

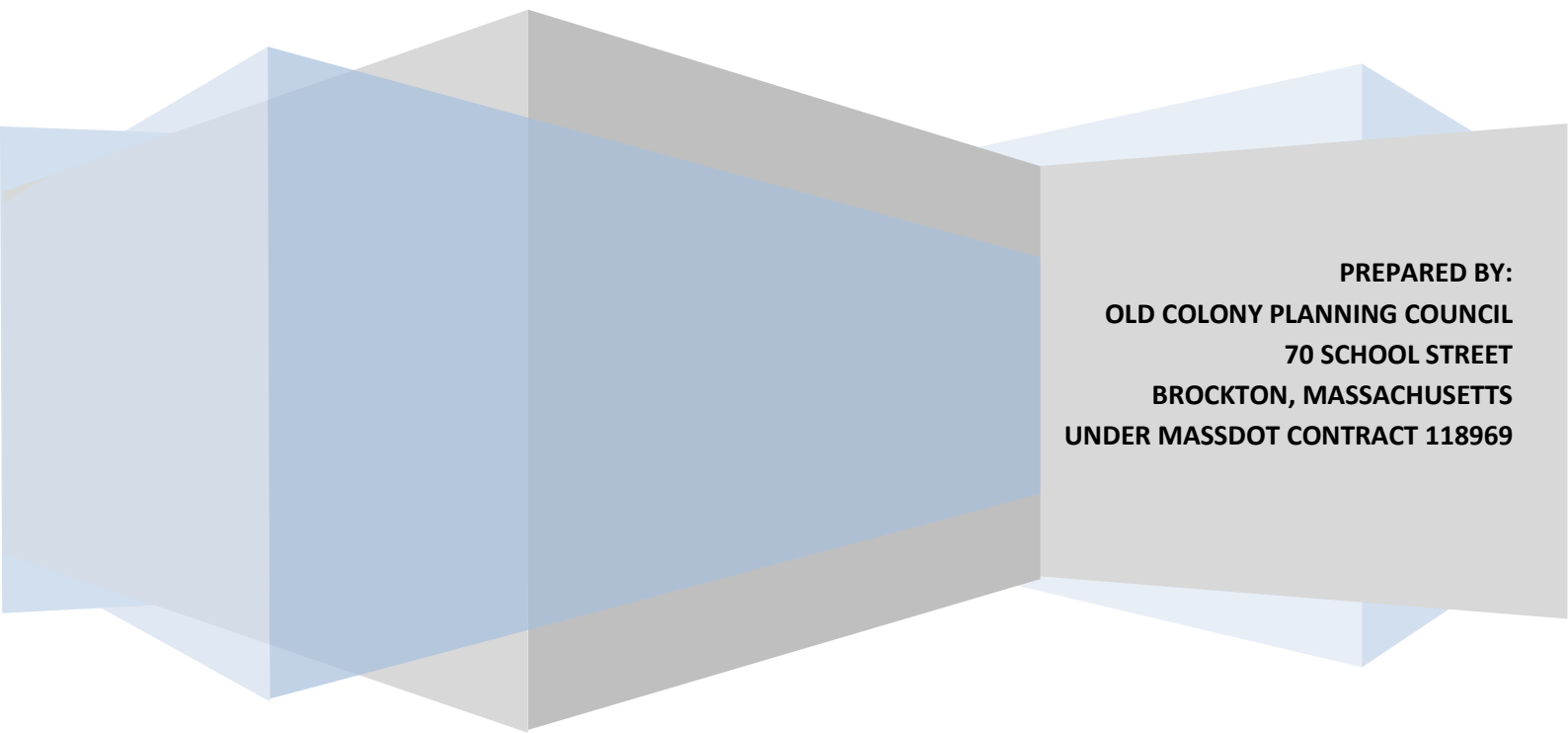
OLD COLONY METROPOLITAN PLANNING ORGANIZATION (MPO)

# **DRAFT VISION 2050 OLD COLONY LONG-RANGE TRANSPORTATION PLAN (LRTP)**

PRESENTED IN DRAFT FORM TO OLD COLONY MPO AUGUST 15, 2023

PREPARED IN COOPERATION WITH:

- BROCKTON AREA TRANSIT AUTHORITY (BAT)
- FEDERAL HIGHWAY ADMINISTRATION (FHWA)
- FEDERAL TRANSIT ADMINISTRATION (FTA)
- MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT)
- OLD COLONY PLANNING COUNCIL (OCPC)



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The Old Colony Long-Range Transportation Plan was prepared by the following:

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- Denise Reyes, Vice-Chair, Board of Selectmen, West Bridgewater (Representing communities with populations less than 15,000 persons)
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**DISCLAIMER**

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## **701 CMR 7.00 USE OF ROAD FLAGGERS AND POLICE DETAILS ON PUBLIC WORKS PROJECTS/ 701 CMR**

7.00 (the Regulation) was promulgated and became law on October 3, 2008. Under this Regulation, the CMR is applicable to any Public works Project that is performed within the limits of, or that impact traffic on, any Public Road. The Municipal Limitation referenced in this Regulation is applicable only to projects where the Municipality is the Awarding Authority. For all projects contained in the TIP, the Commonwealth is the Awarding Authority. Therefore, all projects must be considered and implemented in accordance with 701 CMR 7.00, and the Road Flagger and Police Detail Guidelines. By placing a project on the TIP, the Municipality acknowledges that 701 CMR 7.00 is applicable to its project and design and construction will be fully compliant with this Regulation. This information and additional information relative to guidance and implementation of the Regulation can be found at the following link on the MassDOT Highway Division website: <https://www.mass.gov/road-flaggers-and-police-detail>

### **NOTICE OF NONDISCRIMINATION RIGHTS AND PROTECTIONS TO BENEFICIARIES**

#### **Federal "Title VI/ Nondiscrimination" Protections**

The Old Colony Metropolitan Planning Organization (MPO) operates its programs, services, and activities in compliance with federal nondiscrimination laws including Title VI of the Civil Rights Act of 1964 (Title VI), the Civil Rights Restoration Act of 1987, and related statutes and regulations. Title VI prohibits discrimination in federally assisted programs and requires that no person in the United States of America shall, on the grounds of **race, color, or national origin** (including **limited English proficiency**), be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal assistance. Related federal nondiscrimination laws administered by the Federal Highway Administration, the Federal Transit Administration, or both prohibit discrimination on the basis of **age, sex, and disability**. These protected categories are contemplated within the Old Colony MPO's Title VI Programs consistent with federal interpretation and administration. Additionally, the Old Colony MPO provides meaningful access to its programs, services, and activities to individuals with limited English proficiency, in compliance with US Department of Transportation policy and guidance on federal Executive Order 13166.

#### **State Nondiscrimination Protections**

The Old Colony MPO also complies with the Massachusetts Public Accommodation Law, M.G.L. c 272 §§ 92a, 98, 98a, prohibiting making any distinction, discrimination, or restriction in admission to or treatment in a place of public accommodation based on **race, color, religious creed, national origin, sex, sexual orientation, disability, or ancestry**. Likewise, the Old Colony

MPO complies with the Governor's Executive Order 526, section 4 requiring all programs, activities, and services provided, performed, licensed, chartered, funded, regulated, or contracted for by the state shall be conducted without unlawful discrimination based on **race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status** (including Vietnam-era veterans), or **background**.

Additional Information

To request additional information regarding Title VI and related federal and state nondiscrimination obligations, please contact:

Old Colony Planning Council  
Title VI/ Nondiscrimination Coordinator  
Mary Waldron  
70 School Street  
Brockton, MA 02301  
508-583-1833 Extension 202  
[mwaldron@ocpcrpa.org](mailto:mwaldron@ocpcrpa.org)

Title VI Specialist  
MassDOT, Office of Diversity and Civil Rights  
10 Park Plaza  
Boston, MA 02116  
857-368-8580  
TTY: 857-368-0603  
[MASSDOT.CivilRights@state.ma.us](mailto:MASSDOT.CivilRights@state.ma.us)

### Complaint Filing

To file a complaint alleging a violation of Title VI or related federal nondiscrimination law, contact the Title VI Specialist (above) within 300 days of the alleged discriminatory conduct.

To file a complaint alleging a violation of the state's Public Accommodation Law, contact the Massachusetts Commission Against Discrimination within 300 days of the alleged discriminatory conduct at:

Massachusetts Commission Against Discrimination (MCAD)  
One Ashburton Place, 6th Floor  
Boston, MA 02109  
617-994-6000  
TTY: 617-994-6196

### Translation

#### **English**

If this information is needed in another language, please contact the MPO Title VI Coordinator at 508-583-1833.

#### **Spanish**

Si necesita esta información en otro idioma, por favor contacte al coordinador de MPO del Título VI al 508-583-1833.

#### **Portuguese**

Caso estas informações sejam necessárias em outro idioma, por favor, contate o Coordenador de Título VI da MPO pelo telefone 508-583-1833,

#### **Chinese Simple**

如果需要使用其它□□□□□□□□□□ Old Colony大都会□□□□ (MPO) 《民□□□□□□□□□□, □□ 508- 583-1833。

#### **Chinese Traditional**

如果需要使用其他語言瞭解資訊, 請聯繫Old Colony大都會規劃組織 (MPO) 《民權法案》第六章協調員, 電話508- 583-1833。

#### **Vietnamese**

Nếu quý vị cần thông tin này bằng tiếng khác, vui lòng liên hệ Điều phối viên Luật VI của MPO theo số điện thoại 508- 583-1833,.





## Chapter 1: Introduction

The transportation planning process analyzes and presents the benefits and impacts of various transportation alternatives such as adding new highways, changes in the transit system, auto-free zones, and improvements to freight movement, airports, waterways, and bicycle and pedestrian facilities. This information is used by decision makers in the selection of preferred solutions to current and anticipated problems.

The Old Colony Metropolitan Planning Organization (MPO) is the regional transportation planning entity created under state and federal laws that require the formation of MPOs in urbanized areas with populations of more than 50,000 in order for surface transportation projects to be eligible for federal Highway Trust Fund dollars. The transportation planning area for the Old Colony MPO includes the City of Brockton and sixteen towns: Abington, Avon, Bridgewater, Duxbury, East Bridgewater, Easton, Halifax, Hanover, Hanson, Kingston, Pembroke, Plymouth, Plympton, Stoughton, West Bridgewater, and Whitman. The planning area also includes the service area of Brockton Area Transit (BAT) and portions of the Massachusetts Bay Transportation Authority (MBTA) and the Greater Attleboro Taunton Regional Transit Authority (GATRA) service areas within the MPO regional boundaries.

### THE COOPERATIVE, CONTINUOUS, AND COMPREHENSIVE (3C) PLANNING PROCESS

The Old Colony MPO is responsible for conducting a Continuous, Cooperative, and Comprehensive (3C) Transportation Planning Process for the Old Colony Region. It must plan for the movement of both people and goods within the Region by all modes of travel, including highways, public transportation, bicycles, and foot. It also plans for the connections (such as airports, seaports, and bus, railroad, and pipeline terminals) of these modes to the rest of the world.

The Old Colony MPO sets priorities among surface transportation improvement projects within the Region for state and federal funding. To be eligible for federal funds, the MPO endorses a Transportation Improvement Program (TIP) identifying the projects to be implemented over the next few years.

Approval of federally aided transportation projects is contingent on there being an Old Colony MPO certified “3C” Transportation Planning Process in place that refers to a “Cooperative, Continuous, and Comprehensive Planning Process.”

The State and the Old Colony MPO certify to the FHWA and the FTA that the “3C” Transportation Planning Process is addressing the major issues facing the area and is being developed in accordance with FTA/FHWA regulations governing the implementation of the Bipartisan Infrastructure Law (BIL); more with EPA regulations governing the implementation of the Clean Air Act of 1990 (CAAA); and that it fully incorporates the applicable requirements of the 1964 Civil Rights Act and the Americans with Disabilities Act of 1990 (ADA).

Every four years, FTA and the FHWA make a “Certification Determination” for the transportation planning process in each urbanized area. In general, Certification means that the planning process “is being conducted in a cooperative, continuous, and comprehensive manner, and has resulted in plans and programs consistent with the comprehensively planned development of the area.”

The Old Colony MPO is responsible for implementing the urban transportation planning process and for developing and endorsing the Unified Planning Work Program (UPWP), Long Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), and Public Participation Plan (PPP) for the region. Membership of the Old Colony MPO is as follows:

- The Secretary and CEO of the Massachusetts Department of Transportation
- The Highway Administrator of the Massachusetts Department of Transportation
- The President of the Old Colony Planning Council
- The Administrator of the Brockton Area Transit Authority
- The Mayor of the City of Brockton
- The Chief Elected Official of Plymouth
- The Chief Elected Official from two (2) communities, other than Brockton or Plymouth, duly elected by the Old Colony Planning Council, to represent locally elected communities. No more, or less, than one representative from towns with populations of 15,000 or below (Avon, Halifax, Hanson, Kingston, Plympton, and West Bridgewater), and, no more, or less, than one representative from towns with populations over 15,000 (Abington, Bridgewater, Duxbury, East Bridgewater, Easton, Hanover, Pembroke, Stoughton, and Whitman)

At a full Council meeting, the Old Colony Planning Council elects the above-cited locally elected community officials to the Old Colony MPO. The electoral process is the sole responsibility of the OCPC with full consideration to nominations recommended by the Old Colony Joint Transportation Committee (JTC). This process was approved by the Old Colony MPO in 2003 and is periodically reviewed. The term of office is for two years. The OCPC and the JTC make every effort to provide for a region-wide geographic balance of the communities represented on the Old Colony MPO.

The JTC Chairperson, and one representative each from both the FHWA and the FTA are considered ex-officio, non-voting members of the Old Colony MPO. Designees or alternates are typically limited to the persons who are directly responsible and accountable to the official Old Colony MPO member that they are representing.

The members of the Old Colony MPO recognize that transportation planning and programming must be conducted as an integral part of, and consistent with, the comprehensive planning and development process, and that the process must involve the fullest possible participation by state agencies, local governments, private institutions, and other appropriate groups.

## FUNCTIONAL RESPONSIBILITIES OF PARTICIPATING AGENCIES AND GROUPS

### Local Representatives

The local representatives (Brockton, Plymouth, and the locally elected communities) to the Old Colony MPO are responsible for articulating a local government perspective of regional transportation problems and issues, and the needs for the community or agency on which they represent, and the Region as a whole.

### Massachusetts Department of Transportation (MassDOT)

The Massachusetts Department of Transportation has the statutory responsibility to conduct comprehensive planning and to coordinate the activities and programs of the state transportation agencies.

MassDOT assists in organizing and conducting Old Colony MPO meetings, keeping records, and reporting major statewide and inter-regional policies and issues as they develop. MassDOT is responsible for making appropriate planning funds available to the OCPC by contract to assist in the implementation of the required planning work program as defined in the approved Unified Planning Work Program (UPWP). MassDOT also provides the necessary data, technical support, and staff support required to assist in fulfilling the transportation planning needs of the Old Colony Region and the Commonwealth of Massachusetts. MassDOT is responsible for making appropriate FTA transit planning funds available to the OCPC by contract to assist in the implementation of the required planning work program as defined in the approved UPWP.

### Massachusetts Department of Transportation (MassDOT) Highway Division

The Massachusetts Department of Transportation Highway Division has the statutory responsibility for the construction, maintenance, and operation of state roads and bridges, and serves as the principal source of transportation planning in the Commonwealth. MassDOT is responsible for the continual preparation of comprehensive and coordinated transportation plans and programs.

### Old Colony Planning Council (OCPC)

Established by Chapter 332 of the Acts of 1967, OCPC is the regional planning agency for the metropolitan Brockton area. The Council's planning jurisdiction includes the City of Brockton and the towns of Abington, Avon, Bridgewater, East Bridgewater, Easton, Hanover, Hanson, Halifax, Kingston, Pembroke, Plymouth, Plympton, Stoughton, West Bridgewater, and Whitman. The policy board is composed of one delegate and one alternate appointed by a vote of the Board of Selectmen and Planning Board of each member community. In the case of the City of Brockton, the Mayor appoints the delegate and alternate. The Council is authorized to prepare and revise comprehensive plans. OCPC is recognized by the MPO as the officially designated regional planning agency for the Old Colony MPO Region, and has the statutory responsibility for comprehensive planning, including transportation planning. Currently, the Council's areas of

major emphasis are economic development, transportation, safety and security, water quality, land use and housing, and elder service planning and ombudsman programs.

The OCPC is responsible for comprehensive regional planning and is the transportation planning agency for the Old Colony MPO and Old Colony Region. The OCPC maintains qualified transportation planning staff and is principally responsible for the maintenance of the transportation planning process and for the support and operation of the Old Colony Joint Transportation Committee and MPO.

### **Brockton Area Transit Authority (BAT)**

The Brockton Area Transit Authority has the statutory responsibility to provide mass transportation in the area constituting the authority, and to provide mass transportation service under contract in areas outside the authority.

BAT, in addition to its statutory responsibility of providing mass transportation, assists in obtaining and ensuring input and participation in multimodal transportation planning from local elected officials and the public. BAT actively and consistently participates in the 3C transportation planning and programming process and represents the region's concern for public transportation deficiencies and solutions to transportation demands and needs.

### **FUNCTIONS OF THE OLD COLONY MPO**

The Old Colony MPO reviews, and annually endorses the Unified Planning Work Program, the Transportation Improvement Program, and the Public Participation Plan. Additionally, the Old Colony MPO reviews, and endorses, at least every four years, a Long-Range Transportation Plan, with a 20-year horizon; as well as such transportation plans and other products that federal and state laws and regulations may from time to time require.

The Old Colony MPO is the forum for cooperative decision-making involving allocation of federal transportation funding by chief elected officials of general-purpose local governments, regional authorities and agencies, and state agencies in the Old Colony Region.

In the resolution of basic regional transportation policy, the Old Colony MPO seeks and considers the advice of all interested parties and the JTC. The Old Colony Planning Council Transportation Staff provides the JTC with information and analysis in the form of reports, briefings, and discussions concerning their plans, programs, and priorities so that they can carry out their functions in a timely fashion.

The Old Colony MPO appoints the committees it determines necessary to accomplish its business. Committees may consist of Old Colony MPO members, their designers, the JTC, and transportation providers as appropriate. The Old Colony MPO assigns duties to the committees, as warranted.

## OPERATION OF THE OLD COLONY MPO

The Old Colony MPO meets in the Region at least twice per year and usually more often as may be requested by any one of the Signatories.

In the absence of the Chairman, the Vice-Chairman chairs the meeting. A Vice-Chairman of the Old Colony MPO is elected for a term of two years and is elected from among the non-state permanent members of the Old Colony MPO (City of Brockton, Town of Plymouth, Brockton Area Transit Authority, Old Colony Planning Council, and the two locally elected communities). The Old Colony MPO elects other officers as deemed necessary.

Votes of the Old Colony MPO, including those on all regional certification documents (i.e. the Transportation Improvement Program (TIP), the Long Range Transportation Plan (LRTP), the Unified Planning Work Program (UPWP), Air Quality Conformity Determinations, compliance with the Americans with Disabilities Act (ADA), shall be by simple majority vote, provided that a quorum is present, and that the affected implementation agency (MassDOT – Highway Division for highway and bridge projects, BAT for regional transit projects, and MassDOT for commuter rail projects) is included in the affirmative vote.

## THE JOINT TRANSPORTATION COMMITTEE (JTC)

In order to accomplish the objectives of the 3C process, the Old Colony MPO established a committee known as the Joint Transportation Committee (JTC) to serve as the Transportation Policy Advisory Group for the Old Colony Region, in accordance with earlier agreements. The Old Colony MPO periodically reviews the membership on the Joint Transportation Committee, in a manner that provides for a widely representative viewpoint and ensures a balanced consideration of transportation issues. Consistent with the provisions of the Memorandum of Understanding, the Joint Transportation Committee adopts by-laws and other procedures as may be necessary to govern its operation. The functions of the JTC are:

- To advise the Old Colony MPO and OCPC on matters of policy affecting the conduct of the 3C transportation planning and programming process for the Region.
- To advise the Old Colony MPO and OCPC on such regional transportation documents as may from time to time be required by state or federal laws and regulations (RTP, TIP, UPWP, and PPP their related adjustments and amendments).
- To provide maximum public participation in the transportation planning and programming process by providing a forum to bring the Old Colony MPO together with other public agencies, elected and appointed officials of cities and towns, and citizens concerned with the transportation planning and programming process; thereby facilitating, wherever possible, the consistency of transportation plans and programs for the Old Colony Region with the policies, priorities, and plans of affected state and regional agencies, local communities, private groups, and individuals within the Old Colony Region.

The JTC includes a representative from each OCPC community, who are appointed by the Board of Selectmen/Mayor in the community. Membership is open to any interested resident, a representative from a transportation provider, or interested group. The JTC meets on the second Thursday of each month at the OCPC office.

The Old Colony MPO provides complete information, timely public notice, and full public access to decisions and documents. It supports early and continuing public involvement in the development and review of its plans and programs. It especially tries to seek out and consider the interests of people whose needs may not be well served by the existing transportation system, such as low income and minority households and persons with limited personal mobility. To assist with this, OCPC maintains a Transportation Advisory Network (TAN). The TAN is a mailing list of individuals and organizations that have an interest in local transportation issues. The TAN provides a broad community resource for the formation and review of transportation plans, policies, and strategies. This network provides key contact persons for outreach efforts, dissemination of information, and informal review and comment to ensure sensitivity to varied community needs, concerns, and interests.

## THE TRANSPORTATION PLANNING PROCESS

The transportation planning process has four basic elements: a Unified Planning Work Program (UPWP), a Long-Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), and Public Participation Plan (PPP). These elements are reviewed by the JTC, OCPC, and are endorsed by the Old Colony MPO.

### Public Participation Plan (PPP)

The Public Participation Plan (PPP) identifies strategies employed by the MPO to provide complete information, timely public notice, and full access to key decisions to the public prior to the adoption or amendment of the plans and programs for which the MPO is responsible. This document supports the early and continuing involvement of the public in the MPO process, as required by federal law.

### Unified Planning Work Program (UPWP)

The Unified Planning Work Program (UPWP) describes and provides budgetary information for the transportation planning tasks and activities, which are to be conducted in the region during the program year. The UPWP is a federally required certification document, which must be endorsed annually by the Old Colony MPO prior to the start of the planning program. As the planning staff to the Old Colony MPO, Old Colony Planning Council prepares the UPWP. The planning activities are organized first by work element in a format that will allow efficient administration, management, and reporting.

The UPWP describes all the work to be accomplished by the Old Colony MPO. Each transportation planning activity is described as a procedure under specific work tasks. For each procedure, the

anticipated accomplishment or product and the estimated work force resources needed are also given. For each work task, the total staffing requirements, task budget, and sources of funding are given. For convenience in management, similar work tasks are grouped into broad areas or elements as follows:

- Management and Support of the Planning Process and Certification Activities
- Data Collection and Analysis Activities
- Short Range and Long-Range Transportation Planning Activities
- Other Transportation Technical Activities

The UPWP continues to expand on several major tasks that are specifically targeted to implement provisions of several pieces of federal legislation, such as the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the Clean Air Act Amendments of 1990, and the Americans with Disabilities Act.

### **Long Range Transportation Plan (LRTP)**

The LRTP provides a document and a process that will meet the challenges of preserving and expanding the transportation system. Following the directives of the law, it includes goals, policies, analyses, and recommendations necessary to build and maintain an efficient, effective and affordable regional transportation system. The intention of the LRTP is to build on the current system, working to make it comprehensive and fully integrated.

The LRTP addresses a twenty-year planning horizon and includes both short and long-range strategies/actions that lead to the development of an integrated intermodal transportation system that facilitates the efficient movement of people and goods. Additionally, the Plan examines current and forecasted transportation and land use conditions and trends and provides an overall framework for the future transportation system. Furthermore, the LRTP draws upon the Statewide Transportation Plan and the MassDOT Project Development and Design Guidebook. The mission of the LRTP is to provide a safe and efficient transportation system that promotes multi-modalism (roads, transit, sidewalks, bicycles, etc.), supports projected growth, and addresses livability and social concepts, economic sustainability, and environmental impacts through effective planning/policy and local/regional coordination.

The short and long-range strategies/actions constitute the LRTP. The long-range element addresses the long-range transportation needs of the region and identifies needed major changes in the transportation system and transportation policy. It establishes inter-regional and intra-regional transportation goals and objectives.

The short-range element addresses the transportation strategies/projects that will be implemented within five years. The purpose of the short-range element is to coordinate the different parts of a transportation system, such as pedestrian and bicycle facilities, transit, rail, freight, and highway, to achieve maximum efficiency and productivity of the transportation system as a whole. Simply stated, the goal of the short-range element is to ensure, through the

promotion of management systems and low capital projects, that the region's existing transportation system is utilized and maintained fully before new facilities are added. The short-range element (five years) essentially comprises the TIP.

The transportation management systems provide a process that furnishes information on transportation system performance to decision makers for selecting and implementing cost-effective strategies/actions to manage new and existing facilities so that congestion is alleviated, and the mobility of persons and goods is enhanced.

#### Transportation Improvement Program (TIP)

The Transportation Improvement Program (TIP) is a listing of transportation projects proposed for implementation during the next four federal fiscal years. Projects listed in the TIP include those in the short-range element of the LRTP. In the TIP, projects are classified under federal and non-federal funding categories and assigned a local priority. The TIP briefly describes the project as well as its projected costs and funding sources.

As part of the TIP development, current and proposed projects are evaluated using Transportation Evaluation Criteria and recommended to the Old Colony MPO for consideration and approval. The collective staffs evaluate candidate projects for the Old Colony MPO using the Transportation Evaluation Criteria of Condition, Mobility, Safety and Security, Community Effects and Support, Land Use and Economic Development, and Environmental Effects.

After the evaluations, the results are provided to the Old Colony MPO for review and approval. Once the Old Colony MPO has reviewed and approved the evaluations, the OCPC staff then uses the evaluation results, as well as readiness information, available funding, and other pertinent information to develop a Draft TIP. As part of the development process, the Draft TIP is reviewed by the JTC, the OCPC, and the MPO, and released for a 21-Day Public Review Period. After the 21-Day Public Review Period, the Final Draft TIP is sent to the Old Colony MPO for consideration and approval.

#### PUBLIC PARTICIPATION AND OUTREACH CONSULTATION PROCESS

During the Vision 2050 Long-Range Transportation Plan (LRTP) update, public participation was designed to ensure opportunities for the public to express its views on transportation issues, help staff better understand the needs and desires of the general public when it comes to the transportation system, and encourage the public to become active participants in the regional planning and transportation decision-making process.

The outreach process consisted of activities designed to build better relationships with citizens that are engaged with their communities and businesses, along with individuals of "traditionally underserved" communities and different cultures with Limited English Proficiency, local officials, non-profit organizations, and transportation agencies.

One of the main purposes of the public participation process is to educate and inform stakeholders on new initiatives such as livability, sustainability, and climate change. The process



was designed to fulfill federal-aid requirements and to document people’s transportation and land use needs in their communities.

### *Interagency Consultation and Stakeholders Engagement*

Information of the multiple LRTP events was distributed to the public through reports and editorial board briefings, press releases, and media packages. Electronic mailings were sent on a regular basis to a list of self-identified interest groups. Fact sheets and information of new transportation initiatives were posted on the OCPC website and were distributed during the events. Printed ads were published, and electronic notices were distributed to all the communities and related agencies. The list below illustrates the stakeholders that participated in the consultation process.

- Federal Highway Administration and Federal Transit Administration
- Massachusetts Department of Transportation
- Brockton Area Transit Authority
- Southeastern Massachusetts Planning and Economic Development District (SRPEDD)
- Private and Public Local Transportation Agencies (BAT, GATRA, SSCAC and MBTA)
- Public Elected Officials
- Area Agencies on Aging and Councils of Aging

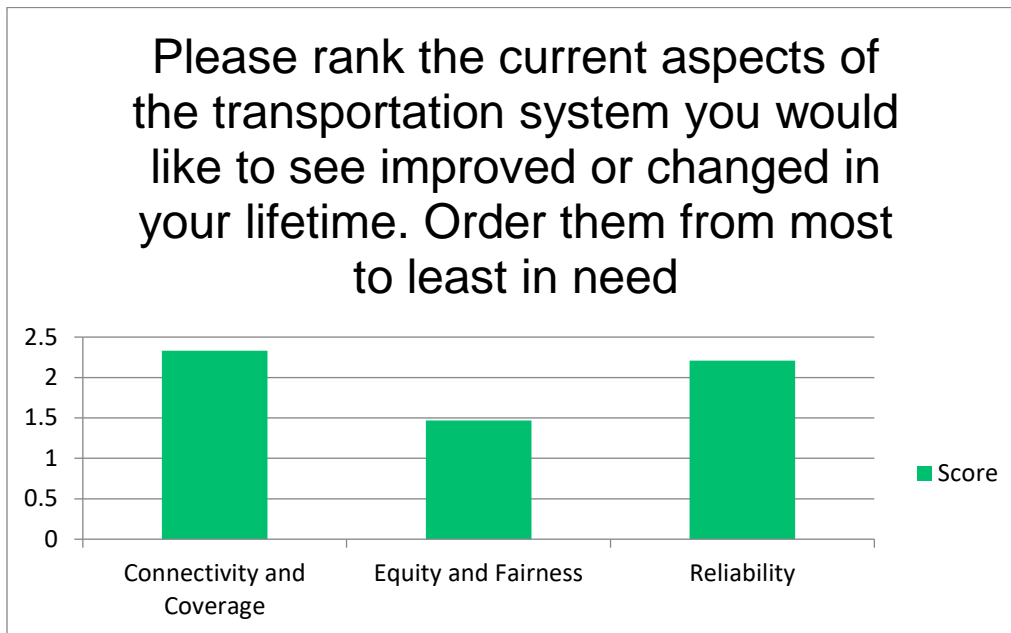
### *Survey*

The survey was designed to educate the public on new initiatives and to obtain people’s comments on mobility, safety and security, land use policies, and environmental protection issues. The survey was available electronically through Survey Monkey on the OCPC website, social media, electronic newsletters. In addition, hard copies of the survey were also available in the Council’s office and distributed throughout the region during the outreach campaign. In order to reach out to all ethnic groups in the region, the survey was also available in multiple languages: English, Spanish, French Haitian (Creole) and Portuguese. Results of the survey assisted with the development of performance measures, and the establishment of short- and long-term planning and capital needs identification. In addition, the survey results validated existing congested corridors identified in the Congestion Management Process and the need for improved bicycle, pedestrian, and ADA accommodations.

**Question 1: Please rank the current aspects of the transportation system you would like to see improved or changed in your lifetime. Order them from most to least in need.**

The following chart summarizes how people answered. The score assigned corresponds with how people ranked that issue in terms of importance.

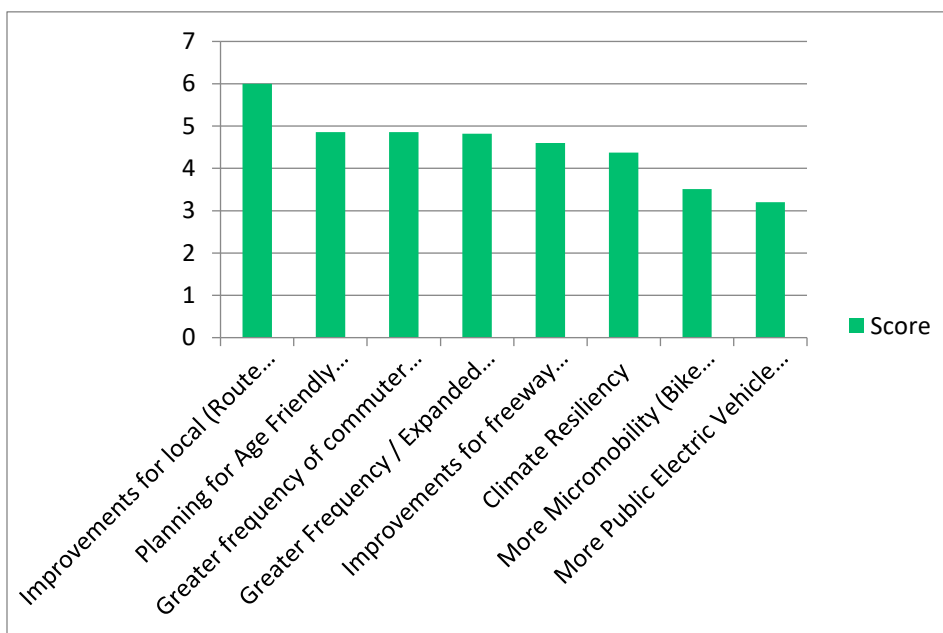
**Figure 1-1: Responses to Survey Question 1**



Connectivity and coverage scored slightly higher in terms of importance to survey respondents than reliability of the system, with equity and fairness commonly ranked the least important.

**Question 2: Please rank the following in terms of importance to you in planning for the future of transportation in Greater Brockton and the South Shore? Rank from most important to least important.**

**Figure 1-2: Responses to Survey Question 2**



The graph in Figure x shows how survey respondents ranked each category in terms of importance to them, which Table 1-1 contains the same data in table form.

**Table 1-1: Summary of Answers to Question 2**

| Category  | Score |
|---|-------|
| Improvements for local (Route 18, Route 106, Town Centers, and Downtowns, etc.) bottlenecks | 6     |
| Planning for Age Friendly Communities   | 4.86  |
| Greater frequency of commuter rail service  | 4.86  |
| Greater Frequency / Expanded Service Coverage of transit bus (BAT, MBTA, etc.) service      | 4.82  |
| Improvements for freeway (Route 3, Route 24, etc.) bottlenecks                              | 4.6   |
| Climate Resiliency  | 4.37  |
| More Micromobility (Bike Share, Community Shuttles, etc.) Options                           | 3.51  |
| More Public Electric Vehicle Charging Stations  | 3.2   |

Improvements to the local roadway network ranked heavily as the top priority among respondents, while the other categories ranked relatively equal with each other, with expansion of micro mobility and electric vehicle infrastructure ranking least important.

**Question 3: Imagine we have achieved a flawless transportation system for Massachusetts. What does a great transportation system do for you? Please choose all that apply.**

**Table 1-2: Summary of Answers to Question 3**

| Answer Choices   | Responses |
|--|-----------|
| Well Maintained roads and Sidewalks  | 84.04%    |
| Ability to reach your job and other important destinations (food, health care, etc.) more easily | 72.34%    |
| Overall reduction in travel times  | 63.83%    |
| Better connections between all modes of transportation   | 52.13%    |
| Car-Free Connectivity from Origin to Destination   | 42.55%    |
| Other (please specify)   | 17.02%    |

State of good repair weighed heavily on the minds of respondents answering Question 3, indicating well maintained roads and sidewalks would be the hallmark of a flawless

transportation network, while many also indicated importance in increased mobility and reduction in travel delays.

For those who chose “other”, several indicated environments (low and zero emissions, incentives for human powered transportation) and affordability (accessible by all income levels, free transit service paid for by gambling revenue) as being important to them.

**Question 4: Imagine you get to decide how transportation funding is spent on roadway improvements. How would you rank these areas in terms of priority for funding? (Please rank from highest priority to lowest priority)**

**Table 1-3: How Survey Respondents Prioritize Investment in Roadway Improvements**

| Roadway Investment Area                    | Score |
|--|-------|
| Pavement and Bridge Condition Improvements | 5.46  |
| Safety Improvements                        | 5.06  |
| Climate resilient infrastructure           | 4.06  |
| Pedestrian and Bicycle Infrastructure      | 3.99  |
| ADA Accessibility Improvements             | 3.49  |
| Transit features on roadways               | 3.71  |
| EV Charging Infrastructure                 | 2.46  |

Survey respondents indicated investing in surface state of good repair along with highway safety improvements ranks high in terms of funding priority.

**Question 5. Imagine you get to decide how transportation funding is spent on transit-related improvements. How would you rank these areas in terms of priority for funding? (Please rank from highest priority to lowest priority)**

**Table 1-4: How Survey Respondents Prioritize Investment in transit Improvements**

| Transit Investment Area                                 | Score |
|---|-------|
| More Frequent Commuter Rail Service                     | 4.7   |
| Community Shuttle Services (Point to Point Around Town) | 4.36  |
| More Frequent Bus Service                               | 3.8   |
| More Passenger Rail Options                             | 3.52  |
| More Frequent subway Service                            | 2.56  |
| Encouragement of carpooling and ridesharing             | 2.24  |

When it comes to investing in transit, increasing frequency of rail service to the region weighed heavily with respondents, followed by support for community shuttle services and increased frequency in local bus transit service.

**Question 6: Imagine you get to decide how transportation funding is spent on other transportation improvements. How would you rank these areas in terms of priority for funding? (Please rank from highest priority to lowest priority)**

**Table 1-5: How Survey Respondents Prioritize Investment in Other (Aside from Highway and Traditional Transit) Transportation Options**

| Other Investment Areas   | Score |
|--|-------|
| Improved pedestrian and bicycle connections to transit         | 4.94  |
| Bus Only Lanes Connecting Transit Stations to Activity Centers | 3.93  |
| Increased parking capacity at stations                         | 3.8   |
| Wayfinding to assist travelers locate transportation options   | 3.65  |
| Increased bicycle parking capacity at stations                 | 2.72  |
| More micromobility options (such as bike sharing)              | 2.24  |

Improving access to transit weighed heavily for investment in “other” transportation areas, with improving connections to transit stops for vulnerable roadway users ranked solidly at the top priority followed by supporting bus only lanes between transit stations and activity centers and increasing parking capacity at commuter rail stations.

**Question 7: How important are each of the three categories of improvements listed previously (Roadway elements, transit elements, and supportive transit elements)? How would you rank them? Assign them a rank of 1-4, from highest to lowest.**

Investing in highway and bridge infrastructure was ranked as the most important by the majority of respondents, followed by investment in transit, investment in bicycle and pedestrian infrastructure for vulnerable roadway users, and investment in other areas. Figure x graphically displays the results of Question 7.

**Question 8: Based on where you live, how satisfied are you with the transportation connections to the following locations? Select your level of satisfaction for each item below.**

Figure x graphically displays the results of Question 8. In terms of level of satisfaction, survey respondents did not overwhelmingly feel satisfied about any particular area. Satisfaction levels were highest with access to education and healthcare, and trailed with access to food retailers, parks and recreation, and jobs. respondents were given opportunity to elaborate in comment field. Most felt a private vehicle was necessary where they live, with little to no mobility for those who do not own a vehicle and for those who are disabled.

Figure 1-3: Ranking of Transportation Investment by Importance to Survey Respondents

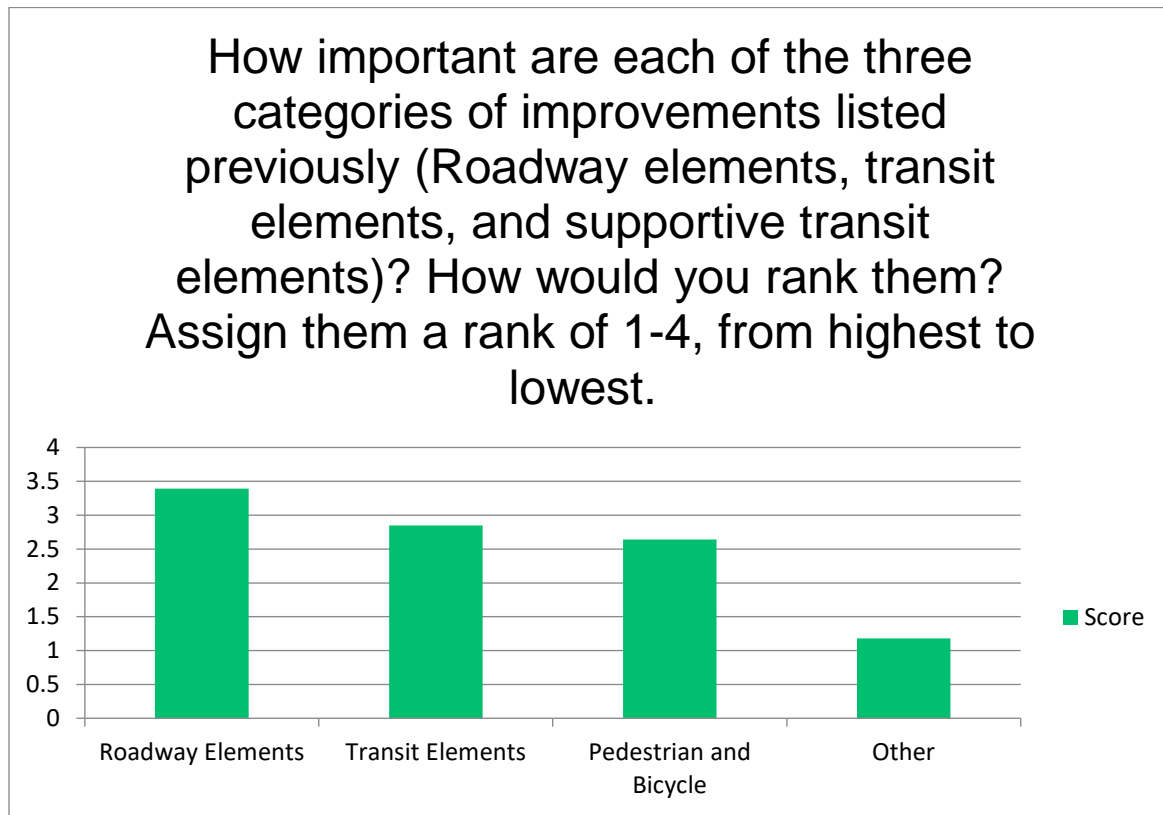


Figure 1-4: Level of Satisfaction in Transportation System



**Question 9: Select the transportation modes you use in a typical week (select 1 or more modes)**

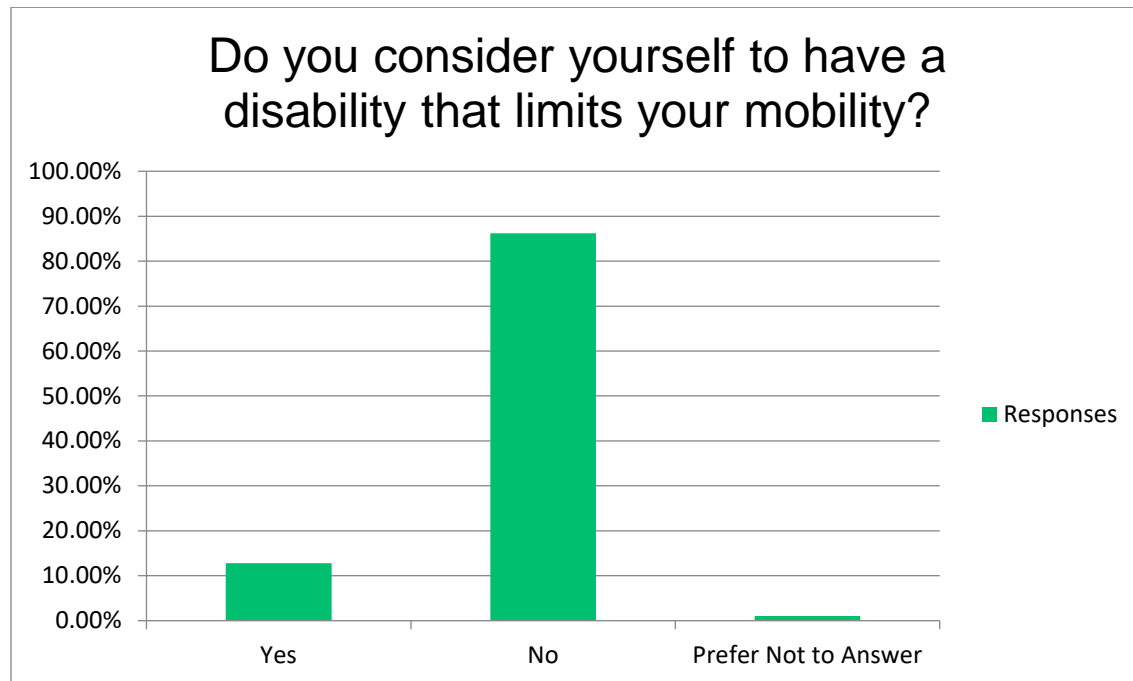
Table 6 lists how people answered when asked which modes of transportation they use in a typical week. Over 90 percent of those who took the survey use their own private vehicles, while walking and passenger in someone else’s vehicles ranked second and third, respectively.

**Table 1-6: Modes of Transport in A Typical Week**

| Transportation Mode                              | Responses |
|--|-----------|
| Own Private Vehicle                              | 92.55%    |
| Walking  | 44.68%    |
| Passenger in Someone Else’s Vehicle              | 29.79%    |
| Bicycle  | 14.89%    |
| Commuter Rail                                    | 12.77%    |
| Subway   | 9.57%     |
| Shared Vehicle (Uber, Lyft, shuttle, taxi, etc.) | 5.32%     |
| Transit Bus                                      | 3.19%     |
| Other (please specify)                           | 3.19%     |
| Paratransit                                      | 2.13%     |
| Intercity Coach (P&B, Bloom, Etc.)               | 0.00%     |

**Question 10: Do you consider yourself to have a disability that limits your mobility?**

**Figure 1-5: Answers to Question 10**



**Question 11: In your own words, what areas of the transportation system are in greatest need of safety improvements?**

This was an open-ended question where representatives were encouraged to identify their top safety priorities. Bicycle and pedestrian safety were the most common answer, including the need for more bike lanes, better sidewalks, and improved pedestrian crossings.

Local roadways and intersections ranked highly as well, but a distant second behind bicycle and pedestrian safety.

While the question was worded to focus on safety, several mentioned their desire to see roadways deprioritized and expansion of transit prioritized.

**Question 12: In your own words, what areas of the transportation system are in greatest need of capacity (reducing congestion and delay) improvements?**

Expansion of transit was the most common answer, followed by capacity expansion of Route 3 and 24.

*Public Outreach Events*

The table events were designed to display preliminary LRTP findings and products during different activities. These activities included attending events hosted by local community organizations, Table events were designed with the purpose of engaging the public in an informal manner to learn more about new projects and initiatives in the region. The following list shows the table events organized during the plan update:



**Table 1-7: 2050 Old Colony LRTP Public Outreach Events**

| Date              | Event   | Location                                |
|-------------------|---|---|
| November 16, 2022 | MetroSouth Chamber of Commerce Annual Meeting and Business Expo | Teen Challenge Brockton, MA             |
| December 8, 2022  | Old Colony Planning Council Regional Summit 2022                | Hanson, MA                              |
| March 21, 2023    | Old Colony Vision 2050 Long Range Transportation Plan Webinar   | Virtual (Zoom)                          |
| April 25, 2023    | Commuter Meet and Greet   | Brockton Area Transit Intermodal Centre |
| April 26, 2023    | Commuter Meet and Greet   | Brockton Area Transit Intermodal Centre |
| June 28, 2023     | OCPC Annual Meeting and Open House                              | OCPC, Brockton                          |

#### ENVIRONMENTAL JUSTICE

Environmental Justice is an important part of the planning process and is considered in all phases of planning. A truly integrated and effective planning process actively considers and promotes environmental justice within projects and groups of projects, across the total plan, and in policy decisions. All reasonably foreseeable adverse social, economic, and environmental effects on minority populations and low-income populations must be identified and addressed. There are three fundamental Environmental Justice principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health or 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 project benefits by minority populations and low-income populations.

Public involvement is an integral part of transportation planning and project development decision-making. The DOT Order (5610.2) on Environmental Justice directs the provision for minority populations and low-income populations greater access to information on and opportunities for public participation in matters that may affect human health and the environment.

Effective public involvement in the planning and project development process can alert State and local agencies to environmental justice concerns during project-development. Continuous

interaction between community members and transportation professionals is critical to successfully identifying and resolving potential Environmental Justice concerns.

The staff developed public-involvement procedures that provide for consideration of Environmental Justice. These procedures provide an inclusive, representative, and equal opportunity for two-way communication resulting in appropriate action. Environmental Justice is considered in all aspects of planning and project decision-making, including the design of both the public-involvement plan and proposed facilities.

### Benefits and Burdens

Environmental Justice Analysis asks whether a proposed action or plan causes disproportionate adverse effects on minority and low-income populations and whether these populations are denied benefits. A framework of analysis that can determine how a proposed action or plan could differentially affect diverse populations is important. This uses an analysis of benefits and burdens. In addition, computer mapping of Environmental Justice Areas with past, present, and future TIP projects, is used to identify the distribution of funding (to ensure geographic equity) and to determine priorities areas of need/ and or concern. The mapping includes available transit (with ¼ mile and ½ mile buffer), commuter parking facilities, pavement conditions, high crash locations, and areas of congestion.

Examples of the Benefits considered during the development of the TIP and the LRTP are:

- Mobility
- Livability and Sustainability
- Accessibility
- Condition of Infrastructure
- Environmental Protection
- Reliability
- Safety
- Security
- Climate Change Adaptation
- Efficiency

Examples of the burdens potentially considered during the development of the TIP and the LRTP are:

- Air, noise, and water pollution and soil contamination.
- Destruction or disruption of community cohesion or a community's economic vitality.
- Destruction or disruption of the availability of public and private facilities and services.
- Adverse employment effects.
- Displacement of persons, businesses, farms, or nonprofit organizations.
- Increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community.

- The denial of reduction in or significant delay in the receipt of, benefits of programs, policies, or activities.

An assessment of the benefits and burdens of the Transportation Improvement Program was completed to identify all regionally significant projects constructed and/or programmed in the Old Colony Transportation Improvement Program during the period of 2003 - 2024. Constructed projects funded through the TIP were included to provide a benchmark of investments. The constructed projects were compiled and then the staff analyzed the location of these improvements relative to Environmental Justice Communities. Environmental Justice Communities in the Old Colony MPO Region are Brockton, Easton, Plymouth, Stoughton, and Whitman.

For the purpose of identifying these communities, the staff utilized the MassGIS Environmental Justice GIS Shape file. Polygons in the Environmental Justice Populations layer represent neighborhoods across the state with high minority, non-English speaking, low-income, and foreign-born populations. Specifically, a community is identified as an Environmental Justice Community if any the following are true within that community:

- Contains a Block group whose annual median household income is equal to or less than 65 percent of the statewide median (\$62,072 in 2010); or
- 25% or more of the residents identify as a race other than white; or
- 25% or more of households have no one over the age of 14 who speaks English only or very well - English Isolation.

Regionally, it was determined that 21.3 percent of the identified highway investment dollars on the FFY 2024-2028 TIP are located in EJ communities. Non-mappable projects, such as transit vehicle replacements or rehabilitation, bridge and roadway repair line items for future projects to be defined, and other non-location-specific projects are not included in this analysis. Moreover, many of the projects that are not located directly within an EJ community are projects of key regional significance, such as interstate highway improvements. These improvements benefit the region as a whole and provide access to many key employment centers, including downtown Brockton and regional commercial and employment destinations.

**Table 1-8**

**Investment Value of TIP Highway Projects 2024-2028 (Projects Planned)**

| <b>Type</b>                   | <b>Population Represented in EJ Communities (2010)</b> | <b>Percent Population Represented</b> | <b>TIP Project Investment</b> | <b>Percentage of Projects in EJ/ Non-EJ Communities by Total Investment (\$)</b> |
|-------------------------------|--|---------------------------------------|-------------------------------|--|
| <b>Within EJ Communities</b>  | <b>137,634</b>   | <b>35%</b>                            | <b>\$38,399,636</b>           | <b>21.3%</b>   |
| <b>Outside EJ Communities</b> | <b>255,615</b>   | <b>65%</b>                            | <b>\$141,941,993</b>          | <b>78.7%</b>   |
| <b>Totals</b>                 | <b>393,249</b>   | <b>100.0%</b>                         | <b>\$180,341,629</b>          | <b>100%</b>  |

The Old Colony MPO undertook further analysis to determine the level of investments during the period of 2003-2022 through previous Transportation Improvement Programs. From that analysis, it was concluded that 62.1. percent of the identified investment dollars allocated during the TIP years of 2003-2022 are located in EJ communities. These percentages approximate 35 percent of the region’s population identified as living in EJ communities.

**Table 1-9**

**Investment Value of TIP Projects 2003 - 2022 (Projects Implemented)**

| <b>Type</b>                   | <b>Population Represented in EJ Communities (2020)</b> | <b>Percent Population Represented</b> | <b>TIP Project Investment*</b> | <b>Percentage of Projects by Total Investment (\$)</b> |
|-------------------------------|--|---------------------------------------|--------------------------------|--|
| <b>Within EJ Communities</b>  | <b>137,634</b>   | <b>35.0%</b>                          | <b>\$163,553,494</b>           | <b>62.1%</b>   |
| <b>Outside EJ Communities</b> | <b>255,615</b>   | <b>65.0%</b>                          | <b>\$99,987,231</b>            | <b>37.9%</b>   |
| <b>Totals</b>                 | <b>393,249</b>   | <b>100.0%</b>                         | <b>\$263,540,725</b>           | <b>100%</b>  |

From the examination of benefits and burdens, it is the determination that no projects implemented because of the TIP will result in adverse impacts to the Environmental Justice Areas in the Old Colony region.

As such, from the review, it may be concluded from the public investment and involvement in the regional transportation planning process and the resultant FFY 2024-2028 Transportation Improvement Program and previous TIPs (dating back to 2003) demonstrate that the benefits of the regional transportation planning process are afforded equitably to both EJ and Non-EJ communities. Given this equitable distribution and investment, it is finding of the Old Colony MPO that the Low-income and minority populations are not disproportionately impacted and are beneficiaries of the transportation planning process and project implementation in the Old Colony Region.

As such, the Old Colony MPO continues to work with our regional partners in the advancement of environmental justice principles throughout the regional planning process.

**Geographic Distribution and Equity Analysis of Projects**

The Old Colony MPO monitors the geographic distribution of TIP projects over time. Table 8 provides the distribution of TIP projects from 2012 through 2028. To assist with providing context to the distribution, included in the table is 2020 Population and 2019 Median Household Income.

From an examination of the distribution of TIP projects from 2012 through 2028, the following observations may be made:

- There are higher concentrations of projects within the more populated urban areas (i.e., Brockton at 28.6 percent of all projects). Such concentrations tend to follow areas with elevated levels of congestion, bicycle and pedestrian activity, and crash clusters.

- The towns of Easton and Pembroke (10.2% each) also had a higher concentration of projects. A potential explanation for such a trend is that these populous communities feature proximity to limited access highways, commuter rail, and academic institutions of higher learning. Such features, while beneficial in many respects, also lead to higher pedestrian, bicyclist and vehicle trips, and the need for additional multimodal and infrastructure.

**Table 1-10**

**Geographic Distribution and Equity Analysis of Projects, 2012-2028**

| <b>Community</b> | <b>2020 Population</b> | <b>2020 Title VI Minority Population</b> | <b>Percent Title VI Minority</b> | <b>Median Household Income, 2019</b> | <b>Number of TIP Projects, 2012 through 2028</b> | <b>Percentage of Total Projects</b> | <b>TIP Project Expenditures, 2012 through 2028 (\$)</b> | <b>Per Capita Expenditure (\$)</b> |
|------------------|------------------------|--|----------------------------------|--------------------------------------|--|-------------------------------------|---|------------------------------------|
| Abington         | 17,062                 | 2,910                                    | 17%                              | \$99,381                             | 4  | 8.2%                                | \$17,083,542  | \$1,001.26                         |
| Avon             | 4,777                  | 1,685                                    | 35%                              | \$85,200                             | 2  | 4.1%                                | \$18,461,881  | \$3,864.74                         |
| Bridgewater      | 28,633                 | 4,997                                    | 17%                              | \$95,675                             | 1  | 2.0%                                | \$1,486,453   | \$51.91                            |
| Brockton         | 105,643                | 74,569                                   | 71%                              | \$58,469                             | 14   | 28.6%                               | \$50,702,624  | \$479.94                           |
| Duxbury          | 16,090                 | 1,081                                    | 7%                               | \$128,173                            | 3  | 6.1%                                | \$80,691,546  | \$5,015.01                         |
| East Bridgewater | 14,440                 | 1,560                                    | 11%                              | \$90,528                             | 1  | 2.0%                                | \$7,763,091   | \$537.61                           |
| Easton           | 25,058                 | 4,025                                    | 16%                              | \$112,268                            | 5  | 10.2%                               | \$22,418,447  | \$894.66                           |
| Halifax          | 7,749                  | 519                                      | 7%                               | \$92,774                             | 0  | 0.0%                                | \$0   | \$0.00                             |
| Hanover          | 14,833                 | 1,140                                    | 8%                               | \$127,981                            | 1  | 2.0%                                | \$7,141,656   | \$481.47                           |
| Hanson           | 10,639                 | 844                                      | 8%                               | \$96,693                             | 1  | 2.0%                                | \$11,548,342  | \$1,085.47                         |
| Kingston         | 13,708                 | 1,069                                    | 8%                               | \$96,104                             | 1  | 2.0%                                | \$14,834,312  | \$1,082.16                         |
| Pembroke         | 18,361                 | 1,285                                    | 7%                               | \$103,905                            | 5  | 10.2%                               | \$24,613,677  | \$1,340.54                         |
| Plymouth         | 61,217                 | 6,673                                    | 11%                              | \$90,279                             | 3  | 6.1%                                | \$20,388,279  | \$333.05                           |
| Plympton         | 2,930                  | 162                                      | 6%                               | \$94,167                             | 1  | 2.0%                                | \$2,062,345   | \$703.87                           |
| Stoughton        | 29,281                 | 11,088                                   | 38%                              | \$83,519                             | 4  | 8.2%                                | \$23,110,506  | \$789.27                           |
| West Bridgewater | 7,707                  | 968                                      | 13%                              | \$97,404                             | 2  | 4.1%                                | \$7,615,278   | \$988.10                           |
| Whitman          | 15,121                 | 1,969                                    | 13%                              | \$86,570                             | 1  | 2.0%                                | \$5,990,816   | \$396.19                           |
| <b>Totals</b>    | <b>393,249</b>         | <b>116,544</b>                           | <b>30%</b>                       |                                      | <b>49</b>  | <b>100.0%</b>                       | <b>\$315,912,796</b>                                    | <b>\$803</b>                       |

This continuing review process for TIP Projects programmed from 2012 through 2024 indicates that no single project has had an adverse effect on any particular population, based on all reviewed data.



## Chapter 2: Regional Goals, Objectives, and Performance Management

The mission, goals, objectives, and performance measures were developed through a comprehensive, continuing, and cooperative effort between the Old Colony Planning Council, the Old Colony Metropolitan Planning Organization (MPO), the Joint Transportation Committee (JTC), the Massachusetts Department of Transportation (MassDOT), and the stakeholders in the transportation system. These regional goals and policies are consistent with the vision of the Federal Government (Bipartisan Infrastructure Law (BIL)), the Commonwealth of Massachusetts and of the communities of the Old Colony Region.

### MISSION

The Long-Range Transportation Plan (LRTP) addresses a twenty-year planning horizon and includes both short and long-range strategies and actions to the development of an integrated intermodal transportation system for the efficient movement of people and goods. Additionally, the Long-Range Transportation Plan examines both current and forecasted transportation and land use conditions and provides framework for the future transportation system. The mission statement for the Vision 2050 Long Range Transportation Plan is defined as a creation of:

“A regional system that provides safe, accessible, and efficient movement of people and goods; fosters healthy community identity and “a sense of place” in all parts of the region; protects the region’s environment; and joins all transportation modes and facilities into an equitable, seamless, and fully interconnected network.”

Essential elements to achieve the mission include ensuring equity by distributing burdens and benefits fairly, providing equitable access to transportation choices, ensuring fiscal stewardship by prioritizing investments that achieve multiple goals, promoting public and private collaboration with meaningful community participation and having transportation agencies that take responsibility for their actions.

Given this framework, the mission of the Old Colony Long Range Transportation Plan is to provide a safe and efficient transportation system that promotes multi-modalism (roads, transit, sidewalks, bicycles, etc.), supports projected growth, addresses social and economic sustainability, community livability, mitigated

#### *How we get there*

**Ensure Equity** - Distribute burdens and benefits fairly and provide equitable access to transportation choices.

**Ensure Fiscal Stewardship** - Prioritize investments that achieve multiple goals, giving taxpayers and passengers more for their money.

**Deliver Accountability** - Promote public and private collaboration with meaningful community participation,

environmental impacts and clearly understanding land use implications through effective planning/policy and local/regional coordination.

#### BIPARTISAN INFRASTRUCTURE LAW

The Bipartisan Infrastructure Law (BIL) legislation requires MPOs to implement a continuing, cooperative, and comprehensive performance-based multimodal transportation planning process. To meet this requirement, the Old Colony MPO develops the Long Range Transportation Plan and Transportation Improvement Program that facilitate the safe and efficient movement of safe and efficient management, operation, and development of surface transportation systems that will serve the mobility needs of people and freight (including accessible pedestrian walkways, bicycle transportation facilities, and intermodal facilities that support intercity transportation, including intercity bus facilities and commuter van pool providers) and that fosters economic growth and development within and between States and urbanized areas, and take into consideration resiliency needs while minimizing transportation-related fuel consumption and air pollution in all areas of the region.

The BIL continues to emphasize performance-based planning as an integral part of the metropolitan planning process: states are to develop performance goals, guided by the national goals, and then MPOs will work with state departments of transportation to develop MPO performance measures and targets, or adopt the statewide performance measures and targets. The TIP integrates MassDOT's and the MPOs' performance measures and link transportation-investment decisions to progress toward achieving performance targets. The MPOs, MassDOT, and providers of public transportation jointly agree and have developed specific written provisions for cooperatively developing and sharing information related to transportation performance data, the selection of performance targets, the reporting of performance targets, the reporting of performance to be used in tracking progress towards attainment of critical outcomes for the MPO regions and the collection of data for the MassDOT Asset Management Plan.

The Old Colony MPO develops the TIP with due consideration of additional planning activities within the metropolitan area and utilizes a process that provides for the design and delivery of transportation services within the metropolitan planning area. The following is an overview of how the Long-Range Transportation Plan and the Transportation Improvement Program reflect the national planning factors and performance-based planning:

#### GOALS AND OBJECTIVES

##### Goal: Safety

This Plan strives for a safe transportation system that minimizes the risk of serious injury to motorized and vulnerable users of the system and helps the Region and Commonwealth move towards its Vision Zero goals.

*Objectives:*

- Program projects aimed at reducing the total number of fatalities and serious non-fatal injuries; the rate of occurrence of fatalities and serious injuries; and the total combined number of fatalities and serious injuries for non-motorized travel.
  - ▬ Target and Performance Measure: The Old Colony MPO shall adapt the Massachusetts Statewide Target for total fatalities and fatality rate, adjusted annually by MassDOT (As of March 2023, Target for CY 2023 was 355 total fatalities and a fatality rate of 0.59 fatalities per 100 million VMT statewide).
  - ▬ Target and Performance Measure: The Old Colony MPO shall adapt the Massachusetts Statewide Target for total serious injuries and rate of serious injuries, adjusted annually by MassDOT (As of March 2023, Target for CY 2023 was 2,569 total serious injuries and rate of serious injury of 4.25 per 100 million VMT statewide).
  - ▬ Target and Performance Measure: The Old Colony MPO shall adapt the Massachusetts Statewide Target for combined fatalities and injuries for non-motorized travel, adjusted annually by MassDOT (As of March 2023, Target for CY 2023 was a total of 437 combined fatalities and serious injuries for non-motorized travelers).
- Collaborate with the Brockton Area Transit (BAT) Authority to reduce total number of preventable accidents on fixed route and demand response service Provide and maintain safe fixed route service (e.g., Preventable Accidents per 100K miles).
  - ▬ Target and Performance Measure: Maintain fixed route service preventable accidents/ 100k miles below 2.00.
  - ▬ Target and Performance Measure: Maintain demand response service preventable accidents/ 10k miles below 2.00.
- Protect the viability of transportation infrastructure to accommodate emergency response and evacuations.
- Protect transportation system users from safety and security threats.

*Goal: Transparency and Equity*

The Plan is designed to ensure an open and inclusive planning process that ensures representation and access to all persons.

*Objectives:*

- Provide background overlay of environmental justice and EJ+ communities against all planning and project implementation considerations.
- Make materials accessible to persons with limited English proficiency, as well to those with visual and audible impairments.
- Annually calculate Measures of Effectiveness of public outreach and engagement efforts and evaluate methods for increasing participation.

- Whenever possible and allowable, incorporate a hybrid mix of virtual and traditional in-person engagement efforts to maximize access to the process and public participation.

Goal: Economic Vitality

The Old Colony MPO is committed to planning for a transportation network that fosters and supports a robust and diverse economy in the Old Colony Region

Objectives

- Plan for a transportation system that supports the local and regional economy, including the tourism economy of Plymouth County.

Goal: Security

The Old Colony MPO is committed to supporting a transportation system that maintains security for physical infrastructure and the users of the system,

Objectives

- While the overall security of the transportation system falls outside of the purview of the Metropolitan Planning Organization and Regional Planning Agency, Old Colony is committed to working with our partners to support efforts to maximize security wherever MPO efforts are applicable.

Goal: Accessibility

A transportation system that ensures access and mobility for all motorized and vulnerable system users regardless of physical ability or prosperity levels.

Objectives

- Consider all users when conducting planning activities such as Road Safety Audits, Corridor Studies, Transit Planning Activities, and Local Technical Assistance Studies.
- Collaborate with partners to promote land uses and development patterns conducive to supporting a transportation system that is designed and built for users of all abilities and prosperity levels.
- Collaborates with partners on ways to improve existing transportation systems to be more age friendly.
- Improve and expand human service coordination, mobility, and accessibility for all modes.
- Reduce the number and size of gaps in the ADA accessible sidewalk network.
- Improve accessibility for all modes for all users.
  - **Target and Performance Measure:** 50% of available Transportation Improvement Program funding allocated to projects that significantly improve bicycle and pedestrian mobility.

Goal: A Clean Environment

A transportation system that is not only protected but enhanced through energy conservation and smart, green practices.

### Objectives

- Minimize negative environmental impacts of the transportation system.
  - **Target and Performance Measure:** Program a minimum of 100% of Congestion Mitigation and Air Quality (CMAQ) Program funding targets.
- Reduce greenhouse gas emissions and ground level ozone (NO<sub>x</sub> and VOCs) by all transportation modes.
  - **Target and Performance Measure:** 50% of TIP projects reduce GHGs while also reducing negative impacts on the natural environment (such as improved storm water management or the addition of green space).
- Increase the usage of clean alternative fuels and recyclable material for new transportation infrastructure.
- Increase coordination of transportation and housing programs to promote affordable housing near transit.
- Support investments that clean up brownfields and avoid investments that increase pressure to develop greenfields.
- Support livable communities and smart growth development patterns through the creation of a balanced multi-modal transportation system.
- Promote Mode Shift by increasing use of transit, carpool/ vanpool, and non-motorized transportation modes such as bicycling and walking.
- Support efforts and programs that Increase automobile and bicycle parking capacity and usage at transit stations and commuter lots.
- Monitor utilization and congestion levels at commuter rail and park & ride parking facilities.
  - **Target and Performance Measure:** Record utilization data twice annually

### Objectives

- Reduce delay along identified freight routes.
- Increase access to major employment centers.
- Plan and prioritize transportation investments that serve targeted development areas.

### Goal: Resiliency

A transportation system that is sustainable and resilient.

### Objectives


- Incorporate support material from plans such as Hazard Mitigation Plan and other documents that identify vulnerable areas when considering programming of projects and annual work program.
- Protect and strengthen transportation systems vulnerable to climate change through identification of at-risk transportation assets and development of protection measures for each category of asset.

### Goal: A State of Good repair

A planning process that prioritizes maintenance and keeping physical infrastructure in a state of good repair.

#### Objectives

- Continue to maintain the Old Colony Pavement Management System program.
- Continue evaluating potential Transportation Improvement Program projects on existing physical condition of facility to be improved.
- Program projects aimed at increasing the overall number of roadway miles with excellent or good pavement conditions.


 Target and Performance Measure: the Old Colony MPO shall adapt the Massachusetts Statewide Targets for bridge conditions and pavement conditions on the National Highway System (NHS), adjusted annually by MassDOT (As of March 2023, 4-Year Target was above 30% of NHS miles in Good condition and fewer than 5% of NHS miles in Poor Condition).

### Goal: Efficiency

A transportation system that minimizes financial and environmental costs associated with congestion and delay.

#### Objectives

- Program projects aimed at mitigating congestion and reducing travel times on the highway network.

 Target and Performance Measure: The Old Colony MPO shall adapt and support the Massachusetts Statewide Targets (updated annually) for travel time reliability on the National Highway System, Truck Travel Time Reliability (TTTR) Index, and Annual Hours of Peak Hour Excessive Delay).

- Coordinate with Brockton Area Transit (BAT) regarding planning or efficiency and minimized travel times on the transit system.
- Provide and maintain fixed route reliability: Miles between breakdowns w/ passenger interruption.
- Provide and maintain demand response reliability: Miles between breakdowns w/ passenger interruption.
- Provide and maintain highway network travel time reliability.

## SAFETY PERFORMANCE MANAGEMENT (PM1)

The Old Colony MPO has chosen to adopt the statewide safety performance measure targets set by MassDOT for Calendar Year (CY) 2023. In setting these targets, MassDOT has followed FHWA guidelines by using statewide crash data and Highway Performance Monitoring System (HPMS) data for vehicle miles traveled (VMT) in order to calculate 5 year, rolling average trend lines for all FHWA-defined safety measures.

Due to higher rates of speeding caused by decreased vehicle miles traveled (VMT) amid pandemic shutdowns in 2020 and the lingering impacts in 2021, 2020 and 2021 fatalities and serious injuries increased relative to previous years. This increase means MassDOT was unable to use a pure trendline approach to set CY2023 targets that “demonstrate constant or improved performance” as required by the Infrastructure Investment and Jobs Act (IIJA). Rather than adopt a target that depicts an increase in the trend line, MassDOT developed targets by projecting 2022 and 2023 fatalities and serious injuries numbers based on a rate of change consistent with recent trends. This methodology was developed to project a future downward trend without it being significantly influenced by the lingering impacts of the pandemic.

In recent years, MassDOT and the Old Colony MPO have invested in “complete streets,” bicycle and pedestrian infrastructure, intersection and safety improvements in both the Capital Investment Plan (CIP) and Statewide Transportation Improvement Program (STIP) to address increasing mode share and to incorporate safety mitigation elements into projects. Moving forward, the Old Colony MPO, alongside MassDOT, is actively seeking to improve data collection and methodology for bicycle and pedestrian VMT counts and to continue analyzing crash clusters and crash counts that include both motorized and non-motorized modes in order to address safety issues at these locations.

In all safety categories, MassDOT has established a long-term target of “Toward Zero Deaths” through MassDOT’s Performance Measures Tracker<sup>1</sup> and will be establishing safety targets for the MPO to consider for adoption each calendar year. While the MPO is not required by FHWA to report on annual safety performance targets, FHWA guidelines require MPOs to adopt MassDOT’s annual targets or to establish their own each year.

The safety measures MassDOT has established for CY 2023, and that the Old Colony MPO has adopted, are as follows:

- 1) Fatalities: The target number of fatalities for years CY 2023 is 355, down from an average of 360 fatalities for the years 2017-2021 [
- 2) Rate of Fatalities per 100 million VMT: The target fatality rate for years CY 2023 is 0.59, equivalent to the 0.59 average for years 2017-2021.

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<sup>1</sup> <https://www.mass.gov/lists/tracker-annual-performance-management-reports>

Figure 2-1

Total Fatalities and Fatality Rate

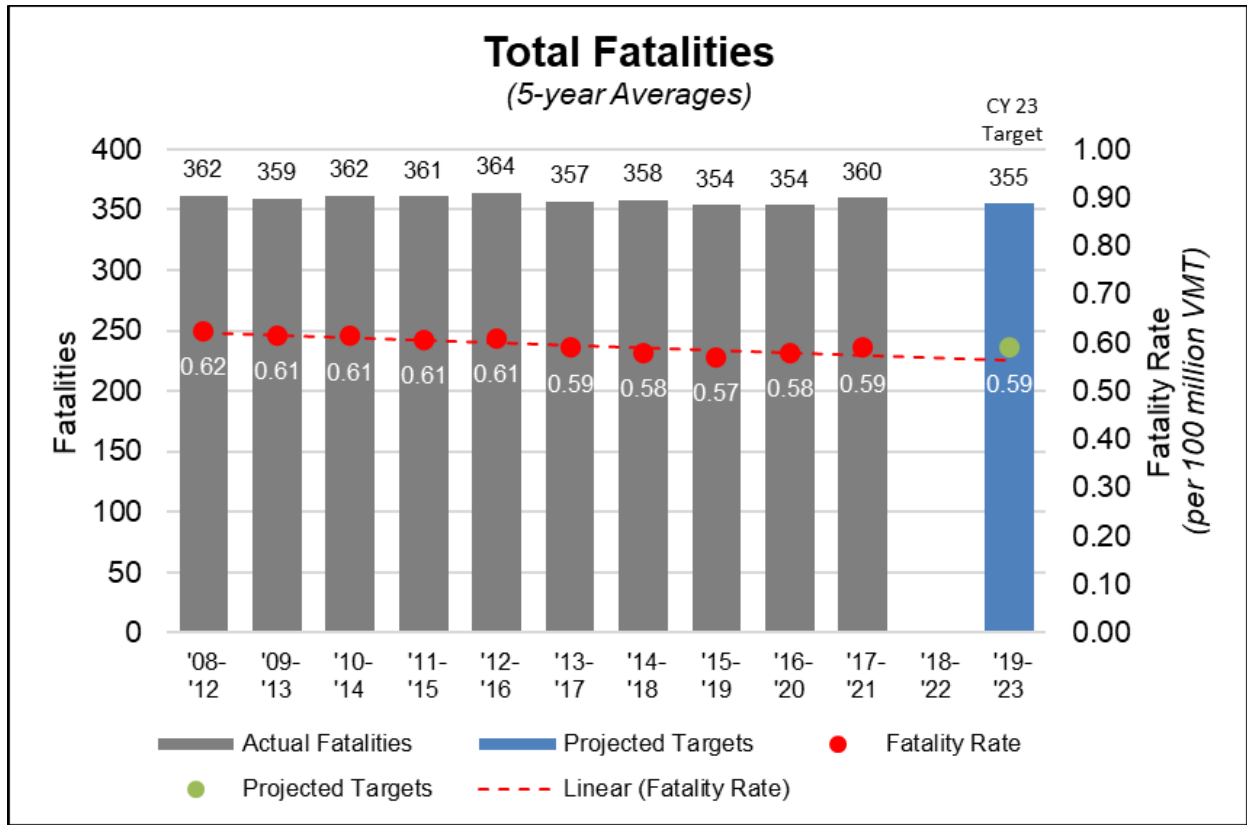




Figure 2-2

Total Serious Injuries and Incapacitating Injuries Rate

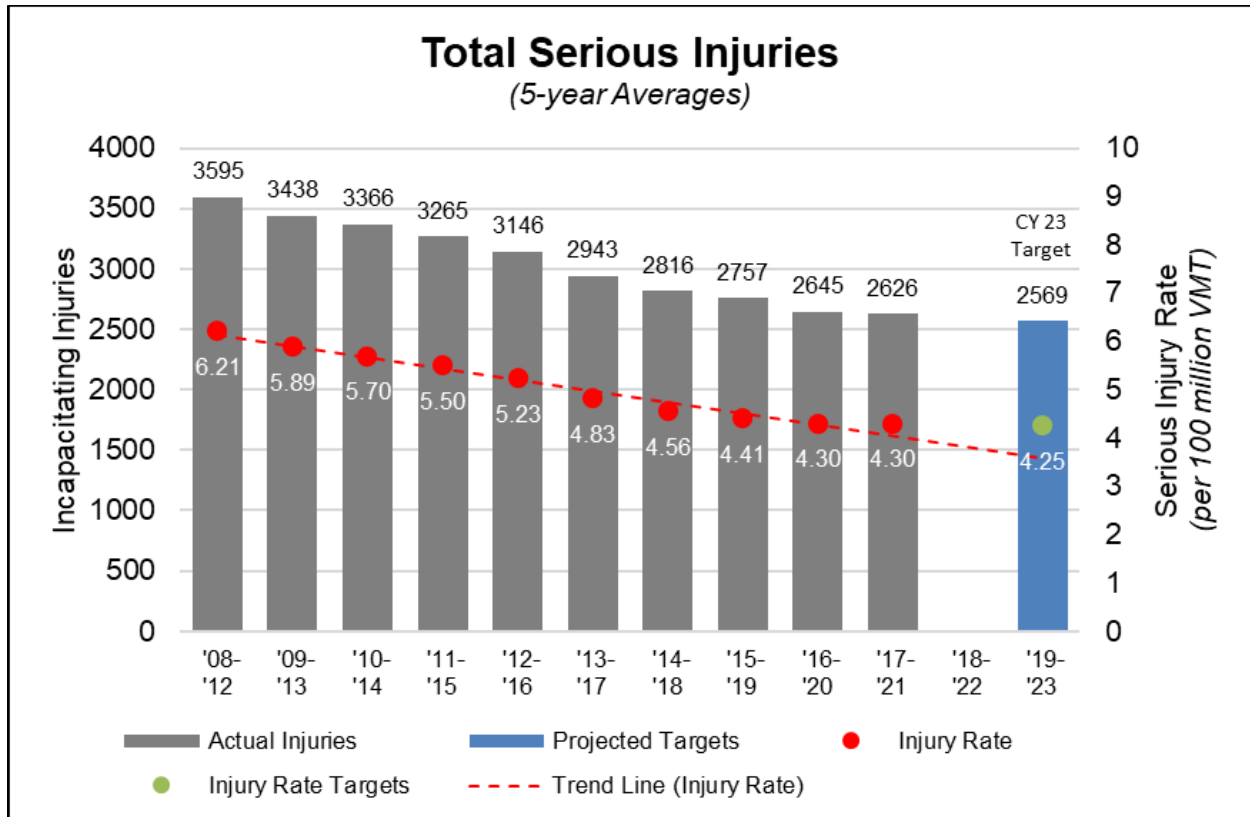
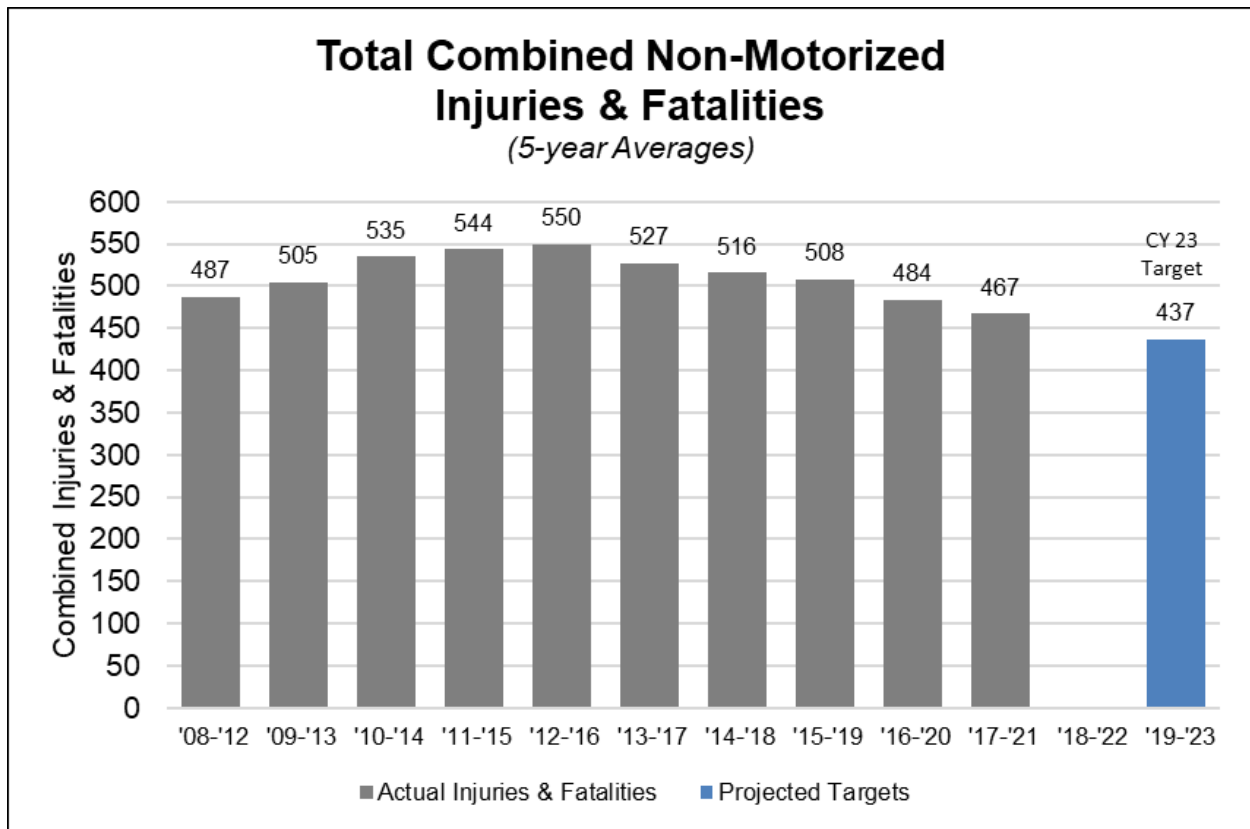


Figure 2-3

Total Number of Non-Motorized Fatalities and Incapacitating Injuries with



SYSTEM PRESERVATION PERFORMANCE (PM2)

The Old Colony MPO has chosen to adopt the 2-year (2024) and 4-year (2026) statewide bridge and pavement performance measure targets set by MassDOT. MassDOT was required to adopt a statewide target by December 16<sup>th</sup>, 2022. In setting these targets, MassDOT has followed FHWA guidelines by measuring bridges and pavement condition using the 9-point National Bridge Inventory Standards (NBIS); the International Roughness Index (IRI); the presence of pavement rutting; and the presence of pavement cracking. 2-year and 4-year targets were set for six individual performance measures: percent of bridges in good condition; percent of bridges in poor condition; percent of Interstate pavement in good condition; percent of Interstate pavement in poor condition; percent of non-Interstate pavement in good condition; and percent of non-Interstate pavement in poor condition. All of the above performance measures are tracked in greater detail in MassDOT’s 2022 Transportation Asset Management Plan (TAMP).

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

Performance targets for pavement-related performance measures were based on a single year of data collection, and thus were set to remain steady under the guidance of FHWA. These measures are to be revisited at the 2-year mark (2024), once three years of data are available, for more informed target setting.

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

**Table 2-1: PM2 Performance Targets**

| Performance Measure                       | Current (2021) | 2-year target (2024) | 4-year target (2026) |
|---|----------------|----------------------|----------------------|
| Bridges in good condition                 | 16%            | 16%                  | 16%                  |
| Bridges in poor condition                 | 12.2%          | 12%                  | 12%                  |
| Interstate Pavement in good condition     | 71.8%          | 70%                  | 70%                  |
| Interstate Pavement in poor condition     | 0.0%           | 2%                   | 2%                   |
| Non-Interstate Pavement in good condition |                | 30%                  | 30%                  |
| Non-Interstate Pavement in poor condition |                | 5%                   | 5%                   |

**SYSTEM PERFORMANCE MEASURES (CONGESTION, RELIABILITY, AND EMISSIONS) (PM3)**

The Old Colony MPO has chosen to adopt the 2-year (2024) and 4-year (2026) statewide reliability, congestion, and emissions performance measure targets set by MassDOT. MassDOT was required to adopt a statewide target by December 16, 2022, with MPOs either adopting the statewide target or establishing their own by June 2023.

MassDOT followed FHWA regulation in measuring Level of Travel Time Reliability (LOTTR) on both the Interstate and non-Interstate NHS as well as Truck Travel Time Reliability (TTTR) on the Interstate system using the National Performance Management Research Dataset (NPMRDS) provided by FHWA. These performance measures aim to identify the predictability of travel times on the roadway network by comparing the average travel time along a given segment against longer travel times. For LOTTR, the performance of all segments of the Interstate and of the non-Interstate NHS are defined as either reliable or unreliable based on a comparison between the 50<sup>th</sup> percentile travel time and the 80<sup>th</sup> percentile travel time, and the proportion of reliable segments is reported. For TTTR, the ratio between the 50<sup>th</sup> percentile travel time and the 90<sup>th</sup> percentile travel time for trucks only along the Interstate system is reported as a statewide measure.

The Old Colony MPO is an agency whose planning area includes communities in the Boston Urbanized Area (UZA), and as a signatory to the 2018 Boston UZA Memorandum of Understanding (Boston UZA MOU)—has also adopted 2-year (2024) and 4-year (2026) Boston UZA-wide congestion performance measure targets. These performance measures are the percentage of non-single occupancy vehicle (SOV) travel and the Peak Hour Excessive Delay (PHED). Targets were developed in coordination with state Departments of Transportation and neighboring MPOs with planning responsibility for portions of the Boston UZA.

The percentage of non-SOV travel is approximated using the U.S. Census Bureau’s American Community Survey (ACS) Journey-to-Work data. This metric is based on the percentage of people commuting to work using a mode other than a single occupancy vehicle. In the Boston UZA, the proportion of non-SOV travel has been steadily increasing and is projected to continue increasing at a rate of 1.4% annually.

PHED is measured by totaling the number of hours spent in excessive delay (defined as travel time at 20 miles per hour or at 60% of the posted speed limit, whichever is greater) in peak hours (between 6:00am and 10:00am, and between 3:00pm and 7:00pm) divided by the total UZA population. For this reporting period, targets are proposed considering the uncertainty of the trend post-pandemic and follow a trendline approach similar to TTR measures. In the Boston UZA, the 2024 target is set at a realistic 24, while the 2026 target of 22 is proposed to establish an improving target and one that is below pre-pandemic numbers.

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

**Table 2-2: PM3 Performance Targets**

| Measure                            | Current (2021) | 2-year (2023) | 4-year (2025) |
|------------------------------------|----------------|---------------|---------------|
| Interstate LOTTR                   | 84.2%          | 74.0%         | 76.0%         |
| Non-Interstate LOTTR               | 87.2%          | 85.0%         | 87.0%         |
| TTTR                               | 1.61           | 1.80          | 1.75          |
| PHED (Boston UZA)                  | 18.0           | 24.0          | 22.0          |
| PHED (Springfield UZA)             | 6.2            | 6.5           | 6.0           |
| PHED (Worcester UZA)               | 6.8            | 7.0           | 5.0           |
| % non-SOV (Boston UZA)             | 36.9%          | 38.8%         | 39.8%         |
| % non-SOV (Springfield UZA)        | 21.5%          | 22.2%         | 22.2%         |
| % non-SOV (Worcester UZA)          | 23.4%          | 25.4%         | 26.1%         |
| <b>Emissions Reductions: PM2.5</b> |                |               |               |
| Emissions Reductions: NOx          | 0.490          | 0.000         | 0.000         |
| Emissions Reductions: VOC          | 0.534          | 0.000         | 0.000         |
| <b>Emissions Reductions: PM10</b>  |                |               |               |
| Emissions Reductions: CO           | 6.637          | 0.354         | 0.354         |

**TRANSIT SYSTEM ASSET (TAM) CONDITION PERFORMANCE MEASURES AND TARGETS**

Table 2-3 lists a set of federally required infrastructure condition performance measures for transit systems along with BAT’s Performance Targets. These transit asset management (TAM) measures, which focus on a specific subset of all transit assets, were established in the FTA’s TAM Rule. Brockton Area Transit presented this information along with supporting documentation to the Old Colony MPO in November 2022. The Old Colony MPO has adopted BAT’s FY 2023 Brockton Area Transit Authority Transit Asset Management (TAM) State of Good Repair Targets in their entirety and as their own and for the Old Colony Region, in accordance with the certified 3C Transportation Planning Process. The Old Colony MPO will continue to assist BAT in striving towards achieving these targets through our project prioritization process and with our evaluation criteria, which considers asset condition an important factor in the selection process. Within the 2024-2028 Transit TIP, projects include the purchase of support vehicles and new buses (35’ & 40’). By purchasing the new support vehicles and buses, BAT will maintain their rolling stock in excellent condition and meet the performance targets within the TAM Plan.

**Table 2-3**

**Brockton Area Transit Authority Performance Measures and Targets**

| Performance Targets by Asset Category |                             |  |                                |                          |   |                                      |
|---------------------------------------|-----------------------------|--|--------------------------------|--------------------------|---|--------------------------------------|
| Category                              | Class                       | Metric   | Performance Target for FY 2023 | Total Number of Vehicles | # of Vehicles that exceed ULB - FY 2022 | % of Fleet that exceed ULB - FY 2022 |
| Rolling Stock                         | Buses                       | X% of fleet that exceeds default ULB of 14                       | 3.00%                          | 46                       | 1                                       | 2.17%                                |
|                                       | Cutaway Buses               | X% of fleet that exceeds default ULB of 10                       | 25.00%                         | 4                        | 1                                       | 25.00%                               |
|                                       | Vans                        | X% of fleet that exceeds default ULB of 8                        | 14.00%                         | 58                       | 8                                       | 13.79%                               |
| Equipment                             | Non-Revenue Service Vehicle | X% of non-revenue service vehicles that exceeds default ULB of 8 | 40.00%                         | 5                        | 2                                       | 40.00%                               |
|                                       | Non-Revenue Service Truck   | X% of non-revenue service vehicles that exceeds default ULB of 8 | 40.00%                         | 5                        | 2                                       | 40.00%                               |
| Facilities                            | Admin/Maintenance Facility  | X% of facilities rated under 3.0 on Term scale                   | 0.00%                          | 3                        | 0                                       | 0.00%                                |

FTA defines ULB as “the expected lifecycle of a capital asset for a particular transit provider’s operating environment, or the acceptable period of use in service for a particular transit provider’s operating

environment.” For example, FTA’s default ULB value for a bus is 14 years. FTA’s Transit Economic Requirements Model (TERM) scale, which pertains to the facilities measure, is a rating system that describes asset condition. The scale values are 1 (poor), 2 (marginal), 3 (adequate), 4 (good), and 5 (excellent). Because each measure is intended to represent the share of transit assets that are not in a state of good repair, the goal is to minimize the value for all four measures. FTA grantees, including transit agencies and agency sponsors, such as MassDOT, are required to develop targets for these TAM measures each fiscal year. MPOs, in turn, are required to set targets for their regions. BAT submitted agency-level targets for state fiscal year (SFY) 2022 (July 2022 through June 2023) to the Old Colony MPO. Their targets reflect the most recent data available on the number, age, and condition of their assets, and their expectations and capital investment plans for improving these assets during SFY 2023.

**PUBLIC TRANSIT AGENCY SAFETY PLAN (PTASP) PERFORMANCE MEASURES AND TARGETS**

The Public Transportation Agency Safety Plan (PTASP) details the safety processes and procedures for the Brockton Area Transit Authority (BAT). This plan utilizes existing agency safety practices and best practices to be implemented to meet the new regulation set in 49 CFR Part 673 of the federal guidelines and was provided to Old Colony Planning on September 15, 2020.

The PTASP includes formal documentation to guide the agency in initiative-taking safety management policy, safety risk management, safety assurance, and safety promotion. The goal is to provide management and labor a comprehensive, collaborative approach to managing safety. The plan includes the process and schedule for an annual review to evaluate the safety performance measures and update processes to continuously improve the organization’s safety practices.

BAT has developed and approved performance targets based on the safety performance measures established under the National Public Transportation Safety Plan. The targets in Table 2-4 are based on the review of the previous five years of BAT’s safety performance data.

**Table 2-4**

**Brockton Area Transit Authority Safety Performance Measures and Targets**

| Safety Performance Targets |                    |                   |                  |                 |                       |                      |  |
|----------------------------|--------------------|-------------------|------------------|-----------------|-----------------------|----------------------|--|
| Mode of Transit Service    | Fatalities (Total) | Fatalities (Rate) | Injuries (Total) | Injuries (Rate) | Safety Events (Total) | Safety Events (Rate) | System Reliability (Miles between Major Failure) |
| Fixed Route                | 0                  | 0                 | 10               | 7.6             | 6                     | 4.6                  | 20,000   |
| Demand Response            | 0                  | 0                 | 4                | 5.9             | 4                     | 5.9                  | 30,000   |

On November 17, 2020, the Old Colony MPO adopted BAT’s Safety Performance Measures and Targets in their entirety and as their own and for the Old Colony Region, in accordance with the certified 3C Transportation Planning Process. The Old Colony MPO will continue to assist BAT in striving towards achieving these targets through our project prioritization process and with our evaluation criteria, which

considers safety an important factor in the selection process. Similar to BAT's TAM Plan, new bus and support vehicle purchases included in the FFY 2024-2028 Transit TIP is also anticipated to help reach the safety targets listed in the PTASP. The new buses and support vehicles will replace the older vehicles and they are expected to be more reliable and safer on the roadways. In addition, the purchasing of support equipment and associated capital maintenance items will assist in the repair of the older vehicles.



## Chapter 3: Planning Scenarios

Old Colony Planning Council collaborated with the Massachusetts Department of Transportation in determining current trends currently happening in transportation, population, employment, and environment that are impacting how people live and work in Massachusetts and particularly the Old Colony region.

The following areas are currently impacting how we all live, work, and move; and how trends in these areas play out going forward will affect how the population grows and hence transportation and planning decisions that must be made.

- Climate Change
- The Future of Work
- Population Trends
- Housing and Workplaces
- Prosperity
- Technology

### CLIMATE CHANGE

The impacts from climate change remain a serious threat to the population and infrastructure in the Old Colony Region. Between 2022 and 2050, climate change will impact life in Massachusetts significantly. Seas have risen eight inches globally since 1900, with even larger rises in Massachusetts, where 75% of the population and \$460 billion in productivity is in coastal areas.

A warming climate will also have direct impacts on the Region's quality of life. The Commonwealth can expect more heat waves by 2050, placing vulnerable people and outdoor workers at risk and consuming more energy for air conditioning.

Extreme precipitation, high winds, and recurring flooding may cause damage and disruption to critical electricity, transportation, and water systems. More frequent, stronger storms and droughts may overwhelm infrastructure, leading to the displacement of residents, coastal erosion, and impacts to agricultural and tourism industries.

#### Sea Level Rise

Acceleration of Sea Level Rise Could Mean:

- Sea level rise increases by two feet by 2050 with an increasing rate of change in a high emissions scenario. Coastal flooding would be a common occurrence, even on fair weather days.
- Continuing commercial and residential development along the shore reduces the natural environment's flood buffering abilities.

- Sea level rise combines with severe weather to cause significant damage and disruption to services. Tourism, agriculture, and other economically significant industries are hampered by repeated flooding events.
- Infrastructure systems such as transportation, energy, water and wastewater are impacted significantly and require frequent maintenance and replacement.

Maintaining Current Sea Level Rise Rates Could Mean:

- Sea level rise increases by one foot by 2050 with a steady rate of change in a lower emissions scenario. Tidal flooding events occur more frequently.
- As urbanization continues, more people live in coastal areas vulnerable to sea level rise and tidal flooding. The costs for evacuation and post flooding recovery increase.
- Coastal communities perform sea level rise vulnerability assessments and implement flooding mitigation solutions such as wetland remediation, strategic retreat, and revised building codes. State and federal funding resources target adaptation measures for sea level rise

Plateauing or reversal of Current Sea Level Rise Rates Could Mean:

- Coastal communities and the Commonwealth dedicate significant funding and resources to climate change mitigation and adaptation measures statewide.
- The Commonwealth and cities implement stricter land use and development regulations, limiting new development in areas vulnerable to flooding.
- Infrastructure asset management and investment focus on resiliency and plan for increasing sea levels, severe weather, and flooding.

**Extreme Temperate and Energy Needs**

An Acceleration of Current Trends Could Mean:

- Historically unprecedented warming continues through 2050 due to a higher emissions pathway. Massachusetts experiences an additional 30 days of extreme heat annually.
- Massachusetts residents, particularly in densely populated urban areas, are at increased risk of extreme heat. Especially vulnerable groups include older adults, children, transit users, people who work outdoors, and people without adequate shelter.
- Public agencies, private industry, and existing infrastructure are unable to meet the increased demand for physical and social services. Road, bridge, rail, and power infrastructure maintenance costs increase, as does the frequency of infrastructure failures.

Maintaining Current Trends Could Mean:

- Under a lower emissions pathway, temperatures continue to increase. Heat waves increase in intensity and duration, while cold waves become less intense.

- Higher temperatures impact the public health of Massachusetts residents. Excessive heat exposure contributes to more heat-related illnesses. Elevated temperatures also contribute to complex air quality issues.
- Electricity demands for air conditioning burden the constrained energy infrastructure system, compete with electric vehicle charging demands, and contribute to further greenhouse gas emissions.

Plateauing or reversal of Trends Could Mean:

- Globally, nations collaborate to reduce greenhouse gas emissions and slow the rate of temperature increase.
- Cities and transportation agencies work to mitigate heat island effects through measures such as installing additional greenspaces, tree cover and shade at transit stops, green and white roofs, and permeable surfaces.
- Electricity demands within the Commonwealth are met through renewable and sustainable energy sources.
- Social services provide adequate support for the populations most vulnerable to extreme temperatures.

Severe Weather Events

An Acceleration of Trends in Severe Weather Events Could Mean:

- Both the frequency and severity of severe weather events increase throughout the century. Disasters become more expensive and affect more people.
- Compounding rain, flooding, and wind events overburden aging and insufficient infrastructure, leading to repeated property damage, displacement of people, and coastal erosion.
- Annual precipitation in Massachusetts increases by six inches by 2050. There are three additional days per year with rain accumulations of more than one inch in a single day.
- Adaptation and mitigation strategies are essential to cope with the effects of climate change.

Maintaining Current Rates of Climate Change Could Mean the Following Severe Weather Impacts:

- The severity of severe weather events increases, but frequency of storms remains steady. Storms cause more damage and disruption of services within Massachusetts.
- Annual precipitation and days with total rain accumulation greater than one inch both increase through 2050.
- The Commonwealth invests in climate change mitigation, adaptation, and betterments for public infrastructure, including transportation. Initiatives struggle to keep up with the growing impacts of severe weather throughout the Northeast.

## Plateauing or Reversing Current Rates of Climate Change Could Mean the Following Severe Weather Impacts

- Globally, nations collaborate to reduce greenhouse gas emissions and slow the rate of ocean and atmospheric warming.
- The frequency and severity of severe weather events remains static. Hurricanes, nor'easters, droughts, and flooding events continue to affect Massachusetts at historical rates.
- Climate change mitigation and adaptation strategies are implemented rigorously and widely throughout the Commonwealth to reduce the total cost of damage and disruptions from severe storms and prolonged droughts.

### THE FUTURE OF WORK

The COVID-19 pandemic dramatically changed the nature of how and where people work, and many of these changes could be permanent changes to society. Flexible schedules and teleworking, which were already gaining in popularity before the Pandemic, may be expectations for Massachusetts workers in many industries the 2020s. At the same time, what benefits workers find in these practices may not be distributed equitably, with white collar workers enjoying an effective standard-of-living increase as compared to those so recently declared “essential heroes”.

At the same time, Massachusetts is experiencing the same “Great Resignation” seen across the nation. In a Commonwealth with 15 jobs for every 10 people, it is possible that the 2020s will be unprecedented in terms of labor mobility and, potentially, scarcity.

The impacts of these trends on transportation are mixed. From the data we have already seen, however, we know that it will not save us from congestion.

#### Flexible Work Schedules

Flexible work schedules –in which employees can vary the times at which they begin and end work –were increasingly popular even prior to COVID-19. Following the pandemic and the widespread switch to fully remote operations for most white-collar jobs, employers and employees have used the time saved on commuting to adopt more flexible work hours. As the pandemic recedes, the uncertainty of whether workers will return to the office and the 9-to-5 workday has implications for the Massachusetts transportation network.

An Acceleration in the trend of workplaces offering flexible work schedules could mean:

- More businesses offer flexible work schedules as an employee benefit. Total work commutes, VMT, and transit ridership decline.
- Widespread flexible work schedules shift traffic away from peak-hour levels and lead to long-term reduction in traffic as employees find alternatives.
- Businesses downsize their office space to reduce business costs, reducing rents for commercial spaces.

- Businesses that rely on foot traffic close at higher rates, leading to higher vacancies in commercial districts and higher unemployment for service workers. Income inequality between white-collar workers and service workers worsens.

Maintaining the trend of workplaces offering flexible work schedules could mean:

- Employees continue to use flexible work schedules to build work hours that accommodate their non-work needs, such as childcare or professional development.
- Commuting by driving alone becomes more common as commuters maximize their flexibility.
- High traffic volumes are distributed throughout the day as work start and stop times vary, reducing congestion at traditional peak times but increasing congestion throughout the day.
- Businesses that rely on foot traffic continue to struggle, leading to lower sales tax revenues and more frequent turnover in commercial districts.

Plateauing or a reversal in the trend of workplaces offering flexible work schedules could mean:

- Many businesses encourage or require a return-to-office and limit flexible work schedules in order to maintain office culture, productivity, or consistency.
- Peak-hour traffic volumes approach and eventually surpass pre-pandemic levels as standardized commuting resumes. Transit ridership recovers as standard work schedules make commuter passes more cost competitive.
- Commercial district businesses stabilize as foot traffic returns.

### Labor Shortages

Pandemic impacts. The changing nature of work. The Great Resignation. All of these and other factors have resulted in the slowest labor force participation rate since World War II during the fastest recovery for unemployment (Washington Post, 2021). While these impacts have been felt across industries, in Massachusetts, there is a shortage of workers per job --15 positions for every 10 people. As of December 2021, the state unemployment rate stood at 3.9 percent, matching the national rate and nearing the pre-pandemic level of 2.8 percent in February 2020 (Bureau of Labor Statistics, 2021). Low unemployment is good for workers. However, gone unchecked labor shortages in key industries have impacts on the Massachusetts businesses' ability to meet demand within the supply chain. This threatens the state's economic position in its strongest and emerging industries such as education, health/biotech, service, and advanced manufacturing.

An Acceleration in the trend of Labor Shortages could mean:

- Labor shortages continue across key industries, diminishing the state's status in biotechnology and health. Lead firms relocate key functions out of Massachusetts.
- The urban and rural divide deepens as lower-cost industrial real estate is emptied from more remote parts of the state without a sufficient workforce in place.

- Public transit funding suffers further losses as a key fare-collection market —essential workers in healthcare and the service industries —quickly shrinks. Concurrently, remote work removes the possibility of a return to normal.

Maintaining current trends in Labor Shortages Could Mean:

- Post-COVID, Massachusetts refines policies in the face of future public health disruptors for businesses to remain open.
- Firms improve training programs to provide entry points to careers in leading Massachusetts industries: biotech, health, and education.
- Childcare and housing are part of the changing nature of work discussion, not only for remote workers, but especially for ‘essential’ workers in health, services, and food.

Plateauing or reversing current trends in Labor Shortages Could Mean:

- Massachusetts invests in large-scale workforce training that has generational impacts on the equitable employment at different education levels, especially in health, biotechnology, and manufacturing.
- Clustering of industries across the state made accessible by better fusion of land use and transportation leads to a larger labor pool across industrial sectors.
- Technology is leveraged to build an equitable workforce in clean energy, creating another leading industry for Massachusetts.

### Telepresence

The COVID-19 pandemic has rendered work, school, medicine, and other critical activities at least partially virtual, and the degree to which they remain so —and for whom —has significant implications for transportation and society at large. It is expected 23% of total working days in the Commonwealth to be virtual in the post-pandemic environment, concentrated in knowledge industry jobs. This may not, however, result in a meaningful reduction in VMT, as teleworkers may still make other non-work trips, and may make them separately instead of chained together into a commute.

An Acceleration of current trends in Telepresence could Mean.

- Telepresence continues to increase post-pandemic in all areas —not only work-from-home but also telemedicine and virtual school instruction.
- VMT declines as telepresence replaces non-work trips such as medical and schooling. Business districts shift to industrial, and research uses and density in general declines.
- Massachusetts and the Federal Government are forced to confront significant inequities in broadband access, both in rural areas and among non-White and vulnerable populations.
- Public schools and all colleges see significant shifts in enrollment as parents and students seek out specific types of experiences.

Maintaining current trends in Telepresence could mean:

- Telework stabilizes after the pandemic at approximately one-fifth of working days.
- VMT increases due to growth in unchained non-work trips, with peaking returning at a lesser level than 2019, but increased congestion throughout the day.
- Schools return to all in-person instruction after the pandemic, but demand remains for virtual options, particularly in higher education.
- Telemedicine maintains a strong presence for routine appointments, driven in part by insurers and employers seeking lower-cost services.

Plateauing or reversal of current trends in Telepresence could mean:

- Telework fades back toward 10% of working days after the Pandemic, driven by employers seeking synergy and control.
- VMT increases a large amount in the absence of a return to transit use, leading to peaking and congestion that exceed 2019 conditions and creating an acute need to promote transit.
- Office uses compete with research and development for space in Massachusetts business districts, driving up rents and potentially challenging the Commonwealth's ability to retain businesses.
- Massachusetts faces pressure to build density of housing and jobs near transit in order to alleviate congestion.
- 

## POPULATION TRENDS

Massachusetts is currently forecasted to buck some national demographic trends –the population is not ageing at the rate of some other states (and is not projected to) –and household size and composition has remained relatively consistent over the past decade.

The Bay State's primary demographic story is that young people arriving from other countries to enjoy the Commonwealth's knowledge economy have outweighed people of all ages departing Massachusetts for other parts of the United States. This has resulted in a population more diverse, younger, and more educated than in other northern and northeastern states.

However, with fewer universities and higher housing costs, the Old Colony region continues to have an older population than other parts of the Commonwealth. Trends in population that could impact how this region grows and thus its transportation needs include an aging population, and an increase in household size with more higher wage earners per household/

### Aging Population

An Accelerating Trend in an Aging Population Could Mean:

- The Region fails to attract migrants in younger age cohorts (or attracts migrants in older cohorts) leading to aging that exceeds prior estimates.

- A rapidly and increasingly aging population places pressure on public and non-profit organizations that serve seniors.
- Seniors live longer than expected, delaying the transfer of generational wealth to their heirs.

Maintaining Current Trends in an Aging Population Could Mean:

- Seniors seeking to age in place remain in their homes, necessitating growth in home health providers and putting pressure on available housing stock.
- The Region and Commonwealth will increasingly need to prioritize seniors' needs for transportation to shopping, medical, appointments, social activities, athletics, and civic functions. This especially applies to immigrants and seniors of color.
- Millennials and Generation Xers will benefit from the "greatest wealth transfer in history."

Plateauing or a reversal In Trend in an Aging Population Could Mean:

- Massachusetts and the Region succeed in attracting migrants in younger age cohorts (or sees higher than expected out-migration in older cohorts), leading to aging that trails prior estimates.
- Aging may occur with even more geographic disparity than anticipated (e.g., if Greater Boston alone ages less than expected). This could leave rural and suburban areas such as the Old Colony Region struggling to draw attention to the needs of their seniors.

### Household Size

An Acceleration of Current Household Trends Could Mean:

- An increased number of wage-earners per household may result in higher household earnings and lower poverty rates.
- Larger households, particularly those made up of adults, can share vehicles and trips, potentially reducing car ownership and VMT.
- The Region's housing stock, whether co-living units, "in-law" apartments, or houses repurposed for large non-family households, may not be well-positioned for an increase in household size.

Maintaining Current Household Trends Could Mean:

- Massachusetts' knowledge-based economy continues to attract young, single workers who seek out co-living situations, and this new population grows into areas south of metro Boston.
- Massachusetts communities make changes to allow more flexible living arrangements, be they larger apartments, dedicated co-living developments, or 'in-law apartments.'



- Multigenerational households continue to be disproportionately in minority communities, combining with concentrations of knowledge workers to vary household size widely in different regions of the Commonwealth.

Plateauing or a reversal of Current Household Trends Could Mean:

- Young choose to not marry or have families at the same rate as previous generations, reducing the average household size.
- Massachusetts may overbuild co-living units or large apartments and condominiums, necessitating conversion to smaller units.
- Smaller households of few adults may increase overall car ownership, VMT, and single-occupant vehicle mode share.

## HOUSING AND WORKPLACES

The COVID-19 Pandemic has created a great deal more uncertainty about where the people of Massachusetts will live and work. This uncertainty is both geographic and geometric –will urban, suburban, and/or rural areas grow, and how dense will development be? Will it be convenient to transit, or will it sprawl along existing highways? Will it be affordable, or will our next generation face the same or even greater challenges in finding a home that meets or exceeds their childhood home?

Massachusetts Law now requires communities in the MBTA service area to provide areas for dense development around stations. In some communities, residents have embraced the principle of transit-oriented development even before legislation required it. In other communities, alternatives are being assessed to avoid increasing multi-family housing capacity.

### Housing

Massachusetts is facing a housing shortage. Many factors point to increasing housing demand through 2050, as well as a shift towards urban and multifamily living. Restrictive zoning laws and development requirements have prevented multifamily housing, particularly in affluent suburbs. New legislation requiring “upzoning” in MBTA-accessible communities—and other zoning reforms that reduce costs and streamline permitting—may change this trajectory. New affordable housing production in neighborhoods that are walkable and well-served by public transit would make the most of existing infrastructure, minimize impacts on traffic congestion, and open opportunities for residents, whereas more people living in areas that encourage driving leads to growing roadway volumes, congestion, and vehicle-miles traveled.

An Acceleration of current trends in Housing could mean:

- Housing demand surges as new housing construction continues to slow. As a result, prices continue to rise, residents relocate to neighborhoods and communities with more affordable housing stock.
- Housing construction in MBTA-adjacent communities does not reach the expected unit capacity. Many communities are slow to comply with zoning and permitting changes.

Maintaining current trends in Housing could mean:

- Housing demand continues to outpace housing production.
- Most development continues to occur in less affluent communities with less restrictive zoning laws, driving gentrification and displacement in lower and moderate-income communities of color.

Plateauing or a Reversal in current trends in Housing could mean:

- Housing production is ramped up and becomes sufficient to meet the demand of a growing number of households.
- Upzoning in MBTA-adjacent communities occurs at a moderate pace, and new development nearly reaches the expected capacity, but then slows and levels out.
- Some burden is removed from lower and moderate-income communities to increase housing supply and affluent communities increase their supply of affordable and accessible housing.

### Workplaces

In Massachusetts, the greater Boston region contains over half of all jobs. However, many are not accessible by transit, and a vast majority of commuters drive to work. This contributes to the Commonwealth having one of the highest average commute times in the country. Several solutions have been proposed to decrease congestion, such as increasing transit service/reach and incentivizing employers to locate in denser, transit-accessible areas, including those in Gateway Cities. As evidenced during the pandemic, the type of job can dictate whether an employee is able to conduct work remotely without the need of a commute trip. Therefore, shifts in the job's economy can influence commuter trends and where and how mobility needs will be met.

An Acceleration of current trends in Workplaces could mean:

- The labor force in Boston and urban core cities grows at an even higher rate than projected compared to the rest of the state.
- Companies increasingly locate in mixed-use central business districts, waterfront areas, and innovation districts, eschewing sprawling suburban office parks.
- Commuting times continue to increase as transportation infrastructure capacity and transit services do not keep up with increasing demand.

Maintaining current trends in Workplaces could mean:

- The labor force continues to grow in Boston and the urban core cities. Some commercial development occurs in surrounding regions, but they see much slower growth than in the urban metropolitan area core.
- Transit improvements are made to maintain existing service levels while accommodating a growing labor force.

Plateauing or a Reversal of current trends in Workplaces could mean:

- Employment rates in Gateway Cities such as Brockton and suburban communities increase, distributing the location of jobs outside of traditionally congested areas.
- Companies seek amenity-rich concentrations in suburban areas.
- Employers and residents relocating to transit-accessible areas, coupled with transit service improvements, leads to an increased percentage of statewide commuters taking public transit instead of driving to work.

## PROSPERITY

Massachusetts' economic boom –based in a knowledge economy founded on institutions of higher education, world-renowned medical centers, and inward migration of skills and smarts from around the world –has so far largely survived the COVID-19 Pandemic. Uncertainty, however, surrounds some elements of this boom. Smaller colleges are seeing declining enrollment and several across the Commonwealth have closed. Massachusetts also runs the risk of becoming overdependent on a biotechnical and bioengineering sector whose members may increasingly telecommute, reducing clustering benefits for service and retail sectors.

It also cannot be ignored that the economic benefits of this boom are hugely inequitable. The racial wealth gap in Boston is immense and the Commonwealth is one of the worst states in the nation in income inequality. At the same time, residents of Gateway Cities such as Brockton pay nearly double the recommended 15% of their income for transportation.

### Cost of Transportation

Massachusetts has a robust multimodal transportation network. However, a lack of investment in housing adjacent to commuter rail and rapid transit routes reduces access to the network and adds more cars on congested roads, raising housing and transportation costs for people who must rely on their personal vehicles more. Rural areas have their own aging roadway networks and transit systems that need maintenance and repair in order to lower transportation costs for rural residents.

An Acceleration in current Cost of Transportation trends could mean:

- Massachusetts fails to expand housing access at commuter rail and rapid transit lines and fails to expand infrastructure funding for rural areas. The lack of housing options increases prices near transit, pushing people away, and increases car reliance while roads are undermaintained.
- Increased reliance on cars leads to more traffic on roadways and more wear-and-tear on local rural roads. The increase in car usage, congestion, and wear-and-tear increases transportation costs and wastes more time.
- The increased congestion and increase in both transportation and housing costs reduces Massachusetts' economic competitiveness and hinders economic growth.

Maintaining current Cost of Transportation trends could mean:

- Funding for transit infrastructure and roadways is indexed to inflation but does not provide sufficient funding to eliminate the backlog of maintenance needs, leading to inadequate conditions for road and transit.
- Failing to maintain transportation infrastructure effectively leads to higher transportation costs for the Commonwealth and its residents, since more expensive replacements will be necessary when this infrastructure fails.
- Multi-family housing supply near transit stations in MBTA communities is built but is not fully sufficient to lower housing costs and improve affordability.

Plateauing of or a Reversal of current Cost of Transportation trends could mean:

- Massachusetts invests in affordable housing in Gateway Cities and in transportation facilities around the state, expanding the housing supply in areas well-served by transportation. This investment reduces the Housing + Transportation cost burden.
- Massachusetts invests in the State of Good Repair for its commuter rail, rapid transit systems, and RTAs, improving system efficiency.
- Expanded access to the transportation network allows users to access jobs, education, healthcare, and other destinations more efficiently, reducing transportation costs for users of all modes.

### **Inequality**

Over the course of one generation, Massachusetts has gone from having one of the most equal income distributions in the United States to one of the least. The Gini Index is a useful tool to demonstrate the distribution of income across different levels –the higher the index value, the more income is concentrated among a smaller group of people. As of 2019, Massachusetts’ Gini Index score was 0.48 out of 1, up from 0.42 in 1989; some communities saw scores as high as 0.59.<sup>1</sup>The impacts of COVID-19 threaten to further exacerbate this inequality due to the pandemic’s uneven impact on different sectors of the economy.

An Acceleration of current trends in Inequality could mean:

- Income inequality continues to increase as income is further concentrated among a smaller share of the population.
- Higher income inequality expands the reach and scale of housing instability as low-income earners are priced out of cities and pushed into economically disconnected parts of the Commonwealth.
- Increased housing instability harms education outcomes among children in poverty and produces worse health outcomes among all impoverished people.
- Public expenditures on health costs increase while the economic gains of education shrink for Massachusetts.

Maintaining current trends in Inequality could mean:

- As housing costs outpace median incomes, Massachusetts increases affordable housing subsidies in order to keep low-income people in their homes.
- The gap between income and housing costs hinders low-income workers' abilities to save or invest and create wealth for their children and exposes them to greater risk of sudden shocks in household costs like healthcare.
- The inability to build pathways to economic advancement for Massachusetts creates a "permanent underclass" within the Commonwealth, choking off growth and widening the gap between the rich and the poor.

Plateauing of or a Reversal of current trends in Inequality could mean:

- Massachusetts expands investments in low-income and minority communities through better healthcare, housing, education, and transportation.
- Expanded resources improve the quality of life and economic mobility for low-income and minority communities by reducing displacement and improving access to jobs and essential services.
- Economic advancement among low-income communities reduces the incidence of multi-generational poverty and reduces public expenditures on public health for chronic conditions, emergency housing, and other high-cost, high-risk socioeconomic conditions.

### Knowledge Economy

As the home to many higher education and research institutions, Massachusetts has a robust Knowledge Economy. Employment in a wide array of sectors including biopharmaceuticals, clean energy, finance, and technology has shown strong growth in Massachusetts, positioning the state as a global innovation hub. However, the concentration of the Knowledge Economy and its relatively homogenous workforce pose a risk to achieving a more equitable economy overall. Furthermore, the risk of closure among small liberal arts colleges and public universities as student populations decline is set to increase in the coming years.

An Acceleration of current trends could mean:

- Massachusetts improves connectivity between the Greater Boston Area's Knowledge Economy and Central Massachusetts, Southeastern Massachusetts, and the Knowledge Corridor.
- Increased opportunity and connectivity throughout the Commonwealth reduce business costs, creates more opportunity for entrepreneurship, and incentivizes higher education enrollment.
- Expanding the footprint of the Knowledge Corridor improves the value of its partnerships with numerous public sector universities. This widens the pipeline for more socioeconomic diversity in the Knowledge Economy.

Maintaining current trend could mean:

- The Knowledge Economy grows while slowly expanding westward through the Greater Boston Area as limited commercial space moves businesses into adjacent communities.
- The slow expansion of the Knowledge Economy expands the number of communities consisting of high-income tech jobs and low-income service jobs, reducing opportunities for the middle class.
- Existing workforce pipelines in the Knowledge Economy create limited opportunity outside of technical fields, meaning opportunity remains concentrated within credentialled fields. Economic growth rewards high-wage owners.

Pleasuring of or a Reversal of current trends could mean:

- The Knowledge Economy continues to concentrate within specific parts of the Greater Boston Area, raising commercial rents for businesses.
- Higher business costs reduce the ability of start-ups to stay in the Boston area, motivating entrepreneurs to leave Massachusetts, and slows hiring for established companies.
- Fewer opportunities in the Knowledge Economy reduce the return on investment for education, depressing student enrollment and causing more closures in higher education.
- The reduction in growth and entrepreneurship weakens the competitiveness of Boston's Knowledge Economy, threatening the long-term sustainability of the sector.

### Racial Wealth Gap

In 2015, the Federal Reserve Bank of Boston found that the median net worth of a white household in the Boston area was \$247,500, while the median net worth of a Black household was \$8. This racial wealth gap is driven by factors including unequal access to healthcare, rising homeownership costs, and high transportation costs to reach economic hubs from more affordable communities. The racial wealth gap holds back millions from escaping multigenerational poverty and is a drag on the state's economy. It is estimated that eliminating this wealth gap could generate billions of dollars for the Massachusetts economy.

An Acceleration in the Racial Wealth Hap could mean:

- Massachusetts fails to address the gap in insurance coverage and healthcare access for Black and Hispanic residents, leading to worse healthcare outcomes.
- Lower commercial insurance rates among minority residents in Gateway Cities put financial pressures on community hospitals in those cities.
- Increasing housing prices drive up homeownership costs and rents, creating greater housing instability among minority populations and increasing displacement to economically disconnected exurban and postindustrial areas.
- Housing instability and worse health outcomes hinder the creation of generational wealth for minority houses.

Maintaining the current pace of the Racial Wealth Gap could mean:

- Massachusetts increases direct housing assistance to reduce cost burdens among vulnerable populations who lack the savings to cover emergency losses in income.
- High-cost burdens for renting and homeownership reduce saving rates among minority and low-income households, hindering these households' ability to create wealth and build generational wealth for their families.
- Massachusetts increases public expenditures for public and community health to address greater health disparities in high-poverty neighborhoods. The wealth gap continues to grow between white households and minority households.

Plateauing of or a Reversal in current trends in the Racial Wealth Gap could mean:

- Massachusetts succeeds in improving homeownership rates among minority populations and reduces housing cost burdens.
- Reduced housing cost burdens reduce housing instability and improve outcomes in health, education, and economic participation.
- Improved homeownership rates stabilize neighborhoods in Gateway Cities, leading to greater economic development and improved public finances within these areas.
- Stronger neighborhoods and stronger Gateway City economies create better environments for human development and wealth creation, reducing the size of the racial wealth gap in the long-term.

## TECHNOLOGY

The future of mobility is highly dependent on a complicated relationship between new technologies, new regulations, new infrastructure, and new behaviors. These technologies include automation –of our vehicles, of our industries, and of our homes –that will require the potential reskilling of hundreds of thousands of Massachusetts residents by 2030 and will require many more to relearn how to move around their world. They also include e-commerce, which has brought new, frequent freight traffic to town and city centers and has committed millions of square feet in Massachusetts to warehousing and distribution.

The Commonwealth's commitment to reduce its emissions introduces change and uncertainty in what will power our future. Massachusetts in recent years eliminated coal and nuclear sources of electricity. Growth in renewable energy is critical but vulnerable to economic shifts and public sentiment in other states. Natural gas may provide the backstop but cannot achieve our collective climate ambition.

### Automation

Nearly every industry, from agriculture to human resources, is or will be affected by automation. An estimated 85 million jobs may be displaced by this shift from human to machine workers by 2025. What this means at the scale of the global economy is less a story about machines replacing humans, and more a story of growth in existing and new industries. That growth could require a

substantial degree of workforce re-skilling and industry hopping, namely within transportation and storage, manufacturing, and wholesale retail.

An Acceleration in current Automation trends could mean:

- Automation replaces jobs at the lower end of the wage spectrum, while creating jobs in the middle and upper ends of economic spectrum, these dynamics require much greater levels of upskilling.
- Grocery and food delivery continue to proliferate, ushering a new industry into Massachusetts as well as changing its landscape, especially in and around Boston.
- The vocational and secondary education market grows exponentially as hundreds of thousands of workers look to change careers.

Maintaining current Automation trends could mean:

- Machines and automating procedures augment human labor, sharing responsibility and working with them, increasing manufacturing efficiency and output. As automation drives efficiency, employment continues to rise.
- As technology continues to progress and decreases in price, the number of industries adopting automation into their processes continues to steadily increase, bringing these technologies close-Commerce and closer to consumers without them noticing.
- While widespread adoption continues to increase, the gap between early adopters and new arrivals to the space continues to widen substantially.

Plateauing of or a Reversal of Automation trends could mean:

- Labor productivity slows, displacing thousands of workers in the manufacturing industry, looking for jobs elsewhere.
- The cost of automation decreases significantly, making it more accessible to small businesses and implementable at a scale.
- Rising automation and associated efficiency across industries provides an apt opportunity for the public at large to reconsider work culture, ushering in both cultural and policy shifts around labor rights and working hours.

### E-Commerce

The accelerated growth of e-commerce is good for the economy but has impacts on the transportation network: more traffic congestion and emissions, parking scarcity, and demand for warehousing space. This growth in e-commerce creates conflicts on local streets and the curb. Deliveries compete with bicycle lanes, on-street parking, transit stops and bus lanes, as well as with passenger pickup and drop off.

An Acceleration of current E-Commerce trends could mean:

- Without a plan for diversifying delivery modes or curb management, e-commerce increases congestion for urban freight delivery.



- The cost of business in terms of delay Massachusetts translates to higher prices for the state’s businesses and consumers.
- Smaller businesses, especially in the restaurant industry, are unable to compete with larger markets for food delivery customers.

Maintaining current E-Commerce trends could mean:

- An omnichannel approach to retail helps diversify the methods of delivery as consumers are willing to pick up or shop at brick-and-mortar stores.
- Reverse logistics on customer returns continues to challenge retailers and cause congestion in new areas of the transportation network.
- Urbanization of e-commerce reduces the cost of delivery to denser areas, but this leaves out rural consumers as delivery to them becomes too expensive for shippers and retailers.

Plateauing of or a Reversal of current E-Commerce trends could mean:

- Automation and technology as well as land use planning bring efficiencies to curb management for last-mile delivery.
- Diversified delivery modes such as drones, robots, and acceleration of the omnichannel approach create frictionless e-commerce for retail and food.
- Equitable distribution of land use for fulfillment centers and freight network improvements helps small businesses and rural consumers enter the market, addressing the impacts of food deserts and supporting the rural economy//

### Electricity and Alternative Energy

Massachusetts has made progress in expanding alternative energy resources throughout the Commonwealth, becoming one of the first states in the nation to issue permits for offshore wind power. While the state has decarbonized parts of its electric grid and brought more alternative energy online, the need for energy storage and dispatchability –especially during the harsh New England winters –and the growing demand for electric vehicles demonstrate the challenges that lie ahead for reducing emissions while maintaining grid reliability for a diverse array of needs.

An Acceleration of current trends in Electricity and Alternative Energy could mean:

- Electricity production from renewable sources, especially solar and offshore wind, increases.
- Inadequate infrastructure to bring natural gas to New England results in energy-security risks, especially during the winter.
- Programs, initiatives, and plans focusing on energy efficiency and green energy are brought to underserved communities.

Maintaining current trends in Electricity and Alternative Energy could mean:

- Debates over transmission lines continue following attempts to connect Massachusetts with hydropower in Quebec via New Hampshire or Maine.

- Increasing electricity demand from the transportation and building sectors keeps electricity prices high, even as renewables such as solar and offshore wind are expanded.
- Natural gas remains the dominant energy source for electricity generation for years to come.

Plateauing of or a Reversal of current trends in Electricity and Alternative Energy could mean:

- Massachusetts does not achieve clean energy targets due to cancelled transmission lines and failure of offshore wind projects.
- Increasing electricity demand from the transportation and building sectors is primarily served by burning natural gas.
- Plans and mandates to electrify home heating fail or are struck down in court. Homes are heated primarily with natural gas and heating oil.

### Freight

The movement of goods and people is the main work of the transportation system. The efficient movement of goods, or freight, is the product of the supply chain in manufacturing and shipping across all transportation modes: air, water, rail, and road. Inefficiencies or disruptions in the supply chain —as we saw during the COVID-19 pandemic —reinforced the need for close monitoring, maintenance, and innovation to address these challenges. In Massachusetts, manufacturing clusters include biopharmaceuticals, health services, technology, and education industries.

An Acceleration of current trends in Freight could mean:

- Without a plan for diversifying modes and updates to infrastructure, congestion increases with population.
- The cost of business for production and manufacturing has a ripple effect on de-clustering of logistics in Massachusetts as firms relocate to neighboring states.
- Lack of truck and intermodal freight facilities (e.g., truck parking, distribution centers, double-stack rail connection to the Port of Boston) exacerbates inefficiencies on the freight network.

Maintaining current trends in Freight could mean:

- Industrial clustering and economic development in Massachusetts improve congestion on critical supply chain links and nodes.
- Distributed manufacturing is served by the biotech base in the state where rapid development of COVID-19 vaccines created synergistic supply chain solutions.
- Expanded broadband throughout Massachusetts enables the Commonwealth to accelerate adoption of automated and connected goods movement, particularly of temperature-sensitive pharmaceutical products.

Plateauing of or a Reversal of current trends in Freight could mean:

- Biotech manufacturing clusters outside the urban core. Modal diversification and technology help to reduce congestion.
- Like the healthcare industry, logistics and manufacturing leaders implement a path to multi-stacked career entry points. Firms explore new sources of the supply chain labor supply. These include adapting roles to levels of education, language-proficiency, and backgrounds.
- Deeper reliance on technology and automation helps grow a more resilient supply chain in terms of domestic production, and quick decision-making by the private sector in the event of disruption.

### **New Mobility**

The future of mobility is highly dependent on a complicated relationship between new technologies, new regulations, new infrastructure, and new behaviors around these changes, due in part to the COVID-19 Pandemic. Shifting influences from the rise of e-bikes to the regulation of ridesharing has the potential to affect everything from insurance to energy. Much is still left to be determined, but what is clear is that the future is still based largely around private vehicles.

An Acceleration of current trends in New Mobility could mean:

- Cities and local governments continue to reconsider how space is used and allocated for the public, closing streets to recreation, welcoming outdoor dining, and adding bike infrastructure.
- Tighter government restrictions on emissions, regulation on autonomous driving, and new emissions standards put pressure on the private sector to change.
- Mostly due to population growth, private car ownership and use increases.

Maintaining current trends in New Mobility could mean:

- Public and private partnerships and transparent communication define the approach to mobility development, leveraging the technology and development of private organizations with the scope and reach of the government.
- Due to supply chain disruptions, everything from electric automobile production to development of the infrastructure that supports grows slowly, putting downward strain on the shift to EVs.
- Last mile, and micro mobility options from the private sector continue to circulate through the public sphere without any single mode gaining widespread adoption.

Plastering of or a Reversal of current trends in New Mobility could mean:

- After years of financial and infrastructural strain, public transportation and regional transit are severely limited in reach and access, limiting mobility for many across the state.

- While private car ownership continues to increase in total, its share of overall mobility usage steadily declines as more efficient means of transportation become increasingly accessible.
- As remote and hybrid working solidify as customary for a large portion of the work force, transportation use reduces in frequency but increases in distance.

## Chapter 4: Regional Profile

The Old Colony Planning Council region consists of the following seventeen communities in Southeastern Massachusetts: Abington, Avon, Bridgewater, Brockton, Duxbury, East Bridgewater, Easton, Halifax, Hanson, Hanover, Kingston, Pembroke, Plymouth, Plympton, Stoughton, West Bridgewater, and Whitman. The region is approximately 397 square miles situated south of the metropolitan concentration of activity and population around Boston and is oriented with north-south transportation lines between Greater Boston and the rest of Southeastern Massachusetts. In addition, the OCPC region is drawn to employment and commercial concentrations associated with the Route 128 area that circumvents the south, west, and north of the City of Boston.

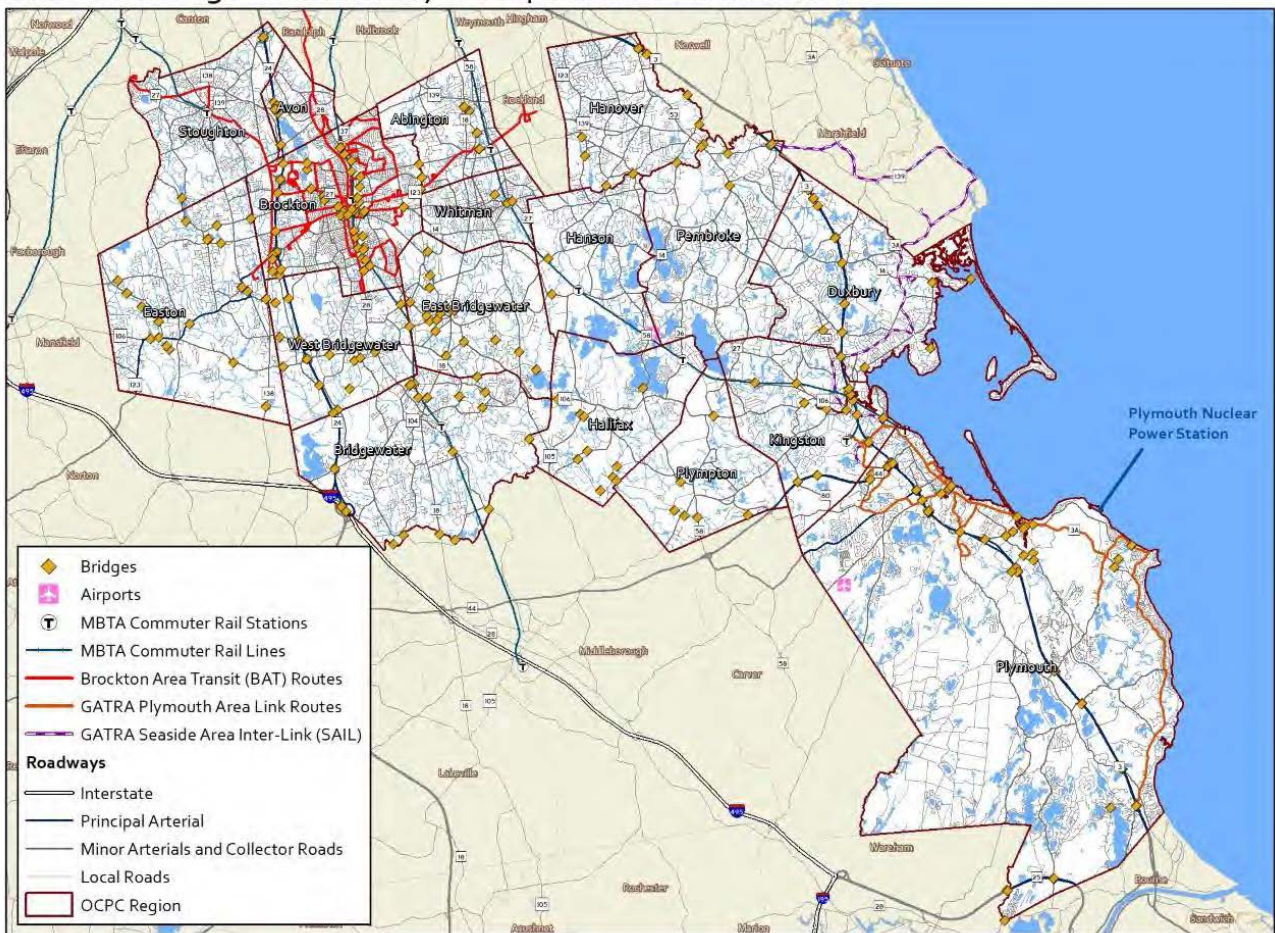
The OCPC communities are within Plymouth County, Norfolk County, and Bristol County, Massachusetts, two communities have representative town meetings while fourteen communities have an open town meeting form of government, and the City of Brockton governs through Council and Alderman. The towns of Halifax, Kingston, Pembroke, and Plympton have a kindergarten through grade 6 school structure, while the remaining communities have either a kindergarten through grade 12 or a partial regional school structure.

Major routes (limited access state highways) in the region include Route 24 running north-south through Avon, Stoughton, Brockton, West Bridgewater, and Bridgewater in the western part of the region. Route 3 runs north-south along the eastern part of the region and along the Atlantic coast through Hanover, Pembroke, Duxbury, Kingston, and Plymouth. Major east-west limited access highways consist of I-495, which is south of Easton and runs through the southeastern portion of Bridgewater, and Route 44, which runs west from Plymouth through Kingston and Plympton. Route 24 and Route 3 provide access to Boston and the Route 128 corridor. Route 44 provides connections to Route I-495 and the Massachusetts Turnpike.

The region is also served by a number of state-numbered routes, mostly two-lane, undivided facilities providing regional connections including Route 106, which runs east from Easton through West Bridgewater, East Bridgewater, Hanson, Halifax, and Kingston. Route 27 runs southeast from Stoughton through Brockton, Whitman, Hanson, Pembroke, and Kingston. In the north of the region, Route 139 runs east through Stoughton, Abington, Hanover, and Pembroke. State-numbered routes that are two-lane, undivided facilities running north-south through the region include Route 28, which runs north from Bridgewater through West Bridgewater, Brockton, and Avon. Route 18 runs north from Bridgewater through East Bridgewater, Whitman, and Abington. In the eastern portion of the region, Route 53 runs north from Kingston through Duxbury and Pembroke, and Route 3A is a coastal route that runs north along the entire length of Plymouth's coastline and continues north through Kingston and Duxbury. Figure 4-1 shows the communities in the Old Colony Planning Council Region.

Figure4- 1: OCPC Region

### Climate Change Vulnerability Transportation Assessment



Over the years, OCPC has coordinated regional efforts to address many important issues. These include using land more wisely; building an efficient and more accessible transportation system; protecting the environment; improving public health; promoting a strong regional economy; better managing our access to energy; ensuring adequate housing for everyone; incorporating equity into the planning process; and supporting a vibrant border.

More recently, planning has focused sharply on how the region can offer people **more transportation choices** – including more options for biking, walking, and public transit. We have also focused on what we can do collectively to better reduce greenhouse gas emissions and better adapt to the effects of climate change. We have drawn stronger links between how we use land and how we get around and achieved a better understanding of how our choices for both can improve both and harm our health. We are also working to make sure the region can benefit from emerging technologies that will make transportation more efficient. Finally, we are ensuring that all groups, including low-income, minority, and senior populations, can be meaningfully involved in developing future plans.

As residents of the Commonwealth of Massachusetts, we all share the responsibility of shaping our region's future. In a region as culturally and economically diverse as ours, crafting a plan for how best to grow and the smartest ways to get around is not easy. But it is vital at a time when the challenges we face are being confronted by Americans across the nation. Among these is an increased rate of obesity, which drives chronic illnesses such as heart disease, diabetes, cancer, and asthma. Other challenges in our region include a "Silver Tsunami" of aging citizens who will have significant needs, and a growing and dynamic population of "Millennials" with their own principles and desires. These two generations have many overlapping interests, including an increasing desire for urban lifestyles and more options for getting around. These are just a few reasons why it is important to plan for our future – locally, regionally, and across all our borders.

It is critical that we coordinate planning with our neighbors outside and within our geographic boundaries. We live in a region with diverse landscapes, politics, economies, languages, and cultures. We are linked socially and economically. People and goods flow across our borders in huge numbers every day. How we grow impacts our neighbors just as our neighbors' growth impacts us. Our region is large and diverse with 17 individual cities and towns.

#### REGIONAL OVERVIEW

- As of the 2020 Decennial Census, the OCPC region had a population of 393,249. Since 2010, the region's population has increased by 12.7 percent, an increase of 44,322 residents.
- According to the MassDOT socio-economic and demographic projections, the region's population is expected to increase/decrease to a total of 398,606 by 2050.
- As of 2021 there were an estimated 62,782 seniors living within the Old Colony Planning Council region representing 17.6 percent of the population. That number is expected to climb.
- The regional trend of aging in place is demonstrated on the charts on the following pages which show the population in age cohorts from 2000 to 2021. Since 2000, the percentage of the population in the youngest age groups (those under 20 years old) has been declining steadily, while the percentage of residents aged 60 and older has increased. In between these trends, the cohorts representing the parenting years (35 to 44 years old) have also declined.
- The median age of the region is 42.1 years, with Plymouth having the highest median age at 47.9 years and Bridgewater having the lowest median age at 35.8 years. According to projections, the region's median age is expected to continue to increase over the next 20 years.
- According to Census estimates, 12.62 percent of the region's population was living with a disability in 2021, a percentage higher than the state average of 11.7 percent. Of the total veteran population in the OCPC region (233,666), 31 percent report having any disability (72,438).

- Median household income in the region increased by 36.7 percent between 2010 and 2021, from \$80,970 to \$110,704 which is significantly greater than the state median income of \$89,645 (32.1%). Hanover has maintained the region's highest median income at \$149,048 (48.7% increase), followed closely by Duxbury at \$130,260 (13.7%), and Pembroke at \$130,015 (61.1%). Communities with the highest percentage increase include Avon (90.1%), Pembroke (61.1%), and Hanover (48.7%).
- The OCPC region workers' journey-to-work patterns have changed only marginally since the 2010 Census. Most people drive to work, alone. In 2021 the rate was 83.10 percent, down just slightly from 84.30 percent from the 2010 Census. Those who carpool comprise 9.23 percent of the total, up significantly from 5.00 percent in 2010 but less than the 10 percent from 2000 and 11.8 percent in 1990. The remainder of the region's workers use other forms of transportation (bicycle/walk) or work from home (0.13% and 2.07%). The use of public transportation as a means of a journey to work within the region remains low (3.89%), compared to the state rate of 4.5 percent.
- Consumer behavior had been evolving with respect to e-commerce and online purchasing, but COVID-19 gave it a new force. Warehousing and distribution centers have become "the new retail" as more consumers embrace online shopping.
- As of 2021, the region's employment was highest in the educational services, health care, and social assistance occupations, followed by retail trade and professional, scientific, and management, and administrative and waste management services. Industries with the lowest participation in the region include agriculture, forestry, fishing and hunting, and mining.
- The OCPC region has a high concentration of natural resources, including hardwood forests, lakes, rivers, and streams. These natural areas provide an abundance of recreation and aesthetic, economic, and environmental resources.

Rich soils suitable for farming are another natural resource that characterizes the region, has shaped its history, and has ongoing transportation implications for both access and protection.

#### OBSERVATIONS AND PLANNING IMPLICATIONS

- Population change is an important influence on the size of the regional labor market and its economic strength. Investments in entrepreneurship and home-grown business development and expanding and strengthening employment and education opportunities will be needed to promote population growth.
- To address the region's aging population, it will be necessary to develop public transportation solutions to meet the changing mobility needs of older residents. These may include the need for planning for mature drivers, predictable construction zones, improved signage, access to public transportation, and planning for autonomous and connected vehicles and future technologies.



- Identification of vulnerable populations will enable OCPC to use that data to inform its investment strategies and project selection, even as it evaluates the benefits and burdens of its proposed programs on these population groups.
- As prime hardwood forests and game lands are abundant throughout the region, coordination will take place with MassDOT and the region's land management organizations to reduce impacts on environmental land by reducing takings, improving stormwater management, and maintaining the region's natural resources.
- The RPA will continue to work on projects to close regional trail network gaps. This will help strengthen the regional trail network, secure crucial corridors, and potentially make them eligible for additional funding sources.
- RPA staff will also continue to educate local officials on various programs and their funding, including the MEPA process.
- The growth in e-commerce increases demand for warehouses and distribution centers closer to end users to minimize supply chains and accelerate delivery. Such trends have significant land use and truck traffic implications as well as "first-and last-mile" implications.
- The regional consideration and concentration of employment in the health care and social assistance industry underscore the need to ensure adequate access to medical facilities throughout the region for employees as well as patients.

#### DEMOGRAPHIC PROFILE

According to the 2020 Census, the OCPC region had a population of 393,249, an increase of 66,111 residents (8.51%) from the 2010 Census. OCPC communities with the highest percentage of population growth between 2010 and 2020 were Brockton (12.61%), West Bridgewater (11.44%), and Avon (9.66%). The communities with the least percentage of population growth during this 2010-2020 timeframe include Pembroke (2.94%), Halifax (3.04%), and Plympton (3.90%).

According to the county-level census data, the greatest numerical increases of the three counties that make up the OCPC region, Norfolk County experienced the greatest increase in the percentage of population growth (8.22%) with 55,131 net persons gained, followed by Plymouth County which experienced an increase of 35,900 residents (7.25%), and Bristol County (5.64%) with 30,915 new residents.

Between 2000 and 2020, the population of the OCPC region increased by 12.7 percent, an increase of 44,322 residents. The three communities in the OCPC region with the highest population increase were Plymouth (18.41%), Abington (16.82%), and Kingston (16.37%).

#### Density

Densities increased for the following communities during the 2010-2020 timeframe, Brockton increased density by 12.59 percent to 4,952.3 population per square mile, Avon by 12.53 percent

to 1,114 per square mile, and West Bridgewater by 11.41 percent to 502.9 per square mile. The three communities with the lowest density increase during the same timeframe were Pembroke by 2.889 percent to 842.7 per square mile, Halifax by 3.26% to 485.1 per square mile, and Abington by 3.44 percent to 1,713.1 per mile.

**Table 4-1: Municipalities of the OCPC Region**

| Municipality            | County   | Billing Cycle | Form of Government          | School Structure | 2020 Population | FY 2022 Single Family Tax Bill | 2019 DOR Income Per Capita | 2020 EQV Per Capita | 2018 Total Road Miles |
|-------------------------|----------|---------------|-----------------------------|------------------|-----------------|--------------------------------|----------------------------|---------------------|-----------------------|
| <b>Abington</b>         | Plymouth | Quarterly     | Open Town Meeting           | K-12             | 17,062          | 6,910                          | 37,848                     | 139,460             | 67.40                 |
| <b>Avon</b>             | Norfolk  | Quarterly     | Open Town Meeting           | K-12             | 4,777           | 6,193                          | 36,559                     | 191,099             | 35.19                 |
| <b>Bridgewater</b>      | Plymouth | Quarterly     | Open Town Meeting           | No data          | 28,633          | 6,553                          | 34,141                     | 118,748             | 135.06                |
| <b>Brockton</b>         | Plymouth | Quarterly     | Council And Alderman        | K-12             | 105,643         | 4,767                          | 21,719                     | 84,119              | 290.31                |
| <b>Duxbury</b>          | Plymouth | Quarterly     | Open Town Meeting           | K-12             | 16,090          | 11,466                         | 113,829                    | 289,293             | 128.57                |
| <b>East Bridgewater</b> | Plymouth | Quarterly     | Open Town Meeting           | K-12             | 14,440          | 6,562                          | 37,748                     | 133,437             | 79.39                 |
| <b>Easton</b>           | Bristol  | Quarterly     | Open Town Meeting           | K-12             | 25,058          | 7,886                          | 53,526                     | 163,281             | 132.84                |
| <b>Halifax</b>          | Plymouth | Semi-Annual   | Open Town Meeting           | K-06             | 7,749           | 6,589                          | 43,560                     | 136,762             | 60.02                 |
| <b>Hanover</b>          | Plymouth | Quarterly     | Open Town Meeting           | K-12             | 14,833          | 9,046                          | 57,309                     | 207,226             | 96.82                 |
| <b>Hanson</b>           | Plymouth | Quarterly     | Open Town Meeting           | No data          | 10,639          | 6,236                          | 39,722                     | 143,501             | 66.23                 |
| <b>Kingston</b>         | Plymouth | Quarterly     | Open Town Meeting           | K-06             | 13,708          | 7,103                          | 44,706                     | 168,010             | 107.04                |
| <b>Pembroke</b>         | Plymouth | Quarterly     | Open Town Meeting           | K-06             | 18,361          | 6,393                          | 45,730                     | 169,748             | 118.53                |
| <b>Plymouth</b>         | Plymouth | Quarterly     | Representative Town Meeting | K-12             | 61,217          | 6,438                          | 41,348                     | 198,689             | 497.04                |
| <b>Plympton</b>         | Plymouth | Quarterly     | Open Town Meeting           | K-06             | 2,930           | 7,227                          | 42,640                     | 201,767             | 35.41                 |
| <b>Stoughton</b>        | Norfolk  | Quarterly     | Representative Town Meeting | K-12             | 29,281          | 6,171                          | 35,657                     | 159,871             | 128.20                |
| <b>West Bridgewater</b> | Plymouth | Quarterly     | Open Town Meeting           | K-12             | 7,707           | 6,199                          | 37,722                     | 178,936             | 59.80                 |
| <b>Whitman</b>          | Plymouth | Quarterly     | Open Town Meeting           | No data          | 15,121          | 5,596                          | 34,792                     | 124,514             | 54.50                 |

**Table4- 2: Population and Density, 2010 - 2020**

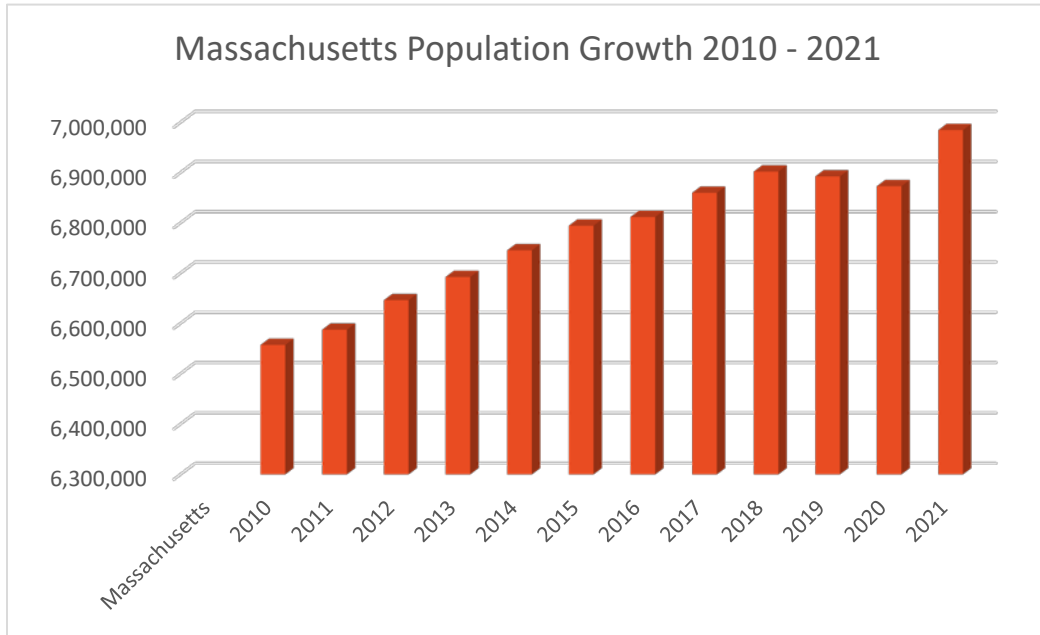
|                         | Census 1990    | Census 2000    | Census 2010    | Census 2020    | Change 2010 – 2020 | Percent Change | Land Area 2010 (Sq. Miles) | Land Area 2020 (Sq. Miles) | Density 2010 (Pop/Sq. Mile) | Density 2020 (Pop/Sq. Mile) |
|-------------------------|----------------|----------------|----------------|----------------|--------------------|----------------|----------------------------|----------------------------|-----------------------------|-----------------------------|
| <b>Abington</b>         | 13,817         | 14,605         | 15,985         | 17,062         | 1,077              | 6.74%          | 9.65                       | 9.96                       | 1,656.2                     | 1,713.1                     |
| <b>Avon</b>             | 4,558          | 4,443          | 4,356          | 4,777          | 421                | 9.66%          | 4.4                        | 4.35                       | 990                         | 1,114                       |
| <b>Bridgewater</b>      | 21,249         | 25,185         | 26,563         | 28,633         | 2,070              | 7.79%          | 27.32                      | 27.25                      | 972.4                       | 1,050.9                     |
| <b>Brockton</b>         | 92,788         | 94,304         | 93,810         | 105,643        | 11,833             | 12.61%         | 21.33                      | 21.33                      | 4,398.4                     | 4,952.3                     |
| <b>Duxbury</b>          | 13,985         | 14,248         | 15,059         | 16,090         | 1,031              | 6.85%          | 23.74                      | 23.70                      | 634.4                       | 678.9                       |
| <b>East Bridgewater</b> | 11,104         | 12,974         | 13,794         | 14,440         | 646                | 4.68%          | 17.21                      | 17.23                      | 801.6                       | 838.0                       |
| <b>Easton</b>           | 19,807         | 22,299         | 23,112         | 25,058         | 1,946              | 8.42%          | 28.75                      | 28.76                      | 803.8                       | 871.3                       |
| <b>Halifax</b>          | 6,526          | 7,500          | 7,518          | 7,749          | 231                | 3.07%          | 16.00                      | 15.97                      | 469.8                       | 485.1                       |
| <b>Hanover</b>          | 11,912         | 13,164         | 13,879         | 14,833         | 954                | 6.87%          | 15.61                      | 15.54                      | 889.2                       | 954.6                       |
| <b>Hanson</b>           | 9,028          | 9,495          | 10,209         | 10,639         | 430                | 4.21%          | 15.05                      | 15.02                      | 678.2                       | 708.4                       |
| <b>Kingston</b>         | 9,045          | 11,780         | 12,629         | 13,708         | 1,079              | 8.54%          | 18.66                      | 18.64                      | 676.9                       | 735.2                       |
| <b>Pembroke</b>         | 14,544         | 16,927         | 17,837         | 18,361         | 524                | 2.94%          | 21.78                      | 21.79                      | 819.0                       | 842.7                       |
| <b>Plymouth</b>         | 45,608         | 51,701         | 56,468         | 61,217         | 4,749              | 8.41%          | 96.46                      | 96.43                      | 585.4                       | 634.8                       |
| <b>Plympton</b>         | 2,384          | 2,637          | 2,820          | 2,930          | 110                | 3.90%          | 14.8                       | 14.67                      | 191                         | 200                         |
| <b>Stoughton</b>        | 26,777         | 27,149         | 26,962         | 29,281         | 2,319              | 8.60%          | 16.09                      | 16.09                      | 1,675.7                     | 1,820.3                     |
| <b>West Bridgewater</b> | 6,389          | 6,634          | 6,916          | 7,707          | 791                | 11.44%         | 15.32                      | 15.33                      | 451.4                       | 502.9                       |
| <b>Whitman</b>          | 12,240         | 13,882         | 14,489         | 15,121         | 35,900             | 7.25%          | 6.94                       | 6.94                       | 2,087.8                     | 2,180.1                     |
| <b>OCPC Region</b>      | <b>321,761</b> | <b>348,927</b> | <b>632,406</b> | <b>393,249</b> | <b>66,111</b>      | <b>8.51%</b>   | <b>369.11</b>              | <b>354.33</b>              | <b>1,104.8</b>              | <b>1,193.1</b>              |
| <b>Bristol County</b>   | 506,325        | 534,678        | 548,285        | 579,200        | 30,915             | 5.64%          | 553.10                     | 553.11                     | 991.3                       | 1,047.2                     |
| <b>Norfolk County</b>   | 616,087        | 650,308        | 670,850        | 725,981        | 55,131             | 8.22%          | 396.11                     | 396.11                     | 1,693.6                     | 1,832.8                     |
| <b>Plymouth County</b>  | 435,276        | 472,822        | 494,919        | 530,819        | 35,900             | 7.25%          | 659.08                     | 658.50                     | 750.9                       | 806.1                       |
| <b>Massachusetts</b>    | 6,016,425      | 6,349,097      | 6,547,629      | 7,029,917      | 482,288            | 7.37%          | 7,800.06                   | 7,800.96                   | 839.4                       | 901.2                       |

**Table 4-3: Population Change 1990 - 2020**

|                         | Decennial Census Population |           |           |           | Change 1990-2000 |         | Change 2000-2010 |         | Change 2010-2020 |         |
|-------------------------|-----------------------------|-----------|-----------|-----------|------------------|---------|------------------|---------|------------------|---------|
|                         | 1990                        | 2000      | 2010      | 2020      | Number           | Percent | Number           | Percent | Number           | Percent |
| <b>Abington</b>         | 13,817                      | 14,605    | 15,985    | 17,062    | 788              | 5.70%   | 1,380            | 9.45%   | 1,077            | 6.74%   |
| <b>Avon</b>             | 4,558                       | 4,443     | 4,356     | 4,777     | -115             | -2.52%  | -87              | -1.96%  | 421              | 9.66%   |
| <b>Bridgewater</b>      | 21,249                      | 25,185    | 26,563    | 28,633    | 3,936            | 18.52%  | 1,378            | 5.47%   | 2,070            | 7.79%   |
| <b>Brockton</b>         | 92,788                      | 94,304    | 93,810    | 105,643   | 1,516            | 1.63%   | -494             | -0.52%  | 11,833           | 12.61%  |
| <b>Duxbury</b>          | 13,985                      | 14,248    | 15,059    | 16,090    | 263              | 1.88%   | 811              | 5.69%   | 1,031            | 6.85%   |
| <b>East Bridgewater</b> | 11,104                      | 12,974    | 13,794    | 14,440    | 1,870            | 16.84%  | 820              | 6.32%   | 646              | 4.68%   |
| <b>Easton</b>           | 19,807                      | 22,299    | 23,122    | 25,058    | 2,492            | 12.58%  | 813              | 3.65%   | 1,946            | 8.42%   |
| <b>Halifax</b>          | 6,526                       | 7,500     | 7,518     | 7,749     | 974              | 14.92%  | 18               | 0.24%   | 231              | 3.07%   |
| <b>Hanover</b>          | 11,912                      | 13,164    | 13,879    | 14,833    | 1,252            | 10.51%  | 715              | 5.43%   | 954              | 6.87%   |
| <b>Hanson</b>           | 9,028                       | 9,495     | 10,209    | 10,639    | 467              | 5.17%   | 714              | 7.52%   | 430              | 4.21%   |
| <b>Kingston</b>         | 9,045                       | 11,780    | 12,629    | 13,708    | 2,735            | 30.24%  | 849              | 7.21%   | 1,079            | 8.54%   |
| <b>Pembroke</b>         | 14,544                      | 16,927    | 17,837    | 18,361    | 2,383            | 16.38%  | 910              | 5.38%   | 524              | 2.94%   |
| <b>Plymouth</b>         | 45,608                      | 51,701    | 56,468    | 61,217    | 6,093            | 13.36%  | 4,767            | 9.22%   | 4,749            | 8.41%   |
| <b>Plympton</b>         | 2,384                       | 2,637     | 2,820     | 2,930     | 253              | 10.61%  | 183              | 6.94%   | 110              | 3.90%   |
| <b>Stoughton</b>        | 26,777                      | 27,149    | 26,962    | 29,281    | 372              | 1.39%   | -187             | -0.69%  | 2,319            | 8.60%   |
| <b>West Bridgewater</b> | 6,389                       | 6,634     | 6,916     | 7,707     | 245              | 3.83%   | 282              | 4.25%   | 791              | 11.44%  |
| <b>Whitman</b>          | 12,240                      | 13,882    | 14,489    | 15,121    | 1,642            | 13.42%  | 607              | 4.37%   | 35,900           | 7.25%   |
| <b>Plymouth County</b>  | 435,276                     | 472,822   | 494,919   | 530,819   | 37,546           | 8.63%   | 22,097           | 4.67%   | 35,900           | 7.25%   |
| <b>Massachusetts</b>    | 6,016,425                   | 6,349,097 | 6,547,629 | 7,029,917 | 332,672          | 5.53%   | 198,532          | 3.13%   | 482,288          | 7.37%   |

Source: US Census Bureau, 1990, 2000, 2010, & 2020

**Figure 4-2: Massachusetts Population ACS Estimates, 2010-2021**



Source: ACS B01001 1-Year Estimates

#### MASSACHUSETTS SOCIOECONOMIC PROJECTIONS

Socioeconomic data (Households, Population, and employment) projections were developed through a collaborative effort between the Massachusetts Department of Transportation (MassDOT), Metropolitan Area Planning Council (MAPC), the University of Massachusetts Donahue Institute (UMDI), and the Regional Planning Agencies of Massachusetts.

These projections were developed using land use models and an UrbanSim model, along with analysis of population trends. They are developed for use in developing travel demand models for the Long Range Transportation Plans.

**Table 4-4- Population Projections Through 2050**

| TOWN             | COUNTY   | RPA  | District | RTA   | CTPS | Census 2000    | Census 2010    | Census 2020    | Population 2030 | Population 2040 | Population 2050 |
|------------------|----------|------|----------|-------|------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| Abington         | Plymouth | OCPC | 5        | BAT   | 1    | 14,605         | 15,985         | 17,062         | 18,756          | 20,110          | 21,411          |
| Avon             | Norfolk  | OCPC | 5        | BAT   | 1    | 4,443          | 4,356          | 4,777          | 4,584           | 4,306           | 3,995           |
| Bridgewater      | Plymouth | OCPC | 5        | BAT   | 1    | 25,185         | 26,563         | 28,633         | 28,677          | 29,046          | 28,951          |
| Brockton         | Plymouth | OCPC | 5        | BAT   | 1    | 94,304         | 93,810         | 105,643        | 108,092         | 109,512         | 111,657         |
| Duxbury          | Plymouth | OCPC | 5        | MBTA  | 1    | 14,248         | 15,059         | 16,090         | 15,713          | 15,860          | 15,210          |
| East Bridgewater | Plymouth | OCPC | 5        | BAT   | 1    | 12,974         | 13,794         | 14,440         | 14,832          | 14,835          | 14,466          |
| Easton           | Bristol  | OCPC | 5        | BAT   | 1    | 22,299         | 23,112         | 25,058         | 23,815          | 22,928          | 21,543          |
| Halifax          | Plymouth | OCPC | 5        | NONE  | 1    | 7,500          | 7,518          | 7,749          | 7,728           | 7,441           | 6,970           |
| Hanover          | Plymouth | OCPC | 5        | MBTA  | 1    | 13,164         | 13,879         | 14,833         | 14,849          | 15,001          | 14,588          |
| Hanson           | Plymouth | OCPC | 5        | NONE  | 1    | 9,495          | 10,209         | 10,639         | 10,772          | 10,738          | 10,322          |
| Kingston         | Plymouth | OCPC | 5        | GATRA | 1    | 11,780         | 12,629         | 13,708         | 14,829          | 15,752          | 15,880          |
| Pembroke         | Plymouth | OCPC | 5        | MBTA  | 1    | 16,927         | 17,837         | 18,361         | 18,377          | 18,028          | 17,208          |
| Plymouth         | Plymouth | OCPC | 5        | GATRA | 1    | 51,701         | 56,468         | 61,217         | 64,973          | 65,873          | 64,849          |
| Plympton         | Plymouth | OCPC | 5        | NONE  | 1    | 2,637          | 2,820          | 2,930          | 2,982           | 2,941           | 2,825           |
| Stoughton        | Norfolk  | OCPC | 5        | BAT   | 1    | 27,149         | 26,962         | 29,281         | 28,599          | 27,423          | 25,950          |
| West Bridgewater | Plymouth | OCPC | 5        | BAT   | 1    | 6,634          | 6,916          | 7,707          | 7,938           | 8,231           | 8,418           |
| Whitman          | Plymouth | OCPC | 5        | BAT   | 1    | 13,882         | 14,489         | 15,121         | 15,146          | 14,890          | 14,452          |
| <b>TOTAL</b>     |          |      |          |       |      | <b>348,927</b> | <b>362,406</b> | <b>393,249</b> | <b>400,662</b>  | <b>402,915</b>  | <b>398,695</b>  |

**Table 4-5- Household Projections**

| TOWN             | COUNTY   | RPA  | District | RTA   | CTPS | Census 2000 | Census 2010 | Census 2020 | Households 2030 | Households 2040 | Households 2050 |
|------------------|----------|------|----------|-------|------|-------------|-------------|-------------|-----------------|-----------------|-----------------|
| Abington         | Plymouth | OCPC | 5        | BAT   | 1    | 5,263       | 6,080       | 6,597       | 6,866           | 7,102           | 7,109           |
| Avon             | Norfolk  | OCPC | 5        | BAT   | 1    | 1,705       | 1,709       | 1,751       | 1,800           | 1,857           | 1,837           |
| Bridgewater      | Plymouth | OCPC | 5        | BAT   | 1    | 7,526       | 7,995       | 9,028       | 8,961           | 9,181           | 9,140           |
| Brockton         | Plymouth | OCPC | 5        | BAT   | 1    | 33,675      | 33,303      | 35,758      | 36,827          | 37,095          | 36,986          |
| Duxbury          | Plymouth | OCPC | 5        | MBTA  | 1    | 4,946       | 5,344       | 5,819       | 5,831           | 5,916           | 5,850           |
| East Bridgewater | Plymouth | OCPC | 5        | BAT   | 1    | 4,344       | 4,750       | 5,077       | 5,231           | 5,240           | 5,208           |
| Easton           | Bristol  | OCPC | 5        | BAT   | 1    | 7,489       | 7,865       | 8,718       | 9,657           | 9,869           | 9,879           |
| Halifax          | Plymouth | OCPC | 5        | NONE  | 1    | 2,758       | 2,863       | 3,006       | 3,049           | 3,051           | 3,031           |
| Hanover          | Plymouth | OCPC | 5        | MBTA  | 1    | 4,349       | 4,709       | 5,100       | 5,546           | 5,663           | 5,657           |
| Hanson           | Plymouth | OCPC | 5        | NONE  | 1    | 3,123       | 3,468       | 3,780       | 4,006           | 4,137           | 4,122           |
| Kingston         | Plymouth | OCPC | 5        | GATRA | 1    | 4,248       | 4,665       | 5,049       | 5,576           | 5,721           | 5,731           |
| Pembroke         | Plymouth | OCPC | 5        | MBTA  | 1    | 5,750       | 6,298       | 6,683       | 6,765           | 6,832           | 6,791           |
| Plymouth         | Plymouth | OCPC | 5        | GATRA | 1    | 18,423      | 21,269      | 24,587      | 28,869          | 29,811          | 29,962          |
| Plympton         | Plymouth | OCPC | 5        | NONE  | 1    | 854         | 1,006       | 1,036       | 1,139           | 1,137           | 1,139           |
| Stoughton        | Norfolk  | OCPC | 5        | BAT   | 1    | 10,254      | 10,295      | 11,233      | 10,969          | 11,199          | 11,154          |
| West Bridgewater | Plymouth | OCPC | 5        | BAT   | 1    | 2,444       | 2,571       | 2,798       | 2,927           | 2,958           | 2,945           |
| Whitman          | Plymouth | OCPC | 5        | BAT   | 1    | 4,999       | 5,300       | 5,719       | 5,877           | 5,934           | 5,932           |
| TOTAL            |          |      |          |       |      | 122,150     | 129,490     | 141,739     | 149,896         | 152,703         | 152,473         |



**Table 4-6- Employment Projections**

| MPO  | Muni             | Muni_ID | Emp_2010 | Emp_2020 | Emp_2030 | Emp_2040 | Emp_2050 |
|------|------------------|---------|----------|----------|----------|----------|----------|
| OCPC | Abington         | 1       | 4,032    | 5,567    | 5,585    | 5,574    | 5,571    |
| OCPC | Avon             | 18      | 5,178    | 5,163    | 4,788    | 4,638    | 4,495    |
| OCPC | Bridgewater      | 42      | 8,025    | 8,791    | 8,536    | 8,585    | 8,624    |
| OCPC | Brockton         | 44      | 37,160   | 38,417   | 37,714   | 37,798   | 38,332   |
| OCPC | Duxbury          | 82      | 3,563    | 3,133    | 2,866    | 2,818    | 2,772    |
| OCPC | East Bridgewater | 83      | 2,975    | 3,455    | 3,473    | 3,425    | 3,383    |
| OCPC | Easton           | 88      | 10,440   | 10,981   | 10,670   | 10,484   | 10,331   |
| OCPC | Halifax          | 118     | 1,431    | 2,570    | 3,135    | 3,183    | 3,275    |
| OCPC | Hanover          | 122     | 7,298    | 6,511    | 5,722    | 5,505    | 5,266    |
| OCPC | Hanson           | 123     | 2,158    | 2,653    | 2,925    | 2,880    | 2,836    |
| OCPC | Kingston         | 145     | 5,570    | 7,894    | 7,666    | 7,449    | 7,221    |
| OCPC | Pembroke         | 231     | 4,987    | 4,530    | 3,978    | 3,812    | 3,650    |
| OCPC | Plymouth         | 239     | 23,807   | 26,329   | 27,764   | 28,176   | 27,883   |
| OCPC | Plympton         | 240     | 393      | 1,013    | 976      | 963      | 943      |
| OCPC | Stoughton        | 285     | 13,777   | 12,759   | 11,460   | 11,078   | 10,646   |
| OCPC | West Bridgewater | 322     | 7,096    | 7,629    | 7,131    | 6,960    | 6,861    |
| OCPC | Whitman          | 338     | 2,681    | 3,334    | 3,419    | 3,399    | 3,483    |
| OCPC | TOTAL            |         | 140,571  | 150,729  | 147,808  | 146,727  | 145,572  |

## SOCIOECONOMIC PROFILE OF THE REGIONS POPULATION

The Massachusetts Department of Transportation Demographic and Socioeconomic Projections prepared by the UMass Amherst Donahue Institute indicates that the OCPC region will grow to nearly 400,000 residents by 2050.

### Households

More than population, the number, and type of households and their spending power within a community correlate with housing demand. A **household** is a single person or two or more people who occupy the same housing unit, which can be a house, apartment, mobile home, group home, or a single room occupied as separate living quarters. According to the US Census Bureau, a household consists of all the people who occupy a housing unit (e.g., house, apartment, single room). A household includes the related family members and all the unrelated people, if any, such as lodgers, or foster children who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit, is also counted as a household. The household count excludes group quarters.

According to the US Census and American Community Survey estimates, from 2010 to 2021, the number of households in the region increased by 10.78 percent from 129,490 households in 2010 to 143,451 households estimated for 2021 (ACS estimates), an increase of 13,961 households. Communities with the highest percentage increase of households include Plymouth (17.47%), Easton (14.34%), and Duxbury (14%). Communities of the OCPC region with a decrease in percent of households include Avon (-3.28%) a loss of 56 households, and Plympton (-1.69%) with a loss of 17 households.

### Household Size

According to the U.S. Census Bureau, the average household size in the region decreased from 2.78 persons per household in 2010 to 2.71 persons per household in 2021. The decline in the average household size is also prevalent in most of the region's communities. The communities with the greatest decrease in household size were Hanson (-0.29) followed by Duxbury and Easton (-0.24). The communities with the greatest increase in household size were Avon (0.16) followed by Abington and Hanover (0.12).

### Housing Units

The Census data indicates an increase of 11,568 housing units between 2010 and 2020 (8.3%) but a slight reduction in the percent change which occurred between 2000 and 2010 (8.4%).

**Table 4-7: OCPC Region Households, Census & ACS 1990-2020, 30-Year Change**

|                    | 1990<br>Census | 2000<br>Census | 2010<br>Census | 2021<br>ACS<br>DP02 | Change 1990-2000 |               | Change 2000-2010 |              | Change 2010-2021 |               |
|--------------------|----------------|----------------|----------------|---------------------|------------------|---------------|------------------|--------------|------------------|---------------|
|                    |                |                |                |                     | Number           | Percent       | Number           | Percent      | Number           | Percent       |
| Abington           | 4,817          | 5,263          | 6,080          | 6,083               | 446              | 9.26%         | 817              | 15.52%       | 3                | 0.05%         |
| Avon               | 1,591          | 1,705          | 1,709          | 1,653               | 114              | 7.17%         | 4                | 0.23%        | -56              | -3.28%        |
| Bridgewater        | 5,947          | 7,526          | 7,995          | 8,690               | 1,579            | 26.55%        | 469              | 6.23%        | 695              | 8.69%         |
| Brockton           | 32,850         | 33,675         | 33,303         | 37,554              | 825              | 2.51%         | -372             | -1.10%       | 4,251            | 12.76%        |
| Duxbury            | 4,625          | 4,946          | 5,344          | 6,092               | 321              | 6.94%         | 398              | 8.05%        | 748              | 14.00%        |
| East Bridgewater   | 3,593          | 4,344          | 4,750          | 4,949               | 751              | 20.90%        | 406              | 9.35%        | 199              | 4.19%         |
| Easton             | 6,436          | 7,489          | 7,865          | 8,993               | 1,053            | 16.36%        | 376              | 5.02%        | 1,128            | 14.34%        |
| Halifax            | 2,362          | 2,758          | 2,863          | 2,930               | 396              | 16.77%        | 105              | 3.81%        | 67               | 2.34%         |
| Hanover            | 3,742          | 4,349          | 4,709          | 4,744               | 607              | 16.22%        | 360              | 8.28%        | 35               | 0.74%         |
| Hanson             | 2,838          | 3,123          | 3,468          | 3,920               | 285              | 10.04%        | 345              | 11.05%       | 452              | 13.03%        |
| Kingston           | 3,224          | 4,248          | 4,665          | 5,321               | 1,024            | 31.76%        | 417              | 9.82%        | 656              | 14.06%        |
| Pembroke           | 4,666          | 5,750          | 6,298          | 6,861               | 1,084            | 23.23%        | 548              | 9.53%        | 563              | 8.94%         |
| Plymouth           | 15,875         | 18,423         | 21,269         | 24,985              | 2,548            | 16.05%        | 2,846            | 15.45%       | 3,716            | 17.47%        |
| Plympton           | 766            | 854            | 1,006          | 989                 | 88               | 11.49%        | 152              | 17.80%       | -17              | -1.69%        |
| Stoughton          | 9,394          | 10,254         | 10,295         | 11,277              | 860              | 9.15%         | 41               | 0.40%        | 982              | 9.54%         |
| West Bridgewater   | 2,232          | 2,444          | 2,571          | 2,726               | 212              | 9.50%         | 127              | 5.20%        | 155              | 6.03%         |
| Whitman            | 4,435          | 4,999          | 5,300          | 5,684               | 564              | 12.72%        | 301              | 6.02%        | 384              | 7.25%         |
| <b>OCPC Region</b> | <b>109,393</b> | <b>122,150</b> | <b>129,490</b> | <b>143,451</b>      | <b>12,757</b>    | <b>11.66%</b> | <b>7,340</b>     | <b>6.01%</b> | <b>13,961</b>    | <b>10.78%</b> |

**Table 4-8:** MassDOT Household Projections 2020-2050

| Household Projections | 2020 Census | MassDOT 2030 | MassDOT 2040 | MassDOT 2050 | Percent Increase 2020 - 2050 |         |
|-----------------------|-------------|--------------|--------------|--------------|------------------------------|---------|
|                       |             |              |              |              | Number                       | Percent |
| Abington              | 6,597       | 6,866        | 7,102        | 7,109        | 512                          | 7.76%   |
| Avon                  | 1,751       | 1,800        | 1,857        | 1,837        | 86                           | 4.91%   |
| Bridgewater           | 9,028       | 8,961        | 9,181        | 9,140        | 112                          | 1.24%   |
| Brockton              | 35,758      | 36,827       | 37,095       | 36,986       | 1,228                        | 3.43%   |
| Duxbury               | 5,819       | 5,831        | 5,916        | 5,850        | 31                           | 0.53%   |
| East Bridgewater      | 5,077       | 5,231        | 5,240        | 5,208        | 131                          | 2.58%   |
| Easton                | 8,718       | 9,657        | 9,869        | 9,879        | 1,161                        | 13.32%  |
| Halifax               | 3,006       | 3,049        | 3,051        | 3,031        | 25                           | 0.83%   |
| Hanover               | 5,100       | 5,546        | 5,663        | 5,657        | 557                          | 10.92%  |
| Hanson                | 3,780       | 4,006        | 4,137        | 4,122        | 342                          | 9.05%   |
| Kingston              | 5,049       | 5,576        | 5,721        | 5,731        | 682                          | 13.51%  |
| Pembroke              | 6,683       | 6,765        | 6,832        | 6,791        | 108                          | 1.62%   |
| Plymouth              | 24,587      | 28,869       | 29,811       | 29,962       | 5,375                        | 21.86%  |
| Plympton              | 1,036       | 1,139        | 1,137        | 1,139        | 103                          | 9.94%   |
| Stoughton             | 11,233      | 10,969       | 11,199       | 11,154       | -79                          | -0.7%   |
| West Bridgewater      | 2,798       | 2,927        | 2,958        | 2,945        | 147                          | 5.25%   |
| Whitman               | 5,719       | 5,877        | 5,934        | 5,932        | 213                          | 3.72%   |
| OCPC Region           | 141,739     | 149,896      | 152,703      | 152,473      | 10,734                       | 7.57%   |
| Massachusetts         | 2,749,225   | 2,870,730    | 2,932,930    | 2,946,290    | 197,065                      | 7.17%   |

**Table 4-9: Housing Units 2000-2020, OCPC Region**

|                      | 2000 Census | 2010 Census | 2020 Census | Occupied Units | Vacant Units | Change 2000 - 2010 |         | Change 2010 - 2020 |         |
|----------------------|-------------|-------------|-------------|----------------|--------------|--------------------|---------|--------------------|---------|
|                      |             |             |             |                |              | Number             | Percent | Number             | Percent |
| Abington             | 5,348       | 6,377       | 6,811       | 6,597          | 214          | 1,029              | 19.2%   | 434                | 6.8%    |
| Avon                 | 1,740       | 1,769       | 1,833       | 1,751          | 82           | 29                 | 1.7%    | 64                 | 3.6%    |
| Bridgewater          | 7,652       | 8,336       | 9,342       | 9,028          | 314          | 684                | 8.9%    | 1,006              | 12.1%   |
| Brockton             | 34,837      | 35,552      | 37,304      | 35,758         | 1,546        | 715                | 2.1%    | 1,752              | 4.9%    |
| Duxbury              | 5,345       | 5,875       | 6,274       | 5,819          | 455          | 530                | 9.9%    | 399                | 6.8%    |
| East Bridgewater     | 4,427       | 4,906       | 5,211       | 5,077          | 134          | 479                | 10.8%   | 305                | 6.2%    |
| Easton               | 7,631       | 8,155       | 9,132       | 8,718          | 414          | 524                | 6.9%    | 977                | 12.0%   |
| Halifax              | 2,841       | 3,014       | 3,107       | 3,006          | 101          | 173                | 6.1%    | 93                 | 3.1%    |
| Hanover              | 4,445       | 4,852       | 5,268       | 5,100          | 168          | 407                | 9.2%    | 416                | 8.6%    |
| Hanson               | 3,178       | 3,589       | 3,960       | 3,780          | 180          | 411                | 12.9%   | 371                | 10.3%   |
| Kingston             | 4,525       | 5,010       | 5,364       | 5,049          | 315          | 485                | 10.7%   | 354                | 7.1%    |
| Pembroke             | 5,897       | 6,552       | 7,007       | 6,683          | 324          | 655                | 11.1%   | 455                | 6.9%    |
| Plymouth             | 21,250      | 24,800      | 28,074      | 24,587         | 3,487        | 3,550              | 16.7%   | 3,274              | 13.2%   |
| Plympton             | 872         | 1,043       | 1,068       | 1,036          | 32           | 171                | 19.6%   | 25                 | 2.4%    |
| Stoughton            | 10,488      | 10,787      | 11,739      | 11,233         | 506          | 299                | 2.9%    | 952                | 8.8%    |
| West<br>Bridgewater  | 2,510       | 2,669       | 2,898       | 2,798          | 100          | 159                | 6.3%    | 229                | 8.6%    |
| Whitman              | 5,104       | 5,522       | 5,984       | 5,719          | 265          | 418                | 8.2%    | 462                | 8.4%    |
| <b>OCPC Region</b>   | 128,090     | 138,808     | 150,376     | 141,739        | 8,637        | 10,718             | 8.4%    | 11,568             | 8.3%    |
| <b>Massachusetts</b> | 2,621,989   | 2,808,254   | 2,998,537   | 2,749,225      | 249,312      | 186,265            | 7.1%    | 190,283            | 6.8%    |

Source: US Census 1990 QT-H1, 2000, 2010 QT-H1, 2020 H1

**Table 4-10: Average Household Size 2010 – 2021**

|                         | Average Household Size | Average Family Size | Average Household Size | Average Family Size | Household Size | Family Size |
|-------------------------|------------------------|---------------------|------------------------|---------------------|----------------|-------------|
|                         | 2010 ACS               | 2010 ACS            | 2021 ACS               | 2021 ACS            | Change         | Change      |
| <b>Abington</b>         | 2.65                   | 3.26                | 2.77                   | 3.27                | 0.12           | 0.01        |
| <b>Avon</b>             | 2.70                   | 3.28                | 2.86                   | 3.51                | 0.16           | 0.23        |
| <b>Bridgewater</b>      | 2.83                   | 3.21                | 2.69                   | 3.06                | -0.14          | -0.15       |
| <b>Brockton</b>         | 2.81                   | 3.42                | 2.75                   | 3.31                | -0.06          | -0.11       |
| <b>Duxbury</b>          | 2.84                   | 3.32                | 2.60                   | 3.06                | -0.24          | -0.26       |
| <b>East Bridgewater</b> | 2.85                   | 3.33                | 2.89                   | 3.26                | 0.04           | -0.07       |
| <b>Easton</b>           | 2.79                   | 3.23                | 2.55                   | 3.04                | -0.24          | -0.19       |
| <b>Halifax</b>          | 2.63                   | 3.21                | 2.64                   | 3.24                | 0.01           | 0.03        |
| <b>Hanover</b>          | 2.96                   | 3.39                | 3.08                   | 3.44                | 0.12           | 0.05        |
| <b>Hanson</b>           | 2.99                   | 3.36                | 2.70                   | 3.25                | -0.29          | -0.11       |
| <b>Kingston</b>         | 2.73                   | 3.17                | 2.52                   | 3.02                | -0.21          | -0.15       |
| <b>Pembroke</b>         | 2.86                   | 3.27                | 2.66                   | 3.19                | -0.2           | -0.08       |
| <b>Plymouth</b>         | 2.54                   | 3.02                | 2.37                   | 2.83                | -0.17          | -0.19       |
| <b>Plympton</b>         | 2.88                   | 3.14                | 2.96                   | 3.18                | 0.08           | 0.04        |
| <b>Stoughton</b>        | 2.58                   | 3.20                | 2.55                   | 3.07                | -0.03          | -0.13       |
| <b>West Bridgewater</b> | 2.95                   | 3.48                | 2.75                   | 3.22                | -0.2           | -0.26       |
| <b>Whitman</b>          | 2.70                   | 3.33                | 2.65                   | 3.2                 | -0.05          | -0.13       |
| <b>OCPC Region</b>      | 2.78                   | 3.27                | 2.71                   | 3.19                | -0.08          | -0.09       |
| <b>Massachusetts</b>    | 2.53                   | 3.14                | 2.44                   | 3.04                | -0.09          | -0.10       |

### Median Income

Between 2010 and 2021, the median income for the OCPC region in some areas increased by 36.7 percent, an increase of \$29,735 greater than the state increase of \$21,799 (32.1%). The three communities in the OCPC region which experienced the highest increases in median income include Avon (90.1%) an increase of \$60,640, Pembroke (61.1%) an increase of \$49,321, and Hanover (48.7%) with an increase of \$48,815. The communities in the region with the lowest increase in median income include Bridgewater (7%) an increase of \$7,010, Duxbury (13.7%) an increase of \$15,695, and Halifax (20.0%) with an increase of \$16,409.

**Table 4-11: Change in Median Income, 2000-2021**

| OCPC Municipalities | 2000 Census Median Income (Dollars) | 2010 ACS Median Income (Dollars) | 2021 ACS Median Income (Dollars) | Change 2000 - 2021 | Percent Change | Change 2010 - 2021 | Percent Change |
|---------------------|-------------------------------------|----------------------------------|----------------------------------|--------------------|----------------|--------------------|----------------|
|                     |                                     |                                  |                                  |                    | 2000 - 2021    |                    | 2010 - 2021    |
| Abington            | \$ 57,100                           | \$ 74,589                        | \$ 113,115                       | \$ 56,015          | 67.5%          | \$ 38,526          | 51.7%          |
| Avon                | \$ 50,305                           | \$ 67,313                        | \$ 127,953                       | \$ 77,648          | 120.5%         | \$ 60,640          | 90.1%          |
| Bridgewater         | \$ 65,318                           | \$ 100,747                       | \$ 107,757                       | \$ 42,439          | 10.7%          | \$ 7,010           | 7.0%           |
| Brockton            | \$ 39,507                           | \$ 49,913                        | \$ 68,581                        | \$ 29,074          | 47.3%          | \$ 18,668          | 37.4%          |
| Duxbury             | \$ 97,124                           | \$ 114,565                       | \$ 130,260                       | \$ 33,136          | 16.2%          | \$ 15,695          | 13.7%          |
| East Bridgewater    | \$ 60,311                           | \$ 78,492                        | \$ 110,842                       | \$ 50,531          | 53.6%          | \$ 32,350          | 41.2%          |
| Easton              | \$ 69,144                           | \$ 86,050                        | \$ 112,116                       | \$ 42,972          | 37.7%          | \$ 26,066          | 30.3%          |
| Halifax             | \$ 57,015                           | \$ 81,855                        | \$ 98,264                        | \$ 41,249          | 28.8%          | \$ 16,409          | 20.0%          |
| Hanover             | \$ 73,838                           | \$ 100,233                       | \$ 149,048                       | \$ 75,210          | 66.1%          | \$ 48,815          | 48.7%          |
| Hanson              | \$ 62,687                           | \$ 81,964                        | \$ 112,315                       | \$ 49,628          | 48.4%          | \$ 30,351          | 37.0%          |
| Kingston            | \$ 53,780                           | \$ 77,656                        | \$ 103,945                       | \$ 50,165          | 48.9%          | \$ 26,289          | 33.9%          |



|                         |           |           |            |           |       |           |       |
|-------------------------|-----------|-----------|------------|-----------|-------|-----------|-------|
| <b>Pembroke</b>         | \$ 65,050 | \$ 80,694 | \$ 130,015 | \$ 64,965 | 75.8% | \$ 49,321 | 61.1% |
| <b>Plymouth</b>         | \$ 54,677 | \$ 74,767 | \$ 97,956  | \$ 43,279 | 42.4% | \$ 23,189 | 31.0% |
| <b>Plympton</b>         | \$ 70,045 | \$ 87,917 | \$ 118,098 | \$ 48,053 | 43.1% | \$ 30,181 | 34.3% |
| <b>Stoughton</b>        | \$ 57,838 | \$ 67,175 | \$ 94,823  | \$ 36,985 | 47.8% | \$ 27,648 | 41.2% |
| <b>West Bridgewater</b> | \$ 55,958 | \$ 76,277 | \$ 111,964 | \$ 56,006 | 63.8% | \$ 35,687 | 46.8% |
| <b>Whitman</b>          | \$ 55,303 | \$ 76,277 | \$ 94,919  | \$ 39,616 | 33.7% | \$ 18,642 | 24.4% |
| <b>OCPC Region</b>      | \$ 61,471 | \$ 80,970 | \$ 110,704 | \$ 49,234 | 80.1% | \$ 29,735 | 36.7% |
| <b>Massachusetts</b>    | \$ 50,502 | \$ 67,846 | \$ 89,645  | \$ 39,143 | 43.2% | \$ 21,799 | 32.1% |

Source: 2010 & 2021 ACS S1901, 2000 Census SF3, 2010 ACS DP03

### Age Distribution

The population of the United States is aging at a pace historically unprecedented. This statistical demographic reality is indisputable, yet not every community is addressing this reality in policies and planning efforts. In the US in 2010, there were 40.3 million people aged sixty-five and older, twelve times the number in 1900. The percentage of the overall US population aged 65 and over increased from 4.1 percent in 1900 to 13.0 percent in 2010; it is projected to reach 20.9 percent by 2050.

People aged eighty-five and older are the fastest-growing cohorts among older adults in both absolute numbers and percentages. The US older-adult population is growing steadily, with increasing numbers of older adults living longer, healthier lives and contributing to their communities and society in general. The 65+ group was the fastest-growing age cohort between 2010 and 2021 with its population increasing by 38 percent.<sup>1</sup> The 0 – 4 age group declined the most, dropping 6.7 percent between 2010 and 2021. The share of the population that is 0 to 4 years old decreased from 6.5 percent in 2010 to 5.7 percent in 2021. The share of the population that is 65 and older increased from 13.1 percent in 2010 to 16.8 percent in 2021.

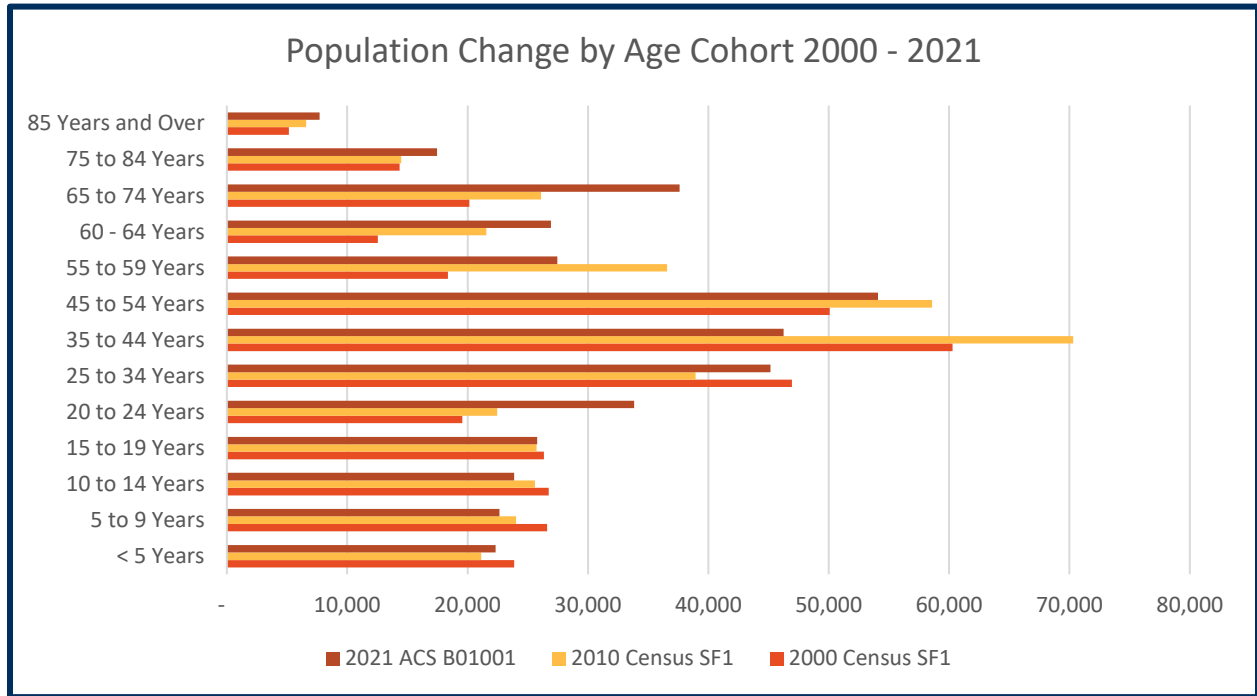
In terms of the age of the population, the residents of the OCPC region are also getting older. According to the 2021 American Community Survey (ACS), the median age for residents of the region increased by 4.18 years between 2000 and 2021, from 37 years in 2000 to 42.1 in 2021. From 2010 to 2021, the median age increased from 41.2 in 2010 to 42.1 in 2021.

As a result of continuing changes in demographics, the needs of residents can be expected to change in relation to transportation, public facilities, and services, economic development, and recreation, as well as housing.

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<sup>1</sup> <https://usafacts.org/data/topics/people-society/population-and-demographics/>

**Figure 4-3: OCPC Region, Population Change by Age Cohort 2000 - 2021**



Median Age

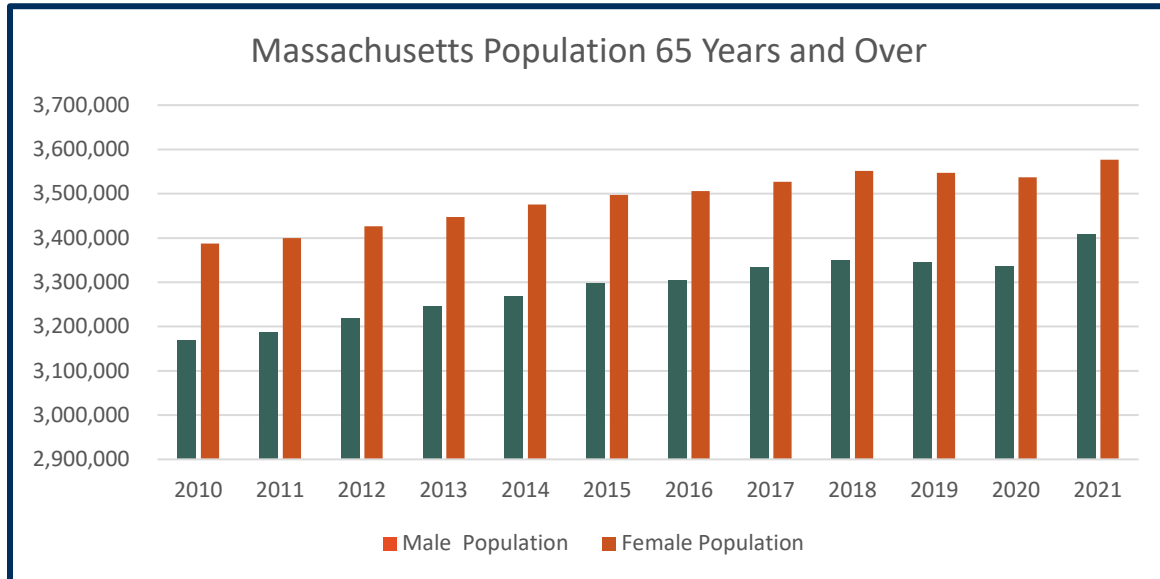
**Table 4-11: Change in Median Age, 2000-2021**

|                         | 2000<br>Census<br>Median<br>Age | 2010<br>Census<br>Median<br>Age | 2021<br>ACS<br>Median<br>Age | 2021 ACS<br>Male<br>Median<br>Age | 2021<br>ACS<br>Female<br>Median<br>Age | Increase<br>Median<br>Age<br>2000-<br>2021 | Increase<br>in<br>Median<br>Age<br>2010 -<br>2021 |
|-------------------------|---------------------------------|---------------------------------|------------------------------|-----------------------------------|--|--|---|
| <b>Abington</b>         | 36.7                            | 39.5                            | 39.9                         | 38.3                              | 41.4                                   | 2.80                                       | 0.4   |
| <b>Avon</b>             | 40.2                            | 44                              | 36.9                         | 38.7                              | 36.2                                   | 3.80                                       | -7.1  |
| <b>Bridgewater</b>      | 33.6                            | 36.7                            | 35.8                         | 36.3                              | 35.3                                   | 3.10                                       | -0.9  |
| <b>Brockton</b>         | 34                              | 35.9                            | 39.4                         | 37.9                              | 40.9                                   | 1.90                                       | 3.5   |
| <b>Duxbury</b>          | 40.3                            | 44.8                            | 47.6                         | 46.3                              | 48.6                                   | 4.50                                       | 2.8   |
| <b>East Bridgewater</b> | 35.9                            | 40.5                            | 39.9                         | 39.7                              | 40.1                                   | 4.60                                       | -0.6  |
| <b>Easton</b>           | 35.5                            | 39.5                            | 41.9                         | 40.9                              | 42.8                                   | 4.00                                       | 2.4   |
| <b>Halifax</b>          | 37.5                            | 42.8                            | 40.9                         | 40.9                              | 40.8                                   | 5.30                                       | -1.9  |
| <b>Hanover</b>          | 37.5                            | 41.8                            | 40.9                         | 38.1                              | 41.9                                   | 4.30                                       | -0.9  |
| <b>Hanson</b>           | 36.1                            | 40.4                            | 42.8                         | 44                                | 41.8                                   | 4.30                                       | 2.4   |
| <b>Kingston</b>         | 37.2                            | 42.3                            | 44.7                         | 44.4                              | 44.9                                   | 5.10                                       | 2.4   |
| <b>Pembroke</b>         | 36                              | 40.8                            | 44.3                         | 41.1                              | 46.3                                   | 4.80                                       | 3.5   |
| <b>Plymouth</b>         | 36.5                            | 41.4                            | 47.9                         | 46.4                              | 50                                     | 4.90                                       | 6.5   |
| <b>Plympton</b>         | 37.7                            | 44.4                            | 45.5                         | 46.4                              | 44.6                                   | 6.70                                       | 1.1   |
| <b>Stoughton</b>        | 39.2                            | 42.9                            | 45.7                         | 43.7                              | 47                                     | 3.70                                       | 2.8   |
| <b>West Bridgewater</b> | 40.1                            | 43.9                            | 39.8                         | 38.3                              | 42.9                                   | 3.80                                       | -4.1  |
| <b>Whitman</b>          | 34.7                            | 38.2                            | 41                           | 40.1                              | 41.7                                   | 3.50                                       | 2.8   |
| <b>OCPC Region</b>      | 37.0                            | 41.2                            | 42.1                         | 41.3                              | 42.8                                   | 4.18                                       | 0.9   |

Source: 2010 DP-1, 2000 SF-1, 2021 ACS B01002

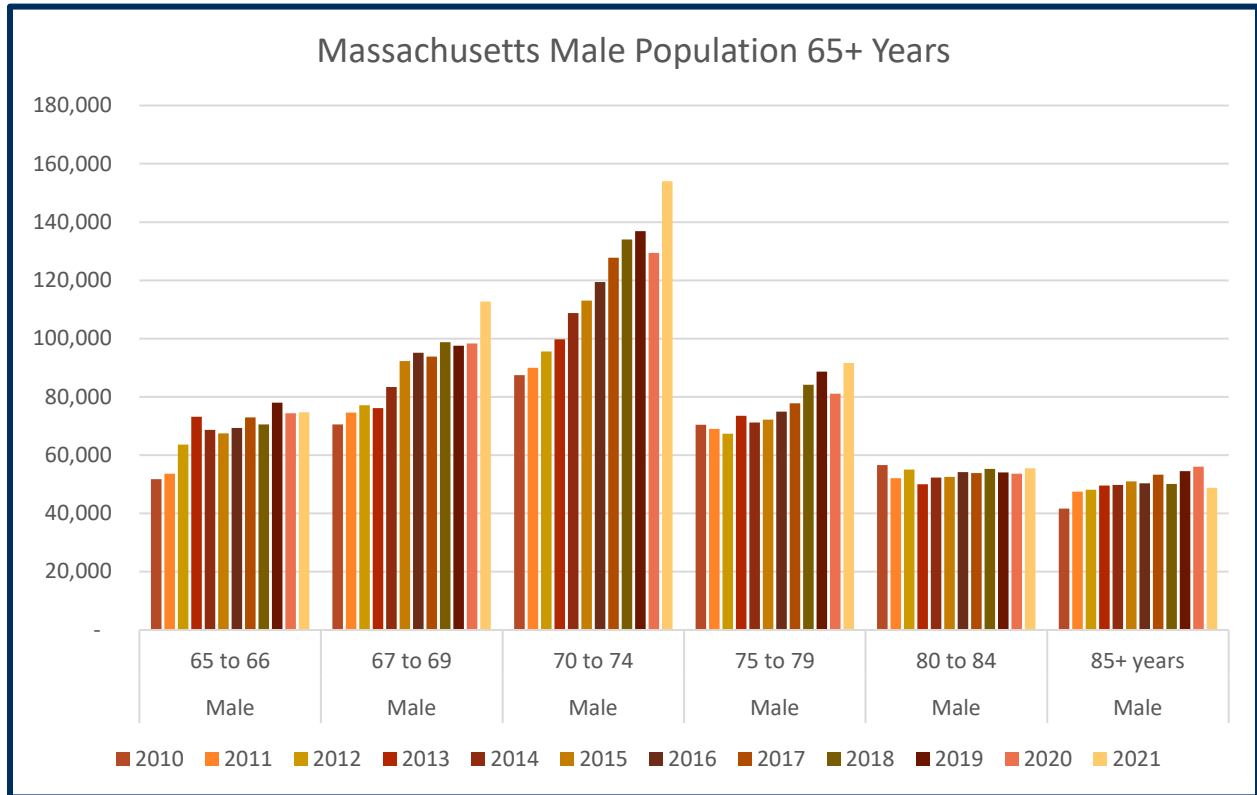
Population 65 Years of Age and Over.

**Figure 4-4: Massachusetts Population 65+ Years**



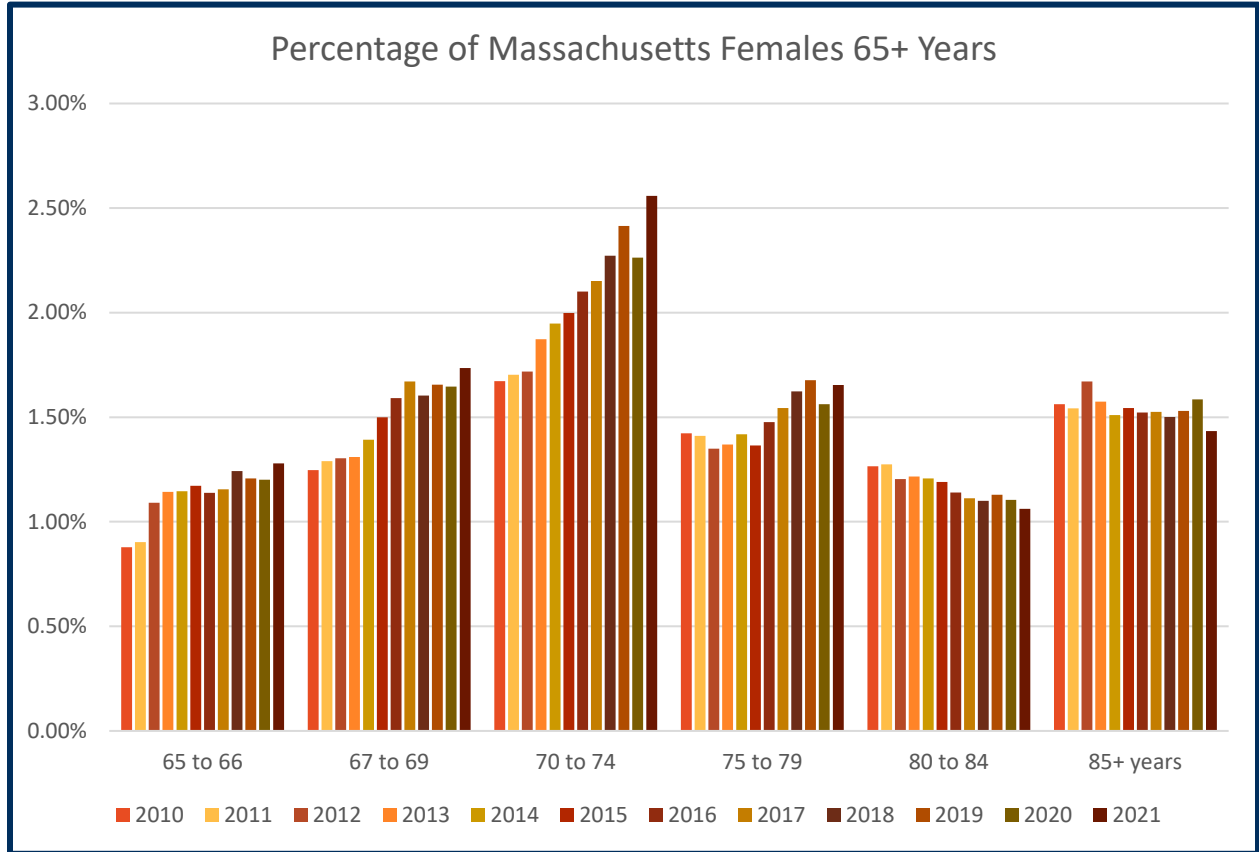
Source: ACS B01001 1-Year Estimates

**Figure 4-5: Massachusetts Male Population 65+ Years**



Source: ACS B01001 1-Year Estimates.

**Figure 4-6: Massachusetts Female Percent of Population 65+ Years**



Source: ACS B01001 1-Year Estimates.

**Table 4-12: Age 65+ nu Sex**

|                         | Total Pop | Male   | 65 to 66 | 67 to 69 | 70 to 74 | 75 to 79 | 80 to 84 | 85+ Years | Female | 65 to 66 | 67 to 69 | 70 to 74 | 75 to 79 | 80 to 84 | 85+ Years |
|-------------------------|-----------|--------|----------|----------|----------|----------|----------|-----------|--------|----------|----------|----------|----------|----------|-----------|
| <b>Abington</b>         | 16,974    | 8,849  | 83       | 225      | 303      | 231      | 58       | 137       | 8,125  | 106      | 213      | 232      | 264      | 106      | 272       |
| <b>Avon</b>             | 4,740     | 2,264  | 25       | 58       | 84       | 173      | -        | 38        | 2,476  | 38       | 83       | 139      | 65       | 59       | 37        |
| <b>Bridgewater</b>      | 28,337    | 14,827 | 257      | 257      | 956      | 381      | 137      | 404       | 13,510 | 243      | 442      | 745      | 380      | 269      | 242       |
| <b>Brockton</b>         | 95,426    | 45,528 | 1,047    | 937      | 1,312    | 722      | 600      | 553       | 49,898 | 978      | 1,046    | 1,643    | 1,146    | 950      | 1,252     |
| <b>Duxbury</b>          | 16,004    | 7,710  | 79       | 296      | 691      | 306      | 133      | 225       | 8,294  | 168      | 441      | 585      | 368      | 240      | 336       |
| <b>East Bridgewater</b> | 14,393    | 7,086  | 63       | 95       | 382      | 199      | 106      | 43        | 7,307  | 96       | 164      | 334      | 279      | 118      | 154       |
| <b>Easton</b>           | 24,962    | 11,894 | 320      | 288      | 741      | 397      | 157      | 151       | 13,068 | 380      | 377      | 616      | 396      | 408      | 311       |
| <b>Halifax</b>          | 7,737     | 3,680  | 44       | 142      | 225      | 45       | 6        | 19        | 4,057  | 79       | 243      | 158      | 61       | 55       | 183       |
| <b>Hanover</b>          | 14,397    | 6,985  | 153      | 302      | 231      | 158      | 39       | 77        | 7,412  | 172      | 260      | 438      | 221      | 158      | 199       |
| <b>Hanson</b>           | 10,601    | 5,382  | 125      | 236      | 300      | 143      | 36       | 50        | 5,219  | 155      | 240      | 141      | 202      | 81       | 98        |
| <b>Kingston</b>         | 13,618    | 7,015  | 291      | 184      | 249      | 296      | 250      | 178       | 6,603  | 62       | 298      | 247      | 256      | 106      | 237       |
| <b>Pembroke</b>         | 2,934     | 1,405  | 21       | 34       | 139      | 74       | 14       | 10        | 1,529  | 40       | 105      | 71       | 51       | 20       | 49        |
| <b>Plymouth</b>         | 60,987    | 30,008 | 860      | 1,430    | 1,657    | 1,242    | 722      | 459       | 30,979 | 1,268    | 1,480    | 2,179    | 1,221    | 625      | 926       |
| <b>Plympton</b>         | 2,934     | 1,405  | 21       | 34       | 139      | 74       | 14       | 10        | 1,529  | 40       | 105      | 71       | 51       | 20       | 49        |
| <b>Stoughton</b>        | 29,028    | 13,755 | 401      | 631      | 865      | 355      | 148      | 248       | 15,273 | 538      | 469      | 946      | 323      | 328      | 565       |
| <b>West Bridgewater</b> | 7,622     | 3,761  | 94       | 88       | 166      | 79       | 47       | 33        | 3,861  | 101      | 178      | 118      | 171      | 39       | 136       |
| <b>Whitman</b>          | 15,116    | 7,276  | 174      | 202      | 258      | 74       | 45       | 54        | 7,840  | 261      | 147      | 399      | 160      | 131      | 149       |

Source: 2021 ACS B01001 1-Year Estimates



**Table 4-13: Massachusetts Male Population 65+**

|      |                  | Male       | Male     | Male     | Male     | Male     | Male     | Male      |
|------|------------------|------------|----------|----------|----------|----------|----------|-----------|
|      | Total population | Population | 65 to 66 | 67 to 69 | 70 to 74 | 75 to 79 | 80 to 84 | 85+ years |
| 2010 | 6,557,254        | 3,170,167  | 51,735   | 70,521   | 87,450   | 70,383   | 56,577   | 41,669    |
| 2011 | 6,587,536        | 3,187,794  | 53,579   | 74,653   | 89,946   | 68,954   | 52,051   | 47,522    |
| 2012 | 6,646,144        | 3,219,753  | 63,611   | 77,082   | 95,634   | 67,390   | 55,027   | 48,165    |
| 2013 | 6,692,284        | 3,245,774  | 73,192   | 76,101   | 99,724   | 73,563   | 50,060   | 49,569    |
| 2014 | 6,745,408        | 3,269,679  | 68,720   | 83,373   | 108,720  | 71,194   | 52,313   | 49,778    |
| 2015 | 6,794,422        | 3,297,384  | 67,476   | 92,339   | 112,994  | 72,236   | 52,518   | 50,957    |
| 2016 | 6,811,779        | 3,305,817  | 69,388   | 95,181   | 119,368  | 74,933   | 54,219   | 50,347    |
| 2017 | 6,859,819        | 3,333,270  | 72,916   | 93,879   | 127,790  | 77,738   | 53,878   | 53,321    |
| 2018 | 6,902,149        | 3,350,887  | 70,517   | 98,793   | 133,975  | 84,126   | 55,229   | 50,150    |
| 2019 | 6,892,503        | 3,345,556  | 78,053   | 97,511   | 136,824  | 88,715   | 54,074   | 54,494    |
| 2020 | 6,873,003        | 3,335,992  | 74,437   | 98,354   | 129,408  | 81,112   | 53,659   | 56,083    |
| 2021 | 6,984,723        | 3,408,252  | 74,739   | 112,766  | 154,055  | 91,601   | 55,548   | 48,777    |

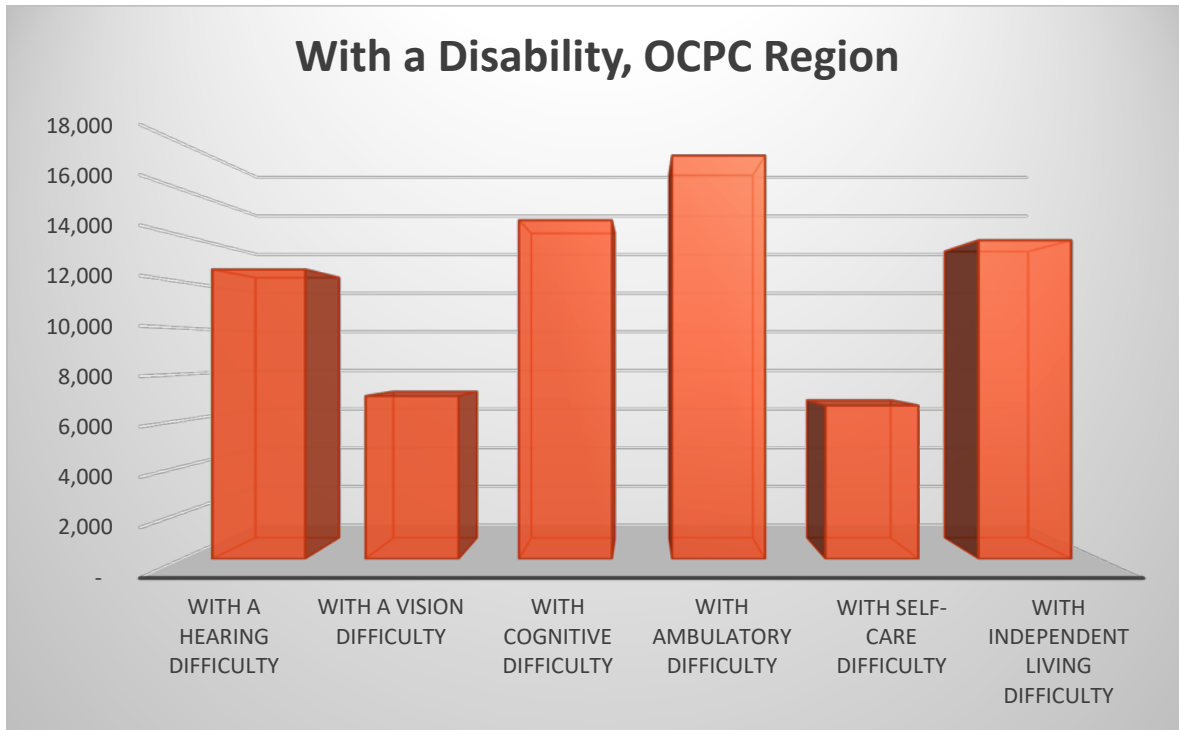
Source: 2021 ACS B01001 1-Year Estimates

**Table 4-14: Massachusetts Female Population 65+**

|             |                  | Female     | Female   | Female   | Female   | Female   | Female   | Female    |
|-------------|------------------|------------|----------|----------|----------|----------|----------|-----------|
|             | Total population | Population | 65 to 66 | 67 to 69 | 70 to 74 | 75 to 79 | 80 to 84 | 85+ years |
| <b>2010</b> | 6,557,254        | 3,387,087  | 57,548   | 81,814   | 109,705  | 93,317   | 83,004   | 102,393   |
| <b>2011</b> | 6,587,536        | 3,399,742  | 59,504   | 85,007   | 112,141  | 92,973   | 83,978   | 101,601   |
| <b>2012</b> | 6,646,144        | 3,426,391  | 72,496   | 86,609   | 114,237  | 89,730   | 80,000   | 111,050   |
| <b>2013</b> | 6,692,284        | 3,447,050  | 76,531   | 87,629   | 125,346  | 91,662   | 81,394   | 105,326   |
| <b>2014</b> | 6,745,408        | 3,475,729  | 77,313   | 93,919   | 131,361  | 95,643   | 81,411   | 101,832   |
| <b>2015</b> | 6,794,422        | 3,497,038  | 79,660   | 101,853  | 135,721  | 92,753   | 80,831   | 104,888   |
| <b>2016</b> | 6,811,779        | 3,505,962  | 77,525   | 108,387  | 143,073  | 100,615  | 77,644   | 103,745   |
| <b>2017</b> | 6,859,819        | 3,526,549  | 79,244   | 114,665  | 147,542  | 105,909  | 76,322   | 104,620   |
| <b>2018</b> | 6,902,149        | 3,551,262  | 85,787   | 110,663  | 156,811  | 112,022  | 75,889   | 103,579   |
| <b>2019</b> | 6,892,503        | 3,546,947  | 83,197   | 114,144  | 166,428  | 115,584  | 77,829   | 105,440   |
| <b>2020</b> | 6,873,003        | 3,537,011  | 82,582   | 113,137  | 155,575  | 107,391  | 75,890   | 108,938   |
| <b>2021</b> | 6,984,723        | 3,576,471  | 89,380   | 121,155  | 178,690  | 115,479  | 74,148   | 100,109   |

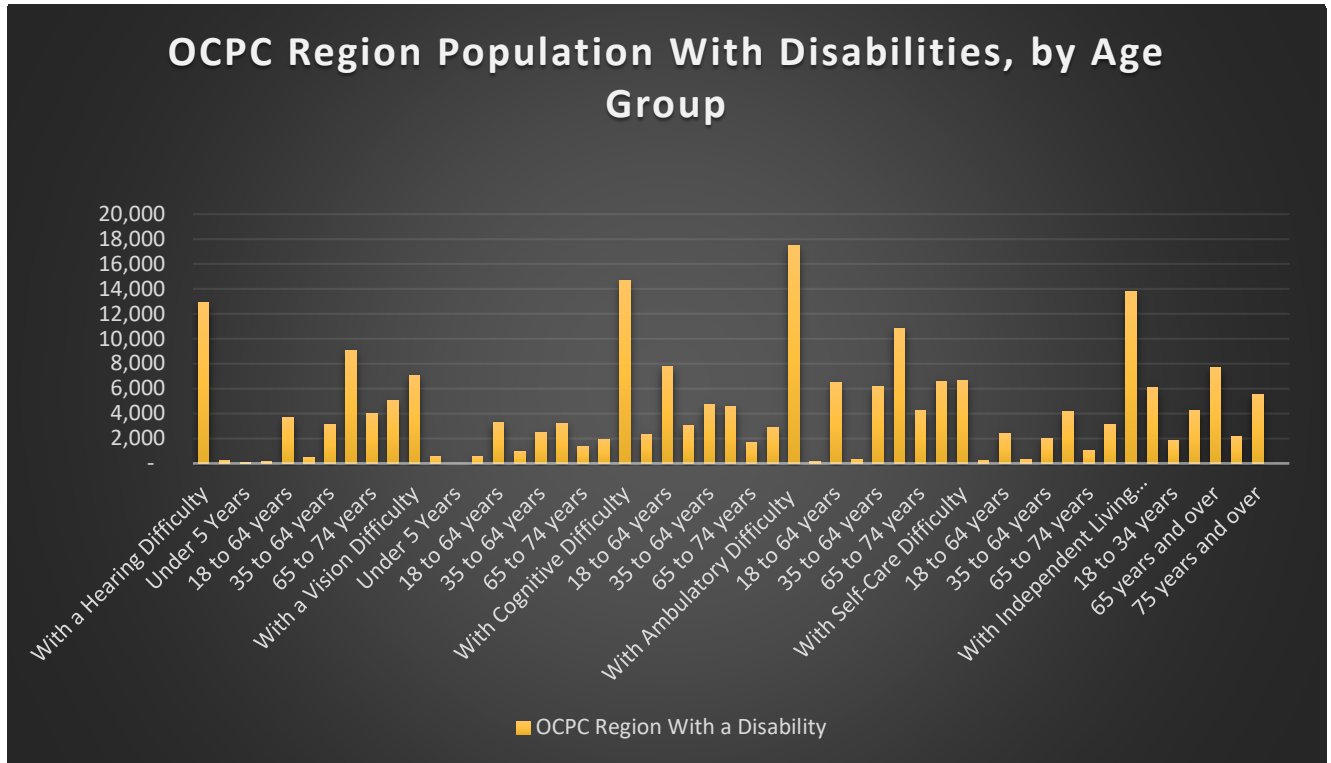
Source: ACS B01001 1-Year Estimate

Disabilities



Source: 2021 ACS S1801

Figure 4-7: OCPC Region, Population with Disabilities, by Age Group



Source: 2021 ACS S1801

Educational Attainment

The following tables depict the educational profile of adults aged 25 years and older in the region.

**Table 4-15: Educational Attainment, Population 25+ Years**

|                  | Pop 25 Years and Over | Less than 9th Grade | 9th to 12th Grade, no Diploma | High School Graduate or GED | Some College, no degree | Associate degree | Bachelor's degree | Graduate or Professional Degree | High School Graduate or Higher | Bachelor's Degree or Higher |
|------------------|-----------------------|---------------------|-------------------------------|-----------------------------|-------------------------|------------------|-------------------|---------------------------------|--------------------------------|-----------------------------|
| Abington         | 11,882                | 276                 | 320                           | 3,406                       | 1,716                   | 1,261            | 3,417             | 1,486                           | 11,286                         | 4,903                       |
| Avon             | 3,273                 | 37                  | 158                           | 1,117                       | 497                     | 489              | 783               | 192                             | 3,078                          | 975                         |
| Bridgewater      | 18,119                | 206                 | 739                           | 5,458                       | 3,075                   | 1,452            | 4,477             | 2,712                           | 17,174                         | 7,189                       |
| Brockton         | 68,610                | 5,794               | 5,936                         | 22,608                      | 10,384                  | 6,808            | 10,837            | 6,243                           | 53,880                         | 17,080                      |
| Duxbury          | 11,413                | 32                  | 408                           | 1,113                       | 1,377                   | 416              | 4,781             | 3,286                           | 10,972                         | 8,067                       |
| East Bridgewater | 9,962                 | 194                 | 233                           | 3,147                       | 2,249                   | 1,132            | 2,037             | 970                             | 9,535                          | 3,007                       |
| Easton           | 16,612                | 187                 | 343                           | 3,522                       | 2,678                   | 1,382            | 5,062             | 3,438                           | 16,082                         | 8,500                       |
| Halifax          | 5,201                 | 39                  | 190                           | 1,902                       | 810                     | 437              | 1,236             | 587                             | 4,972                          | 1,823                       |
| Hanover          | 9,367                 | 79                  | 197                           | 1,847                       | 1,234                   | 1,002            | 3,137             | 1,871                           | 9,091                          | 5,008                       |
| Hanson           | 7,487                 | 97                  | 352                           | 2,458                       | 1,404                   | 572              | 1,631             | 973                             | 7,038                          | 2,604                       |
| Kingston         | 9,965                 | 49                  | 217                           | 2,073                       | 1,822                   | 1,070            | 3,304             | 1,430                           | 9,699                          | 4,734                       |
| Pembroke         | 12,810                | 124                 | 210                           | 2,937                       | 2,452                   | 1,620            | 3,242             | 2,225                           | 12,476                         | 5,467                       |
| Plymouth         | 46,887                | 709                 | 1,438                         | 11,761                      | 8,224                   | 5,196            | 12,226            | 7,333                           | 44,740                         | 19,559                      |
| Plympton         | 2,085                 | 31                  | 116                           | 678                         | 382                     | 169              | 443               | 266                             | 1,938                          | 709                         |
| Stoughton        | 21,560                | 907                 | 1,016                         | 5,472                       | 3,484                   | 1,789            | 5,163             | 3,729                           | 19,637                         | 8,892                       |
| West Bridgewater | 5,404                 | 31                  | 135                           | 1,631                       | 883                     | 482              | 1,584             | 658                             | 5,238                          | 2,242                       |
| Whitman          | 10,407                | 146                 | 357                           | 3,446                       | 2,286                   | 1,408            | 1,875             | 889                             | 9,904                          | 2,764                       |
| Massachusetts    | 4,934,755             | 222,572             | 216,620                       | 1,124,134                   | 694,438                 | 376,568          | 1,250,748         | 1,049,675                       | 4,495,563                      | 2,300,423                   |

Source: 2021 ACS S1501

## ENVIRONMENTAL JUSTICE AND TITLE VI POPULATIONS

Environmental Justice (EJ) is based on the principle that all people have a right to be protected from environmental hazards and to live in and enjoy a clean and healthful environment. EJ is the equal protection and meaningful involvement of all people concerning the development, implementation, and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits.<sup>2</sup>

Achieving environmental justice and compliance with Title VI of the Civil Rights Act of 1964 is a priority of the Old Colony Metropolitan Planning Organization. This is achieved by taking steps to ensure the effects of all programs, policies, and activities on minority populations and low-income populations are identified and addressed in the transportation planning process. There are three fundamental environmental justice principles that are employed in the process:

- 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 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.

Federal legislation requires MPOs:

- Enhance their analytical capabilities to ensure that the long-range transportation plan and the transportation improvement program (TIP) comply with Title VI.
- Identify residential, employment, and transportation patterns of low-income and minority populations so that their needs can be identified and addressed, and the benefits and burdens of transportation investments can be fairly distributed.
- Evaluate and - where necessary - improve their public involvement processes to eliminate participation barriers and engage minority and low-income populations in transportation decision-making.

The Old Colony Metropolitan Planning Organization (MPO) operates its programs, services, and activities in compliance with federal nondiscrimination laws including Title VI of the Civil Rights Act of 1964 (Title VI), the Civil Rights Restoration Act of 1987, and related statutes and regulations. Title VI prohibits discrimination in federally assisted programs and requires that no person in the United States of America shall, on the grounds of **race, color, or national origin** (including **limited English proficiency**), be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal assistance. Related federal nondiscrimination laws administered by the Federal Highway Administration, the Federal Transit Administration, or both prohibit discrimination on the basis

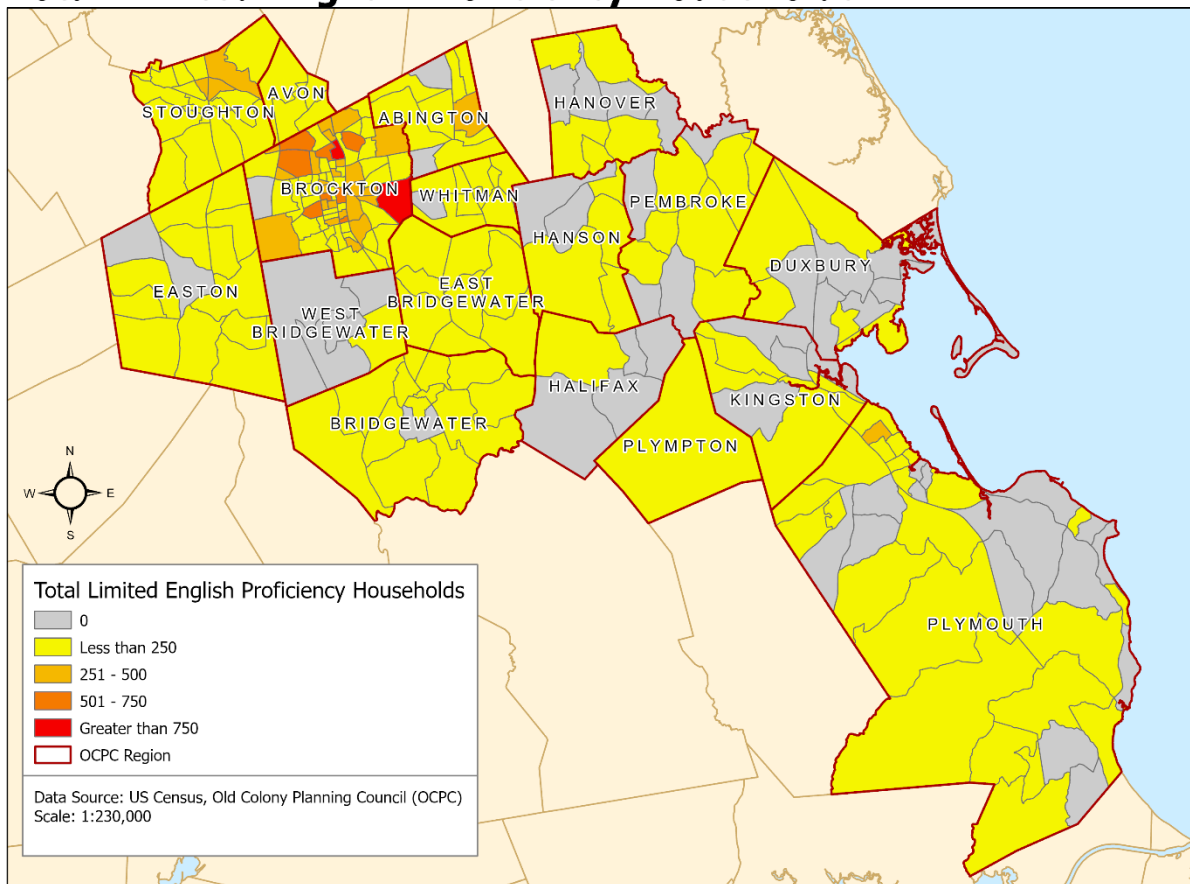
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<sup>2</sup> <https://www.mass.gov/environmental-justice>

of **age, sex, and disability**. These protected categories are contemplated within the Old Colony MPO's Title VI Programs consistent with federal interpretation and administration. Additionally, the Old Colony MPO provides meaningful access to its programs, services, and activities to individuals with limited English proficiency, in compliance with US Department of Transportation policy and guidance on federal Executive Order 13166.

The Old Colony MPO also complies with the Massachusetts Public Accommodation Law, M.G.L. c 272 §§ 92a, 98, 98a, prohibiting making any distinction, discrimination, or restriction in admission to or treatment in a place of public accommodation based on **race, color, religious creed, national origin, sex, sexual orientation, disability, or ancestry**. Likewise, the Old Colony MPO complies with the Governor's Executive Order 526, section 4 requiring all programs, activities, and services provided, performed, licensed, chartered, funded, regulated, or contracted for by the state shall be conducted without unlawful discrimination based on **race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status** (including Vietnam-era veterans), or **background**.

### Total Limited English Proficiency Households

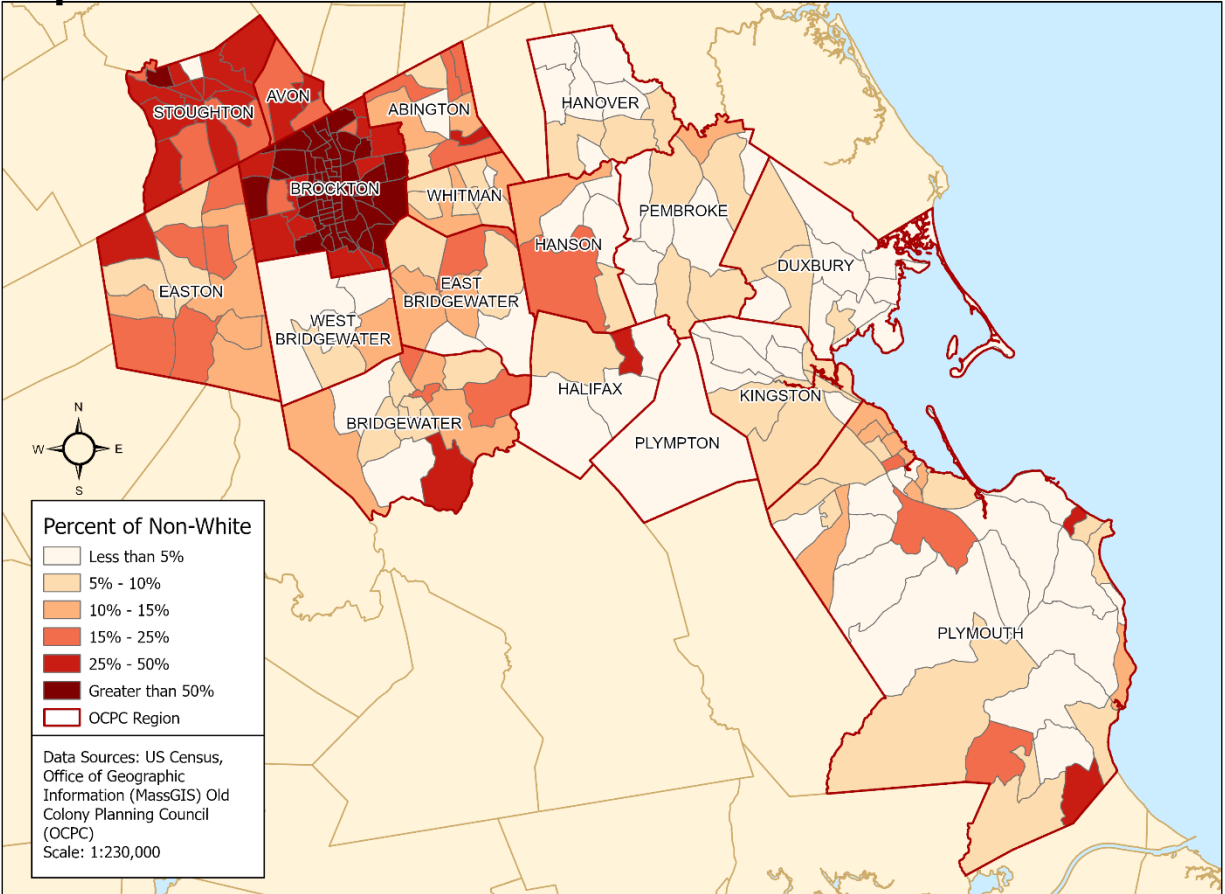


### Race and Ethnicity

The racial demographics of the OCPC region are similar, but the area is far less diverse than Massachusetts as a whole.

**Figure 4-8: Population of Non-White Persons**

### Population of Non-White





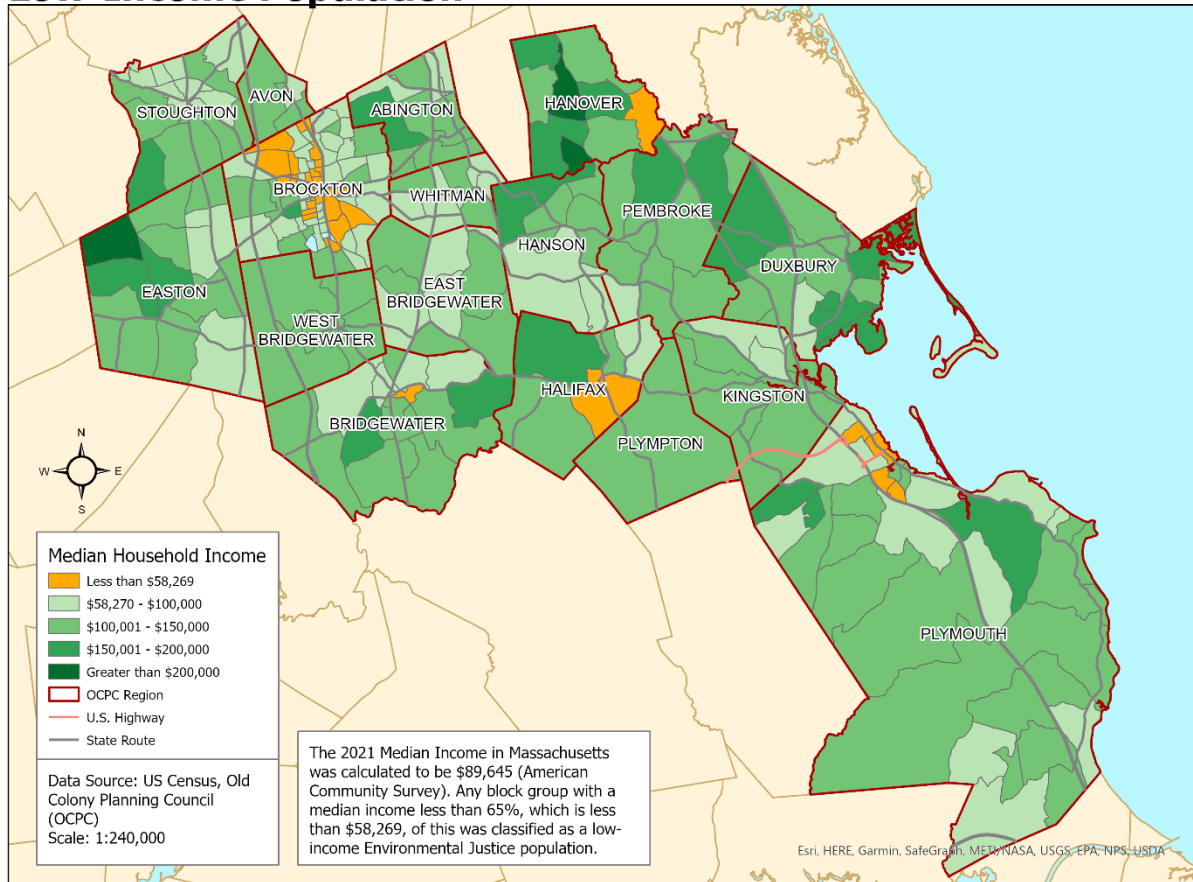
**Table 4-16: Racial Composition, OCPC Region**

| Race                   |                  |                  |                  |                           |                                  |                |   |                |                   |                    |
|------------------------|------------------|------------------|------------------|---------------------------|----------------------------------|----------------|---|----------------|-------------------|--------------------|
|                        | Total Population | One Race         |                  |                           |                                  |                |   |                | Two or More Races | Hispanic or Latino |
|                        |                  | Total            | White            | Black or African American | American Indian or Alaska Native | Asian          | Native Hawaiian and Other Pacific Islands | Other          |                   |                    |
| Abington               | 17,062           | 15,892           | 14,152           | 683                       | 369                              | 428            | 9   | 581            | 1,170             | 660                |
| Avon                   | 4,777            | 4,431            | 3,092            | 910                       | 7                                | 196            | -   | 226            | 346               | 311                |
| Bridgewater            | 28,633           | 26,814           | 23,636           | 2,054                     | 48                               | 541            | 7   | 528            | 1,819             | 1,267              |
| Brockton               | 105,643          | 83,827           | 31,074           | 36,951                    | 492                              | 2,278          | 29  | 13,003         | 21,816            | 12,762             |
| Duxbury                | 16,090           | 15,417           | 15,009           | 72                        | 21                               | 220            | -   | 95             | 673               | 346                |
| East Bridgewater       | 14,440           | 13,636           | 12,880           | 397                       | 21                               | 128            | 3   | 207            | 804               | 367                |
| Easton                 | 25,058           | 23,697           | 21,033           | 1,321                     | 41                               | 819            | 5   | 478            | 1,361             | 955                |
| Halifax                | 7,749            | 7,448            | 7,230            | 72                        | 18                               | 33             | 2   | 93             | 301               | 143                |
| Hanover                | 14,833           | 14,245           | 13,693           | 116                       | 6                                | 271            | 1   | 158            | 588               | 277                |
| Hanson                 | 10,639           | 10,165           | 9,795            | 90                        | 9                                | 107            | -   | 164            | 474               | 205                |
| Kingston               | 13,708           | 13,095           | 12,639           | 134                       | 10                               | 170            | 3   | 139            | 613               | 275                |
| Pembroke               | 18,361           | 17,578           | 17,076           | 122                       | 23                               | 177            | 5   | 175            | 783               | 319                |
| Plymouth               | 61,217           | 57,710           | 54,544           | 1,139                     | 138                              | 685            | 5   | 1,199          | 3,507             | 1,793              |
| Plympton               | 2,930            | 2,833            | 2,768            | 21                        | 10                               | 13             | 2   | 19             | 97                | 37                 |
| Stoughton              | 29,281           | 26,561           | 18,193           | 5,246                     | 48                               | 1,591          | 7   | 1,476          | 2,720             | 1,924              |
| West Bridgewater       | 7,707            | 7,213            | 6,739            | 250                       | 12                               | 84             | 1   | 127            | 494               | 251                |
| Whitman                | 15,121           | 14,171           | 13,152           | 456                       | 18                               | 205            | 2   | 338            | 950               | 538                |
| <b>OCPC Region</b>     | <b>393,249</b>   | <b>354,733</b>   | <b>276,705</b>   | <b>50,034</b>             | <b>1,291</b>                     | <b>7,946</b>   | <b>81</b>                                 | <b>19,006</b>  | <b>38,516</b>     | <b>22,430</b>      |
| <b>Massachusetts</b>   | <b>7,029,917</b> | <b>6,421,050</b> | <b>4,896,037</b> | <b>494,029</b>            | <b>24,018</b>                    | <b>507,934</b> | <b>2,301</b>                              | <b>496,731</b> | <b>608,867</b>    | <b>887,685</b>     |
| <b>OCPC % of State</b> | <b>5.59%</b>     | <b>5.52%</b>     | <b>5.65%</b>     | <b>10.13%</b>             | <b>5.38%</b>                     | <b>1.56%</b>   | <b>3.52%</b>                              | <b>3.83%</b>   | <b>6.33%</b>      | <b>2.53%</b>       |

Source: 2020 Decennial Census P1 & P2

Figure 4-9: OCPC Region Low-Income Populations

### Low-Income Population



The Low-Income Population map represents median household income by block group using the 2021 B19013 data from the American Community Survey. The 2021 Median Income in Massachusetts was calculated to be \$89,645 (American Community Survey). Any block group with a median income of less than 65%, which is less than \$58,269 of this was classified as a low-income Environmental Justice population. Some census blocks within the city of Brockton, Hanover, Halifax, and Plymouth have greater concentrations of low median-income block groups, as well as the area around Bridgewater State University. A couple of block groups were missing data from 2021 and so they were replaced by previous years that were available. The map also shows the state routes and U.S. Highways in the OCPC region.

#### EXISTING LAND USE

Overall, the Old Colony region is characterized by typical “bedroom community” development patterns with single-family homes on residential plots of land and commercial (typically retail and service-based) development clustered around highway interchanges, along state-numbered

roadways, and in town centers. Land use and development patterns in the region are monitored through the Old Colony Land Use Management System (LUMS).

### **Policy and Growth**

By developing local and regional comprehensive plans for growth around transit, designing walkable streetscapes, and facilitating energy-efficient building design, the Region is working to reduce energy consumption and its contribution to climate change. The Region is working to improve resiliency by working with communities in the floodplains to reduce the risks of sea level rise and coastal flooding thereby improving the ability of its neighborhoods, buildings, and infrastructure to withstand and recover quickly from flooding and climate events. These plans identify and implement land use and zoning changes as well as other actions to support the short-term recovery and long-term vitality of communities at risk. Thinking ahead, and working together, helps the region achieve a high quality of life, economies of scale, high-quality regional services, and a competitive edge envied by other communities. These planning efforts do two main things to ensure that tax dollars will be spent for the greatest public good; it provides a roadmap to grow and evolve.

### **Commuting Patterns and Mode Shift**

The primary responsibility for transportation system planning is given to the Old Colony Planning Council Metropolitan Planning Organization (MPO), which oversees the application of Federal and State transportation funding. The MPO produces a Regional Transportation Plan (RTP) every four years. The RTP envisions a safe, efficient, environmentally responsible, and seamless multimodal transportation system integrated with sustainable land use patterns to serve the mobility and accessibility needs of the region's residents, businesses, and through-travelers.

Commuting patterns and mode shifts are monitored through a variety of sources and methodologies, including but not limited to data from the Census Bureau and American Community Survey, the MassDOT Massachusetts Travel Survey, physical traffic counts, and surveys of park and ride facilities across the region.

Duxbury residents have the longest mean commute times (37.5 minutes), followed by Abington (36.1 minutes), and Pembroke (35.7 minutes). The community with the shortest commute is West Bridgewater at 27.6 minutes.

The community with the highest percentage of commuters includes Duxbury (31.3%) and Brockton (30.9%). Communities with the lowest percentage of residents using alternative transportation include Halifax (28.7%), Whitman (18.9%), and Hanson (18.5%). Each of these communities has commuter rail stations within their borders.

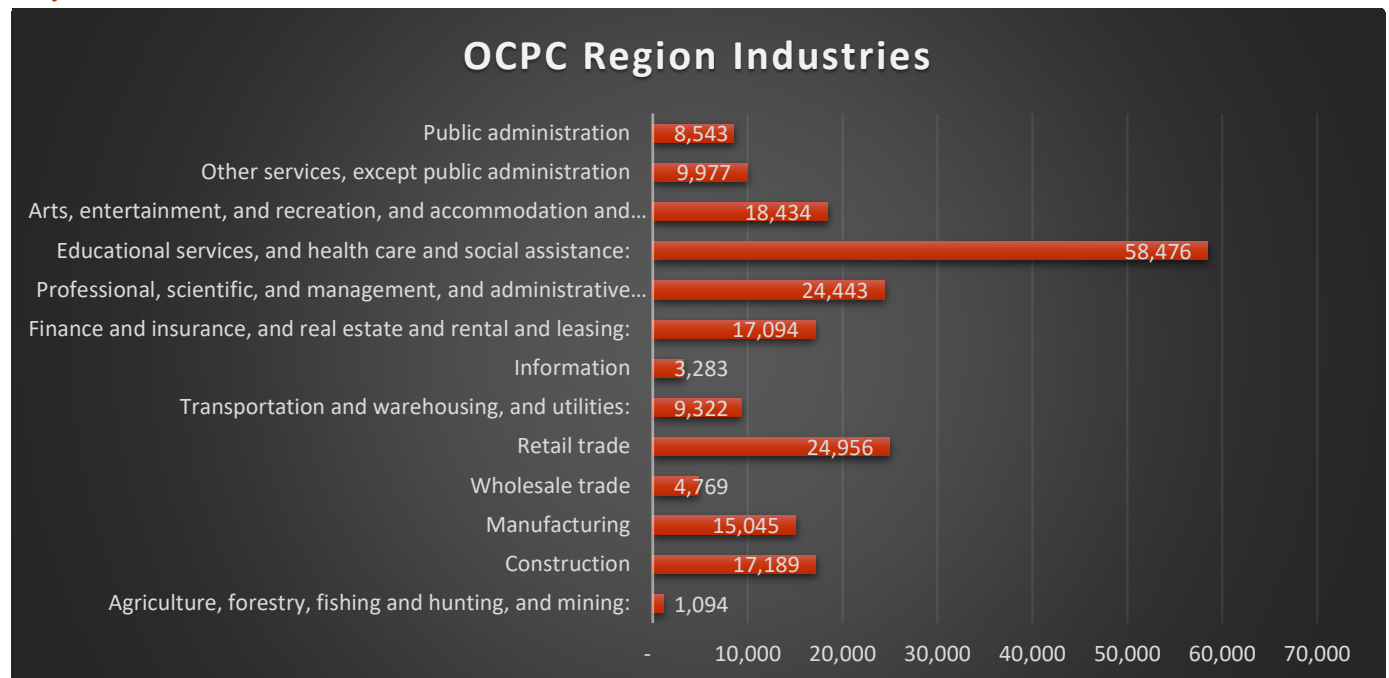
A large percentage of residents drive alone during their commute. Of the residents of West Bridgewater, 85.7 percent drive alone. In Hanson, a community with a commuter rail station, 81.5 percent of the residents drive alone.

The 2021 ACS estimates 22,412 residents of the region worked from home. This is a significant increase from 2013 when 6,058 residents were reported to work from home. This may be due to the COVID-19 pandemic but the ability of some employers to continue to allow work-from-home opportunities is a continuing trend in the workplace.

### American Community Survey Commute to Work Data

The United States Census Bureau releases estimates on the mode of commute for the labor force by the community, based on results of the American Community Survey. The most recent available ACS data at the time of the development of the RTP was from 2021. The data in the following table lists the number of workers over the age of 16 in each community in the Old Colony Region; how they commute to work; and the mean commute time for the community. While a very large percentage of the employed population continues to drive alone in a personal car or truck, other forms of transportation including carpooling and transit are becoming increasingly popular. With a mean commute time of 32.61 minutes, residents of West Bridgewater have the shortest commute in the region at 27.6 minutes while at 37.5 minutes residents of Duxbury had the longest commute.

### Major Industries



Source: 2021 S2403, S2405 5-year estimates

The major occupations for residents of the region are in the educational services, health care, and social assistance fields. The second highest industry is retail trade. And the third is professional, scientific, and management, and administrative services. The smallest industries include Agriculture, forestry, fishing and hunting, and mining.

**Table 4-17: Mode of Commute and Mean Commute Time**

|                    | Workers<br>over 16 | Car,<br>truck,<br>or van | Drove<br>Alone | Carpool       | Public<br>Transport | Bicycle    | Walked       | Other<br>Means | Work at<br>Home | Mean<br>Commute<br>Time<br>(m) |
|--------------------|--------------------|--------------------------|----------------|---------------|---------------------|------------|--------------|----------------|-----------------|--------------------------------|
| Abington           | 9,174              | 7,484                    | 7,061          | 423           | 753                 | 11         | 28           | 12             | 886             |                                |
| Avon               | 2,769              | 2,288                    | 2,078          | 210           | 177                 | -          | 129          | 6              | 169             |                                |
| Bridgewater        | 14,598             | 12,042                   | 11,314         | 728           | 407                 | -          | 860          | 96             | 1,193           |                                |
| Brockton           | 48,845             | 39,567                   | 33,740         | 5,827         | 1,176               | 30         | 500          | 1,272          | 6,300           |                                |
| Duxbury            | 7,484              | 5,595                    | 5,140          | 455           | 480                 | 29         | 54           | 66             | 1,260           |                                |
| East Bridgewater   | 7,673              | 6,488                    | 6,030          | 458           | 316                 | -          | 7            | 135            | 727             |                                |
| Easton             | 12,871             | 10,350                   | 9,404          | 946           | 358                 | 6          | 336          | 96             | 1,725           |                                |
| Halifax            | 4,007              | 3,390                    | 3,258          | 132           | 140                 | -          | 97           | 54             | 326             |                                |
| Hanover            | 7,619              | 6,083                    | 5,747          | 366           | 339                 | 39         | 67           | 43             | 1,048           |                                |
| Hanson             | 5,612              | 4,991                    | 4,576          | 415           | 328                 | -          | 18           | 110            | 165             |                                |
| Kingston           | 7,949              | 6,659                    | 6,018          | 641           | 123                 | -          | 18           | 92             | 1,057           |                                |
| Pembroke           | 10,012             | 7,886                    | 7,251          | 635           | 347                 | -          | 197          | 39             | 1,543           |                                |
| Plymouth           | 31,239             | 25,751                   | 22,972         | 2,779         | 758                 | 73         | 654          | 674            | 3,629           |                                |
| Plympton           | 1,438              | 1,215                    | 1,068          | 147           | 17                  | -          | 8            | 6              | 192             |                                |
| Stoughton          | 15,647             | 12,839                   | 11,395         | 1,444         | 839                 | 44         | 366          | 60             | 1,499           |                                |
| West Bridgewater   | 3,994              | 3,583                    | 3,423          | 160           | 70                  | -          | 74           | 26             | 241             |                                |
| Whitman            | 8,379              | 7,393                    | 6,797          | 596           | 259                 | -          | 254          | 21             | 452             |                                |
| <b>OCPC Region</b> | <b>199,310</b>     | <b>163,604</b>           | <b>147,272</b> | <b>16,362</b> | <b>6,887</b>        | <b>232</b> | <b>3,667</b> | <b>2,808</b>   | <b>22,412</b>   |                                |

Source: 2021 ACS 5-Year Estimates, B08006, S0801

## Chapter 5: Regional Highway System

The Highway section of this plan includes a review of the existing physical conditions, current operational conditions and deficiencies, as well as potential opportunities for improvements in the Old Colony Regional Highway System.

### THE REGIONAL HIGHWAY NETWORK

The regional highway network continues to serve as the primary system within the overall transportation network for the movement of both people and goods within and through the Old Colony Region. Despite the region's continued dependence upon motor vehicles, the integration and coordination of all transportation modes of travel within the region remain at the forefront of the planning process. This includes enhancing land use and development connections to the transportation system (such as transit-oriented-development, TOD), which increase mode choice and efficiency and economy in the system. It also includes implementation of the Massachusetts Complete Streets initiative, which includes planning roads for all road users including transit, bicycling, and walking, as well as the integration of park and rides and transit parking and connections.

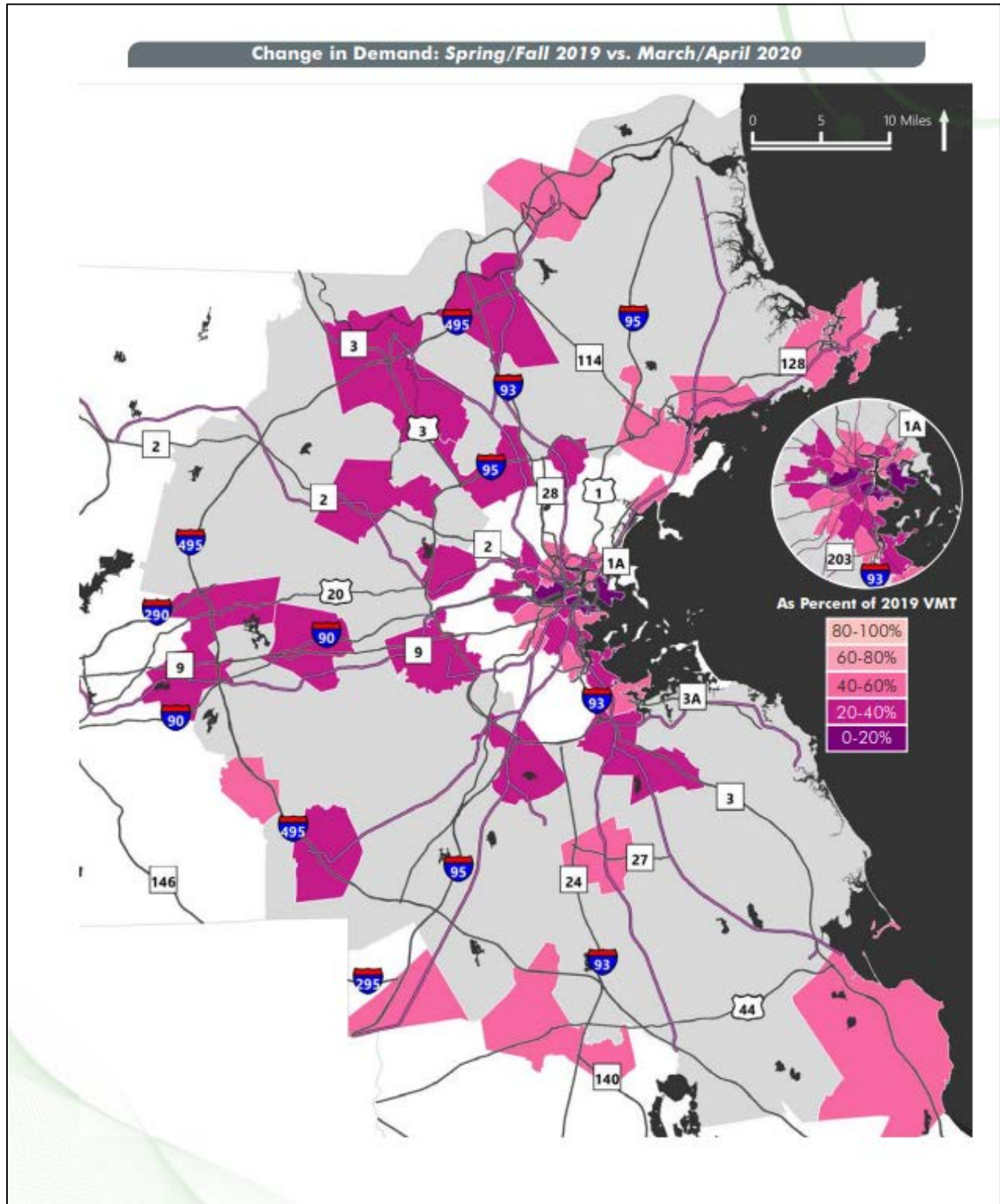
The trend whereby housing, office, retail, and institutional uses are being located along major and minor arterials continues thereby increasing destination points along major regional highway corridors. This increases trip generation and turning movement conflicts within highway corridors thereby decreasing capacity in the overall system. This also continues the dispersal of employment density and contributes to auto dependency.

The Old Colony Region continues to maintain its suburb to core city commute, that is commuting between Old Colony communities and Boston despite that more development and destinations have become dispersed along major corridors throughout the region. This dispersal of corridor development, which is auto dependent, has been and continues to be a challenge for mode shifts to alternatives such as transit, walking, and bicycling.

The Old Colony Region offers transit opportunities including bus (BAT and GATRA), as well as commuter rail for commuting to Boston, and for commuting to destinations within the region. Prior to the COVID-19 Pandemic, which began in early 2020, Massachusetts was slightly better than the national average regarding mode choice. Prior to 2020, over 3.2 million workers living in Massachusetts commuted to their workplaces based on the Massachusetts Department of Transportation (MassDOT) statistics, and over 2.3 million, or 72 percent, drove their car to work, compared to 86.1 percent nationwide. Commuting and mode choice within the Old Colony Region reflected that of Massachusetts as a whole. The COVID Pandemic's impact on travel demand was briefly significant and is illustrated in Figure 651 from MassDOT's 2022 report, *Shared Travel Network Study*. Figure 5-1 shows that travel demand in Brockton and Plymouth was 40 to 60 percent of 2019 levels in 2020.

The Covid pandemic over the past three years has also demonstrated the viability of remote employment and remote learning, and along with increases in retail home delivery, which also increased demand for warehousing, has contributed to a decrease in residential travel demand and trips. Nevertheless, automatic traffic counts show that traffic on the highway system has come back to almost pre-pandemic levels.

Figure 5-1



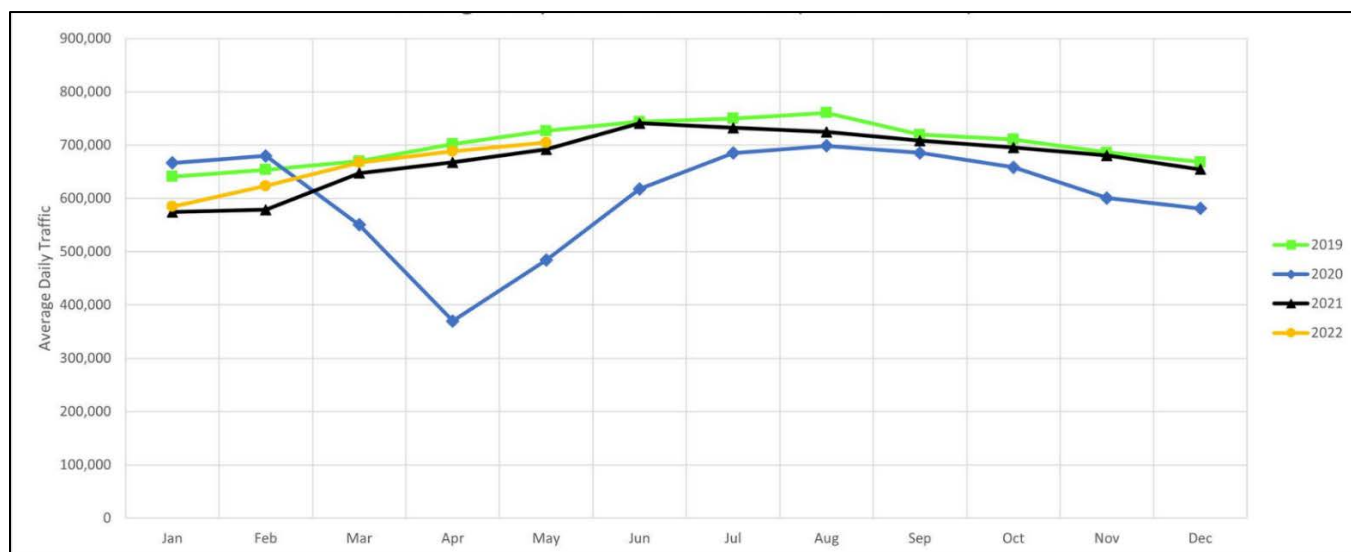


Old Colony staff compiled traffic volume counts from seven MassDOT permanent count stations for 2019 through May of 2022. The data was aggregated from month to month and from year to year (the 2022 data after May of 2022 was unavailable due to Route 24 resurfacing projects). The data was compiled from the following MassDOT permanent count locations:

1. Avon – Route 24 south of Harrison Boulevard
2. Bridgewater – Route 24 at West Bridgewater Line
3. Brockton – Route 24 north of Route 123
4. Plymouth – Route 3 north of Bourne Line
5. Randolph – Route 24 south of Route 93
6. Raynham – Interstate 495 south of Route 24
7. Weymouth – Route 3 north of Route 18

Figure 5-2 shows the permanent count location comparisons for Annual Average Daily Traffic (AADT), which shows a significant drop in volumes from February to April of 2020 at the beginning of the pandemic. Traffic began to climb higher in June and July of 2020, but began to drop off again from October to December of 2020. Traffic volumes began to climb again in 2021 and 2022 almost to 2019 levels.

**Figure 5-2 Annual Average Daily Traffic Permanent Count Locations 2019 – May 2022**



The Old Colony Region contains a small section of Interstate Highway System mileage (approximately 2.526 miles of I-495 in Bridgewater); however, the region has a number of limited access highways including Route 24 (through Bridgewater, West Bridgewater, Brockton, Avon, and Stoughton), Route 3 (through Plymouth, Kingston, Duxbury, and Pembroke), and Route 44 (through Plymouth, Kingston, and Plympton). The region has convenient access to the Interstate system to I-95 and I-93 to the north and west and I-495 to the west and the southeast. In addition, the region is serviced with a number of major arterials (state numbered routes)



interchanges of these corridors as well as at specific bottlenecks along these two key north-south arterials. Table 5-1 shows the growth in traffic on Route 24 and Route 3 since 2013.

**Table 5-1**

| <b>Year</b> | <b>Route 24 AADT<br/>Avon Count<br/>Station</b> | <b>Route 3 AADT<br/>Plymouth<br/>Count Station</b> |
|-------------|---|--|
| 2013        | 108,764   | 53,371   |
| 2014        | 103,430   | 54,225   |
| 2015        | 107,567   | 56,394   |
| 2016        | 120,835   | 59,101   |
| 2017        | 123,252   | 59,574   |
| 2018        | 122,984   | 60,170   |
| 2019        | 125,982   | 61,373   |
| 2020        | 107,843   | 52,167   |
| 2021        | 119,650   | 59,157   |

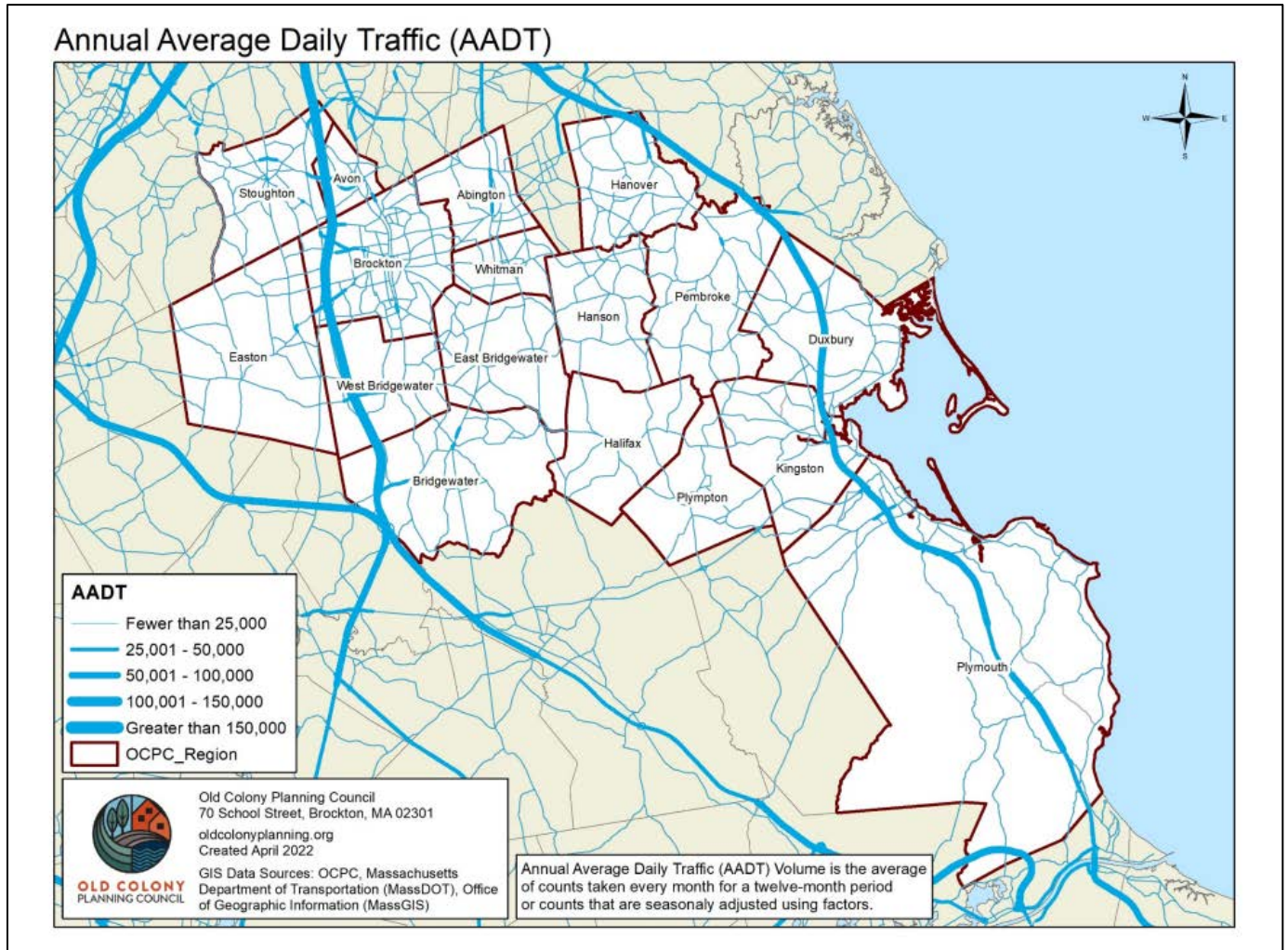
Table 5-1 shows gradual increases in traffic at MassDOT permanent counts stations along Route 24 and Route 3. In the year 2020, the traffic volumes dropped significantly in both corridors due to the Covid Pandemic. In 2021, as the pandemic subsided, the traffic increased again on both highways to almost pre-2019 levels. Figure 5-4 shows the Annual Average Daily Traffic on the Regional Highway Network in the Old Colony Region.

Route 44, as a limited access divided highway, traverses the Old Colony Region from east to west. It transitions into a two-lane undivided major arterial west of Route 18 in Middleboro. The Route 44 interchanges in the Old Colony region generally accommodate the traffic volumes sufficiently. There is in general less congestion along this route and at its access points.

The Old Colony Region provides principal arterials and minor arterials running north-south and east-west providing inter-regional and intra-regional vehicle access. Many of these routes traverse through downtown areas and town centers in the region, which have traditional and historic characteristics found in many New England communities. Many of these routes through the center of the communities within the region were originally laid out in pre-automobile times, sometimes resulting in skewed intersection alignments, intersections in close proximity, and intersections with five-leg or more approaches. Over the past few decades, much of the land use along these corridors has been developed for commercial and office uses, or dense (apartment or condominium) residential development. The phenomenon whereby adjacent land use of these regionally significant roads gradually increase in development, has impacted the function of these principal highways so that they have become destinations as well as regional corridors

designed for mobility, which impacts the carrying capacity of the highways creating bottlenecks and congestion.

Figure 5-4



#### FEDERAL AND STATE GUIDELINES

Federal and state guidelines for the Long-Range Transportation Plan (LRTP) have been evolving over the decades based on transportation reauthorization legislation. The latest statute, Infrastructure Investment and Jobs Act (IIJA), includes a five-year reauthorization of federal surface transportation programs (reauthorizing the Fixing America’s Surface Transportation Act, FAST). These reauthorization laws have been consistent, despite the refinement over the years, in that they require the Long-Range Transportation Plan (LRTP) to reflect state and local goals as well as national goals and objectives. The guidance requires that the LRTP be a planning document and reflect the changes and trends in demographics, land use, and regionally relevant

transportation technology trends. The FHWA, in its updated guidance, listed eight planning emphasis areas for the LRTP. These include:

1. Tackling the Climate Crisis – Transition to a Clean Energy, Resilient Future - MPO's should work with federal, state, and local partners to ensure that our transportation plans and infrastructure investments help achieve the national greenhouse gas reduction goals of 50-52 percent below 2005 levels by 2030, and net-zero emissions by 2050, and increase resilience to extreme weather events and other disasters resulting from the increasing effects of climate change.
2. Equity and Justice in Transportation Planning – MPOs should strive to advance racial equity and support for underserved and disadvantaged communities that will help ensure public involvement in the planning process and that plans and strategies reflect various perspectives, concerns, and priorities from impacted areas.
3. Complete Streets – MPOs should strive to provide an equitable and safe transportation network for travelers of all ages and abilities.
4. Public Involvement - Providing early, effective, and continuous public involvement bringing diverse viewpoints into the decision-making process.
5. Strategic Highway Network (STRAHNET)/U.S. Department of Defense (DOD) Coordination - MPOs and State DOTs should coordinate with representatives from DOD in the transportation planning and project programming process on infrastructure and connectivity needs for STRAHNET routes and other public roads that connect to DOD facilities.
6. Federal Land Management Agency (FLMA) Coordination - MPOs and State DOTs should coordinate with FLMAs in the transportation planning and project programming process on infrastructure and connectivity needs related to access routes and other public roads and transportation services that connect to Federal lands.
7. Planning and Environment Linkages (PEL) - MPOs should implement PEL as part of the transportation planning and environmental review processes.
8. Data in Transportation Planning - MPOs should incorporate data sharing and consideration into the transportation planning process because data assets have value across multiple programs.

#### MASSACHUSETTS DIRECTIVES AND INITIATIVES

Massachusetts has instituted a number of initiatives and directives to combat climate change, improve mobility, improve safety, advance equity, and promote efficiency within the transportation system. The project impact review process in Massachusetts as well as MassDOT's project development process, through its *Project Development and Design Guide* advances its transportation goals, objectives, and policies. Transportation planning is supported through a number of programs and directives including:

- Massachusetts Complete Streets Program
- Massachusetts Safe Routes to School Program

- The Massachusetts Global Warming Solutions Act (and the Massachusetts Clean Energy and Climate Plan for 2025 and 2030)
- The Mode Shift Initiative
- The Healthy Transportation Compact, the Healthy Transportation Policy Directive
- Massachusetts Ridesharing Regulation

Massachusetts Greenhouse Gas (GHG) Emissions and Mitigation Policies focus on reducing greenhouse gas (GHG) emissions, promoting healthy transportation options (walking, bicycling, and public transit), and supporting smart growth development. Old Colony's development of goals, objectives, plans, and projects, as well as its transportation review (MEPA) process, supports and advances MassDOT policies and goals as outlined in its statutes, directives, guidelines, and standards. Shifting travel demand from vehicles to alternative modes helps reduce congestion and preserves the capacity of the highway network as well as protecting the natural environment and improving public health.

#### TRAVEL DEMAND MODEL AND SCENARIO PLANNING

Travel Demand Model (TDM) is a mathematical computing program used to develop estimated future traffic volume and travel time projection. A well developed and calibrated TDM is a fundamental tool for supporting regional transportation planning process. OCPC designs, develops, administers, and updates an in-house travel demand model by using the latest TransCAD software. TransCAD is a GIS-based travel demand modeling software that provides state of art modeling tools rather than paper and pen manual calculation. OCPC's Travel Demand Model is also a centralized data library that stores transportation system inventory and operational data, such network speeds, volume, capacity, and level of service. Travel demand is a special and unique tool that: 1.) Provides land use impact from roadway congestion from volume increase due to land use growth and speed change; 2.) Is the most completeness of network coverage for transportation studies; 3.) Includes integration of exiting traffic data, survey data, and; 3.) Forecasts a calibrated model that projects into the future.

OCPC Travel Demand Model team consists of Guoqiang Li (Certified Professional Transportation Planner) who gained multiple years' working experience in travel demand model development and calibration and graduate education and continued education in travel demand modeling with credible institutions. OCPC staff are also involved and actively seeking continuous learning and data sharing opportunities in the national, regional, statewide modeling groups, such as from TMIP, MassDOT, Caliper and MIT programs.

Data availability and accuracy is an on-going challenge for a relatively small modeling group. OCPC strives to develop, process, and validate TDM with possible data resources and in partnership with MassDOT and other private and public entities. The following are the major components of input data including TAZ, highway network and transit network and various modeling parameters.

OCPC is developing its expanding and updating previous model which was developed in approximately 1999. In the past years, the 1999 model was updated, developed, and served many purposes. OCPC's new generation model is based on 2019-2020 conditions with 3 future model years 2030, 2040 and 2050 projection years. The new model included all 17 communities in the region.

### **Traffic Analysis Zone**

TAZ is a sub model mainly for estimation of trip generation which stores and analysis of socioeconomic projection in compliance with MassDOT policy. OCPC TAZ model has 277 TAZ and 70 External Stations built in in 2023. OCPC Travel Demand Model TAZ boundaries and geometry incorporates US Census Block Group GIS data structure. OCPC does not create new TAZ until there is a need to modify the initial Census Block Group boundary for special land use projects. OCPC Travel Demand Model has a highway network that includes freeways, arterials, collectors, and other important links. MassDOT 2019 Road Inventory Network provides major inputs for developing the TDM highway network. Additional field study and on-line data research are considered as needed. Map 1 illustrates TAZ and highway network structure.

The OCPC Travel Demand Model is a traditional four step model that includes trip generation, trip distribution, mode split and trip assignment. A calibrated 2019-2020 model will be developed to project future traffic conditions for the years of 2030, 2040 and 2050. Diagram 1 below illustrates the OCPC TDM development process.

### **Calibration**

The quality of input data and modeling process defines the outcome of travel demand model. OCPC Travel Demand Model complies with FHWA and State guidelines for modeling calibration recommendations. OCPC is awaiting final socio-economic forecasts (population, households, and employment) from the Projections Committee. Once received OCPC will update the TAZs and undertake the calibration process. Following calibration, staff will continue the application process for the LRTP, which is expected to be completed this spring.

### **Application**

Travel Demand will be a critical tool for traffic analysis and identifying regional congested locations for the LRTP. The model forecasts of future demand for transportation services with model outputs are used to estimate regional vehicle activity and a factor in selecting transportation investments. These modeling results anticipated future demand will inform the conversation informing the future infrastructure need and assist with performance-based planning as it related to PMS - System Performance Measures. It will also help in developing background traffic growth rates for traffic consultants in the region. The travel demand model will assist to fill the gap that relies on the statewide default growth rate or historical traffic counts.

The Travel Demand Model will assist us in developing evaluation for the OCPC Regional Significant Projects locations including but not limited to the following locations:

- Route 3 widening (Route 18 to Cherry Street)
- Route 24 widening (I 495 to Route 128)
- Plymouth – Samoset Street Road Diet (Route 3 to West Plymouth Square)
- Plymouth – Route 25 Interchange with Bourne Road
- Plymouth – Route Full Interchange at Plymouth Plantation Highway
- Plymouth – Route 3 at Long Pond Road Interchange (add northbound slip ramp from Long Pond Road to Route 3 NB)
- Brockton – Downtown Two Traffic Re-Circulation. Main Street (Pleasant to Belmont) and Warren Avenue (Pleasant to Belmont) back to two-way

With the improvement of TransCAD software, OCPC is incorporating the new features such as Signalized Intersection Capacity Analysis, Two-way Stop Controlled (TWSC) analysis, All-way Stop Controlled (AWSC) analysis, and Two-lane Highways Capacity analysis tools for assisting in the regional transportation planning analysis.

The summary plan for OCPC Travel Demand Modeling process is subject to the following factors but not limited to the availability, quality of input data, staffing, process, and needs for the special project and other greater uncertainties of future land use and transportation trends.

#### PAVEMENT CONDITIONS

The utilization of a pavement management system (PMS) allows an agency to keep with the principles of objectives-driven, performance-based planning, and supports the goal of maintaining a highway system in a state of good repair. The Old Colony Region has had a Pavement Management System since the 1980's and has updated the system periodically. A PMS is a set of tools and methods that assist decision makers in finding cost effective strategies for evaluating and maintaining pavements in a serviceable condition. It includes a database which is linked spatially to a Geographic Information System (GIS). A road system in good repair helps reduce delays due to long reconstruction periods, enhances freight movement, improves economic vitality, and provides opportunities to improve sidewalk and bicycle facilities through the implementation of the Complete Streets program.

The PMS calculates the rate of deterioration of pavement for streets or segments of streets and the implications of such deterioration for the cost of repairs. The system is based on a Pavement Condition Index (PCI) score (between 0 and 100) for the surveyed road segments, which leads to a recommended repair and cost associated with that repair based on the score. *Roads and Road segments are placed in condition categories based on the PCI score, which include "Poor", "Deficient", "Fair", "Good", and "Excellent".* Old Colony conducts windshield surveys of the pavement surface periodically, (every four years) for road and highways in the region that are federal aid eligible. As pavement reconstruction and resurfacing projects are completed on federal aid roads through the Old Colony Transportation Improvement Program (TIP), this information is also included in the PMS database. Local roads in the Old Colony Region are not included in the windshield surveys or database unless requested specifically by an OCPC community.



The repairs recommended by the PMS, based on the road condition, include five general default repair strategies. These include:

1. Reconstruction – This work includes a combination of a number of tasks, including: complete removal and replacement of a failed pavement segment, road sub-base replacement (gravel, sand, and aggregates), drainage work, road realignment, and safety hardware (guard rail) installation.
2. Rehabilitation – The rehabilitation of pavements may include full and partial depth patching, joint and crack sealing, grouting and under-sealing, and grinding and milling in conjunction with overlays over two inches.
3. Preventative Maintenance – This work may include extensive crack sealing, chip sealing, and micro-surface or overlays less than two inches thick.
4. Routine Maintenance – This work may include crack sealing and pothole patching.
5. No Immediate Maintenance or Repair.

*There is a total of 669.34 miles of Federal-Aid eligible roadways in the Old Colony region. The total NHS mileage in the Old Colony Region is 158.59 miles. The estimated cost for improving the entire Federal Aid eligible roadway network to a state of good repair (PCI score of “Good” or “Excellent” is more than \$210,000,00.00, The total interstate mileage is 2.526 miles, which is I- 495 entirely in Bridgewater. Table 4-1 shows the federal aid mileage for each community as well as the NHS mileage for each community.*

**Table 5-2 Federal Aid Mileage and NHS Mileage in the Old Colony Region**

| Community        | Federal Aid Mileage | NHS Road Mileage |
|------------------|---------------------|------------------|
| Abington         | 25.64               | 7.07             |
| Avon             | 15.19               | 4.00             |
| Bridgewater      | 43.87               | 11.38            |
| Brockton         | 85.99               | 25.59            |
| Duxbury          | 51.30               | 13.48            |
| East Bridgewater | 34.37               | 4.42             |
| Easton           | 44.17               | 11.16            |
| Halifax          | 15.45               | 0.00             |
| Hanson           | 28.44               | 4.31             |
| Hanover          | 37.14               | 5.70             |
| Kingston         | 38.00               | 11.18            |
| Pembroke         | 39.71               | 7.28             |
| Plymouth         | 106.69              | 22.85            |
| Plympton         | 12.12               | 0.58             |
| Stoughton        | 42.23               | 12.47            |
| West Bridgewater | 29.45               | 10.44            |
| Whitman          | 19.58               | 6.68             |
| Total            | 669.34              | 158.59           |

*The only interstate mileage in the Region is I-495 in Bridgewater, which consists of 2.526 miles. One hundred percent of the interstate are categorized in the “Excellent” condition category.*

*Figure 4-3 shows existing pavement conditions in the Old Colony Region, and Figure 5-4 shows the Recommended Pavement Repairs for the federal aid roads in the region.*

#### TRUCK FREIGHT

Federal transportation authorization legislation, including Moving Ahead for Progress in the 21st Century Act (MAP-21) passed in 2012, the Fixing America’s Surface Transportation Act (FAST Act) passed in 2015, and the most recent in 2021, the Infrastructure Investment and Jobs Act (IIJA), require the tracking of freight performance. Some of the challenges in tracking freight performance include data consistency, accessing multi-modal data, data quality and quantity, developing and maintaining reliable freight transportation models, and understanding the roles of state agencies and MPOs in freight planning and funding. In addition, the proprietary nature of information regarding freight movement among private companies in a competitive environment represents an obstacle in surveying private freight providers.

The federal highway authorization bill of 2012, MAP-21, established a national goal for freight movement and economic activity: “To improve the nation’s freight network, strengthen the

ability of rural communities to access national and international trade markets, and support regional economic development.” The FAST Act of 2015 required each state to develop a state freight plan (covering a five-year forecast period) in order to receive funding under the National Highway Freight Program. The FAST Act also included provisions to improve the condition and performance of the national freight network. Performance measures supporting freight movement include the categories of safety, infrastructure, and system performance. These performance measures were adopted by the MassDOT and the Old Colony MPO:

- ❖ Safety
  - Number and rate of fatalities on all public roads.
  - Number and rate of serious injuries on all public roads.
  - Number of non-motorized fatalities and serious injuries on all public roads.
- ❖ Infrastructure
  - Percent of Interstate pavements in good/poor condition.
  - Percent of non-Interstate NHS pavements in good/poor condition.
  - Percent of NHS bridge deck area in good/poor condition.
- ❖ System performance
  - Truck Travel Time Reliability Index (TTTRI) : This measure is calculated by dividing the 95th percentile truck travel time on a road segment by the 50<sup>th</sup> percentile travel time.

Table 5-3 describes Massachusetts statewide targets adopted for federally required performance measures and the actual performance for travel time reliability on the Interstate Highway System, travel time reliability on the non-Interstate NHS, and TTTRI on the Interstate Highway system. In addition, the Old Colony MPO approved and endorsed the MassDOT System Performance Measure (PM3) 2020 and 2022 Targets in September 2018.

**Table 5-3 - Massachusetts Statewide Performance Measures and Targets\***

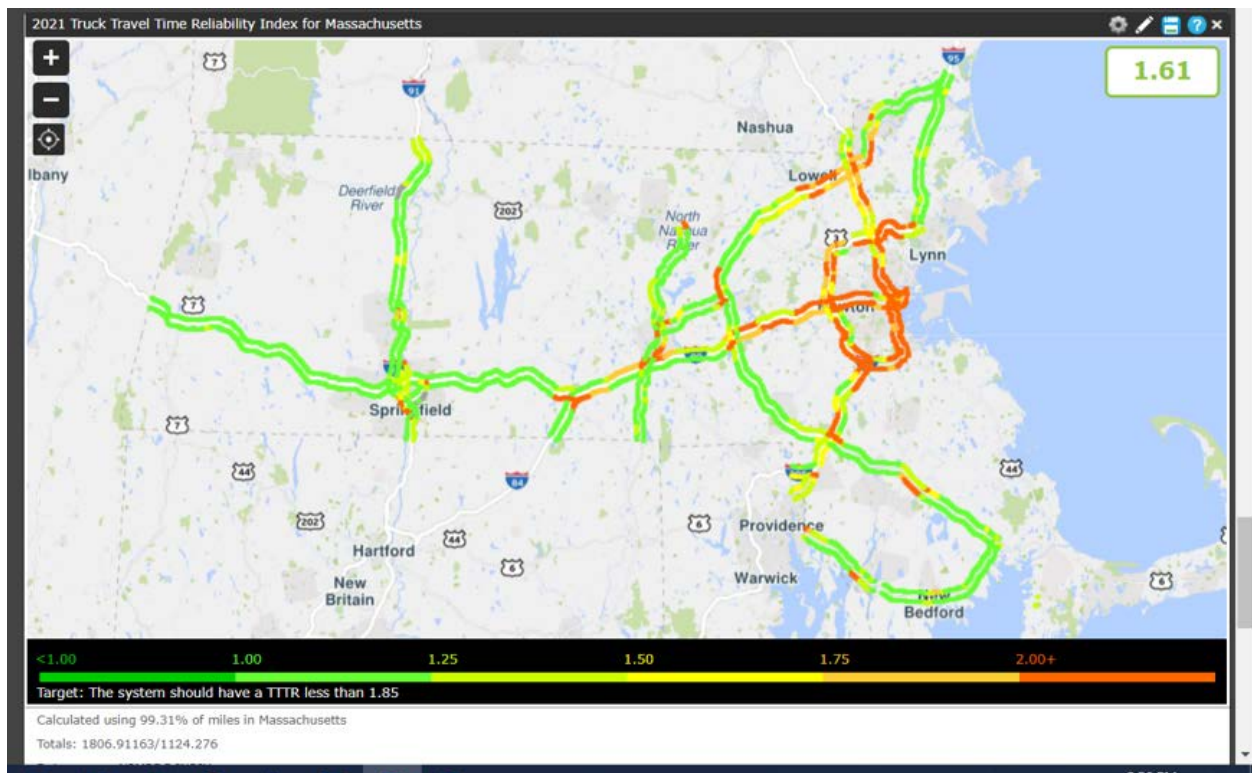
| Adopted Performance Measure  | 2017<br>(Baseline Value) | 2018<br>Actual | 2019<br>Actual | 2019<br>Target | 2020<br>Actual | 2021<br>Four Year<br>Target | 2021<br>Actual |
|--|--------------------------|----------------|----------------|----------------|----------------|-----------------------------|----------------|
| Percent of person-miles on the Interstate Highway System that are reliable | 70%                      | 69%            | 69.1%          | 68%            | —              | 68%                         | —              |
| Percent of person-miles on the non-Interstate NHS that are reliable        | —                        | —              | 82.4%          | —              | —              | 80%                         | —              |
| Truck Travel Time Reliability Index for the Interstate Highway System      | 1.84                     | 1.89           | 1.86           | 1.85           | —              | 1.85                        | —              |

(Source: FHWA State Highway Reliability Report for Massachusetts)

Figure 5-4 shows the TTTRI on Massachusetts Highways for the year 2021 based on data available from National Performance Management Research Data Set (INRIX/RITIS). The TTRI for Massachusetts Interstate Highways was 1.61 in 2021, below the set target of 1.85. The Old Colony Region contains a small portion of interstate mileage (approximately 2.526 miles of I-495 in Bridgewater). The TTTRI for the portion of interstate (I-495) in the Old Colony Region for 2017 was 1.55. It was 1.51 in 2019 and 1.33 in 2021.

Non-Interstate NHS mileage in the Old Colony Region is 354.04 miles. The percentage of person-miles on the non-Interstate NHS that are reliable in the Old Colony Region for 2017 was 90.2 percent (based on INRIX/RITIS data), which was above the 80 percent 2021 target. It was 89.5 percent in 2019, and 89.8 percent in 2021. The percent of person-miles on the Interstate Highway System with the Old Colony Region (approximately 2.56 miles of I-495) that are reliable for 2017, 2019, and 2021, was 100 percent for all three of the reporting years (based on the INRIX/RITIS data).

**Figure 5-4 Map of Massachusetts 2021 Truck Travel Time Reliability Index National Performance Management Research Data Set**



According to the NCHRP Research Report 925, Estimating the Value of Truck Travel Time Reliability, unreliability in travel time can be caused by demand factors that affect vehicle volumes or supply factors affecting a system’s ability to process traffic. These factors include: Demand factors such as special events, and fluctuations in demand, and incidents including crashes, weather, work zones, malfunctioning of traffic control devices, failure in infrastructure, and other incidents that impede capacity and/or disrupt traffic operations.

### The National Highway Freight Network

The National Highway Freight Network (NHFN) was established by the FAST Act. The NHFN network consists of those highway corridors of the U.S. freight transportation system critical to

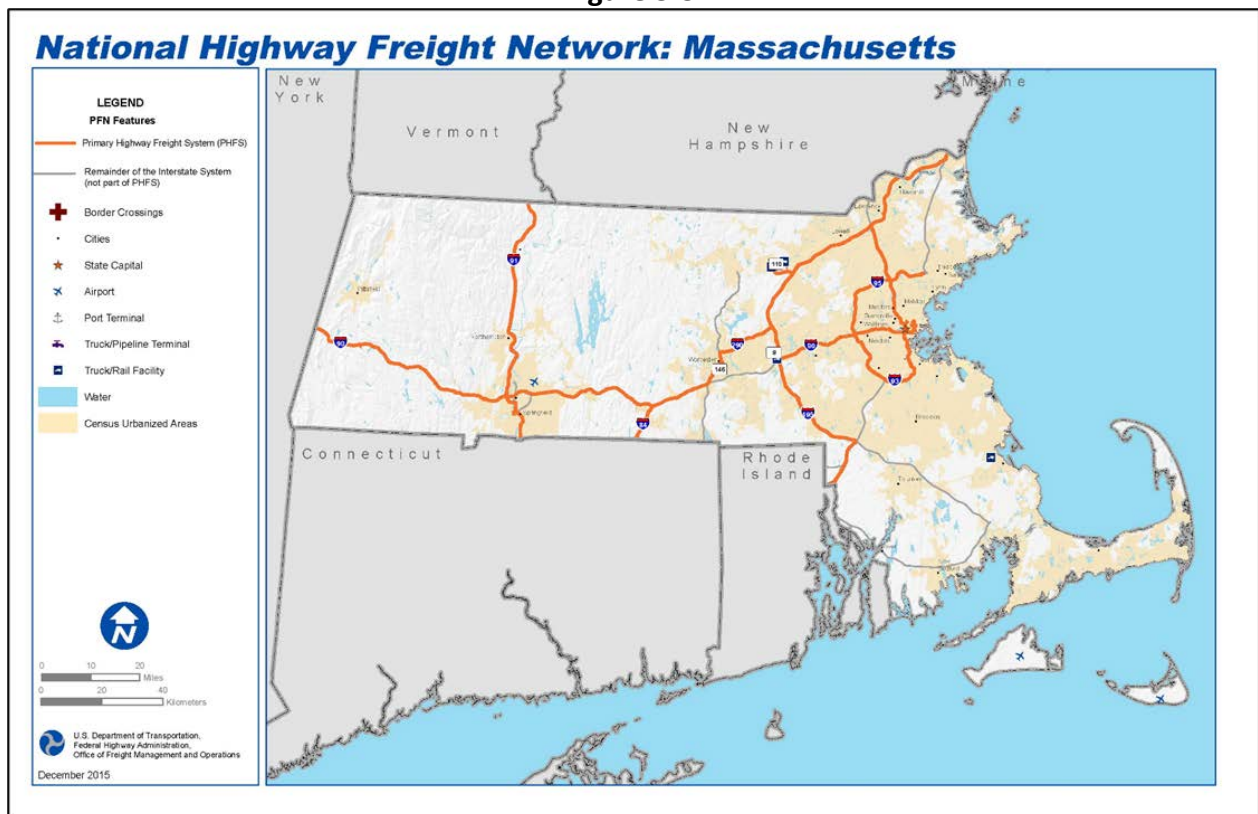
the current and future movement of freight, including all modes and connections in the national freight system (as determined by measurable and objective national data).

The FAST Act required that the NHFN consist of the following road network components:

- ❖ The Primary Highway Freight System (PHFS)
- ❖ Critical Rural Freight Corridors
- ❖ Critical Urban Freight Corridors
- ❖ Those portions of the Interstate System that are not part of the PHFS (Old Colony Region has a minimal amount of Interstate mileage (approximately 2.526 centerline miles) limited to I-495 in Bridgewater)

The FAST Act designated the PHFS and requires FHWA to redesignate it every five years. It also provides for designation of Critical Rural Freight Corridors and Critical Urban Freight Corridors. The Federal Highway Administrator determines the percentage of the national total of PHFS mileage that is located within each individual State. Figure 5-5 shows the National Highway Freight Network in Massachusetts and the Primary Highway Freight System. As shown in Figure 5-5, none of the PHFN is located within the Old Colony Region, although a small portion of I-495, outside of the PHFN is located in Bridgewater within the Old Colony Region. In Massachusetts, the major freight highway corridors within the NHFN include I-84, I-90, I-91, I-93, I-95, I-290, and I-495.

Figure 5-5



## THE MASSACHUSETTS FREIGHT PLAN UPDATE

The 2017 Massachusetts Freight Plan is being updated in 2023 through MassDOT’s continuing planning process and public outreach program, which consists of an advisory committee, public webinars, focus groups, and surveys. The advisory committee consists of stakeholders including representation from the trucking industry, businesses, the Trucking Association of Massachusetts, and public agencies. The outreach program is reaching out to stakeholders (Truck Drivers, port and warehouse workers, E-commerce and gig delivery workers, small business owners, people living near truck routes, and community advocates for safety- walking bicycling) regarding how freight moves through the Commonwealth of Massachusetts and how it impacts communities and/or various industry. The purpose of the study process is to confirm vision and goals, offer insight on local and regional freight-related issues, trends, and needs, share information with institutional and organizational representatives, and develop recommendations, solutions, and strategies by 2024.

The Massachusetts Freight Plan approved in 2017 was to develop and document the vision and goals of Massachusetts in achieving a safe, secure, resilient freight system as well as achieving economic competitiveness, efficient and reliable mobility, and healthy and sustainable communities. This plan is in compliance with the FAST Act, which requires the development of a comprehensive plan for immediate and long-range planning activities for freight investments within each state.

The 2017 Massachusetts plan identified five major interstate corridors as major trucking routes for freight traffic, including I-84, I-90, I-91, I-93, and I-95. It included seven interstate routes characterized as auxiliary routes, which include I-190, I-290, I-291, I-391, I-295, I-395, and I-495. Major non-interstate corridors identified as major trucking routes in the Massachusetts plan includes US-3, US-6, MA-2, MA-3 (within the Old Colony Region), MA-24 (within the Old Colony Region), MA-128, and MA-146.

The Massachusetts plan stated that major trucking routes in Massachusetts serve Boston directly or circumnavigate the Boston metropolitan area using I-495. The plan describes the primary truck route through Massachusetts entering I-84 from Connecticut and New York City, proceeding past Worcester on I-90, continuing north on I-495, and exiting using I-93 to New Hampshire and I-95 to Maine. Additionally, the route from Chicago and the Midwest enters Massachusetts via I-90 from New York. The I-495/I-90 interchange is considered an important bottleneck along the major trucking route, requiring solutions for remediation. Access to the major truck route network in the Old Colony Region is via Route 24 to I-495 in Bridgewater or Route 24 north to I-93 (Route 128) and in Plymouth, Route 3 north to I-93 or west on Route 44 to I-495. Figure 5-6 shows the bottlenecks in the Massachusetts freight network cited in the Massachusetts Freight Plan. Figure 5-6 also shows the Critical Urban Freight Corridors along Route 24 and in Brockton downtown. Recommendations from the 2017 Massachusetts Freight Plan are summarized as follows:

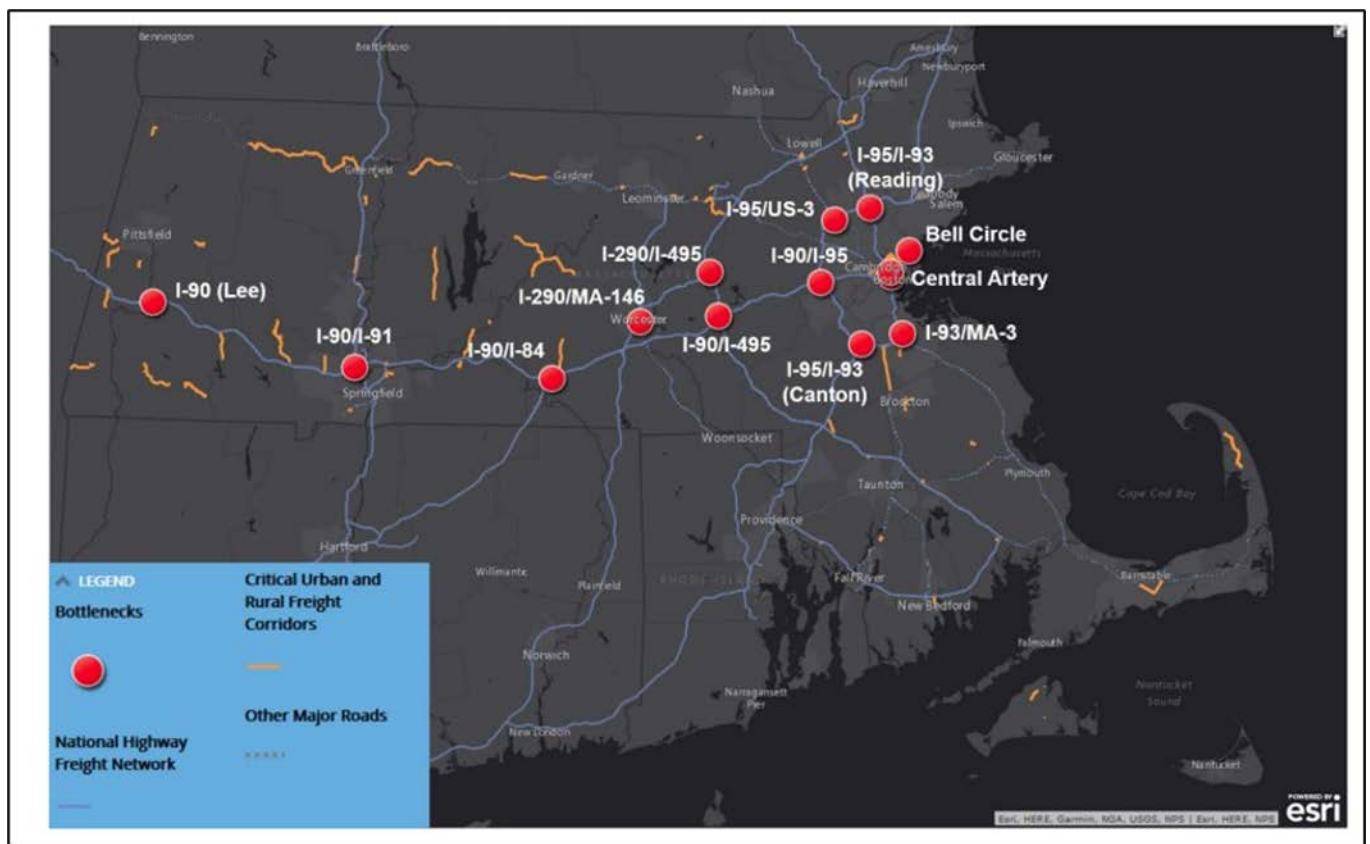
Infrastructure:

1. Improve the condition of freight network assets.
2. Build or expand truck stops on primary truck routes.
3. Upgrade rail lines to the 286K standard.
4. Revolve key bottlenecks on highways.
5. Maintain uncongested freight access to airports, seaports, and rail terminals in mixed-use urban settings.
6. Modernize container terminal facilities.

Policies and people:

1. Develop a workforce strategy for freight professions.
2. Support policies to reduce CO2 emissions from all freight vehicles.
3. Harmonize oversize/overweight permitting across New England.
4. Coordinate with freight planning in neighboring states.

Figure 5-6



OLD COLONY FREIGHT PROFILE AND FREIGHT PLAN RECOMMENDATIONS

The primary mode for moving freight in Massachusetts is by truck. Trucking is the primary mode utilized for the movement of goods to, from, and through the Old Colony Region as well. This is based upon analysis of the movement of freight by mode in Massachusetts developed in the Freight Analysis

Framework. The Freight Analysis Framework (FAF) is a model developed for the U.S. Department of Transportation to provide a comprehensive picture of freight movement and activity. The FAF estimates commodity flow and freight transportation activity among states, regions, and international gateways. It includes estimates of tonnage and value of goods shipped by type of commodity and mode of transportation.

The FAF reports on freight tonnage and value of commodities on the freight network within and through the states. It does not include freight movement on a local level, or within a regional planning region such as the Old Colony Region, nevertheless, the FAF can give an insight into the character of freight movement for the Old Colony Region. Within the FAF freight model, the Old Colony Region is part of a larger Massachusetts Eastern zone (Boston Area).

The primary trucking routes in the Old Colony Region include Route 24, Route 3, and I-495 as trucking remains the primary mode of transportation for the movement of goods in the region and is expected to continue to play this major role into the future. Trucking facilities, warehousing, and industrial parks cluster in the Route 24 corridor and along ancillary highways that serve Route 24. The state numbered route system in the Old Colony Region is vital as trucking facilities and industrial parks are clustered along these routes with easy access to the regional highway network and the national highway network. These include Route 106, Route 104, Route 138, Route 139, Route 27, Route 28, Route 123, and Route 27. State routes important to the Route 3 corridor include Route 3A, Route 27, and Route 139. Freight shipments by truck are expected to grow in the region, therefore constraints in the highway network including limited intersection turning radii, limited bridge heights, and bottleneck congestion will have a negative impact on freight movement in the region. The lack of interstate standards on Route 24, which creates weaving problems and conflicts due to lack of acceleration and deceleration lanes, will continue to have a negative impact on freight movement in the region.

The FHWA offers a series of Transportation Systems Management and Operations improvements as well as Freight Planning Management techniques as potential improvement in the movement of goods in the transportation system. These include:

- Freight Traveler Information Systems
- Truck Parking Information Management Systems
- Weigh-in Motion Systems and Smart Roadside Monitoring
- Arterial Progression Management and Access Management
- Curb Loading Zone Management
- Electronic Credentialing for Drivers and Vehicles
- Off-Peak Deliveries and Demand Management

General improvements to accommodate future freight movement in the Old Colony Region include:

- Intersections - signal timing adjustments and improved signal coordination are needed in key corridors.



- Intersection – limited turning radii at intersections impede truck movement, intersections should be reconfigured for wide truck turns and movements at specific intersections.
- Roadway pavement surface needs to be in a state of good repair (including road/pavement markings and lane markings).
- Traffic flow issues, congestion and bottlenecks, on many of the state numbered routes heavily utilized by trucks should be addressed including Routes 24, 106, 123, Bridgewater Center, and East Bridgewater Center.
- An East-West Truck Route through Brockton is needed (of major concern are the railroad underpasses, and tight turns throughout Brockton, especially downtown)
- Interchanges on I-495 should be improved to provide for longer acceleration and deceleration lanes and to reduce weaving.
- Coordination should be encouraged between the MBTA and the railroad freight operators in the Old Colony Region to increase the Level of Freight/Goods Movement by Rail to help reduce truck traffic congestion.
- The upgrade of Route 24 to interstate standards, including the redesign and reconstruction of interchanges along Route 24, will contribute to the reduction of the potential for rollover incidents involving trucks.
- Encourage side guards on trucks to protect cyclists.

There are a number of challenges including operational constraints as well as physical constraints for truck movement within the region’s highway network. Recurring bottlenecks, poor intersection turning radii, height and weight restrictions, and lack of limited access highway acceleration and deceleration lanes need to be prioritized to maintain productive freight movement and highway network travel time reliability in the Old Colony region. The truck needs in the region include: increasing viaduct clearance to improve freight movement, emergency response, and reduce delay, improved safety along freight routes, improve vertical clearance along freight corridors, and identifying and removing constraints that cause bottlenecks within freight corridors.

## BRIDGES

The Massachusetts Department of Transportation (MassDOT) bridge database lists 270 crossing structures in the Old Colony Region, including bridges and culverts, under state or local jurisdiction. This database contains bridge data from the Massachusetts Department of Transportation Highway Division (MassDOT) Bridge Inspection Management System (BIMS), which is linked to an interactive map, includes performance information (condition ratings) on bridges that span roadways, bodies of water, and railroad tracks, as well as a history of inspections and reconstruction. The data base includes:

- MassDOT and municipally owned structures with spans greater than 20 feet.
- MassDOT Highway and municipally owned short span bridges with spans between 10 to 20 feet (inventory of these bridge is in progress).

- MassDOT Highway and municipally owned culverts with spans of 4 to 10 feet (this category inventory is incomplete with an inventory ongoing).

This database does not contain structures under Federal, other State entities or Private ownership or minor non-highway structures such as pedestrian and bicycle overpasses.

MassDOT conducts bridge inspections utilizing a rating system developed by AASHTO using a scale 0 to 100 with 100 being the best, which is consistent with federal standards. The goal of the MassDOT bridge inspections and Bridge Management System (BMS) is to predict failures and make improvements. The database reports a determination on whether a bridge is structurally deficient or not. Bridges are considered structurally deficient if significant load-carrying elements are found to be in poor or worse condition due to deterioration and/or damage.

According to the FHWA, if a bridge is determined to be unsafe based on the inspections, then the structure must be closed; however, the classification of a bridge as structurally deficient does not imply that it is likely to collapse or that it is unsafe. Deficient bridges that are open to traffic require significant maintenance and repair to remain in service. Structurally deficient bridges often have weight limits restricting the gross weight of vehicles using the bridges to remain in service (this is less than the maximum weight typically allowed by statute). Structurally deficient bridges require eventual rehabilitation or replacement to address deficiencies.

There are 18 bridges in the Old Colony Region, (according to the latest MassDOT bridge database), identified as structurally deficient. Table 6-4 lists the Structurally Deficient bridges in the Old Colony Region.

**Table 5-4 – Old Colony Region Structurally Deficient Bridges**

| Community        | Description                                     | Owner     | Year Built                 | Project Status |
|------------------|---|-----------|----------------------------|----------------|
| Abington         | Central Street over the Shumatuscasant River    | Municipal | 1956                       | Design         |
| Abington         | Washington Street over the Shumatuscasant River | Municipal | 1850 Reconstructed<br>1900 | ---            |
| Bridgewater      | Vernon Street over the Taunton River            | Municipal | 1956                       | ---            |
| Brockton         | Oak Street over Salisbury Brook                 | Municipal | 1939                       | ---            |
| Brockton         | Court Street over Trout Brook                   | Municipal | 1850 Reconstructed<br>1900 | ---            |
| Duxbury          | Bay Road over Water Island Creek                | Municipal | 1928                       | ---            |
| Duxbury          | Route 3 NB over Franklin Street                 | MassDOT   | 1962                       | Design         |
| Duxbury          | Route 3 SB over Franklin Street                 | MassDOT   | 1962                       | Design         |
| Duxbury          | Powder Point over Duxbury Bay                   | Municipal | 1987                       | Design         |
| East Bridgewater | Pond Street over Satucket River                 | Municipal | 1850                       | ---            |
| Easton           | Main Street over Queset Brook                   | Municipal | 1850 Reconstructed<br>1900 | ---            |
| Halifax          | Pine Street over Cranberry bog overflow         | Municipal | 1850 Reconstructed<br>1900 | ---            |
| Halifax          | Hayward Street over Palmer Mill Brook           | Municipal | 1850                       | ---            |
| Plymouth         | River Street over Plimoth Plantation Highway    | MassDOT   | 1951                       | ---            |
| Plympton         | Main Street over Winnetuxet River               | Municipal | 1954                       | ---            |
| West Bridgewater | Forest Street over Water Town River             | Municipal | 1968                       | Design         |
| West Bridgewater | West Street over Route 24                       | MassDOT   | 1953                       | ---            |
| West Bridgewater | Walnut Street over Route 24                     | MassDOT   | 1953                       | ---            |

**CONGESTION AND BOTTLENECKS**

Congestion on a highway or road is defined as a level of performance deemed unacceptable due to traffic interference. Roadway or intersection congestion is often described in terms of capacity, that is the ability of a facility to process traffic during times of peak demand. Congestion occurs when the facility’s capacity is insufficient to meet the traffic demand. More than ever, as development occurs along the Old Colony Region’s major highway corridors, the capacity of these corridors becomes constrained as vehicles exiting and entering the traffic flow create conflicts with through traffic via curb cuts and driveways or signals installed at major commercial plazas.

These built-up areas, many along major and minor arterials, experience reoccurring congestion during peak hour commute times.

Bottlenecks are a condition whereby the free movement of traffic is restricted creating a point of congestion during specific time periods, usually the peak commuter periods. Bottlenecks have different causes including operational influences (traffic control, traffic signals, and the physical design and alignment of intersections); the narrowing of a highway corridor and lane drops, weaving conditions, sun glare, steep grades, or crashes and incidents on a roadway.

Congestion Management Process objectives were developed over time in a collaborative effort with stakeholders including the Federal Highway Administration (FHWA), the Massachusetts Department of Transportation (MassDOT), the Brockton Area Transit (BAT) Authority, and local communities, as well as the public at large. These objectives were developed to reduce congestion, improve mobility, and improve access to critical essential services. The objectives include:

- Promote Mode Shift by increasing use of transit, carpool/vanpool, and non-motorized transportation modes such as bicycling and walking.
- Reduce traffic congestion and improve level of service and access management.
- Maintain and improve transit system efficiency and capacity.
- Increase automobile and bicycle parking capacity and usage at transit stations and commuter lots.
- Eliminate bottlenecks on limited access highways and on the freight network.
- Improve and expand human service coordination, mobility, and accessibility for all modes.
- Reduce the number and size of gaps in the ADA-accessible sidewalk network.
- Increase use of traffic signal priority (hold current green light) for transit vehicles and traffic signal pre-emption for emergency vehicles (override programmed phasing to provide approaching emergency vehicles a green light).
- Monitor utilization and congestion levels at commuter rail and Park & Ride parking facilities.
- Improve accessibility for all modes for all users.

The Old Colony CMP region contains over 2,000 centerline miles of road that provide motorists with the ability to travel throughout the region. Specifically, the Old Colony CMP region has 2,062.35 miles of urban roadways compared to 29.96 miles of rural roadways. Table 5-4 displays the characteristics of the centerline miles within the Old Colony CMP region.

The volume to capacity ratio (V/C), which is based on the relationship between a facility's theoretical capacities to the actual volumes utilizing the system, is an important performance measure utilized in the congestion management process. The capacity of a road or facility can be thought of as its ability to process traffic, measured in both the physical space available and in time, or the speed in which vehicles can travel (how quickly, measured in time, the vehicle traverses the facility). Therefore, the higher the volume to capacity (V/C) ratio, the more

congestion exists. A V/C ratio of 0.80 or above (V/C threshold of 0.80 is an industry standard) is used by Old Colony as a threshold for screening congested facilities. Table 5-5 lists the state numbered routes in the Old Colony Region with a V/C ratio of 0.80 or higher. Figure 5-7 shows the V/C on the region's highway network.

**Table 5-4 Old Colony CMP Region Centerline Miles by Functional Classification**

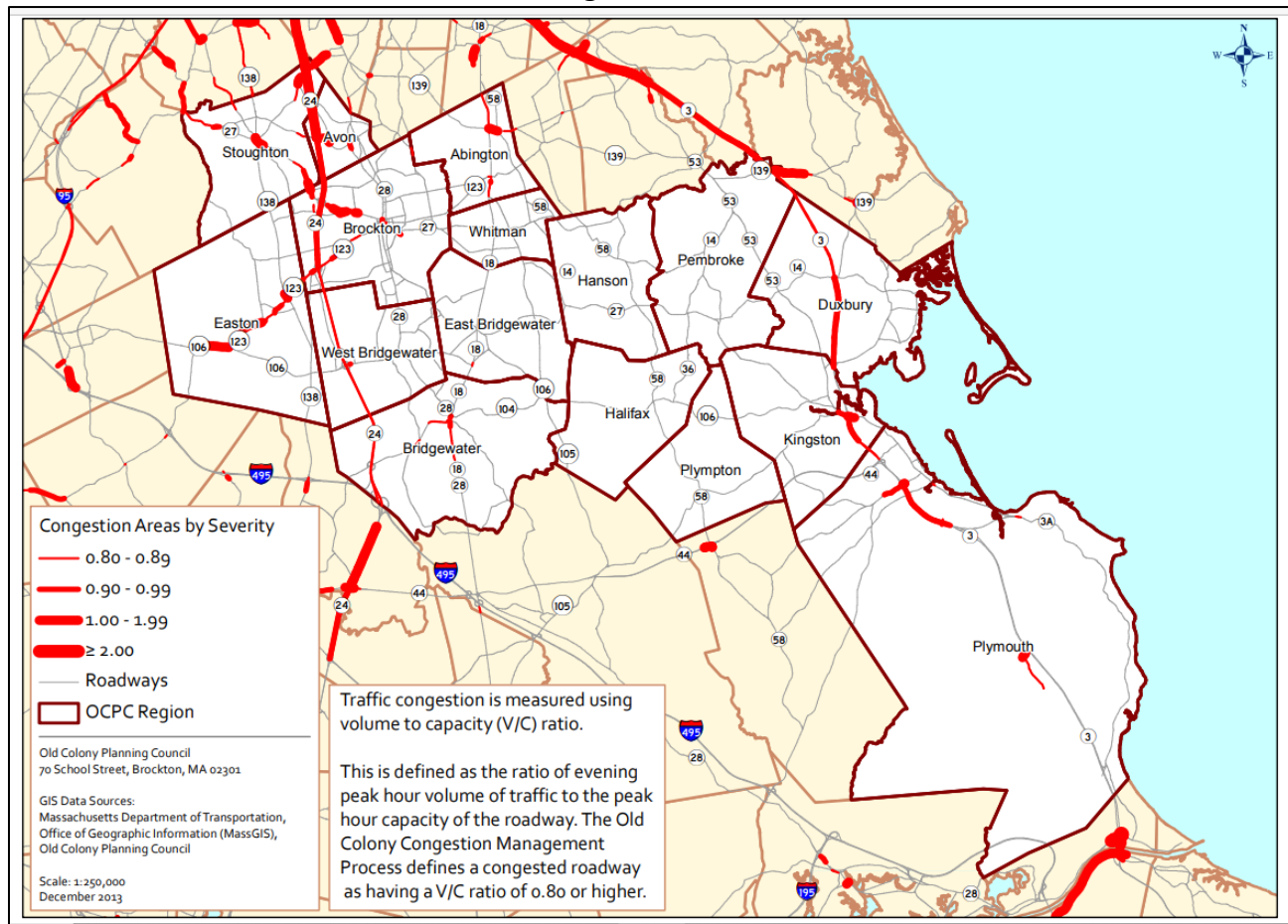
| <b>Designation</b> | <b>Interstate</b> | <b>Arterial</b> | <b>Collector</b> | <b>Local</b> | <b>Total</b> |
|--------------------|-------------------|-----------------|------------------|--------------|--------------|
| Urban              | 1.20              | 404.56          | 261.01           | 1,395.58     | 2,062.35     |
| Rural              | 0.00              | 1.49            | 11.63            | 16.84        | 29.96        |
| Total              | 1.20              | 406.05          | 272.64           | 1,412.42     | 2,092.32     |

Source: MassDOT 2018 Road Inventory Year-End Report

**Table 5-5 State Numbered Locations with a V/C Ratio of 0.80 or Higher**

| Route  | Community        | Street                             | Location                                | ADT     | V/C Ratio |
|--------|------------------|------------------------------------|---|---------|-----------|
| 18     | Abington         | Bedford Street (Route 18)          | S of Randolph Street (Route 139)        | 28,390  | 0.80      |
| 24     | Avon             | AmVets Memorial Highway (Route 24) | S of Harrison Boulevard                 | 125,982 | 1.18      |
| 24     | Bridgewater      | AmVets Memorial Highway (Route 24) | N of Interstate 495                     | 98,865  | 0.93      |
| 24     | Brockton         | AmVets Memorial Highway (Route 24) | At West Bridgewater Town Line           | 105,251 | 0.99      |
| 24     | Brockton         | AmVets Memorial Highway (Route 24) | N of Belmont Street (Route 123)         | 114,015 | 1.07      |
| 24     | Stoughton        | AmVets Memorial Highway (Route 24) | S of Lindelof Avenue (Route 139)        | 118,224 | 1.11      |
| 24     | West Bridgewater | AmVets Memorial Highway (Route 24) | At Bridgewater Town Line                | 104,099 | 0.98      |
| 28     | Brockton         | Main Street (Route 28)             | N of Brookside Avenue                   | 30,282  | 0.85      |
| 53/139 | Pembroke         | Columbia Road (Route 53/139)       | At Hanover Town Line                    | 30,000  | 0.84      |
| 106    | West Bridgewater | West Center Street (Route 106)     | Between Route 24 Ramps                  | 15,006  | 0.84      |
| 106    | West Bridgewater | West Center Street (Route 106)     | E of AmVets Memorial Highway (Route 24) | 28,776  | 0.81      |
| 106    | West Bridgewater | West Center Street (Route 106)     | E of West Street                        | 29,325  | 0.82      |
| 106    | West Bridgewater | West Center Street (Route 106)     | W of Howard Street                      | 31,766  | 0.89      |
| 106    | West Bridgewater | West Center Street (Route 106)     | W of Lincoln Street                     | 30,436  | 0.86      |
| 106    | West Bridgewater | West Center Street (Route 106)     | W of North Elm Street                   | 30,702  | 0.86      |
| 123    | Brockton         | Belmont Street (Route 123)         | W of School Service Drive               | 29,096  | 0.82      |
| 138    | Stoughton        | Washington Street (Route 138)      | S of Wyman Street                       | 36,269  | 1.02      |
| 139    | Pembroke         | Church Street (Route 139)          | E of Water Street                       | 28,288  | 0.80      |

Figure 5-7



### Route 24 Merge with I-93 in Randolph, Canton, and Stoughton

The Route 24 merge with I-93 in Randolph is a significant bottleneck location, which impacts the Old Colony Region, even though the bottleneck is located outside the region in Randolph. Route 24 northbound is limited access with three travel lanes. It transitions into two lanes for I-93 southbound (to Route 128) and two for northbound onto I-93 to Boston. The access ramp from Route 24 to I-93 southbound merges with the I-93 high speed lane. This merge lane does not have adequate length as traffic entering onto I-93 conflicts with I-93 traffic. In addition, the two-lane ramp from Route 24 to I-93 southbound merges back to one lane before traffic enters heavy Route 24 northbound traffic. Northbound Route 24 traffic backs up daily, especially during the morning peak hour, as traffic attempts to access I-93. The queues on Route 24 northbound are routinely five to seven miles long and backup up through Avon and Stoughton and into Brockton.

A 2017 study on freeway bottlenecks completed by Central Transportation Planning Staff identified a number of problems at this location:

- A high volume of traffic on Route 24 northbound to I-93 during the AM peak period.
- A short diverge length where the two Route 24 ramps split at the I-93 interchange.
- A forced merge to a single lane on the I-93 southbound ramp.

- A short merge length at the I-93 northbound ramp.

The 2017 study concluded that “the existing bottleneck creates intense interruption of traffic flow during the AM peak travel period. During these hours, queues of up to five miles long form as drivers wait to merge onto I-93 southbound. These waiting drivers back up onto the Route 24 northbound mainline and prevent vehicles from accessing the otherwise uncongested ramp to I-93 northbound...The bottleneck also likely contributes to crashes in this area.” The study recommendations included widening Route 24 northbound to five lanes as it approaches I-93, widening I-93 to four lanes through the merge with the Route 24 ramps, in order to allow longer acceleration and deceleration lengths as vehicles merge on and off the ramps between the two highways.

#### CONCLUSIONS AND RECOMMENDATIONS

The highway system is an integral component of the economic well-being of the Old Colony Region. The expansion, dynamics, and maintenance of the network is not only tied to economic viability but also to the quality of life for the region’s residence. The network allows for convenience of movement but also can bring negative impacts to communities and neighborhoods in the way of noise, air pollution, and danger for pedestrians. Improvements to the system should be made with equity in mind (Environmental Justice), which requires equality of opportunity for benefits and that the negative impacts are not all burdened by any single portion of the population.

The Old Colony MPO identified a number of key issues affecting the regional highway system:

Key areas in the region demonstrate congestion, excessive delays, circulation problems, and bottlenecks.

Recurring congestion and bottlenecks in the region, which include limited access highway interchanges, town centers, and densely developed highway corridors in the region, have been identified in key areas in the network. The identification of bottlenecks and congested areas has been an ongoing effort, along with planning and analyses to address these areas of concern with OCPC’s 2011 Major Bottleneck Identification and Action Plan, OCPC’s 2012 and 2013 Major Bottleneck In-Depth Analysis and Action Plan, and 2022 High Priority Corridor Study and Screening Assessment.

Previous studies identified areas in the Region’s Highway Network that not only suffer from daily congestion but also experience serious circulation issues due to a number of problems, which include the lack of proper access management techniques, the lack of effective transportation demand management applications, the lack of proper traffic control or updated and coordinated traffic signals, and a lack of multi-modal accommodations such as transit. These studies included improvements identified to improve and enhance capacity, thereby reducing congestion and improving level-of-service include: upgrading traffic signal equipment, upgrading signal timing and signal coordination, and utilizing of traffic signal priority (hold current green light) for transit



vehicles and traffic signal pre-emption for emergency vehicles (override programmed phasing to provide approaching emergency vehicles a green light). Reoccurring bottlenecks and physical constraints also continue to negatively impact freight movement on the regional highway network, adding to the need to address these areas of concern..

*Mode shift is necessary to contribute to the reduction of auto dependency.*

Automobile use, along with a widespread and well connected highway and road network, provides convenience and flexibility to the traveling public. Auto use as a sole means of available transportation; however, can result in significant traffic congestion, increased air pollution (and subsequent climate change and health problems associated with pollution), and higher crash exposures for the traveling public. It also can also lead to higher rates of obesity for auto users compared to those who walk, bicycle, or take transit on a regular basis. Access to automobiles, which can be expensive in terms of car payments, insurance, and maintenance and fuel costs, is also an equity issue, as many people below and above the poverty line struggle to afford a car. Shifting travel demand from vehicles to alternative modes helps reduce congestion, thereby preserving the capacity of the highway network. It also contributes to protecting the natural environment and improving public health.

Auto use is still prevalent in the Old Colony Region as residents continue to rely on the automobile for their primary mode for getting from place to place. The region provides Commuter Rail, transit service, and state-owned park and ride facilities; however, utilization of alternatives still lags behind auto use compared to other parts of the Commonwealth. OCPC will continue to monitor utilization and congestion levels at commuter rail and Park & Ride parking facilities, as well as record utilization data twice annually and report data to MassDOT. OCPC will continue to promote mode shift through policies and plans that include Complete Streets techniques, Safe Route to School Programs, and by encouraging land use and transportation connections through transit oriented development (TOD). In addition, OCPC will promote increased use of transit, carpool/vanpool, and non-motorized transportation modes such as bicycling and walking, and improve and expand human service coordination, mobility, and accessibility for all modes.

*The ability of the Route 24 and Route 3 corridors to handle traffic demand is limited due to sub-standard design.*

Reoccurring bottlenecks and congested commuter peak hour traffic are regular occurrences on Route 3 (Pilgrim Highway) and Route 24 (Amvets Memorial Highway) due to sub-standard design. Although these highways are limited access, they are not up to interstate design. On Route 3 during the morning and afternoon peak periods, motorists are allowed to use the breakdown lane in order to provide additional capacity; however, the majority of the interchange ramps, deceleration ramps, and acceleration ramps are not adequate. The elimination of recurring bottlenecks can be achieved through the elimination of lane drops and improvements in the design.

*There are more roads in the Old Colony region with a “fair” or “poor” pavement condition rating than those with a “good” or “excellent” rating.*

*Currently, the “Fair” and “Poor” categories total 63 percent of the total amount of federal aid roads while the “Good” and “Excellent” categories total 37 percent. A pavement system in disrepair increases delays, restricts freight movement, and inhibits economic vitality.*

There are eighteen bridges in the Old Colony region that have been identified as structurally deficient.

According to the MassDOT bridge database, there are eighteen bridges in the Old Colony region identified as structurally deficient, and only five of these are under design. Bridges play a vital role in the highway network providing links over natural obstacles such as rivers and streams and enhancing the efficiency of the network.

The Old Colony regional highway network contains areas vulnerable to the effects of climate change.

Infrastructure in the Old Colony Region is susceptible to major damage during severe weather events especially due to intense precipitation and increased flooding near the coastline and those located within the one hundred and five hundred Year Flood Zones. The Old Colony Region contains some of the oldest roads and bridges in the country. Although the impact of sea level rise is limited to coastal areas, the effect of intense precipitation on land transportation infrastructure and operations is more widespread and impacts the OCPC communities inland via brooks and streams, pond, and wetlands. The impacts of climate change on the region’s transportation system have been documented in *OCPC’s 2021 Climate Change Vulnerability Transportation Assessment Study*.

Transportation improvement projects costs continue to rise.

Reducing delays in the project development and delivery process through streamlining the development process helps keep costs down and promotes jobs and the economy. It contributes toward accelerating project completion thereby expediting the movement of people and goods. The Region should continue to utilize transportation evaluation criteria in screening potential TIP projects. Initial evaluation should be undertaken on all projects to determine if the project is realistic, viable, and implementable. The enhanced screening and evaluation of projects will help to determine the Year 1 readiness for the TIP. At least 80% of Year 1 TIP Projects should be advertised. The Region will continue to maintain annual participation at TIP Day with MassDOT. At the twenty-five percent design stage, the Region will work with stakeholders on all potential projects to determine ROW, environmental permitting, and other potential challenges to project development and implementation.

Old Colony Planning Council staff through activities programmed in the Old Colony MPO’s UPWP will continue to develop recommendations based on the planning process, community’s needs,

and continued regional cooperation that includes member communities, transportation agencies, and state agencies. These include:

Consider programming studies in the Old Colony UPWP concerning the movement of goods/materials within and through the region including the movement of hazardous materials, the identification and designation of regional and local truck routes, the identification of additional inter-modal facilities, and the overall enhancement of the efficient movement of freight.

Consider programming studies in the Old Colony UPWP to improve east-west connections in the region.

Through the Old Colony Pavement Management System, continue to monitor and evaluate pavement distresses along the federal aid eligible roadways and development maintenance and budgetary strategies, which increased efficiency in terms of the utilization of federal and state money.

Continue the focus on maintenance of local bridges and support increased emphasis on the rehabilitation needs of locally maintained bridges, especially those falling in the Structurally Deficient and Functionally Obsolete categories.

Continue to support the Traffic Monitoring System for Highways. Support actively maintaining and participating in coordinated Traffic Monitoring System for Highways.

Continue semi-annual monitoring of parking utilization at Commute Rail stations within the region, and continue to work with communities and the MBTA on issues related to both capacity and access to and from the stations.

Consider programming studies in the Old Colony UPWP aimed at enhancing traffic circulation in downtown areas and community centers and advocate strategies for enhancing pedestrian and bicycle access, mobility, and safety...

Implement access management and design guidelines at the local level through a number of avenues (Master Plans, Zoning Ordinances, and Subdivision regulations and site plan reviews) to conserve capacity in highway corridors, improve traffic flow and safety, decrease auto dependency, include mixed use development (thereby decreasing sprawl), and improve the quality of development in highway corridors.

Continue to study safety and traffic flow at intersections, particularly at intersections identified as High Crash Locations. Incorporate a multi-mode approach aimed at improving efficient mobility and safety for motorists, pedestrians, bicyclists, and transit.

Large employers should be encouraged to form Transportation Management Associations (TMAs), which marshal business resources to manage employee transportation needs on an area-wide basis. MassRides for example, is available to provide TMA assistance that match employees who wish to carpool, vanpool, etc. Demand for costly long-term parking can be managed by

encouraging shared-ride commuting through preferential parking incentives or special discounts for employees.

Consider programming studies in the Old Colony UPWP that study and offer mitigation strategies for congested corridors and bottlenecks in the region...

Pavement Management Systems should address municipal program requirements. Pavement management should include provisions for policies that address the growing maintenance queues experienced by municipal highway officials who must maintain increasingly deteriorating local roadway with fewer fiscal resources.

Promulgate policy to address needs for improving physical constraints for freight movement including raising bridge clearances to accommodate double stacking of containers in railroad freight hauling operations to promote intermodal opportunities. Freight needs include improving truck turning radii and height and weight restrictions for truck freight movement.

Roundabouts, as well as traffic calming techniques, should be included in the analysis of improvement alternatives in studies that focus on the development of solutions to safety and traffic congestion.

#### *Consider the Establishment of a Transportation Management Association*

The establishment of a Transportation management Association presents an option for reducing congestion on the region's road network and encouraging mode shift and more choices in transportation. In general terms, the Transportation Management Association (TMA) is a membership organization, which includes governmental agencies, non-governmental agencies, and employers and private companies. They are established to provide a coordinated effort to address transportation problems within a specific geographic area. The funding mechanism, geographic area, membership, mission, and services are tailored to meet the specific needs of the geographic area and are set in a legal agreement between the members. The associations are private and non-profit and establish policies, programs, and services that address traffic congestion, air quality, and travel demand issues. TMAs are funded through private sector financing in addition to public funding. TMAs have many of the same characteristics, but also differ due to varying goals, management practices, services, and markets. TMAs sometimes act as brokers, coordinating delivery of services to customers through employers, developers, or local governments. Some TMAs provide direct services to consumers and members. TMAs act as consultants, providing advice and technical support, or fulfill the role of observer and monitor conditions. In addition, they act as a clearinghouse for information and provide information on a number of issues including local requirements and regulations, and the availability of services. They also serve as a forum for consensus building among stakeholders advocating for plans, programs, and policies.

Examples of the common types of services that TMAs provide include:

- Vanpool subsidy program

- Discounted transit passes
- Rideshare and transit promotion
- Promotional events
- Promotional materials development and distribution
- Regional and local advocacy
- Guaranteed ride home program
- Rideshare matching
- Employee transportation coordinator training
- Trip reduction planning
- Vanpool services
- Site design
- Shuttle services
- Parking pricing and management

Most TMAs emphasize use of Transportation Demand Management (TDM) strategies. The purpose of TDM is to manage the demand for motor vehicle travel, which conserves highway and road capacity rather than advocating the increasing of capacity, highway widening and building, which is a more expensive alternative and has environmental and equity consequences. TDM efforts reduce vehicle trips by:

- Accommodating the same number of people in fewer motor vehicles (e.g. transit, carpooling/vanpooling, and cycling/walking).
- Eliminating trips entirely (remote working at home).
- Shifting the timing of trips from the most congested periods to less busy times (flextime).

There are three stages of organizational development for the establishment of a TMA. These include: Exploration, Formation, and Operation.

Exploration is the stage at which the timing and need for a TMA is studied. It helps answer the question regarding whether or not a TMA is the ideal organizational approach for accomplishing the mission. It also helps to understand under what conditions the TMA is feasible and sustainable. A core of supporters need to decide to form a TMA and begin to define problems and solutions. The group should formation tasks, such as drafting bylaws and developing a work plan, and answer the main question, which is whether or not a TMA makes sense. In this stage, operating funds have usually not been secured.

The Formation stage begins after the initial exploration indicates the need for a TMA. What the TMA looks like and what it does is determined under this stage. The core group expands support, plans services and sets up the organizational structure in this stage.

The operation stage includes two main areas of activities: administration and service delivery. Administration refers to the ongoing efforts needed to maintain membership and funding, running the office and serving the board of directors. Service delivery refers to providing services to members and other selected markets. Monitoring and evaluating the programs and policies

are important aspect of the TMA. This feedback provides information needed to refine and promote services. Challenges for TMAs include promoting member interest, promoting TMA services, documenting the TMA's effectiveness, maintaining stable, ongoing funding, and maintaining and developing services.

## Chapter 6 – Transit

The Region is fortunate to host a variety of transit services, such as bus transportation, paratransit services, council on aging services, commuter rail, airport and air services, commuter bus service, highway, and water & rail freight facilities. Although modes are discussed independently through this chapter, they work together as components of an ever-evolving coordinated intermodal system.

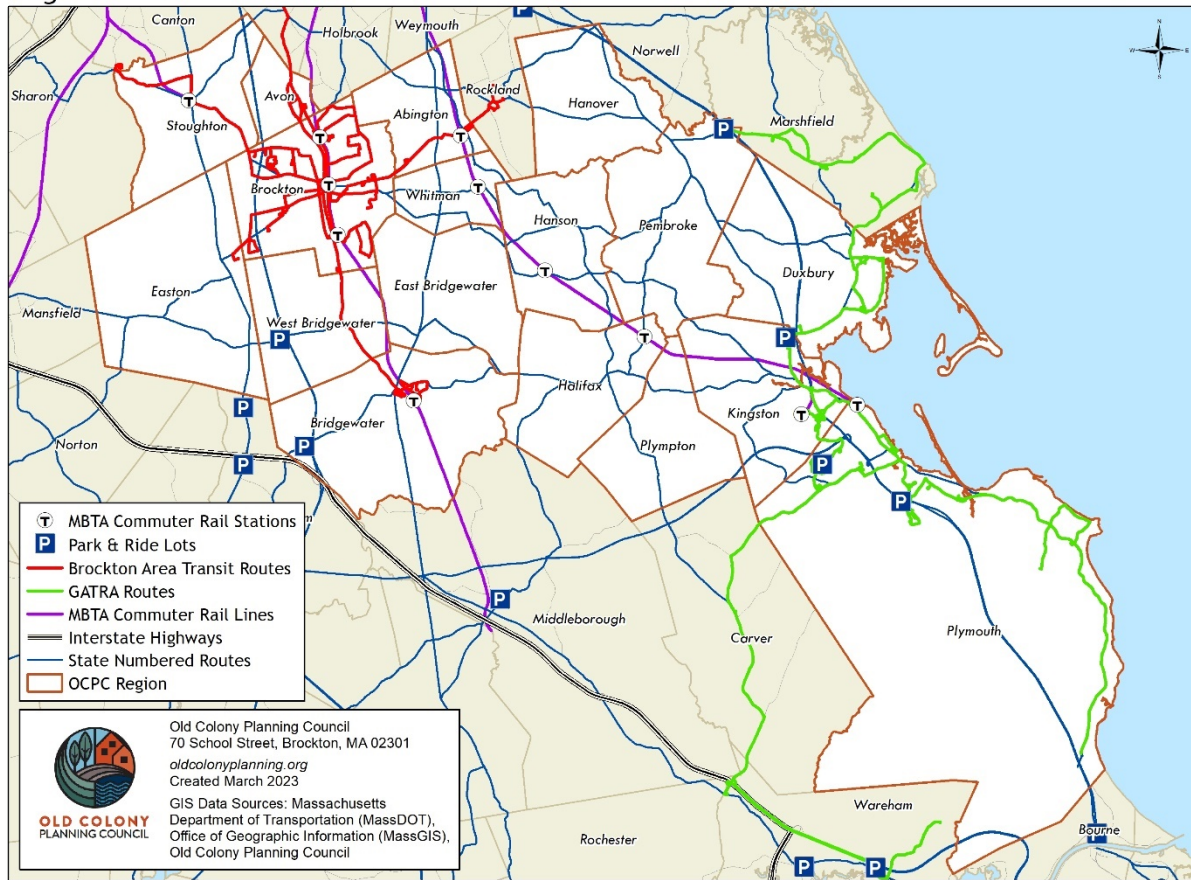
Transportation systems must not be overlooked as a catalyst in shaping land use patterns and their effect on the quality of life and livability of local residents and visitors. Concepts such as the placement of transportation services, and/ or the frequency of service are among the deciding factors in whether or not residents or visitors use transit. The Region faces many of the challenges found across the nation, such as the increasing demand for transit capacity across all modes, the increased costs of operations; and the increased demand for paratransit services the coordination of human service transportation efforts, and the challenge of funding a robust transportation system.

Ideally, the beneficial long-term effect that an efficient mass transit system can have on a region is the potential for effective growth management, fostering of economic development, and the development of mobility measures for livable communities. Focusing sustainable development around transit stations and nodes can lead to a more sensible form of growth in which higher density; mixed-use neighborhoods provide more enjoyable and convenient living environments. By taking advantage of modes such as commuter rail, commuter bus and fixed route transit system, communities can develop smarter alternatives to the inefficient “sprawl” development, which has characterized development in this region and beyond for much too long. Using Smart Growth Principles, communities can develop safe walkable and livable communities with convenient transit and surrounded by both housing and retail services.

This chapter discusses the current transportation networks in the region and potential future networks. The chapter concludes with recommendations that would enhance the transportation network of the region and affect the quality of life of residents in the region. Figure 6-1 is an overview of the transportation networks in the region.

Figure 6-1: Passenger Transit Network

Regional Transit Network



EXISTING PUBLIC TRANSPORTATION NETWORK

The Old Colony region is fortunate to have two Regional Transit Authorities (RTAs) operating within it. The Brockton Area Transit Authority (BAT) services the City of Brockton and the adjacent Towns of: Abington, Avon, Bridgewater, East Bridgewater, Easton, Hanson, Rockland, Stoughton, West Bridgewater, and Whitman. Additionally, BAT also services the City of Boston (along with Randolph and Milton) via its Route 12 Ashmont line.

The Greater Attleboro Taunton Regional Transit Authority (GATRA) provides service to the greater Taunton/Attleboro area, and several other areas in southeastern Massachusetts, including the towns of Duxbury, Kingston, Pembroke, and Plymouth within the Old Colony region.

In addition to services provided by BAT and GATRA, the Massachusetts Bay Transportation Authority (MBTA) provides bus and commuter rail service throughout the region.

Brockton Area Transit Authority, GATRA, and the MBTA all work towards the common goal of reducing traffic congestion on the roadway system by providing a service that encourages mode



shift away from single occupancy vehicle trips to trips via transit. Through the provision of services such as the Route 12 Ashmont operated by BAT, the GATRA SAIL that provides service to the MBTA Kingston Commuter Rail Station, and the three (3) MBTA Commuter Rail lines servicing 10 Commuter Rail Stations are actively working to accomplish this goal. Additionally, BAT and GATRA in the Old Colony region are constantly looking at ways to attract new ridership through the expansion of transit service and through the partnership with private transportation service providers such as ride hail companies.

### Fixed Route Bus Service

#### Brockton Area Transit Authority (BAT)

The Brockton Area Transit Authority's (BAT) yearly ridership was over 1.3 million boardings and over \$2.3 million in annual fare revenue in FY 2022. BAT operates 12 fixed bus routes primarily within the City of Brockton with lines branching out to neighboring communities as seen in Figure 6-2 and to the City of Boston, along with paratransit/demand response service. These routes along with a "pulse system" that operates out of the BAT Intermodal Centre in Downtown Brockton allow for high frequency service during peak hours, serving a high percentage of Brockton's total land area. BAT also provides service to six MBTA Commuter Rail Stations and the Ashmont MBTA Red Line Station. These MBTA Commuter Rail and Red Line connections allow BAT to provide multimodal links between the Old Colony Region and the City of Boston, as well as communities outside the region. BAT also provides buses to Bridgewater State University, enabling the university to provide transportation to its student body, employees, and visitors. Brockton Area Transit routes can be viewed in more detail on their website ([www.ridebat.com](http://www.ridebat.com)).

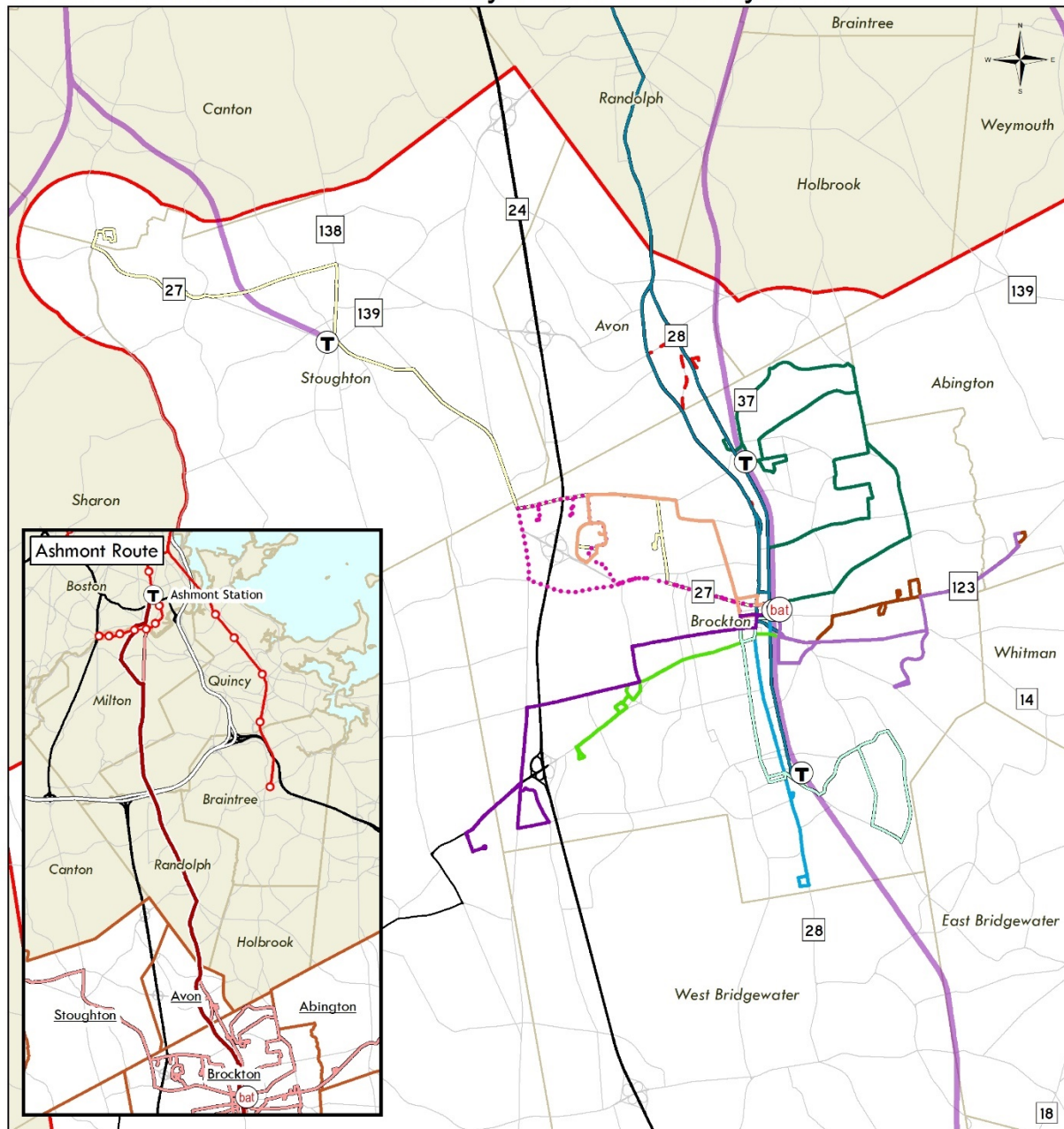
#### The Greater Attleboro Taunton Regional Transit Authority (GATRA)

The Greater Attleboro Taunton Regional Transit Authority (GATRA) is a transit authority operating in 29 communities, including Duxbury, Kingston, Pembroke, and Plymouth in the Old Colony region. In Fiscal Year 2019, the system had a system-combined ridership of 2,720,078 boardings and \$48,486,328 in farebox revenue. GATRA lines serving the Old Colony region include the Seaside Area Inter-Link (SAIL), the Mayflower Link, the Freedom Link, the Liberty Link, the Manomet/Cedarville Deviated Link, and two GATRA GO services – Coastline and Explore. The SAIL operates within the Towns of Marshfield, Duxbury, and Kingston, while the remaining four Links service exclusively the Town of Plymouth. The two GATRA GO services are on-demand services that will pick up passengers and drop them off at their destination. GATRA GO Coastline services South Plymouth and GATRA GO Explore services the Town of Pembroke.

GATRA service makes intermodal connections with the Plymouth and Brockton (P&B) intercity motor coaches at the Plymouth Park-and-Ride lot (Exit 13 on Route 3), and the MBTA Commuter Rail at the Kingston station. This connection to P&B at Route 3 Exit 13 connects local service with Plymouth & Brockton bus service that travels north to Downtown Boston and Logan Airport, and south to Cape Cod. GATRA routes can be viewed more in detail on their website ([www.gatra.org](http://www.gatra.org)).

Figure 6-2: Brockton Area Transit Authority Fixed Route System

### Brockton Area Transit Authority Fixed Route System



- - - Route 1
- Route 10/11
- Route 12
- Route 14
- Route 2
- Route 3
- Commuter Rail Lines
- ..... Route 4
- Route 4A
- Route 5
- Route 6
- Route 8
- Route 9

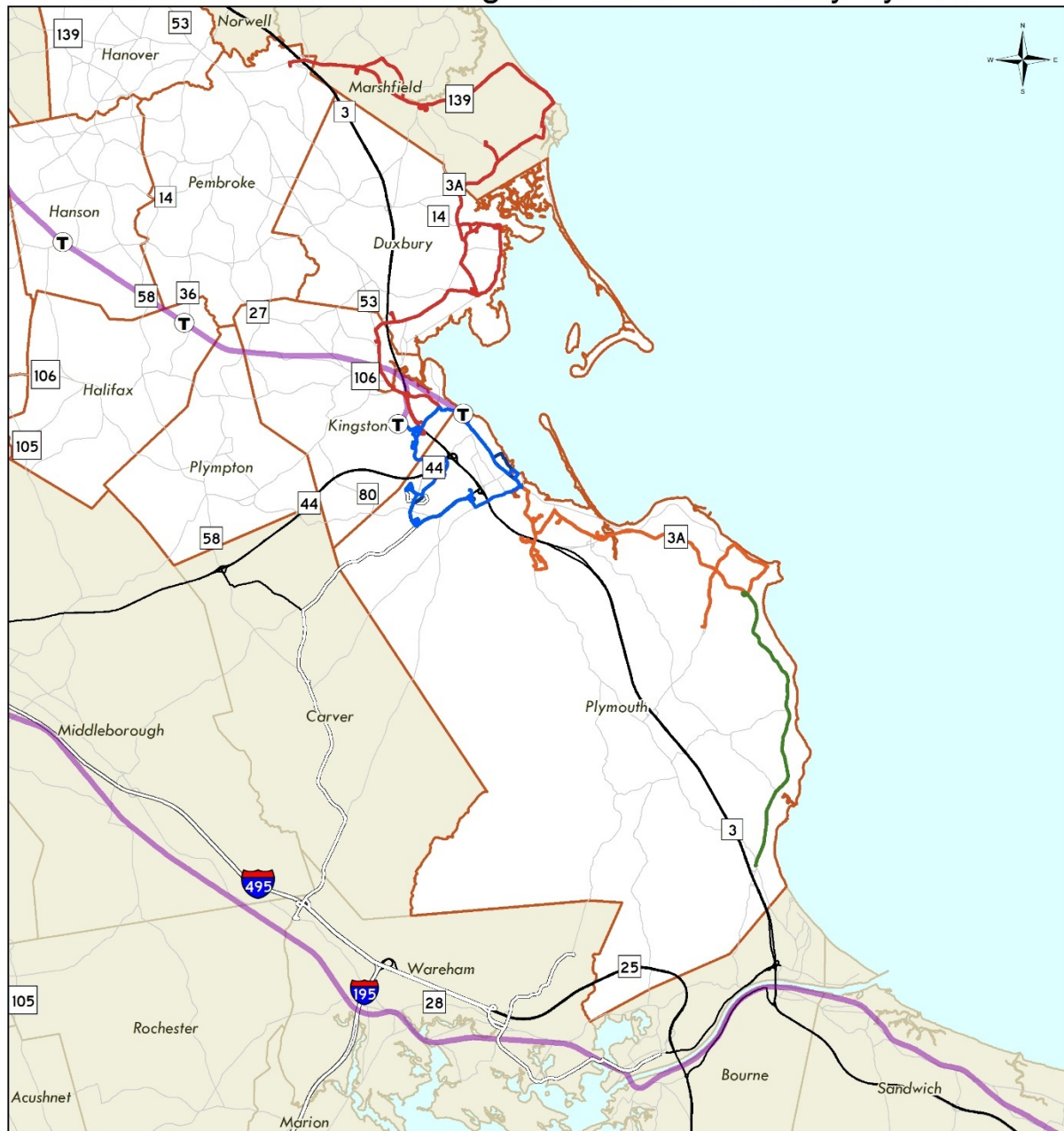


Old Colony Planning Council  
70 School Street, Brockton, MA 02301  
[oldcolonyplanning.org](http://oldcolonyplanning.org)  
Created March 2023

GIS Data Sources:  
Brockton Area Transit Authority (BAT)  
MA Department of Transportation (MassDOT),  
Office of Geographic Information (MassGIS),  
Old Colony Planning Council

Figure 6-3: Greater Attleboro and Taunton Regional Transit Authority System

### Greater Attleboro-Taunton Regional Transit Authority System



- Freedom Link
- Liberty Link
- Manomet/Cedarville Deviated Link
- SAIL: Marshfield/Duxbury/Kingston
- Mayflower Link - Plymouth to Manomet
- Wareham Plymouth Connection



**OLD COLONY**  
PLANNING COUNCIL

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Created March 2023

GIS Data Sources:  
Greater Attleboro-Taunton Regional Transit Authority (GATRA), MassDOT,  
Office of Geographic Information (MassGIS),  
Old Colony Planning Council

### The Massachusetts Bay Transportation Authority (MBTA)

The Massachusetts Bay Transportation Authority (MBTA) bus routes 230, 238 and 240 operate in the region. The MBTA also contracts for the provision of paratransit/demand responsive service for elderly and passengers with disabilities in their service areas. The MBTA 230 route services the Montello commuter rail station and connects to BAT Route 10/11 Lisa & Howard via North Quincy & Court. The bus provides connections to three Red Line stations – Braintree, Quincy Adams, and Quincy Center. The MBTA 238 route operates near the MBTA 240 route and BAT's Ashmont service. The route starts at the Quincy Center station, going through Braintree to South Shore Plaza and ends in downtown Avon on certain scheduled times. The MBTA 240 route runs from Avon Center to the Ashmont Red Line station via Crawford Square in Randolph on select scheduled runs. The MBTA 240 route operates along the same route as BAT's Route 12 Ashmont service. These three routes operate seven days a week and on all holidays with more frequent service Monday through Friday.

The MBTA is currently in the redesign process of improving their bus service with the Better Bus Project, which is part of their five-year Capital Investment Plan (CIP). The idea behind this project is to replace old buses, build new facilities, shift bus routes to fill in gaps while eliminating routes operating near each other, electrify the system, and increase the amount of accessible bus stops. The desired net result of this project is to prioritize bus service to those who use transit the most, provide more frequent service in the busiest neighborhoods, extend the service hours, and create a simpler network with more connections to additional locations. More information on this project can be found on the project website (<https://www.mbta.com/projects/better-bus-project>).

### Demand Response

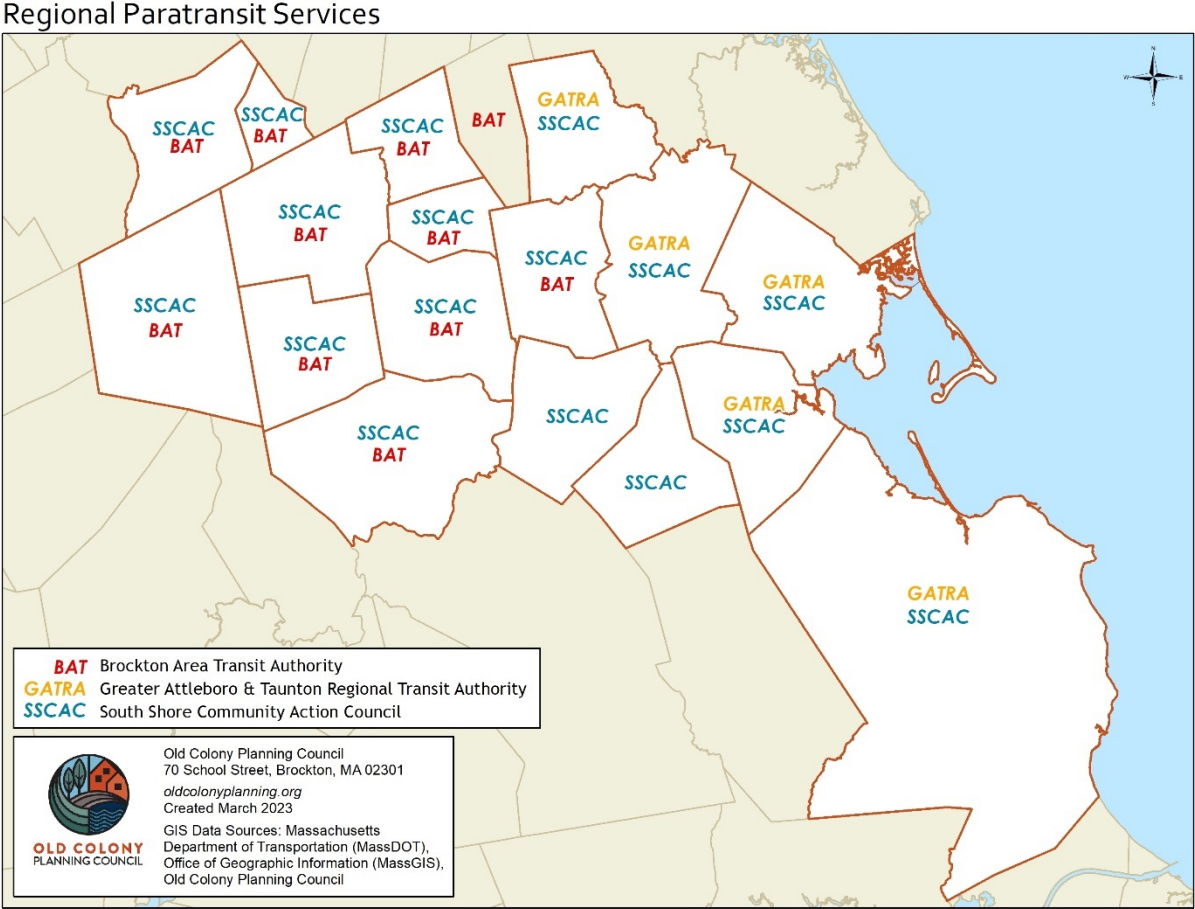
There are two types of paratransit/demand response services in the Old Colony Region; one that transports persons 60 years and older in case of GATRA's paratransit service and 65 years and older in the case of BAT's paratransit service. The other form of paratransit service provides ADA paratransit/demand response service to those with a disability that makes it not possible to use regular fixed route bus service. While the requirements to ride senior paratransit/demand response service is that one must be 60 or 65 years old or older, the requirements to ride ADA paratransit/demand response service are more prescriptive since service is open to all ages and service coverage and hours of operation are usually more extensive in order to provide the same level of service comparable to fixed route services for those unable to ride a regular public transit bus. Paratransit/demand response service in the Old Colony region is provided by BAT, GATRA, and the MBTA.

BAT and GATRA are the primary paratransit/demand response services providers in the Old Colony Region, which are supported by additional human services trips provided by the South Shore Community Action Council (SSCAC) and 12 local Councils on Aging. In accordance with the *Americans with Disabilities Act (ADA)*, BAT and GATRA provide service within  $\frac{3}{4}$  of a mile of fixed transit routes. BAT alone provided over 101,000 paratransit/demand response service trips in FY 22 and GATRA provided just over 120,000 paratransit/demand response service trips in the two

groups in OCPC's region in FY 19. The MBTA does provide paratransit service to the Towns of Abington, Avon, Stoughton, and the City of Brockton. Figure 6-4 displays the paratransit services area in the Region.

BAT and GATRA provide transportation to medical facilities outside of the region with special scheduled trips. Additionally, local contract transportation companies also provide paratransit service. Bridgewater State University also offers four (4) paratransit service routes for on-campus trips during school hours.

Figure 6-4: Paratransit Services in the Old Colony Region



South Shore Community Action Council (SSCAC)

South Shore Community Action Council is a private non-profit agency that provides essential services to the area, one of which is transportation service to communities in and out of the Old Colony Region. SSCAC provides transportation to the elderly, individuals with disabilities, and low-income participants in SSCAC programs and other state and federal programs. SSCAC helps fill the gaps in service for people that often have no other mode of transportation available. SSCAC transport people to adult day health programs, dialysis, doctor and dental appointments, non-emergency hospital trips, shopping trips, social/ recreational events, and employment programs, educational facilities, and service to Metro Boston hospitals. SSCAC completes approximately 64,000 trips and travels around 700,000 miles annually.

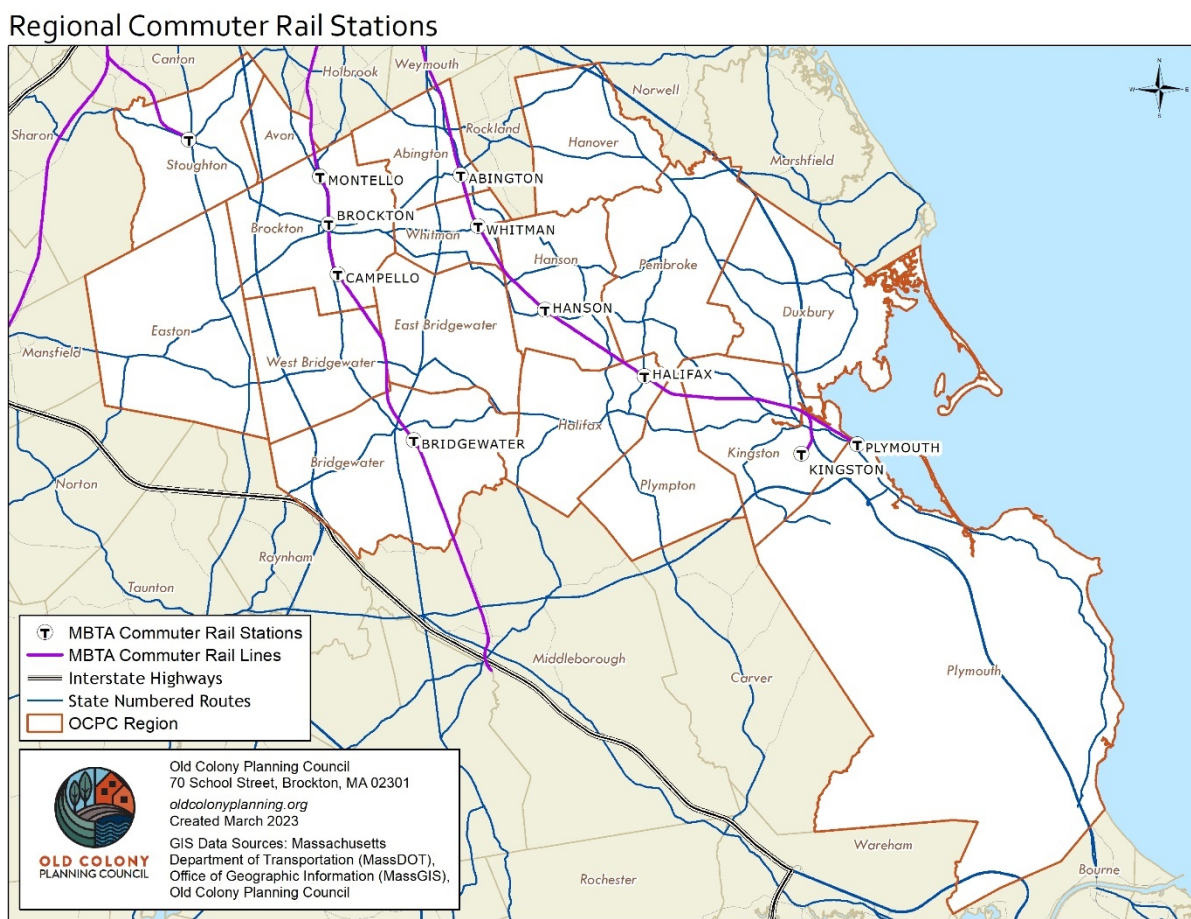
Commuter Rail

Three MBTA Commuter Rail lines operate in the Region: the Kingston line, the Middleborough/ Lakeville line, and the Providence/Stoughton line. The Commuter Rail lines are highlighted in Figure 6-5. The Commuter Rail lines in the Region serve approximately 4,268 boardings on average per day. The Middleborough/ Lakeville and Kingston/ Plymouth lines were restored to

service in the fall of 1997 and have become a popular choice for commuters who work in metro Boston.

The Providence/Stoughton line offers daily service to Stoughton and points north. The Middleborough/Lakeville line offers daily service through the OCPC communities of Brockton and Bridgewater. The Kingston line serves the OCPC communities of Abington, Whitman, Hanson, Halifax, and Kingston. The transit station areas have become opportunity nodes for enhanced redevelopment and have helped to foster transit-oriented development and the creation of 40R Districts. For more information on the MBTA Commuter Rail, see their website at <https://www.mbta.com/schedules/commuter-rail>.

**Figure 6-5: MBTA Commuter Rail System**



The Old Colony MPO planning staff continues to work with BAT and GATRA to explore how connections and service to the commuter rail stations can be enhanced. Infrastructure such as additional bus shelters, and technology such as real time transit data and “next bus arrival time” are examples of how intermodal connections can be enhanced. For example, BAT has recently increased service to the Stoughton MBTA Commuter Rail Station via its Route 14 Stoughton expansion project that provides commuter rail passengers and those who ride Route 14 with

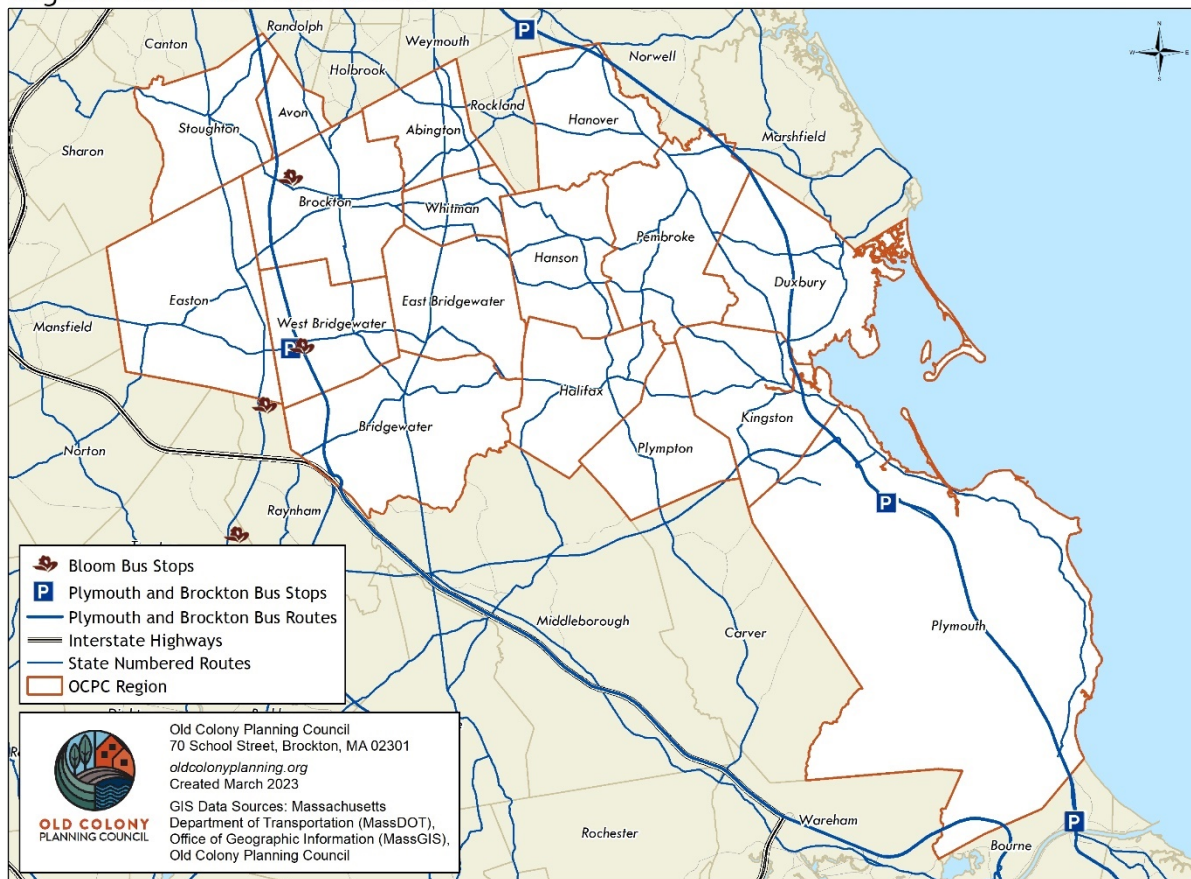
more direct service to the BAT Intermodal Centre in Downtown Brockton. Enhanced traveler information should be present at Commuter Rail stations in the Old Colony Region.

### Commuter Bus

The Plymouth and Brockton (P&B) Bus Company provides commuter bus services in the region. P&B is a private company offering fixed-route long-distance service to multiple MassDOT Park & Ride lots. Two P&B routes service the Old Colony Region: the Hyannis/South Shore to Boston/Logan Airport Bus Route services the Bourne (Sagamore) Park & Ride (Route 3, exit 1A), Plymouth Park & Ride (Route 3, exit 13), and Rockland Park & Ride (Route 3, exit 35) lots. The Woods Hole to Boston/Logan Airport Bus Route services the West Bridgewater Park & Ride lot (Route 24, exit 28).

**Figure 6-6: Regional Commuter Bus System**

#### Regional Commuter Bus Service



Issues facing Commuter Bus is growing highway traffic congestion, which contributes to passenger delays and the absence of a more robust marketing campaign of the service. Having private commuter bus companies helps improve regional mobility giving residents more choice on how they travel.



### Ferry Service

Daily ferry service between Plymouth and Provincetown is provided by Captain John Boats during the summer months. Captain John Boats are a privately owned, for-profit company and employees eight captains and three naturalists to operate their fleet of five boats.

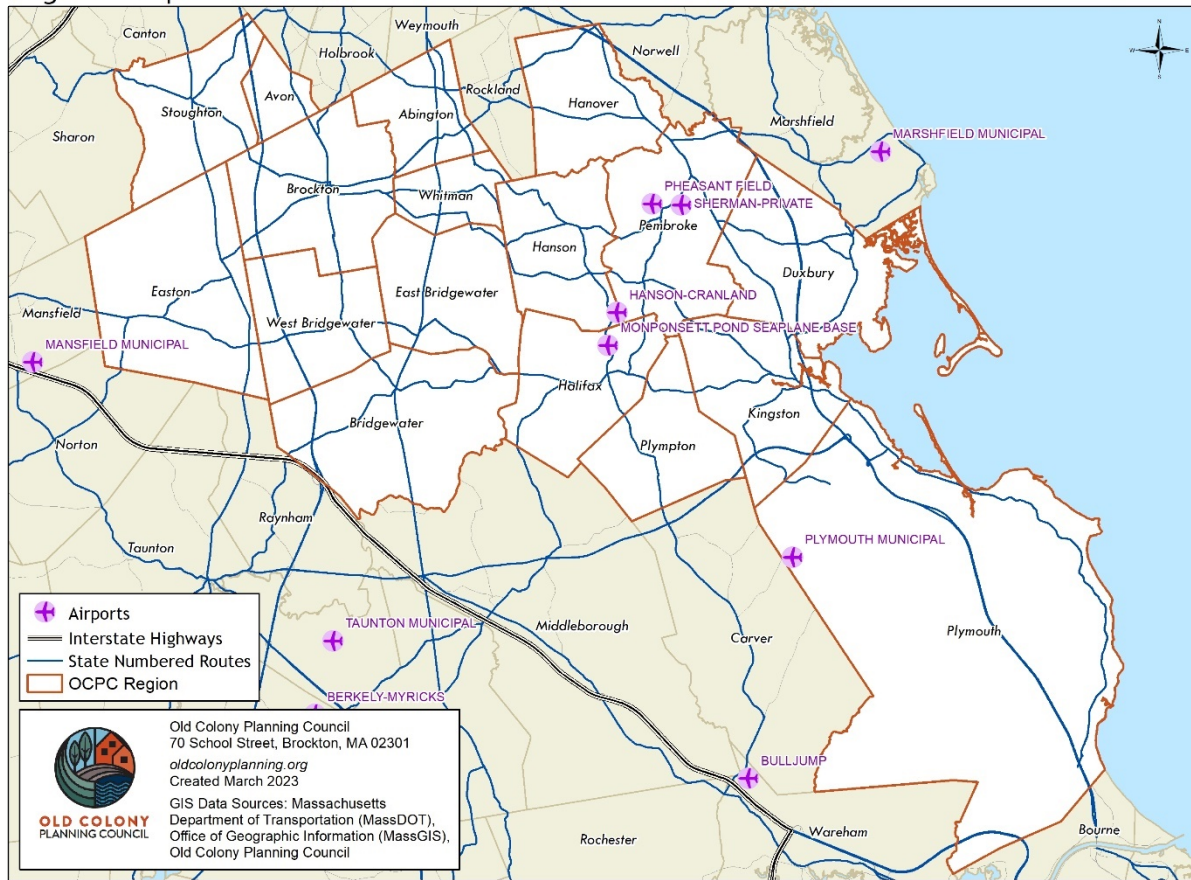
The Commonwealth has recognized the benefits of ferry service and its economic benefits. However, the Commonwealth is struggling to meet the cost of operation and maintenance of ferry service and is looking for some type of public/private partnership, according to MassDOT's 2012 report *Passenger Ferry Transportation in Massachusetts*. The Old Colony MPO planning staff continues to work with local and state partners to identify opportunities for expanding regional ferry service.

### Air Transportation System

There are three airports in the Old Colony Region. Aviation services are provided at Plymouth Municipal Airport and at two private airports: the Monponsett Pond SeaPlane Base in Halifax and Cranland Airport in Hanson. There is a third private airport, Sherman-Private Airport in Pembroke, however it is not available to the public and permission is required before landing. The region's airports are a vital component of the overall transportation network serving personal, business, and recreational purposes, and serve as an important factor in the region's economic development efforts. According to *2010 Massachusetts Statewide Airport System Plan*, the Commonwealth is striving to maintain and grow the airport system as the economy grows and the number of flights arriving and departing continues to climb. In addition to maintaining and expanding the airport system, the Commonwealth goal is to also leverage the economic output the airport system generates. The Old Colony Region should support its regional airport meet the five goals laid out in the statewide plan. These goals include: 1) Meeting FAA applicable design standards. 2) Compliance with Federal, Commonwealth, and Local environmental regulatory requirements. 3) Leveraging economic impacts and benefits of incremental investments in the airport system. 4) Airports should support and promote aviation education programs and conduct community outreach. 5) Integrate with other transportation modes.

**Figure 6-7: Airports in the Old Colony Region**

Regional Airports



Plymouth Municipal Airport

Plymouth Municipal Airport is the only publicly owned airfield in the region, owned by the Town of Plymouth. The airport functions as a general aviation facility serving private operators and individuals. The travel accommodated by the field consists predominantly of recreational and business trips. In addition, three charter services operate out of the field. The facility contains multiple hangars and aviation fuel and repair services. The airport serves the Massachusetts State Police Air Wing, Plymouth County fire planes, and MedFlight helicopters.

Since the last report, the airport has completed the extension of the shorter of its two paved runways from a size of 3,350' x 75' to a length of 4,350' x 75' to reduce the need to have to use both runways operating at the same time and to provide addition runway space for emergency overruns. This extension has helped reduce aircraft conflicts and noise issues.

Halifax: Monponsett Pond SeaPlane Base

This is a seasonal facility and is close in proximity to Hanson’s Cranland Airport, which supplies services to the seaplane base. Halifax utilizes the waters of the Monponsett Pond the seaplanes land on an unmarked area on the pond. Dock space and mooring facilities are available, as is flight

instruction. Emergency-only fuel and repair services are also available from Cranland. Recreational trips are served at this facility. The airport does not offer scheduled passenger or freight service.

#### Hanson: Cranland Airport

Hanson's Cranland Airport is privately owned and permission is required prior to landing. It provides one non-illuminated asphalt runway 1,760 x 60 feet in length. The facility contains seven hangars and emergency-only aviation fuel and repair services. This general aviation facility serves recreational trips as Boston Skydive Company utilizes this airport. There is no scheduled freight or passenger service. The airport does not offer scheduled passenger or freight service.

#### Rail Freight Transportation Network

The current rail freight network within the Old Colony Region includes CSX Transportation, which operates on the Middleborough/Lakeville line and the Providence/Stoughton line. CSX has operating rights along these lines, but the Massachusetts Bay Transportation Authority owns the right of way.

According to the Massachusetts State Rail Plan, freight rail volumes are highest in the western half of the state, where CSX is able to run double stack trains. Rail freight volumes are significantly smaller than truck freight volumes in Massachusetts. According to the rail plan, roughly 88.5 percent of the freight in the state is moved by truck, three (3) percent by rail, one-half (0.5) percent by air, one-half (0.5) percent by water, one (1) percent by multiple modes, six (6) percent by pipeline, and one-half (0.5) percent by "other". According to the rail plan, there has been an increase in freight volumes in eastern Massachusetts, primarily due to increased needs in the area. The increase also reflects coordination and support of the South Coast Rail project, which will return commuter rail service to Fall River and New Bedford. Figure 6-8 shows rail freight in Massachusetts included in the Massachusetts Freight Plan and based on the federal Freight Analysis Framework. It shows growth in rail freight volumes between Springfield and Worcester, north and south of Worcester, and between Worcester and Boston. Rail Freight in the Brockton rail corridor is not expected to increase substantially, according to the Massachusetts Freight Plan, (based on the Freight Analysis Framework).

In 2013, the *Preliminary Market Assessment for the Brockton CSX Site* study was completed by a consultant for the Metro South Chamber of Commerce. The 31-acre Brockton CSX site is known as the former Brockton Freight Yard. It is located north of the Brockton downtown adjacent to North Montello Street, with a long frontage on the active rail line but lacks direct connection to the local roadway system. It is bordered by Elliot Street on the north and Court Street (Route 27) to the south, and has not been in use as a rail yard since the 1980's. The assessment focused on discerning the site's physical, environmental, and infrastructure strengths and weaknesses, gaining the input of stakeholders, and gathering information on potential customers to discuss potential redevelopment opportunities and outline steps toward developing a plan for redevelopment. The study stated that it is possible that intermodal containers could be handled in Brockton on a smaller scale, although the expanded Worcester facility (which now has double-

stack capacity to/from New York) will be the focal point for containers. The study concluded that based on the current market and past uses at the site, the most likely types of freight rail uses there would include:

- Secondary freight rail yard for bulk commodities that are not time sensitive.
- Warehousing/distribution center (rail access is often a benefit for these facilities)
- Manufacturing company that requires rail shipments, such as a food producer that requires bulk products (this is increasingly rare in MA as most manufacturing companies no longer use rail for inbound or outbound shipments)
- Commodity-specific transfer facility from rail to truck for local company (e.g., to handle flour, corn syrup, rock salt, or other bulk commodities)

**Figure 6-8: Freight Rail System**



Since the restoration of the Old Colony Commuter Rail lines in the region, freight transportation has been able to benefit from the upgrades in facilities that were necessary with the reintroduction of frequent passenger service from the area. Many of the grade crossings in the area were upgraded and enhanced, in addition to pedestrian walkways and secured fencing to discourage people from crossing. In addition, the Old Colony lines are also part of Operation Lifesaver, a non-profit organization promoting railroad safety to the public. Operation Lifesaver is a national, non-profit education and awareness program dedicated to ending collisions, fatalities, and injuries at highway-rail grade crossings and on railroad rights of way. To accomplish its mission, Operation Lifesaver promotes “the three E’s:”

- Education: Operation Lifesaver strives to increase public awareness about the dangers around the rails. The program seeks to educate both drivers and pedestrians to make safe decisions at crossings and around railroad tracks.
- Enforcement: Operation Lifesaver promotes enforcement of traffic laws relating to crossing signs and signals and private property laws related to trespassing.
- Engineering: Operation Lifesaver encourages continued engineering research and innovation to improve the safety of railroad crossings.

#### PERFORMANCE TARGETS AND METRICS

Table 6-1 lists a set of federally required infrastructure condition performance measures for transit systems along with BAT's Performance Targets. These Transit Asset Management (TAM) measures, which focus on a specific subset of all transit assets, were established in the FTA's TAM Rule. Brockton Area Transit presented this information along with supporting documentation to the Old Colony MPO in November 2022. The Old Colony MPO has adopted BAT's FY 2023 Brockton Area Transit Authority Transit State of Good Repair Targets in their entirety and as their own and for the Old Colony Region, in accordance with the certified 3C Transportation Planning Process.

**Table 6-1: Brockton Area Transit Authority Performance Measures and Targets**

| Performance Targets by Asset Category |                             |  |                                |                          |                                       |                                     |
|---------------------------------------|-----------------------------|--|--------------------------------|--------------------------|---------------------------------------|-------------------------------------|
| Category                              | Class                       | Metric   | Performance Target for FY 2023 | Total Number of Vehicles | # of Vehicles that exceed ULB - FY 23 | % of Fleet that exceeds ULB - FY 23 |
| Rolling Stock                         | Buses                       | X% of fleet that exceeds default ULB of 14                       | 3.00%                          | 46                       | 1                                     | 2.17%                               |
|                                       | Cutaway Buses               | X% of fleet that exceeds default ULB of 10                       | 25.00%                         | 4                        | 1                                     | 25.00%                              |
|                                       | Vans                        | X% of fleet that exceeds default ULB of 8                        | 14.00%                         | 58                       | 8                                     | 13.79%                              |
| Equipment                             | Non-Revenue Service Vehicle | X% of non-revenue service vehicles that exceeds default ULB of 8 | 40.00%                         | 5                        | 2                                     | 40.00%                              |
|                                       | Non-Revenue Service Truck   | X% of non-revenue services vehicles exceeds default ULB of 8     | 40.00%                         | 5                        | 2                                     | 40.00%                              |
| Facilities                            | Admin/Maintenance Facility  | X% of facilities rated under 3.0 on TERM scale                   | 0.00%                          | 3                        | 0                                     | 0.00%                               |

FTA defines ULB as “the expected lifecycle of a capital asset for a particular transit provider’s operating environment, or the acceptable period of use in service for a particular transit provider’s operating environment.” For example, FTA’s default ULB value for a bus is 14 years. FTA’s Transit Economic Requirements Model (TERM) scale, which pertains to the facilities measure, is a rating system that describes asset condition. The scale values are 1 (poor), 2 (marginal), 3 (adequate), 4 (good), and 5 (excellent). Because each measure is intended to represent the share of transit assets that are not in a state of good repair, the goal is to minimize the value for all four measures. FTA grantees, including transit agencies and agency sponsors, such as MassDOT, are required to develop targets for these TAM measures each fiscal year. MPOs, in turn, are required to set targets for their regions. BAT submitted agency-level targets for state fiscal year (SFY) 2023 (July 2022 through June 2023) to the Old Colony MPO. Their targets

reflect the most recent data available on the number, age, and condition of their assets, and their expectations and capital investment plans for improving these assets during SFY 2023.

Furthermore, BAT, GATRA, and the MBTA each have performance management dashboards which state targets for performance and reliability, and a current measure of where the system is in regard to the targets. The OCPC staff continue to work with these agencies in support of these performance dashboard targets.

#### ISSUES CHALLENGING THE REGIONAL TRANSIT NETWORK

**Meeting Commonwealth Mode Shift Goal.** In 2012, MassDOT announced a statewide mode shift goal to triple the number of commuters statewide choosing transit, bicycling, or walking as their transportation mode choice. The goal has a target year of 2030, and is based on 2010 baseline levels. In order to help achieve this mode shift goal, the planning staff of the Old Colony MPO have coordinated with BAT and GATRA, and continue to do so to explore opportunities for expanding service throughout the region, and continue to maintain levels of service and a state of good repair on the existing transit network.

**Transit service needs reliable, sustainable funding sources.** Having sustained sources of public transit funding is key to keeping the Old Colony Region’s public transit system in a state of good repair, keeping it as a reliable form of transportation for the public and enabling it to meet the transportation needs of the region. Filling the funding gaps should be a multipronged approach via increased Federal and Commonwealth funding, and through better fare box return over time.

**Gaps exist between transit providers.** Through previous studies to identify gaps in the fixed route bus system in the Old Colony Region, it was determined that bus service between the greater Brockton area (BAT) and greater Taunton area (GATRA) should be studied to see where these links should be made.

**An aging population and increasing popularity of “Aging in Place”.** As the population grows older, so does the transit and paratransit dependent population. As such, the number of residents choosing to age in place is also increasing. Meeting the service needs of this population is and will continue to be a major consideration in the planning and routing of transit services.

**Automobile and bicycle parking is underperforming at Commuter Rail and Park-and-Ride lots.** Data from the Old Colony Congestion Management System indicates parking lot utilization remains low at several of the Region’s commuter rail and Park-and-Ride lots, by both motorists and bicyclists. Furthermore, the bicycle parking infrastructure is inconsistent from location to location, with only one (1) Park-and-Ride lot containing bicycle parking infrastructure. The Old Colony MPO is committed to achieving mode shift goals by working with agencies to maximize the potential of these facilities.

## RECOMMENDATIONS

### Service and State of Good Repair (SGR) Recommendations

**Support additional service.** The Old Colony MPO planning staff will continue to work with BAT on planning tasks such as ridership analysis and trip demand analysis for potential new service in a continuing effort to enhance transit service and hours of service in the BAT service area. Similarly, Old Colony staff will work with GATRA on how service can be enhanced in that service area.

**Meet operational needs.** BAT annually seeks Commonwealth and Federal transportation grants to finance support equipment and operations costs. BAT should continue to seek this method of funding to meet operational and capital replacement needs. BAT should also continue to work closely with the Old Colony Metropolitan Planning Organization and staff and Commonwealth to seek out and secure additional operation and capital funding to meet growing service demand. In the 2024-2028 Old Colony TIP (Transportation Improvement Program), BAT will receive \$41.6 million in funding for capital assistance, which includes the replacement of 14 fixed route buses with electric buses as well as the necessary infrastructure to operate them.

**Adequately fund transit to provide a safe, reliable, and efficient regional network.** The Old Colony MPO staff will continue to work with providers to secure stable sources of funding and increase funding when appropriate.

- The Old Colony Region must continue to assist the Regional Transportation Authorities in securing operational and capital funding from both the Commonwealth and the Federal Government.
- Continue to assist the Regional Transportation Authorities in reviewing their fare structures ever few years to see if adjustments are needed to passenger fares.
- Continue to support the funding of commuter rail operations in the Commonwealth through a statewide funding mechanism and its efforts to expand service in the Region.

**Continue current outreach programs.** BAT should continue its ongoing outreach program to educate the residents of the region about the transportation services it offers and destinations it serves to spur additional ridership. BAT should also continue its outreach efforts to local business and companies to understand the needs of their employees to see if there might be opportunities for partnership.

**Explore recommendations set forth in Transportation Network Company (TNC) Study.** Review recommendations set forth in study on impacts of ride hailing companies such as Uber, Lyft, and other TNCs on transit ridership, and support collaboration between transit authorities, TNCs, and regional planning authorities.



### Mobility and Livability Recommendations

**Expand geographic reach of demand response (paratransit and human services coordination) services.** The Old Colony MPO and Old Colony Planning Council staff should continue to work closely with its Regional Transportation Authorities and those private agencies providing paratransit/demand response service to help meet the growing need. It was mentioned in *The Old Colony 2019 Coordinated Human Service Transportation Plan* that paratransit/demand service needs to be increased to help correct the challenge of developing a schedule around limited-service hours and area. Partnering with private transportation providers and ride-hail app services could help improve the customer experience.

**Continue to find additional ways to improve mobility and access to the transit networks, along with the transportation decision planning process, for all users.**

**Support coordination between Town of Bridgewater, Bridgewater State University, and MBTA to relocate Bridgewater Commuter Rail Station.** A comprehensive planning study completed in 2019 by Old Colony Planning Council through the District Local Technical Assistance Program looked at the feasibility of relocating the Bridgewater Commuter Rail Station. The station is currently located within the campus of Bridgewater State University, and the study looked at the benefits of relocating the station to the site of the historic Bridgewater on Spring Street, on parcels currently occupied by Bridgewater State University and municipal parking. Relocating this station could foster transit-oriented development and boost the local economy in and to the south of Central Square, while continuing to provide transit access to Bridgewater State University.

**Improve mass transit linkages.** Every effort should be made to promote improved linkages between mass transit and other modes of transportation. The Old Colony MPO is committed to working with transit providers to identify and study gaps in transit service and identifying strategies and projects to improve linkages between fixed route transit, demand response transit, and other modes of transportation.

**Expand commuter services by private commuter carriers.** The expansion of commuter services by private carriers such as Bloom and Plymouth & Brockton is encouraged in areas where there is a demand for such services.

**Apply Smart Growth and Complete Streets Principles to and around development in the region.**

### Intermodal Recommendations

**Continue supporting the development of a Plymouth Intermodal Center.** GATRA and Plymouth have been in the process of trying to fund the building of an intermodal center that would enhance both commuters and tourist transportation experiences.

**Encourage increased use and expansion of commuter parking facilities.** The Old Colony staff should work with MassDOT to continue to promote existing commuter parking facilities and

develop additional spaces, where needed, for intermodal uses. Furthermore, the addition of enhanced bicycle accommodations should continue at all transit facilities and Park & Ride lots such as the great increase in bicycle parking at the BAT Intermodal Centre.

#### **Air, Water, and Freight Movement Recommendations**

**Increase use of smaller general aviation airports.** Municipal Airports in the region, such as the facility in Plymouth, have experienced marked growth in the numbers of take-offs and landings in recent years. Both runways at Plymouth Airport have been expanded in the past and the shorter of the two runways should be increased in length to increase capacity, promote greater safety, and lessen the impact of noise on residents.

**Investigate potential of municipal airports' ability to serve as freight terminals.** Currently, there is no scheduled freight service at any of the municipal airports throughout Southeastern Massachusetts. A feasibility study should be considered by the Massachusetts Aeronautic Commission to determine whether there is potential for any of the municipal airports to serve as airfreight terminals. Depending upon the type of freight, such a facility could serve intermodal purposes.

**Seek to establish greater public/private partnerships in ferry operations.** The Old Colony Region should work with MassDOT, the Old Colony Planning Council, Municipalities, private ferry operators, and those interested in entering the ferry operation market to form better and more productive ferry service.

**Increase the level of freight/goods movement by rail in the Old Colony Region.** Support such initiatives, which would serve to reduce truck traffic congestion on local highways and local roads. Consider working jointly with the Southeastern Massachusetts Metropolitan Planning Organization and Boston Central Transportation Planning Staff on a regional freight study.

#### **Planning and Policy Recommendations**

**Encourage interagency agreements to enhance passenger service.** For example, currently the MBTA 230 bus ends at the Montello Station, but extending that service to the BAT Centre, would enhance passenger connections. A partnership between the MBTA and Brockton Area Transit should be explored to better service customers in Brockton and those using the line through Holbrook, Braintree, and Quincy.

**Encourage private sector participation in public transit operations.** Brockton Area Transit is encouraged to continue joint development initiatives with private sector contractors when feasible and create partnerships between BAT, other RTAs, private carriers, and ride hail providers in the region to initiate transit service where there is documented unmet transportation need.

## Chapter 7: Vulnerable Road Users Transportation

Facilities for safe, convenient, and efficient bicycle and pedestrian transportation are key elements of a well-balanced regional transportation network. Many of the Old Colony's goals, objectives, and policies include supporting a comprehensive and sustainable transportation network through the fostering of non-motorized active transportation choices.

Bicycling as a mode of transportation offers a high degree of personal mobility, providing door-to-door access, often at speeds comparable or greater than automobile travel in high-density urban areas. In recent years, bicycling has become an increasingly popular healthy mode choice of travel for commuting to school, work, recreation and exercise. The ever-increasing cost of automobile ownership, a growing focus on sustainability and the persistent issue of traffic congestion has driven much of the increase in the popularity of bicycling as a form of transportation.

Safe, convenient, and well-designed bicycle transportation infrastructure is essential to encourage bicycle use. Roads designed to accommodate bicyclists of all abilities will meet the needs of most users and encourage bicycling for everyday use according to the Massachusetts Department of Transportation (MassDOT). Young children, women and the elderly are especially vulnerable and may require special consideration when designing bicycle transportation facilities, particularly on busy arterial streets and those roads with high-speeds and high traffic volumes.

All bicyclists are best served by:

- Extra operating space when riding on the roadway such as cycle tracks, protected bicycle lanes, bicycle lanes, useable shoulders, or wide curb lane
- Low speed streets (where cars and bicyclists share travel lanes)
- A network of designated bicycle facilities (bicycle lanes, side-street bicycle routes, and shared use paths).

All travelers are pedestrians at some point in their trip, and pedestrians are part of every roadway environment. Pedestrian facilities include sidewalks, walking paths, crosswalks, stairways, curb cuts, curb ramps and transit stops. In some areas, particularly in suburban and rural communities, pedestrians may be sharing the roadway itself or its shoulders. It is important to understand that there is no single "pedestrian type" and that the transportation network needs to accommodate a variety of pedestrians of varying abilities. For example, children perceive their environment differently from adults and are not able to judge how drivers behave. Children typically walk slower, have a shorter gait, and have lower eye height than adults. On the opposite end of the spectrum, older adults may require more time to cross a street, desire more predictable surfaces, benefit from handrails in steep areas and may require places to rest along their route. People who are blind or have limited sight require audible and tactile cues to safely navigate sidewalks and crosswalks.

People with limited cognitive abilities may rely on symbols, way-finding signage and take longer to cross the street than other pedestrians. Pedestrians using mobility devices such as wheelchairs, scooters, and walkers need pedestrian infrastructure that possesses adequate widths, slopes and to be free of obstacles to allow these pedestrians to travel with ease and with a high degree of comfort. It is important to recognize pedestrians exhibit a wide range of physical, cognitive, and sensory abilities, but they all comprise the pedestrians that roadway design needs to accommodate.

### **An Act to Reduce Traffic Fatalities**

On January 2, 2023, Governor Baker signed An Act to Reduce Traffic Fatalities into law. This bill has a variety of components that will make roadways within the OCPC region and across the commonwealth safer for everyone.

Key components of the bill are as follows:

#### **Defines Vulnerable Road User**

The legislation defines ‘vulnerable road users’ to include people walking and biking; roadside workers; people using wheelchairs, scooters, skateboards, roller skates, etc.

#### **Safe Passing**

The bill requires “safe passing distance” to be 4 feet. Massachusetts is one of the last states to pass a safe passing distance, this will be in line with other states in terms of roadway safety.

#### **Truck Safety Devices**

Requires state contracted trucks to be equipped with safety side guards, mirrors, and backup cameras to reduce fatalities of people walking and biking.

#### **Safer Speed Limits**

Clarifies the process for municipalities to alter speed limits in thickly settled areas from 30 MPH to 25 MPH both on state controlled roads and on the roads they control.

#### **Crash Reporting**

To improve statewide data collection surrounding vulnerable road user crashes, the bill develops a standardized analysis tool to be used to report crashes and incidents involving a person biking or walking.

#### **Rear Red Light Requirement**

To ensure cyclists are visible on our roadways, the legislation adds a new requirement for use of rear red lights at night. This means, that when riding at night bicyclists should have both a front and rear light.

## ISSUES IN THE OLD COLONY REGION

There continues to be Elementary, Middle, and High Schools in the region not taking advantage of the Safe Routes to School Program. The Safe Routes to School program (SRTS) aims to encourage and promote kids to walk and bike to school rather than being driven to campus through collaborative community approaches. As of January 2023, 51 Schools are partner schools in the OCPC region.

The Old Colony region is generally auto-dependent. Over the past six decades, land-use decisions have generated demand for a transportation system designed to accommodate automobiles without consideration of other transportation modes. Changing demographics, which includes an aging population and a citizenry that is becoming more diverse and includes a wider variety of people who cannot afford the expense of a personal vehicle, are visually impaired, or simply choose not to drive requires better and broader choices in transportation services and infrastructure. Modal shift and inter-modalism can help alleviate auto dependence by increasing the use of transit, carpool/vanpool, and non-motorized transportation modes such as bicycling and walking.

Bicycle parking at transit facilities continues to underperform in some locations. While most transit facilities in the region provide bicycle-parking racks, the number of people biking to transit stations and park and ride facilities remains very low. Minimal security of these racks and a lack of shelter for bicycles may deter bicyclists from parking their bikes at these facilities. Access to park and ride lots and the location of some in the region is not conducive to bicycling either, since most roads leading to these park and ride lots are high-speed, high-volume arterials that are unfriendly to cycling. Additionally, facilities such as showers are not available at some places of employment or they are located far enough away to suppress people's willingness to bike to work since they cannot clean up before they begin the workday.

The current ADA accessible sidewalk network does not meet the needs of the users in all places. Most of the main roadways in the region have a sidewalk on at least one side. However, there are many smaller roadways, particularly in more rural areas, where sidewalks are not present. In some cases, worn footpaths exist and in other areas, pedestrians share the roadway with vehicles. For existing sidewalks, width, surface type and conditions, and curbing conditions vary. In some cases, sidewalks are in disrepair from weathering and vegetation and many are lined with obstacles (such as trash cans or utility poles) that make it hard to navigate for those using mobility devices.

Access to major employment centers is constrained due to the region's over-reliance on the automobile as its main source of transportation. Not all major employment centers are accessible by public transportation nor have adequate bicycle transportation infrastructure and amenities that would encourage individuals to bicycle to work to help mitigate the impacts of traffic congestion. With the automobile being such an integral part of one's commute, routes leading

to these major employment centers become congested and decrease the quality of life for all that wish to access these places on foot or bicycle.

Environmental Justice Areas generally suffer from lack of infrastructure upgrades. The older infrastructure could generally include poor pavement conditions, lack of ADA compliant sidewalks, and lack proper crosswalks and bike lane markings.

## EXISTING CONDITIONS

### Sidewalks

According to the Massachusetts Road Inventory File, the Old Colony region has over 390 miles of roadway with a left and/or right sidewalk. Most of the main roadways in the region have a sidewalk on at least one side. However, there are many smaller roadways, particularly in more rural areas, where sidewalks are not present. In some cases, a worn footpath exists and in others, pedestrians share the roadway with vehicles. For existing sidewalks, width, surface type and conditions, and curbing conditions vary. In some cases, sidewalks are in disrepair from weathering, overgrown vegetation and may contain a number of obstacles that impede pedestrians.

### Existing Walking Paths and Trails

Several parks, nature areas, and recreation areas throughout the region feature walking and shared use paths. These areas include:

- Ames Nowell State Park, Abington
- Hanover Branch Rail Trail, Abington
- Borderland State Park, Easton
- D.W. Field Park, Brockton and Avon
- Myles Standish State Forest, Plymouth
- West Bridgewater Rail Trail, West Bridgewater

In addition to these major areas, several smaller parks and conservation areas exist in each of the towns, many providing pedestrian trails and paths. Bridgewater State University has a network of paved footpaths connecting campus buildings, parking areas, and the Bridgewater MBTA Commuter Rail Station.

### Dedicated Bicycle Routes

Claire Saltonstall Boston to Cape Cod Bikeway: The Boston to Cape Cod Bikeway (“Claire Saltonstall Bikeway”) is the major bike route in both the Old Colony region and Massachusetts. This facility is approximately 65 miles from Boston to the Cape Cod Canal and then runs to both Provincetown (about 70 miles from the canal) and Woods Hole (about 20 miles from the canal). Principally, it accommodates long-distance recreational trips. The Bikeway traverses existing roadways with the bike route marked by road signage. This facility was developed to utilize low volume back roads as much as possible. In addition, the bikeway provides bicyclists with considerable opportunities to visit points of interest such as historical sites, shopping districts,

and parks. In the years since the bikeway was planned, some of the roads, such Long Pond Road in Plymouth, have had large increases in traffic volume, and significantly more conflict between bicyclists and motorists could be occurring now. Additionally, signage that once provided route guidance for bicyclists to follow is missing on many legs of the Claire Saltonstall Bikeway or have fallen into disrepair.

**Bay Circuit Trail:** The Bay Circuit Trail (BCT) is a more than 230 mile long recreation trail connecting parks, open spaces, and waterways in eastern Massachusetts. First proposed in 1929 as an outer "emerald necklace," the route stretches from Plum Island in Newburyport on the North Shore to Kingston Bay, traversing 50 cities and towns. The BCT varies in surface type, from earthen hiking trails to paved shared-use trails.

#### **Recreational Bicycle Routes**

**Seaside Bicycle Trail:** The Seaside Bike Trail in Plymouth is a 1.5 mile long facility that runs parallel to the Plymouth seashore between Hedge Road (just south of Cordage Park) and Nelson Street (just north of Downtown Plymouth) at the Nelson Street Recreation Area.

**D.W. Field Park Parkway:** D.W. Field Park in Brockton has a road that is partitioned for motor vehicle and active transportation usage. The D.W. Field Parkway is 5 miles in length and segmented into a northern section above Pleasant Street and a southern portion below Pleasant Street.

**Easton Schools Complex Bikeway:** The Town of Easton Schools complex has a quarter mile bikeway within the schools complex campus. The bikeway stretches from Columbus Ave to Lothrop Street.

#### **Areas of Concentrated Activity**

Many of the areas of concentrated activity are located within the traditional downtown areas of the Old Colony communities, such as Downtown Brockton, Downtown Whitman, Stoughton Center, Downtown Easton, etc. Others are centered on transit stations, such as the Montello and Campello stations in Brockton.

#### **Abington**

The Town of Abington possesses no one concentration of commercial and/or high-density housing units that could be considered a town center. Instead, Abington has a pocket of commercial activity along certain corridors and housing units disseminated throughout the Town in a suburban pattern. The Town did create Transit Oriented Development (TOD) around its MBTA Commuter Rail station and the Town's central business district to encourage the development of uses that complement both the existing rail line and the surrounding residential areas. The district encompassed thirty acres around the Commuter Rail station.

The Town of Abington continues to experience growth but not at the previous rate, it did between the 2000 and 2010 U.S. Census periods. The Abington MBTA Station along with the close proximity of the Stop & Shop/Target shopping center has the potential to become a major

intermodal transportation center serving the increasing population and economy of Abington and the surrounding towns by containing the following features:

- Commuter Rail (Existing)
- Parking Facility (Existing 400+ Vehicle Lot)
- Enhanced Walkways between the Station, Housing, and Central Business District
- Enhanced Pedestrian Amenities at area signalized intersections (Potential)
- Bicycle Lockers (Potential)
- Fixed Route Bus Service by Brockton Area Transit (Potential)
- Bicycle transportation facilities such as bicycle lanes between the Station, Housing, and Central Business District

### Downtown Bridgewater

Downtown Bridgewater is a crossroads of three numbered Routes: 18, 28, and 104, and served by MBTA Bridgewater Commuter Rail Station. Additionally, the Town of Bridgewater also receives public bus service via Bridgewater State University student bus service and through the Brockton Area Transit Authority's Route 28. Development patterns in the area feature a New England Village style town center, with a mix of housing, local businesses, and services. Traffic flows around the town center in an oblong roundabout-like facility. Bridgewater State University abuts the town center and is a major generator of pedestrian traffic. Many students living in nearby off-campus housing commute to class by foot or biking and similarly many on-campus students travel to nearby businesses via the same means.

Several municipal buildings, including the Town Hall and Public Library, are also located within the center and generate pedestrian and bicycle trips. Due to the scarcity of parking, in some cases, visitors who arrive by automobile must park some distance away from their ultimate destination, and travel from their parking spot to the destination on foot. The area can be greatly served by enhanced pedestrian amenities, including pedestrian countdown signals at signalized intersections and raised crosswalks at major crossing points. Bicycle lanes should be considered on the major roadways leading to and from the college, as the college has a significant population of students and faculty alike that live in nearby housing and may be well served by the option to safely bike to the school. Bicycle transportation infrastructure operating through the town center roundabout should be of robust design with a high degree of protection for the bicyclist. The Bridgewater MBTA Station should be included in all bicycle and pedestrian improvements involving the college.

### Downtown Brockton

Brockton is the largest community in the Old Colony region and is a center of housing, commerce, industry, and government. The Downtown Brockton area contains all of these types of land use within a tight, concentric high-density core that extends between Court Street and Belmont Street from north to south, and Commercial Street and Warren Avenue from east to west.



The Downtown is a typical urban center with a mix of residential units, offices, and retail and service-oriented businesses. Brockton City Hall, Brockton Police Headquarters, the US Post Office, government (county and state) offices, Brockton Area Transit's Intermodal Transportation Centre; and the Brockton Commuter Rail Station are all located within the Downtown. This mix of development over a confined urban downtown generates a large amount of pedestrian trips within and into Downtown Brockton. Due to the dense urban pattern of Brockton and in particular Downtown Brockton, there is a high potential for every day bicycling in the city according to MassDOT standards laid out in its Bicycle Plan. While there has been increasing progress to implement better pedestrian and bicycle transportation infrastructure in the Downtown Brockton area, additional facilities with a strong focus on greater pedestrian and bicyclist safety and security in the city and the downtown area should be developed to promote greater pedestrian and bicycle activity for transportation purposes. These pedestrian and bicycle infrastructure improvements include:

- Pedestrian countdown signals at Downtown intersections and safety bollards
- Leading Pedestrian Interval (LPI) or concurrent pedestrian signal phase policies
- Better lighting of sidewalks and streetscapes
- Raised crosswalks on Commercial Street, between the Brockton MBTA Station & BAT Intermodal Centre, and in front of the Post Office
- Well maintained, brightly painted crosswalks throughout Downtown Brockton
- Bicycle Lockers at Brockton MBTA Station, BAT Intermodal Centre, and various locations downtown
- Protected bicycles lanes in downtown
- Network of bicycle lanes throughout the City of Brockton
- Bolstering of bicycle infrastructure on roads adjacent to D.W. Field Park to unlock the park's potential to be a viable sustainable transport corridor from Avon into Brockton
- Increased North-South bicycle connectivity especially along Route 28
- Bicycle wayfinding signage throughout the city

### Campello and Montello MBTA Stations

The Montello and Campello neighborhoods of Brockton each have an MBTA Commuter Rail Station. The Montello Station is located between North Montello Street (Route 28) and Spark Street, just to the south of Howard Street (Route 37). The Campello Station is located off Plain Street, just to the east of Montello Street (Route 28). Both neighborhoods are very densely developed, and each station generates a large amount of pedestrian traffic. In addition to commuter rail service to Boston, each station is served by Brockton Area Transit's fixed route bus service, and the Montello Station is served by MBTA fixed route bus service to Holbrook, Randolph, Braintree, and Quincy.

The Montello Station could be better served by greater traffic enforcement on North Montello Street (Route 28). Even though there are clearly defined crosswalks and a Rectangular Flashing Beacons (RFBs) at the southern crosswalk at Montello (Route 28) and Wilmington Street, many

drivers do not stop for pedestrians even when the RFB has been activated by pedestrians. Additionally, a counter flow bicycle lane should be established on Wilmington Street to bring bicyclist from the MBTA Commuter Rail Station up to North Main Street.

The Campello Station could be better served by enhanced pedestrian connections to the surrounding neighborhood, as access is currently largely limited to the driveway off Plain Street. Many pedestrians access the Campello Station via Riverside Ave and currently climb a dirt berm in order to access the station platform. Installing stairs and an accessible wheelchair ramp would allow pedestrians to transverse this berm in a safe and comfortable manner. A pedestrian bridge over the railroad track to Forest Street would allow pedestrians to access the station from the eastern neighborhoods across the tracks making it feasible to walk to this station from homes in this area. Establishing bicycle lanes and wayfinding leading cyclists to the Station are needed.

- Improve Roadway Lighting
- Construction of new sidewalks/Pedestrian bridge
- Construction of bicycle paths and bicycle lanes

Design and implantation of any improvements on local and federal-aid eligible roadways around these stations would be the responsibility of the host communities as these roadways are under local jurisdiction.

#### Downtown Stoughton

Stoughton Center is a densely developed area around the intersection of Routes 27, 138, and 139. The Stoughton MBTA Commuter Rail Station is also located in Stoughton Center. Development around the Center features a mix of small local shops; services; municipal facilities; and housing. Like other MBTA Stations in the Old Colony Region, the Stoughton MBTA Station has the potential to develop into a major intermodal transportation center serving the population and economy of Stoughton and the surrounding towns by containing the following features:

- Commuter Rail (Existing)
- High Capacity Parking Facility (Existing 400+ Lot)
- Enhanced Walkways between Station, Housing, and Central Business District (Existing and Potential)
- Enhanced Pedestrian Amenities at area signalized intersections (Existing and Potential)
- Bicycle lanes
- Pedestrian and bicycle linkage crossing Route 24 from Stoughton Center to neighboring communities like Randolph, Avon, and Brockton
- Bicycle wayfinding signage
- Bicycle Lockers and Bike Racks (Existing and Potential)

#### Downtown Plymouth

Downtown Plymouth is less defined than some of the other downtown areas in the region but generally extends north to south along the waterfront from Samoset Street (Route 44) to Lincoln

Street. In addition to the traditional mix of commercial, residential, and municipal uses, the Downtown area of Plymouth also features historic sites and major tourist destinations such as Plymouth Harbor, Plymouth Rock, Pilgrim Hall Museum, and the Mayflower II. Plymouth Harbor provides seasonal waterborne transportation options to Provincetown and serves as an operational fishing port.

Plymouth has a parking management system in the Downtown that directs visitors to park at any one of a network of surface parking lots throughout the area, pay for parking, and walk to their destination. Safe and efficient pedestrian amenities are critical to the vitality of Downtown Plymouth, as many businesses, tourist attractions, and government offices do not have on-site or readily available nearby street parking.

Plymouth's MBTA Commuter Rail Station is just 1.74 miles outside the town's linear downtown. While the distance between the MBTA Commuter Rail Station and Plymouth's downtown is not very conducive to walking, it is a bikeable distance. The extension of the Seaside Rail Trail to the Plymouth MBTA Commuter Rail Station would provide a car-free bicycle ride from the station to the northern point of Plymouth's Downtown area, making it more conducive for commuters to combine a bicycle with their Commuter Rail trip. Additionally, the extension of the Seaside Rail Trail would allow for safer and more direct trips between Plymouth's Downtown and the Cordage Commerce Center, which houses many businesses and the Quincy College Plymouth Campus and housing currently in development on the former Walmart site. Needs include:

- Rectangular Rapid Flash Beacons (RRFB) to better delineate crosswalks
- Bike Racks around the Downtown
- Pedestrian countdown signals at signalized intersections
- Leading Pedestrian Interval (LPI) or concurrent pedestrian signal phase policies
- Raised Crosswalks at major mid-block crossing points
- Increased lighting on side streets and alleyways that connect Main Street to Water Street
- Extension of Seaside Rail Trail to Plymouth MBTA Commuter Rail Station
- Bicycle lockers at the Plymouth MBTA Commuter Rail Station
- Expansion of bicycle lanes throughout the Town of Plymouth

Design and implementation of any improvements on these local and federal-aid eligible roadways would be the responsibility of the host communities as these roadways are under local jurisdiction.

### Cedarville

Cedarville is a village center of Plymouth located at the southern end of Plymouth, between Exit 2 on Route 3, Route 3A, and Hedges Pond Road. The area is highly commercialized along State Road (Route 3A) between Herring Pond Road and Hedges Pond Road. While much of the residential development in the surrounding area is low-density, a large high-density residential development is located along the southern boundary of the village center, on the east side of Route 3A.

The Town has identified this area as an area with a large amount of pedestrian activity and high-hazard to pedestrians. Route 3A is a wide cross-section with high speeds and no signalized intersections to assist with crossings. Pedestrians crossing the highway ramp system at Route 3 Exit 2 also face a high-degree of hazard with unprotected crossings and high travel speeds. According to Strava Metro heat map data, bicyclists do travel through the Cedarville area. However, there are no bicycle accommodations in the Cedarville area. The following improvements have been identified that could greatly improve safety and mobility for pedestrians in the area:

- Signalize the Route 3 Ramps at Herring Pond Road
- Signalize the intersection of State Road (Route 3A) and Herring Pond Road
- Signalize the intersection of State Road (Route 3A) and Hedges Pond Road
- Enhance mid-block crossings at shopping centers, between Herring Pond Road and Hedges Pond Road, and at White Cliffs
- Widening asphalt sidewalks in the area to change their function from pedestrian only, to multiuse paths that accommodate pedestrians and bicyclist.

#### Queset Commercial District

The Queset Commercial District centers on Route 138 and Route 123 in the Town of Easton. Found in this area are Stonehill College and numerous retail and dining establishments. With the recently developed Water Point Condominium project, formerly known as Queset Commons, the resident population is expected to rise and with the additional retail component of the Water Point Condominium project, there is the potential for greater traffic congestion and bicycle and pedestrian activity due to the increased retail offerings. Currently, the retail establishments around the Queset Commercial District area generates a large amount of pedestrian traffic originating at Stonehill College, with most of these trips travel back and forth on Route 138 and Route 123, with students walking between the two commercial areas of Downtown Easton and the Starbucks plaza. Safety and security along Route 138 and Route 123 can be enhanced for pedestrians and bicycle riders by:

- Creation of bicycle Lanes along Route 138 between Route 123 and Main Street
- Creation of bicycle lanes between Route 138 and Pearl Street
- Enhancement of traffic signals along these two corridors
- Installation of pedestrian signal at Route 138 and Route 123
- Work with Stonehill College to redevelop its former main entrance, the Blessed Basil Moreau Drive, into a bicycle and pedestrian corridor
- Improve signage at the Natural Resources Trust (NRT) Sheep Pasture to inform pedestrians and bicyclist they can pass through this area to reach Downtown Easton.
- Establish well-lighted walkways and streetscapes

### Downtown Easton (North Easton)

Downtown Easton or North Easton Center as it is sometimes referred to, is a stretch of Main Street in the Town of Easton that is bound by Seaver Street to the east and Day Street to the west. Found along this stretch of road are numerous retail and dining establishments with single-family homes and medium density housing units present in the area. Downtown Easton is flourishing economically. With this success has come more pedestrian and bicycle activity. Additionally, Downtown Easton has constrained parking availability that results in patrons and residents having to park further away from their destination or homes requiring them to walk a longer distance. Due to the limited road width between Williams Street and Day Street, there are no bicycle lanes or shoulders able to accommodate bicyclists. The following improvements have been identified that could greatly improve safety and mobility for pedestrians and bicyclist in this area:

- Install more bicycle parking to encourage individuals to bike to the area rather than driving their car
- Establish bicycle transition markings informing drivers that cyclist will be leaving the shoulders and taking the travel lane as they enter the commercial area of Downtown Easton
- Reduce automobile speeds along Main Street between Seaver Street and Washington Street to 25mph.
- Increase traffic enforcement along Main Street
- Establish bicycle wayfinding signage
- Where space allows, establish more pedestrian seating

### Five Corners (South Easton)

Five Corners is a commercial area located in the Town of Easton, in a section of town known as South Easton. Five Corners is characterized by suburban auto-oriented development with the dispersion of low-density single-family housing and two multifamily complexes. The area is being upgraded to a sewer waste management system that will allow greater commercial and residential development to take place than the current septic waste management systems can handle now. If more intense commercial and residential usage occurs as a result of the upgrade to a sewer system, there will be the potential for greater pedestrian and bicyclist activity than there is now. The following improvements have been identified that could greatly improve safety and mobility for pedestrians and bicyclist in this area:

- Install pedestrian countdown signals
- Establish a crosswalk on Bay Road and Depot Street
- Reestablish the bicycle lane along Depot Street that is no longer up to modern standards by widening the bike lane to be used as a multiuse path.
- Provide bicycle accommodations such as bicycle lanes in this area.
- Provide greater traffic enforcement in the area

### Downtown Whitman

Downtown Whitman is centered on Washington Street, between South Avenue (Route 27) and West Street. A relatively compact area, featuring several businesses, it is flanked by dense residential development on all sides, a large park to the northeast, and town offices and the Whitman MBTA Station three-quarters of a mile to the east. Observations from data collection in the area indicated a large number of pedestrians between Downtown Whitman and the MBTA Station. Two all-way stop controlled four-legged intersections make up the northern and southern ends of the downtown area. While these “4-Way Stop” sign-controlled intersections effectively process traffic in the area, they can present a challenge to pedestrians attempting to cross at the intersection.

Currently, there is no bicycle accommodation within the Downtown Whitman area. That said, because of the dense development patterns in the Downtown area and numerous retail and dining options, Downtown Whitman is a prime location for everyday bicycling. Pedestrian and Bicycle accommodation can be enhanced by:

- Implementing complete street design elements
- Establishment of pedestrian and bicyclist wayfinding
- Establishment of BAT bus service to the town center and MBTA station
- Bicycle parking in Downtown
- Establishment of a bicycle lane along Route 27

### Pembroke Center

Pembroke Center is a traditional New England community center with a shopping plaza, town offices, a library, and several other free-standing businesses. Low-density residential development surrounds the center. The shopping center at Route 14 and Route 36 was recently redeveloped. Despite low-density residential development, pedestrian activity near the center is likely to increase with the relatively fast growth of the town, the newly developed center, and new transit service between the center and the Hanson MBTA Station.

### SAFE ROUTES TO SCHOOL

The Massachusetts Safe Routes to School (SRTS) program promotes healthy transportation and mode shift for children and parents in their travel to and from school. It educates students, parents and community members on the value of walking and bicycling for travel to and from school.

The Massachusetts Safe Routes to School program is managed by the Massachusetts Department of Transportation. The program was established out of a pilot program developed by WalkBoston and is currently managed by MassDOT. Safe Routes programs:

- Continue to establish healthy lifetime habits for students
- Increase children's independence

- Help students arrive at school ready to learn
- Teach safe pedestrian, bicyclist, and driver skills
- Encourage non SRTS schools in the region to become participants

Safe Routes to School includes education, encouragement, enforcement, engineering, and evaluation to ensure a comprehensive and successful program to increase walking and bicycling to and from school. As the title of the program suggests, safety is a central theme concerning the initiatives and goals of the program. Some of these specific initiatives include the design and maintenance of effective school zones, maximizing safety at street crossings, and reducing travel speeds.

The Massachusetts Safe Routes to School program offers schools technical assistance designing, implementing, marketing, and evaluating initiatives tailored to each school's needs and priorities. Participating schools receive free promotional materials to implement Safe Routes to School, plus no-cost educational materials targeted to students, parents, and community leaders. Training prepares school stakeholders to identify school access challenges and design solutions. School partners qualify for infrastructure improvements to enhance safety along school routes.

## RECOMMENDATIONS

### Livability

Livability recommendations include the continued support of MassDOT “Complete Streets” design element initiative in all roadway projects. Complete Streets are roadways that are designed to support safe, attractive, and comfortable access to all users, including, pedestrians, bicyclists, public transit and motorists. In addition to enhancing safety and mobility, “Complete Street” designed roadways often enhance the surrounding community and environment through traffic calming techniques and vegetated streetscapes. Complete Streets are categorized by wide paved shoulders or separate bicycling lanes; sidewalks separated from the roadway by raised curbing and/or vegetation; well-placed and well-designed crosswalks; raised medians providing crossing refuge, and bulb-outs at intersections to prevent high-speed turning vehicles and shorten the crossing distance for pedestrians. Target and Performance Measure: OCPC’s goal is to have 100% of member communities with Complete Streets policies and at least 50% of communities have taken part in receiving complete street project funding within 10 years. So far all but one (Plympton) have Complete Streets policies, and just over half have received funding.

Improve mobility and access to the pedestrian infrastructure network for all users. There are currently large gaps in the ADA-accessible pedestrian infrastructure network in the region. As the population continues to age, providing access to all users, including those with physical challenges and disabilities will become critically important. All planning efforts should incorporate the needs of all users, and strategies to improve access and reduce gaps in the ADA-accessible network should be incorporated into all transportation planning products.

Encourage/promote walking and bicycle riding as a viable healthy transportation option to automobile commuting and as a means to improve air quality and to advance MassDOT’s policy

of promoting the potential for everyday biking laid out in the Statewide Bicycle Plan. Where feasible, walking or bicycling to work or to transit facilities instead of driving would reduce “cold starts,” which inject high levels of toxic emissions into the atmosphere with the starting and shutting off of automobile engines. A coordinated effort of local officials, the MassDOT, Regional Planning Agencies and interest groups, should encourage and promote the use of existing designated bicycle routes as a viable healthy transportation option to automobile commuting through public information and awareness efforts and their upgrading to more robust bicycle transportation infrastructure.

Identify, designate and implement additional bicycle paths and routes to be used for both commuting and recreation. Local officials, in concert with state and regional planners, should investigate the development of additional bicycle paths and routes which could safely serve the commuting public. This includes, but is not limited to, the development of abandoned railroad rights-of-way as bicycle paths, and bikeways that connect industrial/business parks, shopping centers, schools, and other key destinations.

#### **Inter-Regional Bicycle Connections**

Coordinate efforts to improve bicycle facilities with surrounding municipalities and regional agencies. To help form a more complete and contiguous network of bicycle facilities in the region and southeastern Massachusetts, local agencies should coordinate efforts with agencies and organizations outside the region. This includes, but is not limited to, researching the existing bicycle facilities of surrounding towns before formalizing new bikeways, and coordinating public outreach programs to help minimize the cost of these efforts.

#### **Connections to the West**

- Route 106, Easton-Mansfield
- Bay Road, Easton-Sharon
- Route 27, Stoughton-Sharon

#### **Connections to the East**

- Route 123, Hanover-Norwell

#### **Connections to the South**

- Route 138, Easton-Raynham
- Route 105, Halifax-Middleborough
- Route 18, Bridgewater-Middleborough
- South Coast Rail Phase 2 Rail Right of Way (ROW)
- State Road, Plymouth-Bourne (Claire Saltonstall Bikeway)
- Herring Pond Road, Plymouth-Bourne
- Route 58, Plympton-Carver



### Connections to the North

- South Coast Rail Phase 2 Rail Right of Way (ROW)
- Route 28, Avon-Randolph (Claire Saltonstall Bikeway)
- Route 139, Stoughton-Randolph
- North Quincy Street, Abington-Holbrook
- Pearl Street, Stoughton-Canton
- Page Street, Stoughton-Canton

Promote/encourage pedestrian ways as a viable healthy transportation option to automobile commuting and means of improving air quality. Where feasible, walking to work or to transit facilities instead of driving would reduce “cold starts,” which inject high levels of toxic emissions into the atmosphere with the starting and shutting off of automobile engines. Support of this travel mode includes but is not limited to, the creation of pedestrian walkway connections between residential areas, transit facilities, industrial parks, shopping centers, schools, and other key destinations.

### Safety Recommendations

Promote and increase participation in Safe Routes to School program in the region. Continue partnership with MassDOT to promote to communities and increase participation by eligible elementary and middle schools in the Safe Routes to School Program.

Encourage/promote safe bicycle riding, and reduce the number of injuries and fatalities associated with bicycle crashes. To help ensure safe travel habits and reduce the number of bicycle crashes, education programs for all road users should be implemented. Coordination of municipalities with the Department of Education, Registry of Motor Vehicles and transportation agencies should be a part of this effort.

Promote the continued installation of bicycle detection loops at actuated signalized intersection to increase safety for entering bicyclists. Noting that roadways serve both drivers of motorized vehicles and users of bicycles, actuated traffic signals should include detection loops for bicycles to maximize safety for bicycle riders.

Address potential bicycle infrastructure along highway interchanges. Interchanges can often be the shortest route from one location to another when crossing a highway, but they are dangerous enough to discourage bicycling altogether. Floating bike lanes (dashed bike lanes with vehicular traffic passing on either side) are helpful, but separate bicycle lanes and ramp crossings are ideal for maximum bicyclist safety and minimal confusion for drivers. Signalized ramps should be considered where appropriate.

Support local initiatives, which enact, implement and enforce laws and regulations regarding pedestrian traffic. The responsibility for pedestrian safety ultimately lies with the local jurisdiction.

Communities should utilize safety officers to enforce laws/regulations that promote increased pedestrian safety, with emphasis around high activity areas such as transit facilities, schools, and commercial centers. Participants in the process should include police departments, traffic engineers, school and legal system representatives.

Install physical barriers, pavement markings, and other amenities where needed to maximize pedestrian safety. Marked crosswalks, safety islands, street lighting, pedestrian underpasses/overpasses, sidewalks, traffic signals and signage all constitute useful techniques to separate pedestrians from hazardous vehicular traffic. Particular attention should be given to high activity areas such as transit facilities, schools, and commercial centers.

Promote Installation of Pedestrian Countdown Signals at Signalized Intersections – A Pedestrian Countdown Signal consists of a standard pedestrian signal with standard shapes and color, with an added display that shows the countdown of the remaining crossing time. Studies have shown that these types of signals dramatically decrease pedestrian-vehicle conflicts and increases safety for crossing pedestrians. By viewing the numeric countdown display, pedestrians gain a new level of self-protection by the ability to determine how long it takes them to cross a street, and knowing precisely how much time exists on the current signal phase before the “Don’t Walk” alert comes on and the signal proceeds into its next phase. According to a January 2006 article in the ITE Journal, San Francisco experienced a 52 percent reduction in pedestrian injury collisions at the 700 intersections it had retrofitted with the countdown equipment. The Regional Planning Agency and Metropolitan Planning Organization should work with the City of Brockton and other towns in the Region to retrofit signalized intersection with pedestrian countdown signals. Pedestrian countdown signals should be considered with all new signalization projects. Federal law under the Americans with Disabilities Act (ADA) require pedestrian crossing signals be timed accordingly to accommodate mobility challenged persons.

Promote Safer Pedestrian Access Designs in Parking Lots – Pedestrian consideration is often overlooked in design for parking areas of retail, entertainment, and employment centers. Since many parking lots are private, crashes in these locations are sometimes excluded in annual statewide crash data, although they make up a significant portion of vehicle-pedestrian collisions. Often the pressure to provide as many parking spots as possible or the minimums for zoning regulations eliminates safe pedestrian accommodations from the design process. Once parked and out of the vehicle, pedestrians are often forced to share driveways with motor vehicles. Parking lots in many urban areas are also used as a cut through or connections for pedestrians and bicyclists traveling through a given area, whether it be to shorten a walk or ride or simply because it is safer for the bicyclist or pedestrian to travel through a parking lot rather than an adjacent street. Studies have shown that the frequency and severity of vehicle-pedestrian collisions stays the same regardless of whether parking spaces are angled or straight, if aisles are one-way or two-way, and if crosswalks are provided. Therefore, it is recommended that there be physical incentives such as raised crossings and speed bumps to slow vehicles and reduce

distracted driving. Additionally, curb buildouts and raised islands should be used to decrease the turning radius for vehicles and provide refuge for pedestrians.

Promote Use of Crossing Islands and Medians in Wide Cross-Sections – According to the MassDOT Project Development and Design Guide, fifty feet is generally the longest uninterrupted crossing a pedestrian should encounter at a crosswalk although islands and medians are also appropriate for shorter distances as well. Many multiple lane roadways exceed fifty feet in cross-section width.

#### Capacity and Efficiency Recommendations

Along with the Pedestrian Level of Service (PLOS) developed in the last LRTP, the Old Colony Planning Council should implement a program to monitor the development of new sidewalks established in the region and those sidewalks brought into a state of good repair that had been failing the public before.

The Old Colony Planning Council should continue to implement the Bicycle Level of Service (BLOS) rankings on State Numbered Routes and local roadway in the regions. OCPC Staff shall maintain this inventory on a continuing basis, updating information, as it becomes available and existing infrastructure changes. The Old Colony Planning Council should also implement a program to monitor the state of good repair of bicycle lanes in the region to make sure the investment in them does not fall into disrepair. In addition, the installation of new bicycle lane miles should be quantified to be used as a barometer to gauge the regions progress on implementing bicycle infrastructure throughout the region and its commitment to mode shift and the Commonwealth's goal of promoting everyday biking.

#### Environmental Justice Recommendations

Target pedestrian and bicycle infrastructure improvements in environmental justice areas. Transportation planning efforts should include increase mobility and safety for pedestrian and bicycle infrastructure access in high minority population and low-income population areas.

#### Planning and Policy Recommendations

Coordinate efforts to improve bicycle facilities with surrounding municipalities and regional agencies. To help form a more complete and contiguous network of bicycle facilities in the region and southeastern Massachusetts, local agencies should coordinate efforts with agencies and organizations outside the region. This includes, but is not limited to, researching the existing bicycle facilities of surrounding towns before formalizing new bikeways, and coordinating public outreach programs to help minimize the cost of these efforts.

Support local, regional, and state initiatives and legislation that create or maintain bicycle infrastructure and safety. To best serve the greater good and needs of the public for a safe and secure transportation system, support and endorsement will be provided to all initiatives and legislation (local/regional/state/federal) that result in the implementation of bicycle facilities, ease congestion, promote recreation, and increase safety and security for bicycle users.

Planning agencies should identify and work with key employers in the area to form Transportation Management Associations (TMAs) to facilitate a more coordinated modal shift.

An integration of transportation planning and land use planning is needed to guide developers towards existing transport nodes. Infrastructure-led development should also be encouraged, especially for affordable housing projects and large employers.

## Chapter 8: Environment

Planning efforts, like the processes undertaken by the Old Colony Planning Council, make mitigation a proactive process in the OCPC region. Pre-disaster planning emphasizes actions that can be taken before a natural disaster occurs. Future property damage and loss of life can be reduced or prevented by a mitigation program that addresses the unique geography, demography, economy, and land use of a region within the context of each of the specific potential natural hazards that may threaten a community.

The MPO continually works with federal, state, and local environmental partners to determine how to systematically reduce or eliminate the loss of life and property damage resulting from natural hazards such as floods, earthquakes, and hurricanes. Hazard mitigation means permanently reduce alleviate the losses of life, injuries, and property resulting from natural hazards through long-term strategies. These long-term strategies include planning, policy changes, programs, projects, and other activities.

Working with our communities to prepare local natural hazard mitigation and climate adaptation plans before a disaster occurs can save the community money and facilitate post-disaster funding. Costly repairs or replacement of buildings and infrastructure, as well as the high cost of providing emergency services and rescue/recovery operations, can be avoided, or significantly lessened if the region implements the mitigation measures detailed in the plan. The integrated nature of this type of plan provides the opportunity to identify climate change impacts, describe the effect climate change is anticipated to have on natural hazards, and prepare an integrated strategy to understand and mitigate risks.

Climate Change has brought about uncertainties in accepted and widely used data regarding historically based floods, precipitation, and natural hazards. The current practice in modeling infrastructure lifecycle, although based on historic meteorological data, does not consider the potential future impacts of Climate Change especially the severity and frequency of flooding on local infrastructure.<sup>1</sup> A better understanding of the potential risks and impacts of Climate Change on the transportation system leads to more informed decision-making in the capital investments in infrastructure in the region.

Along with population change, we also face economic and demographic changes that force us to reevaluate past practices. The rising cost of infrastructure, energy, and public services demands that we find more efficient ways to grow; environmental expectations require us to respect our natural systems more fully; and an older more diverse population will demand more housing and mobility choices. Climate change and the challenges and environmental sustainability pose a serious threat to our future.

### Issues Facing the Environment in the OCPC Region

The topography of the region is relatively flat, apart from the Pine Hills near the coast in Plymouth. Areas of relatively higher elevation exist in the northern communities of Stoughton,

Avon, and Abington, ranging up to approximately 250 feet. The lowest elevations are found where the Taunton River exits the region. Although more than 20 miles from the ocean, the elevation is only 15 feet above sea level. The region's rivers and streams do not experience great or rapid drops in elevation and generally flow slowly. Many of the rivers are broad and meandering with shallow depths and a wide riparian zone of wetlands along the banks. The Old Colony region's terrain consists of generally low and gently rolling glaciated land with many hills, ridges, and other features created by the late glacial ages, as well as a generally north-south drainage system and extensive wetlands including the Hockomock Swamp in parts of Bridgewater, Easton, and West Bridgewater and the Great Cedar Swamp in Halifax and Hanson. Three of the region's municipalities are coastal communities including Duxbury, Kingston, and Plymouth. Plymouth has the largest land area of any municipality in Massachusetts with 134 square miles and over 20 miles of coastline.

***Antiquated transportation facilities cause traffic congestion which contributes to air pollution.***

Older roadways, bridges, and intersections that cannot accommodate the current traffic demand cause traffic congestion. Automobile emissions resulting from traffic congestion are one of the primary contributors to air pollution.

***The transportation sector continues to be one of the highest contributors to Greenhouse Gas emissions.*** Fossil fuels are the largest source of greenhouse gas emissions, a leading cause of global warming and climate change. The transportation sector continues to be reliant on fossil fuels and the vehicle miles traveled continue to rise.

***Fossil fuel-powered vehicles are still the most common type of motorized transportation.***

Despite the emergence of alternative fuel vehicles, the infrastructure needed to accommodate these types of vehicles remains insufficient.

## CHALLENGES

According to the *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, Climate Change in Massachusetts is already exacerbating natural hazards and extreme weather and it is leading to new impacts affecting the state. Massachusetts is expected to experience intensification in four areas, precipitation, sea level rise, rising temperatures, and extreme weather events.

### Changes in Precipitation

The changes in precipitation are expected to bring inland flooding as well as drought during the summers. Annual precipitation increases of up to 16 percent or plus 7.3 inches are expected. The days with rainfall accumulation of more than one inch are expected to increase by 57 percent. Conversely, the summers are expected to see a decrease in precipitation with an increase in consecutive dry days leading to more droughts during the summer with an increase in the potential for landslides.

Severe and frequent rainfall may exceed the capacity of existing stormwater systems, as Brockton and many of the OCPC communities experienced in March of 2010. Fire stations, police stations, and schools are vulnerable as coastal and riverine flooding may overflow bridges, roads, and public transit infrastructure. Flooding, as well as coastal storm surge, which will be more severe due to sea level rise, can interrupt first responders and emergency operations. Flooded roads or damaged ports could have significant negative impacts on local economies and disrupted transportation networks may impede the mobility of emergency services. In addition, combined sewer overflow events may precipitate public health crises.

Floods are one of the most common natural hazards in the OCPC region, they can develop slowly over a period of days or develop quickly, with disastrous effects that can be local (impacting a neighborhood or community) or regional (affecting entire river basins, coastlines, and multiple counties or states). A floodplain is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood.

Inland flooding is the result of moderate precipitation over several days, intense precipitation over a short period, or melting snowpack. In addition, developed areas that have impervious areas can contribute to inland flooding.

Several local factors determine the severity of a flooding event, including stream and river basin topography, precipitation and weather patterns, recent soil moisture conditions, amount of impervious surface area, and degree of vegetative clearing. Flooding can also be influenced by more extensive, global climate events. Global warming and climate change are shifting rainfall and storm patterns, resulting in increased precipitation and the frequency of flooding in the region.

Flash flooding typically occurs within minutes or hours after heavy precipitation, after a dam or levee failure, or from a sudden release of water from an ice jam. Most often, flash flooding is the result of a slow-moving thunderstorm or the heavy rains from a hurricane. In rural areas, flash flooding often occurs when small streams spill over their banks. However, in urbanized areas, flash flooding is often the result of clogged storm drains (leaves and other debris) and a higher amount of impervious surface areas (roadways, parking lots, rooftops).

General flooding events may last for several days. Excessive precipitation within a watershed of a stream or river can result in flooding particularly when development in the floodplain has obstructed the natural flow of the water and/or decreased the natural ability of the groundcover to absorb and retain surface water runoff (e.g., the loss of wetlands and the higher amounts of impervious surface area in urban areas).

### Sea Level Rise

Sea level rise projections for the year 2100 are estimated to have an average range of one to four feet. The impact of sea level rise can vary because it is dependent on the local ocean current, wind pattern, shoreline contour, land topology, and natural-based protection features; however,

four feet of water can pose a serious threat to coastal communities and local infrastructure. More extreme average sea level rise scenarios are possible if greenhouse gas emissions and further destabilization of the Antarctic ice sheet remain unchecked.

Sea level rise is expected to bring on coastal flooding and coastal erosion. Three towns in the region will be directly impacted by coastal flooding and erosion, these include Plymouth, Kingston, and Duxbury. Sea level rise poses specific problems for roadways in that it can accelerate roadway deterioration and reduce the life cycle of pavements. In addition, sea level rise can impact ports and harbors as well as coastal development. The impact of sea level rise is dependent on the local ocean current, wind pattern, shoreline contour, land topology, and natural-based protection features. It can impact different roads along the coastline more severely in some areas than others.

### **Rising Temperatures**

Massachusetts has a humid continental climate type with warm, humid summers and cold, snowy winters. This type of climate is found over large areas of land masses in the temperate regions of the mid-latitudes where there is a zone of conflict between polar and tropical air masses. The state is prone to extreme weather, with influences from the polar region as well as tropical weather from the south. In addition, the state's proximity to the ocean makes it susceptible to winds and weather from the Atlantic. The hottest month is July, with an average high of 82 °F (28 °C) and an average low of 66 °F (18 °C), with conditions usually humid. Periods exceeding 90 °F (32 °C) in summer and below 10 °F (-12 °C) in winter are not uncommon. The record high temperature is 104 °F (40 °C), recorded July 4, 1911. The record low temperature is -18 °F (-28 °C), recorded on February 9, 1934.

A heat wave is a period of abnormally and uncomfortably hot and usually humid weather. The World Meteorological Organization is specific in its definition by stating that a heat wave is when the daily maximum temperature for more than five consecutive days exceeds the average maximum temperature by 9 degrees. The National Weather Service reported the longest heat wave in Greater Boston lasted 9 days and took place between July 3 and July 11, 1912, a span during which temperatures ranged from daytime lows of 90 degrees to a high of 98 degrees.

According to the *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, Climate Change is expected to bring average annual temperature increases to 23 percent (plus 10.8 degrees Fahrenheit). It is expected to decrease up to 42 percent the number of days with the minimum temperature below freezing as winter temperatures are expected to increase at a greater rate than spring, summer, or fall. Long-term average minimum winter temperatures are expected to increase up to 66 percent (+11.4 degrees Fahrenheit). The number of days per year with daily maximum temperatures over 90 degrees Fahrenheit is expected to increase to over 64 days per year.

Climate Change is expected to bring, along with the extreme temperatures, more wildfires, and invasive species to Massachusetts. Although New England is generally considered to be a moist



region with ample precipitation, droughts are not uncommon. Widespread drought has occurred across New England several times since climate records have been kept. More frequent and severe droughts are expected as climate change continues to increase temperatures, raise evaporation rates, and soils dry out, despite heavier rainfall events. Seasonal or short-term droughts that last less than six months are most common in New England. The greatest risk for seasonal drought may be in the summer and early fall because of higher temperatures that lead to greater evaporation and earlier snowmelt.

### *Extreme Weather Events*

#### *Hurricanes*

According to the *Massachusetts State Hazard Mitigation and Climate Adaptation Plan*, the frequency and magnitude of hurricanes are expected to increase in Massachusetts due to Climate Change. The Gulf Stream, which traditionally brings warm water from the Gulf of Mexico and the southern portion of the North Atlantic northward along the eastern seaboard and across the ocean from west to east is disrupted in the north due to the melting of the polar ice cap. This in turn stalls warm water in the Gulf of Mexico, the Caribbean, and the southern portion of the North Atlantic Ocean from moving north, making warmer water available with more energy to fuel more frequent and higher-intensity storms.

Hurricanes are also known as Tropical Cyclones. Tropical Cyclone is a general term for low-pressure systems such as tropical storms and hurricanes, as these systems usually form over the tropics, and have a distinctive rotation. These storms are among the most powerful and destructive meteorological systems on earth. The destruction is mainly caused due to high winds, heavy rain, lightning, tornadoes, and storm surge. As these storms move inland, they can cause severe flooding, downed trees, and power lines, and structural damage. The National Hurricane Center (NHC) describes four types of classifications for tropical cyclones, including Tropical Depressions, (with maximum sustained winds of 38 mph or less, Tropical Storms, (with maximum sustained winds of 39 to 73 mph), Hurricanes, tropical cyclones with maximum sustained winds of 74 mph or higher, and Major Hurricanes, a tropical cyclone with maximum sustained winds of 111 mph or higher.

#### *Tornados*

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. These events are spawned by thunderstorms and occasionally by hurricanes and may occur singularly or in multiples. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction. Some ingredients for tornado formation include:

- Very strong winds in the mid and upper levels of the atmosphere
- Clockwise turning of the wind with height (from the southeast at the surface to west aloft)

- Increasing wind speed with altitude in the lowest 10,000 feet of the atmosphere (i.e., 20 mph at the surface and 50 mph at 7,000 feet)
- Very warm, moist air near the ground with unusually cooler air aloft
- A forcing mechanism such as a cold front or leftover weather boundary from the previous shower or thunderstorm activity.

On average there are six tornados that touchdown somewhere in the Northeast region every year. On average, (between 1950 and 2008), more than two tornadoes per year strike the state of Massachusetts alone, with New England as a whole recording more than 8. Most tornadoes reported in the region are "weak", rated EF0 or EF1 on the Enhanced Fujita Scale. Around 30 percent are "significant" tornadoes (rated EF2 or greater), and only one percent are violent (rated EF4 or EF5, the highest damage rating). Weak tornadoes occur in all areas of New England, but EF3 or greater tornadoes have been reported. There have been 34 killer tornadoes in New England's recorded history.

### Nor'easter

A nor'easter is an extratropical cyclone in the western North Atlantic Ocean. The name derives from the direction of the winds that blow from the northeast. The original use of the term in North America is associated with storms that impact the upper north Atlantic coast of the United States and the Atlantic Provinces of Canada.

These storms originate as a low-pressure area that forms within 100 miles of the shore between North Carolina and Massachusetts. The precipitation pattern is like that of other extratropical storms. Nor'easters are usually accompanied by very heavy rain or snow and can cause severe coastal flooding, coastal erosion, hurricane-force winds, (more than 74 miles per hour), or blizzard conditions. Nor'easters are usually most intense during winter in New England and Atlantic Canada. They are fueled by converging air masses that include the cold polar air mass and the warmer air over the water. They can be more severe in the winter when the difference in temperature between air masses is greater.

Nor'easters tend to develop most often and most powerfully between the months of October and April, although they can (much less commonly) develop during other parts of the year as well.

## FEDERAL RESPONSE TO CLIMATE CHANGE

### Executive Order

The federal government issued several executive orders in response to Climate Change. Executive Order 13653, "Preparing the US for the Impacts of Climate Change", was issued in 2013. It built on a previous 2009 executive order, which supported scientific research, observational capabilities, and assessments to improve understanding and response to climate change and its impacts on the country. The 2013 executive order promoted federal agencies to engage in strong partnerships and information sharing at all levels of government, utilize risk-informed decision-

making and the tools to facilitate it, and utilize adaptive learning, in which experiences serve as opportunities to inform and adjust future actions and promote preparedness planning.

In 2014, the Federal Highway Administration (FHWA) created a policy in response to executive Order 13653 via directive. The FHWA stated that it will, “Integrate the consideration of the risks of climate change and extreme weather event impacts and adaptation responses, into the delivery and stewardship of the Federal-aid and Federal Lands Highway programs, including encouraging State DOTs, MPOs, tribal governments, and others to develop cost-effective strategies to minimize climate and extreme weather risks.” Specifically, the FHWA developed the *Climate Change Adaptation Guide for Transportation Systems Management, Operations, and Maintenance*, in response to the need for action due to Climate Change.

The FHWA guide focuses on two transportation functions, transportation systems management, and operations and maintenance of transportation infrastructure. Both of these involve the day-to-day activities that maximize the use of transportation infrastructure. The FHWA anticipates several operational impacts due to Climate Change including:

- Increase in traffic incident management activities.
- Road and lane closures.
- Reduced (and variable) speed limits.
- Disruption of transit service.
- Road and transit diversions.
- Truck restrictions.
- Work zone management (to accommodate additional lane closures).

To ensure that infrastructure is resilient against Climate Change, maintenance practices have to be proactive to anticipate changes to the system (e.g., inspection, frequency of repairs, need for “quick maintenance” patrols).

Transportation systems management and operations include Traffic Management, Freight Management, Work Zone Management, Traffic Incident Management, Planned Special Event management, Traveler Information Services, Road Weather Management, Traffic Signal Coordination, Active Transportation & Demand Management, and Transit Priority and Integration. Maintenance includes Pavement Management, Shoulder Maintenance, Bridge Inspection, Vegetation Management, Road Weather Management, and Asset Management.

## STATE RESPONSE TO CLIMATE CHANGE

### Global Warming Solutions Act

Massachusetts approved the Global Warming Solutions Act (GWSA) on August 7, 2008, as a comprehensive response to the impacts of global climate change. The GWSA requires the Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies, as well as the public, to set economy-wide greenhouse gas (GHG) emission reduction goals for the state. The GWSA approved (in consultation with the state executive office of

administration and finance), the use of market-based compliance mechanisms to address climate change concerns and for setting and reaching reduction goals. In addition, it allowed the state to work with other states to develop a plan to expand market-based compliance mechanisms such as the regional greenhouse gas initiative to other sources and sectors necessary or desirable to facilitate the achievement of the greenhouse gas emission. This includes those states who have in the past participated in the regional greenhouse gas initiative and includes other interested states and Canadian Provinces.

The GWSA set the following priorities:

- Establish 1990 as a baseline assessment of statewide GHG emissions used to measure goal progress (1990 is the base year of the Kyoto Protocol).
- Establish target emission reductions for 2020 and a plan for achieving them.
- Analyze strategies via advisory committee and make recommendations for adapting to climate change, the committee reports to the Legislature by December 31, 2009.
- Reduce between 10 percent and 25 percent below statewide 1990 GHG emission levels in the state by 2020.
- Reduce to at least 80 percent below statewide 1990 GHG emission levels by 2050.
- Establish regulations requiring reporting of GHG emissions by the Commonwealth's largest sources by January 1, 2009, providing data about the types and levels of GHG.
- Develop a projection of the statewide GHG emissions for 2020 (a "business as usual" scenario as if no government action is implemented for reductions).

EOEEA established two advisory committees to provide input on the implementation of the GWSA 1.) The Climate Protection and Green Economy Advisory Committee to advise the Executive Office of Energy and Environmental Affairs on measures to reduce greenhouse gas emissions under the GWSA, 2.) The Climate Change Adaptation Advisory Committee to study and make recommendations on strategies for adapting to climate change.

#### **The Transportation Climate Initiative**

According to the Massachusetts Department of Environmental Protection, the Transportation Climate Initiative (TCI) is a regional collaboration of Northeast and Mid-Atlantic jurisdictions, working together since 2010 to improve transportation, develop a clean energy economy, and reduce emissions from vehicles and fuels. Twelve northeast and mid-Atlantic states plus Washington, D.C., are involved in the discussions to join the TCI, these include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia.

TCI is a "Cap-and-Trade" system, whereby a cap is set on the total amount of carbon dioxide that can be released from vehicles using transportation fuels (lowered as time goes on) in each jurisdiction. Transportation fuel suppliers must then buy allowances for every ton of carbon

dioxide their fuel will produce, the total number of allowances is limited, based on the cap. An auction is held in which fuel suppliers can bid to buy fuel allowances in which the price of those allowances depends on the market, as allowances can be traded.

The states and jurisdictions get money from the sale of the allowances and would be required to invest that money into projects that reduce carbon emissions from transportation. This system is expected to incentivize the development of fuel-efficient technologies and incentivize people to use less pollution-emitting fuel. It is also expected that the system will raise money for state investments in new technologies, such as electric vehicles.

According to the Transportation Climate Initiative, the Memorandum of Understanding was signed in December 2020 by Massachusetts, Connecticut, Rhode Island, and the District of Columbia and includes a commitment to dedicate a minimum of 35 percent of each jurisdiction's proceeds, (which can amount to nearly \$100 million each year in the inaugural jurisdictions combined), to ensure that communities underserved by the transportation system and overburdened by pollution will benefit equitably from clean transportation projects and programs. Each jurisdiction will designate an advisory body to identify underserved and overburdened communities, guide investments, and define goals and metrics for measuring progress. A majority of the members of each advisory body will be people from or representing underserved and overburdened communities.

It was expected that each signatory jurisdiction will work with communities and with its Equity Advisory Body to assess the equity impacts of the program on an ongoing basis, including by monitoring air quality in communities overburdened by air pollution to ensure the effectiveness of policies and investments, and will ensure transparency by annually reviewing and reporting on program progress. The Signatory Jurisdictions agreed to work together to encourage other jurisdictions to participate in TCI to expand the program. Any jurisdiction may withdraw at any time; however, they must not interfere with the integrity of the program. The jurisdictions also commit to continue to work individually and together on additional policies that reduce pollution from transportation and advance shared goals of equity and environmental justice.

On Nov. 15, 2021, Connecticut and Massachusetts pulled out of the 12-state TCI Agreement. The governor of Massachusetts cited a lack of support for TCI from the other partners as a reason to pull out of the agreement. The governor's spokesperson cited that the administration maintained that Massachusetts would only move forward with TCI if multiple states committed and if that was not possible, then TCI would no longer be the best solution for the Commonwealth's transportation and environmental needs.

#### [Massachusetts 2050 Decarbonization Roadmap](#)

The *Massachusetts 2050 Decarbonization Roadmap* report was released in January 2021 by the Executive Office of Energy and Environmental Affairs. The main goal of the report was to identify and document cost-effective and equitable strategies for achieving net zero greenhouse gas (GHG) emissions by the year 2050. The study created a planning process that included

stakeholder engagement, science-based analysis, and the inclusion of the business community to maintain the economy while addressing the impacts of Climate Change and reducing greenhouse gas emissions improving air quality and public health.

The approach toward achieving decarbonization goals explores what the report calls “multiple pathways”. These include policies that reduce carbon but support maintaining equity and a thriving economy. According to the Executive Office of Energy and Environmental Affairs, the study seeks to understand interdependencies in the current system and from there create actions and policies that transition energy use to the goal of net zero carbon emissions in Massachusetts. The study process involves modeling future scenarios as well as producing data that can guide the policy and program design.

The policies to achieve the study’s 2050 net zero goals include:

**Transportation** – Emissions-free cars, trucks, and buses by utilizing zero-carbon fuels, which will include electric and hydrogen-powered vehicles. In addition, create a healthy public transit system in concert with transit-oriented development, bike lanes, and sidewalks.

**Buildings** – Build structures with higher-performing heat pumps that can provide energy-saving heat and air conditioning as more energy-efficient buildings and electric appliances help reduce energy bills for families and small businesses.

**Energy Supply** – Widely utilize wind and solar power to decarbonize the grid and meet the growing demand for clean electricity, but also employ a diverse mix of energy resources for year-round reliability. Make improvements to the transmission and distribution systems to increase access to diverse low-cost energy resources and allow offshore wind to power New England.

**Non-Energy** – Increase composting and recycling of plastics to minimize waste generation. Manage and reduce emissions in agriculture and industry.

#### The Clean Energy and Climate Plan for 2030 (2030 CECP)

The Executive Office of Energy and Environmental Affairs (EOEEA) developed the Clean Energy and Climate Plan for 2030 (2030 CECP) to ensure that the 2030 emissions limits that have been set for Massachusetts will be met. This plan provides details on the actions Massachusetts will undertake through the 2020s to ensure the emissions limit is met. The 2030 CECP was prepared in coordination with the development of the 2050 Decarbonization Roadmap so that the strategies, policies, and actions in the 2030 CECP align with the net zero greenhouse gas emissions by 2050.

The CECP for 2030 outlines a plan to achieve emissions reductions of at least 45% below the 1990 level for 2030. The plan outlined several priorities for the EOEEA:

- Protect Natural and Working Lands - Create programs with incentives to achieve no net loss in forest or farmland. Protect and restore inland and coastal wetlands.

- Manage Ecosystem Health and Enhanced Carbon Sequestration - Implement best management practices identified in the Healthy Soils Action Plan and the Resilient Lands Initiative. Commission additional forest carbon sequestration research, building upon the land use analysis in the 2050 Roadmap, to assess the long-term impacts of sustainable forest management practices.
- Incentivize Regional Manufacture and Use of Durable Wood Products - Explore opportunities to incentivize the regional use of harvested wood in long-lived products, such as cross-laminated timber and wood-based building insulation.
- Develop Sequestration Accounting and Market Frameworks - Work with states and stakeholders in the Northeast to develop the measurement, accounting, and market frameworks necessary to support the development of a regional carbon sequestration offset market by the end of 2025 (Transportation Climate Initiative, TCI). Convene an inter-agency Carbon Sequestration Task Force beginning in 2021. MassDEP will update the statewide biogenic emissions inventory as needed to support and track verified carbon sequestration.

In April of 2021, Governor Baker signed comprehensive climate change legislation (*Senate Bill 9 - An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*) codifying Massachusetts' commitment to achieving Net Zero emissions by 2050. This new law establishes new interim goals for emissions reductions, significantly increases protections for Environmental Justice communities across Massachusetts, authorizes the implementation of a new, voluntary energy-efficient building code for municipalities, and allows the Commonwealth to procure an additional 2,400 Megawatts (MW) of clean, reliable offshore wind energy by 2027. This legislation updates the greenhouse gas emissions limits related to the 2008 Global Warming Solutions Act, commits Massachusetts to achieve Net Zero emissions in 2050, and authorizes the Secretary of Energy and Environmental Affairs (EEA) to establish an emissions limit of no less than 50% for 2030, and no less than 75 percent for 2040. The legislation also authorizes EEA to establish emissions limits every five years and sub-limits for at least six sectors of the Massachusetts economy - electric power; transportation; commercial and industrial heating and cooling; residential heating and cooling; industrial processes; and natural gas distribution and service.

#### THE REGIONAL TRANSPORTATION SYSTEM AND POTENTIAL RISK

Climate change will only increase both the intensity and severity which natural hazards affecting the region. While occasionally flooding, late summer hurricanes, winter storms, and small wildfires are all part of life in the region, they are for the most part, at a manageable level. Other threats, such as tornadoes, earthquakes, and landslides are far less common. Each of these events, which will only intensify in frequency and severity with climate change, can have disastrous impacts across the region and has the potential to wreak havoc on the entire transportation system. Two of the most common means of traveling in the Old Colony region (road and rail) are particularly susceptible to climate change and its resulting increases in precipitation, storm activity, and temperature.

## Rail

Commuter rail is a common form of transportation in the region. The primary rail system in the region is the MBTA Old Colony Commuter Rail, with most of its 14 stations in the region located in low-lying sites. Some stations and rail lines are in or near mapped floodplains, as is the case in the Town of Whitman, where the station is adjacent to a 100-Year Flood zone and the track in the southern portion of the town crosses a mapped floodplain. These facilities, however, were designed for their sites and are unlikely to be affected by local flooding. Other concerns with rail lines include extreme heat that may cause the track to buckle and cause derailments and storms that can knock down signs and potentially cause safety issues.

The interruption of rail traffic is likely to become more common with more frequent flooding. Likely impacts include track inundation, erosion of the track subgrade, and the rooting of wooden crossties. Erosion of the subgrade can wash away ballast and weaken the foundation, making the track unstable for the passage of heavy locomotives and railcars. Wind may impact the railroad signs, signals, and grade crossings, which has the potential to increase rail accidents at grade crossings.

## Roads and Bridges

The highway network is the most vital part of the transportation system in the Old Colony region, as it is used daily by almost all of the region's 393,249 residents who rely on it to get to their jobs, shopping, and social activities. The roads and bridges in the Old Colony region are some of the oldest in the country and when combined with severe weather events, this infrastructure is susceptible to major damage.

The most immediate impact of more intense precipitation is increased flooding of roadways, especially those located within the 100 and 500-Year Flood Zones as well as those areas along the coastline. While potential changes in average annual precipitation are likely to have little impact, an increase in the intensity of individual extreme rainfall events may have significant implications. An increase in the frequency of extreme precipitation events will result in more frequent short-term flooding and bridge scour, as well as more culvert washouts that exceed the capacity of the current stormwater management infrastructure.

While most of the Old Colony region is located inland, the coastal communities of Duxbury, Kingston, and Plymouth must also deal with the potential rise in sea levels. According to the Transportation Research Board (TRB), expected sea level rise will aggravate flooding because storm surges will build on a higher base, reaching farther inland. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report on North America identifies coastal flooding from expected sea level rise and storm surge, especially along the Gulf and Atlantic coasts, as one of the most serious effects of climate change.

Higher sea levels and storm surges can also erode road bases and undermine bridge supports. The loss of coastal wetlands and barrier islands will lead to further coastal erosion due to the loss of natural protection from wave action. Additionally, strong winds from storms can also



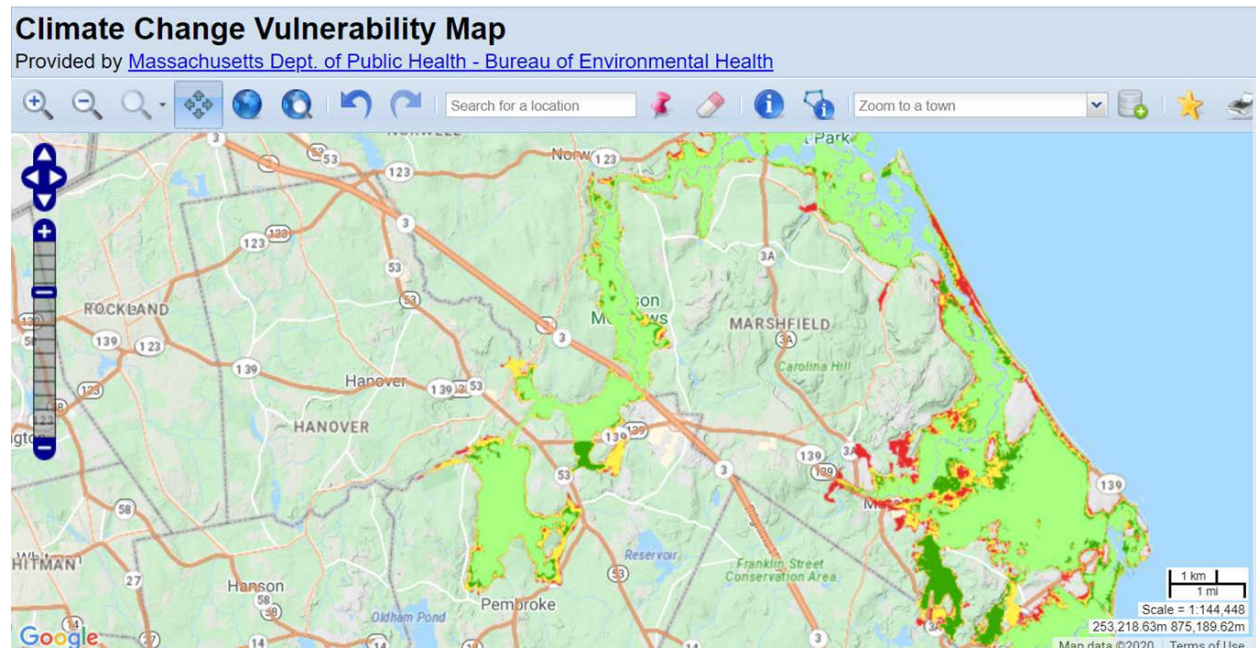
damage highway signs, traffic signals, and luminaries throughout the area. More significant safety and operational impacts are likely to be caused by debris blown onto roadways and from crashes precipitated by debris or severe winds.

The roadways and bridges in the Old Colony region are also exposed to a wide range of temperatures, from the extreme heat and humidity of the summer months to the cold and snow of the winter. According to the U.S. Global Change Research Program, impacts related to projected changes in average temperatures appear to have only moderate implications for bridges and highways, while increases in extreme heat may be significant. Longer periods of extreme heat may compromise pavement integrity, such as softening asphalt and increasing rutting, the buckling of pavement (especially older, jointed concrete), and flushing or bleeding of asphalt from older or poorly constructed pavements. In addition, an increase in the freeze–thaw may occur, creating frost heaves and potholes on roads resulting in load restrictions on certain bridges and roads to minimize damage. Extreme heat can also cause the thermal expansion of bridge joints, which adversely affects bridge operation. This will generally lead to increased maintenance costs wherever pavement thermal tolerances are exceeded. Extreme heat during the summer is also likely to increase the number of wildfires, threatening communities and infrastructure directly and bringing about bridge and road closures in affected areas.

#### Hurricane Surge Zones

Maps from the Massachusetts Department of Public Health show the impact of the Hurricane surge zone on several OCPC coastal communities including Duxbury, Kingston, and Plymouth as well as those communities of Hanover and Pembroke near the coast, (including the non-OCPC communities just north and east, Marshfield and Norwell). The following figures, Figure 8-1 to Figure 8-3 show the inundation zones from Hurricane surges from Category 1 through 4 Hurricanes and how they impact the OCPC transportation system.

Figure 8-1: Climate Change Vulnerability Map



Based on this data, Figure 8-1 shows that a Category 1 Hurricane is expected to cause a storm surge that will impact the North River causing flooding inland through Marshfield, Norwell, Hanover, and Pembroke. A Category One hurricane has the potential to flood out Route 3 at the Pembroke/Norwell Town Line as well as other arterials important to travel on the road network in Hanover and Pembroke including Route 139, Route 53, and Route 14, as well as Elm Street and West Elm Street in Pembroke. This map also shows significant flooding impacts to Route 3A in the northern part of Duxbury at the Marshfield line with flood inundation from a Category 2 and 3 Hurricane.

Figure 8-2: Climate Change Vulnerability Map

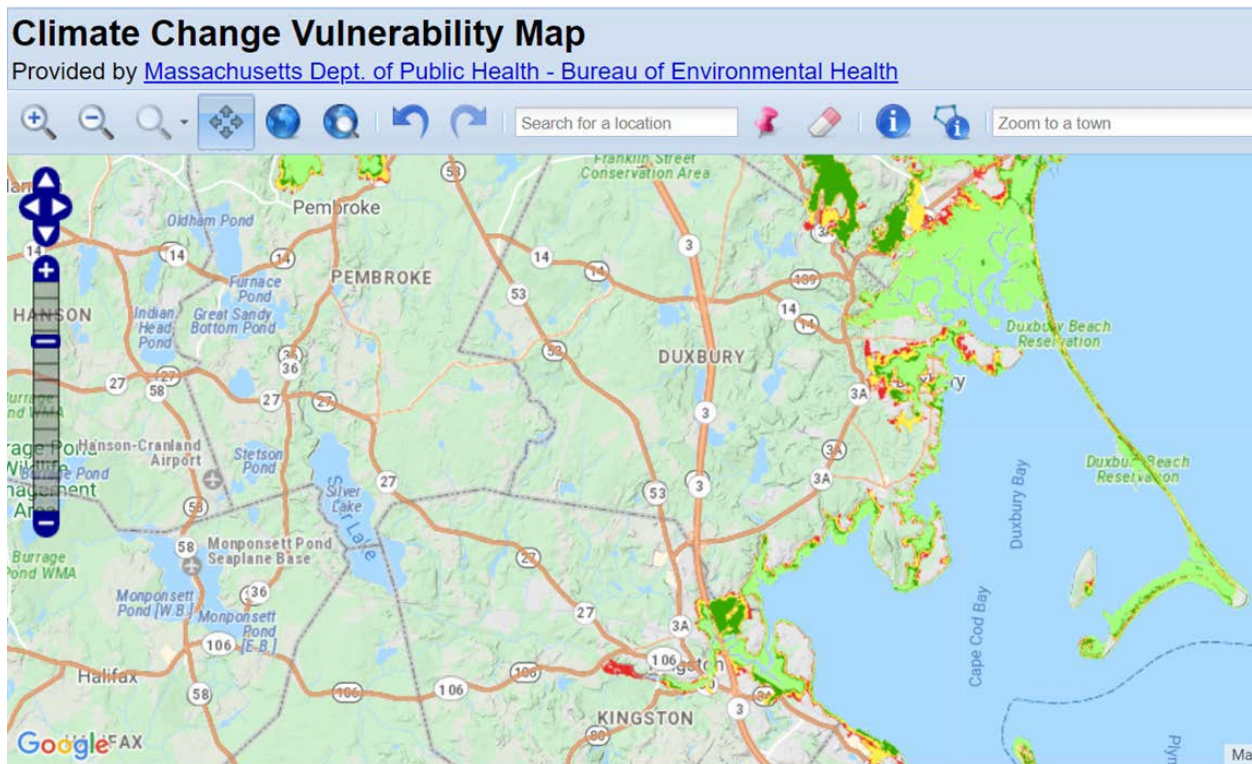


Figure 8-2 shows that a potential storm surge from a Category 1 and 2 Hurricane will impact Route 3A in Duxbury as well as Route 139 in Marshfield just north of the Duxbury line, St. George Street, and Washington Street. A storm surge from a Category 1 or 2 Hurricane is expected to impact Kingston significantly with flood impacts to Route 3 and Main Street (Route 3A). The Hurricane storm surge is also expected to flood the passenger rail lane to North Plymouth, which runs parallel to Main Street (Route 3A) in Kingston, to Kingston center where it then crosses Main Street and runs west at Evergreen Street.

Figure 8-3: Climate Change Vulnerability Map

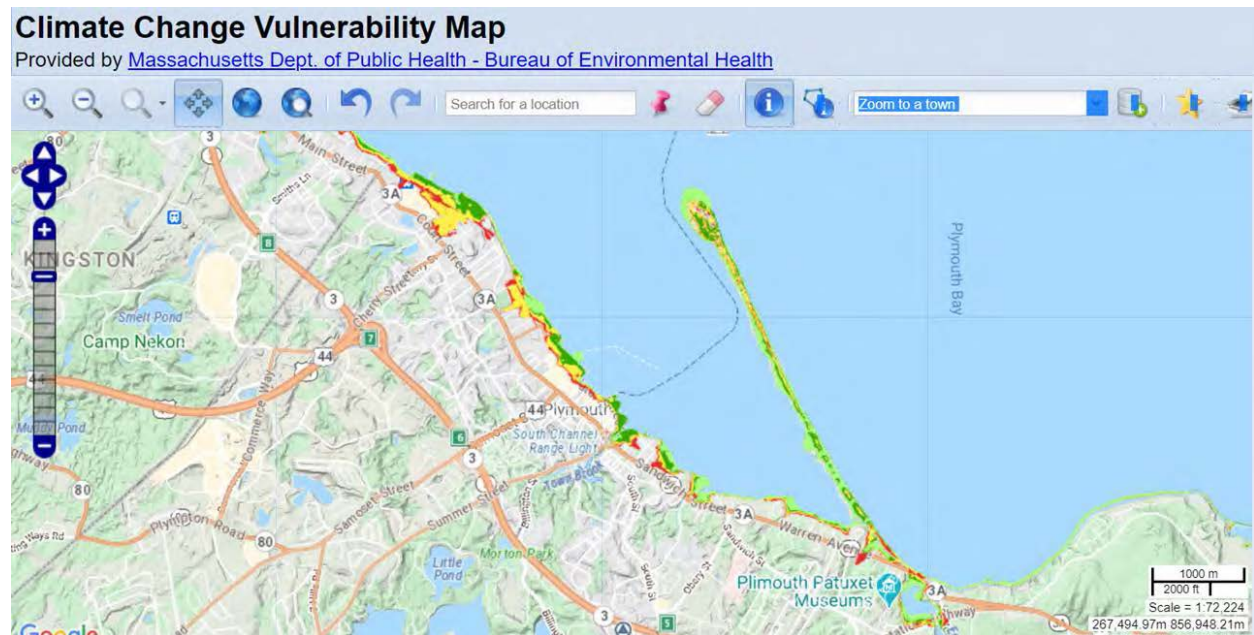


Figure 8-3 shows that Cordage Park, Route 3A at Cordage Park, and the MBTA T Cordage Passenger Rail Station in Plymouth are expected to be flooded during the storm surge from a Category 3 or higher Hurricane. Much of the coastline from Eel Brook north through the Plymouth Center to the Holmes Reservation in the north is expected to be impacted by a Category 1 and higher Hurricane in Plymouth. The most significant impacts to the transportation network in Plymouth occur on Route 3A over the Eel River and also at the Town Brook at Summer Street and Route 3A, where Route 3A in Plymouth is likely to be flooded from a Category 1 or higher Hurricane.

#### National Flood Insurance Program (NFIP)

According to the Federal Emergency Management Administration (FEMA), the National Flood Insurance Program (NFIP) is a federal program that aims to reduce the impact of flooding on private and public structures. It provides affordable insurance to property owners, renters, and businesses and encourages communities to adopt and enforce floodplain management regulations. The program is intended to reduce the socioeconomic impacts of disasters by promoting the purchase and retention of general risk insurance, specifically, flood insurance.

FEMA has defined flood zones within geographic areas according to varying levels of flood risk. These zones are shown on a community's official Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area. According to FEMA, The Flood Insurance Rate Map (FIRM) is the official map of a community on which FEMA has delineated Special Flood Hazard Areas (SFHA) for floods and the risk premium zones applicable to parcels in a specific community. The one percent annual chance flood is also

referred to as the base flood or 100-year flood. The FEMA flood zones are defined as follows (a more detailed description is included in the appendix to this report):

#### Zone A

The flood insurance rate zone that corresponds to the 100-year floodplains no Base Flood Elevations or depths are shown within this zone.

#### Zones AE and A1-A30

The flood insurance rate zones that correspond to the 100-year floodplains are determined by detailed methods. Base Flood Elevations are shown at selected intervals within this zone.

#### Zone AH

The flood insurance rate zone corresponds to the areas of 100-year shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet.

#### Zone AO

The flood insurance rate zone corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average flood depths derived from the detailed hydraulic analyses are shown within this zone.

#### Zone D

The designation on NFIP maps is used for areas where there are possible but undetermined flood hazards. In areas designated as Zone D, no analysis of flood hazards has been conducted.

#### Zone V and VE

The flood insurance rate zone corresponds to the 100-year coastal flood plains that have additional hazards associated with storm waves.

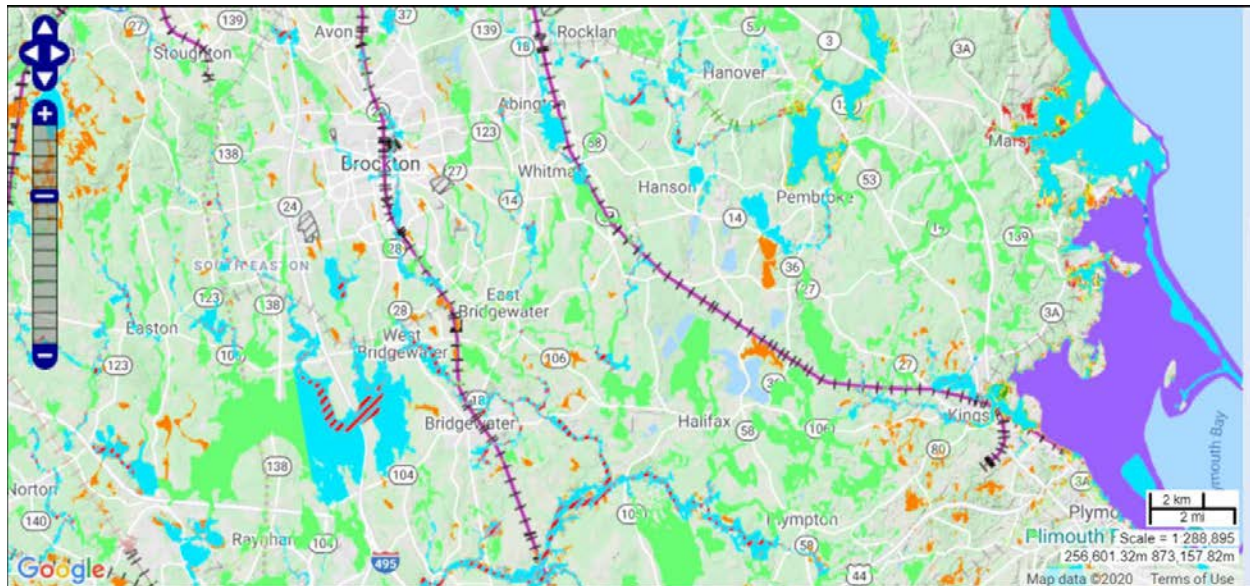
#### Zones B, C, and X

The flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than 1 foot, areas of 100-year stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 100-year flood by levees.

Figures 8-4 through 8-6 show a series of maps that show the FEMA flood zones in the OCPC region and their impact on the transportation infrastructure. Figure 8-4 shows the Plymouth/Kingston passenger rail line is impacted by Zone A through Kingston center as well as in Plymouth at Cordage Park. The Marlborough passenger rail line was impacted by Zone A in Bridgewater and East Bridgewater. Figure 8-4 also shows the Zone A flood impacts on Route 3A in Kingston Center

and Route 106 in Kingston as well as Route 3A in Duxbury. In addition, the Kingston-Plymouth passenger rail is expected to be impacted in Whitman.

**Figure 8-4: FEMA Flood Zones**



**Figure 8-5: FEMA Flood Zones**

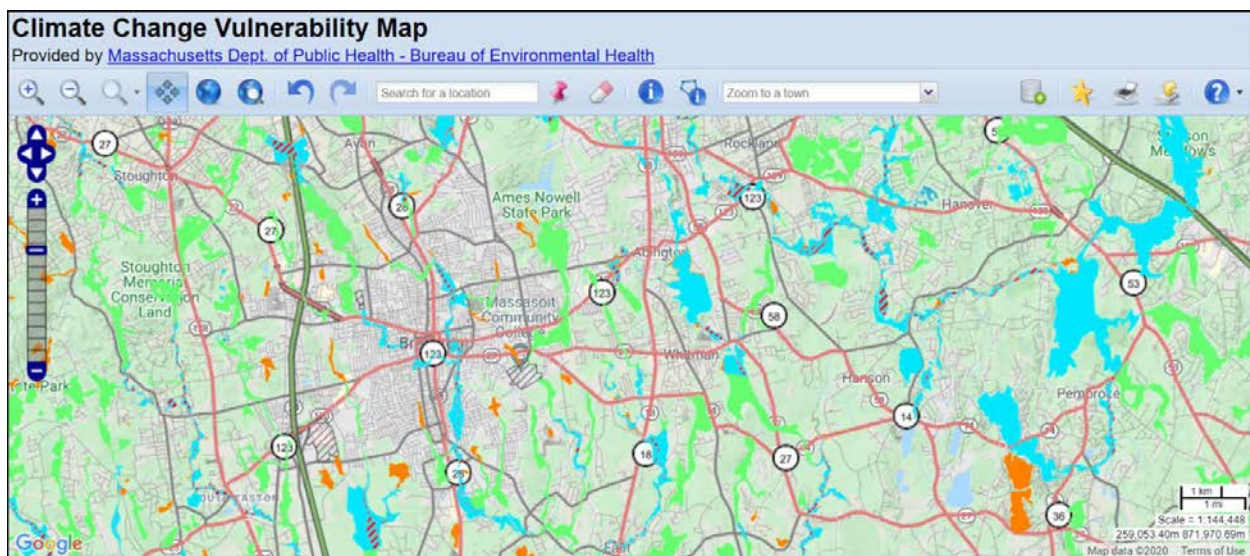


Figure 8-5 shows the impact of the FEMA flood zones on the regional highway network with impact flooding (Zone A) on Route 53 and Route 139 in Hanover, Route 14 in Pembroke, Route 14 in Hanson and Halifax, Route 123 and Route 139 in Abington, Route 18/28 in Bridgewater, Route 18 and Route 28 in West Bridgewater, and Route 28 in the south of Brockton. In addition, Figure 8 shows potential Zone A flooding impacts to the two limited access highways in the region, Route 24 in the north at the Avon/Stoughton line, and Route 3 in Pembroke.

Figure 8-6: FEMA Flood Zones

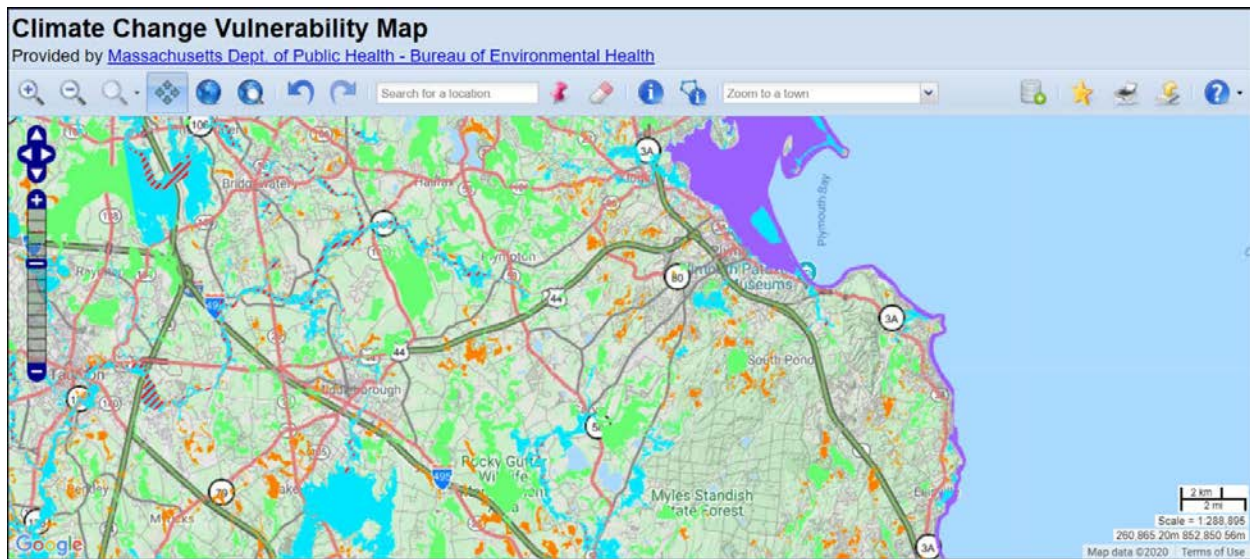


Figure 8-6 shows the flood zone map impacts on Route 138 in Easton, just north of Raynham, as well as the impacts on Route 24 in Bridgewater, Route I-495, just south of the OCPC region, and Route 44. Figure 9 also shows flood zone map impacts on Route 105 in Bridgewater and Halifax, Route 36 in Halifax, Route 106 in Halifax, and Kingston, as well as the impacts to Route 3A in Kingston center and along the coast in Duxbury and Plymouth.

#### Climate Change Projects in the OCPC Region

The *2015 Natural Hazard Mitigation Plan for the Old Colony Region* lists several projects for each of the OCPC communities that are designed to specifically address the impacts of Climate Change. The purpose of the 2015 plan was to develop an inclusive, comprehensive, and long-term plan to prepare for disasters before they occur. The 2015 plan supports communities in their response to The Federal Disaster Management Act of 2000 (DMA 2000), which established a national program for regional mitigation and the administration of disaster relief. The Federal DMA 2000 mandates that all localities must review and revise their local natural hazard mitigation plans every five years to reflect changes in development, progress in mitigation efforts, and changes in priorities.

#### Stormwater Management

In Massachusetts, polluted stormwater runoff and discharges in urbanized areas cause serious water-quality problems. Polluted runoffs to waterbodies can negatively affect aquatic plant and animal life in streams and lakes. The effective management of stormwater is critical in protecting the quality of the natural environment adjacent to the roadway. Stormwater can become a transportation system for pollutants such as car antifreeze, motor oil, and salt and sand from de-icing operations, all of which can be deposited untreated into waterways.

Untreated runoff poses a major threat to water quality and is identified as a major source of nonpoint source pollution (NPS). Nonpoint source pollution or "polluted runoff" – which enters

our water bodies from septic systems, agricultural uses, and runoff from roads, parking lots, construction sites, lawns, and other locations - is now the dominant cause of water quality problems in our lakes, rivers and coastal areas. Point sources still have significant impacts on certain water bodies, but across the state, nonpoint source pollution affects more total miles and acres of water. Although these pollution sources are lumped under the single heading of nonpoint sources there are a huge variety of nonpoint sources from farms to parking lots, which result from a similarly wide range of activities, from cars with leaking oil to the construction of new structures. It is easier and less costly to prevent problems from occurring than it is to fix them after they occur.

The pollution of the marine environment, because of roadway runoff, can impact coastal resources and economies. Protecting water resources is important for a better quality of life, economic development, recreational activities, wildlife and plant protection, and public/private water supplies.

### *The Impact of Salt Deicers*

Salt applied to roadways for winter maintenance eventually percolates through roadside soils and enters aquifers with precipitation recharge in the early spring. There are varying opinions as to the proportion of road salt runoff that infiltrates groundwater; however, the actual amount of road salt runoff that infiltrates groundwater depends upon features such as permeability, vegetation cover, gradients, and roadside drainage techniques. Studies show that up to 35 percent of road salt spread for winter maintenance can end up in the groundwater. The current knowledge regarding the chemistry and physics of salt pollution indicates that groundwater contamination due to road salt for storm application can be problematic.<sup>7</sup> Increased sodium levels in drinking water can represent a health risk to people suffering from high blood pressure. Roadside vegetation is damaged by deicing salts through soil salt concentrations, which allow for salt absorption by roots, and by direct airborne salt spray on needles and branches.<sup>8</sup> Salt, which is sodium chloride, leaves residues of chloride ions on highway surfaces that not only contaminate surrounding groundwater resources but also corrode motor vehicles and bridge structures. Salt along the roadside may also be responsible for attracting deer to the side of the highways thereby contributing to accidents and injuries. The impacts of using salt for deicing include:

- Contamination of drinking water supplies
- Increased maintenance of roadside vegetation and removal of dead trees and shrubs
- Corrosive damage to bridge structures and vehicles.

The use of alternative deicers to salt is how agencies can reduce the amount of salt infiltration. Several alternatives have been in use including calcium magnesium acetate (CMA), calcium chloride, and magnesium chloride; however, calcium chloride and magnesium chloride, like salt,



also leave residues of chloride ions on the road surface, which contaminate ground waters and corrode motor vehicles and bridge structures.<sup>9</sup>

These different deicing alternatives vary in effectiveness depending on the temperature. As the temperature drops, salt's effectiveness slows to the point that when it gets near 10 degrees and below, its effectiveness is greatly diminished. Calcium chloride is a hygroscopic material that attracts moisture from its surroundings, speeding the creation of brine to give melting action a fast start, and its lowest effective temperature is -25°F, which is below that of other common deicers. Magnesium chloride has an effective temperature of 0°F. CMA is typically used in blends with rock salt or other lower-cost materials. It has the lowest effective temperature roughly equivalent to rock salt.

CMA can be an effective deicing alternative to road salt if handled and used properly. CMA is made from limestone and acetic acid (commonly found in vinegar) and is biodegradable and non-toxic. Studies show it has little or no effect on vegetation and water sources and is low in mammalian toxicity. The same equipment that handles road salt can also be used to apply deicer alternatives. In addition, CMA and calcium chloride can be applied with abrasives (sand and mineral aggregates) for application. A wholesale switch from salt to alternative deicers can be expensive. CMA costs up to 20 times more per ton than road salt, and calcium chloride can cost up to 6 times more per ton than road salt. The drawback to using calcium chloride as a salt alternative is that it does not address the impact of chloride on the environment, although it does reduce the amount of sodium.

### *Energy*

The nation's continued reliance on fossil fuels cannot be sustained, as these finite, non-renewable resources will eventually disappear. In addition to being finite resources, fossil fuels are the largest source of greenhouse gas emissions, a leading cause of global warming and climate change. To accommodate the ever-increasing demand for energy, while managing a depleting supply of fossil fuels, alternative forms of energy need to be developed. The best forms of alternative energy sources are ones that are sustainable, renewable and not a detriment to the environment.

### *Alternative Fuels*

The most recent Massachusetts Greenhouse Gas (GHG) Inventory shows that GHG emissions in 2018 were 22 percent below the 1990 baseline level, on track to meet the 25 percent reduction by 2020 required by the Global Warming Solutions Act (GWSA). Massachusetts's success in reducing GHG emissions comes despite a 14 percent growth in population and a 24 percent growth in vehicle miles traveled. Significant GHG emissions reduction from the electric sector since 2005 has been a major contributor to the drop in gross GHG emissions. Additionally, vehicle standards have lowered the carbon intensity of each vehicle mile traveled while the Commonwealth's nation-leading energy efficiency programs have helped to control energy demands in buildings despite economic growth and variable weather conditions. Over 65 percent

of Massachusetts emissions come from our cars, trucks, homes, and offices, another 20 percent comes from the power plants that provide electricity for our lights, computers, and appliances.

Vehicles that use alternative fuels, such as biodiesel, electricity, and natural gas help to reduce carbon emissions and increase our energy security. The Massachusetts Clean Cities Coalition promotes the adoption of alternative fuel vehicles (AFVs), supports the development of the infrastructure necessary to make AFVs viable transportation options, and aims to change our communities for the better.

### *Electric Vehicles in Massachusetts*

The global automobile industry decreased by sixteen percent due to the Covid-19 pandemic. Nevertheless, electric vehicle sales over the past year have been rising steadily. The International Energy Agency (IEA) states that the number of electric vehicles on the road worldwide is forecast to grow from 11 million this year to 145 million by the end of the decade. With electric vehicle sales expected to surge, this will decrease the oil demand, resulting in a decreased carbon footprint.

Massachusetts has joined the nine-state coalition, Transportation Climate Initiative, a regional collaboration of Northeast and Mid-Atlantic jurisdictions, working together since 2010 to improve transportation, develop the clean energy economy, and reduce emissions from vehicles and fuels. In addition, in the 2015 Massachusetts Zero Emission Vehicle Action Plan, there are 80 recommendations for automakers, dealers, utilities, charging and fueling companies, and other key partners to rapidly accelerate consumer adoption of zero-emission vehicles, including plug-in hybrid, battery electric, and hydrogen fuel cell vehicles. The state plans to dramatically cut greenhouse-gas emissions in the next decade and beyond through several changes, including mandating that all new cars sold in the state be electric by 2035. Massachusetts currently has about 30,000 electric vehicles on the roads, the goal by 2035 is to reach 750,000 electric vehicles.

With the number of electric vehicles on the road going up, the number of electric vehicle charging stations needs to increase as well. Many people might not be able to afford to install a charging station in their homes, so public charging station availability is crucial. Currently, Massachusetts has 1,817 public charging stations with 4,107 charging outlets. This number should increase to be able to handle the number of electric vehicles on the road by 2035. Figure 28 shows the number and locations of charging stations in Massachusetts. Figure 29 shows the location of electric vehicle charging stations in the OCPC Region.

Figure 8-7: EV Charging Stations Statewide

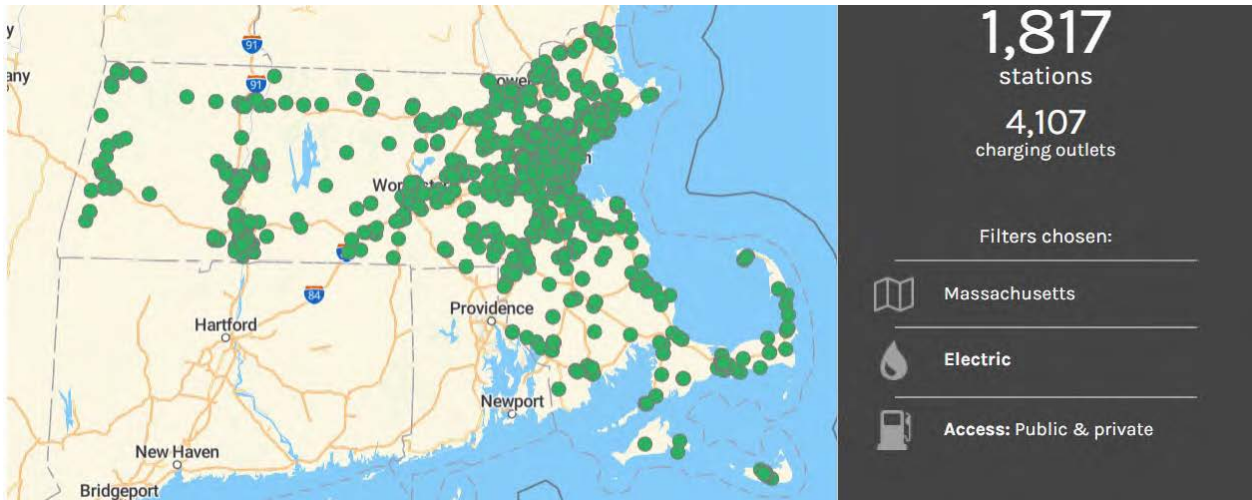
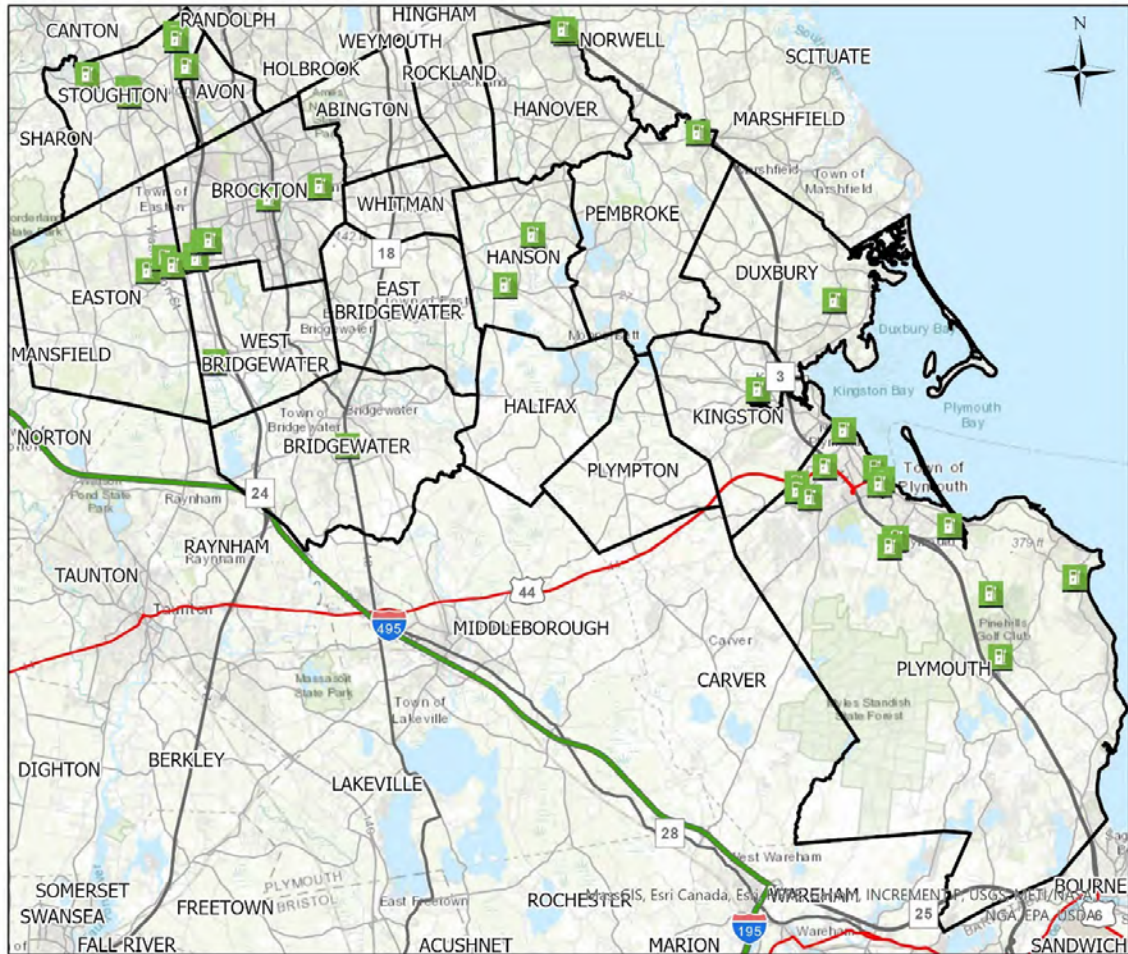





Figure 8-8: EV Charing Old Colony Region


### Electric Car Charging Stations

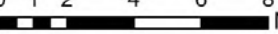


 Electric Charging Stations

 Interstate

 U.S. Highway

 State Route

0 1 2 4 6 8  
 Miles



**OLD COLONY  
 PLANNING COUNCIL**

Old Colony Planning Council  
 70 School Street, Brockton, MA 02301

[www.ocpcrpa.org](http://www.ocpcrpa.org)  
 Created June 2021

GIS Data Sources  
 Department of Transportation (MassDOT), Office of Geographic Information (MassGIS), and ChargeHub

The locations of the Electric Charging Stations in the OCPC region are as follows (by community):

Stoughton:

- 204 Tosca Drive, Stoughton, OHB Corporation
- 630 Washington Street, Stoughton, Sonic Drive-In
- 55 Monk Street, Stoughton
- 105 Porter Street, Stoughton
- 1 Hawes Way, Stoughton
- 1 Ikea Way, Stoughton
- 449 Page Street, Stoughton, Hampton Inn & Suites Boston/Stoughton

Easton

- 8 Island Court, Easton, Water Pointe
- 320 Washington Street, Easton, Stonehill College
- 99 Belmont Street, Easton, 99 Restaurant

Brockton

- 110 Liberty Street, Brockton
- 122 Liberty Street, Brockton, Copeland Volkswagen of Brockton
- 1016 Belmont Street, Brockton, Nissan 24
- 940 Belmont Street, Brockton, Veterans Affairs Boston Healthcare System
- 2-20 Crescent Street, Brockton, Brockton Parking Garage
- 680 Centre Street, Brockton, Signature Healthcare Brockton Hospital Emergency Room

West Bridgewater

- 726 West Center Street, West Bridgewater, National Grid

Bridgewater

- 545 Bedford Street, Bridgewater
- Bridgewater Town Hall, 66 Central Square Bridgewater
- Bridgewater State University Weygand Lot, 85 Burrill Ave, Bridgewater, MA

Hanson

- 1150 Main Street, Hanson
- 542 Liberty Street, Hanson

Hanover

- 1 Saturn Drive, Hanover, Coastal Volkswagen
- 2000 Washington Street, Jannell Ford of Hanover

Pembroke

- 146 Church Street, Pembroke

## Chapter 9: Safety and Security

Traveling safety is one of the public's highest expectations from the transportation system. Ongoing coordination among all agencies is necessary to cover the many factors related to maintaining and improving safety, such as, operator knowledge, experience and skill; operator impairment; the use of safety equipment; vehicle condition; and road and weather conditions. Incorporating safety into transportation planning often means integrating safety into all aspects of an agency's operations.

While municipalities and agencies across the region have made strides in improving transportation safety and security, the region continues to face issues and challenges, including:

- Several areas on the highway network have been identified as having elevated crash rates and Equivalent Property Damage Only (EPDO) values
- Areas of the region are vulnerable to threats from climate change and other factors
- The Safe Routes To School program is underutilized
- There continues to be opportunity for increased security at transportation facilities.

### MASSACHUSETTS STRATEGIC HIGHWAY SAFETY PLAN (SHSP)

In 2006, the Massachusetts Department of Transportation (formerly Executive Office of Transportation) presented the Massachusetts Strategic Highway Safety Plan (SHSP), a statewide comprehensive safety plan that provided a coordinated framework for reducing fatalities and serious injuries on the State's surface transportation network. Through a data-comprehensive, data driven systematic approach, MassDOT with its state, regional, and local partners targeted six emphasis areas and achieved significant accomplishments in traffic safety and reductions in fatalities and serious injuries.

The Commonwealth of Massachusetts' top priority is ensuring the safety of all roadway users: whether they are driving a vehicle, truck, or motorcycle; riding as a passenger, taking transit, walking, bicycling, or using any other mobility device. One life lost or seriously altered on the Commonwealth's roadways is one too many. Massachusetts is committed to the goal of zero roadway fatalities and serious injuries. The 2023 Strategic Highway Safety Plan (SHSP) provides a framework for how the Commonwealth will work to make Massachusetts roadways safer for all people. No matter how people get around, it is essential that everyone feels safe traveling throughout the Commonwealth, regardless of age, ability, lived experience, or mode. The plan applies to all public roadways in Massachusetts ranging from residential streets to interstate highways, regardless of jurisdiction or functional classification.

The Plan adopts the Safe System Approach to achieving the Commonwealth's Vision Zero goal, which prioritizing equity and collaboration.

## SAFETY MANAGEMENT SYSTEM

The Old Colony Safety Management System consists of a systematic process that has the goal of reducing the number of and severity of traffic crashes on public roads, with the ultimate goal of achieving safety performance management targets established in PM1. Recommended actions include providing information for selecting and implementing effective safety strategies and projects. All opportunities to improve roadway safety are identified, considered, and implemented in all phases of highway planning, design, construction, maintenance, and operation.

Guidance from the Federal Highway Administration’s Safety Program and the Massachusetts Strategic Highway Safety Plan (SHSP) has been incorporated into the Old Colony Safety Management System. Based on federal guidance, the Old Colony Safety Management System has been modeled to be a data driven, collaborative process that includes consultation with transportation safety stakeholders on addressing safety planning for highway, transit, bicycle, and pedestrian transportation. This collaborative process includes continually evaluating Engineering components, Education initiatives; Enforcement policies and practices, and Emergency Response (known as the “4 E’s”).

The 2018 Massachusetts Strategic Highway Safety Plan is regularly consulted and incorporated into the Old Colony Safety Management System and safety planning processes. The following target areas from the 2018 Massachusetts SHSP are regularly incorporated into transportation planning efforts: Lane Departure Crashes; Speeding and Aggressive Driving; Intersection Crashes; Pedestrians; and Bicyclists.

The safety management system incorporates roadway, human and vehicle safety elements. Considered an ongoing effort, Old Colony Planning Council collects and maintains all data needed in the estimation of refined performance measures. Staff identifies both existing and future needs of the region’s transportation system with regard to safety. This includes development of annual regional listings of high hazard intersections and corridors, and participation in the Highway Safety Improvement Program.

## SAFE SYSTEM APPROACH

The Safe System Approach has been embraced by the transportation community as an effective way to address and mitigate the risks inherent in our enormous and complex transportation system. It works by building and reinforcing multiple layers of protection to both prevent crashes from happening in the first place and minimize the harm caused to those involved when crashes do occur. It is a holistic and comprehensive approach that provides a guiding framework to make places safer for people.

This is a shift from a conventional safety approach because it focuses on both human mistakes AND human vulnerability and designs a system with many redundancies in place to protect everyone.



Figure 9-1: The Safe System Approach

The primary principles of the Safe System Approach are as follows:

- **Death and Serious Injuries Are Unacceptable:** A Safe System Approach prioritizes the elimination of crashes that result in death and serious injuries.
- **Humans Make Mistakes:** People will inevitably make mistakes and decisions that can lead or contribute to crashes, but the transportation system can be designed and operated to accommodate certain types and levels of human mistakes and avoid death and serious injuries when a crash occurs.
- **Humans Are Vulnerable:** Human bodies have physical limits for tolerating crash forces before death or serious injury occurs; therefore, it is critical to design and operate a transportation system that is human-centric and accommodates physical human vulnerabilities.
- **Responsibility is Shared:** All stakeholders—including government at all levels, industry, non-profit/advocacy, researchers, and the general public—are vital to preventing fatalities and serious injuries on our roadways.
- **Safety is Proactive:** Proactive tools should be used to identify and address safety issues in the transportation system, rather than waiting for crashes to occur and reacting afterwards.
- **Redundancy is Crucial:** Reducing risks requires that all parts of the transportation system be strengthened, so that if one part fails, the other parts still protect people.

Objectives of the Safe System Approach

**Safer People**



Encourage safe, responsible driving and behavior by people who use our roads and create conditions that prioritize their ability to reach their destination unharmed.

### **Safer Roads**

Design roadway environments to mitigate human mistakes and account for injury tolerances, to encourage safer behaviors, and to facilitate safe travel by the most vulnerable users.

### **Safer Vehicles**

Expand the availability of vehicle systems and features that help to prevent crashes and minimize the impact of crashes on both occupants and non-occupants.

### **Safer Speeds**

Promote safer speeds in all roadway environments through a combination of thoughtful, equitable, context-appropriate roadway design, appropriate speed-limit setting, targeted education, outreach campaigns, and enforcement.

### **Post Crash Care**

Enhance the survivability of crashes through expedient access to emergency medical care, while creating a safe working environment for vital first responders and preventing secondary crashes through robust traffic incident management practices.

## HIGHWAY SAFETY

Table 9-1 summarizes crash data for the sixteen communities of the Old Colony region. MassDOT crash data contains 22,252 records of crashes occurring in the Old Colony region from January 1, 2020 through December 31, 2022.

**Table 9-1 Serious Injury and Fatal Crashes by Community, 2020-2022**

|                         | Roadway<br>Mileage | Total<br>Crashes | Crashes<br>Per Mile | With Serious Injuries |              | Fatal<br>Crashes | Pedestrians<br>w/ Serious |           |           | Bicyclists<br>w/ Serious |           |          |
|-------------------------|--------------------|------------------|---------------------|-----------------------|--------------|------------------|---------------------------|-----------|-----------|--------------------------|-----------|----------|
|                         |                    |                  |                     | Crashes               | % Total      |                  | Crashes                   | Injury    | Fatal     | Crashes                  | Injury    | Fatal    |
| <b>Abington</b>         | 67.05              | 1,187            | 17.70               | 24                    | 2.02%        | 5                | 9                         | 2         | 1         | 15                       | 2         | 0        |
| <b>Avon</b>             | 33.61              | 833              | 24.78               | 5                     | 0.60%        | 1                | 5                         | 0         | 0         | 1                        | 0         | 0        |
| <b>Bridgewater</b>      | 134.16             | 1,308            | 9.75                | 27                    | 2.06%        | 7                | 9                         | 3         | 1         | 7                        | 1         | 0        |
| <b>Brockton</b>         | 284.23             | 6,805            | 23.94               | 185                   | 2.72%        | 21               | 155                       | 25        | 9         | 47                       | 5         | 0        |
| <b>Duxbury</b>          | 286.84             | 642              | 2.24                | 9                     | 1.40%        | 3                | 1                         | 0         | 0         | 3                        | 0         | 0        |
| <b>East Bridgewater</b> | 79.63              | 1,004            | 12.61               | 22                    | 2.19%        | 2                | 10                        | 1         | 0         | 6                        | 0         | 0        |
| <b>Easton</b>           | 131                | 1,309            | 9.99                | 42                    | 3.21%        | 4                | 9                         | 2         | 0         | 6                        | 1         | 0        |
| <b>Halifax</b>          | 58.97              | 254              | 4.31                | 10                    | 3.94%        | 1                | 2                         | 1         | 1         | 1                        | 0         | 0        |
| <b>Hanover</b>          | 85.17              | 742              | 8.71                | 16                    | 2.16%        | 2                | 7                         | 1         | 0         | 11                       | 1         | 0        |
| <b>Hanson</b>           | 65.92              | 400              | 6.07                | 9                     | 2.25%        | 1                | 1                         | 0         | 0         | 5                        | 0         | 0        |
| <b>Kingston</b>         | 106.67             | 707              | 6.63                | 17                    | 2.40%        | 3                | 4                         | 0         | 0         | 3                        | 1         | 0        |
| <b>Pembroke</b>         | 113.76             | 815              | 7.16                | 12                    | 1.47%        | 3                | 5                         | 0         | 0         | 11                       | 0         | 0        |
| <b>Plymouth</b>         | 506.45             | 2,337            | 4.61                | 71                    | 3.04%        | 5                | 22                        | 4         | 0         | 20                       | 2         | 0        |
| <b>Plympton</b>         | 35.55              | 132              | 3.71                | 4                     | 3.03%        | 0                | 0                         | 0         | 0         | 0                        | 0         | 0        |
| <b>Stoughton</b>        | 123.06             | 1,976            | 16.06               | 10                    | 0.51%        | 27               | 25                        | 5         | 3         | 9                        | 0         | 0        |
| <b>West Bridgewater</b> | 58.87              | 1,138            | 19.33               | 33                    | 2.90%        | 6                | 8                         | 1         | 1         | 1                        | 0         | 0        |
| <b>Whitman</b>          | 54.06              | 663              | 12.26               | 11                    | 1.66%        | 0                | 3                         | 1         | 0         | 1                        | 0         | 0        |
| <b>Reion</b>            | <b>2,225</b>       | <b>22,252</b>    | <b>10.00</b>        | <b>507</b>            | <b>2.28%</b> | <b>91</b>        | <b>275</b>                | <b>46</b> | <b>16</b> | <b>147</b>               | <b>13</b> | <b>0</b> |

### Intersections

Intersections continue to be a strategic emphasis area where infrastructure improvements can be implemented to improve highway safety. Old Colony Planning Council works with MassDOT and municipal partners to use a data driven process identifying interactions in the communities that have high crash rates and/or have a high occurrence of serious injuries and fatalities.

### Short-Term Strategies

**Road Safety Audits:** Road Safety Audits are regularly conducted at high crash locations in the region. These RSAs are often led and prepared by the Old Colony Planning Council in cooperation with the municipalities along with the Massachusetts Department of Transportation and regional transit agencies.

**Safe Routes to School:** Communities are encouraged to partner and participate with Safe Routes to School, if not already doing so. While participation in the program allows municipalities to be eligible for discretionary safety grants, the community education provided by the program fosters safe walking and bicycling, reducing the risk to vulnerable roadway users.

**Complete Streets:** Communities are encouraged to adopt Complete Streets plans, as Complete Streets designs have demonstrated improved safety and reduction of risk of serious injury.

The MassDOT maintains a database of crashes occurring in Massachusetts based on crash reports submitted to the Massachusetts Registry of Motor Vehicles (RMV). With the data, MassDOT generates analysis tools such as a Geographic Information Systems (GIS) based crash clustering system where crash locations are plotted, and “clusters” where crashes are occurring in close proximity to each other, such as at an intersection or highway interchange, are identified. The Top 5% worst crash clusters are used to determine eligibility for improvements funding through the Highway Safety Improvement Program (HSIP). MassDOT also generates a Top 200 Most Hazardous Intersections statewide list, which uses an Equivalent Property Damage Only (EPDO) weighted average methodology. Similarly, the Old Colony Metropolitan Planning Organization generates a Top 100 Most Hazardous Intersections list for the region using the same EPDO weighted average methodology.

Several areas on the highway network have been identified as having elevated crash rates and Equivalent Property Damage Only (EPDO)

The Old Colony Metropolitan Planning Organization has opportunity through its partnerships with federal, state, and local agencies to mitigate crash rates along with the frequency of fatalities and incapacitating injuries through Unified Planning Work Program (UPWP) activities and the Transportation Improvement Program (TIP). The Old Colony Top 100 Most Hazardous Intersections list along with the MassDOT inventory of top crash clusters are among the analysis tools utilized to determine where efforts and investments may be targeted to improve safety at intersections in the region.

Table 9-2 summarizes the intersections on the federal-aid eligible roadway network in the Old Colony region with the Top 100 highest Equivalent to Property Damage Only (EPDO) values. The EPDO index is a 21-point based weighted scoring system that assigns crashes that result in property damage only (no reported injuries) a single point value while crashes that resulted in a reported injury or fatality receive 21 points. The EPDO for any given intersection is the sum of these point values for all crashes over a 3-year period.

Table 9-2 OCPC Top 100 Highest EPDO Values in Old Colony Region

| RANK | COMMUNITY        | STREET1               | RTE1 | STREET2                               | RTE2 | 2020-2022 EPDO | Fatal | w/Injury | Non_Injury Crashes | Total | Notes                           |
|------|------------------|-----------------------|------|---------------------------------------|------|----------------|-------|----------|--------------------|-------|---------------------------------|
| 1    | BROCKTON         | WEST ELM STREET       |      | BELMONT AVENUE                        |      | 605            | 0     | 28       | 17                 | 45    | Reconstructed                   |
| 2    | EASTON           | ROUTE 138             | 138  | PURCHASE STREET                       |      | 603            | 0     | 27       | 36                 | 63    | RSA Completed                   |
| 3    | BROCKTON         | WARREN AVENUE         |      | MARKET STREET                         |      | 597            | 0     | 27       | 30                 | 57    |                                 |
| 4    | BROCKTON         | MAIN STREET           |      | CENTRE STREET /LEGION PARKWAY         | 123  | 573            | 0     | 26       | 27                 | 53    | RSA Completed                   |
| 5    | BROCKTON         | BELMONT STREET        | 123  | MANLEY STREET                         |      | 571            | 0     | 26       | 25                 | 51    | Reconstructed                   |
| 6    | BROCKTON         | BELMONT STREET        | 123  | BELMONT AVENUE / MANOMET STREET       |      | 548            | 0     | 25       | 23                 | 48    | Reconstructed                   |
| 7    | EASTON           | TURNPIKE STREET       |      | PURCHASE STREET                       |      | 526            | 0     | 23       | 43                 | 66    | RSA Completed                   |
| 8    | BROCKTON         | MONTELLO STREET       | 28   | COURT STREET                          |      | 505            | 0     | 23       | 22                 | 45    |                                 |
| 9    | BROCKTON         | NORTH CARY STREET     |      | EAST ASHLAND STREET                   |      | 494            | 0     | 22       | 32                 | 54    |                                 |
| 10   | BROCKTON         | WEST ELM STREET       |      | ASH STREET                            |      | 493            | 0     | 23       | 10                 | 33    | Reconstructed                   |
| 11   | BROCKTON         | PLEASANT STREET       | 27   | WEST STREET / REYNOLDS HWY            |      | 483            | 0     | 22       | 21                 | 43    | Reconstructed                   |
| 12   | BROCKTON         | NORTH MONTELLO STREET | 28   | EAST ASHLAND STREET                   |      | 476            | 0     | 22       | 14                 | 36    |                                 |
| 13   | BROCKTON         | REYNOLDS HIGHWAY      | 27   | CHRISTY'S PLACE/WESTGATE MALL         |      | 467            | 0     | 21       | 26                 | 47    |                                 |
| 14   | BROCKTON         | MONTELLO STREET       | 28   | EAST NILSSON STREET                   |      | 457            | 0     | 21       | 16                 | 37    | RSA Completed                   |
| 15   | BROCKTON         | NORTH MONTELLO STREET | 28   | AMES STREET                           |      | 452            | 0     | 21       | 11                 | 32    |                                 |
| 16   | BROCKTON         | PLEASANT STREET       | 27   | NORTH WARREN AVENUE                   |      | 446            | 0     | 20       | 26                 | 46    |                                 |
| 17   | BROCKTON         | WEST ELM STREET       |      | MORAINIE STREET                       |      | 442            | 0     | 20       | 22                 | 42    | Reconstructed                   |
| 18   | BROCKTON         | NORTH MONTELLO STREET | 28   | LIVINGSTON ROAD / FIELD STREET        |      | 426            | 0     | 20       | 6                  | 26    |                                 |
| 19   | BROCKTON         | NORTH MONTELLO STREET | 28   | EAST BATTLES STREET                   |      | 392            | 0     | 18       | 14                 | 32    |                                 |
| 20   | AVON             | EAST MAIN STREET      | 28   | EAST / WEST SPRING STREET             |      | 392            | 0     | 17       | 35                 | 52    | RSA Completed                   |
| 21   | BROCKTON         | PLEASANT STREET       | 27   | SPRING STREET                         |      | 376            | 0     | 17       | 19                 | 36    |                                 |
| 22   | STOUGHTON        | CANTON STREET         | 27   | SCHOOL STREET                         |      | 364            | 0     | 16       | 28                 | 44    | RSA Completed                   |
| 23   | BROCKTON         | MAIN STREET           |      | PERKINS AVENUE / SOUTH STREET         |      | 333            | 0     | 15       | 18                 | 33    | 2020 Main Street Corridor Study |
| 24   | BROCKTON         | OAK STREET            |      | MADRID SQUARE                         |      | 333            | 0     | 15       | 18                 | 33    |                                 |
| 25   | BROCKTON         | MAIN STREET           |      | NILSSON STREET                        |      | 332            | 0     | 15       | 17                 | 32    | FFY 2021 RSA                    |
| 26   | ABINGTON         | BEDFORD STREET        | 18   | BROCKTON AVENUE                       | 123  | 318            | 0     | 14       | 24                 | 38    |                                 |
| 27   | BROCKTON         | NORTH MAIN STREET     |      | HOWARD STREET / 'OAK STREET           |      | 314            | 0     | 14       | 20                 | 34    | RSA Completed                   |
| 28   | BROCKTON         | NORTH MONTELLO STREET | 28   | HOWARD STREET                         | 37   | 312            | 0     | 14       | 18                 | 32    |                                 |
| 29   | BROCKTON         | WARREN AVENUE         |      | FOREST AVENUE                         |      | 311            | 0     | 14       | 17                 | 31    | SW Brockton Corridor Study      |
| 30   | STOUGHTON        | WASHINGTON STREET     | 138  | CENTRAL STREET                        |      | 310            | 0     | 12       | 58                 | 70    | TIP FFY 2023                    |
| 31   | BROCKTON         | MONTELLO STREET       | 28   | LAWRENCE STREET                       |      | 301            | 0     | 14       | 7                  | 21    |                                 |
| 32   | STOUGHTON        | PLEASANT STREET       | 139  | LINCOLN STREET                        |      | 292            | 0     | 13       | 19                 | 32    | RSA Completed                   |
| 33   | BROCKTON         | CRESCENT STREET       | 27   | LYMAN STREET                          |      | 283            | 0     | 13       | 10                 | 23    | TIP FFY 2025                    |
| 34   | ABINGTON         | RANDOLPH STREET       | 139  | CHESTNUT STREET / OLD RANDOLPH STREET |      | 273            | 0     | 12       | 21                 | 33    | FFY 2021 RSA                    |
| 35   | BROCKTON         | CENTRE STREET         | 123  | CARY STREET / LYMAN STREET            |      | 270            | 0     | 12       | 18                 | 30    | TIP FFY 2022                    |
| 36   | BROCKTON         | OAK STREET            |      | CAMPANELLI INDUSTRIAL DRIVE           |      | 270            | 0     | 12       | 18                 | 30    |                                 |
| 37   | BROCKTON         | BELMONT STREET        | 123  | PEARL STREET                          |      | 268            | 1     | 11       | 16                 | 28    | RSA Completed                   |
| 38   | BROCKTON         | MONTELLO STREET       | 28   | SCHOOL STREET                         |      | 267            | 0     | 12       | 15                 | 27    |                                 |
| 39   | BROCKTON         | WARREN AVENUE         |      | WEST ELM STREET                       |      | 265            | 0     | 12       | 13                 | 25    |                                 |
| 40   | WEST BRIDGEWATER | WEST CENTER STREET    | 106  | PROSPECT STREET                       |      | 264            | 0     | 11       | 33                 | 44    |                                 |
| 41   | BROCKTON         | WARREN AVENUE         |      | WINTHROP STREET                       |      | 263            | 0     | 12       | 11                 | 23    |                                 |
| 42   | ABINGTON         | HANCOCK STREET        |      | CHESTNUT STREET                       |      | 255            | 0     | 11       | 24                 | 35    | TIP FFY 2026                    |
| 43   | EASTON           | WASHINGTON STREET     | 138  | BELMONT STREET                        | 123  | 250            | 0     | 11       | 19                 | 30    |                                 |
| 44   | BROCKTON         | MONTELLO STREET       | 28   | PERKINS AVENUE                        |      | 248            | 0     | 11       | 17                 | 28    |                                 |
| 45   | BROCKTON         | COURT STREET          |      | CARY STREET / NORTH CARY / PROVOST    |      | 244            | 0     | 11       | 13                 | 24    |                                 |
| 46   | BROCKTON         | FOREST AVENUE         |      | BOUVE AVENUE / MANOMET STREET         |      | 243            | 0     | 11       | 12                 | 23    | SW Brockton Corridor Study      |
| 47   | BROCKTON         | NORTH WARREN AVENUE   |      | PROSPECT STREET                       |      | 242            | 0     | 11       | 11                 | 22    |                                 |
| 48   | BROCKTON         | WARREN AVENUE         |      | BARTLETT STREET / FATHER KENNEY WAY   |      | 242            | 0     | 11       | 11                 | 22    |                                 |
| 49   | BROCKTON         | FOREST AVENUE         |      | ASH STREET                            |      | 241            | 0     | 11       | 10                 | 21    | SW Brockton Corridor Study      |
| 50   | BROCKTON         | PLEASANT STREET       | 27   | MAIN STREET                           |      | 239            | 0     | 10       | 29                 | 39    | 2020 Main Street Corridor Study |

Table 9-2 OCPC Top 100 Highest EPDO Values in Old Colony Region. continued

| RANK | COMMUNITY        | STREET1             | RTE1 | STREET2                                       | RTE2 | 2020-2022 EPDO | Fatal | w/Injury | Non_Injury Crashes | Total | Notes                  |
|------|------------------|---------------------|------|---|------|----------------|-------|----------|--------------------|-------|------------------------|
| 51   | BROCKTON         | BELMONT STREET      | 123  | WEST STREET                                   |      | 238            | 0     | 11       | 7                  | 18    | CONSTRUCTION           |
| 52   | PEMBROKE         | CHURCH STREET       | 139  | OAK STREET                                    |      | 235            | 0     | 10       | 25                 | 35    |                        |
| 53   | BROCKTON         | PROSPECT STREET     |      | BELAIR STREET                                 |      | 232            | 0     | 10       | 22                 | 32    |                        |
| 54   | BROCKTON         | CENTRE STREET       | 123  | QUINCY STREET                                 |      | 231            | 0     | 10       | 21                 | 31    | RSA Completed          |
| 55   | STOUGHTON        | LINDELOF AVENUE     | 139  | TECHNOLOGY CENTER DRIVE                       |      | 224            | 1     | 9        | 14                 | 24    |                        |
| 56   | BROCKTON         | NORTH MAIN STREET   |      | EAST ASHLAND STREET                           |      | 223            | 0     | 10       | 13                 | 23    |                        |
| 57   | BROCKTON         | NORTH QUINCY STREET |      | EAST ASHLAND STREET                           |      | 221            | 0     | 10       | 11                 | 21    |                        |
| 58   | BROCKTON         | PLEASANT STREET     | 27   | ASH STREET / NORTH ASH STREET                 |      | 219            | 0     | 10       | 9                  | 19    |                        |
| 59   | BROCKTON         | CENTRE STREET       | 123  | MONTELLO STREET                               | 28   | 215            | 0     | 10       | 5                  | 15    |                        |
| 60   | HANOVER          | COLUMBIA ROAD       | 53   | BROADWAY                                      |      | 209            | 0     | 9        | 20                 | 29    | FFY 2021 RSA           |
| 61   | STOUGHTON        | TURNPIKE STREET     |      | CENTRAL STREET                                |      | 208            | 0     | 9        | 19                 | 28    |                        |
| 62   | BROCKTON         | OAK STREET          |      | BELAIR STREET                                 |      | 206            | 0     | 9        | 17                 | 26    |                        |
| 63   | BROCKTON         | BELMONT STREET      | 123  | LINWOOD STREET / LORRAINE AVE                 |      | 205            | 1     | 8        | 16                 | 25    | Reconstructed          |
| 64   | EAST BRIDGEWATER | BEDFORD STREET      | 18   | CENTRAL STREET / SPRING STREET / MAPLE AVENUE |      | 205            | 0     | 8        | 37                 | 45    |                        |
| 65   | WEST BRIDGEWATER | NORTH ELM STREET    |      | CRESCENT STREET                               |      | 202            | 0     | 9        | 13                 | 22    |                        |
| 66   | BROCKTON         | PLEASANT STREET     |      | PEARL STREET / NORTH PEARL STREET             |      | 201            | 0     | 9        | 12                 | 21    |                        |
| 67   | WHITMAN          | BEDFORD STREET      | 18   | TEMPLE STREET                                 | 27   | 201            | 0     | 8        | 33                 | 41    | Reconstructed          |
| 68   | EAST BRIDGEWATER | BEDFORD STREET      | 18   | WEST STREET / EAST STREET                     | 106  | 200            | 0     | 8        | 32                 | 40    | RSA Completed          |
| 69   | BROCKTON         | PLEASANT STREET     | 27   | BELAIR STREET / MORaine STREET                |      | 199            | 0     | 9        | 10                 | 19    |                        |
| 70   | BROCKTON         | WARREN AVENUE       |      | WEST CHESTNUT STREET                          |      | 199            | 0     | 9        | 10                 | 19    |                        |
| 71   | EAST BRIDGEWATER | WASHINGTON STREET   |      | CENTRAL STREET                                |      | 199            | 0     | 9        | 10                 | 19    |                        |
| 72   | STOUGHTON        | PARK STREET         | 27   | WALNUT STREET                                 |      | 199            | 0     | 9        | 10                 | 19    | Reconstructed          |
| 73   | BROCKTON         | CRESCENT STREET     | 27   | PERKINS STREET / COMMERCIAL STREET            |      | 197            | 0     | 9        | 8                  | 17    |                        |
| 74   | BROCKTON         | MAIN STREET         |      | FOREST AVENUE                                 |      | 197            | 0     | 9        | 8                  | 17    | FFY 2021 RSA           |
| 75   | STOUGHTON        | WASHINGTON STREET   | 138  | BROCK STREET / KINSLEY STREET                 |      | 197            | 0     | 9        | 8                  | 17    |                        |
| 76   | BROCKTON         | LAWRENCE STREET     |      | PERKINS STREET                                |      | 196            | 0     | 9        | 7                  | 16    |                        |
| 77   | EAST BRIDGEWATER | BEDFORD STREET      | 18   | HIGHLAND STREET                               |      | 188            | 0     | 8        | 20                 | 28    |                        |
| 78   | EAST BRIDGEWATER | PLYMOUTH STREET     | 106  | BRIDGE STREET                                 |      | 181            | 0     | 8        | 13                 | 21    |                        |
| 79   | BROCKTON         | NORTH MAIN STREET   |      | BATTLES STREET                                |      | 180            | 0     | 8        | 12                 | 20    |                        |
| 80   | BROCKTON         | NORTH PEARL STREET  |      | OAK STREET                                    |      | 180            | 0     | 8        | 12                 | 20    |                        |
| 81   | WEST BRIDGEWATER | BELMONT STREET      |      | PLAIN STREET                                  |      | 179            | 0     | 8        | 11                 | 19    |                        |
| 82   | BROCKTON         | CRESCENT STREET     | 27   | MONTELLO STREET                               | 28   | 178            | 0     | 8        | 10                 | 18    |                        |
| 83   | BROCKTON         | MONTELLO STREET     | 28   | CRESCENT STREET                               | 27   | 178            | 0     | 8        | 10                 | 18    |                        |
| 84   | ABINGTON         | PLYMOUTH STREET     | 58   | SUMMER STREET                                 |      | 177            | 0     | 8        | 9                  | 17    |                        |
| 85   | AVON             | HARRISON BOULEVARD  |      | POND STREET                                   |      | 177            | 0     | 7        | 30                 | 37    | CONSTRUCTION           |
| 86   | BROCKTON         | WARREN AVENUE       |      | NILSSON STREET                                |      | 174            | 0     | 8        | 6                  | 14    |                        |
| 87   | HANOVER          | HANOVER STREET      | 139  | GROVE STREET                                  |      | 174            | 0     | 8        | 6                  | 14    |                        |
| 88   | PLYMOUTH         | STATE ROAD          | 3A   | BEAVER DAM ROAD / WHITE HORSE ROAD            |      | 174            | 0     | 8        | 6                  | 14    |                        |
| 89   | BROCKTON         | CENTRE STREET       | 123  | COMMERCIAL STREET                             |      | 173            | 0     | 8        | 5                  | 13    |                        |
| 90   | BROCKTON         | CENTRE STREET       | 123  | PLYMOUTH STREET                               |      | 173            | 0     | 8        | 5                  | 13    | RSA Completed          |
| 91   | BROCKTON         | GROVE STREET        |      | CURVE STREET / CLINTON STREET                 |      | 173            | 0     | 8        | 5                  | 13    |                        |
| 92   | BROCKTON         | PLEASANT STREET     | 27   | AUGUSTA AVENUE / BELMONT AVENUE               |      | 173            | 0     | 8        | 5                  | 13    |                        |
| 93   | DUXBURY          | SUMMER STREET       | 53   | FRANKLIN STREET                               |      | 169            | 0     | 7        | 22                 | 29    | 2018 Road Safety Audit |
| 94   | ABINGTON         | PLYMOUTH STREET     | 58   | CENTRE AVENUE                                 | 123  | 166            | 0     | 7        | 19                 | 26    |                        |
| 95   | STOUGHTON        | SCHOOL STREET       |      | PEARL STREET                                  |      | 165            | 0     | 7        | 18                 | 25    | FFY 2021 RSA           |
| 96   | STOUGHTON        | WASHINGTON STREET   | 138  | SCHOOL STREET                                 |      | 165            | 0     | 7        | 18                 | 25    |                        |
| 97   | KINGSTON         | SUMMER STREET       | 53   | DUXBURY WAY / KINGSBURY PLAZA                 | 3A   | 161            | 0     | 6        | 35                 | 41    |                        |
| 98   | PEMBROKE         | WASHINGTON STREET   | 53   | COLUMBIA ROAD / SCHOOSSETT STREET             | 139  | 160            | 0     | 7        | 13                 | 20    |                        |
| 99   | STOUGHTON        | PLAIN STREET        |      | WEST STREET                                   |      | 158            | 0     | 7        | 11                 | 18    |                        |
| 100  | WEST BRIDGEWATER | WEST CENTER STREET  | 106  | LINCOLN STREET                                |      | 157            | 0     | 6        | 31                 | 37    |                        |

## TRANSIT

The Brockton Area Transit Authority (BAT) and the Massachusetts Bay Transportation Authority (MBTA) maintain programs in their planning and operations to ensure the safety of employees, passengers, and the general public. The Brockton Area Transit Authority continuously monitors safety and security on their system, and routinely reports rates of incidence through their Performance Dashboard.

## BICYCLE AND PEDESTRIAN SAFETY

Addressing safety for bicyclists and pedestrians is a key component of an overall focus on safety throughout the region. Both pedestrian involved crashes and bicycle crashes have been identified as emphasis areas with action plans in the Massachusetts Strategic Highway Safety Plan. The Old Colony Metropolitan Planning Organization has opportunity through its partnerships with federal, state, and local agencies to mitigate crash rates along with the frequency of fatalities and serious injuries through Unified Planning Work Program (UPWP) activities and the Transportation Improvement Program (TIP). Similar to crash clustering of motor vehicle accidents, MassDOT identifies pedestrian and bicycle crash clusters using a GIS-based methodology. The Old Colony MPO is committed to working with state and municipal agencies through its transportation planning tasks to address areas that have been identified as bicycle and pedestrian crash clusters.

The Safe Routes to School program are underutilized, with a 70% partnership rate among eligible schools as of

Bicycle and pedestrian safety education is a critical component of efforts to reduce the number and frequency of bicycle and pedestrian related crashes, and subsequently reducing resulting fatalities and serious injuries. The Massachusetts Safe Routes to School (SRTS) program aims to teach safe pedestrian and bicycling habits to elementary and middle-school aged children while promoting healthy alternatives for children and parents in their travel to and from school. The children who benefit from the Safe Routes to School program often extend those learned safe habits to family members and friends, extending the societal benefits of the program. In 2014, a formal partnership between the Region and MassRIDES (the statewide administrator of the Safe Routes to School program) was established in an effort to increase partnership and participation by eligible schools (those schools housing grades K-8) in the Old Colony Region. Through joint efforts, partnership in the program has increased yet remains underutilized with over 70% of eligible schools partnered with MassRIDES as of May 2019. The Old Colony MPO is committed to continuing its efforts with Safe Routes to School to further increase partnership and participation by eligible schools.

## RECOMMENDED IMPROVEMENT PROJECTS AT IDENTIFIED HIGH CRASH LOCATIONS

The following projects are planned for programming in the Old Colony Transportation Improvement Program (TIP) at some point during FFY 2024 through FFY 2033. These projects are all at locations that are a MassDOT Top 5% Highway Safety Improvement Program (HSIP) Crash Cluster from the years 2018 through 2020, an HSIP Pedestrian Crash Cluster, or on the MassDOT Statewide Top 200 Most Hazardous Intersections List.

#### **FFY 2024-2028**

- ABINGTON -- INTERSECTION IMPROVEMENTS AT HANCOCK STREET AND CHESTNUT STREET
- ABINGTON – INTERSECTION IMPROVEMENTS AT RICHARD FITTS DRIVE (ROUTE 139) AND CHESTNUT STREET AND OLD RIANDOLPH STREET
- BROCKTON - ROUTE 123 (CENTRE STREET) AT PLYMOUTH STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENTS
- BROCKTON- INTERSECTION IMPROVEMENTS AND RELATED WORK AT CENTRE STREET (ROUTE 123), CARY STREET AND LYMAN STREET
- BROCKTON – INTERSECTION IMPROVEMEBNTS ROUTE 123 (BELMONT STREET) AT PEARL STREET AND STONEHILL STREET
- STOUGHTON - CORRIDOR IMPROVEMENTS ON ROUTE 138
- STOUGHTON - CANTON STREET (ROUTE 27) & SCHOOL STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENTS

#### **FFY 2029-2033**

- BROCKTON - FOREST AVENUE CORRIDOR (MAIN STREET TO BELMONT STREET)
- EASTON - ROUTE 138 & TURNPIKE STREET INTERSECTION SIGNALIZATION AND GEOMETRIC IMPROVEMENTS

#### **SECURITY ON THE TRANSPORTATION NETWORK**

Securing the transportation system from threats and disruptions is an overarching concern for all transportation providers. According to the Federal Transit Administration, transit security refers to measures taken to protect a recipient's employees and the public against any intentional act or threat of violence or personal harm, either from a criminal or terrorist act. These actions include, but are not limited to, deploying surveillance technology and security personnel along routes and at stations, implementing security training programs for employees and security awareness programs for the public, and conducting inspections of facilities and passengers. Decisions to provide a greater level of security at some but not all of a recipient's fixed guideway stations in its area or along some but not all of a recipient's transit routes should be based on neutral criteria such as an assessment of security threats to facilities, data showing higher levels of criminal activity at certain facilities or in vehicles traveling along certain routes, or objective information that leads officials to believe that certain facilities or routes are more likely to be at risk. Policies associated with observing suspicious activity should ensure that suspicious activity is observed without regard to race, color, or national origin.



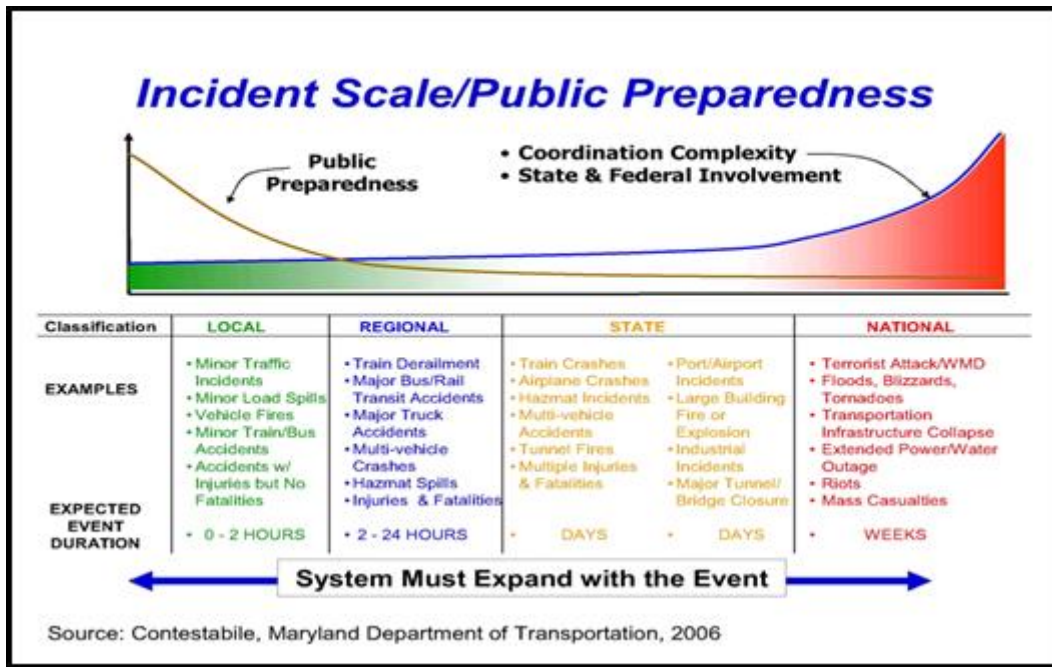
Safety and security are concerns that affect everyone within the region. Vukan R Vuchic in *Urban Transit: Operations, Planning, and Economics*, 2005 outlines some concerns about safety and security that are applicable to the region. Items to consider in the safe operation of fixed route transit are Vehicle performance, bus body design and strength, fire prevention and resistance, driver training and performance, conditions along the routes, bus stop design and operations, communication with control center, and the utilization of ITS. Fixed route transit providers keep many of these topics in mind when planning for the safety and security of their operations.

Vuchic also outlines guidelines for security of transit operations, which can be summarized as passenger security, employee security and the protection of revenues, which includes external theft, internal theft and fare evasion. BAT's has a philosophy similar to Vuchic, believing safety and security is to protect employees, passengers, assets, and revenues. BAT carries this philosophy out through various mechanisms such as employee training, participation in emergency and pandemic drills, the development of continuity of operations plans; uniformed and plain-clothes transit patrols, and the review of trends on complaints and physical damage so they can be informed and up to date on trends in the system.

Figure 9-2 provides an illustration of the relationship between the scale of a security incident and the level of public preparedness and consequent planning and coordination needs. As can be expected, as the scale moves from local to national, public preparedness declines and Coordination Complexity/ State & Federal Involvement increases. Effective coordination and communication among the many different operating agencies in a region and across the nation is absolutely essential. Such coordination is needed to allow enforcement/security/safety responses to occur in an expeditious manner, while at the same time still permitting the transportation system to handle the possibly overwhelming public response to the incident. Complementary to this is the need to make sure the public has clear and concise information about the situation and what actions they should take. Although the immediate organizational response to security incidents and disasters will be the responsibility of security/public safety agencies, there is an important role that the Old Colony MPO can play in promoting coordinated planning in anticipation of unexpected events or natural disasters. In addition, it could also provide a centralized location of information on transportation system conditions and local/national responses that might be useful in an emergency.

Figure 9-2

Incident Scale/ Public Preparedness



Source: Maryland Department of Transportation, 2006

There continues to be opportunity for increased security at transportation facilities.

Areas that the Old Colony MPO may consider with regard to security planning would be to examine and evaluate its strengths and abilities in technical analysis and transportation planning, and subsequently, the actions and tasks that seem most appropriate for the MPO in the context of security/disaster planning. Examples of tasks that may be suitable for programming in the UPWP are as follows:

- Conducting vulnerability analyses on regional transportation facilities and services
- Analyzing transportation network for redundancies in moving large numbers of people (e.g., modeling person and vehicle flows with major links removed or reversed, accommodating street closures, adaptive signal control strategies, impact of traveler information systems), and strategies for dealing with "choke" points and bottlenecks.
- Analyzing transportation network for emergency route planning/strategic gaps in the network

Transit system security is a regional concern. Issues to be addressed in planning for transit security are the age of the system, the types of structures comprising the system, the vulnerability of those structures, the lack of redundant and/or alternate system components and/or capacity, and the increased requirements (over and above personal safety requirements) to provide for anti-terrorism security.

The Secure Stations Initiative is one of the MBTA's programs to enhance its system wide operational security by improving its communications and security systems. This is a requirement of both the Massachusetts State Homeland Security Strategy and the Regional Transit Security Strategy. The Regional Transit Security Strategy was developed by the Regional Transit Security Working Group and is discussed below.

Any new construction, reconstruction, enhancement, or modernization project will include installation or upgrades to the following communications systems:

- closed-circuit television
- public address
- variable message sign
- security intrusion detection
- burglar alarm
- fire alarm
- police call box

One of the issues facing the MBTA in its security emergency response planning is that of interoperability. Interoperability is defined as the ability of radio equipment belonging to one department's emergency first responders to communicate with that of another department's first responders.

#### EVACUATION PLANNING FOR VULNERABLE POPULATIONS

The South Shore and southeastern Massachusetts are vulnerable to both natural and industrial disasters, and planning response and evacuation for such disasters is an important responsibility of local, regional, state, and federal government agencies. Late summer hurricanes, major winter blizzards, and summer droughts are all part of life in Southeastern Massachusetts, but most are at a manageable level. Other threats, e. g, earthquakes, landslides, and major fires are less common or manageable... Hurricanes and blizzards can be very destructive as we know from the Blizzard of 1978, Hurricanes Gloria and Bob, and the blizzard of 2015. Less common events occasionally occur such as Plymouth's 1957 wildfire that burned to the sea; and local fires in Plymouth's Uncle Brances Road and Clark Road areas early in 2005. These events can have disastrous effects on natural features and our synthetic communities. For the sake of waterborne transportation, waterpower, and access to marine resources and level building sites, many older communities have developed on the unprotected coast and along flood plains.

Areas of the region are vulnerable to threats from climate change and other factors.

Hurricanes, floods, tornadoes, and wildfires not only threaten lives and property, but also the transportation system critical for response to such emergencies, and for evacuation. The Old Colony MPO and the Old Colony Planning Council have played a leading role in working with partners on developing pre-disaster mitigation plans and identifying components of the transportation system most vulnerable to disasters.

The Pilgrim Nuclear Generation Station located on the shore of Plymouth near the Manomet section of Town poses perhaps the greatest potential non-natural hazard in the region. Commissioned in 1972, the Pilgrim Nuclear Power Station features a Boiling Water Reactor, General Electric Mark 1 design, with an output capacity of 685 megawatts. Spent nuclear fuel used by the plant is currently stored on-site, awaiting direction from the Federal government on permanent disposal processes.

Local, regional, state, and federal agencies should coordinate regularly and routinely on planning for response and evacuations in the event of natural and industrial disasters. Plans should recognize and consider all assets of the transportation network, including highway and rail. Physical capital that may be needed in such an event, such as portable variable message signs, portable lighting, barriers and delineators, generators, and vehicles should be inventoried in readily accessible plans and be able to be quickly and easily deployed. Expansion of permanent variable message signs and traffic cameras should be expanded onto the South Shore, including the Routes 3, 24, and 44 corridors. This permanent capital is not only beneficial in emergency response and evacuation, but for everyday congestion management operations and incident management as well.

#### PRE-DISASTER MITIGATION

The Old Colony Planning Council, under contract with the Massachusetts Emergency Management Agency (MEMA) developed a Multi-hazard Pre-Disaster Mitigation Plan. The purpose of the Multi-hazard Pre-Disaster Mitigation Plan was examining the natural hazards facing the Old Colony Region, review present protective features and provisions, assess the remaining vulnerability of the area's residents and critical facilities, and recommend ways to mitigate potential damage before the events occur. The Plan drew on the local knowledge of diverse officials and residents in order to produce practical, feasible recommendations for mitigation development against such natural hazards. Ideally, the recommended actions will help to save lives, protect property, and minimize disruption of essential services.

To guide this effort, the OCPC established a regional Multiple Hazard Community Planning Team drawing on locally appointed officials or their representatives. These included Local Emergency Management Directors, Fire, and Police Departments, Public Works officials, Conservation

Officers, and others concerned with emergency management, natural resource management, and protection of life and property. The effort drew heavily on the experience and knowledge of the public safety officials and others on the Multi-Hazard Community Planning Team.

The Old Colony Metropolitan Planning Organization through the planning staff is committed to continuing to work with local, regional, state, and federal emergency management officials in preparing for major weather events and other emergencies.

#### TIP PROJECT EVALUATION CRITERIA

An evaluation process to prioritize transportation projects included in the Transportation Improvement Program (TIP) was implemented several years ago. Among the criteria utilized as part of the effort are safety and security.

#### CONCLUSIONS, POLICIES, AND RECOMMENDATIONS

While great strides have been taken to improve safety and security throughout the transportation network nationally, statewide, and locally; there must be a continued focus on further reducing crashes, injuries, and fatalities. The Old Colony Metropolitan Planning Organization recommends and is committed to the implementation of the following policies and recommendations to improve safety and security throughout the transportation network.

**Target planning efforts and investments at identified high crash locations.** Through the Old Colony Safety Management System (and analysis tools such as the Top 100 Most Hazardous Intersections lists and MassDOT Crash Clusters inventory) identify high crash locations for targeted study, including but not necessarily limited to Road Safety Audits. High crash locations will include those emphasis areas in the Massachusetts Strategic Highway Safety Plan, including intersections, lane departures, older drivers, pedestrians, and bicycles.

**Fully program minimum HSIP targets each TIP year and seek to program Statewide HSIP funds when available/feasible for priority safety related projects.**

**Reduce the rates of motor vehicle, bicycle, and pedestrian fatalities by incorporating engineering, enforcement, education, and emergency response into the planning process.** Planning products of the Old Colony Metropolitan Planning Organization will seek to recommended best planning and engineering practices and standards when addressing safety on the transportation system. Staff will continue to work with state and local partners on addressing vehicular, transit, pedestrian, and bicycle safety through planning, legislative, and law enforcement efforts.

**Support the increase and improvement of safety of services, vehicles, and facilities for transit, and for the transportation disadvantaged.** Staff will continue to work with Brockton Area Transit Authority (BAT) and other transit providers in the area, while the Old Colony Metropolitan Planning Organization through Old Colony Planning Council will provide planning, technical, and

operational assistance to transit providers in the common goal of providing and maintain safe service.

**Support the implementation of emergency response and evacuation plans in cooperation with emergency management agencies.** Emergency response and evacuation needs will be considered in all applicable planning efforts. Staff will work with stakeholders at the statewide, regional, and municipal levels to ensure the transportation network is able to accommodate response, evacuation, and recovery during regional emergencies. Furthermore, staff is committed to the following steps to prepare for emergencies and protect the viability of the transportation network:

**Increase partnership and participation by elementary and middle schools in the Safe Routes to School Program.** The Safe Routes to School program are a valuable asset for teaching safe walking and bicycling habits while **PROMOTING HEALTHY ALTERNATIVES FOR CHILDREN AND PARENTS IN THEIR TRAVEL TO AND FROM SCHOOL**. Staff will continue their partnership with MassDOT to provide technical support for Safe Routes to School and expand participation to local schools in the Old Colony Region.

## Chapter 10: Finance

The Bipartisan Infrastructure Law (BIL) regulations require that the Long-Range Transportation Plan include a financial component that demonstrates how the projects and improvements it identifies can be implemented while achieving financial constraint. The statutory language directs that the Plan be financially constrained to reasonably expected revenues. In addition, this chapter includes a description of federal and state funding programs, and highway and transit financing.

Historical data on transportation spending and allocation within the region are indicators of potential future spending levels. It is assumed that federal and state funding commitments will continue beyond the life of the BIL with future federal legislation and state legislation.

Regardless of the available funding during the implementation of the 2050 Long Range Transportation Plan, several pressing issues continue to face the region. They are as follows:

- The infrastructure preservation, maintenance, safety, security, and reliability need of the regional highway, bridge, and transit network continue to strain available funding. Such strain does not afford investment in regionally significant capacity enhancement and mobility projects.
- The percentage of the federal aid eligible pavement network categorized as in a state of good repair (pavement condition identified as excellent or good by the pavement management system), is declining.
- Extended transit service hours of operation, along with extensive and expanded system reach and coverage cannot be implemented in their entirety given existing funding levels.
- Evolving demographics, and continued growths of population, employment, and households will continue to stress the existing transportation systems and the access to essential services. Examples include the continued increase of medical transportation needs of the aging population.

### HISTORICAL SPENDING TRENDS

Estimating the amount of funds available in the future is an inexact science at best. One approach is to chart past funding experience and attempt to discern a trend. This trend could then be extrapolated to future years.

The potential issue with such an approach is that funding levels are not constant. The amount of funding available changed dramatically between 1991 and 1992 when ISTEA replaced its predecessor, the Surface Transportation and Uniform Relocation Assistance Act (STURAA). While there is no certain reason to think that similar changes in funding are likely at the end of the BIL legislation, that change illustrates the variability of the system and the tentativeness of any long-term financial projections.

In addition to uncertainties at the federal level, the future amount of funding that will be available from the state for transportation is indeterminate. State dollars for transportation

come from sources such as: gasoline tax, license/registration fees; bond proceeds, sales tax; tolls; fares; annual appropriation; and local assessment.

Table 10-1 summarizes both federal and non-federal highway and bridge construction spending, in constant dollars, in the Old Colony Region, from 2003 to 2022. The historical data illustrates that a total of approximately \$239.73 million dollars was spent in the twenty-year period averaging approximately \$11.563 million dollars annually.



**Table 10-1: Summary of Construction Spending in the Old Colony Region**

| <b>Year</b>           | <b>Sum of Advertised Project Amounts</b> |
|-----------------------|--|
| 2003                  | \$ 4,276,801                             |
| 2004                  | \$ 5,712,046                             |
| 2005                  | \$ 9,971,410                             |
| 2006                  | \$ 10,967,000                            |
| 2007                  | \$ 7,376,314                             |
| 2008                  | \$ 19,080,186                            |
| 2009                  | \$ 20,650,414                            |
| 2010                  | \$ 7,418,228                             |
| 2011                  | \$ 10,462,870                            |
| 2012                  | \$ 6,448,368                             |
| 2013                  | \$ 10,845,758                            |
| 2014                  | \$ 8,492,716                             |
| 2015                  | \$ 11,310,972                            |
| 2016                  | \$ 25,255,028                            |
| 2017                  | \$ 8,829,256                             |
| 2018                  | \$ 18,324,030                            |
| 2019                  | \$ 11,144,749                            |
| 2020                  | \$ 9,110,812                             |
| 2021                  | \$ 16,644,025                            |
| 2022                  | \$ 17,412,888                            |
| <b>Total</b>          | <b>\$ 239,733,871</b>                    |
| <b>Annual Average</b> | <b>\$ 11,562,714</b>                     |

*\*Dollars expressed in constant dollar amounts*

#### TRANSPORTATION FUNDING PROGRAMS

The transportation network is financed through federal and state revenue sources. These sources are described below.

#### Federal Funding

Massachusetts receives transportation funds from the federal government. The major sources are the Federal Highway Administration (FHWA), Federal Transit Administration (FTA) and the Federal Aviation Administration (FAA). The United States Congress authorizes funding for these transportation projects through federal legislation. For highways and mass transportation, the most recent authorization was the Bipartisan Infrastructure Law (BIL). Federal funding received from the BIL is allocated to different funding programs.

### Highway Funding Programs

- **National Highway Performance Program (NHPP)** provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.
- **National Freight Program (NFP) Program** provides financial assistance in the form of grants or credit assistance to nationally and regionally significant freight and highway projects that align with the program goals.
- **Surface Transportation Block Grant Program (STBG)** provides funds for roads (including NHS) that are not functionally classified as local or rural minor collectors. These roads are collectively referred to as federal-aid eligible roads. Bridge projects funded with STBG funds are not restricted to federal-aid roads but may be on any public road.
- **Congestion Mitigation and Air Quality Improvement Program (CMAQ)** directs funds toward transportation projects in Clean Air Act non-attainment areas for ozone and carbon monoxide. These projects will contribute to meeting the attainment of national ambient air quality standards. The state receives funds based on its share of the population of air quality non-attainment areas weighted by degree of air pollution.
- **Highway Safety Improvement Program (HSIP)** provides funds to reduce the number of fatal and injury crashes by targeting high crash locations. Projects using (HSIP) funding, are required, by MAP-21, the Federal Legislation, to be selected based on a data driven process.
- **Transportation Alternatives Program (TAP)** provides funds for a variety of alternative transportation projects, including many that were previously eligible activities under separately funded programs. The TAP replaces the funding from pre-MAP-21 programs including Transportation Enhancements, Recreational Trails, Safe Routes to School, and several other discretionary programs, wrapping them into a single funding source.
- **Bridge Replacement and Rehabilitation Program** provides funds for rehabilitation and replacement of any bridge on a public road. Bridges on the federal-aid system or off the federal-aid system are eligible for these funds.
- **Other Federal Aid** includes projects that received federal funding outside the federal-aid program. Funds in this category are generally approved as line items appended to various pieces of federal legislation. Projects in this category are generally intended to improve public safety within a specified region that might not qualify for funding through other sources.
- **Non-Federal Aid (NFA)** contains all projects not receiving federal funds. Various categories of state funding are included in this group such as bikeways, State Aid (Chapter 90), MassWorks, highway construction, and maintenance.

### Transit Funding Programs

- **49 U.S.C. Section 5307** provides capital, preventative maintenance, and operating assistance to transit systems in urbanized areas. MAP-21 expanded eligibility for using Urbanized Area Formula funds for operating expenses. Previously, only urbanized areas

with populations below 200,000 were eligible to use Federal transit funding for operating expenses. Now, transit systems in urbanized areas over 200,000 can use their formula funding for operating expenses if they operate no more than 100 buses. Activities eligible under the former Job Access and Reverse Commute (JARC) program, which focused on providing services to low-income individuals to access jobs, are now eligible under the Urbanized Area Formula program.

- **49 U.S.C. Section 5310** provides formula funding to increase the mobility of seniors and persons with disabilities. Funds are apportioned based on each State's share of the targeted populations and are now apportioned to both States (for all areas under 200,000) and large urbanized areas (over 200,000).
- **49 U.S.C. Section 5311** provides capital, planning, and operating assistance to support public transportation in rural areas, defined as areas with fewer than 50,000 residents. Funding is based on a formula that uses land area, population, and transit service.
- **49 U.S.C. Section 5339** provides funding to replace, rehabilitate, and purchase buses and related equipment, and to construct bus-related facilities.
- **Federal Highway Administration (FHWA) Ferry Boat Program (FBP)**

## MANAGEMENT & OPERATIONS CONSIDERATIONS

### System Level Estimate of Needs and Cost for Maintaining and Operating the Highway System

Given the limited funding, competing priorities, and the comprehensive list of transportation needs, it is crucial to maintain and operate the current system at optimal efficiency, in a safe manner, and in a state of good repair, and to achieve progress toward the attainment of performance targets. Also, various management and operation methodologies such as ITS, Transportation Demand Management strategies, Park and Ride Lots, Transit Signal Priority, and Corridor Management strategies such as traffic signal coordination will help the region obtain its goals of improving mobility, improving safety, reducing greenhouse gases, improving sustainability, and promoting economic development.

As such in order to develop a system level estimate of needs and cost for maintaining and operating the highway system, the Old Colony MPO has refined and updated its pavement management system (PMS) in keeping with the principles of objectives-driven, performance-based planning, and in fulfilling its goal of keeping the highway system in a state of good repair. A well-maintained system in good repair reduces delays (due to long reconstruction periods), enhances freight movement, improves economic vitality, and provides opportunities to implement Complete Streets strategies (improving the sidewalk and bicycle facilities network). The PMS calculates the rate of deterioration of pavement and the implications for the cost of repairs. It calculates a Pavement Condition Index (PCI) score between 0 and 100 for the surveyed road segments and recommends a repair and cost based on the PCI score. Each road or road segment is placed in a condition category based on the PCI. The condition categories include "Poor" PCI between 0 and 60, "Deficient" PCI between 61 and 72, "Fair" PCI between 73 and 85, "Good" PCI between 86 and 92, and "Excellent" PCI between 93 and 100.

The Old Colony MPO updates field inspections of the pavement surface every four years and supplements the data on an ongoing basis, as pavement reconstruction and resurfacing projects are completed on federal aid roads through the Old Colony Transportation Improvement Program. The repairs recommended by the PMS, based on the road condition, include five general default repair strategies.

Based on pavement condition surveys prepared by Old Colony MPO planning staff, the Old Colony MPO Pavement Management System (PMS) has determined the federal-aid eligible roadway network is in need of about \$210,000,000 of investment in various repairs (ranging from minor repairs to full depth reconstructions) in order to bring the system into a complete state of good repair (all roadways with Excellent or Good pavement condition). The is currently an estimated 200 million dollars in investment planned for Federal Fiscal Years 2020 through 2029.

#### HIGHWAY FUNDED PROJECTS AND INITIATIVES

##### Projected Revenue

The major source of funding for highway related projects is apportionments provided through the Federal Highway Administration (FHWA). These funds typically provide 80% of project funds, with the remaining 20% coming from state match. Federal funds are usually derived from gasoline tax revenues, and state funds from the Transportation Bond Bill that is funded with gasoline tax revenues and general tax funds.

The MassDOT Office of Transportation Planning has developed funding estimates for the 20 years of the Long-Range Transportation Plan. To supplement these estimates, reasonable estimates of Chapter 90 Allocations have been added to the MassDOT funding forecasts. Table 10-2 shows that based on that assumption and MassDOT's projections, the region can expect to receive approximately \$971,557,710 million for highway and bridges from FFY 2020 to FFY 2040. An estimated \$235,395,940 in Chapter 90 Funding is added to this estimate to arrive a grand total estimate of \$1,206,953,652. Furthermore, the estimated transit funding is \$438,821,090 for transit operations and capital investments as documented in Table 10-7.

**Table 10-2: 2024-2044 Estimated Highway and Bridge Funding**

|   | 2024 to 2028          | 2029 to 2033          | 2034 to 2038          | 2039 to 2043          | 2044                 | TOTAL                   |
|---|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|-------------------------|
| Interstate MassDOT Pavement                               | \$ 9,745,555          | \$ 10,346,117         | \$ 11,422,949         | \$ 12,611,859         | \$ 2,675,712         | \$ 46,802,190           |
| Non-Interstate MassDOT Pavement                           | \$ 16,223,345         | \$ 17,595,984         | \$ 19,427,388         | \$ 21,449,406         | \$ 4,550,671         | \$ 79,246,794           |
| Statewide Bridge  | \$ 45,766,379         | \$ 68,426,511         | \$ 75,548,397         | \$ 83,411,535         | \$ 17,696,457        | \$ 290,849,279          |
| Other (Remaining) Statewide Programs                      | \$ 44,445,500         | \$ 40,962,308         | \$ 62,225,848         | \$ 69,422,386         | \$ 14,829,402        | \$ 231,885,444          |
| Non-Federal Aid (NFA) Bridge Preservation                 | \$ 23,299,045         | \$ 25,099,688         | \$ 27,039,493         | \$ 29,129,213         | \$ 5,913,230         | \$ 110,480,670          |
| Regional Discretionary Funding                            | \$ 74,020,753         | \$ 88,398,848         | \$ 97,699,913         | \$ 108,007,392        | \$ 22,855,274        | \$ 390,982,181          |
| Chapter 90  | \$ 52,644,486         | \$ 61,096,075         | \$ 61,096,075         | \$ 65,817,824         | \$ 13,361,018        | \$ 254,015,478          |
| <b>Total Highway and Bridge Available for Programming</b> | <b>\$ 266,145,063</b> | <b>\$ 311,925,531</b> | <b>\$ 354,460,063</b> | <b>\$ 389,849,615</b> | <b>\$ 81,881,765</b> | <b>\$ 1,404,262,037</b> |

The funding estimates from the MassDOT Office of Transportation Planning are based on the following assumptions: Federal and state matching funding (core programs plus High Priority Project amounts) for the period of 2024-2028 reflect current allocations and are inflated one and half percent per year thereafter, beginning in 2025.

- Consistent with FHWA Statewide Transportation Improvement Program (STIP) guidance, \$50 million in redistributed obligation authority is assumed each year.
- Federal funding (Obligation authority and redistribution for unspent federal funds) and state match for the period of 2020-2024 reflect current Statewide Transportation Improvement Program allocations and funding.
- Beginning in 2025 and each year thereafter, funding is assumed to grow at a rate of 2.2% per year.
- Deductions for statewide items that cannot be allocated individually to the MPOs - Accelerated Bridge Program Grant Anticipation Notes repayments, Planning, and Extra Work Orders/Cost Adjustments - are taken from total available funding, leaving an amount of available federal funding to be allocated in the regional plans.
- Assumed funding for the National Highway Performance Program/ Interstate Maintenance Programs, the Federal Aid Bridge Program, and Infrastructure Maintenance mirrors the assumptions made for federal funding – 2020-2024 reflect Statewide Transportation Improvement Program amounts, and thereafter programs are adjusted by a rate of 2.2% per year.
- The Non-Federal Aid Program is based upon the existing program and held constant at current amounts for 2020-2024. Beginning in 2025 and thereafter, Non-federal aid funding is adjusted at a rate of 2.2% per year.

The funding available should be allocated to operating, maintaining, and improving the highway-funded transportation system. In addition to road projects, this may include bicycle, pedestrian, transportation alternatives, congestion mitigation and air quality, intelligent transportation systems, or any other program for which federal highway funding is expected to be used.

The FAST Act is not the sole source of funding for transportation projects in the Commonwealth. State funds are also a key component in the financing mix for highway projects. State funds are used to “match” federal dollars to pay for the state share of federally aided projects, to undertake other projects not eligible for federal funding, and to assist cities and towns in maintaining and improving local roadways (Chapter 90 funding). Beginning in 2025 and thereafter, Chapter 90 funding is adjusted at a rate of 1.5% per year.

Local funding has historically been used to help design and engineer highway projects. Many of these costs are reimbursable to the communities with Chapter 90 funds once the project has received final state and federal clearances.

#### Projected Expenses

The Old Colony region’s transportation system is an essential asset that contributes greatly to the economic well-being of the region as well as to the quality of life for the region’s residents. Updating and modernizing the system and conserving and enhancing existing highway capacity by utilizing resources in the most efficient and effective manner as possible requires a comprehensive approach in identifying specific improvement projects and strategies. The funding available has been allocated to operating, maintaining, and improving the highway and bridge transportation system. The following recommendations address the regions’ needs based on the planning process and continued cooperation on a regional basis including member communities, transportation agencies, and state agencies.

Old Colony’s strategies and projects, as well as its transportation review (MEPA) process, support and advance MassDOT policies and goals as outlined in its statutes, directives, guidelines, and standards. It is the intent of this plan to see that projects are developed and implemented in an equitable and timely manner based upon need, financial constraint, and in conformance with the MassDOT design standards, practices, and directives, as well as with local master plans, comprehensive plans, and consensus based on Old Colony’s public outreach program.

The Universe of Projects outlined in the Appendix was developed as a result of the planning process based on the continued cooperation between Old Colony, the general public, member communities, transportation agencies, and state agencies. At its core, it represents the collaborative effort to develop the needs of the Old Colony region.

Tables 10-3 and 10-4 list projects derived from the Universe of Projects that are recommended for implementation in the next ten years. Selection of these projects was based on the FFY 2020-2024 Old Colony Transportation Improvement Program, current design status, and demonstrated community support. Additionally, the result of these projects will help the Region achieve its goals, objectives, and performance targets. Funding for these projects is provided by the Regional Discretionary Funding Category.

**Table 10-3: Recommended Projects FFY 2024-2028**

| <u>FFY</u>  | <u>PROJECT ID#</u> | <u>PROJECT DESCRIPTION</u>  | <u>Cost Estimate</u> |
|---|--------------------|---|----------------------|
| 2024  | 607403             | STOUGHTON - CORRIDOR IMPROVEMENTS ON ROUTE 138 - YEAR 2   | \$2,664,192          |
| 2024  | 609052             | BROCKTON - ROUTE 123 (CENTRE STREET) AT PLYMOUTH STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENTS  | \$2,792,790          |
| 2024  | 409410             | BROCKTON- INTERSECTION IMPROVEMENTS AND RELATED WORK AT CENTRE STREET (ROUTE 123), CARY STREET AND LYMAN STREET   | \$2,506,679          |
| 2024  | 609435             | PLYMPTON-BRIDGE REPLACEMENT, WINNETUXET ROAD OVER WINNETUXET RIVER  | \$1,236,628          |
| 2025  | 607818             | BROCKTON- INTERSECTION IMPROVEMENTS AT LYMAN STREET/GROVE STREET/SUMMER STREET & REPLACEMENT OF GROVE STREET BRIDGE, B-25-005, OVER SALISBURY PLAIN RIVER | \$4,368,000          |
| 2025  | 608195             | EASTON- CORRIDOR IMPROVEMENTS ON ROUTE 138 INCLUDING INTERSECTION IMPROVEMENTS AT ROUTE 138 (WASHINGTON STREET) AND ELM STREET                            | \$7,181,554          |
| 2026  | 606002             | KINGSTON- DUXBURY- INTERSECTION IMPROVEMENTS AT ROUTE 3 RAMPS (NB/SB) AND ROUTE 3A (TREMONT STREET)   | \$2,592,000          |
| 2026  | 609440             | ABINGTON- INTERSECTION IMPROVEMENTS AT HANCOCK STREET AND CHESTNUT STREET   | \$5,182,715          |
| 2026  | 611979             | STOUGHTON- INTERSECTION IMPROVEMENTS AT CANTON STREET (ROUTE 27), SCHOOL STREET AND SUMMER STREET   | \$4,050,000          |
| 2027  | 608506             | HANSON- CORRIDOR IMPROVEMENTS ON ROUTE 14 (MAQUAN STREET), FROM THE PEMBROKE T.L. TO INDIAN HEAD STREET AND RELATED WORK                                  | \$11,548,342         |
| 2027  | 612525             | ABINGTON- INTERSECTION IMPROVEMENTS, RANDOLPH STREET AND RICHARD A FITTS DRIVE (ROUTE 139) AT CHESTNUT STREET AND OLD RANDOLPH STREET                     | \$4,241,020          |
| 2027  | 612006             | DUXBURY- BRIDGE REPLACEMENT, D-14-003 (438), POWDER POINT AVENUE OVER DUXBURY BAY   | \$78,568,000         |
| 2028  | 612262             | BROCKTON- INTERSECTION IMPROVEMENTS AT ROUTE 123 (BELMONT STREET), PEARL STREET AND STONEHILL STREET  | \$8,659,085          |
| 2028  | 612769             | HANOVER- CORRIDOR IMPROVEMENTS ON ROUTE 139 (HANOVER STREET) AT MAIN STREET, CENTER STREET AND SILVER STREET  | \$7,141,835          |
| 2028  | 608615             | KINGSTON- BRIDGE REPLACEMENT, K-01-014, SMITHS LANE OVER ROUTE 3 (PILGRIM HIGHWAY)  | \$14,834,080         |
| 2028  | 611981             | STOUGHTON- INTERSECTION IMPROVEMENTS AT CANTON STREET (ROUTE 27), SCHOOL STREET AND SUMMER STREET   | \$2,668,000          |
| 2028  | 612770             | ABINGTON- INTERSECTION IMPROVEMENTS AT ROUTE 18 (BEDFORD STREET) AND ROUTE 123(BROCKTON AVENUE)   | \$6,248,949          |
| TOTAL PROGRAMMED IN YEAR OF EXPENDITURE DOLLARS (ESTIMATED):                              |                    |   | \$166,483,869        |
| TOTAL REGIONAL FUNDING AVAILABLE (INCLUDES \$35 M IN PROJECT SPECIFIC STATEWIDE FUNDING): |                    |   | \$215,272,989        |

**Table 10-4: Recommended Projects FFY 2029-2033**

| <u>FFY</u>   | <u>PROJECT ID#</u> | <u>PROJECT DESCRIPTION</u>   | <u>COST ESTIMATE</u> |
|--|--------------------|--|----------------------|
| 2029-2033  | 606143             | BROCKTON- INTERSECTION IMPROVEMENTS AT CRESCENT STREET (ROUTE 27)/QUINCY STREET/MASSASOIT BOULEVARD  | \$6,360,960          |
| 2029-2033  | 612526             | BROCKTON - FOREST AVENUE CORRIDOR (MAIN STREET TO BELMONT STREET)  | \$10,534,260         |
| 2029-2033  | 612269             | DUXBURY- INTERSECTION IMPROVEMENTS AT ROUTE 53 AND FRANKLIN STREET   | \$8,734,980          |
| 2029-2033  | 619968             | EAST BRIDGEWATER - INTERSECTION IMPROVEMENTS AT BEDFORD STREET (ROUTE 18), WEST STREET (ROUTE 106) AND EAST STREET                                   | \$4,200,000          |
| 2029-2033  | 6116976            | EAST BRIDGEWATER - INTERSECTION IMPROVEMENTS AT HIGHLAND STREET AND NORTH BEDFORD STREET (ROUTE 18)  | \$4,200,000          |
| 2029-2033  | 608585             | EASTON - RESURFACING AND RELATED WORK ON ROUTE 138 (ROOSEVELT CIRCLE TO STOUGHTON TOWN LINE (EXCLUDING THE SECTION FROM ELM STREET TO UNION STREET)) | \$5,196,288          |
| 2029-2033  | 612975             | EASTON - INTERSECTION IMPROVEMENTS AT ROUTE 138 AND TURNPIKE STREET, AT ROUTE 138 AND PURCHASE STREET, AT TURNPIKE STREET AND PURCHASE STREET        | \$8,914,350          |
| 2029-2033  | PRE-PRC            | PLYMOUTH - IMPROVEMENTS AT ROUTE 3A (STATE ROAD) AND HERRING POND ROAD AND ROUTE 3A (STATE ROAD) AT HEDGES POND ROAD                                 | \$7,500,000          |
| TOTAL PROGRAMMED IN YEAR OF EXPENDITURE DOLLARS (ESTIMATED): |                    |  | \$55,640,838         |
| TOTAL REGIONAL FUNDING TARGET (FORECAST):                    |                    |  | \$88,398,848         |

Beyond 2029, the available Regional Discretionary Funding shall continue to be towards operating, maintaining, and improving the highway and bridge transportation.



**Table 10-5: 2024-2044 Operations and Maintenance, and Major Infrastructure Projects**

|   | 2024 to 2028          | 2029 to 2033          | 2034 to 2038          | 2039 to 2043          | 2044                 | TOTAL                   |
|---|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|-------------------------|
| Interstate MassDOT Pavement                               | \$ 489,885            | \$ 618,593            | \$ 759,552            | \$ 841,850            | \$ 179,060           | \$ 2,888,940            |
| Non-Interstate MassDOT Pavement                           | \$ 21,524,079         | \$ 25,621,853         | \$ 31,460,316         | \$ 34,869,066         | \$ 7,416,582         | \$ 120,891,896          |
| Statewide Bridge  | \$ 30,706,903         | \$ 34,931,389         | \$ 42,891,221         | \$ 47,538,518         | \$ 10,111,350        | \$ 166,179,380          |
| Other (Remaining) Statewide Programs                      | \$ 51,176,632         | \$ 57,514,877         | \$ 70,620,819         | \$ 78,272,639         | \$ 16,648,438        | \$ 274,233,405          |
| Non-Federal Aid (NFA) Bridge Preservation                 | \$ 22,797,500         | \$ 23,299,045         | \$ 23,811,624         | \$ 24,335,480         | \$ 4,974,172         | \$ 99,217,821           |
| Regional Discretionary Funding                            |                       |                       |                       |                       |                      |                         |
| Recon/Resurf/Rehab (Fed-Aid Roads)                        | \$ 35,000,000         | \$ 40,250,000         | \$ 49,507,500         | \$ 54,953,325         | \$ 11,540,198        | \$ 191,251,023          |
| Intersection Improvements/Safety                          | \$ 8,000,000          | \$ 9,200,000          | \$ 11,316,000         | \$ 12,560,760         | \$ 2,837,760         | \$ 43,914,520           |
| Traffic Flow and Mobility Improvements                    | \$ 8,500,000          | \$ 9,775,000          | \$ 12,023,250         | \$ 13,345,808         | \$ 2,840,798         | \$ 46,484,855           |
| Infrastructure (Signage, Guardrails, Etc.)                | \$ 2,000,000          | \$ 2,300,000          | \$ 2,829,000          | \$ 3,140,190          | \$ 659,440           | \$ 10,928,630           |
| Transportation Alternatives Program Projects (Bicycle and | \$ 3,077,467          | \$ 3,341,664          | \$ 3,972,111          | \$ 4,277,686          | \$ 898,314           | \$ 15,567,242           |
| Ongoing Recon/Resurf/Rehab (Local Roads) Chapter 90       | \$ 50,728,920         | \$ 53,057,894         | \$ 57,158,421         | \$ 61,575,852         | \$ 12,874,853        | \$ 235,395,940          |
| <b>Total Project Expenses</b>                             | <b>\$ 234,001,386</b> | <b>\$ 259,910,315</b> | <b>\$ 306,349,813</b> | <b>\$ 335,711,173</b> | <b>\$ 70,980,965</b> | <b>\$ 1,206,953,652</b> |
| <b>Total Available Capital Funding</b>                    | <b>\$ 234,001,386</b> | <b>\$ 259,910,315</b> | <b>\$ 306,349,813</b> | <b>\$ 335,711,173</b> | <b>\$ 70,980,964</b> | <b>\$ 1,206,953,652</b> |

**Regionally Significant Illustrative Highway Projects**

Located in Table 10-6, and as identified in Chapter 4 - The Regional Highway System, regionally significant highway projects have been identified that would, if implemented, expand and complement the existing transportation network. Currently, funding for these projects is not included in the financial plan. Nevertheless, these are recommended for further study.

**Table 10-6 Regionally Significant Illustrative Highway Projects**

| Project   | Cost Estimate    |
|---|------------------|
| Bridgewater - Route 24 Northbound On Ramp From Route 104 Westbound  | \$7,500,000      |
| Plymouth - Route 3 Exit 2 Herring Pond Road Capacity Enhancement, Signalization, and Geometric Improvements | \$10,000,000     |
| Plymouth - State Road (Route 3A) at Herring Pond Road Signalization and Geometric Improvements              | \$3,000,000      |
| Plymouth - State Road (Route 3A) Corridor Improvements Fire Station to Herring Pond Road)                   | \$3,500,000      |
| Plymouth - Route 3 Exit 5 Interchange Improvements and Long Pond Road Bridge Capacity Enhancement           | \$30,000,000     |
| Plymouth - Route 3 Northbound Exit 4 Off-ramp to Plimouth Plantation Highway                                | \$7,500,000      |
| Plymouth - Route 3 Exit 3 Full Interchange  | \$30,000,000     |
| Plymouth - Route 25 Interchange at Bourne Road  | \$25,000,000     |
| Plymouth - Carver Road Corridor Improvements (Summer Street to Town Line)                                   | \$20,835,000     |
| Plymouth - Federal Furnace Road Corridor Improvements (Summer Street to Town Line)                          | \$23,025,000     |
| Plymouth - South Meadow Road Corridor Improvements Federal Furnace Road to Town Line)                       | \$13,203,000     |
| West Bridgewater - Route 106 Capacity Enhancement (Route 24 to Route 28)                                    | \$15,000,000     |
| Region - Route 3 Capacity Enhancement from Route 18 (Weymouth) to Long Pond Road (Plymouth)                 | To be determined |
| Region - Route 24 Capacity Enhancement and Upgrade to Interstate Standards                                  | To be determined |

**TRANSIT FUNDED PROJECTS AND INITIATIVES**

Projected Revenue

Transit operations and capital projects are typically financed with a combination of federal, state, and local funds.

*Federal*

Brockton Area Transit Authority (BAT) receives the vast majority of its federal capital and operating assistance through the 49 U.S.C Section 5307 funding program. These formula grants are distributed annually on a percentage basis. In addition to funds from 49 Section 5307 of the United States Code. Estimated Federal funding for transit is outlined on Table 10-7.

*State*

The Commonwealth provides the Brockton Area Transit Authority (BAT) with financial assistance (through transportation bond issues and annual appropriations).

Annually, under the Community Transit Grant / Mobility Assistance Program (MAP), BAT typically requests 5-7 accessible mini-buses and vans each year, as part of their state of good repair and system preservation program.

*Local*

Communities within the Brockton Area Transit Authority (BAT) service area are assessed annually for transportation services.

*Direct Income*

Farebox revenues generate direct income. The MassDOT developed revenue estimates for the 20 years of the Long-Range Transportation Plan. To supplement these estimates, reasonable estimates of farebox, revenue, State Contract Assistance, and Community Transit Grant Program were added to the Massachusetts Department of Transportation revenue forecasts.

Table 10-7 provides a listing of the estimated available transit funding through the year 2040.

**Table 10-7: 2024-2044 Estimated Transit Funding**

|   | 2024 to 2028  | 2029 to 2033   | 2034 to 2038   | 2039 to 2043   | 2044          | Total          |
|---|---------------|----------------|----------------|----------------|---------------|----------------|
| 49 U.S.C. Section 5307  | \$ 18,346,900 | \$ 20,455,833  | \$ 22,807,183  | \$ 25,428,815  | \$ 5,426,292  | \$ 92,465,024  |
| State Contract Assistance   | \$ 39,331,671 | \$ 42,371,380  | \$ 45,646,010  | \$ 49,173,716  | \$ 10,281,699 | \$ 186,804,475 |
| Local Assessment  | \$ 17,081,035 | \$ 18,401,126  | \$ 19,823,239  | \$ 21,355,258  | \$ 4,465,156  | \$ 81,125,814  |
| Farebox Revenue   | \$ 16,213,890 | \$ 17,466,964  | \$ 18,816,881  | \$ 20,271,125  | \$ 4,238,476  | \$ 77,007,336  |
| Statewide Programs for all Eligible Participants                        |               |                |                |                |               |                |
| Community Transit Grant Program (Estimated AAA, BAT, and SSCAC Portion) | \$ 6,371,651  | \$ 6,864,078   | \$ 7,394,562   | \$ 7,966,043   | \$ 1,665,615  | \$ 30,261,948  |
|   | \$ 97,345,147 | \$ 105,559,381 | \$ 114,487,874 | \$ 124,194,957 | \$ 26,077,238 | \$ 467,664,597 |

The estimates from the MassDOT are based on the following assumptions: Federal Program increases 2.08% each year from current levels to adjust for inflation. State Contract Assistance, local assessment, and farebox revenue, annual increases of 1.5% from current levels were utilized to adjust for inflation.

Projected Expenses

The funding available has been allocated to operating, maintaining, and improving the transit transportation system.

**Table 10-8: 2024-2044 Transit Operations and Capital Projects**

|  |                      |                      |                       |                       |                      |                      |
|--|----------------------|----------------------|-----------------------|-----------------------|----------------------|----------------------|
| 49 U.S.C. Section 5307   | \$ 16,856,133        | \$ 18,683,631        | \$ 20,709,259         | \$ 22,954,501         | \$ 4,881,303         | \$ 84,084,827        |
| State Contract Operating Assistance                                      | \$ 37,057,680        | \$ 39,921,646        | \$ 43,006,950         | \$ 46,330,700         | \$ 9,687,255         | \$176,004,230        |
| BAT Fixed Route Bus Replacement, Hybrid Replacements, Technologies, AVL, | \$ 12,812,800        | \$ 14,091,926        | \$ 19,162,039         | \$ 25,767,608         | \$ -                 | \$ 71,834,373        |
| BAT Intermodal Transportation Centre Improvements                        | \$ 500,000           | \$ 1,000,000         | \$ 1,250,000          | \$ 1,500,000          | \$ 2,150,000         | \$ 6,400,000         |
| BAT Ongoing Paratransit Bus Replacement                                  | \$ 3,109,600         | \$ 3,367,556         | \$ 5,853,066          | \$ 4,415,113          | \$ 2,666,159         | \$ 19,411,494        |
| SSAC Ongoing Vehicle Replacement   | \$ 2,230,800         | \$ 3,175,124         | \$ 3,863,024          | \$ 4,699,959          | \$ 1,184,959         | \$ 15,153,866        |
| <b>Total Operating and Project Expenses</b>                              | <b>\$ 72,567,013</b> | <b>\$ 80,239,882</b> | <b>\$ 93,844,338</b>  | <b>\$ 105,667,881</b> | <b>\$ 20,569,676</b> | <b>\$372,888,790</b> |
| <b>Total Available Operating and Capital Funding</b>                     | <b>\$ 91,545,831</b> | <b>\$ 99,145,648</b> | <b>\$ 107,389,703</b> | <b>\$ 116,333,957</b> | <b>\$ 24,405,950</b> | <b>\$438,821,090</b> |

**FISCAL CONSTRAINT ANALYSIS**

Roadway, bridge operations and maintenance, as well as capital improvements, outlined in the Long-Range Transportation Plan, are estimated to cost approximately \$1.2 billion dollars as shown in Table 10-5 for the 20-year period (2020 to 2040). Additionally, transit operations and maintenance, as well as capital improvements, outlined in the Long-Range Transportation Plan, are estimated to cost approximately \$439 million dollars as shown in Table 10-8 for the 20-year period (2020 to 2040). In order to have a financially constrained plan, resources of an equal amount must be identified.

The funding available has essentially been allocated to operating, maintaining, and modernizing the highway, bridge and transit transportation system. Large scale capacity enhancement projects are not included for funding with the financial plan of this Long-Range Transportation Plan.

The financial capacity from federal, state, and local sources has been examined by comparing projected revenues to transportation needs as outlined in Tables 10-5 and 10-8. As a result, the Old Colony MPO concludes that the 2020 Long Range Transportation Plan is financially constrained according to the definition in the Federal Register 23 CFR Part 450.

It is noted that the Regionally Significant Illustrative Projects listed in Table 10-6 and 10-9 are identified as capacity enhancement and mobility needs of the region and are recommended for study and specific funding is not programmed in the 2020 Long Range Transportation Plan.

**CONCLUSIONS AND RECOMMENDATIONS**

**Provide funding to preserve, operate, and maintain transportation assets for current and future generations.**

**Invest in infrastructure to meet performance measures and targets for PM1 - Safety, PM2 - NHS Bridge and Pavement, PM3 - System Reliability, and Transit Asset Management**

**Adequately maintain and preserve all elements of the transportation system in a state of good repair to protect the public's mobility, safety, and security.**

**Increase the efficiency and reliability of the transportation system using appropriate methods and technologies.**

**Invest and provide comparable transportation access and service quality across the region regardless of income level or minority population.**

**Provide adequate funding to ensure that the transportation system and its users are safe and secure.**

**Support the increase of the annual Chapter 90 statewide total amount to at least \$300 million.**

**Assist communities in preparing and updating their road inventories to ensure that they reflect accurate mileage amounts for publicly accepted roads.**

**Continue to review, develop, and analyze supplemental funding resources.** Such resources could include increased user fees, transit mitigation banks, and concurrency management systems. Concurrency is the growth management concept intended to ensure that the necessary public facilities are available concurrent with the impacts of development.

**Implement fare and revenue policies that increase with inflation.**

**Establish and dedicate transit funding from sources that increase with inflation.**

**Support congestion improvements and the reward for regional approaches to coordinating and interconnecting signalized intersections and corridors.**

**Support and enhance asset management capabilities to perform the appropriate type of improvement at the right time.**

**Support the establishment of an RTA service fund to restore and enhance service.**

## Chapter 11 – Concussion, Potential Planning Scenarios, and Recommendations

This Long Range Transportation Plan has documented that the region will face challenges as it grows and develops over the next twenty-five years. Infrastructure preservation, maintenance, safety, security, and reliability needs of the transportation network continue to strain resources and available funding sources. It is crucial that all agencies and organizations responsible for overseeing the transportation network anticipate these challenges and plan for them accordingly.

This chapter contains recommended strategies, actions, programs, and projects will guide regional planners in planning for the transportation needs of residents, commerce, industry, government, and services over the next twenty-five years.

### PLANNING SCENARIOS

Several factors will determine how transportation planning efforts and transportation investment is guided as we move through 2050. Historically, the gap between regional transportation needs and available financial resources has continued to widen. The future of transportation finance will have a major influence on how transportation resources are allocated.

While transportation finance is a primary factor in determine how investments are directed, socioeconomic and demographic factors will also determine the future of transportation planning. For instance, as the population gets older, there will be a growing need for paratransit, ride hailing, and human services transportation to ensure the population has daily access to essential life services. The mores and desired needs of younger generations will also guide future planning and policy. Will younger generations continue to purchase fewer automobiles and single-family homes than their parents and grandparents did? How will the advent of autonomous vehicles affect our communities?

Chapter 3 of this Plan assessed six scenario areas that will effect how the region grows through 2050, and these scenarios will play a role in how projects and strategies from this LRTP are implemented. It should be noted that these scenarios are not necessarily an “all or nothing” scenario, but rather may be a mix of priorities from two of more scenarios.

RECOMMENDED HIGHWAY PROJECTS FFY 2024 – FFY 20208

The following projects in Table 11-2 are recommended for programming in the Old Colony Transportation Improvement Program (TIP) for Federal Fiscal Years 2024 through 2028.

**Table 11-2: Recommended Highway Projects FFY 2024 – FFY 2028**

| <u>FFY</u>  | <u>PROJECT ID#</u> | <u>PROJECT DESCRIPTION</u>  | <u>Cost Estimate</u> |
|---|--------------------|---|----------------------|
| 2024  | 607403             | STOUGHTON - CORRIDOR IMPROVEMENTS ON ROUTE 138 - YEAR 2   | \$2,664,192          |
| 2024  | 609052             | BROCKTON - ROUTE 123 (CENTRE STREET) AT PLYMOUTH STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENTS  | \$2,792,790          |
| 2024  | 409410             | BROCKTON- INTERSECTION IMPROVEMENTS AND RELATED WORK AT CENTRE STREET (ROUTE 123), CARY STREET AND LYMAN STREET   | \$2,506,679          |
| 2024  | 609435             | PLYMPTON-BRIDGE REPLACEMENT, WINNETUXET ROAD OVER WINNETUXET RIVER  | \$1,236,628          |
| 2025  | 607818             | BROCKTON- INTERSECTION IMPROVEMENTS AT LYMAN STREET/GROVE STREET/SUMMER STREET & REPLACEMENT OF GROVE STREET BRIDGE, B-25-005, OVER SALISBURY PLAIN RIVER | \$4,368,000          |
| 2025  | 608195             | EASTON- CORRIDOR IMPROVEMENTS ON ROUTE 138 INCLUDING INTERSECTION IMPROVEMENTS AT ROUTE 138 (WASHINGTON STREET) AND ELM STREET                            | \$7,181,554          |
| 2026  | 606002             | KINGSTON- DUXBURY- INTERSECTION IMPROVEMENTS AT ROUTE 3 RAMPS (NB/SB) AND ROUTE 3A (TREMONT STREET)   | \$2,592,000          |
| 2026  | 609440             | ABINGTON- INTERSECTION IMPROVEMENTS AT HANCOCK STREET AND CHESTNUT STREET   | \$5,182,715          |
| 2026  | 611979             | STOUGHTON- INTERSECTION IMPROVEMENTS AT CANTON STREET (ROUTE 27), SCHOOL STREET AND SUMMER STREET   | \$4,050,000          |
| 2027  | 608506             | HANSON- CORRIDOR IMPROVEMENTS ON ROUTE 14 (MAQUAN STREET), FROM THE PEMBROKE T.L. TO INDIAN HEAD STREET AND RELATED WORK                                  | \$11,548,342         |
| 2027  | 612525             | ABINGTON- INTERSECTION IMPROVEMENTS, RANDOLPH STREET AND RICHARD A FITTS DRIVE (ROUTE 139) AT CHESTNUT STREET AND OLD RANDOLPH STREET                     | \$4,241,020          |
| 2027  | 612006             | DUXBURY- BRIDGE REPLACEMENT, D-14-003 (438), POWDER POINT AVENUE OVER DUXBURY BAY   | \$78,568,000         |
| 2028  | 612262             | BROCKTON- INTERSECTION IMPROVEMENTS AT ROUTE 123 (BELMONT STREET), PEARL STREET AND STONEHILL STREET  | \$8,659,085          |
| 2028  | 612769             | HANOVER- CORRIDOR IMPROVEMENTS ON ROUTE 139 (HANOVER STREET) AT MAIN STREET, CENTER STREET AND SILVER STREET  | \$7,141,835          |
| 2028  | 608615             | KINGSTON- BRIDGE REPLACEMENT, K-01-014, SMITHS LANE OVER ROUTE 3 (PILGRIM HIGHWAY)  | \$14,834,080         |
| 2028  | 611981             | STOUGHTON- INTERSECTION IMPROVEMENTS AT CANTON STREET (ROUTE 27), SCHOOL STREET AND SUMMER STREET   | \$2,668,000          |
| 2028  | 612770             | ABINGTON- INTERSECTION IMPROVEMENTS AT ROUTE 18 (BEDFORD STREET) AND ROUTE 123(BROCKTON AVENUE)   | \$6,248,949          |
| TOTAL PROGRAMMED IN YEAR OF EXPENDITURE DOLLARS (ESTIMATED):                              |                    |   | \$166,483,869        |
| TOTAL REGIONAL FUNDING AVAILABLE (INCLUDES \$35 M IN PROJECT SPECIFIC STATEWIDE FUNDING): |                    |   | \$215,272,989        |

RECOMMENDED HIGHWAY PROJECTS FFY 2029-2033

The following projects in Table 11-3 are recommended for programming in the Old Colony Transportation Improvement Program (TIP) for Federal Fiscal Years 2029 through 2033.

**Table 11-3: Recommended Highway Projects FFY 2029 – FFY 2033**

| FFY  | PROJECT ID# | PROJECT DESCRIPTION  | COST ESTIMATE |
|--|-------------|--|---------------|
| 2029-2033  | 606143      | BROCKTON- INTERSECTION IMPROVEMENTS AT CRESCENT STREET (ROUTE 27)/QUINCY STREET/MASSASOIT BOULEVARD  | \$6,360,960   |
| 2029-2033  | 612526      | BROCKTON - FOREST AVENUE CORRIDOR (MAIN STREET TO BELMONT STREET)  | \$10,534,260  |
| 2029-2033  | 612269      | DUXBURY- INTERSECTION IMPROVEMENTS AT ROUTE 53 AND FRANKLIN STREET   | \$8,734,980   |
| 2029-2033  | 619968      | EAST BRIDGEWATER - INTERSECTION IMPROVEMENTS AT BEDFORD STREET (ROUTE 18), WEST STREET (ROUTE 106) AND EAST STREET                                   | \$4,200,000   |
| 2029-2033  | 6116976     | EAST BRIDGEWATER - INTERSECTION IMPROVEMENTS AT HIGHLAND STREET AND NORTH BEDFORD STREET (ROUTE 18)  | \$4,200,000   |
| 2029-2033  | 608585      | EASTON - RESURFACING AND RELATED WORK ON ROUTE 138 (ROOSEVELT CIRCLE TO STOUGHTON TOWN LINE (EXCLUDING THE SECTION FROM ELM STREET TO UNION STREET)) | \$5,196,288   |
| 2029-2033  | 612975      | EASTON - INTERSECTION IMPROVEMENTS AT ROUTE 138 AND TURNPIKE STREET, AT ROUTE 138 AND PURCHASE STREET, AT TURNPIKE STREET AND PURCHASE STREET        | \$8,914,350   |
| 2029-2033  | PRE-PRC     | PLYMOUTH - IMPROVEMENTS AT ROUTE 3A (STATE ROAD) AND HERRING POND ROAD AND ROUTE 3A (STATE ROAD) AT HEDGES POND ROAD                                 | \$7,500,000   |
| TOTAL PROGRAMMED IN YEAR OF EXPENDITURE DOLLARS (ESTIMATED): |             |  | \$55,640,838  |
| TOTAL REGIONAL FUNDING TARGET (FORECAST):                    |             |  | \$88,398,848  |

IDENTIFIED REGIONAL HIGHWAY NEEDS (ILLUSTRATIVE ONLY)

The projects listed in Table 11-4 are projects that have been identified as regional highway needs for regional mobility and economic vitality. However, these projects are conceptual only in scope, and do not have identified funding associated with them and are therefore included in this Long Range Transportation Plan as informative and illustrative only at this point.



**Table 11-4: Identified Regional Highway Needs**

| Project   | Cost Estimate    |
|---|------------------|
| Bridgewater - Route 24 Northbound On Ramp From Route 104 Westbound  | \$7,500,000      |
| Plymouth - Route 3/ Route 3A Exit 2 State Road and Herring Pond Road and Hedges Pond Road Capacity Enhancement, Signalization, and Geometric Improvements | \$10,000,000     |
| Plymouth - Route 3 Exit 5 Interchange Improvements and Long Pond Road Bridge Capacity Enhancement   | \$30,000,000     |
| Plymouth - Route 3 Northbound Exit 4 Off-ramp to Plimouth Plantation Highway  | \$7,500,000      |
| Plymouth - Route 3 Exit 3 Full Interchange  | \$30,000,000     |
| Plymouth - Route 25 Interchange at Bourne Road  | \$25,000,000     |
| West Bridgewater - Route 106 Capacity Enhancement (Route 24 to Route 28)  | \$15,000,000     |
| Region - Route 3 Capacity Enhancement from Route 18 (Weymouth) to Long Pond Road (Plymouth)   | To be determined |
| Region - Route 24 Capacity Enhancement and Upgrade to Interstate Standards  | To be determined |

REGIONAL PROFILE AND LIVABILITY RECOMMENDATIONS

**Support “Complete Streets” Design In All Roadway Projects:** Complete Streets are roadways that are designed to support safe, attractive, and comfortable access to all users, including motorists, pedestrians, bicyclists, and transit users. In addition to enhancing safety and mobility, “Complete Street” designed roadways often enhance the surrounding community and environment through traffic calming techniques and vegetated streetscapes. Complete Streets are categorized by wide paved shoulders or separate bicycling lanes; sidewalks separated from the roadway by raised curbing and/or vegetation; well-placed and well-designed crosswalks; raised medians providing crossing refuge; and bulb-outs at intersections to prevent high-speed turning vehicles and shorten crossing distance for pedestrians.

**Support the expansion and enhancement of passenger rail service in the region and improved connections to other regions:** Having multiple transportation alternatives is a major aspect of livability. Developing policies that ensure equitable distribution of burdens and support multi-modalism in compact development is a way to develop self-sustainable communities. It is vital that citizens, as well as engineers, developers, planners and policy makers, understand the role that land-use/transportation planning and day-to-day development decisions have on building quality communities and ensuring equity at the same time.

**Support transportation projects that facilitate access to employment and shopping centers, health care, and educational facilities:** These projects may include increasing capacity or resurfacing roads, improving safety and traffic flow at intersections, purchasing new vehicles and

expanding service by the region's transit authorities, improving bicycle and pedestrian facilities, and enhancing train stations and intermodal facilities.

**Support the Commonwealth's Sustainable Development Principles:** The State has developed these principles to concentrate development and mix uses, advance equity, make efficient decisions, protect land and ecosystems, use natural resources wisely, expand housing opportunities, provide transportation choice, increase job and business opportunities, promote clean energy, and plan regionally.

**Use traffic calming techniques to protect neighborhoods in mixed use areas:** Implementing traffic calming techniques will provide a safer travel environment for all users. Some traffic calming techniques include roundabouts, traffic circles, raised medians, road humps, speed tables, and rumble strips. The narrowing of lanes and the widening of sidewalks is another traffic calming technique that eases crossing for pedestrian and gives them more space to walk.

**Support MassDOT's Healthy Active Transportation Policy Directive:** The Healthy Transportation Policy Directive was issued to ensure all MassDOT projects are designed and implemented in a way that all customers have access to safe and comfortable healthy transportation options at all MassDOT facilities and in all the services MassDOT provides. Healthy transportation modes as defined as walking, bicycling and taking transit.

**Continue to screen all projects for benefits and burdens analysis as it pertains to minority populations and low-income populations.** All Old Colony MPO programs and activities, along with transportation projects funded through the Transportation Improvement Program (TIP), will continue to undergo thorough and comprehensive screening to determine benefits and burdens to minority populations and low-income populations. Efforts will be made to target investments that benefit areas with low-income and/or minority populations, ensuring these populations have access to essential life services, and avoiding or mitigating disproportionately high and adverse human health and environmental effects, including social and economic effects on these populations.

**Eliminate barriers to participation in the decision making process.** The Old Colony Metropolitan Planning Organization will continue to take steps to eliminate barriers to participation in the transportation planning and decision making process. These efforts will include providing upon request translation services to those with limited English proficiency, hearing assistance devices, and large font and translation services for all print materials.

**Support livability and sustainable development initiatives and planning policy that enable the population to choose alternatives to personal, single occupant vehicles for daily trips and subsequently aid in achieving mode shift goals.** Comprehensive regional planning and transportation planning activities through the Old Colony Metropolitan Planning Organization will continue to incorporate principles that encourage livability and sustainable development, such as those listed in the Commonwealth's 10 Sustainable Development Principles. Future new development and redevelopment of existing facilities must be conducted in a responsible

manner that fosters improved connections and a reduction on reliance of the personal automobile for daily trips.

**Enhance planning efforts to plan for the transportation needs of an aging population.**

Transportation planning activities will incorporate the needs of elderly and disabled populations, including ensuring access to essential life services. Efforts will be made to increase and improve coordination between transportation planners and agencies reserving and representing the needs of the elderly and disabled.

**Foster Healthy Communities and Neighborhoods By Supporting The Healthy Transportation Compact (HTC).** Healthy communities and neighborhoods can be achieved through supporting these State initiatives on the local level within the region.

**Increase transit accessibility to underserved, employment centers.** Efforts will be made that may enable extending fixed-route and demand response transit service to employment centers such as industrial parks and major commercial developments. Existing industrial areas and other employment centers whose locations and configuration allow the feasibility for expanded transit options will be encouraged as locations for future development and redevelopment.

**Support a Vibrant Downtown Plymouth and Waterfront Area, Including an Intermodal Transportation Center:** Support increased commuter rail service to the Plymouth Station at Cordage Park, and connections between the station and the Waterfront/Downtown Area including enhanced pedestrian and bicycle connections featuring extension of the Plymouth Seaside Trail, in addition to supporting existing transit connections between Cordage Park and the Waterfront. An intermodal transportation hub located within the Waterfront/Downtown area could greatly improve mobility and accessibility in the area, as well as support surrounding economic development.

## REGIONAL HIGHWAY RECOMMENDED PLANNING STRATEGIES

### ***Collaboratively Develop the Needs of the Old Colony Region***

In order to develop a comprehensive needs assessment for the region, all stakeholders must have an active role in the discussion. Ultimately, those identified needs evolve into projects which are meant to improve particular issues. Project need and the scope of a project are developed through the 3C's Process, (Continuing, Comprehensive, and Cooperative), led by the Old Colony Joint Transportation Committee, with oversight from the Old Colony Metropolitan Planning Organization (MPO).

Old Colony's development of strategies and projects, as well as its transportation review (MEPA) process, supports and advances MassDOT policies and goals as outlined in its statutes, directives, guidelines, and standards. It is the intent of this plan to see that projects are developed and implemented in an equitable and timely manner based upon need, financial constraint, and in conformance with the MassDOT design standards, practices, and directives, as well as with local master plans, comprehensive plans, and consensus based on Old Colony's public outreach program.

The Universe of Projects outlined in the Appendix was developed as a result of the planning process based on the continued cooperation between Old Colony, the general public, member communities, transportation agencies, and state agencies. At its core, it represents the collaborative effort to develop the needs of the Old Colony region.

#### **Coordinate Transportation and Land Use**

The commercial and retail centers that have proliferated along important arterials and collectors are generally auto dependent, mainly single-use zoned, extensive (spread out over large areas), and not conducive or safe for bicycle or pedestrian travel. This "Sprawl" development along corridors has resulted in impacts such as higher vehicle emissions, more traffic congestion, and higher per-person infrastructure costs, less space for conservation and parks, and inefficient street access. In addition, a lack of control, placement, spacing, and width of curb cuts that provide access to adjacent properties has become prevalent throughout most of the arterial corridors within the Old Colony region.

Coordinating transportation and land use prevents highways from becoming unattractive, dysfunctional commercial strips. Highway corridor plans should be coordinated with local master plans and comprehensive plans that support strategies that emphasize density, a diversity of land uses, a variety of mode choice (transit, bicycle, walking), and design standards.

The integration of transportation and land use planning includes:

- Encouraging the redevelopment of traditional town centers by utilizing mixed-use zoning and creating streets that are safe and compatible with pedestrian and bicycle use
- Encouraging development design in corridors that strengthens the physical character of the community and supports the value of properties and the quality of developments

- Setting basic requirements for site design for, building design, landscaping, and signage
- Permitting safe and convenient access and on-site circulation for motorized vehicles, non-motorized vehicles, and pedestrians
- Managing the impacts of commercial and industrial development on adjacent residential neighborhoods
- Improving access management; planning the design, location, and operation of driveways, median openings, interchanges, and street connections

#### Create a Multi-Modal Transportation System

Encourage communities in the Old Colony region to incorporate bicyclists, pedestrians, and transit users in their future plans and/or future designs is a key component in creating a region wide multi-modal system. In addition, encouraging communities to support MassDOT's Mode Shift goal by improving their inter-modal connections around transit stations and park and ride facilities and supporting land uses that enable walking, bicycling, and transit use (denser development, Complete Streets policies, and Transit Oriented Development, TOD) will foster a more sustainable region.

#### Improve capacity within the Old Colony region

Improving capacity alone will not solve the congestion issues in the Old Colony region; however, there are certain areas where capacity enhancements are needed in order to provide a more efficient and safer network. Areas in the Old Colony region where capacity enhancements are recommended include, but are not limited to:

- **Route 3 (Route 18 to Long Pond Road)**  
*Route 3 provides two lanes in each direction between Route 18 in Weymouth and the Sagamore Flyover. Traffic backups are common heading north during the morning commute and heading south during the afternoon commute due to traffic entering the highway and a lane drop respectively. Vehicles are allowed to travel in the breakdown lane during both commuting periods which provides for additional capacity; however, it also creates conflict points for normal access and egress.*
- **Route 3 – Exit 5 (Long Pond Road)**  
*The Long Pond Road interchange currently cannot handle the vehicular demand and routine traffic backups exist. The Route 3 southbound off-ramp routinely backs up onto the highway creating hazardous travel conditions and the Route 3 northbound on-ramp does not provide adequate acceleration space for vehicles entering the travel stream. A redesigned interchange is needed at this location.*
- **Route 24 – Exit 15 (Route 104)**  
*The recent signalization of the Route 104 interchange on/off ramps provided relief for vehicles attempting to travel north on Route 24; however, the current demand for that movement creates backups that at times interfere with the adjacent traffic signal. A slip ramp from Route 104 to Route 24 is needed at this location.*

- **Route 106 Corridor**

*A surge in development along the Route 106 corridor in West Bridgewater has created numerous curb cuts which added to the atiquated traffic signals creates a daily bottleneck from Route 24 to Route 28. Capacity enhancements with proper multi-modal accommodations are needed for this location.*

#### Encourage the use of Access Management techniques

Access Management is defined as the planning of the design, location, and operation of driveways, median openings, interchanges, and street connections. Access management provides two important advantages when applied to a roadway corridor: 1.) It minimizes conflicting turning movements in a highway corridor, thereby reducing interruptions in the traffic flow and conserving highway corridor capacity, 2.) The reduction in conflicting turning movements decreases motorists exposure to crashes, thereby increasing safety. Old Colony planning staff shall consider access management in proposed developments that are submitted through the MEPA process.

#### Incorporate Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) are applications of advanced technology in the field of transportation, with the goals of increasing operation efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility. Successful ITS deployment requires an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems.

### REGIONAL TRANSIT RECOMMENDED PLANNING STRATEGIES

#### Public Transit Opportunities

**Support additional service.** BAT recently increased service on certain lines and expanded its hours of operation. BAT should continue to see how it could expand service hours and the number of trips provided, especially on the weekend, which has been requested by their patrons.

**Meet operation needs.** BAT annually seeks Commonwealth and Federal transportation grants to finance support equipment and operations costs. BAT should continue to seek this method of funding to meet operational and capital replacement needs. BAT should also continue to work closely with the Old Colony Planning Council to seek out and secure additions operation and capital funding to meet growing service demand.

**Improve mass transit linkages.** Every effort should be made to promote improved linkages between mass transit and other modes of transportation. The Regional Transit Authorities should work closely with the Old Colony Planning Council to study and develop recommendations to closing the gaps that keep individuals that use both GATRA and BAT from making connections between both systems, especially south to the City of Taunton.

Intermodal planning tasks in the Unified Planning Work Program support these planning efforts.

**Continue supporting the development of a Plymouth Intermodal Center.** GATRA and Plymouth have been in the process of trying to fund the building of an intermodal center that would enhance both commuters and tourist transportation experiences.

**Continue commuter rail operations funding.** Support the funding of commuter rail operations in the Commonwealth through a statewide funding mechanism.

**Encourage increased use and expansion of commuter parking facilities.** The MassDOT should continue to promote existing commuter parking facilities and develop additional spaces, where needed, for intermodal uses..

**Encourage interagency agreements to enhance passenger service.** For example, currently the MBTA 230 bus ends at the Montello Station, but extending that service to the BAT Centre, would enhance passenger connections.

**Continue current outreach programs.** BAT should continue its outreach program to educate the residents of the region about the transportation services it offers and destinations it serves to spur additional ridership.

**Encourage private sector participation in public transit operations.** BAT is encouraged to continue joint development initiatives with private sector concerns when feasible.

**Expand commuter services by private commuter carriers.** In order to better meet mass transit needs in the region, the expansion of commuter services by private carriers is encouraged in areas where there is a demand for such services.

**Apply Smart Growth and Complete Streets Principles to development in the region.**

**Explore feasibility and support new Commuter Rail station between Campello and Bridgewater Stations.** A review of land parcels abutting the Middleborough / Lakeville Commuter Rail line suggests there may be sites available for a new Commuter Rail station on the border of West Bridgewater and East Bridgewater, in the area of Route 106. Such a facility would serve the communities of West Brie water and East Bridgewater, and potentially remove or shorten personal vehicle trips along the Routes 106 and Route 28 corridors.

**Support coordination between Town of Bridgewater, Bridgewater State University, and MBTA to relocate Bridgewater Commuter Rail Station.** A comprehensive planning study completed in 2019 by Old Colony Planning Council through the District Local Technical Assistance Program looked at the feasibility of relocating the Bridgewater Commuter Rail Station. The station is currently located within the campus of Bridgewater State University, and the study looked at the benefits of relocating the station to the site of the historic Bridgewater on Spring Street, on parcels currently occupied by Bridgewater State

University and municipal parking. Relocating this station could foster transit oriented development and boost the local economy in and to the south of Central Square, while continuing to provide transit access to Bridgewater State University.

#### Air Transportation Opportunities

**Increase use of smaller general aviation airports.** Municipal Airports in the region, such as the facility in Plymouth, have experienced marked growth in the numbers of take-offs and landings in recent years. Both runways at Plymouth Airport have been expanded in the past and the shorter of the two runways should be increased in length to increase capacity, promote greater safety, and lessen the impact of noise on residents.

**Investigate potential of municipal airports' ability to serve as freight terminals.** Currently, there is no scheduled freight service at any of the municipal airports throughout Southeastern Massachusetts. A feasibility study should be considered by the Massachusetts Aeronautic Commission to determine whether there is potential for any of the municipal airports to serve as airfreight terminals. Depending upon the type of freight, such a facility could serve intermodal purposes.

#### Ferry Transportation Opportunities

**Seek to establish greater public/private partnerships in ferry operations.** The Old Colony Region should work with MassDOT, the Old Colony Planning Council, Municipalities, private ferry operators, and those interested in entering the ferry operation market to form better and more productive ferry service.

#### Rail Freight Opportunities

**Increase the level of freight/goods movement by rail in the Old Colony Region.** Support such initiatives, which would serve to reduce truck traffic congestion on local highways and local roads. Consider working jointly with the Southeastern Massachusetts Metropolitan Planning Organization and Boston Central Transportation Planning Staff on a regional freight study.

### BICYCLE AND PEDESTRIAN RECOMMENDED PLANNING STRATEGIES

**Support "Complete Streets" Design In All Roadway Projects:** Complete Streets are roadways that are designed to support safe, attractive, and comfortable access to all users, including motorists, pedestrians, bicyclists, and transit users. In addition to enhancing safety and mobility, "Complete Street" designed roadways often enhance the surrounding community and environment through traffic calming techniques and vegetated streetscapes. Complete Streets are categorized by wide paved shoulders or separate bicycling lanes; sidewalks separated from the roadway by raised curbing and/or vegetation; well-placed and well-designed crosswalks; raised medians providing crossing refuge; and bulb-outs at intersections to prevent high-speed turning vehicles and shorten crossing distance for pedestrians.



**Maintain a Complete and Updated Inventory of Pedestrian Level of Service (PLOS) Rankings:** As part of the Bicycle and Pedestrian Connectivity and Livability Study, Old Colony Planning Council is developing a complete inventory of Pedestrian Level of Service (PLOS) at all signalized intersections in the Old Colony Region. OCPC Staff shall maintain this inventory on a continuing basis, updating information as it becomes available and existing infrastructure changes.

**Maintain a Complete and Updated Inventory of Bicycle Level of Service (BLOS) Rankings on State Numbered Routes and Priority Roadways:** As part of the Bicycle and Pedestrian Connectivity and Livability Study, Old Colony Planning Council is developing a complete inventory of Bicycle Level of Service (BLOS) on the state numbered route network and other roadways identified as priority routes by community representatives and/or the Regional Bicycle and Pedestrian Taskforce. OCPC Staff shall maintain this inventory on a continuing basis, updating information as it becomes available and existing infrastructure changes.

**Encourage/promote bicycle riding as a viable alternative to automobile commuting and as a means to improve air quality.** Where feasible, bicycling to work or to transit facilities instead of driving would reduce “cold starts,” which inject high levels of toxic emissions into the atmosphere with the starting and shutting off of automobile engines. A coordinated effort of local officials, the Massachusetts Highway Department, Regional Planning Agencies and interest groups, should encourage and promote the use of existing designated bicycle routes as a viable alternative to automobile commuting through public information and awareness efforts.

**Encourage/promote safe bicycle riding, and reduce the number of injuries and fatalities associated with bicycle crashes.** To help ensure safe travel habits and reduce the number of bicycle crashes, education programs for all road users should be implemented. Coordination of municipalities with the Department of Education, Registry of Motor Vehicles and transportation agencies should be a part of this effort.

**Support bicycle riding as a part of intermodal travel.** Coordination between different modes of transportation should include the improvement of bicycle access to public transportation. This includes, but is not limited to, permits to allow bicycles on train cars; external racks to carry bicycles on buses as done in Portland and San Francisco, and bicycle lockers at park-and-ride lots, train stations and bus terminals.

**Identify, designate and implement additional bicycle paths and routes to be used for both commuting and recreation.** Local officials, in concert with state and regional planners, should investigate the development of additional bicycle paths and routes which could safely serve the commuting public. This includes, but is not limited to, the development of abandoned railroad rights-of-way as bicycle paths, and bikeways that connect industrial/business parks, shopping centers, schools and other key destinations.

**Coordinate efforts to improve bicycle facilities with surrounding municipalities and regional agencies.** To help form a more complete and contiguous network of bicycle facilities in the region and southeastern Massachusetts, local agencies should coordinate efforts with agencies and

organizations outside the region. This includes, but is not limited to, researching the existing bicycle facilities of surrounding towns before formalizing new bikeways, and coordinating public outreach programs to help minimize the cost of these efforts.

**Support local, regional, and state initiatives and legislation that create or maintain bicycle infrastructure and safety.** To best serve the greater good and needs of the public for a safe and secure transportation system, support and endorsement will be provided to all initiatives and legislation (local/regional/state/federal) that result in the implementation of bicycle facilities, ease congestion, promote recreation, and increase safety and security for bicycle users.

**Enhance bicycle facilities at intermodal facilities (MBTA Stations, BAT Centre, Park and Ride).** The potential for MBTA Stations, the BAT Centre, and MassDOT Park and Ride lots to serve as true intermodal facilities can be maximized by enhancing bicycle facilities, including but not limited to: installation of external bike racks on buses that serve these facilities; the installation of bicycle lockers; and bicycle lanes and paths entering and exiting facilities.

**Promote the installation of bicycle detection loops at actuated signalized intersection to increase safety for entering bicyclists.** Noting that roadways serve both drivers of motorized vehicles and users of bicycles, actuated traffic signals should include detection loops for bicycles to maximize safety for bicycle riders.

**Support local initiatives, which enact, implement and enforce laws and regulations regarding pedestrian traffic.** The responsibility for pedestrian safety ultimately lies with the local jurisdiction. Communities should utilize safety officers to enforce laws/regulations that promote increased pedestrian safety, with emphasis around high activity areas such as transit facilities, schools, and commercial centers. Participants in the process should include police departments, traffic engineers, school and legal system representatives.

**Install physical barriers, pavement markings, and other amenities where needed to maximize pedestrian safety.** Marked crosswalks, safety islands, street lighting, pedestrian underpasses/overpasses, sidewalks, traffic signals and signage all constitute useful techniques to separate pedestrians from hazardous vehicular traffic. Particular attention should be given to high activity areas such as transit facilities, schools, and commercial centers.

**Promote/encourage pedestrian ways as a viable alternative to automobile commuting and means of improving air quality.** Where feasible, walking to work or to transit facilities instead of driving would reduce “cold starts,” which inject high levels of toxic emissions into the atmosphere with the starting and shutting off of automobile engines. Support of this alternative includes, but is not limited to, the creation of pedestrian walkway connections between residential areas, transit facilities, industrial parks, shopping centers, schools and other key destinations.

**Promote Installation of Pedestrian Countdown Signals at Signalized Intersections – A Pedestrian Countdown Signal consists of a standard pedestrian signal with standard shapes and**

color, with an added display that shows the countdown of the remaining crossing time. Studies have shown that these types of signals dramatically decrease pedestrian-vehicle conflicts and increases safety for crossing pedestrians. By viewing the numeric countdown display, pedestrians gain a new level of self-protection by the ability to determine how long it takes them to cross a street, and knowing precisely how much time exists on the current signal phase before the “Don’t Walk” alert comes on and the signal proceeds into its next phase. According to a January 2006 article in the ITE Journal, San Francisco experienced a 52 percent reduction in pedestrian injury collisions at the 700 intersections it had retrofitted with the countdown equipment. The Regional Planning Agency and Metropolitan Planning Organization should work with the City of Brockton and other towns in the Region to retrofit signalized intersection with pedestrian countdown signals. Pedestrian countdown signals should be considered with all new signalization projects.

**Promote Safer Pedestrian Access Designs in Parking Lots** – Pedestrian consideration is often overlooked in design for parking areas of retail, entertainment, and employment centers. Often the pressure to provide as many parking spots as possible or the minimums for zoning regulations eliminates safe pedestrian accommodations from the design process. Once parked and out of the vehicle, pedestrians are often forced to share driveways with motor vehicles. With the boom in popularity of Sport Utility Vehicles and large profile trucks during the 1990’s and early 2000’s, often exiting drivers have very little, if any, visibility of the driveway approaches, making pedestrians virtually invisible. Dedicated pathways between the parking area(s) and building(s) should be provided for pedestrian access. Facility owners should also consider the use of pavement markings, textured surfaces, and other traffic calming devices to further enhance pedestrian safety in parking areas.

**Promote Use of Crossing Islands and Medians in Wide Cross-Sections** – According to the MassDOT Project Development and Design Guide, fifty feet is generally the longest uninterrupted crossing a pedestrian should encounter at a crosswalk although islands and medians are also appropriate for shorter distances as well. Many multiple lane roadways exceed fifty feet in cross-section width.

#### ENVIRONMENTAL RECOMMENDED PLANNING STRATEGIES

##### **Support Livable and Sustainable Land Use Strategies**

The Old Colony MPO recognizes the threat to environmentally sensitive areas and works with communities to make environmentally and economically sound land use decisions. The Old Colony MPO promotes and supports transportation and land use plans that support integrated, multimodal transportation strategies, including the use of transit, ridesharing, bicycling, and walking.

##### **Reduce greenhouse gas emissions and ground level ozone (NOx and VOCs) by all transportation modes**

Encourage research and technology development to find new solutions to air pollution problems created by motor vehicles.

**Reduce dependency on fossil fuels**

Promote research, development and implementation of standards, policies, and programs to reduce fuel consumption and the increase investments in alternative fuels.

**Minimize negative environmental impacts of the transportation system**

Support the development of new and improved designs and Best Management Practices (BMP) to reduce the contamination of water resources from transportation facilities and projects.

**Strive to reduce single occupancy vehicle travel**

Support programs that encourage means to reduce single occupancy automobile travel. Examples are flexible working schedules, preferential parking for ridesharing, and incentives for transit use. MassRIDES program offers employers and their employees' benefits of carpooling and ridesharing.

**Encourage the use of non-motorized alternatives**

Encourage and support non-polluting modes of transportation, such as bicycling and walking as described in the Bicycle and Pedestrian component of this Plan.

**Encourage the Research and Usage of Alternative Energies**

The Old Colony MPO supports the transitioning away from foreign fossil fuel reliance, encouraging the research and usage of alternate fuels and power sources. The benefits of alternative energies include improving air quality by reducing the amount of greenhouse gases and air pollutants emitted by automobiles using traditional petroleum based fuels, reducing America's dependence on foreign oil, and increasing energy sustainability.

**Encourage the use of Renewable Energy**

Promote the use of renewable energies throughout the Commonwealth, such as solar and wind. Using these sources in place of fossil fuels and nuclear energy reduces the depletion of natural resources and the creation of both toxic and non-toxic wastes.

**Encourage coordination between municipalities, federal, state, and regional agencies**

Coordination between all interested parties is important to reduce the negative impacts to the environment. Improving air, land, water, and wildlife quality begins with a team approach and is successful with all voices recognized.

**Support "Intermodalism."**

Promote using "intermodalism" to better integrate all transportation modes such as: Automobile, Motorcycle, Transit, Rail, Bus, Water, Air, Walking, and Bicycling. Providing a hub that supports all transportation modes attracts more people and increases efficiency.

**Encourage the formation of Transportation Management Associations (TMAs)**

Transportation Management Associations (TMAs) are private, non-profit, member-controlled organizations that provide transportation services in a particular area, such as a commercial district, mall, medical center or industrial park. MassRIDES offers carpooling, vanpooling, parking management, and other techniques allow employees to diversify their trips to and from work, thereby reducing congestion and improving air quality.

**Encourage the proper design and use of High Occupancy Vehicle (HOV) lanes**

High Occupancy Vehicle lanes should be designed for and only used by buses carrying large amounts of people to and from their destinations. These lanes would make commuter bus lines a more acceptable alternative to individuals who drive automobiles, thereby reducing congestion and improving air quality.

**Encourage the use of Intelligent Transportation Systems (ITS)**

The Old Colony MPO advocates the consideration of ITS solutions for transportation problems as a routine part of the transportation planning process, with the goals of increasing operation efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility.

**Promote the increase and enforcement of Corporate Average Fuel Economy (CAFE) Standards for passenger car and light truck fleets**

Automobile manufacturers should be required to meet and exceed CAFE standards for passenger and light truck fleets and should be recognized for doing so.

**SAFETY AND SECURITY RECOMMENDED PLANNING STRATEGIES**

**Target planning efforts and investments at identified high crash locations.** Through the Old Colony Safety Management System (and analysis tools such as the Top 100 Most Hazardous Intersections lists and MassDOT Crash Clusters inventory) identify a minimum of three (3) high crash locations per year for targeted study, including but not necessarily limited to Road Safety Audits. High crash locations will include those emphasis areas in the Massachusetts Strategic Highway Safety Plan, including intersections, lane departures, older drivers, pedestrians, and bicycles.

**Fully program minimum HSIP targets each TIP year and seek to program Statewide HSIP funds when available/feasible for priority safety related projects.**

- **Target and Performance Measure:** Fully program minimum HSIP targets each TIP year and seek to program Statewide HSIP funds when available/feasible for priority safety related projects

**Reduce the rates of motor vehicle, bicycle, and pedestrian fatalities by incorporating engineering, enforcement, education, and emergency response into the planning process.** Planning products of the Old Colony Metropolitan Planning Organization will seek to

recommended best planning and engineering practices and standards when addressing safety on the transportation system. Staff will continue to work with state and local partners on addressing vehicular, transit, pedestrian, and bicycle safety through planning, legislative, and law enforcement efforts.

**Support the increase and improvement of safety of services, vehicles, and facilities for transit, and for the transportation disadvantaged.** Staff will continue to work with Brockton Area Transit Authority (BAT) and other transit providers in the area, while the Old Colony Metropolitan Planning Organization through Old Colony Planning Council will provide planning, technical, and operational assistance to transit providers in the common goal of providing and maintain safe service.

**Support the implementation of emergency response and evacuation plans in cooperation with emergency management agencies.** Emergency response and evacuation needs will be considered in all applicable planning efforts. Staff will work with stakeholders at the statewide, regional, and municipal levels to ensure the transportation network is able to accommodate response, evacuation, and recovery during regional emergencies. Furthermore, staff is committed to the following steps to prepare for emergencies and protect the viability of the transportation network:

- Support the forum for cooperation between the different transportation agencies in the state on security concerns through the Regional Homeland Security Councils.
- Conduct vulnerability analyses on regional transportation facilities and services
- Analyze the transportation network for redundancies in moving large numbers of people (e.g., modeling person and vehicle flows with major links removed or reversed, accommodating street closures, adaptive signal control strategies, impact of traveler information systems), and strategies for dealing with "choke" points and bottlenecks.
- Analyze the transportation network for emergency route planning/strategic gaps in the network
- Incorporate intelligent transportation systems, such as variable message signs, into the emergency response system.

**Increase partnership and participation by elementary and middle schools in the Safe Routes to School Program.** The Safe Routes to School program is a valuable asset for teaching safe walking and bicycling habits while **PROMOTING HEALTHY ALTERNATIVES FOR CHILDREN AND PARENTS IN THEIR TRAVEL TO AND FROM SCHOOL**. Staff will continue its partnership with MassDOT to provide technical support for Safe Routes to School and expand participation to local schools in the Old Colony Region

#### FINANCIAL RECOMMENDED PLANNING STRATEGIES

**Invest funding to preserve, operate, and maintain transportation assets for current and future generations.**

**Adequately maintain and preserve all elements of the transportation system in a state of good repair to protect the public’s mobility, safety, and security.**

**Increase the efficiency and reliability of the transportation system using appropriate methods and technologies.**

**Invest and provide comparable transportation access and service quality across the region regardless of income level or minority population.**

**Provide adequate funding to ensure that the transportation system and its users are safe and secure.**

**Support the increase of the annual Chapter 90 statewide total amount to at least \$300 million.**

**Assist communities in preparing and updating their road inventories to ensure that they reflect accurate mileage amounts for publicly accepted roads.**

**Continue to review, develop, and analyze supplemental funding resources.** Such resources could include increased user fees, transit mitigation banks, and concurrency management systems. Concurrency is the growth management concept intended to ensure that the necessary public facilities are available concurrent with the impacts of development.

**Implement fare and revenue policies that increase with inflation.**

**Establish and dedicate transit funding from sources that increase with inflation.**

**Support congestion improvements and the reward for regional approaches to coordinating and interconnecting signalized intersections and corridors.**

**Support and enhance asset management capabilities to perform the appropriate type of improvement at the right time.**

**Support the establishment of a RTA service fund to restore and enhance service.**