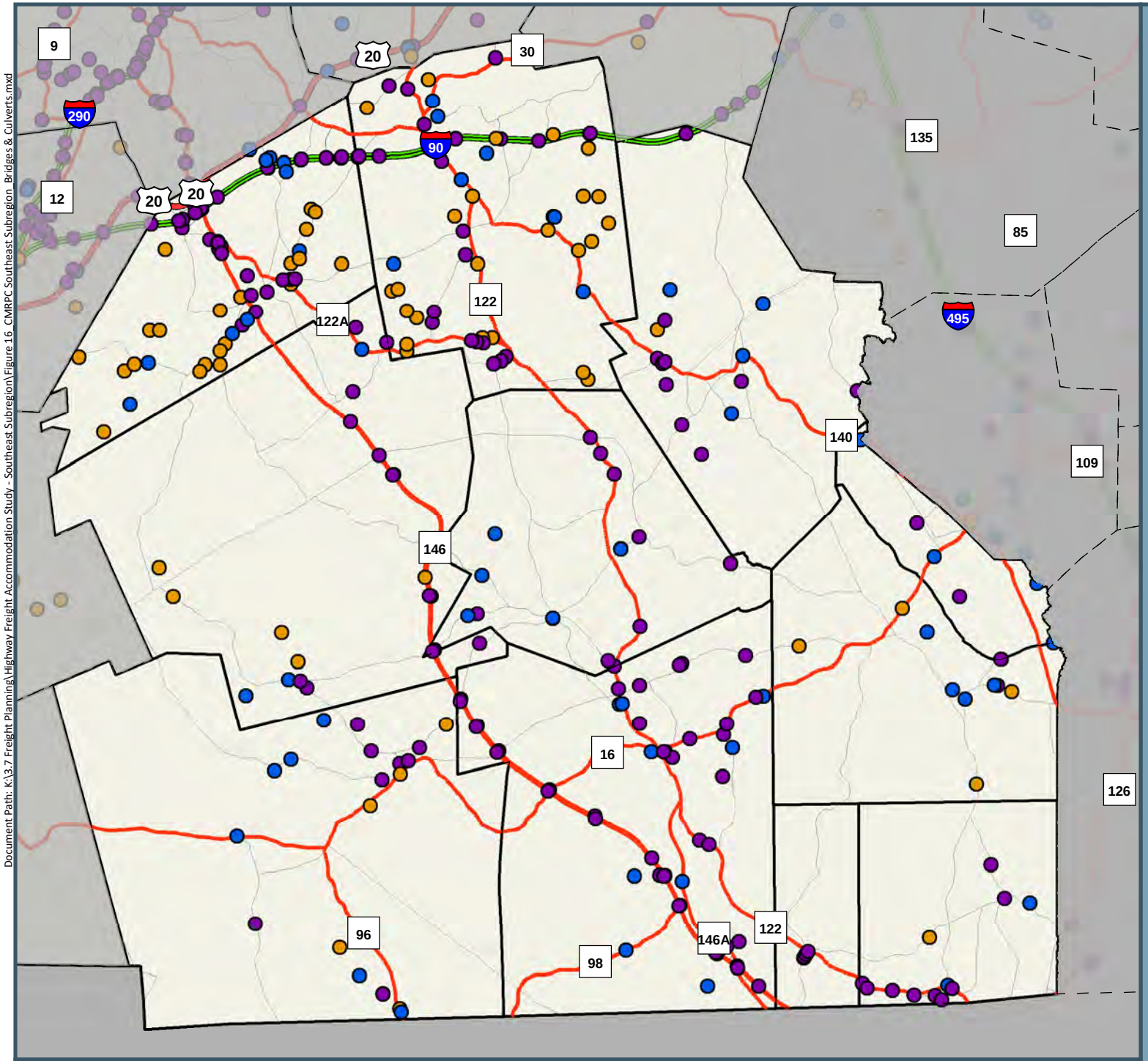
FIGURE 15 - SOUTHEAST SUBREGION PAVEMENT CONDITION

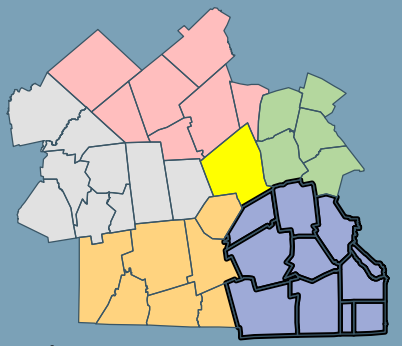
3.4 Bridge Management System (BMS) and Culverts

Figure 16 contains bridge data from the MassDOT – Highway Division Bridge Inspection Management System (BIMS). The types of structures included in the BIMS are:

- MassDOT Highway and municipally owned structures with spans greater than 20 feet. These are categorized as National Bridge Inventory (NBI) structures. MassDOT inspects NBI bridges on a biannual basis.
- MassDOT Highway and municipally owned short span bridges with spans between 10 and 20 feet. *The first complete inspection of the short span bridge inventory is currently in progress.*
- MassDOT Highway and municipally owned culverts with spans of 4 to 10 feet. *This category is currently incomplete and an inventory effort is now underway.*

There are a total of 292 bridges and culverts in the Southeast planning subregion. 88 of the total bridges and culverts are on State Numbered Routes. Additionally, there are 20 structures that are considered Structurally Deficient, however, only one (1) is situated on a State Numbered Route. A Structurally Deficient bridge is defined as a bridge whose condition has been rated no better than poor in any of these five areas: bridge deck, superstructures, substructures, culverts, and retaining walls. The host community of Millbury has the most structures overall with a total of 67 – some on the Interstate System - while the host community of Uxbridge has the most structures on State Numbered Routes with a total of 28.





Legend

- Bridge (NBI)
- Short Span Bridge
- Culvert
- **Interstate**
- **US Highway**
- **State Route**
- Other Major Roads
- Southeast Subregion Towns

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FIGURE 16 - SOUTHEAST SUBREGION BRIDGES AND CULVERTS

3.5 Management Systems Data Integration

Potential priorities for the Southeast planning subregion have been screened using a Management Systems approach, resulting in the identification of several highway segments that demonstrate the greatest need for improvement. The highway segments used in the integration analyses are based on staff's previously defined pavement data collection segments. These segments are usually less than one-mile in length and are between two selected minor streets. All available data were analyzed based on these defined segments. The Management Systems integration approach combines the data related to congestion, safety, traffic volume, pavement condition, freight movement, intersection delays, and bridges to define "hot spots" within the Southeast subregion. The Management Systems data was analyzed to create corresponding scores based on the pre-determined criteria. **Table 4** summarizes the scoring method used for the highway segments.

Table 4 – Management Systems Analysis Scoring Criteria

Management System	Type of Data Used	Scoring Criteria	Points
Congestion	CMRPC Travel Demand Model	Segment is Congested	5 points
		Segment is not Congested	0 points
Safety	MassDOT Crash Data (2017-2019)	Segment has a Fatality	5 points
		Segment has an Injury	3 points
		Segment has a Property Damage-Only Crash	1 point
Traffic Volume	CMRPC Traffic Count Data	>20,000 VPD	5 points
		10,000 – 20,000 VPD	3 points
		<10,000 VPD	1 point
Pavement Condition	CMRPC Pavement Data	Segment is rated Very Poor	5 points
		Segment is rated Poor	3 points
		Segment is rated Fair	1 point
Freight	CMRPC Traffic Count Data	>1,000 Heavy Vehicles Per Day	5 points
		500 – 1,000 Heavy Vehicles Per Day	3 points
Freight Routes	Critical Freight Corridors	Segment is a Defined Critical Freight Corridor	3 points
Intersection Delays	CMRPC TMC Data	>7,500 Minutes of Total Delay	5 points
		1,525 – 7,500 Minutes of Total Delay	3 points

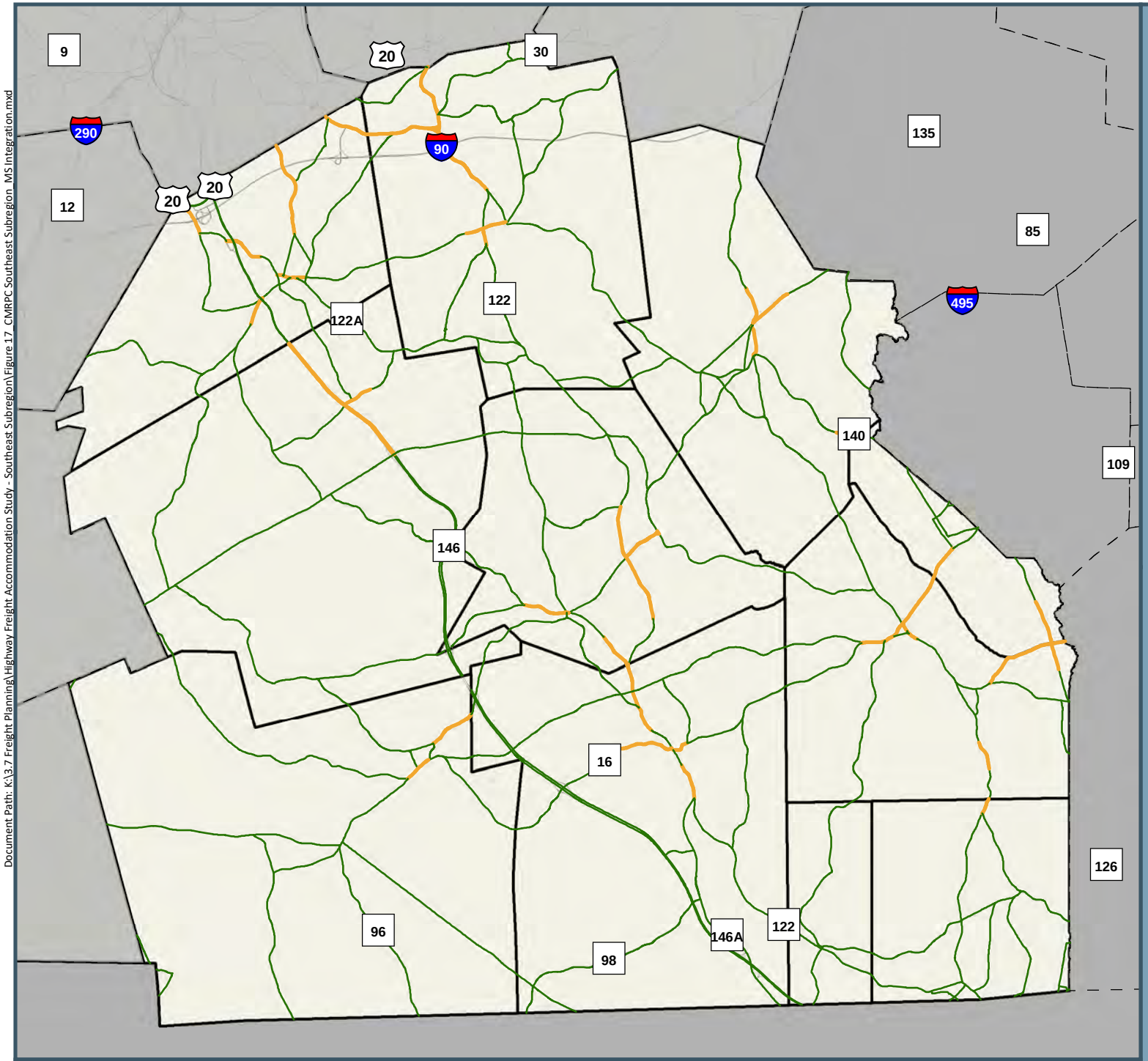
Management System	Type of Data Used	Scoring Criteria	Points
		<1,525 Minutes of Total Delay	1 point
Bridges	MassDOT Bridge Data	Segment has a Structurally Deficient or Weight-Restricted Posted Bridge	3 points

Based on the above scoring criteria, **Figure 17** shows the highway segment Management System integration results in three (3) categories. Tier 1 segments are considered "high priority", Tier 2 segments are considered "medium priority", and Tier 3 segments are "low priority". As the map shows, there are no identified Tier 1 highway segments in the Southeast planning subregion. Corresponding to the map, Tier 2 roadway segments are listed in **Table 5**. While there are no Tier 1 segments, there are a total of 50 Tier 2 highway segments that have been identified in the Southeast subregion. 30 of the 50 Tier 2 highway segments are located on State Routes 16, 122, 122A, 140, and 146. The towns of Grafton and Mendon have the most Tier 2 segments with a total of 9 each. The town of Millville is the only community without an identified Tier 2 segment.

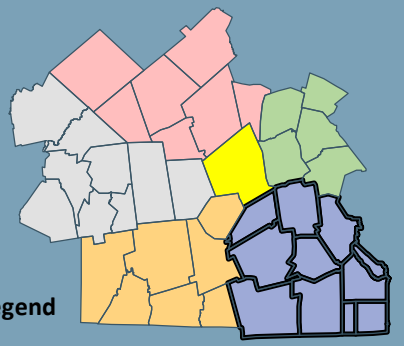
Table 5 – Management Systems Tier 2 Roadway Segments

Community	Roadway	From	To	Total Points
Uxbridge	N Main St (122)	Northbridge TL	Hartford Ave West	23
Mendon	Cape Rd (140)	Hopedale TL	Bates St	21
Millbury	Grafton Rd (122)	Worcester CL	Grafton TL	21
Mendon	Milford Rd (16)	North Ave	41 Milford Rd	20
Uxbridge	N Main St (122)	Hartford Ave West	Hazel St	20
Mendon	Milford Rd (16)	41 Milford Rd	Hopedale TL	19
Mendon	Uxbridge Rd (16)	Washington St	Hartford Ave West	19
Millbury	Main St (122A)	Martin St	McCracken Rd	19
Upton	Hopkinton Rd	High St	Cider Mill Ln	19
Grafton	N Main St (140)	Shrewsbury St (140)	Worcester St (122)	17
Mendon	Hastings St (16)	North Ave	Washington St	17
Millbury	Millbury Ave	Howe Ave	Wheelock Ave	17
Millbury	Millbury Ave	Wheelock Ave	Worcester CL	17
Northbridge	Church St	Quaker St	Providence St (122)	17
Uxbridge	Mendon St (16)	N Main St (122)	Oak St	17
Grafton	Shrewsbury St (140)	Shrewsbury TL	N Main St (140)	16
Grafton	Worcester St (122)	Deernolm St	N Main St (140)	16

Community	Roadway	From	To	Total Points
Grafton	Worcester St (122)	Millbury TL	Deernolm St	16
Hopedale	S Main St (140)	Mellen St	Mendon TL	16
Mendon	Hartford Ave East	Talbot Farm Rd	Bellingham TL	16
Blackston	Blackstone St	Mendon TL	Elm St	15
Douglas	Gilboa St	Uxbridge TL	North St	15
Douglas	Main St (16)	North St	West St	15
Grafton	Bridge St	Worcester St (122)	Shrewsbury St (140)	15
Grafton	Providence Rd (122)	Millbury St	Pleasant St	15
Hopedale	Mendon St (16)	Hopedale St	Mendon TL	15
Millbury	W Main St	Linwood Ave	N Main St	15
Northbridge	Main St	Linwood Ave	N Main St	15
Mendon	Hartford Ave East	Bellingham St	Talbot Farm Rd	14
Mendon	Providence Rd	Massasoit Way	Deer Hill Rd	14
Northbridge	Providence Rd (122)	Church St	Union St	14
Uxbridge	Douglas St (16)	Hunter Rd	Cold Spring Dr	14
Grafton	Worcester St (122/140)	N Main St (140)	Snow Rd	13
Grafton	Worcester St (122/140)	Snow Rd	Providence Rd (122)	13
Grafton	Millbury St	Worcester St (140)	Hudson Ave	13
Mendon	Main St	Milford Rd	George St	13
Millbury	Canal St (122A)	Main St	Riverlin St	13
Millbury	Greenwood St	Worcester CL	McCracken Rd	13
Northbridge	Linwood Ave	Uxbridge TL	Harringa Ave	13
Northbridge	Providence Rd (122)	Benson Rd	Church St	13
Sutton	Route 146 NB	Boston Rd	Millbury TL	13
Sutton	Route 146 SB	Millbury TL	Boston Rd	13
Sutton	Route 146 SB	Boston Rd	Central Tnpk	13
Sutton	Route 146 NB	Central Tnpk	Boston Rd	13
Sutton	Boston Rd	Route 146	Button Wood Ave	13
Upton	N Main St	Grove St	School St	13
Upton	Milford St (140)	Chestnut St	Hopedale TL	13
Upton	Westboro	Hopkinton Rd	72 Westboro Rd	13
Uxbridge	S Main St (122)	McCaffrey St	Route 146A	13
Uxbridge	Douglas St (16)	Court St	Hunter Rd	13



Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 17_CMRPC Southeast Subregion_MS Integration.mxd



Legend

Total

- Tier 3 = 1 - 12 points
- Tier 2 = 13 - 24 points
- Tier 1 = 25 - 36 points
- Southeast Subregion Towns

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FIGURE 17 - SOUTHEAST SUBREGION MANAGEMENT SYSTEMS DATA INTEGRATION

4.0 Other Major Considerations

This section of the *Southeast Subregion Highway Freight Accommodation Study* covers a range of other considerations that assist in the decision-making process of where to potentially apply future-year federal-aid improvement funding. Following federal Performance Management requirements, Truck Travel Time Reliability (TTTR) in the planning region is summarized and a comparison is made between statewide MassDOT TTTR targets and the conditions observed in the planning region. Next, a series of Environmental Consultation maps are provided concerning the critical natural features in the Southeast subregion. Findings extracted from the established Municipal Vulnerability Preparedness (MVP) programs for each host community are also reviewed. The trucking-centric findings of the regional Travel Demand Model, a computer simulation of the network of highways in the Southwest subregion, are then summarized. Both existing and future benchmark year truck volumes have been estimated by the Model, as well as potential future-year "bottleneck" highway segments.

4.1 Performance Management

Performance-Based Planning and Programming (PBPP) refers to a transportation agency's application of performance management in their ongoing planning and programming activities. The foundation of PBPP was initially federally-legislated through Moving Ahead for Progress in the 21st Century (MAP-21) and reaffirmed in the recent Bipartisan Infrastructure Law (BIL). These Acts transformed the federal-aid highway program by establishing new requirements for performance management to ensure the most efficient investment of federal transportation funds that support the following seven National Goals:

1. Safety
2. Infrastructure Condition
3. Congestion Reduction
4. System Reliability
5. Freight Movement and Economic Activity
6. Environmental Sustainability
7. Reduced Project Delays

The CMMPO's PBPP process is shaped by both federal transportation performance management requirements and the MPO's regional goals and objectives. These locally-customized goals and objectives have been integrated through each of the federally-established "Planning Emphasis Areas" when developing transportation plans and projects. By addressing the defined emphasis areas in all areas of the transportation planning process, the CMMPO is able to create more balanced and holistic transportation projects and corresponding policy for

the region. Likewise, the goal of PBPP is to ensure that transportation investment decisions – both long-term planning and short-term programming – are based on the ability to meet the established goals.

The following summary covers the federally-required performance measure related to freight.

Truck Travel Time Reliability (TTTR)

TTTR is the amount of time it takes trucks to drive the length of a highway segment. This measure is only calculated on the Interstate System. The following methodology is applied to determine TTTR for various times of the day:

1. Calculate the travel times from the five time periods used in this measure (shown in **Figure 18**)
2. Find and calculate the TTTR ratio from the 50th and 95th percentile times for each time period
3. The TTTR Index is generated by multiplying each highway segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of Interstate.

Figure 18

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

MassDOT TTTR Targets and CMMPO Comparison

MassDOT followed FHWA regulation in measuring TTTR on the Interstate System using the NPMRDS provided by FHWA. These performance measures aim to identify the predictability of travel times on the major highway network by comparing the average travel time along a given segment against longer travel times. **Table 6** shows the annual TTTR ratio results from 2017 to 2022 for both statewide and CMMPO region. The 2-year (2024) and 4-year (2026) LOTTR targets for the Interstate system are also shown. The first performance period target (2022) is also included for comparison. The TTTR ratio in 2020 is well below the previous three (3) years of data due to the COVID-19 pandemic as people were either required to stay at home and/or work from home, which generated far less vehicles on the Interstate System. The following

statewide and CMMPO Interstate and Non-Interstate percentages are from the Probe Data Analytics Suite of the Regional Integrated Transportation Information System (RITIS) website. The CMMPO region includes I-90 (Massachusetts Turnpike), I-190, I-290 and I-395. Only I-90 travels through a part of the Southeast planning subregion.

Table 6 – Annual TTTR Ratio Results for Statewide & CMMPO Interstates

Year	Statewide Interstate TTTR Ratio	CMMPO Interstate TTTR Ratio	Interstate TTTR Target		
			2022	2024	2026
2017	1.81	1.71	1.85	1.80	1.75
2018	1.88	1.79			
2019	1.84	1.77			
2020*	1.44	1.22			
2021	1.61	1.59			
2022	1.71	1.61			

**COVID-19 pandemic occurred during 2020*

4.2 Environmental Consultation

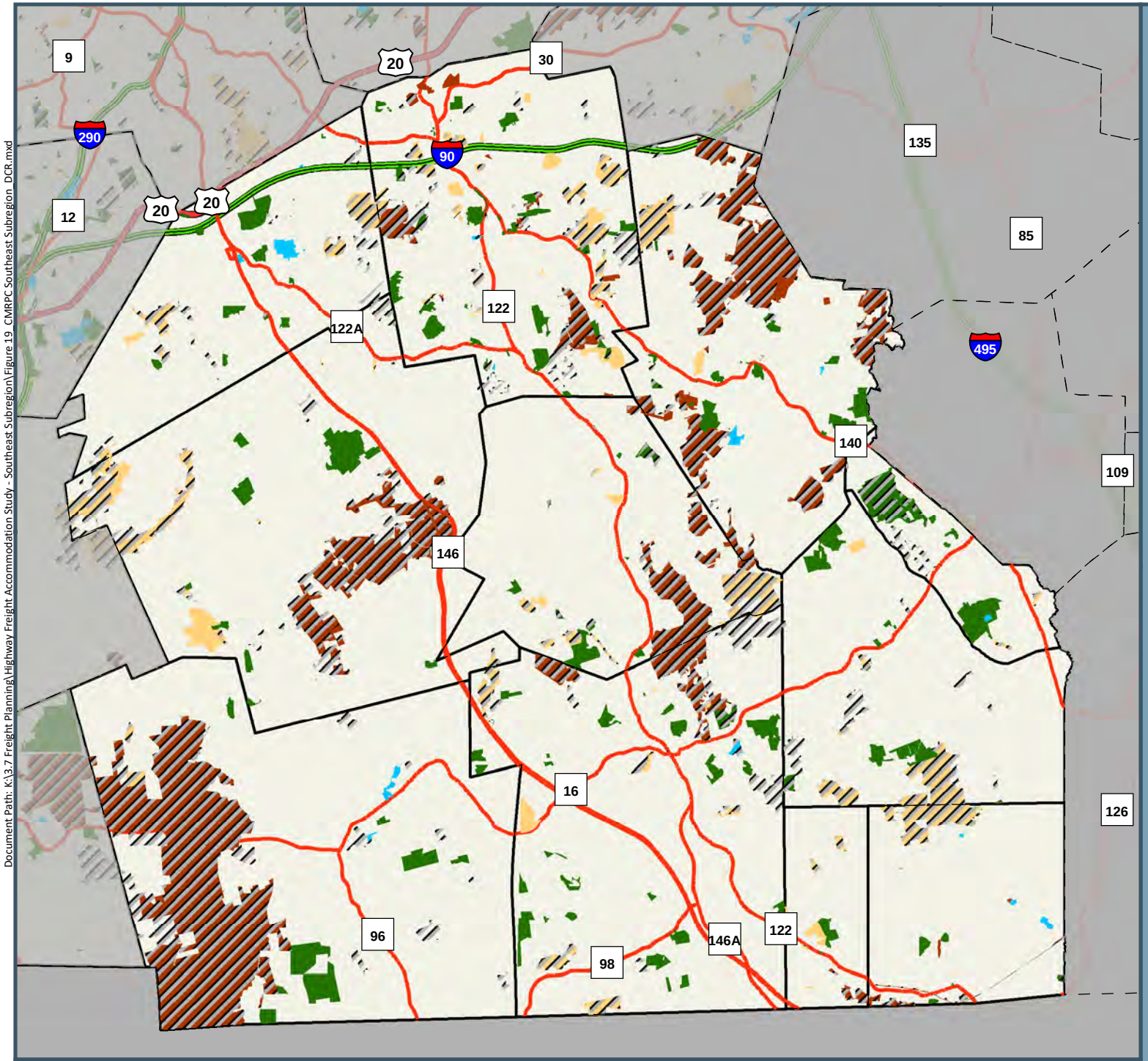
Major features of the natural environment in the Southeast planning subregion were also identified as part of this *Accommodation Assessment study*. The following maps show major environmental systems within the study area that have impacts on such things as drainage, water quality and wildlife migration.

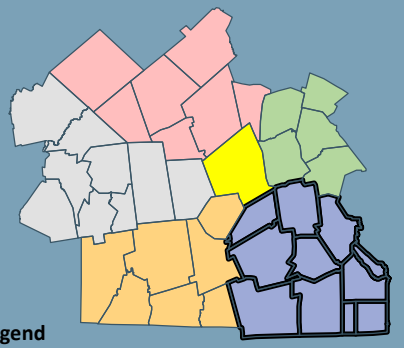
Figure 19 shows general land use within the Southeast subregion which includes recreation, conservation, water supply, and open space areas. This data is managed by the Massachusetts Department of Conservation and Recreation (DCR). The mission of the DCR is to protect, promote and enhance the state's wealth of natural, cultural and recreational resources. As the map shows, there is a large recreation/conservation area in the western part of Douglas, which is the Douglas State Forest. Additionally, there are numerous conservation and recreation area in the other Southeast subregion communities.

Figure 20 shows wetland areas within the Southeast subregion study area. 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. The data comes from the Massachusetts Department of Environmental Protection (DEP). The DEP is responsible for ensuring clean air and water, safe management and recycling of solid and hazardous wastes, timely cleanup of hazardous waste sites and spills, and the preservation of wetlands and coastal resources. Included in the map are bogs, marshes, swamps, and open water. As can be seen, there are numerous defined wetlands in this subregion as well as some larger open water bodies in the western part of the subregion in the towns of Douglas, Millbury, and Sutton.

As shown in **Figure 21**, the federal National Heritage & Endangered Species Program (NHESP) provides the data for vernal pools and rare species habitats (plants & animals). Vernal pools are small, shallow ponds characterized by lack of fish and by periods of dryness. The overall goal of the NHESP is the protection of the state's wide range of native biological diversity. The NHESP is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state. As can be seen on the map, there are many certified vernal pools in the towns of Douglas, Grafton, Sutton, and Upton. Further, each of the eleven (11) towns in the study area has priority habitats of rare species except Millville.

Flood zones were created by the Federal Emergency Management Agency (FEMA) as a guide to establishing corresponding National Flood Insurance Rates. 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 of a flood. The closer something is to the flooding source - river, stream, pond, etc. - the greater the risk of flooding. Flood zones are also used to calculate flood insurance rates for homes and businesses. **Figure 22** shows all the 100 and 500-year flood zones in the Southeast planning subregion. Most flood zones in the Southeast subregion are 100-year, specifically large areas in Grafton, Northbridge, Upton, and Uxbridge. In addition, there are a several smaller 500-year flood zones in each of the Southeast subregion communities.





Legend

DCR Open Space

- Recreation/Conservation
- Conservation (Non Facility)
- Recreation (Facility Based)
- Water Supply Protection
- Open Space in Perpetuity

- Interstate
- US Highway
- State Route
- Southeast Subregion Towns

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Worcester, MA 01608

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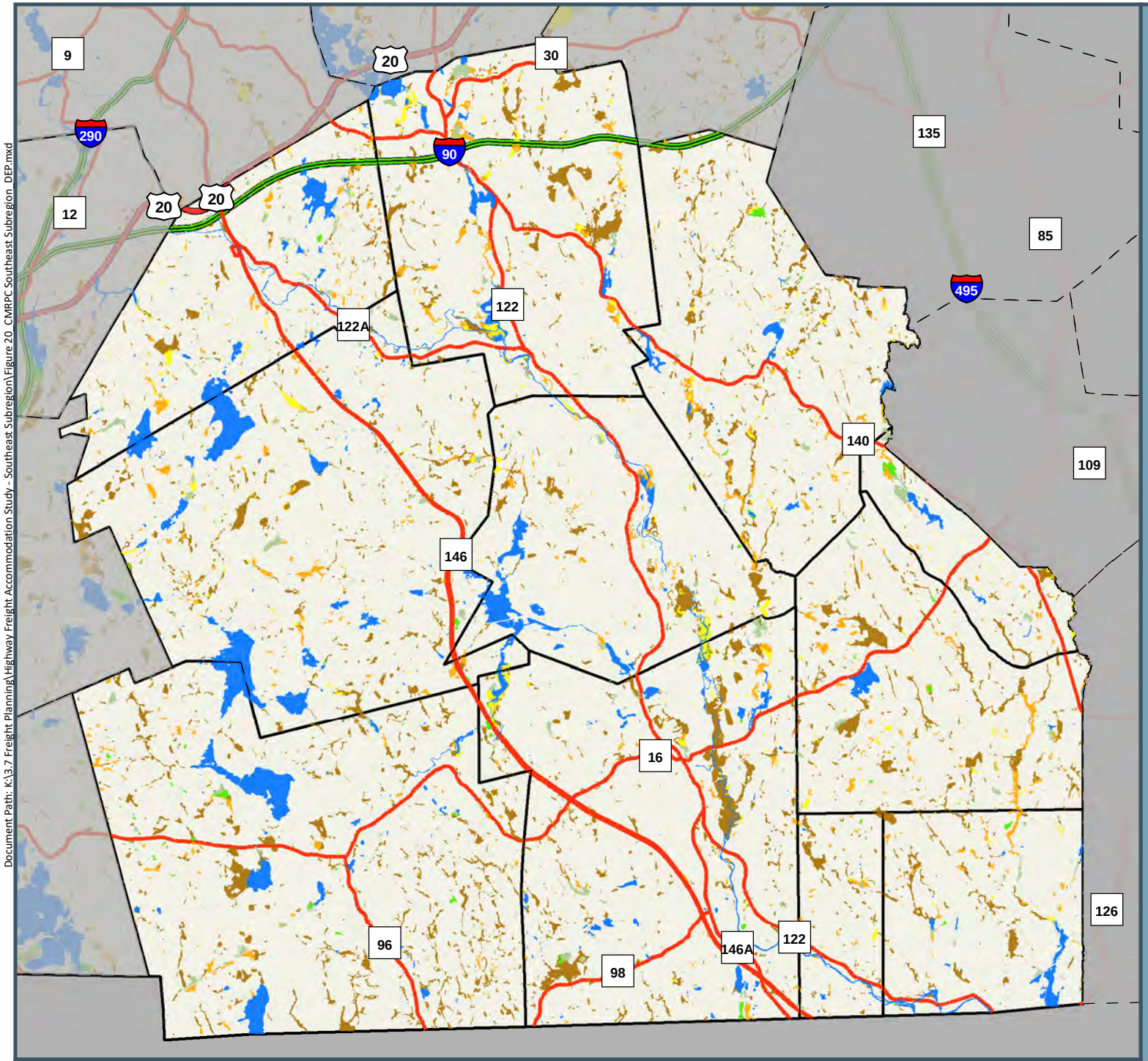
FIGURE 19 - SOUTHEAST SUBREGION GENERAL LAND USE (DCR)



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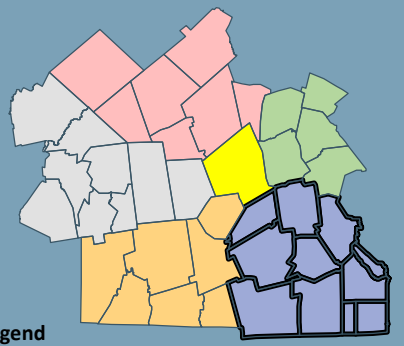

Legend

- OPEN WATER
- BOG
- DEEP MARSH
- SHALLOW MARSH MEADOW OR FEN
- SHRUB SWAMP
- WOODED SWAMP
- **Interstate**
- **US Highway**
- **State Route**
- Southeast Subregion Towns

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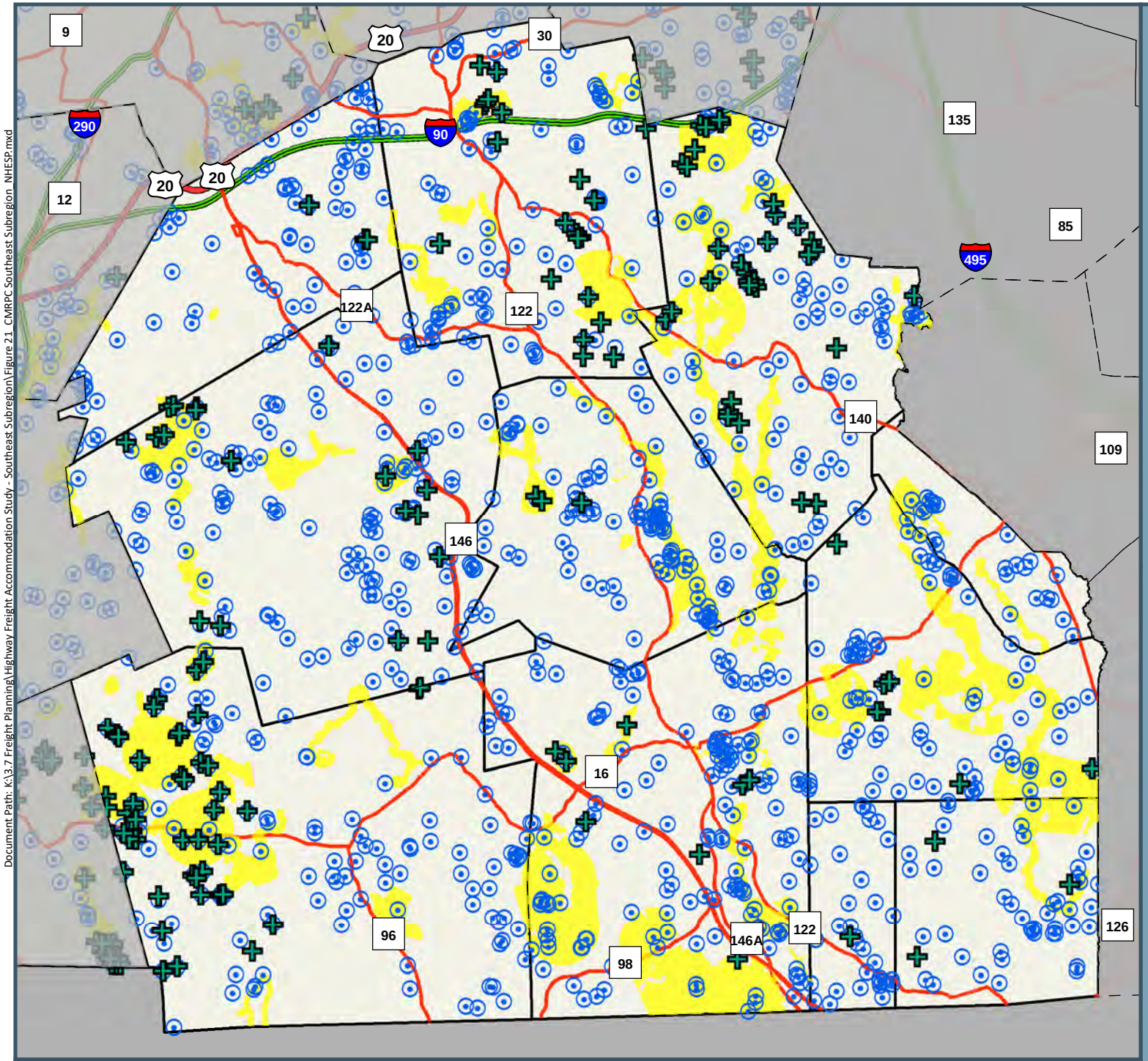
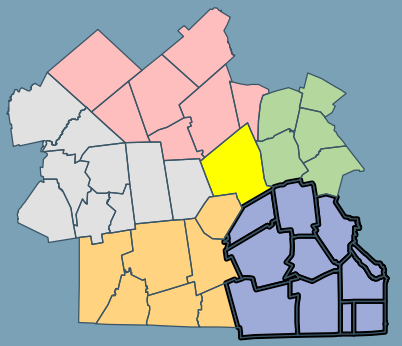
FIGURE 20 - SOUTHEAST SUBREGION WETLANDS (DEP)





Legend

- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools
- NHESP Priority Habitats of Rare Species
- **Interstate**
- **US Highway**
- **State Route**
- Southeast Subregion Towns

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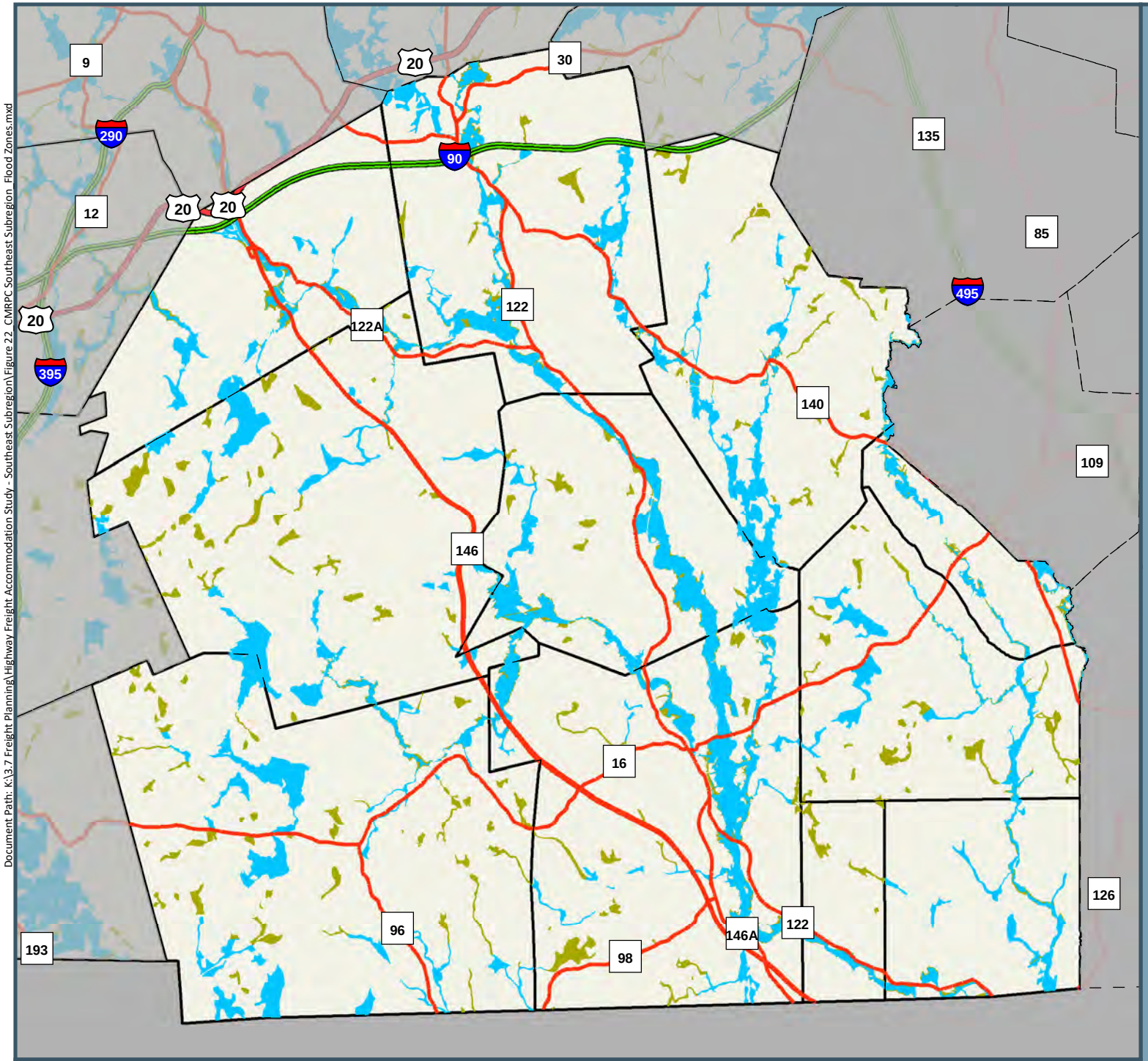
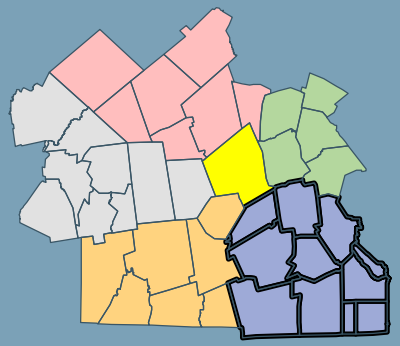
FIGURE 21 - SOUTHEAST SUBREGION VERNAL POOLS & RARE SPECIES HABITATS (NHESP)





Legend

- Southeast Subregion Towns
- FEMA 100 Year Flood Zone
- FEMA 500 Year Flood Zone
- Interstate
- US Highway
- State Route

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FIGURE 22 - SOUTHEAST SUBREGION 100/500 YEAR FLOOD ZONES (FEMA)

4.3 Municipal Vulnerability Preparedness (MVP)

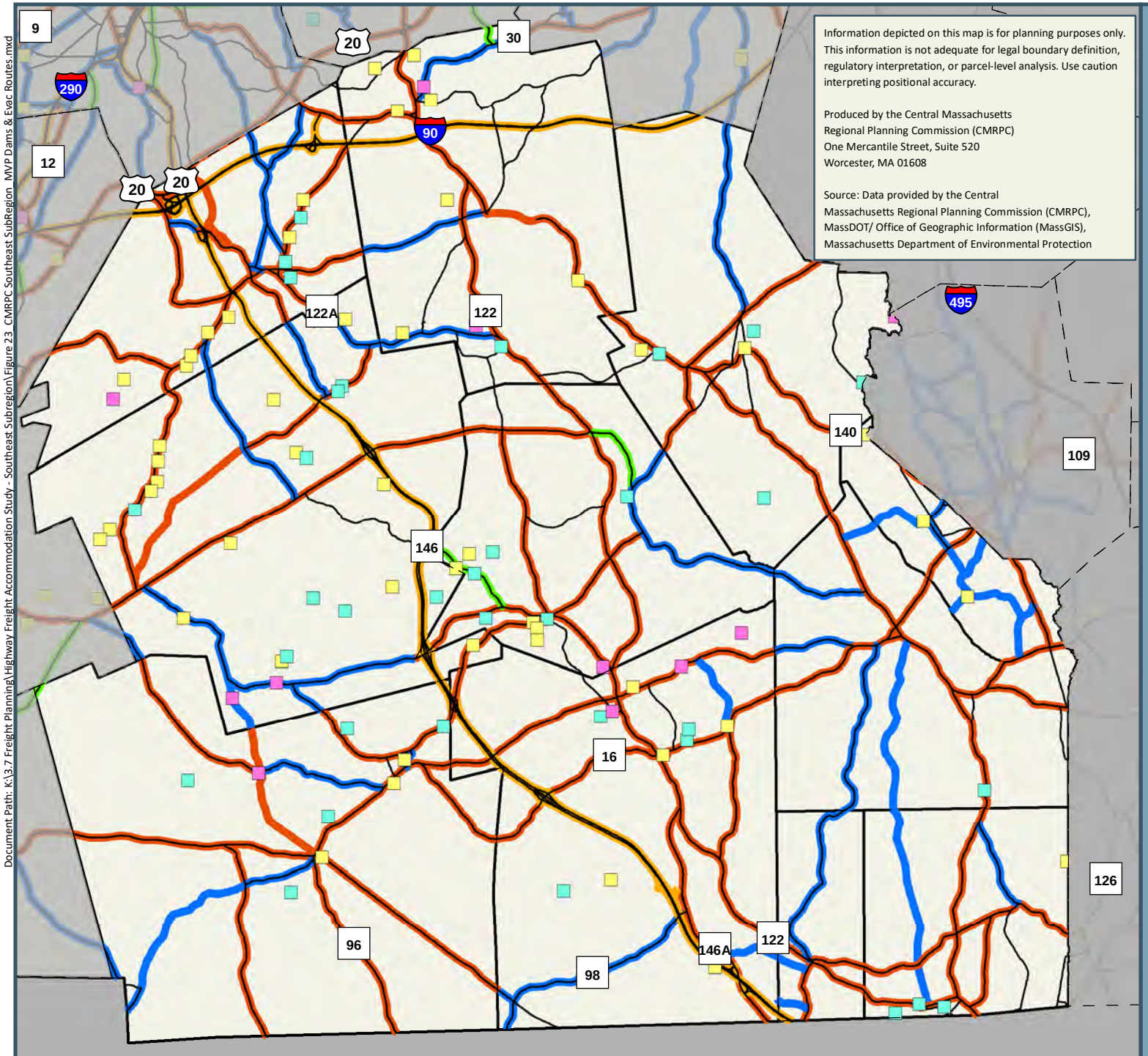
The state's MVP Program provides planning grants to municipalities to complete vulnerability assessments and develop action-oriented resiliency plans. Communities that complete the MVP planning process become certified "MVP Communities" and are eligible for Action Grant funding and other opportunities through the Commonwealth. Critical to this process, various stakeholders actively engage in discussions to determine the top hazards related to climate change that currently impact or could have a future impact on a community.

Figure 23 shows the established Evacuation Routes and the Hazardous Dams within the Southeast subregion communities. The Evacuation Routes were developed as part of the Worcester County Evacuation Plan. During the compilation of the Evacuation Plan, each community identified their important roadways and defined them as primary, secondary, or tertiary Evacuation Routes. Besides the State Numbered Routes, other major roads were designated as Evacuation Routes. As the map shows, the Evacuation Routes may have a primary designation in one town but a secondary designation in an adjoining town.

As for the Hazardous Dams, this data is maintained by the Massachusetts Office of Dam Safety. The map shows the dams classified into three categories. The categories are High Hazard, Significant Hazard, and Low Hazard. The hazards are defined as follows:

- **High Hazard**: Located where failure will likely cause loss of life and serious damage to homes, industrial or commercial facilities, important public utilities, main highways or railroads.
- **Significant Hazard**: Located where failure may cause loss of life and damage homes, industrial or commercial facilities, secondary highways or railroads or cause interruption of use or service of relatively important facilities.
- **Low Hazard**: Located where failure may cause minimal property damage to others. Loss of life is not expected.

Overall, there are a total of 94 hazardous dams in the Southeast subregion. The town of Millville is the only community without a hazardous dam. There are ten (10) High Hazard dams, and the town of Uxbridge has the most with a total of three (3). There are also numerous dams located near State Numbered Routes.



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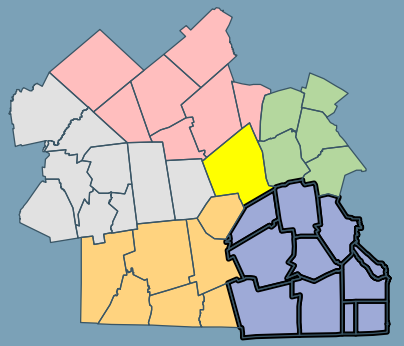

Legend

Hazards (Dams)

- High Hazard Dam
- Significant Hazard Dam
- Low Hazard Dam

Regionwide Evacuation Routes

- Interstate Highway
- Primary
- Secondary
- Tertiary
- Southeast Subregion Towns
- Federal Aid Eligible Roads

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Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 23_CMRPC Southeast SubRegion_MVP Dams & Evac Routes.mxd

FIGURE 23 - SOUTHEAST SUBREGION MVP LAYERS: HAZARDOUS DAMS & REGIONAL EVACUATION ROUTES

Figure 24 shows locally-identified vulnerable critical infrastructure and hazards within the Southeast subregion communities. The types of vulnerable critical infrastructure can differ for each community. The types of infrastructure include major roadways, dams, water & sewer pumping stations, and important buildings such as police stations, fire stations, or Department of Public Works (DPW) garages. Most of the communities in the Southeast subregion considered the police stations, fire stations, and DPW garages as critical infrastructure. Bridges, dams, libraries, pumping stations, schools, and solar farms were also considered critical infrastructure in most of the towns.

Most towns in the Southeast subregion contain numerous locally-identified hazards, except for Douglas. These hazards include dams, flooding issues (past & present), snowdrifts & icing during the winter, and areas for potential fires. Fire hazards were identified in most towns and flooding hazards were identified in each of the eleven (11) Southeast subregion communities.

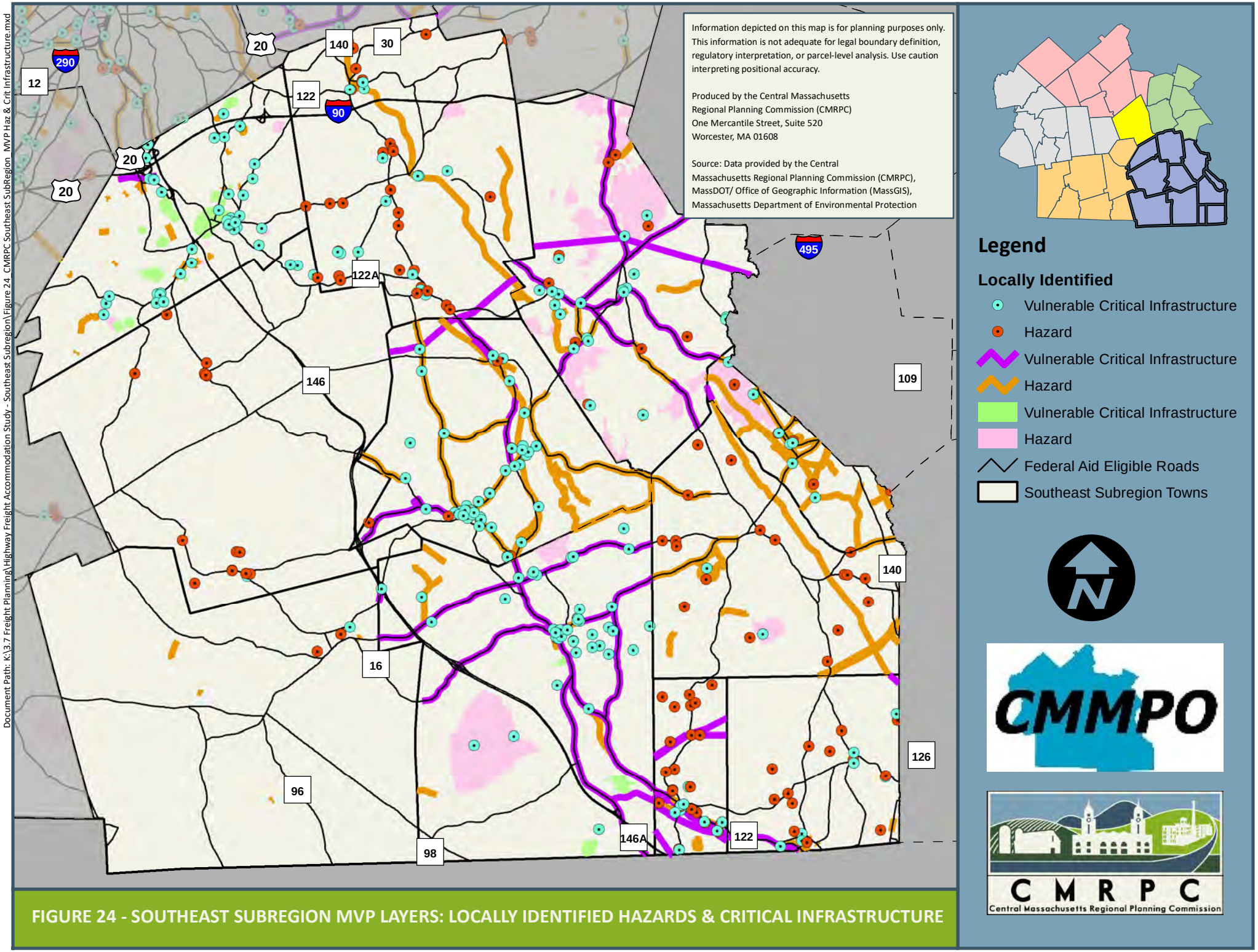


FIGURE 24 - SOUTHEAST SUBREGION MVP LAYERS: LOCALLY IDENTIFIED HAZARDS & CRITICAL INFRASTRUCTURE

4.4 Travel Demand Model

Introduction

Within this installment in the series of *Highway Freight Accommodation Assessment* studies focusing on the federal-aid highway system, the region's Travel Demand Model ("Model") Forecasting software was used to estimate and compile the anticipated Vehicle Miles of Travel (VMT) of heavy vehicles - transporting a broad range of freight - for both existing & projected future conditions in the Southeast planning subregion. Potential future year land development impacting the Route 146 corridor was assessed by the CMRPC in a comprehensive manner in early 2023. This information, compiled for a separate planning effort, was used to craft future benchmark year growth scenarios for all Blackstone Valley communities. Considered a tool for projecting future year traffic growth and its associated impacts, the results of the Model need to be considered in a relative sense and must be considered only as "best estimates" based on currently available information.

The Model is a computer-based simulation of the greater planning region's multimodal transportation network and includes all highways on the Federal-Aid highway system and fixed route public transit. After developing traffic volumes by time of day for all network roads, the model then reports VMT aggregated to a community level for each roadway classification - the FHWA roadway functional classifications are used – as well as vehicle type. The Model's 2020 "base-year" analysis network, representing an existing case, has been "calibrated", or adjusted, to essentially simulate existing roadway travel conditions, based on field-observed traffic volumes which include the percentage of heavy vehicles.

For the purposes of this study effort, the regional Model was utilized to estimate heavy vehicle VMT for the Morning (6 AM-9 AM) peak travel period, Mid-Day (9 AM-3 PM) period, the Evening (3 PM-6 PM) peak, as well as Nighttime (6 PM-6 AM) travel period, resulting in Daily totals. The Model-calculated estimated VMT has also been summarized for each host community in the Southeast planning subregion. Using the 2020 existing benchmark as a basis for the projected future-year analyses, heavy vehicle VMT estimates have been derived by the Model for the planning scenario years of 2030, 2040, and 2050. *(It should be noted that the Model analyses do not necessarily reflect the known/unknown impacts of the Covid-19 pandemic.)*

Truck Type Groupings

The Model results provide truck VMT estimates within three (3) broad groupings of the Federal Highway Administration's (FHWA) Vehicle Classifications. Shown in **Table 7** are the 13 established FHWA Vehicle Classifications. The table indicates the equivalences between the FHWA Vehicle Classifications, and the corresponding three (3) categories of truck type groupings used by the Model. As can be seen in the table, in addition to "Auto", these

groupings are defined as “Light Trucks”, “Medium Trucks” and “Heavy Trucks”. Light Trucks are commercial vehicles with 4 or 6 tires while Medium Trucks are single unit commercial vehicles with more than 6 tires. Heavy Trucks are all articulated vehicles.

Table 7
FHWA Vehicle Classification

Classification Number	Description	Type of Vehicle
1	Motorcycles	Auto
2	Passenger Cars	Auto
3	Pickups and Vans	Auto
4	Buses	Medium Truck
5	Single Unit 2 Axle Truck	Light Truck
6	Single Unit 3 Axle Truck	Medium Truck
7	Single Unit 4 Axle Truck	Medium Truck
8	Trailer 3 or 4 Axle Truck	Heavy Truck
9	Trailer 5 Axle Truck	Heavy Truck
10	Trailer 6 Axle Truck	Heavy Truck
11	Multi-Trailer 5 Axle Truck	Heavy Truck
12	Multi-Trailer 6 Axle Truck	Heavy Truck
13	Multi-Trailer 7 or More Axle Truck	Heavy Truck

These Model analyses results for each host community in the Southeast planning subregion are summarized in **Tables 8, 9, 10, and 11** for each defined truck type grouping. Although the primary purpose of the *Accommodation Assessment* study series is to focus on the federal-aid eligible State Numbered Routes in each of the defined CMRPC planning subregions, the Model analyses summaries presented for each host community ***do not*** reflect, where applicable, Interstate System truck VMT. Thus, both estimated and projected truck VMT totals for I-90 (Massachusetts Turnpike, “MassPike”) in the towns of Grafton, Millbury and Upton are ***not*** reflected in the community totals shown in the following summary tables. Accordingly, **Table 8** includes the estimated truck VMT for the 2020 existing case, **Table 9** lists the projected truck VMT for the future year 2030, **Table 10** includes the projected truck VMT for the future year 2040 and, finally, **Table 11** summarizes the projected truck VMT for the future year 2050. Again, the listed VMT are by time of day: AM Peak, Mid-Day (MD), PM Peak, Nighttime (NT) as well as the Daily total.

Truck Vehicle Miles of Travel (VMT) Observations

As can be seen in **Table 8**, truck Vehicle Miles of Travel (VMT) under the existing 2020 case are highest in the town of Millbury with total estimated daily truck VMT of nearly 29,600 miles, largely due to the heavily utilized US Route 20 corridor as well as State Numbered Routes 146, 122 and 122A. Further, due to the location of both the I-90 (MassPike)/US Route 20/Route 146

and the I-90 (MassPike)/Route 122 interchanges in Millbury, trucks from a broad geographic area are attracted to this host community. Next, the town of Uxbridge exhibits truck VMT of approximately 28,850 miles. Here, the Route 146 corridor contributes in large part to the truck volumes estimated in Uxbridge as does, although to a lesser extent, the convergence of Routes 16, 98, 122 and 146A in this host community. Next, the town of Grafton ranks third with a VMT of nearly 25,500 miles of daily truck travel utilizing State Numbered Routes 30, 122, 122A and 140. Sutton follows Grafton with nearly 25,000 miles of daily truck travel using Routes 146 and 122A. Although not a State Numbered Route, it is anticipated that Central Turnpike accommodates moderate daily truck VMT as it provides a direct route between Route 146 in Sutton and I-395 in neighboring Oxford, part of the Southwest planning subregion. Mendon is next with a truck VMT of just over 21,200 daily miles largely due to Route 16 that traverses the community and, to a lesser extent, Route 140 which skirts the eastern border of Mendon. The host community of Northbridge accommodates a total estimated daily truck VMT of around 16,900 miles, due to Route 146 just touching the community along its southwestern border as well as Route 122 which essentially bisects Northbridge. Following Northbridge, the host community of Upton has an estimated daily truck VMT of approximately 16,200 miles with State Numbered Route 140 attributing to a relative percentage of the total estimate. Further, in Upton, the Hartford Avenue/High Street/Hopkinton Street corridor is anticipated to accommodate a moderate daily truck VMT due to the I-495 interchange in neighboring Hopkinton to the east.

Estimated daily truck VMT for the existing benchmark year 2020 is much less substantive in the four (4) remaining Southeast subregion host communities. In Douglas, estimated truck VMT of almost 8,600 miles daily is accommodated. Route 146 touches the northeast corner of Douglas and can be attributed to a portion of the estimated truck VMT as well as Route 16 which traverses the town and, to a lesser extent, State Numbered Route 96. Route 96 provides access to Rhode Island to the south. Next is the host community of Hopedale with daily truck VMT of almost 6,900 miles. Both Routes 16 and 140 serve Hopedale. Blackstone follows with estimated truck VMT of about 5,250 miles. Neighboring Millville exhibits the lowest estimated total daily truck VMT in the Southeast subregion with around 3,100 miles. Route 146 touches Millville on its southwest corner before entering Rhode Island while Route 122 serves the center of this host community.

Table 8
Existing Truck VMT: 2020 Benchmark Year

	2020												
	AM			MD			PM			NT			
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	VMT Totals
Blackstone	425	356	521	506	409	596	458	371	540	367	282	414	5,245
Douglas	472	647	973	563	780	1,181	501	692	1,041	395	541	804	8,590
Grafton	2,242	1,764	2,394	2,713	2,131	2,890	2,416	1,904	2,577	1,508	1,269	1,676	25,484
Hopedale	532	479	641	631	580	776	573	517	689	523	404	534	6,879
Mendon	1,527	1,495	2,126	1,843	1,785	2,532	1,633	1,597	2,269	1,346	1,266	1,798	21,217
Millbury	2,256	2,012	2,949	2,696	2,432	3,640	2,431	2,228	3,314	1,806	1,560	2,263	29,588
Millville	257	193	307	300	230	373	272	210	341	203	157	258	3,101
Northbridge	1,594	1,109	1,443	1,891	1,306	1,705	1,708	1,181	1,544	1,333	911	1,179	16,902
Sutton	1,122	1,853	3,001	1,355	2,321	3,902	1,226	2,113	3,514	919	1,412	2,247	24,986
Upton	879	1,322	1,851	1,025	1,520	2,120	937	1,408	1,965	746	1,028	1,417	16,217
Uxbridge	1,722	1,945	3,168	2,073	2,462	4,167	1,869	2,199	3,682	1,439	1,584	2,536	28,846
Totals	13,028	13,175	19,373	15,594	15,957	23,884	14,025	14,421	21,475	10,585	10,414	15,125	187,056

Shown in **Table 9**, under anticipated 2030 conditions, total daily estimated truck VMT, although dropping slightly from the 2020 benchmark year, remains highest in the town of Millbury with almost 29,350 miles of travel. This is, again, largely due to the heavily utilized US Route 20 corridor as well as State Numbered Routes 146, 122 and 122A. As previously noted, due to the location of both the I-90 (MassPike)/US Route 20/Route 146 and the I-90 (MassPike)/Route 122 interchanges in Millbury, trucks from a broad geographic area are attracted to this host community. Importantly, in 2030, the anticipated far-reaching impacts of the reconstruction and modernization of the I-495/I-90 (MassPike) interchange to the east in the host communities of Hopkinton and Westborough are evident as the now underway construction at this location will be completed in this future benchmark year. West of this interchange, daily truck VMT is lower in 2030 as a fair percentage of trucks are exiting I-90 (MassPike) at I-495 and shifting to other routes. One major reason for these measurable shifts is likely due to truck tolls being substantially higher than auto tolls. The new interchange does provide for vastly improved traffic flow between the I-90 (MassPike) and I-495, and thus a significant number of trucks are anticipated to select other routes in the greater region. It should also be mentioned, however, that although some communities exhibit declining truck VMT, overall truck VMT on a regional basis continues to increase for each future benchmark analysis year.

Continuing, the table indicates that in 2030 the town of Uxbridge exhibits daily truck VMT of approximately 28,350 miles of travel, indicating a drop of almost 500 miles over the 2020 condition. In Uxbridge, the Route 146 corridor contributes to the truck VMT estimated in this community as does the convergence of Routes 16, 98, 122 and 146A. Next in 2030, Sutton now follows Uxbridge with a truck VMT of nearly 24,000 miles using Routes 146, 122A and Central Turnpike. Truck VMT in Sutton drops by approximately 1,000 miles daily when compared to the existing 2020 case. After Sutton, the town of Grafton now ranks forth with a truck VMT of just

over 23,000 miles. In Grafton, daily truck VMT under the projected 2030 scenario drops substantially by about 2,450 miles. As previously noted, I-90 (MassPike), has substantial influence on Grafton's overall reduced truck VMT in 2030 as the modernized interchange of I-90 (MassPike) with I-495 will be complete at this future date.

Mendon is next with a daily truck VMT of almost 22,100 miles, which represents an increase of nearly 850 miles over the existing 2020 condition. In 2030, the host community of Upton, as opposed to Northbridge, now follows Mendon with an estimated truck VMT of over 18,250 miles, a daily increase of nearly 1,800 miles over 2020. The Hartford Avenue/High Street/Hopkinton Street corridor in Upton is anticipated to accommodate moderate daily truck VMT due to the I-495 interchange in neighboring Hopkinton to the east. Under projected 2030 conditions, Northbridge accommodates total estimated daily truck VMT of just over 18,000 miles, an increase of over 1,100 miles over 2020, largely due to Route 146.

As under the existing case, estimated truck VMT for the projected benchmark year 2030 is much less substantive in the four (4) remaining Southeast subregion host communities. In Douglas, an estimated daily truck VMT of almost 8,650 miles is anticipated, a modest increase of almost 60 miles over 2020. Next in 2030 is the host community of Hopedale with daily truck VMT of nearly 7,200 miles, an increase of over 300 miles when compared to 2020. Blackstone follows with estimated truck VMT of over 5,800 miles, an increase of nearly 600 miles of truck travel in this host community. Last, neighboring Millville continues to exhibit the lowest estimated total daily truck VMT in the Southeast subregion with just over 3,300 miles projected, an increase of over 200 miles of truck travel compared to the existing condition.

Table 9
Projected Truck VMT: Future 2030 Condition

	2030												
	AM			MD			PM			NT			
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	VMT Totals
Blackstone	480	393	567	562	457	662	509	411	594	414	316	459	5,825
Douglas	480	657	977	570	780	1,160	508	700	1,045	401	551	816	8,646
Grafton	1,816	1,642	2,187	2,155	1,987	2,657	1,988	1,779	2,368	1,511	1,280	1,670	23,039
Hopedale	552	499	670	647	611	824	592	546	739	537	415	548	7,180
Mendon	1,567	1,557	2,217	1,879	1,875	2,672	1,671	1,657	2,371	1,410	1,319	1,869	22,064
Millbury	2,258	2,030	2,938	2,669	2,376	3,436	2,426	2,212	3,210	1,847	1,608	2,322	29,333
Millville	267	211	341	318	247	399	288	227	368	212	168	272	3,318
Northbridge	1,638	1,197	1,588	1,944	1,415	1,878	1,758	1,285	1,708	1,364	967	1,271	18,015
Sutton	1,166	1,826	2,908	1,381	2,141	3,404	1,255	1,997	3,191	967	1,450	2,298	23,984
Upton	1,005	1,486	2,107	1,170	1,718	2,435	1,069	1,580	2,230	819	1,110	1,540	18,269
Uxbridge	1,774	1,977	3,194	2,110	2,343	3,776	1,907	2,133	3,448	1,484	1,626	2,605	28,377
Totals	13,002	13,475	19,695	15,405	15,950	23,303	13,972	14,527	21,271	10,966	10,812	15,670	188,049

Looking to the 2040 future benchmark year, as shown in **Table 10**, overall daily truck VMT is projected to increase in each of the eleven Southeast subregion host communities, although,

based on currently available information, at a more modest rate than projected between 2020-2030. Also, those communities that experienced a drop in truck VMT due to the completion of the modernized I-495 interchange with I-90 (MassPike) are all anticipated to see future year increases. Total daily truck VMT will remain highest at nearly 30,400 miles in the town of Millbury, again due to the two highly utilized I-90 (MassPike) interchanges and the attractive US Route 20 and State Numbered Route 146 corridors. Like the prior decade, projected truck VMT in the town of Uxbridge will continue to rank second in the Southeast subregion exhibiting a daily total of almost 29,300 miles. Total daily truck VMT in the town of Sutton will increase by nearly 1,000 miles of travel under projected 2040 conditions. Similarly, in Grafton, a projected daily increase of over 850 miles is anticipated. In 2040, estimated truck VMT in Mendon will increase by almost 500 miles over 2030 conditions and, in neighboring Upton, daily truck VMT is expected to increase by about 600 miles over the same decade. Northbridge is next with a projected increase in daily truck VMT of over 600 miles. The host communities of Douglas, Hopedale and Blackstone all see truck VMT increases averaging about 200 miles of travel. Finally, in 2040, Millville sees a minimal increase in truck VMT of about 75 miles over 2030 conditions.

Table 10
Projected Truck VMT: Future 2040 Condition

	2040												
	AM			MD			PM			NT			
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	VMT Totals
Blackstone	502	405	582	586	477	687	536	430	619	432	331	478	6,066
Douglas	491	674	1,003	588	804	1,194	524	722	1,076	414	569	842	8,903
Grafton	1,887	1,700	2,262	2,250	2,060	2,755	2,087	1,837	2,441	1,560	1,325	1,732	23,897
Hopedale	574	511	682	666	623	841	623	559	750	551	425	560	7,363
Mendon	1,611	1,587	2,252	1,915	1,918	2,731	1,719	1,690	2,408	1,445	1,353	1,916	22,547
Millbury	2,318	2,112	3,058	2,742	2,467	3,568	2,494	2,301	3,341	1,893	1,666	2,406	30,367
Millville	271	216	349	326	254	409	291	232	375	217	173	279	3,393
Northbridge	1,693	1,234	1,636	2,010	1,471	1,953	1,819	1,333	1,773	1,409	998	1,311	18,640
Sutton	1,210	1,905	3,030	1,434	2,228	3,536	1,302	2,084	3,327	1,003	1,512	2,392	24,963
Upton	1,040	1,533	2,172	1,209	1,773	2,513	1,108	1,635	2,303	848	1,148	1,593	18,874
Uxbridge	1,828	2,048	3,301	2,172	2,415	3,885	1,967	2,199	3,546	1,529	1,684	2,691	29,264
Totals	13,425	13,925	20,328	15,899	16,490	24,072	14,471	15,024	21,960	11,300	11,183	16,200	194,276

Under projected 2050 conditions, as shown in **Table 11**, overall daily truck VMT is anticipated to increase in all eleven Southeast subregion host communities. In some, Millbury, Uxbridge and Sutton, daily truck VMT growth will be somewhat robust with respective increases of over 1,400 miles in Millbury and over 1,000 miles in both Uxbridge and Sutton. Elsewhere in the subregion, daily truck VMT will increase by almost 700 miles per day in Grafton while in both Mendon and Upton daily truck VMT will increase by almost 600 miles per day. The host community of Northbridge, under anticipated future year 2050 conditions, is expected to accommodate a daily truck VMT increase of over 750 miles of travel. Modest VMT increases

are expected in the 2050 benchmark year for each remaining Southeast subregion community with Douglas, Hopedale, and Blackstone each seeing an average increase in daily truck VMT of about 230 miles. Millville is anticipated to experience the smallest daily increase in truck VMT with just over 120 miles of travel.

Table 11
Projected Truck VMT: Future 2050 Condition

	2050												
	AM			MD			PM			NT			
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	VMT Totals
Blackstone	523	420	601	610	496	711	559	447	639	448	344	494	6,292
Douglas	507	691	1,028	610	831	1,235	538	738	1,099	429	580	856	9,141
Grafton	1,943	1,748	2,319	2,329	2,118	2,830	2,155	1,889	2,502	1,613	1,366	1,784	24,595
Hopedale	605	526	701	691	640	860	652	574	768	569	435	573	7,594
Mendon	1,661	1,627	2,312	1,971	1,971	2,803	1,774	1,723	2,443	1,488	1,387	1,962	23,123
Millbury	2,402	2,232	3,236	2,843	2,597	3,758	2,587	2,409	3,494	1,958	1,752	2,534	31,801
Millville	281	224	358	339	264	422	303	241	387	226	180	289	3,514
Northbridge	1,758	1,292	1,722	2,087	1,518	2,012	1,890	1,395	1,862	1,464	1,038	1,362	19,400
Sutton	1,260	1,990	3,157	1,493	2,314	3,660	1,355	2,170	3,454	1,047	1,584	2,497	25,980
Upton	1,076	1,575	2,224	1,256	1,831	2,588	1,150	1,678	2,356	880	1,182	1,636	19,431
Uxbridge	1,887	2,121	3,419	2,243	2,511	4,037	2,033	2,283	3,682	1,579	1,744	2,788	30,328
Totals	13,904	14,447	21,075	16,473	17,091	24,914	14,996	15,546	22,684	11,701	11,592	16,776	201,199

The corresponding percentage increases and decreases in projected truck VMT in the Southeast transportation planning subregion during the various travel periods of a typical day are provided in **Tables 12, 13, and 14. Table 12** summarizes the percentage increases/decreases anticipated in the ten-year period between 2020 and 2030. Again, truck VMT using the Interstate System are ***not*** included to allow enhanced focus on the anticipated impacts to federal-aid eligible State Numbered Routes. Further, as specifically mentioned above, in 2030, the anticipated far-reaching impacts of the reconstruction and modernization of the I-495/I-90 (MassPike) interchange in the host communities of Hopkinton and Westborough are evident as construction at this location will be completed in this future benchmark year. West of this interchange, truck VMT decreases in a number of the host communities in 2030 as a fair percentage of trucks are projected to exit I-90 (MassPike) at I-495 and shift to other routes. As can be seen from the table, the impact of the modernized interchange is significant in the town of Grafton as well as, although to a lesser extent, the three towns of Millbury, Sutton, and Uxbridge. The percentage decreases in Grafton predominately range between -6% and -20%, and are most prevalent during the Morning, Mid-Day and Evening peak travel times. Conversely, note that the host communities of Blackstone, Millville, Northbridge, and Upton all accommodate substantive percentage increases in truck VMT between 2020 and 2030. In the remaining Southeast subregion towns of Douglas, Hopedale and Mendon, daily truck VMT percentage growth over the decade between 2020 to 2030 is expected to be somewhat minimal.

Table 12
Projected Truck VMT: Percentage Increases 2020-2030

	Change 2020 to 2030											
	AM			MD			PM			NT		
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck
Blackstone	13.0%	10.2%	8.8%	11.0%	11.8%	11.1%	11.1%	11.0%	10.0%	13.0%	12.2%	10.9%
Douglas	1.6%	1.5%	0.5%	1.4%	-0.1%	-1.8%	1.5%	1.2%	0.4%	1.6%	1.9%	1.5%
Grafton	-19.0%	-6.9%	-8.6%	-20.6%	-6.8%	-8.1%	-17.7%	-6.6%	-8.1%	0.2%	0.8%	-0.3%
Hopedale	3.7%	4.1%	4.5%	2.7%	5.3%	6.1%	3.2%	5.6%	7.2%	2.8%	2.9%	2.6%
Mendon	2.6%	4.2%	4.3%	2.0%	5.0%	5.5%	2.3%	3.8%	4.5%	4.7%	4.2%	3.9%
Millbury	0.1%	0.9%	-0.4%	-1.0%	-2.3%	-5.6%	-0.2%	-0.7%	-3.1%	2.2%	3.1%	2.6%
Millville	4.0%	9.4%	11.1%	6.1%	7.5%	7.0%	5.8%	7.8%	8.0%	4.3%	7.0%	5.3%
Northbridge	2.8%	8.0%	10.1%	2.8%	8.4%	10.2%	2.9%	8.8%	10.7%	2.4%	6.1%	7.8%
Sutton	3.9%	-1.5%	-3.1%	1.9%	-7.8%	-12.8%	2.4%	-5.5%	-9.2%	5.1%	2.7%	2.3%
Upton	14.4%	12.5%	13.9%	14.2%	13.0%	14.9%	14.1%	12.2%	13.5%	9.7%	8.0%	8.7%
Uxbridge	3.0%	1.7%	0.8%	1.8%	-4.8%	-9.4%	2.1%	-3.0%	-6.4%	3.2%	2.7%	2.7%

Similarly, **Table 13** summarizes the percentage increases in truck VMT anticipated between the future benchmark years of 2030 and 2040. Unlike the previous decade, no percentage decreases were calculated for this time parameter. The towns of Blackstone and Sutton realize percentages increases in VMT of about 4% and above in nearly all truck types throughout a typical day. The towns of Grafton and Millbury follow, reaching percentage increases in VMT of about 3% and above in nearly all truck types. Next, to a lesser extent, Hopedale & Northbridge are anticipated to realize truck VMT increases in the 2-3% range. Within the other five remaining Southeast subregion communities - Douglas, Mendon, Millville, Upton, and Uxbridge - truck VMT percentage increases are also mostly in the 2-3% range. Notably, the VMT percent increase for light trucks during the PM peak travel period in Blackstone, Grafton and Hopedale are all anticipated to exceed 5%.

Table 13
Projected Truck VMT: Percentage Increases 2030-2040

	Change 2030 to 2040											
	AM			MD			PM			NT		
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck
Blackstone	4.6%	3.2%	2.8%	4.3%	4.3%	3.8%	5.3%	4.6%	4.1%	4.3%	4.6%	4.1%
Douglas	2.4%	2.6%	2.6%	3.2%	3.1%	3.0%	3.2%	3.1%	3.0%	3.2%	3.3%	3.3%
Grafton	4.0%	3.6%	3.4%	4.4%	3.7%	3.7%	5.0%	3.3%	3.1%	3.2%	3.5%	3.7%
Hopedale	4.0%	2.4%	1.8%	2.9%	2.1%	2.0%	5.2%	2.4%	1.5%	2.5%	2.2%	2.2%
Mendon	2.8%	2.0%	1.6%	1.9%	2.3%	2.2%	2.9%	2.0%	1.6%	2.5%	2.6%	2.5%
Millbury	2.7%	4.0%	4.1%	2.8%	3.8%	3.8%	2.8%	4.0%	4.1%	2.5%	3.6%	3.6%
Millville	1.6%	2.7%	2.2%	2.3%	2.8%	2.3%	1.2%	2.4%	1.9%	2.4%	3.2%	2.7%
Northbridge	3.3%	3.0%	3.0%	3.4%	3.9%	4.0%	3.4%	3.8%	3.8%	3.3%	3.2%	3.2%
Sutton	3.8%	4.4%	4.2%	3.9%	4.1%	3.9%	3.7%	4.4%	4.3%	3.7%	4.2%	4.1%
Upton	3.4%	3.1%	3.1%	3.3%	3.2%	3.2%	3.6%	3.5%	3.3%	3.6%	3.4%	3.4%
Uxbridge	3.0%	3.6%	3.4%	2.9%	3.1%	2.9%	3.1%	3.1%	2.9%	3.0%	3.5%	3.3%

Lastly, **Table 14** summarizes the percentage increases in daily truck VMT anticipated between the future benchmark years of 2040 and 2050. Certainly, less is presently known about likely travel conditions within this future time parameter. Nevertheless, truck VMT increases in the host community of Millbury are anticipated to exceed 5% for both medium & heavy trucks, during most defined travel periods. The town of Sutton realizes percentage increases in truck VMT of about 4% and above in nearly all truck types throughout a typical day. In Northbridge, heavy truck VMT increases of 5% and above are projected during both the morning and evening peak travel periods, along with VMT increases of 3% and above for the remaining truck types throughout a typical day. Next, Blackstone sees VMT increases for light trucks exceeding 4% for three defined travel periods. Similarly, the town of Millville also realizes light truck VMT increases exceeding 4% for three defined travel periods. In the host community of Hopedale, light truck VMT increases of around 5% are anticipated during both the morning and evening peak travel periods, with lesser VMT increases ranging between 2-3% for other truck types during a typical day. VMT percentage increases in Uxbridge range between 3-4% for all truck types on a typical day. Similarly, in Upton, truck VMT increases closer to 3% throughout the day are realized. In the remaining three Southeast subregion communities of Douglas, Grafton, and Mendon, projected VMT increases for all truck types during all travel periods generally range from 2-3%.

Table 14
Projected Truck VMT: Percentage Increases 2040-2050

	Change 2040 to 2050											
	AM			MD			PM			NT		
	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck	Light Truck	Medium Truck	Heavy Truck
Blackstone	4.3%	3.7%	3.2%	4.1%	3.9%	3.4%	4.4%	3.8%	3.2%	3.7%	3.9%	3.4%
Douglas	3.1%	2.5%	2.5%	3.7%	3.4%	3.4%	2.5%	2.2%	2.1%	3.6%	1.9%	1.6%
Grafton	2.9%	2.8%	2.5%	3.5%	2.8%	2.7%	3.3%	2.8%	2.5%	3.4%	3.1%	3.0%
Hopedale	5.4%	3.1%	2.8%	3.8%	2.7%	2.3%	4.7%	2.8%	2.4%	3.2%	2.5%	2.4%
Mendon	3.1%	2.5%	2.6%	2.9%	2.8%	2.6%	3.2%	1.9%	1.4%	3.0%	2.5%	2.4%
Millbury	3.6%	5.7%	5.8%	3.7%	5.3%	5.3%	3.7%	4.7%	4.6%	3.5%	5.2%	5.4%
Millville	3.5%	3.3%	2.7%	4.0%	3.9%	3.2%	4.2%	3.9%	3.3%	4.2%	4.0%	3.3%
Northbridge	3.9%	4.7%	5.3%	3.8%	3.2%	3.0%	3.9%	4.6%	5.0%	3.9%	4.0%	3.8%
Sutton	4.1%	4.5%	4.2%	4.1%	3.8%	3.5%	4.1%	4.1%	3.8%	4.4%	4.8%	4.4%
Upton	3.5%	2.8%	2.4%	3.9%	3.3%	3.0%	3.7%	2.6%	2.3%	3.8%	2.9%	2.7%
Uxbridge	3.2%	3.6%	3.6%	3.3%	4.0%	3.9%	3.4%	3.8%	3.8%	3.3%	3.6%	3.6%

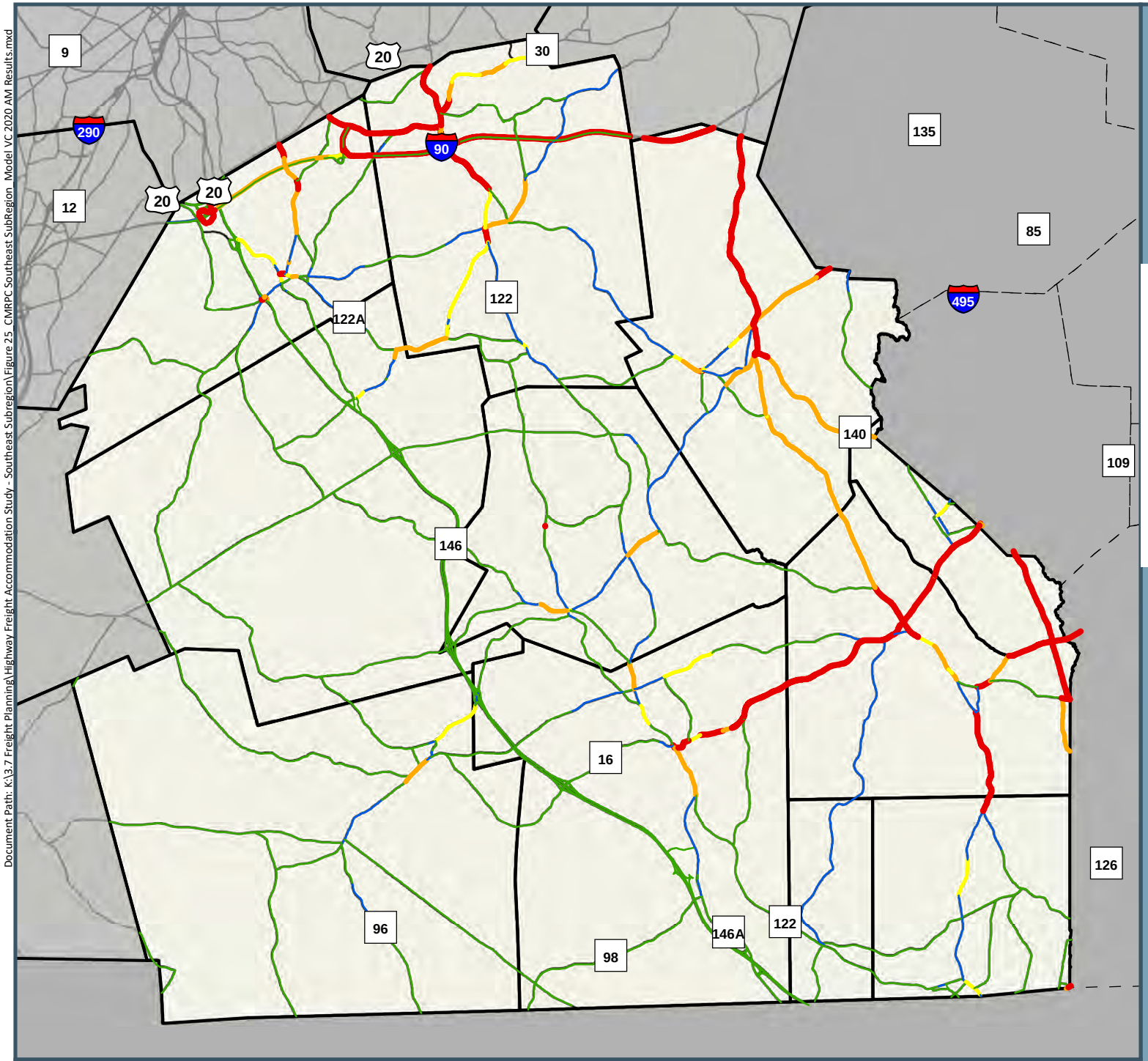
Congestion in the Southeast Subregion

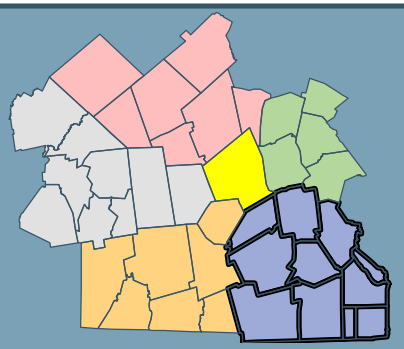
In an effort to detect existing congestion and its potential future year spread, the Model was used to calculate Volume-to-Capacity ("V/C") ratio data ranges for the host communities in the Southeast planning subregion. The higher the V/C ratio, the more indicative of heavy travel. Where the peak period Models cover a 3-hour period, using a V/C ratio of 0.80 for the 3 hours would suggest that one of the 3 hours is close to or beyond a V/C ratio value of 1.0. This is indicative of the fact that traffic volumes are not distributed uniformly over the 3 hours, but rather have a peak hour within the 3 hours with traffic volumes building or declining on either side of the peak. V/C ratios exceeding 1.0 theoretically indicate *over-capacity* conditions with significant incurred vehicle delay. As a product of this exercise, the following color-coded maps showing the analyses results were compiled and are shown in **Figures 25 through 32.**

Model-Calculated V/C Ratio Observations

As previously mentioned, the Model's 2020 analysis network has been "calibrated", or adjusted, to best estimate existing roadway travel conditions, based on field-observed traffic volumes which include the percentage of heavy vehicles. Under the 2020 existing case, shown in **Figures 25 & 26**, during both the morning and evening peak travel periods, V/C ratios in exceeding 0.80 are indicated in the host community of Mendon, particularly along Route 16 and Route 140 as well as other roadways in the town center area including Main Street, North Avenue, and Providence Street. In neighboring Hopedale, V/C ratios in excess of 0.80 are similarly seen on both Routes 16 & 140. In the town of Upton, Grove Street, North Main Street and Westboro Street have V/C ratios in excess of 0.80 during both peak travel periods while during the evening peak, a segment of Route 140 shows V/C ratios of over 0.80. Elsewhere in the Southeast subregion, Grafton realizes V/C ratios of over 0.80 on both Routes 122 and 140 in

the northern part of the community during both peaks. In Millbury, V/C ratios exceeding 0.80 are seen at the interchange of I-90 (MassPike) with US Route 20 and Route 146 during both peak periods and on Millbury Avenue, particularly during the evening peak hour. In the town of Uxbridge, the eastern section of Route 16 shows V/C ratios exceeding 0.80. The remaining Southeast subregion communities of Blackstone, Douglas, Millville, Northbridge and Sutton have either none or minimal roadway segments with V/C ratios over 0.80.





Legend

2020 VC Ratios_AM

- 0.00 - 0.40
- 0.41 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- > 0.80
- Southeast Subregion Towns

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.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
One Mercantile Street, Suite 520
Worcester, MA 01608

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), MassDOT/ Office of Geographic Information (MassGIS), Massachusetts Department of Environmental Protection

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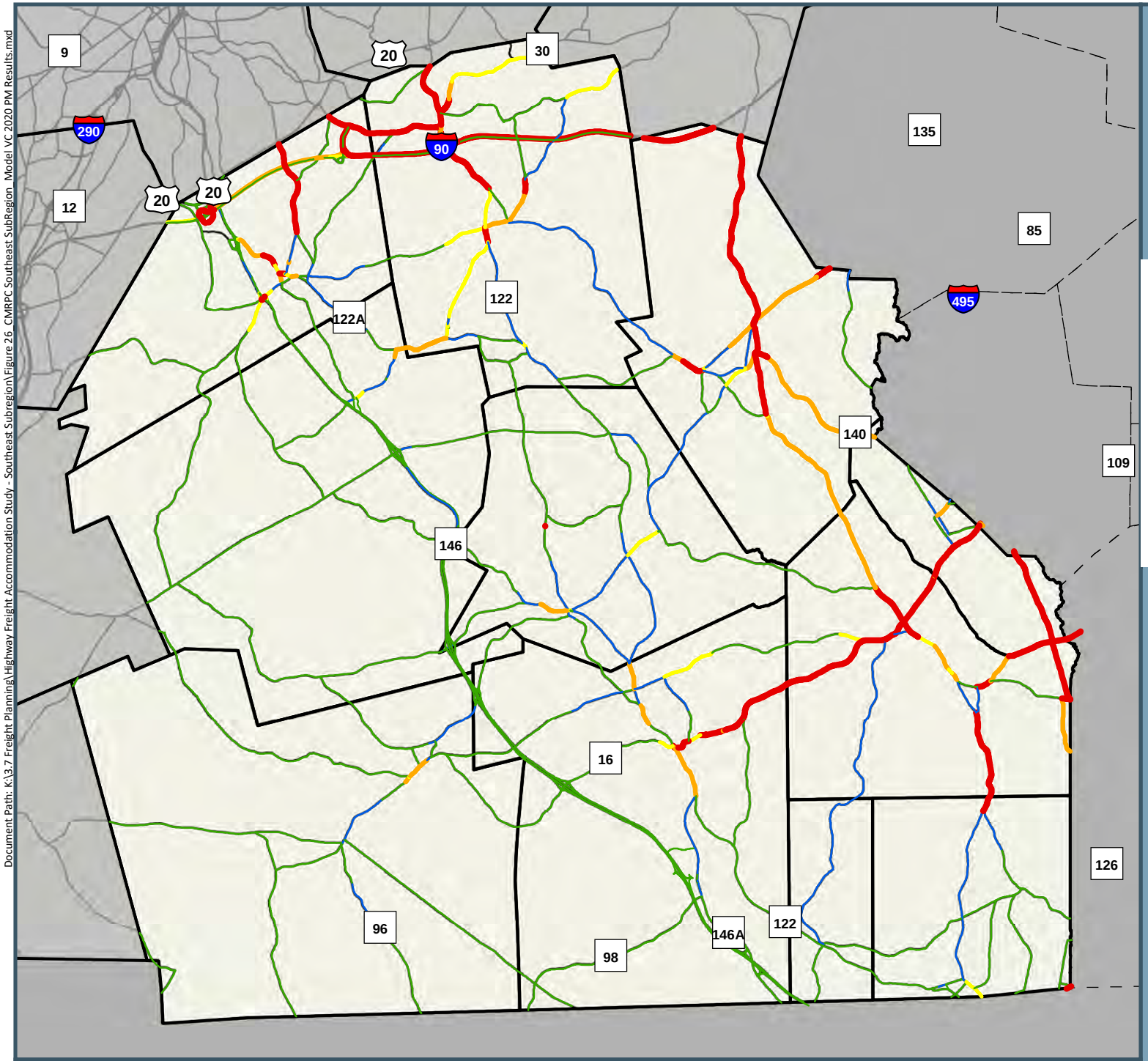
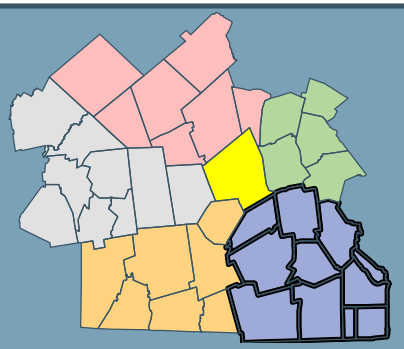
Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 25_CMRPC Southeast SubRegion_Model VC 2020 AM Results.mxd

FIGURE 25 - SOUTHEAST SUBREGION EXISTING 2020 V/C RATIOS, AM PEAK PERIOD





Legend

2020 VC Ratios_PM

- 0.00 - 0.40
- 0.41 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- > 0.80
- Southeast Subregion Towns

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One Mercantile Street, Suite 520
Worcester, MA 01608

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), MassDOT/ Office of Geographic Information (MassGIS), Massachusetts Department of Environmental Protection

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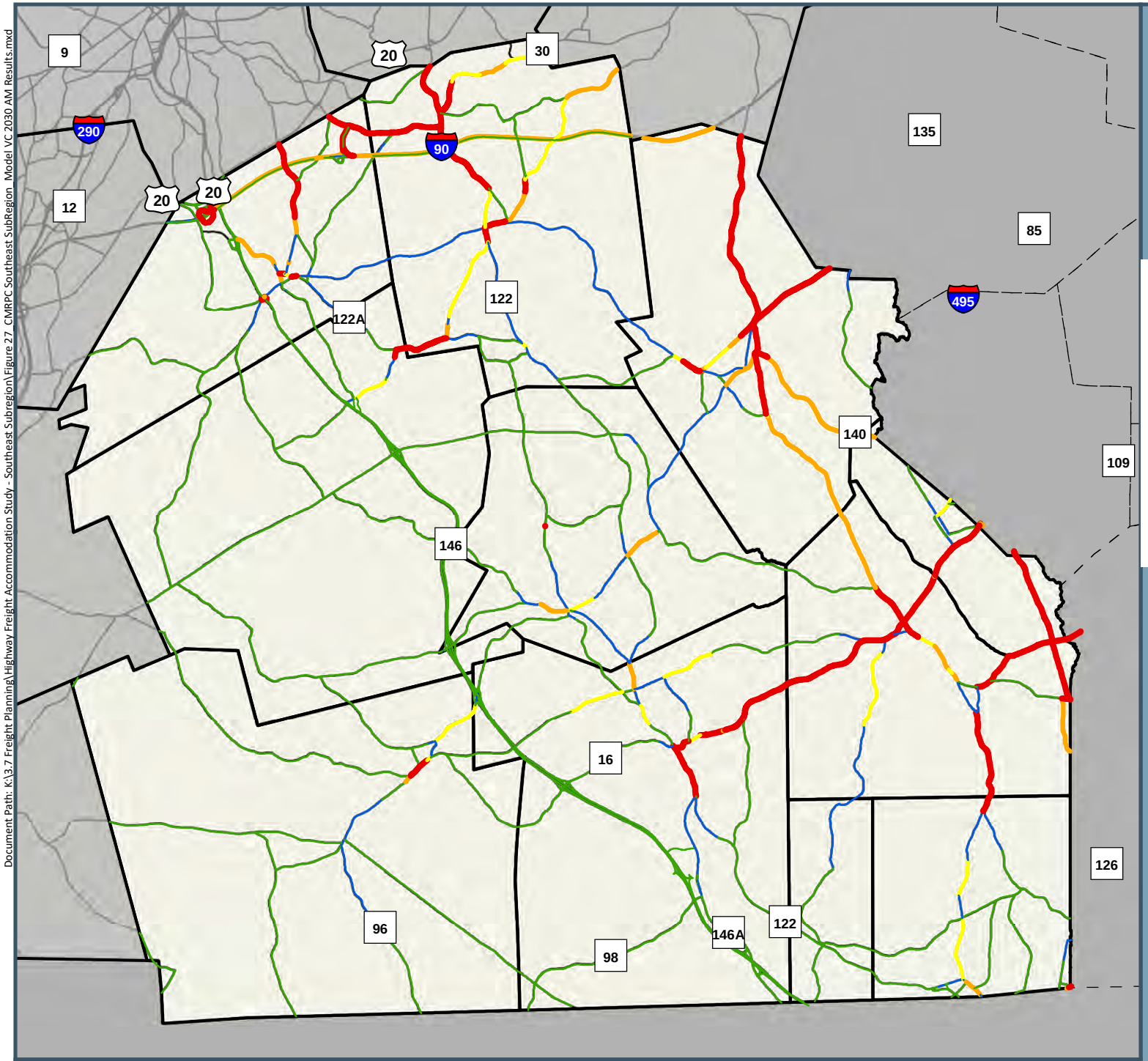
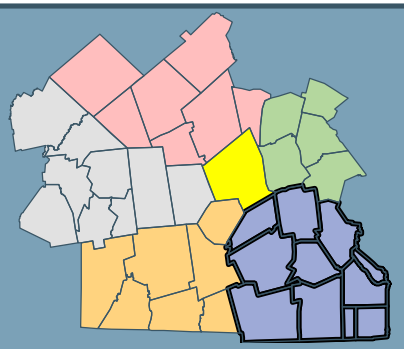
FIGURE 26 - SOUTHEAST SUBREGION EXISTING 2020 V/C RATIOS, PM PEAK PERIOD

Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 26_CMRPC Southeast SubRegion_Model VC 2020 PM Results.mxd

Under the 2030 benchmark year scenario, shown in **Figures 27 & 28**, the Model results indicate peak travel period V/C ratios greater than 0.80 that continue to be anticipated on a number of key roadways in the host community of Mendon, again along Route 16 and Route 140 as well as other streets in the town center and elsewhere on Providence Street. Notably, the projected 2030 conditions also indicate an expansion, or "spill-over", of peak travel period congestion to other roadways, at times seemingly unattractive local streets, perhaps indicative of likely future year cut-through traffic. In neighboring Hopedale, V/C ratios in excess of 0.80 are expected to continue on both Routes 16 & 140. Elsewhere in the Southeast subregion, projected conditions in 2030 again indicate V/C ratios in excess of 0.80 during both peak travel periods in the town of Upton, with Hopkinton Street - a popular corridor to gain access to I-495 - joining Grove Street, Westboro Street, North Mian Street and a segment of Route 140. The host community of Grafton continues to realize V/C ratios of over 0.80 during both peaks on Routes 122 and 140 in the northern part of the community as well as increased congestion in the town center area on both Millbury and North Streets. A segment of Route 122A in the southwest corner of town also exceeds 0.80 during both peak periods in 2030. The town of Millbury is projected to continue experiencing V/C ratios exceeding 0.80 at the interchange of I-90 (MassPike) with US Route 20 and Route 146 during both peak periods as well as on Millbury Avenue during both the morning and evening peak hours. In Uxbridge, the eastern section of Route 16 continues to show V/C ratios exceeding 0.80 under projected 2030 conditions during both peak travel periods with congestion spreading to Route 122 (Main Street) during the morning peak in the town center south of Route 16. As under existing 2020 conditions, projected 2030 conditions in the other remaining Southeast subregion communities of Blackstone, Douglas, Millville, Northbridge and Sutton show either none or minimal roadway segments with V/C ratios over 0.80. Notably, reoccurring congestion begins to become more prevalent in the Douglas town center area during the morning peak hour on Route 16.





Legend

2030 VC Ratios_AM

- 0.00 - 0.40
- 0.41 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- > 0.80
- Southeast Subregion Towns

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Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), MassDOT/ Office of Geographic Information (MassGIS), Massachusetts Department of Environmental Protection

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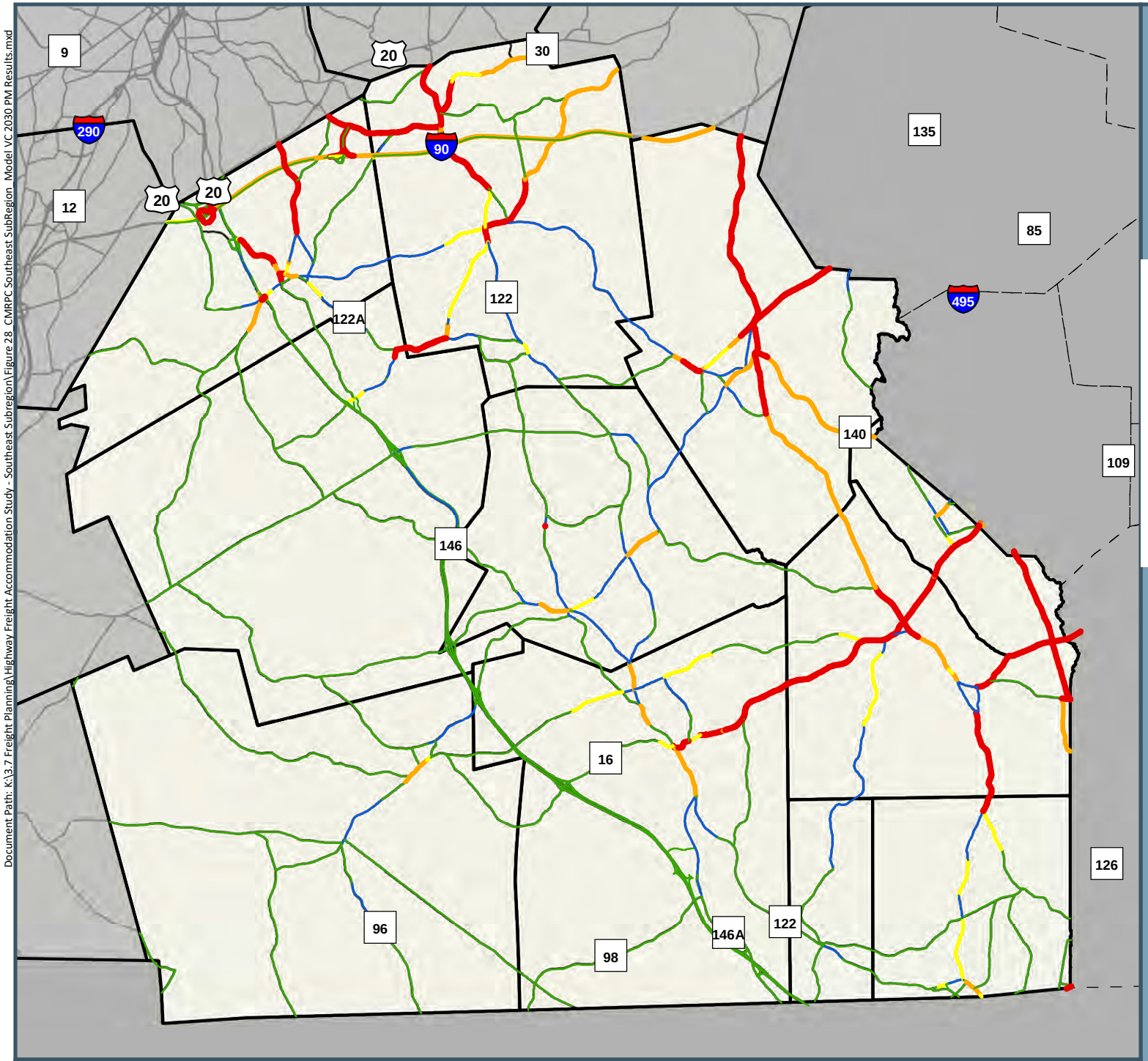
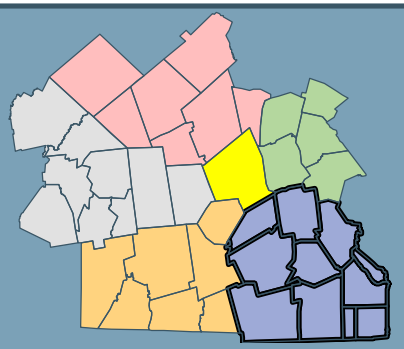
FIGURE 27 - SOUTHEAST SUBREGION EXISTING 2030 V/C RATIOS, AM PEAK PERIOD

Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 27_CMRPC Southeast SubRegion_Model VC 2030 AM Results.mxd





Legend

2030 VC Ratios_PM

- 0.00 - 0.40
- 0.41 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- > 0.80
- Southeast Subregion Towns

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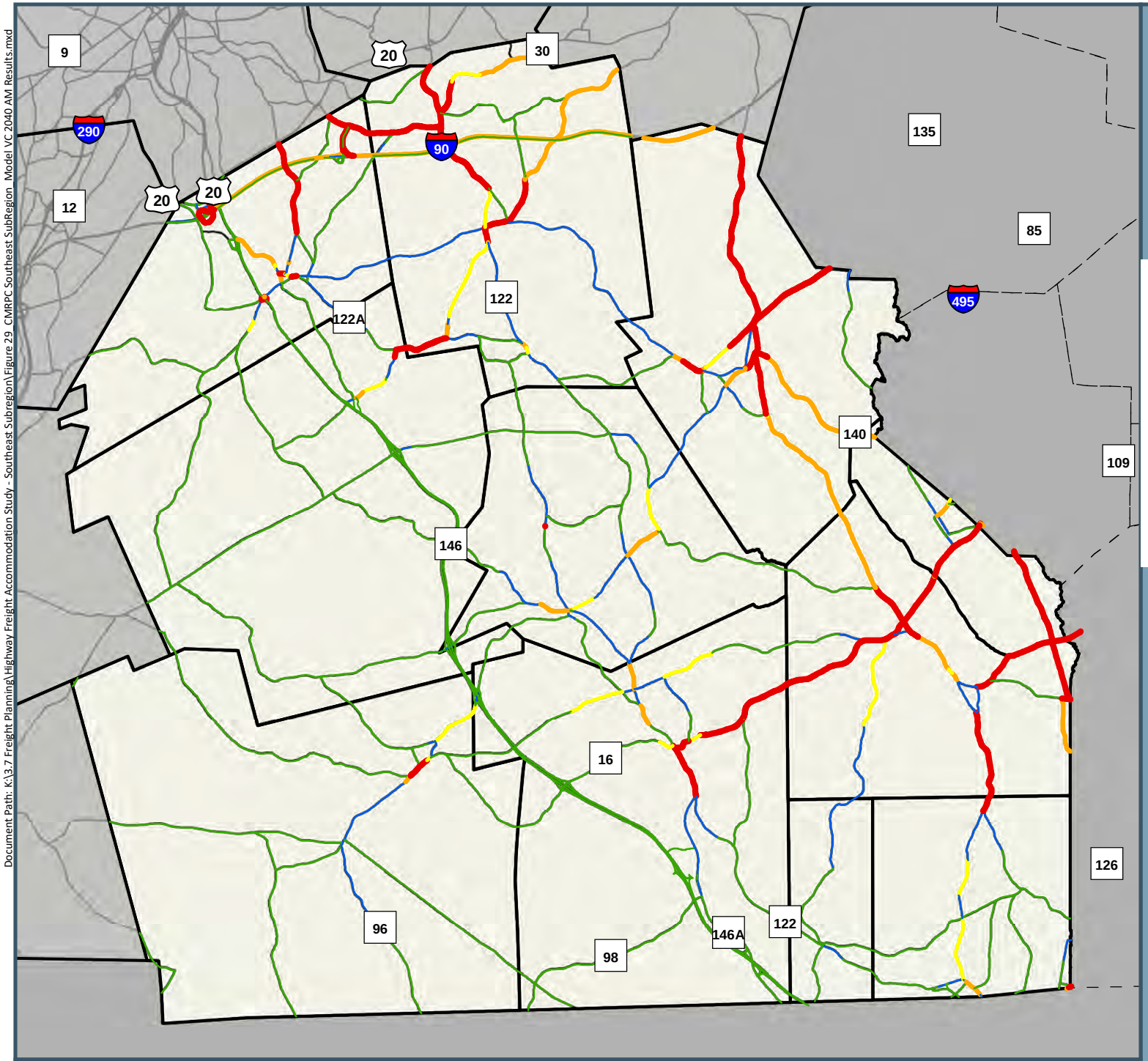
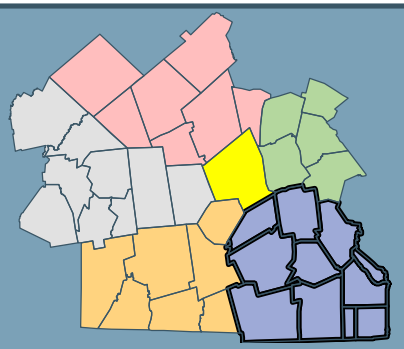
FIGURE 28 - SOUTHEAST SUBREGION EXISTING 2030 V/C RATIOS, PM PEAK PERIOD

Under the projected 2040 scenario, shown in **Figures 29 & 30**, essentially the same highway corridors in the Southeast planning subregion identified above continue to experience V/C ratios in excess of 0.80. Throughout the Southeast subregion's highway network during both projected 2040 peak travel periods, calculated V/C ratios rise relative to the modest increases in VMT anticipated between 2030 and 2040 at the present time. Congested conditions are anticipated to spread, but to a lesser extent than in the previous decade. Notably, during the AM peak travel period, an expansion, or "spill-over", of congestion to other roadway segments and roadways occurs in the area of the Grafton town center. During the evening peak period, the anticipated spread of congested conditions is more prevalent, with V/C ratios exceeding 0.80 on additional roadway segments in town centers of Douglas, Millbury, Northbridge (Whitinsville) and Uxbridge. In each of the community centers, congestion could spread to, at times, seemingly unattractive local streets, perhaps indicative of likely future year cut-through traffic.





Legend

2040 VC Ratios_AM

- 0.00 - 0.40
- 0.41 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- > 0.80
- Southeast Subregion Towns

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FIGURE 29 - SOUTHEAST SUBREGION EXISTING 2040 V/C RATIOS, AM PEAK PERIOD

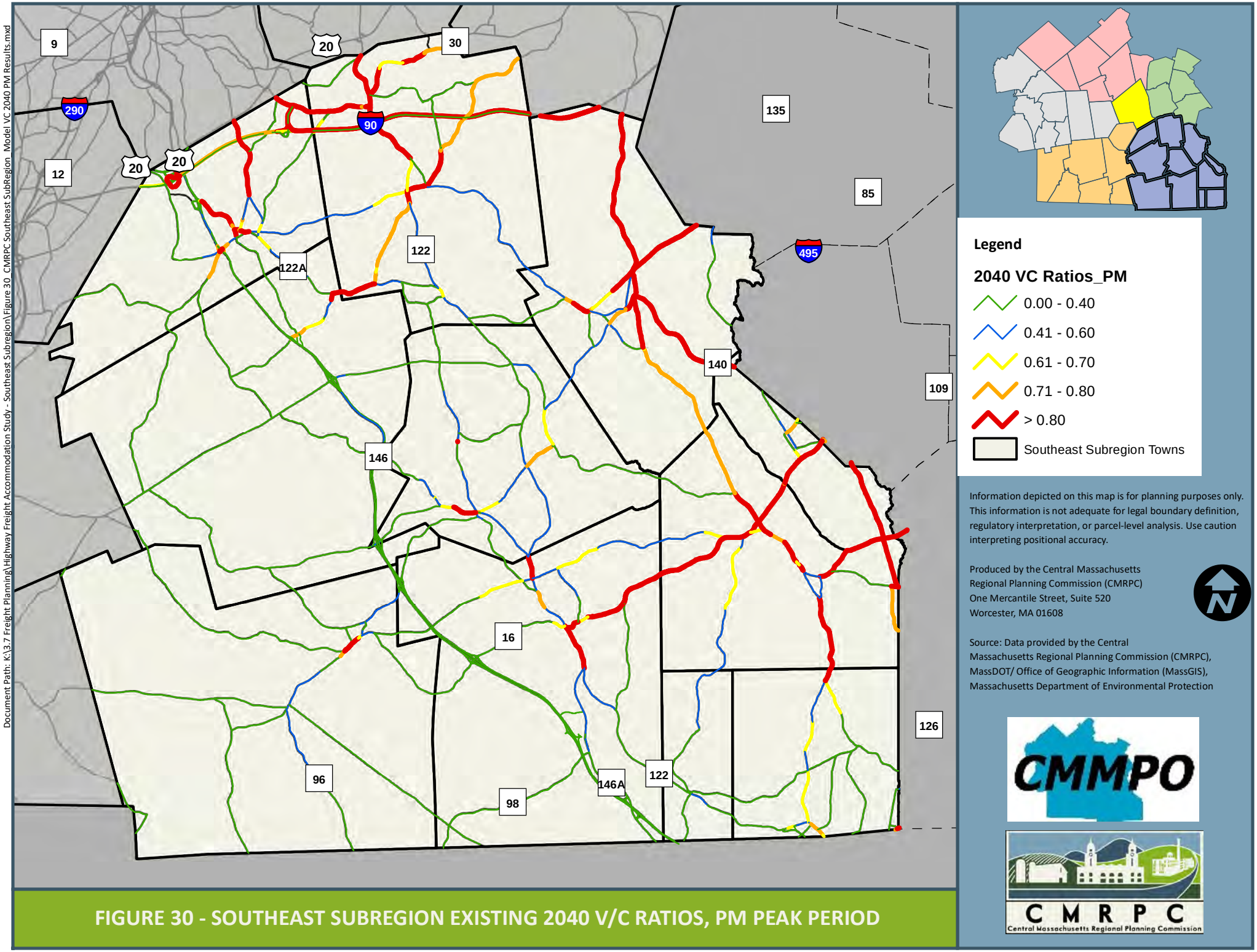


FIGURE 30 - SOUTHEAST SUBREGION EXISTING 2040 V/C RATIOS, PM PEAK PERIOD

Lastly, under the projected 2050 scenario, shown in **Figures 31 & 32**, largely the same highway segments in the Southeast planning subregion discussed above continue to experience V/C ratios in excess of 0.80. Certainly, much less is known at this time concerning future land use development trends and resulting travel patterns that may be experienced within the Southeast subregion during the decade between 2040 and 2050. However, it appears that congested conditions are anticipated to spread, or "spill-over", during the morning peak travel period in the Whitinsville area of Northbridge. Similarly, during the evening peak travel period, the number of roadway segments with V/C ratios exceeding 0.80 appears to increase in the Millbury town center. Again, as previously mentioned, recurring congested conditions perhaps may spread to seemingly unattractive local streets, indicative of future year cut-through traffic.

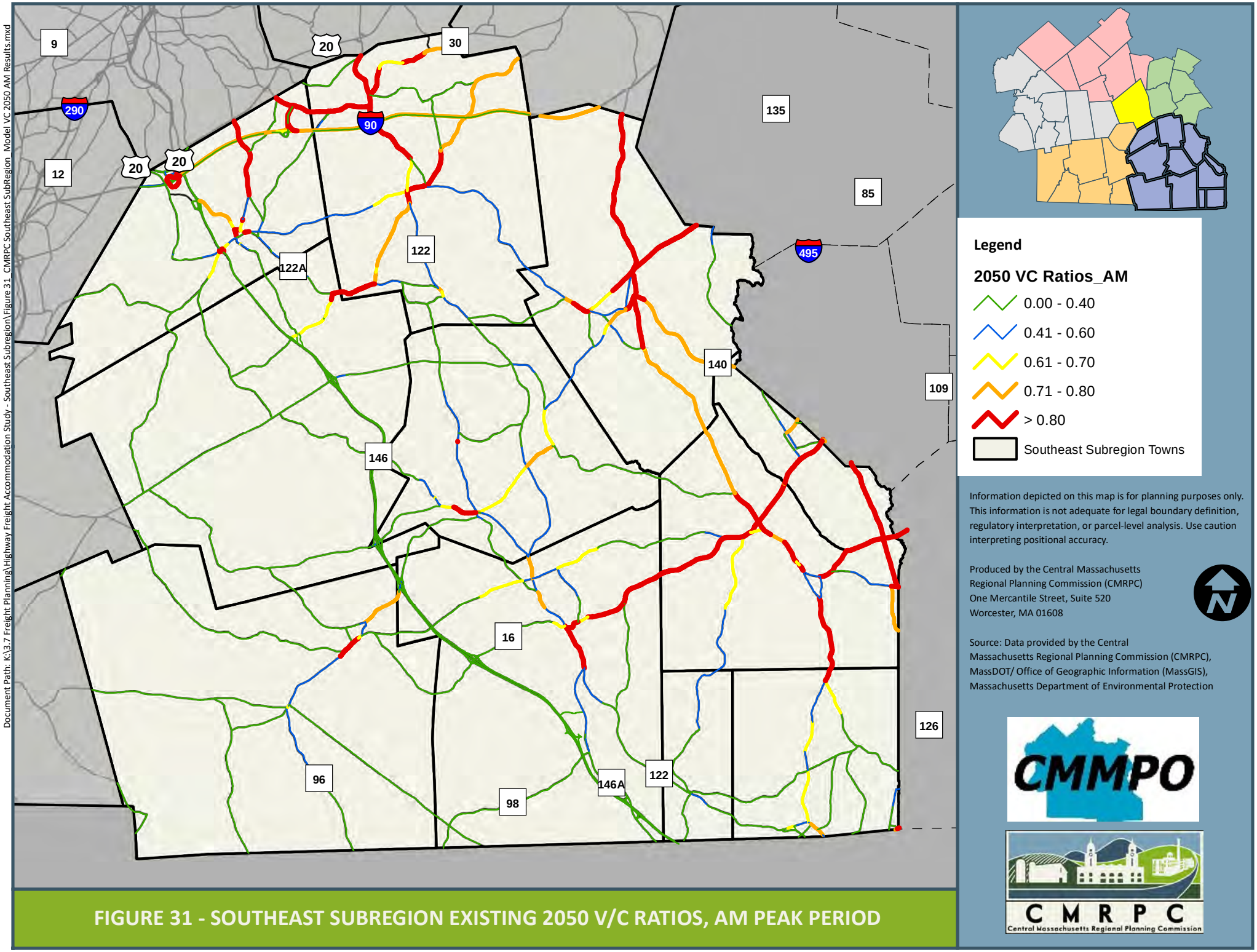
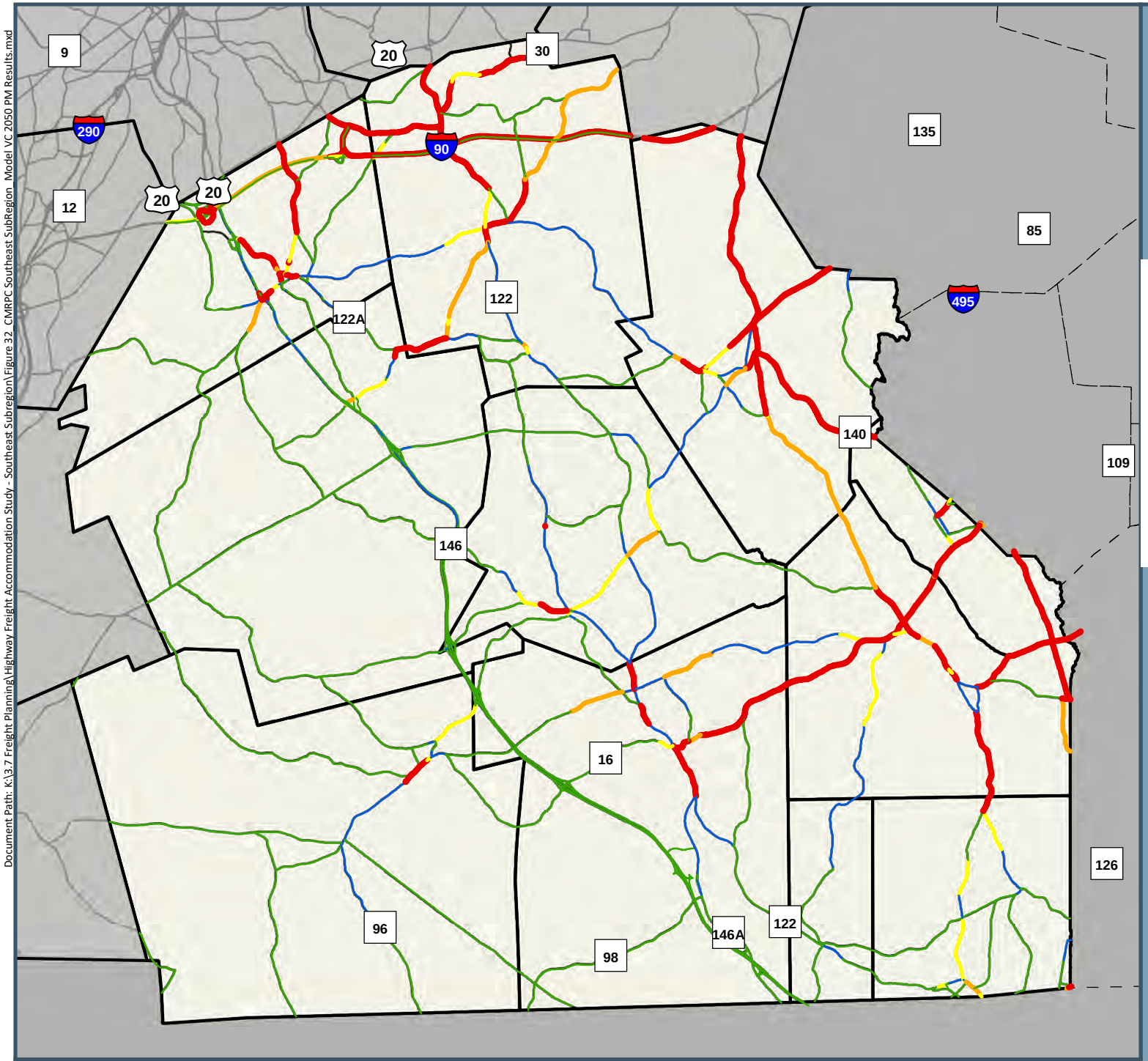
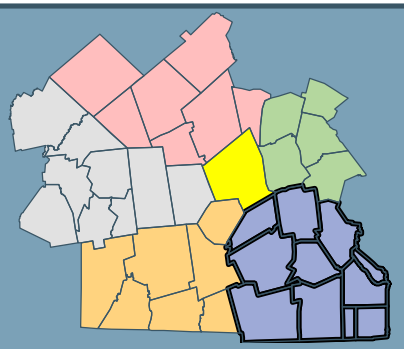


FIGURE 31 - SOUTHEAST SUBREGION EXISTING 2050 V/C RATIOS, AM PEAK PERIOD





Legend

2050 VC Ratios_PM

- 0.00 - 0.40
- 0.41 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- > 0.80
- Southeast Subregion Towns

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FIGURE 32 - SOUTHEAST SUBREGION EXISTING 2050 V/C RATIOS, PM PEAK PERIOD

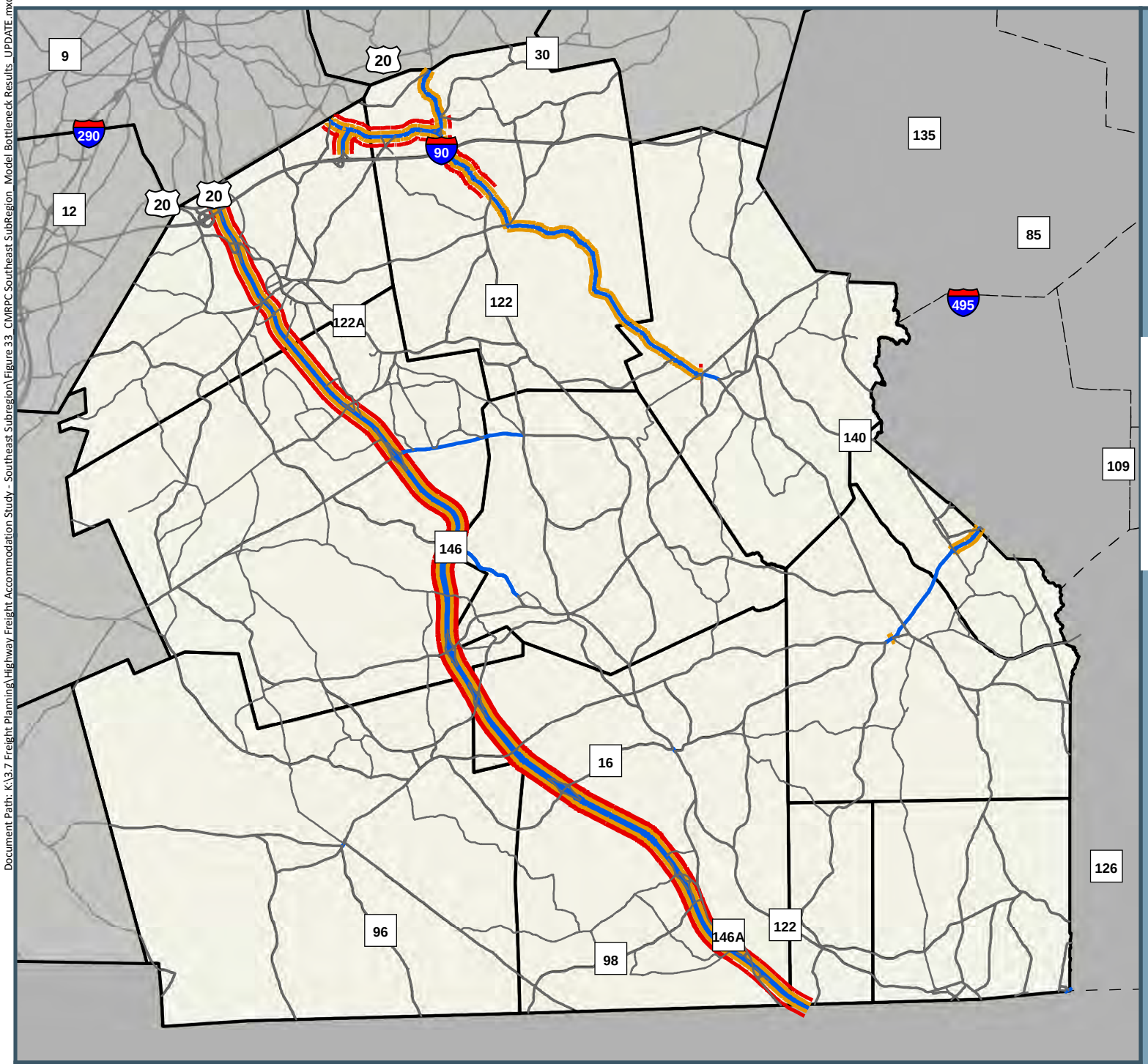
Potential Highway "Bottleneck" Segments in the Southeast Subregion

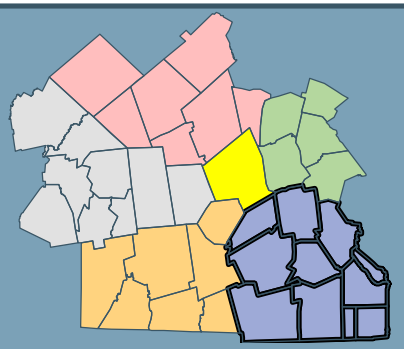
The Travel Demand Model software, or "Model", was also used to identify potential "Bottleneck" segments on the Southeast subregion's federal-aid highways and other major locally maintained roads. This analysis is based on the number of "Origin/Destination" (O/D) pairs using the highway network. The "Origin" is the location of the beginning of a vehicle trip. The "Destination" is the location of the end of the vehicle trip. This particular analysis is customized to the CMRPC region's Model which has a definitive number of calculated O/D pairs: 837,225. In a relative sense, Models for larger planning areas would have more O/D pairs, such as the greater Boston region. Conversely, smaller planning regions would have fewer O/D pairs, such as Franklin County in western Massachusetts.

Three (3) Scenarios were analyzed: "Stage 1", "Stage 2" & "Stage 3". The "Stage 1" Scenario Model results indicate where there are over 5,000 O/D pairs estimated to be using a particular segment of highway in both the suburban and rural areas of the Southeast subregion. Under the "Stage 2" Scenario, Model results identify where there are over 7,500 O/D pairs using a particular highway segment in the Southeast subregion. Finally, a "Stage 3" Scenario shows where there are over 10,000 O/D pairs using the major federal-aid highways in the Southeast planning subregion. Additionally, there are 955 transportation analysis zones (TAZs) in the Model which translates to 912,025 O/D pairs. Highways identified under the Stage 3 Scenario serve approximately 1% of the O/D pairs.

The results of the three (3) analyzed Scenarios are shown on **Figure 33**. The figure shows *potential* Model-derived highway Bottleneck segments in the Southeast planning subregion. The identified potential Bottleneck segments affect all traffic using the highway network, including the range of heavy vehicles transporting a wide array of freight. The major highways in the Southeast subregion highlighted by this Model analysis include the entirety of State Numbered Route 146 through the Blackstone Valley which exhibits a Stage 3 level of O/D pairs. Similarly, in the host communities of Grafton and Millbury, Route 122, and the ramps to the highly utilized I-90 (MassPike) interchange show a Stage 3 attractiveness. Further, in Grafton, a Stage 3 level of O/D pairs is also accommodated on the common highway segment of Route 122/140. Route 140 in Grafton, both north & south of the common highway segment with Route 122, exhibits a Stage 2 level of O/D pair attractiveness. This occurs in the village of North Grafton as well as south of the town center, for the entirety of Route 140 to the town of Upton, where this condition diminishes near the Hartford Avenue intersection. Elsewhere, segments of Sutton Street in the town of Northbridge, continuous with Central Turnpike in Sutton, exhibit a Stage 1 level of attractiveness, as do Purgatory Road and North Main Street in Northbridge. Finally, segments of the entirety of Route 16 in Hopedale show both Stage 1 & 2 levels of attractiveness while in neighboring Mendon additional segments of Route 16 exhibit a Stage 1 level of O/D pairs.

As such, travel conditions in the Southeast planning subregion, particularly on the length of Route 146 as well as Routes 122 and 140 in the town of Grafton need to be monitored on a continued, periodic basis to verify Model results based on observed conditions in the field. Analytical estimates often need to be verified, perhaps through Travel Time & Delay studies conducted by a survey vehicle during both peak and off-peak travel periods. If congestion based on roadway capacity constraints becomes apparent on an ongoing, reoccurring basis, then the consideration of improvements will become more apparent. Such improvements could be targeted towards those highway segments experiencing regular, reoccurring congestion-related incidents, delays, etc. Again, all vehicles, including those heavy vehicles carrying freight, are impacted by the potentially sluggish projected travel conditions.





Legend

Southeast Subregion Towns

Bottleneck Locations

Stage 1: > 5,000 OD pairs

Stage 2: > 7,500 OD pairs

Stage 3: > 10,000 OD pairs

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FIGURE 33 - POTENTIAL HIGHWAY "BOTTLENECK" SEGMENTS IN THE SOUTHEAST SUBREGION

Document Path: K:\3.7 Freight Planning\Highway Freight Accommodation Study - Southeast Subregion\Figure 33_CMRPC Southeast SubRegion_Model Bottleneck Results_UPDATE.mxd

5.0 Summary of Findings

Table 15 contains a summary of findings extracted from the range of maps previously presented. The information is summarized by Southeast subregion host community and then by each State Numbered Route within the community. For some of the columns, as explained earlier, there was no sufficient data yet available. Further, some of the columns have multiple findings listed while other columns contain a range of findings such as overall traffic volumes as well as heavy vehicle volumes. The information within the table includes:

- Highway federal-aid eligibility
- Highway Ownership
- Regional Environmental Justice Plus (REJ+) Populations
- Critical Freight Corridor
- Transportation Improvement Program (TIP) Projects
- Traffic volume
- Heavy vehicle volume
- Heavy vehicle volume (northbound/eastbound)
- Heavy vehicle volume (southbound/westbound)
- Heavy vehicle percentage
- Average AM travel speeds
- Average PM travel speeds
- CMP Congested intersections
- Highway Safety Improvement Program (HSIP) crash clusters
- Pavement condition
- Bridges and culverts
- Management Systems data integration
- Environmental Profiles
- Evacuation Routes
- Hazardous Dams
- Locally-identified hazards and vulnerable infrastructure

The following are observations concerning each Southeast subregion host community that pertain to the above listed information categories:

Blackstone

State Numbered Route 122 is located in the town of Blackstone. There is an REJ+ area of low-income population near Route 122 and the Rhode Island state line. There are no Critical Freight

Corridors or TIP projects within the town of Blackstone. Route 122 traffic volumes range from 3,750 to 13,900 vpd and approximately 5% are heavy vehicles. There are no known congested intersections or HSIP crash clusters in Blackstone. Regarding pavement conditions, Route 122 was observed to be in excellent condition. Along Route 122, there are four (4) bridges and one (1) short span bridge. Resulting from the Management Systems integration exercise, the entire length of Route 122 is considered "Tier 3", or low priority. There are three (3) Low Hazard dams located near Route 122. Lastly, a number of locally-identified vulnerable critical infrastructure and hazards are located near Route 122 in the host community of Blackstone.

Douglas

State Numbered Routes 16, 96, and 146 are located in the town of Douglas. There are currently no REJ+ populations within Douglas as well as no Critical Freight Corridors. Although only a small section, Route 146 is part of a TIP project programmed for FFY 2025. The project will replace guide and traffic signs from Uxbridge to Worcester. The highest daily traffic volumes observed in Douglas are found on Route 146, with over 38,000 vpd. Elsewhere, some sections of Route 16 have traffic volumes that are over 12,000 vpd. Route 16 also carries about 9% heavy vehicles daily. There are no identified congested intersections or HSIP crash clusters on any of the State Numbered Routes in Douglas. Route 146 pavement was observed to be in excellent condition while both Route 16 and Route 96 exhibit a mix of varying pavement conditions. There is one (1) major culvert along Route 16 and one (1) short span bridge and along Route 98 there is one (1) major culvert. As a result of the Management Systems integration exercise, one (1) "Tier 2" rated segment, or medium priority has been identified on Route 16. Also, there is one (1) Low Hazard dam and three (3) Significant Hazard dams near Route 16 while Route 96 has one (1) nearby Significant Hazard dam. Additionally, some locally-identified vulnerable critical infrastructure is located near both Routes 16 and 146 while hazards are also near Route 16.

Grafton

In the town of Grafton, the State Numbered Routes are Route 30, Route 122, Route 122A, and Route 140. There are currently no REJ+ populations or Critical Freight Corridors within Grafton. There is a Route 140 resurfacing project programmed for FFY 2024 as well as a Route 140 over MBTA bridge replacement for FFY 2026 on the TIP. The combined section of Routes 122 & 140 has the highest daily traffic volumes in the host community with up to 25,000 vpd. Route 140 has the highest heavy vehicle percentages with up to 14% daily. There are no identified congested intersections or HSIP crash clusters within the town of Grafton. All State Numbered Routes were observed to exhibit pavement condition between fair and excellent. There are six (6) major culverts on Route 122 while on Route 122A there are three (3) bridges and one (1) major culvert. On Route 140, there are two (2) bridges, one (1) short span bridge and one (1)

major culvert. Elsewhere, on Routes 122/140, there are one (1) bridge, one (1) short span bridge, and one (1) major culvert. Resulting from the Management Systems integration exercise, "Tier 2" segments, deemed medium priority, were identified on State Numbered Routes 122 and 140. There is a mixture of hazardous dams near all State Numbered Routes in Grafton except the combined section of Routes 122/140. Lastly, there exists locally-identified hazards and vulnerable infrastructure near each of the State Numbered Routes except Route 30, which only has nearby identified hazards.

Hopedale

State Numbered Routes 16 and 140 are located in the town of Hopedale. There are currently no identified REJ+ populations, Critical Freight Corridors or programmed TIP projects within the town of Hopedale. Route 16 and Route 140 both accommodate traffic volumes over 12,000 vpd. Regarding daily heavy vehicles, both Routes 16 and 140 are between 6% to 7% daily. There are no identified congested intersections or HSIP crash clusters in the host community of Hopedale. Regarding pavement, Route 16 was observed to be in good condition while Route 140 was observed to be in excellent condition. There is one (1) short span bridge on both Route 16 and Route 140. Resulting from the Management Systems integration exercise, two (2) "Tier 2" or medium priority segments have been identified on Routes 16 and 140. Also, Route 140 has one (1) nearby Significant Hazard dam while both State Numbered Routes 16 and 140 have nearby locally-identified hazards and vulnerable critical infrastructure.

Mendon

In the host community of Mendon, the State Numbered Routes are Route 16 and Route 140. There are no REJ+ populations or Critical Freight Corridors within the town of Mendon. There is a TIP resurfacing project on Route 16 currently programmed for FFY 2025. Route 16 accommodates the highest daily traffic volumes in Mendon and both Route 16 and Route 140 have as much as 11% heavy vehicles on a daily basis. There is one (1) identified congested intersection on Route 140 at Hartford Avenue. There is also one (1) HSIP crash cluster located on Route 16 at the North Avenue/Main Street intersection. Route 140 pavement was observed to be in excellent condition while Route 16 exhibits a mix of pavement conditions. There are no bridges or major culverts along either Route 16 or Route 140. The Management Systems integration exercise showed one (1) identified "Tier 2" rated segment on Route 140 while four (4) "Tier 2" segments were identified on Route 16. Lastly, there are nearby hazards to Route 140 while Route 16 has both nearby hazards and vulnerable critical infrastructure.

Millbury

State Numbered Routes 122, 122A, 146, and US Route 20 are located in the host community of Millbury. There are identified REJ+ populations of Low Income as well as Limited English

Proficiency (LEP) populations adjacent to both Route 122A and Route 146. There are no Critical Freight Corridors within the town of Millbury. As part of a multi-town project, guide and traffic sign replacement on Route 146 is currently programmed in FFY 2025 of the CMMPO TIP. The highest observed daily traffic volumes are on Route 146 and US Route 20. As the only State Numbered Route with heavy vehicle data, Route 122 has between 8% and 15% daily. There are two (2) identified congested intersections, one (1) at the Route 122A/Route 146 SB Ramps/McCracken Road/Blackstone Shoppes and the other at the Route 122/MassPike Ramps. There are currently no HSIP crash clusters located in Millbury. Routes 122, 146, and US Route 20 were observed to have good or excellent pavement while Route 122A exhibited a mix of pavement conditions. There are two (2) bridges on US Route 20, one (1) bridge & one (1) major culvert on Route 122A, and nine (9) bridges & one (1) major culvert on Route 146. Resulting from the Management Systems integration exercise, there are two (2) "Tier 2" medium priority segments on Route 122A and one (1) "Tier 2" segment identified on Route 122. There are Low Hazard dams near Route 122A while there are Significant Hazard dams near Route 146. Additionally, locally-identified vulnerable critical infrastructure are situated nearby each of Routes 122A, 146, and US Route 20.

Millville

In the town of Millville, the State Numbered Routes are Route 122 and Route 146. There are currently no REJ+ populations, Critical Freight Corridors, or programmed TIP projects in the town of Millville. There are in excess of 31,000 vpd on Route 146 and nearly 3,500 vpd on Route 122. Route 122 also carries 10% to 12% heavy vehicles daily. There are no identified congested intersections or HSIP crash clusters in the host community of Millville. Both Route 122 and Route 146 pavement was observed to be in excellent condition. There are no bridges or major culverts on the State Numbered Routes in Millville. According to the results of the Management Systems integration exercise, only "Tier 3" low priority segments exist on Route 122 and Route 146. Lastly, there is locally-identified vulnerable critical infrastructure near both Routes 122 and 146.

Northbridge

In the town of Northbridge, the State Numbered Routes are Route 122 and Route 146. There is an REJ+ population of Low-Income near Route 122 in the southern part of town. There are no Critical Freight Corridors in the town of Northbridge. There is a TIP project each on Route 122 and Route 146. The TIP project on Route 122 is for intersection improvements at School Street, Sutton Street, and Upton Street. It is currently programmed for FFY 2026. For Route 146, there is a project to replace guide and traffic signs and it is programmed for FFY 2025. There are more than 38,000 vpd on the small section of Route 146 in Northbridge. Route 122 exceeds 11,000 vpd on some sections and accommodates between 8% and 14% heavy vehicles on a

daily basis. There are no identified congested intersections on either Route 122 or Route 146. However, there are two (2) HSIP crash clusters on Route 122, one at Sutton Street and one at Church Street. Regarding pavement, Route 122 was observed to be in fair or good condition and Route 146 was determined to be in excellent condition. Route 122 has four (4) bridges, one of which is structurally deficient, and Route 146 has two (2) bridges. According to the results of the Management Systems integration exercise, there are two (2) "Tier 2" segments on Route 122. There is one (1) High Hazard dam in proximity to Route 122 in Northbridge. Further, there is locally-identified vulnerable critical infrastructure and hazards in Northbridge that are near both State Numbered Routes 122 and 146.

Sutton

State Numbered Routes 122A and 146 are in the host community of Sutton. There are no identified REJ+ populations or Critical Freight Corridors within the town of Sutton. As part of a MassDOT multi-town project, guide and traffic sign replacement on Route 146 is currently programmed in FFY 2025 of the CMMPO TIP. The highest observed daily traffic volumes in Sutton are on Route 146, with up to 40,000 vpd. Elsewhere in the host community, Route 122A carries about 6,000 vpd. The major signalized intersection of Route 146/Boston Road is both an identified congested location and a HSIP crash cluster. Route 122A was observed to exhibit fair or poor pavement while Route 146 pavement was in excellent condition. There is one (1) short span bridge on Route 122A while there are five (5) bridges & two (2) major culverts on Route 146. Resulting from the Management Systems integration exercise, there are four (4) "Tier 2" or medium priority segments identified on Route 146. There are Significant Hazard dams near both Route 122A and Route 146 in Sutton. Additionally, locally-identified vulnerable critical infrastructure is nearby Route 122A while hazards are also near both State Numbered Routes 122A and 146.

Upton

In the host community of Upton, the only State Numbered Route is Route 140. There are no REJ+ populations or Critical Freight Corridors in Upton. There are two (2) Route 140 TIP resurfacing projects programmed for FFY 2024 and FFY 2025. In addition, there is a culvert replacement project programmed for FFY 2026. There are between 7,000 vpd and 12,000 vpd on Route 140 with 7% heavy vehicles. There are no identified congested intersections or HSIP crash clusters on Route 140. Regarding pavement, Route 140 was observed to be in fair or good condition. Route 140 has one (1) bridge and one (1) short span bridge. According to the results of the Management Systems integration exercise, there are no identified "Tier 2" segments on Route 140. There are Low and Significant Hazard dams in proximity to Route 140. Lastly, there are locally-identified hazards and vulnerable critical infrastructure in Upton near Route 140.

Uxbridge

State Numbered Routes 16, 98, 122, 146, and 146A are located in the host community of Uxbridge. There are no identified REJ+ populations or Critical Freight Corridors within the town of Uxbridge. There are three (3) programmed TIP projects on State Numbered Routes. On Route 122, there is a reconstruction project programmed for FFY 2024. Further, there is a guide and traffic sign replacement project for Route 146 programmed for FFY 2025 and a rehabilitation project on Route 16 programmed for FFY 2027. The highest observed daily traffic volumes are on Route 146, with up to 38,000 vpd. Additionally, Routes 16 and 122 carry up to 13,000 vpd. With limited data, Route 16 has the highest daily heavy vehicle percentage, ranging between 12% and 16%. There is one (1) HSIP crash cluster located at the Route 16/Route 122 intersection in Uxbridge. Routes 98, 146, and 146A were observed to have good or excellent pavement while Routes 16 and 122 exhibit a mix of pavement conditions. There are four (4) bridges and one (1) short span bridge on Route 16, one (1) short span bridge on Route 98, and three (3) bridges and one (1) short span bridge on Route 122. On Route 146 there are thirteen (13) bridges and two (2) major culverts while on Route 146A there are one (1) bridge and one (1) short span bridge. Resulting from the Management Systems integration exercise, there are three (3) "Tier 2" segments each on both Route 16 and Route 122. There are Significant Hazard dams near Routes 16, 122, 146, and 146A. There are also two (2) High Hazard dams near Route 122 in Uxbridge. Additionally, locally-identified vulnerable critical infrastructure are nearby all State Numbered Routes in the community as well as hazards near both Route 122 and Route 146.

Table 15 - Summary of Findings

Host Community	Route #	Fed-Aid Eligible	Highway Ownership	REJ+ Populations	Critical Freight Corridor	TIP Projects	Traffic Volume	Heavy Vehicle Volume	Heavy Vehicle Volume (NB/EB)	Heavy Vehicle Volume (SB/WB)	Heavy Vehicle %	Average Travel Speeds (AM)	Average Travel Speeds (PM)	CMP Congested Intersections	HSIP Crash Clusters	Pavement Condition	Bridges & Culverts	Management Systems Data Integration	Environmental Profiles	Evacuation Route	Dams	Locally-Identified Hazards & Vulnerable Infrastructure
Blackstone	122	Yes	MassDOT	Yes	No	No	3,350 - 13,900	290	140	150	5%	No Data	No Data	No	No	Excellent	4 Bridges, 1 Short Span Bridge	Tier 3	Nearby recreation & conservation areas, wetlands, potential vernal pools, and 100 & 500 year flood zones.	Primary	Nearby Low Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
Douglas	16	Yes	Town	No	No	No	3,750 - 12,975	1,125 - 1,300	600 - 675	525 - 625	8% - 10%	No Data	No Data	No	No	Poor / Fair / Good / Excellent	1 Culvert	Tiers 2 & 3	Nearby recreation/conservation & open space areas, wetlands, vernal and potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Primary	Nearby Low & Significant Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
	96	Yes	Town	No	No	No	550 - 2,750	No Data	No Data	No Data	No Data	No Data	No Data	No	No	Poor / Fair / Good	1 Short Span Bridge, 1 Culvert	Tier 3	Nearby wetlands, potential vernal pools, rare species habitat, and 100 year flood zones.	Primary	Nearby Significant Hazard Dam	None
	146	Yes	MassDOT	No	No	Yes	38,200	No Data	No Data	No Data	No Data	62 - 64 MPH	63 - 66 MPH	No	No	Excellent	None	Tier 3	Nearby potential vernal pools.	Interstate Highway	Nearby Low Hazard Dam	Nearby Vulnerable Critical Infrastructure
Grafton	30	Yes	Town	No	No	No	4,650 - 6,100	No Data	No Data	No Data	No Data	No Data	No Data	No	No	Fair / Good	None	Tier 3	Nearby recreation & conservation areas, wetlands, potential vernal pools, and 100 & 500 year flood zones.	Secondary	Nearby High Hazard Dam	Nearby Hazards
	122	Yes	MassDOT	No	No	No	6,725 - 16,575	520 - 1,400	250 - 740	260 - 660	5% - 8%	37 - 41 MPH	36 - 40 MPH	No	No	Fair / Good / Excellent	6 Culverts	Tiers 2 & 3	Nearby conservation, recreation & open space areas, wetlands, vernal & potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Primary	Nearby Low, Significant & High Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
	122A	Yes	Town	No	No	No	5,225 - 5,950	320	150	170	6%	No Data	No Data	No	No	Good	3 Bridges, 1 Culvert	Tier 3	Nearby recreation area, wetlands, vernal & potential vernal pools, and 100 & 500 year flood zones.	Secondary	Nearby Low, Significant & High Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
	140	Yes	MassDOT & Town	No	No	Yes	7,300 - 17,000	540 - 2,400	230 - 1,300	315 - 1,100	7% - 14%	25 - 33 MPH	30 - 31 MPH	No	No	Fair / Good / Excellent	2 Bridges, 1 Short Span Bridge, 2 Culverts	Tiers 2 & 3	Nearby recreation, conservation & open space areas, wetlands, potential vernal pools, and 100 year flood zones.	Primary	Nearby Significant & High Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
	122/140	Yes	MassDOT	No	No	No	18,275 - 25,350	No Data	No Data	No Data	No Data	28 - 36 MPH	21 - 36 MPH	No	No	Excellent	1 Bridge, 1 Short Span Bridge, 1 Culvert	Tier 2	Nearby conservation & recreation areas, wetlands, vernal & potential vernal pools, rare species habitat, and 100 year flood zones.	Primary	None	Nearby Hazards & Vulnerable Critical Infrastructure
Hopedale	16	Yes	Town	No	No	No	10,600 - 12,825	850	285	565	7%	No Data	No Data	No	No	Good	1 Short Span Bridge	Tiers 2 & 3	Nearby recreation & open space area, potential vernal pools, and 100 & 500 year flood zones.	Primary	None	Nearby Hazards & Vulnerable Critical Infrastructure
	140	Yes	MassDOT	No	No	No	9,900 - 14,125	580	305	275	6%	No Data	No Data	No	No	Excellent	1 Short Span Bridge	Tiers 2 & 3	Nearby conservation & recreation areas, wetlands, potential vernal pools, and 100 & 500 year flood zones.	Primary	Nearby Significant Hazard Dam	Nearby Hazards & Vulnerable Critical Infrastructure
Mendon	16	Yes	MassDOT	No	No	Yes	9,415 - 19,775	850 - 1,900	280 - 950	570 - 950	7% - 11%	No Data	No Data	No	Yes	Very Poor / Fair / Good / Excellent	None	Tiers 2 & 3	Nearby conservaton, recreation & open space areas, wetlands, potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Primary	None	Nearby Hazards & Vulnerable Critical Infrastructure
	140	Yes	MassDOT	No	No	No	5,100 - 8,725	1,000	570	430	11%	No Data	No Data	Yes	No	Excellent	None	Tiers 2 & 3	Nearby wetlands and potential vernal pools.	None	None	Nearby Hazards

Table 15 - Summary of Findings

Host Community	Route #	Fed-Aid Eligible	Highway Ownership	REJ+ Populations	Critical Freight Corridor	TIP Projects	Traffic Volume	Heavy Vehicle Volume	Heavy Vehicle Volume (NB/EB)	Heavy Vehicle Volume (SB/WB)	Heavy Vehicle %	Average Travel Speeds (AM)	Average Travel Speeds (PM)	CMP Congested Intersections	HSIP Crash Clusters	Pavement Condition	Bridges & Culverts	Management Systems Data Integration	Environmental Profiles	Evacuation Route	Dams	Locally-Identified Hazards & Vulnerable Infrastructure
Millbury	20	Yes	MassDOT	No	No	No	25,800 - 26,450	No Data	No Data	No Data	No Data	22 - 36 MPH	16 - 38 MPH	No	No	Good	2 Bridges	Tier 3	Nearby recreation area, wetlands, and 100 & 500 year flood zones.	Primary	None	Nearby Vulnerable Critical Infrastructure
	122	Yes	MassDOT	No	No	No	16,200 - 18,925	1,300 - 2,950	620 - 1,575	680 - 1,375	8% - 15%	No Data	No Data	Yes	No	Excellent	None	Tiers 2 & 3	Nearby open space area, wetlands, and potential vernal pools.	Primary	None	None
	122A	Yes	MassDOT & Town	Yes	No	No	6,250 - 12,100	No Data	No Data	No Data	No Data	No Data	No Data	Yes	No	Very Poor / Poor / Good / Excellent	1 Bridge, 1 Culvert	Tiers 2 & 3	Nearby recreation & water supply protection areas, wetlands, potential vernal pools, and 100 & 500 year flood zones.	Primary	Nearby Low Hazard Dams	Nearby Vulnerable Critical Infrastructure
	146	Yes	MassDOT	Yes	No	Yes	35,800	No Data	No Data	No Data	No Data	48 - 55 MPH	46 - 56 MPH	No	No	Excellent	9 Bridges, 1 Culvert	Tier 3	Nearby recreation and water supply protection areas, wetlands, potential vernal pools, and 100 & 500 year flood zones.	Interstate Highway	Nearby Significant Hazard Dam	Nearby Hazards & Vulnerable Critical Infrastructure
Millville	122	Yes	MassDOT	No	No	No	2,900 - 3,350	290 - 775	130 - 525	160 - 250	10% - 12%	No Data	No Data	No	No	Excellent	None	Tier 3	Nearby conservation & recreation areas, wetlands, potential vernal pools, and 100 year flood zones.	Primary	None	Nearby Hazards & Vulnerable Critical Infrastructure
	146	Yes	MassDOT	No	No	No	31,200	No Data	No Data	No Data	No Data	66 - 67 MPH	62 - 65 MPH	No	No	Excellent	None	Tier 3	Nearby wetlands and potential vernal pools.	Interstate Highway	None	Nearby Vulnerable Critical Infrastructure
Northbridge	122	Yes	MassDOT & Town	Yes	No	Yes	6,300 - 11,550	480 - 1,185	225 - 555	255 - 630	8% - 14%	28 - 37 MPH	30 - 37 MPH	No	Yes	Fair / Good	4 Bridges (1SD)	Tiers 2 & 3	Nearby conservation, recreation & open space areas, wetlands, potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Primary	Nearby High Hazard Dam	Nearby Hazards & Vulnerable Critical Infrastructure
	146	Yes	MassDOT	No	No	Yes	38,225	No Data	No Data	No Data	No Data	59 - 66 MPH	63 - 66 MPH	No	No	Excellent	2 Bridges	Tier 3	Nearby wetlands, potential vernal pools, and 100 year flood zones.	Interstate Highway	None	Nearby Hazards & Vulnerable Critical Infrastructure
Sutton	122A	Yes	Town	No	No	No	5,950 - 6,250	No Data	No Data	No Data	No Data	No Data	No Data	No	No	Poor / Fair	1 Short Span Bridge	Tier 3	Nearby conservation area, wetlands, potential vernal pools, and 100 year flood zones.	Secondary	Nearby Significant Hazard Dam	Nearby Hazards & Vulnerable Critical Infrastructure
	146	Yes	MassDOT	No	No	Yes	35,800 - 39,800	No Data	No Data	No Data	No Data	37 - 66 MPH	37 - 67 MPH	Yes	Yes	Excellent	5 Bridge, 2 Culverts	Tiers 2 & 3	Nearby conservation, recreation & open space area, wetlands, vernal & potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Interstate Highway	Nearby Low & Significant Hazard Dams	Nearby Hazards
Upton	140	Yes	MassDOT	No	No	Yes	7,300 - 11,725	550 - 600	230 - 325	320 - 275	7%	No Data	No Data	No	No	Fair / Good	1 Bridge, 1 Short Span Bridge	Tiers 2 & 3	Nearby conservation & recreation areas, wetlands, vernal & potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Primary	Nearby Low & Significant Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
Uxbridge	16	Yes	MassDOT & Town	No	No	Yes	3,750 - 13,000	1,430 - 2,070	590 - 840	840 - 1,230	12% - 16%	11 - 42 MPH	16 - 44 MPH	No	Yes	Poor / Fair / Good / Excellent	4 Bridges, 1 Short Span Bridge	Tiers 2 & 3	Nearby conservation, recreation, open space & water supply protection areas, wetlands, potential vernal pools, rare species habitat, and 100 & 500 year floods zones.	Primary	Nearby Low & Significant Hazard Dams	Nearby Vulnerable Critical Infrastructure
	98	Yes	Town	No	No	No	1,525 - 3,575	No Data	No Data	No Data	No Data	No Data	No Data	No	No	Good / Excellent	1 Short Span Bridge	Tier 3	Nearby conservation, recreation & open space areas, wetlands, potential vernal pools, rare species habitat, and 500 year flood zones.	Secondary	None	Nearby Vulnerable Critical Infrastructure
	122	Yes	MassDOT & Town	No	No	Yes	2,900 - 12,750	280 - 860	125 - 465	155 - 395	8% - 10%	19 - 44 MPH	22 - 42 MPH	No	Yes	Poor / Fair / Good / Excellent	3 Bridges, 1 Short Span Bridge	Tiers 2 & 3	Nearby recreation areas, wetlands, potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Primary	Nearby Significant & High Hazard Dams	Nearby Hazards & Vulnerable Critical Infrastructure
	146	Yes	MassDOT	No	No	Yes	30,900 - 38,225	No Data	No Data	No Data	No Data	63 - 66 MPH	60 - 67 MPH	No	No	Good / Excellent	15 Bridges, 2 Culverts	Tier 3	Nearby conservation & open space areas, wetlands, vernal & potential vernal pools, rare species habitat, and 100 & 500 year flood zones.	Interstate Highway	Nearby Significant Hazard Dam	Nearby Hazards & Vulnerable Critical Infrastructure
	146A	Yes	MassDOT	No	No	No	4,275 - 8,950	No Data	No Data	No Data	No Data	No Data	No Data	No	No	Good / Excellent	1 Bridge, 1 Short Span Bridge	Tier 3	Nearby wetlands, potential vernal pools, rare species habitat, and 100 year flood zones.	Primary	Nearby Significant Hazard Dam	Nearby Vulnerable Critical Infrastructure

6.0 Suggested Improvement Options

Based on the previous Summary of Findings section, a number of suggested improvement options have been compiled for consideration by both MassDOT and the eleven (11) host communities in the Southeast planning subregion. The following **Figure 34** shows suggested priority infrastructure improvements for each of the towns. Highway segments that are on the federal-aid network are eligible for potential future-year project funding through the CMMPO's TIP. Other available improvement funding resources also have the potential to be applied, such as various grant opportunities and state-provided Chapter 90 funds.

6.1 Southeast Subregion-Wide Improvement Options

- In the spirit of Jason's Law, contemplate revised local policy and strongly consider truck parking-friendly bylaws that allow for federally required driver rest periods for long distance truckers at key commercial and/or industrial locations in each of the host communities.
- Potential improvement of truck turning radii at major intersections, limited box widening where necessary, the installation of truck climbing lanes on steep grades as well as the elimination of hazardous highway curves.
- Check and optimize traffic signal timing & phasing at high-volume signalized intersections.
- Maintain all pavement to a condition of "Good" or above. Pavement conditions are especially critical on State Numbered Routes.
- Address all structurally deficient (SD) bridges. In addition, address those bridges with posted weight limits associated with reduced load-carrying capabilities.
- Numerous culverts need attention in the Southeast transportation planning subregion. As such, commence corridor-wide and/or town-wide culvert assessment programs that can allow for the future targeted replacement of key vulnerable drainage system components. *(The CMRPC transportation staff is available to discuss this program further.)*
- Improve/repair the hazardous dams identified in the Southeast subregion, especially those located upstream of State Numbered Routes.

6.2 Southeast Subregion Host Community Improvement Options

Blackstone

- Maintain the four (4) bridges and one (1) short span bridge along Route 122.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Douglas

- Improve the poor pavement segments identified on Route 16 and Route 96.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segment on Route 16.
- Consider improving all Significant Hazard dams in the community, specifically near and upstream of both Route 16 and Route 96.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Grafton

- Maintain pavement in good to excellent condition for all State Numbered Routes.
- Consider improving all Significant & High Hazard dams in the community, specifically near and upstream of Route 30, Route 122, Route 122A, and Route 140.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on Route 122, Route 140, and the Route 122/140 section.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Hopedale

- Maintain pavement in good to excellent condition for both State Numbered Route 16 and Route 140.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on Route 16 and Route 140.
- Consider improving all Significant Hazard dams in the town of Hopedale, specifically near Route 140.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Mendon

- Improve the very poor pavement segments identified on Route 16 between North Avenue and the Hopedale town line. A TIP project to resurface Route 16 in Mendon is currently programmed for FFY 2025.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on Route 16 and Route 140.
- Improve the one (1) identified HSIP crash cluster on Route 16 at the Main Street/North Avenue intersection.

- Consider improvements at the identified congested intersection at Route 140 & Hartford Avenue.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Millbury

- Improve the poor and very poor pavement segments identified on Route 122A, between Grafton Street and the Sutton town line.
- Consider improvements at the two (2) identified congested intersections.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on Route 122 and Route 122A.
- Consider improving all Significant Hazard dams in the community, in particular near Route 146.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Millville

- Maintain good to excellent pavement condition on Route 122 and Route 146.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Northbridge

- Maintain the pavement on Route 122 and Route 146 in good to excellent condition.
- Improve the structurally deficient bridge on Route 122 near the Uxbridge town line.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on Route 122.
- Improve the identified HSIP crash cluster at the Route 122/Sutton Street/School Street/Upton Street intersection. This intersection will be improved as a TIP project and is currently programmed for FFY 2026.
- Consider improving all Significant and High Hazard dams in the town of Northbridge, specifically near Route 122 and Route 146.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Sutton

- Improve the poor pavement segment identified on Route 122A, between the Millbury town line and Buttonwood Avenue.

- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on Route 146.
- Improve the one (1) identified HSIP crash cluster located at the major signalized Route 146/Boston Road intersection. This location is also an identified CMP congested intersection. Importantly, the Long-Range Transportation Plan (LRTP) for the planning region, 2050 Connections, has identified this intersection as a future year candidate for Major Infrastructure (MI) funding. A grade-separated interchange with some type of well-planned ramp arrangement is envisioned.
- Consider improving all Significant Hazard dams in the community, in particular near Route 122A and Route 146.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Upton

- Maintain pavement on Route 140 in good to excellent condition. There are currently two (2) TIP resurfacing projects for Route 140 that are programmed for FFY 2024 and FFY 2025.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segment on Route 140, between Chestnut Street and the Hopedale town line.
- Consider improving all Significant Hazard dams in the community, specifically near and upstream of Route 140.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

Uxbridge

- Improve the poor pavement segments identified on Route 122 (North Main Street). There was a recently completed TIP project (2020/2021) on the northern section of Route 122 that includes the poor pavement sections. The current pavement is likely to be in good condition, but staff have only assessed pavement in that area prior to the implemented improvement project.
- Improve the poor pavement segments identified on Route 16 (Douglas Street). There is a TIP rehabilitation project programmed for FFY 2027 on this section of the road.
- Improve the identified HSIP crash cluster at the Route 122/Route 16 (Douglas Street) intersection.
- Consider improving the Management Systems data integration exercise-identified Tier 2 priority segments on both Route 16 and Route 122.

- Consider improving all Significant & High Hazard dams in the community, specifically near all State Numbered Routes.
- Consider any nearby locally-identified hazards and vulnerable critical infrastructure that could potentially be impacted by the suggested subregion-wide improvement options.

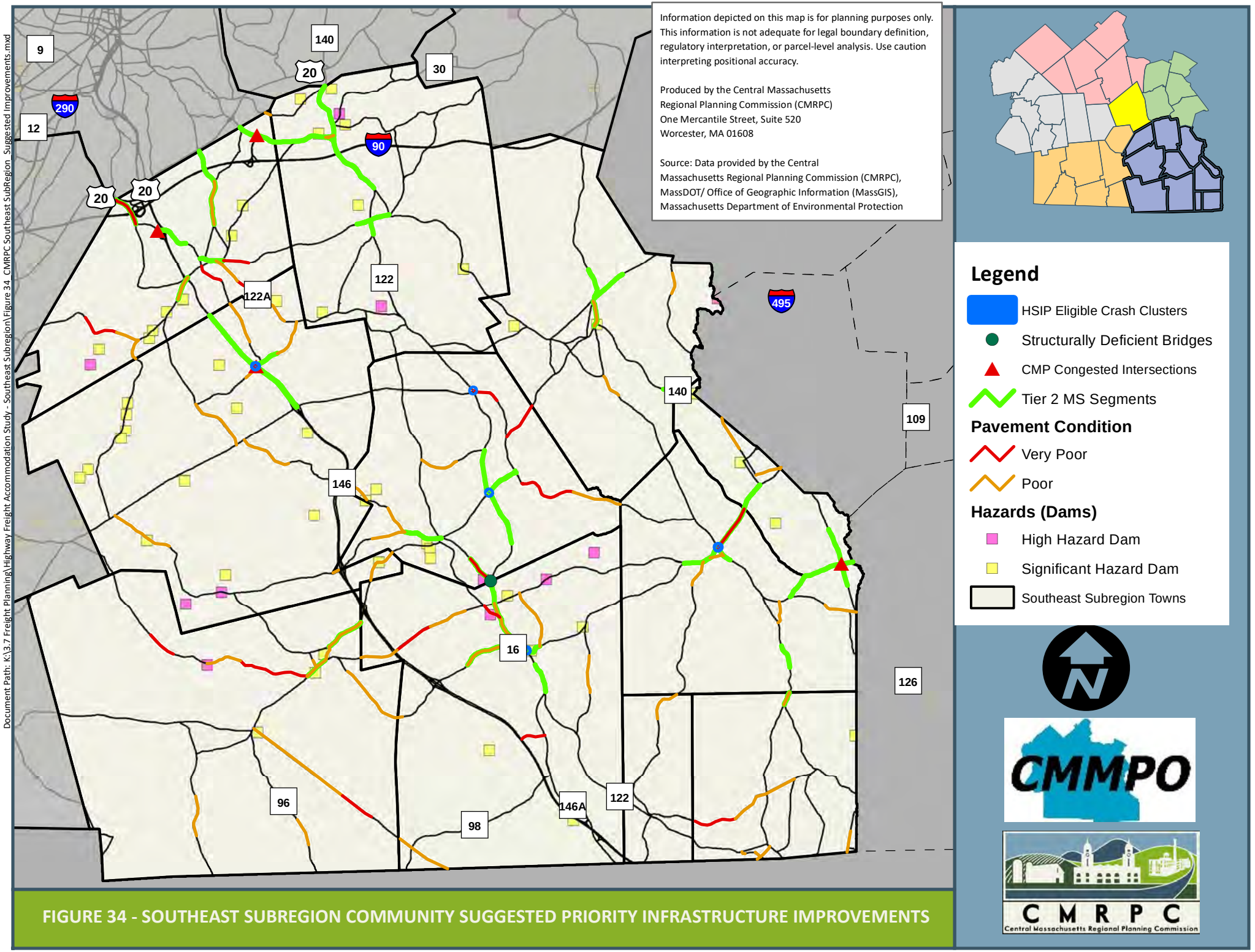

FIGURE 34 - SOUTHEAST SUBREGION COMMUNITY SUGGESTED PRIORITY INFRASTRUCTURE IMPROVEMENTS

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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