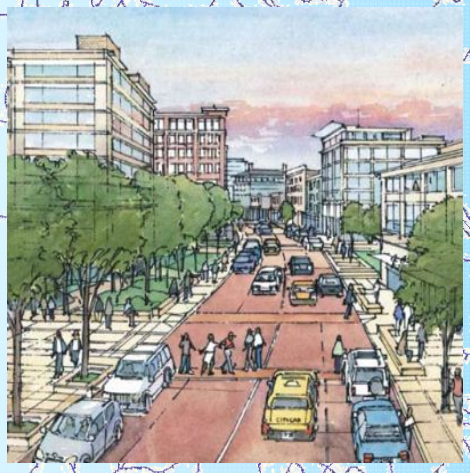
Old Colony

Metropolitan Planning Organization

2012

OLD COLONY REGIONAL TRANSPORTATION PLAN



Exploring Mobility, Livability, Transit, Transportation and Downtown Centers In the Old Colony Region

Prepared by:

Old Colony Planning Council

70 School Street, Brockton, MA 02301

Under MassDOT Contract # 0052455

September, 2011

This Document was prepared in Cooperation with the Massachusetts Department of Transportation (MASSDOT) Contract #0052455, The Federal Highway Administration, and the Federal Transit Administration

Old Colony Metropolitan Planning Organization (MPO)

Endorsement of the 2012 Old Colony Regional Transportation Plan (RTP) And Air Quality Determination

Endorsement of the 2012 Regional Transportation Plan and Air Quality Conformity Determination

In accordance with 23 CFR Part 450 Section 322 (Development and content of the Metropolitan Transportation Plan) of the March 16, 2007 Final Rules for Statewide and Metropolitan Planning, the Old Colony Metropolitan Planning Organization (MPO) for the Old Colony Region hereby endorses the 2012 Old Colony Regional Transportation Plan (RTP).

Whereas the 1990 Clean Air Act Amendments (CAAA) require Metropolitan Planning Organizations within ozone non-attainment areas to perform air quality conformity determinations prior to the approval of transportation plans and transportation improvement programs, and at such other times as required by regulation.

Specifically, the Old Colony Metropolitan Planning Organization has completed its review accordance with Section 176(c) (4) of the Clean Air Act as amended in 1990 [42 U.S.C. 7251 (a)}, and hereby certifies that implementation of the 2012 Old Colony Regional Transportation Plan satisfies the conformity criteria specified in both 40 CFR Part 51 and 93 (8/15/1997) and 310 CMR 60.03 (12/30/1994). The Old Colony Regional Transportation Plan continues to include all regionally significant, non-exempt projects identified. Based on the results of the conformity analyses, the 2012 Old Colony Regional Transportation Plan is consistent with the air quality goals of, and in conformity with, the Massachusetts State Implementation Plan. Furthermore, the conformity determination is based on the air quality documentation contained in the Old Colony Regional Transportation Plan.

Signatory Certification:

for

Jeff Mullan, Secretary and CEO
Massachusetts Department of Transportation

Date

Linda M. Balzotti

The Honorable Linda M. Balzotti, Mayor
City of Brockton

8/23/11
Date

Frank DePaola, P.E., Highway Administrator
Massachusetts Department of Transportation

8/23/11
Date

for

William Hallisey, Jr., Chairman
Town of Plymouth Board of Selectmen

8/23/11
Date

Reinald G. Ledoux, Jr., Administrator
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Daniel Salvucci, Vice Chairman
Town of Whitman Board of Selectmen

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Date

Acknowledgements

Old Colony Planning Council acknowledges the contributions of numerous organizations and individuals that include, but are not limited to: Bridgewater State University, Brockton Area Transit Authority, the communities of the Old Colony Planning Council Region, Department of Environmental Protection, Environmental Protection Agency, Federal Highway Administration, Federal Transit Administration, Greater Attleboro Taunton Regional Transit Authority, Latin American Health Institute, Massachusetts Department of Transportation, Massasoit Community College, Metro South Chamber of Commerce, and the Old Colony Joint Transportation Committee.

The 2012 Old Colony Regional Transportation Plan (RTP) was prepared for the Old Colony Metropolitan Planning Organization (MPO) by the following members of the Old Colony Planning Council (OCPC) staff under the supervision of Charles Kilmer, Transportation Program Manager, and the direction of Pasquale Ciaramella, Executive Director.

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The views and opinions of the Old Colony Planning Council expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

Table Of Contents

1.0 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, bikeways, and pedestrian accommodations. 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 fourteen towns: Abington, Avon, Bridgewater, East Bridgewater, Easton, Halifax, Hanson, Kingston, Pembroke, Plymouth, Plympton, Stoughton, West Bridgewater, and Whitman. The planning area also includes the community service areas 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.

1.1 3C Process

The Old Colony MPO is responsible for conducting a continuous, cooperative, and comprehensive 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, or bus, railroad, and pipeline terminals) of these modes to the rest of the world.

Figure 1-1: Old Colony Transportation Planning Process

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 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU); 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), Regional Transportation Plan (RTP), 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 12,000 or below (Avon, Halifax, Hanson, Kingston, Plympton, and West Bridgewater), and, no more, or less, than one representative from towns with populations over 12,000 (Abington, Bridgewater, East Bridgewater, Easton, 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 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.

1.2 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 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, 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, having 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.

1.3 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 Regional 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 designees, the JTC, and transportation providers as appropriate. The Old Colony MPO assigns duties to the committees, as warranted.

1.4 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 Regional Transportation Plan (RTP), 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.

1.5 Transportation Advisory Group

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, whom are appointed by the Board of Selectmen/Mayor in the community. Membership is open to any interested resident, 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 be 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.

1.6 The 3C Process

The Old Colony MPO is responsible for conducting a cooperative, continuous, and comprehensive transportation planning process for all of the Old Colony Region.

The 3C process is cooperative, requiring effective coordination among public officials at all levels of government, and inviting the wide participation of all parties, public or private, at all stages of the transportation planning process. A key objective of the process is to resolve transportation issues by providing a forum for the resolution of issues. At the same time, the process is not intended to operate, and cannot operate, to dilute the ultimate authority or responsibility of those state, regional, or local public officials or agencies who, pursuant to statute or under contract, develop, review, and/or implement transportation plans, programs, and projects.

The 3C process is continuous, affirming the necessity to plan for the short and long range, emphasizing the iterative character of the progression from systems planning to project planning and programming, to implementation, and the necessity for re-evaluating data and plans.

The 3C process is comprehensive, including the effective integration of the various stages and levels of transportation planning and programming for the entire Old Colony Region, and examines all modes to assure a balanced planning and programming effort. There is a simultaneous analysis of various related non-transportation elements, such as land use, economic sustainability, environmental resources, and population to assure consistency within a total comprehensive planning and programming process.

1.7 The Transportation Planning Process

The transportation planning process has four basic elements; a Unified Planning Work Program, a Regional Transportation Plan, Transportation Improvement Program, and Public Participation Plan. 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 coming year. The UPWP is a federally required certification document, which must be prepared and endorsed annually by the Old Colony MPO prior to the start of the planning program. The OCPC has the responsibility of preparing 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 legislations, 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.

Regional Transportation Plan (RTP)

The RTP 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 RTP is to build on the current system, working to make it comprehensive and fully integrated.

The RTP 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 RTP draws upon the Statewide Transportation Plan and the MassDOT Project Development and Design Guide Book. The mission of the RTP 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 RTP. 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 insure, 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 RTP. 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 30-Day Public Review Period. After the 30-Day Public Review Period, the Final Draft TIP is sent to the Old Colony MPO for consideration and approval.

1.8 Public Participation and Outreach Consultation Process

During the 2012 Regional Transportation Plan update, public participation was designed to ensure opportunities for the public to express its views on transportation issues and 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 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 RTP events was distributed to the public through reports and editorial board briefings, press releases, and media packages. Mailings were sent in 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.

Figure 1-2: *OCPC staff met with local businesses to discuss new transportation initiatives during the Metro South Business Expo at Massasoit Conference Center.*

- Federal Highway Administration and Federal Transit Administration
- Private and Public Local Transportation Agencies (BAT, GATRA, SSCAC and MBTA)

- Public Elected Offices
- Chambers of Commerce (Metro South, Plymouth and South Shore)
- Housing Authorities
- Latin American Health Institute
- Area Agencies on Aging and Councils of Aging
- State Department of Environmental Protection, Federal Environmental Protection Agency, Department of Public Health, Hospitals and Nursing Homes

Public Participation Activities

In order to improve public consideration of issues and to maximize citizen involvement, the Old Colony Planning Council planned a number of diverse activities to keep the public engaged and informed regarding on-going transportation and comprehensive planning efforts in the region. OCPC organized a comprehensive survey, two visioning workshops, three open houses, and eight table events. In addition, OCPC developed four task forces to keep the public involved during the next four years of the plan.

Survey

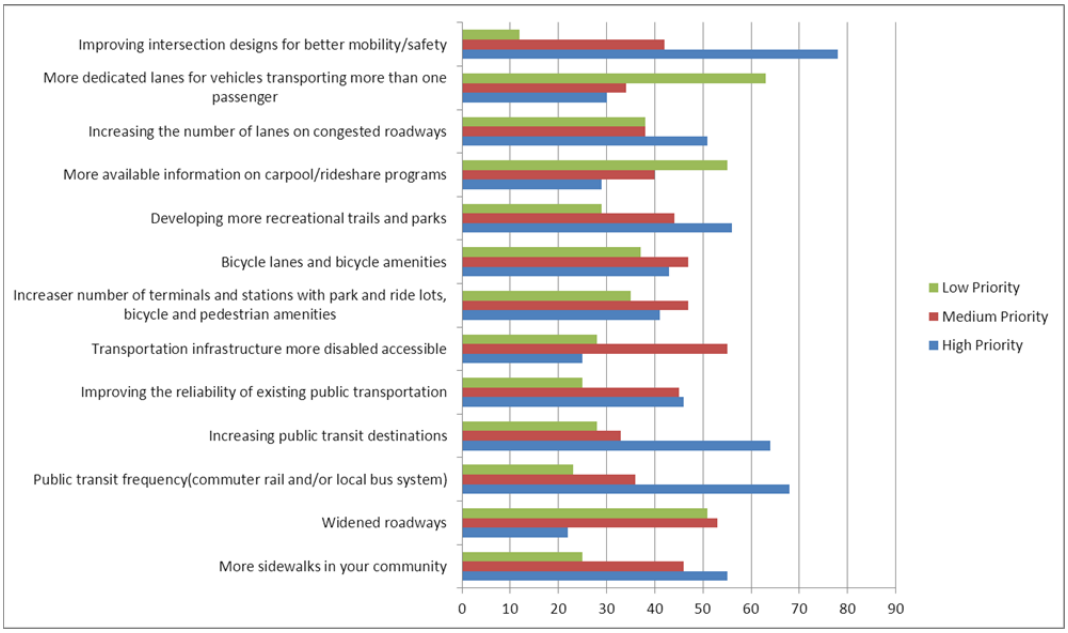
The survey was designed to educate the public on new initiatives and to obtain people's comments on mobility, safety and security, land use policies and environmental protection issues. The survey was available electronically through Survey Monkey on the OCPC website and electronic newsletters. In addition, the survey was distributed to a mass email list of interest groups at the beginning of the plan update process. Hard copies of the survey were also available in the Council's office and were 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 (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.

Survey Results

The survey results reflect the responses of local residents, businesses, and students who participated during the outreach campaign. A total of 134 surveys were received during the process. Word of mouth was the most effective method of learning about the survey as approximately 70 percent of respondents found about the RTP survey through their friends, colleagues, and fellow employees. The survey was also a successful tool in recruiting local residents to participate in the newly developed task forces. Approximately 40 surveyed participants showed interest in joining at least one of the task forces.

1. ***Question on Mobility Needs:*** Question 1 asked respondents to prioritize the mobility needs that applied to their community. A majority felt that improving the intersection designs would improve transportation mobility and safety in the Old Colony Region. Other priorities are: Increasing public transportation services, improving public transportation services' frequency, providing more sidewalks, recreational trails, and parks in order to have communities that are more active. As shown below, the least favorable responses were widening roadways in congested areas, creating HOV lanes, and providing more information on carpool/rideshare programs.

Figure 1-3: Regional Mobility Needs



Specific mobility needs in the Old Colony region were identified as follows:

- Add bus shelters on the Massasoit Community College Campus
- Coordinated regional transit services with commuter rail schedules
- Return two way traffic to Main Street in Brockton
- Installation of a traffic signal at the corner of Route 106 and Prospect Street in Easton
- Add bicycle lanes throughout the region for increased safety
- Improve overall crosswalk system
- Enforce speed limit with traffic calming techniques
- Bus route expansion

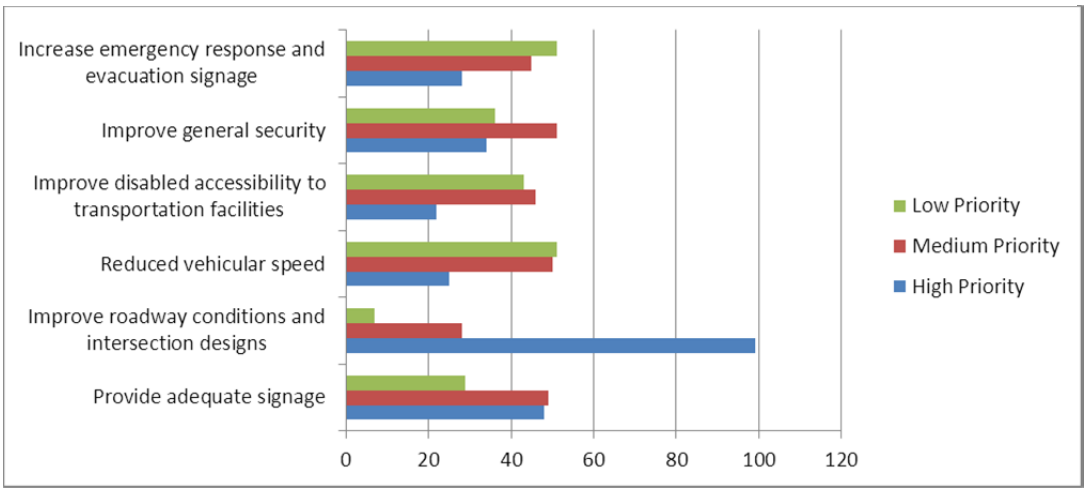
2. ***Question on Congestion:*** Question 2 asked respondents to list the top three congested areas or intersections they experience within their communities or during their commute to work. The following table shows all the congested locations shared in this question. The parenthesis represents the number of people with common responses.

Figure 1-4: Congested Locations

Community	Location #1	Location #2	Location #3
Abington	Route 18 & Route 123 (4)	Route 18 & Route 139 (3)	Route 18 & Summer Street (2)
Avon	*NO DATA*	*NO DATA*	*NO DATA*
Bridgewater	Bridgewater Center (13)	Route 18 & High Street (4)	Route 24 & Route 104 (1)
Brockton	Route 27 & Quincy Street / Massasoit (22)	Downtown Brockton (8)	Route 27 & Quincy Street (7)
East Bridgewater	East Bridgewater Center (15)	Route 18 & Route 106 (2)	*NO DATA*
Easton	Five Corners (6)	Route 106 & Route 138 (1)	Route 138 & Elm Street (1)
Halifax	Route 58 & Route 106 (4)	Route 105 & Route 106 (1)	Route 106 & Carver Street (1)
Hanson	*NO DATA*	*NO DATA*	*NO DATA*
Kingston	Route 3 (1)	Route 3A & Route 80 (1)	Route 27 & Route 106 (1)
Pembroke	Pembroke Center (2)	Route 139 (1)	*NO DATA*
Plymouth	South Street & Obery Street (4)	Route 3A & South Street (3)	Samoset Street (2)
Plympton	*NO DATA*	*NO DATA*	*NO DATA*
Stoughton	Stoughton Center (3)	Central Street (3)	Route 24 & Harrison Boulevard (1)
West Bridgewater	West Bridgewater Center (4)	Route 24 & Route 106 (4)	Route 28 & Matfield Street (4)
Whitman	Route 18 & Route 14 (4)	Route 18 & Route 27 (4)	Whitman Center (3)

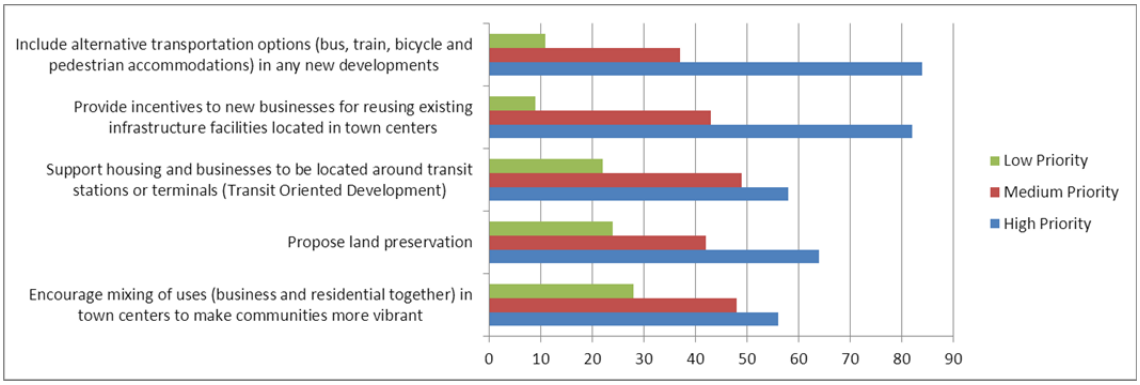
3. ***Question on Safety and Security:*** Question 3 asked respondents to prioritize safety and security needs that could relate to transportation infrastructure and services. A large majority of respondents (73 percent) agreed that improving and redesigning roadways and intersections should be the top priority. The following graph summarizes the responses.

Figure 1-5: Safety and Security Transportation Priorities



4. ***Question on Land Use Policies:*** Question 4 asked respondents to prioritize land use policies that could be applied to the region's transportation network. There were five smart growth oriented policies presented in this section: Encourage mixed uses in town centers, propose land preservation, support Transit Oriented Developments, encourage the re-use of existing facilities located in town centers, and provide alternative transportation options other than single occupancy vehicles. Respondents evenly supported all the land use and transportation policies presented in this section, with a significant preference on supporting alternative transportation options and the reuse of existing facilities in town centers. A summary of the responses are presented below.

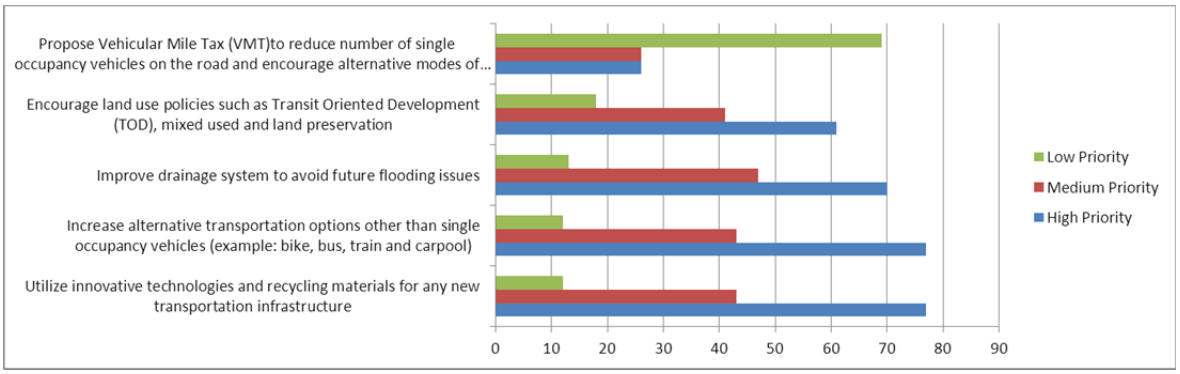
Figure 1-6: Priority on Land Use Policies



5. ***Question on Environmental Impact and Climate Change:*** Question 5 emphasized environmental impact solutions that could be applied to the transportation network in the Old Colony region. Survey participants were asked to prioritize these possible environmental impact solutions. The

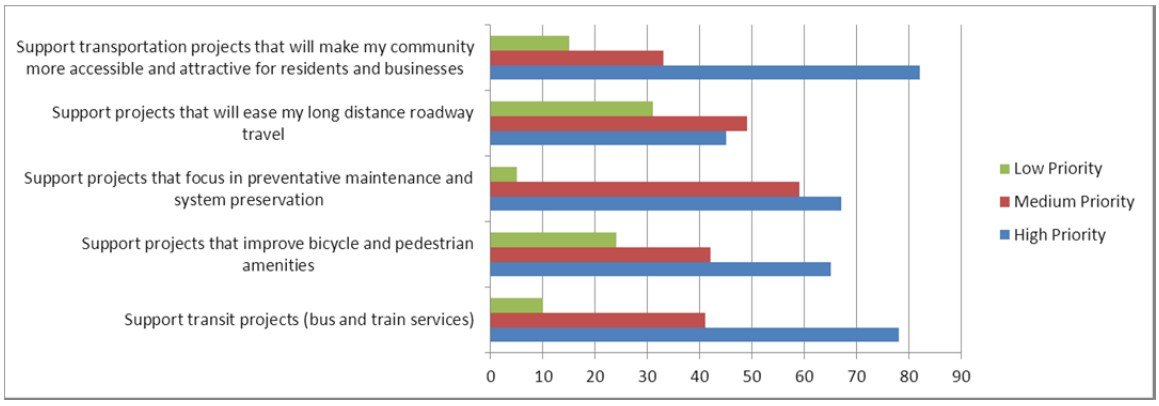
increases in transportation alternatives to single occupancy vehicles as well as the utilization of innovative technologies and recycling materials for new transportation infrastructure seem to be the most preferred policies to reduce environmental impacts and climate change effects. The proposed Vehicular Mile Traveled Tax (VMTT) to reduce this number of single occupancy vehicles on the road and encourage alternative modes was by far the least favored policy to mitigate environmental impacts. The following graph reflects these results.

Figure 1-7: Environmental Impact and Climate Change Regional Priorities



6. ***Question on Funding and Financial Sustainability:*** Transportation funding varies by region. Depending upon the type of grant and priority, some federal grant programs cover one hundred percent of costs while others cover eighty percent and non-federal sources pay the other twenty percent. Question 6 requested suggestions on how federal and state funding should be spent on transportation infrastructure and services in our communities over the next 20 years. The most popular response received was to support transportation projects that will make Old Colony communities more accessible and attractive for residents and businesses, followed by supporting transit projects such as bus and train service. The graph below describes all the responses in more detail.

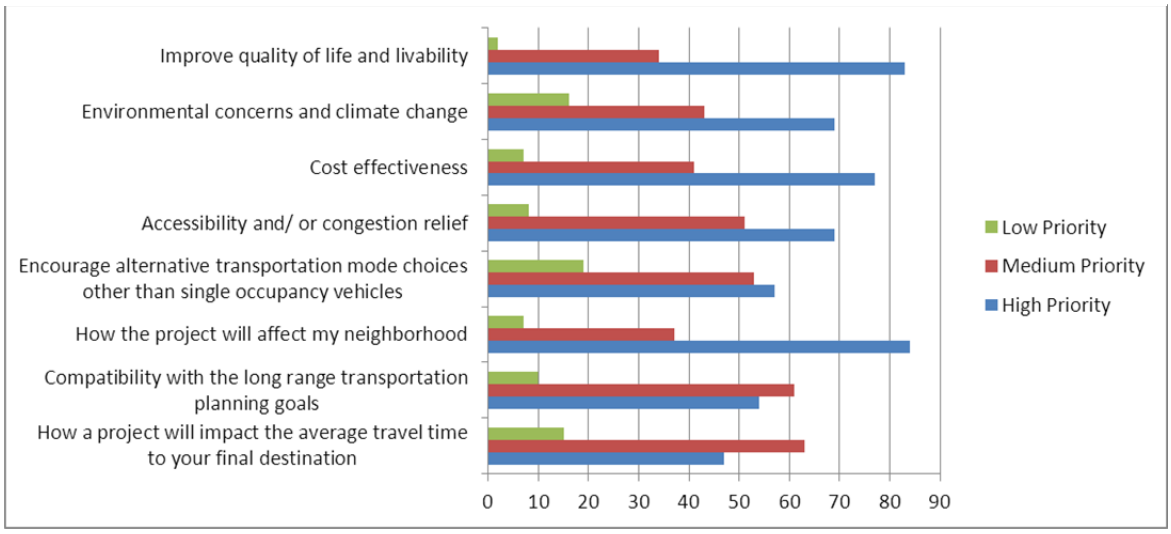
Figure 1-8: Funding and Financial Sustainability Priorities



7. ***Selection of Evaluation Criteria:*** There are many factors to consider when reviewing new projects and programs for the Regional Transportation Plan. In this section, the survey asked for

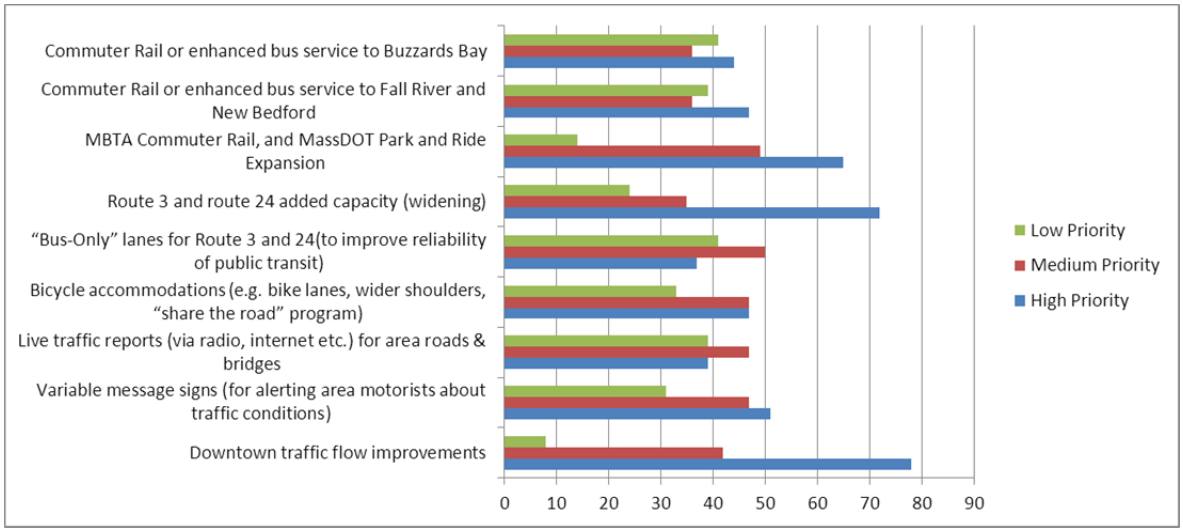
suggestions on how to prioritize the evaluation criteria factors. According to the responses received, making our communities more livable is the most desirable factor in the evaluation process of transportation initiatives. The graph below illustrates in more detail people's views.

Figure 1-9: Evaluation Criteria Selection



8. ***Existing Transportation Projects:*** OCPC provided a list of transportation improvements that were identified as high priority in the 2007 RTP. Survey participants had the opportunity to rank these projects. Downtown traffic flow improvements, adding capacity to Route 3 and Route 24, and MBTA Commuter Rail and MassDOT park and ride expansion were participants' top priorities.

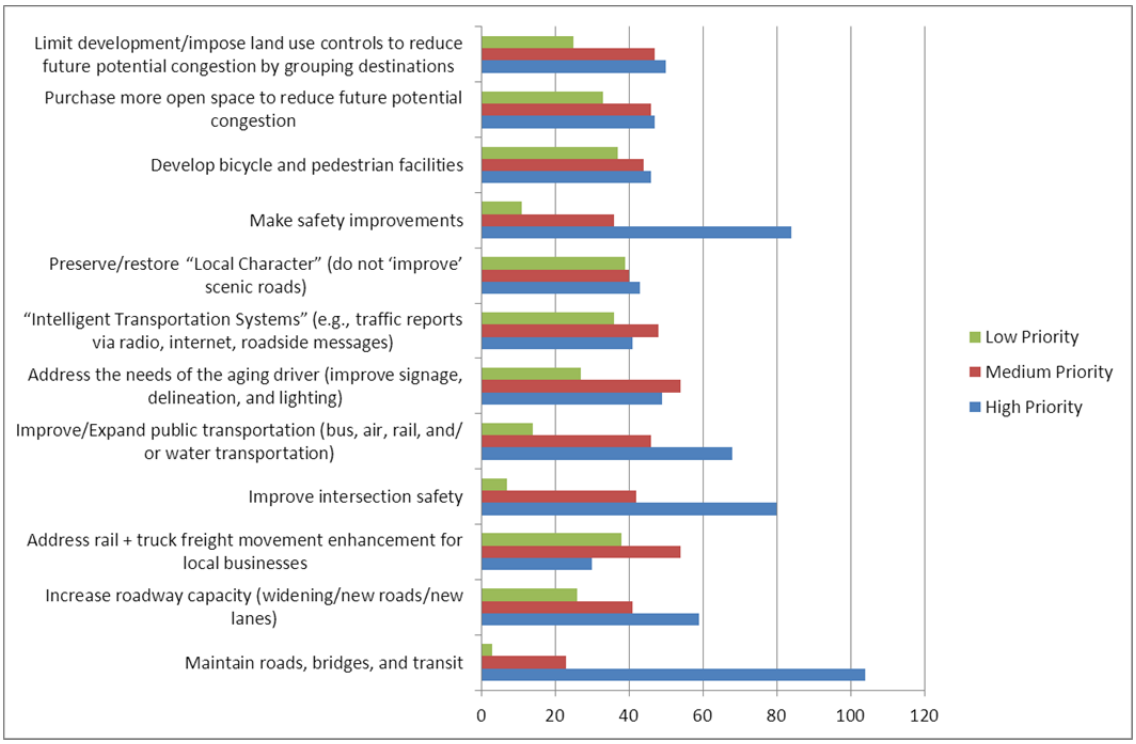
Figure 1-10: Prioritization of Existing Transportation Projects



9. ***Future Transportation Priorities:*** The Regional Transportation Plan includes fundamental objectives for the region. In this section of the survey, participants were asked to select their top transportation priorities. The majority of participants agreed that maintaining existing

infrastructure in good repair should be the top priority. Another high priority is making safety improvements to existing transportation infrastructure and services. The following graph summarizes the survey responses.

Figure 1-11: Future Transportation Priorities



Task Force Development

Since public participation is ongoing, OCPC organized four task forces with topics that play important roles to transportation and land use planning decisions. These task forces are intended to act as advisory committees to the Joint Transportation Committee (JTC). The meeting frequency can either be "routine" (no specific product on which to be worked) or "special" (primarily for the purpose of working towards specific products). The following is a draft statement of functions, developed on the premise that each task force would have an open-ended mandate while defining specific roles and responsibilities to the OCPC public participation process.

Livability and Sustainability Task Force: *The relationship between land use planning, transportation and economic development is central to this task force, which calls for urban investment, concentrated development patterns, and smart economic growth. The task force will provide reports to the JTC, MPO and OCPC on the new concepts of livability and sustainability.*

Environmental Protection and Climate Change Task Force: *Focus on new initiatives and strategies to reduce greenhouse gas emissions in the OCPC region. The strategies will include maintaining and expanding transit services, carpool and rideshare alternative options, land use regulations, Intelligent Transportation Systems, congestion relieve initiatives, alternative energy and fuels, and CAFE and emission standards.*

Regional Mobility Task Force: *Focus on issues regarding public transportation including bus and train services; goods movement; intersection design; parking management; safety and security; access management, and carry out special projects (corridor studies, road safety audits, transit feasibility studies, transit level of service, pavement management, public meetings) or prepare discussions of specific topics as requested by JTC MPO, and OCPC.*

Bicycle and Pedestrian Task Force: *Provide concise and timely reports to the JTC, MPO and OCPC on issues regarding bicycle/pedestrian travel environment, draft bicycle and pedestrian planning products; and carry out special bicycle and pedestrian specific projects (walking audits, Bicycle Plans, Bike/Ped Level of Service Inventory, public meetings).*

Public Visioning Workshops

OCPC developed two regional visioning workshops during the 2012 Regional Transportation Plan Update. They were designed to inform the public and local stakeholders on new transportation and land use initiatives. The following four topics were discussed at the workshops:

- Protecting and Enhancing Regional Mobility
- Building Sustainable Livable Communities
- Enhancing Safety and Security
- Environmental Protection and Climate Change

Brockton Visioning Workshop

Over twenty people from different affiliations and municipalities participated in the first Visioning Workshop at the Brockton Main Library. The following list of comments is a summary of the participants' vision of the Old Colony region for the next twenty years:

Figure 1-12: *Visioning Workshop at the Brockton* Library

- Vibrant communities – People live and work in vibrant communities where they can choose to walk for pleasure and to meet every day needs.
- Economic Prosperity – Current and future residents benefit from the region's sustained economic competiveness and prosperity.
- Safe and Reliable Transportation Choices – People have safe and reliable transportation choices that enhance their quality of life.
- Leadership on Climate Change – The region should take initiative in minimizing contributions to global warming
- Clean Air and Water – Current and future generations enjoy clean air, clean water, and healthy ecosystems.
- Equity – The benefits and burdens of growth and change are distributed equitably.

Plymouth Visioning Workshop

In the Plymouth workshop, attendees had the opportunity to express their opinion on the four topics of discussion presented by OCPC staff. The workshop took place in the Plymouth Main Library with an attendance of approximately 20 people. The workshop was advertised in advance to local government agencies, supermarkets, local businesses, local newspapers and radio stations. The following list summarizes the input received on the four key transportation related themes at the Plymouth workshop.

Figure 1-13: *Visioning Workshop at the Plymouth* Library

Efforts to lessen carbon footprint:

- Work from home or compressed work week will reduce greenhouse gas emissions
- The use of efficient bulbs can make a big difference
- Trip consolidation. Combining trips helps reducing fossil fuel usage

- Carpooling will reduce the number of vehicles on the road. Advertise the Guarantee Ride Home (GRH) incentives for carpoolers
- Continue promoting fuel efficient vehicles
- People will look at options to live closer to work
- Some people will find the option of bicycling to work at least once a week
- Towns should continue encouraging mixed use in the town centers
- Trip consolidation will be an option
- People will slow down on the road to save some gas

Comments on Livability and Sustainability:

- Communities should be broken down into neighborhoods that have an identity
- The five Plymouth village centers should be neighborhoods that offer shopping, work places, etc.
- Encourage levels of government to make livability and sustainability options affordable
- Need a substantial sidewalk network in Plymouth
- Federal funding needs to stop being spent on addressing automobile traffic issues and instead be spent on pedestrians/transit/bicycle
- Increase mix of housing opportunities by affordability
- Offer incentives to employees to live closer to work
- There should be signage for bikeways and bike racks in communities
- Need to address safety issues on roads – fix the most hazardous intersections
- Need an implementation plan for regional transit
- Improve people connectivity and multi-modalism
- Maintain and preserve the public transit system
- Maximize use of federal transit dollars

Comments on Regional Mobility:

- Long Pond Road is part of the Saltonstall Regional Bicycle Trail; however, this road is dangerous for bicyclists (as well as walkers) due to the narrowness of the road, heavy vehicle volumes, and the speed of motorists.
- Long Pond Road should have as a long term improvement a dedicated bicycle/pedestrian path separate from the road.
- The commuter rail in Plymouth should be extended to Sandwich on Cape Cod, and there should be a station at Pine Hills, Plymouth.
- Peak Hour service is not convenient at Plymouth Commuter Rail Station at Cordage Park, the peak frequency of trains should be extended, and the commuter rail service should be extended to downtown Plymouth so that people and tourists from South Station in Boston should not be left stranded at Cordage Park.
- The 20 Year Plan should address and prioritize the traffic congested hot spots in Plymouth and Kingston. The worst and projected worst should be prioritized.
- The congestion on Route 3 in Plymouth and Kingston should be addressed by fixing the bottleneck at the I-93/Route 3 split in Braintree, which causes the back-ups on the Route 3 corridor. Start there and work on the congestion southward.
- The RTP should include an origin study of commuters at the Kingston Commuter Rail Station to determine the need for commuter rail extension in Plymouth and surrounding communities.

- Extend and expand transit in both the long term (commuter rail) and short term (shuttle bus) to connect Cordage Park, by shuttle bus, to Downtown Plymouth and other destinations.
- Connect Boston to Plymouth by boat and ferry.
- Upgrade transit amenities, regarding physical amenities, such as bus shelters and benches, convenience, and also marketing and access to information regarding available service.
- Plymouth needs an overall plan to create strategies for mass transit that better serve the public for convenience, better service, and dissemination of information to the public regarding service.
- Exit 5 on Route 3 is routinely congested during the peak hour.
- Bridgewater Center is a major bottleneck for vehicular travel to and from the Brockton area, especially when Bridgewater State University is in session.

Comments on Safety and Security:

- Safe passage for pedestrians and bicyclists throughout the region
    - Bicycle connections between North Plymouth (Cordage / Seaside Trail) to other areas of Plymouth, including the State Forest
- The Regional Transportation Plan needs to address implementation of improvements at all top 5% crash clusters in the Old Colony Region
- Many of the area interchanges need to be redesigned and/or reconfigured, including
    - Route 3 @ Route 44 (exit 7)
    - Route 3 @ Samoset Street (Exit 6)
    - Route 3 @ Plimoth Plantation Highway (Exit 4)
    - Route 3 @ Route 3A (Exit 10)
    - Route 3 @ Long Pond Road (Exit 5)
    - Route 24 @ Route 495
- STOP signs used in conjunction with traffic signals at off-ramps that are confusing and dangerous
- Bike storage needed at Town Halls and other major trip generating sites
- According to the Federal government, 25 lives per year could be saved in Massachusetts with a Primary Seatbelt Use Law
- Mid-block crosswalks need to be better designed, and consistent
- Local jurisdictions need more control over roadways, and leeway from the MUTCD
- Travel speeds and sight distances are a major problem at Samoset Street and Marc Drive in Plymouth
    - Many pedestrian crossings over a very wide Samoset Street west of Route 3
- The closing of rest areas is a concern, particularly in light of the issue of distracted driving and fatigued driving
    - Security can be controlled at rest areas through lighting and surveillance video

Table 1-1: 2010 Regional Visioning Workshops

Location	Date	Time
Brockton Main Library	June 28	7-8:30pm
Plymouth Main Library	August 18	7-8:30pm

Open House Events

The open house events were designed for people to come in and interact with the OCPC staff and at the same time to learn about new initiatives in the region. With this method, the public feels more comfortable sharing information and opinions that will support the development of the Regional Transportation Plan. The open house events were offered during different times and locations to capture different audiences.

Figure 1-14: *Open House at the Peruvian Place Restaurant*

The following list of comments summarizes some of the input received during the open houses:

- Improve pedestrian crossing at the Montello Station
- Need a dedicated left turn lane at Oak and Pearl Streets
- Connect BAT and GATRA bus systems to create more job opportunities
- Coordinate commuter rail and bus schedules especially during peak commuting hours
- Improve safety in public parks
- Extend bus services on weekends and holidays

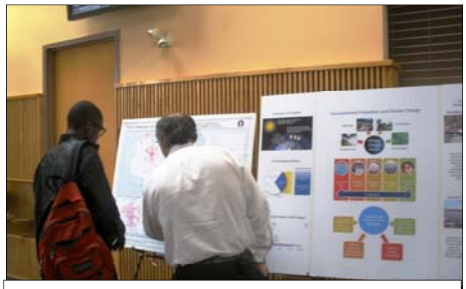


Figure 1-15: *Open House at BAT Intermodal Centre*

Table 1-2: 2010 Open House Events

Location	Date	Time
The Peruvian Place Restaurant	July 14	5-7pm
OCPC Office	July 28	8:30-4pm
BAT Terminal	August 25	3-6pm

Table Events

The table events were designed to display preliminary RTP findings and products during different activities. These activities included attending one of the Brockton Rox Baseball game, shopping malls, colleges and local supermarkets. Similar to the open house events, table events were designed with the purpose of engaging the public in an informally manner to learn more about new projects and initiatives in the region. The following list shows the table events organized during the plan update.

Figure 1-16: *Table Event at the Brockton Rox Stadium*

Table 1-3: 2010 Table Events

Location	Date	Time
Baseball game: Brockton Rox vs Pittsfield	July 21	5:30-7:30pm
Independence Mall	July 24	4-7pm
Westgate Mall	September 4	4-7pm
Bridgewater State University	September 21	11-3pm
Massasoit Community College	September 22	11-3pm

1.9 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 identify and resolve 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.

Inclusive Public Participation

These are specific examples on how the Old Colony Planning Council reaches out to minority communities on an ongoing basis:

- Community Connections: Monthly newsletter (newsletter goes to 700 businesses and includes laundry mats, grocery stores, supermarkets, etc.), free quarterly magazine (magazines go to 5,000 locations and includes hospitals, medical centers, schools and universities, employment centers, drug stores, etc.), mass email to minority leaders and interested parties (approx. 1,000 email addresses)
- Yearly meetings with: Stairway to Recover, Adult Education Center, BAT Intermodal Centre, Councils on Aging, Brockton Mass in Motion, and Latin American Health Institute
- Advertise in Ethnic Media: An ad inviting the public to participate in the decision making process of the MPO is placed on WJFD 97.3 FM during the commute peak hours (7-9am and 4-6pm) for one month. WJFD 97.3 FM is a Portuguese radio station that covers the Old Colony region and is popular with the Cape Verdean population. A Spanish ad was also place in the LATINA 100.3 FM during the commute peak hours (7-9am and 4-6pm) for 1 month.

Meeting with Minority Group

- **Stairway to Recovery/Latin American Health Institute Meeting**. Input received at these meetings are summarized as follow:
  - The pedestrian push button at Main Street and Court Street does not function properly at all the time specially when it snows or rains
  - There is a need for exclusive bicycle paths/multi-use pedestrian and bicycle
  - There is a need for more affordable housing in Brockton near the BAT Intermodal Centre
  - There is no alternative transportation in West Bridgewater
  - There is no east-west transit connection. If people want to go to Plymouth, they have to go to Boston and then transfer to a train to Kingston or Plymouth (not too frequent)
  - There is a need for bicycle parking in the following locations:
    - Westgate Mall
    - D.W Field Park
    - Massasoit Community College
    - BAT Center
    - City Hall
    - Wal-Mart

***Figure 1.17**: Meeting held at the Stairway to Recovery/Latin American Health Institute*

Stakeholder Participation in Forms other than Writing

- Radio interviews were held on 95.9 WATD FM and 1460 WXBR AM before and after the Regional Transportation Plan visioning workshops
- An ad inviting the public to participate in the decision making process of the MPO was placed in LATINA 100.3 FM and WJFD 97.3 FM during the commute peak hours (7-9am and 4-6pm) for 1 month during June and July 2011.
- Focus meeting/interviews with minority group such as Stairway to Recovery, Adult Education Center, Chamber of Commerce, Area Agency on Aging, and Latin American Health Institute
- Table events, open house meetings, and visioning workshops

Figure 1-18: *Radio interview after the Plymouth Visioning Workshop*

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 RTP 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 RTP 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.

The examination of benefits and burdens will help to determine that no RTP projects will result in adverse impacts to the Environmental Justice Areas in the Old Colony region.

An assessment of the benefits and burdens of the Transportation Improvement Program (TIP) was completed to identify all regionally significant projects constructed and/ or programmed in the Old Colony Transportation Improvement Program during the period of 2004 – 2014. Constructed projects funded through the TIP were included to provide a benchmark of investments. Transportation Improvement Program and analyzed the location of these improvements relative to locations of minority and low-income populations. For the purposes of identifying these populations, the staff utilized the MassGIS Environmental Justice GIS Shape file. Polygons in the Environmental Justice (EJ) Populations layer represent neighborhoods across the state with high minority, non-English speaking, low-income, and foreign-born populations. Data in this layer were derived from Summary File 3 at the block group level (Summary Level 150) from 2000 U.S. Census data).

Regionally, it was determined that about 46.7% of the identified improvement projects, representing approximately 47.6 percent of the identified investment dollars on the FFY 2011-2014 TIP are located in or immediately adjacent to EJ communities. This exceeds the 25.9 percent of the region's population identified as living in EJ communities as documented in Table 3. Non-mappable projects, such as transit vehicle replacements or rehabilitations, 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 shopping centers.

Table 1-4: Investment Value of TIP Projects 2011-2014 (Programmed and Planned)

Type	Population Represented in EJ Communities (2000)	Percent Population Represented	TIP Project Investment	Percent Projects in EJ/ Non EJ Communities by Total Investment ($)
Within EJ Communities	83,272	25.9%	$13,550,166	47.6%
Outside EJ Communities	238,243	74.1%	$14,898,277	52.4%
Totals	321,515	100.0%	$28,448,443	100%

OCPC undertook further analysis to determine the level of investments during the period of 2004-2010 through previous Transportation Improvement Programs. From that analysis, it was concluded that about 43.3 percent of the identified improvement projects, representing approximately 46.5 percent of the identified investment dollars allocated during the TIP years of 2004-2010 are located in or immediately adjacent to EJ communities. This exceeds the 25.9 percent of the region's population identified as living in EJ communities (Table 4).

Table 1-5: Investment Value of TIP Projects 2004 - 2010 (Projects Implemented)

Type	Population Represented in EJ Communities (2000)	Percent Population Represented	TIP Project Investment	Percent Projects in EJ/ Non EJ Communities by Total Investment ($)
Within EJ Communities	83,272	25.9%	$44,777,527	46.5%
Outside EJ Communities	238,243	74.1%	$51,604,276	53.5%
Totals	321,515	100.0%	$96,381,802	100%

As such, from the review, it may be concluded that the public investment and involvement in the regional transportation planning process and the resultant FFY 2011-2014 Transportation Improvement Program and previous TIPs (dating back to 2004 demonstrate that the benefits of the regional transportation planning process accrue to both EJ and Non-EJ communities. Low-income and minority populations are not disproportionately impacted and are beneficiaries of the transportation planning process in the Old Colony Region.

As a result, the Old Colony Planning Council continues to work with our regional partners in the advancement of environmental justice principles throughout the regional planning process. Such analyses will be conducted annually and included in the endorsed TIP.

2.0 Introduction

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), and the stakeholders in the transportation system. The mission and the related goals, objectives, and performance measures reflect directly and expand upon the planning factors prescribed in federal SAFETEA-LU legislation. In addition, these regional goals and policies are consistent with the vision of the Commonwealth of Massachusetts and of the communities of the Old Colony Region.

2.1 Mission

The Regional Transportation Plan (RTP) 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 Regional 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 2012 Regional 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 Regional 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 environmental impacts and clearly understanding land use implications through effective planning/policy and local/regional coordination.

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, and with transportation agencies that take responsibility for their actions*

2.2 Goals and Objectives

These goals and objectives were developed to guide the region's transportation planning activities through the near future, as were the performance measures that work towards achieving these goals and objectives. The goals and objectives include:

Goal 1: Enhance and Protect Regional Mobility

Objectives:

- Focusing on transit, highway, and bridge preservation and maintenance
- Targeting improvements to the most critical bottlenecks
- Promoting multimodal transportation centers that serve business, residential, and mixed-use developments
- Improving roadway network efficiency, access management, and capacity
- Maintaining and improving transit system efficiency and capacity
- Improving human service coordination, mobility, and accessibility for elderly, youth and disabled populations
- Expanding bicycle and pedestrian infrastructure networks and amenities in the region

Goal 2: Foster Sustainable, Healthy, and Livable Communities

Objectives:

- Revitalizing downtown and town centers with economic development planning
- Integrating transit, bicycle, and pedestrian amenities into residential and commercial/industrial developments
- Promoting efficient urban designs that create more human-scale, aesthetically pleasing environments and open spaces near all neighborhoods
- Supporting concentrated developments to reduce trips
- Developing transportation policies that support healthy lifestyles

Goal 3: Ensure Equity and Adequate Public Participation

Objectives

- Developing inclusive task forces on new and existing regional initiatives
- Promoting public and private collaboration with meaningful community participation
- Providing equitable access to transportation choices
- Distributing burdens and benefits fairly in the region
- Promoting partnerships with other agencies with similar goals and objectives
- Continuing coordination of transportation and housing programs to promote affordable housing near transit
- Supporting transportation improvement projects that include Environmental Management Systems and Context-Sensitive-Solutions

Goal 4: Enhance Safety and Security

Objectives

- Promoting programs, services, and projects that maximize safety through the use of Intelligent Transportation System Technologies, new technologies, and transportation systems management and operations
- Reducing the number of crashes and the severe injuries and fatalities
- Protecting the viability of transportation infrastructure to emergency response and evacuations
- Providing consistent safety maintenance for motorized and non-motorized transportation modes

Goal 5: Promote Environmental Protection and Climate Change Adaptation

Objectives

- Reducing vehicular combustion engine emissions
- Increasing the use of transit, carpool/vanpool, and non-motorized transportation modes such as bicycling and walking
- Supporting investments that clean up brownfields and avoid investments that increase pressure to develop greenfields
- Encouraging the use of clean alternative fuels and recyclable material for new transportation infrastructure
- Promoting preventative methods to lessen the possible effects of natural disasters caused by climate change

Goal 6: Promote Policies that Ensure Economic Vitality and Sustainability

Objectives

- Prioritizing investments that achieve multiple goals
- Supporting economic competiveness by promoting public and private collaboration
- Revitalizing downtown and town centers by continuing the promotion of Transit Oriented Development
- Maximizing supplemental funding opportunities to improve self-sustainability of the transportation system

Goal 7: Pursue the GreenDOT Vision and achieve the three GreenDOT goals

- Work with MassDOT to address short- and long-term greenhouse gas emissions at every stage of planning, construction, and operation of our transportation system in order to minimize climate disruption and its effects on the environment and on our region.
- Consider the needs of all our populations, regardless of mode choice or ability, in the planning of transportation facilities. We will be guided by the MassDOT Complete Streets design philosophy articulated in the Highway Division Project Development and Design Guide and the principles of safe and full access to and within transit, rail, and other transportation facilities.
- Distribute staff resources and define department objectives in a manner that ensures adequate attention to all customers and modes.

- Plan for our transportation system so that it supports smart growth development; this in turn will facilitate travel by the healthy transportation modes of walking, bicycling, and public transit; improve air quality; preserve the environment; and enhance quality of life for all of our region.
- Measure our performance toward the GreenDOT goals with a robust set of performance measures that evaluate sustainability and service to our customers – the users of our transportation facilities.

2.3 Performance Measures Identification Process

The 2012 Regional Transportation Plan's performance measures allow the Old Colony MPO to align its transportation planning program to its long range strategy, and to monitor performance toward strategic objectives over time.

A key responsibility of state and local governments is to develop and manage programs, services, and their related resources as efficiently and effectively as possible and to communicate the results of these efforts to the stakeholders. Performance measurement when linked to the budget and strategic planning process can assess accomplishments on an organization-wide basis. When used in the long-term planning and goals setting process and linked to the entity's mission, goals, and objectives, meaningful performance measurements can assist government officials and citizens in identifying financial and program results, evaluating past resource decisions, and facilitating qualitative improvements in future decisions regarding resource allocation and service delivery.

The following methods and tasks were developed during the performance measure identification process in the Old Colony MPO.

I. Identify Old Colony MPO transportation planning policies that currently lack performance measures.

Task #1: Develop a performance measures planning framework

- Compile and summarize goals, policies, and objectives from the State of Massachusetts and MPO transportation plans
- Identify goals and policies currently lacking adequate performance measures
- Conduct transportation performance measure literature search and prepare database of performance measures, classified by policy area, data requirements, and other characteristics.

II. Identify, develop, and recommend multi-modal transportation performance measures that:

- Can be readily implemented by OCPC, and MPO in its planning process, and can utilize current and planned forecasting tools;
- Address relevant local, state, and federal policies;
- Provide useful information to decision makers, help them discern among plan alternatives and investment options, and enable them to consider impacts on both the public in general and on various population segments;
- Allow performance to be measured as well as forecasted;
- Build upon recent research in transportation plan performance measurement; and
- Identify additional research opportunities.

Task #2: Select performance measures for detailed evaluation

- Develop selection and evaluation criteria
- Inventory State and MPO data and models
- Consult with JTC, MPO, MassDOT, FTA, EPA, DEP, and FHWA
- Summarize discussions and input, identify measures to evaluate
- Identify future research needs

III. Test the recommended performance measures using current MPO, OCPC and MassDOT transportation planning models. Evaluate the results.

Task #3: Develop tools to test the selected performance measures

- Develop application procedures, and scripts to evaluate existing MPO scenarios in terms of the selected measures

IV. Prepare final recommended performance measures.

Task #4: Evaluate measures, prepare final report

2.4 Old Colony MPO Performance Measures

The measures below represent the relationship between the outcomes of the 2012 Regional Transportation Plan objectives and the proposed sustainable transportation performance measures. The performance measures were identified and reviewed during the consultation process with the MPO, JTC as well as state and federal agencies.

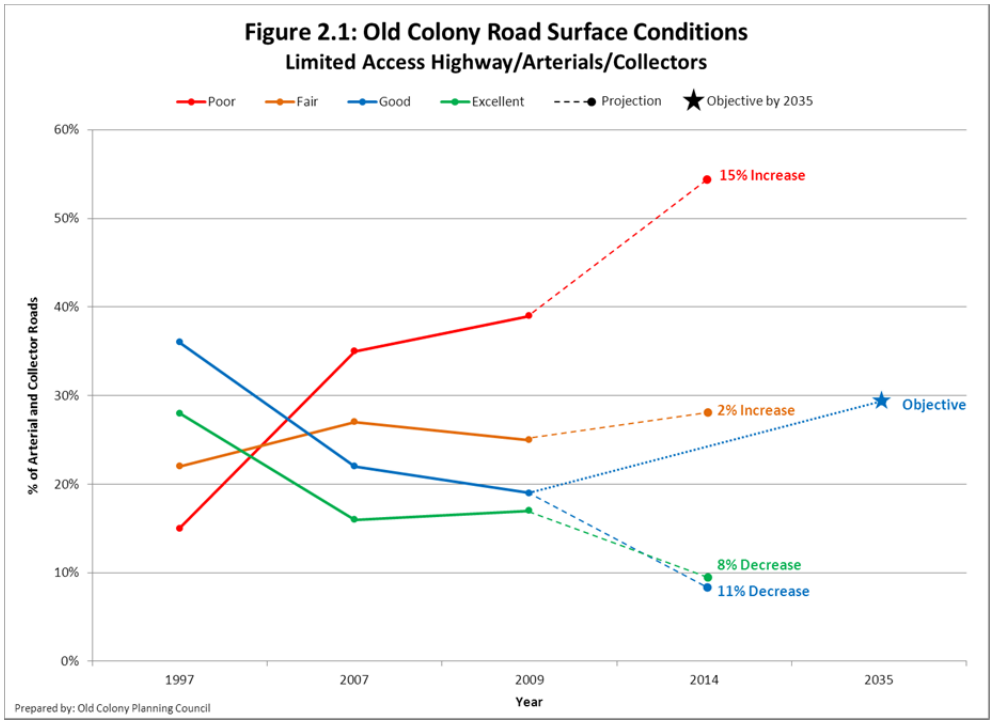
Goal 1: Enhance and Protect Regional Mobility

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
1 a. Maintained and preserved transit, highway and bridge infrastructure	- Pavement Management Inventory and bridge standard condition evaluation (PONTIS model) - Transit providers reports	- By 2035, increase the percent of roads, highways, and bridges with condition performance standards rated good by 10%. By 2035, stabilize, and reduce the percentage of roads rated as fair and poor - By 2035, replace 20% of exiting bus fleet with hybrid buses -By 2035, reduce average age of transit fleet by 20%
1 b. Improved roadway network efficiency, access management and capacity	- Highway delay / LOS - Congestion / LOS - V/C Ratio	- By 2035, 50% of identified bottlenecks in the Old Colony region will receive local planning technical assistance - By 2035, reduce highway delay and congestion by 20%
1 c. Increased bicycle and pedestrian infrastructure networks and amenities in the region	- Pedestrian Compatibility Index (pedestrian level of service) -Bicycle Compatibility Index (bicycle level of service)	- By 2015, determine bicycle and pedestrian short and long term infrastructure projects. - By 2020, complete 40% of short-term infrastructure projects identified in the 2011 Bicycle Connectivity Study - By 2035, implementing 50% of the identified long-term bicycle and pedestrian projects
1 d. Increased multimodal transportation centers (Transit Oriented Development) that serve business, residential, and mixed-use developments	- Support the development of TODs in Kingston, Plymouth, Bridgewater, Hanson, and Easton Commuter Rail stations	- By 2035, Kingston, Plymouth, Halifax, Hanson, Whitman, and Easton Commuter Rail stations will be TOD designated
1 e. Improved human service coordination, mobility, and accessibility for elderly, youth and disabled populations	- "New Freedom" Federal Transit Authority projects in the Old Colony Region - Environmental Justice Study	- By 2035, increase the number of "New Freedom" projects in the Old Colony Region by 20% compared to 2010 - By 2035, increase paratransit ridership by 10% compared to 2010
1 f. Improved transit system efficiency and capacity	- Transit time ratio - BAT, GATRA and MBTA Ridership data	- By 2035, increase in bus ridership in the Old Colony region by 10%. - By 2035, increase passenger miles at critical congestion locations by 20%

Responses to Contributing Factors

1a. Maintaining and preserving transit, highway, and bridge infrastructure

OCPC conducts a pavement management Inventory of the Federal Aid Eligible roads every four years. This inventory provides the latest conditions of the roadway system in the region. According to the pavement management inventory over the past 10 years, the road surface condition projections for 2014 show an increase of poor condition roadways by 15 percent, a 2 percent increase in fair condition, a decrease of good condition roads by 11 percent, and an 8 percent decrease in excellent condition surface roadway. This continued decline in pavement conditions demonstrates the need for additional investment in order to slow the decline, let alone reverse the negative trend. By 2035, an increase in the percentage of roads, highways, and bridges in good condition by 10% is one of the goals of the MPO in 2011. In terms of maintaining and preserving transit services, by 2035, the MPO has the goal of replacing 20% of existing bus fleet with hybrid buses. In late 2010, BAT added three hybrid buses into its fleet. As part of its system preservation program, BAT will continue to work on replacing the existing fleet with newer and more fuel efficient vehicles.



1b. Improving roadway network efficiency, access management, and capacity

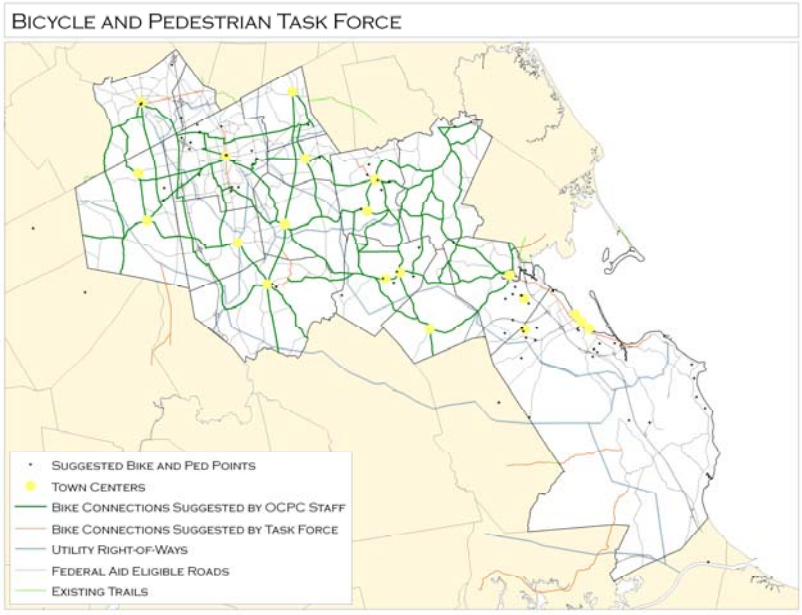
As part of the 2010 Bottleneck Identification Study, OCPC identified the most congested locations. The screening process consisted of selecting congested areas in limited access highways and interchanges, major and minor arterials, and in town centers and downtowns. There were 31 locations identified, and the top location from each category was taken to Phase Two. Phase Two consists of a more in-depth analysis, which will provide a set of potential recommendations for each. Each location will have a working group consisting of local officials, residents, and business owners that will contribute to defining and prioritizing the recommendations. By 2035, the goal is to provide local technical assistance to at least 50 percent of the bottleneck locations. By 2035, the goal is to reduce traffic delay and congestion by 20 percent.

Table 2-1: Bottleneck Locations in the Old Colony Region

Bottleneck Facility	Bottleneck Types (Cause)
Limited Access Highway Interchanges	
AmVets Memorial Highway (Route 24) & Interstate 495 - Exit 14	Demand surge/ merges/weaves/narrow lanes
AmVets Memorial Highway (Route 24) & Pleasant Street (Route 104) - Exit 15	Demand surge/ merges
AmVets Memorial Highway (Route 24) & West Center Street (Route 106) - Exit 16	Demand surge/ merges
AmVets Memorial Highway (Route 24) & Belmont Street (Route 123) - Exit 17	Demand surge/ merges
AmVets Memorial Highway (Route 24) & Reynolds Memorial Highway (Route 27) - Exit 18	Demand surge/ merges
AmVets Memorial Highway (Route 24) & Harrison Boulevard/Central Street - Exit 19	Demand surge/ merges
AmVets Memorial Highway (Route 24) & Lindelof Avenue (Route 139) - Exit 20	Demand surge/ merges
Pilgrim Highway (Route 3) & Long Pond Road - Exit 5	Demand Surge
Pilgrim Highway (Route 3) & Samoset Street (Route 44) SB - Exit 6A	Demand Surge
Pilgrim Highway (Route 3) & Samoset Street SB - Exit 6B	Demand Surge – Lane drop
Pilgrim Highway (Route 3) & Smiths Lane - Exit 8	Demand Surge
Pilgrim Highway (Route 3) & Main Street (Route 3A) - Exit 9	Demand surge
Pilgrim Highway (Route 3) & Church Street (Route 139) – Exit 12	Demand surge
Arterials	
Route 3A Kingston – Railroad Tracks to Route 3	
Route 3A Plymouth – Cherry Street to South Street	
Route 18 - Abington from Weymouth Town Line to Whitman Town Line	Lane drop
Route 106 West Bridgewater from Route 138 (Easton) to Route 28 (W. Bridgewater Center)	
Route 106 Halifax from Route 58 to Route 105	
Route 123 Brockton from Route 138 (Easton) to Route 28	
Central Street - Stoughton and Avon	Signal
Route 27 Stoughton from West Street to Main Street	
Route 27 Stoughton from Town Center to Brockton	
Route 27 Brockton from West Street to Downtown to Route 14	
Route 138 Stoughton from Canton Town Line to Main Street	
Central Street Stoughton Route 27 to Avon Town Line	
Main Street Brockton – Howard Street to Plain Street	
City/ Town Centers	
Stoughton Square	Signal/ Systematic
East Bridgewater Center	Signal/ Systematic
West Bridgewater Center	Signal
Bridgewater Center	Signal/Traffic Control (Systematic)
Whitman Center	Intersection
Downtown Brockton	One way roads

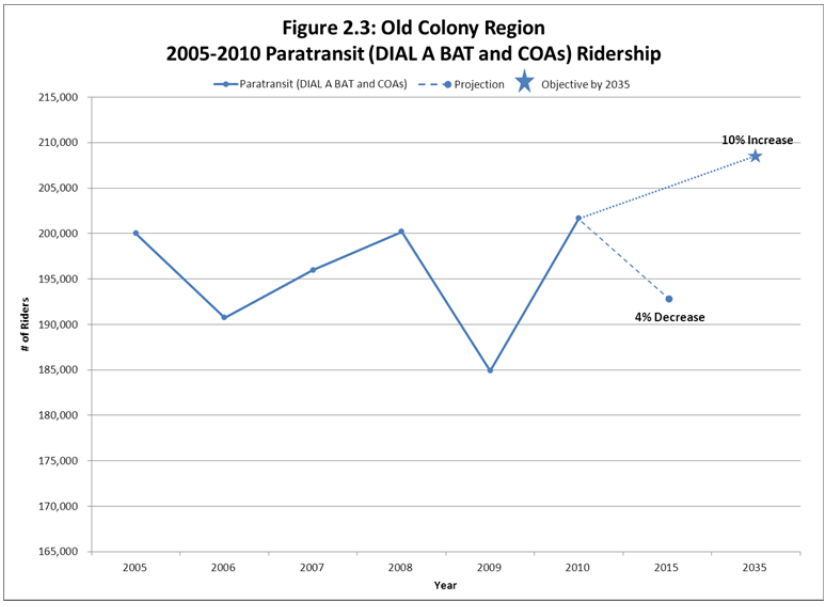
1c. Increasing bicycle and pedestrian infrastructure networks and amenities in the region

As part of the 2011 Regional Bicycle and Pedestrian Connectivity Study, a list of bicycle and pedestrian short and long term infrastructure projects will be identified by 2012. By 2020, the goal is to complete 40 percent of the short-term projects using local, state and federal funding. In the long run, by 2035, implementing50 percent of the identified long-term projects is the goal. These efforts will be carefully coordinated with the Old Colony Regional Bicycle and Pedestrian Task Force, which involves a diverse group of residents and agencies from different affiliations. The map illustrates the locations where the OCPC staff will be conducting data collection and analysis in order to prioritize projects.



1d. Increasing multimodal transportation centers (Transit Oriented Development) that serves business, residential, and mixed-use developments

The Old Colony Regional Technology Center Economic Target Area, which includes the Towns of Bridgewater, East Bridgewater, Halifax, Hanson, Kingston, Pembroke, Plympton, and Whitman, created by the Old Colony Planning Council and approved by the MA Economic Assistance Coordinating Council in November, 2010, will help build livable communities by assisting in local business development, expansion and job creation, expanding educational opportunities for workers, and supporting expanded business access to markets. These efforts will contribute to the designation of Transit Oriented Development districts in Kingston, Halifax, Hanson, and Whitman. The Town of Plymouth has approved a 40R development in the close proximity of the commuter rail station, and the Town of Easton is working with the South Coast Rail Project to explore



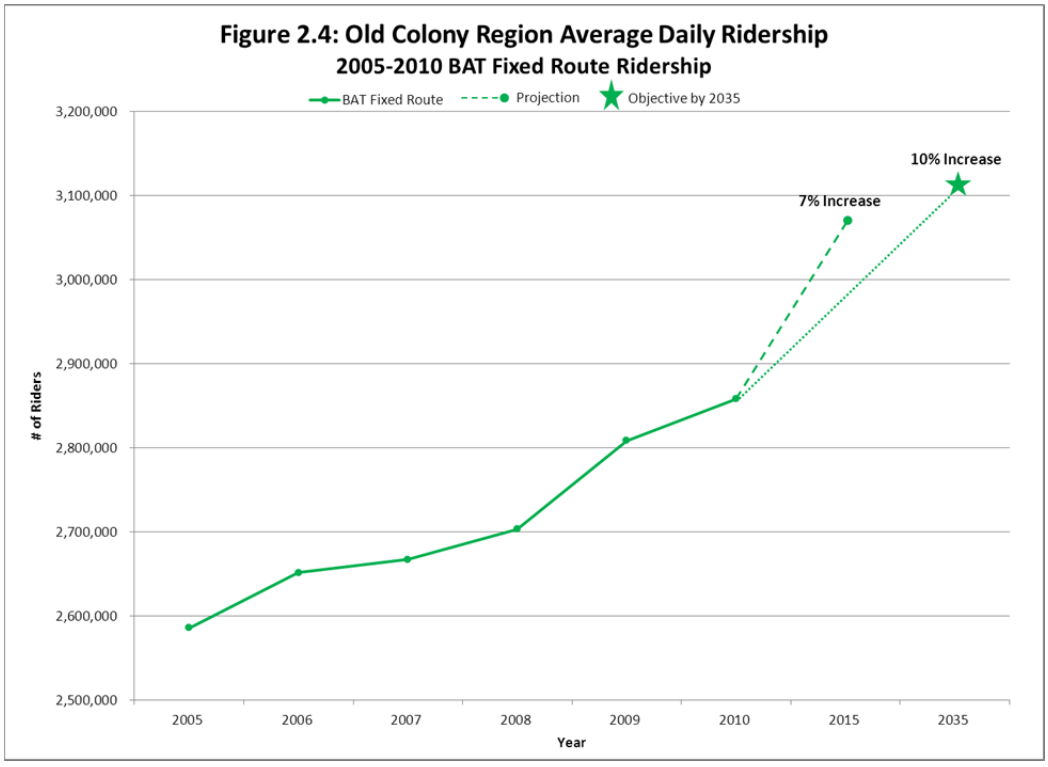
TOD/opportunities for Smart Growth in the two proposed stations. The Stoughton TOD bylaw has already been enacted but studies for future station configuration and traffic improvements continue under development.

1e. Improving human service coordination, mobility, and accessibility for elderly, youth, and disabled populations

Based on the number of "New Freedom" applications received in 2010, and the funding available for paratransit service, the goal for 2012 and beyond is to promote federal transit programs to serve elderly, youth, and disabled populations. According to the linear projected trend of the paratransit ridership of the past 5 years (2005-2010), by 2015 the Old Colony region will slightly decrease in paratransit ridership (see figure 2.3). It is important to mention that in 2009 the region experienced a drastic drop of paratransit riders, thus the short term forecast may have been skewed by the data anomaly. By 2035, the goal is to increase the paratransit ridership of the underserved, elderly, and disabled populations by 10 percent compared to 2010 as part of meeting unserved needs.

1f. Improving transit system efficiency and capacity

The fixed route ridership of BAT is projected to increase by 7.5 percent by 2015 according to the 2005-2010 projected linear trends (see figure 2.4). BAT provides the fixed route services in the Greater Brockton Metropolitan Area supplemented by GATRA's PAL and SAIL service, and the recently added Pembroke – Hanson shuttle service. By 2035, the goal is to increase fixed route ridership by10 percent in the Old Colony Region. By 2035, the goal is to increase passenger miles at critical congestion locations by 20 percent.



Goal 2: Foster Sustainable, Healthy, and Livable Communities

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
2a. Increased access to convenient and affordable transportation choices	-Transit services in non-urbanized areas -Transit seat-miles in environmental justice areas	- By 2035, increase transit services in suburban areas - By 2035, increase transit seat-miles in environmental justice areas
2b. Improved transit and vehicular options and reliability	- Commuter rail ridership by station - Number of additional bus routes - Number of Additional commuter rail routes - Number of shared car services	-By 2035, the commuter rail ridership will increase at the projected trends' pace - By 2035, 70% of the Old Colony region will have fixed route transit services -By 2035, shared car services (e.g. zip car) will be introduced in the Old Colony region's intermodal centers, downtowns, and disperse in areas of demand service
2c. Improved networks that accommodate pedestrians and bicycles	- Pedestrian Compatibility Index (pedestrian level of service) -Bicycle Compatibility Index (bicycle level of service)	- By 2035, create a contiguous, region-wide network of sidewalks, walkways, bicycle paths, and bicycle lanes - By 2035, bring Pedestrian Level of Service B or better at intersections with high pedestrian activity
2d. Improved access to transportation for special needs populations and individuals with disabilities	- Percent of bus fleets compliant with the Americans with Disabilities Act (ADA) - Percent of transit stations compliant with the ADA	-By 2020, all transit services in the Old Colony Region will comply with the American Disability Act. -By 2020, all transit stations will compliant with ADA
2e. Revitalized downtowns and town centers	- Additional mixed-used developments with bicycle and pedestrian amenities in downtowns and town centers	- Support local initiatives, which enact, implement and enforce laws and regulations regarding pedestrian and bicycle traffic in downtowns. - Support policies that encourage cluster development. - By 2035, Kingston, Plymouth, Hanson, Whitman, and Easton Commuter Rail stations will be in designated TOD

Response to Contributing Factors

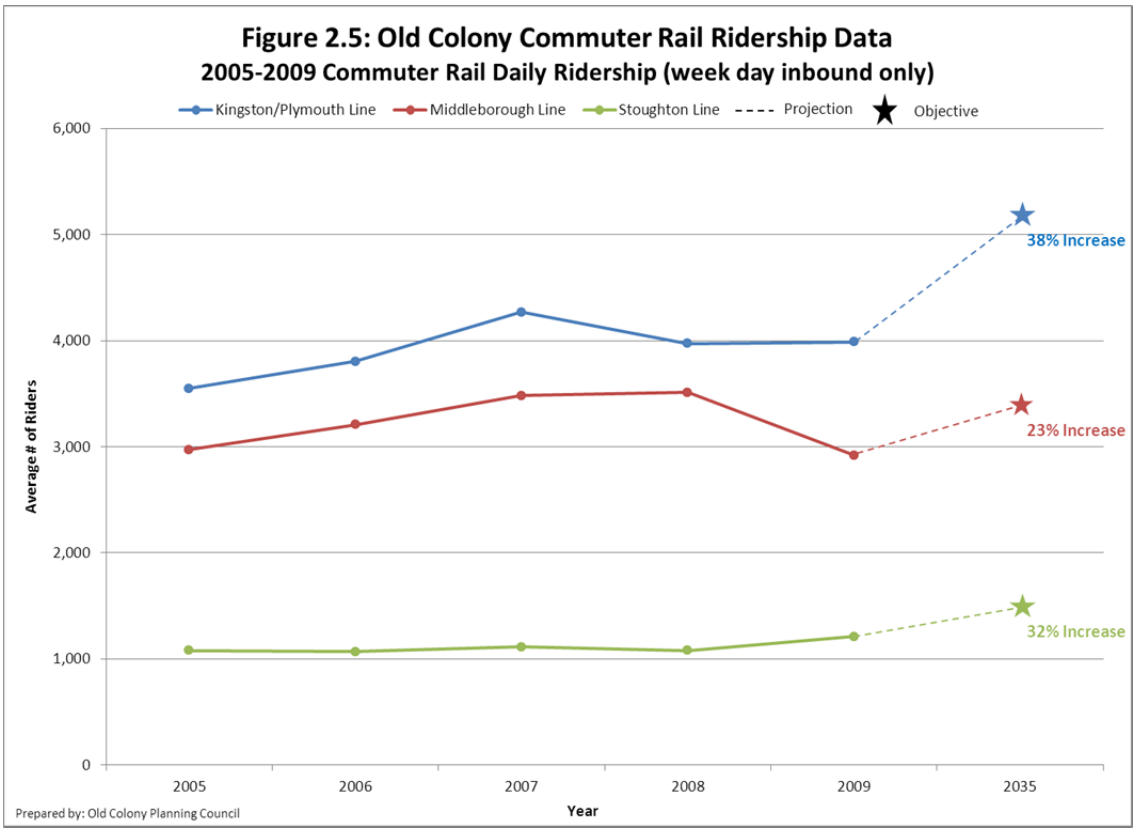
2a. Increasing access to convenient and affordable transportation choices

The BAT, the MBTA, and the GATRA are the transit agencies providing bus fixed route and commuter rail services in the Old Colony Region. These agencies are participating in the efforts to connect suburban neighborhoods to more urbanized areas with transit services.

2b. Improving transit and vehicular options and reliability

According to the MBTA's 2009 weekday inbound ridership data on the Old Colony commuter rail lines, the Kingston/Plymouth line has around 4,000 daily commuter riders; the Middleborough line around 3,000 riders; and the Stoughton line around 1,200 daily inbound riders. Assuming that most of inbound trips are round trips, the number of commuter rail riders could be doubled. According to the 2005 to

2009 linear trend projections, by 2035 the Kingston/Plymouth commuter line will increase its ridership by 38 percent; the Middleborough line by 23 percent; and, the Stoughton line by 32 percent. The Old Colony MPO goal for 2035 is to increase its commuter rail line ridership by the projected trends. In addition, the South Coast Rail project proposal, which will potentially traverse the Old Colony region via Stoughton and Easton, is an initiative to meet the existing and future demand for public transportation between New Bedford and Fall River and the Boston area. For the Old Colony MPO region, the South Coast Rail proposal will increase the frequency of services in Stoughton and will add more travel destinations for its residents, and increase the number of commuter rail riders by 2035.



2c. Improving networks that accommodate pedestrians and bicyclists

As part of the Bicycle and Pedestrian Connectivity and Livability Study, the Old Colony Planning Council is developing a complete inventory of Bicycle Levels of Service (BLOS), Pedestrian Levels of Service (PLOS), and Pedestrian Infrastructure Indices (PII) on the state numbered route network and other roadways identified as priority routes by community representatives and/or the Regional Bicycle and Pedestrian Task Force members. OCPC Staff will maintain this inventory on a continuing basis, updating information as it becomes available and as existing infrastructure changes. By 2035, the Old Colony MPO will create a contiguous, region-wide network of bicycle paths and bicycle lanes, and locally complete sidewalk system. In addition, the MPO will bring intersections with high pedestrian activity to pedestrian level of service B or better.

2d. Improving access to transportation for special needs populations and individuals with disabilities

The short term goal of the Old Colony MPO is to ensure that all transit services and transit stations in the region will comply with the American with Disabilities Act.

Figure 2-6: Example of Bicycle and Pedestrian Level of Service Findings

2e. Revitalizing downtowns and town centers

Integrate land uses with well-connected transportation systems to develop a transit environment that provides timely access to a wide-range of jobs, services, education, and recreational opportunities is the ultimate goal of the Old Colony MPO. By 2035, the Old Colony MPO has set the goal of designating Plymouth, Hanson, Whitman, Kingston, and Easton stations as official Transit Oriented Developments. The basic provisions of Cluster Development, Transit Oriented Developments (TOD), mixed-used CBD zoning, Transferable Development Rights (TDR), Chapter 40R planned mixed use development district, and Planned Unit Development (PUD) in the Old Colony communities will support the revitalization of downtowns and town centers in the Old colony Communities.

Goal 3: Ensure Equity and Public Participation

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
3 a. Improved equitable mobility and access to jobs, education, and services for low-income and minority residents, the elderly and youth	-TIP projects -MBTA, BAT, and GATRA yearly progress reports	- Eliminate to zero the negative impacts of transportation infrastructure on low-income and minority neighborhoods - Increase capacity and frequency for transit services by 20 percent in environmental justice areas by 2035
3 b. Improved public participation and awareness of new initiatives and programs	- Number of active multidisciplinary task forces -Number of surveys and feedback forms during the year	-Meet quarterly with stakeholders and the public to discuss key Environmental Justice issues on Sustainability and Livability, bicycle and pedestrian, regional mobility, and climate change -Develop surveys during the year to collect public opinion on different transportation issues
3 c. Partnered with other agencies with similar goals and objectives	-List of existing and potential partners	-Extended partnerships with agencies that have similar goals and objectives

Response to Contributing Factors

3a. Improving equitable mobility and access to jobs, education, and services for low-income and minority residents, the elderly, and youth

Transportation investments frequently have mixed impacts. While the completed project generally has a positive impact for users, the construction and implementation phases commonly impose negative impacts on both users and proximate residents. A major focus of transportation facilities is to move users from a starting point to an ending destination; however, there can be a mismatch between the

intervening population who experience the negative impacts of construction (in the form of temporary disruptions, noise, and air pollution) and those who reap the benefits of the completed facility. Historically, mismatches have frequently occurred where highways connecting suburbs to business districts were constructed through minority or low-income neighborhoods, imposing a burden on neighborhood residents who reaped little or none of the benefit. This raises concerns about equity, particularly when specific groups (e.g. minority or low-income) are systematically impacted. The Old Colony MPO goal is to eliminate completely the negative impacts of existing and added transportation infrastructure on low-income and minority neighborhoods and to decrease travel time, and add capacity and frequency for transit services by 20 percent in environmental justice areas by 2035.

3b. Improving public participation and awareness of new initiatives and programs

In order to improve public consideration of issues and to maximize citizen involvement, the Old Colony MPO will continue developing diverse activities to keep the public engaged and informed regarding on-going transportation and comprehensive planning efforts in the region. The Old Colony MPO's goal is to maintain regional task forces with topics that play important roles to transportation and land use planning decisions. In addition, every project and study developed by the Old Colony MPO will have a public survey. These surveys will be designated to educate the public on new initiatives as well as to obtain people's input.

3c. Partnering with other agencies with similar goals and objectives

The Old Colony MPO has demonstrated a strong partnership with private and public local transit agencies (MBTA, BAT, GATRA, and SSCAC), MassDOT, FTA, FHWA, housing authorities, Chambers of Commerce (Metro South, Plymouth, and South Shore), educational institutions, and local businesses in the decision making process. The Old Colony MPO will continue these partnerships in the future and will continue reaching out to other agencies with similar goals and objectives.

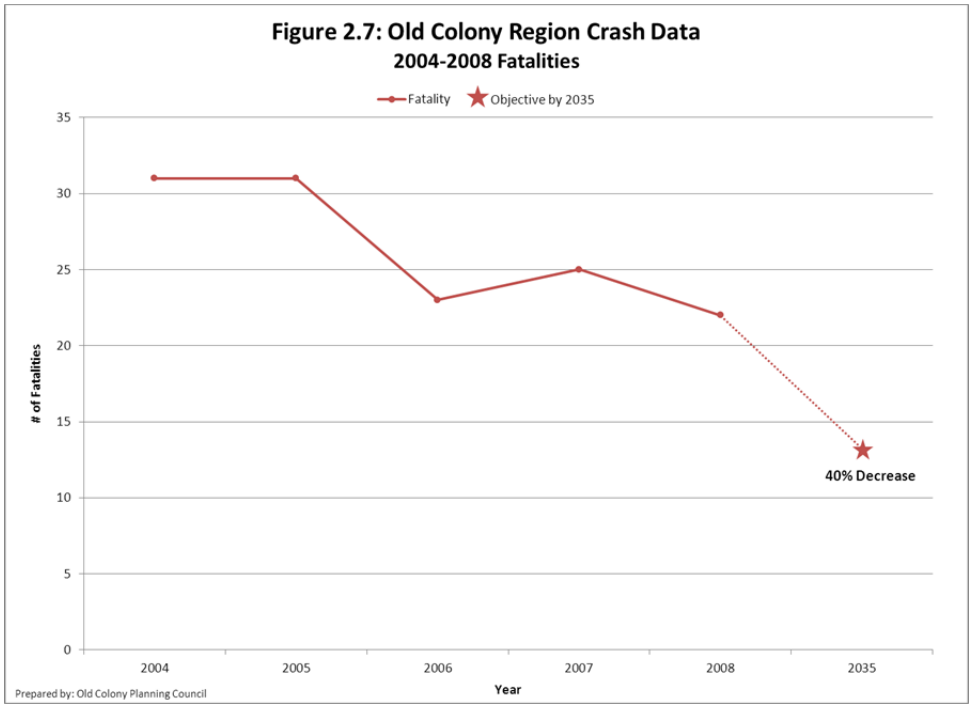
Goal 4: Improve Transportation Safety and Security

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
4 a. Reduced transportation-related fatalities	-Annual crash data report -Road safety audits	- Reduce the number of transportation-related fatalities in the Old Colony region by 40 percent in 2035 compared to 2008.
4 b. Reduced transportation-related injuries	-Annual crash data report -Road safety audits	- Reduce the number of transportation-related accidents in the Old Colony region by 20 percent in 2035 compared to 2008.

Response to Contributing Factors

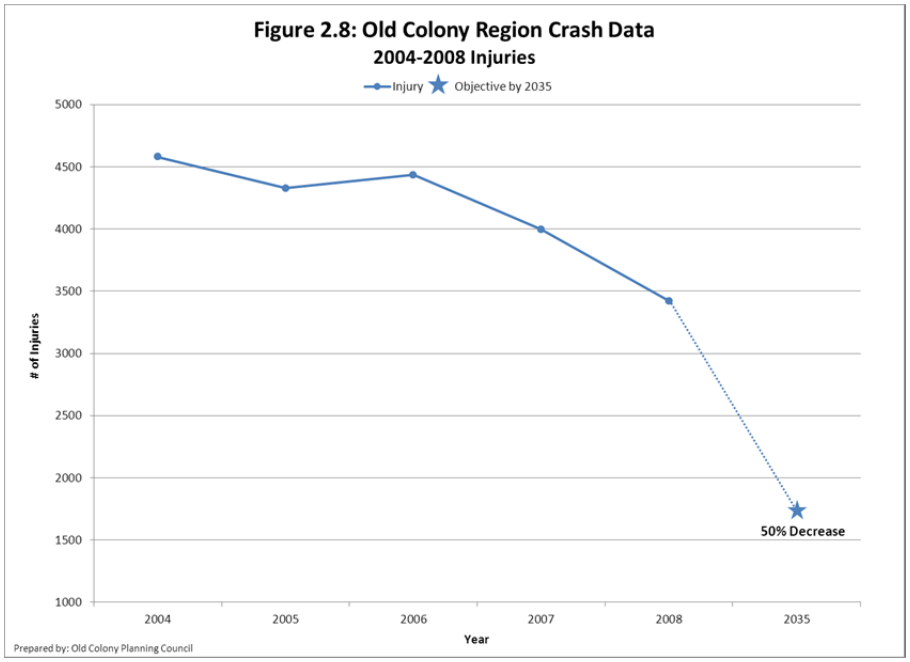
4a. Reducing transportation related fatalities

Every year from 2003 to 2008, there has been a reduction in the number of fatalities at both the State and regional level (overall reduction: State -19%, Region -32%). According to the five year projection, the Old Colony Region will experience an 8.2 percent decrease in fatalities by 2013. The philosophy is to continue encouraging safety policies, the utilization of safer vehicles, and improvement of roadway design. By 2035, the goal is to decrease the number of fatalities in the region by 40 percent compared to 2008.



4b. Reducing transportation related injuries

Every year from 2002 to 2008, there has been a reduction in the number of annual crashes and injuries at both the State and Regional level (Overall Reduction: State -1.9%, Region – 13.5%). Because the number of injuries has decreased over time, in the next 5 years (by 2013) the number of transportation related injuries is projected to decrease by 40 percent. The goal is to decrease the transportation related injuries by 50 percent by 2035.



Goal 5: Promote Environmental Protection and Climate Change Adaptation

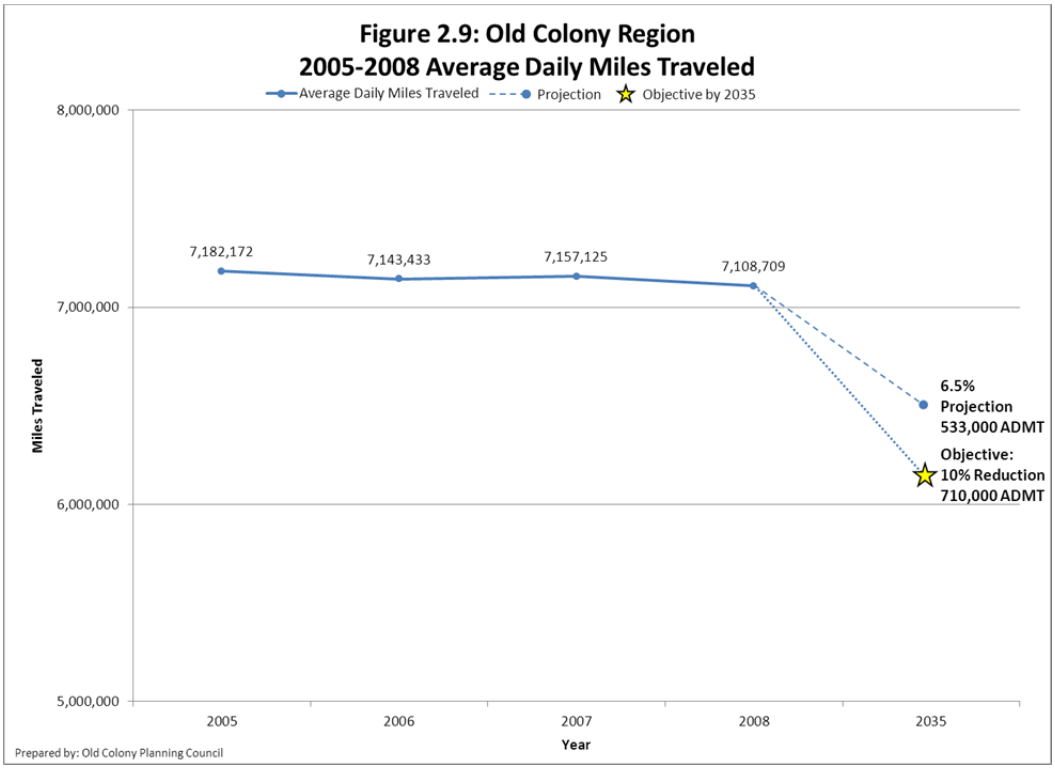
OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES
5 a. Reduced carbon emissions, improved energy efficiency, and reduced dependence on oil	-1993 to 2008 Department of Motor Vehicle (Average Vehicular Daily Miles Traveled in the Old Colony region)	- Decrease fuel consumption per vehicle-miles traveled, per passenger miles traveled, and per (net) freight ton-mile - Increase percent of transit vehicles using alternative fuels - By 2035, stop increasing greenhouse emissions -By 2035, reduce average daily miles traveled to 10% below 2008
5 b. Increased the use of environmentally sustainable practices in transportation to prevent climate change effects	- Data comparison of 2000 and 2010 US Census Journey to Work data	- By 2035, increase the use of transit by 20% compared to 2000 - Increase carpool/vanpool and non-motorized transportation modes such as bicycle and walking compared to 2000 census
5 c. Increased development of waste water treatment capacity and drainage systems	- 2011 Climate Change Roadway Drainage and Runoff Program	-By 2035, upgrade 20%of the drainage systems in areas identified as high risk in the Climate Change Study

Response to Contributing Factors

5a. Reducing carbon emissions, improving energy efficiency, and reducing dependency on foreign oil

According to the 1993 to 2008 average the daily vehicular miles traveled (VMT) registered by the Registry of Motor Vehicles, the average daily miles traveled in the Old Colony MPO region has been decreasing at a pace of approximately 20,000 traveled miles per year since 2005 from a base of 7.2 million VMT (see figure 2.9). If the Old Colony MPO region continues at this pace, by 2035 there will be a reduction of 533,000 average daily miles traveled (6.5 percent less than 2008).

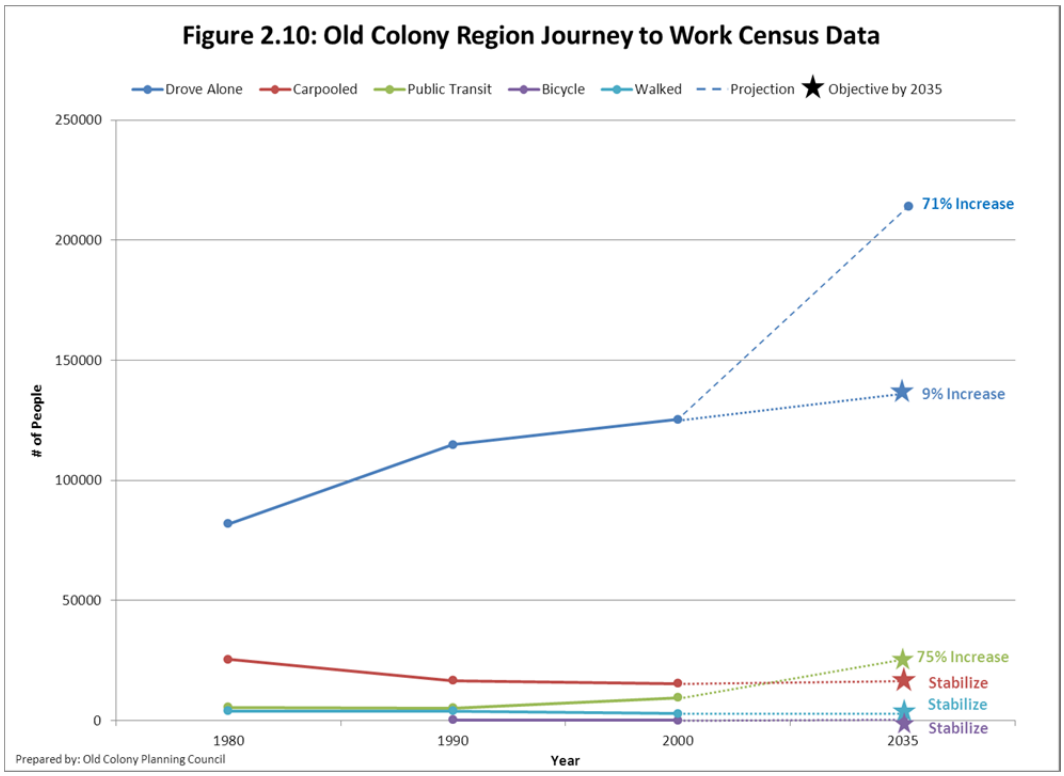
The Old Colony MPO goal for 2035 is to continue encouraging smart growth development strategies, promoting alternative transportation options other than single occupancy vehicles, increasing transit accessibility to nearby, unserved, employment centers, and encouraging the use of renewable energy to reduce greenhouse gas emissions. As part of the proposed performance measures of the 2012 Regional Transportation Plan, by 2035, the Old Colony MPO aims to reduce VMT by 10 percent (710,000 VMT) below the 2008 levels, going beyond the projected 6.5% VMT reduction. Increasing use of environmentally sustainable practices in transportation and reducing the dependence on oil are the primary goals of the U.S. Department of Transportation and the Old Colony MPO.



5b.

Increasing the use of environmentally sustainable practices in transportation to prevent climate change effects

Sustainable practices in transportation that contribute toward the prevention of Climate Change include flexible work schedules, preferential parking for ridesharing, incentives for transit use, and increases in accessibility at the neighborhood scale.



According to the US census journey to work data, between the years of 1980 and 2000, the Old Colony Region has experienced growth in single occupancy vehicles by approximately 45,000, a decrease of people carpooling by 10,000, an increase of people using public transit by 4,000, and a substantial decrease of people walking or bicycling to work. By 2035, the goal of the Old Colony MPO is to stabilize carpool/vanpool and non-motorized transportation modes such as bicycle and walking and to increase public transit ridership by 75 percent compared to the 2000 census data. The percentage increase on the public transit services is based on the 2035 linear projected trend. The linear projected trend for the driving alone census data between 1980 and 2000, shows a 71 percent increase in this mode by 2035.The Old colony MPO goal for 2035 is to reduce the driving alone commute from 71 percent increase (2035 projected trend) to 9 percent increase, based on the percentage growth on this mode between 1990 and 2000.

5c. Increasing development of waste water treatment capacity and drainage systems

By 2035, the goal of the Old Colony MPO is to upgrade 20% of the drainage systems in areas identified as high risk in the Climate Change Roadway Drainage and Runoff Program. This study consists of collecting and analyzing existing infrastructure deficiencies and matches them with potential funding opportunities.

Goal 6: Promote Policies that Ensure Economic Vitality and Sustainability

OUTCOMES	METRICS	PROPOSED PERFORMANCE MEASURES

6 a. Increased mix use centers, re-use of existing infrastructures, and transit oriented development districts in the Old Colony region	- Number of Transit Oriented Development Studies - Number of Economic Development Studies - Number of projects under Chapter 40R of the state's affordable housing law and 40R smart growth act -Number of Brownfield projects	- By 2035, Plymouth, Halifax, Hanson, Whitman, and Easton Commuter Rail stations will be TOD designated -By 2035, all OCPC communities will have overlay districts that encourage economic development
6 b. Pursued policies of sustainable development	-Number of communities that opt to modify their subdivision rules and regulations to require bicycle/pedestrian easements to tie into a binding adopted region-wide bicycle/pedestrian system -Open Space Regional Study	-Revision of local Subdivision Rules and Regulations to require bicycle/pedestrian easements and paths to adjacent property, located so as to tie into binding adopted region-wide bicycle/pedestrian system

Response to Contributing Factors

Revitalization and redevelopment becomes a critical part of the economic vitality of the Old Colony communities as the region grows. Retaining and enhancing the vitality of downtowns and town centers is an imperative priority in maintaining the region's overall economic health. It is important to focus investments in mixed-use centers in order to create increased commercial activity, and a greater concentration of jobs and housing, and to maximize the efficiency of the region's existing infrastructure is the primary goal of the Old Colony MPO.

Goal 7: Pursue the GreenDOT Vision and achieve the three GreenDOT goals

The Massachusetts Department of Transportation (MassDOT) announced its GreenDOT Policy Directive in June 2010. This comprehensive sustainability initiative sets three principal goals:

- **Reduce greenhouse gas (GHG) emissions.** MassDOT will achieve this by taking GHG emissions into account in all of its responsibilities, from strategic planning to project design and construction and system operations.

- **Promote the healthy transportation modes of walking, bicycling, and public transit.** MassDOT will achieve this by pursuing multi-modal, "complete streets" design standards; providing choice in transportation services; and by working with MPOs and other partners to prioritize and program a balance of projects that serve drivers, pedestrians, bicyclists, and public transit riders.

- **To support smart growth development.** MassDOT will achieve this by working with MPOs and other partners to make transportation investments that enable denser, smart growth development patterns that support reduced GHG emissions.

The GreenDOT Policy Directive was developed in accordance with the Climate Protection and Green Economy Act (Mass. Gen. L. c. 21N), also known as the Global Warming Solutions Act (GWSA), which Governor Deval Patrick signed into law in August 2008. This law will make Massachusetts one of the first states in the nation to move forward with a comprehensive regulatory program to address climate change. The law requires the Massachusetts Executive Office of Energy and Environmental Affairs

(EOEEA), in consultation with other state agencies and the public, to set economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts to achieve:

- By 2020, a reduction of between 10 percent and 25 percent below statewide 1990 GHG emission levels, which were 94.4 million metric tons of CO2 equivalent (MMTCO2e).
- By 2050, a reduction of 80 percent below statewide 1990 GHG emission levels.

Because the transportation sector is the single largest emitter of greenhouse gases, accounting for over a third of GHG emissions, the GreenDOT Policy, and its effective implementation are critical to reaching these reduction targets. The GreenDOT Policy Directive proposed specific emission reduction targets for each of its three goals.

The Old Colony MPO will be integrally involved in helping to achieve the GreenDOT goals. The MPO will be most directly involved in helping to achieve GHG emissions reductions under the second goal – to promote healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments – and assist in the third goal by supporting smart growth development patterns through the creation of a balanced multi-modal transportation system.

The Old Colony MPO will pursue the GreenDOT Vision and achieve the three GreenDOT goals by making sustainability an integral part of every staff member's role, and by integrating these objectives into organizational visions and missions.

- Work with MassDOT to address short- and long-term greenhouse gas emissions at every stage of planning, construction, and operation of our transportation system in order to minimize climate disruption and its effects on the environment and on our region.
- Consider the needs of all our populations, regardless of mode choice or ability, in the planning of transportation facilities. We will be guided by the MassDOT Complete Streets design philosophy articulated in the Highway Division Project Development and Design Guide and the principles of safe and full access to and within transit, rail, and other transportation facilities.
- Distribute staff resources and define department objectives in a manner that ensures adequate attention to all customers and modes.
- Plan for our transportation system so that it supports smart growth development; this in turn will facilitate travel by the healthy transportation modes of walking, bicycling, and public transit; improve air quality; preserve the environment; and enhance quality of life for all of our region.
- Measure our performance toward the GreenDOT goals with a robust set of performance measures that evaluate sustainability and service to our customers – the users of our transportation facilities.

Use of Project Selection Criteria:

The Old Colony MPO includes land use assumptions in the RTP through inclusion of demographic projections in their travel demand models. In addition, both MassDOT and the MPO use objective criteria in project selection for both the RTP and TIP. Land use is typically one of the areas where criteria are applied.

Additional project selection criteria can be included to support projects that reduce GHG emissions but also for projects that support smart growth development and promote healthy transportation. Projects can be ranked based on how well the community is implementing the smart growth and healthy transportation initiatives in addition to whether the project itself reduces GHG emissions. Examples

include: whether the community is developing a climate action plan or is a green community under the Green Community Act. Municipalities can receive points for these activities and be rewarded under this point system for projects being funded in the Plan and TIP.

Working closely with MassDOT, the Old Colony MPO will continue to report on its actions to comply with the GWSA and to help meet the GHG reductions targets. As part of this activity, the MPO will provide further public information on the topic and will advocate for steps needed to accomplish the MPO's and state's goals for greenhouse gas reductions.

3.0 Introduction

The concept of Livability is a top priority for the U.S. Department of Transportation and the OCPC. Livability reflects a community's public safety, housing supply, access to goods and services, mobility, environmental quality, community cohesion, friendliness, aesthetics, accessibility, pride, and opportunity. Livability is an important concept to define and understand because improving livability is a high priority for future transportation planning funding.

There are several techniques that federal, state, regional and local transportation agencies are using to improve livability at the local level. This chapter describes the concept of livability and ways that transportation and land use techniques can improve the well-being of our citizens and communities.

Livability is the number one national theme in transportation planning today, and providing adequate guidance in applying livability principals and concepts in the region is one of the Council's goals.

This chapter offers an in depth description of local livability examples in the Old Colony region and a list of potential funding opportunities to make our communities more vibrant and sustainable.

"Creating livable communities will result in improved quality of life for all Americans and create a more efficient and more accessible transportation network that serves the needs of individual communities. Fostering the concept of livability in transportation projects and programs will help America's neighborhoods become safer, healthier and more vibrant." **USDOT**

3.1 What does livability mean?

While some would suggest that livability means a life that does not require cars, this definition really does not apply for the millions of Americans who have chosen the suburban lifestyle that their communities can offer. Community Livability refers to the environmental and social quality of an area as perceived by residents, employees, customers, and visitors. This includes safety and health (traffic safety, personal security and public health), local environmental conditions (cleanliness, noise, dust, air quality and water quality), access to convenient shopping and services, the quality of social interactions (neighborliness, fairness, respect, community identity and pride), opportunities for recreation and entertainment, aesthetics, existence of unique cultural and environmental resources (e.g., historic structures, mature trees and traditional architectural styles), and accessible, reliable and affordable transportation options.

"Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, high quality schools, and safe streets. This includes addressing safety and capacity issues on all roads through better planning and design, maximizing and expanding new technologies such as ITS and the use of quiet pavements, and using Travel Demand Management approaches to system planning and operations, etc." ***Federal Highway Administration***

Figure 3-1

The photograph above illustrates a successful example of compact village center development in New England that demonstrates some of the livability concept. This development was designed to accommodate both pedestrians and vehicles for seasonal events. The physical form of this dense mixed-use center supports "tight," vertical, compact structures while promoting open space activities and streetscape design. Such developments could be constructed as infill developments in town centers or in newly established village center districts that allow for mixed use zoning, walkability, transit and neighborhood connectivity.

Areas around multimodal stations could support mixed-use development with office, retail, residential, recreational and other uses as shown

Community livability directly benefits people who live, work or visit an area. It can also increase property values and business activity, and can improve public health and safety. The relationship between livability and transportation is largely affected by the public investment in the community, and creating places where people naturally interact with each other. These public places include streets, parks, trails, transportation terminals, and other shared facilities. All these factors are affected by local public policy and planning decisions.

The desired economic, cultural, and physical diversity of the neighborhoods and communities within the Old Colony region must be reflected in the policies and objectives of the Council. Policies that fail to recognize the diverse needs and lifestyles of the population will prevent individuals and groups from working to enhance the opportunities and the quality of life in the community. This philosophy is reflected in the Old Colony Planning Council's vision statement, which recognizes the range of transportation alternatives, housing opportunities and lifestyles within its member communities.

"The vision of the Old Colony Planning Council is to develop compact, livable communities that allow residents to walk, drive, or use transit to reach destinations, that have a mix of uses and a range of housing types and neighborhoods for the diverse needs of its population, and that support developing an employment base to serve the needs of the region"

The Council's advocacy of new development that provides a wide-range of services, housing, and transportation choices, is also reflected in the diverse needs expressed in the 2012 Regional Transportation Plan's survey. According to the survey, around eighty percent of participants support alternative

transportation options (bus, train, bicycle, and pedestrian accommodations) in any new developments, and sixty percent support housing and businesses being located around transit stations or terminals (Transit Oriented Development). This recognition of the value of diverse housing choices with transit connections is reflected in the Council's policies and the transit-oriented development efforts throughout the region.

Transit-Oriented Development (TOD) is one livability initiative that the OCPC has been promoting for more than five years. Potential sites for TOD districts include the commuter rail stations in Kingston, Bridgewater, Easton (with the approval of the South Coast Rail proposal) Whitman and Hanson. A portion of the Town of Abington, the Brockton Area Transit Intermodal Centre and vicinity, and Stoughton Center are already designated Transit Oriented Development Districts.

As part of the livability efforts, the Old Colony Planning Council intends to continue advising on infrastructure and land use patterns that support a variety of mode choices. The Council encourages bicycle, pedestrian, and transit planning in its Regional Transportation Plan. A livability task force was recently formed. Its purpose is to identify available bicycle and pedestrian services potentially linking residential areas, employment centers, major shopping areas, educational facilities, and tourist and recreational destinations.

The Council continues to 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 ways to develop self-sustainable communities. Goals in the Regional Transportation Plan include "ensuring equity and adequate public participation" and "fostering sustainable, healthy, and livable communities." The Council will continue its efforts to prevent any negative impact from new projects on minority and low-income groups. The objective is to make our communities more livable and sustainable for all; and linking land use and transportation is a key to building quality communities for residents of all income levels. 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.

OCPC supports 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.

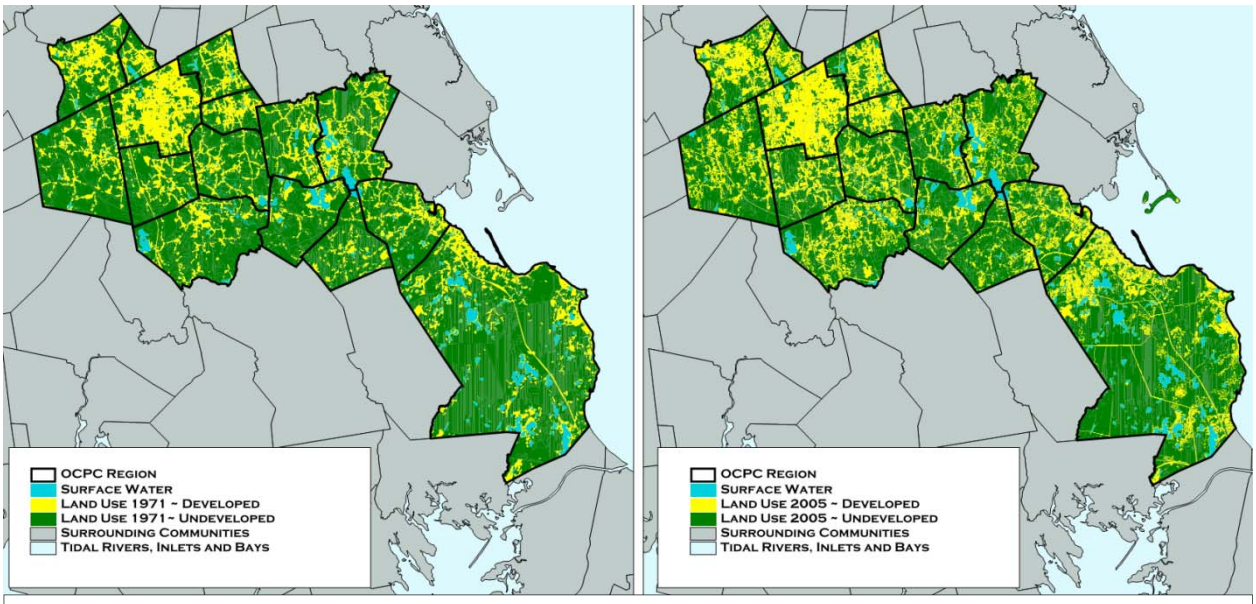
3.2 Why livability?

Spurred by the prosperity of the post-World War II era and the resulting availability of affordable transportation, Americans began a migration from the cities to the suburbs. Thus began a fundamental shift in land-use development patterns and our sense of place. The current challenges confronting urban, suburban, and rural communities are reflected by the fact that land is being developed faster than the population is growing. However, it is the way in which land is being developed that causes the greatest issues in transportation. Unorganized outlying, low density development that centers on auto-dependence with no foresight about how the pieces fit together is called sprawl, and it often foreshadows deteriorating quality of

life. The inner cities and older inner suburbs are being abandoned, leaving vast areas of infrastructure underused. Rural areas are seeing an erosion of environmental, cultural, and economic values. (Yet to many people, sprawl is an acceptable compromise towards a perceived or desired higher quality of life).

Figure 3-2: 1971 OCPC Cumulative Development Map

Figure 3-3: 2005 OCPC Cumulative Development Map



The LEFT figure is the 1971 cumulative development map of the Old Colony Region. Most of the development was still in or near the downtowns areas. The RIGHT map is new growth over the last forty years. Development has consumed some of the farms and other open space at an accelerated pace, while there has been a continuous exodus from established cities and towns. The Old Colony region's population has expanded from 230,000 to more than 330,000 (over 100,000 people) in the past 30 years and is expected to exceed 377,000 residents in the next 25 years.

We have continued to take the urban migration path because our perception is that suburbs have abundant resources such as water and land for housing, and materials for construction to accommodate our expansion. Public policy and laws written in the last 60 years have encouraged this movement and now livability policies are starting to change that way of thinking.

The role of the livability concept in the new century is to change these policies and encourage the revitalization of downtowns and town centers. The objective is to build livable communities for the future, places where young and old citizens can walk, bike, and play together; where historic neighborhoods are preserved; where farms, forests, and other green spaces are protected; where parents spend less time in traffic and more time with their children, spouses, and neighbors; and where older neighborhoods can thrive once again. Such livable communities will have safe streets, good schools, and public and private spaces that help foster a spirit of community.

Communities can become livable by implementing "smart growth" practices:

- Sustain prosperity and expand economic growth by building on past investments and preserving prime farm land for agricultural use,
- Enhance the quality of life by reducing congestion to increase personal time,
- Encouraging redevelopment of centrally located "brownfield" sites (contaminated, abandoned, idled, or under-used commercial, industrial, or institutional properties, where investment for redevelopment or reuse is discouraged by light to moderate contamination from hazardous substances),
- Reducing threats to air and water quality and open space. In order to build livable and sustainable communities, it is essential that local residents, business owners, and government agencies work as partners with a common vision and mutually supporting goals.

Benefits of Walkable Neighborhoods

Environment – *Cars are a leading cause of climate change. Our feet are zero-pollution transportation machines*

Health – *The average resident of a walkable neighborhood weighs 7 pounds less than someone who lives in a sprawling neighborhood* (Pryne, 2006)

Finances – *The value of a property is at least $3,000 higher when the property has pedestrian connectivity (Source: Walk Score)*

Communities – *Studies show that for every 10 minutes a person spends in a daily car commute, time spent in community activities falls by 10 percent*

In economically challenged times with constrained budgets, transportation funding can be more effective if the focus is on multipurpose projects that support economic revitalization by improving community development, public transportation, and functional bicycling and pedestrian travel. Increasing multimodal mobility, accessibility in denser developments, and reducing the overall costs of moving people, goods, and services, will enhance local economic competitiveness. Transportation investments that support community livability can also have multiple benefits. In terms of transportation, compact and connected communities encourage regular walking, wheeling, and transit use, reducing the need for auto travel—while making trips shorter for those who choose to drive. Less driving helps to reduce greenhouse gas emissions (GHGs), and to reduce the nation's dependence on foreign oil. In terms of land use, compact and connected development patterns require less land and pavement, which reduces stormwater runoff, groundwater pollution, and loss of wildlife habitat, fields, and forests.

Adequate land use and transportation policies also have a positive influence on healthy living. The daily exercise associated with more active transportation choices has been recognized to improve human health, reduce obesity and health care costs, and encourage community social interactions. Even those who drive to a mixed-use "park-once" district (or traditional downtown) find they can get exercise and social connections by not having to drive between every destination, given a safe walking and wheeling network.

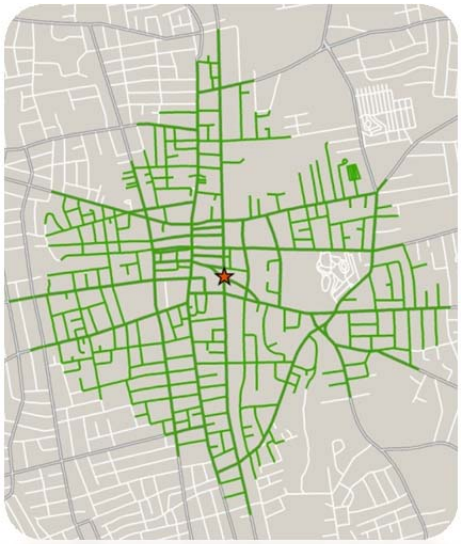


Figure 3-5: One-Mile Walk in a Compact Neighborhood

A one-mile walk in Brockton MA takes you through a grid-like street network with a mix of residences and businesses.

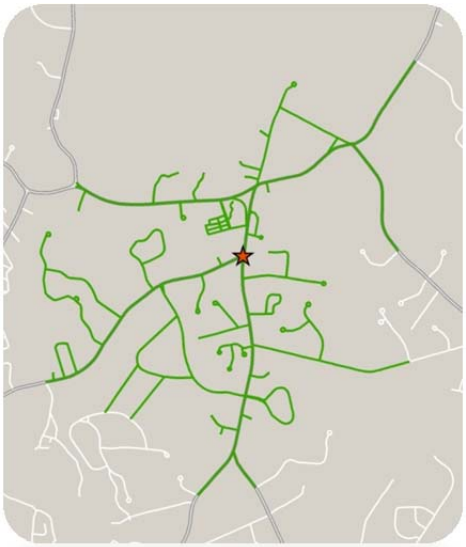


Figure 3-6: One-Mile Walk in a Sprawling Suburb

A one-mile walk in Pembroke MA with cul-de-sacs and winding streets has few shops and services within walking distance.

3.3 Achieving Livability through National Transportation Techniques

The US Department of Transportation together with Federal and State Planning Agencies are using several techniques to improve the livability of our communities. Some of these techniques have already been considered at the local and state level in the Old Colony Region.

- **Creating good-paying jobs.** Livability starts with jobs. One year after the enactment of the 2009 American Recovery Reinvestment Act (ARRA), state and local governments have generated almost one million short-term and permanent jobs for highway and transit programs. This has resulted in the repair of 1,262 bridges, improvements to almost 35,000 miles of roadway, and the purchase of 7,400 buses. The real story of the Recovery Act has been about the people whose jobs were saved or who went back to work.

- **Stimulating the broader economy.** States have achieved a remarkable record of jobs created, highways rebuilt, and transit systems improved. However, the benefit to the broader economy goes well beyond the infrastructure improvements themselves. The success of the Recovery Act will help sustain the economy, create more jobs, create more opportunities, and secure a better future.

- **Investing in green projects.** As important, Congress enabled states and local governments to invest some of their economic stimulus resources in projects that not only created jobs but also improved "community livability and sustainability."

- **Revitalizing a small town's "main street."** A main street can be the pride of a small town's existence. If a main street continues to fit the community's small-town scale, its goals, its features, and its temperament, it can remain or become a place for vibrant public life for robust commerce and for recreational enjoyment. In countless communities across the country, Main Street also happens to be a state highway. Many states are working with their towns to modify traffic patterns so that these streets play both roles; to move traffic and enhance the community.

- **Transforming urban streets into neighborhood centers.** Streets on high density neighborhoods often are centers of community life where local people come to shop, do errands, get together, and enjoy leisure time. Urban streets need to be geared to serve the business and residential needs of their communities: by accommodating traffic yet keeping it moving at a pace that gives pedestrians a sense of comfort and safety; by providing adequate parking, and by offering amenities that make people feel "at home", and by not encroaching on adjacent neighborhood.

- **Preserving scenic country roads.** Rural areas, especially those with special scenic and historic qualities, face design challenges that are different from those of commercial and urban residential areas. When planning any changes, DOT and local highway departments should seek to respect the contours and characteristics of the land rather than bulldozing out any unique features. They should also work to support both the natural and manmade features that flank the road. This way, designated and undesignated scenic roads can enhance the experience of driving and living along them, while at the same time preserving

a sense of place. With careful attention to design, safety goals can be achieved without sacrificing a road's compatibility with settings highly valued by the community.

- **Creating smart transportation solutions in tight economic times.** As states struggle to find the resources to pay for needed transportation improvements, many are using "smart solutions" to help find answers to self-sustainability.

- **Enhancing neighborhoods through the enhancement program.** There are federal programs that aim to improve America's communities. The Transportation Enhancement Program is one example where resulting projects include bicycle and pedestrian trails, historic preservation efforts such as saving historic bridges and train stations, landscaping, and transportation museums. Because most of these projects have strong community support, extensive volunteer labor and local fundraising can help stretch every transportation dollar.

- **Making design responsive to community needs.** For more than a decade, transportation agencies have been advancing the concept of "context sensitive solutions" or "footprint regions," in which transportation projects are planned, designed, and implemented in a way that is responsive to community concerns and to the environment. (E.g. within the "footprint" of the present road.)

- **Integrating transportation and land use.** Effective planning for growth requires the coordination of transportation, land use, housing, energy, climate change, and environmental policies. Because of relatively inexpensive gasoline that kept commuting costs low, combined with consumer preference for suburban living, the housing development patterns of the past 50 years moved people further away from the cities. Future growth patterns may change; however, as gasoline costs continue to rise, young adults as well as aging boomers may choose to locate in more urbanized areas. Some experts have suggested that as much as one-third of the demand for future housing and commercial development could be achieved through infill development in central cities and older suburbs. Another third may be met through new, mixed-use, transit-oriented development, and compact single-family subdivisions.

- **Using scenic byways to attract tourists and support local economies.** Under the National Scenic Byway Program, grants are made to states to fund corridor management plans, interpretive sites, facilities, such as restrooms, improved access to recreation, resource protection, safety improvements, and marketing efforts. Federal and state transportation agencies partner with grassroots community organizations to implement the program. Part of the motivation of the community groups is to preserve the heritage and beauty associated with what can be seen and experienced from the scenic byway. Another motivation is to market the byway to attract visitors who will spend money in local economies at restaurants, motels, and other businesses.

- **Promoting walking and biking.** Building a transportation system that encourages walking and biking is a vital role for the nation's transportation agencies.

- **Supporting travel and tourism.** For the many tourists and travelers roaming America's landscape, easy access, good public services, and abundant choices are critical components

when setting out on a weekend or weeklong adventure. Taken together, tourism, travel, and recreation rank as the most important industry in many states and cities, including Plymouth.

3.4 Livability Principles

By incorporating livability principles into transportation plans and programs, communities can maximize the efficiency of existing transportation investments while providing better access within and between activity centers. Livability approaches can also be a catalyst for reinvesting in aging suburban corridors, restoring complete streets and networks, and revitalizing rural small towns. A transportation system that provides reliable, safe access to jobs, education, health care, and goods and services is every bit as important to rural communities as it is to urban areas. Rural communities present unique mobility challenges, and the transportation options needed in rural areas can be different in order to ensure access for older citizens to services and activities, and to improve connections and service between communities. Linking transportation investments to compact development and revitalization strategies can preserve natural and cultural resources, while better preparing communities to mitigate and adapt to the impacts of climate change. Making sure that people of all ages have real choices to walk and wheel in the course of daily living, and making communities age-friendly, can support active living, and help improve health and quality of life.

1. Provide More Transportation Choices

Develop safe, reliable, and economical transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health

Giving people more options for getting around meets many community goals. When people find it easy and safe to walk, bike, or take transit, they no longer have to rely exclusively on cars to get to shops, work, and school. Using transportation modes other than the car helps to reduce air pollution and traffic congestion. Walking and biking also help people to include physical activities in their daily routines, give more freedom to those unable or unwilling to drive, and can reduce household transportation and health costs.

Figure 3-7: *BAT Intermodal Centre strategically located next to Downtown Brockton Commuter Rail Station is a great example of providing multiple transportation options in the Old Colony*

2. Promote Equitable, Affordable Housing

Expand location and energy efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation

The economic growth of the Old Colony region has new opportunities in areas that are considered high minority census tracts. Some of the Old Colony communities' zoning bylaws and

regulations include work force housing as well as elderly housing districts in desired locations. Programs that can be used to create affordable housing in appropriate locations in Massachusetts are Chapters 40B and 40R. Chapter 40B allows local boards of appeal to issue Comprehensive Permits for affordable housing over-riding local zoning, and to set appropriate conditions. The permits require at least 25 percent of the housing to be affordable to people making 80 percent or less of the regional median household income while paying no more than 30 percent of income for housing. The Abington Station multi-family project is an example of a 40B project quite close to but not within a TOD district.

Chapter 40R allows a community to rezone a specific area as a "Smart Growth District" allowing very closely-defined uses as-of-right, and any project with more than 12 units has to be at least 20 percent affordable. As an example of a 40R project in the Old Colony region is the redevelopment of the former rope works at Plymouth's Cordage Park next to the commuter rail station. The majority of these districts are usually walkable and with accessible public transit services.

Figure 3-8: *Even in the winter, bicycle use is a transportation necessity for some residents in Brockton. Most of Brockton's work force housing is accessible to a transit route or commuter rail station service.*

3. Support Existing Communities

Targeting Federal Funds toward Existing Communities to Spur Revitalization and Protect Rural Landscapes

The revitalization of downtowns and town centers, and promoting compact developments that emphasize connecting streets, sidewalks, accessible transit, and human-scale design are critical elements of the process for fostering sustainable communities. A community that takes a proactive approach to designing its neighborhoods and activity centers to work effectively with multiple modes of transportation such as transit, walking, bicycles, automobiles, goods movement, and provide options for a wide range of system users such as children, the elderly, the disabled, business owners, low-income people, and tourists – fosters greater mobility, and fewer conflicts between land use and transportation, and at the same time it creates a vital community. By supporting

Figure 3-9: *This photograph reflects the human-scale design of Main Street in Plymouth, MA. The width of the sidewalk, mix-use and compact development, historic, cultural and recreational amenities in the center with multiple modes of transportation are some of the attributes that make this particular community an example of a livable community in the Old Colony region.*

development in existing urban areas, communities indirectly protect open space areas and rural landscapes.

4. Improve Economic Competitiveness

Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers, as well as expanded business access to markets.

The Old Colony Regional Technology Center Economic Target Area, which includes the towns of Bridgewater, East Bridgewater, Halifax, Hanson, Kingston, Pembroke, Plympton and Whitman, was created by the Old Colony Planning Council and approved by the Massachusetts Economic Assistance Coordinating Council in November, 2010. This Economic Target area will help build livable communities by assisting in local business development, expansion and job creation, expanding educational opportunities for workers, and expanding business access to markets. The economic growth of the Old Colony Region also has new opportunities in high minority census tracts. For example, the downtown Brockton Transit Oriented Development has contributed to the city's center by encouraging housing conversion in old mills. The prospect for downtown Brockton is bright and the addition of the Intermodal Centre combined with the MBTA commuter rail service has had a positive effect on the city's housing and economic development. This is because the confluence of bus lines, major roads, and the rail, make Brockton the easiest place in the region to reach without driving.

5. Coordinate and Leverage Federal Policies and Investment

Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.

The interagency partnership between DOT, HUD, and EPA has been developed with the goal of building sustainable communities. Identifying barriers to coordinating transportation, housing, and environmental programs and investments is part of their combined efforts. Building livable communities involves far more than just transportation solutions and has therefore required collaboration across lines of authority and responsibility to leverage related Federal investments.

6. Value Communities and Neighborhoods

Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods - rural, urban, or suburban

The character of a community is affected by the social, cultural, recreational, and economic activity in neighborhood streets. It involves reducing vehicle traffic volumes and speeds, and creating more attractive street environments to encourage interaction and increase residents' involvement in their community. It supports compact development with higher density, urban infill, and therefore more efficient, land use. These land use components can make neighborhoods more livable and at the same time improve public health by increasing foot traffic and physical activities. Improving street environments and encouraging community interaction by engaging in social and recreational activities along and within streets helps residents and visitors to consider the streets and sidewalks in outdoor living spaces that possess

their own character. As an example of this principle, the Town of Plymouth is looking to improve vehicular and pedestrian circulation and safety through enhanced roadway surfaces, pedestrian crossings, lighting, and signage in its historic waterfront downtown. The project consists of reducing the width of the roadway while not reducing parking to allow for larger pedestrian walkways with benches, plantings, lighting, amenities and traffic-slowing curb parking thereby making the waterfront more pedestrian friendly, safer and more beautiful.

Figure 3-10: *In a community that has been built for children, the children, and most every other public space user, seem to reflect the respect given to them.*

3.5 Livability in the Old Colony Region

In the Old Colony Region, livability has varied aspects. A livable community has safe streets, accessible transportation options, good schools, public/private spaces and strong accessible centers that help foster a spirit of community. Many communities in this part of the region have traditional New England urban centers – centers that are focal points for growth and new investments. Some neighborhoods include a variety of housing types and services, like small businesses, schools, parks, and community centers, all near where people live.

Figure 3-11: *Town of Stoughton, a typical New England town center*

The currently endorsed livability and sustainable development movements encourage a "redevelop first" mentality, putting relatively high-density development near existing centers and in areas with well-established infrastructure, avoiding additional energy consumption, minimizing the effect on natural resources, and mitigating unavoidable impacts on environmental quality. The effect on travel patterns and modal choices can vary with the scale of action. Communities that adopt these principles have a greater concentration of growth in regional centers that create more walkable neighborhoods and allow for a greater use of mass transit. With adequate planning and active land acquisition and protection efforts, we can preserve many special places and still have needed new housing and sustainable economic development.

Compact residential communities in the Old Colony Region are located throughout urban areas. They knit together neighborhoods and form the building blocks of a more livable region with convenient transit stops and stations, sidewalks, and a network of streets that enable residents to walk, bike, and ride the bus or train.

The Old Colony Region also has a series of highways and routes that accommodate scattered housing and strip commercial development. They have the potential to be transformed into urban transportation corridors; corridors with well-defined cluster developments or nodes where residents and visitors can easily walk, bicycle, or use transit to reach their destinations.

Figure 3-12: *Downtown Brockton, an example of compact mixed used development with multiple transportation options*

A mix of small-scale farming and forestry, open space and natural areas combining uniform low-density living in new subdivisions with some houses on smaller lots in new cluster developments and varied lot sizes in older village settings, also characterize the region. Rural areas are linked to and support natural resource lands, which can also contribute to the prosperity of local economic development.

Figure 3-13: *Long-established farm selling hay and firewood in Plympton*

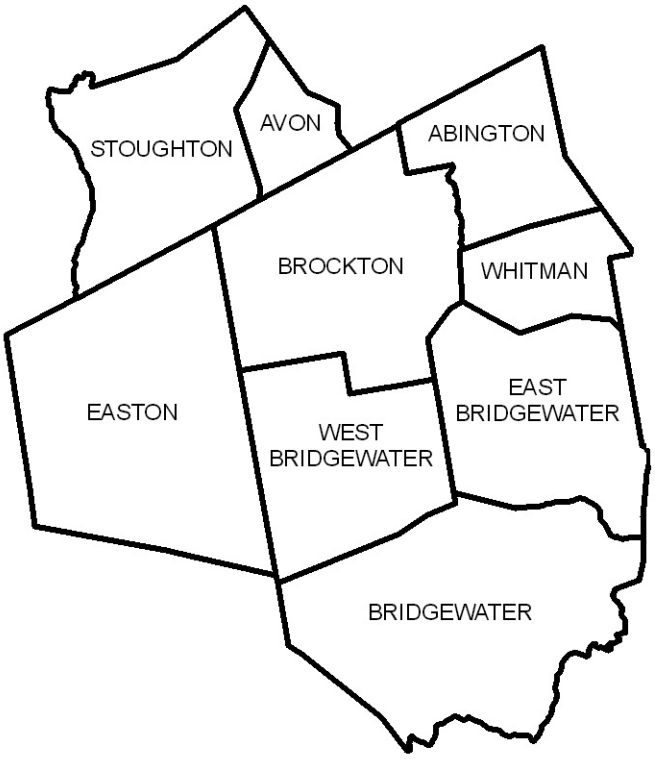
In order to obtain a better understanding of its livability and sustainability the Old Colony Region has been divided into three sub-regions: The Greater Brockton Region, the Lakes Region, and the Coastal Region.

Greater Brockton Region

The City of Brockton and the Town of Stoughton are the most walkable communities in the Old Colony Region. They have strong higher density centers that are served by commuter rail lines that bring people in and out of the Greater Boston Metropolitan Area. The commuter rail line in Stoughton is also connected to the Greater Providence Rhode Island Metropolitan Area via a transfer at the Canton Junction Rail Station.

Brockton and Stoughton have land uses that are well defined, offering mixed use development options in their urban centers, with interconnected pedestrian networks – sidewalks along most streets that connect major residential and employment centers.

The City of Brockton has three major urban/village centers; Montello, Downtown Brockton, and Campello. A common characteristic that makes these three urban centers, as well as central Stoughton, examples of livable and sustainable communities is their "multi-modalism", as all are accessible by car, bus, and commuter rail. The public transit service is provided by Brockton Area Transit (BAT). BAT offers transfer options to other areas of the region and state through connections to the commuter rail, to MBTA buses at the Montello rail station and at Avon Center, and to the Red Line at the Ashmont MBTA station in Dorchester. BAT operates most lines on a pulse system[1] easing transfers at the BAT Centre, which is strategically located adjacent to the Downtown Brockton commuter rail station.



Due to their high density, compactness, and mixed use developments within 1/3 mile radius (7 minute walk) of the transit stations, the Montello, Downtown Brockton, Campello, and Stoughton stations have great potential for Transit Oriented Development (TOD)[2]. The rail tracks in Brockton were grade separated at the City's expense in the late 19th Century, thereby preventing rail-related vehicular and pedestrian circulation conflicts, and making Brockton a much more livable community. However, there are now truck clearance issues.

Figure 3-15: *Rail Bridge over Route 27 in downtown Brockton*

[1] *The pulse system in Brockton works so that buses arrive and depart at the same time from the Brockton Itermodal Centre. The pulse system gives transit users the opportunity to transfer to other fixed route lines with little lost time and to the commuter rail.*

[2] *TOD districts are typically mixed-use zoning overlay districts located near (usually within 1/3 mile) of transit stations. Their intent is to allow higher density residential and commercial uses to promote increased ridership and create a vibrant activity center. The districts generally encourage housing, retail, and office uses, as well as public facilities and open space. They allow higher densities and reduced parking ratios, require high quality design, and include pedestrian amenities.*

The proposed South Coast Rail project, which will potentially go through the Old Colony Region via Stoughton and Easton, is an initiative to meet the existing and future demand for public transportation between Fall River and New Bedford (and potentially Cape Cod) and the Boston Metropolitan Area. The project is proposed to restore use of the historic H.H. Richardson designed North Easton train station and to strengthen this historic transit village center. Sensitive adaptive reuse of the adjacent Shovel Shop structures will provide multifamily housing steps from the station and breathe new life into a vital piece of Easton's past. The South Coast Rail project also proposes a new station on the Easton and Stoughton Town line. This would complement and extend local mixed uses near an adjacent shopping center while having a regional park and ride lot with good pedestrian and bicycle access. For Stoughton, the South Coast Rail proposal will strengthen the existing mixed-use transit-served town center in conjunction with its recently adopted Stoughton Center Mixed Use Overlay District (SCMUOD).

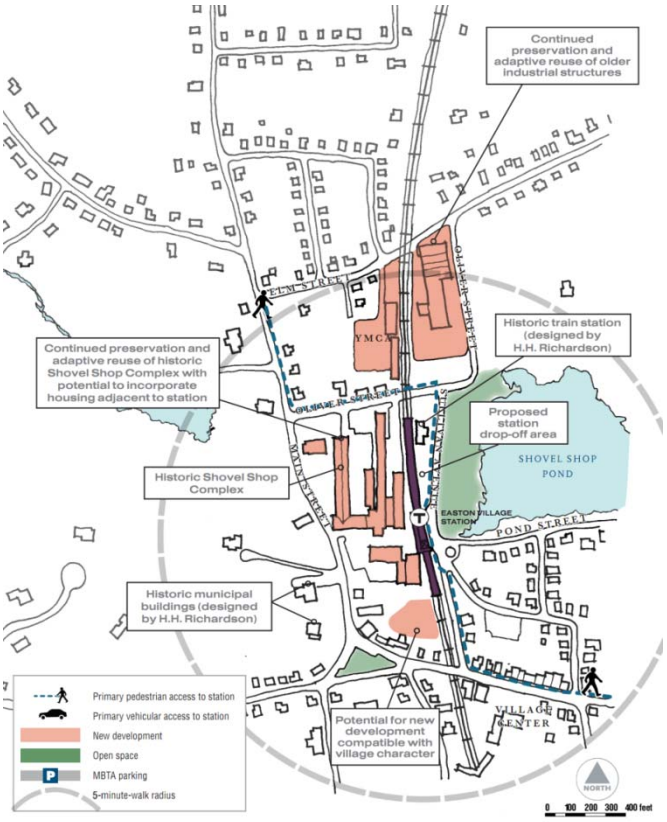


Figure 3-16: *South Coast Rail Corridor plan alternative for enhancing and revitalizing the Easton Village Station and surroundings. One of the objectives for Easton is to make the surroundings bicycle and pedestrian accessible*

Figure 3-17: *West Bridgewater shopping center with rear parking and pedestrian accessible*

Other communities such as Abington, Avon, Bridgewater, East Bridgewater, West Bridgewater and Whitman have great potential for revitalizing their well-defined urban/village centers. Bridgewater has a positive impact from Bridgewater State University, which is close to the town center, contains the relocated rail station, and enlivens the town for residents, visitors, faculty, and students with related cultural and recreation activities. With year round commuter rail service and school year BAT service around the campus and to the southern edge of Brockton, Bridgewater's station has great potential as a regional multimodal transportation center.

The Town of Abington is a somewhat walkable community, with two traditional town centers, a commuter rail station, a TOD (Transit Oriented Development) zoning district, and new multi-family housing near the town centers. Abington has regular scheduled BAT service to the Wal-Mart store at the western edge of the town, and a less frequent deviated route service between Brockton Hospital, Rockland Center, and the eastern end of Rockland along Route 123. As with the Dial-A-BAT service, buses are allowed to deviate from this route to serve people with special needs.

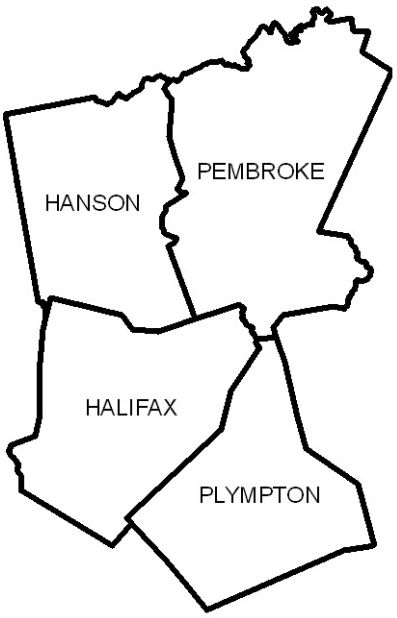
Whitman has a strong walkable center with continuing retail and civic uses, a major urban park, and new housing in a former school. However, the commuter rail station is in the East Whitman sub-center about ¾ of mile to the east. The conversion of the old Bostonian Shoe Factory into a mixed-use residential commercial site in Whitman is representative of the "redevelop first" initiative. The Bostonian Shoe Lofts development contains about 120 apartment units and 14 commercial spaces located within 1/2 mile of Whitman's commuter rail station and 1/3 mile of Whitman town center. Whitman does not have scheduled BAT service. However, a loop linking Brockton, Abington Center, and Whitman Center has been proposed.

Figure 3-18: *One of Whitman's assets, its compact and varied downtown*

The Town of Avon has one of the most traditional town centers in the region, with the historic Blanchard Tavern (ex. Town Hall), churches, town hall, nearby library, offices, retail establishments, and a major park. Avon is the smallest municipality land wise in the Old Colony Region. It has clearly defined land uses with an industrial park adjacent to Route 24, neighborhoods to the east and south, a mixed use town center, D.W Field park in the south-west corner extending into Brockton, and some open space land along the eastern town line.

Central "Lakes" Region

The central part of the Old Colony region is noted for its rural character and historic preservation lands. It is filled with lakes and wetland areas that limit and shape development. The communities in this region have taken advantage of the wetland and water surface to create one of the greatest arrays of cranberry bogs in the United States.



In addition to traditional town centers, Hanson, Halifax, Pembroke, and Plympton have important urban transportation corridors that accommodate their community needs. Although Route 58, in Hanson, Halifax, and Plympton, Route 27, in Hanson and Pembroke, and Route 106, in Halifax and Plympton, are mostly auto-oriented collectors and arterials, nodes on these corridors have the potential to accommodate alternative transportation options serving a

Figure 3-19: *The Wampatuck Bogs viewed from Robinson Street - formerly abandoned and now being restored in Hanson*

range of mixed uses. These corridors include a mix of stores, services, offices, and housing that make alternative transportation more feasible in the future.

Halifax has a growing commercial center at the junction of Routes 106 and 58, though the civic uses are concentrated along Route 106 to the west. New sidewalks have greatly increased walking between these points and neighborhoods to the west. Halifax does not have bus service. The commuter rail station is in the northeast corner of the town near the Cranland Airport is remote from the rest of Halifax except for the high density traditional Annawon lakeside neighborhood, and the large Twin Lakes condominium project. However, these neighborhoods have limited or no direct pedestrian connections to the station despite the proximity. Beyond this, the newest developments in Halifax are remote from the commuter rail station on Route 105 to the south/west near the Middleboro line. In all, Halifax has the elements of a very livable community if future growth and circulation investments can be knit together.

Hanson has two centers, the retail and municipal center along Route 14 north of Liberty Street, and the commercial/industrial area around the former Ocean Spray complex and the restored commuter rail station on Route 27 with some nearby multi-family development. The Old Colony Planning Council has completed a South Hanson TOD study examining alternative transportation possibilities at this location (including the nearby former County Hospital site on High Street). This includes a draft TOD bylaw being considered by the Planning Board.

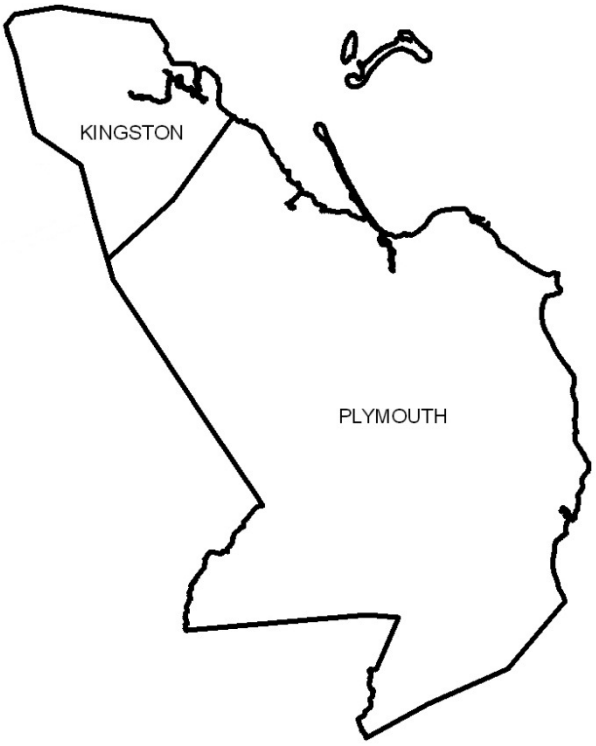
Pembroke has a traditional town center with varied stores, town hall, police and fire stations, churches, and library along with recent affordable housing around the junction of Routes 14 and 36. It also has a regional scale cluster of shopping centers, highway oriented retail and services, light industries, a hospital, and extensive affordable housing around the intersection of Routes 3 and 139. This range of services and facilities adds to the town's livability but the focus here is on the traditional center. Services in the center have expanded with the Mattakesett Street plaza additions. These additions include a CVS drug store and a small scale supermarket. The town has adopted a Center Protection District requiring new buildings in the mapped area to have a "traditional", colonial, or Greek revival appearance. The district allows new development to include mixed residential and commercial uses potentially increasing the livability for the new residents. Unfortunately, the bylaw requires such large lots and setbacks that there are few applicable sites in the center. In addition, new GATRA "SAIL" service connects the Route 139/3 commercial complex on the Pembroke/Marshfield line with the Kingston Commuter Rail and downtown Plymouth via Marshfield, Duxbury and Kingston. However, the schedule provides very few trips to the station.

Pembroke selectmen have recently approved a pilot initiative that will provide GATRA-operated transit services between Pembroke's town center and the Hanson commuter rail station. This route is anticipated being used by college students heading to Boston for school and by those who commute into the city for work. Free commuter parking will be designated in the town center.

Plympton has a very small town center consisting of Town Hall, Library, fire and police stations, and very few stores. There is no bus service or rail station, and all major shopping requires driving to Plymouth, Kingston, or Halifax. The Town is livable only for people who have access to automobiles and it is a treasured place for those who have chosen to live there.

Figure 3-20: *Mechanical dry harvesting of bogs south of Pleasant Street*

Coastal Region



Similar to the central part of the region, cranberry bogs are an important landscape in Kingston and Plymouth. Cranberry bogs help secure the rural character of these two communities, especially since each bog typically has 2-3 acres of upland open space supply water and sand that buffer the bogs.

The coastal region is a popular tourist destination, and Plymouth alone attracts large numbers of visitors, who are drawn to the history of the Town. The Town is well known for its park system and trails. Nearly one million people a year come from all over the world to visit the Town, where in 1620, Europeans first made a home in New England, and to see Plymouth Rock where, tradition tells us, the passengers on the Mayflower first set foot in the New World. A simple glacial boulder on the shore of Plymouth Harbor, Plymouth Rock has become a world famous symbol of the courage and faith of the men and women who founded the first New England colony. A landscaped waterfront park provides scenic views of Plymouth Harbor. The Mayflower II, a replica of the ship that brought the first Pilgrims to Massachusetts, is anchored at the park as part of a tourist attraction.

Figure 3-21: *Tourists gathering together at the Pilgrim State Park near the center of Town. The Mayflower II is seen in the far distance*

Plymouth and Kingston are maturing communities with vibrant and pleasant village centers. Downtown Plymouth has many businesses, but those supplying basic merchandise are being replaced by recreation and restaurant uses. At the same time, the Center has lost the benefits of major public uses; the Probate Court, the District Court; and Registry of Deeds has all been moved to a peripheral highway-oriented location. Rail service at the Cordage Park station is very limited and off-peak, as most trips end and begin in neighboring Kingston.

Figure 3-22: *Plymouth is well known for its open land, park system and trails*

The Town does have limited bus service provided by the Greater Attleboro Taunton Regional Transit Authority (GATRA)'s Plymouth Link bus service from Cedarville to Cordage Park and the Kingston rail station, and on through Duxbury to Marshfield at the Route 3 and 139 interchange via GATRA's new SAIL

(Seaside Area Intertown Link) service. These services require many transfers but they do help to tie the town together and to connect to towns to the north. In all, people in the northern parts of Plymouth have access to needs and services, while those south of the Chiltonville neighborhood and away from the coast have fewer nearby resources and must drive further to access them.

Kingston is much more compact with a commercial center along Route 3A by the rail tracks and former station, with many shopping centers to the north along Route 3A, and with the major regional Independence Mall just north of Plymouth. Its town hall and library are on or just off of Route 3A. Kingston has frequent train service through the new commuter rail station and bus service south to Plymouth via GATRA's Plymouth Link, and north through Duxbury and Marshfield via the SAIL service. The regional high school is remote in the westernmost part of the town requiring most students to be bused while the elementary school is more central just off of Main Street near Brook Street. The Town's many historic houses give residents and visitors a feeling of connection with a proud maritime past, and some of those along Route 3A on partially protected by special zoning provisions.

3.6 GHG-Emissions Reduction for GreenDOT Implementation

MassDOT, using its statewide travel demand model, has provided the Old Colony MPO with statewide estimates of CO_2 emissions resulting from the collective list of all recommended projects in all the Massachusetts RTPs combined. Emissions are estimated in the same way as the criteria pollutants (volatile organic compounds, nitrogen oxides, and carbon monoxide) whose emissions are required for the air quality conformity determination (for further description, see Chapter 8. However, the CO_2 emissions shown here are part of an effort separate from the conformity analysis and are not part of those federal standards and reporting requirements.

The Global Warming Solutions Act (GWSA) legislation requires reductions by 2020 and further reductions by 2050, relative to the 1990 baseline. The project mix from this RTP (and all other RTPs) was modeled for both 2020 and 2035 using an Action (Build) vs. Baseline (No-Build) analysis to determine the CO_2 emissions attributed to the all MPO's mix of projects and smart-growth land use assumptions. The estimates of the modeled CO_2 emissions are provided below:

Table 3-1: Massachusetts Statewide CO2 Emissions Estimates
(all emissions in tons per summer day)

Year	CO2 Action Emissions	CO2 Base Emissions	Difference (Action – Base)
2010	101,514.4	101,514.4	n/a
2020	105,747.5	105,856.4	-108.9
2035	115,034.1	115,028.0	6.1

As shown above, collectively, all the projects in the RTPs in the 2020 Action scenario provide a statewide reduction of nearly 109 tons of CO_2 per day compared to the base case. However, the 2035 Action scenario estimates an increase of about 6 tons of CO_2 emissions compared to the base case. It should be noted that this current analysis measures only projects that are included in the travel demand model. Many other types of projects that cannot be accounted for in the model (such as bicycle and pedestrian facilities, shuttle services, intersection improvements, etc.) will be further analyzed for CO_2 reductions in the next Transportation Improvement Program development cycle. This information will be updated and reported at that time.

Working closely with MassDOT, the Old Colony MPO will continue to report on its actions to comply with the GWSA and to help meet the GHG reductions targets. As part of this activity, the MPO will provide further public information on the topic and will advocate for steps needed to accomplish the MPO's and state's goals for greenhouse gas reductions.

3.7 Livability Funding Opportunities

Pedestrian and Bicycle Safety Program
Livable communities are a high priority for the U.S. Department of Transportation and the Obama Administration. A livable community is one that provides safe and convenient transportation choices to all citizens, whether by walking, bicycling, transit, or driving. Each year, unfortunately, pedestrian fatalities comprise about 12 percent of all traffic fatalities and there are approximately 4,000 pedestrian deaths. Another 59,000 pedestrians are injured in roadway crashes annually. The numbers are improving, but we still have a ways to go. Pedestrian safety improvements depend on an integrated approach that involves the 4 E's: Engineering, Enforcement, Education, and Emergency Services. The FHWA's Office of Safety develops projects, programs and materials for use in reducing pedestrian and bicyclist fatalities.
http://safety.fhwa.dot.gov/ped_bike/

Recreational Trails Program (RTP)
The Recreational Trails Program (RTP) provides funds to the States to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. The RTP is an assistance program of the Department of Transportation's Federal

Highway Administration (FHWA). Federal transportation funds benefit recreation including hiking, bicycling, in-line skating, equestrian use, cross-country skiing, snowmobiling, off-road motorcycling, all-terrain vehicle riding, four-wheel driving, or using other off-road motorized vehicles.

The RTP funds come from the Federal Highway Trust Fund, and represent a portion of the motor fuel excise tax collected from non-highway recreational fuel use: fuel used for off-highway recreation by snowmobiles, all-terrain vehicles, off-highway motorcycles, and off-highway light trucks.
http://www.fhwa.dot.gov/environment/rectrails/

Transportation Enhancement (TE) Program
Transportation Enhancement (TE) activities offer funding opportunities to help expand transportation choices and enhance the transportation experience through 12 eligible TE activities related to surface transportation, including pedestrian and bicycle infrastructure and safety programs, scenic and historic highway programs, landscaping and scenic beautification, historic preservation, and environmental mitigation. TE projects must relate to surface transportation and must qualify under one or more of the 12 eligible categories. The eligible activities are as follow:

1. Provision of pedestrian and bicycle facilities
2. Provision of pedestrian and bicycle safety and education activities
3. Acquisition of scenic or historic easements and sites
4. Scenic or historic highway programs including tourist and welcome centers
5. Landscaping and scenic beautification
6. Historic Preservation
7. Rehabilitation and operation of historic transportation buildings, structures, or facilities
8. Conversion of abandoned railway corridors to trails
9. Control and removal of outdoor advertising
10. Archaeological planning and research
11. Environmental mitigation of highway runoff pollution, reduce vehicle-caused wildlife mortality, maintain habitat connectivity
12. Establishment of transportation museums

http://www.fhwa.dot.gov/environment/te/

Context Sensitive Solutions (CSS)
Focused efforts to achieve the FHWA objective of incorporating CSS into all aspects of transportation planning and project development include; the development and delivery of CSS training through the National Highway Institute and FHWA Resource Centers; initiatives to integrate CSS concepts into university curriculums; support and sponsorship of research projects, technical guidance handbooks, competitions and conferences; management and coordination of contracts and internal and external partnerships to link CSS with planning and project development.

The continued planning, funding and implementation of these activities is referred to as the FHWA CSS Program. Management and coordination of contracts and partnerships directly or indirectly related to the advancement of the implementation of CSS are considered FHWA CSS

Program Activities. This list of activities is updated quarterly and represents recently completed and current CSS projects and initiatives.
http://www.fhwa.dot.gov/context/

National Scenic Byways Program
The National Scenic Byways Program is part of the U.S. Department of Transportation, FHWA. Established in Title 23, Section 162 of the United States Code under the ISTEA of 1991 and reauthorized and expanded significantly in 1998 under TEA-21 and again under SAFETEA-LU in 2005, the program is a grass-roots collaborative effort established to help recognize, preserve and enhance selected roads throughout the United States.
http://www.fhwa.dot.gov/HEP/byways/index.htm

Safe Routes to School Program
The Safe Routes to Schools Program is a Federal-Aid program of the U.S. Department of Transportation's Federal Highway Administration (FHWA). The Program was created by Section 1404 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users Act (SAFETEA-LU). The SRTS Program is funded at $612 million over five Federal fiscal years (FY 2005-2009) and is to be administered by State Departments of Transportation (DOTs).

The Program provides funds to the States to substantially improve the ability of primary and middle school students to walk and bicycle to school safely. The purposes of the program are:

1. To enable and encourage children, including those with disabilities, to walk and bicycle to school
2. To make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age; and
3. To facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity (approximately 2 miles) of primary and middle schools (Grades K-8).

Each State administers its own program and develops its own procedures to solicit and select projects for funding. The program establishes two distinct types of funding opportunities: infrastructure projects (engineering improvements) and non-infrastructure related activities (such as education, enforcement and encouragement programs). More detail on eligible projects, as well as program set-up is provided in the SRTS Program Guidance document.
http://safety.fhwa.dot.gov/saferoutes/

Transportation, Community, and System Preservation Program (TCSP)
These discretionary funds, usually earmarked by Congress, may be used to carry out eligible projects to integrate transportation, community, and system preservation plans and practices that improve the efficiency of the transportation system of the United States; reduce the impacts of transportation on the environment; reduce the need for costly future investments in public infrastructure; provide efficient access to jobs, services, and centers of trade; examine community development patterns; and identify strategies to encourage private-sector development. http://www.fhwa.dot.gov/tcsp/

Towns and cities should contact the MPO for their area for prospective projects. A list of MPOs can be found at http://www.ampo.org/directory/index.php. For additional information, towns and cities can contact their state department of transportation.

Federal Transit Administration Grant Program

Each grant program listing has an Overview page that describes the program, and a Related Items page that contains other relevant information. For information on applying for any of FTA's grant programs, please visit the "Applying for and Managing Grants" portion of the website.

- Metropolitan & Statewide Planning (5303, 5304, 5305)
- Urbanized Area Formula Program (5307)
- Clean Fuels Grant Program (5308)
- Major Capital Investments (New Starts & Small Starts) (5309(b)(1))
- Fixed Guideway Modernization (5309 (b)(2))
- Bus and Bus Facilities (5309, 5318)
- Transportation for Elderly Person and Persons with Disabilities (5310)
- Formula Grants for Other than Urbanized Areas (5311)
- Rural Transit Assistance Program (5311(b)(3))
- Public Transportation on Indian Reservations (5311(c))
- Over-the-Road Bus Program
- Transit Cooperative Research Program (5313)
- National Research & Technology Program (5314)
- Job Access and Reverse Commute Program (5316)
- New Freedom Program (5317)
- Paul S. Sarbanes Transit in Parks Program (5320)
- Alternatives Analysis (5339)
- University Transportation Centers Program (TEA-21 5505)
- Flexible Funding for Highway and Transit
- TIGGER Program
  http://www.fta.dot.gov/funding/grants_financing_263.html

Congestion Mitigation and Air Quality (CMAQ) Program

With passage of the Clean Air Act Amendments of 1990, the Congress made great strides in America's efforts to attain the National Ambient Air Quality Standards (NAAQS). Reducing pollution and other adverse environmental effects of transportation projects and transportation system inefficiency have been long-standing DOT objectives. CMAQ funds may be used to establish new or expanded transportation projects or programs that reduce emissions, including capital investments in transportation infrastructure, congestion relief efforts, and diesel engine retrofits. Other CMAQ projects include operating assistance for new transit services, travel demand management strategies, traffic flow improvement programs that reduce emissions, and bicycle/pedestrian facilities and programs.
http://www.fhwa.dot.gov/environment/cmaqpgs/

Surface Transportation Program

The Surface Transportation Program provides flexible funding that may be used by states and localities for projects on any federal-aid highway, including the National Highway System, bridge

projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities.
http://www.fhwa.dot.gov/safetealu/factsheets/stp.htm

National Highway System (NHS) Program
The NHS Program provides flexible funding that may be used by states and localities for projects to make improvements to rural and urban roads that are part of the NHS, including the Interstate System and designated connections to major intermodal terminals. NHS Program funds can be used to fund transit improvements in NHS corridors.
http://www.fhwa.dot.gov/safetealu/factsheets/nhs.htm

Public Housing Program
The Public Housing Program provides funding to local housing agencies for operating expenses and repairs to public housing developments. Funds are allocated based on the continuing needs of the housing authorities, especially the number of units they own. Public housing agencies are encouraged to use environmentally-responsible practices through regulations and policy guidance and through specific programs like Energy Performance Contracting (EPC). EPC provides funding to make public housing units more energy efficient through energy efficiency, water efficiency, or renewable energy improvements to units. Funding is provided through freezing utility subsidies for up to 20 years; the savings resulting from lower utility costs are then used to repay financing obtained to make the improvements. For every $1 spent on utility efficient improvements under this program, $2.44 in savings will be created.
http://www.hud.gov/offices/pih/programs/ph/hope6/index.cfm

Section 108 is the loan guarantee provision of the CDBG program that provides public entities loan funds for businesses or other entities to carry out approved economic development, housing, and public facility projects. The public entity may carry out eligible projects itself.
http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/

Brownfields Economic Development Initiative (BEDI)
The Brownfields Economic Development Initiative (BEDI) is a key competitive grant program that HUD administers to stimulate and promote economic and community development. BEDI is designed to assist cities with the redevelopment of abandoned, idled and underused industrial and commercial facilities where expansion and redevelopment is burdened by real or potential environmental contamination.

BEDI grant funds are primarily targeted for use with a particular emphasis upon the redevelopment of brownfields sites in economic development projects and the increase of economic opportunities for low-and moderate-income persons as part of the creation or retention of businesses, jobs and increases in the local tax base.
http://www.hud.gov/offices/cpd/economicdevelopment/programs/bedi/index.cfm

HOME Investment Partnership
HOME is the largest Federal block grant to State and local governments designed exclusively to create affordable housing for low-income households. Each year it allocates approximately $2 billion among the States and hundreds of localities nationwide. The program was designed to reinforce several important values and principles of community development:

- HOME's flexibility empowers people and communities to design and implement strategies tailored to their own needs and priorities.
- HOME's emphasis on consolidated planning expands and strengthens partnerships among all levels of government and the private sector in the development of affordable housing.
- HOME's technical assistance activities and set-aside for qualified community-based nonprofit housing groups builds the capacity of these partners.
- HOME's requirement that participating jurisdictions (PJs) match 25 cents of every dollar in program funds mobilizes community resources in support of affordable housing.
  http://www.hud.gov/offices/cpd/affordablehousing/programs/home/

Housing Opportunities for Persons with AIDS (HOPWA)
HOPWA provides formula funding and competitively-awarded grants to states, cities, and nonprofit organizations. Funds can be used to develop and support housing for people with AIDS and may be used for certain supportive services.
http://www.hud.gov/offices/cpd/aidshousing/index.cfm

Homeless Programs
Homeless Programs provide formula and competitive funding to state and local governments and private nonprofit organizations. Competitive funds are awarded in connection with the Continuum of Care planning group, a community-wide group that plans for and provides services to homeless people. Funds can be used for services and for development of emergency shelters and transitional and permanent housing to serve the homeless.
http://www.hud.gov/offices/cpd/homeless/index.cfm

Rural Innovation Fund
HUD's FY 2010 appropriations include $25 million for a new Rural Innovation Fund to address the problems of concentrated rural housing distress and community poverty.

Supportive Housing for the Elderly (Section 202) and Supportive Housing for Persons with Disabilities (Section 811)
These programs provide competitive funding to nonprofit agencies developing housing for the elderly and persons with disabilities. Funds consist of capital grants to assist in the original construction and annual project rental assistance to support operating and maintenance costs to ensure that rents remain affordable to very low-income people.
http://www.hud.gov/offices/hsg/mfh/progdesc/eld202.cfm
http://www.hud.gov/offices/hsg/mfh/progdesc/disab811.cfm

Mortgage Insurance for Rental Housing
Several FHA mortgage insurance programs can be used to facilitate the new construction and substantial rehabilitation of multifamily rental projects. Some FHA programs can be used to refinance and acquire existing multifamily projects not requiring substantial rehabilitation. These programs include:

- Mortgage insurance pursuant to Section 220 may be used to insure loans for multifamily housing projects in designated urban renewal areas, code enforcement areas, and other areas that local governments have designated for revitalization.
  http://www.hud.gov/offices/hsg/mfh/progdesc/renturbanhsg220.cfm

- Mortgage insurance pursuant to Section 221(d)(4) and Section 221(d)(3) may be used to insure mortgages used to construct or substantially rehabilitate multifamily rental housing. The former program may be used by for-profit sponsors and the latter by nonprofit sponsors.
  http://www.hud.gov/offices/hsg/mfh/progdesc/rentcoophsg221d3n4.cfm

- Mortgage insurance pursuant to Section 207/223(f) may be used to insure mortgages made for the purpose of acquiring or refinancing existing multifamily rental housing. Projects requiring substantial rehabilitation are not eligible for the program. http://www.hud.gov/offices/hsg/mfh/progdesc/purchrefi223f.cfm

Eligible owners and purchasers utilizing the above programs apply for the FHA insurance through HUD-approved lenders. The programs have differing maximum mortgage limitations and requirements.

Mortgage Insurance for Condominium Units
FHA also insures mortgages on condominium units in developments that are proposed or under construction, existing projects, or conversions. Generally, approval of the condominium project must be obtained from an authorized lender.
http://www.hud.gov/offices/adm/hudclips/letters/mortgagee/files/09-46aml.pdf
http://www.hud.gov/offices/adm/hudclips/letters/mortgagee/files/09-46bml.pdf

Neighborhood Stabilization Program (NSP)
NSP provides some formula funding to states and local governments and some competitive grants to states, local governments, nonprofit entities, or a consortium of nonprofit entities. Funds can be used to acquire and rehabilitate abandoned or foreclosed-upon homes or residential properties in neighborhoods.
http://portal.hud.gov/portal/page/portal/HUD/recovery

Housing Finance Agency Risk Sharing Program
Under this program, HUD provides credit enhancement on loans underwritten and closed by a state or local housing finance agency (HFA). Loans made pursuant to Section 542(c) are for affordable housing, which includes new construction, substantial rehabilitation, elderly housing, and refinancing. Eligible owners and purchasers apply for the program through the appropriate HFA.
http://www.hud.gov/offices/hsg/mfh/progdesc/riskshare542b.cfm

Housing Choice and Project-Based Vouchers
Housing Choice and Project-Based Voucher Programs provide funding to local public housing agencies for rental subsidies for units that are chosen by the tenant in the private market (Housing Choice Vouchers) or for use in specific developments or units (Project-Based Vouchers). Housing Choice Vouchers allow tenants more flexibility in deciding the location of their residence, giving them more of an opportunity to live closer to work, family, amenities, or services.
http://www.hud.gov/offices/pih/programs/hcv/about/index.cfm

HOPE VI

The HOPE VI Program provides competitive funding for the eradication of severely distressed public housing developments. Funds can be used for demolition, major rehabilitation, and new construction of public housing; acquisition of sites in other locations for private new construction; and supportive services for those relocated by the program. HOPE VI promotes the creation of mixed-income communities that are dense, pedestrian friendly, and transit accessible. It also encourages high standards of green building for new construction projects through regulation and giving priority to proposals with green features.
http://www.hud.gov/offices/pih/programs/ph/hope6/index.cfm

Community Development Block Grants (CDBG)

The Community Development Block Grant (CDBG) program is a flexible program that provides communities with resources to address a wide range of unique community development needs. Beginning in 1974, the CDBG program is one of the longest continuously run programs at HUD. The CDBG program provides annual grants on a formula basis to 1209 general units of local government and States.
http://www.hud.gov/offices/cpd/communitydevelopment/programs/

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency's mission is to protect human health and the environment. Where and how we build communities has a major impact on the environment and on public health. By promoting more environmentally, economically, and socially sustainable communities, EPA can help protect our nation's air, water, land, and people. A clean, green, healthy community is a better place to buy a home and raise a family, it is an appealing place for businesses to locate, and it has the foundations it needs for prosperity. Many EPA programs are aimed at helping tribal, state, and local governments support activities that build more sustainable communities and protect human health and the environment.
In addition to the resources listed here, EPA programs offer many tools on a variety of topics that communities may find useful.
http://www.epa.gov/smartgrowth/partnership/tools.html

Brownfields Remediation and Redevelopment

EPA has a variety of programs to help eligible entities assess, remediate, and restore brownfields sites to productive use and revitalize affected neighborhoods.
http://www.epa.gov/brownfields/

Assessment Grant Program

These grants provide funding to inventory, characterize, assess, and conduct planning and community involvement related to brownfield sites. Grants are for up to $200,000 to address sites contaminated by hazardous substances, and up to $200,000 to address sites contaminated by petroleum. Applicants can also apply as an Assessment Coalition (a group of three or more eligible entities) for up to $1 million.
http://www.epa.gov/brownfields/assessment_grants.htm

Revolving Loan Fund (RLF) Grant Program

These grants of up to $1 million provide funding to capitalize a revolving loan fund. Revolving loan funds can be used to provide no-interest or low-interest loans and subgrants to eligible

entities who own the site to carry out cleanup activities at brownfield sites. RLF grants require a 20 percent cost share.
http://www.epa.gov/brownfields/rlflst.htm

Cleanup Grant Program
These grants provide funding for a recipient to carry out cleanup activities at brownfields sites that it owns. Sites may be contaminated by hazardous substances and/or petroleum. Grants are up to $200,000 per site and require a 20 percent cost share.
http://www.epa.gov/brownfields/cleanup_grants.htm

Brownfields Job Training Grant Program
These grants provide funding to eligible entities and nonprofit organizations to help communities take advantage of jobs created by the assessment and cleanup of brownfields. The Job Training Grant Program's goals are to prepare trainees for future employment in the environmental field and to facilitate cleanup of brownfield sites contaminated with hazardous substances. Grants are for up to $200,000.
http://www.epa.gov/brownfields/job.htm

Targeted Brownfields Assessments
These assessments are conducted by an EPA contractor, and services can include site assessments, cleanup options and cost estimates, and community outreach. Sites for this program are selected by EPA regional offices. Services can range from several thousand dollars to as much as $100,000.
http://www.epa.gov/brownfields/grant_info/tba.htm

Technical Assistance to Brownfields (TAB) Program
TAB services are provided to communities, regional entities, and nonprofits that need technical assistance dealing with brownfield sites. The program can also assist communities with applying for EPA brownfields grants or identifying other resources to address their brownfield sites.
http://epa.gov/brownfields/tools/tab_bifold.pdf

Environmental Justice
Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across the nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.
http://www.epa.gov/environmentaljustice/

Environmental Justice Small Grants Program
This program provides financial assistance to eligible organizations to build collaborative partnerships, to identify the local environmental and/or public health issues, and to envision solutions and empower the community through education, training, and outreach.
http://www.epa.gov/environmentaljustice/grants/ej-smgrants.html

Environmental Justice Collaborative Problem-Solving Cooperative Agreement Program

This program provides financial assistance to eligible organizations working on or planning to work on projects to address local environmental and/or public health issues in their communities, using EPA's "Environmental Justice Collaborative Problem-Solving Model."
http://www.epa.gov/environmentaljustice/grants/ej-cps-grants.html

State Environmental Justice Cooperative Agreements Program
This program provides funding so that eligible entities may work collaboratively with affected communities to understand, promote, and integrate approaches to provide meaningful and measurable improvements to the public health and/or environment in the communities.
http://www.epa.gov/environmentaljustice/grants/ej-sejca-grants.html

Environmental Justice Showcase Communities Project
This project provides EPA regional office funding to bring together governmental and non-governmental organizations to pool their resources and expertise on the best ways to achieve real results in communities. The successes and lessons learned in these demonstration projects will be used to help guide the design and implementation of future environmental justice projects and will help EPA increase its ability to address local environmental challenges in more effective, efficient, and sustainable ways.
http://www.epa.gov/environmentaljustice/grants/ej-showcase.html

Community Action for a Renewed Environment (CARE)
CARE is a competitive grant program that offers an innovative way for a community to organize and take action to reduce toxic pollution in its local environment. Through CARE, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them. By providing financial and technical assistance, EPA helps CARE communities get on the path to a renewed environment.
http://www.epa.gov/care/

Lead Grants
The EPA awards grants aimed at reducing childhood lead poisoning in communities with older housing through the National Community-Based Lead Grant and the Targeted Lead Grant Programs. The projects supported by these grant funds are an important part of EPA's lead program to eliminate childhood lead poisoning as a major public health concern.
http://www.epa.gov/lead/pubs/grantmap.htm

Energy Efficiency at the State and Local Levels
The State and Local Climate and Energy Program provide technical assistance, analytical tools, and outreach support to state, local, and tribal governments. Specific assistance includes identifying and documenting cost-effective policies and initiatives; measuring and evaluating the benefits of clean energy initiatives; offering tools, guidance, and outreach support; and fostering peer exchange opportunities. The program's web site provides state and local governments with information on energy efficiency and clean energy, including webcasts on a variety of topics.
http://epa.gov/statelocalclimate/

National Clean Diesel Campaign (NCDC)
NCDC offers a comprehensive program to help fleet owners clean up their diesel fleets. The campaign awards competitive grants through the Diesel Emissions Reduction Act to public

agencies, eligible nonprofits, and private entities, such as school bus contractors, who partner with eligible entities. NCDC's rigorous verification program evaluates the performance and durability of retrofit technologies and provides a path to verification for emerging technologies. The campaign's innovative programs, such as Clean School Bus USA, Clean Ports USA, and Clean Construction USA, provide sector-specific information, including case studies, technology options, and publications. NCDC's tools and resources include the web-based Diesel Emissions Quantifier to help evaluate the cost-effectiveness of various retrofit options and the State and Local Toolkit to help design, fund, and evaluate emission-reduction programs. In addition, NCDC supports regional private-public collaborative whose members coordinate to implement a wide array of activities to reduce diesel emissions.
http://epa.gov/cleandiesel/

SmartWay Transport Partnership
Under SmartWay, EPA provides web-based analytical tools, technical assistance, innovative financing options, air quality planning guidance, product and vehicle verification and certification, and recognition incentives to help states and municipalities support cleaner goods movement in their communities. SmartWay partners learn how to shrink their carbon footprints and reduce emissions of air pollutants while saving fuel and expanding their businesses. SmartWay's innovative financial options can help trucking firms, municipal fleet managers, and owner-operators serving communities across the country overcome financial obstacles to cleaner, fuel-saving vehicle retrofits and upgrades. Cities can partner with EPA regional offices to recruit city-based freight shippers and carriers into the program, organize events or pilot tools/resources for the local business community, use locomotive and truck idle-reduction strategies to achieve clean air goals, and let businesses and consumers know about lower-polluting, fuel-saving, SmartWay-designated passenger vehicles and commercial trucks.
http://www.epa.gov/smartway/

Smart Growth
EPA's Smart Growth Program offers case studies, research, tools, and publications to help communities learn about and implement smart growth solutions to a wide range of development-related challenges, including transportation and parking, affordable housing, stormwater runoff, zoning codes, infill and redevelopment, and many other issues.
http://www.epa.gov/smartgrowth/

Smart Growth Implementation Assistance (SGIA) Program
Through the SGIA program, EPA solicits applications from state, local, regional, and tribal governments (and non-profits that have partnered with a governmental entity) that want to incorporate smart growth techniques into their future development. Once selected, communities receive direct technical assistance from a team of national experts in one of two areas: policy analysis (e.g., zoning codes, school siting guidelines, transportation policies) or public participatory processes (e.g., visioning, design workshops, alternatives analysis). EPA tailors the assistance to the community's unique situation and priorities and provides the contractor team. This is not a grant. Through a site visit and a report, the multidisciplinary teams help the community achieve its goal of encouraging growth that fosters economic progress and environmental protection. The SGIA Request for Applications is usually open in the first quarter of the year.
http://www.epa.gov/smartgrowth/sgia.htm

Smart Growth Funding Resources
The Smart Growth Program occasionally offers competitive grants. It has also compiled lists of federal, regional, and state resources for communities and non-governmental organizations that are seeking funding to address various aspects of smart growth.
http://www.epa.gov/smartgrowth/grants/index.htm

Water Quality
In urban and suburban areas, much of the land surface is covered by buildings, pavement, and compacted landscapes that do not allow rain and snowmelt to soak into the ground, which greatly increases the volume and velocity of stormwater runoff. Upgrading water infrastructure and using green infrastructure techniques can help improve stormwater management to better protect our nation's drinking water and lakes, rivers, streams, and other water bodies.
http://www.epa.gov/owow/nps/urban.html

State Revolving Loan Funds
The Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) Programs are federal/state partnerships designed to finance the cost of infrastructure needed to achieve compliance with the Clean Water Act. Through the SRFs, states maintain revolving loan funds to provide low-cost financing for a wide range of water quality infrastructure projects, such as traditional municipal wastewater treatment and collection systems, nonpoint source program implementation projects, wetlands restoration, groundwater protection, innovative stormwater runoff and estuary management projects, drinking water treatment and conveyance systems, and source water protection. Funds to establish or capitalize the SRF programs are provided through EPA grants to the states, along with state matching funds (equal to 20 percent of federal government grants). Under the American Recovery and Reinvestment Act stimulus funding, in FY 2010, 20 percent of the federal funds must be targeted to green infrastructure, water-efficiency improvements, energy-efficiency improvement, and environmentally innovative approaches to water quality improvement.
http://www.epa.gov/owm/cwfinance/cwsrf/ and http://www.epa.gov/safewater/dwsrf/

Green Infrastructure
Green infrastructure is an approach to wet weather management that is cost effective, sustainable, and environmentally friendly. Green infrastructure management approaches and technologies infiltrate, evapotranspire, capture, and reuse stormwater to maintain or restore natural hydrology. Many of these approaches, including green roofs, rain gardens, green streets, and other innovative stormwater management techniques, can also make neighborhoods safer, healthier, and more attractive. EPA has compiled a list of funding resources to help communities fund green infrastructure projects.
http://cfpub.epa.gov/npdes/greeninfrastructure/fundingopportunities.cfm

Asset Management
As communities undertake the task of renewing their water infrastructure systems, EPA can offer a suite of practices and approaches to ensure that water infrastructure both supports sustainable communities and can be supported by the communities it serves. One of the keys to sustainable infrastructure is the practice of Asset Management (AM), which provides a platform for making the best, most effective infrastructure investments. EPA offers AM training and a

suite of tools to promote adoption and improvement of AM implementation. Multisector AM integrates investments in water, transportation, and housing infrastructure and is being promoted through a Memorandum of Understanding between EPA and DOT.
http://www.epa.gov/owm/assetmanage/

Nonpoint Source Management Grants
Under Section 319 of the Clean Water Act, states receive grant money to support a wide variety of activities to reduce nonpoint source pollution, including techniques related to agriculture, urban runoff, forestry, and the physical modification of water bodies. States directly implement projects as well as provide funds to organizations and local governments to carry out projects that reduce nonpoint source pollution through best management practices, outreach and education, and demonstration of new approaches to improve water quality. These grant monies may not be used to fund activities currently required in a stormwater permit issued under the authority of the Clean Water Act. Each state publishes an annual request for proposals.
http://www.epa.gov/nps/cwact.html

4.0 Introduction

The Old Colony region consists of the following communities in Southeastern Massachusetts: Abington; Avon; Bridgewater; Brockton; East Bridgewater; Easton; Halifax; Hanson; Kingston; Pembroke; Plymouth; Plympton; Stoughton; West Bridgewater; and Whitman.

4.1 The 2010 Census

Much of the population, housing, and economic data presented in this Regional Transportation Plan and other planning documents prepared by Old Colony Planning Council are obtained from the United States Census Bureau. The Census Bureau conducts its official national census every ten years, most recently in 2010. While much of the 2010 Census data such as population figures has been released for the state and municipality geographies, some refined census tract and block group data was not available at the time of this Plan. While 2010 Census data is presented in tables in this chapter, graphically the maps presented in this chapter are based on 2000 Census block group data. As data becomes available for census tracts and block groups, these mapping products will be updated.

As a State, Massachusetts grew 3.1 percent from 2000 to 2010, with a population of 6,547,629 people according to the 2010 Census. It was the slowest rate of growth the State has experienced over a decade since the 1970s. Nationally, the population of the United States grew 9.7 percent from 2000, with a 2010 Census population of 308,745,538. It was the slowest national rate of growth since the 1930s.

4.2 Existing Population. Housing, and Demographic Characteristics

Community Populations and Growth

While the official Census is conducted every ten years. the United States Census Bureau [provides annual population estimates for incorporated places (cities and towns) in the United States to supplement the decennial Census, and these figures are used by Old Colony Planning Council to determine regional and community populations on an annual basis. Table 4-1 analyzes the communities of the Old Colony Region and ranks them based on their average annual growth rate between 2000 and 2010 relative to the region. While most communities gained population from 2000 through 2010, Avon, Stoughton, and Brockton experienced slight decreases. Hanson, Plymouth, and Abington were the most rapidly growing communities this past decade. Census estimates for the years 2001 through 2009, along with the 2000 and 2010 Census populations, are listed in Table 4-3.

Table 4-2 contains the 2010 population for each community in the Old Colony Region, and the population density of the town based on total square mileage of land area in the community.

Table 4-1: Growth Trends over Past Decade (2000-2010)

Little or No Growth - Annual Growth Rate of Less Than 0.40%		Moderate Growth - Annual Growth Rate of 0.40% - 0.65%		Most Growth - Annual Growth Rate of Greater than 0.65%	
Avon	-0.20%	West Bridgewater	0.42%	Plympton	0.67%
Stoughton	-0.07%	Whitman	0.43%	Kingston	0.70%
Brockton	-0.05%	Bridgewater	0.53%	Hanson	0.73%
Halifax	0.02%	Pembroke	0.53%	Plymouth	0.89%
Easton	0.36%	East Bridgewater	0.61%	Abington	0.91%

Table 4-2: 2010 Population Density

Area	2010 Census Population	Land Area (Sq. Miles)	Density in 2000 (Pop/ Sq. Mile)
Massachusetts	6,547,629	7,840	835
Region	333,468	330.5	1,009
Abington	15,985	9.9	1,615
Avon	4,356	4.4	990
Bridgewater	26,563	27.5	966
Brockton	93,810	21.5	4,363
East Bridgewater	13,794	17.2	802
Easton	23,112	28.4	814
Halifax	7,518	16.1	467
Hanson	10,209	15.0	681
Kingston	12,629	18.5	683
Pembroke	17,837	21.8	818
Plymouth	56,468	96.5	585
Plympton	2,820	14.8	191
Stoughton	26,962	16.0	1,685
West Bridgewater	6,916	15.7	441
Whitman	14,489	7.0	2,070

Table 4-3 – Census Figures and Population Growth, 2000-2010

	Cenus	Census Bureau Estimates									Census	% Growth	Annual
	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	2000-2010	% Growth
Abington	15,985	16,789	16,682	16,305	16,147	16,111	16,058	15,942	15,167	14,940	14,605	9.45%	0.91%
Avon	4,356	4,375	4,365	4,336	4,322	4,312	4,354	4,391	4,427	4,448	4,443	-1.96%	-0.20%
Bridgewater	26,563	27,263	27,218	27,094	26,623	26,513	26,208	25,942	25,853	25,858	25,185	5.47%	0.53%
Brockton	93,810	93,529	93,143	93,015	93,129	93,365	93,895	94,495	94,854	94,579	94,304	-0.52%	-0.05%
East Bridgewater	13,794	14,097	13,978	13,876	13,780	13,725	13,628	13,479	13,444	13,221	12,974	6.32%	0.61%
Easton	23,112	23,005	22,921	22,967	22,826	22,881	22,977	22,947	22,793	22,483	22,299	3.65%	0.36%
Halifax	7,518	7,790	7,749	7,715	7,712	7,718	7,705	7,714	7,671	7,593	7,500	0.24%	0.02%
Hanson	10,209	10,139	10,046	9,944	9,875	9,804	9,800	9,804	9,788	9,678	9,495	7.52%	0.73%
Kingston	12,629	12,484	12,373	12,329	12,343	12,312	12,218	12,145	12,091	11,981	11,780	7.21%	0.70%
Pembroke	17,837	18,848	18,708	18,510	18,466	17,823	17,493	17,548	17,430	17,223	16,927	5.38%	0.53%
Plymouth	56,468	56,845	56,250	55,980	55,828	55,709	54,990	54,401	53,525	52,701	51,701	9.22%	0.89%
Plympton	2,820	2,800	2,773	2,748	2,713	2,727	2,708	2,696	2,675	2,651	2,637	6.94%	0.67%
Stoughton	26,962	27,169	27,123	26,978	26,787	26,520	26,703	26,902	27,096	27,198	27,149	-0.69%	-0.07%
West Bridgewater	6,916	6,699	6,648	6,646	6,651	6,700	6,743	6,778	6,769	6,715	6,634	4.25%	0.42%
Whitman	14,489	14,189	14,061	14,029	14,067	14,155	14,136	14,069	14,102	14,024	13,882	4.37%	0.43%
OCPC Region	**333,468**	**336,021**	**334,038**	**332,472**	**331,269**	**330,375**	**329,616**	**329,253**	**327,685**	**325,293**	**321,515**	3.72%	0.37%
Massachusetts	**6,547,629**	**6,593,587**	**6,543,595**	**6,499,275**	**6,466,399**	**6,453,031**	**6,451,279**	**6,451,637**	**6,440,978**	**6,411,730**	**6,349,097**	3.13%	0.31%

Housing

According to the 2010 Census, the number of housing units in the region increased by 8.27 percent from 118,300 in 2000 to 128,081 in 20100. The communities with the greatest percent increase in housing were Plympton (19.61%), Abington (19.24%), and Plymouth (16.71%). Table 4-4 shows the total housing units, by municipality in the Old Colony Region.

Table 4-4 – Regional Housing Characteristics

	Total Housing Units			Housing Units in 2010			
Community	2000	2010	% Change 2000-2010	Occupied	% Total Units	Vacant	% Total Units
Abington	5,348	6,377	19.24%	6,080	95.34%	297	4.66%
Avon	1,740	1,769	1.67%	1,709	96.61%	60	3.39%
Bridgewater	7,652	8,336	8.94%	7,995	95.91%	341	4.09%
Brockton	34,837	35,552	2.05%	33,303	93.67%	2,249	6.33%
East Bridgewater	4,427	4,906	10.82%	4,750	96.82%	156	3.18%
Easton	7,631	8,155	6.87%	7,865	96.44%	290	3.56%
Halifax	2,841	3,014	6.09%	2,863	94.99%	151	5.01%
Hanson	3,178	3,589	12.93%	3,468	96.63%	121	3.37%
Kingston	4,525	5,010	10.72%	4,665	93.11%	345	6.89%
Pembroke	5,897	6,552	11.11%	6,298	96.12%	254	3.88%
Plymouth	21,250	24,800	16.71%	21,269	85.76%	3,531	14.24%
Plympton	872	1,043	19.61%	1,006	96.45%	37	3.55%
Stoughton	10,488	10,787	2.85%	10,295	95.44%	492	4.56%
West Bridgewater	2,510	2,669	6.33%	2,571	96.33%	98	3.67%
Whitman	5,104	5,522	8.19%	5,300	95.98%	222	4.02%
Region	118,300	128,081	8.27%	119,437	93.25%	8,644	6.75%

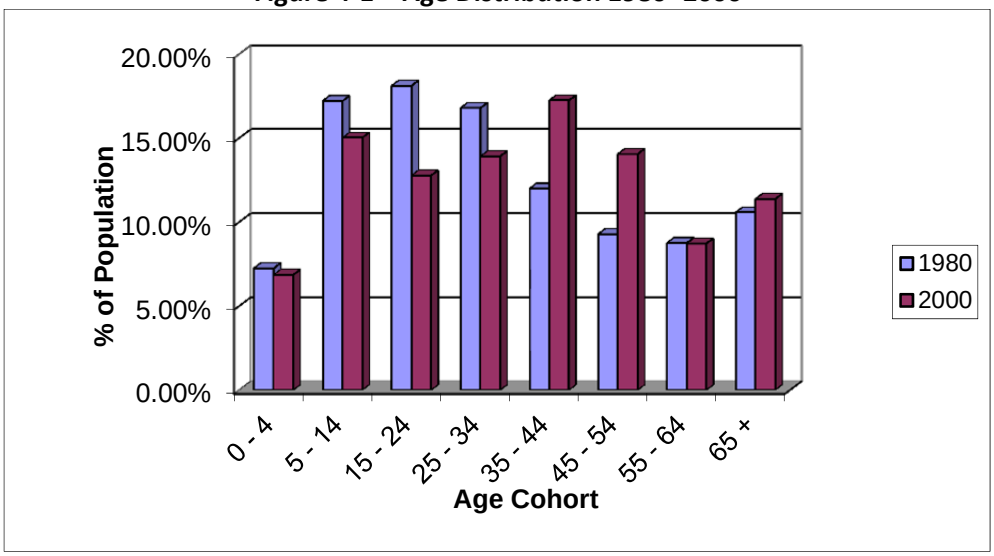
Age Composition

Table 4-5 shows the regional patterns in age distribution of the population over the past 40 years, and Figure 4-1 graphically compares the 20-year difference in age distribution from 1980 to 2000. The trend indicates that the region's population is getting older.

Table 4-5 – Age Distribution of Population, 1970 – 2000

Age Group	1970	Percent of Total	1980	Percent of Total	1990	Percent of Total	2000	Percent of Total
0 - 4	22,734	10.17%	20,077	7.25%	22,387	7.54%	22,062	6.86%
5 - 14	47,968	21.45%	47,664	17.21%	41,435	13.96%	48,313	15.03%
15 - 24	34,196	15.29%	50,188	18.12%	45,642	15.37%	41,097	12.78%
25 - 34	30,294	13.55%	46,517	16.80%	52,649	17.74%	44,754	13.92%
35 - 44	24,612	11.01%	33,218	11.99%	47,428	15.98%	55,447	17.25%
45 - 54	24,394	10.91%	25,725	9.29%	31,410	10.58%	45,210	14.06%
55 - 64	18,707	8.37%	24,258	8.76%	22,331	7.52%	28,058	8.73%
65 +	20,723	9.27%	29,307	10.58%	33,582	11.31%	36,574	11.38%
Total	223,628	100.00%	276,954	100.00%	296,864	100.00%	321,515	100.00%

Figure 4-1 – Age Distribution 1980 -2000

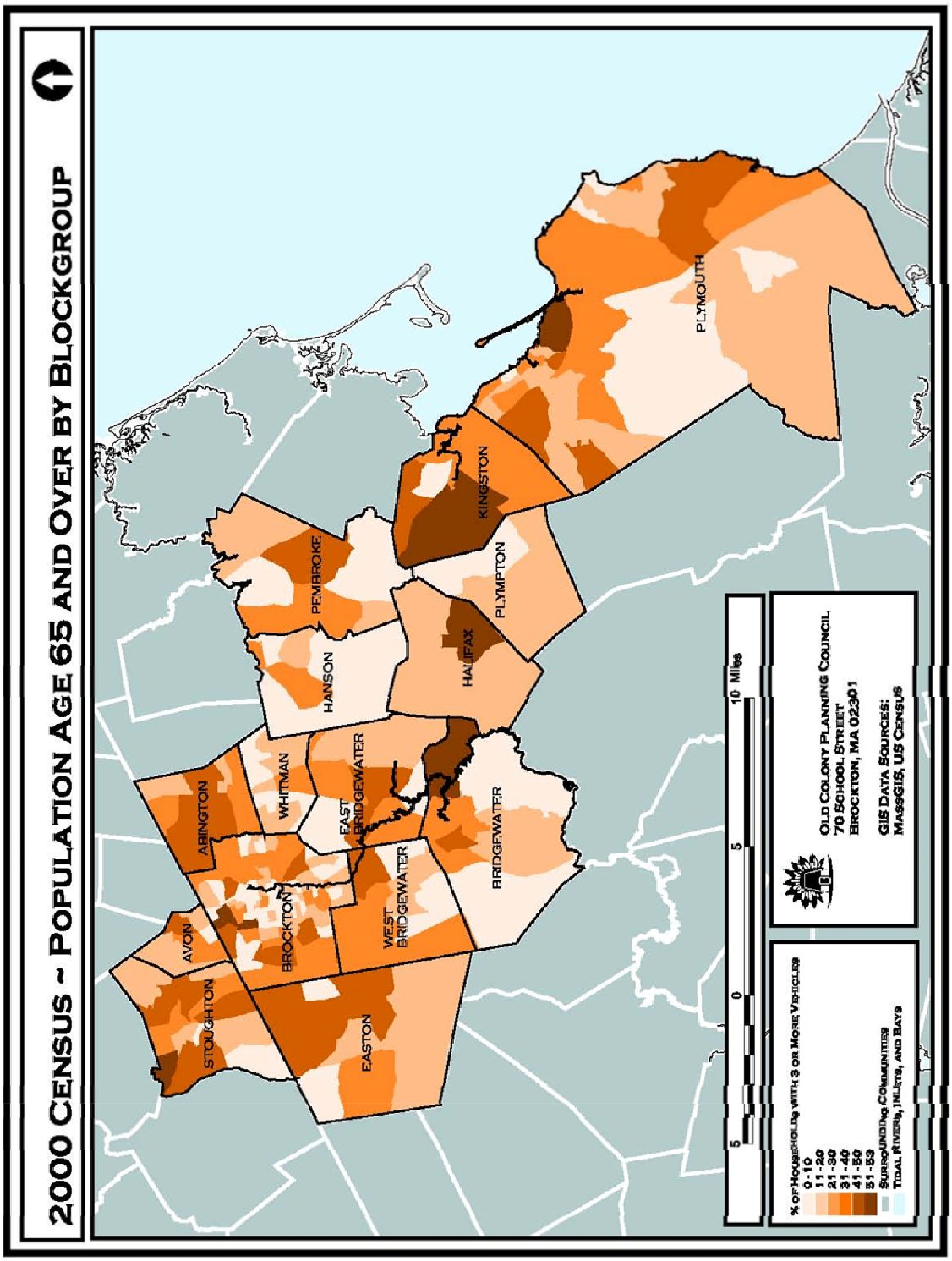


Elder Persons

In 2000, over 20 percent of the population was 55 or older, a percentage that has risen consistently since 1970. Nationally, approximately 1 in every 7 licensed drivers is 65 years of age or older. By 2030, that figure is estimated to be about 1 in 4. According to the Institute of Transportation Engineers (ITE), the average male will outlive his driving abilities by six years and the average female will outlive hers by ten years. The map in Figure 4-2 indicates where the most significant concentrations of older persons reside in the Region.

Other trends in recent years have shown many elder persons choosing to stay in their own suburban homes rather than opting for a specific community or facility that caters to their physical and social needs. Similarly, people are generally working later in life than in past generations, further emphasizing the transportation needs for this segment of the population.

Figure 4-2: Population of Older Persons



The Federal Highway Administration (FHWA) in Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians cites results of a survey that identifies specific challenges faced by older Americans while driving. For example, crash analyses and observational studies indicated the following factors in intersection crashes involving older drivers:

- 27 percent had difficulty reading road signs
- 21 percent had difficulty driving across an intersection
- 20 percent had difficulty finding the beginning of a left turn lane
- 19 percent had difficulty making a left turn
- 17 percent had difficulty following pavement markings
- 12 percent had difficulty responding to traffic signals

The same study also yielded the following results of a survey given to older drivers to identify highway features more important to them for safe driving as they grow in age:

- Lighting at intersections (62 percent)
- Pavement markings at intersections (57 percent)
- Number of left turn lanes at an intersection (55 percent)
- Width of travel lanes (51 percent)
- Raised-curb channelization for turns at intersections (47 percent)
- Size of traffic signals at intersections (42 percent)

Planning for the transportation needs of the older drivers of today and tomorrow must be a priority for planners and government entities.

Environmental Justice Populations

Achieving environmental justice is a priority of the Old Colony Metropolitan Planning Organization and Old Colony Planning Council. This is achieved by taking steps to ensure the effects of all programs, policies, and activities on minority populations and low-income population and 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 the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

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.

Figures 4-3 (Non-White Population by Block Group) and 4-4 (Low Income Population by Block Group) show the environmental justice populations within the Old Colony Region, based on Census 2000 Block Group data. Table 4.6 contains the 2010 Census data on race, by community.

Income levels influence transportation choices in a variety of ways. By whatever measure (median household income, median family income, per capita income or discretionary income), a person or family's income influences the number and kind of vehicle trips they generate. Income also influences a person's need for and use of public transportation. Table 4-7 shows the median household income, median family income, and per capita income for the Old Colony region by community, based on Census and American Community Survey data.

Table 4-6
Population By Race in OCPC Region, 2010 Census

		Race								
		One Race								
	Total Population	Total	White	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian and Other Pacific	Other	Two or More Races	Hispanic or Latino
Abington	15,985	15,766	14,788	342	47	284	2	303	219	310
Avon	4,356	4,284	3,660	434	5	120	0	65	72	121
Bridgewater	26,563	26,139	24,163	1,292	62	328	0	294	424	838
Brockton	93,810	87,327	43,821	29,276	332	2,151	52	11,695	6,483	9,357
East Bridgewater	13,794	13,593	13,139	216	28	117	0	93	201	204
Easton	23,112	22,733	21,144	745	20	563	5	256	379	575
Halifax	7,518	7,409	7,291	45	6	42	0	25	109	81
Hanson	10,209	10,069	9,850	104	3	48	1	63	140	95
Kingston	12,629	12,467	12,137	133	14	116	1	66	162	140
Pembroke	17,837	17,664	17,274	109	29	170	3	79	173	193
Plymouth	56,468	55,482	52,955	1,147	193	516	22	649	986	1,030
Plympton	2,820	2,793	2,731	24	8	22	0	8	27	36
Stoughton	26,962	26,267	21,634	2,984	46	971	2	630	695	876
West Bridgewater	6,916	6,817	6,564	104	7	75	0	67	99	121
Whitman	14,489	14,249	13,768	180	35	111	5	150	240	267
OCPC Total	**333,468**	**323,059**	**264,919**	**37,135**	**835**	**5,634**	**93**	**14,443**	**10,409**	**14,244**
Massachusetts	**6,547,629**	**6,375,626**	**5,265,236**	**434,398**	**18,850**	**349,768**	**2,223**	**305,151**	**172,003**	**627,654**
OCPC % of State	**5.09%**	**5.07%**	**5.03%**	**8.55%**	**4.43%**	**1.61%**	**4.18%**	**4.73%**	**6.05%**	**2.27%**

Figure 4-3: Population of Non-White Persons by Block Group, 2000 Census

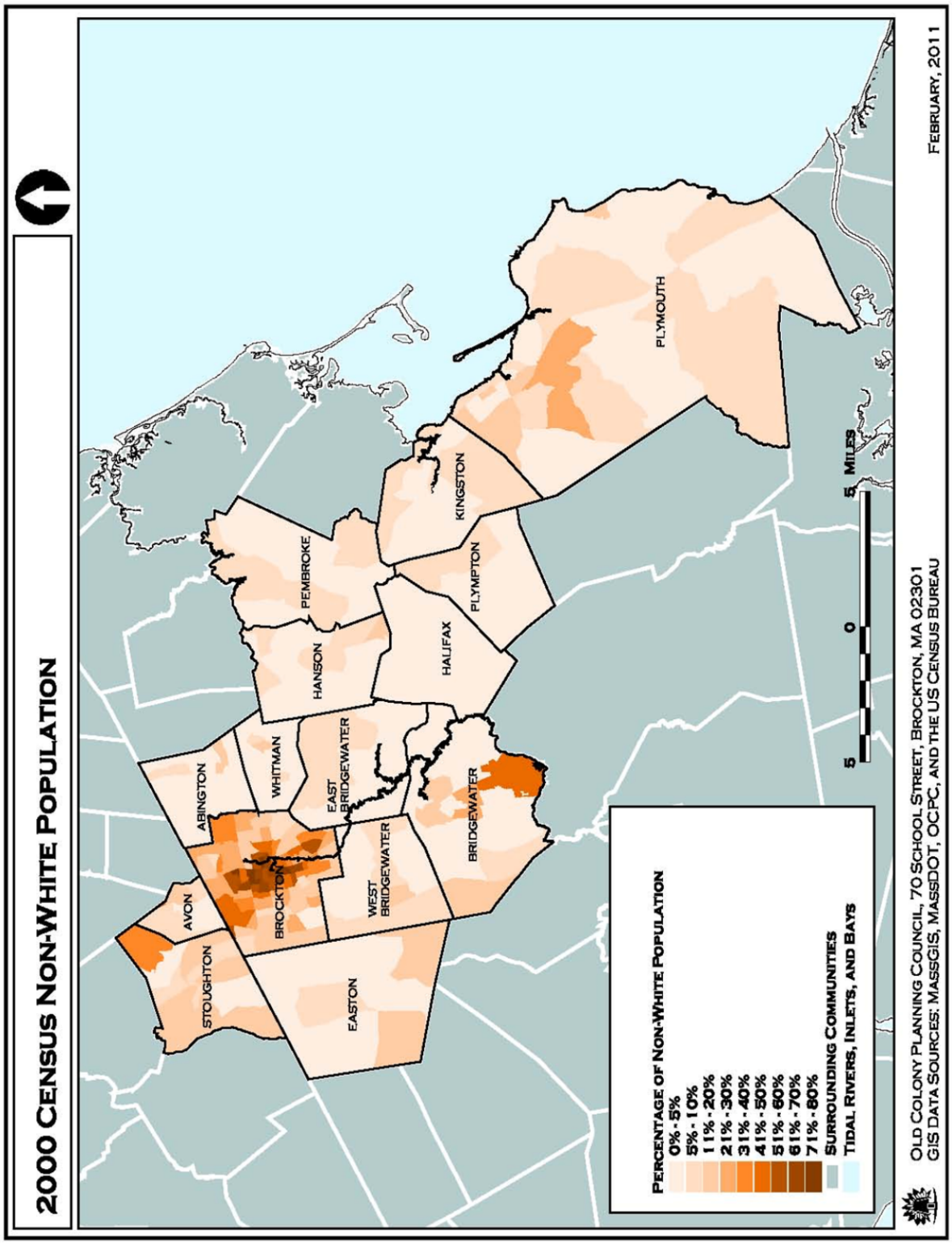
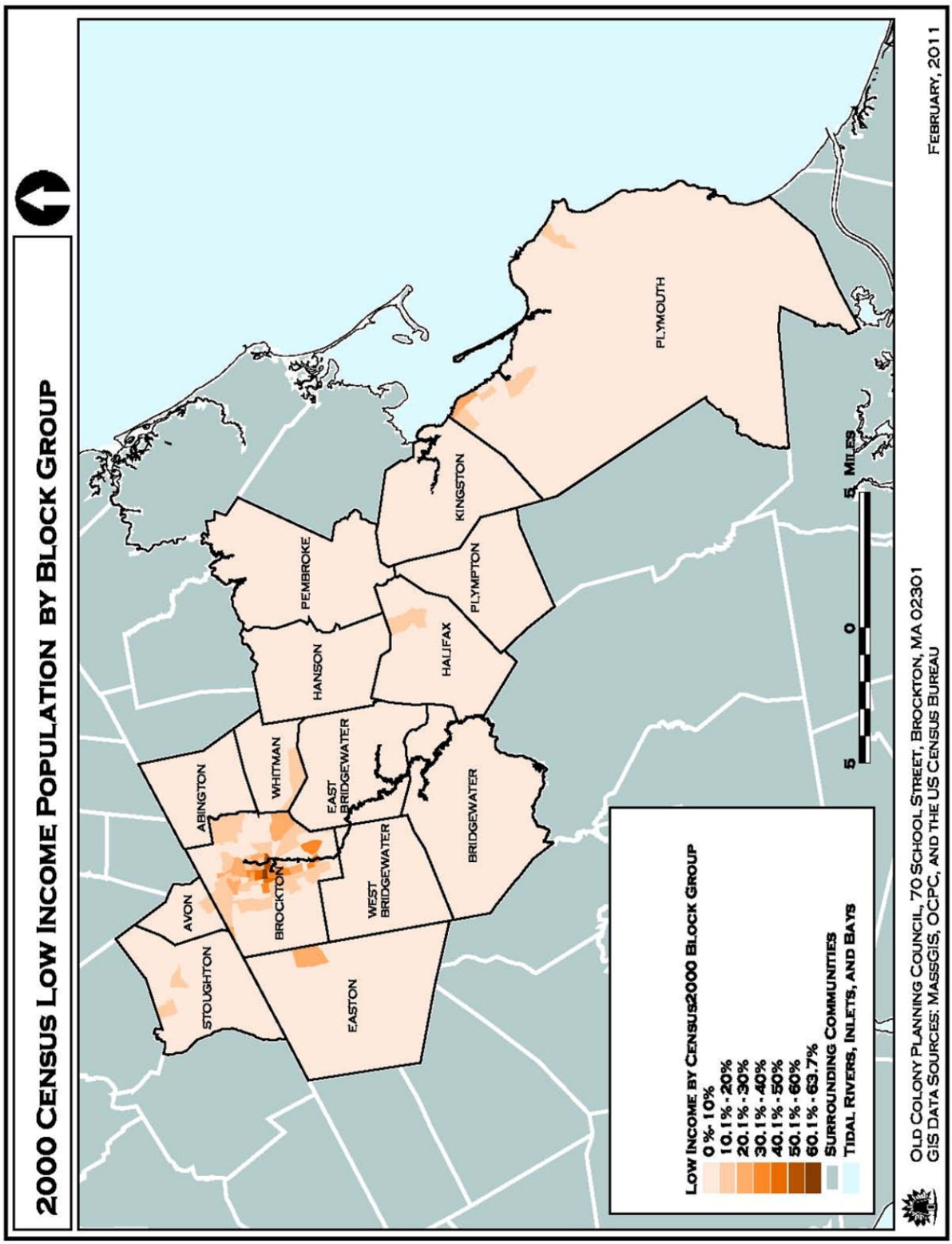


Figure 4-4: Low-Income Population by Block Group, 2000 Census



The Median Household Income in the Old Colony Region increased by 28.25 percent from 2000 to 2009, (using an un-weighted average of community figures) Similarly, the region's Median Family Income grew by 29.90 percent.

Incomes vary greatly by community. Based on 2009 American Community Survey data, median household incomes ranged from $50,197 in Brockton to $85,523 in Plympton. Median family incomes ranged from $58,001 in Brockton to $104,091 in Easton.

Table 4-7 – Income Statistics by Community, 2000-2009

	Median Household Income			Median Family Income			Per Capita Income		
Community	**2000**	**2009**	**% Change**	**2000**	**2009**	**% Change**	**2000**	**2009**	**% Change**
Abington	$57,100	$73,956	29.52%	$68,826	$91,151	32.44%	$23,380	$32,436	38.73%
Avon	$50,305	$60,933	21.13%	$60,625	$85,273	40.66%	$24,410	$30,829	26.30%
Bridgewater	$65,318	$84,176	28.87%	$73,953	$97,267	31.53%	$23,105	$26,398	14.25%
Brockton	$39,507	$50,197	27.06%	$46,235	$58,001	25.45%	$17,163	$22,108	28.81%
East Bridgewater	$60,311	$76,438	26.74%	$67,307	$87,750	30.37%	$23,532	$30,883	31.24%
Easton	$69,144	$84,375	22.03%	$82,190	$104,091	26.65%	$30,732	$36,556	18.95%
Halifax	$57,015	$74,679	30.98%	$65,461	$86,139	31.59%	$23,738	$31,335	32.00%
Hanson	$62,687	$83,667	33.47%	$68,560	$89,478	30.51%	$23,727	$30,808	29.84%
Kingston	$53,780	$79,045	46.98%	$65,101	$99,438	52.74%	$23,370	$36,771	57.34%
Pembroke	$65,050	$81,971	26.01%	$74,985	$94,129	25.53%	$27,066	$33,904	25.26%
Plymouth	$54,677	$74,355	35.99%	$63,266	$86,963	37.46%	$23,732	$31,934	34.56%
Plympton	$70,045	$85,523	22.10%	$75,000	$86,909	15.88%	$24,344	$32,491	33.47%
Stoughton	$57,838	$66,018	14.14%	$69,942	$78,453	12.17%	$25,480	$29,537	15.92%
West Bridgewater	$55,958	$73,271	30.94%	$64,815	$82,014	26.54%	$23,701	$31,773	34.06%
Whitman	$55,303	$72,381	30.88%	$63,706	$84,915	33.29%	$23,002	$29,272	27.26%
OCPC Region (Average)	$58,269	$74,732	28.25%	$67,331	$87,465	29.90%	$24,032	$31,136	29.56%

2000 figures obtained from 2000 Census. 2009 figures obtained from American Community Survey

4.3 Existing Land Use

Old Colony Regional Land Use Management System (LUMS)

Old Colony Planning Council maintains a Land Use Management Systems (LUMS) to monitor the changes in local government land use plans and regulations; land use patterns; development projects; trip generations; on and off-site mitigation; and the various associated characteristics of the region in order to update land use and zonal forecasts; and use as inputs into the Congestion Management Process and mitigation activities.

Residential Land Use

Given the "bedroom community" nature of many of its towns, much of the developed land in the Old Colony region is characterized by relatively low density single-home residential development. However, recent trends in new development or revitalization of existing development have included increased density development, including condominium and apartment construction. Through the State's Smart Growth Zoning Overlay District Act (Chapter 40R), some communities in the region have developed smart growth and transit oriented districts. Existing 40R districts in the Region include:

- Downtown Brockton
- Cordage Park, Plymouth

In addition to these specified districts, increased-density style development has occurred in scattered spots throughout most of the region's communities, with new condominium and apartment complexes built in multiple areas.

Figure 4.5: 1971 Land Use In The Old Colony Region

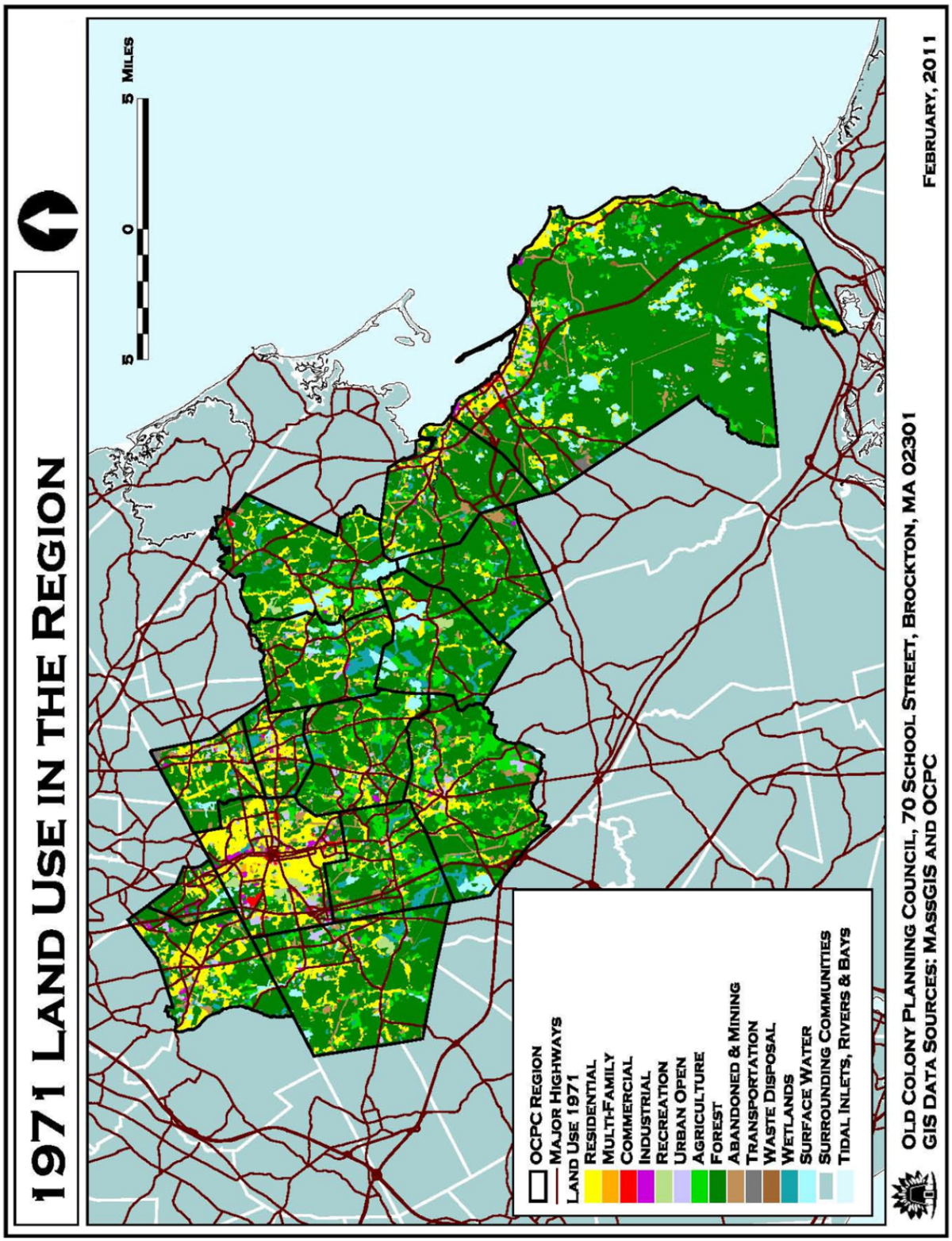


Figure 4.6: 1985 Land Use In The Old Colony Region

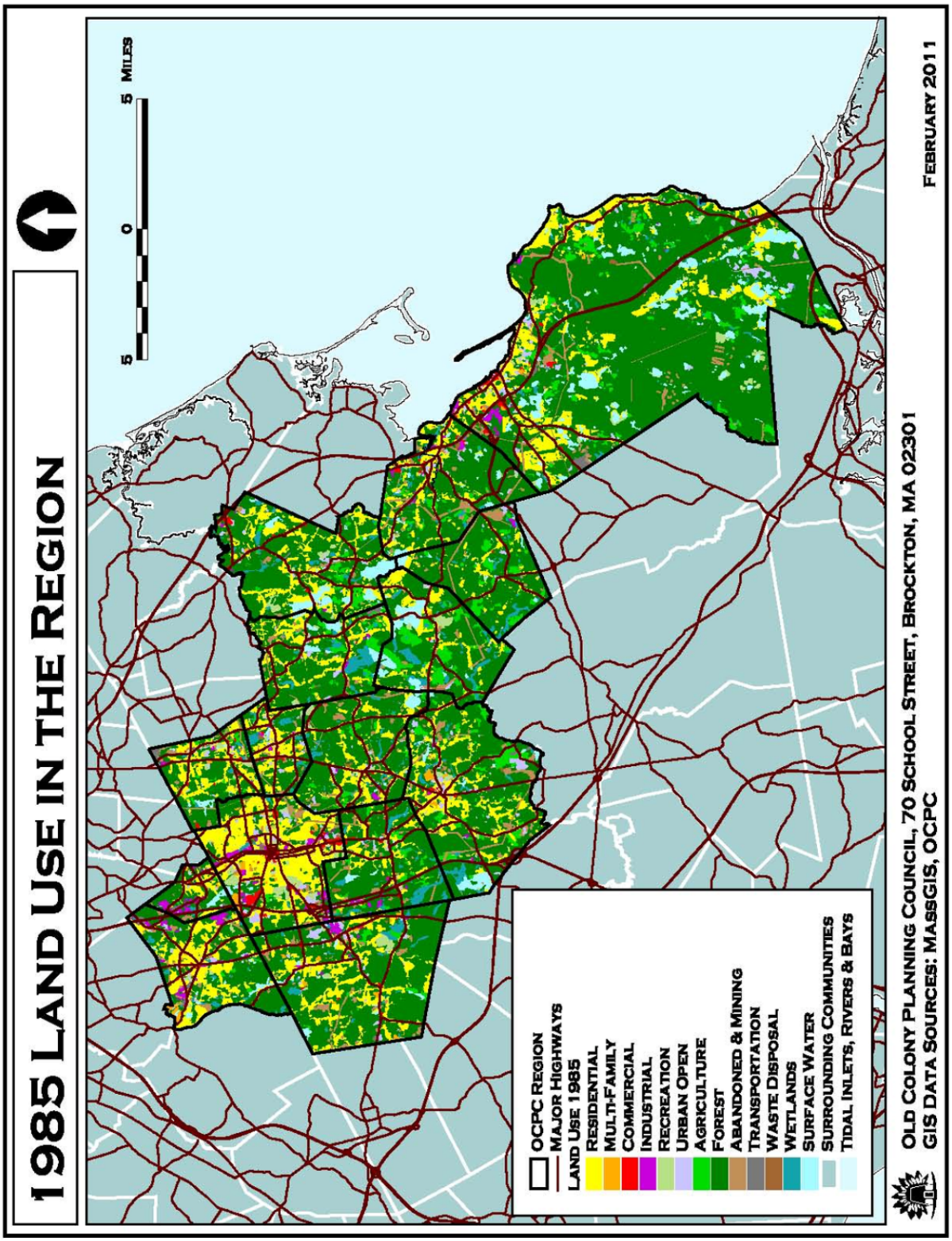


Figure 4.7: 1999 Land Use In The Old Colony Region

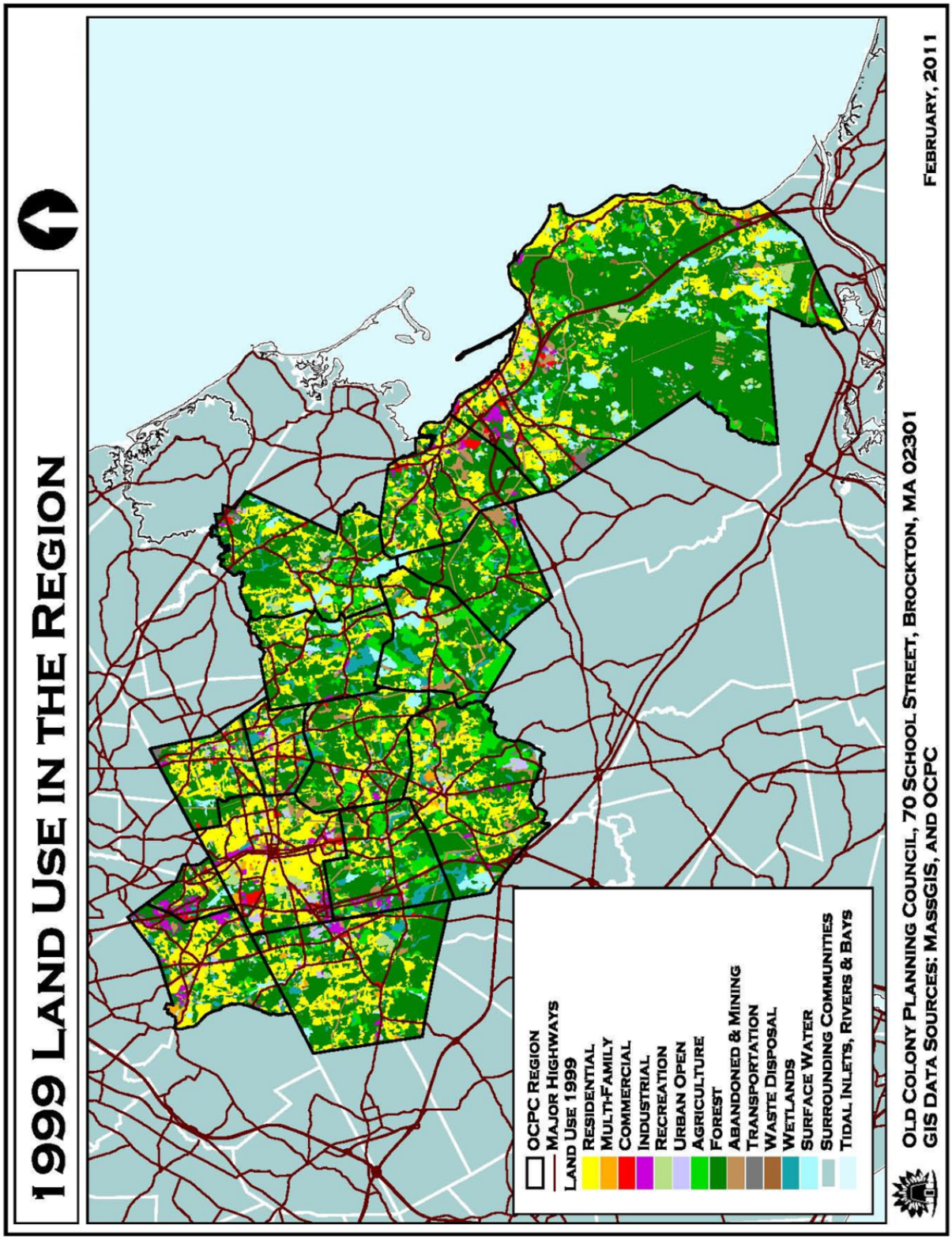
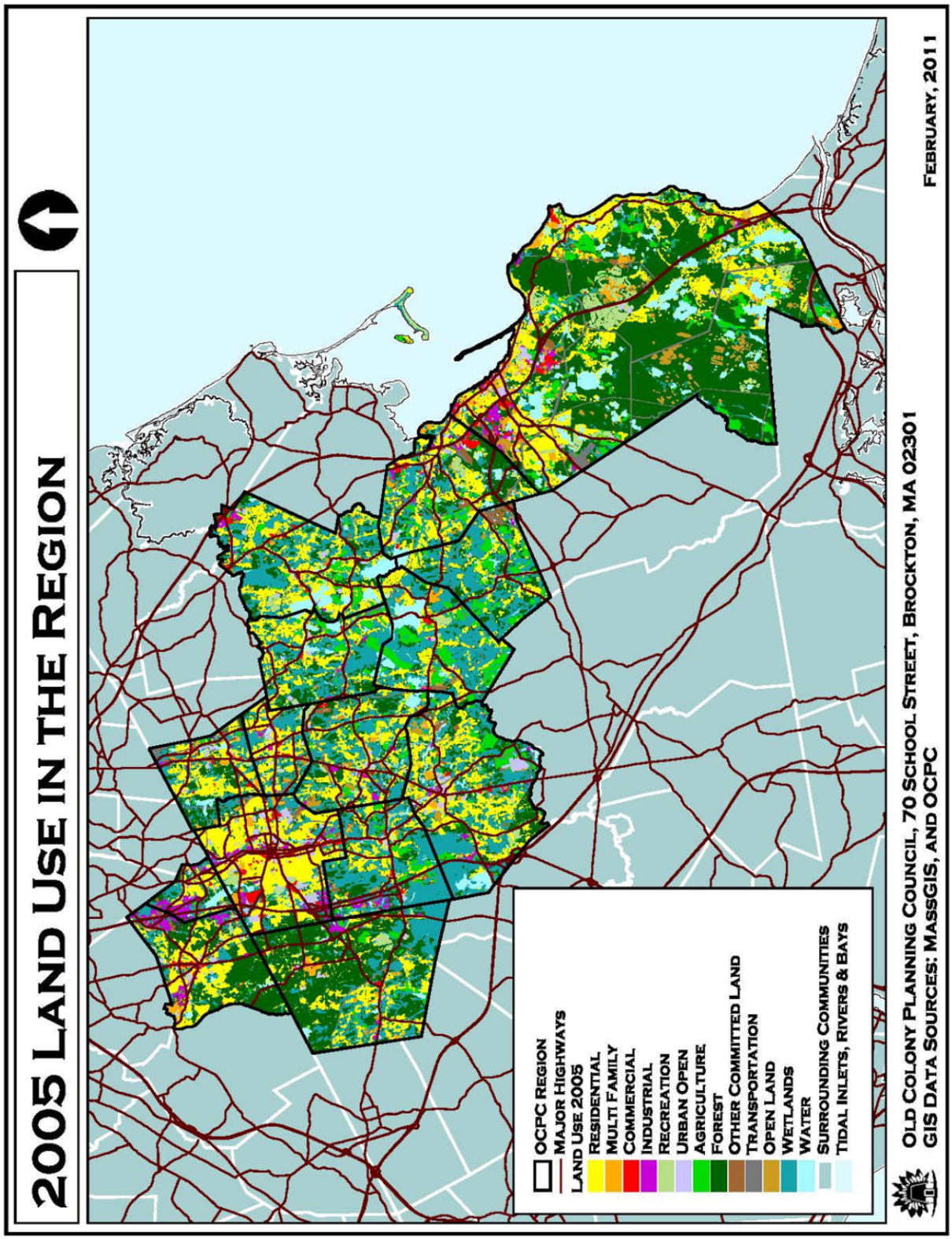


Figure 4.8: 2005 Land Use In The Old Colony Region



Commercial Land Use

The relatively small proportion of all developed land acreage in the Old Colony Region occupied by commercial use acreage can be very misleading, given the huge influence commercial development has on the regional transportation system and the surrounding environment. Commercial development carries great significance for employment, access to needed goods and services, traffic generation, and community character.

The major historic concentrations of retail activity are in the central portions of Brockton, Stoughton, and Plymouth with some continued smaller concentrations in the centers of Whitman, Easton and Bridgewater. However, recent trends in new commercial development are dominated by the practice of sighting large "big box" retail and open air shopping centers near major highway interchanges. The following are some recent examples of this type of development in the Old Colony Region:

- Colony Place, Plymouth: At Route 44 and Commerce Way, near the junction of Route 44 and Route 3
- Shops at Five, Plymouth: At Route 3 and Long Pond Road (Exit 5)
- IKEA, Stoughton, at Route 24 and Harrison Boulevard (Exit 18)
- Home Depot, Bridgewater, at the junction of Route 24 and Route 104 (Exit 15)
- Lowes, West Bridgewater, at the junction of Route 24 and Route 106 (Exit 16)
- Lowes, Pembroke, at the junction of Route 3 and Route 139 (Exit 12)

In addition to the large, open-air shopping centers such as Colony Place and Shops at Five, the region contains two traditional regional shopping malls, in Brockton and Kingston.

The dispersed pattern of current retail development puts such facilities within reach of most of the population, but requires driving. At the same time, the single-purpose nature of most new retail development requires more land dedicated to parking, generates more local trips, and fragments activity patterns. This suggests that towns seize on opportunities to create strong multi-purpose mixed-use centers as described above. Such traditional centers require accommodating varied uses but they can reduce single-purpose trips and greatly enrich community life.

Approved Smart Growth (Chapter 40R) Districts

Downtown Brockton: The Department of Housing and Community Development has approved Downtown Brockton as a Chapter 40R Smart Growth district through the "Transit Oriented Development" provision of the statute. The Downtown Brockton District at full buildout will feature 1,096 units, densely developed over a 60 acre zone in Downtown Brockton. Much of this development will be completed through converting older brownfield structures to apartment and condominium complexes. Some structures have already been completed and inhabited. The BAT Intermodal Transportation Centre and Brockton MBTA Commuter Rail Station are located within the zone, as well as a newly reconstructed city owned surface parking facility.

Cordage Park, Plymouth: Cordage Park in Plymouth has been approved as a Smart Growth District by the DHCD, under the "Transit Oriented Development" provision on the Chapter 40R statute. At full build-out, Cordage Park will feature 675 units on a 57 acre District. Development will feature a mix of residential and commercial uses. The Plymouth MBTA Commuter Rail Station is located on-site, and the site is also served by GATRA Plymouth Area Link fixed route bus service.

Industrial Land Use

Historically, the industrial development in the region was concentrated along railroad lines and near town centers, often within walking distance of workers homes. Many interrelated firms (e.g., those making shoe components, shoe boxes and finished shoes) located near one another, thus minimizing delivery times and costs. More recently firms have depended less on rail freight, have sought workers and customers from the greater region, and have preferred convenient one-story plants. As a result, many firms have moved to industrial parks or freestanding sites near highway interchanges. This can be seen in the extensive development of the highway-oriented Brockton, Avon and Easton Industrial Parks and along Manley St. in West Bridgewater.

Today, the largest concentration of industrial land is in the region's industrial parks listed on Table 4-9. Most of these are near major highways. The major parks are in Brockton, Avon, Easton and Stoughton near Route 24, and in Pembroke, Plymouth and Kingston near Route 3. In contrast, Brockton's Oak Hill Way Park is in the south central portion of the city near the railroad and close to the city's traditional industrial areas. It houses a number of distribution and trucking activities in new buildings.

Brockton's major traditional industrial corridor runs nearly the length of the City from north to south, generally on the east side of the railroad tracks that bisect the city. There are older mills within the area, and extensive open areas suitable for new industrial space. Two of these are sites of the previously proposed Freight Yards and FootJoy Industrial Parks. The corridor includes a series of Economic Opportunity Areas designated under the state's Economic Target Area program of financial incentives for economic development and public improvements.

Table 4-8: Existing Industrial and Business Park

	Business Park	Street	Total Acres	Utilities/Service				
				Rail	Water	Sewer	Gas	Optics
Avon								
	Avon Industrial Park	Bodwell Street	300		x		x	
	Avon Merchants Park	Stockwell Drive	147		x		x	
Bridgewater								
	Bridgewater Industrial Park	Elm Street	56		x		x	
	Scotland Industrial Park	Pleasant Street	105		x		x	
	Lakeshore Center	Pleasant Street	140		x		x	
Brockton								
	Brockton Business Center	Liberty Street	195		x	x	x	x
	Oak Hill Way Industrial Park	Oak Hill Way	70	x	x	x	x	x
	AMB Industrial Park	Manley Street	18		x	x	x	x
	Northeast Industrial Park	Harrison Blvd.	40		x	x	x	x
Easton								
	Easton Industrial Park	Belmont Street	150		x		x	
Halifax								
	Halifax Industrial Park	Plymouth Street	21		x			
Hanson								
	Casoli Industrial Park	Main Street	14		x			
	Hanson Commerce Center	Industrial Blvd.	34		x			
	Station Street Industrial Park	Station Street	16		x			
Kingston								
	Jones River Industrial Park	Wapping Road	8		x		x	x
	Kingston Industrial Park	Gallen Road	400		x		x	
	South Shore Commuter Rail Park	Marion Drrive	135		x		x	x
Pembroke								
	Corporate Park	Oak Street	80		x		x	
	North River Commercial Park	Oak Street	34		x		x	
	Pembroke Business Center	Oak Street	118		x		x	
Plymouth								
	Airport Industrial Park	South Meadow Road	150		x			
	Camelot Industrial Park	Long Pond Road	110		x			
	Cooks Pond Industrial Park	Long Pond Road	30		x			
	Plymouth Industrial Park	W. Cherry Street	450		x		x	
Plympton								
	Plympton Industrial Park	Spring Street	130					
Stoughton								
	AMB Business Park	Turnpike Street	85.6		x	x	x	x
	Metro South Corp. Center	Technology Center Dr.	287		x	x	x	x
	Qual-Craft Corporate Center	Central Street	5		x	x	x	
	Shawmut Mills Industrial Park	Canton Street	10		x	x	x	
	Tosca Drive Industrial Park	Canton Street	45		x	x	x	
	Campanelli Commerce Park	Page Street	40		x	x	x	x
West Bridgewater								
	W. Bridgewater Business Park	Manley Street	48.3		x		x	x
Whitman								
	Whitman Industrial Park	Industrial Way	6		x	x	x	

Ports

Cranland Airport, Hanson: Cranland Airport is a public airport owned by Cranland Airport, Inc. It features a single asphalt surfaced runway, 1,860' in length, and averages about 100 flights per week.

Monponsett Pond Seaplane Base, Halifax: Monponsett Pond Seaplane Base is a privately owned public seaplane port on Monponsett Pond in Halifax. It features two water surface runways: Runway 10/28: (3,200' x 300'), and Runway 17/35 (4,600' x 500').

Plymouth Harbor, Plymouth: Plymouth Harbor, accessed from land by Water Street, is home to several piers that service charter fishing operations, minor commercial fishing operations, tourism based sightseeing tours, and ferry service to Provincetown.

Plymouth Municipal Airport, Plymouth: Plymouth Municipal Airport, located off of South Meadow Road, is a public use airport owned by the Town of Plymouth. It is the largest airport in the Old Colony region and features two asphalt surfaced runways: Runway 6/24 is 4,349' by 75'), and Runway 15/33 (3,351' by 75').

Colleges

Bridgewater State University, Bridgewater: Bridgewater State University is a public liberal arts college located just south and east of Central Square in Bridgewater. Approximately 11,000 students currently attend Bridgewater State University. While the school has a large number of on-campus resident students living in eight dormitory buildings, it also attracts a large number of commuting students from nearby apartments and rooming houses as well as surrounding communities. The commuting population is served by several large surface lots which are served by an internal shuttle bus system. The campus is also served by Brockton Area Transit and an on-campus MBTA Commuter Rail Station.

Stonehill College, Easton: Stonehill College is a large, private college located on a 375 acre campus off of Washington Street (Route 138) in Easton. According to the college's website, Stonehill has an enrollment of approximately 2,300 students. The college is accessed by multiple driveways on Washington Street (Route 138) and Belmont Street (Route 123). Students often frequent nearby businesses on Washington Street by walking.

Massasoit Community College, Brockton: The Brockton campus of Massasoit Community College is located on a 100 acre site between Crescent Street (Route 27) and Thatcher Street, A single roadway, Massasoit Boulevard, traverses the campus and connects to Crescent Street on the northern end Thatcher Street on the southwestern end. The Brockton campus serves over 6,000 enrolled students. The campus is served by Brockton Area Transit, as well as a shuttle service that runs between the Brockton and Canton campuses.

University College (UMass Boston), Plymouth: University College, a subsidiary of the University of Massachusetts – Boston, offers courses at Cordage Park in Plymouth. The campus is transit-accessible by MBTA Commuter Rail and GATRA Plymouth Area Link service.

Quincy College (Plymouth Campus): The Plymouth campus of Quincy College is located at Cordage Park. Quincy College is a public community college operating under the auspices of the City of Quincy. A board of governors, consisting of thirteen members, is appointed to oversee and govern Quincy College. It is an-accredited two-year college offering over 500 courses and awarding Associate degrees and certificates of completion in a wide variety of studies. The campus is transit-accessible by MBTA Commuter Rail and GATRA Plymouth Area Link service.

Hospitals

The Old Colony region is home to the following general care and emergency medicine medical facilities:

- Signature Healthcare Brockton Hospital, Brockton
- Jordan Hospital, Plymouth
- Caritas Good Samaritan Medical Center, Brockton
- VA Boston Healthcare System, Brockton Campus

4.4 Employment and Economy

Employment Figures

Table 4-9 lists employment figures for the communities of the Old Colony Region, for 2003 through 2009. The labor force is the number of persons in each community between 16 and 65 years old, while employment are those people in the labor force employed at the time, and unemployment those in the labor force not employed. The unemployment rate is the number of unemployed persons divided by the total labor force.

Regarding employment trends over the past decade, generally the region saw unemployment decrease in the middle years of the decade from the beginning, before rising sharply at the end of the decade, consistent with the national recession. Individual community level unemployment rates ranged from 5.71% (East Bridgewater) to 10.37% (Brockton) in 2009. Regionally, the unemployment rate was 7.66%.

Table 4-9: Labor Force and Employment Figures, 2003-2009

Community	Year	Labor Force	Employment	Unemployment	Unemployment Rate
Abington	**2003**	8,985	8,530	455	5.06%
	2005	9,030	8,606	424	4.70%
	2009	**9,455**	**8,903**	**542**	**5.73%**
Avon	**2003**	2,316	2,169	147	6.35%
	2005	2,276	2,149	127	5.58%
	2009	**2,512**	**2,318**	**194**	**7.72%**
Bridgewater	**2003**	13,037	12,375	662	5.08%
	2005	12,986	12,381	605	4.66%
	2009	**13,380**	**12,470**	**877**	**6.55%**
Brockton	**2003**	45,259	41,968	3,291	7.27%
	2005	44,442	41,732	2,710	6.10%
	2009	**49,400**	**44,232**	**5,124**	**10.37%**
East Bridgewater	**2003**	7,336	6,950	386	5.26%
	2005	7,272	6,937	335	4.61%
	2009	**8,162**	**7,687**	**466**	**5.71%**
Easton	**2003**	13,110	12,479	631	4.81%
	2005	13,014	12,484	530	4.07%
	2009	**12,905**	**12,062**	**796**	**6.17%**
Halifax	**2003**	4,221	3,984	237	5.61%
	2005	4,201	3,984	217	5.17%
	2009	**4,550**	**4,198**	**341**	**7.49%**
Hanson	**2003**	5,430	5,134	296	5.45%
	2005	5,410	5,140	270	4.99%
	2009	**6,023**	**5,634**	**389**	**6.46%**
Kingston	**2003**	6,254	5,942	312	4.99%
	2005	6,260	5,993	267	4.27%
	2009	**6,562**	**6,169**	**393**	**5.99%**
Pembroke	**2003**	9,770	9,263	507	5.19%
	2005	9,683	9,263	420	4.34%
	2009	**10,388**	**9,696**	**674**	**6.49%**
Plymouth	**2003**	28,541	26,959	1,582	5.54%
	2005	28,509	27,124	1,385	4.86%
	2009	**30,470**	**28,307**	**2,091**	**6.86%**
Plympton	**2003**	1,584	1,493	91	5.74%
	2005	1,575	1,501	74	4.70%
	2009	**1,433**	**1,342**	**91**	**6.35%**
Stoughton	**2003**	15,269	14,363	906	5.93%
	2005	14,988	14,266	722	4.82%
	2009	**14,485**	**13,346**	**1,139**	**7.86%**
West Bridgewater	**2003**	3,535	3,342	193	5.46%
	2005	3,505	3,329	176	5.02%
	2009	**3,627**	**3,404**	**223**	**6.15%**
Whitman	**2003**	8,114	7,654	460	5.67%
	2005	8,018	7,621	397	4.95%
	2009	**8,206**	**7,602**	**570**	**6.95%**
OCPC Total	**2003**	**172,761**	**162,605**	**10,156**	**5.88%**
	2005	**171,169**	**162,510**	**8,659**	**5.06%**
	2009	**181,558**	**167,370**	**13,910**	**7.66%**

Source: 2003 and 2005 from Division of Workforce Development; 2009 from American Community Survey

Commute To Work

The United States Census Bureau recently released estimates on mode of commute for the labor force by community, based on results of their 2005-2009 American Community Survey. The data in table 4-10 lists the number of workers over 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 25 minutes, residents of West Bridgewater have the shortest commute in the region, while at 37.5 minutes residents of Halifax had the longest commute.

Table 4-10: Mode of Commute and Mean Commute Time, 2005-2009

		Mode of Commute						
Community	**Workers Over 16**	**Drove Alone**	**Carpool**	**Public Transportation**	**Walked**	**Other Means**	**Work At Home**	**Mean Commute Time (minutes)**
Abington	8,716	7,182	591	629	63	118	133	29.5
Avon	2,234	1,958	179	58	9	0	30	27.9
Bridgewater	12,130	9,750	781	682	509	44	364	31.6
Brockton	42,491	32,627	5,551	2,407	989	316	602	28.8
East Bridgewater	7,367	5,964	646	267	34	58	398	28.1
Easton	11,765	9,295	671	554	428	122	695	30.8
Halifax	3,995	3,239	340	342	12	0	62	37.5
Hanson	5,508	4,597	393	264	87	28	139	32.9
Kingston	6,038	4,932	449	293	72	48	244	30.5
Pembroke	9,454	7,756	610	410	121	8	549	33.9
Plymouth	27,571	22,196	2,151	856	477	355	1,536	33.5
Plympton	1,315	1,134	68	44	23	0	46	31.4
Stoughton	12,807	10,618	800	607	261	158	364	28.8
West Bridgewater	3,364	2,848	236	94	46	55	85	25.0
Whitman	7,336	6,145	612	421	81	18	59	33.5

Figures presented here are estimates based on the 2005-2009 American Community Survey, and published by the US Census Bureau

4.5 Future Growth and Development

Buildouts

Buildout refers to a state reached by a community when no additional development is possible. In other words, the term means the community has reached its maximum potential for additional development since every piece of land is either already developed or permanently protected, or is prohibited from being developed due to constraints on development.

The Old Colony Planning Council is currently conducting a Buildout Analysis in order to update the 2000 Regional Buildout Analysis using the most recent available land use and community data, and to prepare a needs assessment for inclusion in the Regional Policy Plan. This study will coincide with the release of 2010 U.S. Census data, which will give the most up-to-date and accurate data when determining buildout statistics.

MassDOT / Old Colony Population, Household, and Employment Forecasts

The Massachusetts Department of Transportation has developed a 2010 statewide and regional total estimates for population, households, and employment, along with forecasting these totals for years 2017, 2020, 2025, 2030, and 2035. These estimates and forecasts are developed using a "top-down" approach, in which a statewide total is developed, and then regional totals.

The forecasts are used as inputs to statewide and MPO region travel demand models that estimate changes in future traffic volumes. The variables to be forecast include population, households, and employment, as well as subsets of those variables.

State Forecasts

The demographic forecasts begin with the latest Massachusetts population forecasts by the U.S. Bureau of the Census. Their population estimates through 2008 are tracking below the level implied in their 2010 forecast. The Census Bureau forecasts extend only to 2030. MassDOT constructed a 2035 forecast based upon the extrapolation of one-half (5 years instead of 10) of the overall rate of growth forecast between 2020 and 2030. This is an assumption because the state's rate of population growth has been steadily slowing for decades. The 2035 population was allocated among the age groups based upon the anticipated changes implied in the Census' age-group forecasts between 2020 and 2030.

A review of recent and anticipated statewide population, household, labor force, and employment concludes that the outlook for population is for a continued slowing of population growth, the likelihood of significant reduction in net domestic out-migration, but with an offsetting risk that future immigration is curtailed by improving economic opportunities in the developing countries.

The demographics review indicates that by far the largest impact upon future labor force and employment growth is likely to be changes in labor force participation rate. There have been recent and dramatic changes in the trend, especially among the elderly, with resulting wide disagreement among analysts about the future. The current rate forecasts of one expert, the U.S. Bureau of Labor Statistics (BLS), have been criticized as being "behind the curve" in anticipating change, and consequently the BLS forecasts are the basis for a low-growth rate scenario.

Another labor force expert and founder of American Demographics magazine, Peter Francese, forecasts much higher participation rates in the future, especially for the near and active elderly. The Francese forecasts are taken as a high-growth rate scenario, with his projected 2020 uptrend extended through 2035. MassDOT feels that an average of these high and low scenarios is the best basis for a statewide labor force participation rate forecast. The Census Bureau age-group population forecasts are multiplied by the average, age-specific labor force participation rates to create a potential in the labor force population. Certain ineligible population subgroups are removed from this potential labor force, including people in the armed forces, those residing in institutions, absentees and seasonal workers, and natural unemployment.

Regional Forecasts

Future population changes are based upon population counts from the decennial censuses of 1970, 1980, 1990, and 2000, with the counts turned into regional shares of the state. The past direction in regional population shares is extended through the forecast period, but with steep trends (up or down) moderated. The regional shares are then multiplied by the statewide population forecast to derive the initial MPO region control total forecast.

Future household changes are also based upon the decennial censuses of 1970, 1980, 1990, and 2000. The household forecasts are based upon changes in the group quarters population, population in households, and average household size. The share of group quarters population to total population is forecast to be unchanged, with each region's future share held constant to that in 2000. The population in group quarters is subtracted from the population to obtain the population in households. A final step divides the population in households by the average household size to obtain the number of households in each region. Average household size for each region is forecast to decline each decade, based on the four-decade decline in average size, but tempered by a 2008 Massachusetts average household size of 2.53 reported by the American Community Survey, up from 2.51 in the 2000 Census. The current instability in the housing market and economy has put upward pressure on average household size. A very small decade-to-decade reduction in average size (1 percent) is assumed over the forecast period.

To forecast employment, the annual ES-202 series from the Massachusetts Department of Labor and Workforce Development provides 28 years of past data. With the counts turned into regional shares, linear regression is applied and the regression-based shares are then multiplied by the statewide employment forecast. Year-to-year employment can be quite volatile, so the past regional shares are examined for the duration and consistency of their long-term trend. MPO regions with extremely high or low change in regional shares, and especially those with small employment bases, had their trend in regional shares tempered. To identify inconsistencies in the initial employment forecasts and their relationship to population forecasts, employment to population ratios (E/P ratios) were calculated for estimated 2010 employment and 2008 population, and for 2035 employment and 2035 population in each MPO region. The large influence of a retiring baby-boom generation produces a significant drop in the E/P ratios in almost every MPO region. Regional employment or population forecasts were modified in a handful of regions based on divergent trends in their E/P ratios.

Community level estimates and forecasts have been developed by Old Colony Planning Council (except for Pembroke and Stoughton-, which were developed by the Metropolitan Area Planning Council and Central Transportation Planning Staff). These community level forecasts are pre also prepared using a

"top down" approach, in which the regional control total developed by MassDOT is allocated into the member communities of the Old Colony Region. Factors considered in the allocating process include current community level share of the regional total; development trends; availability of developable land and/or existing development below capacity; known planned developments; and proximity to major transportation routes and transit facilities.

Table 4-11 contains the statewide, regional, and community level forecasts generated by MassDOT and Old Colony Planning Council, while Table 4-12 contains household figures and Table 4-13 employment figures.

Table 4-11 – Population Forecasts Through 2035

	2010	Forecast Year				
	Census	2017	2020	2025	2030	2035
Massachusetts	***6,547,629***	***6,760,000***	***6,844,000***	***6,992,000***	***7,139,000***	***7,292,000***
OCPC Region	***333,468***	***348,000***	***353,000***	***361,000***	***369,000***	***377,000***
Abington	15,985	16,521	16,867	16,993	17,397	17,698
Avon	4,356	4,421	4,517	4,550	4,600	4,636
Bridgewater	26,563	27,442	27,997	28,200	28,674	29,370
Brockton	93,810	95,520	96,080	98,083	98,577	99,076
East Bridgewater	13,794	14,720	14,878	15,118	15,593	16,553
Easton	23,112	23,420	23,667	24,069	24,559	25,376
Halifax	7,518	7,770	8,021	8,134	8,595	8,716
Hanson	10,209	10,502	10,888	11,183	12,073	12,576
Kingston	12,629	12,770	13,030	13,283	14,213	14,418
Pembroke	17,837	18,929	18,925	19,259	19,592	19,978
Plymouth	56,468	63,842	65,354	68,250	69,281	71,057
Plympton	2,820	2,920	3,180	3,283	3,773	3,876
Stoughton	26,962	27,474	27,561	28,341	29,120	29,927
West Bridgewater	6,916	7,125	7,280	7,293	7,798	8,316
Whitman	14,489	14,624	14,755	14,961	15,155	15,427

Massachusetts and Old Colony Regional Total population forecasts produced by the Massachusetts Department of Transportation, Community level forecasts are conceptual and based on past growth trends, and not a scientific forecast

Table 4-12: Household Forecasts Through 2035

	2010	Forecast Year				
	Census	2017	2020	2025	2030	2035
Massachusetts	***2,597,900***	***2,677,300***	***2,726,200***	***2,849,600***	***2,923,000***	***2,995,400***
OCPC Region	***119,437***	***125,600***	***127,900***	***131,800***	***135,200***	***138,700***
Abington	6,080	6,470	6,604	6,650	6,730	6,840
Avon	1,709	1,715	1,774	1,774	1,784	1,794
Bridgewater	7,995	8,478	8,634	8,720	8,873	9,256
Brockton	33,303	34,045	34,449	35,229	35,400	35,474
East Bridgewater	4,750	5,094	5,190	5,369	5,553	5,884
Easton	7,865	7,949	8,005	8,224	8,417	8,751
Halifax	2,863	2,949	3,071	3,125	3,312	3,402
Hanson	3,468	3,679	3,782	3,928	4,220	4,595
Kingston	4,665	4,688	4,833	5,013	5,276	5,434
Pembroke	6,298	6,700	6,888	7,105	7,321	7,463
Plymouth	21,269	24,028	24,151	25,530	26,142	26,836
Plympton	1,006	1,053	1,226	1,262	1,472	1,512
Stoughton	10,295	10,800	11,200	11,696	12,192	12,521
West Bridgewater	2,571	2,616	2,694	2,700	2,936	3,149
Whitman	5,300	5,336	5,399	5,475	5,572	5,789

Massachusetts and Old Colony Regional Total household forecasts produced by the Massachusetts Department of Transportation, Community level forecasts are calculated based on the average forecast regional household size for the given year

Table 4-13: Employment Estimates Through 2035

	2009	2010	Forecast Year				
	Employment[1]	Estimate	2017	2020	2025	2030	2035
Massachusetts	***3,095,144***	***3,112,000***	***3,263,000***	***3,332,000***	***3,364,000***	***3,394,000***	***3,416,000***
OCPC Region	***123,709***	***124,400***	***131,000***	***135,000***	***138,000***	***141,000***	***142,000***
Abington	3,812	3,812	3,988	4,185	4,234	4,334	4,440
Avon	5,077	5,080	5,227	5,335	5,634	5,684	5,740
Bridgewater	7,774	7,780	8,176	8,460	8,684	8,934	9,040
Brockton	36,769	36,800	38,752	39,635	40,334	41,534	42,040
East Bridgewater	2,536	2,540	2,661	2,788	2,863	2,924	2,951
Easton	9,324	9,330	9,799	10,210	10,410	10,661	10,815
Halifax	1,171	1,175	1,216	1,312	1,359	1,369	1,384
Hanson	1,504	1,512	1,569	1,676	1,734	1,748	1,766
Kingston	5,137	5,100	5,176	5,285	5,684	5,734	5,790
Pembroke	5,681	6,340	6,479	6,539	6,406	6,272	6,226
Plymouth	22,805	22,869	24,106	24,888	25,768	26,721	26,759
Plympton	382	384	1,076	1,235	1,234	1,234	1,240
Stoughton	12,773	12,691	13,331	13,605	13,586	13,566	13,444
West Bridgewater	5,855	5,860	6,176	6,424	6,566	6,707	6,760
Whitman	3,109	3,126	3,268	3,427	3,502	3,578	3,608

1 - 2009 Employment Figures From Massachusetts Executive Office of Labor and Workforce Development

Massachusetts and Old Colony Regional Total employment forecasts produced by the Massachusetts Department of Transportation, Community level forecasts are conceptual and based on past growth trends, and not a scientific forecast

4.6 Conclusion and Recommendations

Approaches To Regional Land Use Planning

Current- "Smart Growth" and "Sustainable Development" movements encourage putting relatively high density development near existing centers and in areas with well established infrastructure and doing so in ways which minimum energy consumption.

Smart Growth principles are intended to be the antithesis of sprawl, but they can be applied at a great range of scales from individual projects up to region-wide policies. The effect on travel patterns and modal choices can vary with the scale of action. Thus successful smart growth policies over a region would lead to a greater concentration of growth in regional centers allowing a greater use of mass transit and a largely radial, center-focused road system. In outlying areas Smart Growth can also support local transit use and reduce local trips by concentrating local or sub regional destinations but will not greatly change overall travel patterns. At the local level Smart Growth in the form of cluster development can reduce paving and runoff and preserve particularly valuable open space, but it does not necessarily strengthen the community's structure or reduce trips if sited at the edge of town.

The Healthy Transportation Compact (HTC) and GreenDOT Policy Directive

The Healthy Transportation Compact (HTC) is a key requirement of the landmark transportation reform legislation that was enacted by Governor Patrick and the Massachusetts Legislature in 2009. The inter-agency (MassDOT, Executive Office of Energy and Environmental Affairs, Department of Public Health) initiative is designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities.

From the HTC, MassDOT created its "GreenDOT" Policy Directive. The GreenDOT Policy is a comprehensive environmental responsibility and sustainability initiative designed to make Massachusetts a national leader in greening the state transportation system. GreenDOT is driven by three primary goals: Reduce Greenhouse gas (GHG) emissions; Promote the healthy transportation options of walking, bicycling, and public transit; and support smart growth development.

Principle components of the Healthy Transportation Compact include:

- Promoting inter-agency cooperation to implement state and federal policies and programs that support healthy transportation.
- Reducing greenhouse gas emissions, improving access to services for persons with mobility limitations and increasing opportunities for physical activities.
- Increasing bicycle and pedestrian travel and facilitating implementation of the Bay State Greenway Network.
- Working with the Massachusetts Bicycle and Pedestrian Advisory Board (MABPAB) to effectively implement a policy of complete streets for all users, consistent with the current edition of the Project Development and Design Guide.
- Implement health impact assessments to for use by planners, transportation administrators, public health administrators and developers.
- Expanding service offerings for the Safe Routes to Schools program.

- Initiating public-private partnerships that support healthy transportation with private and nonprofit institutions.
- Establishing an advisory council with private and nonprofit advocacy.
- Developing goals for the Compact and measuring progress toward these goals.

Many of the principles of the Healthy Transportation Compact and GreenDOT Policy are integral components of the programs at Old Colony Planning Council, and OCPC is committed to working with the state and local communities to further achieve the goals of the HTC and GreenDOT Policy Directive through programs and tasks such as:

- Multi-faceted approach to reviewing development proposals that go through the MEPA environmental review process
- Road Safety Audits that encourage a multidisciplinary approach and ensure all roadways users and the surrounding community are included in the planning process
- Ensuring non-motorized transportation (pedestrians and bicyclists) and public transit are considered in Local Highway Planning Technical Assistance and Transit Planning Technical Assistance projects
- Development of planning documents such as the Regional Bicycle and Pedestrian Plan, and Bicycle and Pedestrian Connectivity Study

Smart Growth and Sustainable Development Principles

Smart growth is a principle of land development that emphasizes the mixing of land uses, increases the availability of a range of housing types in neighborhoods, takes advantage of compact design, fosters distinctive and attractive communities, preserves open space, farmland, natural beauty and critical environmental areas, strengthens existing communities, provides a variety of transportation choices, makes development decisions predictable, fair and cost effective, and encourages community and stakeholder collaboration in development decisions.

Smart growth is development that protects natural resources, enhances quality of life, offers housing choices, reduces energy consumption, and improves municipal finances by considering the location, design and long-term costs of development.

Smart growth is not "no-growth" - development is needed to keep Massachusetts economically and culturally vibrant. Currently about 1/4 of the Commonwealth is developed and 1/4 is permanently protected. The remaining 50% of the Commonwealth's land is at stake. Although some of this land will be needed to accommodate new homes and businesses, we are consuming far more land than necessary to accommodate our growth needs. The Audubon Society's *Losing Ground* report indicates that 44 acres of land is consumed by development in Massachusetts every day. Almost 9 out of every 10 acres developed go to residential growth, with 65% of that used for low-density, large-lot development. The smart growth/smart energy techniques included in this Toolkit provide communities the tools to work with the Commonwealth to use the remaining land as efficiently as possible, while building vibrant and sustainable neighborhoods and communities.

Old Colony Planning Council supports the implementation and practice of the Commonwealth's Smart Sustainable Development Principles. The state has developed these 10 Sustainable Development Principles to encourage planning and development that protects land, promotes social and economic health, conserves energy and resources, and meets the needs of our residents.

1. Concentrate Development and Mix Uses.

Support the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses. Encourage remediation and reuse of existing sites, structures, and infrastructure rather than new construction in undeveloped areas. Create pedestrian-friendly districts and neighborhoods that mix commercial, civic, cultural, educational, and recreational activities with open spaces and homes.

2. Advance Equity.

Promote equitable sharing of the benefits and burdens of development. Provide technical and strategic support for inclusive community planning and decision making to ensure social, economic, and environmental justice. Ensure that the interests of future generations are not compromised by today's decisions.

3. Make Efficient Decisions.

Make regulatory and permitting processes for development clear, predictable, coordinated, and timely in accordance with smart growth and environmental stewardship.

4. Protect Land and Ecosystems.

Protect and restore environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. Increase the quantity, quality and accessibility of open spaces and recreational opportunities.

5. Use Natural Resources Wisely.

Construct and promote developments, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through efficient use of land, energy, water, and materials.

6. Expand Housing Opportunities.

Support the construction and rehabilitation of homes to meet the needs of people of all abilities, income levels, and household types. Build homes near jobs, transit, and where services are available. Foster the development of housing, particularly multifamily and smaller single-family homes, in a way that is compatible with a community's character and vision and with providing new housing choices for people of all means.

7. Provide Transportation Choice.

Maintain and expand transportation options that maximize mobility, reduce congestion, conserve fuel and improve air quality. Prioritize rail, bus, boat, rapid and surface transit, shared-vehicle and shared-ride services, bicycling, and walking. Invest strategically in existing and new passenger and freight transportation infrastructure that supports sound economic development consistent with smart growth objectives.

8. Increase Job and Business Opportunities.

Attract businesses and jobs to locations near housing, infrastructure, and transportation options. Promote economic development in industry clusters. Expand access to education, training, and entrepreneurial opportunities. Support the growth of local businesses, including sustainable natural resource-based businesses, such as agriculture, forestry, clean energy technology, and fisheries.

9. Promote Clean Energy.

Maximize energy efficiency and renewable energy opportunities. Support energy conservation strategies, local clean power generation, distributed generation technologies, and innovative industries. Reduce greenhouse gas emissions and consumption of fossil fuels.

10. Plan Regionally.

Support the development and implementation of local and regional, state and interstate plans that have broad public support and are consistent with these principles. Foster development projects, land and water conservation, transportation and housing that have a regional or multi-community benefit. Consider the long-term costs and benefits to the Commonwealth.

Transportation-Specific Planning Recommendations

- **Increase accessibility at the neighborhood scale.** One approach is to use the Subdivision Rules and Regulations to encourage pedestrian and bicycle ways to connect cul-de-sacs and local streets in subdivisions to one another and to nearby schools, stores and other destinations.

- **Foster Healthy Communities and Neighborhoods By Supporting The Healthy Transportation Compact (HTC) and GreenDOT Initiatives.** Healthy communities and neighborhoods can be achieved through supporting these State initiatives on the local level within the region.

- **Develop healthier and more varied centers**. So doing would increase opportunities available in compact settings, and reduce trips by concentrating local destinations and strengthening community character. Communities should seek means to guide public, commercial and high-density residential investment to selected multi-purpose centers. Larger communities with failed shopping centers should adopt Planned Unit Development regulations or other tools for redeveloping such sites with diverse complementary uses.

- **Develop a North-South industrial access and service road through Brockton's discontinuous central industrial corridor**. The City should study ways of acquiring land, constructing new segments and improving others between Court St. and Spark St. with minimum neighborhood impacts.

- **Continue to study the implications of major development projects.** Even after MEPA review and local approval, many large and complex projects can have ill-defined impacts or significant changes in major factors, particularly involving actions not requiring State permits. It is important to have the capacity to continue reviewing major traffic-generating projects such as the reuse of the South Weymouth Naval Air Station and the Pine Hills project in Plymouth.

- **Increase transit accessibility to nearby, un-served, employment centers**. Put high priority on extending fixed-route service and on encouraging growth in industrial areas whose location and configuration fit such service, but be open to limited demand-responsive service where required to give residents needed employment opportunities.

- **Respond to the potential impacts of major highway and rail projects potentially encouraging continued overall sprawl development.** Old Colony Planning council should continue to work with local communities on exploring issues raised by the Southeastern Massachusetts Vision 20/20 project examining and publicizing alternatives to current trends, refining goals and objectives, developing a plan implementation effort; and working for region-wide acceptance of the program and meaningful commitments to it.

- **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.

- **Modify transportation improvement projects and priorities to encourage the compact close-in development patterns envisioned in the Plan's Goals and Objectives.** Take actions ranging from improving the flexibility of minor arterials, major collectors and minor collectors, to improving ease of pedestrian/ bicycle movement in and between neighborhoods and facilities and within the downtown. Examples in Brockton would be restoring the stairs at the Downtown Rail station, which allowed direct movement from the platform toward most downtown destinations and reopening the recently blocked 100-year old pedestrian underpass between Lincoln Street and the Post Office.

- **Use traffic calming and other roadway alterations to protect neighborhoods in mixed residential/industrial areas.** Study opportunities to lessen industrial impacts on neighborhoods by rerouting truck traffic, creating safe pedestrian ways, and working with firms to lessen impacts from noise, lighting, odors and vibration.

- **Develop new build out analysis based on most recent data and trends to better understand impacts of development and continued growth.**

5.0 Introduction

Federal guidelines for the Regional Transportation Plan require that the Plan reflect local, state, and national goals and objectives. In 2008, MassDOT implemented its *YouMove Massachusetts* public outreach initiative. In October of 2010, MassDOT established state policies and initiatives based on input received from public workshops throughout Massachusetts and through an interactive website. Ten core themes were developed for future planning, design, and operation of the transportation system, including:

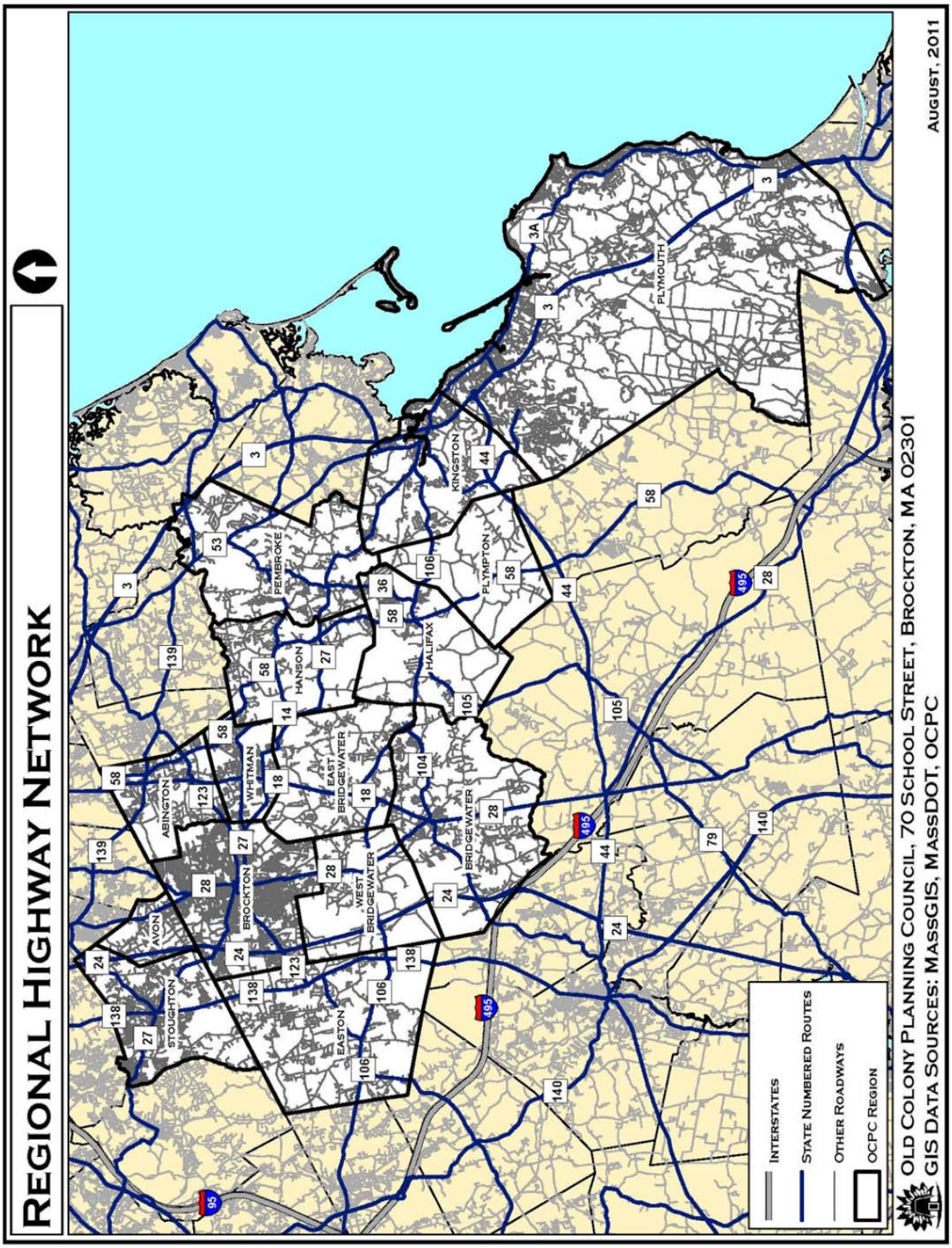
1. Improve transportation system reliability
2. Focus more attention on maintaining our transportation system
3. Design transportation systems better
4. Encourage shared use of infrastructure
5. Increase capacity by expanding existing facilities and services
6. Create more user friendly transportation system
7. Broaden the transportation system to serve more people
8. Provide adequate funding and collect revenue equitably
9. Minimize environmental impacts
10. Improve access to our transportation system

The Regional Highway System chapter of the Old Colony RTP includes the integration of these State themes developed through their public outreach program.

The regional highway network contains a number of major limited access highways for interstate travel and inter-regional access. These include Route 24, Route 3, and Route 44, which are state highways, and Interstate 495, which is part of the federal Interstate Highway System. Route 24 and Route 3 provide north south freeway travel to and from the region. Route 24 extends from Interstate 195 in Fall River north to Interstate 93 (commonly referred to as Route 128) to Boston. Route 3 extends from Cape Cod north to Interstate 93 to Boston. Interstate 495 runs concentrically around Route 128 and the Boston area, and meets Route 24 at a major interchange at the Bridgewater/Raynham town line. Route 44 runs east from Route 3 in Plymouth, as a limited access state facility, to the Middleborough Rotary, which is adjacent to the I-495/Route 18 interchange in Middleborough. Route 44 is a two-lane, non-limited access facility from Route 3 east to Plymouth downtown.

There are a number of state numbered routes, mainly two-lane facilities that provide inter-regional and intra-regional travel in the region. These facilities are non-limited access highways and are classified as arterial highways. The regional highway network, both limited access and non-limited access, is shown in Figure 5-1.

Figure 5-1: Regional Highway Network



5.1 Existing Conditions

5.1.1 Roadway Network

The Functional Classification of Roads

Highways have been grouped into different functional classes for a number of purposes. Highways have been classified based upon the character of service they provide. Highways and roads provide two main functions to varying degrees; mobility and access to adjacent land uses. The functional classes are used also to denote the levels of government responsibility for repair and maintenance, and for the eligibility of government financing.

The following classification definitions are based on the Federal Highway Administration's (FHWA) descriptions of roadway functional classifications:

- Interstate System: The Interstate System consists of all presently designated freeway routes (limited access highways) meeting the FHWA defined interstate geometric and construction standards for future traffic, except for portions in Alaska and Puerto Rico. The Interstate System is the highest classification of arterial roads. It provides the highest level of mobility, at the highest speed, for a long uninterrupted distance.
- Other Arterials: These consist of limited access freeways, multi-lane highways, and other important highways supplementing the Interstate System that connect, as directly as practicable, the nation's principal urbanized areas, cities, and industrial centers; serve the national defense; and connect at suitable border points with routes of continental importance.
- Collectors: The collectors provide land access service and traffic circulation within residential neighborhoods, commercial and industrial areas, and downtown city centers. Collectors connect local roads and streets with arterials, and provide less mobility than arterials at lower speeds, and for a shorter distance.
- Locals: The local roads and streets provide a high level of access to abutting land but limited mobility.

Another important distinction given to highways in the federal classification system is a rural and urban designation. These rural and urban designations are based on federally designated boundaries and not on municipal boundaries.

The highway classification scheme used in Massachusetts is based upon the requirements and guidelines found in federal highway authorizing statutes, specifically in The Inter-Modal Surface Transportation Efficiency Act (ISTEA) and subsequent reauthorizing statues to the current Safe Accountable Flexible Efficient Transportation Act a Legacy for Users (SAFETEA-LU). ISTEA created the National Highway System (NHS), which designated highways eligible under the NHS program, and a second tier eligibility status for roads under Surface Transportation System Program (STP) funding. The road inventories based on these statutes make up the criteria for funding eligibility for our nation's roadway network.

Table 5-1 provides a summary of roadway mileage for Old Colony member communities by functional classification. Table 5-2 summarizes the mileage eligible for federal aid within the region by community and for the region as a whole. Federal aid roads include Interstate (Urban and Rural), Urban Arterial, Urban Collector, and Rural Arterial. Rural Minor Collector roads are eligible for federal aid funds;

however, the state can only dedicate 15 percent of its STP funding toward these roads. Local roads (Urban or Rural) are not eligible for federal aid funds.

Table 5–1: Functional Classification of Mileage by Community

	URBAN ROADS				RURAL ROADS				TOTAL
Community	**Interstate**	**Arterial**	**Collector**	**Local**	**Interstate**	**Arterial & Major Collector**	**Minor Collector**	**Local**	**Mileage**
Abington	0.00	14.31	11.33	41.40	0.00	0.00	0.00	0.00	67.04
Avon	0.00	11.66	3.53	18.42	0.00	0.00	0.00	0.00	33.61
Bridgewater	1.30	29.43	12.79	91.18	0.00	0.00	0.00	0.00	134.7
Brockton	0.00	55.72	30.22	201.01	0.00	0.00	0.00	0.00	286.95
East Bridgewater	0.00	24.87	9.49	45.34	0.00	0.00	0.00	0.00	79.7
Easton	0.00	26.43	17.74	86.70	0.00	0.00	0.00	0.00	130.87
Halifax	0.00	9.90	4.56	27.17	0.00	0.00	5.74	10.81	58.18
Hanson	0.00	16.26	12.18	33.91	0.00	0.00	0.00	0.00	62.35
Kingston	0.00	18.52	14.55	67.46	0.00	2.06	1.97	2.18	106.74
Pembroke	0.00	21.58	18.12	69.35	0.00	0.00	0.00	0.00	109.05
Plymouth	0.00	54.33	50.83	290.47	0.00	1.53	3.53	103.62	504.31
Plympton	0.00	0.66	1.48	2.05	0.00	0.58	17.94	12.88	35.59
Stoughton	0.00	23.64	18.33	81.46	0.00	0.00	0.00	0.00	123.43
West Bridgewater	0.00	23.85	5.67	27.28	0.00	0.00	0.00	0.00	56.8
Whitman	0.00	14.29	5.29	34.83	0.00	0.00	0.00	0.00	54.41
TOTALS	**1.3**	**345.45**	**216.11**	**1,118.03**	**0**	**4.17**	**29.18**	**129.49**	**1,843.73**

Source: MassDOT 2009 Road Inventory Year End Report - 2009 MassDOT Road Inventory Database

Table 5–2: Federal Aid Eligible Mileage by Community

Community	Total Miles	Eligible Miles	Percent Eligible
Abington	67.04	25.64	38.25%
Avon	33.61	15.19	45.19%
Bridgewater	134.7	43.87	32.57%
Brockton	286.95	85.99	29.97%
East Bridgewater	79.7	34.37	43.12%
Easton	130.87	44.17	33.75%
Halifax	58.18	15.45	26.56%
Hanson	62.35	28.44	45.61%
Kingston	106.74	38.00	35.60%
Pembroke	109.05	39.71	36.41%
Plymouth	504.31	106.69	21.16%
Plympton	35.59	12.12	34.05%
Stoughton	123.43	42.23	34.21%
West Bridgewater	56.8	29.52	51.97%
Whitman	54.41	19.58	35.99%
TOTALS	**1,843.73**	580.97	31.51%

Source: MassDOT 2009 Road Inventory Year End Report - 2009 MassDOT Road Inventory Database

Changes in functional classification are approved by the Federal Highway Administration (FHWA). The requests to revise the functional classification along a particular roadway or group of roadways are submitted by a municipality through the Old Colony Metropolitan Planning Organization, which in turn submits the request to MassDOT Office of Transportation Planning. The requests are then submitted to

the FHWA. Figure 5-2 shows the functional classification of roads in the Region. The steps for changes in functional classification, according to the Surface Transportation Program (STP) Guide to Federal-Aid Program and Projects, are as follows:

1. One or more municipalities write a letter addressed to the MPO requesting a functional classification change. If the requested roadway also travels through adjacent municipalities, then those municipalities submit a letter requesting the same change to the MPO.

2. The MPO staff reviews the letter to determine whether the request makes sense.

3. If the MPO staff agrees with the request, the MPO staff works with the municipalities to obtain current traffic counts at key locations along the roadway to support a change and document why the change is warranted. This could include a discussion in changes to land use that have increased or decreased the roadway's importance, or a description explaining changes in travel patterns that have resulted from highway construction. The percentage of roadway centerline mileage by functional class within the MPO should be kept as close to the existing amounts as possible. This can be achieved by including a change in the functional classification of another parallel road. If the functional reclassification is the result of population growth or a new roadway is constructed leading to an area not served by an existing collector or arterial classified roadway, then downgrading the functional class of a parallel roadway may not be necessary. Finally, 8.5 X 11 maps should be created highlighting the roadways under review.

4. The MPO should informally send the request to the Office of Transportation Planning's (OTP) Geospatial Resources Section for a quick review prior to MPO adoption. It might make sense to follow this step in the early stages of Step 3 to avoid unnecessary work.

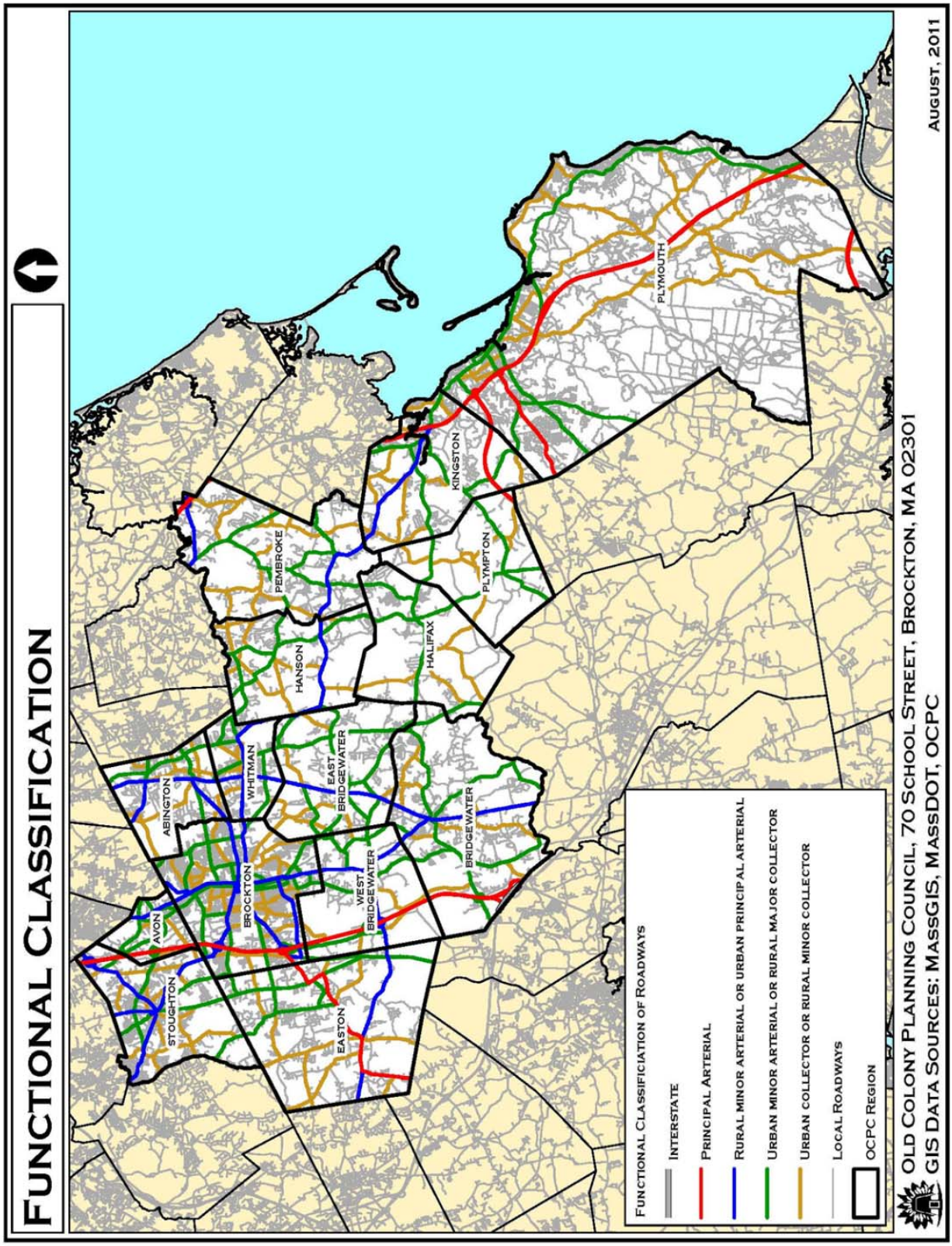
5. Upon completing the package outlined in Step 3, present to the MPO Board for their approval.

6. Once the MPO Board approval is granted and documented, send the approved package to OTP. The package should include the following:

    - Letter(s) from municipality(ies) requesting the change
    - Volume counts along roadways under review
    - Maps highlighting roadways under review
    - Descriptive text explaining why the change is warranted, citing land use changes, roadway alignment changes, or other reason
    - MPO Board approval.

If the package is complete, OTP will submit to FHWA for their approval. Once FHWA provides a ruling, OTP will provide the results to the MPO.

Figure 5-2: Functional Classification of Roads in the Region



5.1.2 Traffic Volumes

The Old Colony Planning Council maintains a Traffic Count Management System for the region with archived data from 1965 to the present. The system contains traffic information mainly from traffic counts conducted by OCPC, which conducts approximately 200 automatic traffic counts per year; however, the OCPC traffic count management system contains counts from a variety of sources including the MassDOT and various consulting and engineering firms. A traffic flow map utilizing a "band width" scale, shown in Figure 5-3 illustrates the volumes on major roadways in the region and surrounding areas. The traffic volumes on this map are based on recent traffic counts and factored historical count data.

Traffic volumes are an important component of transportation planning. Knowledge of current and historic traffic volumes allows planners and engineers to calculate the rate of traffic growth, expected vehicle emissions, and plan for traffic, pedestrian, and bicycle safety.

OCPC generally conducts its traffic counts in a forty-eight hour period using automatic traffic recorders with road tubes across the road that detect air pulses recorded by the counters at the side of the road. These counters determine the Average Daily Traffic (ADT), which is an average of a twenty-four hour period. OCPC does not adjust the counts for seasonal variations. Traffic counts are conducted throughout most of the year except during winter months due to snow and ice on the road surface, which hamper the placement of road tubes across the roads.

OCPC offers a number of traffic counting services to its member communities including ADT collection; intersection turning movement counts; speed studies; vehicles classification studies; level-of-service analyses; traffic signal warrant evaluations; multi-way stop sign warrant evaluations; crash rate analyses; and various forms of technical assistance.

In addition to directly working with the local communities and MassDOT, the Council conducts volume counts to: assist with the transportation planning efforts of the region; provide screen-line calibration data for the Regional Travel Demand Model; prepare the annual Traffic Counting Report; and aid with local corridor planning studies.

The Region, in general, has a north south orientation with commuters traveling north to Boston and the Boston area during the morning commute and south back to the region during the afternoon commute; however, the current trends are that employment has become much more diverse with employment centers spread over a wider area, and commuters traveling farther distances between home and work. Nevertheless, traffic volumes in the region are heaviest on state numbered routes, which provide the most direct connections between communities and provide connections to principal arterials for inter-regional travel. Tables 5-3 and 5-4 show the average daily traffic volumes for the major state numbered routes in the region and the total traffic growth and annual traffic growth rates. Figure 5-3 shows the average daily traffic in the Region.

Figure 5-3: Average Daily traffic

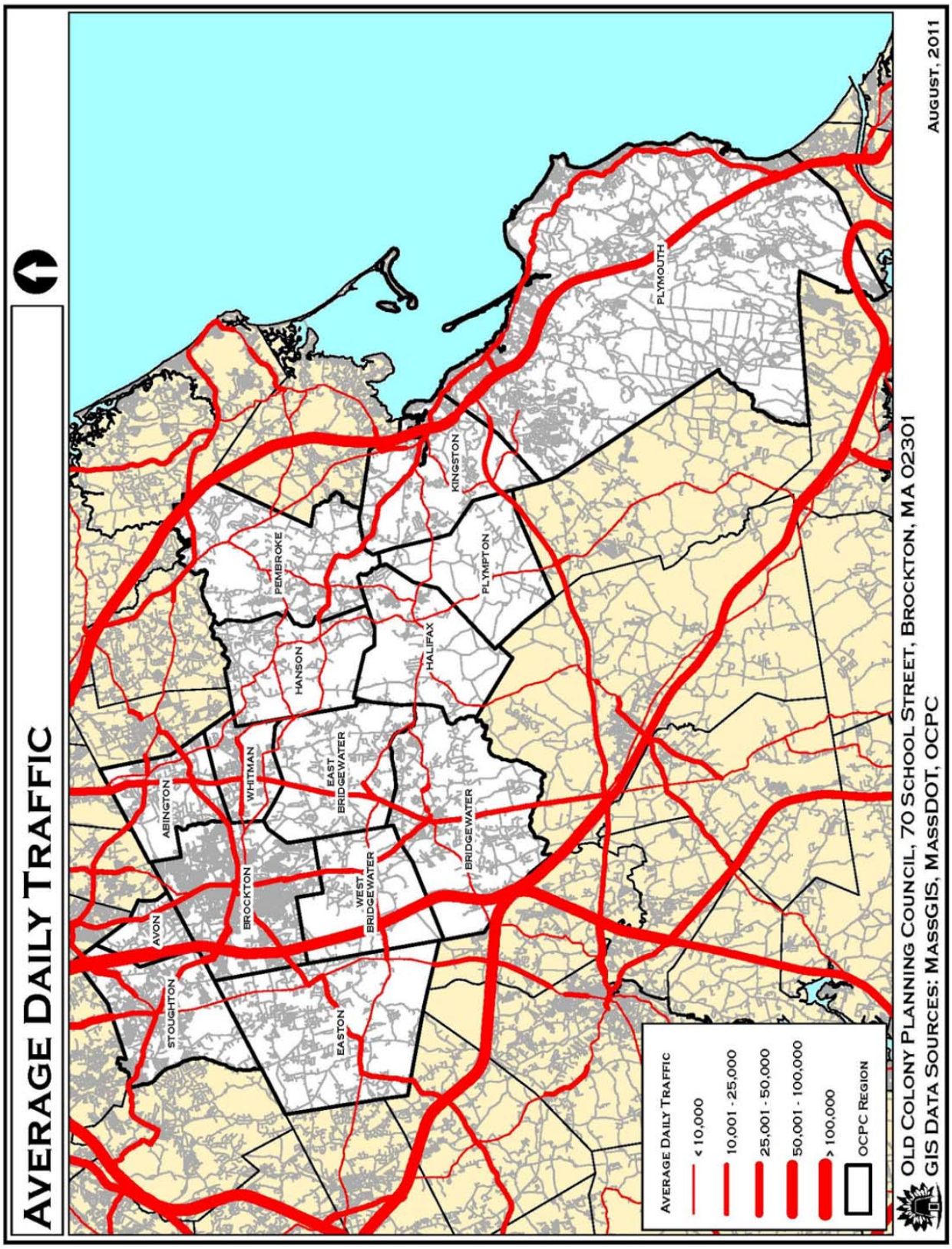


Table 5–3: Traffic Volumes on East - West Highways

ROUTE	LOCATION	HISTORIC YEAR	ADT	LATEST YEAR	ADT	TOTAL % GROWTH	ANNUAL % GROWTH
14	PEMBROKE- CONGRESS STREET (ROUTE 14) AT DUXBURY T/L	2002	2,555	2008	2,421	-5.2%	-0.9%
25	WAREHAM - ROUTE 25 EAST OF INTERSTATE 195	2004	62,800	2008	46,400	-26.1%	-7.3%
27	HANSON- MAIN STREET (ROUTE 27) WEST OF PHILLIPS STREET	2001	11,700	2008	10,000	-14.5%	-2.2%
27	WHITMAN - TEMPLE STREET (ROUTE 27) EAST OF BEDFORD STREET (ROUTE 18)	2005	13,200	2008	13,900	5.3%	1.7%
104	BRIDGEWATER - PLYMOUTH STREET (ROUTE 104) WEST OF SPRING STREET	2005	14,718	2008	13,800	-6.2%	-2.1%
106	EAST BRIDGEWATER - PLYMOUTH STREET (ROUTE 106) AT HALIFAX T/L	2003	11,317	2009	12,114	7.0%	1.1%
106	WEST BRIDGEWATER - WEST CENTER STREET (ROUTE 106) WEST OF ELM STREET	2001	25,400	2007	24,600	-3.1%	-0.5%
123	ABINGTON - BROCKTON AVENUE (ROUTE 123) EAST OF BEDFORD STREET	2000	13,900	2006	12,700	-8.6%	-1.5%
123	BROCKTON - BELMONT STREET (ROUTE 123) SOUTH OF TORREY STREET	2005	14,000	2008	13,700	-2.1%	-0.7%
139	ABINGTON - NORTH AVENUE (ROUTE 139) AT ROCKLAND T/L	2004	15,300	2009	16,608	8.5%	1.7%

Table 5–4: Traffic Volumes on North - South Highways

ROUTE	LOCATION	HISTORIC YEAR	ADT	LATEST YEAR	ADT	TOTAL % GROWTH	ANNUAL % GROWTH
3	KINGSTON - PILGRIM HWY (ROUTE 3) AT DUXBURY T/L	2003	60,200	2008	52,100	-13.5%	-2.8%
3A	PLYMOUTH - COURT STREET (ROUTE 3A) AT KINGSTON T/L	2005	11,700	2008	11,900	1.7%	0.6%
3	PLYMOUTH - PILGRIM HWY (ROUTE 3) AT BOURNE T/L	2004	34,306	2009	35,320	3.0%	0.6%
3	WEYMOUTH - PILGRIM HWY (ROUTE 3) NORTH OF MAIN STREET (ROUTE 18)	2004	138,392	2009	135,235	-2.3%	-0.5%
18	ABINGTON - BEDFORD STREET (ROUTE 18) NORTH OF BROCKTON AVENUE (ROUTE 123)	2001	21,500	2008	20,884	-2.9%	-0.4%
18	EAST BRIDGEWATER - BEDFORD STREET (ROUTE 18) AT WHITMAN T/L	2004	17,226	2009	17,700	2.8%	0.5%
24	AVON - AMVETS MEMORIAL HWY (ROUTE 24) SOUTH OF NEW POND STREET	2004	97,100	2009	95,000	-2.2%	-0.4%
24	BROCKTON - AMVETS MEMORIAL HWY (ROUTE 24) NORTH OF BELMONT STREET (ROUTE 123)	2005	94,600	2008	95,500	1.0%	0.3%
24	RANDOLPH - AMVETS MEMORIAL HWY (ROUTE 24) SOUTH OF ROUTE I-93	2003	126,995	2009	124,315	-2.1%	-0.4%
28	AVON - EAST MAIN STREET (ROUTE 28) SOUTH OF E SPRING STREET	2004	15,775	2008	16,300	3.3%	0.8%
28	BRIDGEWATER - MAIN STREET (ROUTE 28) AT WEST BRIDGEWATER T/L	2004	13,900	2007	14,700	5.8%	1.9%
28	BROCKTON - MAIN STREET (ROUTE 28) SOUTH OF SARGENT'S WAY	2004	19,444	2008	17,427	-10.4%	-2.7%
36	HALIFAX - HOLMES STREET (ROUTE 36) NORTH OF PLYMOUTH STREET (ROUTE 106)	2000	5,907	2003	6,012	1.8%	0.6%
53	PEMBROKE - WASHINGTON STREET (ROUTE 53) AT DUXBURY T/L	2004	5,249	2008	5,004	-4.7%	-1.2%
58	HALIFAX - MONPONSETT STREET (ROUTE 58) AT PLYMPTON T/L	2002	5,529	2008	5,308	-4.0%	-0.7%
58	HANSON - INDIAN HEAD STREET (ROUTE 58) NORTH OF MAIN STREET (ROUTE 27)	2002	10,170	2008	8,523	-16.2%	-2.9%
80	PLYMOUTH - PLYMPTON ROAD (ROUTE 80) NORTH OF CARVER ROAD	2002	10,656	2007	11,937	12.0%	2.3%
105	HALIFAX - THOMPSON STREET (ROUTE 105) SOUTH OF PLYMOUTH STREET (ROUTE 106)	2003	2,460	2008	2,541	3.3%	0.7%
138	STOUGHTON - WASHINGTON STREET (ROUTE 138) AT CANTON T/L	2005	19,244	2008	19,148	-0.5%	-0.2%

5.1.3 Pavement Conditions

OCPC continues to refine and update its pavement management system in keeping with the Congestion Management Process (CMP) principles of objectives-driven, performance-based planning. A region-wide Pavement Management System (PMS) for federal-aid eligible roads was developed by OCPC in conformance with federal guidelines initiated by the Inter-Modal Surface Transportation Efficiency Act of 1991 (ISTEA), the precursor to TEA-21 and SAFETEA-LU. Although guidelines under subsequent federal legislation TEA-21 and SAFETEA-LU did not require a PMS, OCPC has continued its effort over the years to maintain the region wide PMS for federal aid eligible roads. These federal aid eligible roads fall into two main funding categories; the Surface Transportation Program (STP) and the National Highway System (NHS). The PMS was developed in cooperation with the Massachusetts Department of Transportation (MassDOT) and other Massachusetts regional planning agencies. This PMS, although a voluntary management system under current federal statute, is essential in ensuring that resources are allocated in the most effective and efficient manner.

The PMS, which includes a pavement deterioration curve demonstrating the rate of deterioration of pavement and the implications for cost of maintenance, utilized by OCPC calculates Pavement Condition Index (PCI) scores for the surveyed road segments. The PCI assigned to each road or road segment are based on the condition surveys conducted by OCPC staff. The field condition surveys are based on the severity and extent of specific surface condition criteria including: potholes and patching, alligator cracking, distortion, rutting, weathering/block cracking, transverse and longitudinal cracking, bleeding/polished aggregate, surface wear and raveling, corrugations, shoving, and slippage. The information on road surface conditions obtained in the field via the windshield survey is entered into the pavement management software, which assigns a PCI and recommends a repair and associated cost for each road and road segment. Each road or road segment is placed in a condition category based on the PCI, which includes “Poor” (PCI = 0 to 64), “Fair” (PCI = 65 to 84), “Good” (PCI = 85 to 94), and “Excellent (PCI = 95 to 100).

OCPC recently completed field inspections for all federal eligible roads in November of 2010; thereby updating the conditions field and recommended improvements field in the PMS. This data is updated every four years and supplemented on an ongoing basis, as pavement reconstruction and resurfacing projects are completed on federal aid roads through the OCPC Transportation Improvement Program (TIP). The repairs recommended by the PMI, 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.

Table 5-5 summarizes the surface conditions and estimated repair costs for roads based on updates to the system to 2010. Table 5-6 summarizes the 2010 estimated repair costs by funding category

eligibility (National Highway System, NHS, and Surface Transportation Program, STP). Table 5-7 shows the estimated repair costs for federal aid eligible roads under state jurisdiction compared to those under local jurisdiction.

Table 5-5: 2010 Road Surface Condition and Estimated Repair Costs Federal Aid Roads

	Condition	Road Mileage	Percent Mileage	Estimated Repair Cost	Percentage of Cost
Arterials	Excellent	34	25%	$0	0%
	Good	39	29%	$3,675,479	8%
	Fair	42	31%	$23,780,171	51%
	Poor	21	15%	$19,537,032	42%
	Total	136	100%	$46,992,682	100%
Collectors	Excellent	63	14%	$0	0%
	Good	101	22%	$1,980,493	1%
	Fair	136	30%	$48,335,810	32%
	Poor	154	34%	$102,609,425	67%
	Total	454	100%	$152,925,728	100%
All Federal Aid Roads	Excellent	97	16%	$0	0%
	Good	140	24%	$5,655,972	3%
	Fair	178	30%	$72,115,981	36%
	Poor	175	30%	$122,146,457	61%
	Total	590	100%	$199,918,410	100%

Table 5-6: Estimated Costs by Funding Category

Funding Category	Mileage	Estimated Repair Cost
NHS	117	$46,992,682
STP	473	$152,925,728
TOTAL	590	$199,918,410

Table 5-7: Estimated Costs by Jurisdiction

Jurisdiction	Mileage	Estimated Repair Cost
State	122	$41,454,029
Local	468	$158,464,381
TOTAL	590	$199,918,410

Based on Table 5-5, the total cost to improve all roads is estimated at $199,918,410, with the bulk of the cost, $152,925,728, estimated for repair of collector roads and the remainder of $46,992,682estimated for repair of arterials. The bulk of the repair costs, as shown in Table 5-6, fall in the STP category ($152,925,728), and, as shown in Table 5-7, the majority of the necessary repairs are under local jurisdiction (estimated cost of $158,464,381). Figures 5-4 and 5-5 show the pavement conditions in the region and the recommended improvements in the region.

Figure 5-4: 2010 Pavement Conditions in the Region.

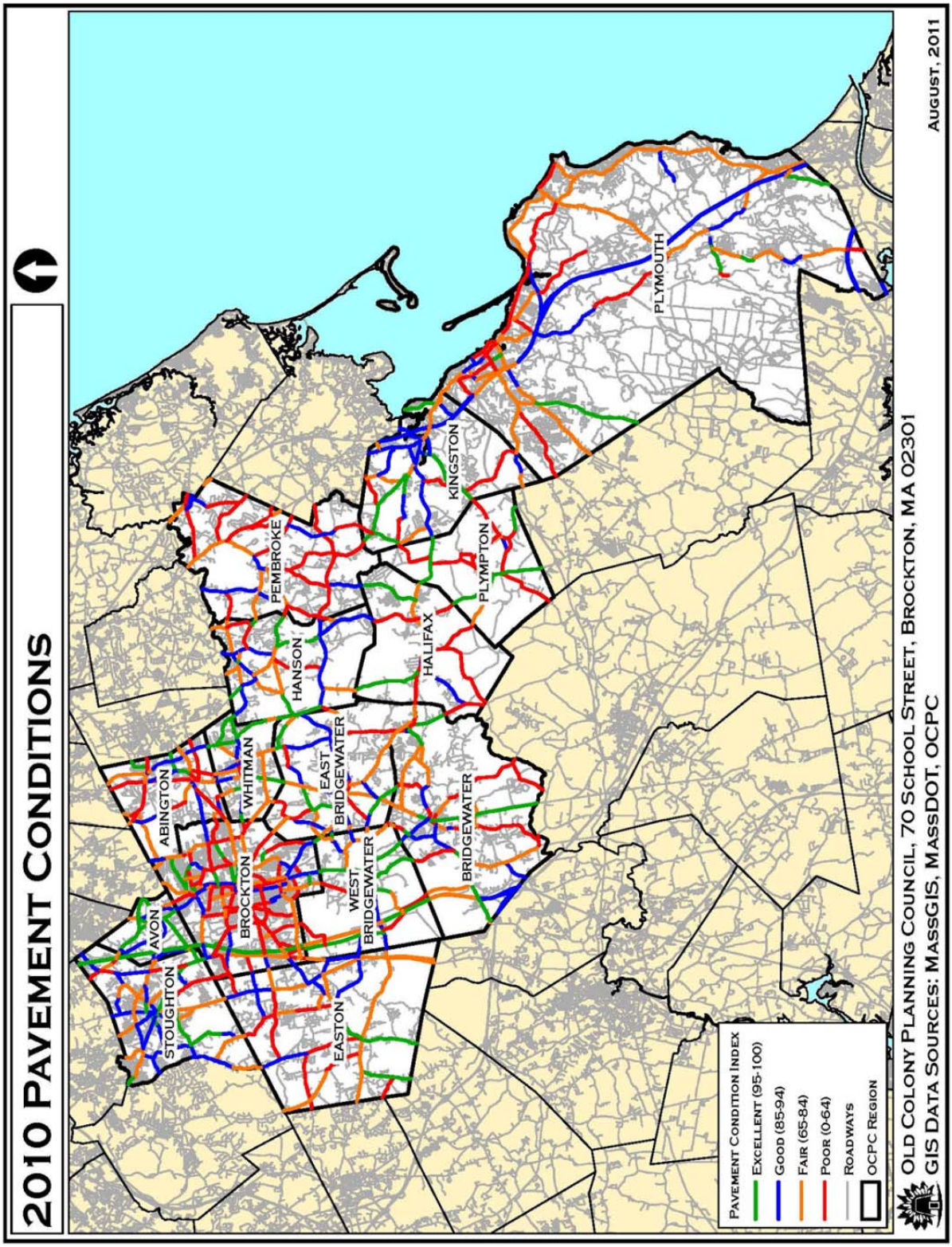
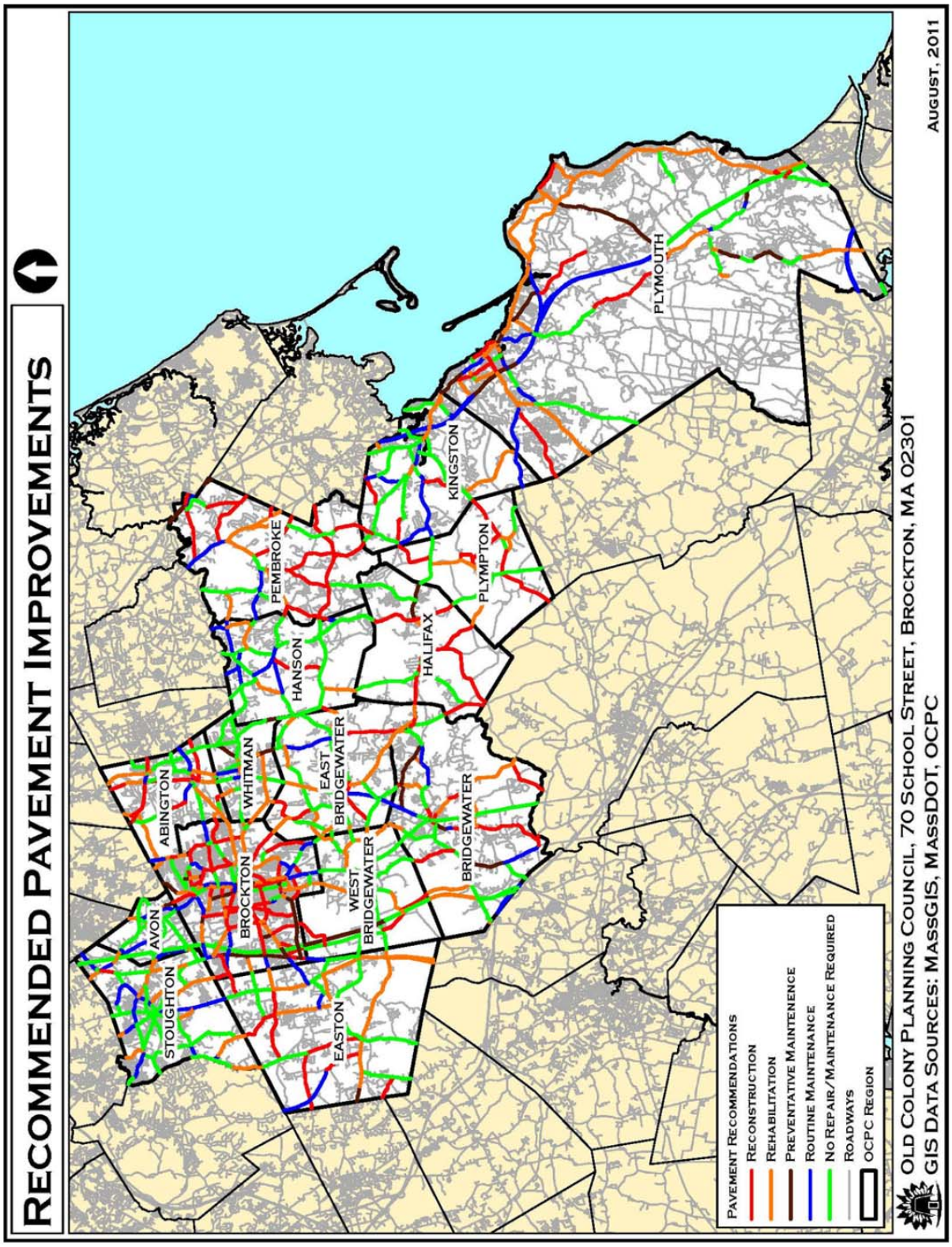


Figure 5-5: 2010 Recommended Pavement Improvements



5.1.4 Truck Freight

The Freight Analysis Framework (FAF), developed under the U.S. Department of Energy, integrates data from a variety of sources to present a comprehensive picture of freight movement among states and major metropolitan areas by all modes of transportation, provides estimates for movement of freight tonnage. According to the FAF, 307,365,970 tons of goods were shipped to and from Massachusetts by truck in 2009.

Trucking is the primary mode for the movement of goods in the Region. The primary trucking routes include the region's limited access highways: Route 24, Route 3, and Interstate 495, as well as other important state numbered routes including Route 3A, Route 14, Route 18, Route 27, Route 28, Route 36, Route 44, Route 58, Route 80, Route 104, Route 106, Route 123, Route 138, and Route 139. Other minor arterials, major collectors, or other roadways that connect with industrial areas and/or shopping centers include Pond Street and Harrison Boulevard in Avon, Central Street in Stoughton, Oak Street, Howard Street (Route 37), Manley Street, Main Street in Brockton, and Commerce Way in Plymouth. These routes are mainly two-lane facilities; however, there are some exceptions including Commerce Way, in Plymouth, which is mainly four lanes, and Route 104 in Bridgewater, just west of Route 24, to accommodate retail development.

There are several important truck routes in Brockton Downtown that pass under the Railroad viaduct, which include Court Street (Route 27), Centre Street (Route 123), School Street, and Crescent Street (Route 27). This viaduct was built in the late 1800s before bridge height was an issue for moving freight via truck, and the viaduct is currently 13 feet and 6 inches high at its highest point, which is insufficient for many of today's heavy vehicles. These routes mainly hinder east to west truck traffic in Brockton. In addition to the low railroad viaduct, truck traffic turning between these major east west routes in Downtown Brockton to north south routes such as Main Street or Montello Street are hindered by tight turning radii. Trucks often encroach on other lanes or end up on sidewalks making these turns at intersections along Montello Street (Route 28) and Main Street in Brockton Downtown.

Roads in the region that are not truck routes are largely roads in residential areas or other roads excluded to trucks. Table 5-8 lists the truck route restrictions in the Region, based on MassDOT data.

The impact of trucks on neighborhoods is an important issue regarding the movement of goods in the region. OCPC receives numerous requests from communities to assist in the development of heavy commercial vehicle exclusion reports (HVCE), in order to help minimize the residential impacts while maintaining the efficiency of goods movement. MassDOT maintains sole jurisdiction over the granting of these exclusions, and grants the exclusions based upon specific criteria. Freight movement via truck through neighborhoods remains an issue with the growth of both residential and commercial development within the region.

Table 5-8: Truck Restrictions in the Region

Community	Truck Restriction Street	Exemption From	Exemption To	Exemption Type	Time Restrictions
Abington	Temple Street	Randolph Street (Route 139)	Bates Street	All vehicles over 2 1/2 tons.	24 Hours, 7 Days
Abington	Thicket Street	Old Randolph Road	Weymouth Town Line	All vehicles over 2 1/2 tons	24 Hours, 7 Days
Abington	Vernon Street	Washington Street	Brockton Avenue	All vehicles over 2 1/2 tons	24 Hours, 7 Days
Bridgewater	Roberts Road	Pond Street (Route 104)	East Bridgewater Town Line	All vehicles over 2 1/2 tons	24 Hours, 7 Days
East Bridgewater	Old Plymouth Street	Plymouth Street (Route 106)	Bridgewater Town Line	All vehicles over 2 1/2 tons	24 Hours, 7 Days
Pembroke	Brick Kiln Lane	Washington Street (Route 53)	Schooset Street (Route 139)	All vehicles over 2 1/2 tons	12 Hours,6AM to 6PM
Pembroke	Mill Street	Route 36 (Center Street)	Hobomock Street	2 1/2 TONS	24 hrs., 7 days
Pembroke	Oak Street	Elm Street	Pleasant Street	All vehicles over 2 1/2 tons	24 Hours, 7 Days
Pembroke	Water Street	Washington Street (Route53)	Schooset Street (Route139)	All vehicles over 2 1/2 tons	12 Hours,6AM to 6PM
Pembroke	West Street	Route 27 (School Street)	Route 36 (Center Street)	2 1/2 tons	24 hrs., 7 days
Stoughton	Chapman Road	Central Street	Turnpike Street	2 1/2 TONS	24 HRS
Stoughton	Pine Street	Pleasant Street	York Street	All vehicles over 2 1/2 tons	6AM to 7PM
Stoughton	York Street	Washington Street	Canton Town Line	All vehicles over 2 1/2 tons	13 Hours,6AM to 7PM
West Bridgewater	West Street	West Center Street	Easton Town line	All vehicles over 2 1/2 tons	24 Hours, 7 Days

5.1.5 Intersections

Traffic Signals

OCPC maintains an inventory of signalized intersections in the region. Traffic signals, supplemented with proper pavement markings and signage, ensure safety and facilitate traffic flow by assigning right of way at intersections. Flashing beacons are special signals used at intersections or locations where a full signal is not warranted, but conditions warrant alerting drivers to use extra caution when proceeding through the area. Over the years, improvements in signal technology, including signal coordination and timing, have helped reduce delays and improve traffic flow at intersections, especially during peak periods. OCPC continues to include recommending the upgrading of signal systems and techniques in its plans and recommendations for long range studies and local technical assistance studies.

The industry standard for determining the need for traffic control devices is presented in the Manual on Uniform Traffic Control Devices (MUTCD), which is developed and approved by the Federal Highway Administration. The manual specifies nine warrants that test whether an intersection merits the installation of a traffic signal. These warrants represent the minimum standards by which the need for a traffic signal should be judged. While the MUTCD does not suggest that any intersection meeting one or more warrants requires a signal, it emphasizes that no signal should be constructed at an intersection that does not meet any of the warrants. The MUTCD recommends that a comprehensive traffic engineering study be conducted before the decision is made to install traffic signals at an intersection. OCPC continually updates its inventory of signals for the region. Traffic signals in the Old Colony region are listed in Table 5-9.

Table 5-9: Traffic Signals

Community	Major Street	Intersecting Street	Other Streets	Type
Abington	North Avenue (Route 139)	Adams Street (Route 58)		Full
Abington	Bedford Street (Route 18)	Ames Plaza		Full
Abington	Bedford Street (Route 18)	Brockton Avenue (Route 123)		Full
Abington	Bedford Street (Route 18)	Fire Station		Emergency
Abington	Bedford Street (Route 18)	Lincoln Boulevard		Full
Abington	Bedford Street (Route 18)	Randolph Street (Route 139)	North Avenue	Full
Abington	Hancock Street	Chestnut Street		Flashing Beacon
Abington	Centre Avenue (Route 123)	Plymouth Street (Route 58)		Full
Abington	Plymouth Street (Route 58)	Central Street		Full
Abington	Plymouth Street (Route 58)	Summer Street		Full
Abington	Centre Avenue (Route 123)	Stop and Shop		Full
Abington	Brockton Avenue (Route 123)	Wal-Mart		Full
Abington	Summer Street	Walnut Street		Flashing Beacon
Abington	Brockton Avenue (Route 123)	Washington Street	Thaxter Avenue	Full
Abington	Centre Avenue (Route 123)	Washington Street	Orange Street	Full
Abington	Brockton Avenue (Route 123)	Groveland Street	Vernon Street	Full
Avon	Page Street	Bodwell Street	Bodwell Street Ext	Full
Avon	East Main Street (Route 28)	E/W Spring Street		Flashing Beacon
Avon	East Main Street (Route 28)	Harrison Boulevard		Full
Avon	Main Street (Route 28)	West Main Street	Main Street	Full
Avon	North Main Street (Route 28)	E/W High Street	North Main Street	Full
Avon	Memorial Drive (Route 28)	Wal-Mart		Full
Avon	Harrison Boulevard	Pond Street	Harrison Boulevard	Full
Avon	New Pond Street	Stockwell Drive	Dykeman Street	Full
Avon	Harrison Boulevard	West Main Street		Full
Bridgewater	Bedford Street (Route 18)	School Street		Emergency
Bridgewater	Bedford Street (Route 18)	Winter Street		Full
Bridgewater	Broad Street (Route 18)	High Street		Flashing Beacon
Bridgewater	Broad Street (Route 18)	Central Square		Full
Bridgewater	Broad Street (Route 18)	Spring Street		Full
Bridgewater	Center Street	High School		Controlled Full
Bridgewater	Pleasant Street (Route 104)	Elm Street	Old Pleasant Street	Full
Bridgewater	Pleasant Street (Route 104)	Center Street		Full
Bridgewater	Main Street (Route 28)	High Street	Center Street	Full

Table 5-9: Traffic Signals Continued				
Bridgewater	Pleasant Street (Route 104)	Prospect Street		Full
Bridgewater	Pleasant Street(Route 104)	Home Depot		Full
Bridgewater	Pleasant Street (Route 104)	Route 24 Northbound Ramps		Full
Bridgewater	Pleasant Street (Route 104)	Route 24 Southbound Ramps		Full
Bridgewater	South Street (Route 104)	Central Square		Emergency
Bridgewater	Plymouth Street (Route 104))	Spring Street		Full
Bridgewater	Plymouth Street (Route 104))	Summer Street		Full
Bridgewater	Pleasant Street (Route 104)	Vernon Street		Full
Brockton	Crescent Street (Route 27)	Alger Street (Route 14)		Full
Brockton	Belmont Street (Route 123)	Ash Street		Full
Brockton	Forest Avenue	Ash Street		Full
Brockton	Pleasant Street (Route 27)	Belair Street		Full
Brockton	Belmont Street (Route 123)	Torrey Street		Full
Brockton	Belmont Street (Route 123)	West Street		Full
Brockton	Belmont Street (Route 123)	Forest Avenue	Shaws Plaza Ent	Full
Brockton	Oak Street	Madrid Square		Full
Brockton	Oak Street	Campanelli Drive	Chatham West Ent	Full
Brockton	Centre Street (Route 123)	Cary Street	Lyman Street	Full
Brockton	Court Street	Cary Street	Provost Street	Full
Brockton	Centre Street (Route 123)	Commercial Street		Full
Brockton	Court Street	Commercial Street		Full
Brockton	Crescent Street (Route 27)	Commercial Street	Perkins Street	Full
Brockton	School Street	Commercial Street		Full
Brockton	Crescent Street (Route 27)	Wendell Street		Full
Brockton	Oak Street	DW Field Park		Full
Brockton	Crescent Street (Route 27)	East Plaza		Full
Brockton	West Chestnut Street	Linwood Street		Flashing Beacon
Brockton	Crescent Street (Route 27)	Lyman Street		Full
Brockton	Summer Street	Lyman Street	Grove Street	Full
Brockton	North Main Street	Battles Street		Full
Brockton	Belmont Street (Route 123)	Main Street		Full
Brockton	Main Street (Route 28)	Brookside Avenue	BAT Bus Garage	Full
Brockton	Centre Street (Route 123)	Main Street		Full
Brockton	Crescent Street (Route 27)	Main Street		Full
Brockton	Main Street (Route 28)	Maple Avenue		Full
Brockton	Main Street (Route 28)	Plain Street		Full
Brockton	Main Street	Pleasant Street (Route 27)		Full

Table 5-9: Traffic Signals Continued				
Brockton	Main Street (Route 28)	Sargents Way		Full
Brockton	Main Street	School Street		Full
Brockton	Main Street	Perkins Avenue		Full
Brockton	Main Street	West Elm Street	VFW Parkway	Full
Brockton	Belmont Street (Route 123)	Manley Street		Full
Brockton	Forest Avenue	Bouve Avenue		Full
Brockton	Centre Street (Route 123)	Montello Street (Route 28)		Full
Brockton	Montello Street (Route 28)	Court Street		Full
Brockton	Crescent Street (Route 27)	Montello Street (Route 28)		Full
Brockton	Montello Street (Route 28)	Grove Street		Full
Brockton	Montello Street (Route 28)	Lawrence Street		Full
Brockton	Pleasant Street (Route 27)	Fire Station 1		Flashing Beacon
Brockton	Main Street	Fire Station 2		Flashing Beacon
Brockton	North Main Street	Fire Station 3		Flashing Beacon
Brockton	Montello Street (Route 28)	Perkins Avenue		Full
Brockton	Montello Street (Route 28)	School Street		Full
Brockton	East Ashland Street	North Cary Street		Full
Brockton	North Main Street	East Ashland Street		Full
Brockton	North Main Street	Oak Street		Full
Brockton	North Montello Street (Route 28)	Ames Street		Full
Brockton	North Montello Street (Route 28)	East Ashland Street		Full
Brockton	North Montello Street (Route 28)	Elliot Street		Full
Brockton	North Montello Street (Route 28)	Howard Street		Full
Brockton	North Pearl Street	Good Samaritan Hospital		Full
Brockton	North Pearl Street	Oak Street Extension		Full
Brockton	Reynolds Memorial Hwy (Route 27)	North Pearl Street		Full
Brockton	North Quincy Street	East Ashland Street		Full
Brockton	North Quincy Street	North Cary Street		Flashing Beacon
Brockton	North Warren Avenue	Prospect Street		Flashing Beacon
Brockton	Oak Street	Belair Street		Full
Brockton	Oak Street	Westgate Pavilion		Full
Brockton	Belmont Street (Route 123)	Pearl Street		Full
Brockton	Pearl Street	Pleasant Street		Full
Brockton	Pearl Street	Torrey Street		Full
Brockton	Centre Street (Route 123)	Plymouth Street		Flashing Beacon
Brockton	Centre Street (Route 123)	Quincy Street		Full

Table 5-9: Traffic Signals Continued				
Brockton	Crescent Street (Route 27)	Quincy Street		Full
Brockton	Pleasant Street (Route 27)	Reynolds Hwy (Route 27)	West Street	Full
Brockton	Reynolds Memorial Hwy (Route 27)	Westgate Pavilion		Full
Brockton	Belmont Street (Route 123)	Stop and Shop		Full
Brockton	Crescent Street (Route 27)	Summer Street		Full
Brockton	Belmont Street (Route 123)	VA Hospital Entrance		Full
Brockton	Belmont Street (Route 123)	Warren Avenue		Full
Brockton	Warren Avenue	Forest Avenue		Full
Brockton	Warren Avenue	High Street		Full
Brockton	Warren Avenue	Legion Pkwy		Full
Brockton	Pleasant Street (Route 27)	Warren Avenue		Full
Brockton	Warren Avenue	West Elm Street		Full
Brockton	Belmont Street (Route 123)	West Street		Full
Brockton	West Street	Torrey Street		Full
Brockton	West Street	West Elm Street		Full
Brockton	West Chestnut	Manley Street	Liberty ST	Full
East Bridgewater	Bedford Street (Route 18)	Central Street		Full
East Bridgewater	Bedford Street (Route 18)	Highland Street		Full
East Bridgewater	Bedford Street (Route 18)	West Street (Route 106)		Full
East Bridgewater	Bedford Street (Route 18)	Whitman Street (Route 106)		Full
East Bridgewater	Washington Street	Central Street		Full
East Bridgewater	Oak Street (Route 14)	Franklin St (Route 27)	W. Washington	Full
Easton	Foundry Street (Route 106)	Depot Street (Route 123)		Full
Easton	Foundry Street (Route 106)	Eastman Street (Route 123)		Full
Easton	Belmont Street (Route 123)	Stonehill College		Full
Easton	Foundry Street (Route 106)	Turnpike Street (Route 138)		Full
Easton	Turnpike Street (Route 138)	Purchase Street		Flashing Beacon
Easton	Washington Street (Route 138)	Belmont Street (Route 123)		Full
Easton	Washington Street (Route 138)	Central Street		Full
Easton	Washington Street (Route 138)	Depot Street (Route 123)		Full
Easton	Washington Street (Route 138)	Main Street		Full
Easton	Washington Street (Route 138)	Stonehill College		Full
Easton	Washington Street (Route 138)	Roche Brothers		Full
Halifax	Plymouth Street (Route 106)	Monponsett Street (Route 58)		Full
Halifax	Plymouth Street (Route 106)	Wal-Mart		Full
Halifax	Plymouth Street (Route 106)	Stop and Shop		Full

Table 5-9: Traffic Signals Continued				
Hanson	West Washington Street (Route 14)	Holmes Street		Flashing Beacon
Hanson	Liberty Street (Route 58)	County Road (Route 14)		Full
Hanson	Main Street (Route 27)	Indian Head Street (Route 58)		Full
Hanson	West Washington Street	Spring Street		Flashing Beacon
Hanson	Liberty Street (Route 58)	Winter Street		Full
Kingston	Bishops Hwy (Route 80)	Parting Ways		Flashing Beacon
Kingston	Main Street (Route 3A)	Brook Street (Route 80)		Full
Kingston	Elm Street	North of Jones River Crossing		Full
Kingston	Main Street (Route 3A)	Hilltop Avenue		Full
Kingston	Main Street (Route 106)	Pembroke Street (Route 27)	Evergreen Street	Full
Kingston	Independence Mall Way	Cranberry Road		Full
Kingston	Smiths Lane	Independence Mall		Full
Kingston	Smiths Lane	Route 3 Northbound Ramps		Full
Kingston	Summer Street (Route 53)	Tremont Street (Route 3A)		Full
Pembroke	Center Street (Route 14)	High Street		Flashing Beacon
Pembroke	Center Street (Route 36)	Fire Station		Full
Pembroke	Center Street (Route 36)	Mattakeeset Street (Route 14)		Full
Pembroke	Center Street (Route 36)	Elliot Avenue		Full
Pembroke	Center Street (Route 36)	School Street (Route 27)		Full
Pembroke	Church Street (Route 139)	Oak Street		Full
Pembroke	Church Street (Route 139)	Union Street		Full
Pembroke	School Street (Route 27)	Mattakeeset Street		Flashing Beacon
Pembroke	Church Street (Route 139)	Route 3 NB Ramp		Full
Pembroke	Church Street (Route 139)	Route 3 SB Ramp		Full
Pembroke	Church Street (Route 139)	North River Plaza		Full
Pembroke	Washington Street (Route 53)	Barker Street (Route 14)		Full
Pembroke	Washington Street (Route 53)	Congress Street (Route 14)		Flashing Beacon
Pembroke	Washington Street (Route 53)	Schoosett Street (Route 139)		Full
Pembroke	School Street (Route 27)	Union/Mattakeeset Street		Full
Plymouth	Court Street (Route 3A)	Cherry Street		Full
Plymouth	Samoset Street (Route 44)	Court Street (Route 3A)		Full
Plymouth	Rocky Hill Road	Edison Access		Full
Plymouth	Long Pond Road	Route 3 NB Interchange		Full
Plymouth	Long Pond Road	Route 3 SB Interchange		Full

Table 5-9: Traffic Signals Continued				
Plymouth	Long Pond Road	Camelot Drive		Full
Plymouth	Long Pond Road	Shops at 5		Full
Plymouth	Long Pond Road	Home Depot		Full
Plymouth	Commerce Way	Plympton Rd (Route 80)		Full
Plymouth	Commerce Way	Wal-Mart Colony Place	Resnik	Full
Plymouth	Commerce Way	McAullife Way		Full
Plymouth	Commerce Way	Route 44 Eastbound Ramps		Full
Plymouth	Commerce Way	Route 44 Westbound Ramps		Full
Plymouth	Commerce Way	Enterprise Drive	Cherry Street	Full
Plymouth	Main Street (Route 3A)	Leyden Street		Full
Plymouth	Samoset Street	Pilgrim Hill Road		Full
Plymouth	Summer Street	Pilgrim Hill Road		Full
Plymouth	Samoset Street	Route 3 SB		Full
Plymouth	Warren Avenue (Route 3A)	Sandwich Street		Full
Plymouth	Samoset Street	Fire Station		Emergency Signal
Plymouth	Samoset Street	Carver Road	Seven Hills Road	Full
Plymouth	Long Pond Road	Obery Street	South Street	Full
Plymouth	Cherry Street	Standish Avenue		Full
Plymouth	Samoset Street	Standish Avenue		Flashing Beacon
Plymouth	Samoset Street	Route 3 NB Interchange	Westerly Road	Full
Plymouth	Carver Road	Plympton Rd (Route 80)		Full
Plymouth	State Road (Route 3A)	White Horse Road	Beaver Damn Rd	Full
Plympton	Main Street (Route 58)	Parsonage Road	Mayflower Road	Full
Plympton	Palmer Road (Route 58)	Center Street		Flashing Beacon
Plympton	Prospect Street	Winnetuxet Road		Flashing Beacon
Stoughton	Sharon Street (Route 27)	Bay Road		Full
Stoughton	Central Street	Lincoln Street		Full
Stoughton	Prospect Street	Park Street		Flashing Beacon
Stoughton	Central Street	Pearl Street		Full
Stoughton	Pearl Street	Ralph Mann Drive		Full
Stoughton	Pearl Street	School Street		Flashing Beacon
Stoughton	Plain Street	Morton Street		Flashing Beacon
Stoughton	Pleasant Street (Route 139)	Central Street		Full
Stoughton	Lindelof Avenue (Route 139)	Technology Center Drive	Kay Way	Full
Stoughton	Central Street	Turnpike Street		Full

Table 5-9: Traffic Signals Continued				
Stoughton	Pleasant Street (Route 139)	Turnpike Street		Full
Stoughton	Turnpike Street (Route 139)	Page Street		Full
Stoughton	Washington Street (Route 138)	Central Street		Full
Stoughton	Washington Street (Route 138)	Stop and Shop		Full
Stoughton	Washington Street (Route 138)	Porter Street	Pearl Street	Full
Stoughton	Washington Street (Route 138)	Wyman Street		Full
Stoughton	Washington Street (Route 138)	Pleasant Street (Route 139)		Full
Stoughton	Turnpike Street	IKEA Way		Full
Stoughton Street	Turnpike Street (Route 139)	Hawes Way		Full
West Bridgewater	East Center Street (Route 106)	East Street		Flashing Beacon
West Bridgewater	West Center Street (Route 106)	North Elm Street	South Elm Street	Full
West Bridgewater	West Center Street (Route 106)	North Main Street (Route 28)	River Street	Full
West Bridgewater	West Center Street (Route 106)	Manley Street	Lowes	Full
West Bridgewater	West Center Street (Route 106)	Shaws Headquarters		Full
West Bridgewater	West Center Street (Route 106)	Retail Plaza	Dunkin Donuts	Flashing Beacon
Whitman	Bedford Street (Route 18)	Auburn Street (Route 14)		Full
Whitman	Bedford Street (Route 18)	Stop and Shop		Full
Whitman	Bedford Street (Route 18)	Temple Street (Route 27)		Full
Whitman	Temple Street (Route 27)	Corthell Avenue		Full
Whitman	Temple Street (Route 27)	Washington Street	South Avenue (Route 27)	Flashing Beacon
Whitman	Auburn Street (Route 14)	Washington Street		Flashing Beacon
Whitman	Auburn Street (Route 14)	Harvard Street		Flashing Beacon
Whitman	Washington Street	West Street	Park Avenue	Flashing Beacon

Interchanges

The Region is served by three limited access highways including Route 24 and Route 3, which run north south through the region, and Interstate 495. Interstate 495 enters the southwest edge of Bridgewater running southeast to Route 25 through Plymouth providing direct access to Cape Cod via the Bourne Bridge.

Upgrading Route 24 to interstate standards has been an issue in the region for over a decade. In 1998, MassDOT completed a study to examine the geometric improvements necessary, along with the estimated costs, associated with upgrading Route 24 to interstate highway standards. Route 24 was constructed in the 1950s to the design standards of that time, although some reconstruction has occurred since then to improve deficiencies. According to the MassDOT study, Route 24 does not meet design standards of an interstate highway, and these design deficiencies are associated with acceleration and deceleration lanes on ramp exits and entrances. There are also deficiencies associated with shoulder width and vertical clearance requirements. The study stated that improving Route 24 to

interstate standards involves widening shoulders for safety, replacing overpass bridges to accommodate higher vertical clearances, and reconstructing ramp entrances and exists to higher acceleration and deceleration design standards. Except for recently completed construction at the Route 3/Route 44 merge, which includes updated standards as well as a widening of Route 3 from four to six lanes at this junction, Route 3 in Kingston and Plymouth was also not constructed to interstate design standards.

Since the time of the 1998 report, both Route 24 and Route 3 have experienced high commercial and residential growth along the secondary arterials and collectors that provide access to these limited access highways. This has led to current conditions that have resulted in congestion and high traffic volumes at the Route 24 and Route 3 interchanges. Tables 5-10 and 5-11 show the peak hour levels-of-service and average daily traffic volumes for 2011 and the projected 20 year volumes for the connecting highways at Route 24 and Route 3 interchanges.

Table 5-10: LOS and Traffic Volumes at Route 24 Interchanges

	2011	2011				2031		
Route 24 Corridor	**Number of Lanes**	**Average Daily Traffic**	**Peak Hour LOS**	**V/C**	**Number of Lanes**	**Average Daily Traffic**	**Peak Hour LOS**	**V/C**
Route 139 - Stoughton	4	37,880	C	0.53	4	42,990	C	0.60
New Pond Street – Avon	4	33,580	B	0.47	4	40,680	C	0.57
Route 27 – Brockton	4	38,700	C	0.54	4	47,220	D	0.66
Route 123 – Brockton	4	24,160	B	0.34	4	29,500	B	0.41
Route 106 – West Bridgewater	2	26,655	E	0.75	2	32,500	F	0.91
Route 104 - Bridgewater	4	26,160	B	0.37	4	28,200	B	0.40

Table 5-11: LOS and Traffic Volumes at Route 3 Interchanges

	2011	2011			2031	2031		
Route 3 Corridor	**Number of Lanes**	**Average Daily Traffic**	**Peak Hour LOS**	**V/C**	**Number of Lanes**	**Average Daily Traffic**	**Peak Hour LOS**	**V/C**
Route 3A - Kingston	2	20,175	D	0.57	2	24,600	E	0.69
Samoset Street Route 44 - Plymouth	4	38,275	C	0.54	4	46,700	C	0.66
Long Pond Road - Plymouth	4	24,900	B	0.35	4	30,380	B	0.43
Clark Road - Plymouth	2	11,120	C	0.31	2	15,350	D	0.43
Herring Pond Road - Plymouth	2	14,000	D	0.39	2	15,575	D	0.44

Other Intersection Types – Non-Conventional and Roundabouts

Intersections typically include three or four approach legs that are aligned at approximately ninety degrees. Under these types of conventional alignments, traffic control is more easily conveyed to the motorist, sight distances are more easily discernible, and safety and traffic flow are more easily managed. Nevertheless, many intersections within the Old Colony region can be classified as "non-conventional" types. This is due mainly to the history of New England's road system, which can be traced to pre-automobile times. Overland travel in the 18th and 19th centuries was either by foot, horse, or oxen. Roads and paths in these times developed based on the natural topography, along areas that were relatively flat, along river beds, and where the natural soils were relatively stable. These roads and paths were further packed due to use, which added to the stability of the road. The paved road network in use today is based upon this pre-automobile network that contains a great number of intersections that are not properly aligned for motor vehicle use and which also include non-conventional five-way intersections.

Important intersections in the region that are categorized as unconventional include Stoughton Center, East Bridgewater Center, West Bridgewater Center (at the intersection of Route 106 and Route 28), and the intersection of Howard Street/North Montello Street (Route 28)/Albion Street in Brockton. Other intersections that have poor alignment, which creates safety hazards, include:

- Route 106 at Route 3A in Kingston
- Washington Street at Route 18 in Abington
- Route 27 at Central Street in Stoughton
- Route 139 at Page Street in Stoughton
- Route 106 at Washington Street in East Bridgewater
- Turnpike Street at Route 138 in Easton
- North Central Street at West Union Street in East Bridgewater
- Washington Street at Beulah Street in Whitman

Roundabouts reduce crashes and injuries at intersections significantly over conventional stop controlled and traffic signal controlled intersections. Studies cited in the FHWA's publication Roundabouts: An Informational Guide, have shown that roundabouts can provide a 71 percent reduction in personal injury crashes and a 32 percent reduction in crashes with property damage only over conventional intersections. These studies have shown that roundabouts can provide a 51 percent reduction in overall crashes over conventional intersections.

The roundabout option for an at-grade intersection offers a number of advantages including:

- Safety – The severity of a crash is determined by the speed of the vehicles. Roundabouts greatly improve safety at intersections because they require traffic to slow down to 20 miles per hour. Crashes are less likely to result in injury or fatality due to collisions in the 20 miles per hour range. Roundabouts reduce the number of conflict points from 32 to 8 over a conventional 4-way intersection.
- Operational Efficiency – Roundabouts process peak hour traffic as efficiently as traffic signals and offer high capacity and minimal delays for all modes including trucks.
- Aesthetics and Geometric Flexibility – Roundabouts offer better aesthetics than conventional traffic signals. The designs can vary in shape and size to conform to right-of-way constraints.

There are a number of roundabouts within the region including Gliniewicz Way at the Abington High School/Town Hall entrance in Abington, Route 58 Plymouth Street/Essex Street/Raynor Avenue in Whitman, Water Street at Park Avenue in Plymouth, and Stockwell Drive and the IKEA Furniture store entrance. The roundabouts in Whitman and in Plymouth are the oldest in the region and were constructed before standards were set for the modern roundabout. The Whitman roundabout has a long interior diameter (160 to 180 feet) and lacks a truck apron, and the Plymouth Water Street roundabout lacks splitter islands, which create deflection and slow traffic down; however, both are compact in design with room for trucks and operate efficiently and safely, much like the modern roundabout.

The roundabout on Stockwell Drive in Avon was constructed to mitigate traffic generated by IKEA. Congestion has been problematic at this roundabout, especially on Saturdays and Sundays due to the popularity of the IKEA store. This roundabout has two approach lanes northbound into the circle, but only one lane southbound to Access Drive and Stockwell Drive, which make up the west and south leg of the intersection. An additional right turn only slip lane southbound to Access Road, which is signed to provide access to the Route 24 interchange at Route 139 in Stoughton, can improve the efficiency of the roundabout. Traffic consultants for IKEA continue to monitor congestion at this location.

5.1.6 Bridges

OCPC compiled information on bridges in the region based on MassDOT database of bridges in Massachusetts that span roadways, bodies of water, and railroad tracks. The MassDOT database contains the descriptions of the bridges, including the name of the roadway that contains the bridge, the impediment that is spanned, the year the bridge was built, the most recent reconstruction if applicable, and the conditions rating of the bridge, which is based on the American Association of State and Highway Transportation Officials (AASHTO) bridge rating. The MassDOT Highway Division personnel regularly inspect and rate all bridges in Massachusetts.

The bridge inspections conducted by MassDOT are consistent with federal standards for bridge decks, superstructures, substructures, retaining walls, deck geometries, and roadway approach alignments. The rating system developed by AASHTO uses a scale of 0 to 100, with 100 being the best. The goal of the MassDOT Bridge Management System (BMS) is to predict failures and make improvements. The BMS includes all bridges under state or local jurisdiction and is designed to provide the means by which appropriate policies and programs can be considered. The database includes a structurally deficient or functionally obsolete determination for each bridge. If the bridge-deck, pavement, or supporting structure (superstructures and substructures) of a bridge fail to meet AASHTO standards, then a bridge is considered to be structurally deficient. Weight restrictions or closings are imposed on bridges deemed structurally deficient. As of 2011, there were five bridges (3.4%) in the Old Colony region identified as structurally deficient. Two of these structurally deficient bridges are slated for replacement in the Old Colony TIP, while three are currently under construction.

Functionally obsolete bridges are older structures built with design standards that are different than current design standards. Additional factors used to determine a bridge as functionally obsolete are deck geometry, under clearance, and approach roadway alignment. Functionally obsolete bridges generally cannot accommodate the volume and nature of vehicle traffic due to insufficient vertical clearances and/or inadequate widths. According to the 2010 MassDOT bridge ratings, there were forty-four bridges (30 percent) in the Old Colony region classified as functionally obsolete. Two of these functionally obsolete bridges are slated for rehabilitation and reconstruction in the Old Colony TIP. Figure 5-6 shows the locations of bridges in the region. Tables 5-12 and 5-13 summarize the number of bridges, the average AASHTO ratings, and the age of bridges within the Old Colony region.

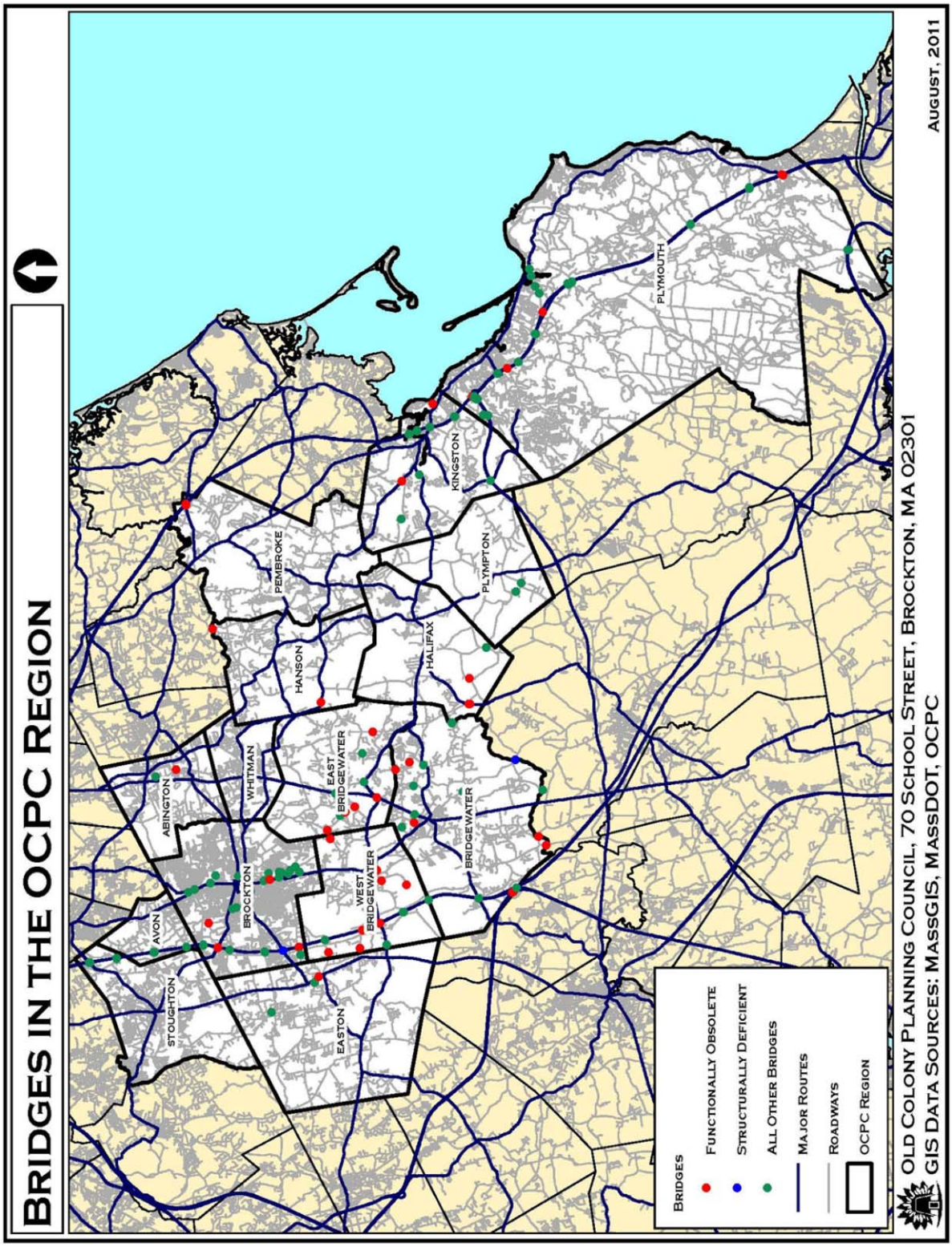
Table 5-12: Summary of Bridges

	Bridges Over Highway	Bridges Over Water	Bridges Over Railroad	All Bridges
Number of Bridges	55	79	15	149
Percent	37%	53%	10%	100%
Average Age (Years)	32	51	28	44
Average AASHTO Rating	82	78	85	80

Table 5-13 Age of Bridge Structures

	125 + Years	100 to 124 Years	75 to 99 Years	50 to 74 Years	25 to 49 Years	New-Under 25 Years
Roadway Span	0	0	0	24	16	15
Water Span	2	3	14	19	19	22
Railroad Span	0	0	0	2	5	8
Total	2	3	14	45	40	45
Average AASHTO Rating	71	78	68	77	81	86

Figure 5-6: Bridges in the Region



5.1.7 Congestion and Bottlenecks

Federal regulations define congestion on a transportation facility as a level of performance that is deemed unacceptable due to traffic interference. The acceptable level of performance varies from state to state and depends upon the performance measures utilized to quantify congestion. Under federal planning regulations, the FHWA and FTA have designated the Region as a Transportation Management Area (TMA, urbanized areas with a population of more than 200,000.) In addition, the region is included in a "serious" ozone non-attainment area for eastern Massachusetts, in regards to air quality. Federal planning regulations require that the planning process for a TMA in non-attainment areas include the development of a Congestion Management Process (CMP) that provides for efficient management of new and existing transportation facilities through the use of travel demand reduction and operational management strategies.

Federal guidelines define a CMP as, "a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs." The CMP should include serious consideration for implementing strategies that provide the most efficient and effective use of existing and future transportation facilities. In both metropolitan and non-metropolitan areas, consideration should be given to strategies that reduce single occupancy vehicle (SOV) travel and improve existing transportation system efficiency.

Federal regulations require that the CMP include:

- Methods to monitor and evaluate the performance of the transportation system and identify the causes of congestion
- Definitions for measuring the extent of congestion, performance measures and service thresholds should be tailored to the specific needs of the area and established cooperatively with the state, MPO, and local officials
- The establishment of a program for data collection and system performance monitoring to define the extent and duration of congestion, to help determine the causes of congestion, and to evaluate the efficiency and effectiveness of implemented actions
- Strategies, or combinations of strategies, should be appropriately considered for each area such as: Transportation Demand Management measures, including growth management and congestion pricing; traffic operational improvements; public transportation improvements; ITS technologies; and, where necessary, additional system capacity
- The implementation of a process for periodic assessment of the efficiency and effectiveness of implemented strategies, in terms of the area's established performance measures

Congestion is often described in terms of capacity. The capacity of a facility refers to 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. In addition to the physical capacity, external events can have a major effect on traffic flow. These include traffic incidents such as crashes and vehicle breakdowns; work zones; inclement weather; special events; and poorly timed traffic signals. When these events occur, their main impact is to subtract physical capacity from the roadway. A bottleneck is a condition that restricts the free movement of traffic creating a point of congestion during specific periods, usually the peak commuter periods. Bottlenecks have a number of different causes including operational influences (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. The FHWA defines bottlenecks as "Localized sections of highway where traffic experiences reduced speeds and delays due to recurring operational conditions or non-recurring traffic influencing events." Although bottlenecks cause congestion, the terms are not interchangeable. A bottleneck occurs at a specific location on a facility. Congestion can be pervasive on a facility where too many vehicles compete along segments of a facility.

Bottlenecks have been categorized by traffic engineers based upon their causes and unique characteristics. Bottlenecks are divided into two main types; those that create recurring congestion and those that create nonrecurring congestion. Recurring bottlenecks can be caused by inadequate capacity and poor signal timing. Nonrecurring bottlenecks are due mainly to random factors such as bad weather, and traffic incidents, and can vary widely in location and severity. Table 5-14 summarizes bottleneck types.

Table 5-14: Bottleneck Types

Occurrences	**Recurring** – "Predictable" in cause, location, time of day, and approximate duration. **Nonrecurring –** "Random" (in the colloquial sense) as to location and severity. Even if planned in some cases, like work zones or special events, these occurrences are irregular and are not predictably habitual or recurring in location.
Causes	**Recurring: Operational Causes –** A "facility determinate" condition wherein a fixed condition (the design or function of the facility at that point) allows surging traffic confluence to periodically overwhelm the roadway's physical ability (i.e., capacity) to handle the traffic, resulting in predictable periods of delay. **Nonrecurring: Dynamic Occurrences –** An "event determinate" occurrence, wherein a dynamic situation either reduces available capacity (e.g., loss of lanes due to incident or work zone) or increases demand (e.g., special event).
Examples	**Recurring:** Ramps, lane drops, weaves, merges, grades, underpasses, tunnels, narrow lanes, lack of shoulders, bridge lane reduction, curves, poorly operating traffic signals. **Nonrecurring:** Work zones, crashes, incidents, special events, weather.
Supplementary Terms (Applies to both types)	**"Active" bottlenecks –** When traffic "released" past the bottleneck is not affected by a downstream restriction (i.e., queue spillback) from another bottleneck. **"Hidden" bottlenecks –** When traffic demand is metered by another upstream bottleneck(s); i.e., either a lesser or nonexistent bottleneck that would increase or appear, respectively, if only unfettered traffic could reach it.
Identification of (Applies to either type)	Motorists typically refer to bottlenecks in terms of added time delay when compared to the same non-delayed trip, but engineers and agencies also measure performance data: average speed (travel time), lane densities, queue lengths, queue discharge rates, vehicle miles of travel (VMT), and vehicle hours of travel (VHT).
Measurement of: (applies to either type)	Data is collected using manual techniques (e.g., floating cars, aerial photography, or manual counts from video recordings) or from dynamic surveillance (e.g., detectors, radar, video, etc.) collected in real time. Modeling, especially micro-simulation, can be used to study the impacts of bottleneck remediation on upstream and downstream conditions.
Classification	**Recurring: Type I –** Demand surge, no capacity reduction (typically at freeway on-ramp merges). **Type II –** Capacity reduction, no demand surge (typically changes in freeway geometry; lane drop, grade, curve). **Type III –** Combined demand surge and capacity reduction (typically in weaving sections). **Nonrecurring:** Usually classified by the type of event (e.g., incident, work zone) and severity of impact (e.g., duration of the number of lanes lost, closed, or impassable).
Signature Trigger	**Recurring:** Bottleneck is due to over-demand of volume (i.e., peak-hour conditions). The bottleneck clears from the rear of the queue as volume declines. **Nonrecurring:** Bottleneck is due to loss of capacity due to an incident, or short-term over-demand due to a spot event. The bottleneck clears from the front or rear of the queue, depending on whether the cause is incident-related (former) or volume-related (latter), respectively.
Disappears	**Recurring:** When volume over-demand drops back to manageable levels for available capacity (i.e., when off-peak conditions return). **Nonrecurring:** When dynamic event is removed; queue should dissipate, thereafter.

Source: FHWA

The cost of congestion can be measured in dollars as well as time. There is a direct link between transportation investment, travel conditions (congestion and reliability), and economic productivity. Two key trends have a substantial impact on the total cost of moving freight:

1. As congestion spreads into the midday, which is typically the peak travel period for trucks, more direct costs will be incurred; and
2. Reliability – For trucks, the ability to hit delivery windows predictably will decrease and will add even more costs as firms struggle to optimize delivery schedules. This is especially a problem for

truckers who must meet "just-in-time" delivery schedules set by shippers, manufacturers, and retailers.

The Old Colony Region's commuting patterns have traditionally had a strong orientation to and from the Boston area, which orients traffic in a general north south direction. That north-south orientation is still prevalent, based on traffic monitoring; however, commuting patterns have gradually become more dispersed due to the dispersion over the past three decades of both residential growth and employment centers in eastern and southeastern Massachusetts. Nevertheless, access to Boston remains important because of the area's reliance on Boston and points north for employment. Recent census trends have shown an increase in the development of large employment centers in the outlying suburbs of metropolitan Boston. Corporations attracted by land availability and lower costs are locating office centers in suburban areas such as Stoughton, Avon, Norwell, Rockland, and Foxborough. This increase in the dispersal of employment opportunities has created an increase in suburb-to-suburb trips. The changing land patterns in the Region the and redevelopment of industrial properties, which have been adapted for other mixed uses such as residential, commercial, and office, provide unique opportunities to reduce the length and number of auto trips and also to make better use of transit and inter-modal connections; however, it also creates a situation in which secondary arterials and major collectors play an increasing role in regional travel and travel between communities.

Corridor Congestion

The volume to capacity ratio, 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). Traffic volumes are the primary indicator of the demand for roadway travel. Congestion can be measured by comparing traffic volumes to roadway capacity. The higher the volume to capacity (V/C) ratio, the more congestion exists (in actual traffic operations, V/C ratios do not exceed 100%, but higher values generally indicate that congestion spreads beyond the typical rush hours into other parts of the day). A V/C ratio of 0.80 or above is used as a threshold for screening congested facilities.

Roadways that the MassDOT regional travel demand model has identified as congested (based on a V/C $\geq$ 0.80), as well as those that are observed directly as congested are included in the Old Colony Congestion Management Process. Traffic congestion (V/C $\geq$0.80) in the region is shown in Figure 5-7 and is summarized as follows:

Route 3 From Plymouth/Bourne Town Line To Pembroke/Norwell Town Line - Currently on Route 3, South Shore commuters encounter pockets of moderate to heavy congestion during the morning and afternoon peak hours in Plymouth, Kingston, and Pembroke. Traffic on Route 3, north of Exit 12 in Pembroke, experiences chronic congestion during the morning and afternoon peak hours, which extends to I-93. Route 3 contains three lanes in the northbound and southbound direction north of Exit 16 in Weymouth. The southbound lane drops from three lanes to two lanes south of Exit 16. The northbound side contains two lanes to Exit 16 where it widens to three lanes. Route 3 is four-lane highway south of Exit 16 except for the segment between Exit 6 and Exit 7 in Plymouth, where Route 3 is a six lane cross section. This situation creates a lane drop for northbound traffic after Exit 7, while the southbound contains two lane drops, one just south of Exit 16 in Weymouth and one at Exit 6 in Plymouth. As traffic volumes continue to grow on this highway, additional capacity that would create

consistency in the number of lanes from Plymouth to Pembroke will be required to eliminate bottlenecks due to lane drops and relieve congestion.

Although the recorded average daily traffic volume in 2008 at the Bourne town line on Route 3 was 35,410 vehicles per day (vpd), the volume was over 66,600 vpd fifteen miles to the north on Route 3 north of Smiths Lane. The number of vehicles per day on this highway is almost doubled over a fifteen-mile stretch.

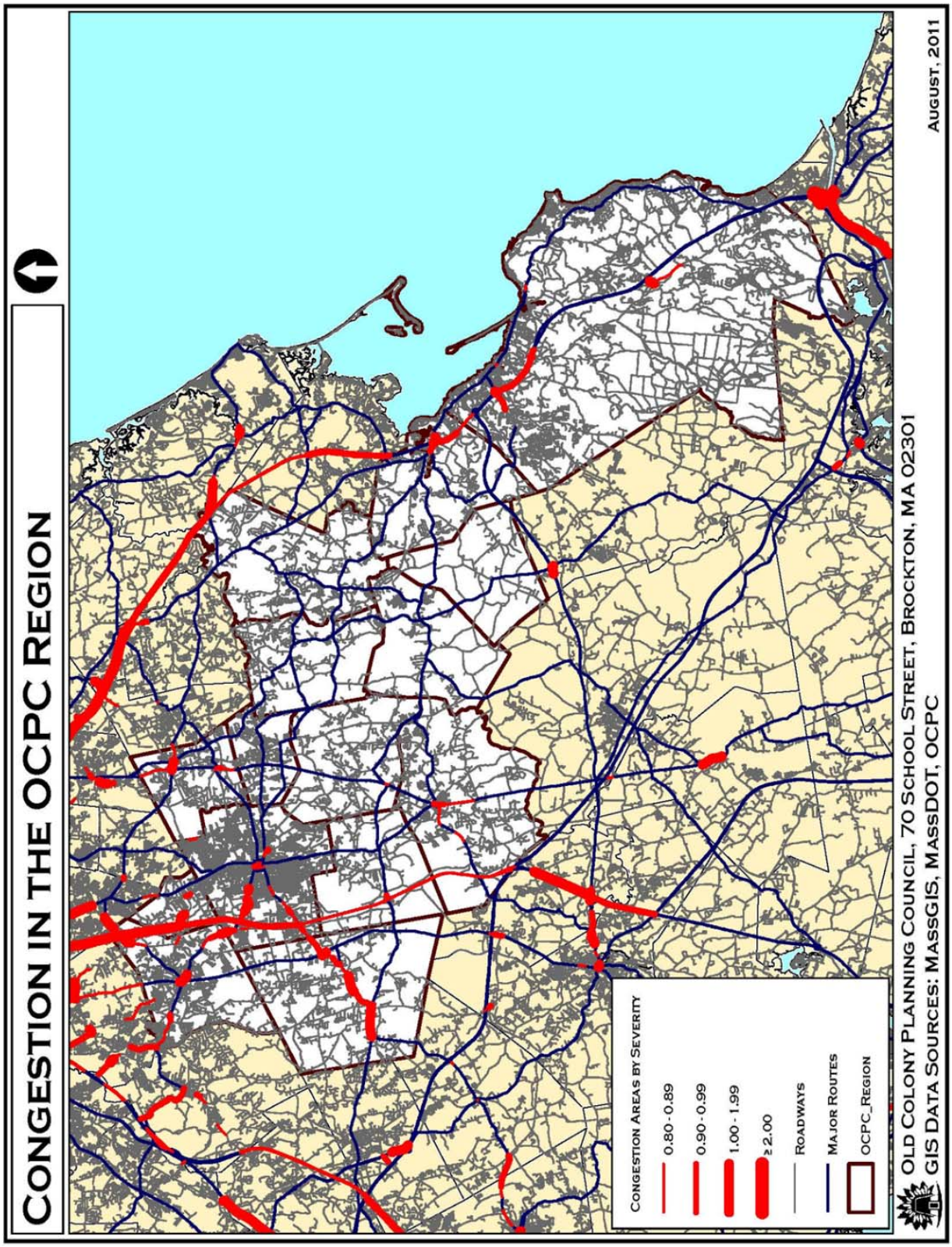
The widening of Route 3 is a top priority for the Old Colony Planning Council for a number of years. The Route 44 relocation project, which opened to traffic in 2005, represents a major capital investment in the area, and Route 3 between exits 6 and 7 was widened to six lanes in order to accommodate the Route 44 project. Proposed development in Plymouth will also have a major impact on Route 3 traffic. The River Run Wareham Road mixed use development will add 1,285 housing units to Plymouth. Plymouth Rock Studios is proposing a movie studio campus off of Route 3 Exit 3, adjacent to Clark Road and Long Pond Road, that will include sound stages, offices, pre- and post-production facilities, and multi-acres of exterior sets, as well as an amenity village, including retail, residential components, and a 300 room hotel. In addition, the Town of Plymouth intends to celebrate the 400th anniversary of the founding of the Plymouth Colony. This celebration is expected to draw between one to two million visitors to the area.

Route 3A in Kingston and Plymouth - An in-depth corridor study for Route 3A in the Towns of Plymouth and Kingston was completed by OCPC in 2007. The Route 3A corridor in Kingston and Plymouth runs north south parallel to Route 3 along the Massachusetts coast. Route 3A is a two lane highway and connects to Routes 53, 106 (to Route 27), and 80 in Kingston, as well as Somerset Street (Route 44) in Plymouth. Route 3A also connects to Route 3 at Exit 2 in Plymouth, just north of the Bourne Town Line, Exit 4 in Plymouth, Exit 9 in Kingston, and Exit 10 in Duxbury just east of the Kingston Town Line. Route 3A traverses Kingston Town Center, where it crosses the railroad tracks, as well as Plymouth Town Center, and traditional village centers in north Plymouth, and Cedarville in south Plymouth. Route 3A experiences congestion in these village centers, especially in the Plymouth Town Center, which is a major tourist destination in the summer. The Plymouth Town Center congestion is extensive from Somerset Street (Route 44), south through the downtown to the Water Street/Route 3A intersection. Heavy volumes during the peak period, the existence of on-street parking, and frequent intersections with busy side streets all contribute to congestion. There are also problem areas south of the town center including the Cedarville area in south Plymouth at the Route 3A (Herring Pond Road) interchange with Route 3. Numerous businesses, commercial and retail, outside the village centers along Route 3A with multiple driveways and traffic signals add to delays and congestion within the corridor.

In Kingston, specific congestion points within the corridor include the Route 3 Exit 9 area, Route 3A and Route 53 intersection, Route 3A at Evergreen Street near the railroad crossing in the downtown, and the section of Route 3A from Spring Street to Route 106.

The highest annual average daily traffic volume within the Route 3A corridor was 19,550 vehicles per day just north of Route 3 (Exit 9) in Kingston. In general, traffic fluctuates along the corridor, from under 10,000 vehicles per day in some areas to nearly 20,000 vehicles per day in others. The continued growth and expansion of the population and seasonal tourist economy; the newly completed Route 44, and the Route 3 widening contribute towards the increased congestion problems already experienced with this corridor.

Figure 5-7: Congestion in the Region



Route 24 from Raynham/ Bridgewater Town Line to Stoughton/ Canton Town Line -
Route 24 is a six-lane (three in each direction), principal limited access highway within the Old Colony Region that provides north south access between I-495, and points south, and Route 128 (I-93). Route 24, within the region, is over capacity during the morning and afternoon peak hours due to extremely heavy volume surges and a lack of weaving areas and acceleration and deceleration lanes. Lane widths, bridge heights, shoulder widths, and weaving and merging lanes do not conform to interstate standards. The congestion and back-ups on Route 128 (I-93) create congestion at the Route 24/Route 128 merge in Randolph, and back onto Route 24 into Stoughton, Avon, Brockton, and West Bridgewater.

The V/C ratio for Route 24 exceeds 0.80 from the I-495 to Route 104 interchanges in Bridgewater and from the Route 106 interchange in West Bridgewater north through Brockton, Avon, and Stoughton to the Route 128 merge in Randolph. In addition, the peak hour demand surges create bottlenecks at the Route 24 interchanges including Route 24 at Lindelof Avenue (Route 139) in Exit 20 in Stoughton, Route 24 at Harrison Boulevard/Central Street Exit 19 in Avon, Route 24 at Belmont Street (Route 123) Exit 17 in Brockton, Route 24 at West Center Street Route 106 Exit 16 in West Bridgewater, and Route 24 at Pleasant Street (Route 104) Exit 15 in Bridgewater. In addition to chronic congestion, frequent incidents due to crashes and curiosity cause long delays within this corridor resulting in back-ups for several miles. Capacity enhancements within this corridor were identified in previous Regional Transportation Plans, along with designating this highway as an interstate. As part of the interstate designation, shoulder widths and acceleration and deceleration lanes would have to be improved to conform to interstate standards. Improvements to travel conditions during peak periods within the corridor can be realized through capacity enhancement (possibly by adding HOV lanes) and the development of incident management techniques.

Route 18 From the Weymouth/Abington Town Line to the Abington/Whitman Town Line - Route 18 is a major north-south route in Abington providing connections for regional access to Route 128/I-93 to Boston in the north, as it parallels Route 24. It is two-lane highway in Abington, except for the section from Lincoln Boulevard to Thayer Street, which has a four lane cross section. Major congestion occurs on Route 18 beginning in Weymouth and extending south into Abington. Key signalized and un-signalized intersections in Abington in the corridor experience long delays and/or forced flow (LOS “E” and “F”) conditions during the morning and afternoon peak hours due to the lack of sufficient gaps in the Route 18 peak hour flow and heavy peak hour surge demands. Long delays occur at the Brockton Avenue (Route 123) intersection and at the Randolph Street (Route 139) intersection. The re-use of the South Weymouth Naval Air Station is expected to have a major impact on Route 18 traffic, although this project is located in South Weymouth just north of the Abington town line. Improvements to Route 18 in anticipation of the Naval Air Station re-use plan include the widening of Route 18 in Abington from Route 139 to Highland Place in Weymouth. The design is currently underway for this project; however, it does not address the bottlenecks caused by demand surges and lane drops on Route 18 south of the Route 139 intersection.

Route 27 from West Street to Route 14 - Brockton
Route 27 east from West Street to its intersection with Main Street in the Brockton Downtown provides two lanes of travel with sidewalks on both sides of the road. Utility poles are located close to the travel way, due to a lack of shoulders, creating potential hazards for lane departure crashes. Route 27 is in a densely settled residential area with numerous driveways and side streets. Some of the side streets contain heavy traffic that turns onto Route 27 or crosses through traffic. In addition, pedestrian traffic is significant in this densely settled area. Currently, the intersection of Reynolds Highway (Route 27) at Pleasant Street and Pleasant Street (Route 27) at West Street are being reconstructed (under the

American Reinvestment and Recovery Act) and combined to form one four-way intersection. This project includes the relocation of the Westgate Mall Entrance at Pleasant Street further west off Reynolds Highway.

Route 27 continues east from Main Street passing under the viaduct in downtown Brockton. This viaduct was built in the late 1800s before bridge height was an issue for moving freight via truck, and the viaduct is currently 13 feet and 6 inches high at its highest point, which is insufficient for many of today's heavy vehicles. Route 27 intersects both Main Street and Route 28 (Montello Street), two heavily traveled corridors in the Brockton area. Route 27 turns right along Commercial Street, adjacent to the Brockton Area Transit (BAT) Intermodal Centre and the Brockton Commuter Rail Station. Route 27 then intersects Route 123 (Centre Street) an important east-west corridor in the Brockton region. Sidewalks are provided on Route 27 throughout the Brockton downtown with textured crosswalks provided across Route 27 between the BAT Intermodal Centre and the Brockton MBTA Commuter Rail Station. Route 27 turns left along Crescent Street where it provides a four-lane cross section to the Route 27/Lyman Street intersection. Route 27 narrows to two lanes with no shoulders east of the Lyman Street intersection. The land use along Route 27 in this area east of Brockton Downtown is commercial in nature with strip malls and a Home Depot home improvement store. Route 27 forms a four-way intersection with the Massasoit Community College entrance and Quincy Street. Quincy Street is a heavily traveled north south road between Route 123 and Route 27 in Brockton, and Massasoit Community College is a commuter college that currently serves 7,500 full and part-time students. Congestion at this intersection is prevalent during the morning and afternoon peak hours and into the midday due to heavy demand at the Massasoit Community College entrance.

Route 28 through Avon, Brockton, West Bridgewater, and Bridgewater - The Route 28 corridor, within the region, runs parallel to Route 24 in a north to south direction from Avon to Bridgewater. Route 28 provides an alternative route to Route 24 traffic overflow; however, because Route 28 is mainly a two lane highway with a number of side streets, traffic signals and driveways, bottlenecks occur throughout the corridor, especially during the peak hours. Route 28 intersects several major east west corridors in the region including Route 37, Route 123, Route 27, in Brockton, Route 106 in West Bridgewater, and Route 104 in Bridgewater. Major land uses and trip generators along Route 28 include Bridgewater State University, MCI Bridgewater, county, state, and federal courthouses in downtown Brockton, MBTA and BAT stations in Brockton, and numerous commercial and industrial facilities.

The average daily traffic volumes on Route 28 were 18,347 vehicles per day in 2008 at the Avon/Brockton line. The average daily traffic through Brockton ranges between 12,400 and 19,150 vehicles per day. The ADT through West Bridgewater ranges from 13,400 to 17,350 vehicles per day. The ADT on Route 28 at the West Bridgewater/Bridgewater Town Line is 14,700.

Route 28 includes two and four lane sections in Avon and north Brockton, a narrow two-lane section through downtown Brockton, two and four lane sections in south Brockton, two lane sections through West Bridgewater to Bridgewater Center, and a high-speed, two lane section through Bridgewater south of the center as Route 28 merges with Route 18.

OCPC completed a study of the Route 28 corridor study in 2006 that highlighted congestion at a number of locations within the corridor. In Avon, the signalized Harrison Boulevard/Route 28 intersection currently operates under acceptable levels of service during the peak hours; however, the un-signalized East/West Spring Street intersection with Route 28, which is located just north of the Harrison Boulevard intersection, experiences long delays and queuing on the side street approaches due to heavy

Route 28 volumes. The back-ups from this intersection interfere with traffic operations at the Harrison Boulevard/Route 28 intersection. Insufficient gaps within the Route 28 traffic stream during the peak hours cause long delays for side street traffic attempting to enter Route 28 from East and West Spring Street. This problem is exacerbated due to the heavy left turn movements from East Spring Street to Route 28, which then go right on Harrison Boulevard for access to Route 24 in the morning peak. This movement is reversed from Harrison Boulevard to Route 28 and East Spring Street during the afternoon peak. The installation of signals at the Route 28/East/West Spring Street intersection that would be coordinated with the Harrison Boulevard signals would improve peak hour flows at this location.

Brockton Downtown is a major bottleneck area for Route 28. Although the peak hour levels of service at a series of intersections in Brockton Downtown are within acceptable ranges, the cumulative delays at Court Street (Route 27), Crescent Street, School Street, and Centre Street (Route 123) create a bottleneck for peak hour traffic flows. These intersections carry heavy east west traffic during the peak hours, which conflicts with the north south flow on Route 28. The turning radii at these intersections are inadequate for trucks and large vehicles, which often encroach on other lanes as they turn. In addition, antiquated, pre-timed traffic signals at the Route 28 and Perkins Avenue intersection along with numerous driveways add to delays along the corridor. Route 28 transitions from Montello Street to Main Street at Plain Street. The reconstruction of the Plain Street/Keith Street/Main Street intersection, which includes upgrades in traffic signals, is included in the FFY 2011-2014 Old Colony TIP and currently in the design stage.

Congestion problems along the Route 28 corridor in West Bridgewater occur at the Matfield Street intersection and at the town center where Route 28 intersects Route 106. Peak hour traffic is police controlled at the Matfield Street intersection due to the lack of sufficient gaps in the mainstream traffic, which causes long delays for side street traffic turning on to the major road. The installation of signals will improve the overall safety and operation at this intersection. The signalization of this intersection has been recommended by OCPC as a project for inclusion to the FFY 2011-2014 Old Colony TIP. Long delays and queuing at the Route 28/Route 106 intersection are due mainly to a surge of peak hour traffic volumes. This intersection also requires alignment modifications for safety improvement. The Route 28/Route 106 intersection in West Bridgewater is a major bottleneck location for both highway corridors. Intersection improvements for this intersection are included in the Old Colony TIP and the project is currently in the design stage.

Route 28 at Central Square in Bridgewater forms a signalized intersection with Route 18 and the town center oval at the northern end of the town center. The southern end of the Central Square is yield controlled for vehicles entering from South Street and Route 28 (Bedford Street). Analyses of peak hour flows at this location show that northbound vehicles experienced long delays and queuing at the signalized Route 28/Route 18 intersection, which in turn cause them to back-up into Central Square block the yield approaches at South Street and Route 28 (Bedford Street) thereby creating forced flow conditions in the town center. In addition, delays at the signal at the Summer Street/Plymouth Street intersection, just east of the town center, cause eastbound vehicles to back-up into the town center. This problem is exacerbated due to the surge in traffic demand due to Bridgewater State University.

Carver Street/Samoset Street in Plymouth – Within the last decade, this corridor has experienced an increase in commercial and residential growth. The average daily traffic on Samoset Street was 36,054 in 2005. Samoset Street, west of Route 3 was formerly designated as Route 44, and was widened in the late 1990's. Although commercial development is located within this corridor, with quick access to and from Route 6 Exit 3, Samoset Street is also an alternative route to Route 44 providing access to the retail

and commercial plazas on Commerce Way. Samoset Street also provides access to Plymouth Downtown east of Route 3. Westbound traffic backups along this corridor interfere with traffic exiting Route 3 southbound, which create backups onto the exit ramp and Route 3. In addition to commercial uses, there is also a densely settled residential development on Algonquin Terrace off Samoset Street. Highway planning for this corridor should be expanded beyond the focus of operational and engineering fixes to include the coordination and integration of land use and transportation planning. The Town should develop a comprehensive corridor plan, utilizing public outreach and visioning, that support strategies that can gradually transform this areas into a mixed-use districts that offer a choice of modes including walking, bicycling, mass transit, as well as personal auto.

Route 106 West Bridgewater – Route 106 between Route 24 and Route 18 is highly utilized by commuters for access to Route 24 from the Easton, West Bridgewater, East Bridgewater, and Bridgewater area. In addition, there are a number of important commercial and educational attractors in the corridor. The average daily traffic volume on Route 106 west of Elm Street in West Bridgewater is 24,600 vehicles per day. Route 106 over Route 24 provides four lanes of travel; however, east of the Route 24 Interchange, the highway drops to two lanes. This area of Route 106 in West Bridgewater between Route 24 and Crescent Street is highly congested with multiple factors contributing to the traffic problems including: the Combined Route 24 northbound off-ramp and lane merge eastbound due to the lane drop on Route 106, high volume pass-by generators due to service stations, convenience stores and coffee shops, and the high volume of turning movements around the Crescent Street/Lincoln Street intersection. The merging of both through lanes on Route 106 combined with traffic entering and merging from the Route 24 northbound ramp creates a very tight bottleneck. During peak hours, especially in the afternoon, eastbound traffic backs up considerably through this stretch and occasionally backs up onto the exit ramp and Route 24.

Route 106 intersects Route 28 at West Bridgewater Central Square, and is a highly developed area, with municipal buildings and offices for the town located on Route 28 just north of Route 106. Reconstruction of the Route 28 and Route 106 intersection at West Bridgewater Center is currently in the design phase. West Bridgewater High School, the Spring Street School, the Howard School, and the West Bridgewater Public Library are all located on Howard Street, which connects between West Center Street (Route 106) and North Main Street (Route 28) in the northwest quadrant of Central Square. These schools include playgrounds and recreational facilities. The headquarters for the West Bridgewater Police and Fire Departments are located on the corner of Howard Street and West Center Street. Elm Square at the intersection of West Center Street (Route 106) and North and South Elm Streets hosts commercial development with a small strip mall on the northeast corner and a gas station on the southwest corner. There is a large volume of motorists attempting to avoid traffic congestion at Central Square by turning from West Center Street onto either leg of Howard Street. The northern leg of Howard Street creates a direct connection between West Center Street (Route 106) and North Main Street (Route 28) while the southern leg connects to River Street, which provides access to South Main Street (Route 28). Likewise, drivers from North Main Street (Route 28) avoid Central Square by using Howard Street to connect to Route 106 westbound. Few vehicles use the northbound approach of Howard Street, as access to Route 106 from this direction is very difficult due to heavy traffic and a lack of sufficient gaps in the Route 106 traffic flow.

Route 106 in Halifax and East Bridgewater – Route 106 is a two-lane highway in East Bridgewater and Halifax. The average daily traffic on Route 106 at the East Bridgewater/Halifax Town Line is 12,114 vehicles per day, and the average daily traffic in this corridor ranges from 10,000 to 17,700 vehicles per day in East Bridgewater and Halifax. Route 106 is used as an alternative to Route 44 for east west access

between the Brockton area and the Kingston/Plymouth area. In addition to carrying peak commuter traffic, increased commercial development has increased demand adding multiple driveways along the corridor, especially in Halifax. Improvements at the Route 106 and Route 58 intersection, which include adding turning lanes, have recently been implemented as mitigation for a Wal-Mart and supermarket opening just east of Route 58. These improvements included adding signals to Route 106/Wal-Mart drive intersection and the Route 106/supermarket drive intersection. This section of Route 106 in Halifax includes an elementary school as well as the Police Department and Post Office. Morning and afternoon peak traffic on Route 106 is heavy with few sufficient gaps in the traffic flow for vehicles entering and exiting side streets.

Route 106 lacks sufficient gaps within the traffic stream that would allow safe movement to and from side streets, especially within the corridor in Halifax. The area just west of the Route 58 intersection contains an elementary school, post office, playgrounds, and town hall. The development of a comprehensive corridor plan with strategies to transform the character of the area supporting a mixed use district with traffic calming could enhance a choice of modes including walking, bicycling and mass transit that better suits existing activities within this section of Route 106 in Halifax.

Route 123 in Easton and Brockton – Route 123 is a major east-west connector between the Brockton Downtown and Route 24 Interchange 17, and Easton to the west. This segment of Route 123 includes major trip generators such as Brockton High School, Campanelli Stadium, and the Veterans Administration Hospital. In addition, the land use along this section is densely residential with an elementary school just west of the downtown, which transitions into commercial/strip plaza use with a high number of driveways west of Torrey Street. Route 123 also provides a connection between Route 24 and Route 138, Stonehill College, and the Easton Industrial Park in Easton. Route 123 is two lanes from Brockton Downtown west to Torrey Street where it transitions to a four lane cross-section. Route 123 is four lanes from Torrey Street west to Pearl Street where it becomes a two lane highway again into Easton to Route 138.

There are twenty signalized intersections in the eastbound direction and eighteen in the westbound direction within the corridor. Average Daily Traffic on Route 123 ranges from 13,700 to 23,700 vehicles per day. Major delays occur on Route 123 in the vicinity of the Route 24 interchange in Brockton just east of the Easton town line, on Route 123 just east of Route 24 to Linwood Street (in the vicinity of the Veteran's Hospital), and between Warren Avenue and Commercial Street in downtown Brockton. The alignment of the corridor is disjointed at intersection locations in Easton (as it crosses Route 138) and in the Brockton downtown, which adds to the delays along the route. There is increased demand within this corridor due to its use as an alternative route for access between Route 24 and I-495, through Easton, especially when these limited access highways are congested. The FFY 2011-2014 Old Colony TIP includes a project for improving the Route 123/V.A. Hospital intersection and the Route 123/ Manley Street intersection, which includes upgrading traffic signals, and Roadway widening.

Route 138 From the Canton/ Stoughton Town Line to Junction of Routes 138 / 27 / 139 In Stoughton Square - This corridor, from Stoughton Square to the Canton Town Line, experiences heavy volumes during the average weekday and during the morning and afternoon peak hours. Route 138 provides an alternative north south route connection to Route 95/128 as it runs parallel to Route 24, which is consistently congested during the peak hours. Land use along this section of Route 138 is mostly commercial with a large number of driveways providing direct access to commercial plazas, fast food restaurants, and supermarkets. This corridor provides a three lane cross section from Stoughton Town Center to Lincoln Street; however, except for another section from Central Street to Charles Avenue,

Route 138 is mostly a two lane highway. Route 138 intersects Central Street, which is an important east west corridor, which connects from Route 27 in the west of the Town to Route 24 in Avon to the east. The average daily traffic on Route 138 is about 19,700 vehicles per day. An important consideration for this corridor is the close proximity to schools and dense residential areas adjacent to Route 138 in North Stoughton.

A comprehensive corridor plan that includes traffic calming and provides for safe connections to the adjacent neighborhoods would help reduce demand in the corridor and provide for alternative modes of transportation. The plan should emphasize mixed uses and streetscape and pedestrian amenities, and should employ regulations developed through a design focused public participation process in order to ensure a thorough discussion of land use and transportation issues.

Route 139 From The Junction Of Route 139/53 In Pembroke To The Pembroke/Marshfield Town Line - The congestion on this facility occurs generally during the morning and afternoon peak hours. Average daily traffic volumes on Route 139 were 33,960 at the Marshfield Town Line and 21,387 east of Water Street in 2009. The heaviest volumes and worst congestion problems occur near the Route 3 Exit 12 interchange. The northbound and southbound ramps at Route 3/Church Street (Route 139) Exit 12 in Pembroke make up two signalized intersections, with the northbound on-off ramps intersecting Route 139 to the east of Route 3 and the southbound ramps intersecting Route 139 to the west of Route 3. These intersections have multiple lane approaches on Route 139 as well as on the off ramps. Both signals are coordinated and have high peak hour travel demands resulting in long delays, especially at the southbound ramp intersection during the PM peak hour. Left turn storage is limited at both the southbound and northbound ramp systems and physical constraints on Route 139, due to the Route 3 overpass, embankments, and commercial development, present obstacles to potential roadway widening. The queue for left turn from Church Street (Route 139) onto Route 3 southbound occasionally exceeds available storage during peak hours. The queue for left turn from Church Street (Route 139) onto Route 3 northbound frequently exceeds the available storage during peak hours. There are also conflicts on the on-ramp between heavy streams of vehicles coming from both approaches of Church Street that add to the delays. The large volumes exiting and entering the Route 3 Interchange, coupled with the extensive commercial development along the corridor, contribute toward the congestion problems of this corridor.

Harrison Boulevard/Central Street In Avon And Stoughton (between Route 28 and Route 27) - Harrison Boulevard is an important urban arterial providing east west connection between the Route 28 corridor and Route 24 in Avon. Harrison Boulevard continues west from Avon into Stoughton as Dykeman Way and Central Street. Route 24 Exit 19 in at Harrison Boulevard is a full cloverleaf design and serves the Avon Industrial Park to the east (via Harrison Boulevard to Pond Street to Bodwell Street), and a major retail area on Stockwell Drive. Typically, during the weekday morning and afternoon peak hour, traffic is backed up at the intersection of Harrison Boulevard and Pond Street, with a heavy left turn demand on the Harrison Boulevard eastbound approach. On the weekends, during the Saturday and Sunday retail peak hours, because of the IKEA Home Furnishings on Stockwell Drive, traffic is backed up from Stockwell Drive along Harrison Boulevard, onto the Route 24 ramps and southbound travel lane. The Avon Industrial Park, located along Bodwell Street between Pond Street and Wales Avenue is the home of several major employers and trucking facilities that generate approximately 8,000 trips on a typical weekday. On Route 28, Wal-Mart, along with numerous other small businesses along the route, contributes to the heavy volumes along the Harrison Boulevard/Central Street corridor. Stockwell Drive features a number of large retailers such as Home Depot, Staples, Ikea Furniture, Jordan's Furniture, and

Christmas Tree Shops that generate large volumes of traffic in both Stoughton and Avon along this corridor.

Central Street in Stoughton intersects Route 139 and Route 138, which serve as north south alternatives to Route 24, and connects to Route 27 in west Stoughton.

The road capacity varies along this corridor. The western portion of the route, from the Stoughton town line to Pond Street, is a four-lane highway providing higher speeds of travel with limited access. A raised concrete median with guardrails divides this section, allowing higher capacity and greater travel speeds. The central portion, from Pond Street to Route 28, also has limited access and transitions into a two-lane undivided highway at Pond Street. Recent improvements in the corridor include the reconstruction of the West Main Street/Harrison Boulevard intersection, which is currently under construction. The average daily traffic ranges from 27,330 vehicles per day on Harrison Boulevard West of West Main Street in Avon to 23,345 vehicles per day on Central Street west of Route 138 in Stoughton.

Main Street/North Main Street In Brockton From Plain Street To Avon Town Line - Main Street, running north-south between Plain Street and Avon, runs through Brockton Downtown and densely settled areas of Brockton. It is a two lane road with parking and sidewalks along both sides of the road. It intersects with major east–west routes in the downtown including Route 27, providing access to Route 24 and points west and Whitman to the east, and Route 123 providing access to Route 24 and Easton to the west and Abington to the east.

Congestion in the Main Street corridor in is centered between the West Elm intersection and the Pleasant Street intersection in the downtown. This section is presently one-way in the northbound direction. Numerous parking maneuvers, along with pedestrian activity, contribute to the overall delay. In addition, congestion occurs further north of the downtown on North Main Street with bottlenecks at major signalized intersections such as the Howard Street intersection. The Brockton Central Area Traffic Study included the study of Main Street in the Brockton Downtown with several alternative recommended circulation patterns. The FFY 2011-2014 Old Colony TIP contains a project for signal and intersection upgrades for Main Street in the Downtown. The FFY 2011-2014 Old Colony TIP also includes a project for improving the Main Street/Keith Avenue/Plain Street intersection, including realigning the intersection and upgrading traffic signals.

Intersections

The Congestion Management Process (CMP) is identifies key intersections that demonstrate congestion, excessive delays, and circulation problems. The CMP identifies these congested facilities through corridor studies, road safety audits, and Local Transportation Assistance Studies completed by OCPC, as well as by other agencies and organizations, and through the ongoing monitoring of facilities. Standard operating procedures have been adopted for data collection that allows the monitoring of intersections within the region specifically targeted due to congestion.

The CMP has identified congested intersections, based on a threshold of LOS “D” or less, within the Old Colony region. This data has been compiled from studies completed by OCPC. Table 5-14 lists these intersections, their deficiencies, and potential improvements.

Table 5-14: Congested Intersections in the Region

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Abington	Route 18 at Washington Street (north-most intersection)	Stop sign		LOS F AM peak and LOS F PM peak	
Abington	Route 18 at Shaw Avenue	Stop sign		LOS F AM peak and LOS F PM peak	
Abington	Route 18 at Washington Street (south-most intersection)	Stop sign		LOS F AM peak and LOS F PM peak	
Abington	Route 18 at Summer Street	Stop sign		LOS F AM peak and LOS F PM peak	
Abington	Route 18 at Washington Street (just north of Whitman)	Stop sign		LOS F AM peak and LOS E PM peak	
Abington	Route 58 at Adams Street	Stop sign	Poor alignment	LOS C AM peak and LOS E PM peak	
Abington	Route 58 at Birch Street/ Brighton Street	Stop sign	Five way stop sign intersection, poor alignment	LOS E AM peak and LOS F PM peak	
Abington	Route 58 at Route 123	Signal		LOS D AM peak and E PM peak	
Abington	Route 58 at Central Street	Signal		LOS D AM peak hour	
Abington	Route 58 at Summer Street	Signal		LOS D AM peak hour	
Abington	Route 139 at Spruce Street	Stop sign	Long delays entering from side street during the peak hour	LOS C AM peak and LOS F PM peak	
Abington	Route 139 at Route 18	Signal	Lack of left turn protection eastbound Route 139	LOS D AM peak and LOS E PM peak	
Abington	Route 139 at Lincoln Street	Stop sign	Queues from Route 18 signal interfere with intersection operations	LOS C AM peak and LOS F PM peak	
Abington	Route 139 at Chestnut Street/ Old Randolph Street	Stop sign	Limited sight lines from the east	LOS F AM peak and LOS F PM peak	

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Abington	Route 139 at Hancock Street/ Old Randolph Street	Stop sign	Poor alignment, poor sign placement, high volumes and speeds on Route 139	LOS F AM peak and LOS F PM peak	
Avon	Route 28 at East and West Spring Street	Stop sign		LOS F and F for vehicles trying to enter from the minor Spring St approaches	Install traffic signals and coordinate the signals with the existing signals at the Route 28/Harrison Boulevard intersection.
Avon	Harrison Boulevard at Pond Street	Signal		Very long queues and long delays for eastbound left turns into Pond Street	
Bridgewater	Route 18 at High Street	Stop sign		LOS F AM peak and LOS F PM peak	Install signals
Bridgewater	Route 18 at Campus Plaza Main Entrance	Stop sign		LOS E AM peak and LOS F PM peak	
Bridgewater	Route 18 at Campus Plaza South Entrance	Stop sign		LOS F AM peak and LOS E PM peak	
Bridgewater	Route 18 at Stetson Street	Stop sign		LOS F AM peak and LOS E PM peak	
Bridgewater	Central Square	Signal at north end with yield at south approaches	Congestion during the morning and afternoon throughout the center, especially during the school season	LOS E at the signal in the PM peak and E and F at the yield during the AM and PM peak	

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Bridgewater	Route 18/28 at Grove Street	Stop sign		LOS D AM peak and LOS F PM peak	
Bridgewater	Route 18/28 at Flagg Street	Stop sign		LOS D AM peak and LOS F PM peak	
Brockton	Route 28 at East Battles Street	Stop sign		LOS F and F for vehicles trying to enter from the minor street approaches	Install traffic signals
Brockton	Route 28 at East Nilsson Street	Stop sign		LOS F for the PM peak vehicles trying to enter from the minor street approaches	Install traffic signals
Brockton	Route 28 at Plain Street	Stop sign		LOS F and F for vehicles trying to enter from the stop sign approach	Install traffic signals
East Bridgewater	Route 18 at Highland Street/ Harvard Street	Signal		LOS B AM peak and LOS E PM peak	
East Bridgewater	Route 18 at Water Street	Stop sign		LOS C AM peak and LOS F PM peak	
East Bridgewater	Route 18 at Union Street	Stop sign		LOS F AM peak and LOS F PM peak	
East Bridgewater	Route 18 at Town Center	Signal	Five-way traffic signal	LOS F AM peak and LOS F PM peak	

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Easton	Route 138 at Union Street	Stop sign	Poor sight distances on the Union Street approach	LOS F for vehicles entering from Union Street	Recommendations include installing a traffic signal and adding southbound left turn lane storage
Easton	Route 138 at Elm Street	Stop sign	Poor sight distances on the Elm Street approaches and poor intersection alignment on the Elm Street westbound approach	LOS F for vehicles entering from Elm Street	Recommendations include installing a traffic signal and improving intersection alignment
Easton	Route 138 at Stonehill College	Signal	Poor visibility on the Washington Street approaches		Add warning signs signal ahead for northbound and southbound traffic to improve signal visibility.
Easton	Route 138 at Route 123	Signal		LOS D PM peak	Recommendations include adding separate eastbound protected phase, adding southbound left turn storage lane, and extending the westbound traffic island to remove cross movements at adjacent curb cuts
Easton	Route 138 at Plymouth Drive Easton Industrial Park	Stop sign		LOS E and F for vehicles entering Washington Street from Plymouth Drive	
Easton	Route 138 at Purchase St/West Street	Stop sign		LOS F for vehicles entering Washington Street from Purchase Street	Recommendations include installing traffic signals

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Easton	Route 138 at Turnpike Street	Stop sign	Poor intersection alignment	LOS E and F for vehicles entering Washington Street from Turnpike Street	MassDOT plans to improve alignment PROJIS 604098, also main street gaps for entering from the side street should improve with the signalization of Washington at Purchase
Easton	Turnpike Street at West Street/ Purchase Street	Stop sign	Sight distances limited on side streets, high speeds on Turnpike Street	LOS D and F	Speeds on Turnpike Street should decrease with the realignment of Turnpike at Washington
Easton	Route 138 at Route 106	Signal			MassDOT plans to resurface PROJIS 601333, also pavement markings necessary to channelize traffic to prevent cross movement crashes
Easton	FIVE CORNERS (Route 106) at Route 123 including the Foundry Street /Bay Street intersection	Signal		LOS E and E	Intersection re-alignment and widening improvements planned 2008/2009 PROJIS 604658
Easton	Route 106 at Poquanticut Avenue	Stop sign		LOS E and F	
Easton	Route 106 at Prospect Street	Stop sign		LOS C and F	Town to proceed with signalization
Easton	Route 123 at Cross Street	Stop sign		LOS F and F	
Easton	Route 123 at Center Street	Stop sign		LOS F and F	
Easton	Route 123 at Purchase Street	Stop sign		LOS F and F	
Easton	Route 123 at Central Street	Stop sign		LOS F	
Easton	Route 123 at Bristol Drive (Industrial Park)	Stop sign		LOS D and F	

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Hanson	Route 58 at West Washington Street	Stop sign		LOS F am peak and LOS F pm peak	
Hanson	Route 58 at Liberty Street/ East Washington Street	Stop sign		LOS F am peak and LOS F pm peak	
Hanson	Route 58 at Indian Head Street/Maquan Street	Stop sign		LOS C am peak and LOS E pm peak	Install traffic signals
Hanson	Route 58 at Union street	Stop sign		LOS C am peak and LOS F pm peak	
Kingston	Route 3A at Cranberry Crossing	Stop sign	Insufficient gaps in major street traffic for side street egress	LOS F am peak and LOS F pm peak	
Kingston	Route 3A at Main Street and Linden	Stop sign	Insufficient gaps in major street traffic for side street egress	LOS F am peak and LOS D pm peak	
Kingston	Route 3A at Landing Road	Stop sign	Insufficient gaps in major street traffic for side street egress	LOS F am peak and LOS F pm peak	
Pembroke	Columbia Road (Route 139/53) at Washington Street	Stop sign	Insufficient gaps in major street traffic for side street egress	LOS F am peak and LOS F pm peak	
Pembroke	Route 139 at Route 3 Southbound Ramps	Signal	Queue for left turn from onto Route 3 SB exceeds available storage during peak hours	LOS E pm peak	
Pembroke	Route 139 at Old Oak Street	Signal	Lack of protection for vehicles turning from Old Oak Street	LOS D am peak and LOS F pm peak	
Plymouth	Sandwich Street at Route 3A	Stop sign		LOS F for vehicles trying to enter from the stop sign approach	
Plymouth	Route 3A at Water Street	Stop sign		LOS F for vehicles trying to enter from the stop sign approach	
Plymouth	Route 3A at Route 44	Signal		LOS F pm peak hour	

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
Plymouth	Route 3A at Summer Street	Stop sign		LOS F pm peak hour	
Plymouth	Route 3A at Water Street	Stop sign		LOS F pm peak hour	
Plymouth	Route 3A at Lincoln Street	Stop sign	Insufficient gaps in major street traffic for side street egress	LOS E pm peak hour	
Plymouth	Route 3A at South Street	Stop sign		LOS F pm peak hour	
Plymouth	Route 3A at Powerhouse Road	Stop sign		LOS E am peak and LOS E pm peak	
Plymouth	Route 3A at Herring Pond Road	Stop sign		LOS F am peak and LOS F pm peak	
Plymouth	Route 3A at Hedges Pond Road	Stop sign		LOS F am peak and LOS F pm peak	
Stoughton	Route 139 at Prospect Street	Stop sign		LOS F am peak and LOS F pm peak	
Stoughton	Route 139 at Lincoln Street	Stop sign		LOS F pm peak	
Stoughton	Route 139 at Central Street	Signal	Turning radii not sufficient for tractor trailers	LOS D am peak and LOS F pm peak	Lack of left turn protection
Stoughton	Route 139 at Pine Street	Stop sign	Poor intersection alignment	LOS F am peak and LOS F pm peak	
Stoughton	Route 139 at Route 24 southbound ramps	Yield sign	Merging and weaving conflicts	LOS E am peak and LOS F pm peak	
Stoughton	Route 139 at Route 24 northbound ramps	Yield sign	Limited sight distances	LOS F am peak and LOS F pm peak	
Stoughton	Canton Street at School Street	Stop sign		LOS F for vehicles trying to enter from the stop sign approach	Install traffic signals

Table 5-14: Congested Intersections in the Region (continued)

Community	Intersection	Traffic Control	Deficiencies including alignment/sight distance	Congestion	Improvements
West Bridgewater	Route 28 at Copeland Street	Stop sign	Poor sight distance due to poor alignment.	LOS D during the PM Peak	Reconstruct and re-align the intersection at right angle with Route 28
West Bridgewater	Route 106 at Howard Street	Stop sign		LOS F for vehicles trying to enter from the stop sign approach	Install traffic signals
West Bridgewater	Route 28 at Matfield Street	Stop sign		LOS F for vehicles trying to enter from the stop sign approach	Install traffic signals
Whitman	Route 18 at Warren Avenue	Stop sign		LOS D AM peak and LOS E PM peak	
Whitman	Route 18 at Route 14	Signal		LOS C AM peak and LOS D PM peak	Update signals and timing and phasing

A number of specific community centers present major bottlenecks at the convergence of important state numbered highway corridors in the region. These include Brockton Downtown, Bridgewater Center (Central Square), West Bridgewater Center, Stoughton Center, and East Bridgewater Center. These bottlenecks experience recurring peak hour congestion and circulation problems requiring on-going efforts to improve traffic flow and reduce delays.

Downtown Brockton – There are three state numbered routes that converge in Brockton's downtown including Route 27, Route 123, and Route 28. Route 123 and Route 27 traverse east west through the downtown. Route 28 provides north south access with Main Street, which runs parallel providing an alternative route. Travel on Route 28 through Brockton downtown occurs along a direct north south route along Montello Street, however; travel on Route 27 and Route 123 through the downtown is circuitous due to a one-way street system. Signing for State Routes 27 and 123 in the downtown results in excessive vehicle circulation and can create confusion for motorists due to the one-way system. The daily entering vehicles on the state numbered routes in the downtown is approximately 40,000 to 45,000 vehicles per day, with 5.5 percent of this volume classified as heavy vehicles. In addition, truck and tractor trailer progression is hindered due to insufficient turning radii at intersections in the downtown along the Route 28 corridor, as it intersects Route 27 and Route 123, and the Main Street corridor, as it intersects Route 27 and Route 123. The Brockton Downtown Railroad viaduct, which was built in 1888, provides a height at 13 feet 6 inches at its highest over Route 27 and over Route 123. The

viaduct is an arch, which forces trucks to pass directly underneath often encroaching on the opposite lane of travel.

A comprehensive study of traffic congestion and circulation was completed by a consultant for the city in 1999. This study recommended upgrading traffic and pedestrian signals; upgrade state route designation signs; restricting parking in the vicinity of major intersections; evaluating and eliminating "no right turn on red" signs in the downtown; and completing hardwire interconnect and closed loop traffic control system in the downtown. This study examined the possibilities of implementing two-way traffic in the downtown area, converting Main Street, Warren Avenue, Spring Street, West Elm Street, and Belmont Street from one-way back to two-way in the downtown. The study recommendations were re-evaluated in 2009, and the one-way to two-way conversion was dropped. The study recommendations roadway and streetscape improvements are currently included in a FFY 2011-2014 Old Colony TIP project.

Stoughton Square – The bottleneck in Stoughton Square results from deficiencies due to inadequate roadway space, weaving patterns, cross movements (due to side street traffic), and peak hour traffic surges. Stoughton Square experiences a large amount of traffic volume and high percentage of trucks and heavy vehicles over the course of an average day, with approximately 30,000 vehicles entering the square on a daily basis. The Town of Stoughton participated in the Route 138 Corridor Study, conducted by the Central Transportation Planning Staff in 2002. The study concluded that traffic congestion and crash rates were problematic, especially during the morning and afternoon peak hours due to heavy north south through movements, which cause long delays for vehicles turning left from the square or into the square from the side streets, and weaving movements within the square that result in chaotic conditions. Rear-end and angle collisions are common due to stop and go traffic and confusion regarding traffic control and left turn prohibitions that are in effect during certain periods of the day.

The study concluded that the town should work to implement traffic and pedestrian improvements in Stoughton Square. These improvements included upgrading the crosswalks throughout Stoughton Square and prohibiting left turns from Wyman Street eastbound during the morning peak (these movements are already prohibited during the afternoon peak) and installing traffic signals at the north end and south end of the square.

Stoughton received a Public Works and Economic Development (PWED) grant to implement the recommended traffic and pedestrian improvements including adding traffic signals at the north and south ends of the square. The improvements included reconstruction of traffic islands for pedestrian refuge, installation of pedestrian button actuation, and textured crosswalks. Although the improvements have been implemented, the Town has currently contracted a consultant to maximize signal coordination and the channeling of downtown traffic, since traffic progression has remained problematic during the morning and afternoon peak hours. The Town also developed the *Stoughton Community Development Plan* (CDP) to enable Stoughton to address future growth and development by creating visions, goals, and strategies. In 2006, the Town of Stoughton amended its zoning laws to include the Stoughton Center Mixed-Use Overlay District (SCMUOD). This district applies to the town center and includes the Central Business District zone and portions of Residential zones, Industrial zones and General Business zones.

West Bridgewater Square – Route 106 (East and West Center Street) and Route 28 (North and South Main Street) intersect at West Bridgewater Square to form a five-way intersection with River Street, which is one-way southbound away from the intersection. This intersection carries heavy commuter

volumes during the morning and afternoon peak hours with access to Route 24 to the west via Route 106, and north south access via Route 28 to Brockton, which parallels Route 24. The heaviest volumes through the intersection are on the east west through movements (Route 106), the north south through movements (Route 28), the eastbound right turn movements (Route 106 eastbound to Route 28 southbound), and the northbound left turn movements (Route 28 northbound to Route 106 westbound). The intersection is poorly aligned. River Street, which is one-way southbound from the intersection, intersects directly opposite Route 28 southbound. The Route 28 northbound approach enters northwest to form a modified five-way intersection.

Level-of-service analysis performed for this intersection for the Route 28 Corridor Study, shows that the intersection operates at forced flow conditions with long delays (LOS "F") during the afternoon peak hour period. Long queues and delays occur on the Route 106 eastbound and westbound approaches and on the Route 28 northbound approach. The average daily traffic entering this intersection is approximately 33,000 vehicles per day. A high priority project to implement improvements at this intersection is included in the FFY 2011-2014 Old Colony, and this project presently is in the design stage.

Central Square in Bridgewater - Bridgewater's Central Square represents a major bottleneck for traffic flow in the Route 18 corridor, based on analysis of traffic and circulation for Bridgewater Central Square in two OCPC corridor studies (Route 28 Corridor Study, 2006 and Route 18 Corridor Study, 2009). Central Square forms an oval with Route 18 Broad Street, Route 28 Main Street, and Route 104 Summer Street intersecting at a signalized intersection in the northern end. At the southern end of Central Square, there are two yield control access points with Route 104 South Street entering the oval with a yield control, and Route 18/28 Bedford Street at another yield controlled access. Bedford Street continues south of Central Square and is designated as both Route 18 and Route 28, while Route 104 continues along South Street connecting with Route 24. In addition, there is head-in parking inside Central Square, with parking maneuvers interfering with overall traffic operations.

During the morning and afternoon peak hours, delays at the signalized intersection of Route 18 Broad Street/Route 28 Main Street/Route 104 Summer Street (LOS "D" in the AM and "E" in the PM) cause back-ups for vehicles in the oval (northbound), which in turn causes back-ups at the two yield controlled south end intersections; Route 104 South Street at Central Square and Route 18/28 Bedford Street at Central Square. Traffic weaving within the oval, as it enters from South Street and Bedford Street from the south, also contributes to safety and congestion at this location. During the morning peak hour, vehicles entering from Route 104 South Street traverse the oval to access Bridgewater State University via Plymouth Street. Traffic delayed at the Summer Street/Plymouth Street intersection during the morning peak hour back up along Summer Street into the oval. Traffic also queues southbound on Route 18 Broad Street at this intersection during the AM and PM peak hour so that the queues back up past the commuter rail grade crossing, with vehicles stopped on the tracks for the signal.

Improvements to the signal timing and phasing at the Route 28/Route 18/Route 104 intersection that clear out vehicles on the northbound approach will improve traffic operations at the center overall by facilitating movement into and through the town center oval.

East Bridgewater Center - Route 18 intersects Central Street and Spring Street at East Bridgewater Town Center to form a five-way signalized intersection. This intersection becomes a major bottleneck along Route 18 due to heavy morning and afternoon peak hour volume surges. Along with the congestion and delay, the intersection also has a higher than average crash rate. This intersection has an unusual

alignment with has six approaches that causes confusion for turning vehicles. Within the intersection, there is a lot of area within the intersection where vehicles waiting to turn left get hung up at the end of a green phase. Recommendations from a Route 18 Corridor study, completed by OCPC in 2009 include widening the Route 18 northbound approach to two lanes.

5.1.8 Environmental Justice

The U.S. Environmental Protection Agency (EPA) defines Environmental Justice as follows: "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socio-economic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

The major goal of Environmental Justice is to ensure that there is equity in the distribution of transportation resources and services for low income and minority communities and neighborhoods. In order to achieve this goal, Metropolitan Planning Organizations (MPO's) must provide full and fair participation for all socio-economic groups throughout their planning and decision-making processes. All people and groups should realize the benefits of transportation projects and bear equally any adverse impacts from them as well.

The Old Colony MPO actively supports and encourages minority and low-income populations and/or communities to participate in the 3C planning process through the Old Colony (OCPC) Joint Transportation Committee (JTC) and through the Public Participation Plan. The Old Colony Planning Council provided a number of venues to garner a broad base of participation in the Regional Transportation Plan including open houses and workshops in minority census tracts (at a local Peruvian Restaurant), the Brockton Area Transit Intermodal Centre, and the Brockton and Plymouth Public Libraries. In addition, OCPC staff took part in table events at Bridgewater State University, Massasoit Community College, and the Metro South Chamber of Commerce Expo.

Environmental Justice compliments and strengthens the provisions found in Title VI of the Civil Rights Act of 1964:

"No person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

Title VI prohibits discriminatory practices in programs, policies, and activities receiving federal funds. To further enhance application of Title VI, President Clinton issued Executive Order 12898. This executive order entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations," stated that "Each Federal agency shall make achieving Environmental Justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The vision of the Old Colony Planning Council is to develop compact, livable communities that allow residents to walk, drive, or use transit. These communities will have a mix of uses, offer a range of

housing types, provide a sufficient employment base, and will meet the diverse needs of the population. The Council seeks to provide infrastructure and encourage a land use pattern that supports a variety of mode choices. Low-income persons often have difficulty affording automobiles or shouldering maintenance costs. OCPC supports projects that will facilitate access to population and employment centers, improve safety at specific intersections and on specific highways, improve air quality, and enhance the quality of life in its member communities. Such projects include enhancing capacity or resurfacing roads, improving safety and traffic flow at intersections, enhancing bicycle facilities, and constructing and enhancing inter-modal facilities

The location of recommended system roadway improvements, are shown in Figure 5-8 along with block groups categorized by percent of the population below poverty (Environmental Justice Areas.) Figure 5-8 shows that the projects are equitably distributed throughout the region and serve a variety of neighborhoods, from the more affluent areas to low-income areas.

5.2 Traffic Trends and Future Demand

OCPC has developed a Land Use Management System (LUMS) to track development projects in order to discern changes in land use patterns in the region. These land use patterns impact travel demand and traffic patterns and development. Small changes in land use, such as the development of small shopping plazas or small subdivisions, do not create large travel demands; however, over time, the cumulative impact of many developments can affect travel demand and traffic. Larger developments that have the potential to generate large amounts of traffic on a region-wide basis are of particular interest, and are summarized as follows:

<u>Southfield:</u>
The redevelopment of the former South Weymouth Naval Air Station, known as Southfield, is expected to have an impact on the region's transportation system. The site is located in the Towns of Weymouth, Rockland, and Abington. The project is described by the proponent as a mix of retail, residential, and office uses oriented around a series of public squares. The project's Village Center is proposed to be within walking distance of the MBTA's Old Colony commuter rail station in South Weymouth. In addition, several residential/mixed-use development clusters, many of the recreational fields and amenities, and significant portions of the Shea Science Park are proposed to be within walking distance of the Village Center. The project's Master Plan includes a public school facility that will accommodate Kindergarten through Eighth Grade (elementary and middle school) as well as a civic or community center. The Master Plan calls for buildings along the main street in the Village Center to accommodate residential and commercial, with shops on the ground floor and residential units above. The residential mix will consist of a neighborhood of townhouses and garden homes oriented to a series of small parks and squares in the Northern Village Center; a neighborhood of townhouses and single-family homes next to the planned public golf course in the Golf Village; and a neighborhood primarily of townhouses and single-family homes next to public squares, small parks and recreation fields in the East Village. The project is expected to be built in three major phases, and include 2,855 housing units (single-family, townhouse condominiums, apartments), 900,000 to 2,000,000 commercial square feet, a golf course, public playgrounds and recreation fields, and an east-west parkway connecting Route 18 in Weymouth to Route 228 Hingham Street in Rockland. The proponent's Final Environmental Impact Statement (FEIR) concluded that most of the project's traffic impact to OCPC communities would be on the Route 18 corridor. The FEIR included mitigation recommendations for impacts to the region's highway network and includes a transit component in its Master Plan. This includes the construction of a transit village

adjacent to the South Weymouth MBTA commuter rail station and shuttle bus service between Southfield village center and the commuter rail station.

Town of Plymouth 400th Anniversary

In June 2008, Governor Patrick signed an executive order creating the Plymouth 400th Celebration Commission. The job of the commission is to plan the 400th anniversary celebration of the founding of Plymouth, Massachusetts. In December 2008, the Plymouth Board of Selectmen appointed a 400th Anniversary Committee to; serve as an advisor to the Board of Selectmen, the Massachusetts State Commission and to all other entities formed to plan and support the 400th Anniversary; coordinate local activities related to the 400th Anniversary; and, to promote community participation in the planning of the 400th Anniversary. In addition to the public celebration (including parades, speeches, and events), in which it is estimated that between 2 and 3 million people will visit Plymouth, the Town's committee is planning implementing functional improvements in the downtown and waterfront public space area. Planning for the Town of Plymouth's 400th Anniversary in 2020 is still in the preliminary stage.

Plymouth Rock Studios

Plymouth Rock Studios is proposing to build a film and television (F/TV) production campus located off of Long Pond Road and Clark Road in Plymouth. The development will include a 300 room hotel, 14 sound stages, and a ten acre back lot area. Highway access will be via Route 3 Exit 3. This phased development will employ between 1,500 and 2,000 employees and generate direct and indirect economic benefits to the surrounding area. The proponent is currently seeking funding to begin the design stage of the project.

Traffic Growth Trends

Traffic trends can be discerned and future traffic forecasts can be estimated based on historic trends in traffic growth. OCPC maintains extensive archives of traffic counts on the Old Colony Region's road and highway network consisting of traffic counts taken by OCPC and other sources that go back to 1979. The *Old Colony Traffic Volumes Report (August of 2010)* calculates average growth factors (Section VI, Traffic Growth Rate) for the region's state numbered routes. The general trend for traffic growth has been that traffic volumes have remained static or increased slowly over the short term (the past five to ten years). Some of the state routes have actually decreased in volume over the short-term; however, the Old Colony Traffic Volumes Report estimates an average background growth in traffic of 0.25 percent per year for the region as a whole. This is a general trend that has occurring over a five year period, and regional traffic growth can vary considerably from route to route, especially in areas that have experienced growth in retail and commercial development, which have seen spikes in traffic. The trend for growth over a longer period (15 years) based on counts compiled in the OCPC Traffic Volumes Report has been at 0.84 percent per year.

Traffic growth within a highway corridor can be attributed to the influences of land development along the highway or in close proximity. Fluctuations and changes in the overall economy also influence job growth and retail and commercial activity. Volatility in the price of gasoline can also bring about a decrease in auto use and number of trips, and cause a switch to transit use. For analysis purposes, the background growth of one percent per year is used in this report to estimate growth in future tragic on the Region's highway network for the years 2011, 2021, and 2031.

Figures 5-8 and 5-9 show the traffic growth trends for Route 3 and Route 24.

Figure 5-8: Route 3 Traffic Volume Trend

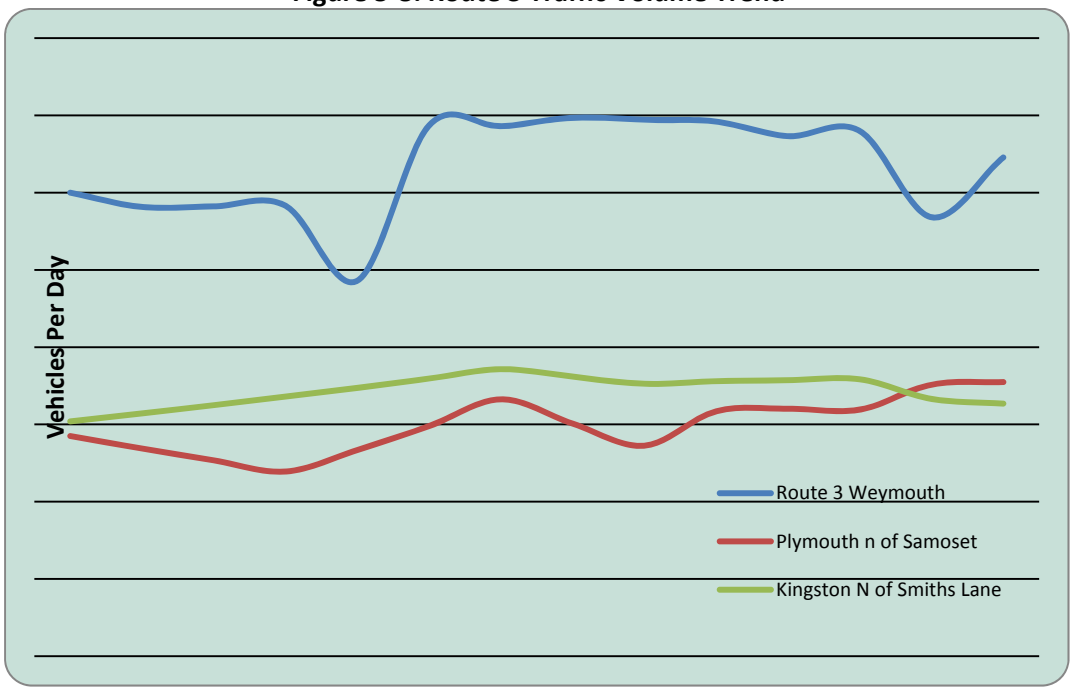
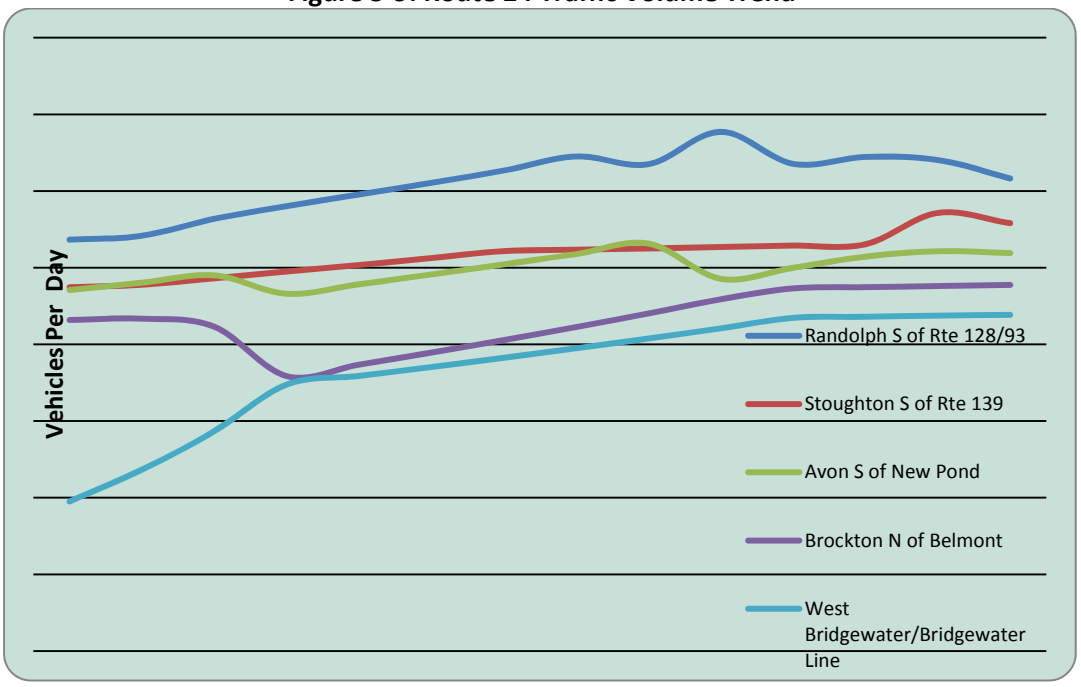


Figure 5-9: Route 24 Traffic Volume Trend



Tables 5-15 and 5-16 show 2011 traffic volumes and the forecasted traffic volumes on the Region's highway network with the associated levels-of-service for major north south and east west routes. Tables 5-17, 5-18, and 5-19, show 2011 traffic volumes and the forecasted traffic volumes for the years 2021, and 2031 for Route 24, Route 3, and Route 106, along with associated levels-of-service.

Table 5-15: Traffic Forecasts East West Highways

Route	2011	LOS 2010	2021	LOS 2020	2031	LOS 2030
Route 14 - at Duxbury Town Line – Pembroke	2,168	A	2,395	A	2,645	A
Route 27 - West of Phillips Street Hanson	10,300	C	11,380	C	12,570	C
Route 27- East of Route 18 – Whitman	14,320	D	15,820	D	17,475	D
Samoset Street - at Route 80 - Plymouth four lanes	17,690	A	19,540	A	21,585	B
Route 104 – west of Spring Street – Bridgewater	14,200	D	15,700	D	17,350	D
Route 106 at Halifax town line - East Bridgewater	12,357	C	13,650	C	15,078	D
Route 106 –East of Manley Street - West Bridgewater	24,699	E	27,283	E	30,137	E
Route 123 - South of Torrey Street – Brockton	14,115	D	15,592	D	17,223	D
Route 123 - East of Route 18 – Abington	13,348	C	14,744	D	16,287	D
Route 139 - at Rockland Town Line – Abington	16,934	D	18,705	D	20,662	D
Route 25 East of I-195 – Wareham	47,806	C	52,808	C	58,332	C

Table 5-16: Traffic Model Forecasts North South Highways

Route	2011	LOS 2011	2021	LOS 2021	2031	LOS 2031
Route 3 - South of Hedges Pond Rd – Plymouth	18,030	D	19,916	D	22,000	D
Route 18 - at Whitman town line - East Bridgewater	17,206	D	19,006	D	20,995	D
Route 18 - at Weymouth town line – Abington	20,892	D	23,078	E	25,492	E
Route 28 - South of Harrison Boulevard – Avon (four lanes)	29,936	B	33,068	B	36,528	C
Route 28 - South of Route 123 – Brockton	13,793	C	15,236	D	16,830	D
Route 28 - South of Route 106 - West Bridgewater	17,698	D	19,549	D	21,595	D
Route 36 - North of Route 106 – Halifax	7,000	B	7,732	B	8,541	B
Route 53 - at Duxbury town line – Pembroke	5,667	A	6,260	B	6,914	B
Route 58 - at Plympton town line – Halifax	5,693	A	6,289	B	6,947	B
Route 58 at Whitman town line – Hanson	8,272	B	9,138	B	10,094	C
Route 80 - North of Samoset St – Plymouth	12,806	C	14,145	D	15,625	D
Route 105 – South of Plymouth St – Halifax	2,877	A	3,178	A	3,510	A
Route 138 - at Canton town line – Stoughton	21,430	D	23,672	E	26,149	E

Table 5-17: Traffic Projections and Level-of-Service for Route 24

Route 24 Location	2011	LOS 2011	2021	LOS 2021	2031	LOS 2031
Route 128 to Route 139	127,008	E	140,296	F	154,974	F
Route 139 to Pond Street	114,992	D	127,023	E	140,312	F
Pond Street to Route 27	108,535	D	119,890	D	132,433	E
Route 27 to Route 123	98,394	D	108,688	D	120,059	E
Route 123 to Route 106	94,994	D	104,932	D	115,910	D
Route 106 to Route 104	90,357	C	99,811	D	110,253	D
Route 104 to I-495	93,862	C	103,683	D	114,530	D
I-495 to Route 44	79,660	C	87,994	C	97,200	D

Table 5-17 shows that Route 24 operates at LOS "D" and "E" conditions in 2011 with long delays beginning at the segment just north of Route 123 in Brockton and extending to Route 128. Under 2021 conditions, Route 24 will be operating at LOS "D," "E," and "F" conditions from Route 104 to Route 128 and in 2031; the corridor will be at LOS "D" or below between I-495 in Bridgewater to Route 128.

Table 5-18: Traffic Projections and Level-of-Service for Route 3

Route 3 Location	2011	LOS 2011	2021	LOS 2021	2031	LOS 2031
Weymouth north of Route 18	133,028	E	146,946	F	162,320	F
Route 18 to Derby St - Hingham	112,401	F	124,160	F	137,150	F
Route 53 to Route 139 - Pembroke	72,800	D	80,417	E	88,830	E
Route 139 to Route 14 - Duxbury	59,314	C	65,520	D	72,375	D
Route 14 to Route 3A - Duxbury/Kingston	72,183	D	79,735	E	88,077	E
Route 3A to Smiths Lane - Kingston	69,304	D	76,555	D	84,564	E
Smiths Lane to Route 44 – Plymouth*	65,501	C	72,354	C	79,924	C
Route 44 to Samoset Street – Plymouth*	73,154	C	80,808	C	89,262	C
Samoset Street to Long Pond Road – Plymouth	66,454	D	73,407	D	81,087	E
Plimoth Plantation Hwy to Clark Road – Plymouth	40,792	B	45,059	C	49,774	C
Clark Rd to Herring Pond Road – Plymouth	34,132	B	37,703	B	41,647	B
Herring Pond Road to the Sagamore Bridge	36,483	B	40,300	B	44,516	C

* Currently at a six-lane cross-section yielding higher LOS.

Table 5-18 shows the forecasted traffic and levels-of-service expected on Route 3 for the years 2010, 2020, and 2030. Route 3 in the Region provides a four lane cross section with two lanes for each direction of travel, except for the sections between Smiths Lane to Route 44 and from Route 44 to Samoset Street in Plymouth. These portions of Route 3 in Plymouth provide a six lane cross section with three lanes for each direction of travel, and therefore yield higher levels-of-service despite higher traffic volumes than some of the other four lane sections of Route 3. Table 5 – 18 shows that Route 3 operates at LOS "D," "E and "F" with forced flow conditions from the I-93 split in Braintree to Route 139 in Pembroke under 2011 conditions. These forced flow conditions are expected in Kingston and Plymouth by 2031.

5.3 System Improvements

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; therefore, maintaining and improving the system by utilizing resources in the most efficient, effective, and safe manner possible, is a major goal.

Projects that do not add new major facilities or components to the existing highway system are considered maintenance and/or improvement projects. These projects represent the vast majority of all projects implemented throughout the Region, as well as the rest of the Commonwealth. Listed below are some types of projects that fall within this category:

- Resurfacing, rehabilitation, and reconstruction of roadways including full depth reconstruction to federal standards.
- Replacement or rehabilitation of an existing bridge, culvert, or viaduct.

- Existing intersection realignments, improvements to lane use, signal updates, and/or signalization.
- Maintenance of the existing sign networks throughout the region, including sign replacement.

Projects originate from local sources as well as from MassDOT. It is the intent of this plan to see that projects are developed and implemented in a timely manner based upon need, financial constraint, and in conformance with the MassDOT Design Guidebook (for those projects in which the guidebook applications are required). Projects are originated from the following sources:

- Local Highway Officials
- MassDOT
- Old Colony Congestion Management Process
- Old Colony Planning Council Traffic Studies
- Previous Transportation Plans and Transportation Improvement Programs
- Road Safety Audits and Crash Data Analysis

Project need and the scope of a project are demonstrated through the project sources. The OCPC highway system maintenance project implementation recommendations are determined from the Pavement Management System and Bridge Management System, as well as individual project studies. Determining the proper combination and scheduling of regional transportation improvement projects is an on-going process. This process, which is known as the 3C Process (Continuing, Comprehensive, and Cooperative), is led by the Old Colony Joint Transportation Committee, with oversight from the Old Colony Metropolitan Planning Organization (MPO.) OCPC has identified short-range and long-range projects for maintaining and improving the existing highway system.

The following general recommendations address the planning process based on continued cooperation between OCPC, communities, transportation agencies, and state agencies:

- Accommodate for bridges along the planned or new commuter rail system. Bridges or underpasses should be a consideration at the grade crossings of the commuter rail system currently under construction.
- Accommodate pedestrians in all bridge maintenance and construction. Addition of sidewalks and bike lanes or shared byways where appropriate, should be a considered whenever bridges are replaced or rehabilitated.
- Conduct additional studies concerning the movement of goods/materials within and through the region. Additional studies should be undertaken which address the movement of goods and materials, such as 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.
- Conduct studies to improve east-west access in the region. This should also include further study of the widening of Route 106 from Route 24 to just east of Route 28 in West Bridgewater.
- Continue monitoring/evaluating pavement distresses along the federal aid eligible roadways toward the development of both maintenance and budgetary strategies, which produce increased efficiency in terms of utilization of federal and state money.
- Continue support of bridge management. The Commonwealth should continue its support of the Bridge Management System.
- Continue the focus on maintenance of local bridges. Support increased emphasis on the rehabilitation needs of locally maintained bridges.
- Continue the support of management systems.

- Continue to support the Traffic Monitoring System for Highways. Support actively maintaining and participating in coordinated Traffic Monitoring System for Highways.
- Encourage the provision of adequate parking and traffic mitigation at the Old Colony Rail Line facilities. It is imperative that local officials confer with MBTA planners and engineers to determine that access and egress to/from station sites are properly mitigated.
- Enhance downtown circulation. Advocate for the initiation of improvement strategies for enhancing downtown circulation.
- 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 improve traffic flow, decrease auto dependency, and improve the quality of development in highway corridors.
- Improve safety and traffic flow at intersections. Support the initiation and continuation of an intersection analysis program as a means to improve safety and traffic flow.
- 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.
- Mitigate congestion along corridors and develop strategies that address the root cause of bottlenecks. Support the mitigation of corridor segments currently experiencing congestion problems.
- OCPC will coordinate with the Town of Plymouth and MassDOT to develop a comprehensive plan that includes strategies to address the demand created by the Plymouth 400th Anniversary celebration. The plan will include strategies that manage demand and include alternative modes of transportation.
- 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 raising bridge clearances to accommodate double stacking of containers in railroad freight hauling operations. This policy is essential to promoting increased inter-modal opportunities in the movement of goods within and across state and international borders. In addition, expeditious movement of imported and exported goods serves to increase profitability and job creation in the end.
- 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.
- Support installation of 'rumble strips' on all divided highways in the region.

5.3.1 Short-Term Improvements (0-5 years)

Short-range and long-range projects have been identified for maintaining and improving the existing highway system. The short-term improvements consist of projects that can typically be implemented within a five-year period. Long-term improvements are improvements that are implemented, either through reconstruction, equipment upgrades, or long-term policies, over a longer period, beyond five years, due to logistical or financial constraints. Although this plan lists a number of short-term improvement projects that address improvements at specific intersections and locations, it is not

possible to discern all the needs at all locations within the fifteen communities within the region. There are potential projects and improvements that have yet to be identified. These future projects will be added to the recommendations described within this section as the need arises.

In addition to transportation safety, maintenance of the existing transportation system is a top priority. Short and long-range project lists for maintenance to the existing highway system have been identified. These projects are included in the 2007-2010 Transportation Improvement Program (TIP), although some projects have not yet been approved by the Project Review Committee.

Recommended Projects

Recommended projects are divided into three categories: projects approved and programmed in the FFY 2011-2014 Old Colony Transportation Improvement Program (TIP), projects approved in the TIP but not yet assigned to a funding category, and projects that have been identified by communities and/or studies completed by OCPC. Table 5-19 lists those projects currently approved for programming in the TIP, Table 5-20 shows those projects approved in the TIP but not assigned to a funding category, and Table 5-21 lists projects not yet submitted to the Project Review Committee.

Table 5-19: Endorsed Old FFY 2012-2015 TIP Projects

COMMUNITY	PROJECT DESCRIPTION	ID	YEAR
ABINGTON & WEYMOUTH	WEYMOUTH- ABINGTON- RECONSTRUCTION & WIDENING ON ROUTE 18 FROM HIGHLAND PLACE TO ROUTE 139 (4.0 MILES)	601630	2012 - BOSTON
BRIDGEWATER	BRIDGEWATER- SIGNAL & INTERSECTION IMPROVEMENTS AT STATE ROUTE 18 & HIGH STREET	603660	2015
BROCKTON	BROCKTON - DESIGN AND CONSTRUCT DOWNTOWN ROADWAY AND STREETSCAPE IMPROVEMENTS. DEMO ID: MA-214.	603675	2013
BROCKTON	BROCKTON- RESURFACING & RELATED WORK ON A SECTION OF ROUTE 27 (PLEASANT STREET & CRESCENT STREET)	600365	2012
BROCKTON	BROCKTON- RESURFACING & RELATED WORK ON WEST ELM STREET, FROM WARREN AVENUE TO WEST STREET (6,800 FT.)	601644	2014
BROCKTON	BROCKTON- SAFE ROUTES TO SCHOOL (BROOKFIELD ELEMENTARY SCHOOL)	606519	2013
BROCKTON	BROCKTON- SIGNAL & INTERSECTION IMPROVEMENTS @ ROUTE 123/LINWOOD STREET/LORRAINE AVENUE	606036	2015
EASTON	EASTON- SAFE ROUTES TO SCHOOL (F.L. OLMSTED SCHOOL)	606225	2012
EASTON	EASTON- SIGNAL & INTERSECTION IMPROVEMENTS @ ROUTE 138 (TURNPIKE STREET) AND ROUTE 106 (FOUNDRY STREET)	606071	2015
PLYMOUTH	PLYMOUTH- RECONSTRUCTION OF ROUTE 44 (SAMOSET STREET) FROM ROUTE 3 (NB RAMP) EASTERLY TO WATER STREET	600426	2013
REGION	OLD COLONY REGIONAL BICYCLE PARKING PROGRAM (BICYLE RACK GRANT PROGAM)		2012-2015
WEST BRIDGEWATER	WEST BRIDGEWATER- BRIDGE REPLACEMENT, W-18-012, SR 106 OVER THE HOCKOMOCK RIVER	605351	2013
WEST BRIDGEWATER	WEST BRIDGEWATER- INTERSECTION IMPROVEMENTS AT ROUTE 106 & ROUTE 28 (CENTRAL SQUARE)	603457	2013

Table 5-20: Projects Approved by the Project Review Committee

COMMUNITY	PROJECT DESCRIPTION	ID	DESIGN STATUS	FUNDING	COST
ABINGTON	ABINGT0N SAFE ROUTES TO SCHOOL (CENTER SCHOOL)	605693	100	SRTS	$489,600
BRIDGEWATER	BRIDGEWATER- BRIDGE REHABILITATION, B-23-009, OAK STREET OVER THE TOWN RIVER	53430	0	BR	$800,000
BROCKTON	BROCKTON- INTERSECTION IMPROVEMENTS @ CRESCENT STREET (ROUTE 27)/QUINCY STREET/MASSASOIT BOULEVARD	606143	0	STP/ HSIP	$3,600,000
BROCKTON	BROCKTON- RECONSTRUCTION OF FOREST AVENUE, FROM WARREN AVENUE TO BELMONT STREET ("3R" PROJECT)	601344	0	STP	$1,125,000
BROCKTON	BROCKTON- REHABILITATION OF ROUTE 123 (CENTRE STREET), FROM MONTELLO STREET TO NORTH CARY STREET (2,900 FEET - 3R PROJECT)	601346	0	STP	$570,000
BROCKTON	BROCKTON- RESURFACING & RELATED WORK ON FIELD STREET, FROM MONTELLO STREET TO WINTER STREET (4,000 FT.)	601639	0	STP	$525,000
BROCKTON	BROCKTON- RESURFACING & RELATED WORK ON PERKINS AVENUE, FROM SUMMER STREET TO MAIN STREET (2,800 FT.)	601642	0	STP	$500,000
BROCKTON	RECONSTRUCTION OF COURT STREET, FROM MAIN STREET TO NORTH CARY STREET ("3R" PROJECT)	601342	0	STP	$843,750
EASTON	EASTON - RECONSTRUCTION ON ROUTE 123 (DEPOT STREET) FROM FOXRIDGE ROAD TO ROUTE 138	601337	0	STP	$1,506,500
EASTON	EASTON- INTERSECTION IMPROVEMENTS @ ROUTE 138 & TURNPIKE AVENUE	604098	0	STP	$1,500,000
KINGSTON	KINGSTON- RECONSTRUCTION ON ROUTE 106 (MAIN STREET, WAPPING ROAD) (5,300 FEET)	601164	25	STP	$3,750,000
KINGSTON	KINGSTON- SIGNAL & INTERSECTION IMPROVEMENTS @ ROUTE 3A & ROUTE 53 AT KINGSBURY PLAZA	600865	0	STP/ CMAQ	$1,000,000
PEMBROKE	PEMBROKE- RECONSTRUCTION ON ROUTE 14, FROM THE HANSON T.L. TO WASHINGTON STREET (ROUTE 53)	604957	75	STP	$8,000,000
PEMBROKE	PEMBROKE- REHABILITATION ON ROUTE 36 (CENTER STREET)	600380	25	STP	$2,522,783
PLYMOUTH	PLYMOUTH- BRIDGE PRESERVATION, P-13-026, ROUTE 3 (PILGRIM HIGHWAY) OVER BILLINGTON STREET	605100	0	BR	$2,767,700

Table 5-20: Projects Approved by the Project Review Committee (Continued)

PLYMOUTH	PLYMOUTH- IMPROVEMENTS ON OBERY STREET, FROM SOUTH STREET TO A.A. CARANCI WAY/PLYMOUTH NORTH H.S. DRIVE INTERSECTION	606264	0	STP	$4,800,000
PLYMOUTH	PLYMOUTH- RECONSTRUCTION OF TAYLOR AVENUE, FROM WHITE HORSE ROAD TO MANOMET POINT ROAD, INCLUDES P-13-010	605038	75	STP	$5,106,000
STOUGHTON	STOUGHTON- RESURFACING & RELATED WORK ON ROUTE 138, FROM CANTON TL TO 300' NORTH OF THOMAS STREET	601109	0	STP	$500,000
WEST BRIDGEWATER	WEST BRIDGEWATER- RECONSTRUCTION ON ROUTE 106, FROM ROUTE 28 (CENTRAL SQUARE) TO EASTON T.L.	603456	0	STP	$6,000,000
				Total of All Potential Projects	**$ 77,255,583**

** This is an Informational List of Other Regional Priorities Regardless of Funding Source*

Table 5-21: Potential Projects Identified by Communities and OCPC Studies

COMMUNITY	PROJECT DESCRIPTION	ID	FUNDING	COST
ABINGTON	ABINGTON - SAFE ROUTES TO SCHOOL (WOODWARD SCHOOL)	PRE - PRC	TBD	$500,000
ABINGTON/ WHITMAN	ROUTE 18 CAPACITY ENHANCEMENT FROM ROUTE 139 TO ROUTE 14	PRE - PRC	TBD	$3,000,000
AVON	ROUTE AT EAST/WEST SPRING STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENT	PRE - PRC	TBD	$750,000
AVON	WEST MAIN STREET RECONSTRUCTION (HARRISON BOULEVARD TO ROUTE 28)	PRE - PRC	TBD	$500,000
BRIDGEWATER	HIGH STREET RECONSTRUCTION FROM HAYWARD STREET TO PLYMOUTH STREET	PRE - PRC	TBD	$5,500,000
BRIDGEWATER	MILL STREET RECONSTRUCTION FROM PLYMOUTH STREET TO HIGH STREET	PRE - PRC	TBD	$1,100,000
BRIDGEWATER	SOUTH STREET@ ROUTE 104 SIGNALIZATION AND GEOMETRIC IMPROVEMENT	PRE - PRC	TBD	$750,000
BRIDGEWATER	SUMMER STREET RECONSTRUCTION FROM GROVE STREET TO FLAGG STREET	PRE - PRC	TBD	$5,100,000
BRIDGEWATER	TITICUT STREET BRIDGE REPLACEMENT OVER TAUNTON RIVER	PRE - PRC	TBD	$500,000
BRIDGEWATER	TOWN RIVER LANDING PEDESTRIAN BRIDGE ENHANCEMENT PROJECT	PRE - PRC	TBD	$880,660
BROCKTON	ITS REVENUE COLLECTION EQUIPMENT	PRE - PRC	TBD	$500,000
BROCKTON	MAIN STREET AT FOREST AVENUE TRAFFIC SIGNALS AND GEOMETRIC IMPROVEMENTS	PRE - PRC	TBD	$750,000
BROCKTON	MAIN STREET RECONSTRUCTION FROM WHITE AVENUE TO HAYWARD AVENUE	PRE - PRC	TBD	$2,000,000
BROCKTON	N MAIN STREET RECONSTRUCTION FROM PROSPECT TO COURT WAY	PRE - PRC	TBD	$1,500,000
BROCKTON	PEDESTRIAN/ BIKEWAY CONNECTIONS TO THE INTERMODAL TRANSPORTATION CENTRE	PRE - PRC	TBD	$300,000
BROCKTON	ROUTE 28 RECONSTRUCTION FROM EAST ASHLAND STREET TO PLAIN STREET	PRE - PRC	TBD	$2,500,000
EAST BRIDGEWATER	ROUTE 106 RECONSTRUCTION WHITMAN STREET TO HALIFAX TOWN LINE	PRE - PRC	TBD	$4,500,000
EASTON	CENTRAL STREET RESURFACING FROM WASHINGTON TO DEPOT	PRE - PRC	TBD	$550,000
EASTON	ROUTE 106 - EASTMAN STREET, MANSFIELD TOWN LINE TO ROUTE 123	PRE - PRC	TBD	$280,715
EASTON	ROUTE 106 - FOUNDRY STREET, BAY ROAD TO MORSE ROAD	PRE - PRC	TBD	$1,689,350
EASTON	ROUTE 106 - FOUNDRY STREET, EASTMAN STREET TO BAY ROAD	PRE - PRC	TBD	$1,400,000
EASTON	ROUTE 138 @ ELM STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENT	PRE - PRC	TBD	$750,000
EASTON	ROUTE 138 @ PLYMOUTH STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENT	PRE - PRC	TBD	$750,000
EASTON	ROUTE 138 @ UNION STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENT	PRE - PRC	TBD	$750,000
HALIFAX	ROUTE 106 RECONSTRUCTION (ROUTE 105 TO BRIDGEWATER TOWN LINE)	PRE - PRC	TBD	$1,000,000

Table 5-21: Potential Projects Identified by Communities and OCPC Studies (continued)

HALIFAX	ROUTE 58 RECONSTRUCTION (LINGAN STREET TO PLYMPTON TL)	PRE - PRC	TBD	$3,765,334
KINGSTON	ROUTE 27 @ ROUTE 106 SIGNAL REPLACEMENT AND GEOMETRIC IMPROVEMENTS	PRE - PRC	TBD	$750,000
KINGSTON	ROUTE 3A AT CRESCENT STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENTS	PRE - PRC	TBD	$750,000
PEMBROKE	ROUTE 53 AT PLEASANT STREET SIGNALIZATION AND GEOMETRIC IMPROVEMENTS	PRE - PRC	TBD	$750,000
PLYMOUTH	CARVER ROAD/SUMMER ST/FEDERAL FURNACE/SLEEPY HOLLOW ROAD SIGNALIZATION	PRE - PRC	TBD	$750,000
PLYMOUTH	CHERRY STREET RECONSTRUCTION FROM INDUSTRIAL PARK ROAD TO COMMERCE WAY	PRE - PRC	TBD	$2,600,000
PLYMOUTH	FEDERAL FURNACE ROAD RECONSTRUCTION FROM CARVER TOWN LINE TO SOUTH MEADOW ROAD	PRE - PRC	TBD	$5,500,000
PLYMOUTH	JENNY GRIST MILL/ BILLINGTON SEA WALKWAY	PRE - PRC	TBD	$1,500,000
PLYMOUTH	LONG POND ROAD RECONSTRUCTION (DREW ROAD TO CLARK ROAD)	PRE - PRC	TBD	$5,000,000
PLYMOUTH	NELSON STREET TO STEVENS FIELD PEDESTRIAN CONNECTION	PRE - PRC	TBD	$3,000,000
PLYMOUTH	ROUTE 3 AT EXIT 3 INTERCHANGE AND VICINITY ACCESS IMPROVEMENTS	PRE - PRC	TBD	$28,000,000
PLYMOUTH	ROUTE 3A AT SOUTH STREET SIGNALIZATION	PRE - PRC	TBD	$750,000
PLYMOUTH	ROUTE 3A MAIN STREET @ WATER STREET SIGNALIZATION	PRE - PRC	TBD	$750,000
PLYMOUTH	ROUTE 3A STATE ROAD AND HERRING POND ROAD SIGNALIZATION	PRE - PRC	TBD	$750,000
PLYMOUTH	SAMOSET STREET @ MARC DRIVE/ MOBILE HOME ESTATES SIGNALIZATION	PRE - PRC	TBD	$750,000
PLYMOUTH	TOWN PIER BOARDWALK (NELSON TO BURIAL HILL)	PRE - PRC	TBD	$300,000
PLYMOUTH	TOWN WHARF PEDESTRIAN AND ROADWAY IMPROVEMENTS	PRE - PRC	TBD	$750,000
PLYMOUTH	WATER STREET RECONSTRUCTION (ROUTE 3A TO NELSON STREET)	PRE - PRC	TBD	$1,500,000
STOUGHTON	BAY ROAD RECONSTRUCTION	PRE - PRC	TBD	$1,000,000
STOUGHTON	CANTON (ROUTE 27) & SCHOOL STREET SIGNALIZATION	PRE - PRC	TBD	$750,000
STOUGHTON	CANTON (ROUTE 27)/TOSCA/CENTRAL INTERSECTION IMPROVEMENTS	PRE - PRC	TBD	$750,000
STOUGHTON	TURNPIKE AND CENTRAL STREETS RESURFACING	PRE - PRC	TBD	$522,000
WEST BRIDGEWATER	BELMONT STREET BRIDGE REHABILITATION	PRE - PRC	TBD	$500,000
WEST BRIDGEWATER	BRIDGE REHABILITATION ARCH STREET	PRE - PRC	TBD	$500,000
WEST BRIDGEWATER	ROUTE 106 @ EAST STREET SIGNALIZATION	PRE - PRC	TBD	$750,000
WEST BRIDGEWATER	ROUTE 106 @ HOWARD STREET SIGNALIZATION	PRE - PRC	TBD	$750,000
WEST BRIDGEWATER	ROUTE 28 @ MATFIELD STREET SIGNALIZATION	PRE - PRC	TBD	$750,000
WEST BRIDGEWATER	SOUTH STREET RESURFACING AND SIDEWALKS	PRE - PRC	TBD	$300,000
WEST BRIDGEWATER	WEST STREET BRIDGE REHABILITATION	PRE - PRC	TBD	$500,000
			Total of All Potential Projects	**$ 102,788,059**

5.3.2 Coordinating Transportation and Land-Use Planning

Connecting Transportation and Land Use

Highway planning has traditionally focused on relieving bottlenecks and congestion in order to maximize traffic flow efficiency; however, commercial and retail activities have become significant within certain highway segments. 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 OCPC communities. These conditions have led to situations in which traffic flow and safety have been compromised. The commercial and retail centers that have proliferated along important arterials and collectors are auto dependent, mainly single-use zoned, and extensive in development (spread out over large areas). Many of them are 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. Highway corridor planning should include techniques and ways to prevent highways from becoming unattractive, dysfunctional commercial strips. Corridor plans should be coordinated with local master plans and comprehensive plans that support strategies that emphasize density, a diversity of land uses, and design standards. The planning process should provide progressive redevelopment to gradually transform areas into economically vibrant, mixed-use districts that offer a choice of modes including walking, bicycling, mass transit, as well as personal auto.

The Highway Corridor Overlay District is one technique that can provide basic guidelines for achieving the goals and objectives for integrating transportation and land use planning. The purpose of the overlay district includes:

- Encouraging development design 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.

The basis for employing these types of planning techniques should be driven through the public participation process, at the local and regional level, through discussion regarding the inter-relation and integration of transportation and land use issues.

Access Management

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:

- Improved Safety
- Improved Capacity

These advantages are achieved through Access Management techniques that seek to obtain the following results:

- Limit the number of conflict points in turning movements
- Separate conflict areas
- Remove turning vehicles from through traffic lanes

- Reduce conflicting volumes
- Improve roadway operations
- Improve driveway operations

Access management goals are typically accomplished over the long term; however, specific techniques can be implemented immediately to begin a process that will cumulatively result in the advantages of improved safety and the preservation of roadway capacity. Examples of typical access management applications along a commercial corridor include:

1. Access Spacing
   - Limit the number of access points to properties
   - Consolidate redundant, low-volume drives
   - Establish a minimum distance between drives
   - Limit the width of access points based on the site use

2. Turning Lanes
   - Establish minimum turning radii to slow traffic in high traffic pedestrian areas
   - Improve corner clearance
   - Establish deceleration/acceleration lanes
   - Add Two-Way Turning Lanes

3. On-Site Remedies
   - Share drives between sites
   - Add longer “throat lengths” to internal driveways in lots
   - Connect adjacent commercial properties
   - Construct service roads with multiple drives but less access points on the arterial

4. Median Treatments
   - Add Medians and turning lanes

5.3.3 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.

The policy of the Old Colony Planning Council is to advocate and endorse the consideration of Intelligent Transportation Systems solutions for transportation problems as a routine part of the transportation planning process. The Old Colony Planning Council is a stakeholder in the Metropolitan Boston Regional ITS Architecture and the Southeastern Massachusetts Regional ITS Architecture and is committed to continuing an active role in ITS systems. This includes maintaining channels of communication between Old Colony Planning Council and other stakeholders, including but not limited to: the MassDOT; the Southeastern Regional Planning and Economic Development District (SRPEDD); the Central Transportation Planning Staff (CTPS) and Metropolitan Area Planning Council (MAPC); the Cape Cod Commission, and the Brockton Area Transit Agency (BAT).

A regional ITS architecture is a framework that defines component systems and their interconnections. Successful ITS deployment requires an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems. The regional architecture is a mechanism design to ensure this collaboration and compatibility occurs.

Inputs into ITS systems can involve any variety of a range of collection devices, including:

- Loop detectors in the pavement and sophisticated ground level radar systems are able to collect real time traffic volume and speed data.

- Video equipment is often used to monitor the transportation system, which is useful in allowing system operators to immediately detect areas of congestion that may be forming. It is also used to detect incidents such as crashes and disabled vehicles, in turn accelerating emergency dispatch and the overall incident management process. Video surveillance is also a useful tool for security and incident management in transit vehicles and around stops and terminals.

- Automatic vehicle locators (AVL) on board transit vehicles, emergency response vehicles, and roadside assistance vehicles allow operators to know where vehicles are in real time that allows for more efficient dispatch and adjustment of traffic controls if necessary.

- Automated Fare Payment Systems that allow riders on transit systems to pay electronically using a "smart card" (prepaid balance) or in the future conventional credit/debit cards rather than cash.

- Transmitters' onboard transit and emergency vehicles alike are used to pre-empt traffic signals ahead or to alert travelers at a transit stop that the vehicle is approaching.

- Remote weather stations and Doppler radar provide real time weather conditions occurring throughout the transportation network, and provide alerts regarding events such as icing or flooding that may be occurring.

These are some of the technological applications that can be utilized for managing the regional transportation network. All of this information travels over both hard-wired and wireless communication systems to systems that manipulate the data and distribute it to users of the transportation system. End users of ITS system and the output media include:

- Transit Operation Centers that monitor the transit system through video feed, radio communications, and AVL signals, allowing operators to make improved decisions regarding security, dispatch, and incident management.

- Traffic Operation Centers that monitor the roadway system through reports from systems like loop detection and video feed, allowing operators to make improved decisions regarding congestion management, incident management, security, and maintenance management.

- Traveler Information Services such as the national 511 System or SmarTraveler locally, which receive traffic data from traffic and transit operations centers and distribute it to users via hard line and wireless communications.

- Variable Message Signage that allows operators from traffic and transit operation centers to instantly relay messages to users on the system.

- Kiosks that receive information from transit operation centers and transit vehicles, relaying it to users of the transit system.

MassDOT owns and operates several permanent variable message signs and a large fleet of portable variable message signs throughout the Commonwealth. While there are not any permanent locations within the boundaries of the OCPC region, two are located just outside of the region: on Route 24 in Randolph and on Route 3 in Weymouth. These permanent stations are used to alert drivers to major events affecting the Route 128 belt and Interstate 93, as well as the tunnels.

Portable variable message sign trailers are located throughout the state and are able to be dispatched to locations wherever and whenever needed. Often they are used for a major local event, such as a road race or sidewalk carnival. They can also be dispatched for major unplanned events, such as a chemical spill that forces an extended closure of a highway. All variable message signs are controlled from the MassDOT Traffic Operations Center in South Boston.

The MassDOT is using automated vehicle locators on their snow removal and highway maintenance fleet, increasing the efficiency of dispatch of resources to where they are needed.

Travelers are able to obtain real time traffic conditions for highways in the Commonwealth, including locally Routes 3 and 24 as well as the Cape Cod Canal bridges, through SmartRoutes phone and web links, which is available through a statewide 511 system and MassDOT website.

5.3.4 Long-Term improvements (greater than 5 years)

The transportation system in the Old Colony Region represents an irreplaceable asset that needs to be maintained constantly; however, its capacity remains static while its demand is in a constant state of flux. The region is constantly changing, with significant projects planned that will place new and greater needs on the existing transportation system. Modifications are needed to address these ever increasing demands. Long-term improvements are improvements that are implemented, either through reconstruction, equipment upgrades, or long-term policies, over a longer period, beyond five years, due to logistical or financial constraints. However, it is noted that projects may be advanced within the next five years.

<u>Maintenance</u>

Identifying all of the maintenance projects needed in the next twenty years is not completely possible due to the dynamic nature of the system and the extent of the forecast period. OCPC has compiled a list of maintenance projects that will need to be implemented, but recognizes that this list might be incomplete. Further, the listing of a project in the long-range maintenance project list does not constitute design approval, future acceptance to the TIP, or any guarantee that the project will be implemented. The identification of long-range maintenance projects serves to provide the citizens and communities with a list of potential projects.

<u>Capacity Expansion</u>

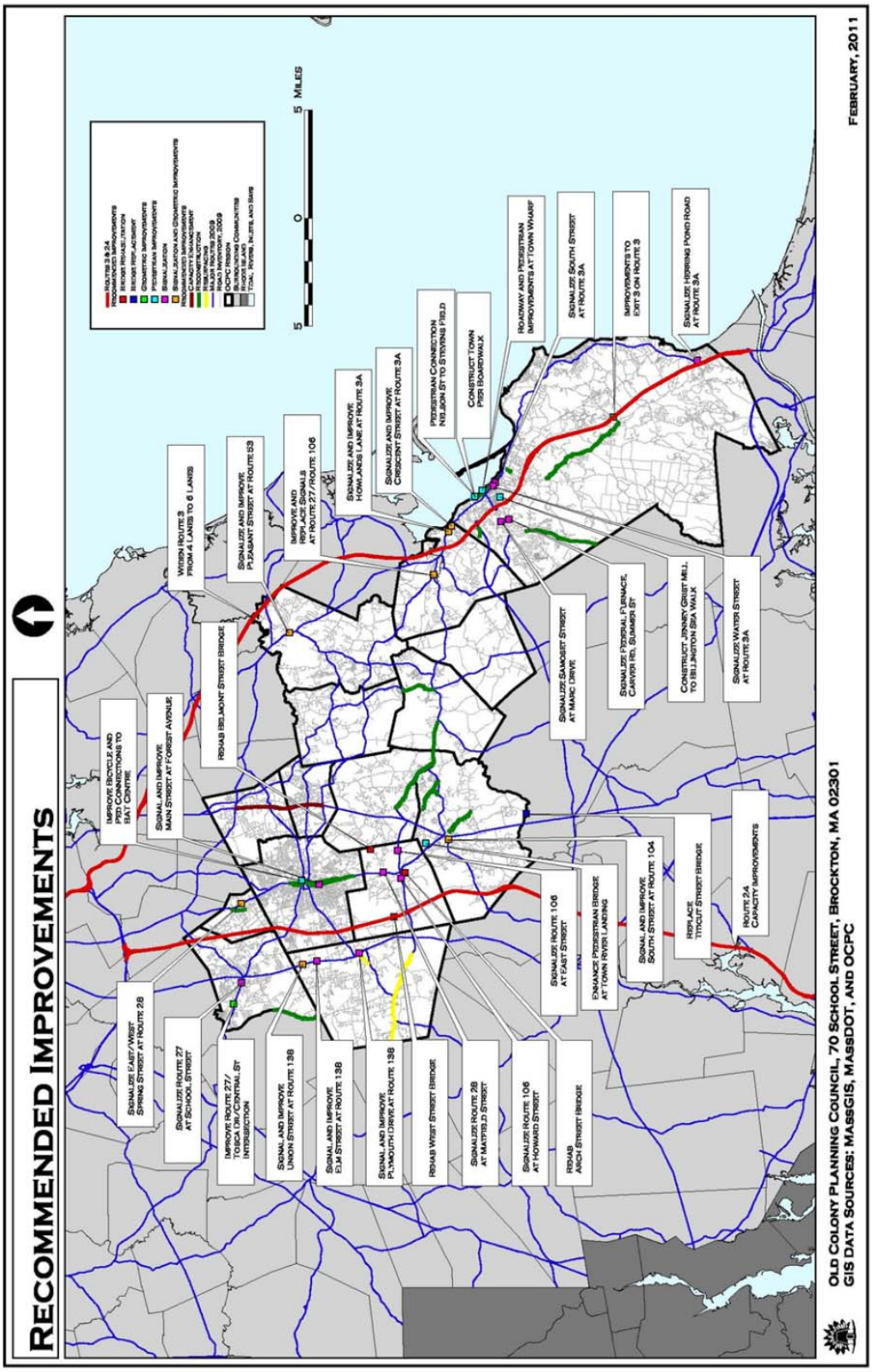
Projects that add to the existing system, unlike maintenance projects, are considered major capital improvements to the system. These projects tend to be large-scale construction projects geared to alleviating problems such as chronic congestion and bottlenecks within the existing system. These

projects also tend to have a direct effect on the air quality analysis for the region, whereas maintenance projects do not. The Council has identified a number of projects that fit this category. Recommended projects that will expand the existing system are shown on Figure 5-8 and are summarized as follows:

Route 3 Capacity Enhancement and Improvements

The widening of Route 3 to a six lane cross section from Hingham to Route 44 continues to be a priority for the Old Colony Planning Council, as it has been for a number of years. The relocation project for Route 44 was opened to traffic in 2005. The addition of this east west limited access facility (from Route 3 in Plymouth to Middleboro) represents a major capital investment in Kingston and Plymouth with Route 3, between exits 6 and 7 widened to six lanes in order to accommodate the Route 44 relocation project. A large amount of traffic flows between the two highways. Recent large-scale residential development in southern Plymouth will also have a major impact on traffic commuting to and from Boston via Route 3. The Wareham Road mixed use development (River Run project) will add 1,285 housing units to Plymouth. It is expected that major development will impact traffic on Route 3, along with extensive commercial development on Commerce Way at the new Route 44 junction with Route 3 in Plymouth.

Figure 5-8: Recommended Improvements



MassDOT previously submitted a Draft Environmental Impact Report for the widening of Route 3 in Hingham from Exit 16 south to Duxbury just south of Exit 12 in Pembroke. The widening would be achieved by adding a third lane in each direction of travel to the median. No land takings are anticipated for the completion of the project. Improvements to Route 3 interchanges 12, 13 and 14, will be addressed under separate related projects. MassDOT has submitted several Notices of Project Change for this widening project. The needs analyses in these studies show that capacity problems have existing within this section of Route 3 and will continue to grow. The project needs analysis show that congestion will extend further south on Route 3 to Exit 7 in Plymouth.

A report on the meetings of a Route 3 Land Development Task Force, which was created by MassDOT in 2001, concluded that a more comprehensive study is necessary that will include the impacts of the newly reconstructed Route 44, the impacts of major residential and commercial developments (such as the Pine Hills and Makepeace development,) and the impacts of the condition of the Braintree split.

Recommendations for Route 3 include the following:

- Address congestion problems on Route 3 from Plymouth to Route 128 and develop improvement strategies that include the enhancement of capacity within the Route 3 corridor.

- Conduct a traffic study to define the operational deficiencies at Route 3 Exit 6 in Plymouth, and to analyze the potential improvement concept to construct an acceleration lane at the bottom of the southbound ramp to Samoset Street. Under existing peak hour conditions, traffic exiting Route 3 southbound at Exit 6 to Samoset Street westbound backs up on the exit ramp onto Route 3 southbound. These backups are due to delays at the end of the ramp as vehicles wait for sufficient gaps in the westbound Samoset traffic stream. The widening of Samoset Street with an additional lane with sufficient length that would allow vehicles to merge into Samoset westbound traffic will prevent vehicles from backing up this ramp and onto the Route 3 southbound travel lanes. The right of way in this section of Samoset is 80 feet according to the latest MassDOT road inventory.

- Recommended improvements at Exit 5 are based upon a traffic study completed for Plymouth by engineering consultants. The recommendations include the addition of a northbound slip ramp at Exit 5 that will allow traffic direct access from Long Pond Road. At present, the loop ramp at Exit 5 requires vehicles to turn left from Long Pond Road to access Route 3 for northbound access. This causes back-ups on Long Pond Road as vehicles making this movement wait for sufficient gaps in through traffic to make their move. A southbound slip ramp has already been added from Long Pond Road to Route 3 at Exit 5. In addition to the ramps, other improvements proposed at Exit 5 include adding a connector road between Long Pond Road and Camelot Drive and extending Holman Road to Long Pond Road to form the eastbound leg of a four-way intersection with Camelot Drive and Long Pond Road.

- Construct ramps to and from Route 3 southbound to be added at the end of Camelot Drive. This on-ramp would split and extend to Plantation Highway southbound. Northbound off ramps would also be added at Exit 4 to Plantation Highway to the east and Camelot Drive to the west. The cost of improvements at Camelot Drive is estimated at $ 23,400,000.

- Expand Route 3 Exit 3 at Clark Road to a full directional interchange, along with an access road and access improvements as related to the Plymouth Rock Studios. The cost is estimated at $28,000,000.

Route 24 Capacity Enhancement and Improvements

In 1997, OCPC conducted a study entitled, The Route 24 Traffic and LOS Projections Study. The purpose of the study was to examine the congestion on Route 24 and to determine potential need, such as added capacity. In the study, OCPC forecasted traffic volumes and levels of service for the years 1996, 1999, 2010, and 2020. The methodology utilized the Regional travel demand model and linear regression forecasts. The study recommended capacity improvements to the Route 24 interchanges and the re-designation of Route 24 to an interstate. In 1998, MassDOT prepared an additional study to evaluate the conversion of Route 24 to interstate standards. The study included an inventory of existing conditions, traffic volumes, design criteria and considerations, proposed geometric improvements, and estimates of construction costs. The study included improvements required to bring the facility up to interstate standards such as widening shoulders and reconstructing ramps. It did not include capacity expansion such as adding lanes.

Table 5-22 summarizes the peak hour level-of-service from the 1997 Route 24 study. This table identified peak hour level-of-service deficiencies for Route 24 expected to occur in the years 1999, 2010, and 2020. Route 24 is expected to be at capacity (within the LOS “E” and “F” range) in at least one direction during the morning or afternoon peak between Route 128 and Route 44 by the year 2020. Table 5-23 shows the updated traffic projections and expected levels-of-service for Route 24.

Table 5–22: Route 24 Level-of-Service (from the Route 24 Traffic and LOS Projections Study, 1997)

Location		*1996 Peak LOS*		*1999 Peak LOS*		*2010 Peak LOS*		*2020 Peak LOS*	
		NB	*SB*	*NB*	*SB*	*NB*	*SB*	*NB*	*SB*
Route 128 to Route 139 – Stoughton	AM Peak	D	B	D	C	F	C	F	D
	PM Peak	C	D	C	E	D	F	E	F
Route 139 to Pond Street – Avon	AM Peak	D	B	D	B	B	C	F	C
	PM Peak	C	D	C	D	C	F	D	F
Pond Street to Route 27 – Brockton	AM Peak	C	B	D	B	D	C	E	C
	PM Peak	C	D	C	D	C	E	C	F
Route 27 to Route 123 – Brockton	AM Peak	C	B	C	B	D	C	E	C
	PM Peak	B	D	C	D	C	E	C	F
Route 123 to Route 106 – W. Bridgewater	AM Peak	C	B	C	B	D	B	D	C
	PM Peak	B	C	B	C	C	D	C	E
Route 106 to Route 104 – Bridgewater	AM Peak	C	B	C	B	D	B	D	C
	PM Peak	B	C	B	C	C	D	C	E
I-495 to Route 44 - Raynham	AM Peak	C	B	C	B	D	B	E	C
	PM Peak	B	C	B	C	C	D	C	E

Table 5-23: Traffic Projections and Updated Levels-of-Service for Route 24

Route 24 Location	2011	LOS 2011	2021	LOS 2021	2031	LOS 2031
Route 128 to Route 139	127,008	E	140,296	F	154,974	F
Route 139 to Pond Street	114,992	D	127,023	E	140,312	F
Pond Street to Route 27	108,535	D	119,890	D	132,433	E
Route 27 to Route 123	98,394	D	108,688	D	120,059	E
Route 123 to Route 106	94,994	D	104,932	D	115,910	D
Route 106 to Route 104	90,357	C	99,811	D	110,253	D
Route 104 to I-495	93,862	C	103,683	D	114,530	D
I-495 to Route 44	79,660	C	87,994	C	97,200	D

Retail and commercial development along important state numbered route arterials that connect to the Route 24 ramp system has amplified congestion problems within the Route 24 corridor. In Stoughton, on Route 139, the close proximity of Page Point retail development to the Route 24 ramps has resulted in impacts to traffic weaving onto the Route 24 ramps. In addition, IKEA and other retail development on Stockwell Drive in Avon have added higher traffic volumes on and off Exit 20 at Route 139 in Stoughton and Exit 19 on Harrison Boulevard/Dykeman Way in Avon. One solution that has been discussed has been the addition of a southbound ramp directly to Route 24 from the end of Stockwell Drive behind the IKEA store. In addition to higher volumes on Harrison Boulevard west of Exit 19 due to Merchants Plaza, traffic generation due to Avon Industrial Park east of Exit 19 results in long queues due to left turns into Pond Street, especially during the morning peak hour.

Other conceptual improvements to the Route 24 ramp system that have been considered by MassDOT include the reconstruction of Exit 15 to and from Route 104 in Bridgewater. This concept would place the northbound on and off ramps in the northeast quadrant of the interchange. MassDOT has received authorization from the state legislature to acquire the necessary right of way for these ramps through a land swap with the adjacent landowner.

The Boston Metropolitan Planning Organization completed a study entitled Traffic Safety and Operational Improvements for the I-93/Route 24 Interchange in 2007. The primary study area included Route 24 from the I-93 Interchange south to Interchange 20 at Route 139 in Stoughton. OCPC was included in the advisory task force for the study. The main purpose of the study was to evaluate alternative improvements, including adding a fourth lane on Route 24 southbound, adding an HOV northbound, and other safety and operational improvements such as redesigning merges and weaving. Presently, the merge requires that traffic entering Route 93 south from Route 24 north merge from two lanes on the Route 24 ramp to the high speed left lane on Route 93 south. Conversely, traffic exiting Route 93 northbound to Route 24 southbound merges into the Route 24 right lane southbound and the middle lane. The middle lane carries traffic from Route 93 southbound to Route 24 southbound. These merges, which do not allow for proper acceleration and deceleration, along with delays on I-93 at interchanges north and south of the Route 24 merge, create long back-ups and long delays on Route 24. In addition, the high volumes of traffic at the merge, along with the weaving deficiencies cause a high incident rate in crashes, which create congestion and delays, especially during the peak hours. The study evaluated a number of alternatives including extending the Route 24 northbound and southbound travel lanes from three lanes to four lanes. The study concluded that adding a lane to the southbound side improves traffic flow on both Route 24 and I-93. In addition, adding a lane to the northbound side will reduce the traffic queues during the AM peak period on Route 24 northbound.

MassDOT has begun the reconstruction of Route 128 (I-93 Add-a-Lane project). This project consists of approximately five miles of I-95/93 (Route 128) roadway construction, beginning at Route 24 (Randolph) to the MBTA Franklin Rail Road Line Bridge in Westwood, just north of the East Street Rotary. An additional 12-foot travel lane and 10-foot shoulder will be constructed toward the median in both directions. As part of this construction, longer acceleration lanes and longer weaving areas will be added to the merge from the Route 24 northbound ram to Route 128 northbound. This project is expected to improve traffic flow on Route 24 south of the merge, especially for northbound traffic, which queues back from I-93 through the merge onto Route 24 during the morning peak hour.

OCPC recommends that the congestion problems on Route 24 be addressed through the development of strategies that enhance the capacity of Route 24 by 2031. In the interim, the development of incident management techniques will be advantageous in preserving existing capacity.

Abington to Weymouth: Route 18

The re-development of the South Weymouth Naval Air Station will have an impact on Route 18 traffic in Abington, although the project access points will be located in South Weymouth just north of the Abington town line. Improvements to Route 18 in anticipation of the redevelopment plan include the widening of Route 18 in Abington from Route 139 to Highland Place in Weymouth, which is currently in the design phase.

Bridgewater: Route 104

Route 104 is mainly a two-lane highway except for the section between the Route 24 northbound ramps and the Elm Street intersection, which was recently widened to four lanes to accommodate a construction of a home improvement center on the north side of Route 104, just east of Route 24. Route 104 carries approximately 23,000 vehicles per day and is a major connector between Route 24 and Bridgewater Center and the Bridgewater State University Campus. The Town of Bridgewater is considering zoning changes that will encourage future commercial growth along this corridor near the Route 24 interchange. Similar to the Route 106 corridor in West Bridgewater, high through volumes on Route 104 with multiple drives and side streets creates congested conditions especially during the peak

period. The recent home improvement center improvements to Route 104 included consolidation of curb cuts to create a common drive into the site, adding traffic signals to the Route 24 northbound and southbound ramps at Route 104, and adding a signal at the site drive. In addition, MassDOT has determined that the addition of an on ramp in the northeast quadrant carrying Route 104 westbound traffic to Route 24 northbound will improve traffic flow on Route 104, and relieve back-ups on Route 24 that currently occur due to vehicles waiting to turn onto the ramps under the current configuration. MassDOT has entered into an agreement with the owners of the retail site for a land swap that will enable MassDOT to relocate the northbound ramp to the northeast quadrant of the Exit 15 interchange. The construction of this ramp is recommended by OCPC; however, it is recommended that monitoring of the corridor continue and that future studies regarding this corridor consider the widening of Route 104 to Bridgewater center.

Brockton: Downtown Improvements

Recommendations from the Brockton Downtown Two-Way Circulation Study completed by an engineering consultant in 1999, included recommendation for traffic flow modifications in the downtown. These included: converting Main Street, Warren Avenue, Spring Street, West Elm Street, and Belmont Street from one-way to two-way in the downtown; upgrade traffic signals and pedestrian signals; upgrade state route designation signs; restrict parking in the vicinity of major intersections; evaluate and eliminate "no right turn on red" signs in the downtown; and complete hardwire interconnect and closed loop traffic control system in the downtown. In 2008, the study was updated and the recommendations have been revised, which no longer include the two-way reconversion. These improvements are in the FFY 2011-2014 Old Colony TIP and are currently in the design stage.

Brockton: Route 123 from Route 24 to Linwood Street

Route 123 within this corridor has four lanes of travel; however, the lane widths and shoulder are substandard for the speeds and traffic volumes on this road. Average Daily Traffic on Route 123 within this section is approximately 25,000 to 30,000 vehicles per day. Major delays occur on Route 123 east of the Route 24 interchange in Brockton due to delays at the Route 123/Manley Street intersection. This intersection carries heavy right turns from Route 123 to Manley Street southbound, and heavy left turn movements from Manley Street to Route 123 westbound during the peak hours. MassDOT has completed Road Safety Audits for the Route 123/ Linwood Street/ Lorraine Avenue intersection (2010) and the Route 123/ Manley Street intersection and Route 123/ VA Hospital intersection (2011).

Plymouth: Route 25 Interchange

The construction of an additional Route 25 interchange in Plymouth before Exit 1 has been considered as a long-term possible improvement to offset the impacts of potential developmental growth at the Plymouth 1,000 acre site by the Plymouth Area Chamber of Commerce. This exit would most likely be connected to Bourne Road in Plymouth. The construction of this interchange would most likely require right of way takings in Plymouth and possibly in Wareham. The 1,000 acre site in Plymouth represents an economic development opportunity for the Town of Plymouth, which has expressed interest in encouraging economic development in this area.

Plymouth: Route 3 Interchange 2 1/2

The construction of an additional Route 3 exit (Exit 2 ½), between existing Exit 2 and Exit 3, has been considered as a long-term possible improvement to offset the impacts of developmental growth in Plymouth by both the Plymouth DPW and Planning Department. Planning and implementation of this concept are beyond the long-term scope of this plan (twenty years); therefore, a preliminary cost estimate is not included. It is expected that an Exit 2 ½ would be connected to Long Pond Road to the

west and Route 3A to the east. An Exit 2 ½ would most likely require takings through a conservation area in Plymouth.

Plymouth: Commerce Way

Commerce Way in Plymouth is a key road corridor that directly connects Route 44 (to Route 3) to an important commercial district, with a number of commercial areas including Colony Place and Wal-Mart. This area also includes medical office buildings and some light industrial uses. Commerce Way also connects to Enterprise Drive and the Independence Mall in Kingston to the north. Although some sections of Commerce Way provide four lanes, the road should be widened to four lanes to provide consistency throughout the corridor.

Plymouth: Long Pond Road Northbound Ramp at Exit 5

Currently, Long Pond Road westbound traffic from Route 3A and Plymouth downtown accesses Route 3 northbound at a signalized ramp intersection. This ramp creates added delay and lacks sufficient length for vehicles to accelerate as they enter Route 3 northbound traffic. A direct ramp from Long Pond Road westbound would provide more efficient direct access to Route 3 without added delays from a traffic signal. In addition, an acceleration lane can be added to the Route 3 northbound side to receive this traffic and improve safety.

Plymouth: Route 3 Exit 2 at Route 3A at between Hedges Pond Road and Herring Pond Road

This segment of the Route 3A corridor in Plymouth has experienced rapid growth in commercial and residential growth in the recent decade. In addition to heavy volumes within the Route 3A corridor near the Route 3 interchange at Exit 2, because of rapid growth; the Route 3A corridor also contains numerous curb cuts that add an excess of turning movements. Widening Route 3A to a four lane cross section between the Herring Pond Road intersection and the Hedges Pond Road/Old County Road intersection has been included as part of development mitigation, along with the installation of traffic signals at four locations: at the Route 3A/Hedges Pond Road/Old County Road intersection, at the Route 3A retail drive intersection, at the Herring Pond Road/State Road intersection, and at the Route 3 northbound ramps/Herring Pond Road intersection. Although the retail development has been postponed, the potential for development in this are remains. The plan also called for the coordination the signals to minimize vehicle stops and maximize progression along the major road.

Easton: Main Street in North Easton Village

Planned developments in the North Easton Village are expected to affect the traffic circulation and the pedestrian and bicycle traffic in North Easton Village. These developments include the construction of a commuter rail station adjacent to Sullivan Street and Mechanic Street (with the extension of the South Coast Rail), and the Ames Shovel Works residential development, which consists of adding 119 town house condominiums. The Ames Shovel Works development will include on site sewer treatment with extended capacity that will be shared with Main Street businesses. The North Easton Village consists of a mix of uses and includes offices, residences and apartments, historic estates and historic buildings, a commercial area along Main Street (with small shops, offices, and eateries), the public library, the Children's Museum on Mechanic Street. In addition, the village lies within the North Easton National Register Historic District that includes buildings designed by the renowned architect H. H. Richardson. The Town of Easton is planning streetscape improvements, along with pavement improvements and improvements to sidewalks and pedestrian crossings in anticipation of these developments to the village.

Easton: Route 106 at Prospect Street

OCPC conducted a study of traffic operations at this intersection for the Town of Easton, which recommended the installation of a traffic signal in order to mitigate the lack of sufficient gaps in the major street, Route 106, traffic flow that would allow side street traffic to enter the major street safely. The signal would also improve safety at this intersection due to a lack of sight distance at the side street, Prospect Street, approaches. This is a high crash location with a history of serious injury crashes including a fatality. Project is currently under construction by the town of Easton.

Easton: Route 138 at Elm Street

A Road Safety was completed by MassDOT in 2009. A study of operations at this intersection by OCPC for the Town of Easton concluded that deficiencies exist due to poor alignment and heavy peak hour traffic flow on the major street, Route 138, which prevents sufficient gaps for side street traffic to enter the major street. In addition, the study showed that this is a high crash location with a history of serious injury crashes including a fatality. The study recommended the installation of a traffic signal at this intersection.

Easton: Route 138 at Union Street

A Road Safety was completed by MassDOT in 2009. The installation of traffic signals at this intersection has been recommended in the Easton State Numbered Routes Corridor Study conducted by OCPC. The traffic on Route 138 is such that there are few sufficient gaps for side street traffic from Union Street safely enter traffic flow.

Kingston: Route 3A at Route 3 (Exit 9)

This stretch of Route 3A at Exit 9 in Kingston is a major bottleneck in the Route 3A corridor, with signals at the southbound off ramp in close proximity to the northbound on off ramp. These signals should be coordinated to improve progression on Route 3A. In addition, the lack of acceleration and deceleration lanes, along with side streets and a multitude of curb cuts for restaurants and businesses, impede through progression on Route 3A.

Stoughton: Route 27 at School Street

A Road Safety was completed by MassDOT in 2009. OCPC completed a traffic signal warrant analysis in response to a request from the Town of Stoughton in February of 2006. Based on the analysis of traffic data collected at the Canton Street (Route 27) and School Street intersection, geometric improvements and full signalization of this intersection was recommended. Upgrading the intersection with traffic signals was recommended based on a number of factors. The intersection has a crash rate of 2.46 crashes per million entering vehicles; a rate over three times higher (318%) than the MassDOT District 5 average crash rate (0.59) for un-signalized intersections. According to Registry of Motor Vehicles (RMV) crash records, thirty-seven (37) crashes occurred during the three-year period from January 1, 2002 through December 31, 2004. Of the 37 crashes reported in the three-year period, 17 (46 percent) involved personal injury. The majority of these crashes (31 of 37) were cross movement collisions between conflicting vehicle movements from perpendicular approaches. In addition, this intersection experiences very heavy delays on the School Street approaches during both the morning and afternoon peak hours with poor level-of-service (LOS F). Four of the eight warrants for traffic signals from the 2003 Manual on Uniform Traffic Control Devices (MUTCD) are satisfied for this intersection: the Eight-Hour Vehicular Volumes Warrant (Warrant 1); the Four-Hour Vehicular Volumes Warrant (Warrant 2); Crash Experience Warrant (Warrant 7); and the Roadway Network Warrant (Warrant 8).

West Bridgewater: Route 28 at Matfield Street

Based on the Route 28 Corridor Study, which was completed by OCPC in 2006, Matfield Street at Route 28 in West Bridgewater operates under forced flow conditions (LOS "F) during the morning and afternoon peak hours. Currently, this intersection is stop controlled at the Matfield approach, with police officers controlling traffic during the peak hours. The volume of traffic on Route 28 is such that there are few sufficient gaps on Route 28 for side street traffic from Matfield Street to safely enter traffic flow on Route 28. The plan to install traffic signals at this intersection requires MassDOT approval for TIP programming. Signal warrant analysis shows that this intersection satisfies the MUTCD Warrants for Warrant 2, Four-Hour Vehicular Volume. Level-of-service analyses for future 2010 peak hour conditions show that this intersection will operate at LOS "C" during the morning and afternoon peak hours under signalized operation.

West Bridgewater: Route 106

Route 106 provides two lanes of travel within the corridor between Route 138 in Easton and Route 28 in West Bridgewater, with the exception of a short four-lane section over Route 24 between the Route 24 ramps. Very heavy through moving traffic combined with multiple high traffic generating land uses in the area (gas stations, convenience stores, and fast food establishments) creates congested conditions with long delays especially in vicinity just east and west of the Route 24 ramps. Route 106 carries approximately 25,000 vehicles per day east of the Route 24 ramps. These vehicles merge from two lanes eastbound to one lane eastbound just east of the Route 24 ramps. Vehicles on the through lanes waiting to make left turns into side driveways, along with vehicles turning out of side drives, create blockages and hazardous conditions due to turning movement conflicts. The heaviest volumes on Route 106 occur between Route 28 and Route 24. This is also the area with the densest commercial development. Widening Route 106 between Route 24 and Route 28, which has the support of the West Bridgewater Highway Department, along with the application of access management such as consolidating access drives, will improve traffic flow, and improve safety within this corridor. One of the major constraints to widening Route 106 from two to four lanes from the Route 24 ramps to Route 28 is the limitation in right of way. The right of way for Route 106 from the Easton town line to Route 24 is 50 feet, according to the latest MassDOT road inventory. This would leave only one foot on each side of the road for shoulders if the cross section were widened to four twelve foot lanes. An alternative widening of Route 106, to include a three lane cross section, two travel lanes for each direction of travel and a center two-way turning lane (TWTL), should be considered. This alternative can be used to avoid costly right of way takings while providing an additional lane for traffic on Route 106 that will not block the through lane as vehicles turn left into adjacent drives or side streets.

West Bridgewater: Route 106 at Howard Street

The Route 106/Howard Street intersection, which is currently under stop sign control, is located just west of the Route 106/Route 28 intersection at the town center. Traffic on the Route 106 corridor in this section is so heavy that vehicles entering the Route 106 major street from the side streets experience very long delays, especially during the peak hours. The signalization of this intersection is necessary to mitigate impacts from development and allow safe efficient access to and from Route 106. In addition, this intersection lacks pedestrian amenities for people crossing Route 106.

West Bridgewater: Route 106 at Route 28

Improvements to the intersection of Route 106 (East and West Center Street) and Route 28 (North and South Main Street) at the West Bridgewater Town Center are included in FFY 2013 the FFY 2012-2015 Old Colony TIP. The project is currently in the design stage. This intersection carries heavy commuter volumes during the morning and afternoon peak hours, providing access to Route 24 to the west via Route 106, and providing a north south alternative to Route 24 via Route 28, and it also lies at the

center of the Town of West Bridgewater. This intersection operates under forced flow conditions with long delays (LOS "F") during the peak hours.

5.3.5 Highway Corridor Planning and Access Management

Highway Corridor Overlay Districts provides basic guidelines that promote quality design along the most visible and heavily traveled road corridors. The purpose of these districts is to integrate transportation and land use planning. These districts encourage development design that strengthens the physical character of the area; supports the property value and quality of development; sets guidelines and requirements for building and site design, landscaping, and signage; permits safe and convenient transportation access and circulation for motorized and non-motorized vehicles, and for pedestrians; and manages the impacts of commercial and industrial development on adjacent residential neighborhoods.

Access Management is defined as the planning of the design, location, and operation of driveways, median openings, interchanges, and street connections. The goals of access management include conserving highway corridor capacity and improving safety. Access Management applications result in reduced blocking of driveways by queues, better access between neighborhoods and businesses, and safer overall driving conditions. All of these attributes are important to both retailers and the customers they serve within a highway corridor.

Areas within the Region in which highway corridor planning and access management techniques should be a prime focus include:

- Route 28 (Memorial Drive) in Avon from Harrison Boulevard south to Route 37 (Howard Street) in north Brockton.
- Route 123 Belmont Street east and west of Route 24 in Brockton
- Route 123 in Brockton east of the downtown to Abington
- Route 28 through the Brockton downtown (between Route 37 and Plain Street)
- Route 28 in south Brockton (Main Street)from Plain Street to the West Bridgewater Town Line
- Route 28 in West Bridgewater (North Main Street and south Main Street)
- The Route 28 (Bedford Street) Route 18 corridor in Bridgewater from Central Square south to Middleboro
- Route 138 in Stoughton from the Canton Town Line to Stoughton Center
- Route 138 in Easton from Belmont Street south to Depot Road
- Route 106 east of Route 138 in Easton to West Bridgewater Center
- Route 104 east of Route 24 in Bridgewater
- Route 18 in Abington from the Weymouth Town Line to Route 139
- Route 3A in Kingston and Plymouth
- Samoset Street in Plymouth

The basis for employing highway corridor overlay districts and access management techniques should be driven through the public participation process and can be achieved through the local level utilizing:

- Master Plan - The Master plan is the responsibility of the Planning Board and outlines policies for development
- Zoning - The zoning codifies land-use regulations, design standards, and site plan requirements
- Subdivision regulations and site plan review regulate parcel subdivision and encourage developers to include Access Management

5.3.6 Intelligent Transportation Systems

There are a number of ITS initiatives proposed for the long-term within the Region:

Downtown Brockton: Several ITS components are included in the recommended improvements for Downtown Brockton. Traffic signal preemption is recommended for emergency vehicles at all signalized intersections in the downtown area. In addition, it is recommended that all traffic signals be connected within a closed loop system, with a connection to a central monitoring system. Video surveillance at critical downtown area locations is also recommended. The City of Brockton included video surveillance cameras in the recent reconstruction of the Lincoln Street Municipal Parking Lot. Although not specifically recommended in the Brockton Downtown Circulation Study, a Traffic Operations Center (TOC) is recommended in order to provide a mechanism for managing these systems.

Town of Plymouth: The Regional ITS Architecture for Southeastern Massachusetts contains provisions for a traffic management center to be created in Plymouth. The traffic management center would be used to monitor and control the Town's traffic signals, traffic sensors, and variable message signage. The TMC would interface with a variety of equipment and departments, including the Plymouth Police Department; Plymouth Department of Public Works; the Massachusetts Highway Department; GATRA; Plymouth & Brockton Street Railway Company, and other agencies.

Information Kiosk at Route 3 Exit 5 in Plymouth: There are many opportunities for the application of Intelligent Transportation Systems at the new MassDOT Rest Area at Exit 5 on Route 3 in Plymouth. This Rest Area includes a tourist information center, food services, and a terminal for the Plymouth and Brockton Street Railway Company (P&B). Automated kiosks can be used for transit fare sales for P&B, MBTA, and Steamship Authority routes. Variable message signs can be used to inform visitors of traffic conditions on lower Route 3, Routes 6, and 6A, and the Cape Cod Canal bridges. Since the P&B terminal provides connections to Logan Airport, systems informing travelers of flight and gate information, including delays, could be useful.

Brockton Traffic Operations Center: Many cities are beginning to develop Traffic Operations Centers (TOCs) to monitor and manage traffic conditions on their roadways, particularly in downtown areas. These TOCs can be operated either full time or on a part-time, as needed basis. A combination of loop detection and video surveillance systems are used to monitor and assess conditions on the transportation network. The operator has the opportunity to respond to situations with a variety of options depending on the type and severity, including adjusting traffic signal phasing, operating variable message signage, and dispatching resources such a highway maintenance and emergency services as needed. For example, if a crash on Route 27 is causing heavy congestion, an operator from a traffic operations center could place a message on a variable message sign at the Whitman town line to avoid Route 27 and use Route 123 instead. A Brockton TOC could also be very useful in monitoring and managing parking in the downtown area, monitoring the occupancy of parking areas and informing travelers of parking conditions via variable message signage.

Local DPW Maintenance and Construction Vehicle AVL: Many public works and emergency services departments around the country are installing automated vehicle locator systems on their equipment. The systems consist of GPS receivers and transmitters on vehicles that allow the tracking of vehicle activity. Not only are the systems very useful for administrative purposes, but also they exist as an invaluable asset for dispatch efficiency.

6.0 Introduction

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, water freight services and rail freight facilities. Although modes are discussed independently through this chapter, they work together as components of an ever-evolving coordinated intermodal system. For information such as maps, schedules, fares and other service please refer to the *Old Colony Transportation Resource Directory for the Old Colony region,* and/ or the individual transit providers for the most current and up to date information.

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. Concepts such as the placement of transportation services, and/ or the frequency of service are among the deciding factors in whether or not the residents 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 and the coordination of human service transportation efforts. All these challenges are combined with the perhaps greatest of; funding sources for public transit are shrinking.

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, while Figure 6-2 provides an overview of the BAT and GATRA Routes.

Figure 6-1: Passenger Transit Network

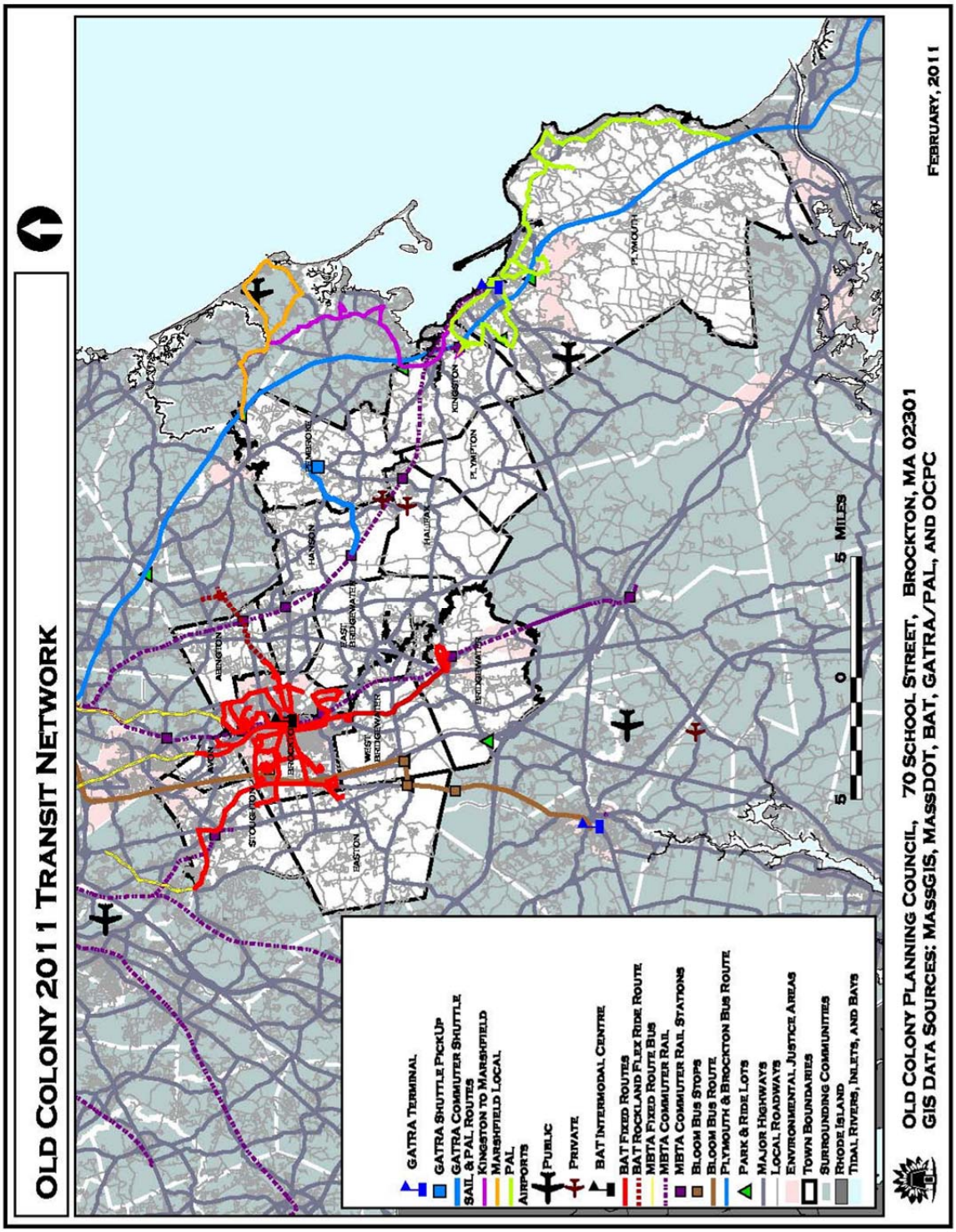
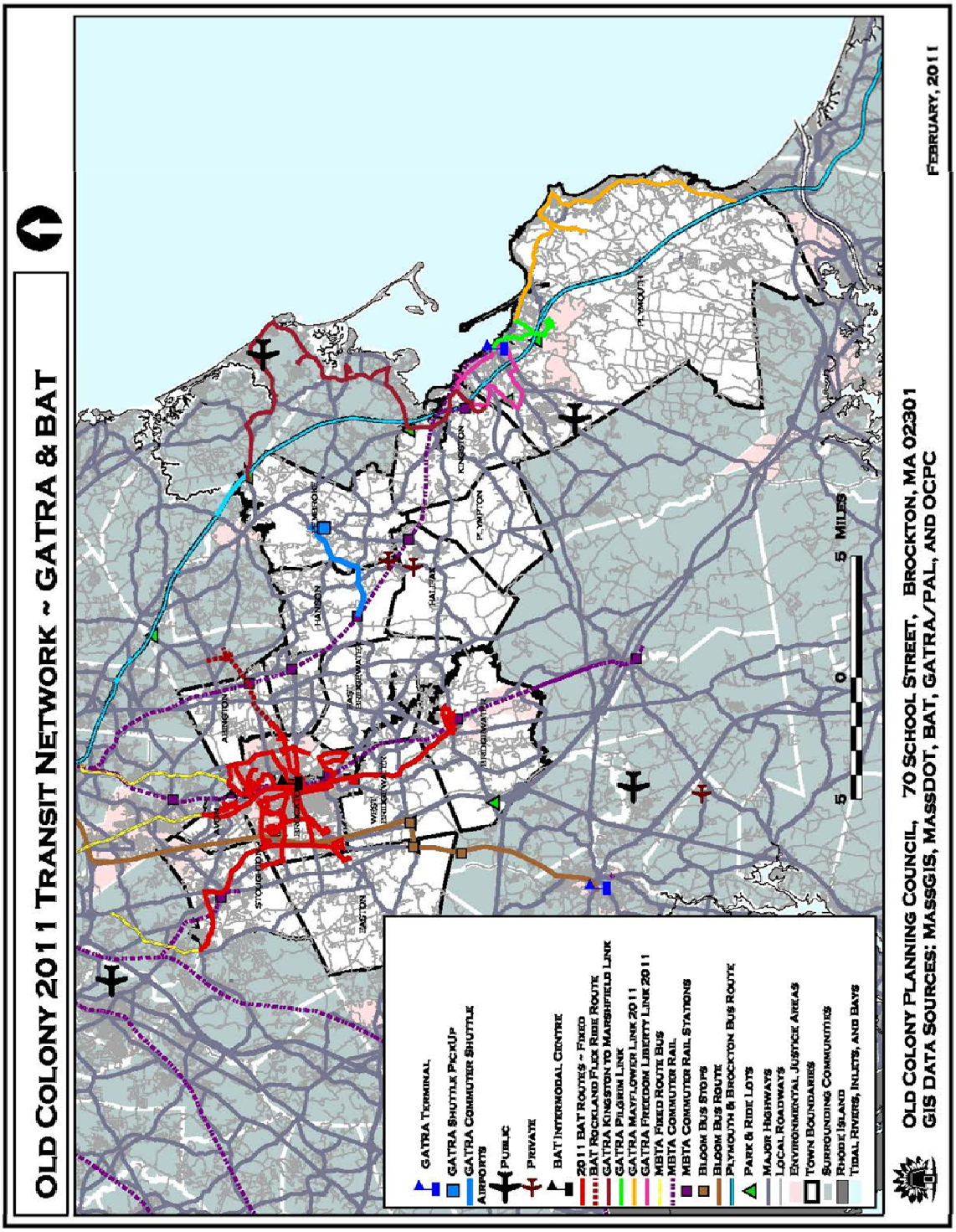


Figure 6-2: BAT and GATRA Routes



6.1 Current Transit Systems in the Old Colony Region

BAT

The Brockton Area Transit (BAT) was established on September 30, 1974 in accordance with the provisions of Massachusetts General Laws, Chapter 161B. BAT is the largest provider of fixed route and paratransit in the region, providing fixed route service to six communities and paratransit service to ten communities in the region. In 2006, BAT completed the BAT Centre and Intermodal Transit Facility, offering parking, administrative services, a connection to bus and taxi service and is in close proximity to the commuter rail.

Fixed route bus service is provided in the region to: Abington, Avon, Brockton, Bridgewater, Easton, and Stoughton, and deviated fixed route service in Rockland. The service in Bridgewater is provided by BAT through the Bridgewater State University (BSU) Transportation Services, which focus on the college community and follows the academic calendar. The BAT system provides transportation to locations such as schools, medical facilities, shopping centers and industrial parks, in addition to intermodal opportunities including commuter rail stations and the MBTA red line. The 2009 National Transit Database for BAT reports that there were 3,031,591 Annual Unlinked Trips, with 10,921 Average Weekday Unlinked Trips, 4,069 Average Saturday Unlinked Trips, and 1,198 Average Sunday Unlinked Trips.

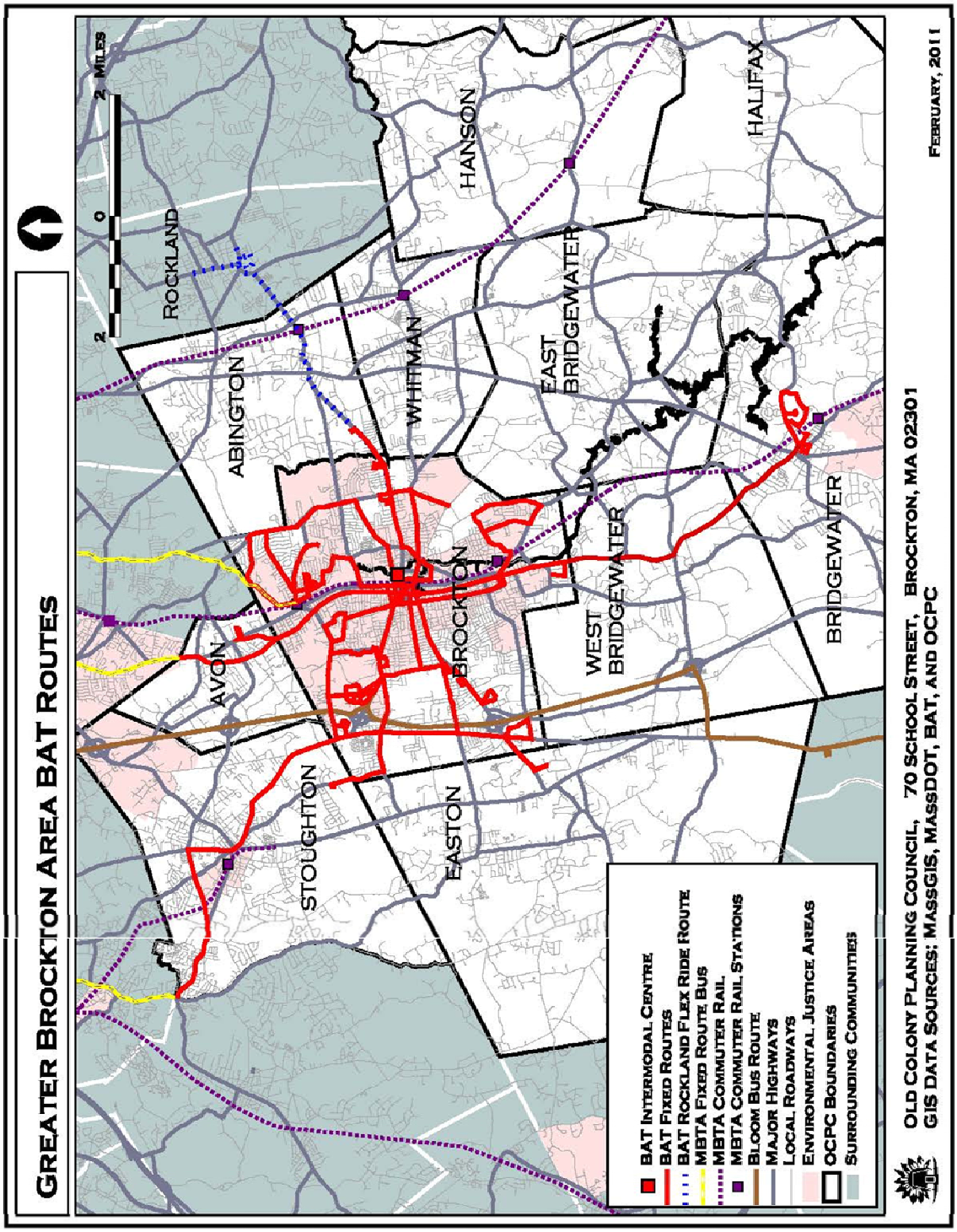
Table 6-1: BAT Routes

Route Number	Area/Description
1	Montello via North Main Street
2	South Plaza/Campello via Main Street
3	VA Hospital via Belmont
4	Westgate Mall via Pleasant
4A	Westgate Mall via North Warren
5	Brockton Hospital via Centre
6	Massasoit via Crescent
8	Southfield via Warren and Plain Street
9	Pearl via West Elm and Torrey Street
10	Lisa & Howard via N Quincy St & Court St
11	Cary Hill & the Village
12	Ashmont
14	Stoughton
MM	Mini-Maller
BSU	Bridgewater State University Routes

BAT provides service on fifteen fixed routes. These routes operate generally from 6:00 A.M. to 9:20 P.M. Monday through Friday and with reduced hours and routes on Saturday and Sunday. Operating 7 days a week, the BAT Centre features access to the MBTA Commuter Rail and the Downtown Brockton Station. Utilizing a pulse system, most of the BAT routes depart from the downtown location of the BAT Centre, allowing riders to transfer from one route to another without significant wait. This method allows a time sensitive system to operate effectively for the system riders. Exceptions to this are: The MM (Mini-Maller), BSC (Bridgewater State University) and Route 14, which operates from the Westgate Mall to Cobbs Corner in Stoughton. However, Route 14 does have four round trips to the BAT Centre Monday

thru Saturday. BAT's most popular route is Route 12 (Ashmont); it had a 2010 average daily ridership of 1,694 riders. Table 6-1 is a summary of the BAT routes. Figure 6-3 is a map of the transit services provided by BAT. For up to date information on BAT's operations and schedules visit www.ridebat.com.

Figure 6-3: BAT Routes



GATRA

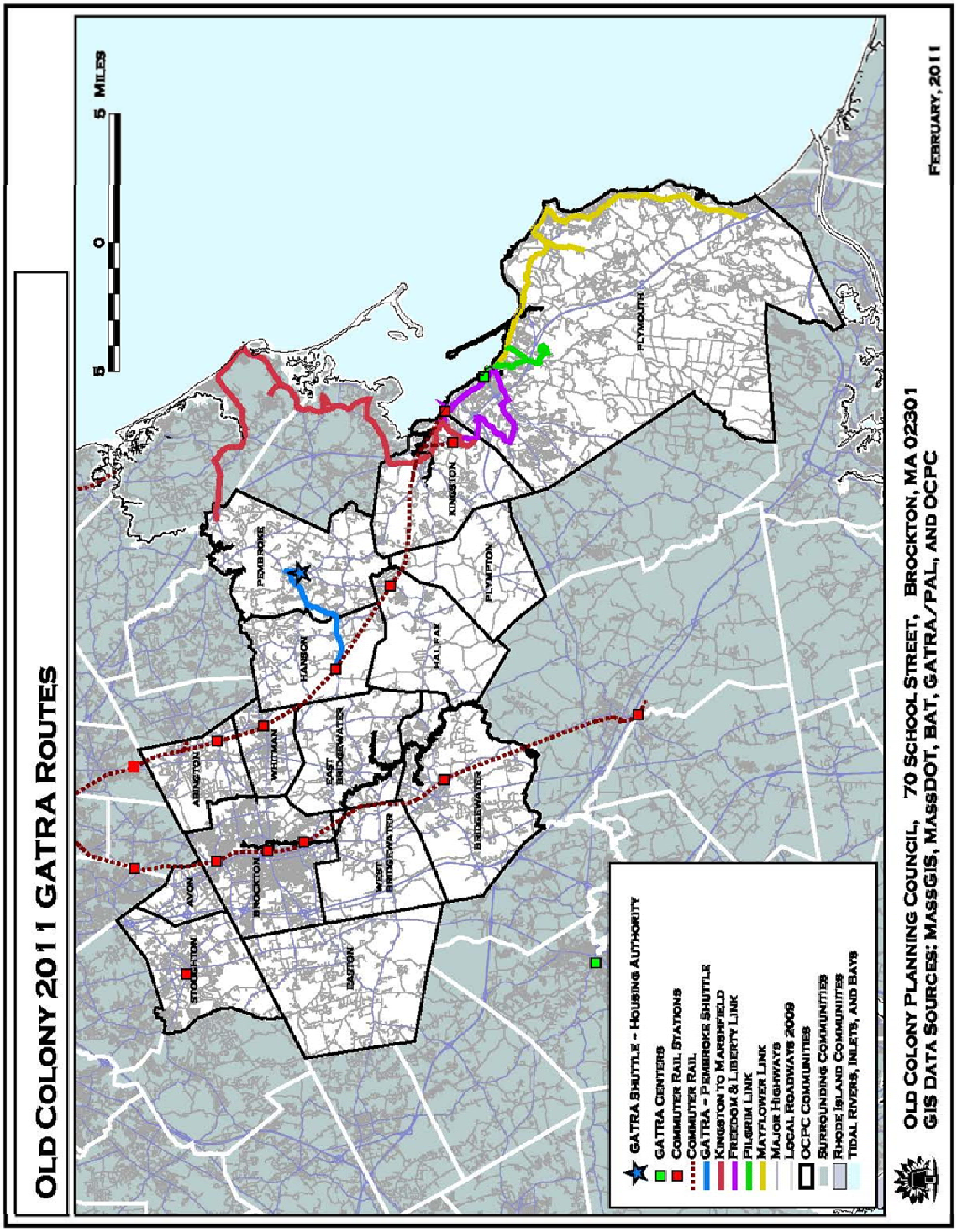
The Greater Attleboro Taunton Regional Transit Authority (GATRA) is an authority made up of seventeen communities of which Kingston, Pembroke, and Plymouth are in the OCPC region. The Plymouth Area Link or PAL system is run under contract by the Plymouth & Brockton bus company for GATRA and consists of four routes, which operate seven days a week from 6:20 AM to 6:10pm Monday- Friday and 8:20AM to 6:10PM on Saturday and Sunday. One of the recent service additions is the service between Pembroke Town Center and the MBTA Commuter Rail Station in Hanson. The 2009 National Transit Database for GATRA reports that there were 924,637 Annual Unlinked Trips, with 3,251 Average Weekday Unlinked Trips, and 1,926 Average Saturday Unlinked Trips. Refer to Figure 6-4 for GATRA's PAL routes and connections to the Plymouth and Kingston Commuter Rail Stations.

GATRA has intermodal connections with the Plymouth and Brockton commuter buses at Exit 5 on Route 3. This connects the local service with an intercity carrier that travels both north to Boston and south to Cape Cod. GATRA is in the process of siting an intermodal transportation center in downtown Plymouth. A siting feasibility study of multiple downtown locations is underway, with the preferred alternative to be identified by year's end.

MBTA Bus

MBTA bus routes 230, 238 and 240 operate in the region. The MBTA also contracts for provision of demand-responsive service for elderly and disabled passengers in their service region. The MBTA 230 bus serving the Montello station and connects to BAT route 10, the bus runs to the Braintree Red Line station, Quincy Adams Station and then proceeds to the Quincy Center station. MBTA bus 238 starts in Avon and connects with BAT route 12 and the Red line at both Quincy Adams Station and Quincy stations. The MBTA 240 bus runs from Avon Center to the Ashmont Red Line station via Crawford Square in Randolph. It operates on the same route as BAT's Ashmont service, route 12. The routes operate seven days a week and on all holidays with more frequent service Monday-Friday.

Figure 6-4: GATRA Routes



Paratransit

Paratransit service means "parallel" service to fixed route, it runs in the proximity of the fixed routes and has the same operating hours. BAT, GATRA offer paratransit services, which is supported by additional human services trips, provided by BAT, GATRA, South Shore Community Action Council and several local Councils on Aging. In accordance to the *Americans with Disabilities Act* BAT and GATRA provides service within ¾ of a mile of fixed transit routes. The MBTA provides service in communities within their region; however, the MBTA does not provide paratransit service in the Region. Figure 6-5 displays the paratransit services area in the Region.

Currently, BAT and GATRA provide pertinent services to local area hospitals for medical patients that require blood dialysis. Additionally, local contract transportation companies also provide paratransit service. Bridgewater State University also offers paratransit service for on campus trips during school hours.

DIAL-A-BAT

BAT's paratransit service, known as *DIAL-A-BAT*, began operation in 1977. As one of the first coordinated paratransit systems in the nation, dial-a-bat provides transportation to disabled and elderly persons throughout BAT's service area as well as to medical facilities in Boston. Coordinated efforts provide service utilizing private operators, councils on aging, taxi, chair car and livery providers. BAT, throughout its network of transportation providers, serves a number of human service agencies and private businesses under contract.

Paratransit service is provided to the elderly (over 65 years of age) and all individuals, regardless of age, who fall within the guidelines, set forth by the Americans with Disability Act (ADA) of 1990. Transportation to Human Service Agencies is also provided and may be arranged through contracting with the Authority. *DIAL-A-BAT* transports approximately 17,000 passengers per month in subscription and dial-a-ride service, using mini-buses specially designed for transporting the elderly and disabled. All buses are equipped with two-way radios and wheelchair lifts.

The *DIAL-A-BAT* program does not have any restrictions on trip purpose and may be used for shopping, medical, social/ recreational or service needs. The only restriction in the program is that trips must start or end in Brockton, Abington, Avon, Bridgewater, East Bridgewater, West Bridgewater, Whitman or parts of Stoughton. *DIAL-A-BAT* also provides service to nearby medical facilities including Good Samaritan Medical Center, Park Medical Associates, Compass Medical, and West Bridgewater Medical Center. Additionally, *DIAL-A-BAT* provides limited service to Boston's medical facilities for treatment not available in the Brockton area. *DIAL-A-BAT*'s regular hours of operation are in Table 6-3.

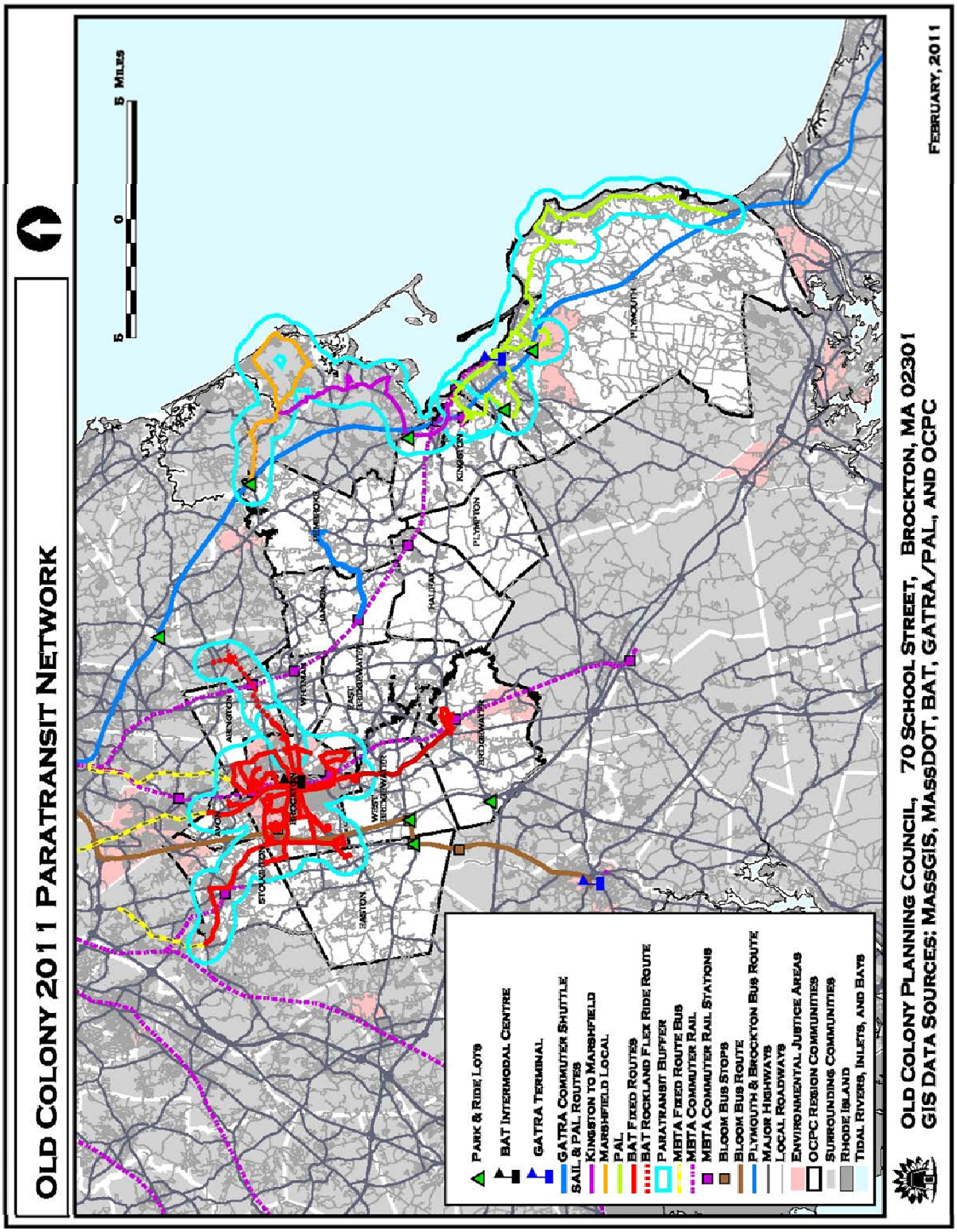
This ¾-mile ADA Paratransit buffer is outlined on Figure 6-4. ADA eligible riders have access to *DIAL-A-BAT* service in the City of Brockton and sections of Abington, Avon, Easton, Stoughton and Whitman. The schedule is for DIAL-A-BAT ADA service hours mirror the BAT fixed route schedule.

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, handicapped, disabled, and low income, participants in SSCAC programs and other state and federal programs. SSCAC fills in the gaps in service for people that often have no other mode of available transportation. They transport people to adult day health programs, dialysis, doctor and dental visits, non-emergency hospital trips, shopping trips, social/ recreational events, employment/welfare to work programs, educational facilities, and service to Metro Boston hospitals. SSCAC has the to service individuals beyond the community boundaries that often are found with other forms of public transportation. SSCAC completes approximately 70,000 trips annually.

Figure 6-5: Paratransit Network



DIAL-A-BAT offers three types of shared ride service designed to maximize utilization of vehicles, reducing costs. All service is door-to-door and, if necessary, the driver assists riders between the vehicle and the door of the entrance to the destination. The types of service similar but fall into three categories depending on the distribution of the service, these services are DIAL-A-RIDE, Subscription, Out-of-Town**.**

Commuter Rail

Three MBTA Commuter Rail lines operate in the Region, Middleborough/ Lakeville, Kingston/ Plymouth, and Providence/ Stoughton lines. The Commuter Rail lines are highlighted in Figure 6-6. The current Commuter Rail lines in the Region handle approximately 11,000 one-way transit trips 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 service to Stoughton and points north, with service Monday-Friday. The Middleborough/ Lakeville line offers service through the OCPC communities of Brockton and Bridgewater. The Kingston/Plymouth line serves the OCPC communities of Abington, Whitman, Hanson, Halifax, Kingston and Plymouth. The Old Colony lines have seven day a week service including all holidays. 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 www.mbta.com.

Commuter Bus

Plymouth and Brockton Street Railway Company (P&B), JBL and Bloom bus companies provide commuter bus services in the region. Plymouth and Brockton (P&B) is a private company offering fixed route long distance service. The routes generally run north-south with the most frequent trips leaving from Plymouth, Kingston, Rockland, and Duxbury, with terminus locations in Downtown Boston and Logan Airport. The service predominantly provides work commuter trips and trips to Logan Airport. P&B also runs trips south through Cape Cod. Trips from Plymouth heading north towards Boston begin as early as 4:05 AM, and the last trip leaving Boston traveling south towards Plymouth is at 11:15PM. Plymouth and Brockton has wheelchair accessible coaches. Some of the older vehicles are not equipped with lifts; however, as buses are replaced, the newly purchased buses are equipped with lifts. On average, Plymouth & Brockton carries about 24,000 people from the region to points in Boston.

Figure 6-6: Commuter Rail & Express Bus

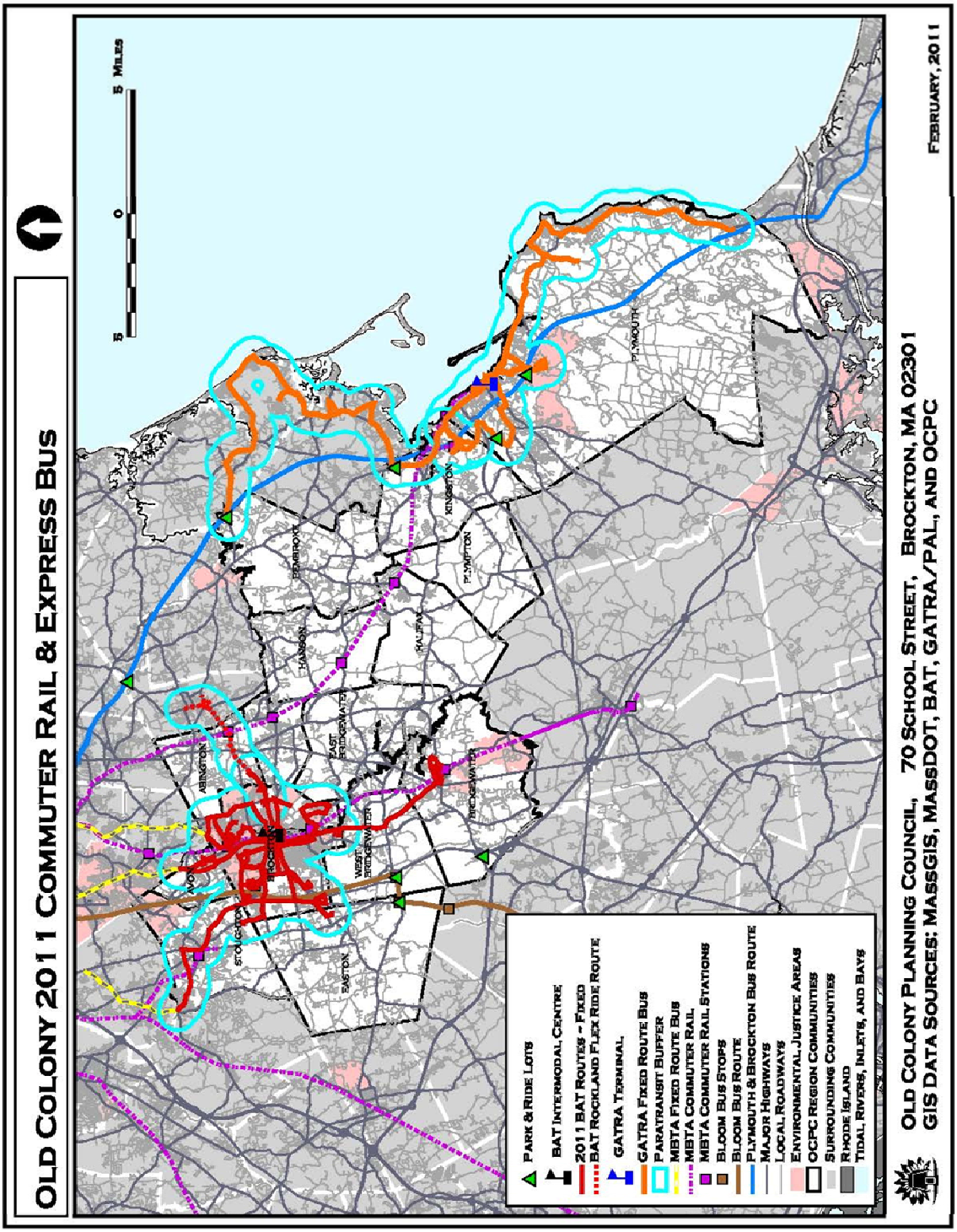
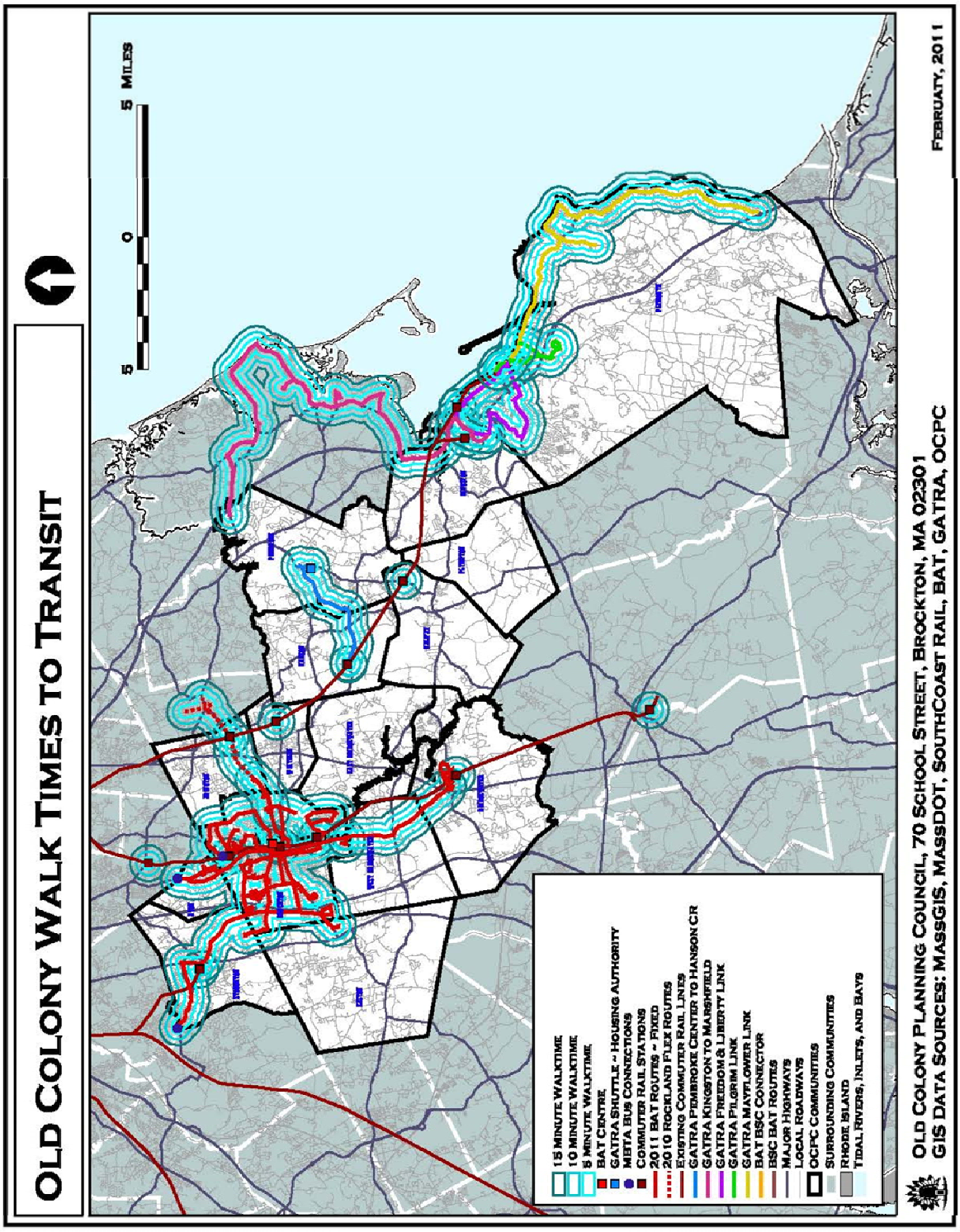


Figure 6-7: Walk Times to Transit



P&B is also the contractor that runs the fixed route PAL and SAIL service in Plymouth and Kingston for GATRA. This relationship with GATRA gives them a greater understanding of public transportation needs in the area for both local and long distance commuting transportation. P&B continually seeks to enhance intermodal connections between the PAL, P&B commuter buses, rail, and other transportation options in the area.

Bloom serves Easton and a MassDOT Park and Ride facility in West Bridgewater. JBL provides Boston commuter service for the towns of Whitman and Abington. The service is generally from points south of Boston to a final destination in Downtown Boston or Logan Airport.

Bloom Bus took assumed operations of the former Interstate Coach in 2004. Interstate Coach provided service from Middleborough, Bridgewater, and West Bridgewater to Boston. Service to the MassDOT Park and Ride locations is most frequent in the peak travel periods. Bloom currently serves the West Bridgewater park and ride on Route 106 next to Route 24. Bloom also has a stop in Easton at the corner of Routes 106 and 138. The Bloom service to Boston will also stop at the Westgate Mall in Brockton by request only. Additionally, Bloom and Dattco offer daily shuttle service from some of the MassDOT Park and Ride lots in the region to the casinos in Connecticut.

Table 6-6 displays the park and ride locations and facilities and services provided.

Table 6-2: Summary of MassDOT Park and Ride Services

Town	Park and Ride Locations	Transportation Services Provided
Bridgewater	Route 104 @ Route 24	Carpool/Vanpool, Free Parking
Easton	Route 106 @ Route 138	Bloom Bus Service, No Parking
Kingston	Route 3A @ Route 53	Carpool/Vanpool, P & B Bus Service, Free Parking
Pembroke	Route 3 @ Route 139	Carpool/Vanpool, Free Parking
Plymouth	Route 3 exit 5 @ Long Pond Rd	Carpool/Vanpool, P & B Bus Service, Free Parking
Plymouth	Route 3 @ Commerce Way	Carpool/Vanpool, Free Parking, Bloom & Dattco Service
W. Bridgewater	Route 24 @ Route 106	Carpool/Vanpool, Bloom Bus Service, Free Parking

Water Transit

One passenger ferry operates in the Region. It provides summer seasonal service from Downtown Plymouth to Provincetown from May 20th to September 4th with a single roundtrip daily from June 17th to September 4th and weekend only service from May 20th to June 16th. The ferry service is run by Captain John Boats. The town of Plymouth recently sponsored a study looking into the feasibility of a commuter ferry from Plymouth to Boston. This study will be discussed further later in this chapter. Other ferries close to the region provide service to Boston and Logan International Airport. Additionally, there are ferries that operate from New Bedford to Martha's Vineyard.

6.2 Current Transit Capacity and Service Standards

Regional Transit Agencies and MBTA Bus

Two regional transit agencies provide most of the fixed routes service in the region. BAT operates

sixteen fixed routes in the Brockton area and GATRA operates the Plymouth Area Link with four routes in Plymouth and Kingston. MBTA also offers limited bus service to the region. Current passenger buses used in the BAT system are listed in Table 6-7.

The service capacity for the two regional transit systems is measured using average daily passengers per route divided by the seating capacity of the vehicles used on those routes. For BAT, the fleet roster from the 2010 Title VI Report was utilized to determine an overall 36 seats per bus seating capacity. Table 6-8 shows this calculation for the BAT system in 2010. The current service level across the system is level A. If the system were to fall to a level D, service needs would not be met and BAT would need to consider adding capacity or finding another way to address the issue. The service standard grade is assigned relative to the seating capacity being used.

TABLE 6-3: BAT Weekday Level of Service

2010 BAT Weekday Level of Service				
Route	Average Daily Passengers	Daily Seats	Passengers Per Seat Per Day	Level of Service for Day
1	751	1,872	0.40	A
2	1,009	2,196	0.46	A
2A	119	1,080	0.11	A
3	1,104	2,196	0.50	A
4	1,054	2,160	0.49	A
4A	820	2,196	0.37	A
5	624	2,196	0.28	A
6	794	2,160	0.37	A
8	748	2,160	0.35	A
9	333	1,152	0.29	A
10	259	1,476	0.18	A
11	223	1,188	0.19	A
12	1,694	3,740	0.45	A
14	203	1,008	0.20	A

*The table represents an entire weekday of service and does not indicate specific run conditions

Commuter Rail

The restored Old Colony Commuter Rail lines have been operating in the region since 1997. The lines have proven to be popular alternatives to other forms of transportation available**.** However, one effect of the popularity of the rail lines has been on the availability of parking and seating on the trains. In October 2005, OCPC conducted a boarding and alighting survey to gauge the current capacity of the peak period Commuter Rail lines. The survey used staff members to count the boarding and alighting of passengers at each station along the rail lines during peak weekday A.M. and P.M. travel periods.

Commuter Rail service by the three branches and stops served in the region is under capacity as of October 2005. Additional boarding and alighting studies are planned in the coming years to monitor the changes in ridership along the three lines. The Stoughton branch was surveyed at the Stoughton station only and does not reflect capacity restraints beyond the Stoughton station. The capacity of the Middleborough/Lakeville line and the Kingston/Plymouth line is least congested at the end of the lines. The congestion builds as the train makes more stops heading towards Boston. This is a result of the majority of ridership being bound for Boston.

Figure 6-8: Old Colony Lines and Stoughton Branch AM Level of Service

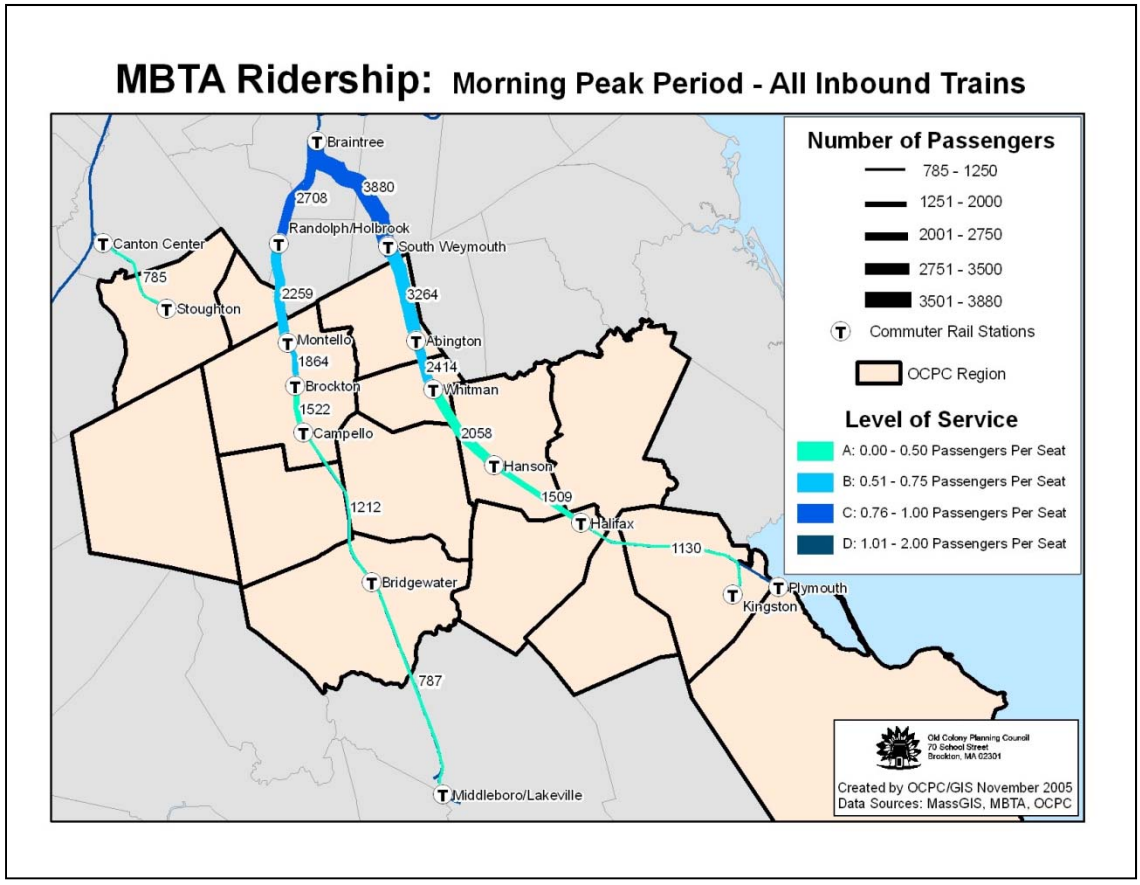
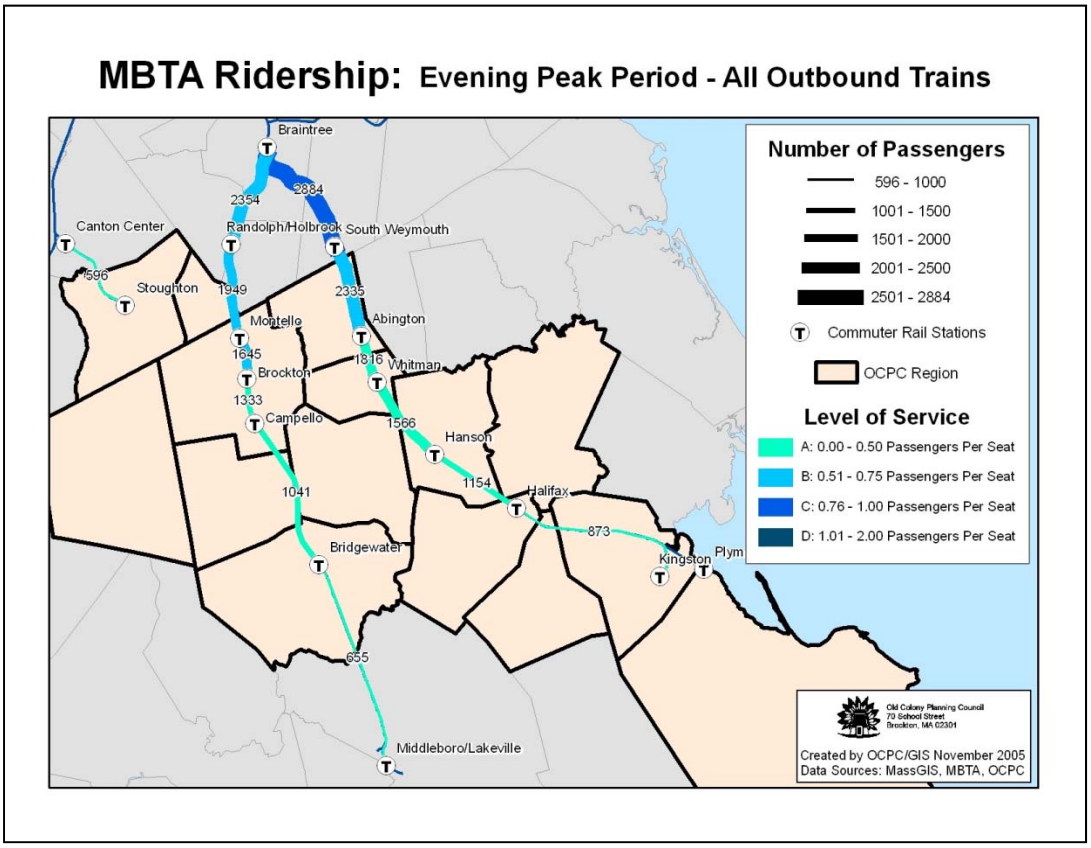


Figure 6-9: Old Colony Line and Stoughton Branch PM Level of Service



The lowest level of service was reached north of the South Weymouth station and the Holbrook/Randolph station. The level of service D indicates that all of the seats on the train are occupied and that standees are present along the segment. The highest levels of service occurred near the terminus stations on each of the three lines. Stoughton station sees a level of service A. One way to improve the level of service is to improve capacity by using more two level passenger cars.

In conjunction with the commuter rail are the parking lots used by many of the people who ride the train. Most of these lots are owned by the MBTA with exceptions being the parking garage at the Brockton station owned by BAT and the parking lot at the Stoughton station operated by the town of Stoughton.

The Table 6-9 shows lot utilization figures for commuter rail parking lots. The ITE publication, Transportation Planning Handbook, describes the effective supply of a lot as the level of occupancy for optimum operating efficiency. The handbook states that a parking facility can be perceived as full at a level that is less than its actual capacity (number of spaces), which is at a range of 85 to 95 percent. Utilizing 85 percent as the threshold for capacity allows for unusual peaks in activity and loss of spaces due to snow cover and/or other special circumstances. The table indicates that all of the commuter rail lots in the region were below the 85 percent parking capacity threshold in October 2010.

Table 6-4: Commuter Rail Parking Lot Utilization Rate

Location	Total Spaces	Spaces	Apr-08	Jul-08	Oct-08	Apr-09	Jul-09	Oct-09	Apr-10	Jul-10	Oct-10
Providence/Stoughton Line											
Canton Junction	**764**	**11**	N/A	N/A	N/A	N/A	N/A	595	536	480	528
Canton Center	**215**	**4**	N/A	N/A	N/A	N/A	N/A	166	94	132	146
Stoughton	**333**	**10**	340	389	370	237	251	219	228	198	236
Middleborough/Lakeville Line											
Holbrook/Randolph	**369**	**14**	307	283	326	229	195	205	195	167	207
Montello (Brockton)	**347**	**12**	242	225	244	131	123	128	143	128	129
Downtown (Brockton)	**267**	**6**	141	128	144	176	201	161	155	159	174
Campello (Brockton)	**535**	**11**	242	242	266	178	143	293	131	128	145
Bridgewater	**504**	**10**	380	348	429	294	216	326	251	195	270
Middleborough/Lakeville	**769**	**14**	630	689	721	528	486	710	438	434	439
Kingston/Plymouth Line											
South Weymouth	**543**	**9**	435	411	418	399	310	290	374	279	286
Abington	**405**	**9**	396	344	404	287	241	242	233	211	233
Whitman	**208**	**7**	185	181	185	115	177	125	145	116	119
Hanson	**482**	**8**	358	322	385	332	209	296	262	232	266
Halifax	**402**	**10**	339	291	326	272	225	237	234	201	226
Kingston	**1,039**	**25**	720	836	738	814	455	405	354	302	324
Plymouth	**96**	**4**	1	4	3	1	3	1	0	1	2
Total Providence/Stoughton Line	***1,312***	***25***	***340***	***389***	***370***	***237***	***251***	***980***	***858***	***810***	***910***
Total Middleborough/Lakeville Line	***2,791***	***67***	***1,942***	***1,915***	***2,130***	***1,536***	***1,364***	***1,823***	***1,313***	***1,211***	***1,364***
Total Kingston/Plymouth Line	***3,175***	***72***	***2,434***	***2,389***	***2,459***	***2,220***	***1,620***	***1,596***	***1,602***	***1,342***	***1,456***
Total All Stations	***7,278***	***164***	***4,716***	***4,693***	***4,959***	***3,993***	***3,235***	***4,399***	***3,773***	***3,363***	***3,730***

Location	Total Spaces	Spaces	Apr-08	Jul-08	Oct-08	Apr-09	Jul-09	Oct-09	Apr-10	Jul-10	Oct-10
Providence/Stoughton Line											
Canton Junction	**764**	**11**	N/A	N/A	N/A	N/A	N/A	77.9%	70.2%	62.8%	69.1%
Canton Center	**215**	**4**	N/A	N/A	N/A	N/A	N/A	77.2%	43.7%	61.4%	67.9%
Stoughton	**333**	**10**	102.1%	116.8%	111.1%	102.1%	116.8%	65.8%	68.5%	59.5%	70.9%
Middleborough/Lakeville Line											
Holbrook/Randolph	**369**	**14**	83.2%	76.7%	88.3%	83.2%	76.7%	55.6%	52.8%	45.3%	56.1%
Montello (Brockton)	**347**	**12**	69.7%	64.8%	70.3%	69.7%	64.8%	36.9%	41.2%	36.9%	37.2%
Downtown (Brockton)	**267**	**6**	52.8%	47.9%	53.9%	52.8%	47.9%	60.3%	58.1%	59.6%	65.2%
Campello (Brockton)	**535**	**11**	45.2%	45.2%	49.7%	45.2%	45.2%	54.8%	24.5%	23.9%	27.1%
Bridgewater	**504**	**10**	75.4%	69.0%	85.1%	75.4%	69.0%	64.7%	49.8%	38.7%	53.6%
Middleborough/Lakeville	**769**	**14**	81.9%	89.6%	93.8%	81.9%	89.6%	92.3%	57.0%	56.4%	57.1%
Kingston/Plymouth Line											
South Weymouth	**543**	**9**	80.1%	75.7%	77.0%	80.1%	75.7%	53.4%	68.9%	51.4%	52.7%
Abington	**405**	**9**	97.8%	84.9%	99.8%	97.8%	84.9%	59.8%	57.5%	52.1%	57.5%
Whitman	**208**	**7**	88.9%	87.0%	88.9%	88.9%	87.0%	60.1%	69.7%	55.8%	57.2%
Hanson	**482**	**8**	74.3%	66.8%	79.9%	74.3%	66.8%	61.4%	54.4%	48.1%	55.2%
Halifax	**402**	**10**	84.3%	72.4%	81.1%	84.3%	72.4%	59.0%	58.2%	50.0%	56.2%
Kingston	**1,039**	**25**	69.3%	80.5%	71.0%	69.3%	80.5%	39.0%	34.1%	29.1%	31.2%
Plymouth	**96**	**4**	1.0%	4.2%	3.1%	1.0%	4.2%	1.0%	0.0%	1.0%	2.1%
Total Providence/Stoughton Line	***1,312***	***25***	***44.6%***	***51.0%***	***48.5%***	***44.6%***	***51.0%***	***74.7%***	***65.4%***	***61.7%***	***69.4%***
Total Middleborough/Lakeville Line	***2,791***	***67***	***69.6%***	***68.6%***	***76.3%***	***69.6%***	***68.6%***	***65.3%***	***47.0%***	***43.4%***	***48.9%***
Total Kingston/Plymouth Line	***3,175***	***72***	***76.7%***	***75.2%***	***77.4%***	***76.7%***	***75.2%***	***50.3%***	***50.5%***	***42.3%***	***45.9%***

Commuter Bus

Commuter bus operations in the Region provide service to passengers as alternative transit means along the major arterials leading into Boston and Logan airport. Most of the passenger traffic on the commuter bus lines occurs during the morning and evening peak periods. However, the P&B lines see more midday and weekend passengers due to the service to Logan airport.

Some of the commuter bus pick-ups are from MassDOT Park & Ride lots in the region. Plymouth & Brockton Street Railway Company runs service from three of the park and ride lots: Rockland at Routes 3 and 228, Kingston at Routes 3 and 3A/53 and Plymouth at Route 3 and Long Pond Road. Additionally, H&L Bloom bus offers service from the West Bridgewater lot at Routes 24 and 106. Three lots without bus service, the Bridgewater lot has the highest percentage of use. This lot used to have bus service but service was cut when demand diminished because of the addition of the commuter rail to the community, though it is still being used for carpool/ vanpool purposes. Table 6-10 provides the lot utilization rate for the park and rides with in the region.

Table 6-5: MassDOT Park & Ride Utilization

Location	Total Spaces	Spaces	Apr-08	Jul-08	Oct-08	Apr-09	Jul-09	Oct-09	Apr-10	Jul-10	Oct-10
Route 24 Corridor											
West Bridgewater - Route 24 @ Route 106	**140**	**0**	153	166	148	146	151	143	142	131	123
Bridgewater - Route 24 @ Route 104	**60**	**0**	58	51	50	29	53	60	41	37	32
Route 3 Corridor											
Rockland - Route 3 @ Route 228	**440**	**9**	307	271	341	349	255	292	304	270	193
Pembroke - Route 3 @ Route 139	**62**	**0**	3	3	6	15	9	11	5	3	1
Kingston - Route 3 @ Route 3A & 53	**80**	**0**	53	96	59	67	44	71	73	43	47
Plymouth - Route 3 @ Route 44 & Commerce Way	**520**	**6**	22	30	21	16	18	21	12	10	11
Plymouth - Route 3 @ Long Pond Road	**200**	**8**	150	138	160	169	143	184	190	165	187
Bourne - Route 3 @ Route 6 (Sagamore)	**377**	**8**	N/A	307	325	330	273	285	291	278	348
Total Route 24 Corridor	***200***	***0***	***211***	***217***	***198***	***175***	***204***	***203***	***183***	***168***	***155***
Total Route 3 Corridor	***1,679***	***31***	***535***	***845***	***912***	***946***	***742***	***864***	***875***	***769***	***787***
Total All Lots	***1,879***	***31***	***746***	***1,062***	***1,110***	***1,121***	***946***	***1,067***	***1,058***	***937***	***942***

Location	Total Spaces	Spaces	Apr-08	Jul-08	Oct-08	Apr-09	Jul-09	Oct-09	Apr-10	Jul-10	Oct-10
Route 24 Corridor											
West Bridgewater - Route 24 @ Route 106	**140**	**0**	109.3%	118.6%	105.7%	104.3%	107.9%	102.1%	101.4%	93.6%	87.9%
Bridgewater - Route 24 @ Route 104	**60**	**0**	96.7%	85.0%	83.3%	48.3%	88.3%	100.0%	68.3%	61.7%	53.3%
Route 3 Corridor											
Rockland - Route 3 @ Route 228	**440**	**9**	69.8%	61.6%	77.5%	79.3%	58.0%	66.4%	69.1%	61.4%	43.9%
Pembroke - Route 3 @ Route 139	**62**	**0**	4.8%	4.8%	9.7%	24.2%	14.5%	17.7%	8.1%	4.8%	1.6%
Kingston - Route 3 @ Route 3A & 53	**80**	**0**	66.3%	120.0%	73.8%	83.8%	55.0%	88.8%	91.3%	53.8%	58.8%
Plymouth - Route 3 @ Route 44 & Commerce Way	**520**	**6**	4.2%	5.8%	4.0%	3.1%	3.5%	4.0%	2.3%	1.9%	2.1%
Plymouth - Route 3 @ Long Pond Road	**200**	**8**	75.0%	69.0%	80.0%	84.5%	71.5%	92.0%	95.0%	82.5%	93.5%
Bourne - Route 3 @ Route 6 (Sagamore)	**377**	**8**	N/A	81.4%	86.2%	N/A	72.4%	75.6%	77.2%	73.7%	92.3%
Total Route 24 Corridor	***200***	***0***	***105.5%***	***108.5%***	***99.0%***	***87.5%***	***102.0%***	***101.5%***	***91.5%***	***84.0%***	***77.5%***
Total Route 3 Corridor	***1,679***	***31***	***31.9%***	***50.3%***	***54.3%***	***56.3%***	***44.2%***	***51.5%***	***52.1%***	***45.8%***	***46.9%***
Total All Lots	***1,879***	***31***	***39.7%***	***56.5%***	***59.1%***	***59.7%***	***50.3%***	***56.8%***	***56.3%***	***49.9%***	***50.1%***

Most of the MassDOT Park & Ride lots lack abundant traveler information, such as current bus

schedules, the type of service, signage guiding commuters to the lot, shelters, and lighting that could benefit the commuters. It is noted the MassDOT Park & Ride located at Routes 24 and 106 in West Bridgewater was expanded by 40 spaces, and the additions of bicycle parking racks, and the provision of a bus shelter in 2010. Congestion Mitigation and Air Quality (CMAQ) funding for this expansion was provided by the Old Colony Transportation Improvement Program (TIP).

Water Transit

Currently, the region's only passenger ferry operates on a seasonal basis. Captain John's Boats in Plymouth operate the ferry. There are no plans to expand this service. However, there are proposals to add new Boston bound ferry service from Plymouth. The plan is discussed in further detail later in this chapter.

Congestion Management Process

Old Colony staff currently maintains a management system of commuter rail, park and ride, and regional transit ridership and capacity data. These data are compared on a regular basis to the capacities of commuter rail equipment, parking area capacity, and bus capacity. From the comparison of data, staff is able to monitor as well as recommend capacity improvements to specific areas of the regional transit system. Old Colony works closely with the transit agencies in the region to coordinate these efforts. One example is the *2005 Commuter Rail Boarding and Alighting Survey*, of which the results were previously highlighted in Figures 6-5 to 6-7.

6.3 Current Transit Safety Systems and Intelligent Transportation Systems (ITS)

Regional Transit Agencies and MBTA Bus

Safety and security are concerns that affect everyone in the region. The text, *Urban Transit: Operations, Planning and Economics,* Vukan R. Vuchic, 2005, outlines 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 centers, 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 has a philosophy similar to Vuchic, believing safety and security are 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, the review of trends on complaints and physical damage so they can be informed and up to date on trends in the system.

Human Resource Protection and Safety

BAT and GATRA provide extensive service in the region. BAT and GATRA both operate with human resources to include employees and passengers. For these agencies, the protection and safety of their passengers is the first priority in their operations.

BAT and GATRA have contingency plans and local interagency agreements to coordinate emergency and disaster response plans. Examples include meeting evacuation requirements for local elderly populations and blood dialysis operations. The agencies also plan to have an important role in the Pilgrim Nuclear Power Plant emergency response plan.

BAT's Intermodal Centre represents a confluence of transportation resources, such as buses, trains, taxis and parking, at a single location. The safety and security of the passengers at the Intermodal Centre and along BAT routes in the communities of Avon, Abington, Brockton, Easton, and Stoughton is a tremendous responsibility. This responsibility is passed to the employees and riders of BAT through an active passenger education program. Programs such as Transit Watch encourage both passengers and employees to become aware of their surroundings and report suspicious behavior or activity. Additional employee-training programs are updated annually through the BAT safety and training manager.

Education

BAT's education efforts primarily focus on employee training. Efforts include the distribution of emergency preparedness training materials, safety education classes and classes on the handling of passenger during an emergency or disturbance.

Local Community Training

BAT provides evacuation services to the local communities in its service area as well as services to the Pilgrim Power Plant in Plymouth. Training on equipment familiarity is conducted with local fire departments within the fixed route service area. Fire department personnel are trained in responding to bus accidents and to medical emergencies aboard fixed route and paratransit vehicles.

Physical Resource Protection and Safety

BAT's physical resources include over one hundred vehicles, three buildings, one parking structure and several bus shelters along fixed transit routes in Brockton. The safety of passengers at these facilities requires vigilance and protective actions to reduce the likelihood of incidents harming passengers and employees alike. Police patrols the BAT Intermodal Centre.

BAT has also hosted the National Transit Institute (NTI) Terrorist Activity and Recognition and the Workplace Safety and Security classes for its employees.

Intelligent Transportation Systems

ITS systems used by BAT include surveillance equipment on buses and property, talking buses (2005 and newer series buses), interoperable fare cards, smart parking pay cards used at the parking facility, monthly local and Ashmont passes and reduced fare passes, in addition to the exploration of new technologies such as AVL and signal priority.

Commuter Rail

Urban Transit Operations, Planning and Economics, 2005, outline some key components to focus on for safety when it comes to rail transportation. These components are:

- Fully protected right of ways to help prevent collisions with vehicles or pedestrians
- Track signals that ensure fully protect paths for trains through switches and conflict points
- "Dead man" safety device on trains
- Vehicles that can withstand high impact collisions and provide protection to passengers
- Up to date communication systems, and continually supervised operations

Massachusetts Bay Commuter Railroad operates the commuter rail lines for the MBTA. As the operator, they work in cooperation with MBTA to ensure that these safety guidelines are being met.

Transit Police

The Massachusetts Bay Transportation Authority maintains a Transit Police force for its service area. The Transit Police actively patrol, investigate and prevent crime. The Transit Police work with local police on identifying concerns of safety and security.

Transit Police are also responsible for responding to incidents along the right of way involving property or equipment of the MBTA. Local police departments respond as well. Due to the proximity to the incidents, local police departments respond to a majority of incidents.

Education

Education efforts include training local community resource police officers and Operation Lifesaver training outreach efforts. Operation Lifesaver focuses on protecting the public from the dangers of railroading. Efforts include education of K-12 students on how to act at railroad grade crossings, and the railroad right of way. The training also includes lessons for motor vehicle operators, and local police and fire officials. It can be accomplished by requesting an Operation Lifesaver instructor or by volunteering to teach the courses through the website at www.oli.org/index.php.

Local Community Training

Local community training efforts can be accomplished through coordination with the MBTA Railroad Operations Department through accident response and disaster response training. The exercises allow local law enforcement officials, emergency services coordinators and local fire officials to coordinate response plans with the MBTA. For example, an exercise held in Kingston in October of 2006 simulated the response necessary for a collision causing derailment and injury to customers and causing a fuel spill requiring hazardous material response as well. Further exercises can be coordinated through the MBTA's Railroad Operations Department.

Physical Resource Protection and Safety

The safety of the railroad right of way, employees, passengers, property and equipment is critical to maintaining fluid operations. The MBTA Commuter Rail operates over large lengths of relatively

unprotected right of way. The Transit Police Department patrols the right of way on a regular basis. However, many local police departments report and enforce safety laws around the right of way. Figure 5-6 displays the locations of railroad and pedestrian grade crossings in the Region.

All of the crossings are equipped with audible and visual warning systems for motorists and pedestrians. However, the pedestrian crossings within the stations and a single crossing in East Bridgewater do not have physical barriers to protect vehicles or pedestrians. The single crossing in East Bridgewater is an unused spur that serves the former Shaw's warehouse and is not owned by the MBTA. The pedestrian grade crossings are located at the Montello, Brockton, and Whitman and Halifax stations. An example of a typical commuter rail grade crossing design can be found in Figure 6-10.

Other physical barriers include fencing, soundproofing, jersey barriers and gates to reduce the potential for right of way intrusions. Examples of fencing and soundproofing can be found in Figures 6-11 and 6-12. These barriers require regular upkeep to maintain their ability to deter unauthorized activates along the right of way. The MBTA stations and layover yards are lighted during times of darkness with additional security protection added to the layover yards.

Figure 6-10: Commuter Rail Grade Crossing Design

Figure 6-11:
Commuter Rail Sound Proofing

Figure 6-12:
Commuter Rail Protective Fencing

Intelligent Transportation Systems

Intelligent Transportation Systems are an active part of present day Commuter Rail operations. Examples of ITS include passenger message signs indicating transportation information to waiting passengers, *1 for cell phone users which transfers to the smartraveler travel information system, and the MBTA transit updates website at www.mbta.com.

Human Resource Protection and Safety

P&B, JBL, Bloom all provides driver training for emergency scenarios. P&B participated in a disaster drill at the Kingston Commuter Rail station in October 2006. The drill involved a simulated bus accident with injured passengers. The training involved the MBTA, several local fire and police departments and P&B. Training exercise provide opportunities for employees and management to learn how to respond to unexpected events. The training scenarios also provide for better passenger safety and security by enhancing the employees' understanding of safety related issues affecting the transit services.

P&B is a component of local emergency plans. Service maybe needed for an evacuation of the area and P&B is part of the response team for that. P&B is also part of the system to help the area deal with pandemic situations, transporting people either to a central location to receive help, or by using the buses in a central location, as in the dispersal of vaccines.

Education

P&B, JBL and Bloom have active employee safety programs. These programs provide up to date education efforts to improve employee knowledge of safety and security related matters. For example, P&B runs programs yearly with a mixture of new topics and fresher courses. Training could be on topics such as customer service, ADA, safety and security, new technologies, idling, and sensitivity training.

6.4 Present Freight Transportation Network

Rail Freight System

The current rail freight network includes CSX Transportation and Bay Colony Railroads. The CSX Transportation Company operates along the Middleborough Secondary and the Bay Colony Railroad along the Plymouth branch. Each of the railroads has operating rights but the Massachusetts Bay Transportation Authority owns the right of way. CSX also operates along the Stoughton Branch, serving a lumberyard as required from the Readville Yard in Boston.

Freight operations consist of a single roundtrip local train that serves customers in Brockton and Avon. The train originates from the Middleborough Yard and operates to Braintree five days per week. It interchanges with the Quincy Bay Terminal Railroad to pickup fertilizer from the Massachusetts Water Resources Authority Plant in Quincy.

Water Freight System

Water freight operations in the region are limited. Operations are out of the port of Plymouth and consist of fish products. Between 1972 and 1977, the total tonnage of waterborne freight utilizing local facilities declined significantly, but has stabilized since. The stability of total tonnage exhibited in recent years stems directly from the expanded volume of dogfish and shellfish passing through the port. Reliable Fish Company operating on the town wharfs largely purchases the fish products. Much of the fish and shellfish are ultimately exported overseas. In addition, another three or four companies come onto the pier to truck fish and lobster.

Current Freight Capacity and Service Standard

There is limited freight service demand in the region. Some examples of the rail fright you will find in the region would be Cohenno, Inc on the Stoughton branch, which currently receives carloads of building materials from around the nation and Canada. Other examples on the Middleborough/Lakeville Branch, Browning-Ferris Industries (BFI) in Brockton ship carloads of bailed recyclables from their recycling center on Mulberry Street; National Grid receives carloads of electric light poles from the South; Bay State Gas receives carloads of liquefied propane from New York, and Canada at their siding off of Oak Hill Way; and, Trojan Recycling on Forest Avenue in Brockton uses freight rail to ship out trash and demolition material. Champion City Recovery in Brockton receives wood waste from presorted construction and demolition (C & D) debris by tractor/trailer, then they use rail to ship the waste out of the location.

There are no container or truck piggyback (COFC/TOFC) facilities in the region. Cohenno, Inc. in Stoughton and Massachusetts Electric receive freight by rail for regional and local shipment by truck. BFI in Brockton receives truckloads of bailed recyclables for shipment by rail. Containers on flatcars are loaded with pelletized fertilizer, which is produced at the Massachusetts Water Resources Authority's (MWRA) sludge-to-fertilizer facility at the Fore River Staging Area (formerly the Quincy Shipyard). Pellets are shipped by rail to several locations within the continental United States. The Quincy Bay Terminal Company (QBT) a short line freight railroad provides the freight rail transportation services between Quincy Point and South Braintree where QBT interchanges with CSXT and continues on the Middleborough/Lakeville corridor on their way to the South.

Current Freight Safety Systems and Intelligent Transportation Systems

Rail Grade Crossing Safety

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 graded crossings in the area were upgraded and enhanced, in addition to pedestrian walkways and secured fencing to discourage people from crossing.

Operation Lifesaver

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 Es:"

- 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

Almost fifteen years have passed since the restoration of the Old Colony line and Operation Lifesaver remains active in the region. Teachers and safety officers in the area do currently educational outreach and audiences range from young to old. Operation Lifesaver customizes presentations to the group and will even run specialized training sessions for groups such as an emergency response team, or school bus drivers. Anyone who is interested in running training sessions can do so after some training with operation Lifesaver. For more information, please refer to www.oli.org.

Right of Way Security Measures

Freight traffic has been able to benefit from the enhancements to the right of way with the reintroduction of the Old Colony Commuter Rail. Enhancements such as security fencing and soundproofing make the operation of rail in the area safer for both the train operators and the members of the communities that the rail operates in.

6.5 Present Air Transportation Network

Air Passenger System

Within the Region, there are three airports. Aviation services are provided at the Plymouth Municipal Airport and two private airports: Halifax and Hanson (refer to Figure 6-1 for locations). 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.

Five other municipally owned airports are located in communities adjacent to the region: Mansfield, Marshfield, New Bedford, Norwood, and Taunton. Only New Bedford has scheduled passenger service and none of the facilities have scheduled freight service, although helicopters based at Norwood Airport are utilized for the delivery of FedEx packages to various destinations. One other facility, the South Weymouth Naval Air Station, is closed and the reuse plan excludes plans for aviation activities.

In this section, the existing conditions of the region's airports are discussed, as well as future development, adjacent airport facilities and recommendations.

Plymouth: Municipal

Plymouth's airport is the only publicly owned airfield in the region. The Town of Plymouth owns the facility with no scheduled passenger or freight service. 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 40 hangars and aviation fuel and repair services. In addition, the airport is the headquarters to the Massachusetts State Police Air Wing and the Plymouth County Fire plane. Boston Medflight helicopters is also an active tenant of the airport with a average of about 4-6 flights per day to support the emergency medical needs of Plymouth area residents. The airport recently completed an extension of its two paved runways to a size of 4,350' x 75' and 3,350' x 75' respectively to better accommodate corporate aircraft.

Halifax: Monponsett 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. There is no scheduled freight or passenger service and air traffic growth is minimal. The facility has no expansion or improvement plans at this time.

Hanson: Cranland Airport

The nearly adjacent Hanson airport is privately owned and publicly accessible. 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. There is no scheduled freight or passenger service. There are no plans for expansion of services or capital improvements at this time.

New Bedford: Regional

Owned by the City of New Bedford, there is scheduled passenger service, but no scheduled freight service. Two paved runways each measure approximately 5,000' x 150'. A proposed project to expand one of the paved runways an additional 3,000' is currently undergoing the environmental review and permitting process. Sewer and natural gas infrastructure was recently installed around the airport and the terminal was recently renovated. Passenger flights depart hourly for the islands and the airport hopes to provide regular passenger service to and from New York City and scheduled freight service in the future. New Bedford reports a sharp increase in use of its facilities over the past few years. Cape Air is the primary commercial operator at the airfield. The U.S. Customs Service operates on an on-call basis for any international flight operations.

Taunton: Municipal

Owned by the City of Taunton, there is no scheduled passenger or freight service. The airport recently extended its gravel and turf runway from 1,550' x 150' to 2,000' x 150'. The 3,500' x 75' paved runway was repaved in 1998. A security project is underway to enclose the perimeter of the facility with

fencing. A new flight school opened at the airport in 1999, which serves Bridgewater State University's aviation program. More than $3 million in improvements have been completed since 1996.

Weymouth: South Weymouth Naval Air Station

A reuse plan is in place and undergoing implementation for the redevelopment of the former base, the federal government in 1996 officially closed the aviation function of the base. The base was closed in 1997 and the U.S. Navy is in the process of transferring the land to stakeholders. The reuse plan does not include aviation activities or services.

Air Freight System

Currently there are no airfreight services available in the Region.

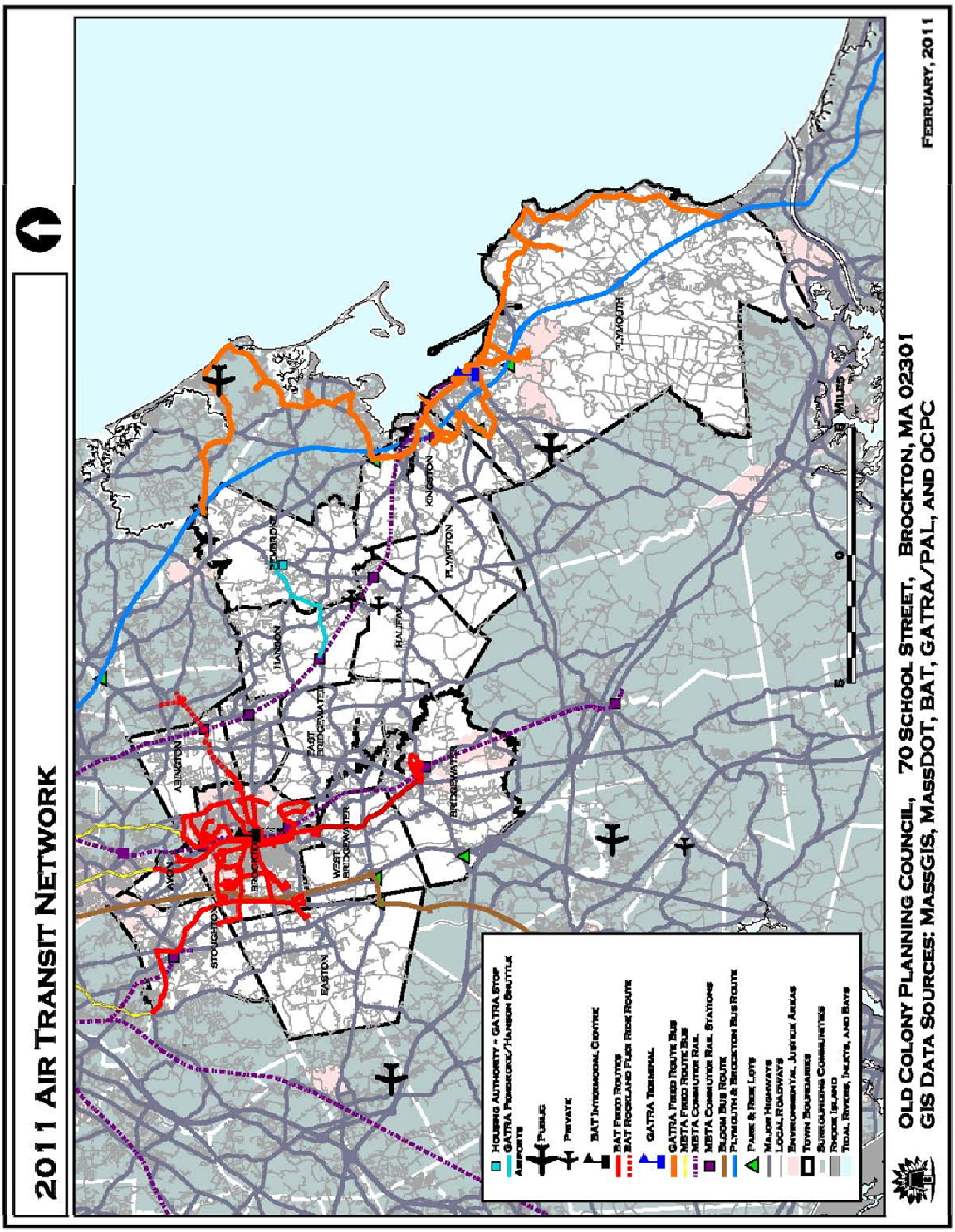
Current Air Transportation Capacity and Service Standard

Plymouth Municipal Airport is the largest in the region and is a midsize airport compared to other airports in the state of Massachusetts. The airport is open to the public and is municipally owned; the airport has no passenger or freight service. The airport has about 75,000 movements a year; approximately 50% of that traffic is from the flight schools. The Plymouth Airport has gradually increased in traffic. The airport commission takes care in selecting expansion opportunities to ensure that they will fit in with the profile of the neighborhood. The airport currently has 40 hangers on premises; they are leased out to a mix of aviation and non-aviation related business. Airport officials report a steady increase in demand, particularly with regard to hangar space, over the past few years.

Current Air Transportation Safety Systems and Intelligent Transportation Systems

Plymouth Airport has implemented the safety and security measures as required by the Massachusetts Aeronautics Commission (MAC). The airport has an emergency preparedness plan and is currently working on updating its master plan. The airport is home to Boston Med flight, Massachusetts State Police Air Wing and the Plymouth County Fire Plane, all of which provide vital services to the area in terms of safety and security. The airport premises are secured by fencing and the airport utilizes employee badges to identify employees of the airport and the business that are part of the facility. Eighty percent of planes are in hangers, which enhances the security of the airport. Many of the hangers are equipped with security systems.

Figure 6-13: Air Transit Network



6.6 Transit Connectivity Opportunities

Human Services Transportation Coordination

SAFETEA-LU requires MPO along with regional transit agencies and human service providers to coordinate human service plans in order to be funding eligible for certain funding programs. The plan must be in place to receive Federal Transit Administration funding in sections 5310 (Elderly Individuals and Individuals with Disabilities Program), 5316 (Job Access and Reverse Commute or JARC), 5317 (New Freedom Program).

A coordinated human services plan enables the region to prepare for the future; a few statistics to consider:

- According to the American Association of Retired Persons (AARP) in the next 15 years the population of people aged 50-60 will increase by 21% and the population of people older than 65 will increase by 33%.
- Ten states will have more Medicaid eligible seniors than school aged children.
- In 2003, about one in seven licensed drivers was 65 and older. By 2029 when the last of the baby boomer generation turns 65, the proportion will be closer to one in four.
- The average male will outlive his driving abilities by six years and the average female will outlive hers by 10 years.
- Nearly three-quarters of people surveyed aged 50-74 relied mostly on driving, but that figures dropped significantly after age 75.
- Persons who are dependant on transportation are six times more likely to miss doing something they would have liked to do because they do not have transportation.
- Sixty percent of seniors said that there was no public transportation within a 10-minute walking distance of their homes.

The human services transportation coordination provisions of SAFETEA-LU aim to improve transportation services for persons with disabilities, older adults, and individuals with lower incomes by ensuring that communities coordinate the transportation resources provided through multiple federal programs. Coordination between organizations such as BAT, GATRA, MBTA, local Councils on Aging, the South Shore Community Action Council, and other local human service providers in the Region will enhance transportation access, minimize duplication of services, and facilitate the most appropriate cost-effective transportation possible with available resources. The plan is to be developed by a process that includes representatives of public, private and nonprofit transportation and human services providers and participation by the public.

The focus of the plan involves the centralization of human transportation service centers to provide a seamless one-stop system for human service customers. Currently, there are several methods for obtaining human service transportation services. For example, a single call center with a single outreach element will enhance the ability of a growing elderly and disabled population to access fair and equitable transportation services.

Community Transportation Association of America has outlined guidelines to consider when making a human services coordinated plan:

- Assess transportation needs for individuals with disabilities, older adults and persons with limited income.
- Inventory available services to identify areas of redundant service and gaps in service.
- Develop strategies to address the identified gaps in service.
- Identification of coordination actions to eliminate or reduce duplication in services and strategies for more efficient utilization and recourses.
- Prioritization of implementation strategies.

As a starting point Table, 6-11 is a summary of transportation options in the area, including human services transportation.

Table 6-6: Summary of Human Services Related Transit Resources in the Region

Community	Services	Notes about services	Fixed Route Services	Commuter Rail Station
Abington	Dial-A-BAT, COA, Fixed Route, Commuter Rail	The COA uses Dial-A-BAT first and COA vans for all other things, such as: shopping trips and trips in Abington and surrounding towns. The town has a commuter rail station with no fixed route service to the station.	Limited, BAT Route 5 to Wal-Mart in Abington	YES
Avon	Dial-A-BAT, COA, Fixed Route	The COA uses COA van first then Dial-A-BAT, trips to Avon and surrounding towns and the COA has a morning church trip.	Limited, BAT Route 1& Route 12	NO
Bridgewater	Dial-A-BAT, COA, Fixed Route, Commuter Rail	Dial-A-BAT for most trips, COA van is for limited use such as: prearranged group trips and transportation to the Tuesday luncheon. Commuter Rail station is serviced by BSC transportation but it is not open year round.	BSU operates about 9 months out of the year.	YES
Brockton	Dial-A-BAT, SSCAC, Fixed Route, Commuter Rail	Dial-A-BAT is the primary provider of trips for both recreation and medical purposes. All three commuter rail stations have fixed route services, the Brockton station is adjacent to the BAT Intermodal Centre	Extensive BAT coverage	YES (3 stations)
East Bridgewater	Dial-A-BAT, COA, SSCAC	Dial-A-BAT for most trips, COA van is for prearranged group trips	NO	NO
Halifax	COA, SSCAC, Commuter Rail	COA vans are for individual and prearranged group trips, destinations in town and surrounding communities and trips to Boston for medical purposes. The COA also has a Wednesday morning church trip. The commuter rail station in town has no fixed route service to it.	NO	YES
Hanson	COA, SSCAC, Commuter Rail	COA trips are to support programs at the center and adult day care programs, because of limited resources the COA depends on surrounding COA's for support. The commuter rail station has no fixed route service to it.	NO	YES

Table 6-6: Summary of Human Services Related Transit Resources in the Region Continued

Community	Services	Notes about services	Fixed Route Services	Commuter Rail Station
Kingston	Dial-a-ride, fixed route, SSCAC, Commuter Rail	COA service can be used for: shopping, medical appointments, social and recreational purposes. The commuter rail stations has fixed route service available to it on a limited frequency. The community also has limited fixed route service.	GATRA	YES
Easton	COA, Dial-a-ride, Fixed Route	COA provides medical, shopping, trips around town and surrounding communities. Services also available through the DIAL-A-BAT	Limited, BAT Route 9	NO
Pembroke	COA, SSCAC	COA provides trips for food shopping, lunch, activities, mall, medical. Recently GATRA had begun offering dial-a-ride services in the community	GATRA	NO
Plymouth	Dial-a-ride, fixed route, SSCAC, Commuter Rail	Transportation for both senior and ADA service is provided by Churchill Transportation. Services include shopping trips, medical trips, social and ADA required rides. The physical geography of Plymouth makes it difficult to offer more than a two days of service to non ADA riders in the southern part of town. The commuter rail station has non-peak train service and fixed route service available to it on a limited frequency.	GATRA	YES (4 daily non-peak trains)
Plympton	SSCAC	Plympton is currently trying to find a way to get cost effective service to their senior population.	NO	NO
Stoughton	Dial-A-BAT, COA, Fixed Route, Commuter Rail	COA provides service to Stoughton and surrounding towns, medical, shopping trips on Tuesday. DIAL-A-BAT service is also available.	Limited, BAT Route 14 & Mini Maller	YES
West Bridgewater	Dial-A-BAT, COA, Commuter Rail	Dial-A-BAT for most trips and COA van will take people to local destinations.	NO	NO
Whitman	Dial-A-BAT, COA	Dial-A-BAT for medical and individual trips, COA will arrange group trips to different shopping areas and senior activities the COA van is not for individual trips	NO	YES

COA = Council on Aging

SSCAC = South Shore Community Action Council

In addition to the challenges of coordinating human services in the region, there is also the challenge of getting individuals that have been independent all of their lives to surrender their licenses and embrace the public transit options around them. In developing a coordinated plan; attention will need to be given to these people and as this population grows the demands that they will require on transportation services. Finding solutions that provide these individuals with the flexible transit options, maintaining their own independence, but keeping them and the community safe should be the ultimate goal.

BAT - Examples of gaps in services

The DIAL-A-BAT covers the entire city of Brockton, as well as limited service to the Towns of Abington, Avon, Bridgewater, East Bridgewater, West Bridgewater, Whitman, Stoughton, and Easton. There is a need for transit beyond the current service area, specifically with the DIAL-A-BAT service. BAT addresses ways to increase service to underserved populations, extend hours of operation, and develop new routes while continuing running service that is financially responsible. Capital purchases, including technology, can increase BAT's ability to be efficient with resources, and provide a better transportation service as well.

A study completed for MARTA in 2005 identified what the baseline of services would be for each of the regional transit authorities based upon regional characteristics. This study identified that BAT, as an urban transportation system needed to increase service by approximately 33,000 hours to provide the base level service need by the communities in the transit authority area and an additional 17,000 hours of service to meet most of the local needs for transit service. The baseline service for an urban system is defined as 15 to 30 minute head ways in the peak period and 30 to 60 minute headways in a base period, with service running from 6 AM to 10PM on the weekdays and 7AM to 8PM on the weekends. This baseline service addresses service previously eliminated areas and where there has been growth in the demand for transportation in that region. Additionally, any new fixed route service would also need the complementary paratransit buffer of ¾ of mile incorporated into the existing paratransit network. Other suggestions made by this study were to bring the weekend operations of DIAL-A-BAT back in house and to add enhanced connecting service to the MBTA commuter rail stations.

GATRA - Examples of gaps in service

The fixed route service recently changed to a radial design originating from one central point, Memorial Hall in Plymouth, and to pulse out into the Plymouth and Kingston area. The PAL service and the OWL service in Wareham, although nearby, are not connected. The PAL service in Plymouth and Kingston covers a large area, with limited frequency, making it challenging for riders to utilize public transportation for commuting to work and medical appointments. Additionally, because of the amount of area covered by the fixed route service, the paratransit service is challenged with covering the service area in the manner deemed by ADA. Plymouth is, in terms of land area, the largest municipality in the state, meaning that transportation service in this community in particular is a challenge because of the extensive distance just for trips in town.

The 2005 MARTA study identified that approximately 6,032 hours of services are needed to bring GATRA-PAL up to an acceptable service level. This is utilizing approximately 30 minute headways as identified in the MARTA study. Increasing the amount of service enhances the transportation system for all users making it a better and more convenient option with more trip options.

SSCAC - Examples of gaps in service

SSCAC serves such a variety of clients that often have no other means of transportation. SSCAC struggles with operational costs, like other transportation companies, with escalating fuel and employee health care costs. There are more citizens in need of transportation services that SSCAC would be willing to service, if additional operational support for the service could be found.

P&B – Examples of Gaps in Service

Plymouth and Brockton is currently at capacity on their peak rush hour service trips. Additional trips to Boston would improve service for the people commuting to Boston and would ease the crush on vehicle trips. PB also is interested in filling the intercity need, with a possibility of connecting the different RTAs. For example, intercity bus service could be established between Plymouth and Brockton, or Brockton and Taunton, Taunton and Plymouth or even Plymouth and Providence RI, and then the passenger would either end their destination or connect to a local transportation service. PB has identified a possible need for service from the Plymouth area to Providence, Rhode Island that would mimic the service they currently run to Boston.

Councils on Aging - Example of gaps in services

The Councils on Aging have some of the most direct access to the elderly and disabled population in a community. They promote a variety of programs to enhance the quality of life but the challenge usually comes down to money for the purchase vehicles, the operations of vehicles, and the repair vehicles. This, in turn, limits the more localized connection and puts more pressure on other transportation resources to provide the services for those in need. Additionally, with the more recent economic pressures, many COA's transportation programs are the first to receive a reduction in funding when communities' have to reconcile their annual budgets. Some communities, such as Bridgewater, have managed to continue services with generous local support. Others, such as Abington, have taken the strategy of simply discontinuing service a couple of days per month.

Finding ways to maintain transportation to these senior populations should be a consideration in any transportation program.

Improved RTA Funding

In a climate of raising fuel costs, human resource costs, and increased demand for safety and security, regional transit authorities (RTA) in Massachusetts have been challenged to maintain the same level of service on the road. Systems across the state, such as BAT and GATRA, have had to make hard choices between reducing service and raising fares to cover the increased costs. In addition, the RTA's fund their operational costs by borrowing the money to operate for the year and then receiving money at the end of the fiscal year from the state to pay for the services already run. There are two problems with this. One is that the RTA's may receive less money than expected to pay for service already provided. The second is an inefficient use of state funds. Since the RTA borrow money to run operations in addition to paying for the cost of operations, state and federal money is used to pay the interest on that loan. This could be avoided by forward funding the RTA has and eliminate the cost of debt service. As the RTA's struggle to survive on the same dollar value they received in 2001, they lose the ability to serve their customers since they have to cut service and raise fares.

In June of 2005, Massachusetts Association of Regional Transit Authorities (MARTA) completed the *Five Year Transit Service and Capital Plan for the Massachusetts Regional Transit Authorities.* The plan outlined steps the RTA's and state can take to help restore service cuts and increase service to meet the demands and the needs of the area. Two RTA's in this report are in the Region; BAT and GATRA.

According to the report, an increase of 33,321 service hours is needed to bring BAT to the most efficient level. This included enhancements to service during the weekday and more specifically to the morning and evening commute times. Additionally it also included enhancements to weekend service, improved multimodal connections to the MBTA commuter rail stations, and turning the operations of DIAL-A-BAT back over to BAT from the contractor that currently runs the weekend service. Compared to many other urban transit systems in Massachusetts, BAT required the least amount of additional service hours to bring the system back to its most efficient levels of service. The system should be recognized in its ability to maintain a high level of service in a challenging financial climate.

GATRA would need to add an additional 187,101 hours to its current operations to bring operations to most efficient level to service demand. This would include 84,240 hours to improve weekday frequency to 30 minutes and 23,660 hours to add service to Saturday and Sunday. Additional enhancements would include restoring canceled service and adding service to major trip generators such as the Silver City Galleria, Emerald Square Mall, Taunton Industrial Park and the Attleboro County Industrial Park. The final suggestion from the plan is for GATRA is to enhance the connectivity with other transit authorities; this would include connections to the MBTA commuter rail stations, BAT, SRTA and Rhode Island Public Transit Authority and service to Providence.

Car Sharing

Another way to increase the connectivity of transit modes is by adding car-sharing program like Zip Car or Flexcar. Areas such as downtown Brockton and Stonehill College are communities that would be enhanced by a car-sharing program. Generally, a person needs to be 21 and over to use the service, but both Flexcar and Zip Car have undergraduate programs, geared for college communities. In addition, colleges can benefit from such a program because they can offer cars to their students, faculty and staff at a reasonable cost and the programs require little administration from the college.

Areas with downtown residential growth will benefit from the option of car sharing to supplement public transit. One of the benefits of the car-sharing program in contrast to the typical rental car program is that you can use the car by the hour, day or longer periods if necessary. Car sharing gives people the flexibility that is much like owning your car and many areas that already have the program have seen it work successfully.

Common Fare Card

An interoperable fare card enhances connectivity among the local RTAs and the MBTA. An enhanced fare structure that could come with a card would also offer more flexibility in pricing for BAT and GATRA, much like what the MBTA has implemented with the Charlie Card. Currently there is no fare connectivity between the commuter rail and the fixed route or paratransit options in the region. Efficiency, in both fiduciary and physical connections, between the modes of transportation benefits commuters in the

region. Local RTA's are compatible with the MBTA system, while being able to maintain and manger their own system.

East-West Connectivity

Overall, the region has disconnectivity for travel via mass transit in the east-west direction. The commuter rail lines run through the region north to south, one reason being that Boston, the final destination, is a major employment center for residents in the region. Some areas of the region have radial local coverage, such as the city of Brockton. The centrally located BAT Centre and the use of the pulse system allow BAT to cover Brockton in the most efficient manner. The pulse begins with vehicles leaving the Centre on a run out to the edges of the city and come back to the Centre, where passengers may transfer to another bus. Using this system, most locations in the city can be reached by no more than one transfer.

The challenge with mobility via transit is travel to points east west region as there are few options connecting communities across the region. Additionally many stations lack the intermodal connectivity to promote transit use in its many forms. There is limited or no service to bring people in and out of the commuter rail stations. Therefore, if a rider is not with in walking distance, they must drive their car to utilize the system.

Sites such as the BAT Centre is a great example of intermodal connectivity between rail and fixed route bus and should be an example of what communities in the region should think about when trying to coordinate services. Additionally, intercity coach travel could be one way to bridge the connect the RTA's.

Intermodal Focal Points

The establishment of intermodal connections is an important factor in public transportation. Links between different forms of transportation lead to situations where different modes support one another, and lead to greater mobility. Mobility through intermodal transit connections affects not only the commuting public but also the economic competitiveness of a region. The cost of doing business in the Region is affected by the transportation system that is in place.

Bus Service

The BAT intermodal transportation facility accomplishes an important goal in the improvement of public transportation in the Region. The facility establishes a clear center for transportation in the Brockton area. The intermodal facility encompasses commuter buses, a taxi stand, bicycle facilities, and commuter parking. The Old Colony commuter rail station is also located across the street from the intermodal facility.

BAT provides direct service to MBTA rapid transit (red line) at Ashmont, access to bus transit run by the MBTA (bus 230, 238, 240), and service to four commuter rail stations directly (one through Bridgewater State University service which runs seasonally). Enhancement of the intermodal connections between MBTA and BAT would benefit people transferring between systems, specifically at the Montello station,

in addition to exploring an interagency agreement that would bring the MBTA 238 and 233 buses all the way into the BAT Centre in downtown Brockton.

Plymouth Area Link (PAL) a service provided by the Greater Attleboro - Taunton Regional Transit Authority (GATRA) offers intermodal connectivity with service to the Kingston and Plymouth commuter rail stations and links from them to Plymouth Center. The service is on a one hour to two-hour frequency, so it would need to increase frequency to serve the commuting population.

GATRA is in the concept phase of developing an intermodal center. There are two locations with the most interest the first being Cordage Park, which has fixed route bus service (GATRA, and commuter rail service in addition to a bike trail leading to downtown Plymouth. An intermodal station here would look to enhance the connections rail, bus and bike. Additionally since it is right along the water there could either be connections by boat also, by the addition of service or if the seasonal services were to move docking locations.

The other location is downtown Plymouth, where the town is exploring the idea of a building a parking garage downtown that would also connect with fixed route bus (GATRA) and with a proximity to water ferry connections. The construction of an intermodal center in Plymouth would certainly enhance the public transit system for the benefit of both residents and the many visitors that they town receives every year.

In addition to developing an intermodal concept, GATRA is currently looking at modifying the PAL routes. Part of this is to improve connections to public transportation and places visitors want to go. One option is to modify the current routes in town, and such modification may benefit visitors and residents of the area as well.

Commuter Rail

Commuter rail service represents a more recent and popular form of intermodal transportation in the Region. At the main terminal in South Station, travelers have access to MBTA rapid transit, commuter rail, Amtrak and bus service throughout the nation, Central Boston, and the Greater Boston area. South Station also connects with the new Silver Line allowing direct access Logan International Airport.

The newest addition to the commuter rail line, the Greenbush Line after long delays is scheduled to open for revenue service in 2007. Commuter rail service may be expanding in the future should the MBTA's plans for extensions to New Bedford/Fall River lead to construction. Many of the commuter rail parking lots that serve the train stations are at or close to capacity. A study into ways to increase parking lots size is needed to understand how to handle this capacity problem and may lead to enhancements in intermodal connections at the stations.

MassDOT Park & Ride Facilities

There are six facilities maintained by the MassDOT south of Boston. These facilities provide intermodal connections for commuters who drive automobiles, walk, or bicycle, and wish to access commuter buses, car/van pools, rapid transit, and commuter rail and/or water shuttles. Park & Ride lots can be a

viable alternative to automobile commuting and can lead to decreased traffic congestion and improved air quality. Refer to Table 6-5 for a list of the locations and services available.

Transit and Land Use

Smart Growth is a set of policies that govern transportation and planning to benefit communities and preserve the environment. Smart Growth polices in Massachusetts have been developed by the Office of Commonwealth Development based of the 10 Sustainable Development Principles. Those principles are:

- Redevelop First: revitalizing existing neighborhoods does not require expensive new infrastructure or consume forest and fields and dins new uses for historic buildings and underutilized Brownfield sits.
- Concentrate Development: compact development conserves land and fosters vibrant and walkable districts. According to the Lincoln Institute, development that is more compact could save the public sector in the Northeast $40 billion over 25 years.
- Be Fair: all should equitably share the benefits and burdens of development. Transparent and predictable permitting will result in cost-effective and fair outcomes.
- Restore and Enhance the Environment: the conservation, protection and restoration of water, land and cultural resources provides a high quality of life and ecological health.
- Conserve Natural Resources: renewable energy and efficient use of building materials and water contribute to a healthier environment, limit waste, and are cost-effective.
- Expand Housing Opportunities: expanding the number, affordability, and diversity of housing units will ensure that people of all abilities, income levels, and ages have appropriate housing options.
- Provide Transportation Choice: opportunities for public transit, walking and biking should be expanded.
- Increase Job Opportunities: connecting people with jobs in their communities and close to homes and transportation infrastructure will expand our economy.
- Foster Sustainable Businesses: great potential exists for new innovated industries and for resource-based industries to contribute to the social, economic, and environmental health of our state.
- Plan Regionally: economic development, water, transportation, and housing are regional in nature they do not stop at the town boundary. Regional planning recognizes this and results in inter-municipal coordination and better outcomes.

Utilizing these principles in the planning process for the region will enhance the region, increase multimodal, and cross functionality of new and renovated areas, from road improvements to retail and residential developments, to bike and pedestrian enhancements and increased mass transit coverage.

Bicycle Storage Facilities

Bicycle storage facilities will enhance transit network and intermodal connections in the OCPC region by giving commuters more options. Some people may live too far from a bus stop or commuter rail station to walk but would be interested in biking if the facilities are provided. Bike storage facilities would assist in keeping bikes locked up in an appropriate way and encourage the use of bicycling as a mode of transportation. A bicycle parking program is under development in the region. This program will provide annual funding to communities for the acquisition of bicycle racks. Additionally the potential for bike racks on fixed route vehicles could help to enhance intermodal opportunities.

6.7 Transit Service Area Expansion Opportunities

South Shore Transit Options Study

Published in November 2003, Brockton Area Transit and Greater Attleboro-Taunton Regional Transit Authority developed a transit plan for the south shore region. This ten-town study included: Duxbury, Halifax, Hanover, Hanson, Kingston, Marshfield, Pembroke, Plympton, Rockland, and Scituate. The towns of Halifax, Hanson, Kingston, Plympton, Pembroke, are in the region.

The communities represented in the study area are primarily along the Route 3 corridor. The area has experienced a considerable amount of growth but transportation in the area has not grown at the same rate. Boston remains a major destination for medical and employment related trips. In addition, the study area has experience significant growth in industry and population that has created a need for increased transportation infrastructure with in the local area, especially in communities such as Brockton, Attleboro and Plymouth.

The Route 3 corridor has developed in many ways to become a self-sufficient area with retail, commercial and medical services available. These regionally based services create local options for people in the study area. Along with this, the population has experienced aging issues similar to the remainder of the country, increasing demand for public transit and paratransit services. These factors, coupled with overall population growth, have created a need for transportation services as part of the overall infrastructure. In addition to MBTA commuter rail to Boston, bus service in the Greater Attleboro and Greater Brockton areas are few of the limited service options for South Shore residents.

The study was to recommend routes to extend “lifeline” services to the transportation dependant and others in the area. Information for the study was gathered through community involvement including local stakeholder interviews, community meetings and local working group meetings to determine transit strategy development. These public forums, as well as intensive research and study team knowledge of rural transportation provided the key elements for a plan to address transit need and feasibility in this area.

Study results were the recommendation of two types of service. The first is a flex route service that can provide the flexibility in route deviation needed in a rural population while providing the dependability and cost effectiveness of a fixed route service. The first of the two routes proposed would go from the Independence Mall in Kingston to the Hanover Mall in Hanover using routes 3A, 139, and 53 and serve

Duxbury and Marshfield. The second route would run from the Hanover Mall to the Brockton Hospital. The two new routes would use the Hanover Mall as a central transfer point. The Brockton Hospital would be a transfer point for passengers wanting to move further in Brockton via the BAT system and the route could be integrated with the PAL service in Kingston at the Independence Mall.

The second type of service suggested by the study was the provision of demand response service in eight communities. Those communities are: Duxbury, Halifax, Hanover, Hanson, Marshfield, Plympton and Scituate.

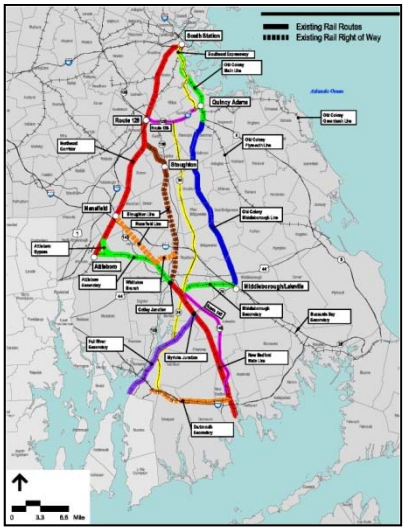
Commuter Rail Expansion

Fall River/ New Bedford

The South Coast Rail project is an initiative to restore commuter rail transportation from South Station in Boston to the cities of Fall River and New Bedford along an existing freight rail corridor running south from Taunton to Fall River and New Bedford.

Environmental Review

On March 23, 2011, the U. S. Army Corps of Engineers, New England District (Corps) completed and released the Draft Environmental Impact Statement (EIS) that was prepared to identify and address the effects of the proposed South Coast Rail project. As part of the coordinated federal and state environmental review, MassDOT adopted the DEIS document as its state environmental review document (Draft Environmental Impact Report or DEIR) and therefore, it became a DEIS/DEIR.



The DEIS/DEIR document serves as a joint National Environmental Policy Act (NEPA) and Massachusetts Environmental Policy Act (MEPA) environmental review document that will comply with the procedural requirements of both federal and state law. The NEPA/MEPA review is being conducted simultaneously in order to reduce duplication.

Significant issues analyzed in the DEIS/DEIR include, but are not limited to: impacts to waters of the U.S., including vernal pools and other wetlands; cultural resources; threatened and endangered species; transportation; air quality, including greenhouse gas emissions; noise and vibration; surface water and groundwater; hydrology and water quality; and socioeconomic effects.

May 27, 2011 marked the end of the environmental review public comment period for the DEIS/DEIR. The MEPA Office issues a certificate on the DEIS/DEIR on June 29, 2011 and the FEIS/FEIR is expected to be released early next year.

Historically, the New Bedford/ Fall River Commuter Rail Project Expanded Feasibility Study, prepared in March of 1997, explore projected ridership, costs, operational issues, and potential environmental impacts of each alternative. Complete rebuilding of the New Bedford and Fall River Secondary Track is required for all alternatives.

The MBTA's analysis outlined the three alternatives for the commuter rail system: the Attleboro, Stoughton and Middleborough Lines. The study concluded that the preferred Transportation Alternative, the Stoughton Alternative would attract the highest ridership, be most cost-effective and have the least environmental impact. However, difficulties remain due to environmental concerns and protests by officials in towns along the right-of-way.

In October 1998, state and local officials broke ground for initial reconstruction work on four bridges. In July 2000, the MBTA submitted a Supplemental Draft Environmental Impact Report (SDEIR) for the New Bedford/Fall River Commuter Rail Project in response to the requirements of the Massachusetts Environmental Policy Act (MEPA) Certification on the DEIR. This document provides the detailed analysis and reporting on the environmental impacts of the Stoughton Alternative.

The Final EIR was submitted in April of 2002. This document selects the Stoughton Alternative as the only viable option. It lists the Hockomock Swamp as the primary area of environmental concern. In August of 2002, the State Secretary of Environmental Affairs concluded that the Stoughton route was the most feasible and that it meets most environmental hurdles except for the Hockomock Swamp that will require an elevated trestle. The project now needs to pass the federal regulation process to be cleared.

The Old Colony Planning Council has been participating in the Southeastern Massachusetts Commuter Rail Task Force since 2002. Currently, the New Bedford / Fall River line is in construction phase 1. This phase includes design and construction to support the extension of service to New Bedford and Fall River. Present efforts include the rehabilitation of Bridges in New Bedford and Fall River. There are also plans to rehabilitate bridges in Taunton as outlined in the MBTA Capital Investment Program.

Phase II construction is currently in the discussion stage at the regional, local, and state level. This phase would include the full rebuilding of the rail extension from Stoughton to New Bedford and Fall River.

<u>New Bedford and Fall River via the Stoughton Line -</u>

The Stoughton Alternative would provide commuter rail service from South Station to New Bedford and Fall River by extending the Stoughton Line. From the Stoughton Station, the train will follow the existing inactive Stoughton Line through Cotley Junction to Myrick's Junction where it would split to the New Bedford Main Line and Fall River Secondary.

This Alternative would require the reconstruction of 14 miles of inactive and abandoned track from Stoughton to Taunton. The railroad right-of-way between Stoughton and Dean Street in Taunton was taken out of service in 1959 and was formally abandoned in 1966.
New stations on the Stoughton Line would be located in North Easton, Raynham, Taunton (Dean Street) and East Taunton. The New Bedford Main Line station would be in New Bedford and the Fall River Branch would locate new stations in Freetown, Fall River and Battleship Cove.

New Bedford and Fall River would be served by 36 weekday daily trains. Sixteen of these trips would serve New Bedford (eight inbound, eight outbound) and 16 trips would serve Fall River; four trips originate/terminate at Taunton (Dean Street.) The travel time from New Bedford and Fall River to South Station is projected to be approximately 1 hour and 20 minutes.

The Preferred Stoughton Alternative will provide the highest total ridership and the greatest number of transit trips. It is estimated that this alternative will attract 4,280 daily inbound riders. Three other alternatives studied, out of several total, included enhanced bus services, extending the Middleborough line via Taunton and using the existing Attleboro secondary via the Northeast Corridor.

As part of the process for commuter rail expansion, the MBTA continues negotiations with CSX to secure and enhance the right of way necessary for the rail line expansion to New Bedford/ Fall River. Currently the line is owned by CSX and is used for freight.

Wareham/ Buzzards Bay

In January 2007, the Boston Metropolitan Planning Organization examined the feasibility of reestablishing commuter rail services to Buzzards Bay. In 1996, a similar study was performed, but no action was taken. With renewed interest from elected officials and community leaders in the area, in addition to new census data, and new observations from the reestablishment of the Middleborough line the idea of commuter service to Buzzards Bay is back on the table. The Buzzards Bay Commuter Feasibility Study included forecasts of demand, capital cost estimates, operating cost and revenue estimates, and some analysis of the environmental impacts of such an extension. For full details, please refer to the study.

The services would be an extension of the MBTA commuter rail service from Middleborough to the town of Bourne and would use an existing rail line known as the Buzzards Bay Secondary Track. This line runs from Middleborough through the northeast corner of the town of Rochester, to the center of Wareham, to Bourne. Currently, the line is used for freight service operated by the Bay Colony Railroad, mainly trash trains that come up from the Cape Cod area. There were three methods proposed for the train service. The first and the preferred method, is simply to extend the current Middleborough/ Lakeville line down to Buzzards Bay, this would require additional train sets to provide the same service currently advertised on the existing portion of the line. The other two methods were to run the trains express through stops beyond the extension, or to run a shuttle service along the extension, requiring a longer platform in Middleborough where the passengers would exit one train and board a second train heading to Boston.

The study's proposed route and stations, with the understanding that station siting may change based on the community need and the availability of land for parking and access roads, are Rock Village, Country Road, Wareham and Buzzards Bay. Approximately 2,045 additional passengers would be added to the line because of the four additional stations. Some of these passengers would not be new to the service but are shifting from other rail stations.

Upgrades to infrastructure would be necessary to run the service. The rail line is in good shape but would likely need to be replaced either before or shortly after the services were to begin. Additional

stations and platforms would need to be constructed at the estimated cost of $2.5 million dollars each, in addition to adjacent parking facilities. In addition to taking cars off the road and reducing environmental effects like emissions, it is also estimated that about 8% of the auto traffic that heads into metro Boston through the Braintree split would be eliminated.

Expanding Commuter Rail Service to Plymouth

Plymouth currently has commuter rail service four times a day; these trains do not serve the station at peak commuter times and the station is currently under utilized. Many Plymouth residents drive to the Kingston Station to catch a train at peak commute times. Providing peak period train service in Plymouth would not only alleviate some of the parking congestion at the Kingston station but it would also generate some reverse commute trips during the summer, Plymouth's peak tourism time. It is estimated that 750,000 people visit Plymouth annually making tourism an important part of Plymouth's economy and a potential to tie that into the current regional transportation infrastructure.

Adding a Station in West Bridgewater along the Middleboro/Lakeville Line

The town of West Bridgewater has requested the siting of a commuter rail station along the Middleboro/ Lakeville Commuter Rail Line. Currently the train passes through the town and thus the town pays an assessment to the MBTA. A station could provide convenient accessibility to the commuter rail for residents of both East and West Bridgewater, and function as s transit node for redevelopment opportunities. Additionally, access to rail service could have a positive effect on decreasing the traffic on route 106.

Plymouth Water Ferry Study

The town of Plymouth conducted a water transportation study published in November of 2006. The purpose of this study was to look at the feasibility of creating a water transportation service linking Plymouth to Boston. Other routes explored were service to Provincetown, Hull, Quincy and Hingham. The study focused on existing market conditions, available sites and potential intermodal services and concluded with a recommended service and facility. Because of funding, the study is general and if the region and the town of Plymouth are interested in pursuing this idea further, study is needed.

Railbanking to Preserve Rail Right of Way

Railbanking is a way to preserve rail rights of way for future transportation expansions. One way of accomplishing this task is by turning the rights of way into multi use trails for recreation and commuting purposes. Generally, a multipurpose trail would welcome non-motorized forms of transportation, such as bikes, roller blades, walking and equestrian. Using a rail bank will preserve the easement, rather than let the land revert to the original owners and close transportation options.

Unmet Transit Service Needs

Unmet transit needs for the regional transit authorities is partially addressed by the *Five Year Transit Service and Capital Plan for the Massachusetts Regional Transit Authorities* report addressing the need to acquire additional funding for the RTAs so they can restore canceled service and expand service to

the most efficient service level for the area. In addition, reflecting national trends, there will be an increased demand on human service transportation as the region population is increasing in age.

Strategies to Address Unmet Service Needs

1. Protect and strengthen existing transportation services
    a. Support, strengthen, and maintain the existing network of public and private transportation providers (protect the assets that are in place that the community has invested in)
    b. Pursue a funding strategy that leverages local, state, federal and private resources
    c. Allocate available public and private resources to implement plan goals
    d. Provide vehicles to serve the transportation disadvantaged of the Region
2. Improve intra-community transportation services
    a. Establish a system of intra-"community" transportation services that connect population centers with shuttles and vanpools between communities
    b. Support and coordinate participation in the car pool and van pool programs
    c. Provide improved services to human services populations, elderly and persons with disabilities, and people with low incomes
    d. Focus public transportation on access to social and medical services, jobs, shopping, education and recreation
    e. Encourage and support multi-modal options including pedestrian and bicycle usage
    f. Provide expanded fixed route service to employment centers, educational and residential development, such as the South Weymouth Naval Air Station Redevelopment and Massasoit Community College
3. Increase accessibility to transportation services
    a. Identify "underserved" areas (geography) and population (demographics)
    b. Identify transportation-dependent populations geographically
    c. Evaluate the effectiveness of existing transportation services
    d. Institute an ongoing evaluation process focused on system effectiveness and efficiency.
    e. Operate a clearinghouse for transportation information
    f. Develop an ongoing public education program focused on commuting and transportation services
    g. Provide transportation options that are sustainable and environmentally sensitive
    h. Maintain public transportation services that are fast, fair, flexible and frequent
4. Coordinate Transportation Services
    a. Identify or develop a regional coordinating entity with the authority, expertise and capacity to coordinate transportation services
    b. Coordinate transportation services with surrounding communities outside of the region
    c. Build tools for a coordination system of public transportation services, including (1) conduct a comprehensive market analysis to inform investment and programming decisions, (2) develop a model agreement to coordinate transportation services, and (3) develop a model process to attract new public and private investors and service partners

There are many ways to address the four strategies to provide services identified, as unmet service needs. The following are examples of the types of services that would facilitate achieving this strategy.

System Preservation

In difficult economic times, more transportation that is public is needed, not less, but it is often the first to go. The first step in maintaining dependable public transportation is maintaining the current system.

Increased Fixed Route Service Hours

The region has varied frequency of service. Increasing service hours makes fixed route transportation a viable choice in transporting people to jobs, medical appointments, and social engagements.

Accessibility enhancement

Accessibility enhancements can include curb cuts, information kiosks, travel training, signage and shelters, etc.

Increased Fixed Route Service Area

The region also has a varying degree of fixed route coverage. Service in some areas is close by and convenient and other areas have no service at all. Addressing these concerns based on the populations needs will help transport people to medical appointments, and provide connectivity to employment and education facilities as well.

Same Day Service

The transportation services that are available in the region are, at best, those that are scheduled 24 hours in advance. The ability to provide same day service gives the users that need the service increased flexibility in planning their transportation to work and medical appointments.

Increased Paratransit Services Hours

There is always a need for more service and longer service hours. As such, it is a challenge to develop a schedule around limited hours of service.

Increased Paratransit Service Area

Much like increasing the services hours, increasing the service area gives patrons of the service a greater ability to access the services they need.

Development of Volunteer Driver Programs

Volunteer drivers can be a low cost way to meet the transportation needs of community members. Coordination of volunteers is the biggest challenge.

Volunteer Program Administrator

Many local transportation programs depend on volunteer drivers. With the support of a volunteer program administrator for the region, one individual, rather than each COA, can do the task of finding drivers, training them, and arranging their schedules.

Development of rider education program

Many individuals new to transit often do not take advantage of programs simply because they are unaware of the services. Rider education can be for all users of public transportation services and it helps the rider become more comfortable with the service and to understand what is expected of them in the role of customer.

Increase the availability of lift accessible vehicles to the disabled population

One problem in particular is the availably of lift accessible vehicles within the private carrier sector. Most taxi companies do not have lift vans for services because the difference in the cost to purchase a lift vehicle versus a non-lift equipped sedans and is more than what the company can expect to receive as a return on investment on that lift equipped vehicle.

Expand Paratransit buffer beyond ¾ of a mile

Expanding the Paratransit buffer offers more flexibility in destination choices to the individual dependent upon the service.

Sunday Service

Expanding the Sunday service offers more flexibility to those individuals' dependent on the service

Increased Access to Employment Centers

Increased access to employment centers helps low income, disabled, and the elderly have access to jobs that they would not be able to access without a car.

Increased Access to Education Centers

Increased access to education centers helps low income, disabled and the elderly have access to education that they would not be able to access without a car. These skills can help these individuals acquire jobs or promotions in their current work.

Add service to areas and needs currently being under served.

In the region, there are so many needs that it would be difficult to describe them in detail. Additional services hours, additional service, more vehicles, more drivers, greater access to technology; voucher systems, volunteer driver programs, and training program are just some of the kinds of services that are needed as part of the Human Services Transportation network. Individual needs are often going to be addressed in different ways and a simple "one solution fits all" is not a realistic possibility.

Promote the use of transit by workers with non-traditional work schedules

Increasing the hours of availability of transit on late nights and weekends increases the accessibility to jobs for workers who work the non-traditional work shift.

Promotion of use of transit vouchers

Promotion of transit use by appropriate agencies utilizing transit vouchers for welfare recipients and eligible low income individuals can assist getting people to jobs and eventually out of these programs

Promotion of use of employer provided transportation including the transit pass benefit program

Transportation benefit programs can benefit both employers and the employees.

Promotion of use of bus, train, carpool, vans, and other transfer services for reverse commute by which workers are transported to suburban job sites.

Promote increased transit connections

Increased transit connections provide more flexibility and options, specifically to transit dependent populations. It increases accessibility to jobs, medical, and social needs.

6.8 Transit Safety and Intelligent Transportation Systems

Signal Priority

Signal Priority is a technology that can be utilized beyond transit, as the same technologies can be used to give different levels of priority to other vehicles. For example, emergency service vehicles have what is called preemption. This interrupts the light cycle to let the emergency vehicle through, where as for transit, the system can extend or truncate light cycles, in varying degrees, and to allow eased movement of transit vehicles.

A technology such as signal priority have many benefits for BAT, as the BAT Centre is located in an area with signalized intersections and competing vehicle traffic, and was implemented at five intersections. In addition, vehicles leaving the Centre on a pulse can be stuck in light cycles from north and south movements, whereas the bus is ultimately going east to west. Having signal priority at the five locations enhances the on time performance. Studies in areas where transit priority has been implemented show that there is little to no impact on other traffic, which is why the feasibility of this technology for BAT should be explored.

Rail Right of Way Security

When the Old Colony Commuter Rail line was restored in 1997, the MBTA did enhancements all along the rail right of way. This included security fencing to keep people off the rail lines. MBTA needs to have a schedule of routine maintenance and system checks to make sure this fencing is still intact and doing its job. Fencing needs repair and replacement over time continues to protect resources.

Bus Security Enhancements

BAT has made great strides in its efforts to improve safety and security not only of its vehicles but also of its employees and infrastructure. Recent site hardening techniques and employee training efforts are the start of these efforts. BAT currently plans to continue to enhance weak points in the system and to up grade technologies as they improve in order to maintain and enhance the safety and security measures that both internal and external customers have come to expect.

Training Opportunities

Training at all, levels can better prepare the region for emergencies just as interagency collaborative training can sustain preparedness as a whole. Transit networks do not operate independently of each other but work interdependently, emphasizing the importance of tabletop drills and interagency agreements. Times of emergency will call for support beyond a sole agency's capacities and this interagency collaboration will absolutely make the difference in the delivery of services to those in need.

Individual agencies need to maintain and to enhance their individual employee safety and security training programs. Programs like Transit Watch work now, and will continue to be effective through the proper training of current and new employees.

Operation Lifesaver

Operation Lifesaver is a program that a community can use to enhance its relationship with rail service. Operation Lifesaver depends on the bulk of its message being delivered by presenters, which anyone can become one once they satisfy the Operation Lifesaver criteria. Presenters can distribute the information in places like, but not limited to, schools and senior centers. In addition to presenters, Operation Lifesaver has information available on the web and through Operation Lifesaver associates. This resource is an effective and efficient use of resource available to Old Colony communities to keep their residents best informed on how to behave near railroad crossings.

Pedestrian Enhancements

Some of the commuter rail stations in the region lack adequate pedestrian infrastructure. For example, pedestrians trying to access the Montello Station along the Middleboro/ Lakeville line often have difficulty crossing the street along North Montello Street in order to get to the station. Further study and inventory should be taken of not only the commuter rail stations, but also any location with a high transit and pedestrian impact and its surrounding area. Specifically a study should be done to examine the area surrounding the Montello Station to develop a solution to enhance pedestrian safety.

Continuity of Operations Planning (COOP)

The Continuity of Operations Plan is a plan to establish a framework of management and operations procedures to sustain the essential functions of BAT in an emergency. In addition, the plan lays out steps to maintain mission critical functions while potentially moving BAT operations from its normal location. This may require the assistance of local RTAs such as GATRA, located in Taunton, and SRTA, located in Fall River and New Bedford.

The COOP also includes a procedure of testing, training and exercises. This ensures that systems are fully functional and that management is up to date on the options available to them in a variety of situations. Most of the testing, training and exercises are to be done once a year but some systems require a quarterly test. The procedure is explained in detail in the plan for management to implement.

Legal Risk and Protection

Protecting your transportation systems from a legal aspect is often over looked. Litigation can be costly to a transit network and the taxpayers that help fund it. *Urban Transit: Operations, Planning and Economics, 2005,* offer some key components to help keep litigation to a minimum. The first is to keep the public informed; give them periodic reminders about safe practices and habits to keep them safe while they use the transit system. Another component is to intensify the review of facilities and operating practices with respect to their impacts on passenger safety. A review of transportation systems will help identify safety needs before they become safety concerns or worse. The last guideline was to improve record keeping and collection of information that is applied in the case of accidents. Information is power, and having ample data can help you in many ways. It may protect the organization being questioned from litigation or you may be able to develop training scenarios out of the incident. The transportation providers in the region may be currently following some of these guidelines, but in order to protect all our transit networks, all transportation providers, public and private should look to incorporating these guidelines into their daily operations.

6.9 Future Freight and Air Transportation Network

Rail Freight Systems, Capacity Expansions and Enhancements

Rail Freight in the region has some obstacles to overcome if service is to expand. Commuter rail service uses the same lines as freight rail and there could be competing interests on the lines. If the demand was present for the service, CSX certainly could meet that need by the addition of a second track, as much of the rail lines that run through the region are on a single track. Currently some trains, usually freight, have to wait for other trains to pass. The addition of a double tracking the Old Colony rail line from end to end would benefit both passenger and freight rail allowing rail traffic to flow mores smoothly.

Water Freight Systems, Capacity Expansions and Enhancements

Plymouth has been an active and viable port city. Even though it is no longer a designed port, it still handles water freight. If Plymouth were interested in expanding water freight capabilities infrastructure would have to be improved. Cordage Park in North Plymouth was once a busy port but now it is a collection of abandoned buildings. If Cordage Park were to be expanded, the port channel would need to redredgeding and infrastructure would have to be improved, in addition to the intermodal freight transportation facilities developed by either rail or truck. Currently there are no plans in the region to develop this area to be used as a freight intermodal site.

Air Freight and Air Passenger Systems, Capacity Expansions and Enhancements

The Plymouth Municipal Airport does not currently have passenger or freight service; even so, the airport is an important part of the region because it is home to many vital regional emergency services. Currently the Plymouth Airport does not have any plans for future investment or upgrades to the facilities to accommodate air passenger or freight services. The airport has seen an increased amount of corporate jet activity over the last ten years and currently eight corporate jets are based there. This trend in corporate jet use is expected to continue and the airport does have plans to expand the use of the airport for both general aviation and complementary non-aviation uses.

Future Freight and Air Transportation Safety Systems and Intelligent Transportation Systems

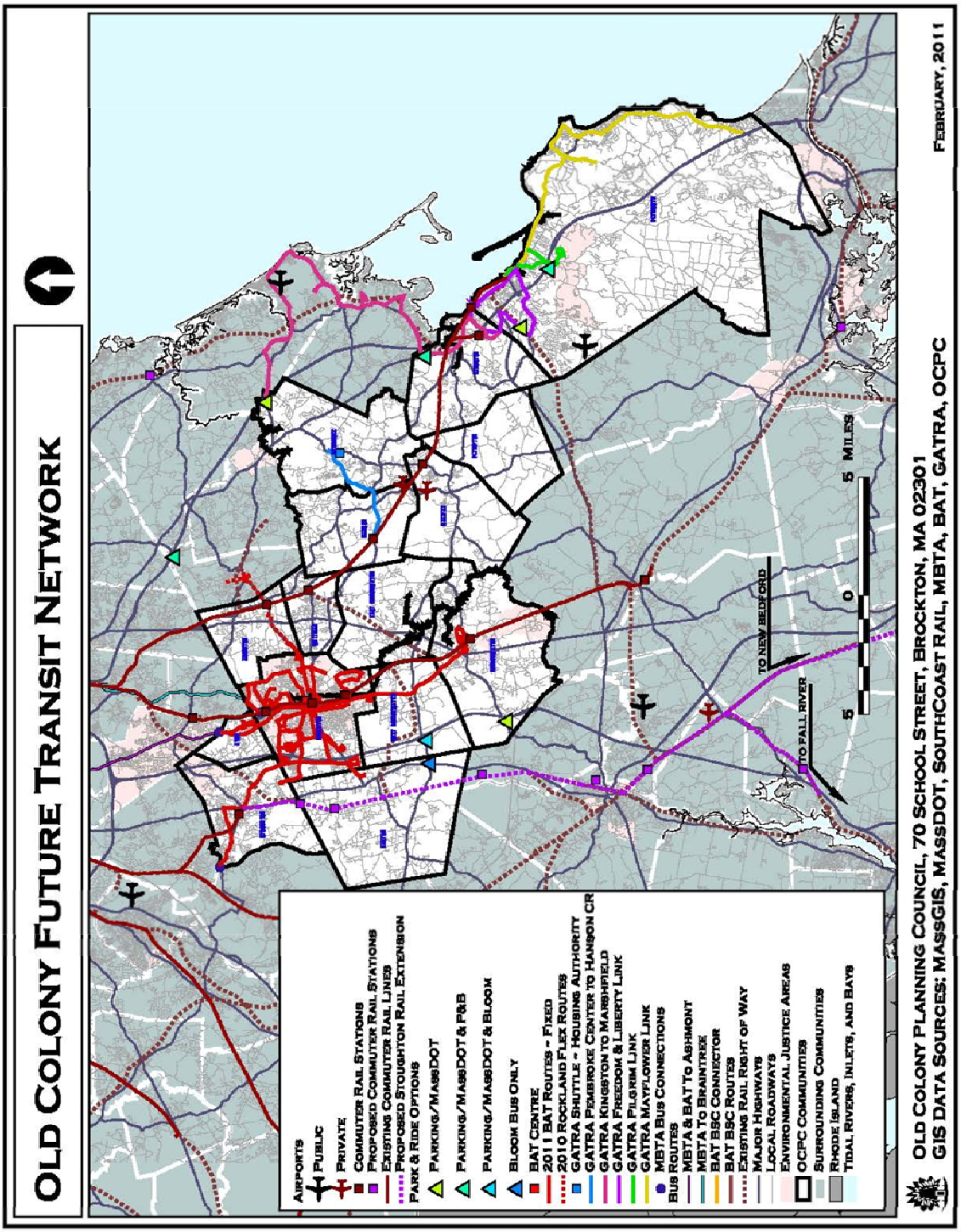
Rail freight security and ITS enhancements made on commuter rail in the region can also benefit rail freight because of the shared rail lines. Enhancements to Right of Way security, training such as Operation Lifesaver, or physical infrastructure can benefit both passenger and freight rail.

Water freight is small part of the transportation networks. Ensuring these products are handled in a safe and controlled manner will keep harm from those products. The fish products handled through the ports are subject to the safety and health concerns of the end consumers, so ensuring the safety and security in transport is important.

The air transportation network in the region does not anticipate exponential growth in the near future, but does anticipate the growth of corporate jets utilizing the airport. Currently the

Plymouth Airport is working on updating the Master Plan that will help guide the growth of the facility over the next year. In addition to that, the airport is going to continue to expand its safety and security efforts to protect their own assets and the communities around them. Transportation is not a static feature in the OCPC region. As demands increase or changes so does the transportation needs of the regions communities. Figure 6-13 outlines some of the OCPC region's future potential transit networks.

Figure 6-14: Future Transit Network



6.10 Recommendations

Transit Connectivity 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 to increase capacity and promote greater safety.

Support additional service. In 1999, BAT implemented Sunday service on both fixed and paratransit routes. This much-needed service provides access for residents of the BAT member communities to weekend jobs and shopping. Support such new programs, as well as the continuation of existing programs that support economic development in the region.

Maintain productivity and cost effectiveness. BAT contracts out transportation services to a variety of private carriers. Support this method of maintaining productivity and cost effectiveness.

Meet operations needs. BAT annually seeks FTA 49 U.S.C. Section 5307 grants to finance support equipment and operations costs. BAT should continue to seek this method of funding to meet operations needs, for as long as such funding is available.

Maintain capital planning for BAT's paratransit services. BAT continues to seek funding each fiscal year through the Mobility Assistance Program for the replacement of paratransit vehicles as needed. This policy should be maintained so that BAT may replenish its rolling stock that is considered "beyond its useful life."

Support the development of a Human Services Coordinated Plan for the region. This is a requirement of the federal SAFETEA-LU legislation. This coordinated effort can enhance and improve human services in the region as a coordinated effort and merging of resources.

Improve mass transit linkages. Every effort should be made to promote improved linkages between mass transit and other modes of transportation. One example would be a public private relationship utilizing private carriers to connect localized RTA's.

Increase intermodal connections at the Montello Station. Currently an MBAT route, a BAT route, and passenger rail to Boston is serviced by the station. Coordinating the fixed routes there and making the station a mini –intermodal center will enhance the transportation options for the people in the area and using the station.

Support the development of a Plymouth Intermodal Center. GATRA and Plymouth is interested in building 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.

Provide feeder service to Old Colony commuter rail stations. Intercity bus carriers, such as P&B and JBL Bus Lines, Inc. should consider altering and/or adding routes, to serve as feeder routes to Old Colony commuter rail stations. GATRA provides service between Pembroke Town Center and the MBTA Commuter Rail Station in Hanson.

Encourage adequate parking and traffic mitigation at station sites. It is imperative that local officials confer with MBTA planners and engineers to determine that access and egress to/from station sites are properly mitigated.

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.

Develop additional park-and-ride facilities. OCPC transportation staff should interact with MassDOT in determining potential new sites for the construction of park-and-ride facilities to augment existing facilities.

Support creation of HOV lanes on congested highways leading into Boston. Intercity bus carriers throughout the region maintain that the creation of genuine High Occupancy Vehicle (HOV) lanes would reduce their commuting time into Boston, making commuter bus lines more competitive with commuter rail. In addition, HOV lanes would make commuter bus lines a more acceptable alternative to individuals who drive automobiles (primarily alone) into Boston, thereby reducing congestion.

Study the feasibility of HOV lanes for buses, carpools and vanpools. As was mentioned earlier, HOV lanes installed along Principal Arterials such as the one on Interstate 93 would improve commuting times into Boston, reduce congestion and improve air quality. A feasibility study should be conducted to determine the potential for HOV lanes along Principal Arterials in the region.

Support alternative means of funding mass transit. Support initiatives to determine dedicated sources of revenue, such as the fuel tax and Senate Bill 2315, which could fund transit operations throughout the Commonwealth.

Consider development of additional public moorings in Plymouth Harbor. The development of additional public moorings would better serve recreational and visiting boaters. Support such an initiative.

Consider expansion of North Plymouth Harbor. Such a development could potentially derive additional economic development as well as tourism benefits by instituting a water shuttle between Cordage Park and Town Wharf or State Pier.

Increase parking capacity in downtown Stoughton. The town-owned and MBTA-owned lots are at capacity on a daily basis. The MBTA should study the feasibility of constructing a multi-level parking garage in Downtown Stoughton adjacent to the station.

Develop park-and-ride facilities to maximize a multimode transportation system. Park-and-Ride facilities should be sited adjacent to major interchanges/arterials, rapid transit and passenger rail stations.

Transit Service Area Expansion Opportunities

Determine potential for regional airports to accommodate tilt-rotor aircraft. New tilt-rotor services could co-exist with fixed wing operations at existing airports, or operate directly out of additional capacity to the traveling public. The potential for regional airports to accommodate these services should be investigated.

Preserve abandoned railroad rights-of-way by use of Rail Banking. Support preservation abandoned railroad rights-of-way having the potential for construction of future transportation projects.

Support efforts to operate a full weekday schedule on holidays on which most retail stores are open--Martin Luther King Day, President's Day, Columbus Day and Veteran's Day. Increasing the amount of service would provide access for both patrons and employees to businesses that do not observe those holidays**.**

Support the guidelines recommended by MARTA to bring service at BAT and GATRA to its most efficient levels. Service has been cut across the state over the last couple of years to complete with raising fuel and employee benefit costs. When service is cut and fares are raised to compensate for this, the transit riding public is put at a disadvantage. The proposal set out by the MARTA study would restore those cuts and bring transit up to a level that could best serve the community.

Study the feasibility of BAT expanding its service area.

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 the elderly and disabled communities.

Encourage private sector participation in public transit operations. BAT is encouraged to continue joint development initiatives with private sector concerns when feasible.

Support expanding the reach of fixed route transit as identified in the Route 3 Corridor Transit Options Study.

Study expansion of intercity bus service. Studies should be performed to consider the feasibility of implementing intercity bus service between Brockton and Plymouth, Taunton and Brockton.

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.

Support the restoration and extension of commuter rail to Fall River and New Bedford, while providing adequate community mitigation, and feeder regional transit services.

Support restoration and extension of commuter rail to Buzzards Bay, while providing adequate community mitigation, and feeder regional transit services.

Support provision of a commuter rail station in West Bridgewater along Old Colony Commuter Rail Line.

Encourage staggered work hour initiatives. Where feasible, encourage large employers to stagger their work hours to offset emissions from high concentrations of automobiles during peak hours.

Support employer-based transportation programs. 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. As well, managing demand for costly long-term parking by encouraging shared-ride commuting through preferential parking incentives or special discounts for employees. MassRides is a great first resource for an employer looking to establish commuter programs for their employees.

Support legislative initiatives affecting corporate commuter services program. Under the Massachusetts General Laws, Chapter 63, Section 31D, corporations doing business in Massachusetts are allowed a tax credit amounting to 30% of the cost of purchasing or leasing a commuter van for their employees to use in their daily work trips. This legislation also waives registration fees, creates a special license plate for commuter vans and established insurance requirements for participating vehicles. Corporations are encouraged to implement commuter services programs that provide incentives through the above legislative initiatives.

Encourage the use of Transit Tax Credits. Currently the federal government will allow employees to use up to 110 dollars of month pretax to pay for transit passes. In the state of Massachusetts, a similar benefit is extended only to the MBTA. The utilization of the federal benefit and the extension of a Massachusetts transit income tax benefit would benefit both employees and employers.

Enforce Massachusetts's rideshare regulation. To comply with Massachusetts's environmental regulation (310 CMR 7.16), employers with more than 250 employees at a single location must implement commuter programs geared to reducing drive alone commuting by 25%. Program options include instituting a transit pass program, creating incentives for bicycle commuting, posting transit schedules and maps, and promoting carpooling. In addition, companies with more than 1000 employees at one facility must implement a vanpool program.

Develop a plan for senior transition from personally operated vehicles to public transportation. Seniors as they lose their mobility and the reaction necessary to drive maybe more will to move to public transportation if they can achieve some level of flexibility while retaining their independence. A plan should be developed to enhance and encourage this transition.

Support Car Sharing. Car sharing programs like Zipcar and Flexcar can be a great way to offers residents flexible transportation options. Areas that would be great candidates in the region are Bridgewater State University, Stonehill College and the developing area around the BAT intermodal Centre.

Encourage the application of Smart Growth Principles to development in the region.

Support redevelopment of the former Weymouth Naval Air Station. Support mixed transit focused reuse of the land occupied by the former Weymouth Naval Air Station.

Transit Safety and Intelligent Transportation Systems

Support BAT's bus replacement program and system preservation to ensure a state of good repair. BAT should continue to seek funding to update its fixed route bus fleet and allied equipment on an as needed basis.

Support the Development of Transit Safety Plans As technologies improve so will the need to keep our safety and security systems up to date. Some steps are as simple as the cooperation amongst RTAs to develop a continuity of operations plan (COOP). This is a great first step. The next step, making sure that the entire key stakeholders understand what is involved when the plan is invoked will be the key to its success.

Support the integration of technologies across modes of transportation. Examples of this would be a regional fare card or integrated AVL systems to improve transit connections across systems.

Support the use of Rail Education programs like Operation Life Saver Regional efforts to increase safety can come from many levels, for example the continuation of educational programs like operation lifesaver is important to communities that have to live with frequent rail traffic in there community.

Support transportation improvements save energy. Transportation improvements in the region should be undertaken with consideration to energy conservation. Support should be developed for increased promotion of ridesharing, HOV lanes, employer sponsored trip reduction plans and the use of alternative forms of energy.

Support the use of new technologies for transit vehicles. Hybrid and hydrogen technology on buses can reduce fuel consumption and pollution and AVL technology for DIAL-A-BAT and BAT and GATRA can improve safety and efficiency for the service.

Study the use of Signal Priority in the BAT and GATRA service areas. Expand signal priority for the BAT system especially near the BAT Centre would increase efficiency and on time performance. The same technology can be employed at intersections to the benefit of emergency services vehicles as well.

Develop park-and-ride facilities, which support and enhance state air quality goals and commitments. Facilities should serve as many alternative High-Occupancy Vehicle (HOV) modes as possible. Public and private transit operators should be encouraged to serve park-and-ride facilities. Site selection criteria should include consideration of bicycle and/or pedestrian accessibility to reduce the number of cold starts by vehicles.

Support the improvement of pedestrian safety around transit stations. For example, the streets surrounding the Montello station do not promote pedestrian safety and pedestrians are often forced to choose unsafe routes to the station.

Freight and Air Transportation Transit Networks

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.

Accommodate freight and passenger railroad operations. Old Colony commuter rail operations could affect existing freight train services by reducing the flexibility available to CSX and Bay Colony Railroad. However, the low frequency of operation of the Old Colony lines during off-peak periods, coupled with the provision of a modern signaling system, centralized traffic control and passing sidings at strategic locations would permit freight operations during the midday periods. Consideration of freight and passenger railroad impacts is encouraged.

Increase the level of freight/goods movement by rail on the Old Colony and Stoughton lines. Support such initiatives, which would serve to reduce truck traffic congestion, particularly if the double stacking of containers in railroad freight hauling operations is implemented in the near future.

Allow for freight rail operations and the Old Colony commuter rail service to co-exist. Coordination should be encouraged between the MBTA and the two railroad freight operators in the region: CSX (Middleboro Line) and Bay Colony Railroad (Plymouth Line). Although freight railroad service in the region generally should not conflict with the restored passenger rail service during its peak operating periods in the A.M. and P.M., contingencies will need to be addressed such as the installation of updated switching equipment and passing siding.

7.0 Introduction

Facilities for safe, convenient, and efficient bicycle and pedestrian transportation are key components of a well-balanced regional transportation network. Many of the goals, objectives, and policies of the Old Colony Planning Council include supporting a comprehensive and sustainable transportation network fostering non-motorized travel choices.

The bicycle mode of transportation offers personal mobility featuring door-to-door access; often at speeds comparable to auto travel in high-density areas. In recent years, the bicycle has become an increasingly popular alternative means of travel for commuting to school and work, as well as for recreation and exercise. Increasing gasoline prices and a growing focus on "green" lifestyles and sustainability has driven much of this growth in the popularity of cycling.

Safe, convenient, and well-designed facilities are essential to encourage bicycle use. Roads designed to accommodate bicyclists with moderate skills will meet the needs of most users, according to the Massachusetts Department of Transportation. Young children are primarily the bicyclists who may require special consideration, particularly on neighborhood streets, in recreational areas, and close to schools. Moderate skilled bicyclists are best served by:

- Extra operating space when riding on the roadway such as bicycle lanes, useable shoulders, or wide curb lane;
- Low speed streets (where cars and bicyclists share travel lanes); and
- 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, paths, crosswalks, stairways, curb cuts and 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 "design pedestrian" and that the transportation network needs to accommodate a variety of pedestrians, including those with disabilities. For example, children perceive their environment differently from adults and are not able to judge how drivers shall behave. Children typically walk more slowly, 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 and take longer to cross the street. People using wheelchairs and scooters may be able to cross the street more quickly than someone walking, but may be more difficult to see by a seated driver in a vehicle. 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.

7.1 Developments since the 2007 Regional Transportation Plan

Regional Bicycle and Pedestrian Plan, Old Colony Planning Council: The Regional Bicycle and Pedestrian Transportation Plan, developed in 2008, addressed cycling and walking within the Region by assessing conditions and infrastructure, and addressing the needs of the Region for a further enhanced bicycle and pedestrian infrastructure throughout the transportation network.

The Plan outlined goals aimed at improving bicycle and pedestrian transportation, and strategies for achieving these goals. The Plan listed specific bicycle and pedestrian projects and goals identified by the communities and the public through the public participation process.

Regional Bicycle and Pedestrian Connectivity and Livability Study, Old Colony Planning Council: The Regional Bicycle and Pedestrian Connectivity and Livability Study, being developed concurrently with this 2012 Regional Transportation Plan as a programmed task (Task 3400 - Bicycle and Pedestrian Connectivity and Livability Study) in the FFY 2011 Unified Planning Work Program, provides analysis of the bicycle and pedestrian network in terms of livability and sustainability throughout the region. Development of this Study includes data collection to calculate Bicycle Level of Service (BLOS) and Pedestrian Level of Service (PLOS) at specific areas and corridors throughout the Region. Areas of detailed study were chosen based largely on the results of surveys conducted by Old Colony Planning Council; meetings with the communities; and meetings of the Regional Bicycle and Pedestrian Planning Task Force.

Implementation of Bicycle and Pedestrian Planning Task Force, Old Colony Planning Council: The Bicycle and Pedestrian Planning Task Force was initiated in 2010. The Task Force was developed by Old Colony Planning Council to assist in the development of the Regional Transportation Plan and Bicycle and Pedestrian Connectivity and Livability Study. Additionally, the Task Force will provide a forum for bicyclists and pedestrians provide focused input into the 3C transportation planning process and shape other planning products produced by the Old Colony Planning Council. The Bicycle and Pedestrian Planning Task Force meets quarterly, and OCPC staff will report to the Joint Transportation Committee and Metropolitan Planning Organization with regular updates from the Task Force.

North Abington Business District, Abington: Through a Massachusetts Public Works and Economic Development (PWED) grant, improvements are being constructed on North Avenue (Route 139) west of and including the intersection with Adams Street (Route 58). Construction of improvements in this area, known as the North Abington Business District, began in 2010. Among the improvements being constructed, pedestrian enhancements include installing countdown pedestrian signals with audio for the visually impaired and reconstructing pedestrian crossings for ADA compliancy, as well as sidewalk and streetscape (street lamps, benches, vegetation) improvements to North Avenue.

Lincoln Street Pedestrian Improvements, Brockton: Through a Massachusetts Public Works and Economic Development (PWED) grant, a surface lot parking facility located between Lincoln Street and Church Street in Downtown Brockton was reconstructed in 2010. The project included pedestrian enhancements to the surrounding area, including an enhanced crosswalk, curb bump-outs, and

ADA/ABA compliant ramps at the intersection of Montello Street (Route 28) and Lincoln Street, and construction of a sidewalk on Railroad Avenue along the railroad viaduct. Pedestrian connections between the lot and sidewalks were also improved.

Foundry Street (Route 123), Easton The reconstruction of Foundry Street (Route 123) between Eastman Street (Route 106) and the Norton Town Line, completed in 2010, included construction of sidewalks for pedestrians and wider, paved shoulders for cyclists.

Holmes Street (Route 36), Halifax: The reconstruction of Holmes Street (Route 36) between Plymouth Street (Route 106) and the Pembroke Town Line completed in 2008, included construction of sidewalks for pedestrians, crosswalk improvements, and ADA/ABA compliant ramps.

Figure 7-1: Route 36 in Halifax

Route 106 Signage and Crosswalk Improvements, Halifax: In 2009, the Town of Halifax made improvements to Plymouth Street (Route 106) near its town center to enhance safety for pedestrians in the area. These improvements included newly painted crosswalks with advanced warning signage; variable message speed signs indicating the speed at which drivers are approaching, and flashing when in excess of the speed limit; and removal of a passing zone and replacing it with a double yellow striped centerline. Furthermore, the Town requested and hosted a Road Safety Audit in 2010, to foster solutions for further improving traffic calming and pedestrian safety through this section.

Pembroke Street (Route 27), Kingston: Pembroke Street (Route 27) in Kingston was reconstructed in 2009 (completed in 2010). Included in the reconstruction was addition of new sidewalks, and shoulder improvements to increase mobility and safety for cyclists.

Route 3A Sidewalk Reconstruction, Kingston: Sidewalks along Route 3A in Kingston were reconstructed in various sports between Main Street (Route 106) and the Plymouth Town Line.

Nelson Street Park / Seaside Bike Trail Trailhead Improvements, Plymouth: In 2010, the Nelson Street Park, which comprises the southern terminus of the Plymouth Seaside Trail, was reconstructed. Reconstruction included replacement of the parking facility; landscaping improvements; and signage and connection improvements to the Seaside Bike Trail.

Figure 7-2: Southern trailhead of Plymouth Seaside Trail, at Nelson Street Park

Plymouth Sidewalk Improvements, Various Roadways: The Town of Plymouth has routinely addressed construction of new and improvements to existing sidewalks in its capital improvement plan. Since 2007, the town has added new sidewalks and replaced existing sidewalks along several roadways, including Mayflower Road.

Stoughton Square Improvements, Stoughton: Through a Public Works and Economic Development grant, the Town of Stoughton constructed roadway and sidewalk improvements in their downtown square, aimed at improving both traffic flow for motorists and safety for pedestrians. Improvements include curb bump outs and pedestrian crossings; enhanced crosswalks; and signalization of intersections.

Manley Street, West Bridgewater: The recent reconstruction of Manley Street, between West Center Street (Route 106) and the Brockton City Line, included the construction of sidewalks, as well as shoulder improvements to improve safety and mobility for cyclists.

7.2 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 and vegetation.

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
- Borderland State Park, Easton
- D.W. Field Park, Brockton and Avon
- Myles Standish State Forest, Plymouth

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.

Signalized Intersections

Intersections controlled by traffic signals present the opportunity for safe roadway crossings for pedestrians and left turns for cyclists when pedestrian and bicycle controls are included in the signal system. Signal systems that are not equipped with pedestrian and bicycle controls present increased challenges for walkers and cyclists, as they often need to interact with more conflict points than they otherwise would away from an intersection. The maps in Figures 7-3 and 7-4 show the signalized locations throughout the Old Colony Region and the pedestrian and bicycle controls that are included in these systems, as of September 2008.

Intermodal Connections

Transit stations and Park-and-Ride facilities provide intermodal connections between pedestrians and cyclists and the transit systems service the Old Colony Region.

Table 7-1: Intermodal Connections

Community	Facility	Services
Abington	Abington MBTA Station	Commuter Rail
Bridgewater	Bridgewater MBTA Station	Commuter Rail, Campus Shuttle
	Route 104 at Route 24 Park-and-Ride	Intercity Commuter Bus
Brockton	BAT Intermodal Transportation Centre	Commuter Rail, Local Fixed Route Bus
	Campello MBTA Station	Commuter Rail
	Montello MBTA Station	Commuter Rail, Local Fixed Route Bus
Halifax	Halifax MBTA Station	Commuter Rail
Hanson	Hanson MBTA Station	Commuter Rail, Local Fixed Route Bus
Kingston	Kingston MBTA Station	Commuter Rail, Local Fixed Route Bus
	Route 3A/53 at Route 3 Park-and-Ride	Intercity Commuter Bus, Local Fixed Route Bus
Pembroke	Route 139 at Route 3 Park-and-Ride	Intercity Commuter Bus
Plymouth	Plymouth MBTA Station	Commuter Rail, Local Fixed Route Bus
	Route 3 Exit 5 Park-and-Ride	Intercity Commuter Bus, Local Fixed Route Bus
	Commerce Way Park-and-Ride	Intercity Commuter Bus
Stoughton	Stoughton MBTA Station	Commuter Rail, Local Fixed Route Bus
West Bridewater	Route 106 at Route 24 Park-and-Ride	Intercity Commuter Bus
Whitman	Whitman MBTA Station	Commuter Rail

Figure 7-3: Pedestrian Controls at Signalized Intersections

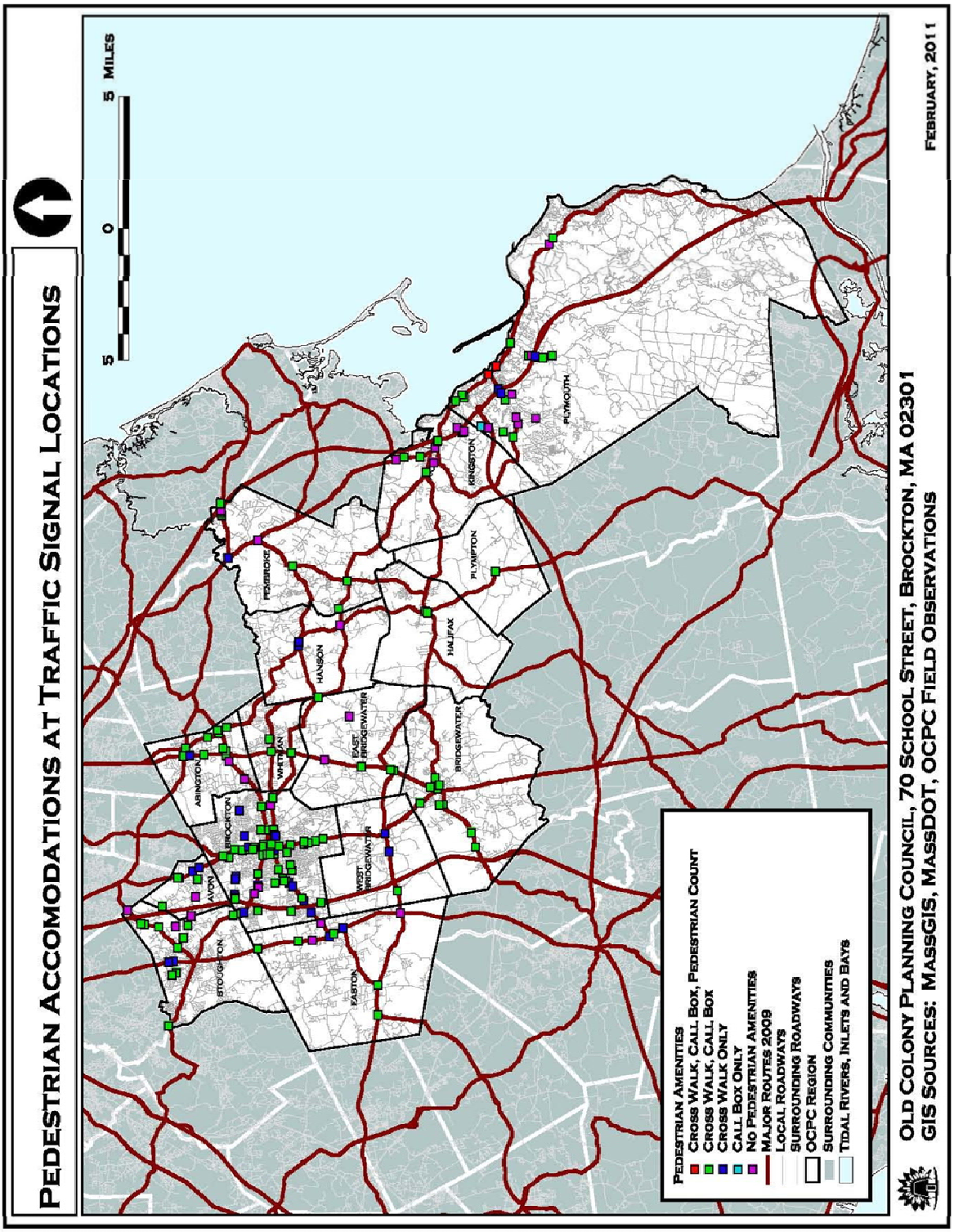
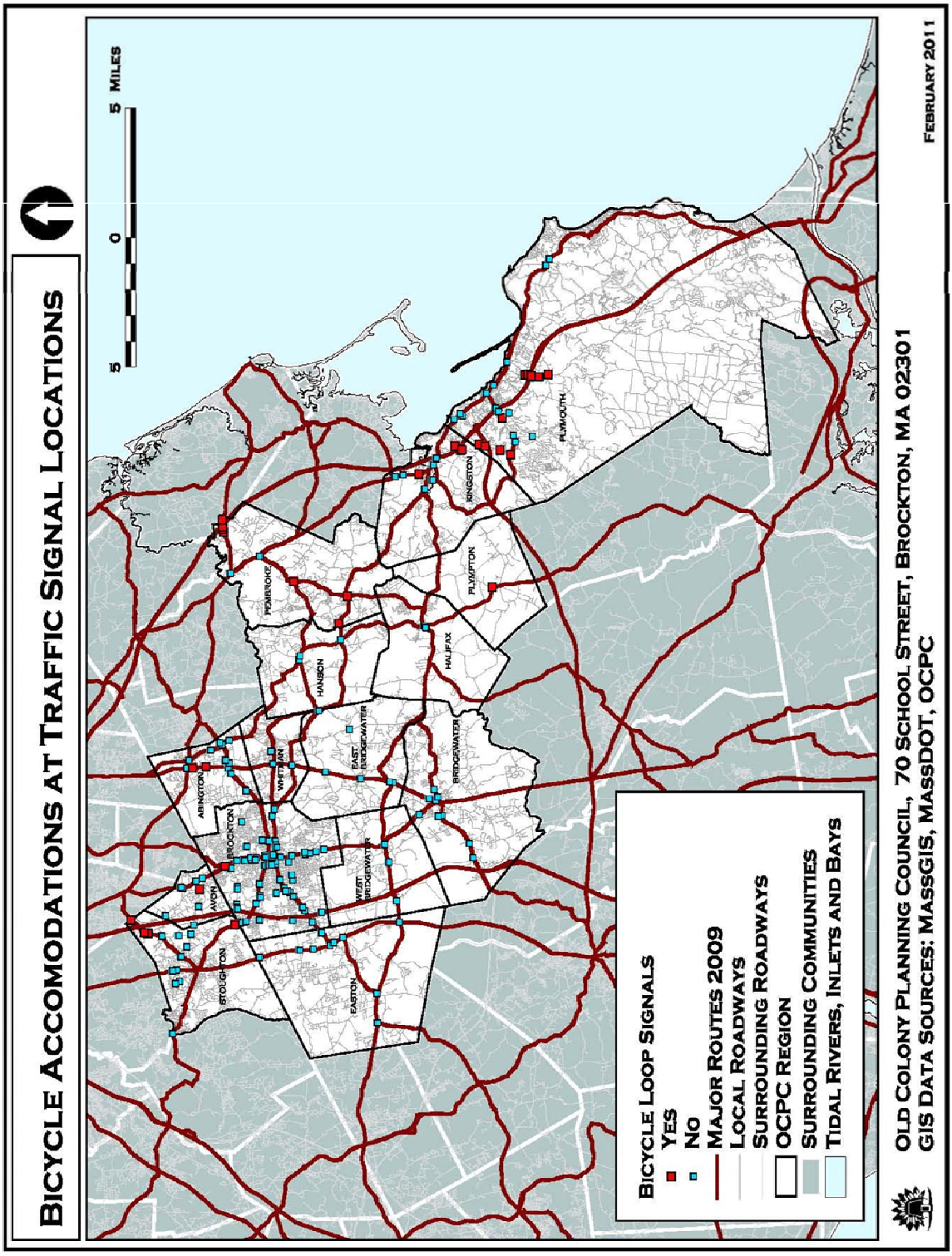


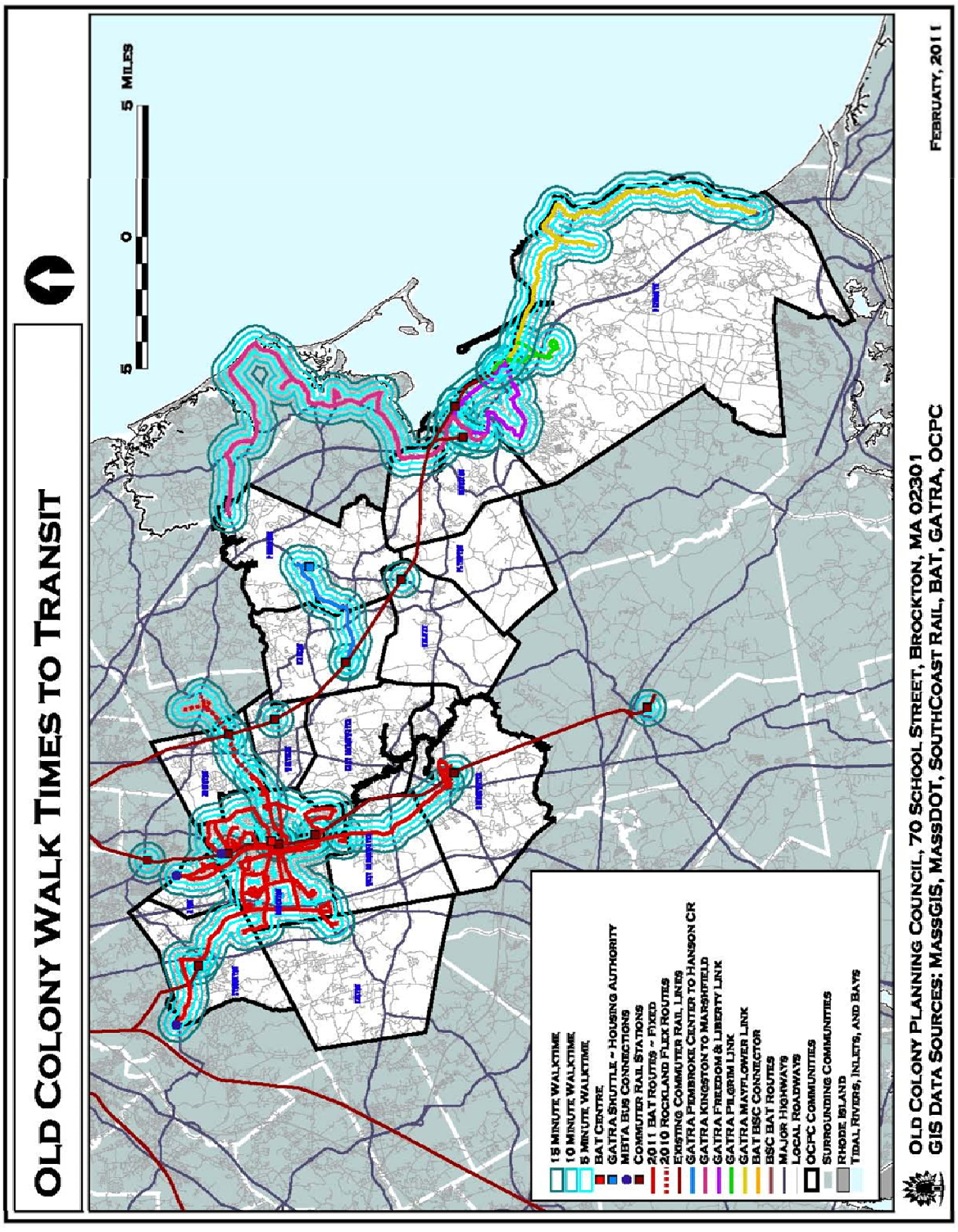
Figure 7-4: Bicycle Controls at Signalized Intersections



Walk Times to Transit

With the MBTA Commuter Rail stations throughout the region; Brockton Area Transit (BAT) bus routes serving Brockton and its neighboring communities; GATRA serving Plymouth, Kingston, Pembroke, and Hanson; and MassDOT Park-and-Ride lots served by intercity bus lines to Boston, the Old Colony region is well served by public transit. Figure 7-5 shows areas within walking distance to transit, categorized by estimated walk time based on the average walking speed of an adult. A large percentage of the region's population is within walking distance to transit, including much of the City of Brockton.

Figure 7-5: Walk Times to Transit



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 signs. 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. The conflicts are more likely on narrow, country-type roadways.

Bay Circuit Trail: The Bay Circuit Trail (BCT) is a two hundred 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. Approximately 150 miles of the trail have been completed. The BCT varies in surface type, from earthen hiking trails to paved shared-use trails.

In the Old Colony Region, the Bay Circuit Trail runs through Easton, West Bridgewater, Bridgewater, East Bridgewater, Hanson, Pembroke, and Kingston. Aside from a gap in Bridgewater and East Bridgewater, where a trail connection is proposed but not open, the trail creates a contiguous path from the western border of the region (the Easton/Sharon Town Line) to Kingston Bay.

Bay State Greenway (BSG): In its 2008 Massachusetts Bicycle Transportation Plan, MassDOT proposed the formation of a statewide bicycle network, called the Bay State Greenway (BSG). A primary network supported by secondary routes throughout the Commonwealth, the BSG is aimed at enhancing the State's existing infrastructure.

The Bay State Greenway is composed of seven main corridors, including:

- Mass Central (150 mi)20
- Berkshires (65 mi)
- Connecticut River Valley (East and West) (120 mi)
- Nashua River-Buzzards Bay (140 mi)
- Boston-Cape Cod (150 mi)
- North Shore (55 mi)
- Merrimack River-Charles River (60 mi)

The Boston to Cape Cod Corridor (BCC) travels through the Old Colon region, largely following the existing Claire Saltonstall Bikeway. Towns within the Old Colony region directly served by the BCC include Abington, Avon, Brockton, East Bridgewater, Halifax, Kingston, Plymouth, and Plympton.

The Boston to Cape Cod Corridor has connections to Massachusetts Central, Nashua River to Buzzards Bay, and Merrimack River to Charles River Corridors.

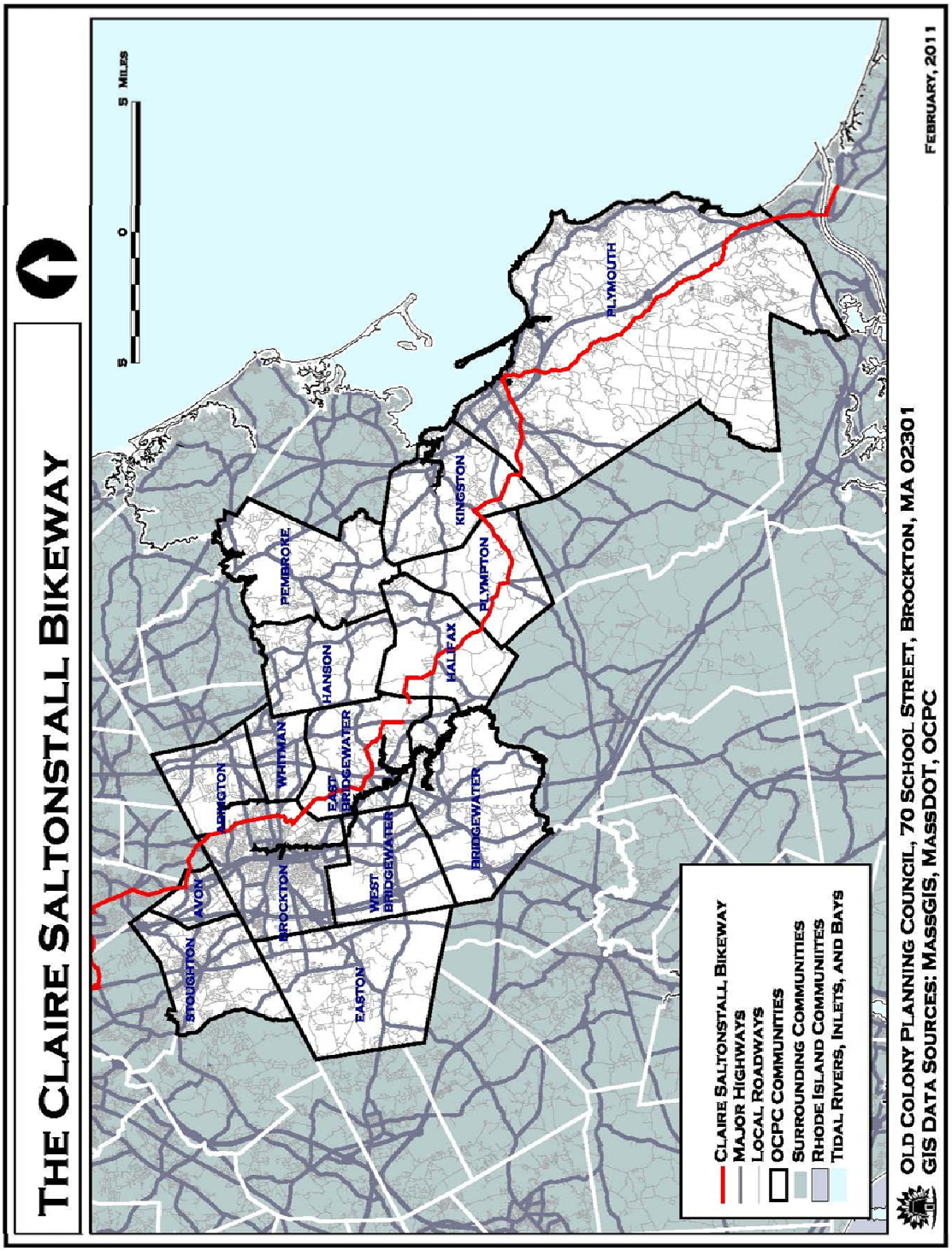
Recreational Bicycle Routes

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.

Other Recreational Areas

Several parks and forests offer throughout the region offer recreational cycling opportunities. The largest is Myles Standish State Forest, The forest features 15 miles of bicycle trails over 15,000 acres. Other parks in the region featuring bicycle and/or shared use paths are DW Field Park in Brockton and Avon; Ames Nowell State Park in Abington; and Borderland State Park in Easton.

Figure 7-6: Claire Saltonstall Bikeway



7.3 Areas of Concentrated Activity

The Bicycle and Pedestrian Connectivity and Livability Study, in development at the time of this Plan and scheduled for completion in the summer of 2011, addresses areas of concentrated pedestrian and cycling activity, and will present current levels of service based on existing infrastructure and recommendations for improvements. Many of these areas of concentrated activity are located within the traditional downtown areas of the Old Colony communities, such as Downtown Brockton, Downtown Whitman, Stoughton Center, Pembroke Center, etc. Others are centered on transit stations, such as the Montello and Campello stations in Brockton.

Abington TOD

The Town of Abington has created a 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 experienced impressive growth between 2000 and 2009, and with new higher-density residential development, the Town has the potential to become one of the larger communities in the region. The Abington MBTA Station 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 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)

Enhancing pedestrian facilities (well maintained and lighted sidewalks, pedestrian countdown signals at intersections) between the Target Shopping Center on Route 123, the Abington MBTA Station and TOD Zone, and the Central Business District on Washington Street would, in all likelihood, foster and strengthen high-density development around the Station.

Downtown Bridgewater

Downtown Bridgewater is a transportation hub in the region, with the intersection of Routes 18, 28, and 104, as well as the nearby location of the Bridgewater MBTA Commuter Rail Station. 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 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 way of walking or biking, and similarly many on-campus students commute to nearby businesses on foot or bike.

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.

According to the 2010 Census, Bridgewater is the fourth most populous community in the region with a population of 26,563 residents. Bridgewater State University has consistently grown for the past several years, with an enrollment of approximately 10,400 students. Bridgewater has a significant population of people that do not have access to cars and are dependent upon walking, bicycling, and transit to get around.

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 or sharrows may also 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. 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, state, and federal) 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 occur within Downtown Brockton.

Brockton has completed several projects to enhance the downtown area along with the Intermodal Transportation Centre such as sidewalks and pedestrian amenities and condominium projects located near the Centre.

While much has been done already in the Downtown Brockton area, additional facilities could serve to increase safety and security of pedestrians and bike riders in the Downtown area, including:

- Pedestrian countdown signals at Downtown Intersections

- 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 at other locations
- Bicycle Lockers at Brockton MBTA Station, BAT Intermodal Centre, and various locations downtown

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 the Abington MBTA Station, the Stoughton MBTA Station also 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 Lockers and Bike Racks (Potential)
- Fixed Route Bus Service by Brockton Area Transit and MBTA (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 water borne transportation options to Provincetown, and also serves as an operational fishing port.

Plymouth has a parking management system in the Downtown that directs visitors to park at any one among 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. The majority of visitors to and employees in Downtown Plymouth must park their cars at satellite municipal parking lots and walk the remainder of the trip to their destination.

The area could be greatly served by the following amenities:

- Bicycle Lockers and Bike Racks around the Downtown
- Pedestrian countdown signals at signalized intersections
- Raised Crosswalks at major mid-block crossing points
- Increased lighting on side streets and alleyways that connect Main Street to Water Street

Stonehill College and Route 138

Stonehill College, located on Route 138 in Easton, contains a large on-campus population, and generates some commuting student traffic as well. Immediately to the south of Stonehill College, Route 138 is highly developed with many restaurants, convenience stores and services, and other businesses. This commercial retail generates a large amount of pedestrian traffic originating at Stonehill College, and most of these trips travel back and forth on Route 138.

Safety and security along Route 138 can be enhanced for pedestrians and bicycle riders by:

- Creation of Bicycle Lanes along Route 138 between Stonehill College and through business district
- Enhancement of traffic signals along corridor
- Well-lighted walkways and streetscapes

Downtown Whitman

Downtown Whitman is centered on Washington Street, between South Avenue (Route 27) and West Street. The relatively compacts area, featuring several businesses, is flanked by dense residential development on all sides, a large park to the northeast, and Town Offices and the Whitman MBTA Station with 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.

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 relatively fast growth of the town, the newly developed center, and new transit service between the center and the Hanson MBTA Station.

Campello and Montello MBTA Stations

The Campello and Montello neighborhoods of Brockton each have an MBTA 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 of 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 fixed route bus service, and the Montello Station is served by MBTA fixed route bus service to Holbrook, Randolph, Braintree, and Quincy.

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 of Plain Street.

The Montello Station could be better served by enhanced mid-block pedestrian crossings on North Montello Street (Route 28). The roadway has high traffic volumes through this two-lane cross-section of roadway and increasing speeds as vehicles clear the intersection at Route 37 and travel southbound.

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.

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
- Improve Roadway Lighting
- Construction of new sidewalks
- Construction of bicycle paths and/or on-road lanes

7.4 Safe Routes to School

The Massachusetts Safe Routes to School (SRTS) program promotes healthy alternatives 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. Following a successful pilot program developed by WalkBoston and funded by MassDOT, an expanded program was established in 2005 through MassRIDES, the Commonwealth's travel options program. MassRIDES offers schools technical support to customize programs and training.

The Safe Routes to School program (SRTS) aims to reduce congestion, air pollution, and traffic congestion near participating schools, while increasing the health, safety, and physical activity of elementary and middle school students.

Safe Routes programs:

- 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

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.

<u>Current Participant Schools</u>

Old Colony Planning Council provides technical assistance to communities and the school systems in their Safe Routes to School programs.

The following schools are partnered with MassRIDES on participation in the Safe Routes to School Program:

Table 7-2: Current Safe Routes to School Member Schools in OCPC Region (May 2011)

Community	Schools
Abington	Woodsdale Elementary School
	Center School
Brockton	Brookfield Elementary School
	Davis K-8 School
	Downey Elementary
	Hancock Elementary School
	John F. Kennedy School
East Bridgewater	Central Elementary School
	Mitchell Middle School
Easton	F.L. Olmstead School
	Richardson School
Halifax	Halifax Elementary School
Hanson	Indian Head School
	Maquan Elementary School
Pembroke	North Pembroke Elementary
Plymouth	Federal Furnace Elementary School
	Hedge Elementary
Stoughton	West Elementary School
	Joseph R. Dawe Elementary School

7.5 Conclusion and Recommendations

Continue support and coordination of the Regional Bicycle and Pedestrian Taskforce: Old Colony Planning Council staff shall be responsible for scheduling and coordinating meetings of the Regional Bicycle and Pedestrian Taskforce. The Taskforce shall meet quarterly, unless otherwise directed by the majority opinion of the Taskforce members. Staff shall record and disseminate minutes of all Taskforce meetings, and report to the Joint Transportation Committee, Old Colony Planning Council, and Metropolitan Planning Organization in a timely manner.

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.

Plymouth MBTA Commuter Rail Station and Seaside Rail Trail: Construction of new connections and enhancements to existing ones should be made between the Plymouth Station, the Plymouth Seaside Trail, and the Historic Plymouth Waterfront and Downtown Plymouth. Currently there is some degree of disconnect between these three components to this underutilized transportation corridor.

Maintain and Regularly Update the Regional Bicycle and Pedestrian Transportation Plan. The Regional Bicycle and Pedestrian Transportation Plan examine the existing infrastructure in the region that supports bicycle and pedestrian transportation, and identify strengths and weaknesses in the system. The Plan identifies key areas to address for the creation of a contiguous, region-wide network of sidewalks, walkways, bicycle paths, and bicycle lanes, as well as identify strategies to accomplish the goals of the plan.

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.

Continue bicycle and pedestrian transportation safety efforts in Safety Management System. The Safety Management System promotes and plans for safety improvements throughout all modes on the transportation network.

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.

Enhance pedestrian consideration during the planning and design phases. Too often municipalities overlook the safety and access of pedestrians in areas with high volumes of automobiles. Only as an afterthought, safety amenities are added or design conditions are changed. A coordinated effort of planners, engineers, and local officials, should encourage pedestrian needs to be of higher priority during the initial design process.

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 and Support the Bay State Greenway and Boston to Cape Cod Corridor. OCPC shall promote and support the Bay State Greenway and Boston to Cape Cod Corridor through its planning efforts and public outreach activities. Signage indicated the bike route should be upgraded to both better serve cyclists using the facilities as well as to notify drivers that the on-road portions are designated bike routes.

Continue to study/identify additional pedestrian facilities. Continue to conduct studies in the region as needed to identify, designate, and implement additional pedestrian facilities. These facilities should improve linkages between existing pedestrian walkways, transit facilities, activity areas, and residential neighborhoods, and provide a safe and accessible means of short distance travel and recreation.

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. Raised medians provide the following benefits to pedestrians on the roadway network:

- ***Allow pedestrians to cross few lanes at a time, reducing exposure time;***
- ***Provide a refuge so slower pedestrians (older persons, physically disabled, etc.) can wait for a break in the traffic stream;***
- ***Allow pedestrians to focus on one direction of traffic at a time;***

- ***Reduce the total distance over which pedestrians are exposed to conflicts with motor vehicles; and,***
- ***May provide easily accessible location for pedestrians signal call buttons.***

Raised medians may also further enhance safety by functioning as a traffic-calming device, forcing drivers to reduce speed on approach to the crossing area.

Promote Pedestrian Level of Service B or Better at Intersections with High Pedestrian Activity – Pedestrian level of service is defined by the delay experienced by the pedestrian at an intersection, with guidance provided for by the Highway Capacity Manual (HCM). At Level of Service grades A and B, the likelihood of risk taking behavior (accepting dangerously small traffic gap, ignoring signals, etc.) in evaluated as "Low" by the HCM. The likelihood of risky behavior increases to "Moderate" at Level of Service grades C and D. At level of service E, the likelihood of risky behavior increases to "High". All reasonable efforts should be exercised in planning, design, and construction of pedestrian facilities at intersections to minimize the potential risk taking behavior by pedestrians at intersections.

8.0 Introduction

The Old Colony region contains many areas of environmental and historical value and the Old Colony MPO is dedicated to protecting those rich areas. This chapter describes the characteristics of the natural environment in the Old Colony region; provides a map series of those characteristics; identifies federal and state policies put in place to protect, preserve, and maintain vulnerable areas; and discusses potential environmental mitigation measures that may assist these policies in protecting environmental quality. In addition, this chapter discusses the possible effects that climate change may have on the transportation system within the Old Colony region; identifies natural hazards that could endanger the citizens and wildlife of the region; highlights numerous energy alternatives; and identifies programs which have the potential to enhance environmental quality throughout the Commonwealth.

Figure 8-1: Jones River, Kingston, MA

Objectives and Goals

The Old Colony MPO has developed a set of objectives and goals to guide its transportation planning activities through the foreseeable future. The following objectives and goals apply directly to the content of this chapter:

Objectives:

- Support the reduction of emissions emitted from vehicular combustion engines
- Encourage the use of transit, carpool/vanpool, and non-motorized transportation modes, such as bicycling and walking
- Promote developments that improve water quality, reduce impacts to wildlife, and reduce impacts to open space
- Support investments that cleanup brownfields and avoid investments that increase that pressure to develop greenfields
- Encourage the use of clean alternative fuels and recyclable materials for new transportation infrastructure
- Promote proactive planning to lessen the possible effects of natural disasters that are exacerbated by climate change

Goals:

- Reduce carbon emissions through improved automobile fuel efficiency
- Increase transit use, carpooling, vanpooling, bicycling and walking through education and incentives
- Increase brownfield redevelopment incentives
- Increase alternative fuels and energy incentives

- Increase the development of wastewater treatment capacity and drainage in areas identified as frequently flooded

Coordination & Outreach

As required by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation, the Regional Transportation Plan (RTP) update process incorporated consultations with federal, state, and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation.

Old Colony Planning Council (OCPC) uses a wide variety of approaches to the Regional Transportation Plan (RTP) Update Consultation Process. Old Colony Planning Council's consultation process included, but was not limited to the following:

- Topic Specific Meetings
- MEPA Project Scoping Sessions
- Phone Interviews
- Email Correspondence
- General Meetings
- Public Outreach Events

OCPC consulted with the following agencies and groups in order to ensure that all appropriate information was included in this chapter as well as to fully comply with the requirements set forth by SAFETEA-LU:

- United States Environmental Protection Agency
- Massachusetts Department of Environmental Protection
- Massachusetts Department of Conservation & Recreation
- Massachusetts Department of Transportation
- Massachusetts Environmental Policy Act Office
- Massachusetts Department of Agricultural Resources
- Massachusetts Department of Fish & Game
- Massachusetts Executive Office of Energy and Environmental Affairs
- Massachusetts Audubon Society
- The Nature Conservancy

The consultation process included phone interviews and email correspondences with the aforementioned agencies and groups. In addition, whenever possible, OCPC staff regularly engaged representatives from the aforementioned agencies and groups at public outreach events, topic specific public meetings (i.e. – corridor study meetings), as well as regularly scheduled meetings of the Joint Transportation Committee (JTC) and Metropolitan Planning Organization (MPO).

In addition, OCPC reviewed the following plans in order to ensure that the goals and objectives of the 2012 Regional Transportation Plan reflected those of the aforementioned list of agencies and groups:

- MassDOT GreenDOT Policy Directive
- Massachusetts Regional Greenhouse Gas Initiative
- Massachusetts Clean Energy and Climate Plan for 2020

- MassDOT Project Development and Design Guidebook
- Massachusetts Smart Growth/Smart Energy Toolkit
- HUD-DOT-EPA Partnership for Sustainable Communities
- MassDEP Stormwater Management Policy Handbook
- MEPA Greenhouse Gas Emissions Policy & Protocol
- Massachusetts Outdoors 2006
- BioMap 2: Conserving the Biodiversity of Massachusetts in a Changing World
- Massachusetts Natural Heritage Atlas, 13th Edition

This consultation process is valuable in that it provides other agencies with the opportunity to learn more about the Regional Transportation Plan (RTP) while providing the opportunity to strengthen the plan with additional information relative to the environmental quality of the future transportation infrastructure.

8.1 Environmental Quality

8.1.1 Air Quality

Existing Conditions

The 1990 Clean Air Act Amendments (CAAA) require Metropolitan Planning Organizations within ozone nonattainment areas to perform air quality conformity determinations prior to the approval of Regional Transportation Plans (RTPs) and Transportation Improvement Programs (TIPs). Conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. This section presents information and analyses for the air quality conformity determination for the 2012 Regional Transportation Plan of the Old Colony MPO, as required by Federal Regulations 40 CFR Parts 51 and 93, and the Massachusetts Conformity Regulations (310 CMR 60.03). This information and analyses include: regulatory framework, conformity requirements, planning assumptions, emissions budgets, and conformity consultation procedures.

Background

The Commonwealth of Massachusetts is classified as serious nonattainment for ozone, and is divided into two nonattainment areas. The Eastern Massachusetts ozone nonattainment area includes Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Suffolk, and Worcester counties. Berkshire, Franklin, Hampden, and Hampshire counties comprise the Western Massachusetts ozone nonattainment area. With these classifications, the 1990 Clean Air Act Amendments (CAAA) required the Commonwealth to reduce its emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), the two major precursors to ozone formation to achieve attainment of the ozone standard.

In April 2002, the cities of Lowell, Waltham, Worcester and Springfield were re-designated to attainment for carbon monoxide with EPA-approved limited maintenance plans. In April 1996, the communities of Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville were classified as attainment for carbon monoxide (CO). Air quality conformity analysis must still be completed in these communities, as they have a carbon monoxide maintenance plan approved into the state implementation plan (SIP). The year 2010 carbon monoxide motor vehicle emission budget established for the Boston CO attainment area with a maintenance plan is 228.33 tons of carbon monoxide per winter day.

A prior conformity determination for all RTPs occurred in 2007, when the Federal Highway Administration (FHWA) – in consultation with the Environmental Protection Agency (EPA New England) and the Massachusetts Department of Environmental Protection (DEP) – confirmed that all 13 of the RTPs for the year 2007 in Massachusetts were in conformity with the Massachusetts State Implementation Plan (SIP). A summary of major conformity milestones in recent years is as follows:

Between 2003 and 2006, several new conformity determinations were made that were triggered by various events, including: The 2003 regional transportation plans, a change in designation from the one-hour ozone standard to an eight-hour ozone standard, and various changes to regional TIPs that involved reprogramming transportation projects across analysis years.

In 2007, air quality analyses were conducted on behalf of all the 2007 Regional Transportation Plans (RTPs), the purposes of which were to evaluate the RTPs' air quality impacts on the SIP. Conformity determinations were performed to ensure that all regionally significant projects were included in the RTPs. The Massachusetts Department of Transportation found the emission levels from the 2007 Regional Transportation Plans to be in conformance with the SIP.

On April 2, 2008, EPA found that the 2008 and 2009 motor vehicle emissions budgets (MVEBs) in the January 31, 2008 Massachusetts 8-hour ozone State Implementation Plan revision were adequate for transportation conformity purposes. The submittal included 2008 and 2009 MVEBs for the Boston-Lawrence-Worcester (Eastern Massachusetts) and Springfield (Western Massachusetts) 8-hour ozone nonattainment areas. Massachusetts submitted these budgets as part of the 8-hour ozone attainment demonstration and reasonable further progress plan for both nonattainment areas, and as a result of EPA's adequacy finding, these budgets were required to be used for conformity determinations. EPA later determined (in 2010) that only the most recent MVEBs - 2009 - be used for future conformity determinations.

In 2010, air quality analyses were conducted on behalf of all the 2011-2014 Regional Transportation Improvement Programs (TIPs), the purposes of which were to evaluate the TIPs' air quality impacts on the SIP. Conformity determinations were performed to ensure that all regionally significant projects were included in the TIPs. The Massachusetts Department of Transportation found the emission levels from the 2011-2014 TIPs to be in conformance with the SIP. On November 15, 2010, EPA confirmed that both the Eastern and Western Massachusetts Non-Attainment areas collectively demonstrated transportation conformity, with concurrence from Massachusetts DEP on 11/23/10. On December 22, 2010, FHWA and FTA determined that the TIPs were in conformity with the Clean Air Act and the EPA conformity regulations (40 CFR Part 51).

Conformity Regulations

The CAAA revised the requirements for designated MPOs to perform conformity determinations by ozone non-attainment area for their RTPs and TIPs. Section 176 of the CAAA defines conformity to a State Implementation Plan to mean conformity to the plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of the standards. The Old Colony MPO must certify that all activities outlined in the 2012 The Old Colony Regional Transportation Plan:

- *will not cause or contribute to any new violation of any standard in any area*

- will not increase the frequency or severity of any existing violation of any standard in any area
- *will not delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area*

The federal conformity regulations from EPA set forth requirements for determining conformity of Transportation Plans, Transportation Improvement Programs, and individual projects. The requirements of the conformity analysis are summarized below and will be explained in detail in this conformity determination:

- Conformity Criteria
  - *Horizon Years*
  - *Latest planning assumptions*
  - *Latest emission model used*
  - *Timely implementation of transportation control measures (TCMs)*
  - *Conformity in accordance with the consultation procedures and SIP revisions*
  - *Public Participation Procedures*
  - *Financially Constrained Document*
- Procedures for Determining Regional Transportation Emissions
- The Conformity Test
  - *Consistent with emission budgets set forth in SIP*
  - *Contribute to reductions in CO nonattainment areas*

In addition, the regulations set specific requirements for different time periods depending on the timeframe of the Commonwealth's SIP submittals to EPA. These periods are defined as follows:

Control Strategy Period: Once a control strategy SIP has been submitted to EPA, EPA has to make a positive adequacy determination of the mobile source emission budget before such budget can be used for conformity purposes. The conformity test in this period is consistency with the mobile source emission budget.

Maintenance Period is the period of time beginning when the Commonwealth submits and EPA approves a request for redesignation to an attainment area, and lasting for 20 years. The conformity test in this period is consistency with the mobile source emission budget.

Horizon Year Requirements

Horizon years for regional and state model analyses have been established following 40 CFR 93.106(a) of the Federal Conformity Regulations. The years for which the regional and state transportation models were run for ozone precursor emission estimates are shown below:

- 2010: Milestone Year – This year is now being used by the statewide travel demand model as the new base year for calculation of emission reductions of VOCs and NOx.
- 2016: Milestone Year and Analysis Year: This year is used to show conformity with the existing emission budgets for ozone precursors in Western Massachusetts.
- 2020: Analysis Year

- 2025: Analysis Year
- 2035: Horizon Year – last forecast year of the regional transportation plan

Latest Planning Assumptions

Section 93.110 of the Federal Conformity Regulations outlines the requirements for the most recent planning assumptions that must be in place at the time of the conformity determination. Assumptions must be derived from the estimates of current and future population, households, employment, travel, and congestion most recently developed by the MPO. For the 2012 The Old Colony Regional Transportation Plan and other regional plans, the MassDOT developed a series of forecasts – in cooperation with all the MPOs – that represent the most recent planning assumptions for all of Massachusetts.

Transit Operating Policy Assumptions

For the (Region) MPO, the operating policies and assumed transit ridership have not changed since the conformity determination prepared for the 2007 Transportation Plan.

Latest Emissions Model

Emission factors used for calculating emission changes were determined using MOBILE 6, the model used by DEP in determining motor vehicle emission budgets. Emission factors for motor vehicles are specific to each model year, pollutant type, temperature, and travel speed. MOBILE 6 requires a wide range of input parameters including inspection and maintenance program information and other data such as anti-tampering rates, hot/cold start mix, emission failure rates, vehicle fleet mix, fleet age distribution, etc. The input variables used in this conformity determination were received from DEP and approved by EPA.

Timely Implementation of Transportation Control Measures

Transportation Control Measures (TCMs) have been required in the SIP in revisions submitted to EPA in 1979 and 1982. All SIP TCMs have been accomplished through construction or through implementation of ongoing programs. All of the projects have been included in the Region's Transportation Plan (present of past) as recommended projects or projects requiring further study.

DEP submitted to EPA its strategy of programs to show Reasonable Further Progress of a 15% reduction of VOCs in 1996 and the further 9% reduction of NOx toward attainment of the National Ambient Air Quality Standards (NAAQS) for ozone in 1999. Within that strategy there are no specific TCM projects. The strategy does call for traffic flow improvements to reduce congestion and, therefore, improve air quality. Other transportation-related projects that have been included in the SIP control strategy are listed below:

- *Enhanced Inspection and Maintenance Program*
- *California Low Emission Vehicle Program*
- *Reformulated Gasoline for On- and Off-Road Vehicles*
- *Stage II Vapor Recovery at Gasoline Refueling Stations*
- *Tier I Federal Vehicle Standards*

Consultation Procedures

The final conformity regulations require that the MPO make a conformity determination according to consultation procedures set out in the federal and state regulations, and the MPO must also follow public involvement procedures established under federal metropolitan transportation planning regulations. The consultation requirements of both the state and federal regulations require that the Old Colony MPO (and all other MPOs), MassDOT, Mass. DEP, US EPA - Region 1 and FHWA – Massachusetts Division, consult on the following issues:

- *Selection of regional emissions analysis models including model development and assessment of project design factors for modeling*
- *Selection of inputs to the most recent EPA-approved emissions factor model*
- *Selection of CO hotspot modeling procedures, as necessary*
- *Identification of regionally significant projects to be included in the regional emissions analysis*
- *Identification of projects which have changed in design and scope*
- *Identification of exempt projects*
- *Identification of exempt projects that should be treated as non-exempt because of adverse air quality impacts*
- *Identification of the latest planning assumptions and determination of consistency with SIP assumptions*

These issues have all been addressed through consultation among the agencies listed above.

Public Participation Procedures

Title 23 CFR Section 450.322 and 310 CMR 60.03(6)(h) require that the development of the Regional Transportation Plan, TIP, and related certification documents provide an adequate opportunity for public review and comment. Section 450.316(b) also establishes the outline for MPO public participation programs.

An underlying principle of the metropolitan planning process is public participation, coordination, and consultation with appropriate agencies and groups. As such, a successful public participation model was developed and utilized. Legal advertisements are not a panacea for public participation. With that in mind, the staff engaged the public to the maximum extent possible. Various strategies were deployed, documented, and evaluated.

This Regional Transportation Plan was developed in accordance with the Public Participation Plan (PPP) for the Old Colony Planning Council Region. Brockton Area Transit utilizes the Old Colony MPO's public participation as its public participation process.

Public participation in the RTP development process is welcomed and encouraged. The public is able to participate in the development of the RTP by attending various meetings and reviews designated for the RTP, or by contacting the OCPC offices. The development process is as such:

- Review previous years RTP s
- List all projects carried over from the latest RTP and new suggestions for projects
- Review list of Projects with the JTC, OCPC, and MPO
- Consideration of the Congestion Management Process
- Consideration of Transportation Evaluation Criteria
- Development of future projects

Staff utilized a diverse methodology for coordination, consultation, and engaging the public to maximum extent possible in the development of the RTP. The methodology is presented below.

- Old Colony MPO - The MPO provided oversight of the RTP development and has the responsibility of ultimately endorsing the RTP.

- Old Colony Planning Council (OCPC) - The Old Colony Planning Council discussed the RTP development and provided both planning and policy guidance at regularly scheduled Council meetings. Meetings took place typically during the last Wednesday of the month.

- Old Colony Joint Transportation Committee (JTC) - Functioning as the advisory group to the Old Colony MPO and Old Colony Planning Council, this group assisted with the identification of transportation deficiencies and provided regular input and review of RTP products. The Committee consists of superintendents and or directors of highway/ department of public works, town planners, engineers, etc. Typically, meetings took place during the second Thursday of the month. As such, regular input and guidance occurred.

- Transit Providers – Council staff solicited input regarding transit issues from the BAT, GATRA, MBTA, South Shore Community Action Council, as well as a private carrier (P&B).

- Coordination and consultation activities - Coordination and consultation, and/ or information dissemination activities took place with multiple agencies and groups. As such, these coordination and consultation activities took place with: Brockton Area Transit Authority, Brockton 21st Century Cooperation, Cape Verdean Association of Brockton, Chief Elected Officials, Departments of Public Works and Highway Departments, Executive Office of Transportation, Latino Health Institute, Greater Attleboro Taunton Transit Authority, MassDOT District 5, MBTA, Metro South Chamber of Commerce, NAACP, Plymouth and Brockton (P&B), Plymouth Area Chamber of Commerce, Plymouth County Development Council, South Shore Chamber of Commerce, and South Shore Community Action Council.

- Transportation Advisory Network (TAN) - The TAN consists of over 200 members. Members include chief elected officials, legislators, planning boards, MassDOT, FHWA, FTA, transit providers, minority groups, town clerks, and transportation officials. The objective was to provide continuing outreach to a wide network. Council staff provided announcements of product availability, upcoming events, and meetings associated with the TIP to the TAN.

- Media Outlets and places of public convenience - Staff utilized multiple media outlets and places of public convenience to solicit public comment, advertise meetings, and advertise TIP availability. The media outlets and places of public convenience consisted of newspaper legal advertisements, websites (Old Colony Planning Council, town and city halls, local cable access (all communities with cable access).

- Copies of the Draft RTP on the OCPC website and Office so residents and stakeholders from member communities had many opportunities to review the Draft RTP. Copies of the Draft RTP were provided upon request.

- 30-Day Public Review Period - During the public review period for the Draft RTP, copies were available and their availability was advertised using multiple media outlets and the TAN. During

the period, public meetings were held and the Council staff was available to discuss the Draft RTP with the public upon request.

Financial Consistency

Title 23 CFR Section 450.322 and 40 CFR 93.108 require the 2012 Old Colony Regional Transportation Plan to "be financially constrained by year and include a financial plan that demonstrates which projects can be implemented using current revenue sources and which projects are to be implemented using proposed revenue sources."

The 2012 Plan is financially constrained to projections of federal and state resources reasonably expected to be available during the appropriate time frame. Projections of federal resources are based upon the estimated apportionment of the most recent federal authorizations, as allocated to the region by the state or as allocated among the various MPOs according to federal formulae or MPO agreement. Projections of state resources are based upon the allocations contained in the current Transportation Bond Bill and historic trends. Therefore, the 2012 Plan substantially complies with the federal requirements relating to financial planning.

Model Specific Information

40 CFR Part 93.111 of the federal regulations outlines requirements to be used in the network-based transportation demand models. These requirements include modeling methods and functional relationships to be used in accordance with acceptable professional practice and reasonable for purposes of emission estimation. MassDOT, on behalf of the Old Colony MPO, has used the methods described in the conformity regulations in the analysis of this 2012 Regional Transportation Plan.

Highway Performance Monitoring System Adjustments

As stated in EPA guidance, all areas of serious ozone and carbon monoxide nonattainment must use FHWA's Performance Monitoring System (HPMS) to track daily vehicle-miles of travel (VMT) prior to attainment to ensure that the state is in line with commitments made in reaching attainment of the ambient air quality standards by the required attainment dates. MassDOT provided HPMS information to DEP. DEP used this information in setting mobile-source budgets for VOC, NOx, and CO in all SIP revisions prior to 1997. DEP has since revised its VOC and NOx budgets using transportation-demand model runs. However, the models must still be compared to HPMS data since HPMS remains the accepted tracking procedure as outlined in the regulations.

The conformity regulations require that all model-based VMT be compared with the HPMS VMT to ensure that the region is in line with VMT and emission projections made by DEP. An adjustment factor that compares the 2010 HPMS VMT to the 2010 transportation model VMT has been developed. This adjustment factor is then applied to all modeled VOC and NOx emissions for the years 2016 through 2035 to ensure consistency with EPA-accepted procedures.

$$\frac{\text{2010 HPMS VMT}}{\text{2010 Modeled VMT for VOC and NOx}} = \text{Adjustment factor} = 1.051$$

HPMS adjustment factors, calculated on a regional basis, are applied to the model output of future scenarios, and they change as base-year models are updated or improved, or as HPMS data is revised or updated. The latest factors for Eastern Massachusetts are as follows:

REGION	2010 HPMS VMT (miles)	Travel Demand Model VMT (miles)	HPMS/Model Conversion Factor
Cape Cod	6,869,000	4,456,118	1.541
Central Massachusetts	14,564,000	11,924,422	1.221
Martha's Vineyard	266,000	224,944	1.183
Merrimack Valley	9,353,000	9,143,834	1.023
Boston	60,751,000	71,225,035	0.853
Montachusett	5,015,000	4,392,193	1.142
Nantucket	153,000	71,899	2.128
Northern Middlesex	6,523,000	6,735,326	0.968
Old Colony	6,883,000	6,549,927	1.051
Southeastern Massachusetts	14,710,000	13,745,040	1.070
Eastern MA	125,087,000	128,468,738	0.974
State Total	148,937,000	142,159,733	1.048

Changes in Project Design since the Last Conformity Determination Analysis

The Commonwealth requires that any change in project design from the previous conformity determination for the region is identified. Changes that have occurred since the last conformity determination in 2010 are as follows:

- The modeled base year has changed from 2007 to 2010.
- A new analysis year has been included in the conformity determination. An air quality analysis has been completed for 2016. This complies with EPA's Transportation Conformity Rule Restructuring Amendments (40 CFR Part 93.118, expected to become effective August 2011) which states that "if the attainment date has not yet been established, the first analysis year must be no more than five years beyond the year in which the conformity determination is being made." (2011 base to 2016 analysis year).
- Emission factors have been developed for 2010, 2016, 2020, 2025, and 2035 using Mobile 6.2 with inputs approved by MassDEP and US EPA.
- New HPMS adjustment factors have been developed for the new 2010 base year.

Procedures for Determining Regional Transportation Emissions

The federal conformity regulations set specific requirements for determining transportation emissions, which are estimated from a combination of emission rates, HPMS volume data, and travel demand model projections. Travel demand models use estimates of population, households, and employment to project future travel volumes and patterns. Chapter 4 – Regional Profile of the Plan presents these estimates as part of the existing and future regional transportation system.

Only "regionally significant" projects are required to be included in the travel demand modeling efforts. The final federal conformity regulations define regionally significant as follows:

> ***Regionally significant:*** *a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sport complexes, etc., or transportation terminals as well as most terminals themselves) and would be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.*

In addition, specific classes of projects have been exempted from regional modeling emissions analysis. The categories of exempt projects include:

- *Intersection channelization projects*
- *Intersection signalization projects at individual intersections*
- *Interchange reconfiguration projects*
- *Changes in vertical and horizontal alignment*
- *Truck size and weight inspection stations*
- *Bus terminals and transfer points*

Previous conformity amendments now allow traffic signal synchronization projects to be exempt from conformity determinations prior to their funding, approval or implementation. However, once they are implemented, they must be included in conformity determinations for future plans and TIPs

The milestone and analysis year transportation model networks are composed of projects proposed in this RTP. Projects in these networks consist of all in-place regionally significant projects that can reasonably be expected to be completed by a given analysis/horizon year with consideration of available funding commitments. This project group would include, but not be limited to, regionally significant projects where at least one of the following steps has occurred within the past three years:

- Comes from the first year of a previously conforming TIP,
- Completed the NEPA process, or
- Currently under construction or are undergoing right-of-way acquisition

Regionally Significant Projects Included in the Regional Transportation Models for the Eastern Massachusetts Ozone Non-Attainment Area

Analysis Year	Community	Description of Projects Under Construction – Boston Region
2016	Bedford, Burlington	Middlesex Turnpike Improvements Phases 1and 2
2016	Bellingham	Pulaski Boulevard
2016	Boston	Fairmount Line Improvements, including new stations
2016	Boston	East Boston Haul Road/Chelsea Truck Route (new grade separated roadway)
2016	Concord, Lincoln	Route 2/Crosby's Corner (grade separation)
2016	Danvers	Route 128/Route 35 and Route 62
2016	Hudson	Route 85 (capacity improvements from Marlborough TL to Rt 62)
2016	Marshfield	Route 139 Widening (to 4 lanes between School St. and Furnace St.)
2016	Quincy	Quincy Center Concourse, Phase 2 (new roadway: Parking Way to Hancock St.)
2016	Randolph to Wellesley	Route 128 Additional Lanes
2016	Somerville	Assembly Square Orange Line Station
2016	Somerville	Assembly Square Roadways (new and reconfigured)
2016	Weymouth, Hingham, Rockland	South Weymouth Naval Air Station Access Improvements
2016	Regionwide	1000 Additional Park and Ride Spaces
Analysis Year	**Community**	**Description of Recommended Plan Projects– Boston Region**
2016	Beverly	Beverly Station Commuter Rail Parking Garage
2016	Boston	Conley Haul Road
2016	Salem	Salem Station Commuter Rail Parking Garage Expansion
2016	Somerville, Cambridge, Medford	Green Line Extension to Medford Hillside/Union Square
2016	Weymouth	Route 18 Capacity Improvements
2020	Bedford, Burlington, Billerica	Middlesex Turnpike Improvements Phase 3 – widening Plank St. to Manning
2020	Boston	Sullivan Square/Rutherford Avenue Improvements
2020	Hanover	Route 53 Final Phase (widening to 4 lanes between Rt 3 and Rt 123)
2020	Salem	Bridge Street (widening to 4 lanes between Flint and Washington St.)
2020	Somerville, Medford	Green Line Extension to Mystic Valley Parkway (Route 16)
2025	Canton	I-95 (NB)/Dedham Street Ramp/Dedham Street Corridor (new ramp with widening on Dedham St. from I-95 to University Ave.)
2025	Canton	I-95/I-93 Interchange (new direct connect ramps)
2025	Newton, Needham	Needham Street/Highland Avenue (includes widening Charles River Bridge)
2025	Woburn	Montvale Avenue (widening between Central St. to east of Washington St.)
2025	Woburn	New Boston Street Bridge (reestablish connection over MBTA Lowell line)
2035	Braintree	Braintree Split - I-93/Route 3 Interchange
2035	Framingham	Route 126/135 Grade Separation
2035	Reading, Woburn, Stoneham	I-93/I-95 Interchange (new direct connect ramps)
2035	Revere, Malden, Saugus	Route 1 (widening from 4 to 6 lanes between Copeland Circle and Rt. 99)
2035	Wilmington	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.)
Analysis Year	**Community**	**Project Description - Cape Cod Region**
2020	Barnstable	Yarmouth Rd. /Rt 28 (widening to 4 lanes) with Hyannis Access Improvements
2025	Bourne	Route 6 Exit 1 WB on-ramp changes and interchange improvements
2035	Bourne	Route 25 Access Ramp widening / Belmont Circle two-way travel
2035	Capewide	Daily Passenger Rail Service: Hyannis to Buzzard's Bay, Middleborough
2035	Mashpee	Mashpee Rotary Ring Roads (connectors, Great Neck Rd, Routes 28 and151)
Analysis Year	**Community**	**Project Description - Central Massachusetts Region**
2016	Northborough	Rt 20 Church to South, signal coordination in corridor
2016	Shrewsbury/Worcester	Rt 9 Bridge over Lake Quinsigamond: widening, additional lane each direction
2016	Auburn	Rt 12/20 to Auburn TL capacity improvements and raised median

2016	Worcester	Lincoln/Highland/Pleasant Streets intersection corridor improvements, minor widening, select signal coordination
2016	Worcester	Route 20 Widening to a consistent 4 lanes
2020	Charlton, Oxford	Route 20 Widening to a consistent 4 lanes
2025	Westborough, Hopkinton	I-90/I-495 and I-495/Rt 9 Interchange Improvements (CD or frontage roads)
2035	Worcester	Route 122/122A Madison St/Chandler St. Kelley Square to Pleasant St: various improvements and signal coordination
2035	Worcester	I-290 Hope Ave. (to full interchange and roundabout at Webster and Hope)
2035	Millbury, Sutton	Route 146 Improvements: Route 122A to Central Turnpike
Analysis Year	**Community**	**Project Description – Martha's Vineyard Region**
n/a	n/a	none
Analysis Year	**Community**	**Project Description – Merrimack Valley Region**
2016	Amesbury	Route 110 from I-495 to I-95 (widen from 2 lanes to 4)
2020	Newburyport, Amesbury	I-95 over Merrimack River (Whittier Bridge widening from 6 to 8 lanes)
2020	Methuen	Route 110/113 (Methuen Rotary – new interchange ramps at I-93)
2025	Lawrence, North Andover	Route 114 (widening from I-495 to Waverly Road)
2035	Andover	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.) and I-93 widening to 4 lanes in each direction from new interchange/current "lane drop" area to I-495.
Analysis Year	**Community**	**Project Description – Montachusett Region**
2016	Fitchburg/Westminster	New Wachusett Commuter Rail Station
2016	Ayer to South Acton	Fitchburg Line Commuter Rail Improvements (double track)
2020	Leominster	Route 13 Hawes St. to Prospect St. (some widening, new signals, etc.)
2025	Athol	New Interchange on Route 2 at South Athol Road
Analysis Year	**Community**	**Project Description – Nantucket Region**
n/a	n/a	none
Analysis Year	**Community**	**Project Description – Northern Middlesex Region**
2016	Westford	Route 110 Minot's Corner to Nixon widen to 4 lanes
2020	Billerica	Middlesex Turnpike Improvements Phase 3 – widening Plank St. to Manning
2035	Tewksbury	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.) and I-93 widening to 4 lanes in each direction from new interchange/current "lane drop" area to I-495.
2035	Westford	I-495 at Boston Road (Exit 32) widening of on and off ramps
2035	Lowell, Tewksbury, Chelmsford, and Westford	I-495 Additional travel lane each direction between Exits 32 and 35 and between Exits 37 and 40
2035	Lowell	Wood Street, Rourke Bridge: new bridge, widening and corridor improvements
Analysis Year	**Community**	**Project Description – Old Colony Region**
2016	Abington	Route 18 - Widening to 4 Lanes from Route 139 to Highland Rd.
2020	Brockton	Route 123 - Widen from Route 24 to Angus Beaton Drive
2020	Bridgewater	Route 24 - Add Northbound Slip Ramp from Route 104 WB to Route 24 NB
2020	Plymouth	Route 3 - Add Northbound on-Ramp at Long Pond Road (Exit 5)
2020	Plymouth	Long Pond Road Bridge widening (Exit 5)
2025	Brockton	Main Street, Warren Avenue, Spring Street, West Elm Street, Belmont Street - Reestablish Two-Way Circulation
2025	West Bridgewater	Route 106 - Widening from 2 to 4 Lanes between Route 24 and Route 28
2035	Plymouth	Route 3 – Add NB Off-ramp to Plimouth Plantation Hwy (Exit 4)

2035	Plymouth	Route 25 - Add New Interchange Before Exit 1 and connect to Bourne Road
2035	West Bridgewater	Route 28, Route 106, Central Square Signal and intersection coordination
Analysis Year	**Community**	**Project Description – Southeastern Massachusetts Region**
2016	Fall River, Somerset	New Brightman Street Bridge - capacity improvements to 4 lane divided facility
2016	Fall River	Route 79/Davol Street (interchange improvements and new traffic circulation)
2016	Freetown	Route 24 - New Interchange (Exit 8 ½)
2016	Mansfield	Route 140 / I-495 New Southbound On-Ramp
2020	Dartmouth	Route 6 (Faunce Corner Rd) / I-195 Interchange - Bridge Widening to 5 Lanes
2035	Taunton	Route 24 / 140 - Interchange Reconstruction

Air Quality Conformity Analysis

The emissions from the following MPOs have been combined to show conformity with the SIP for the Eastern Massachusetts Ozone Nonattainment Area:

- Cape Cod MPO
- Central Massachusetts MPO
- Merrimack Valley MPO
- Boston MPO
- Montachusett Region MPO
- Northern Middlesex MPO
- Old Colony MPO
- Southeastern Region MPO
- Martha's Vineyard Commission*
- Nantucket Planning and Economic Development Commission*

* These regions do not contain any official urbanized areas, but are considered to be MPOs for planning purposes.

Using the latest planning assumptions, the Massachusetts Department of Transportation, Office of Transportation Planning, in coordination with MPO staff, estimated the emissions for VOC and NOx for all MPOs in Eastern Massachusetts through a combination of the statewide and Boston Region travel demand models. The VOC mobile source emission budget for 2009 and beyond for the Eastern Massachusetts Nonattainment Area has been set at 63.50 tons per summer day and the 2009 (and beyond) mobile source budget for NOx is 174.96 tons per summer day. As shown in Tables 1 and 2, the results of the air quality analysis demonstrate that the VOC and NOx emissions from all Action scenarios are less than the VOC and NOx emissions budgets for the Eastern Massachusetts Nonattainment Area:

TABLE 1
VOC Emissions Estimates for the Eastern Massachusetts Ozone Nonattainment Area
(All emissions in tons per summer day)

Year	Old Colony Action Emissions	Eastern MA Action Emissions	Budget	Difference (Action – Budget)
2010	n/a	64.974	n/a	n/a
2016	2.0009	36.232	63.50	-27.268
2020	1.7691	32.386	63.50	-31.114
2025	1.6559	30.988	63.50	-32.512
2035	1.6954	31.063	63.50	-32.437

TABLE 2
NOx Emissions Estimates for the Eastern Massachusetts Ozone Nonattainment Area
(All emissions in tons per summer day)

Year	Old Colony Action Emissions	Eastern MA Action Emissions	Budget	Difference (Action – Budget)
2010	n/a	178.925	n/a	n/a
2016	3.4136	66.219	174.96	-108.741
2020	2.2196	45.188	174.96	-129.772
2025	1.6763	36.521	174.96	-138.439
2035	1.4418	29.038	174.96	-145.922

The Old Colony MPO has conducted an air quality analysis of the 2012 Old Colony Regional Transportation Plan and its latest conformity determination. The purpose of the analysis is to evaluate the air quality impacts of the Plan on the SIP. The analysis evaluates the change in ozone precursor emissions (VOCs, and NOx) due to the implementation of the 2012 Old Colony Regional Transportation Plan. The modeling procedures and assumptions used in this air quality analysis follow guidance from EPA and the Commonwealth and are consistent with all present and past procedures used by the Massachusetts DEP to develop and amend the SIP.

MassDOT has found the emission levels from all MPOs in Eastern Massachusetts – including from the 2012 Old Colony Regional Transportation Plan – to be in conformance with the SIP according to conformity criteria. Specifically, the following conditions are met:

- The VOC emissions for the Action (build) scenarios are less than the 2009 VOC motor vehicle emission budget for analysis years 2016 through 2035.
- The NOx emissions for the Action (build) scenario are less than the 2009 NOx motor vehicle emission budget for analysis years 2016 through 2035.

In accordance with Section 176(c)(4) of the Clean Air Act as amended in 1990, the MPO for the Old Colony Region has completed its review and hereby certifies that the 2012 Old Colony Regional Transportation Plan and its latest conformity determination satisfies the conformity criteria where applicable, and therefore conditionally conforms with 40 CFR Parts 51 and 93, and 310 CMR 60.03, and is consistent with the air quality goals in the Massachusetts State Implementation Plan.

Problems or Threats

Air Pollution

Driving cars and trucks; burning coal, oil, and other fossil fuels; and manufacturing chemicals pollute the air humans and wildlife breathe. Air pollution can even come from smaller, everyday activities such as dry cleaning, filling your car with gas, and degreasing and painting operations. These activities add gases and particles to the breathable air. When these gases and particles accumulate in the air in high enough concentrations, they can cause harm to humans, wildlife, and our environment. More people in cities and surrounding counties means more cars, trucks, industrial and commercial operations, and generally means more pollution. Many air pollutants, such as those that form urban smog and toxic compounds, remain in the environment for long periods of time and are carried by the winds hundreds of miles from their origin. Millions of people live in areas where urban smog, very small particles, and toxic pollutants pose serious health concerns. People exposed to high enough levels of certain air pollutants may experience burning in their eyes, an irritated throat, or breathing difficulties. Long-term exposure to air pollution can cause cancer and long-term damage to the immune, neurological, reproductive, respiratory systems, and in extreme cases, it can even cause death.

Particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead are identified by the U.S. Environmental Protection Agency as the six most common air pollutants in the United States. These pollutants can harm human health, the environment, and cause property damage. Of the six pollutants, particle pollution and ground-level ozone are the most widespread health threats.

Green House Gases

Gases that trap heat in the atmosphere are often called greenhouse gases. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These gases trap heat in the atmosphere and therefore create a “greenhouse” effect,

which slowly warms the temperature of the earth. This warming results in a wide variety of impacts including, but not limited to: flooding, droughts, abnormal weather patterns, and long term climate change.

Mitigation Plans, Programs, and Strategies

The Old Colony MPO recognizes the issues relatedto air pollution and continues to encourage the use of the following plans, programs, and/or strategies in order to mitigate the effect on the natural environment.

Congestion Mitigation and Air Quality Improvement (CMAQ) Program

The Congestion Mitigation and Air Quality Improvement (CMAQ) Program was created under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, continued under the Transportation Equity Act for the 21st Century (TEA-21), and reauthorized by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005.

SAFETEA-LU placed a renewed focus on advancing cost-effective transportation projects that improve air quality. Specifically, the bill highlighted diesel engine retrofits as a priority for CMAQ expenditures, due to the cost-effective emissions reduction benefits that can be achieved through many retrofit technologies. SAFETEA-LU also established priority funding consideration for cost-effective congestion mitigation activities that improve air quality. The goals of the CMAQ program support this initiative in three main ways: promoting operational and technological improvements, targeting major freight bottlenecks, and relieving urban congestion.

The purpose of the CMAQ program is to fund transportation projects or programs that will contribute to attainment or maintenance of the national ambient air quality standards (NAAQS) for ozone, carbon monoxide (CO), and particulate matter (PM). The main goal of the CMAQ program is to reduce emissions in nonattainment and maintenance areas and to mitigate congestion. Congestion relief can contribute to improvements in air quality by reducing travel delays, engine idle time and unproductive fuel consumption.

Since congestion relief projects also reduce idling, the negative emissions impacts of “stop and go” driving, and the number of vehicles on the road, they have a corollary benefit of improving air quality. Based on their emissions reductions, these types of projects, including investments in improved system pricing and operations, are eligible for CMAQ funding.

Eligible projects and programs include:

- Transportation Control Measures (TCMs)
- Extreme Low-Temperature Cold Start Programs
- Alternate Fuels and Vehicles
- Congestion Reduction & Traffic Flow Improvements
- Transit Improvements
- Bicycle and Pedestrian Facilities and Programs
- Travel Demand Management
- Public Education and Outreach Activities
- Transportation Management Associations

- Carpooling and Vanpooling
- Freight/Intermodal
- Diesel Engine Retrofits & Other Advanced Truck Technologies
- Idle Reduction
- Training
- Inspection/Maintenance (I/M) Programs
- Experimental Pilot Programs

National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. To meet this requirement, federal agencies prepare a detailed statement known as an Environmental Impact Statement (EIS). The U.S. Environmental Protection Agency reviews and provides comments on the EISs prepared by other federal agencies, maintains a national filing system for all EISs, and assures that its own actions comply with NEPA.

The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis depending on whether or not an undertaking could significantly affect the environment. These three levels include: categorical exclusion determination; preparation of an environmental assessment/finding of no significant impact (EA/FONSI); and preparation of an environmental impact statement (EIS).

At the first level, an undertaking may be categorically excluded from a detailed environmental analysis if it meets certain criteria, which a federal agency has previously determined as having no significant environmental impact. A number of agencies have developed lists of actions that are normally categorically excluded from environmental evaluation under their NEPA regulations. At the second level of analysis, a federal agency prepares a written environmental assessment (EA) to determine whether or not a federal undertaking would significantly affect the environment. If the answer is no, the agency issues a finding of no significant impact (FONSI). The FONSI may address measures that an agency will take to reduce (mitigate) potentially significant impacts. If the EA determines that the environmental consequences of a proposed federal undertaking may be significant, a more detailed evaluation (EIS) of the proposed action and alternatives is prepared. The public, other federal agencies and outside parties may provide input into the preparation of an EIS and then comment on the draft EIS when it is completed. If a federal agency anticipates that an undertaking may significantly impact the environment, or if a project is environmentally controversial, a federal agency may choose to prepare an EIS without having to first prepare an EA. After a final EIS is prepared and at the time of its decision, a federal agency will prepare a public record of its decision addressing how the findings of the EIS, including consideration of alternatives, were incorporated into the agency's decision-making process.

Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act (MEPA) requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. MEPA further requires that state agencies "use all practicable means and measures to minimize damage to the environment," by studying alternatives to the proposed project, and developing enforceable mitigation commitments, which will become permit conditions for the project if and when it is permitted.

While MEPA requires that all project proponents undertake an assessment of project impacts and alternatives in an effort to avoid, minimize, mitigate damage to the environment to the maximum extent possible, the MEPA Greenhouse Gas Emissions Policy and Protocol builds on this general requirement by requiring certain projects undergoing review by the MEPA Office quantify their GHG emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying project-related GHG emissions, the Policy also requires proponents to evaluate project alternatives that may result in lower GHG emissions and to quantify the impact of proposed mitigation in terms of emissions and energy savings.

MEPA applies to projects above a certain size that involve some state agency action. That is, they are either proposed by a state agency or are proposed by municipal, nonprofit or private parties and require a permit, financial assistance, or land transfer from state agencies.

MEPA review is not a permitting process. MEPA requires public study, disclosure, and development of feasible mitigation for a proposed project. It does not pass judgment on whether a project is environmentally beneficial, or whether a project can or should receive a particular permit. Those decisions are left to the permitting agencies. MEPA review occurs before permitting agencies act, to ensure that they know the environmental consequences of their actions.

The MEPA Office is the staff of the Secretary of Energy and Environmental Affairs and is responsible for day-to-day implementation of the MEPA review process. Its job is to solicit comments from the public and agencies; represent the Secretary at the public consultation sessions on projects; coordinate project review with the proponent consultants, and interested agencies and citizens; and make a recommendation to the Secretary regarding the need for environmental documentation submitted for a project.

MEPA provides the mechanism through which this information collection and mitigation mandate is executed. The primary mechanism is known as an Environmental Impact Report (EIR). MEPA empowers the Secretary of Energy and Environmental Affairs to oversee the review process. The process is public and encourages comments from the public and from state, regional and local agencies.

Massachusetts Smart Growth / Smart Energy Program

Smart Growth is a principle of land development that emphasizes mixing land uses, increases the availability of range of housing types in neighborhoods, takes advantage of compact design, fosters distinctive and attractive communities, preserves open space, farmland, natural beauty and critical environmental areas, strengthens existing communities, provides a variety of transportation choices, makes development decisions predictable, fair and cost effective and encourages community and stakeholder collaboration in development decisions. Using elements such as compact design and providing transportation choices promotes better air quality by reducing vehicle trips, especially single occupant trips.

GreenDOT

A policy directive of the Massachusetts Department of Transportation (MassDOT), GreenDOT is a comprehensive environmental and sustainability initiative that will make MassDOT a national leader in

"greening" the state's transportation system. MassDOT will promote sustainable economic development, protect the natural environment, and enhance the quality of life for all of the Commonwealth's residents and visitors through the full range of activities, from strategic planning to construction and system operations. This will enable MassDOT to use resources in a manner that serves its existing customers while preserving resources for future generations. GreenDOT will be driven by three primary goals: reduce greenhouse gas emissions; promote healthy transportation options of walking, bicycling and public transit; and support smart growth development.

Global Warming Solutions Act

The Global Warming Solutions Act, passed in 2008, requires the Massachusetts Office of Energy and Environmental Affairs, in consultation with other state agencies and the public to set economy-wide greenhouse gas emission reduction goals and strategies for the state. This legislation calls for a reduction of between 10 percent and 25 percent below statewide 1990 GHG emission levels by 2020, and a reduction of 80 percent below statewide 1990 GHG emission levels by 2050. To achieve these goals, both land use and transportation planning will need to focus on GHG impacts and reductions.

This past December, 2010 Energy and Environmental Affairs Secretary Ian Bowles in the Clean Energy and Climate Plan, set the statewide greenhouse gas (GHG) emissions limit for 2020 at 25 percent below 1990 levels, the maximum authorized by the Act.

The Healthy Transportation Compact

The Healthy Transportation Compact is a key requirement of the landmark transportation reform legislation signed into law in 2009. The compact is co-chaired by the Secretary of Transportation and the Secretary of Health and Human Services and includes the Secretary of Energy and Environmental Affairs, MassDOT Highway Administrator, MassDOT Transit Administrator, and the Commissioner of Public Health. This inter-agency initiative is designed to facilitate transportation decisions that balance the needs of all transportation users by expanding mobility, improving public health, supporting a cleaner environment by reducing greenhouse gas emissions and creating stronger communities.

Regional Greenhouse Gas Initiative (RGGI)

The Regional Greenhouse Gas Initiative (RGGI) is the first mandatory, market-based effort in the United States to reduce greenhouse gas emissions. Ten Northeastern and Mid-Atlantic states have capped and will reduce CO_2 emissions from the power sector 10% by 2018. Massachusetts as a member state is tasked with the: development and maintenance of a system to report data from emissions sources subject to RGGI, and to track CO_2 allowances; implementation of a platform to auction CO_2 allowances; monitoring the market related to the auction and trading of CO_2 allowances; providing technical assistance to the participating states in reviewing applications for emissions offset projects; providing technical assistance to the participating states to evaluate proposed changes to the states' RGGI programs.

The Climate Registry

The Climate Registry is a nonprofit collaboration among North American states, provinces, territories and Native Sovereign Nations that sets consistent and transparent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry. As a member, Massachusetts supports

the Registry's voluntary and mandatory reporting programs and provides comprehensive, accurate data to reduce greenhouse gas emissions.

MassRIDES

Mass*RIDES* is the statewide travel options program that focuses on moving people smarter by the use of carpooling, vanpooling, bicycling, walking, and public transportation. The concept of carpooling, and vanpooling - which may collectively be termed "ridesharing", are typically commuter-oriented strategies that seek to reduce vehicle miles travelled (VMT) by increasing vehicle occupancies for work trips.

Compressed Work Week

The concept of a compressed work weeks refers to a scheduling system where a regularly scheduled number of hours are worked in a shortened span of time. Often, compressed work weeks refer to 40 hours worked over the course of only four days (4/40) or 80 hours worked over the course of nine days (9/80). Under a compressed work week, each day worked is often longer than a standard 9:00 a.m. to 5:00 p.m. schedule. The 4/40 and 9/80 schedules are among the most common forms of compressed work weeks, and they give employees one day off every week or every other week, respectively. With recent energy cost concerns, some agencies and companies have expressed renewed interest in compressed work weeks; for example, in August 2008 the State of Utah implemented a mandatory four-day workweek for 17,000 state government employees.

Car Sharing

Another way to increase the connectivity of transit modes is by adding car-sharing programs. There are many local companies across the United States, but the most well-known is ZipCar. Areas, such as the BAT Intermodal Centre in downtown Brockton, Bridgewater State University, and Stonehill College, are locations that would be enhanced by a car-sharing program. Areas with downtown residential growth will benefit from the operation of car sharing to supplement public transit.

Flexible Scheduling

Flexible work schedules refer to employer-facilitated alternatives to a standard 9:00 a.m. to 5:00 p.m. work schedule for employees. Employees are given more discretion over when they work so that they can accommodate other obligations and/or commute during less congested off-peak periods.

Telecommuting

Telecommuting is the practice of working from a location other than the regular workplace and using modern technology to bridge the resulting distance. In the United States, a majority of "teleworkers" work from their homes, while a much smaller number of individuals work from "telecenters", smaller offices in close proximity to the employee's home with direct communication access to the regular workplace. The environmental benefits of telecommuting include a reduction in fuel consumption, traffic congestion, and improved air quality, as are there fewer commuters on the road.

Best Workplaces for Commuters Program

Best Workplaces for Commuters is an innovative membership program that provides qualified employers with national recognition and an elite designation for offering outstanding commuter benefits such as free or low cost bus passes and vanpool fares and strong telework programs. Originally sponsored by the U.S. Environmental Protection Agency and the U.S. Department of Transportation, the Best Workplaces for Commuters Program is now managed by the National Center for Transit Research at the University of South Florida.

Employers that meet the National Standard of Excellence in commute benefits-a standard created by the National Center for Transit Research and the U.S. Environmental Protection Agency (EPA)-can get on the list of Best Workplaces for Commuters. There are currently over 240 businesses in 30 states that have achieved this designation. Through partnerships with public and private sector employers, Best Workplaces for Commuters is demonstrating that alternatives to drive-alone commuting such as transit, carpools, and teleworking are economically beneficial, yielding value to workers, employers, and our environment.

8.1.2 Land Management

The Land Management section describes important land areas; identifies threats to them; and summarizes mitigation plans, programs, and/ or strategies that have the potential to enhance the quality of the natural environment.

Existing Conditions

Areas of Critical Environmental Concern (ACECs)

Areas of Critical Environmental Concern (ACECs) are places in Massachusetts that receive special recognition because of the quality, uniqueness and significance of their natural and cultural resources. Areas are identified and nominated at the community level and are reviewed and designated by the state's Secretary of Environmental Affairs. ACEC designation creates a framework for local and regional stewardship of critical resources and ecosystems. Thirty ACECs have been designated as of 2011 covering approximately 268,000 acres in 76 communities. The Department of Conservation and Recreation (DCR) administers the ACEC Program on behalf of the Secretary.

Areas of Critical Environmental Concern (ACECs) in the Old Colony Region are:

- Canoe River Aquifer and Associated Areas – officially designated in 1991
  Size: 17,200 acres; Location: Easton, Foxborough, Mansfield, Norton, Sharon, Taunton
- Hocomock Swamp – officially designated in 1990
  Size: 16,950 acres; Location: Bridgewater, Easton, Norton, Raynham, Taunton, West Bridgewater

Figure 8-2: The Hockomock Swamp

- Herring River Watershed – officially designated in 1991
  Size: 4,450 acres; Location: Bourne and Plymouth
- Ellisville Harbor – officially designated in 1980
  Size: 600 acres; Location: Plymouth

The ACEC Regulations (301 CMR 12.00) describe the procedures for the nomination, review, and designation of ACECs and direct the agencies of the Executive Office of Energy and Environmental Affairs. (EOEEA) to take actions, administer programs, and revise regulations in order to preserve, restore, or enhance the natural and cultural resources of ACECs. The ACEC designation works through the existing state environmental regulatory and review framework. Projects with an ACEC that are subject to state agency jurisdiction or regulation, particularly those that are initiated by an agency, require a state permit, or are funded by a state agency are subject to more stringent guidelines in order to protect the quality of the area.

The Massachusetts Environmental Policy Act (MEPA) Office is responsible for reviewing proposed projects to avoid or minimize adverse impacts to the natural and cultural resources of an area. Projects located within ACECs subject to MEPA jurisdiction require closer scrutiny than projects located outside of ACECs. MEPA project review thresholds (for the size or type of a project) that require a proponent to file an Environmental Notification Form are lowered to include all projects located within an ACEC. Massachusetts Department of Environmental Protection programs that have high performance standards within their regulations for ACECs to include the Wetlands Protection Act Program, the Waterways Regulation Program, the 401 Water Quality Certification Program, and the Solid Waste Facilities Site Assignment Regulations.

Protected Open Space

The Statewide Comprehensive Outdoor Recreation Plan (SCORP), *Massachusetts Outdoors 2006*, identified a statewide open and recreational space inventory and is the Commonwealth's official Open Space and Recreation Plan. According to the plan, the agencies within the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) control the majority of the Commonwealth's open space resources. Municipalities and Private Non-profit agencies rank second and third respectively regarding control of open space. These parcels of land may include, but are not limited to: parks, easements, trails, and agricultural land and are important to preserve, maintain, and protect. See figures 8-1 & 8-4 for geographical representations of Land Management and Challenges to Development in the Old Colony MPO region.

Farmland

Generations ago, much of the Massachusetts landscape was a patchwork of farms and productive woodlands. People raised on farms were connected to the ebb and flow of life throughout the seasons. Planting and harvesting, shearing and slaughtering, sugaring and cutting cordwood linked our communities, our health, our very existence to the soil. It was a life lived close to the earth. But today, that's no longer the case. Development pressures have resulted in many of the farmlands in Southeastern Massachusetts becoming home to housing or commercial enterprises. As a result, much of the green space has disappeared and therefore, direct impacts from vehicles are more prominent.

Figure 8-3: Land Management in the Region

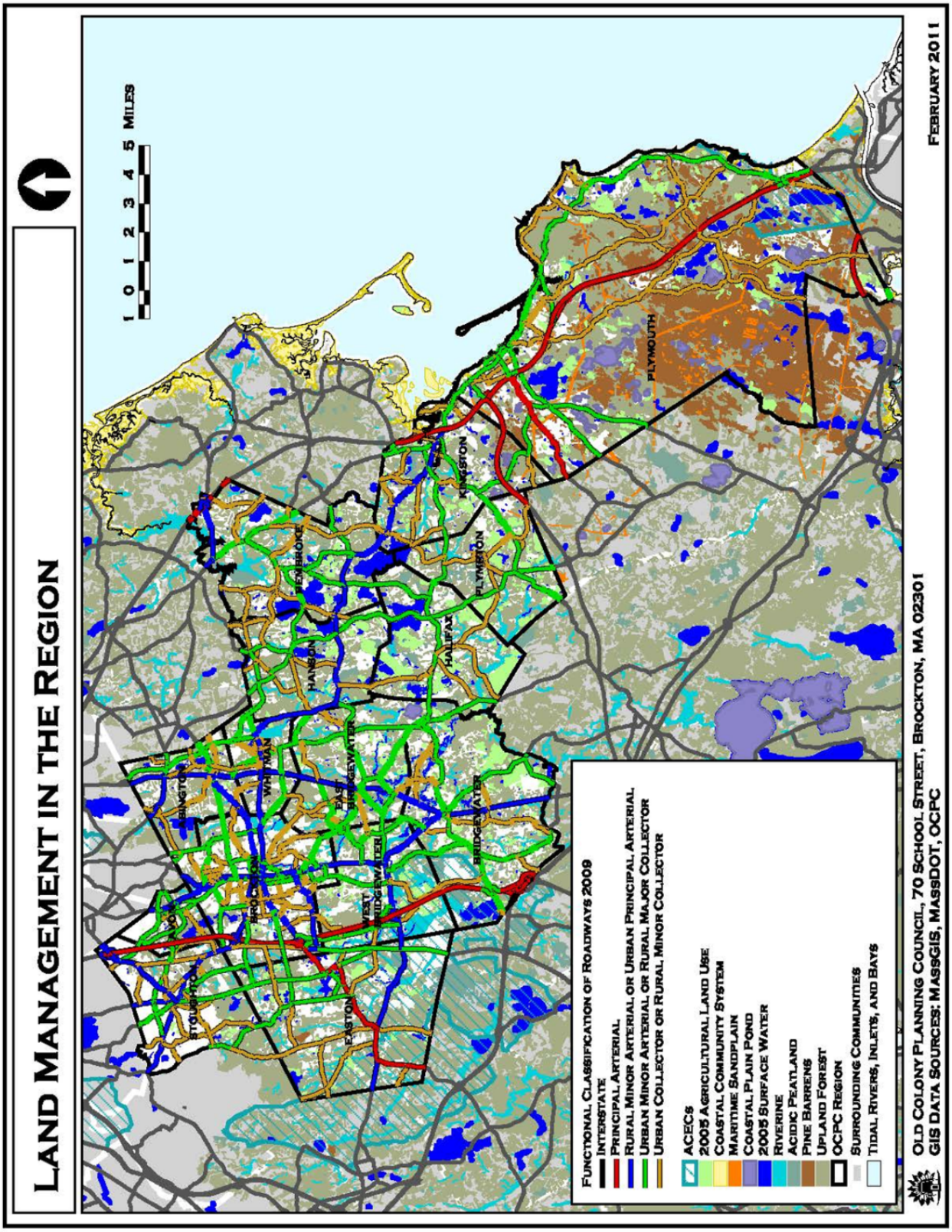
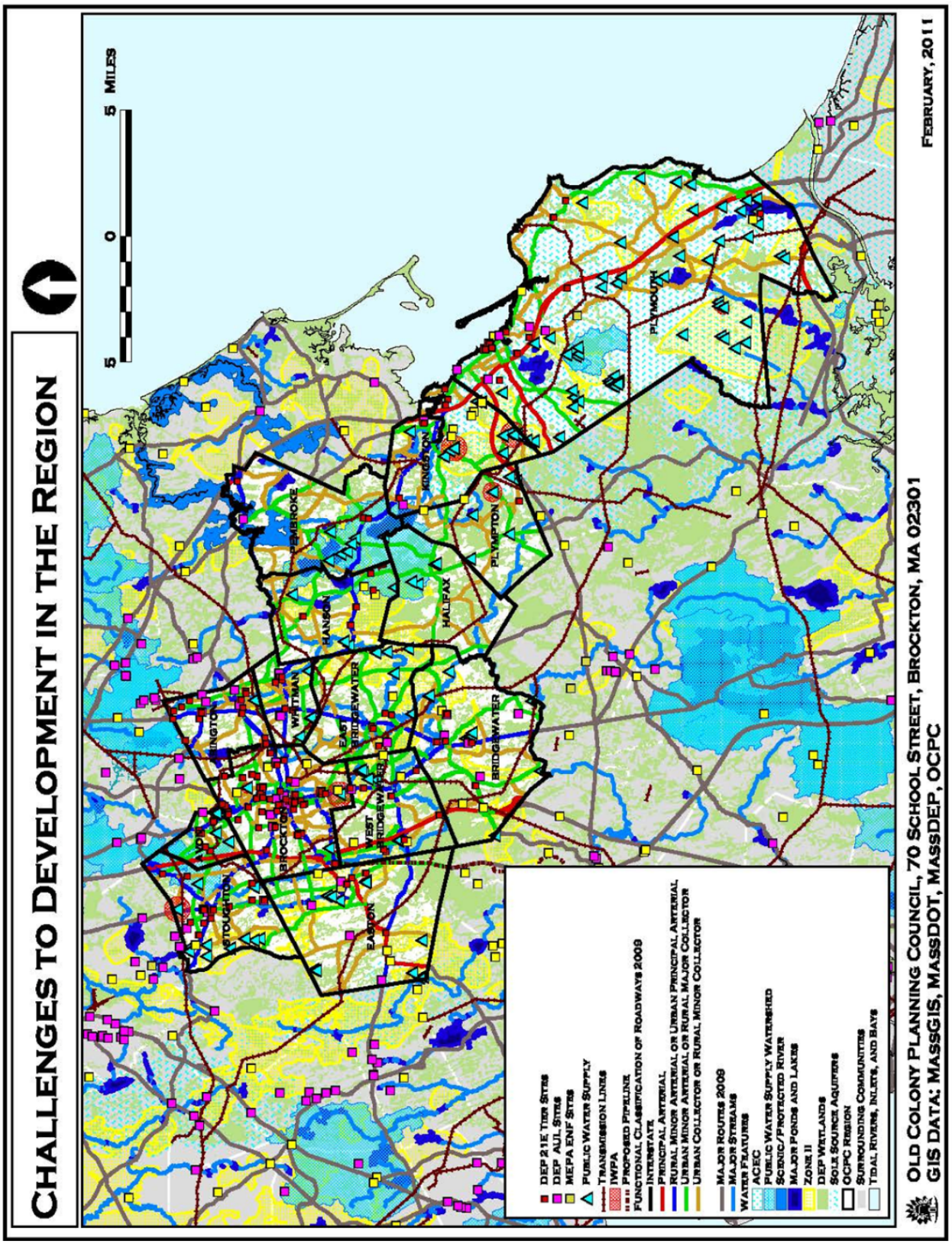


Figure 8-4: Challenges to Development in the Region



Problems or Threats

Residential Land Use

Regional growth continues to decentralize the population and to consume land at an increasingly high rate. Overall, housing grew from 31,706 acres in 1971 (10.5% of the region) to 53,151 acres in 1999 (24.22% of the region). From 2000 to 2005, much of the region's growth occurred in the southeastern half of the region, where many communities experienced over 6 percent growth during the time period. Many communities in the northwestern half experienced substantially less growth. Areas to the south have generally had more developable land, and residential development in recent years for the most part has come in the form of low to moderate density single family home development on relatively large lots. This lower-density development combined with the cul-de-sac nature of many subdivisions and the typical scattering of public and commercial uses, increases local travel demands.

Some communities have had a wave of multi-family development. This tends to be near town centers or, quite often, on commercially-zoned major highways in outlying areas. As a result, even these concentrations of population are often too remote to walk to schools, stores or jobs, and too scattered to support local bus service. However, many of the new multi-family developments are quite close to highway interchanges, making them convenient for persons commuting a distance by car.

Figure 8-5: Pinehills Development, Plymouth, MA

The densities of new neighborhoods will continue to drop and land consumption per unit will continue to rise as long as communities increase the area requirements on undeveloped land to an acre or more.Increased development pressures in the southeastern Massachusetts region put the environmentally sensitive areas in jeopardy. As such, many communities are encouraged to allow large commercial developments in an effort to offset the burden that local residents face in property taxes to provide funding for local services. This becomes a regional problem when these large developments generate large amounts of vehicular trips, thus increasing the exposure of the environmentally sensitive areas to pollutants.

Commercial Land Use

The major historic concentrations of retail activity are in the central portions of Brockton, Stoughton, and Plymouth with some continued smaller concentrations in the centers of Whitman, Easton and Bridgewater.

The Region contains two regional shopping malls, in Brockton and Kingston, and several big-box retail and other shopping centers located along or near major roadway. New retail development continues to be dispersed beyond traditional centers and away from transit. While such growth is generally along

high-capacity roads, big box stores are tending to cluster, rather than be totally freestanding, thus offering greater convenience to customers and slightly reducing total trips.

The dispersed pattern of current retail development puts some facilities within reach of most of the population, but requires driving. At the same time, the single-purpose nature of most new retail development requires more land dedicated to parking, generates more local trips, increases stormwater runoff, and fragments activity patterns. This suggests that towns seize on opportunities to create strong multi-purpose mixed-use centers as described above. Such traditional centers require accommodating varied uses but they can reduce single-purpose trips and greatly enrich community life.

Industrial Land Use

In the past, the region's industry was concentrated along railroad lines and near town centers, often within walking distance of workers homes. Many interrelated firms (e.g., those making shoe components, shoe boxes and finished shoes) located near one another, thus minimizing delivery times and costs. More recently firms have depended less on rail freight, have sought workers and customers from the greater region, and have preferred convenient one-story plants. As a result, many firms have moved to industrial parks or freestanding sites near highway interchanges. This can be seen in the extensive development of the highway-oriented Brockton, Avon and Easton Industrial Parks and along Manley Street in West Bridgewater.

Land use patterns and trends are well established throughout the region. As a result, most transportation investments are in maintaining and improving present infrastructure. Such investments are more likely to support present land use patterns and trends than to reverse them, or to lead to a major redirection of growth. On the other hand, the present patterns and trends include a major tension between the long established focus of employment and services in Boston and Brockton, and the continuing outward movement of population and activity known as sprawl.

If allowed by local planning and zoning, the combined radial/circumferential highway system facilitates much less focused development. The existing highway system supports further scattering of all activities. Highway construction like the relocated Route 44 and the upgrading of Route 3 can attract low-density growth if permitted by local communities.

Mitigation Plans, Programs, and Strategies

The Old Colony MPO recognizes the issues related to land management and continues to encourage the use of the following plans, programs, and/or strategies in order to mitigate the effect on the natural environment.

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. The Old Colony MPO also works to ensure that transportation improvement projects consider enhancement of aesthetics and character of neighborhoods, communities, and commercial districts.

The current-endorsed “Smart Growth” and “Sustainable Development” movements encourage putting relatively high density development near existing centers and in areas with well established

infrastructure and doing so in ways that avoid additional energy consumption, minimize the effect on natural resources, and mitigate unavoidable impacts on environmental quality.

Smart Growth principles are intended to be the antithesis of sprawl, but they can be applied at a great range of scales from individual projects up to the region. The effect on travel patterns and modal choices can vary with the scale of action. Thus successful smart growth policies over a region would lead to a greater concentration of growth in regional centers allowing a greater use of mass transit and a largely radial, center-focused road system. In outlying areas Smart Growth can also support local transit use and reduce local trips by concentrating local or sub regional destinations but will not greatly change overall travel patterns. At the local level Smart Growth in the form of cluster development can reduce paving and runoff and preserve particularly valuable open space, but it does not necessarily strengthen the community's structure or reduce trips if sited at the edge of town.

The Commonwealth, through the Office of Commonwealth Development promotes the following ten sustainable development principles:

- Redevelop First
- Concentrate Development
- Be Fair
- Restore and Enhance the Environment
- Conserve Natural Resources
- Expand Housing Opportunities
- Provide Transportation Choice
- Increase Job Opportunities
- Foster Sustainable Businesses
- Plan Regionally

These ten principles provide a framework for development throughout the Commonwealth in an effort to minimize the affect on the environment. The following practices are examples of Smart Growth techniques available to communities of the Commonwealth.

Transit Oriented Development (TOD)

Transit-oriented development (TOD) is compact, mixed-use, walkable development centered around transit stations, and generally includes a mix of uses such as housing, shopping, employment, and recreational facilities. TOD projects are designed with transit and pedestrians as high priorities. TOD represents an opportunity for communities all across Massachusetts to enhance their quality of life. With TOD, parking lots and underutilized land near public transportation can be turned into vibrant mixed-use districts, diverse housing, and lively public places. This type of development reduces the impacts to the environment by concentrating usages to one particular area, thus decreasing the amount of daily vehicle trips to and around the site.

Brownfield Redevelopment

The U.S. Environmental Protection Agency defines a brownfield as "real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." EPA's Brownfields Program provides funds and

technical assistance to states, communities, and other stakeholders in economic redevelopment to work together to prevent, assess, safely clean up, and sustainable reuse brownfields.

In 1998, Governor Cellucci signed into law the "Brownfields Act" which created financial incentives and liability relief for parties undertaking brownfields cleanup projects. The Brownfields Act provided agencies at the state level with $50 million dollars to administer programs targeted towards the cleanup and reuse of contaminated property.

Figure 8-6: The Brockton Brightfields

Massachusetts DEP brownfields program incentives are available to buyers, and sometimes sellers, of contaminated property provided there is a commitment to cleanup and redevelopment. Brownfields properties are often located where there is an existing infrastructure, workforce and other amenities. State incentives can help parties identify risk, limit liability, and fund the cleanup of brownfields sites enabling their reuse for industry, housing and other purposes.

The Brockton Brightfield, a 425-kilowatt (kW) photovoltaic (PV) solar energy system located on a 3.7 acre environmentally remediated brownfield in Brockton, Massachusetts is the largest solar energy plant in New England, and the largest brightfield transformed into a solar energy generating station in the nation.

Transfer of Development Rights

Transfer of Development Rights program represents an innovative way to direct growth away from lands that should be preserved to areas well suited to higher density development. Areas that may be suited to higher density development include pre-existing village centers or other districts that have adequate infrastructure to service larger amounts of development. The Town of Plymouth is utilizing this program to create a more compact, mixed-use development that will result in permanent protection of open space.

Low Impact Development (LID)

Low Impact Development (LID) uses an integrated approach to site design, stormwater management, and water conservation to protect the natural terrain and hydrology. Low Impact Development (LID) is a more sustainable land development pattern that results from a site planning process that first identifies critical natural resources, then determines appropriate building envelopes. LID also incorporates a range of best management practices (BMPs) that preserve the natural hydrology of the land.

Chapter 40R: The Smart Growth Zoning and Housing Production Act

In order to encourage housing production in the Commonwealth consistent with the concept of smart growth the Legislature passed and the Governor signed into law Chapter 40R. Chapter 40R provides financial rewards to communities that adopt special zoning districts allowing as-of-right high density residential development.

Eligible locations: Smart growth zoning districts can be in one of three locations:

1. Areas near transit stations, including rapid transit, commuter rail, and bus and ferry terminals;
2. Areas of concentrated development, including town and city centers, other existing commercial districts in cities and towns, and existing rural village districts; or
3. Areas that by virtue of their infrastructure, transportation access, existing underutilized facilities, and/or location make highly suitable locations for residential or mixed use smart growth zoning districts.

Executive Order 418-Creation of Community Development Plans

The goal of Executive Order 418 is to promote balanced local, state, and regional planning for the future. It is designed so that communities consider affordable housing sites and quantities while also creating plans for economic development, transportation improvements, and environmental protection. Goal-setting is an essential element of good planning, and communities are asked to remember the following themes:

- Develop a community-based planning process with broad citizen participation Promote regional cooperation
- Protect the character and individuality of Massachusetts communities
- Protect environmentally sensitive areas, conserve open space, and preserve the historic built environment
- Promote sustainable economic development
- Provide for transportation that focuses on the movement of people and goods rather than automobiles

Coastal Smart Growth Program

The Coastal Smart Growth Program, run by the Massachusetts Office of Coastal Zone Management, works to promote Green Neighborhoods: Open Space Residential Design (OSRD). It is a method of planning residential development that conserves open space in a new subdivision. The same number of homes that would be permissible in a conventionally-zoned subdivision is allowed using the Open Space Residential Design.

Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act (MEPA) requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. MEPA further requires that state agencies "use all practicable means and measures to minimize damage to the environment," by studying alternatives to the proposed project, and developing enforceable mitigation commitments, which will become permit conditions for the project if and when it is permitted. More information regarding the MEPA unit is discussed under the Air Quality Mitigation Programs.

MassDOT Project Development and Design Guidebook

The newly revised 2006 MassDOT Project Development and Design Guidebook promotes an integrated multimodal approach to roadway planning and design, ensures that context sensitivity is integrated into the planning, design, and construction process, and provides a clear project development process. New chapters in the guidebook include: Project Development; Drainage and Erosion Control; Bridges; Shared

Use Paths and Greenways; Intermodal Facilities and Rest Areas; Landscape and Aesthetics; Wildlife Accommodation; Access Management; Traffic Calming; and Work Zone Management. These new chapters ensure that all details of a proposed project are properly evaluated before the project can be programmed.

Specifically, the Project Development chapter encourages early coordination with environmental agencies or groups to ensure that environmental issues are addressed early on in the process. Public outreach in the design and environmental process is essential to maintain public support for the project and to seek meaningful input on the design elements. This effort can also shape a more environmentally responsive and sustainable design. The designer, in coordination with the MassDOT Environmental Section, is responsible for determining the appropriate MEPA and NEPA project category, while identifying and complying with all other applicable federal, state and local environmental laws and requirements.

Community Preservation Act

The Community Preservation Act (CPA) was signed into law by former Governor Paul Cellucci and Lt. Governor Jane Swift on September 14, 2000 and has been amended five times since then, with the last occurring in September 2006.

The Community Preservation Act (CPA) is an innovative tool for communities to address important community needs and finance specific community preservation acquisitions and initiatives. The CPA allows communities to create a local Community Preservation Fund to raise money through a surcharge of up to 3% of the real estate tax levy on real property for open space protection, historic preservation and the provision of affordable housing. The act also creates a significant state matching fund, which serves as an incentive to communities to pass the CPA.

Once adopted locally, the Community Preservation Act requires the legislative body to annually appropriate, or reserve for future appropriation, at least 10% of the estimated annual fund revenues for acquisitions or initiatives in each of the following three categories of allowable community preservation purposes: open space (excluding recreational uses), historic resources, and community housing. This allows the community flexibility in distributing the majority of the money for any of the three categories as determined by the community.

As required by SAFETEA-LU, this section was prepared and strengthened by discussions with representatives of the U.S. Environmental Protection Agency, Massachusetts Department of Environmental Protection, Massachusetts Environmental Policy Act Unit, Executive Office of Transportation, MassDOT, and many other environmental groups or agencies.

8.1.3 Water Resources

Existing Conditions

Massachusetts' lakes, rivers and coastal waters are valuable natural resources that provide wildlife habitat, recreation, fishing, and shellfishing. In order to protect these natural resources, the State of Massachusetts established water quality protection policies and practices to ensure compliance with the federal Clean Water Act, Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990,

the Massachusetts Environmental Policy Act, Coastal Zone Management Consistency Review, and Chapter 91 of the Massachusetts General Laws.

Public Water Supplies

As stated in 310 CMR 22.02, a Public Water System is defined as a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year.

Zone IIs & Interim Wellhead Protection Areas (IWPA)

Wellhead protection areas are important for protecting the recharge area around public water supply (PWS) groundwater sources. A Zone II is a wellhead protection area that has been determined by hydro-geologic modeling and approved by the Massachusetts Department of Environmental Protection's (DEP) Drinking Water Program (DWP). An Interim Wellhead Protection Area (IWPA) is established, based on DEP DWP well pumping rates or default values, where hydro-geologic modeling studies have not been performed and there is no approved Zone II area. Certain land uses may be either prohibited or restricted in both approved (Zone II) and interim (IWPA) wellhead protection areas.

Watersheds

Watersheds are defined as those land areas that catch rain or snow and drain to specific marshes, streams, rivers, lakes, or to ground water. Watersheds provide critical natural services that sustain or enrich our daily lives: they supply our drinking water, critical habitat for plants and animals, areas of natural beauty, and water bodies for recreation and relaxation. Federal, state, local agencies, and the public must work together to ensure that watershed areas are protected.

Taunton River Watershed

The Taunton River Watershed is the second largest watershed in the state at 562 square miles and contains 94 square miles of wetlands, 221 lakes or ponds and includes all or most of 43 communities in the southeastern region of Massachusetts. It stretches from Avon and Brockton to the north; Foxboro and Wrentham to the west; Fall River and Somerset to the south; and Plymouth and Carver to the east.

Figure 8-7: The Taunton River

The Taunton River, the first Heritage River in the state, starts in the Town of Bridgewater and receives discharge waters from 18 river systems as it courses through ten communities before ending at the State of Rhode Island's Mount Hope Bay, which is part of Narragansett Bay. Tidal influences reach 18.0 miles inland and a salt-water intrusion reaches 12.6 miles inland, providing unique habitat for fresh and salt-water aquatic, terrestrial, and biological species.

South Coastal Watersheds

The South Coastal Watersheds consist of 14 coastal river watersheds with a total drainage area of approximately 240.7 square miles that span over all or part of 19 municipalities. The major coastal watersheds include the North and South Rivers (combined drainage area 105 square miles), the Jones River (30 square miles), and the Gulf/Bound Brook (16 square miles). It is also one of eleven watersheds in eastern Massachusetts that discharge directly to the ocean. The South Coastal Watersheds contain numerous wetlands, many of which are used to cultivate cranberries. The South Coastal Watersheds are biologically significant because they are home to one of the state's largest assemblages of rare and endangered species, particularly so in Plymouth's coastal ponds.

Buzzards Bay Watershed

The Buzzards Bay Watershed encompasses all or part of 15 municipalities including the entire City of New Bedford, which is consistently one of the largest revenue-producing fishing ports in the United States. It contains approximately 432 square miles of land, including lakes, rivers, streams, and wetlands. Buzzards Bay is approximately 228 square miles in size and has a coastline, which stretches over 280 miles, offering a wealth of diverse habitats including 5,000 acres of salt marsh, 10,500 acres of eelgrass beds, and 5,000 acres of tidal flats. Buzzards Bay was designated an Estuary of National Significance in 1988.

Sole Source Aquifers

A Sole Source Aquifer (SSA) is an aquifer designated by the US Environmental Protection Agency as the 'sole or principal source' of drinking water for a given aquifer service area; that is, an aquifer which is needed to supply 50% or more of the drinking water for that area. EPA guidelines also require that these areas have no alternative drinking water sources, which could physically, legally, and economically supply water to all who depend on the aquifer for drinking water. After a Sole Source Aquifer is designated, no commitment for federal financial assistance may be provided for any project, which the EPA determines, may contaminate the aquifer through its recharge area so as to create a significant hazard to public health.

Plymouth / Carver Sole Source Aquifer

The Plymouth / Carver Sole Source Aquifer is a 199.0 square mile aquifer located in eight communities of southeastern Massachusetts. Primarily in Plymouth County, it includes the entire area of the Towns of Plymouth, Bourne and Sandwich north of the Cape Cod Canal, most of the Towns of Carver and Wareham, substantial portions of Kinston and Plympton, and a small section of the Town of Middleborough. The 199 square mile Plymouth / Carver aquifer is the second largest aquifer in the Commonwealth, containing more than 500 billion gallons of fresh water.

Canoe River Sole Source Aquifer

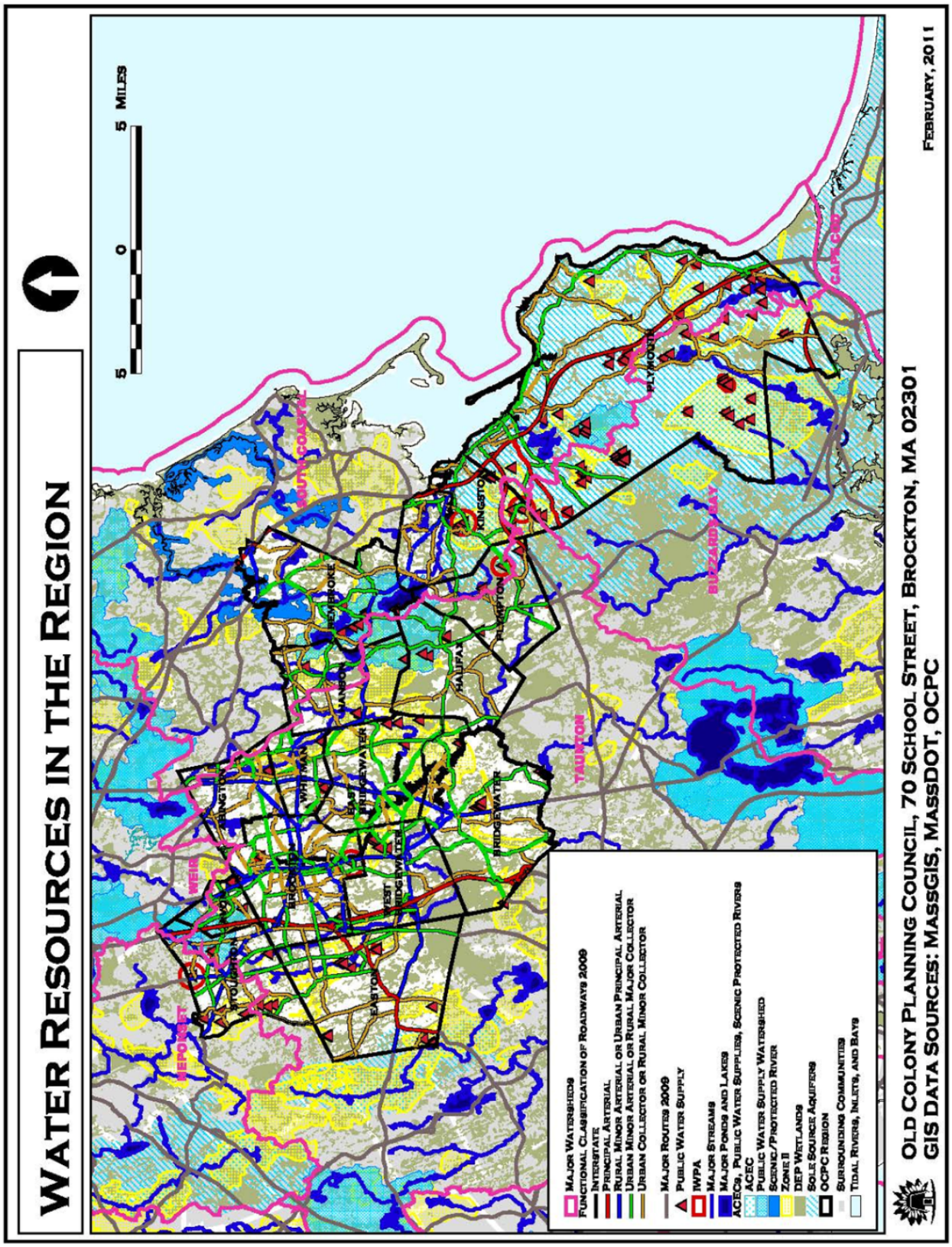
The Canoe River Aquifer sub basin is approximately 25 square miles in area, and encompasses portions of the towns of, Easton, Foxborough, Mansfield, Norton, and Sharon. The Canoe River begins its headwaters south of Massapoag Lake in Sharon and flows in a southerly direction through Foxborough, Mansfield, Easton, and Norton to Winnecunnet Pond in Norton.

Wetlands

Wetlands help clean drinking water supplies, prevent flooding and storm damage, and support a variety of wildlife. Coastal wetlands are directly adjacent to the ocean and include beaches, salt marshes, dunes, coastal banks, rocky intertidal shores, and barrier beaches. Inland wetlands are areas where water is at or just below the surface of the ground. Although these wetlands can appear dry during some seasons, they contain enough water to support certain plants and soils. Inland wetlands include marshes, wet meadows, bogs, and swamps.

Wetlands protection is important to the preservation of wildlife habitat, protection of public and private water supplies, flood prevention and attenuation, lessening of storm damage and prevention of groundwater contamination. Wetlands have sensitive, complex ecosystems, which can easily be adversely influenced by transportation facilities. See figure 8.8 for a geographical representation of Water Resources in the Old Colony MPO region.

Figure 8-8: Water Resources in the Region



Problems or Threats

Stormwater

Stormwater is water that originates during precipitation events. Stormwater that does not soak into the ground becomes surface runoff, which either flows directly into surface waterways or is channeled into storm sewers, which eventually discharge to surface waters.

Stormwater becomes a transportation system for pollutants. Soil that erodes from a construction site, cigarette butts and other litter from parking lots, antifreeze and oil dripped from cars, fertilizers and pesticides from turf management, and grit and salt left from de-icing operations on roadways can be deposited untreated into waterways. Water can contain and transport sediments, metals (copper, cadmium, chromium, lead, zinc), nutrients (nitrates, phosphates, ammonia), salt, petroleum products and coliform bacteria among other materials. Vegetative surfaces slow the flow, filter out sediments, and can break down or trap pollutants in the root zone. In contrast, buildings, roads, parking areas, and exposed bedrock increase the volume and speed of stormwater runoff since none can soak in and the hard surfaces present little resistance to flow.

In addition, wet weather discharge needs consideration. Wet weather discharges refer collectively to point source discharges that result from precipitation events, such as rainfall and snowmelt. Wet weather discharges include stormwater runoff, combined sewer overflows (CSOs), and wet weather sanitary sewer overflows (SSOs). Stormwater runoff accumulates pollutants such as oil and grease, chemicals, nutrients, metals, and bacteria as it travels across land. CSOs and wet weather SSOs contain a mixture of raw sewage, industrial wastewater and storm water, and have resulted in beach closings, shellfish bed closings, and aesthetic problems. In Massachusetts, polluted stormwater runoff and discharges in urbanized areas cause serious water-quality problems. Polluted runoffs to waterbodies have affected aquatic plant and animal life in streams and lakes, closed shellfish beds, reduced recreational activities such as boating and swimming, and increased existing flooding conditions caused by natural events.

The 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 to our lakes, rivers and coastal areas. Point sources still have significant impacts in 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, in fact 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 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, as a result 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 Old Colony MPO recognizes the importance of these issues/concerns and is committed to the protection of these resources.

Mitigation Plans, Programs, and Strategies

Federal Clean Water Act Section 404

The Federal Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. The statute employs a variety of regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Section 404 of the Clean Water Act established a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Wetlands subject to Clean Water Act Section 404 are defined by the U.S. Environmental Protection Agency as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Activities in waters of the United States regulated under this program include fill for development, water resource projects, infrastructure development and mining projects. Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation. The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service and National Marine Fisheries Service, and individual States all have a role in Section 404 permit applications and decisions.

Massachusetts Wetlands Protection Act

In response to rapid loss of wetlands, Massachusetts adopted the nation's first wetlands protection laws in the early 1960s. The Wetlands Protection Act [Massachusetts General Laws (MGL) Chapter 131, Section 40] protects wetlands and the public interests they serve, including flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat. The law protects wetlands and other resource areas, such as land subject to flooding (100-year floodplains), the riverfront area (added by the Rivers Protection Act), and land under water bodies, waterways, salt ponds, fish runs, and the ocean. The Massachusetts Department of Environmental Protection (DEP) oversees administration of the act, develops regulations and policies, and provides technical training to local conservation commissions. DEP also hears appeals of decisions made by these commissions.

At the local level, the community's conservation commission administers the Wetlands Protection Act. The commission is a volunteer board of three to seven members appointed by the selectmen or city council. The conservation commission ensures that proposed activities will not alter resource areas and the public interests they provide by reviewing projects on a case-by-case basis according to regulations [310 Code of Massachusetts Regulations (CMR) 10.00].

The regulations describe how each type of resource area provides one or more of the public interests. The regulations also spell out the type and extent of work allowed in resource areas. Proposed work must meet these standards. This information helps landowners and developers plan their work and helps commissions apply the law to specific projects. The law regulates many types of work in resource areas, including vegetation removal, regarding, and construction of, roads, sidewalks, bikeways, driveways, and commercial, industrial, or residential buildings.

Massachusetts Water Policy

In 2004, the Massachusetts Executive Office of Environmental Affairs launched the Massachusetts Water Policy, setting out a blueprint that cuts across all aspects of water policy and builds upon prior policy-setting activities, including the 1996 Water Supply Policy, the Interim Infiltration and Inflow Policy, the Wetlands Protection Act, the Rivers Protection Act, the Stormwater Management Policy, the Water Management Act, and the Interbasin Transfer Act.

Water resource management principles of the Massachusetts Water Policy are:

- Keep water local and live within municipal water budgets by addressing issues from a watershed perspective;
- Protect clean water and restore impaired waters;
- Protect and restore fish and wildlife habitat; and
- Promote development strategies consistent with sustainable water resource management.

The Water Policy recommendations include development and refinement of planning tools and strategies to promote efficient use of water, measures to promote proper infrastructure maintenance, wastewater reuse and recharge, stormwater recharge, water supply development, resource protection and restoration strategies, and permit streamlining. Sustainable water use and effective pollution control strategies (such as addressing non-point source pollution) will require more active pursuit of sustainable development practices - in essence, protection of critical resource areas, targeted resource restoration, higher-density growth, and more up-to-date designs and landscaping. These strategies will be important as areas of the state undergoing heavy development in the coming years are faced with significant water resource, habitat, and dam issues. Recognizing that current utilization patterns of the Commonwealth's water resources are frequently not sustainable and that the Commonwealth's economic growth and quality of life depend on a sustainable water supply, a key Water Policy goal is a more effective partnership with municipalities. Working with localities, the policy includes recommendations on planning and design innovations, fix-it-first strategies to encourage compact development and the revitalization of cities and towns, and proactive protection of future water supplies and critical water resources. The Massachusetts Water Policy supports the Federal Clean Water Act mandate that each state maintain, safeguard and restore the physical, chemical, and biological integrity of its waters. The Water Policy underscores the significance of natural hydrologic cycles, establishes a method to prioritize watersheds in need of restoration, and better integrates science into resource management decisions.

Wetland Mitigation Banks

New initiatives for the state that are planned or underway include the development of best management practices for drainage work and wetlands replication. MassDOT is also participating in a multi-agency effort to explore the potential of wetlands banking, including the formulation of a way to trade or earn credits for the creation of wetland areas, as mitigation for those requires replication due to loss resulting from construction.

The Taunton River Pilot Wetlands Mitigation Bank Project in Hanson, is an example of the wetlands replication program. Section 89 of Chapter 291 of the Massachusetts Acts of 2004, enacted on August 10, 2004, directed the Executive Office of Environmental Affairs to establish a pilot wetlands mitigation bank in the Taunton River watershed. A wetlands mitigation bank is a wetlands restoration, creation, or enhancement project that is undertaken in order to compensate for losses to wetlands resources in a

defined geographic area, such as the Taunton River watershed, by providing compensatory mitigation for adverse impacts to wetlands that are permitted by local, state or Federal regulatory agencies. The bank sells "credits" created through the bank's restoration efforts and purchasers use these credits to offset impacts to wetlands from transportation, public works and/or private development projects requiring wetlands variances and orders of conditions within the watershed. This is done when mitigation on site would not be effective, is otherwise impractical due to the small size of the mitigation area, or when there is a lack of a viable mitigation site.

Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act (MEPA) requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. MEPA further requires that state agencies "use all practicable means and measures to minimize damage to the environment," by studying alternatives to the proposed project, and developing enforceable mitigation commitments, which will become permit conditions for the project if and when it is permitted. More information regarding the MEPA unit is discussed under the Air Quality Mitigation Programs.

MassDEP Stormwater Management Policy Handbook (Volume 1 & 2)

To prevent flooding and protect property in developed areas, stormwater drainage systems collect stormwater runoff and carry it away from roadways and structures to a discharge point; however, most discharges are into natural waters. Stormwater drainage systems consist of curbs, gutters, storm drains, channels, ditches, pipes, and culverts and do not treat the stormwater.

Both Massachusetts Department of Environmental Protection (DEP) and U.S. Environmental Protection Agency (EPA) regulate stormwater in Massachusetts. In addition, municipalities may have local drainage, wetland, or other ordinances that regulate stormwater, as granted by home-rule legislation. EPA believes that wet weather discharges should be addressed in a coordinated and comprehensive fashion to reduce the threat to water quality, reduce redundant pollution control costs, and provide State and local governments with greater flexibility to solve wet weather discharge problems.

The Massachusetts Department of Environmental Protection (DEP) developed Volume 1 and Volume 2 of the Stormwater Management Policy Handbook. This handbook provides guidance for minimizing the impacts of increased stormwater runoff and nonpoint source pollution resulting from site development.

National Pollutant Discharge Elimination System (NPDES) General Permit

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

Polluted stormwater runoff is commonly transported through Municipal Separate Storm Sewer Systems (MS4s), from which it is often discharged untreated into local waterbodies. To prevent harmful pollutants from being washed or dumped into an MS4, operators must obtain a NPDES permit and develop a stormwater management program. Phase I, issued in 1990, required *medium* and *large* cities

or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges. Phase II, issued in 1999, required regulated small MS4s in urbanized areas, as well as small MS4s outside the urbanized areas that are designated by the permitting authority, to obtain NPDES permit coverage for their stormwater discharges. Generally, Phase I MS4s are covered by individual permits and Phase II MS4s are covered by a general permit. Each regulated MS4 is required to develop and implement a stormwater management program (SWMP) to reduce the contamination of stormwater runoff and prohibit illicit discharges. All Old Colony MPO communities fall under Phase II, as well as MassDOT Department and other non-traditional MS4s. The communities of Abington, Brockton and Whitman are wholly in an Urbanized Area, while the remaining 12 are partially within the Urbanized Area.

MassDOT Stormwater Management Program (SWMP)

The MassDOT Storm Water Management Program (SWMP), developed to summarize the programs MassDOT is implementing to meet the NPDES Phase II General Permit, includes several programs that involve cooperation with the surrounding municipalities.

In May 2004, MassDOT published a *Storm Water Handbook for Highways and Bridges*. The handbook was approved by both MassDOT and DEP and signed by both Commissioners with wide distribution to those responsible for the design, construction and maintenance of the highway system in Massachusetts. The handbook represents the culmination of a cooperative effort undertaken by the Commonwealth's environmental and transportation agencies to manage stormwater from the states roadway's and facilities. The handbook offers guidance for roadway designers to manage stormwater to the greatest extent practicable, with all project types in mind. On May 30, 2008, the United States District Court for the District of Massachusetts (Young, J.) entered findings and rulings after a trial held in Conservation Law Foundation et al. v. Patrick et al., No. 06-11295-WGY. MassDOT subsequently revised its SWMP to conform to the Court's trial findings, and submitted its revised SWMP to the Court and EPA on about December 23, 2009. On May 11, 2010, the Court entered an order, requiring MassDOT to implement stormwater mitigation measures at the three sites addressed at trial (in Bellingham, Lancaster, and Milford) and to further revise its SWMP in accordance with an April 22, 2010 letter from the EPA (discussed below). On July 26, 2010, the Court approved the remedial plan submitted by MassDOT (including all SWMP revisions), and on April 14, 2011, it entered final judgment and closed the case.

MassDOT Salt Remediation Program

MassDOT acknowledges that application of road salt for snow and ice operations may have a negative effect on public and private drinking water supplies. Elevated levels of sodium greater than 20 parts per million (ppm) in drinking water could present a health issue for hypertensive individuals. To investigate road salting impacts on drinking water supplies in a cooperative effort with stakeholders, MassDOT has administered a Salt Remediation Program since 1986. At the conclusion of the investigation, and when necessary, MassDOT will implement an appropriate remedial effort, including but not limited to, a reduced salt zone. Other program initiatives have included increased training of both union and privatized forces to increase awareness on the effects of road salting within environmentally sensitive areas.

Massachusetts Smart Growth/Smart Energy Toolkit

The Smart Growth Toolkit recently produced by the Massachusetts Executive Office of Environmental Affairs (EOEA) on behalf of the Office for Commonwealth Development (OCD) includes information on, but not limited to: Low Impact Development (LID), Open Space Residential Design (OSRD), Transfer of Development Rights (TDR), and Transit Oriented Development (TOD). This resource provides state, regional, and local agencies or groups with the information needed to reduce the impact of development on the environment.

As required by SAFETEA-LU, this section was prepared and strengthened by discussions with representatives of the U.S. Environmental Protection Agency, Massachusetts Department of Environmental Protection, Massachusetts Environmental Policy Act Unit, Executive Office of Transportation, MassDOT, and many other environmental groups or agencies.

8.1.4 Wildlife Habitats

Existing Conditions

Priority Habitat

Priority Habitat is the known geographical extent of habitat for all state-listed rare species, both plants and animals, and is codified under the Massachusetts Endangered Species Act. Habitat alteration within Priority Habitats may result in a take of a state-listed species, and is subject to regulatory review by the Natural Heritage & Endangered Species Program. Estimated Habitatsare a sub-set of the Priority Habitats that show the geographical extent of the habitat of state-listed rare wildlife and is codified under the Wetlands Protection Act, which does not protect plants. State-listed wetland wildlife species are protected under the Massachusetts Endangered Species Act as well as the Wetlands Protection Act.

Vernal Pools

Vernal pools are unique wildlife habitats best known for the amphibians and invertebrate animals that use them to breed. Vernal pools, also known as ephemeral pools, autumnal pools, and temporary woodland ponds, typically fill with water in the autumn or winter due to rising ground water and rainfall and remain ponded through the spring and into summer. Vernal pools dry completely by the middle or end of summer each year, or at least every few years. Occasional drying prevents fish from establishing permanent populations and many amphibian and invertebrate species rely on breeding habitat that is free of fish predators. Some vernal pools are protected in Massachusetts under the Wetlands Protection Act regulations, as well as several other federal and state regulations, and local bylaws. The NHESP serves the important role of officially "certifying" vernal pools that are documented by citizens.

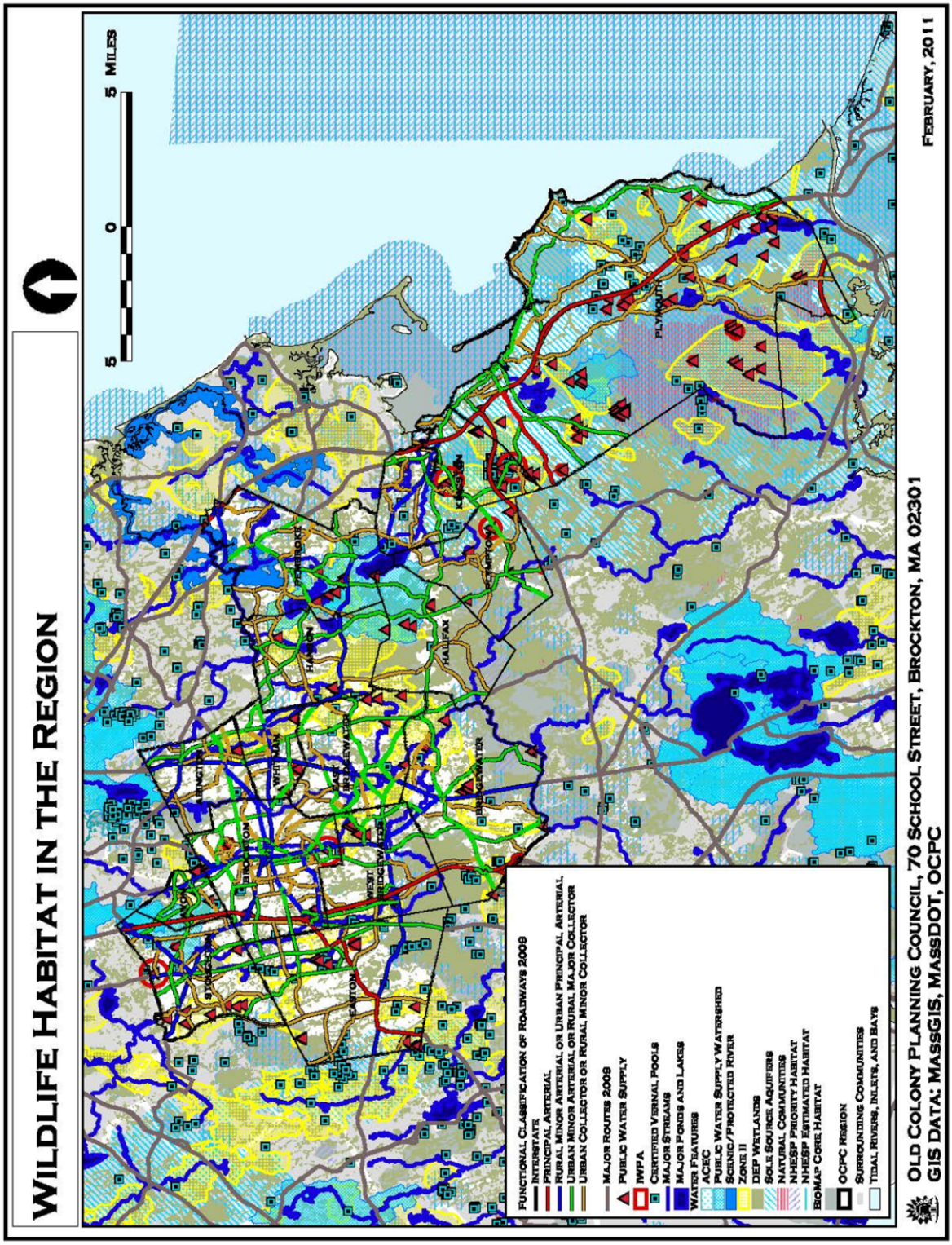
Figure 8-9: Vernal Pool

Natural Communities

Natural communities are assemblages of species that occur together in space and time. These groups of plants and animals are found in recurring patterns that can be classified and described by their dominant physical and biological features. Red Maple swamp and Pitch Pine/Scrub Oak are examples of natural communities found in the Commonwealth. Natural communities are not discrete units with neat boundaries; there is overlap among and between communities in their composition, structure, and physical characteristics. Large animals often make use of multiple communities. Natural communities may be restricted or widespread in their distribution across the state. Conservation priority should be given to: natural communities with limited distribution across eco-regions within the state, those with restricted global distribution, and those common types for which the best documented examples occur in Massachusetts.

The Natural Heritage & Endangered Species Program (NHESP) is responsible for the conservation and protection of Massachusetts' biodiversity. Their highest priority is the approximately 178 species of vertebrate and invertebrate animals and 264 species of native plants and their habitats that are officially listed as endangered, threatened or of special concern under the Massachusetts Endangered Species Act. See figure 8-3 for a geographical representation of Wildlife Habitats in the Old Colony MPO region.

Figure 8-10: Wildlife Habitat in the Region



Problems or Threats

Transportation infrastructure can lead to wildlife-vehicle collisions, habitat loss, and habitat fragmentation. Wildlife-vehicle collisions are a dangerous phenomenon that injure or kill many animals on an annual basis. Collisions with large mammals such as deer, moose, and black bear can also result in human injury or even loss of life. Habitat loss is the result of developing an area previously providing cover, shelter, food, or breeding habitat. Habitat fragmentation is the separation of a landscape into various land uses (e.g., development, agriculture, etc.), resulting in numerous small, and disconnected habitat patches left for use by wildlife. Additionally, the small habitat patches resulting from fragmentation often do not provide the food and cover resources for many species that do attempt to use them, thus resulting in an increased risk of death by predation or automobile conflicts.

Stormwater runoff from newly developed areas, fill or degradation of wetlands from development, and air emissions from additional vehicle miles traveled are also environmental impacts associated with growth. The Old Colony MPO is dedicated to protecting environmental quality by supporting smart growth principles such as Low Impact Design, Transfer of Development Rights, and Transit Oriented Developments.

Noise pollution from sounds that cause a nuisance, could injure public health, or unreasonably interfere with the comfortable enjoyment of life, property, or the conduct of business. Noise emanates from a wide variety of transportation facilities and related sources including, but not limited to: vehicle engines, emergency vehicle sirens, train car wheels, and construction equipment. Highway traffic noise tends to be a dominant source of noise in an urban environment. Excessive noise can impair sleep, interfere with concentration and conversation and, in extreme cases, damaging hearing. Types of sounds that may cause noise include: “Loud” continuous sounds from industrial or commercial activity, demolition, or highly amplified music; Sounds in narrow frequency ranges such as “squealing” fans or other rotary equipment; and Intermittent or “impact” sounds such as those from pile drivers, jackhammers, slamming truck tailgates, public address systems, etc.

Mitigation Plans, Programs, and Strategies

Federal Endangered Species Act

In 1966, Congress passed the Endangered Species Preservation Act. This law allowed listing of only native animal species as endangered and provided limited means for the protection of species. The Departments of Interior, Agriculture, and Defense were tasked with protecting listed species and preserving the habitats of such species. Land acquisition for protection of endangered species was also authorized. The Endangered Species Conservation Act of 1969 was passed to provide additional protection to species in danger of "worldwide extinction". Import of such species was prohibited, as was their subsequent sale within the United States. Subsequently, the Endangered Species Act was passed in 1973, combining and considerably strengthening the provisions of its predecessors. Since that time, many amendments have been made to the original act but the protection of endangered species is still remains paramount.

Transportation Enhancement Program

The Federal Transportation Enhancements (TE) program funds 12 different types of transportation related activities. Activity 11, known in law as "Environmental Mitigation to address water pollution due to highway runoff or reduce vehicle caused wildlife mortality while maintaining habitat connectivity," allows communities to decrease the negative impacts of roads on the natural environment, such as water pollution and wildlife habitat fragmentation. Projects funded in this category seek to reduce these environmental impacts by controlling surface runoff and improving wildlife habitat connectivity with wildlife passages. Since the TE program began in 1992, approximately 1 percent of available TE funds have been programmed for "Environmental Mitigation" projects.

Working within Federal Highway Administration (FHWA) guidelines, each state Department of Transportation determines the eligibility of TE projects for funding. Examples of projects that may be considered eligible include:

- Projects that address water pollution due to highway runoff
- Wetlands acquisition and restoration
- Detention and sediment basins
- Water pollution studies
- Channel stabilization, storm drain stenciling and river clean-ups
- Wildlife under or overpasses, including bridge extensions to provide or improve wildlife passage and habitat connectivity
- Monitoring and data collection on habitat fragmentation and vehicle-caused wildlife mortality

Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act (MEPA) requires that state agencies study the environmental consequences of their actions, including permitting and financial assistance. MEPA further requires that state agencies "use all practicable means and measures to minimize damage to the environment," by studying alternatives to the proposed project, and developing enforceable mitigation commitments, which will become permit conditions for the project if and when it is permitted. More information regarding the MEPA unit is discussed under the Air Quality Mitigation Programs.

MassDOT Project Development and Design Guidebook

As mentioned in the Land Management section, the newly revised 2006 MassDOT Project Development and Design Guidebook included a variety of new chapters that ensure that all details of a proposed project are properly evaluated before the project can be programmed. Chapter 14 of the Guidebook, entitled "Wildlife Accommodation" describes the potential effects of roads on wildlife, includes descriptions of wildlife accommodations that can be incorporated along new and existing roadways, and details wildlife crossing structure guidelines.

The Guidebook suggests the following six policy initiatives that should be considered as goals and guidelines to address wildlife issues:

- Conduct landscape-based analyses to identify important "connectivity zones" and set priorities for mitigation.
- Evaluate road-stream crossings for their barrier effects and prioritize structures for replacement.
- Perforate road corridors for frequent wildlife and water crossings to reduce the road-barrier effect and habitat fragmentation.

- Depress roads and use soil berms and vegetation to reduce traffic disturbance and noise effects on wildlife and adjacent residential areas.
- Collect and consolidate traffic, including trucks, and channel it into primary roads to reduce the dispersion of both noise and barrier effects on lower classification roadways.
- Improve engineering designs or road surfaces, tires, motors, and vehicles (aerodynamics) to reduce the ecological effects of noise.
- Use cleaner fuel and "life cycle" vehicular materials (by designing vehicle parts to be recycled) to reduce greenhouse gases as well as pollutants of soil, water, and air.
- Consider exclusion fencing to keep wildlife off high-volume roadways.

Measures to mitigate potential infrastructure impacts, by altering wildlife behavior, include: installing vegetated berms, modified Jersey barriers, or "living fences"; incorporating native plantings along rights-of-way; constructing wildlife crossing structures or underpasses; and enhancing or creating habitat near roads through means such as wetland replication. Mitigation techniques that attempt to alter human behavior include signage, animal detection technology, public education and awareness, roadway lighting and reduced speed limits. The Old Colony MPO and MassDOT recognize the importance of reducing wildlife impacts associated with transportation infrastructure and improving habitat connectivity, while providing safe and efficient transportation for motorists, bicyclists, and pedestrians.

Noise Mitigation

Noise reduction is best addressed at its source. Mitigation strategies where source reduction is not feasible may be desirable and appropriate in some areas. Increased insulation and special windows can offer added protection to home and building occupants; noise barriers along railways and busy highways can be effective in shielding nearby properties where noise levels exceed reasonable limits.

Along major highway systems, noise barriers provide effective noise reduction. According to the U.S. Department of Transportation (USDOT), noise barriers are solid obstructions built between the highway and the homes along a highway. They do not *completely* block all noise; they only reduce overall noise levels. Effective noise barriers typically reduce noise levels by 5 to 10 decibels (dB), cutting the loudness of traffic noise by as much as one half. For example, a barrier, which achieves a 10-dB reduction, can reduce the sound level of a typical tractor-trailer pass-by to that of an average automobile. Barriers can be formed from earth mounds or "berms" along the road, from high, vertical walls, or from a combination of earth berms and walls. Earth berms have a very natural appearance and are usually attractive; however, earth berms can require a lot of land to construct, especially if they are very tall. Walls require less space, but they are usually limited to eight meters (25 feet) in height for structural and aesthetic reasons. Noise barriers are present along the new Route 44 between the Route 58 and Spring Street Interchanges.

Local planning or zoning boards are usually the first line of defense against these and other nuisance conditions; however, all levels of government need to share the burden to protect the environmental quality of the Commonwealth. The planning and zoning boards can require mitigation measures during the design review stage of a particular project and ensure that the proponent implements those mitigation techniques. Community and regional planning is a key component in mitigating the effects of noise and air pollution caused by transportation projects. Implementation of prudent land use control today can help to prevent many future traffic noise and air problems. Such controls need not prohibit development, but rather can require among other considerations, reasonable distances between buildings and roads and buffer zones of dense vegetation. As such, the Old Colony MPO ensures that

transportation system planning and programs are integrated with other planning efforts including land use, housing, open space and recreation, water and air quality, and economic development planning and implementation programs.

8.2 Climate Change

Climate Change is defined by the U.S. Environmental Protection Agency (EPA) as "any significant change in measures of climate (such as temperature, precipitation or wind) lasting for an extended period of time (decades or longer)." Throughout its history, the Earth's climate has endured many changes within a wide spectrum, from the extremes of ice ages to prolonged periods of extreme heat and warmth. These changes in climate can last from a period of decades to millions of years. Changes in climate can affect natural ecosystems, as well as the human economies and cultures that depend on them.

There are many different types of climate in the world today. They vary from the warm temperatures and high rainfalls found in the rainforests in South America to the desolate lands in the tundra across the northern parts of Alaska, Canada and Russia, to the temperatures we have here in Massachusetts.

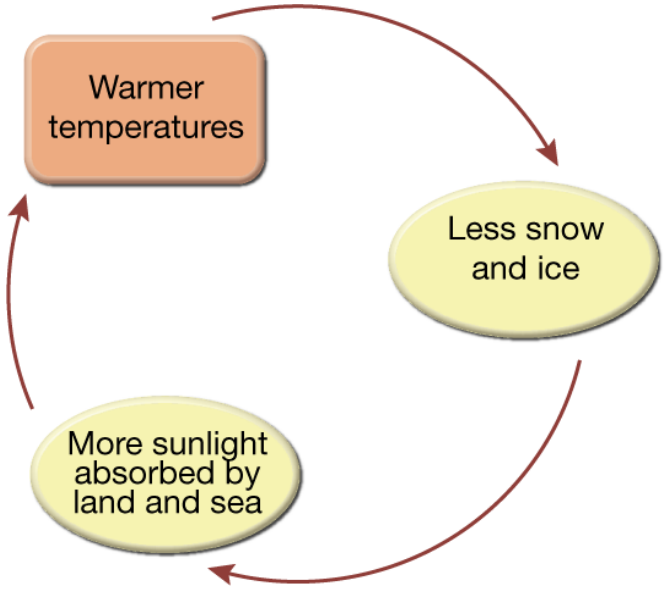


Figure 8-11: Climate Change - Ice and Snow and the Albedo Effect: *Changes in the Polar Regions can cause more warming in the entire planet earth system through feedback effects. One such effect is the reduction of ice and snow due to warmer temperatures. When the white and gray snow and ice disappears, fewer sun rays are reflected and instead the heat is absorbed by land and sea – which causes further the warming.*

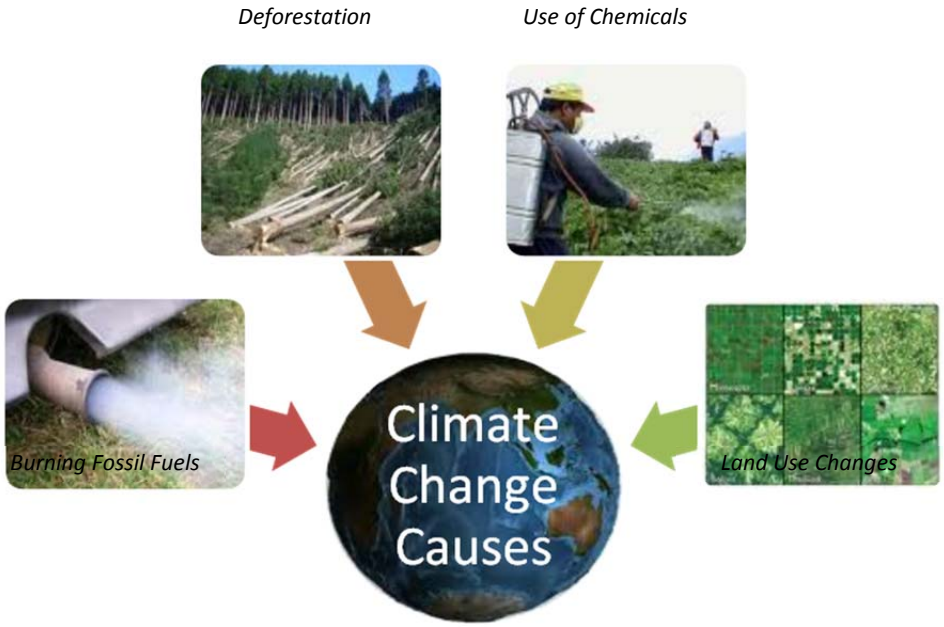
Causes of Climate Change

The climate can change for a variety of reasons. The EPA separates the known "drivers" or "forcers" of climate change into two time periods: Prior to the Industrial Revolution (pre-1750), and after the Industrial Revolution (post-1750). In the period prior to the Industrial Revolution, the known drivers of climate change were changes in the Earth's orbit, as in how the Earth's tilt is either toward or away from the sun, which affects the amount of direct sunlight that Earth receives, changes occurring within or inside the sun affecting the amount of light and warmth it gives to the Earth; and volcanic eruptions that can emit carbon dioxide (CO^2) which can block the sun's light from reaching the Earth.

GHGs are emitted naturally and can be found in the atmosphere in small levels. GHGs consist primarily of water vapor, but also contain methane, carbon dioxide (CO^2), nitrous oxide (NO^2) and fluorinated

gases. These gases form a natural "greenhouse effect" on the planet, where heat is trapped inside the Earth's atmosphere making it a habitable place for life.

Figure 8-12: Causes of Climate Change Diagram



Since the beginning of the Industrial Revolution (post-1750), there has been an increase in the amount of fossil fuels (petroleum, natural gas and coal) being used. These were first used to power industrial and commercial enterprises, and later fossil fuels were used at an increasing rate to power trains, homes, automobiles, and generate electricity. These man-made activities have contributed to the increase of the GHGs in the atmosphere, which is affecting and changing our current climate. The burning of fossil fuels to power industrial and commercial enterprises, transportation, and homes is only one of the causes for the increase in the GHGs in the atmosphere. Other causes are: increased deforestation, which is eliminating the plants and trees that convert the carbon dioxide to oxygen; an increase of chlorofluorocarbons (CFCs), a man-made gas found in aerosol cans (now being reduced); changes in land use patterns, particularly sprawl, which causes an increase and reliance on the use of automobiles and the burning of fossil fuels.

The use of fossil fuels has been growing at an alarming rate over the past century, as it has come to be relied upon as the main source of energy worldwide. According to the U.S. Department of Energy, "more than 85% of the energy consumed in the United States comes from fossil fuels, as does nearly two-thirds of the electricity generated and virtually of all of our transportation fuels."

The increased burning of fossil fuels leads increased GHGs in the atmosphere, therefore increasing the greenhouse effect and increasing the temperature of the planet.

According to the National Oceanic and Atmospheric Administration (NOAA) the global surface temperature has increased about 0.74 degrees Celsius since the late nineteenth century, and the linear trend for the past 50 years of 0.13 degrees Celsius per decade is nearly twice that for the past 100 years. The warming of the planet has not been uniform; as some areas have experienced colder temperatures

while others have seen a warming in the temperatures. Seven of the eight warmest years on record have occurred since 2001, while the ten warmest years on record have all occurred since 1995.

Impacts to Infrastructure

Roadways & Bridges

Roads and bridges are a vital part of the transportation infrastructure in the Old Colony region and are used daily by almost all of the region's 320,000 residents who drive alone, carpool, and use public transit services such as BAT, GATRA, commuter buses or paratransit services. The roads and bridges in the Old Colony region are considered some of the oldest in the country and when combined with severe weather events, this infrastructure is susceptible to major damage.

Precipitation Impacts

The most immediate impact of more intense precipitation is the increased flooding of bridges and roads, especially those near the coastline and those located within 100 & 500 Year Flood Zones. While the 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 for roads and bridges. 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.

Figure 8-13: The Bridge Street Bridge spanning the Matfield River in Bridgewater was damaged and closed due to extreme flooding

Precipitation and moisture also contribute to the weathering of transportation infrastructure. The premature deterioration of roads, bridges, parking garages, and other concrete structures are magnified where climate change induces more frequent precipitation events, especially in areas such as the Northeast where acid rain is a problem. Low-lying bridges and tunnel entrances for roads are also more susceptible to flooding, and many culverts could be undersized for flows. Interruption of road and bridge traffic is likely to become more common with more frequent flooding.

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. For example, two record-breaking rainstorms in March 2010 resulted in flash flooding in metropolitan Boston and its suburbs. The two storms dumped approximately 15 inches of rain within a period of two weeks, making March, 2010 the second wettest month on record, since records were kept beginning in 1872.

The storms of March 2010 caused extensive flooding on numerous streets and bridges in the Old Colony region causing travel delays as many roads and bridges were closed. As part of the Old Colony Climate Change Transportation Impact Study, Old Colony MPO sent letters to each of the fifteen Public Works/Highway Departments in the region asking which areas were flooded by the March storms. As an example of what was included in the Climate Change Transportation Impact Study for each community,

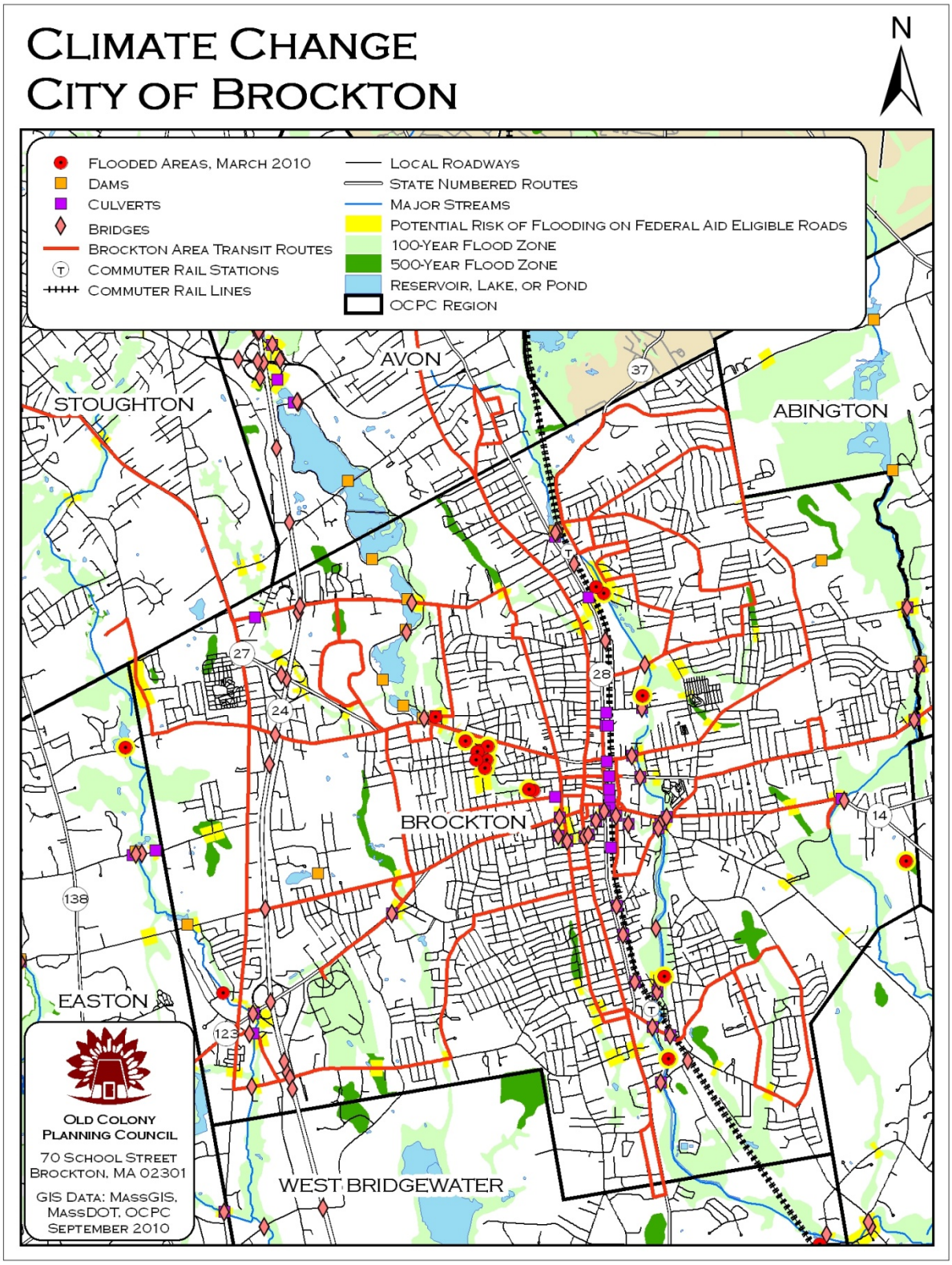
a table of flooded areas and the accompanying map for the City of Brockton is included below as an example.

Building on the Climate Change Transportation Impact Study, the OLD Colony MPO is currently working on a Climate Change Roadway Drainage and Runoff Program as part of this year's Unified Planning Work Program (UPWP). The program will build upon the Climate Change Transportation Impact Study by identifying frequently impacted (flooded) areas, evaluating the condition of drainage structures, determining compliance with EPA Storm Water regulations and select the appropriate remediation methods to address these inadequacies.

List of Flooded Areas from Brockton's Public Works Department

- Alger Street from Route 14 to the East Bridgewater Town Line
- Ames Street from Montello Street to Intervale Street
- Spark Street from Ames Street to Field Street
- Poplar Road from Spring Street to Fenway Circle
- Spring Street from Poplar Road to Belmont Avenue
- Belmont Avenue from West Elm Street to Pleasant Street
- Fenway Circle from Poplar Road to Belmont Avenue
- Silver Road from Ash Street to Belmont Avenue
- Park Road from Ash Street to Belmont Avenue
- Sycamore Avenue from Ash Street to Belmont Avenue
- Newbury Street from West Elm Street to Highland Street
- Ellsworth Street from North Arlington Street to Newbury Street
- Prospect Street from Belair Street to Pleasant Street (BAT Bus Route)
- Meadowbrook Road from Sargent's Way to Plain Street
- Riverview Avenue from Perkins Avenue to North Leyden Street
- Tiffany Drive from Pearl Street to Hatchfield Drive
- Teele Street from Riverside Street, Westerly to Trout Brook

Figure 8-14: Climate Change Transportation Impact Study – City of Brockton Map



Temperature Impacts

Roadways and bridges in the Old Colony region are exposed to a wide-variety of temperatures, from the extreme heat and humidity of the summer months to the freezing 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 (temperatures over 90°F are a significant threshold for such problems) 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 conditions 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.

On the positive side, fewer extremely cold days and warmer minimum temperature thresholds may reduce thermal cracking of pavement during winter and offset some of the increased summer maintenance costs. In New England, the warming temperatures will reduce in snow and ice removal costs, and lessen the adverse environmental impacts of the use of salt and chemicals on roads. The warmer temperatures will also improve the mobility and safety of passenger and freight travel through reduced winter hazards.

Storm Activity Impacts (Sea Level Rise & Wind)

While most of the Old Colony region is located inland, the coastal communities of Kingston and Plymouth also have to deal with the potential rise in sea level. According to the Transportation Research Board, expected sea level rise will aggravate the flooding because storm surges will build on a higher base, reaching farther inland. In fact, the chapter in 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.

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 from debris blown onto roadways and from crashes precipitated by debris or severe winds.

Rail

The Old Colony Commuter Rail Line is located throughout the Old Colony region and most of the 14 stations are on low-lying sites near the railroad tracks, except for the three stations on Brockton's viaduct. Some stations and rail lines are located in or near mapped flood plains, such as is the case in the Town of Whitman, where the station is next to a 100 year flood zone and the track in the southern portion of the town actually crosses a mapped flood plain. 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.

Precipitation Impacts

The primary impacts on rail infrastructure from flooding can cause erosion of the track subgrade and the rotting of wooden crossties according to a report by the U.S. Climate Change Science Program. Erosion of the subgrade can wash away ballast and weaken the foundation, making the track unstable for passage of heavy locomotives and railcars. As with buckling, subgrade erosion and rotting crossties are difficult to detect using methods other than visual inspection.

Figure 8-15: This photo was taken from the Old Colony Commuter Rail in Braintree during the March 2010 storm

The interruption of rail traffic is likely to become more common with more frequent flooding. The impact of sea level rise is limited to coastal areas, but the effect of intense precipitation on land transportation infrastructure and operations is not. For example record-breaking rainstorms in March 2010 resulted in flash flooding of the entire metropolitan Boston area, with major impacts on the entire area. Local examples of this include the MBTA Old Colony Commuter Rail Line in Braintree being flooded by the nearby Hollingsworth Pond. Also, the MBTA Old Colony Commuter Rail Line rail bed was washed out between the Holbrook/Randolph and Braintree stations. While the repairs were being made at this location, buses were used to transport passengers, which added an extra 20-30 minutes to the average commute time.

Temperature Impacts

According to a report by the U.S. Climate Change Science Program, the average temperature increases are unlikely to require immediate design changes to track or other rail infrastructure, as these ranges generally fall within the current standards for existing rail track and facilities. However, the increase in temperature extremes – very hot days (air temperatures above 95°F) – increases the incidence of buckling or "sun kinks" on rail tracks. Track buckling occurs predominately on continuously welded track, though it also can occur on older jointed track when the ends of the track become frozen in place. Track buckling is most prevalent on an isolated hot day in the springtime or early summer, rather than mid to late summer when temperatures are more uniformly hot. Buckling also is more likely to occur in alternating sun/shade regions and on curves.

The most serious problem associated with track buckling is derailments. Derailments occur when a buckled section of track is not observed in time for the train to safely stop. One way to overcome this problem is to reduce the speed of trains. In hot weather (more than 95 °F), railroads can issue orders to slow train speeds by 10 mph to help prevent derailments caused by buckling. This has several negative consequences, such as longer transit times, higher operating costs and reduced track capacity.
One example of an accident caused by a heat induced track buckle was an April 2002 incident when an Amtrak Auto Train derailed near Crescent City, Florida. The accident claimed four lives and injured 142. The National Transportation Safety Board (NTSB) concluded that "heat-induced track buckle that developed because of inadequate CSX Transportation track-surfacing operations. These operations included the misalignment of the curve, insufficient track restraint, and failure to reestablish an appropriate neutral rail temperature."

If incidences of buckling arise, it will be important to develop improved methods of detection. It is relatively easy to detect a broken rail by running a light electric current through track, but manual observation remains the best method for identifying track buckling. Research is underway to develop improved methods that measure temperature and stress of the track.

Storm Activity Impacts (Sea Level Rise & Wind)

Frequent inundation and interruptions in travel on coastal and low-lying roadways and rail lines due to storm surge are projected in the coming century, potentially requiring changes to minimize disruptions.

According to the U.S. Global Change Research Program wind from storms may impact the railroad signs, signals, and grade crossings. This may cause an increase in rail accidents at grade crossings. More significant safety and operational impacts are to be likely from debris blown onto roadways and from crashes precipitated by debris or severe winds.

Air Travel

Each of the Old Colony region's three airports are outside of a mapped flood plain and are unlikely to be affected by flooding. Precipitation, heat, and storms can each affect air travel in other ways, like extreme heat affecting lift, storms that create more turbulence, and an increase in precipitation events causing flight delays, cancellations, and a more challenging flying environment for pilots.

Precipitation Impacts

In general, airlines, airports, and aircraft operate more efficiently in dry weather than in wet. Weather is a critical influence on aircraft performance and the outcome of the flight operations for taking off, landing, and while aloft. A wetter climate would reduce the number of visual flight rules (VFR) operating time periods and would impact the general aviation sector. General aviation pilots would either learn to fly in instrument flight rules (IFR) conditions by becoming "instrument rated", or not fly during periods of reduced visibility and precipitation. In order for pilots to fly in IFR conditions, aircraft flight

Figure 8-16: The Norwood Memorial Airport runway and taxiway system were under up to two feet of water.

decks must be equipped with complex navigation instruments, which is a significant investment for aircraft owners.

Stormwater runoff that exceeds the capacity of collection and drainage systems can cause flooding, delays, and airport closings. Heavy downpours affect the structural integrity of airport facilities, through flood damage to runways and other infrastructure. In March 2010, extreme rains flooded the Norwood Memorial Airport, as the Neponset River and Purgatory Brook overflowed their banks causing the airport to close twice in a period of two weeks.

Storm Activity Impacts (Sea Level Rise, Wind)

At a minimum, increased intense precipitation is likely to cause increased disruptions and delays in air service and periodic airport closures. Additionally, with the increased storm activity, airport facilities including terminals, navigational equipment, perimeter fencing, and signs are likely to sustain increased wind damage.

Temperature Impacts

Extreme temperatures can affect air travel in a variety of ways. According to the U.S. Global Change Research Program, warming temperatures and possible increases in temperature extremes will affect airport ground facilities, runways in particular, in much the same way they affect roads. Airports in some areas are likely to benefit from reduction in the cost of snow and ice removal and the impacts of salt and chemical use, and from the reduced need to de-ice planes. More heat extremes will create added operational difficulties, for example, causing greater energy consumption by planes on the ground.

Mitigation Plans, Programs, and Strategies

In an effort to reduce the risks posed by the gases, particles and toxics in the air we breathe and reduce the impacts of climate change, Massachusetts is working continuously to reduce these through a variety of programs that are described below.

Maintaining and Expanding Transit Services

The increased use of mass transit and the possible expanded regional transit services follow the state's guidelines on Smart Growth and Sustainable Development, as they reduce congestion on the roadways and reduce the use of fossil fuels and greenhouse gas emissions in the atmosphere.

Bus Transit Expansion

Two Regional Transit Authorities (RTA) provide most of the regional fixed route service. BAT operates 14 routes in the metro Brockton area and GATRA operates the Plymouth Area Link (PAL) with routes in the Old Colony MPO communities of Hanson, Pembroke, Plymouth and Kingston.

BAT recently expanded its service area into Rockland in February 2010 with the Rockland Flex Ride service. This service is offered to riders on a flexible route schedule, which features on-demand, as well as fixed-stop service. It brings riders to retail centers such as Target, Stop & Shop, and Walmart in Abington, and Signature Healthcare Brockton Hospital in Brockton.

GATRA recently expanded service to Pembroke with daily MBTA shuttle service to the MBTA Commuter Rail Station in Hanson. The shuttle picks up commuters who wish to use the commuter rail at four locations in Pembroke in the morning and drops them off at the station at three different times. In the evening the shuttle picks up commuters from the station at three different times and drops them off at the same four locations in Pembroke.

Commuter Rail Expansion

The current commuter rail lines in the Region handle approximately 11,000 one-way transit trips 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 Boston. There are additional proposals to expand transit service within the region, including the *South Coast Rail Project,* which is an initiative of the Massachusetts Department of Transportation (MassDOT) to restore commuter rail transportation from South Station in Boston to the cities of Fall River and New Bedford. There is also a proposal to extend MBTA commuter rail service from Middleborough to the town of Bourne using an existing rail line known as the Buzzards Bay Secondary Track. In addition, there is a proposal to expand Commuter Rail Service to Downtown Plymouth. The commuter rail services the Plymouth station only four times per day and these trains do not serve the station at peak commute times, which makes the station underutilized. Increasing the amount of train service in Plymouth would generate some reverse commute trips during the summer, during Plymouth's peak tourism season. It is estimated that 750,000 people visit Plymouth annually making tourism an important part of Plymouth's economy. An opportunity exists to meet the travel needs of tourists through the use of the current regional transportation infrastructure.

Land Use Strategies

Within the Old Colony region growth continues to decentralize the population and to consume land at an increasingly alarming rate. This continuing pattern of low-density residential development of outlying areas and the scattering of non-residential uses has become commonly referred to as "sprawl."

Many communities that grew rapidly over the past fifty years were those that were sparsely populated, while the more densely settled areas having much less buildable land, experienced a much slower rate of growth. Land use within the Old Colony region has grown dramatically over this time as residential development has grew 68%, yet, the population only grew by 40% during the same time period. In recent years, most development has come in the form of low to moderate density single family housing development on relatively large lots. Most of the region's housing inventory can be classified as low to moderate densities with Brockton the only community considered to be having a "high density."

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 also promotes and supports transportation and land use plans that support integrated, multimodal transportation strategies, including the use of transit, ridesharing, bicycling, and walking. Additionally, the Old Colony MPO also works to ensure that transportation improvement projects consider enhancement of aesthetics and character of neighborhoods, communities, and commercial districts.

The current-endorsed "Livability" and "Sustainable Development" movements encourage a "redevelop first" mentality, putting relatively high-density development near existing centers and in areas with well-

established infrastructure, and doing so in ways that avoid additional energy consumption, minimize the effect on natural resources, and mitigate unavoidable impacts on environmental quality.

Livability and sustainable development principles are intended to be the antithesis of sprawl, but they can be applied at a great range of scales from individual projects to a regional scale. The effect on travel patterns and modal choices can vary with the scale of action. Communities that adopt these principles have a greater concentration of growth in regional centers that create more walkable neighborhoods and allow for a greater use of mass transit.

On July 16, 2009 the U.S. Department of Transportation (DOT), the U.S. Department of Housing and Urban Development (HUD) and the Environmental Protection Agency (EPA) announced the formation of the interagency Partnership for Sustainable Communities. With the formation of the Partnership for Sustainable Communities these three agencies agreed to collaborate to help communities become economically strong and environmentally sustainable by following the Partnership for Sustainable Communities Six Principles of Livability:

- Provide more transportation choices to decrease household transportation costs, reduce our dependence on oil, improve air quality and promote public health.
- Expand location- and energy-efficient housing choices for people of all ages, incomes, races and ethnicities to increase mobility and lower the combined cost of housing and transportation.
- Improve economic competitiveness of neighborhoods by giving people reliable access to employment centers, educational opportunities, services and other basic needs.
- Target federal funding toward existing communities – through transit-oriented and land recycling – to revitalize communities, reduce public works costs, and safeguard rural landscapes.
- Align federal policies and funding to remove barriers to collaboration, leverage funding and increase the effectiveness of programs to plan for future growth.
- Enhance the unique characteristics of all communities by investing in healthy, safe and walkable neighborhoods, whether rural, urban or suburban.

Intelligent Transportation Systems (ITS)

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.

The Old Colony MPO advocates the consideration of ITS solutions for transportation problems as a routine part of the transportation planning process. A regional ITS architecture is a framework that defines component systems and their interconnections. Successful ITS deployment requires an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems. The regional architecture is a mechanism design to ensure this collaboration and compatibility occurs.

Inputs into ITS systems can involve any variety of collection devices, including:

- Loop detectors in the pavement and sophisticated ground level radar systems that are able to collect real time traffic volume and speed data.
- Video equipment is often used to monitor the transportation system. This is useful in allowing system operators to immediately detect areas of congestion that may be forming. It is also used

to detect incidents such as crashes and disabled vehicles, in turn accelerating the emergency dispatch, and the overall incident management process. Video surveillance is also a useful tool for security and incident management in transit vehicles and around stops and terminals.

- Automatic vehicle locators (AVL) on board transit vehicles, emergency response vehicles, and roadside assistance vehicles allow operators to know where vehicles are in real time allowing for more efficient dispatch and adjustment of traffic controls if necessary.
- Transmitters onboard transit and emergency vehicles alike are used to pre-empt traffic signals ahead or to alert travelers at a transit stop that the vehicle is approaching.
- Remote weather stations and Doppler radar provide real time weather conditions occurring throughout the transportation network, and provide alerts regarding events such as icing or flooding that may be occurring.

Congestion Relief Methods

Congestion on a transportation facility may be defined as the level of performance that is deemed unacceptable due to traffic interference. The acceptable level of performance varies from state to state. In addition, the types of transportation modes and links also vary from place to place. Therefore, an effective Congestion Management Process (CMP) is required to provide information on enhancing performance and identifies effective congestion reducing strategies that meet the needs of a particular region. In general, the root causes of congestion can be summarized into one of two categories; too much traffic on a facility for the available physical capacity to handle-causing a bottleneck and the occurrence of traffic incidents-accidents, work zones, inclement weather.

The use of Access Management is the proactive management of vehicular access points to land parcels adjacent to all manner of roadways. Good access management promotes safe and efficient use of the transportation network. Access Management encompasses a set of techniques that state and local governments can use to control access to highways, major arterials, and other roadways. These techniques include:

- *Access Spacing:* increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality for heavily traveled corridors.
- *Driveway Spacing:* Fewer driveways spaced further apart allows for more orderly merging of traffic and presents fewer challenges to drivers.
- *Safe Turning Lanes:* dedicated left- and right-turn, indirect left-turns and U-turns, and roundabouts keep through-traffic flowing. Roundabouts represent an opportunity to reduce an intersection with many conflict points or a severe crash history (T-bone crashes) to one that operates with fewer conflict points and less severe crashes (sideswipes) if they occur.
- *Median Treatments:* two-way left-turn lanes (TWLTL) and nontraversible, raised medians are examples of some of the most effective means to regulate access and reduce crashes.
- *Right-of-Way Management:* as it pertains to R/W reservation for future widenings, good sight distance, access location, and other access-related issues.

The purpose of managing access to parcels along a roadway is twofold: 1) To preserve capacity within the roadway, thereby increasing the efficiency of traffic flow and avoiding congestion, and 2) To enhance safety within the overall road corridor, especially at access points and at places where vehicles make turning movements. The benefits of managing access include the conservation of lives and property within the transportation system and the relief of traffic congestion.

Alternative Energies & Emission Standards

Federal and state agencies have both stressed the importance of transitioning away from foreign fossil fuel reliance, encouraging the research and usage of alternate fuels, power sources and reducing vehicle emissions. The Old Colony MPO supports such programs and reducing emissions, and consistently works with local, regional, and statewide partners to further the endeavor.

Alternative fuels and power sources can be described as fuels derived from resources other than traditional petroleum and most being generally renewable. By increasing the use of alternative fuels the country will reap many beneficial impacts including:

- Improving air quality by reducing the amount of greenhouse gases and air pollutants currently emitted by automobiles using traditional petroleum based fuels.
- Increasing energy sustainability as traditional petroleum sources are not infinite.
- Reducing America's dependence on foreign oil, therefore strengthening national security.

Emission standards are set via Corporate Average Fuel Economy (CAFE) Standards. CAFE standard is the sales weighted average fuel economy, expressed in miles per gallon (mpg), of a manufacturer's fleet of passenger cars or light trucks. The National Highway Traffic Safety Administration (NHTSA) is responsible for establishing and amending the CAFE standards and the Environmental Protection Agency (EPA) is responsible for calculating the average fuel economy for each manufacturer.

Since its inception in 1975, CAFE standards have progressed slowly from 18 miles per gallon for passenger cars in 1978 to 27.5 miles per gallon for passenger cars in 1990. Recently, in May 2009 President Obama signed an executive memorandum ordering the EPA and Department of Transportation (DOT) to develop new fuel and emissions standards. The new standards, covering model years 2012-2016, and ultimately requiring an average fuel economy standard of 35.5 mpg in 2016, are projected to save 1.8 billion barrels of oil over the life of the program with a fuel economy gain averaging more than 5 percent per year and a reduction of approximately 900 million metric tons in greenhouse gas emissions.

Executive Order 484 - Leading by Example: Clean Energy and Efficient Buildings

Executive Order 484 builds on a number of the Division of Capital Asset Management's (DCAM's) current initiatives, while setting more specific and far-reaching targets for state facilities. Specific goals and objectives of particular importance to DCAM are outlined below. All Commonwealth agencies as a whole, and to the greatest extent feasible individually, shall meet the following goals by 2012:

- 25% greenhouse gas emission reductions from 2002 levels
- 20% energy reduction per square foot from 2004 levels
- 15% of energy consumption procured from renewable energy sources (either through purchase of renewable energy or through installation of on-site resources)
- 10% reduction in water use from 2006 levels

(Note: Larger goals for greenhouse gas emission reductions, energy use reductions, renewable energy consumption and water reduction are targeted for 2020 and 2050.)

All new construction and major renovation over 20,000 square feet must meet MassLEED Plus requirements. All new construction under 20,000 square feet must meet MassLEED Plus, achieve 20% above the Mass Energy Code, or meet the Advanced Buildings energy criteria.

Furthermore, DCAM is charged with:

- Initiating comprehensive large-scale energy efficiency projects at all appropriate facilities over 100,000 square feet.
- Undertaking "retro-commissioning" at all applicable buildings over 50,000 square feet
- Considering energy performance in siting and procuring leased space
- Developing a facility maintenance program for lighting and HVAC systems
- Supporting training of client agency personnel on energy, water and sustainable practices
- Assisting in the development of an Energy Information System to track agency energy use

Vehicle Mileage Tax/Road Pricing/Congestion Pricing

The Vehicle Mileage Tax (VMT), Road Pricing and Congestion Pricing are all alternative funding mechanisms that are being explored here in the United States and that are already in use in many parts of the world. The premise for exploring these alternative funding mechanisms is that the current gasoline tax is not providing a sufficient source of revenue to fund highway infrastructure projects. The lack of funding from the gasoline tax can be attributed to rising gas prices, the recent downturn in the economy, and the increase of more fuel efficient automobiles. These alternative funding mechanisms would charge drivers not on the amount of gasoline they use, but on how far they drive, where they drive, and when they use specific roads. While there are concerns about privacy and fairness issues relating to these alternatives, they must be studied further to examine all potential benefits and drawbacks.

8.3 Hazards & Evacuation

New England weather is proverbially variable and sometimes dramatic; and the drama can evolve into danger. Late summer hurricanes, major winter blizzards, and summer droughts are all part of life in Southeastern Massachusetts, but most are at a manageable level. Blizzards can be very destructive, as we know from the Blizzard of 1978, which dropped more than 25 inches of snow and resulted in dramatic snowdrifts. Other threats, such as, earthquakes, landslides, and major fires are less common. In 1957, a wildfire burned from the western end of Plymouth to the sea. Local fires in Plymouth's Uncle Brances Road and Clark Road areas early in 2005 also resulted in massive destruction. These events can have disastrous effects on natural features, our man-made communities, and transportation infrastructure. The communities of Plymouth and Kingston have extensive coastlines, which are susceptible to flooding as a result of powerful hurricanes or rain events.

8.3.1 Potential Natural Hazards

Flood

Southeastern Massachusetts is particularly susceptible to flooding, with approximately 275 miles of coastline and 1,800 miles of major rivers in the region. Within the Old Colony Region, there are approximately 49.3 miles of shoreline, and the roughly 44 miles of the Taunton River, the longest river in the region. The Taunton River, with its tributaries (approximately 20 named lesser brooks, streams and rivers) drain most of the region.

Floods are caused by stream flows exceeding the watershed's storage capacity, a stream's carrying capacity, or coastal surges overflowing low-lying developed areas. These conditions occur during major rain sources, such as hurricanes, nor'easters, blizzards and severe thunderstorms. They are

exacerbated by factors such as increased impervious areas, loss of safely floodable floodplains or other natural stormwater retention areas, seasonal frozen ground, and monthly high tides in coastal areas. The combination of high tides and wind-driven water in storm surges, generally during hurricanes, nor'easters or blizzards, causes flooding of coastal areas and estuaries. The threat is greatest during the highest tides of the month when the sun and moon are opposite one another and their tidal influences are combined.

Figure 8-17: Flooding on Spring Street in Brockton due to heavy rains.

The effect in estuaries can be compounded when flood flows from rain and /or snow-melt meet high tides and storm-driven seawater. The effect is reduced behind barrier beaches, which take the brunt of the waves, but high waters can still damage shoreline properties. In the greater southeastern Massachusetts region, 17% of the land is in the one-hundred year flood plain and an additional 4% is in the five hundred year floodplain. These are determined by the U.S. Army Corps of Engineers to have a respective 1% or 2% probability of flooding in any given year. Most of the region's undeveloped land within the 100-year to 500-year flood plain is regulated by local flood protection zoning as required under the National Flood Insurance Program, some local bylaws include the 500-year flood plain, and some is within the minimum 100 foot band absolutely protected under the Massachusetts Rivers Act. Under the flood plain zoning, the various residential, commercial or institutional uses allowed by the basic zoning may generally be done only if the proponent can demonstrate that the site is not actually flood plain, or that done according to applicable regulations, the project will not increase risks, diminish flood storage or passage, or otherwise create problems there or downstream.

Hurricanes

The areas that are susceptible to hurricane-related flood damage are described as SLOSH (Sea and Lake Overland Surges from Hurricanes) zones. The phenomenon is measured by a model that uses topography, tides, and past hurricane behavior to predict the areas that would be inundated by hurricanes. The zones are related to the intensity of the storm, according to the Saffir-Simpson Scale and by the tide at the time of the storm. The probable SLOSH areas are the low-lying inlets or coastal ponds in Plymouth; Ellisville Harbor, Center Hill Pond, Ship Pond and White Horse Beach/Bartlett Pond; Plymouth Beach; a thin strip along Plymouth Harbor; the thinly settled, low-lying part of Kingston along the Jones River and the Jones River Marshes east of Rocky Nook to the Duxbury line, and along the Jones River about 2500' west of Route 3A.

Nor'easters

The Massachusetts Hazard Mitigation Plan reports that while hurricanes strike with more force than Nor'easters, Nor'easters cause more damage because they are so frequent, with one or two every winter in New England. They bring high winds and sustained rains, and last longer – 12 hours to 3 days, versus 6 to 12 hours for hurricanes. Many southeastern Massachusetts communities have flooding

following these heavy rains, particularly when melting snow and ice add to the flow, or when chunks of ice clog drains and increase local flooding of roadways and buildings.

Blizzards

Blizzards combine large amounts of snow and wind, often leading to crippling snowdrifts. On average, the coastal areas of Plymouth and the southern edge of Kingston receive the least amounts of snow, approximately 24.1 to 36.00 inches; most of the region receives between 36.1 to 48 inches; and the extreme inland northernmost portions of Avon and Stoughton get 48.1 to 72 inches. The total is important for potential flood-inducing snow melt in a warm spell, but the greater concern is the intensity of individual storms or closely linked storms. According to the National Oceans and Aeronautic Administration (NOAA), the greater Boston area covering much of southeastern Massachusetts has a 33% chance of having at least one 12-inch storm out of a probable 10.33 snowstorms annually. Major storms can block roads and generally cripple activity, particularly when heavy wet snow combines with rain and ice to damage trees, power lines and other critical facilities.

Fire

Wildfires are a natural part of the southeastern Massachusetts ecosystem. They keep the forest clean of debris, encourage the growth of grasses that serve as wildlife feed, and allow for new growth of fire-dependent plant communities like Pine Barrens and Scrub Pine /Scrub Oak communities that might otherwise be succeeded by other trees. These forests are primarily pitch pine with an understory of scrub oak and black huckleberry. They are very flammable and the ecosystem requires dependant plant communities like pine barrens and scrub pine/scrub oak communities that might otherwise periodic fire to perpetuate the barrens. Whether set or natural, cyclically recurring isolated fires recycle nutrients and maintain diverse natural habitats.

This increasingly dangerous Wildlands/Urban Interface is visible in Plymouth and other communities bordering the 15,000-acre Myles Standish State Forest, as well as in the out-of-region Fall River Bioreserve/Freetown State Forest, and the 1,500-acre Massasoit State Forest. According to the State Fire Suppression staff, Southeastern Massachusetts is the 3rd most hazardous wildfire / interface area in the country with fires able to spread over 40 acres in a minute.

The resiny and waxy Pitch pine/scrub oak vegetation is the region's most flammable vegetation. It is widespread in the western portion of Plymouth and in some areas east of Pilgrim Highway (Route 3). Other areas east of Pilgrim Highway (Route 3) have mixed deciduous and coniferous cover with scattered pockets of pitch pine and scrub oak, and with deciduous trees dominating in the easternmost areas. The dramatic pattern in the west may obscure hazards elsewhere. For example, the rapidly developing Pine Hills area also has some patches of Scrub Oak and Pitch Pine and, as its name suggests, considerable cover by other coniferous trees along with many deciduous trees that can be seen in aerial photographs. It reportedly reflects very little use of recommended protective practices. These other vegetative covers in Plymouth County have an under-story of inflammable mountain laurel, as well as a mix of Juniper and Atlantic Cedar.

More broadly, wildfires reflect three major factors: weather, topography, and fuel. Weather, especially long droughts, lightening, and winds, encourage and influence fires, and hazards are generally higher in the spring and fall when it is dry and/or windy. Topography influences fires as steep slopes and gullies act as flues. Most basic is vegetation, supplying fuel from trees, shrubs and branches, though cultural supplies like wood roofs, firewood piles, etc. can add risks and shape the resulting fire.

Southeastern Massachusetts is generally flat so the overall topography does not encourage high-speed wildfires. However, local slopes combined with the summer's prevailing west winds may accelerate and direct a fire. Given the worst combination of temperature, wind, humidity, and topography, a wildfire can burn at a rate of 30+ acres per minute, though in flat areas the Bureau of Fire Control expects speeds of up to 20 acres per minute. While these factors influence the course of fires, the Bureau reports that nearly 98% of Massachusetts' fires result from human carelessness. By far the largest fires have been in and adjacent to Myles Standish State Forest in Plymouth and Carver, but the size of fires has dropped from the 18,000 acres of 1957 to 1,350 acres in from 1991 to 1995. After such fires there is the potential for increased erosion, hydrophobic soils, and major shifts in habitat, depending on the severity and speed of the burn.

Major needs in controlling fires once they start are good access to the areas and sufficient water. Old cart paths or logging roads cross most of the region's woods but only the heavy-duty, specially equipped, woods trucks ("breaker trucks") can get reasonably close to the more remote fires.
One of the communities with considerable pockets of Pitch Pine and other coniferous trees interspersed with housing, Plympton, has no public water system. In such communities, and away from water lines in other communities, fire fighters must rely on water tankers and ponds, and homes are likely to be lost.

As with hurricanes, a major risk factor is a low sense of danger from inexperience. Nearly 50 years have passed since the large Plymouth fire that burned through the pine-barrens to the shore and many new homes are in these highly flammable areas, and homeowners are unaware of the risk.

Mitigation Plans, Programs, and Strategies

Pre-Disaster Mitigation Plans

Pre-Disaster Planning is very important because it identifies the vulnerable areas, establishes a network of help, and discusses how the transportation infrastructure can be utilized. The Old Colony MPO recognizes the importance of Pre-Disaster Mitigation Planning and promotes further funding for updating existing plans.

8.3.2 Sensitive Facilities

Pilgrim Nuclear Power Plant-Plymouth, MA

The U.S. Nuclear Regulatory Commission is responsible for assuring that nuclear power plants operate safely and meet federal regulations. NRC inspectors work full-time at Entergy Nuclear plants, reviewing day-to-day activities and programs. Additional inspectors conduct several special inspections of specific areas and programs each year. Changes in plant design and operation are reviewed to assure they meet safety standards and comply with NRC regulations.

Wastewater Treatment Facilities

Wastewater treatment plants range in size and complexity from satellite plants treating sanitary wastewater from homes to large regional facilities treating millions of gallons a day of sanitary and industrial wastewater. New pollution problems have placed additional burdens on wastewater treatment systems. Today's pollutants, such as heavy metals, chemical compounds, and toxic

substances, are more difficult to remove from water and rising demands for water supply only exacerbate the problem. Wastewater treatment facilities are critical to protecting and maintaining the environmental quality of the Commonwealth.

Public Water Supplies

Source water is untreated water from streams, rivers, lakes or underground aquifers that is used to provide public drinking water, as well to supply private wells used for human consumption. Some water treatment is usually necessary, so public utilities treat most of the drinking water before it enters the home. Protecting source water from contamination can reduce the cost of this treatment, as well as the risks to public health. The U.S. Environmental Protection Agency, other federal agencies, states, local communities, businesses and citizens all play a role in ensuring that drinking water is protected.

Mitigation Plans, Programs, and Strategies

Evacuation Planning

Approximately 10 miles around the Pilgrim Nuclear Power Plant is called the Emergency Planning Zone. Communities within the 10-mile area include: Plymouth, Kingston, Duxbury and portions of Carver and Marshfield. Major arterials and collector roadways in the region are designated as evacuation routes and each sub-area of the EPZ have specific receiving points to limit confusion during an event.

Figure 8-18: Evacuation Route Sign

In 2005, the Massachusetts Emergency Management Agency, Massachusetts Department of Public Health, and Entergy Nuclear Northeast's Pilgrim Nuclear Power Station provided an important emergency public information calendar to the neighbors of the station. The calendar provided useful emergency information, such as, contact numbers, emergency alert radio stations, evacuation routes, emergency bus routes, and reception centers. The Taunton High School, Braintree High School, and Bridgewater State College are designated receiving points for citizens of southeastern Massachusetts evacuating the area near the Plymouth Shores Nuclear Power Plant. This type of planning will help maintain an orderly system of evacuation if such an event is to occur.

Pre-Disaster Mitigation Plans

Pre-Disaster Planning is very important because it identifies the vulnerable areas, establishes a network of help, and discusses how the transportation infrastructure can be utilized. The Old Colony MPO recognizes the importance of Pre-Disaster Mitigation Planning and promotes further funding for updating existing plans.

8.4 Energy, Fuels, and Emissions

According to the U.S. Department of Transportation, the transportation sector directly accounted for about 28 percent of total U.S. GHG emissions in 2006, making it the second largest source of GHG emissions, behind only electricity generation (34 percent).Also nearly 97 percent of transportation GHG emissions came through the direct combustion of fossil fuels, making thetransportation sector the largest end-use sector emitting of carbon dioxide (CO_2), the most prevalent greenhouse gas.

To reduce the massive amounts of CO_2 that isemitted by the transportation sector, the Old Colony MPO encourages and supports the increased use of renewable energies, alternative fuels, strict emission standards, and greater fuel efficiency in all new automobiles.

8.4.1 Renewable Energy

One of the unique features of Massachusetts is its diversity of clean energy resources. The state boasts an abundant bio-energy stock, excellent wind potential in a number of areas, existing hydropower facilities and infrastructure, and sufficient solar energy for widespread solar photovoltaic installations. The actual amount of clean energy that could be developed in the state is far greater than what is currently being utilized.

Solar Power

Figure 8-19: Solar Panels on the BAT Intermodal Centre in Brockton

Solar photovoltaic technology, or "PV" for short, uses solar energy to produce electricity. PV is one of the most environmentally friendly technologies available and is very easy to install on a building or property. While cost can be a barrier to some installations, there are many incentives available for PV installations. Solar photovoltaic (PV) panels can be installed around Massachusetts at a variety of sites, most often on the rooftops of buildings. Because solar energy is an unlimited resource, the potential for PV development in the state depends more on the number of sites where these can be installed without being shaded or damaged. Governor Patrick has a set a goal of 250 megawatts (MW) installed in Massachusetts by 2017.

An example of solar power at work in the Old Colony MPO region is the Brockton Brightfield, a 425-kilowatt (kW) photovoltaic (PV) solar energy system located on a 3.7 acre remediated brownfield in Brockton. At the time of its construction, it was the largest solar energy plant in New England and the largest brightfield transformed into a solar energy generating station in the nation.

Wind Power

Wind turbines provide significant amounts of energy using only the natural power of the wind. In fact, wind power is one of the fastest growing and most commercially viable forms of clean energy. Because it produces no emissions and can be installed locally, it is a growing energy choice for everyone from

residential customers to communities and municipalities to entire nations. Approximately 3.5% of Massachusetts land has sufficient average wind speeds and available land for the installation of utility-scale wind turbines. This number excludes areas that have already been developed or identified as environmentally sensitive. Because wind farms do not require significant areas of land, at most only 0.35% of the 3.5% of available land would be taken up by turbines and associated structures. Governor Patrick has a set a goal of 2,000 megawatts (MW) of wind power capacity in Massachusetts by 2020.

Through a grant received through American Recovery and Reinvestment Act (ARRA) of 2009, the MBTA will install two renewable wind energy turbines within the Old Colony region. A 100kW wind turbine will be located at the Kingston Layover Facility at the terminus of the Kingston/Plymouth Line and a 600kW will be located at the Bridgewater Station along the Lakeville/Middleborough Line. The installation of these wind energy turbines will provide clean energy to support the plugging-in of trains for storage, maintenance and passenger waiting facilities. It is expected that these turbines will allow the MBTA to save 75 percent of energy consumption at these locations.

Two other local examples of wind power in eastern Massachusetts is the Cape Wind project on Cape Cod and a smaller wind turbine project in Hull. Cape Wind is in the process of developing first offshore wind farm in the United States. The 130 wind turbines will sit 400 feet high in Nantucket Sound and Horseshoe Shoal and produce 420 megawatts of clean energy. In average winds, Cape Wind will provide ¾ of Cape Cod and the Islands with their electricity needs. The wind turbine project in Hull, MA is a nice example of forward thinking, as it provides electricity for the local street and traffic lights.

Biomass

Bio-energy can be produced using a variety of materials that include wood, crops like corn and soybeans, and waste from consumer, municipal, industrial, and agricultural processes. Each of these materials are sources of fuels that can be burned to produce energy. Massachusetts has an abundant natural stock of bio-energy fuels, making it a clean energy source with great potential for the state. However, recovery of some types of biomass is expensive and not economically feasible at present, so the true role of biomass in local energy production may end up being smaller than projected. Liquid biofuels like ethanol, biodiesel, and bio-oil can be used to power cars and other transportation.

An example of bio-energy near the Old Colony MPO region is the SEMASS Recovery Center in West Wareham. Municipal waste from surrounding communities in the region is brought to the SEMASS Recovery Center where it is converted to electricity. The resulting energy is sold to NStar, which then sells the energy to communities throughout southeastern Massachusetts. On average SEMASS burns enough waste to power 75,000 homes in the region.

Hydropower

Rivers, streams, and other flowing waters can be used to generate electricity through hydropower. Hydroelectric facilities represent the largest source of clean energy in the United States and around the world. A handful of massive hydro plants account for a significant percentage of this energy in Massachusetts. Development of hydropower in Massachusetts will likely be limited to the upgrade or repair of existing dams, as new river construction is heavily regulated. If all the potential hydropower sites that meet these regulations were developed, they could produce 4% of the state's energy consumption.

Both current and future hydropower projects should consider the effects to the fish and wildlife populations that may be affected by such projects, with every effort being made to make hydropower projects as environmentally freindly as possible. Also the development of non-hydro options, such as water supply conduits and pipes that are outside the natural environment should be examined as well, as these typically have minimal impacts on the environment.

Geothermal Energy

Geothermal energy is thermal energy that is generated and stored in the Earth. Resources of this clean and sustainable energy can be found contained in underground reservoirs of steam, hot water, and hot dry rocks. As used at electric generating facilities, hot water or steam extracted from geothermal reservoirs in the Earth's crust is supplied to steam turbines at electric utilities that drive generators to produce electricity. Moderate-to-low temperature geothermal resources are used for direct-use applications such as district and space heating. Lower temperature, shallow ground, geothermal resources are used by geothermal heat pumps to heat and cool buildings.

A local example of geothermal energy being utilized in the Old Colony region can be found at the Wayside Farms subdivision in East Bridgewater. This 66 unit subdivision consisting of single family homes and townhouses uses ground-source geothermal heat pumps to heat the homes and consume up to 70% less energy than a traditional heating system.

8.4.2 Alternative Fuels

President Barack Obama and Massachusetts Governor Deval Patrick have stressed the importance of transitioning away from foreign fossil fuel reliance while encouraging the research and usage of alternative fuels. The Old Colony MPO supports programs aimed at encouraging the use of alternative fuels and consistently works with local, regional, and statewide partners to further that endeavor.

In support of the efforts to increase the use of alternate fuels, the state of Massachusetts passed the Massachusetts Clean Energy BioFuels Act in 2008. The legislation encourages the growth of an advanced biofuels industry as part of the growing clean energy technology sector in Massachusetts. In nation-leading provisions, this legislation gives preferential tax treatment to non-corn-based alternatives to ethanol, requires biofuel content in all diesel and home heating fuel in the state, and proposes a new fuel standard for the region that will encourage a range of emissions reducing technologies for cars and trucks.

Reformulated Gasoline (RFG)

Reformulated gasoline (RFG) is gasoline blended to burn cleaner and reduce smog-forming and toxic pollutants in the air we breathe. The Clean Air Act of 1990 requires those metropolitan areas with the worst smog problems to participate in the reformulated gasoline program to reduce harmful emissions that cause ground-level ozone. In addition, many communities and states have voluntarily chosen to participate in the RFG program to meet the pollution reduction goals of the Clean Air Act. The federal RFG program was introduced in 1995; RFG is currently used in 17 states and the District of Columbia and approximately 30 percent of gasoline sold in the U.S. is reformulated. Between 1995 and 1999, it cut smog-forming pollutant levels by about 17 percent compared to conventional gasoline in communities where 75 million people live and work. Phase II, which began January 1, 2000, took another step toward cleaner air. It reduces smog-forming pollutants 27 percent more than conventional gasoline.

Ethanol

Ethanol is a renewable fuel made from various plant materials, which collectively are called biomass. Nearly half of the gasoline the United States contains ethanol in a low-level blend to oxygenate the fuel and reduce air pollution. E85 is the term for motor fuel blends of 85 percent ethanol and just 15 percent gasoline. Besides its superior performance characteristics, ethanol burns cleaner than gasoline and it is a completely renewable, domestic, environmentally friendly fuel that enhances the nation's economy and energy independence. Government tests have shown that E85 vehicles reduce harmful hydrocarbon and benzene emissions when compared to vehicles running on gasoline. E85 can also reduce carbon dioxide (CO2), a harmful greenhouse gas and a major contributor to global warming. Although CO2 is released during ethanol production and combustion, it is recaptured as a nutrient to the crops that are used in its production. Ethanol also degrades quickly in water and, therefore, poses much less risk to the environment than an oil or gasoline spill.

Figure 8-20: Ethanol Station Pump

Biodiesel

Biodiesel is a domestically produced, renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant greases. Biodiesel is safe, biodegradable, and reduces serious air pollutants such as particulates, carbon monoxide, hydrocarbons, and air toxics. Blends of 20% biodiesel with 80% petroleum diesel (B20) can generally be used in unmodified diesel engines. It can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel can also be used in its pure form (B100), but it may require certain engine modifications to avoid maintenance and performance problems and may not be suitable for wintertime use. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics. Since it is made in the United States from renewable resources such as soybeans, its use decreases our dependence on foreign oil and contributes to our own economy.

Natural Gas-CNG & LNG

Natural gas is domestically produced and readily available to end-users through the utility infrastructure. It is also clean burning and produces significantly fewer harmful emissions than reformulated gasoline or diesel when used in natural gas vehicles. In addition, commercially available medium- and heavy-duty natural gas engines have demonstrated over 90% reductions of carbon monoxide (CO) and particulate matter and more than 50% reduction in nitrogen oxides (NOx) relative to commercial diesel engines. Natural gas can either be stored onboard a vehicle as compressed natural gas (CNG) at 3,000 or 3,600 psi or as liquefied natural gas (LNG) at typically 20-150 psi.

Hydrogen Fuel Cells

Although they are still in development, hydrogen vehicles have the potential to revolutionize our transportation system as well as represent an attractive option for reducing petroleum consumption

and improving air quality. Hydrogen vehicles are powered by fuel cells that produce no air pollutants and few greenhouse gases. If fueled with pure hydrogen, fuel cells emit only heat and water as a byproduct. Hydrogen fuel cell vehicles are not yet commercially available. However, they are currently being demonstrated in light- and heavy-duty applications in fleets throughout the country. For example, Honda has leased 200 FCX Clarity fuel cell vehicles to residents in Southern California on a three year trial basis and a number of California transit agencies are demonstrating fuel cell buses in revenue service.

Propane

Propane is a liquefied petroleum gas (LPG) that is a byproduct of natural gas processing and crude oil refining. Propane produces few toxins and air pollutants and is currently the third most used vehicle fuel in the United States behind gasoline and diesel respectively. Vehicles using LPG produce considerably lower amounts of harmful emissions and the greenhouse gas carbon dioxide. In addition to being used as an alternative vehicle fuel, propane is also used to heat homes and to power farm and commercial equipment. Most propane consumed in the United States is produced domestically, which reduces the country's dependence on foreign oil.

Electric Vehicles

Electric Vehicles (EVs) do not produce tailpipe emissions, but generators producing the electricity used to charge EV batteries do emit pollutants. Electricity for EVs is produced by power plants, which send it to substations through transmission lines and then to homes and businesses through distribution systems. An EV's electric motor converts electricity usually from a battery pack—into mechanical power that runs the vehicle. Electric vehicle batteries must be recharged after a certain limited vehicle driving range. Electric vehicle are now available from major auto manufactures in select markets across the country, with availability nationwide within the next two years.

Clean Cities Program

Clean Cities is a government-industry partnership sponsored by the U.S. Department of Energy's Vehicle Technologies Program. The mission of Clean Cities is to advance the economic, environmental, and energy security of the United States by supporting local decisions to adopt practices that contribute to the reduction of petroleum consumption in the transportation sector. Clean Cities carries out this mission through a network of more than 87 volunteer coalitions, which develop public/private partnerships to promote alternative fuels and vehicles, fuel blends, fuel economy, hybrid vehicles, and idle reduction. Since its inception in 1993, Clean Cities has grown to almost 90 coalitions and 8,400 stakeholders across the country, put close to 1 million alternative fuel vehicles (AFVs) on the road, and displaced approximately 3 billion gallons of gasoline. Clean Cities and its coalitions are on track to displace 2.5 billion gallons of petroleum annually by the year 2020.

8.4.3 Mitigation Plans, Programs, and Strategies

The Old Colony MPO recognizes the need to reduce automobile emissions for a clean and sustainable energy future and encourages the use of the following programs that regulate automobile fuel efficiency and reduce fuel consumptionin order to mitigate its effects on the natural environment.

Corporate Average Fuel Economy (CAFE) Standards

In response to the 1973-74 Arab oil embargo, Congress enacted the "Energy Policy Conservation Act," into law in 1975, adding Title V, "Improving Automotive Efficiency," to the Motor Vehicle Information and Cost Savings Act and established Corporate Average Fuel Economy (CAFE) standards for passenger cars and light trucks. The CAFE standard is the sales weighted average fuel economy, expressed in miles per gallon (mpg), of a manufacturer's fleet of passenger cars or light trucks with a gross vehicle weighting (GVWR) of 8,500 lbs. or less, manufactured for sale in the United States, for any given model year. Fuel economy is defined as the average mileage travelled by an automobile per gallon of gasoline (or equivalent amount of other fuel) consumed as measured with the testing and evaluation protocol set forth by the Environmental Protection Agency (EPA).

The National Highway Traffic Safety Administration (NHTSA) is responsible for establishing and amending the CAFE standards; promulgating regulations concerning CAFE procedures, definitions and reports; considering petitions for exemption from standards for low volume manufacturers and establishing unique standards for them; enforcing fuel economy standards and regulations; responding to petitions concerning domestic production by foreign manufacturers and all other aspects of CAFE, including the classification of vehicle lines as either cars or trucks; collecting, recording and cataloging Pre- and Mid-model year reports; adjudicating carry back credit plans; and providing program incentives such as credits for alternative fueled vehicle lines. The EPA is responsible for calculating the average fuel economy for each manufacturer. The penalty for failing to meet CAFE standards is $5.50 per tenth of a mile per gallon for each tenth under the target value times the total volume of those vehicles manufactured for a given model year.

Since its inception in 1975, CAFE standards have progressed slowly from 18 miles per gallon for passenger cars in 1978 to 27.5 miles per gallon for passenger cars in 1990, where it remained the same until the signing of the Energy Independence and Security Act of 2007. This Act marked the first major overhaul since the inception of CAFE more than 30 years ago. The Act will require that automakers boost fleetwide gas mileage to 35 miles per gallon by 2020, which will increase fuel economy standards by 40 percent and save billions of gallons of fuel.

Most recently, in May 2009 President Obama signed an executive memorandum ordering the EPA and Department of Transportation (DOT) to develop new fuel and emissions standards. The new standards, covering model years 2012-2016, and ultimately requiring an average fuel economy standard of 35.5 mpg in 2016, are projected to save 1.8 billion barrels of oil over the life of the program with a fuel economy gain averaging more than 5 percent per year and a reduction of approximately 900 million metric tons in greenhouse gas emissions. This would surpass the CAFE law passed by Congress in 2007 required an average fuel economy of 35 mpg in 2020.

Massachusetts Vehicle Check Program

Clean air and safe roads have long been important for Massachusetts. The Commonwealth started to inspect vehicles for safety effects more than 60 years ago, and has one of the longest-running safety inspection programs in the country. In 1983, Massachusetts became on the first states in the country to start testing vehicle emissions. As vehicles have become more sophisticated, the tests have been updated to ensure that, to the extent possible, problems are identified and repaired before they create risks to public health and safety.

The National Ambient Air Quality Standards (adopted by the U.S. Environmental Protection Agency) establish maximum levels for ozone, particulates, and other air pollutants. Since Massachusetts' air does not meet the standard for ground level ozone, we are required by the U.S. Clean Air Act to implement programs that will reduce ozone levels so that our air meets the standard. One important component of this effort is the Massachusetts Vehicle Check Program, which helps to ensure that vehicles run as cleanly as they were designed to run throughout their "life". Since its introduction, the Massachusetts vehicle testing program has helped to reduce air pollution across the Commonwealth. Annual emission tests (which replaced biennial emission testing in October 2008) means that vehicles with faulty emission control systems are identified and repaired quicker, therefore reducing the amount of pollution being released into the atmosphere.

The current Massachusetts Vehicle Check Program provides a combined safety and emissions inspection for the more than 4.6 million cars, trucks, buses, and SUVs registered in Massachusetts that are powered by internal combustion engines running primarily on petroleum based fossil fuels. Details of the Massachusetts Vehicle Check Program include:

- The requirement of all vehicles driven on Massachusetts roads to pass an annual safety inspection.
- The requirement of vehicles with onboard diagnostic systems, manufactured model year 1997 and newer, to pass an annual emissions test.
- The requirement that heavy duty diesel trucks, buses and other vehicles weighing 10,000 pounds or more receive opacity tests that measure the density of the smoke from their tailpipes.
- Fleets of commercial vehicles can be tested by mobile inspectors who bring testing equipment to company lots, or by a company employee who is licensed to conduct inspections.
- The Massachusetts Vehicle Check for commercial vehicles is equivalent to the annual Federal Motor Carrier Safety Administration (FMCSA) "DOT" inspection. This allows commercial vehicle owners to meet state and federal requirements with one inspection.
- Creation of new Motorist Assistance Centers across the state that provide advice and technical assistance to motorists and repair technicians who can answer questions relating to the emissions portion of the vehicle inspection process.

The annual emission inspections of the Program are the best way to check whether the emissions control system on a vehicle is working correctly. Although all new passenger cars and trucks sold in the United States must meet stringent pollution standards, they can only retain this low-pollution profile if the emission controls and engines are working properly. The Program is part of a comprehensive plan to reduce air pollution and its impact on the health of Massachusetts' residents, particularly those with lung and respiratory ailments.

Clean Cities

Clean Cities is a government-industry partnership sponsored by the U.S. Department of Energy's Vehicle Technologies Program. The mission of Clean Cities is to advance the economic, environmental, and energy security of the United States by supporting local decisions to adopt practices that contribute to

the reduction of petroleum consumption in the transportation sector. Clean Cities carries out this mission through a network of more than 87 volunteer coalitions, which develop public/private partnerships to promote alternative fuels and vehicles, fuel blends, fuel economy, hybrid vehicles, and idle reduction. Since its inception in 1993, Clean Cities has grown to almost 90 coalitions and 8,400 stakeholders across the country, put close to 1 million alternative fuel vehicles (AFVs) on the road, and displaced approximately 3 billion gallons of gasoline. Clean Cities and its coalitions are on track to displace 2.5 billion gallons of petroleum annually by the year 2020.

Carl Moyer Program

Carl Moyer Memorial Air Quality Standards Attainment Program provides incentive grants for cleaner-than-required engines, equipment and other sources of pollution providing early or extra emission reductions. Eligible projects include cleaner on-road, off-road, marine, locomotive and agricultural sources. The program achieves near-term reductions in emissions of oxides of nitrogen (NOx), particulate matter (PM), and reactive organic gas (ROG) which are necessary for California to meet its clean air commitments under the State Implementation Plan.

FreedomCAR and Fuel Partnership

The long-term goal of the FreedomCAR and Fuel Partnership is a clean and sustainable energy future. Through this program partners work together to examine the pre-competitive, high-risk research needed to develop the component and infrastructure technologies necessary to enable a full range of affordable light cars and trucks, and the fueling infrastructure for them, that we will reduce the dependence of the nation's personal transportation system on imported oil and minimize harmful vehicle emissions, without sacrificing freedom of mobility and freedom of vehicle choice.

The Partnership provides a forum in which partners discuss technical requirements and R&D priorities, develop joint roadmaps that include technology-specific goals, and monitor and discuss R&D activities to evaluate progress toward Partnership goals.

The Partnership focuses on the following technical areas:

- Advanced combustion and emission control
- Batteries/electrochemical energy storage
- Electric propulsion systems (e.g., power electronics, electric motors)
- Fuel cell power systems
- Material technologies (e.g., for lightweighting)
- Vehicle systems and analysis
- Vehicle-to-electricity grid interaction
- On-board hydrogen storage
- Hydrogen production and delivery
- Hydrogen codes and standards

SmartWay Transport Partnership Program

SmartWay Transport is a voluntary partnership between various freight industry sectors and the U.S. Environmental Protection Agency that establishes incentives for fuel efficiency improvements and greenhouse gas emissions reductions. SmartWayTranport's goals aim to reduce the impact of freight transport on the environment by reducing fuel consumption from trucks and rail delivering freight,

reducing operating costs associated with freight delivery and reducing the amount of emissions and air toxins released into the atmosphere.

Partnerships with companies and organizations are the foundation of the SmartWay Transport Program. The EPA welcomes any company or organization that will improve the environmental performance of their freight operations. SmartWay Transport Partners are companies that ship products and the truck and rail companies that deliver these products. Partners commit to measure and improve the efficiency of their freight operations, using EPA-developed tools that quantify the benefits of a number of fuel-saving strategies. Reducing unnecessary idling improves air quality, saves fuel and saves companies money. Another component of the SmartWay Transport Partnership is to eliminate unnecessary truck and rail idling by developing a nationwide network of idle-reduction options along major transportation corridors - truck stops, travel centers, distribution hubs, rail switch yards, borders, ports, and even along the side of the road. A third component of the SmartWay Transport Partnership is to highlight practical opportunities where rail can be better utilized and to encourage more efficient rail operations and technical innovation.

Regional Transit Authority Bus Diesel Retrofit Program

As part of the CMAQ program, this proposed program would provide $4.5 million in funding to retrofit up to 600 regional transit authority buses in Massachusetts with Diesel Particulate Filters (DPFs). Diesel Particulate Filters (DPFs) are ceramic devices that collect PM in the exhaust stream. They can be installed in new or used buses, but must be used in conjunction with ultra-low sulfur diesel fuel with a sulfur content of less than 15 parts per million, which is mandated by EPA for all on-road diesel vehicles as of October 15, 2006. The use of such DPFs can significantly reduce emissions of carbon monoxide (CO), hydrocarbons (HC), volatile organic compounds (VOC), and particulate matter (PM), all by 85%.

The installation of these Diesel Particulate Filters (DPFs) on the regional transit authority buses has been delayed due to engineering issues associated with the make and model of buses that are commonly used by the 15 regional transit authorities in Massachusetts; however, solutions are currently being explored.

MassCleanDiesel

MassCleanDiesel is the nation's first statewide program to reduce air pollution from diesel-powered school buses. MassCleanDiesel provided and installed free of charge Diesel Oxidation Catalysts (DOCs) and Crank Case Filters (CCFs) to owners of school buses across the state of Massachusetts. Although this technology was not required to be installed school buses at this time, the technology used in these retrofits helped prevent the most harmful exhaust particles from entering the air.

Recent research has shown a significant risk of in-cabin exposure on school buses. Given this new research and the fact that children are a highly sensitive population, retrofitting school buses with technologies that address both external and in-cabin exposure provides significant benefits at relatively low cost. The use of both DOCs and CCFs can significantly reduce emissions of carbon monoxide (CO) hydrocarbons (HC), and particulate matter (PM).

8.5 Conclusions and Recommendations

8.5.1 Conclusions

The Old Colony Metropolitan Planning Organization (MPO) region is a rich and diverse area that is favorable to development and protection. The map series included in the chapter provides a visual component for better understanding of the environmental characteristics of the Old Colony MPO region. The Old Colony MPO is dedicated to protecting, preserving, and maintaining the environmental quality of the region.

Environmental Mitigation

Transportation projects in the Commonwealth of Massachusetts, which occur in environmentally sensitive areas, are subject to stringent review, commonly by federal, state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation. These agencies include but are not limited to: the U.S. Environmental Protection Agency, the Massachusetts Department of Environmental Protection, the Massachusetts Environmental Policy Act Office, and the Massachusetts Historical Commission. The mitigation techniques discussed in this chapter are ways in which the reviewing agencies minimize the environmental impacts associated with transportation infrastructure projects.

The proposed expansion of the Fall River/New Bedford Rail Service (South Coast Rail) is an example of a project that was reviewed by many environmental groups on the federal, state, and local levels. The impacts associated with this project were identified as well as mitigation measures to reduce the impact to the environment. Examples of such mitigation included but were not limited to: providing wildlife underpasses/tunnels as practical; utilizing appropriate best management practices for construction erosion and sedimentation control; providing electric block heaters at layover facilities to eliminate overnight idling; and providing various intersection and roadway improvements along the proposed project corridor.

Additional proposed projects in the Old Colony MPO that will be subject to extensive review by federal, state and local agencies responsible for land use management, environmental protection, conservation, and historic preservation include but are not limited to: Route 24 Interstate Conversion, Commuter Rail Extension to Buzzards Bay, Route 3 Capacity Enhancements, and the West Bridgewater Commuter Rail Station proposal.

8.5.2 Recommendations

Environmental Quality

Strive to reduce vehicle emissions
Encourage research and technology development to find new solutions to air pollution problems created by motor vehicles.

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.

Make maximum use of existing facilities and programs
The Massachusetts Environmental Policy Act Unit is responsible for reviewing large-scale development projects and should be allowed to maximize their influence to help protect the quality of the environment. The MassDOT Project Development and Design Guidebook can be extremely helpful in the protection and preservation of the environment as it promotes an integrated multimodal approach to roadway planning and design, ensures that context sensitivity is integrated into the planning, design, and construction process, and provides a clear project development process.

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.

Encourage the Commonwelath's "Fix It First" Policy
The Old Colony MPO also realizes the continual need to maintain and preserve the transportation infrastructure in the region and fully supports the Commonwealth's "Fix it First" policy. Fix it First is a statewide commitment to repair and maintain the existing transportation infrastructure in order to avoid unnecessary environmental impacts.

Support programs that mitigate water resource shortages
The Taunton River Desalinization Plant in Dighton (Aquaria project) will help meet the water demand of the Old Colony MPO region.

Reduce nonpoint source pollution
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.

Minimize the use of road salt and sand
Studies have shown that road salt can have negative effects on some roadside vegetation and aquatic life. Accumulated amounts of sand can be hazardous to both the natural environment (air, land, and water) as well as to the traveling public. MassDOT has taken a number of steps to reduce the

environmental impact from winter sanding and salt practices on state highways; including the reduction of sand applied during storms, use of liquid and flake calcium chloride to reduce sodium levels in runoff; construction of covered facilities for sand and salt storage and establishment of certain zones where reduced salt is used.

Support programs that reduce transportation related litter

The MassDOT Adopt-A-Highway program is a public service program that utilizes volunteer teams to pick up litter along the roadways.

Develop solutions for controlling transportation related noise

Transportation-related noise impacts can be minimized through improved facility design, compatible land uses, and enforcement of noise regulations. Encourage all regional and local transportation-planning efforts deal with noise problems as a normal step in the planning process.

Work to reduce/prevent light and noise impacts

Develop solutions for controlling transportation-related noise. Include noise mitigation through improved facility design, compatible land uses, enforcement of noise regulations, and selective use of sound barriers. Relate takings and designs to the sensitivity of adjacent habitats and neighborhoods. Design/install highway lights and street lights to be directed down away from houses or other sensitive receptors or the sky.

Encourage Brownfield Redevelopment

Brownfields properties are often located where there is existing infrastructure, workforce and other amenities and therefore, are attractive for potential new business. Reuse of these facilities cleanses the existing site and eliminates the need to clear cut forest for more development. Fostering the cleanup and re-use of contaminated properties is a priority for the state and the Old Colony MPO and is consistent with the Sustainable Development Principles established by the Massachusetts Office of Commonwealth Development.

Encourage Smart Growth Development Strategies

Support the smart growth initiatives resulting in cluster and condensed development. These strategies aim to reduce vehicle trips and vehicle dependency, therefore, resulting in benefits to air quality and reduction of foreign fossil fuel dependency.

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.

Promote the use of Corridor Management Plans

The MassDOTOffice of Transportation Planning is developing a Route 44 Plymouth-Taunton Corridor Management Plan. This type of planning is vital to the Southeastern Massachusetts region, as it encourages collaboration between corridor municipalities, the Commonwealth, and other agencies and identifies potential growth and transportation management strategies for the corridor.

Encourage the use of parking garage structures

As more development occurs along major transportation infrastructure, the pressure to make parking lots larger to accommodate more residents, shoppers, and visitors increases. Parking garage structures allow the impact of vehicle parking to happen on a smaller footprint, thus reducing the amount of impervious pavement.

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.

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.

Climate Change

Maintain and Expand Transit Services in the Region

The Old Colony MPO supports the increased use of mass transit and the possible expansion of regional transit services, as they reduce congestion on the roadways and will reduce the use of fossil fuels which will in turn reduce greenhouse gas emissions that are emitted into the atmosphere.

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.

The current-endorsed "Livability" and "Sustainable Development" movements encourage a "redevelop first" mentality, putting relatively high-density development near existing centers and in areas with well-established infrastructure, and doing so in ways that avoid additional energy consumption and the emission of greenhouse gases into the atmosphere.

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.*

Support Congestion Relief Methods

An effective Congestion Management Process (CMP) identifies effective congestion reducing strategies that meet the needs of a particular region. State and local governments can use Access Management techniques to control access to highways, major arterials, and other roadways. The utilization of access management techniques can preserve capacity within the roadway, thereby increasing the efficiency of traffic flow and avoiding congestion, therefore reducing the amount of greenhouse gases being emitted into the atmosphere.

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.

Support Executive Order 484 - Leading by Example: Clean Energy and Efficient Buildings

The Old Colony MPO realizes the need to promote and invest and clean energy and supports the Commonwealth's efforts through Executive Order 484. Executive Order 484 builds on a number of the Division of Capital Asset Management's (DCAM's) current initiatives, while setting more specific and far-reaching targets for state facilities. All Commonwealth agencies as a whole to the greatest extent feasible individually, shall meet a number of energy and greenhouse gas emission reducing goals by 2012:

Support the Exploration of Alternative Funding Mechanisms

The Vehicle Mileage Tax (VMT), Road Pricing and Congestion Pricing are all alternative funding mechanisms that are being explored here in the United States and that are already in use in many parts of the world. The premise for exploring these alternative funding mechanisms is that the current gasoline tax is not providing a sufficient source of revenue to fund highway infrastructure projects.

Hazards & Evacuations

Encourage pre-disaster planning

Many communities have participated in a multi-hazard pre-disaster planning effort, which focused on natural disasters and how the region's citizens will respond.

Reduce the loss of life, property, infrastructure, and cultural resources from natural disasters

A coordinated response to a natural disaster will reduce the loss of life, property, infrastructure and cultural resources. Visible evacuation routes will also eliminate congestion on major routes.

Make maximum use of existing facilities and programs

Programs and facilities that are established to mitigate damage to transportation infrastructure, property, and cultural resources should be maintained and utilized to their greatest potential.

Increase the number of communities applying for FEMA Hazard Mitigation Assistance (HMA) grants

Communities can apply to receive funding for Hazard Mitigation Assistance (HMA) grant programs for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following five HMA grant programs: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL).

Improve pre-disaster planning and communication/coordination between federal, state, regional, county, municipal, private, and non-profit agencies and major firms and institutions, especially prisons, colleges, and concentrations of population and employment.

Pre-disaster planning can help reduce the loss of life and property by lessening the impact of a disaster. This can be achieved through risk analysis, where the results can then provide the information needed for mitigation activities that reduce the risk and impacts of hazards. Also, partnering and sharing

information among the many stakeholders in the community as well as with the state and federal government can be beneficial to all parties involved. When lines of communication are open among stakeholders, solutions to hazards are usually easier to come by.

Energy, Fuels, and Emissions

Reduce dependency on foreign fossil fuels
Promote research, development and implementation of standards, policies, and programs to reduce fuel consumption and the increase investments in alternative fuels.

Conserve Natural Resources
The southeastern portion of Massachusetts has seen substantial growth over the past decade. Water demand will be the limiting factor in terms of growth in the region and that water resource must be protected.

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.

Promote the increase and enforcement of Corporate Average Fuel Economy (CAFEE) 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.

Continue to enforce the emissions standards set by the Commonwealth
Enforcing the emissions standards for all vehicles of the Commonwealth plays a large role in improving the air quality of the State.

Promote new and forward thinking "green" technologies
The Carl Moyer Program in California is a prime example of how Massachusetts can encourage drivers to replace their old automobiles with newer and less polluting vehicles.

9.0 Introduction

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, drive skill level, driver 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.

9.1 Developments since the 2007 Regional Transportation Plan

Road Safety Audits: Old Colony Planning Council began conducting Road Safety Audits (RSAs) in 2008. Since then, Old Colony Planning Council has completed several RSA's throughout the region, in conjunction with MassDOT through the Highway Safety Improvement Program (HSIP), as well as through the Local Highway Technical Assistance Program. As of December of 2010, the following Road Safety Audits have been completed:

- Thatcher Street, Brockton and East Bridgewater
- Belmont Street (Route 123) at Linwood Street and Lorraine Avenue, Brockton
- Belmont Street (Route 123) at Torrey Avenue, Brockton
- Centre Street (Route 123) at Quincy Street, Brockton
- Main Street (Brockton Housing Authority), Brockton
- Main Street at Legion Parkway, Brockton
- North Main Street at Oak Street and Howard Street, Brockton
- North Montello Street (Route 28) at Court Street, Brockton
- West Elm Street at Ash Street, Brockton
- Plymouth Street (Route 106) at Washington Street, East Bridgewater
- Foundry Street (Route 106) at Depot Street (Route 123) and Bay Road, Easton
- Foundry Street (Route 106) at Prospect Street, Easton
- Foundry Street (Route 106) at Washington Street (Route 138), Easton
- Washington Street (Route 138) at Union Street, Easton
- Washington Street (Route 138) at Elm Street, Eason
- Holmes Street (Route 36) at Oak Street, Halifax
- Plymouth Street (Route 106) Walkability Safety Audit, Halifax
- Landing Road, Kingston
- Canton Street (Route 27) at School Street, Stoughton
- Route 24, between I-93 (Randolph) and I-495 (Bridgewater)

North Abington Business District, Abington: Through a Massachusetts Public Works and Economic Development (PWED) grant, improvements are being constructed on North Avenue (Route 139), west of and including the intersection with Adams Street (Route 58). Construction of improvements in this area, known as the North Abington Business District, began in 2010. Among the Improvements being constructed, safety enhancements include upgrading traffic signal equipment including the installation

of countdown pedestrian signals with audio for the visually impaired; reconstructing pedestrian crossings for ADA compliancy, sidewalk improvements, and geometric and pavement improvements.

Lincoln Street Pedestrian Improvements, Brockton: Through a Massachusetts Public Works and Economic Development (PWED) grant, a surface lot parking facility located between Lincoln Street and Church Street in Downtown Brockton was reconstructed in 2010. The project included pedestrian enhancements to the surrounding area, including an enhanced crosswalk, curb bump-outs, and ADA/ABA compliant ramps at the intersection of Montello Street (Route 28) and Lincoln Street, and construction of a sidewalk on Railroad Avenue along the railroad viaduct. Pedestrian connections between the lot and sidewalks were also improved.

Foundry Street (Route 123), Easton The reconstruction of Foundry Street (Route 123) between Eastman Street (Route 106) and the Norton Town Line, completed in 2010, included construction of sidewalks for pedestrians, wider paved shoulders, new pavement, and pavement markings.

Holmes Street (Route 36), Halifax: The reconstruction of Holmes Street (Route 36) between Plymouth Street (Route 106) and the Pembroke Town Line, completed in 2008, included construction of sidewalks for pedestrians, crosswalk improvements, ADA/ABA compliant ramps at crossings, drainage improvements, new guardrails, and pavement markings and signage improvements.

Route 106 Signage and Crosswalk Improvements, Halifax: In 2009, the Town of Halifax made improvements to Plymouth Street (Route 106) near its town center to enhance safety for pedestrians in the area. These improvements included newly painted crosswalks with advanced warning signage; variable message speed signs indicating the speed at which drivers are approaching, and flashing when in excess of the speed limit; and removal of a passing zone and replacing it with a double yellow striped centerline. Furthermore, the Town requested and hosted a Road Safety Audit in 2010, to foster solutions for further improving traffic calming and pedestrian safety through this section.

Pembroke Street (Route 27), Kingston: Pembroke Street (Route 27) in Kingston was reconstructed in 2009 (completed in 2010). Included in the reconstruction was the addition of new sidewalks, shoulder improvements to increase mobility and safety for cyclists, drainage improvements, new guardrails, and pavement markings and signage improvements

Route 3A Sidewalk Reconstruction, Kingston: Sidewalks along Route 3A in Kingston were reconstructed in various sports between Main Street (Route 106) and the Plymouth Town Line.

Stoughton Square Improvements, Stoughton: Through a Public Works and Economic Development grant, the Town of Stoughton constructed roadway and sidewalk improvements in their downtown square, aimed at improving both traffic flow and safety. Improvements include curb bump outs and pedestrian crossings; enhanced crosswalks; and signalization of intersections.

Manley Street, West Bridgewater: The recent reconstruction of Manley Street, between West Center Street (Route 106) and the Brockton City Line, included the construction of sidewalks, as well as shoulder improvements to improve safety and mobility for cyclists.

Winter Street, Brockton**:** The reconstruction of Winter Street included the following safety improvements: minor widening and installation of granite curbing; installation of new bituminous concrete sidewalks and wheelchair ramps; drainage improvements and the installation of a traffic signal with pedestrian phase at the intersection of Howard Street (Route 37) and Winter Street.

Pleasant Street (Route 27) at Belair Street and Moraine Street, Brockton: The intersection of Pleasant Street at Belair Street and Moraine Street was reconstructed to realign a previous skewed, dog-legged intersection into a more traditional intersection, joining Belair Street to Moraine Street. The project included replacement of the existing traffic signal system and enhanced pedestrian crossings.

North Street, Bridgewater: A full reconstruction of North Street in Bridgewater included widening the existing layout by four feet, construction of new sidewalks, improved drainage systems, and realigning the Plymouth Street (Route 104) at North Street intersection to a more perpendicular layout.

Bedford Street (Route 18/28) at Winter Street, Bridgewater: This project was designed to enhance safety and improve efficiency by installing a new traffic signal at the intersection of Bedford Street (Routes 18/28) and Winter Street in Bridgewater. Safety-related highlights of this project included:

- Widening Winter Street to create a bike lane
- Wider turning radii so trucks don't encroach into oncoming lanes
- installation of crosswalks with wheelchair ramps and pushbutton pedestrian signals

9.2 SAFETEA-LU and HSIP Legislation

The highway re-authorization bill, SAFETEA-LU of 2005, places greater focus on transportation safety than its predecessors ISTEA and TEA-21. Saving lives is the number one priority of SAFETEA-LU. Our transportation systems also face significant challenges in the areas of homeland security as well as overall safety, congestion, and inter-modal connectivity.

SAFETEA-LU created a new stand-alone program for funding safety projects. This program, Highway Safety Improvement Program (HSIP), is designed to provide states with funds to institute programs that reduce the fatalities and injuries that occur annually on the highway system; reinforce FHWA's safety partnerships; and complement National Highway Traffic Safety Administration (NHTSA) and the Federal Motor Carrier Safety Administration (FMCSA) safety programs.

The HSIP program requires that states have a process in place to analyze highway safety problems, identify opportunities for prevention of hazardous conditions, and produce a list of projects to be funded based upon the analysis and opportunities identified. The FHWA will formulate programmatic guidelines for states including the following components:

- Adoption of strategic and performance-based goals for the Highway Safety Improvement Program (HSIP) that addresses all roadways within the state and focus on areas of greatest need.

- Advancement of the states' capabilities in traffic records data collection, analysis, and integration with other sources of safety data.
- Provide flexibility to the states to address existing and potential highway safety problems.
- Requirement that states establish an evaluation process to assess the results of safety improvement projects and use the results to set priorities for future projects.
- States are to report their progress in implementing safety improvement projects and the effectiveness of the improvements to the Secretary of Transportation.

Massachusetts has adopted the following policies and procedures in response to HSIP implementation, although FHWA programmatic guidelines for HSIP are currently pending.

- A proposed improvement project for a specific intersection must meet certain criteria thresholds to be eligible as a safety project.
- The intersection must appear on the state's top 1,000 intersection crash list and experience an above average crash rate or the crash rate must exceed the critical crash rate.
- The project should reduce the number of crashes at the subject intersection location.

In addition, the state has adopted the following policies and procedures:

- The Top 1,000 Crash List is based on the state crash records system and is updated periodically.
- Average crash rates are based on a compilation of information from a wide-array of intersections from around the Commonwealth (currently 0.87 crashes/million entering vehicles (C/MEV) for signalized and 0.66 C/MEV for un-signalized).
- Critical Crash Rate, the rate at which an intersection is considered a high crash location, is based on the Rate Control Quality Method [$xp = xc + k * (xc/m)^{0.5} - 1/(2m)$] yielding 1.77 C/MEV for signalized and 1.38 C/MEV for un-signalized intersections.

Ongoing state efforts to improve the HSIP include:

- Refining the Top 1,000 Crash List to segregate by location type.
- Improving the crash location data by working with the Governor's Highway Safety Bureau (GHSB), law enforcement, and Registry of Motor Vehicles (RMV).
- Improving of the timeliness of crash data records.
- Completing the crash data system interface with Geographic Information Systems (GIS) and the Road Inventory File (RIF).
- Expanding current roadway volume data.
- Developing of crash rates for location type.
- Establishing an evaluation process of crash reduction factors (pre- and post-improvement crash analyses) and cost-benefit ratio of improvement.

In response to the requirements of SAFETEA-LU, MassDOT has undertaken the development of the Strategic Highway Safety Plan (SHSP). The SHSP will enable MassDOT to fulfill the component requirements of the HSIP process. States that adopt and implement an SHSP are provided additional

flexibility to use federal Highway Safety Improvement Program (HSIP) funds for public awareness, education, and enforcement activities otherwise not eligible under this program. SAFETEA-LU states that in order to qualify for flexible safety funding, the state SHSP must be based on a collaborative process that includes the State DOT, the Governor's Representative for Highway Safety, and other major State and local safety stakeholders, including: engineering, education, enforcement, and emergency services. The plan must also include an effective analysis of State crash data.

In order to initiate the development of the Massachusetts SHSP, MassDOT established the Massachusetts Strategic Highway Safety Plan Executive Leadership Committee. This committee is an interagency, intergovernmental committee with a membership from the following: Administrator, MassDOT Highway Division; Director, MassDOT - Office of Transportation Planning; Director, Governor's Highway Safety Bureau; Colonel, Massachusetts State Police; Registrar, Registry of Motor Vehicles; Commissioner, Department of Public Health; President, Massachusetts Chiefs of Police Association; Co-Chairs of the Joint Transportation Committee; Executive Director, Massachusetts Association of Regional Planning Agencies; and Division Administrators of Federal Highway Administration and Federal Motor Carrier Safety Administration; Regional Administrator, National Highway Traffic Safety Administration. On January 19, 2006, MassDOT hosted meetings of the Executive Leadership and the Steering/Advisory Committee, which was established to oversee the development of the plan. The Steering/Advisory Committee drafted a mission statement, a vision, and goals to guide the development of the plan. The members of the Executive Leadership Committee agreed to support MassDOT in its efforts to achieve the Mission, Vision, and Goals. The following Mission, Vision, and Goals have been established:

MISSION: Develop, promote, implement, and evaluate data-driven, multi-disciplinary strategies to maximize safety for users of the roadway system.

VISION: Provide the safest roadway system in the country and promote its safe use.

GOALS: Reverse the increasing trend of traffic-related fatalities and injuries upon implementation of the Massachusetts SHSP (towards zero fatalities and injuries).

- Achieve a 20% reduction from 476 (2004) lives lost in traffic-related fatal crashes by 2010.
- Achieve a 20% reduction from 5,554 (2004) in non-fatal traffic-related injuries requiring hospitalizations by 2010.

Six potential emphasis areas were established to serve as the major components of the Plan. Under each of these areas, multiple safety issues will be examined. The goal of this process is to have a multi-disciplinary team of stakeholders who have knowledge, interest, and experience in addressing the relevant issues of each emphasis area. The action teams are responsible for identifying, evaluating, and recommending strategies to address the following emphasis areas:

- Data Systems (including crash records, EMS data, etc.).
- At Risk Driver Behavior, (including impaired driving, speeding, and occupant protection).
- Infrastructure (including lane departure crashes and intersection crashes).

- Public Education and Media (including how to "market" safety in Massachusetts).
- Leadership (safety program management, including legislative support).
- Vulnerable Transportation System Users (including young drivers, older drivers, mobility needs of diverse populations, pedestrians, bicyclists, and motorcyclists).

9.3 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. 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 SAFETEA-LU and HSIP legislation, the Federal Highway Administration's Safety Program and the Massachusetts Strategic Highway Safety Plan (SHSP) have 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 Massachusetts Strategic Highway Safety Plan is regularly consulted and incorporated into the Old Colony Safety Management System and safety planning processes. The six main emphasis areas: Data Systems; Infrastructure; At-Risk Driver Behavior; Higher Risk Transportation System Users; Public Education and Media; and Safety Program Management are addressed in transportation safety activities.

Table 9-1 contains examples of how the Massachusetts Strategic Highway Safety Plan is consulted and incorporated into the regional safety planning process.

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.

Table 9-1: Massachusetts SHSP Implementation in Regional Planning

SHSP Emphasis Area	Examples of Implementation Into Old Colony Planning Process
Data Systems	Crash data collected from various sources; numerous crash analytics (crash rate; % with injuries and fatalities, types of collision; time of day, etc.) routinely used; Top 100 Most Hazardous Intersections
Infrastructure	Infrastructure improvements ultimately identified through collaborative planning efforts and studies (Corridor Studies; Road Safety Audits, Local Highway Planning Technical Assistance, Regional ITS Plan, Regional Bottleneck Study, Regional Bicycle and Pedestrian Study, etc.)
At-Risk Driver Behavior	Recommendations for regular and strict enforcement of traffic laws (speeding, red light running; failure to yield to pedestrians, OUI, Distracted Driving, etc.); Support use of technology to mitigate speeding
Higher-Risk Transportations System Users	Support for local Safe Routes To School (SRTS) participation and initiatives throughout region; Gather input from higher-risk transportation system users (such as Bicycle and Pedestrian Task Force, consultation/outreach to older persons and disabled community
Public Education and Media	Regional marketing of safety planning initiatives (Website, Facebook, Cable Access Television, Local Radio and Print Media)
Safety Program Management	Development and Implementation of Old Colony Safety Management System

9.4 Highway Safety

Table 9-2 summarizes crash data for the fifteen communities of the Old Colony region. MassDOT crash data contains over 24,400 records of crashes occurring in the Old Colony region from 2006 through 2008. Of these crashes, about one-third of them involved injuries, while 69 (less than 1%) were fatal. Brockton had the highest rate of crashes in the region, with 28.66 crashes per roadway mile over the three year period. Plympton had the lowest frequency of crashes with 4.33 crashes per roadway mile. Note that these figures are per roadway mile, and not per vehicle miles traveled, therefore they are heavily skewed by traffic volumes through the community.

Table 9-2: Crashes by Community, 2006-2008

	Roadway Mileage	Total Crashes	Crashes Per Mile	With Injuries Crashes	With Injuries % Total	Fatal Crashes	Pedestrian Crashes	Pedestrian Fatal	Bicycle Crashes	Bicycle Fatal
Abington	66.72	1,420	21.28	375	26.41%	4	10	1	9	1
Avon	33.66	606	18.00	232	38.28%	2	6	0	1	0
Bridgewater	125.87	1,514	12.03	421	27.81%	5	12	0	5	0
Brockton	284.23	8,145	28.66	3351	41.14%	11	155	3	90	0
East Bridgewater	96.31	822	8.53	219	26.64%	3	4	1	4	0
Easton	128.69	1,339	10.40	423	31.59%	5	10	1	2	0
Halifax	58.1	273	4.70	77	28.21%	4	2	0	4	0
Hanson	62.28	501	8.04	100	19.96%	1	0	0	4	0
Kingston	99.76	995	9.97	278	27.94%	6	7	0	2	0
Pembroke	108.99	1,116	10.24	317	28.41%	2	9	0	4	0
Plymouth	480.72	3,349	6.97	983	29.35%	14	26	1	9	0
Plympton	35.56	154	4.33	52	33.77%	3	1	0	0	0
Stoughton	123.76	2,427	19.61	627	25.83%	5	34	0	19	0
West Bridgewater	55.34	982	17.74	323	32.89%	1	3	0	1	0
Whitman	54.14	796	14.70	231	29.02%	3	12	1	5	0
OCPC Region	**1814.13**	**24,439**	**13.47**	**8009**	**32.77%**	**69**	**291**	**8**	**159**	**1**

Fatal Crashes

Information on fatal crashes in the region was compiled from MassDOT crash data. The information compiled from the data was specific to discern, as much as possible, the types, locations, and circumstances concerning the crashes, with the purpose of finding the root causes of fatal crashes. It is expected that an understanding of these causes will lead to specific improvements that can prevent future fatalities in motor vehicle crashes in the region. Table 9-2 shows the number of fatal crashes in Old Colony communities for the period between 1990 and 2008

The City of Brockton experienced the most crashes that resulted in fatalities within the study time-period with 129 crashes. Plymouth had the second highest with 81 fatal crashes. Stoughton had 37, the third most highest.

Table 9-3 shows that there were 200 ran off the road type crashes that resulted in fatalities, 101 angle fatal crashes, 73 vehicle crashes that resulted in pedestrian deaths, and 65 fatal head-on collisions during the study period. There were 20 fatal crashes that were reported as unknown, 16 rear-end fatal collisions, seven fatal collisions with a bicyclist, and seven sideswipe collisions.

Communities with major arterials, including Route 24 and Route 3, experienced higher numbers of fatal crashes, since many of the crashes occurred along these limited access highways, and on the ramps that connect them to the roadway system, due to higher speeds and higher volumes, which lead to higher exposure. Arterials and collectors that serve rural and suburban areas also experience high numbers of fatalities due to “ran off the road” type crashes that occur due to winding curves and limited sight distances. Some of these roads such as Route 106 in Kingston, Turnpike Street in West Bridgewater,

North Cary Street in Brockton, and Bay Road in Easton, which were in existence before the prevalent use of the automobile, are not able to provide for safe travel at higher speeds due to limitations in the geometric design. These hazardous situations become amplified in those cases where driving conditions are slippery or the driver is impaired due to alcohol or lack of sleep. Pedestrian fatalities occurred in either urban situations, such as Brockton, or suburban situations whereby pedestrians were attempting to cross major high-speed, high-volume arterials.

Brockton led the Old Colony communities regarding pedestrian fatalities with 25, Stoughton was second with seven. Some of these deaths were due to pedestrians being struck on high speed, limited access facilities such as Route 3 and Route 24 in Pembroke, Brockton, and West Bridgewater; however, most of the pedestrian fatalities occurred on facilities through urbanized areas, and on major arterials that have experienced commercial and residential growth. These facilities, such as Route 28 in Avon and Washington Street and Turnpike Street in Stoughton, combine higher speed through traffic (35 to 50 miles per hour) with increased commercial and residential activities. Although the preferred mode of choice along these routes is the automobile, pedestrian activity has increased and, in general, there are no pedestrian amenities such as sidewalks, crosswalks, or pedestrian signals available to accommodate pedestrian activity on these types of roads.

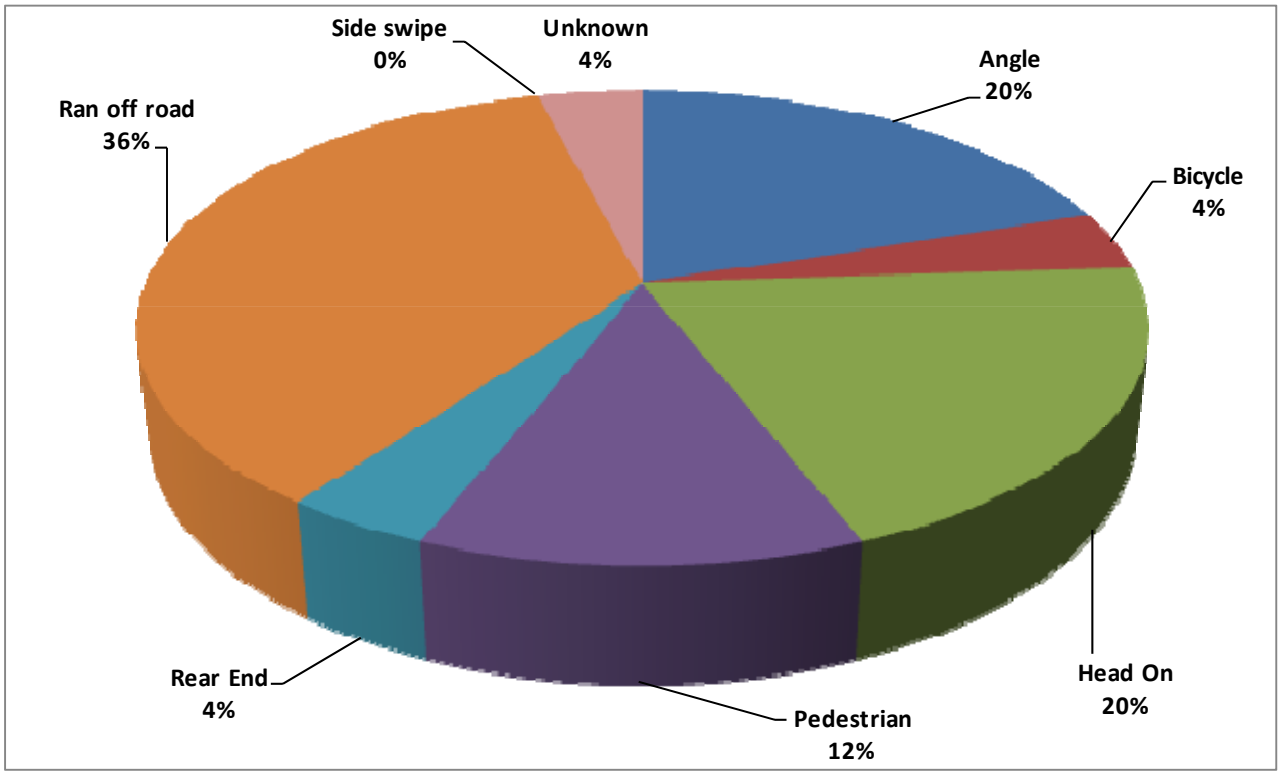
Figure 9-1 shows the types of fatal crashes in the region. Collectively, lane departure crashes (ran off the road, sideswipe, and head-on) make up the highest percentage of fatal crashes. Addressing lane departure crashes is a primary focus of MassDOT in their Strategic Highway Safety Plan. MassDOT conducted several Road Safety Audits at some of the most problematic roadways for lane departure crashes, including two locations in the Old Colony Region: Route 24 (Randolph through Bridgewater) and Thatcher Street in Brockton and East Bridgewater. Improvements such as roadside vegetative clearance and enhance delineation were implemented.

Angle type collisions make up the second highest percentage of crashes (20 percent.) Crashes involving pedestrians also account for a significant percentage of fatal crashes with 12 percent of all fatalities involving a motor vehicle collision with a pedestrian. Collisions with bicycles, rear end collisions, and unknown type collisions each account for 4 percent of fatal crashes in the region.

Table 9-3: Fatal Crashes By Community, 1990-2008

Community	Angle	Bicycle	Head On	Pedestrian	Rear End	Ran off road	Side swipe	Unknown	Total
Abington	5	1	5	3	1	9	0	1	**25**
Avon	4	0	3	3	2	2	1	1	**16**
Bridgewater	7	0	6	3	0	12	1	1	**30**
Brockton	35	1	13	25	2	44	1	8	**129**
East Bridgewater	3	0	2	5	0	4	0	1	**15**
Easton	3	0	8	2	0	19	0	2	**34**
Halifax	1	0	2	1	1	8	0	0	**13**
Hanson	2	0	3	2	0	7	0	1	**15**
Kingston	2	0	3	3	3	14	0	1	**26**
Pembroke	3	2	6	2	0	13	0	1	**27**
Plymouth	16	1	9	6	4	42	1	2	**81**
Plympton	3	0	1	0	0	4	0	1	**9**
Stoughton	12	2	1	7	2	11	2	0	**37**
West Bridgewater	4	0	1	5	1	9	0	0	**20**
Whitman	1	0	2	6	0	2	1	0	**12**
Totals	**101**	**7**	**65**	**73**	**16**	**200**	**7**	**20**	**489**

Figure 9-1: Types of Fatal Crashes 1990-2008 Old Colony Region



Route 3

According to MassDOT crash records, 572 crashes occurred along Route 3 from 2006 through 2008. Table 9-4 provides a summary of the general location of these crashes, while Figure 9-2 contains a plot of crash locations on a map, including those that could not be located based on the location narrative

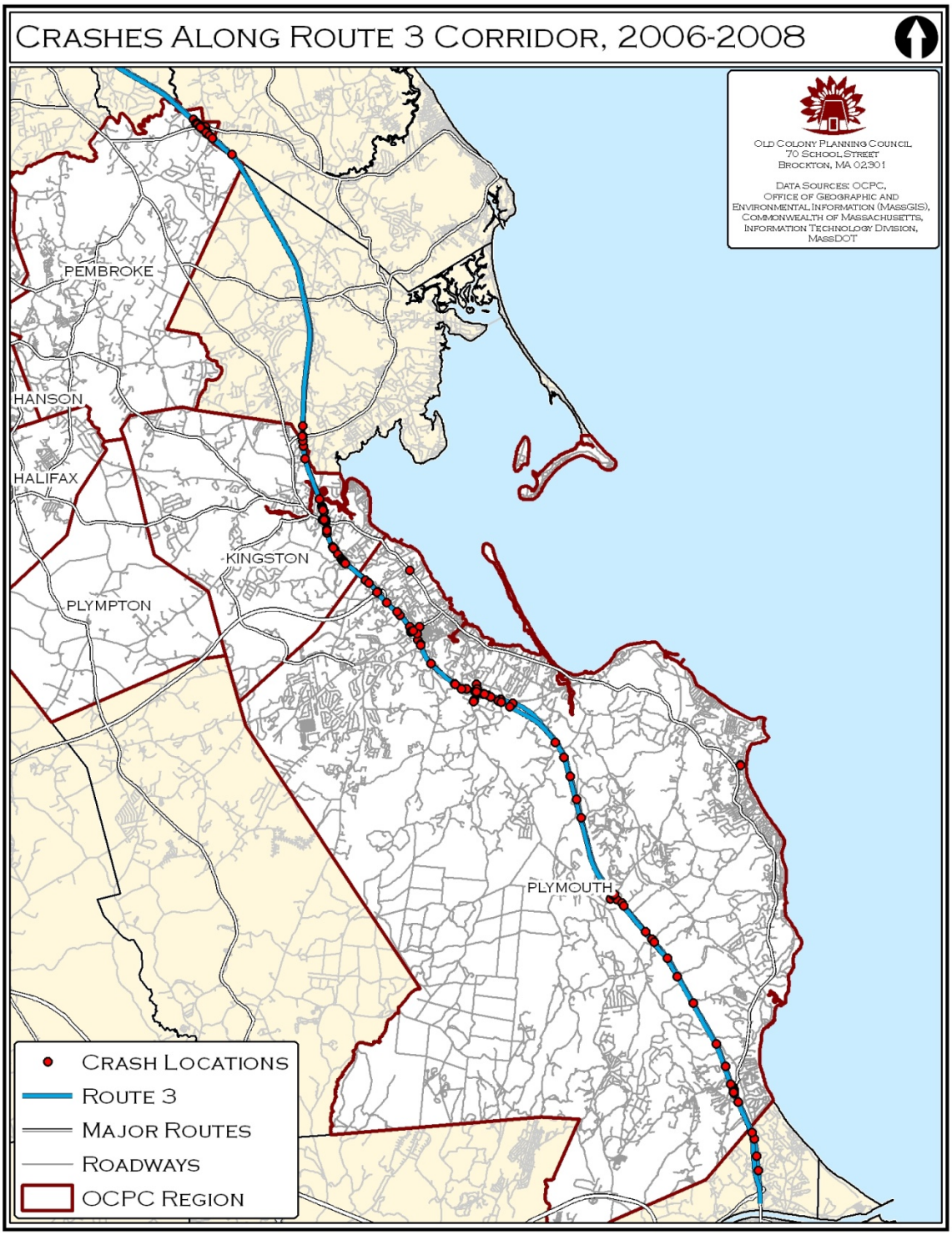
The interchange between Route 3 and Long Pond Road (Exit 5) stands out as a particular area of crash concern, with 110 crashes on the facility. The Samoset Street (Exit 6) and Main Street (Route 3A) (Exit 9) facilities also experience a relatively high frequency of crashes.

Table 9-4: Route 3 Corridor Crashes

Route 3 Corridor Crashes MassDOT Crash Data 2006 - 2008							
		Crashes With:				Crashes With:	
Interchange	Crashes	Injuries	Fatal	Segment	Crashes	Injuries	Fatal
Exit 2	40	10	0	**South of Exit 2**	5	2	0
Exit 3	36	14	0	**Between Exits 2 & 3**	4	1	1
Exit 4 (SB Only)	18	2	0	**Between Exits 3 & 5**	3	0	0
Exit 5	110	42	0	**Between Exits 5 & 6**	5	2	1
Exit 6	76	22	0	**Between Exits 6 & 7**	4	2	0
Exit 7	32	7	0	**Between Exits 7 & 8**	2	0	0
Exit 8	32	12	0	**Between Exits 8 & 9**	4	0	0
Exit 9	62	21	1	**Between Exits 9 & 10**	4	1	0
Exit 10	22	6	0	**South of Exit 12**	7	2	0
Exit 12	30	23	0	**North of Exit 12**	1	0	0

		Crashes With:	
	Crashes	Injuries	Fatal
At (Within 1,000' of) Interchanges:	458	159	1
Between (Beyond 1,000' From) Interchanges:	39	10	2
Unlocated / Non-Descriptive Records:	75	28	1
Total:	572	197	4

Figure 9-2: Route 3 Crashes, 2006-2008



Route 24

From 2006 through 2008, there were nearly 1,100 crashes on Route 24 and its interchanges in the Old Colony Region. Table 9-5 provides a summary of the general location of these crashes, while Figure 9-3 contains a plot of crash locations on a map, including those that could not be located based on the location narrative

Of the 1,090 crashes along Route 24 in the three year period from 2006 through 2008, over 400 resulted in personal injuries and five resulted in fatal injuries.

While nearly every interchange has an extensive crash history, the interchange between Route 24 and Route 123 (Exit 17) stands out as a particular area of high crash frequency, with 194 crashes on the facility.

While numerous safety deficiencies have been identified through several studies, including a Road Safety Audit prepared by MassDOT and Old Colony Planning Council, the following are considered the main factors in the high crash frequency along Route 24:

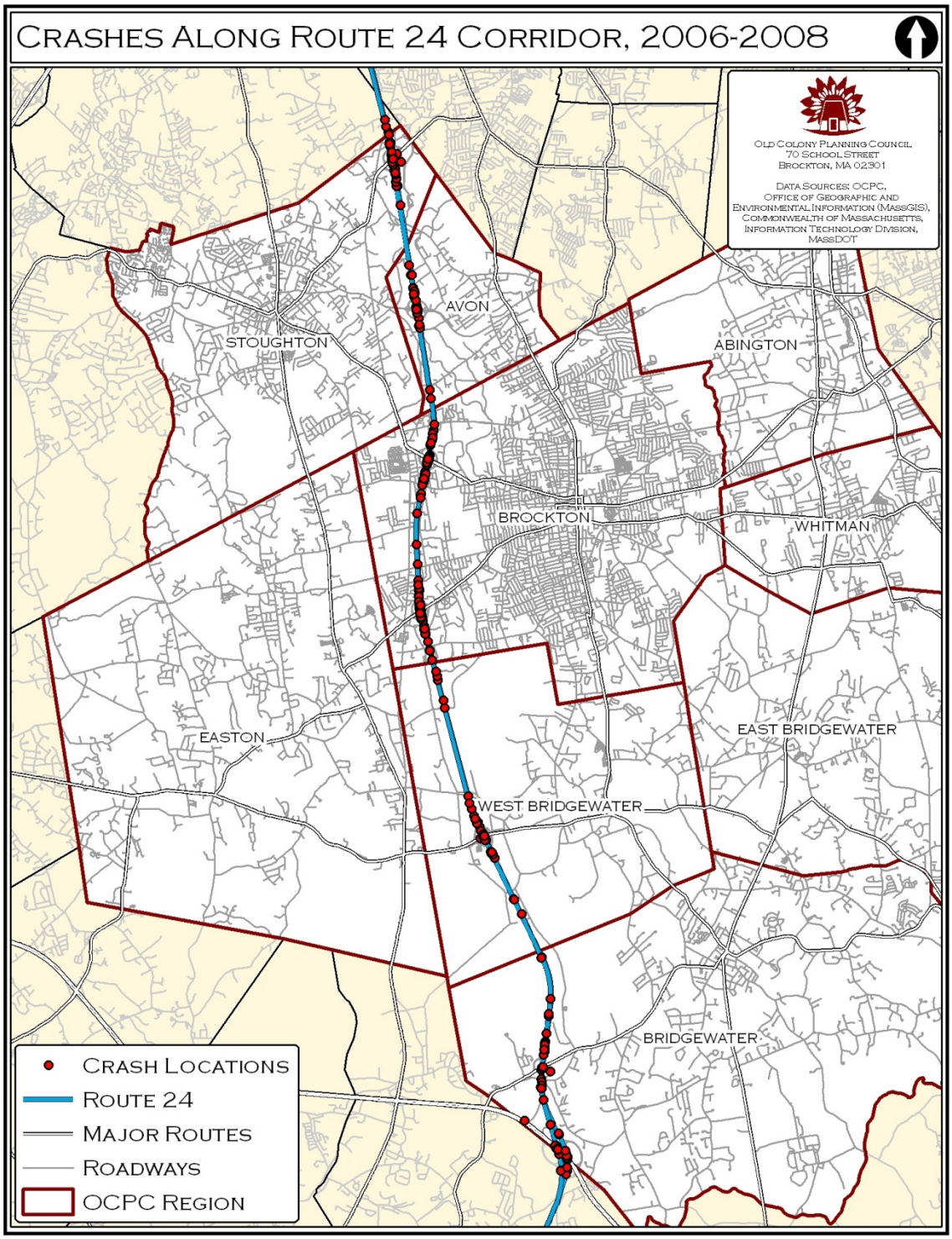
- High Travel Speeds
- High Traffic Volumes That Exceed Design Limits
- Inadequate Interchange Design

Table 9-5: Route 24 Crashes

Route 24 Corridor Crashes MassDOT Crash Data 2006 - 2008							
		Crashes With:				Crashes With:	
Interchange	Crashes	Injuries	Fatal	Segment	Crashes	Injuries	Fatal
Route 24 at I-495	54	14	1	**Between Exits 15 & 16**	15	6	0
Service Area	5	2	0	**Between Exits 16 & 17**	17	7	0
Exit 15	124	52	1	**Between Exits 17 & 18**	7	3	0
Exit 16	132	39	0	**Between Exits 18 & 19**	9	4	0
Exit 17	194	73	0	**Between Exits 19 & 20**	7	3	0
Exit 18	135	51	0	**North of Exit 20**	6	1	0
Exit 19	138	68	2				
Exit 20	133	50	1				

		Crashes With:	
	Crashes	Injuries	Fatal
At (Within 1,000' of) Interchanges:	915	349	5
Between (Beyond 1,000' From) Interchanges:	61	24	0
Unlocated / Non-Descriptive Records:	114	46	0
Total:	1,090	419	5

Figure 9-3: Route 24 Crashes, 2006-2008



Route 25

The portion of Route 25 in the Old Colony Region is a relatively short segment, approximately 2.4 miles in length between the Wareham town line and Bourne town line in southwest Plymouth. Route 25 does not have any interchanges in the region.

From 2006 through 2008, there were 17 records of crashes occurring along Route 25 in Plymouth. Five of these crashes involved personal injury, and none were fatal.

Route 44

The portion of Route 44 between Route 3 and the western border of the region is the newest facility in the region. The roadway is a limited access, divided four-lane highway between Route 58 in Carver and Route 3 in Plymouth. Table 9-6 contains the crash data for this section of Route 44.

Table 9-6: Route 44 Crashes

Route 44 Corridor Crashes
MassDOT Crash Data 2006 - 2008

		Crashes With:			Crashes With:	
Interchange	**Crashes**	**Injuries**	**Fatal**	**Segment**	**Crashes**	**Injuries**	**Fatal**
Route 3	5	1	0	**Non-Interchange**	28	8	0
Commerce Way	14	5	0				
Spring Street	6	2	0				

	Crashes With:		
	Crashes	**Injuries**	**Fatal**
At (Within 1,000' of) Interchanges:	25	8	0
Between (Beyond 1,000' From) Interchanges:	28	8	0
Unlocated / Non-Descriptive Records:	114	46	0
Total:	167	62	0

Intersections

In their Strategic Highway Safety Plan, MassDOT has identified intersections as a primary focus area where infrastructure improvements can be implemented to improve highway safety. The MassDOT maintains a database of crashes occurring in Massachusetts based on crash reports submitted to the Massachusetts Registry of Motor Vehicles (RMV). MassDOT compiles a report annually on the top 200 crash locations in the Commonwealth, as part of its HSIP development. The top 200 crash locations list is based on a weighted average, with higher weights given to fatal crashes and injury crashes. This data is obtained from the Registry of Motor Vehicles and is based on local and state police crash reports. Twenty-five intersections in the Old Colony region are listed on the 2008 MassDOT Top 200 Most Hazardous Intersections list.

The crash data provides information about each crash, including: the time of day the crash occurred; the number of people injured; the number of people killed; the direction of travel of vehicles involved; weather and lighting conditions at time of crash; the type of crash; and other pertinent location

information. OCPC uses this data to discern trends in crashes and to develop a list of top 100 crash locations for the region. The frequency of types of crashes and the frequency of crashes at certain locations provides insight into crash exposure and helps to determine safety needs.

The weighted crash average is calculated to reflect the severity of crashes at intersections. The Weighted Crash Average is a numeric calculation derived by assigning a value of 1 for all crashes involving property damage only, 5 for all crashes that involve personal injury, and 10 to all crashes that result in a fatality.

Table 9-7 summarizes the top 100 high crash locations in the region based on MassDOT's crash database. This list of hazardous intersections is prioritized by the highest weighted average, utilizing the same weighted methodology used by MassDOT. Table 9-7 is based on the latest available data for the region (years 2007, 2008, and 2009).

Table 9-7 Old Colony Top 100 Most Hazardous Intersections (2007-2009)

Rank	Community	Roadway Intersection	Total Crashes	Average # of Crashes	Traffic Control	Property Damage Only	Total Non-fatal Injuries	Total Fatal Injuries	EPDO Weighted Score	Notes
1	Brockton	Pleasant Street (Route 27) & West Street / Westgate Drive	71	23.67	Signal	34	62	0	344	Reconstructed 2011 (TIP #604431)
2	Brockton	Belmont Street (Route 123) & Manley Street	51	17.00	Signal	25	51	0	280	RSA Conducted 2011 / TIP - 2011 (#602606)
3	Brockton	West Elm Street & Ash Street	59	19.67	Stop Sign	35	44	0	255	RSA Conducted 2010 / TIP - 2014 (#601644)
4	Brockton	Pleasant Street (Route 27) & Ash Street	43	14.33	Stop Sign	20	40	0	220	TIP - 2012 (#600365)
5	Brockton	North Montello Street (Route 28) & Livingston Road / Field Street	34	11.33	Stop Sign	13	40	0	213	Route 28 Corridor Study
6	Brockton	Centre Street (Route 123) & Legion Parkway (Route 123) / Main Street	46	15.33	Signal	27	36	0	207	RSA Conducted 2010
7	Brockton	West Elm Street & Newbury Street	45	15.00	Stop Sign	21	37	0	206	TIP - 2014 (#601644)
8	Brockton	Oak Street & Campanelli Industrial Drive	45	15.00	Signal	23	36	0	203	
9	Brockton	Centre Street (Route 123) & Plymouth Street	33	11.00	Beacon	16	36	0	196	
10	Brockton	Centre Street (Route 123) & Cary Street / Lyman Street	34	11.33	Signal	14	36	0	194	
11	Brockton	Belmont Street (Route 123) & West Street	37	12.33	Signal	21	32	0	181	
12	Stoughton	Washington Street (Route 138) & Central Street	87	29.00	Signal	71	21	0	176	
13	Brockton	Belmont Street (Route 123) & Manomet Street / Belmont Avenue	28	9.33	Stop Sign	12	30	1	172	
14	Brockton	Forest Avenue & Manomet Street / Bouve Avenue	36	12.00	Signal	15	31	0	170	
15	Brockton	Pleasant Street (Route 27) & Augusta Avenue / Belmont Avenue	27	9.00	Stop Sign	10	32	0	170	TIP - 2012 (#600365)
16	Abington	Bedford Street (Route 18) & Randolph Street (Route 139) / North Avenue (Route 139)	83	27.67	Signal	66	19	0	161	RSA Conducted 2011
17	Brockton	West Elm Street & Belmont Avenue	26	8.67	Stop Sign	11	30	0	161	TIP - 2014 (#601644)
18	Brockton	North Main Street & Howard Street / Oak Street / Wilmington Street	53	17.67	Signal	34	25	0	159	RSA Completed 2010
19	Brockton	North Pearl Street (Route 27) & Oak Street	39	13.00	Signal	19	28	0	159	
20	Brockton	Main Street & Nilsson Street / East Nilsson Street	32	10.67	Stop Sign	13	29	0	158	
21	Brockton	Warren Avenue & Forest Avenue	28	9.33	Signal	13	29	0	158	
22	Abington	Bedford Street (Route 18) & Brockton Avenue (Route 123)	44	14.67	Signal	29	25	0	154	Route 18 Corridor Study
23	Brockton	Pleasant Street (Route 27) & Warren Avenue / North Warren Avenue	35	11.67	Signal	21	26	0	151	TIP - 2012 (#600365)
24	Avon	New Pond Street & Edward S Harrison Boulevard / Pond Street / Old Pond Street	33	11.00	Signal	18	26	0	148	
25	Brockton	Spring Street & Glenwood Street	19	6.33	Stop Sign	8	26	0	138	

Table 9-7 Old Colony Top 100 Most Hazardous Intersections (2007-2009), Continued

Rank	Community	Roadway Intersection	Total Crashes	Average # of Crashes	Traffic Control	Property Damage Only	Total Non-fatal Injuries	Total Fatal Injuries	EPDO Weighted Score	Notes
26	Brockton	Belmont Street (Route 123) & Pearl Street	49	16.33	Signal	36	20	0	136	Reconstructed 1999 (TIP #600004)
27	Brockton	West Elm Street & Warren Avenue (Route 123)	32	10.67	Signal	16	24	0	136	TIP - 2014 (#601644)
28	Stoughton	Canton Street (Route 27) & School Street	33	11.00	Stop Sign	21	21	1	136	RSA Completed 2009
29	Brockton	North Montello Street (Route 28) & East Ashland Street	28	9.33	Signal	14	24	0	134	Route 28 Corridor Study
30	Brockton	Court Street (Route 27) & Montello Street (Route 28) / Pleasant Street (Route 27) / North Montello Street (Route 28)	53	17.67	Signal	37	19	0	132	RSA Completed 2010
31	Brockton	Crescent Street (Route 27) & Lyman Street	31	10.33	Signal	17	23	0	132	Route 27 Corridor Study
32	Easton	Turnpike Street & Purchase Street	29	9.67	Beacon	17	23	0	132	
33	Brockton	Warren Avenue & Winthrop Street	21	7.00	Stop Sign	10	24	0	130	
34	Brockton	Centre Street (Route 123) & Commercial Street	46	15.33	Signal	34	19	0	129	
35	Brockton	North Montello Street (Route 28) & Ames Street	30	10.00	Signal	14	23	0	129	Route 28 Corridor Study
36	Pembroke	Washington Street (Route 53) & Schoosett Street (Route 139) / Columbia Road (Route 53)	48	16.00	Signal	29	20	0	129	Route 139 Corridor Study
37	West Bridgewater	North & South Main Street (Route 28) & East & West Center Street (Route 106) / River Street	44	14.67	Signal	28	20	0	128	TIP - 2013 (#603456)
38	Whitman	Washington Street & Park Avenue / West Street	27	9.00	Stop Sign	15	22	0	125	
39	Brockton	Oak Street & Reservoir Street	33	11.00	Signal	19	21	0	124	
40	Easton	Depot Street (Route 123) & Washington Street (Route 138)	35	11.67	Signal	23	20	0	123	Easton State Numbered Routes Study
41	Abington	Brockton Avenue (Route 123) & Mill Street / Green Street	23	7.67	Stop Sign	12	22	0	122	
42	Brockton	Main Street & Perkins Avenue & South Street	21	7.00	Signal	11	22	0	121	
43	Brockton	North Main Street & East & West Ashland Street	36	12.00	Signal	21	20	0	121	
44	Whitman	Auburn Street (Route 14) & Bedford Street (Route 18)	43	14.33	Signal	31	18	0	121	Route 18 Corridor Study
45	Brockton	Main Street (Route 28) & Sargent's Way	19	6.33	Signal	5	23	0	120	Route 28 Corridor Study
46	Brockton	Belmont Street (Route 123) & Linwood Street / Lorraine Avenue	38	12.67	Stop Sign	24	19	0	119	RSA Completed 2009 / TIP - 2014 (#606036)
47	Brockton	North Montello Street (Route 28) & East Battles Street	27	9.00	Stop Sign	14	21	0	119	Route 28 Corridor Study
48	Brockton	North Cary Street & East Ashland Street	29	9.67	Signal	18	20	0	118	
49	Brockton	West Elm Street & Moraine Street	23	7.67	Stop Sign	10	21	0	115	TIP - 2014 (#601644)
50	East Bridgewater	Bedford Street (Route 18) & West Street (Route 106) / East Street	48	16.00	Signal	35	16	0	115	Route 18 Corridor Study

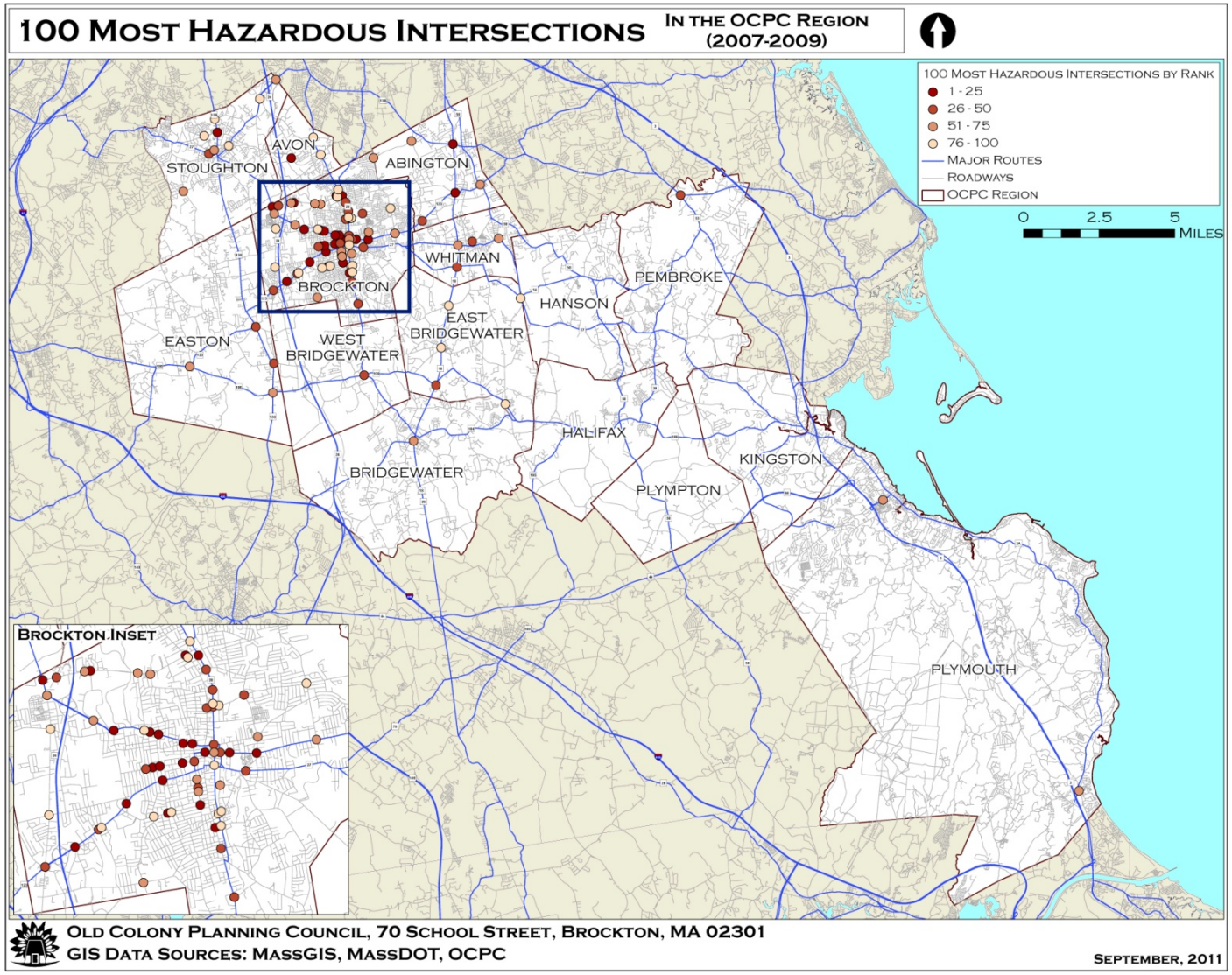
Table 9-7 Old Colony Top 100 Most Hazardous Intersections (2007-2009), Continued

Rank	Community	Roadway Intersection	Total Crashes	Average # of Crashes	Traffic Control	Property Damage Only	Total Non-fatal Injuries	Total Fatal Injuries	EPDO Weighted Score	Notes
51	Brockton	Reynolds Highway (Route 27) & Westgate Drive / Christys Drive	37	12.33	Signal	24	18	0	114	
52	Stoughton	Plain Street & West Street	13	4.33	Stop Sign	8	21	0	113	
53	Brockton	Court Street & Cary Street & North Cary Street / Provost Street	22	7.33	Signal	11	20	0	111	
54	Brockton	Warren Avenue & Bartlett Street / Father Kenney Way	23	7.67	Stop Sign	15	19	0	110	
55	Easton	Foundry Street (Route 106) & Depot Street (Route 123) / Bay Road	43	14.33	Signal	34	15	0	109	Under Construction
56	Easton	Foundry Street (Route 106) & Turnpike Street (Route 138)	35	11.67	Signal	24	17	0	109	RSA Completed 2009 / TIP - 2014 (#606071
57	Whitman	Franklin Street (Route 27) & South Avenue (Route 27) / Pleasant Street	26	8.67	Stop Sign	14	19	0	109	Route 27 Corridor Study
58	Brockton	North Quincy Street & Boundary Avenue / Chestnut Street	18	6.00	Stop Sign	7	20	0	107	
59	Brockton	North Pearl Street (Route 27) & Reynolds Highway (Route 27)	32	10.67	Signal	20	17	0	105	Route 27 Corridor Study
60	Abington	Plymouth Street (Route 58) & Center Avenue (Route 123)	31	10.33	Signal	19	17	0	104	Route 58 Corridor Study
61	Plymouth	State Road (Route 3A) & Herring Pond Road	27	9.00	Stop Sign	14	18	0	104	Route 3A Corridor Study
62	Brockton	Oak Street & Battles Street	18	6.00	Signal	8	19	0	103	
63	Plymouth	Samoset Street (Route 44) & Standish Avenue / Chestnut Street	21	7.00	Beacon	13	18	0	103	TIP - 2013 (#600426)
64	Whitman	Bedford Street (Route 18) & Temple Street (Route 27)	51	17.00	Signal	43	12	0	103	Route 18 Corridor Study
65	Brockton	Centre Street (Route 123) & Quincy Street	32	10.67	Signal	21	16	0	101	RSA Completed 2010
66	Abington	Hancock Street & Chestnut Street	32	10.67	Stop Sign	20	14	1	100	
67	Brockton	Montello Street (Route 28) & Centre Street (Route 123)	30	10.00	Signal	10	18	0	100	Route 28 Corridor Study
68	Brockton	Oak Street & Madrid Square Entrance	14	4.67	Stop Sign	5	19	0	100	
69	Brockton	Lawrence Street & Perkins Street / Commercial Yard	24	8.00	Stop Sign	13	17	0	98	
70	Stoughton	Lindelof Avenue (Route 139) & Technology Center Drive / Kay Way	23	7.67	Signal	12	17	0	97	Route 139 Corridor Study
71	Brockton	Oak Street & Belair Street	21	7.00	Signal	11	17	0	96	
72	Stoughton	School Street & Pearl Street	41	13.67	Stop Sign	31	13	0	96	
73	Brockton	Warren Avenue & Harvard Street	15	5.00	Stop Sign	5	18	0	95	
74	Brockton	West Chestnut Street & Ash Street	13	4.33	Stop Sign	5	18	0	95	

Table 9-7 Old Colony Top 100 Most Hazardous Intersections (2007-2009), Continued

Rank	Community	Roadway Intersection	Total Crashes	Average # of Crashes	Traffic Control	Property Damage Only	Total Non-fatal Injuries	Total Fatal Injuries	EPDO Weighted Score	Notes
75	Bridgewater	Bedford Street (Route 18/28) & Grove Street	21	7.00	Stop Sign	13	16	0	93	Route 18 Corridor Study
76	Brockton	Montello Street (Route 28) & Grove Street	21	7.00	Signal	13	16	0	93	Route 28 Corridor Study
77	Brockton	East Ashland Street & Mulberry Street	13	4.33	Stop Sign	4	17	0	89	
78	East Bridgewater	Bedford Street (Route 18) & Highland Street / Harvard Street	30	10.00	Signal	19	14	0	89	Route 18 Corridor Study
79	Stoughton	Washington Street (Route 138) & York Street	28	9.33	Stop Sign	19	14	0	89	
80	Brockton	North Main Street & Field Street	7	2.33	Stop Sign	3	17	0	88	
81	Brockton	North Montello Street (Route 28) & Harrison Avenue	7	2.33	Stop Sign	2	17	0	87	Route 28 Corridor Study
82	East	Plymouth Street (Route 106) & Washington Street / Old Plymouth Street	20	6.67	Stop Sign	12	15	0	87	RSA Completed 2010
83	Brockton	Grove Street & Curve Street / Clinton Street	15	5.00	Stop Sign	6	16	0	86	
84	Brockton	Montello Street (Route 28) & Crescent Street (Route 123)	14	4.67	Signal	6	16	0	86	Route 28 Corridor Study
85	Brockton	Montello Street (Route 28) & East Nilsson Street	21	7.00	Stop Sign	6	16	0	86	Route 28 Corridor Study
86	Stoughton	Pleasant Street (Route 139) & Lincoln Street	23	7.67	Stop Sign	15	14	0	85	Route 139 Corridor Study
87	Brockton	Forest Avenue & Grafton Street	16	5.33	Stop Sign	9	15	0	84	
88	Avon	East Main Street (Route 28) & Harrison Boulevard	33	11.00	Signal	28	11	0	83	Route 28 Corridor Study
89	Avon	North Main Street (Route 28) & East & West High Street	31	10.33	Signal	23	12	0	83	Route 28 Corridor Study
90	Brockton	North Montello Street (Route 28) & Howard Street (Route 37) / Albion Street	29	9.67	Signal	18	13	0	83	Reconstructed 2004 (TIP #602557)
91	Brockton	North Quincy Street & East Ashland Street	27	9.00	Signal	18	13	0	83	
92	Brockton	Pearl Street & Pleasant Street	20	6.67	Signal	13	14	0	83	
93	Brockton	Pearl Street & Torrey Street	22	7.33	Signal	13	14	0	83	
94	Brockton	Pleasant Street (Route 27) & Belair Street / Moraine Street	21	7.00	Signal	13	14	0	83	Reconstructed 2008 (TIP #604595)
95	Stoughton	Central Street & Pearl Street	36	12.00	Signal	27	11	0	82	
96	East Bridgewater	Bedford Street (Route 18) & Central Street / Spring Street / Maple Avenue	36	12.00	Signal	26	11	0	81	2011 Major Bottleneck Study
97	East Bridgewater	Oak Street (Route 14) & Franklin Street (Route 27) / West Washington Street (Route 14)	31	10.33	Signal	21	12	0	81	Reconstructed 2005 (TIP #600397)
98	Brockton	Ash Street & Forest Avenue	24	8.00	Signal	14	13	0	79	
99	Brockton	Belmont Street (Route 123) & Torrey Avenue	16	5.33	Stop Sign	9	14	0	79	RSA Completed 2010
100	Stoughton	Turnpike Street (Route 139) & Page Street	30	10.00	Signal	19	12	0	79	Reconstructed 2009

Figure 9-4: Locations of Old Colony Top 100 Most Hazardous Intersections



Bridges

Bridges are a critical component to the regional transportation system as they allow people and goods to traverse over physical obstacles. When a bridge fails, it can potentially cause severe injury or death to those on or under the structure. Unplanned bridge closures can cause major disruption to the daily commute of citizens as well as impede local commerce. MassDOT conducts yearly inspections of bridges throughout the Commonwealth and scores them based on structural integrity in three areas: surface, superstructure, or substructure. This ranking determines which bridges are classified as "structurally deficient". A structurally deficient (SD) bridge is one for which the deck (driving surface), the superstructure (supports immediately beneath the driving surface), or the substructure (foundation and supporting posts and piers) are rated in condition 4 or less on a scale of 1-10. Structural deficiency does not necessarily imply that a bridge is unsafe. It does, however, mean that a structure is deteriorated to the point of needing repairs immediately to prevent restrictions on the bridge.

Accelerated Bridge Program

The historic $3 billion Accelerated Bridge Program was enacted by the Patrick Administration in 2008, in response to the Minnesota interstate bridge disaster. This program greatly reduces the number of structurally deficient bridges in the state system.

To complete this program MassDOT and the Department of Conservation and Recreation (DCR) will rely on the use of innovative and accelerated project development and construction techniques. As a result, projects will be completed on-time, on-budget and with minimum disruption to people and to commerce.

Since 2008, the number of structurally deficient bridges has dropped from 543 to 482, a decline of over 11 percent. The ABP Program has completed 28 bridge projects already, with another 61 bridge projects currently in construction, and an additional 69 bridge projects scheduled to start construction within the next year. Over the course of the eight year program, more than 200 bridges are planned to be replaced or repaired.

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.

Highway Safety Patrols

The term "highway safety patrols" is traditionally referring to state troopers patrolling state highways. However, in Massachusetts, that term also refers to the MassDOT's Emergency Roadside Assistance vans, which operate through a sponsorship from Commerce Insurance. Specially equipped vehicles patrol four different routes along 332 miles of interstate and express highways in the Boston region to aid motorists with disabled vehicles.

Table 9-8: Accelerated Bridge Program – Old Colony Region

City/Town	Bridge	Type	Status (as of 12/2010)	Advertised	Amount
Bridgewater	Summer Street, over Taunton River	Replacement	Planned	9/18/2010	$2,507,000
Brockton	Belmont Street (Route 123), over Route 24	Replacement	Construction	6/26/2008	$3,425,215
Brockton	White Avenue, over Salisbury Brook	Replacement	Planned	3/27/2010	n/a
Brockton	Bartlett Street, Over Salisbury Brook	Replacement	Construction	6/27/2009	$933,932
District 5 Region	Scheduled and Emergency Repairs to Bridge Substructures – Route 24 Corridor	Repairs	Construction	12/6/2008	$2,290,042
Hanson	Winter Street, over Indian Head River	Replacement	Construction	8/29/2009	$1,391,768
Kingston	Elm Street, over Jones River	Replacement	Planned		
West Bridgewater	West Center Street (Route 106), over Hockomock River	Rehabilitation	Planned		

Intelligent Transportation Systems (ITS)

The United Stated Department of Transportation defines Intelligent Transportation Systems (ITS) as systems that improve transportation safety and mobility and enhance American productivity through the integration of advanced communications technologies into the transportation infrastructure and in vehicles. Intelligent transportation systems (ITS) encompass a broad range of wireless and wire line communications-based information and electronics technologies.

Effectively delivering information to users of the transportation system helps them to make safer and more efficient decisions. ITS technology can be used in several ways to improve safety on the transportation system. For example, networked and synchronized traffic signal systems can encourage a safe travel speed by ensuring drivers that travel at a given speed arrive on "green lights" at each successive signal in a corridor network. Driving too fast in a coordinated signal network would result in drivers having to stop at "red lights."

ITS technologies can also greatly assist Emergency Response, often considered one of the "E's" (along with Engineering, Enforcement, and Education) in safety engineering principles. Traffic signal preemption technology allows intersections to clear out in and provide green lights in advance of approaching emergency vehicles.

Old Colony Planning Council has developed a Regional ITS Plan to guide incorporating ITS into its transportation planning programs. Additionally, OCPC routinely works with the State on the Regional ITS Architectures, and will continue to do so in the development of a Statewide ITS Strategic ITS Plan.

Evacuation Planning

Southeastern Massachusetts is 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. 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 Planning Council has played a lead 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.

The nuclear crisis that occurred at Fukushima Dai-ichi in Japan as the result of an earthquake on March 11, 2011 has highlighted the vulnerability of nuclear power plants and nuclear fuel storage facilities to earthquakes. It was also demonstrated the potential geographic reach of leaked radiation in such an event.

While earthquakes that do occur are typically minor, New England is an area of seismic activity, and there is a risk of a significant earthquake. In report published in 2010, the Nuclear Regulatory Commission estimated the annual risk of an earthquake strong enough to damage the core of the nuclear reactor at Pilgrim to be 1 in 14,493. With its location on the coastline, hurricanes also pose a threat to the Pilgrim Nuclear Generation Station.

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.

Old Colony Planning Council is committed to continued cooperation with its local, regional, state, and federal partners on pre-disaster planning and mitigation.

Distracted Driving

With the rampant popularity of and access to handheld, portable electronic communication and navigation devices (cell phones, “smart phones”, GPS devices, etc); crashes attributed to distracted driving have increased sharply in recent years. As such, there is an increased focus by planners, legislators, public safety, educators, and media to address the dangers of distracted driving and deter such behavior through a combination of education, enforcement, and engineering.

Driving is a complicated task. Whether it’s a subconscious process such as checking rearview mirrors or more obvious conscious decisions such as searching for his turnoff, the driver must process upwards of 120 decisions per minute while operating a motor vehicle. In vehicle activities such as using electronic devices, eating and drinking, and reading significantly distract the driver from making these important decisions and therefore increasing the likelihood of a crash.

In 2009, 5, 474 people were killed on U.S. roadways and an estimated additional 448,000 were injured in motor vehicle crashes that were reported to have involved distracted driving. Distracted driving was reported as a factor in 16 percent of all fatal crashes and 20 percent of all injury crashes in the United States during 2009.

Massachusetts recently enacted legislation aimed at curbing distracted driving, including a ban on texting while driving. United States Secretary of Transportation Ray LaHood has made raising awareness of the dangers of and decreasing the practice of distracted driving a major national focus.

Sign Retroreflectivity

The Federal Highway Administration recently enacted new standards for sign retroreflectivity. Approximately 42,000 people have been killed on American roads during each of the past eight years. While only one-quarter of all travel occurs at night, about half of the traffic fatalities occur during nighttime hours. Therefore, the Federal Highway Administration has adopted new retroreflectivity standards to address this disparity.

In addition to addressing fatal crashes that occur during nighttime, these new standards for retroreflectivity are important for older drivers. Beginning at age 20, the amount of light a person needs to see a given distance increases, doubling about every 13 years. As baby boomers are reaching retirement age, the number of older drivers using the roadway system is increasing. Retroreflectivity standards are important for addressing the safety needs of this group of drivers.

The *Manual on Uniform Traffic Control Devices* (MUTCD) is the national standard for all traffic control devices on any street or highway open to public travel.

The 2009 edition of the MUTCD requires signs to be either illuminated or made with retroreflective sheeting materials. Most signs in the U.S. are made with retroreflective sheeting materials, which degrade over time and therefore have a limited life. Until now, there has been little information available to determine when signs need to be replaced based on retroreflectivity.

New federal requirements require agencies that have jurisdiction over roadway signage to have a plan in place by January 2012 to establish and implement a sign assessment or management method to maintain minimum levels of sign retroreflectivity. The compliance date for meeting the minimum retroreflectivity requirements on regulatory, warning, and ground-mounted guide signs is January 2015. For overhead guide signs and street name signs, the compliance date is January 2018.

9.5 Transit

The Commonwealth's regional transit authorities and the Massachusetts Bay Transportation Authority (MBTA) maintain rigorous programs to ensure the safety of employees, passengers, and the general public. Because of safety concerns, MassDOT discourages the establishment of any new at-grade rail crossings in the state. MassDOT is also seeking to reduce the number of at-grade crossings by working with towns to consolidate crossings that are in close proximity to each other.

Due to the nature of safety and security for the MBTA's transit system, many safety initiatives also have a security aspect to them. The reverse relationship is, of course, true as well. Security cameras, as an example, could also be called safety cameras, because they provide both safety from an assailant in an isolated area of a train station, as well as provide security from a would-be terrorist on a train platform or a bus.

All of the grade crossings are equipped with audible and visual warnings systems for motorists and pedestrians. However, the pedestrian crossings at the stations and a single crossing in East Bridgewater do not have physical barriers to protect vehicles or pedestrians. The single crossing in East Bridgewater is an unused spur that serves the former Shaw's warehouse and is not owned by the MBTA. The pedestrian grade crossings are located at the Montello, Brockton, Whitman, and Halifax stations.

Other physical barriers include fencing, soundproofing, jersey barriers and gates to reduce the potential for right of way intrusions. These barriers require regular upkeep to maintain their ability to deter unauthorized activates along the right of way. The MBTA stations and layover yards are lighted during times of darkness with additional security protection added to the layover yards.

MBTA Police Department

Through a combination of approximately 250 uniformed and plainclothes police officers, the MBTA Police Department carries out its primary mission of maintaining safety within the MBTA transit system. The MBTA police accomplish this through mobile, line, and canine patrol teams on both scheduled and random patrols, all of which serve to maintain a high degree of visibility within the system. 115 police officers, four police substations, and 15 police kiosks are assigned to the Blue, Green, Orange, and Red Lines, while additional surface patrols provide support to buses and commuter rail.

The three primary components of its safety operations are:

- Community Policing Patrol Plan
- Investigation and Prosecution (arrests and trials)
- Police Community Relations (public outreach)

MBTA Safety Department

The primary role of the MBTA Safety Department is to ensure the safety of its employees, its customers, and members of the general public throughout the MBTA system. In order to accomplish this, the MBTA Safety Department designs, implements, supports, and monitors safe work practices for and among its

employees, whether they are working in MBTA vehicles and facilities or on MBTA property and rights-of-way. These safe practices are outlined in the MBTA's System Safety Program Plan and their Safety Policies and Procedures Manual.

Examples of the types of activities conducted by the MBTA Safety Department include:

- Right-of-Way Safety Training
- Tracking Accidents
- Operation Lifesaver
- Safety Audits
- Safety Hazard Correction
- Safety Drills

MBTA Security Cameras

The MBTA will increase the number of surveillance and security cameras in the subway system by an additional 186, bringing the total number operating in the subway system to 488. This will provide a security camera in every subway station in the entire system. The cameras will be monitored from a number of different locations, including the MBTA Operations Control Center, the Transit Police Department, and the Massachusetts Emergency Operations Center in Framingham.

In addition, the MBTA has embarked upon a program of installing security cameras in new buses. There is also a strong surveillance component to the MBTA's Station Management Program, which includes the Automated Fare Collection System Project, the Hub Stations Project, and the Wide Area Network Project. The Hub Stations and Wide Area Network Projects surveillance components consist of closed-circuit television cameras and the fiber optic cable required connecting them to their monitors.

Advanced Warning Techniques

The Commonwealth of Massachusetts, the MBTA, and a majority of those in the railroad industry agree that the use of locomotive horns helps to promote safety at highway-rail grade crossings. Although the custom in Massachusetts is for trains to blow their horns at highway-rail grade crossings, horn bans have been created by the legislature in many communities. The MBTA complies with these bans within those communities. Like other transit property owners across the United States, the MBTA continues to await the implementation of Federal Railroad Administration regulations on the use of train locomotive horns at highway-rail grade crossings.

Meanwhile, the MBTA has taken steps to improve safety at its 200 public highway-rail grade crossings. Included among these steps is an investment in automatic warning systems, such as crossing gates, both two-way and four-way, flashing lights, and warning bells, to be installed on almost all of the public grade crossings used by the MBTA. A MBTA demonstration project was recently completed for the Federal

Transit Administration using four-quadrant gates and motor vehicle detection systems at grade crossings on the Old Colony Line.

Communications Interoperability

One of the issues facing the MBTA in its safety 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. Currently, radio coverage inside MBTA subway system tunnels does not meet these operational standards. This affects the response capabilities of not only the Boston and Cambridge Fire Departments, but both cities' police departments, emergency medical services, and the MBTA Police Department. Interoperability affects nearly every community in the Commonwealth. The MBTA is working with other members of the State Interoperability Committee to explore this issue and develop solutions to improve radio communications.

Operation Lifesaver

Operation Lifesaver is an educational program created to stop deaths, injuries, and crashes at railroad grade crossings and along railroad rights-of-way. Crashes between trains and trucks are especially harmful, as they typically result in mass-casualty scenarios. As so much of the hazardous material transported in the United States is moved by truck, the reduction of grade crossing collisions for this type of vehicle is especially important.

Grade Crossings

The Federal Railroad Administration maintains records of all collisions between railroad equipment, roadway vehicles, and pedestrians at all at-grade railroad crossings. In 2009, there were nearly 1900 incidents at public rail-highway crossings in the United States that resulted in 247 deaths and 705 injuries. Additionally, 431 people were killed and 343 injured while trespassing on railroad rights-of-way and property.

The Federal Railroad Administration uses the "three E" approach (Education, Enforcement, and Engineering) to reduce such fatalities. Informing the public about how to be safe at highway-rail crossings and the importance of not trespassing along railroad rights-of-way is vital to improving safety. The FRA has worked alongside the rail industry, state and local governments, and other transportation organizations in outreach efforts at schools and workplaces in communities to spread the word about rail safety. The FRA also provides data and statistics on the FRA website for public use. Table 9-9 summarizes collisions that have occurred at railroad-highway crossings in the Old Colony region since 1997.

Table 9-9: Collisions at at-grade Railroad-Highway Crossings, 1997-2010

Town	Crossing	Collisions	Fatal
Abington	Birch Street	2	1
Abington	North Avenue (Route 139)	3	0
Abington	Plymouth Street (Route 58)	1	0
Bridgewater	Plymouth Street (Route 104)	1	1
Hanson	Main Street (Route 27)	1	0
Hanson	Pleasant Street	1	1
Kingston	Summer Street (Route 3A)	1	0
Stoughton	Wyman Street	1	0
	Total Collisions:	**11**	**3**

Improving grade crossing safety has long been one of the top priorities of the Federal Railroad Administration. From 1995 to 2004, the number of grade-crossing collisions declined by 3%, the frequency of such collisions per million train miles decreased by 42%, and the number of fatalities fell by 36%. During the first 11 months of 2005, grade crossing collisions were down 5.1%, and fatalities declined 5.3% compared to the same period of 2004. In Massachusetts, funding exists under the Section 130 Program of MGL Chapter 160 for the upgrading and improving of railroad crossings.

9.6 Bicycle and Pedestrian Safety

Addressing safety for bicyclists and pedestrians is a key component of an overall focus on safety for "Higher Risk Transportation System Users", as identified in the Massachusetts Strategic Highway Safety Plan. Evaluating bicycle and pedestrian safety is a routine component of all transportation planning activities completed by Old Colony Planning Council, such as in corridor studies, road safety audits, and local technical assistance studies. The Bicycle and Pedestrian Transportation Plan (2008) and the Bicycle and Pedestrian Connectivity and Livability Study (2012) serve as guiding documents in planning for safety of bicyclists and pedestrians. Additionally, a Bicycle and Pedestrian Task Force has been created to gather input from and provide an additional avenue of public outreach to the bicycle and pedestrian community.

Bicycle Crashes

Table 9-10 contains a summary of crashes in the region from 2006 through 2008 that involved bicyclist. While crashes involving bicyclists have a high rate of injury, due largely to the exposure of the bike rider, the frequency of fatalities among crashes involving bicyclists is low.

Communities in the greater Brockton area had the most crashes involving bicyclists, including Brockton (90), Stoughton (19), and Abington (9). These communities are among the most densely populated in the region. These areas are likely to generate the most daily (non-recreation) bicycle trips given the denser patterns of development and proximity to schools, places of employment, and transit facilities. Cyclists also have an increased exposure to traffic in these areas, as traffic volumes are generally higher in these communities than in more suburban and rural areas of the region.

Table 9-10: Crashes involving Bicyclists, 2006-2008

	Crashes	Crashes With Injuries	Parentage	Fatal Crashes	Percentage	Location At Intersection	Location Non-Intersection
Abington	9	7	77.78%	1	11.11%	5	4
Avon	1	1	100.00%	0	0.00%	1	0
Bridgewater	5	3	60.00%	0	0.00%	1	4
Brockton	90	66	73.33%	0	0.00%	71	19
East Bridgewater	4	2	50.00%	0	0.00%	1	3
Easton	2	2	100.00%	0	0.00%	0	2
Halifax	4	2	50.00%	0	0.00%	2	2
Hanson	4	4	100.00%	0	0.00%	1	3
Kingston	2	1	50.00%	0	0.00%	0	2
Pembroke	4	4	100.00%	0	0.00%	1	3
Plymouth	9	0	0.00%	0	0.00%	3	6
Plympton	0	0	0.00%	0	0.00%	0	0
Stoughton	19	10	52.63%	0	0.00%	3	16
West Bridgewater	1	1	100.00%	0	0.00%	1	0
Whitman	5	3	60.00%	0	0.00%	4	1
OCPC Region	**159**	**106**	**66.67%**	**1**	0.63%	**94**	**65**

Safety challenges for cyclists can be mitigated through relatively low-cost traffic calming and awareness measures, as well as through higher cost engineering.

Installation of signage, such as “Share The Road” in areas where bicycle traffic is focused on, such as major travel corridors through town and around transit facilities, is a low-cost solution that increases awareness to drivers that bicyclists are using the roadway.

Figure 9-5: Typical “Share the Road” advisory signage and placard

Sharrows are increasingly used on corridors that communities wish to designate as a bike route but do not necessarily have the right-of-way for a traditional bike lane. Similar to “Share The Road” signage (in which they’re often used in conjunction with), sharrows are designed to alert drivers that the roadway has been designated as a bike route and to expect bicycle traffic interacting with motor vehicle traffic.

Figure 9.6 contains a photo of a sharrow used in densely developed residential area in Alexandria, Virginia.

Figure 9-6: A "Sharrow" used in a densely developed setting in Alexandria, Virginia

Pedestrian Crashes

Table 9-11 summarizes crash data for crashes involving pedestrians occurring from 2006 through 2008. During the time frame, there were 291 crashes in the region that involved a pedestrian. While the total number is a relatively small percentage of all crashes, the rate of injury (66%) and fatalities (3%) are very high compared to other types of crashes.

More than half of all pedestrian crashes from 2006 through 2008 occurred in Brockton. The densely developed urban setting of Brockton combined with a comprehensive transit system that features three commuter rail stations and several fixed route bus routes creates an environment that generates a high number of pedestrian trips which coexist with high vehicular traffic volumes, hence the high number of crashes involving pedestrians in the city. Stoughton had the second most crashes involving pedestrians, at 34. Plymouth, a community with a vibrant waterfront and historic district, had 26 crashes involving pedestrians, while Abington, Bridgewater, Easton, and Whitman also had double digit figures for crashes involving pedestrians.

Table 9-11: Crashes involving Pedestrians, 2006-2008

						Location	
	Crashes	Crashes With Injuries	Parentage	Fatal Crashes	Percentage	At Intersection	Non-Intersection
Abington	10	6	60.00%	1	10.00%	3	7
Avon	6	3	50.00%	0	0.00%	1	6
Bridgewater	12	9	75.00%	0	0.00%	3	9
Brockton	155	114	73.55%	3	1.94%	75	80
East Bridgewater	4	1	25.00%	1	25.00%	0	4
Easton	10	4	40.00%	1	10.00%	0	10
Halifax	2	1	50.00%	0	0.00%	0	2
Hanson	0	0	0.00%	0	0.00%	0	0
Kingston	7	6	85.71%	0	0.00%	1	6
Pembroke	9	8	88.89%	0	0.00%	2	7
Plymouth	26	4	15.38%	1	3.85%	1	25
Plympton	1	0	0.00%	0	0.00%	0	1
Stoughton	34	26	76.47%	0	0.00%	16	18
West Bridgewater	3	2	66.67%	0	0.00%	2	1
Whitman	12	7	58.33%	1	8.33%	5	7
OCPC Region	**291**	**191**	**65.64%**	**8**	2.75%	**109**	**183**

Safe Routes to School

The Massachusetts Safe Routes to School (SRTS) program promotes healthy alternatives 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. Following a successful pilot program developed by WalkBoston and funded by MassDOT, an expanded program was established in 2005 through MassRIDES, the Commonwealth's travel options program. MassRIDES offers schools technical support to customize programs and training.

The Safe Routes to School program (SRTS) aims to reduce congestion, air pollution, and traffic congestion near participating schools, while increasing the health, safety, and physical activity of elementary and middle school students.

Safe Routes programs:

- 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

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.

9.7 Conclusions, Policies, and Recommendations

While great strides have been taken to improve safety throughout the transportation network nationally, statewide, and locally; there must be a continued focus on further reducing crashes, injuries, and fatalities. Old Colony Planning Council recommends and is committed to the implementation of the following policies and recommendations to improve safety:

- Reduce the rates of motor vehicle, bicycle, and pedestrian fatalities by incorporating engineering, enforcement, education, and emergency response into the planning process.
- Support the increase of safety of highway and railroad grade crossings and other locations where modes intersect.
- Support the increase and improvement of safety of services, vehicles, and facilities for transit, and for the transportation disadvantaged.
- Support the implementation of emergency response and evacuation plans in cooperation with emergency management agencies.
- Continue to utilize safety performance measures in the planning process.
- Broaden the awareness of safety issues through dissemination of messages to the public and elected officials.
- Identify top lane departure and crash location and work at the local and regional levels to develop and implement location specific strategies to mitigate the deficiencies.
- Continue to provide technical support for Safe Routes To School and expand participation to local schools in the Old Colony Region
- Support the increase of seat belt use in the State.
- Increase the awareness of the dangers of speeding.
- Support initiatives to educate and increase awareness on the dangers of distracted driving, and support legislation and law enforcement initiatives to curb the practice of distracted driving
- Expand the use of Intelligent Transportation Systems technologies designed to enhance safety throughout the transportation network
- Continue conducting Road Safety Audits at locations identified as high crash locations, soliciting input and solutions using a multidisciplinary approach
- Support new federal standards on sign retroreflectivity, and identify areas that must be upgraded

10.0 Introduction

Securing the transportation system from threats and disruptions is an overarching concern for all transportation providers. Traditionally, the greatest threats to the safety of these networks were the vehicles operating within the transportation systems themselves. Intricate infrastructure systems and standards have been adopted to prevent accidents, mitigate unsafe weather conditions, allow for safe handling of hazardous materials, and otherwise provide a safe, efficient transportation network that is available to all.

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.

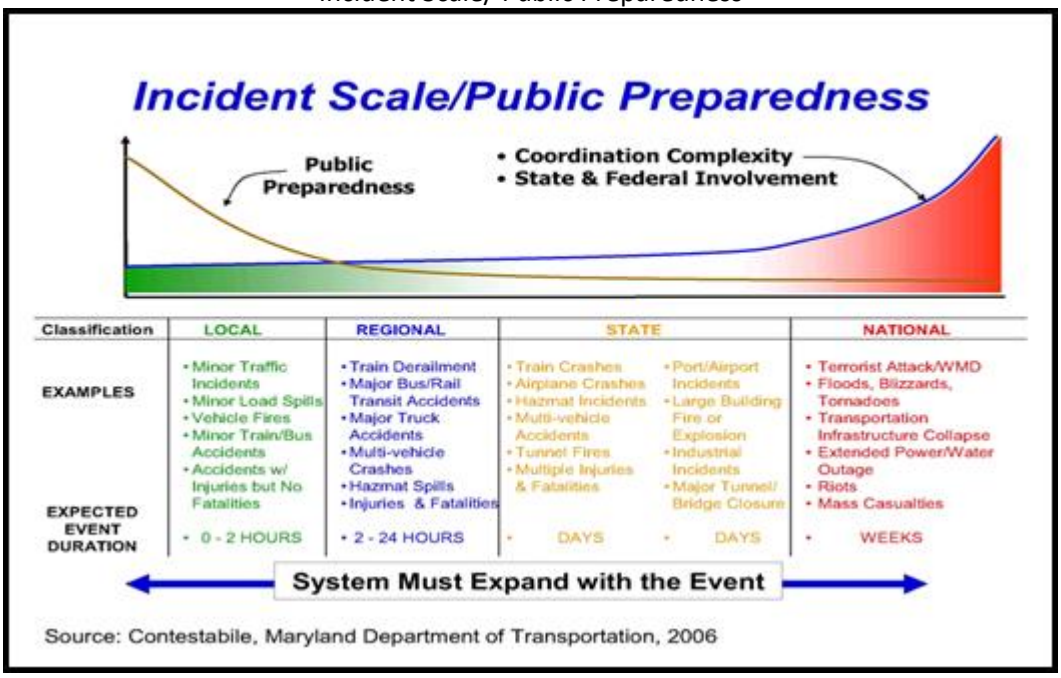
Safety and security are concerns that affect everyone within the region. Vukan R Vuchic in *Urban Transit: Operations, Planning, and Economics,* 2005 outlines some concerns about safety and security that are applicable to the region. Items to consider in the safe operation of fixed route transit are: 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 10-1 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 10-1
Incident Scale/ Public Preparedness



Source: Maryland Department of Transportation, 2006

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

10.1 Security Practices at the Regional Transit Authorities

The Regional Transit Authorities (RTAs) have moved forward with their security planning, developing both preemptive and prescriptive programs. Ranging from active discussions at security roundtables to applications for federally funded grant programs, the RTAs have taken an active role in the joint effort by transportation providers to protect the Commonwealth. Key areas that Brockton Area Transit focuses on include the protection and security of passengers, employees, assets, and revenues. National Incident Management (NIM) training been undertaken by several employee in an approach to prepare for emergencies where coordination among multiple agencies and departments will be essential.

The RTAs continued the "See Something, Say Something" program. This statewide program, which is consistent with the MBTA's Transit Watch described above, distributed educational brochures explaining procedures that passengers should undertake if they see suspicious activities. Agencies also performed driver awareness exercises and broadcast messages to improve passenger responsiveness should an incident occur.

Another important element of the security integration involves the help that can be provided by its customers through such programs as Transit Watch. Through a broad-based public outreach effort, Transit Watch seeks to increase the security awareness of the public and includes regular station announcements, advertisements on buses and trains, and pamphlets distributed to riders that inform the public how they can work with transit employees to contribute to a safer transportation system.

In addition, through a federal grant each RTA received a "Go Kit" containing emergency equipment to be used in case a safety or security event occurs. Each of the RTAs also developed a Continuity of Operations Plan for reactive procedures should a safety and security event occur. The plans included procedures for RTAs to implement their administrative offices are deemed unusable, including communication chains to ensure coordination of efforts.

10.2 Human Resource Protection and Safety

BAT and GATRA provide extensive service in the Old Colony Region. BAT and GATRA both operate with human resources to include employees and passengers. For these agencies, the protection and safety of their passengers is their first priority.

BAT and GATRA have contingency plans and local interagency agreements to coordinate emergency and disaster response plans. Examples include evacuation requirements for local elderly populations and blood dialysis operations. The agencies also plan an important safety role for the Pilgrim Nuclear Power Plant emergency response plan.

BAT's Intermodal Centre represents a confluence of transportation resources at a single location. The safety and security of the passengers at the Intermodal Centre and along BAT routes in the communities of Avon, Abington, Brockton, Easton, and Stoughton is a great responsibility. This responsibility is passed to the employees and riders of BAT through an active passenger education program. Programs such as Transit Watch encourage both passengers and employees to become aware of their surroundings and report suspicious behavior or activity. Additional employee-training programs are updated annually through the BAT safety and training manager.

10.3 Education

BAT's education efforts primarily focus on employee training. Efforts include the distribution of emergency preparedness training materials, safety education classes and classes on the handling of passengers during an emergency or disturbance.

10.4 Local Community Training

BAT provides evacuation services to the local communities in its service area as well as services to the Pilgrim Power Plant in Plymouth. Training on equipment familiarity is conducted with local fire departments within the fixed route service area. Fire department personnel are trained in responding to bus accidents and medical emergencies aboard fixed route and paratransit vehicles.

10.5 Physical Resource Protection and Safety

BAT's physical resources include over one hundred vehicles, three buildings, one parking structure and several bus shelters along fixed transit routes in Brockton. The safety of passengers at these facilities requires vigilance and protective actions to reduce the likelihood of incidents harming passengers and employees alike. The BAT Intermodal Centre is patrolled regularly by a police detail hired to protect the Centre. The detail also provides onboard route protection based on the conditions.

BAT has also hosted the National Transit Institutes Terrorist Activity and Recognition and the Workplace Safety and Security classes for its employees.

Massachusetts Bay Transportation Authority

The MBTA and the Kingston Fire Department have conducted an emergency response training exercise at the Kingston Commuter Rail Station. This full-scale emergency response exercise involved a simulated collision causing a derailment and injuries to customers. The simulated collision also caused a diesel fuel tank to rupture thus presenting a hazardous materials condition. Such exercises are conducted to ensure an efficient and professional operational response to an emergency.

The MBTA, in its Fiscal Years 2012-2016 Capital Investment Program, states, "Transit security is an essential aspect of ensuring a safe environment throughout the transit system."

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.

Massachusetts Emergency Management Agency

The Massachusetts Emergency Management Agency's Operations Division manages and coordinates emergency response efforts for the Commonwealth. It also operates the state Emergency Operations Center (EOC), where it monitors emergencies statewide on a twenty-four hour per day, seven-day per week basis. The EOC serves as the command and control center for the Commonwealth during an emergency.

Massachusetts Statewide Anti-Terrorism Unified Response Network

The Massachusetts Statewide Anti-Terrorism Unified Response Network (SATURN) is an information-sharing and first-responder network that enhances existing public security delivery systems. SATURN is a first-of-its kind initiative that brings together fire, emergency management, and police officers from every Massachusetts community, and provides them with a process for receiving and exchanging information in the face of a terrorist threat.

Commonwealth Fusion Center

The Commonwealth of Massachusetts maintains a fusion center inside of the State Police General Headquarters. A fusion center is defined by the Global Justice Information Sharing Initiative as "a collaborative effort of two or more agencies who provide resources, expertise, and /or information to the center with the goal of maximizing the ability to detect, prevent, apprehend, and respond to criminal and terrorist activity." The Commonwealth Fusion Center (CFC) operates 24 hours per day, seven days per week providing terrorist-related intelligence and public safety and security-related information among the state's local, state, and federal public safety agencies and private organizations involved with safety and security.

10.6 Evacuation Planning for Vulnerable Populations

Disaster Preparedness Planning Data and Interactive GIS Application (DPPD)

The November 1st, 2005, New York Daily News article read "More than half of New York's nursing homes have no plan to evacuate sick and vulnerable patients in the face of a hurricane or other disaster, officials revealed yesterday…There is great confusion on the part of the nursing home industry about exactly what we are supposed to do." The November 5th, 2005, LA Times headline read "Most of Louisiana's Identified Storm Victims over 60" - The article went on to explain that nearly two-thirds (66%) of all fatalities from the Katrina storm and aftermath were persons age 60 and older.

Those who watched television coverage of the natural disaster and initial rescue and recovery efforts witnessed scenes of utter devastation and ruin. Daily, there were reports of people of all ages and backgrounds desperately waiting for any type of assistance that could be provided. There were countless stories of people searching for lost family members or friends. There were stories and pictures of people who had died while waiting at evacuation centers. There were tragic situations where people who were completely dependent upon others were left on their own, and died.

To many, the initial warnings and preparation at the local, state, and federal level seemed extensive and reasonably well planned. From viewing television reports, one might have concluded that rescue efforts seemed to be moving quickly and effectively, even if not completely adequate in the initial days following the flooding.

Nevertheless, despite years of planning and preparation on all levels, there were failures and problems. When Katrina struck the gulf coast region, at least one important and useful disaster preparedness lesson was learned. That is, vulnerable segments of the population will always require special attention and assistance in the event of a natural disaster, terrorist attack, or other critical incident.

Old Colony Planning Council, with funding provided through the Southeast Region Homeland Security Advisory Council, created the Disaster Preparedness Planning Data and Interactive GIS Application (DPPD). The key objective of this effort was to create a data set and interactive GIS Application (DPPD) on vulnerable segments of the population that may require additional and unique assistance in the event of a critical incident in southeastern Massachusetts. This data set can be used by the appropriate agencies (first responders) to better identify and assist vulnerable segments of the population. Specifically, the project developed a data set and GIS mapping capability containing the following:

- Councils on Aging; Aging Service Access Points; Public Housing facilities; Child Care Centers; Adult Day Care Centers; Homeless Shelters; Nursing Homes; Rest Homes; Retirement/Assisted Living facilities; Kidney Dialysis Centers; Mental Health Residential facilities; Mental Retardation Residential facilities; Hospitals; American Red Cross offices; Public Health offices; Health Clinics; Centers for Disease Control; Pharmaceutical Manufacturing facilities; Medical Stockpile facilities; Medical Surgical Distribution facilities; Blood Banks; and Medical Research facilities.

The Application allows users (first-responders, local and regional coordinators) to access data about these different facilities. A map-based data retrieval system, where users can simply click on a point of a map and information about that facility is brought up directly on the computer or mobile data terminal. The system will allow users to "draw" a box on the map, show them how many different facilities are within the area drawn, and then bring up the data about any given facility. The system allows users to access the specified information on any of the agencies/facilities listed above.

The DPPD Application provides the total capacity of all facilities (number of beds), name and contact number of individual or individuals responsible for facility, and number of vehicles. Additionally, the Application includes a listing of agency personnel who have access to information on individuals/clients who have special needs and would likely require special assistance in the event of a critical incident. Specifically, there is an extensive human service network throughout the region that currently serves at–risk populations (frail elders, disabled, senior housing residents). Many agencies in this network maintain a database of clients who require special assistance. These agency-specific databases could be critically important in helping first responders to identify and assist people who will require special assistance.

The information collected during the development of the DPPD Application included:

- Name of facility, owner, complete address, emergency point of contact
- Type of existing facility security (patrols, badge system, fences, cameras, etc.)
- Type of emergency response mechanisms in place at facility (emergency action plan, emergency drills, etc.)
- Whether or not the facility has employees represented by a union and what that union is.
- Number of units/beds/residents
- Estimated percentage of residents/clients who are mobile vs. non-mobile (wheelchair bound, etc.).
- Number of Ambulances on site
- Presence of a trauma center on site
- Type of back-up power generation
- Presence of research laboratory

The outcomes of this Application address the following goals of the Southeast Region Homeland Security Council:

- Enhance regional ability to assess risk and prevent future attacks or critical incidents. – This is accomplished by developing a DPPD Application that includes useful information that is relevant to first responders (police, fire, EMS) and support personnel in trying to assist after an incident has occurred. This information could be used for evacuation planning and/or supply distribution purposes.
- Improve regional ability to collect, analyze, disseminate, and manage key information. – If and when the DPPD Application is collected in a comprehensive, uniform fashion, it can be used by emergency personnel to reach people most in need of assistance. To our knowledge, this information does not currently exist in this format on a regional basis.
- Improve the regions preparedness by enhancing coordination among all public safety officials. – This DPPD Application, if shared and analyzed before an event occurs, can be used by local, state, and federal planners to help to direct first responders to these areas with needs that are more critical.
- Improve the ability of first responders to communicate at the scene of a terrorist attack or critical incident in the region. – The DPPD Application contained in the data set can be used at regional response centers/FUSION Centers to track rescue efforts (who has been rescued, who still needs to be rescued, what other issues or information will responding personnel need to safely evacuate residents).

10.7 Pre-Disaster Mitigation

Multi-hazard Pre-Disaster Mitigation Plan

New England weather is proverbially variable and sometimes dramatic; and the drama can evolve into danger. 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. Some people tend to look forward to dramatic, but manageable storms and to dismiss other hazards. Yet hurricanes and blizzards can be very destructive as we know from 1978; the less common events can occur as with 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 or along riverine flood plains

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 examine 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 Plan drew on local disaster mitigation planning efforts noted in the local annexes, provided by MHCPT members. The MHCPT offered local data and insight to this regional process, which is evident in the regional plan. The public was involved through outreach to the Boards of Selectmen, Brockton City staff, and other local officials, through the open meetings of the MHCPT, and through questionnaires filled out by other community staff and coordinated by the MHCPT.

The proposed added mitigating actions in the annexes drew on present practices throughout the regions communities to recommend successful practices in one area for adoption in similar communities. They also drew on suggestions of the MHCPT, suggestions from public safety practitioners like the firefighting staff at Myles Standish State Park and local building inspectors, highway superintendents, and water and sewer officials, along with available literature and on observations of the study staff.

The Regional Implementation group, based on the MHCPT, will meet periodically to review regional plan implementation and effectiveness, and to draft changes for inclusion in plan updates every five years. The updates will examine potential damage to the few future structures allowable in flood hazard areas and SLOSH zones, to the greater number of buildings possible in or downwind from wildfire hazard areas, and to any other prospective facilities potentially subject to potential natural hazards.

Local implementation and updating will be coordinated by each community's MHCPT member or delegate who will monitor the plan's effectiveness and advocate for incorporating plan recommendations in local comprehensive plans, requirements, and departmental practices, and develop needed revisions.

10.8 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.

10.9 Intelligent Transportation Systems (ITS)

Intelligent Transportation Systems (ITS) technologies are applied to vehicles and roadways that perform communications, data processing, traffic control, surveillance, navigation, sensing, and various other functions that aid in the management of the security process. ITS elements, such as traffic cameras, signal preemption devices and variable message signs (VMS), would provide timely responses for emergency vehicles and the ability to monitor evacuations during times of natural, or other disasters.

The MassDOT's Statewide Traffic Operations Center (STOC) is located in South Boston. The STOC's primary mission is traffic incident management on state-controlled roadways throughout the Commonwealth of Massachusetts. The STOC is the headquarters for the application of ITS around the state. From the STOC, reports on traffic incidents are relayed to the involved MassDOT district office, which assigns the necessary personnel and equipment, required to abate the incident.

10.10 Recommendations

Foster communication and cooperation between federal, state, regional, and local agencies for the planning, practice, and implementation of emergency scenario plans.

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 surveillance and security efforts at transportation facilities throughout the region.

Continue other security improvements at the public use airports, such as the installation of security

fencing, gates, and access control and video monitoring systems.

Facilitate comprehensive evacuation planning and coordination procedures between state and local agencies.

Designate and indicate, through road signs, emergency evacuation routes, and shelters

Support enforcement of state and local traffic laws.

Continue to implement "Transit Watch" and the station improvement program of the MBTA, including station monitors and the new communications system.

Consider developing a general information booklet to be distributed to all human service agencies in the region. The basic information might include the following: What to do in the event of an emergency; the local community emergency/disaster contact person and phone; an outline of the proposed regional evacuation routes; a listing of local shelters; etc.

11.0 Introduction

The federal legislation SAFETEA-LU requires that the Regional Transportation Plan include a financial component that demonstrates how the projects and improvements it identifies can be implemented. In addition, the statutory language directs that the Plan be financially constrained to revenues expected to be reasonably available to carry out the Plan. The Regional Transportation Plan must be cost feasible. The costs of planned improvements and maintenance must be balances with revenues that can be reasonably expected.

Historical data on transportation spending and allocation within the region are key indicators of probable future spending levels over the period of this document. It is assumed that federal and state-funding commitments will continue beyond the life of SAFETEA-LU with future federal and state legislation. In addition, this chapter includes a description of federal and state funding programs, and highway and transit financing.

11.1 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 as constant as we would like. The amount of funding available changed dramatically between 1991 and 1992 when ISTEA replaced its predecessor, 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 SAFETEA-LU period, 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 the following sources: gasoline tax, license/registration fees; bond proceeds, sales tax; tolls; fares; annual appropriation; and local assessment. Furthermore, the distribution of both federal and state funds among the thirteen regions of the Commonwealth does not adhere to a strict formula. The Old Colony region could receive a larger or smaller share of the statewide total depending on a number of factors.

Table 11-1 summarizes both federal and non-federal construction spending in the Old Colony Region, from 1992 to 2011. The historical data illustrate that a total of approximately $270.5 million dollars was spend in the twenty year period averaging approximately $13.5 million dollars annually.

Table 11-1: Summary of Construction Spending in the Old Colony Region

Year	Sum of Advertised Project Amounts
1992	$ 20,246,117
1993	$ 39,417,562
1994	$ 10,045,153
1995	$ 29,362,750
1996	$ 15,738,263
1997	$ 36,942,432
1998	$ 8,594,745
1999	$ 1,869,334
2000	$ 1,800,000
2001	$ 3,358,460
2002	$ 7,225,538
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
Total	**$ 270,515,623**
Annual Average	**$ 13,525,781**

11.2 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 SAFETEA-LU (2005). Federal funding received from SAFETEA-LU is allocated to different funding programs.

Highway Funding Programs

American Recovery and Reinvestment Act (ARRA) is an economic stimulus package enacted by the 111th United States Congress in February 2009 that intended to provide a stimulus to the U.S. economy in the wake of the economic downturn.

National Highway System (NHS) consists primarily of existing Interstate routes and portions of the Primary System. The program was established to focus federal resources on roads that are the most

important to interstate travel and national defense, roads that connect with other modes of transportation, and others that are essential for international commerce.

Interstate Maintenance (IM) includes resurfacing, restoration, and rehabilitation as eligible activities for maintaining Interstate facilities. Reconstruction is also eligible if it does not add capacity. However, high-occupancy-vehicle (HOV) and auxiliary lanes can be added.

Surface Transportation Program (STP) is a block grant program that may be used for any 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 paid for with STP funds are not restricted to federal-aid roads but may be on any public road. Transit capital projects are also eligible under this program.

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) is a program that aims to reduce the number of fatal and injury crashes by targeting high crash locations. Projects, using (HSIP) funding, are required, by SAFETEA-LU, the Federal Legislation, to be selected based a data driven process.

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. Eligible are bridge painting, seismic retrofitting, and calcium magnesium applications.

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) and highway construction, and maintenance (Chapter 497).

Public Works Economic Development (PWED) projects are funded entirely with state funds and are often part of state grant projects targeting downtown revitalization.

Transit Funding Programs

49 U.S.C. Section 5307 provides capital, preventative maintenance, and operating assistance to transit systems in urbanized areas.

49 U.S.C. Section 5309 provides funding for the construction or extension of new transit service projects, modernization of existing rail systems, and major bus purchases and related facilities.

49 U.S.C. Section 5310 is the Elderly and Persons with Disabilities program, which provides capital assistance to private non-profit service carriers.

49 U.S.C. Section 5311 provides funding capital and operating assistance to transit systems in non-urbanized areas (Rural Transit).

49 U.S.C. Section 5316 provides funding for transportation services designed to transport welfare recipients and low income individuals to and from jobs and to develop transportation services for residents of urban centers and rural and suburban areas to suburban employment opportunities.

49 U.S.C. Section 5317 provides funding to encourage service and facility improvements to address the transportation needs of persons with disabilities that go beyond those required by the Americans with Disabilities Act.

Mobility Assistance Program (MAP) is a state funded program similar to Section 5310, but provides capital assistance to public non-profit service carriers. MAP funds are intended for use by public agencies, such as Councils on Aging, South Shore Community Action Council, and the Brockton Area Transit Authority (BAT), to provide van service to elderly and disabled persons.

11.3 Highway Financing

Federal

Table 11-1 provides a summary of the amounts spent on highway construction projects in the region over the last twenty years.

In September 2000, the state and its MPOs executed a Memorandum of Understanding of the Task Force of the State and Regional Officials to Define, Develop, and Monitor a Statewide Road and Bridge Program (Statewide Road and Bridge MOU). The Statewide Road and Bridge MOU commits MassHighway to expend no less than $400 million per year on transportation projects for the remaining years of the Central Artery, through state fiscal year 2005. Given the recent and historic trends concerning payouts and for previously obligated projects, an expenditure of $400 million per year translate into an annual advertising program of approximately $20-$25 million.

For programming and planning purpose, the Massachusetts Association of Regional Planning Agencies (MARPA) has developed targets to apportion highway funding between MPOs. Under the MARPA Target Formula, the Old Colony MPO assumes that it will receive approximately 4.56 % of all available highway funds. Table 11-2 shows that based on that assumption and MassDOT's expectations regarding the, the region can expect to receive approximately $991,424,000 million for highway and bridges between FFY 2012 and FFY 2035. An estimated $207,000,000 in Chapter 90 Funding is added to this estimate to arrive a grand total estimate of $1,198,424,000. Furthermore, the estimated transit funding is $495,110,134 for Brockton Area Transit as documented in Table 11-3.

The MassDOT Office of Transportation Planning has developed revenue estimates for the 23 years of the Regional Transportation Plan. To supplement these estimates, reasonable estimates of Chapter 90 Allocations were have been added to the MassDOT revenue forecasts.

Table 11-2: 2012-2035 Estimated Highway and Bridge Funding

	2011 - 2015	2016 - 2020	2021 - 2025	2026 - 2030	2031 -2035	TOTAL
Major Infrastructure Projects	$ 7,421,000	$ 9,974,000	$ 15,067,000	$ 18,410,000	$ 21,342,000	**$ 72,214,000**
Federal Aid Bridge Projects	$ 18,461,000	$ 20,340,000	$ 30,435,000	$ 37,127,000	$ 43,040,000	**$ 149,403,000**
NHS/ IM Projects	$ 13,394,000	$ 14,353,000	$ 21,545,000	$ 26,296,000	$ 30,484,000	**$ 106,072,000**
Statewide Maintenance	$ 49,211,000	$ 50,200,000	$ 61,090,000	$ 71,894,000	$ 83,345,000	**$ 315,740,000**
Regional Discretionary Funding	$ 32,437,000	$ 50,469,000	$ 71,482,000	$ 89,663,000	$ 103,944,000	**$ 347,995,000**
Chapter 90	$ 36,000,000	$ 42,179,738	$ 43,042,254	$ 42,212,831	$ 43,565,177	**$ 207,000,000**
Total Highway and Bridge Available for Programming	**$ 156,924,000**	**$ 187,515,738**	**$ 242,661,254**	**$ 285,602,831**	**$ 325,720,177**	**$ 1,198,424,000**

The 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 2011-2015 reflect current allocations and are inflated three percent per year thereafter, beginning in 2016.

- All figures provided are based upon an assumed obligation amount of 85%.
- Consistent with FHWA STIP guidance, $40 million in redistributed obligation authority is assumed each year.
- Deductions for statewide items that cannot be allocated individually to the MPOs -- Central Artery GANs repayment, Planning, and Extra Work Orders/Cost Adjustments -- are taken from total available funding, leaving the amount for the available federal funding to be allocated in the regional plans.
- Federal funding (OA and redistribution) and state match for the period of 2011 – 2014 reflect current STIP allocations and funding for FFY 2015 is assumed equal to estimates for FFY 2014.
- Beginning in 2016 and each year thereafter, federal funding is assumed to grow at a rate of 3% per year.
- Deductions for statewide items that cannot be allocated individually to the MPOs - Central Artery and ABP GANs 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 Major Infrastructure Projects, the NHS/IM Programs, the Federal Aid Bridge Program, and Infrastructure Maintenance mirrors the assumptions made for federal funding - 2011-2015 reflect STIP amounts, and thereafter programs are adjusted by a rate of 3% per year.
- The Balance Available for the Statewide Road and Bridge Program is a function of the other assumptions made in the financial plan and represents federal funding after deducting statewide line items and GANS repayments. For 2011-2015, this amount reflects the regional targets provided in the STIP; from 2016 to 2021 it fluctuates based upon the assumed 3% growth in revenue and programs costs, as well as the repayment schedule of the ABP GANs; in 2022, the amount balloons to reflect the end of GANs repayments and thereafter it grows at a rate of 3% per year.
- The Non-Federal Aid Program is based upon the existing program and held constant at current amounts for 2011 - 2015. Beginning in 2016 and thereafter, NFA funding is adjusted at a rate of 3% per year.

Funding by region, by category is distributed into five-year increments. These funds have been allocated among the regions based upon the following assumptions:

- With the exception of funds for the NHS/IM and Bridge Programs, the estimated funding is allocated among the MPOs based upon the existing MARPA TIP targets.
- Funding assumed for the NHS/IM Program is allocated based upon the regional share of National Highway System mileage.
- Amounts assumed for the Bridge Program are allocated based upon each region's percentage of bridges.

The estimated MPO allocations for Major Infrastructure Projects and the NHS/IM and bridge programs are included to provide order-of-magnitude guidance.

The Major Infrastructure Program is provided to account for projects of a significant cost that would not normally be expected to be included in an MPO's target component of the TIP. While this program would typically be the source of funding for projects that are regionally significant for air quality, it may also be used to fund large cost non-expansion projects. Most bridge projects, regardless of cost, should be accommodated within the Bridge Program; however, depending upon the magnitude of the project, it may be necessary for a region to fund a particular bridge project under the Major Infrastructure Program.

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, enhancement, CMAQ, ITS, or any other program for which federal highway funding is expected to be used.

State

SAFETEA-LU 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).

State funding for highway projects are raised from a variety of sources. As in most states, the gasoline tax is the major source of user fee revenues for transportation. Massachusetts started collecting a tax on gasoline in 1928. Since 1991, the gasoline tax has been steady at 21 cents per gallon, just slightly higher than the nationwide average of 18.6 cents. A percentage of the gasoline tax revenues is distributed to the State Highway Fund (for local use, roadway and bridge projects, etc.), to the General Fund (for mass transportation) and to a variety of environmental funds. The percentage of gasoline tax that is deposited into the Highway Fund is mandated for local use in all 351 Massachusetts cities and towns.

In addition, the Commonwealth finances most of its capital improvement program, including transportation, through bond sales. The Transportation Bond Bill (TBB) authorizes and directs the MHD to expend moneys for transportation projects such as reconstruction, resurfacing, relocation, or improvements of highways, bridges, and parking facilities.

In summary, the cumulative dollars estimated to be apportioned to the region during fiscal years 2012 to 2035 is shown in Table 11-2.

Local

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.

11.4 Transit Financing

As with highway projects, transit projects in the Old Colony region have historically been financed with a combination of federal, state, and local funds. Brockton Area Transit Authority (BAT) generates its funding from a number of sources that are described below.

Federal

Federal funding under the Surface Transportation Program (STP), Congestion Mitigation/Air Quality (CMAQ) and, to a limited degree, the National Highway System (NHS) programs under SAFETEA-LU may be used for transit purposes. By allowing states to use some SAFETEA-LU funds interchangeably for highways, transit or intermodal purposes, regions can determine the appropriate mix of projects to most efficiently attain their transportation goals.

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, funds are also made available from Sections 5309, 5310, 5311, 5316, and 5317. Estimated Federal funding for transit is outlined on Table 11-2.

State

The Commonwealth provides the Brockton Area Transit Authority (BAT) with financial assistance (through transportation bond issues and annual appropriations).

Under the Mobility Assistance Program (MAP), BAT requests annually 5-7 accessible mini-buses and vans each year, as part of their paratransit vehicle replacement 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 Executive Office of Transportation developed revenue estimates for the 23 years of the Regional Transportation Plan. To supplement these estimates, reasonable estimates of farebox, revenue, and Mobility Assistance Program and Section 5309 capital assistance were added to the Executive Office of Transportation revenue forecasts.

Table 11-3: 2012-2035 Estimated Transit Funding

	2011 - 2015	2016 - 2020	2021 - 2025	2026 - 2030	2031 -2035	Total
§ 5307 Urbanized Area Formula	$ 15,117,638	$ 17,525,486	$ 20,316,841	$ 23,552,787	$ 27,304,136	**$ 103,816,888**
§ 5309 Discretionary	$ 7,500,000	$ 8,500,000	$ 10,000,000	$ 12,000,000	$ 13,000,000	**$ 51,000,000**
Commonwealth Programs for BAT						
State Contract Operating Assistance	$ 26,459,477	$ 30,666,000	$ 35,538,000	$ 41,181,000	$ 47,723,000	**$ 181,567,477**
RTA Capital Assistance Program	$ 3,656,996	$ 4,763,148	$ 5,239,463	$ 5,763,410	$ 6,339,751	**$ 25,762,768**
Local Assessment	$ 9,725,569	$ 10,531,398	$ 10,959,015	$ 11,403,995	$ 11,673,249	**$ 54,293,225**
Farebox Revenue	$ 14,092,151	$ 15,259,780	$ 15,879,388	$ 16,524,155	$ 16,914,300	**$ 78,669,775**
Statewide Programs for all eligible participants						
§ 5310 Elderly/Persons with Disabilities	$ 14,542,206	$ 16,837,000	$ 19,481,000	$ 22,543,000	$ 26,097,000	**$ 99,500,206**
§ 5311 Rural Area/Non Urbanized	$ 13,917,629	$ 16,124,000	$ 18,676,000	$ 21,634,000	$ 25,063,000	**$ 95,414,629**
§ 5311(f) Intercity bus	$ 2,783,522	$ 3,218,000	$ 3,718,000	$ 4,297,000	$ 4,969,000	**$ 18,985,522**
Mobility Assistance Program	$ 18,721,340	$ 21,703,164	$ 25,159,916	$ 29,167,238	$ 33,812,823	**$ 128,564,481**
Regional Bus Fleet Acquisition Program	$ 6,500,000	$ 8,250,000	$ 9,075,000	$ 9,982,500	$ 10,980,750	**$ 44,788,250**
Rural Transportation Assistance	$ 542,519	$ 620,000	$ 701,000	$ 800,000	$ 915,000	**$ 3,578,519**
JARC & New Freedom Programs for Boston UZA						
§ 5316 Job Access Reverse Commute	$ 8,400,344	$ 9,734,000	$ 11,270,000	$ 13,048,000	$ 15,109,000	**$ 57,561,344**
§ 5317 New Freedom	$ 6,595,232	$ 7,641,000	$ 8,848,000	$ 10,245,000	$ 11,870,000	**$ 45,199,232**

The estimates from the MassDOT are based on the following assumptions:

- Federal Program and State Operating Assistance increase 3% each year from current levels to adjust for inflation
- State Capital reflects amount programmed through 2016 with 10% increase every fifth year to adjust for inflation

11.5 Fiscal Constraint Analysis

Roadway, bridge operations and maintenance, as well as capital improvements, outlined in the Regional Transportation Plan, are estimated to cost approximately $1.198 billion dollars as shown in Table 11-5 for the 23-year period (2012 to 2035). Additionally, transit operations and maintenance, as well as capital improvements, outlined in the Regional Transportation Plan, are estimated to cost approximately $387 million dollars as shown in Table 11-6 for the 23-year period (2012 to 2035). In order to have a financially constrained plan, resources of an equal amount must be identified. These resources are shown in Tables 11-2 and 11-3

Because the surface transportation legislation has not been reauthorized for the federal fiscal year beginning October 1, 2011, the 2012 Old Colony Regional Transportation Plan represents a large and uncertain time span for financial planning purposes. During these 23 years, many things may or may not occur and could seriously change any financial forecast made today. For instance, state match requirements can change, flexible-funding categories can be increased, reduced or eliminated, or overall federal funding levels can be substantially changed in response to budget decisions made by Congress.

Despite these and other uncertainties, assumptions associated with Tables 11-2 and 11-3 include amounts similar to those programmed under SAFETEA-LU will be provided for local transportation needs by the federal appropriations process throughout the life of the Regional Transportation Plan. The amounts from local and state sources are also assumed to remain at approximately the same levels throughout the life of the Regional Transportation Plan.

The funding available has allocated to operating, maintaining, and improving the highway, bridge and transit transportation system. The financial capacity from federal, state, and local sources has been examined by comparing projected revenues to transportation needs as outlined in Tables 11-2 and 11-3 with the estimated needs as documented in Tables 11-4, 11-5, and 11-6. As a result, the Old Colony MPO concludes that the 2012 Regional Transportation Plan is financially constrained according to the definition in the Federal Register 23 CFR Part 450.

Table 11-4: 2012-2035 Major Infrastructure Projects

Project	2011 - 2015	2016 - 2020	2021 - 2025	2026 - 2030	2031 -2035	TOTAL
Bridgewater - Route 24 On Ramp From Route 104 Westbound		$ 3,500,000				**$ 3,500,000**
Brockton - Route 123 Widening From Route 24 to Angus Beaton Drive		$ 5,500,000				**$ 5,500,000**
Plymouth - Long Pond Road Bridge Capacity Enhancement		$ 13,000,000				**$ 13,000,000**
Plymouth - Long Pond Road Bridge Capacity Enhancement		$ 3,500,000				**$ 3,500,000**
West Bridgewater - West Bridgewater Central Square		$ 2,000,000				**$ 2,000,000**
Brockton - Downtown Brockton Circulation			$ 6,500,000			**$ 6,500,000**
Plymouth - Exit 3 Full Interchange			$ 28,000,000			**$ 28,000,000**
West Bridgewater - Route 106 Capacity Enhancement			$ 6,000,000			**$ 6,000,000**
Plymouth - Route 25 Interchange at Bourne Rd				$ 20,000,000		**$ 20,000,000**
Plymouth - Route 3 Exit 4 Northbound Off-ramp to Plymouth Plantation Highway				$ 3,000,000		**$ 3,000,000**
Total Major Infrastructure Projects	**$ -**	**$ 27,500,000**	**$ 40,500,000**	**$ 23,000,000**	**$ -**	**$ 91,000,000**

Table 11-5: 2012-2035 Operations and Maintenance, and Major Infrastructure Projects

	2011 - 2015	2016 - 2020	2021 - 2025	2026 - 2030	2031 -2035	TOTAL
Ongoing Recon/Resurf/Rehab (Local Roads)	$ 36,000,000	$ 42,179,738	$ 43,042,254	$ 42,212,831	$ 43,565,177	**$ 207,000,000**
Bridge Replacements/Repair/Inspections	$ 18,461,000	$ 20,340,000	$ 30,435,000	$ 37,127,000	$ 43,041,000	**$ 149,404,000**
NHS/ IM Projects	$ 13,394,000	$ 14,353,000	$ 21,545,000	$ 26,296,000	$ 30,483,000	**$ 106,071,000**
Statewide Maintenance	$ 49,211,000	$ 50,200,000	$ 61,090,000	$ 71,894,000	$ 83,345,000	**$ 315,740,000**
Regional Discretionary Funding						
Recon/Resurf/Rehab (Fed-Aid Roads)	$ 31,358,000	$ 29,130,000	$ 37,000,000	$ 70,000,000	$ 90,000,000	**$ 257,488,000**
Intersection Improvements/Safety	$ 4,000,000	$ 2,113,000	$ 6,000,000	$ 8,423,000	$ 19,286,000	**$ 39,822,000**
Infrastructure (Signage, Guardrails, Etc.)	$ 4,000,000	$ 1,500,000	$ 2,749,000	$ 6,000,000	$ 15,000,000	**$ 29,249,000**
Enhancement Projects	$ 500,000	$ 200,000	$ 300,000	$ 650,000	$ 1,000,000	**$ 2,650,000**
Major Infrastructure Projects		$ 27,500,000	$ 40,500,000	$ 23,000,000		**$ 91,000,000**
Total Overall	**$ 156,924,000**	**$ 187,515,738**	**$ 242,661,254**	**$ 285,602,831**	**$ 325,720,177**	**$ 1,198,424,000**

Table 11-6: 2012-2035 Transit Operations and Capital Projects

	2011 - 2015	2016 - 2020	2021 - 2025	2026 - 2030	2031 -2035	Total
§ 5307 Urbanized Area Formula	$ 15,117,638	$ 17,525,486	$ 20,316,841	$ 23,552,787	$ 27,304,136	**$ 103,816,888**
State Contract Operating Assistance	$ 26,459,477	$ 30,666,000	$ 35,538,000	$ 41,181,000	$ 47,723,000	**$ 181,567,477**
RTA Capital Assistance Program	$ 3,656,996	$ 4,763,148	$ 5,239,463	$ 5,763,410	$ 6,339,751	**$ 25,762,768**
Bus Replacement, Hybrid Buses & Technologies, AVL, Farebox	$ 7,500,000	$ 8,500,000	$ 10,000,000	$ 12,000,000	$ 13,000,000	**$ 51,000,000**
BAT Intermodal Transportation Centre Improvements	$ 500,000	$ 1,000,000	$ 1,250,000	$ 1,500,000	$ 2,150,000	**$ 6,400,000**
BAT Ongoing Commuter Coach Replacement	$ 855,000	$ 923,400	$ 957,600	$ 991,800	$ 1,026,000	**$ 4,753,800.00**
BAT Ongoing Paratransit Bus Replacement	$ 2,530,000	$ 2,732,400	$ 2,833,600	$ 2,934,800	$ 3,036,000	**$ 14,066,800**
SSAC Ongoing Maxivan Replacement	$ 1,825,000	$ 1,971,000	$ 2,044,000	$ 2,117,000	$ 2,190,000	**$ 10,147,000**
§ 5316 Job Access Reverse Commute	$ 8,400,344	$ 9,734,000	$ 11,270,000	$ 13,048,000	$ 15,109,000	**$ 57,561,344**
§ 5317 New Freedom	$ 6,595,232	$ 7,641,000	$ 8,848,000	$ 10,245,000	$ 11,870,000	**$ 45,199,232**

11.6 Conclusions and Recommendations

Preserve, operate, and maintain transportation assets for current and future generations.

Adequately maintain all elements of the transportation system to protect the public's investment.

Increase the efficiency of the transportation system using appropriate technologies.

Discuss, analyze, and incorporate, as deemed appropriate, the recommendations of the Transportation Finance Commission.

Support the increase of the annual Chapter 90 statewide total amount to at least $250 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 grow with inflation.

Establish and dedicate transit funding from sources that grow 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.

Support the changing of RTA financing from retroactive reimbursement to current financing (forward funding).

CHAPTER 3 – LIVABILITY AND CHAPTER 4 – REGIONAL PROFILE

Approaches to Regional Land Use Planning

Current- "Smart Growth" and "Sustainable Development" movements encourage putting relatively high density development near existing centers and in areas with well-established infrastructure and doing so in ways which minimum energy consumption.

Smart Growth principles are intended to be the antithesis of sprawl, but they can be applied at a great range of scales from individual projects up to region-wide policies. The effect on travel patterns and modal choices can vary with the scale of action. Thus successful smart growth policies over a region would lead to a greater concentration of growth in regional centers allowing a greater use of mass transit and a largely radial, center-focused road system. In outlying areas Smart Growth can also support local transit use and reduce local trips by concentrating local or sub regional destinations but will not greatly change overall travel patterns. At the local level Smart Growth in the form of cluster development can reduce paving and runoff and preserve particularly valuable open space, but it does not necessarily strengthen the community's structure or reduce trips if sited at the edge of town.

The Healthy Transportation Compact (HTC) and GreenDOT Policy Directive

The Healthy Transportation Compact (HTC) is a key requirement of the landmark transportation reform legislation that was enacted by Governor Patrick and the Massachusetts Legislature in 2009. The inter-agency (MassDOT, Executive Office of Energy, and Environmental Affairs, Department of Public Health) initiative is designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment, and create stronger communities.

From the HTC, MassDOT created its "GreenDOT" Policy Directive. The GreenDOT Policy is a comprehensive environmental responsibility and sustainability initiative designed to make Massachusetts a national leader in greening the state transportation system. GreenDOT is driven by three primary goals: Reduce Greenhouse gas (GHG) emissions; Promote the healthy transportation options of walking, bicycling, and public transit; and support smart growth development.

Principle components of the Healthy Transportation Compact include:

- Promoting inter-agency cooperation to implement state and federal policies and programs that support healthy transportation.
- Reducing greenhouse gas emissions, improving access to services for persons with mobility limitations and increasing opportunities for physical activities.
- Increasing bicycle and pedestrian travel and facilitating implementation of the Bay State Greenway Network.
- Working with the Massachusetts Bicycle and Pedestrian Advisory Board (MABPAB) to effectively implement a policy of complete streets for all users, consistent with the current edition of the Project Development and Design Guide.
- Implement health impact assessments to for use by planners, transportation administrators, public health administrators, and developers.
- Expanding service offerings for the Safe Routes to Schools program.
- Initiating public-private partnerships that support healthy transportation with private and nonprofit institutions.

- Establishing an advisory council with private and nonprofit advocacy.
- Developing goals for the Compact and measuring progress toward these goals.

Many of the principles of the Healthy Transportation Compact and GreenDOT Policy are integral components of the programs at Old Colony Planning Council, and OCPC is committed to working with the state and local communities to further achieve the goals of the HTC and GreenDOT Policy Directive through programs and tasks such as:

- Multi-faceted approach to reviewing development proposals that go through the MEPA environmental review process
- Road Safety Audits that encourage a multidisciplinary approach and ensure all roadways users and the surrounding community are included in the planning process
- Ensuring non-motorized transportation (pedestrians and bicyclists) and public transit are considered in Local Highway Planning Technical Assistance and Transit Planning Technical Assistance projects
- Development of planning documents such as the Regional Bicycle and Pedestrian Plan, and Bicycle and Pedestrian Connectivity Study

Smart Growth and Sustainable Development Principles

Smart growth is a principle of land development that emphasizes the mixing of land uses, increases the availability of a range of housing types in neighborhoods, takes advantage of compact design, fosters distinctive and attractive communities, preserves open space, farmland, natural beauty and critical environmental areas, strengthens existing communities, provides a variety of transportation choices, makes development decisions predictable, fair and cost effective, and encourages community and stakeholder collaboration in development decisions.

Smart growth is development that protects natural resources, enhances quality of life, offers housing choices, reduces energy consumption, and improves municipal finances by considering the location, design, and long-term costs of development.

Smart growth is not "no-growth" - development is needed to keep Massachusetts economically and culturally vibrant. Currently about 1/4 of the Commonwealth is developed and 1/4 is permanently protected. The remaining 50% of the Commonwealth's land is at stake. Although some of this land will be needed to accommodate new homes and businesses, we are consuming far more land than necessary to accommodate our growth needs. The Audubon Society's *Losing Ground* report indicates that 44 acres of land is consumed by development in Massachusetts every day. Almost 9 out of every 10 acres developed go to residential growth, with 65% of that used for low-density, large-lot development. The smart growth/smart energy techniques included in this Toolkit provide communities the tools to work with the Commonwealth to use the remaining land as efficiently as possible, while building vibrant and sustainable neighborhoods and communities.

Old Colony Planning Council supports the implementation and practice of the Commonwealth’s Smart Sustainable Development Principles. The state has developed these 10 Sustainable Development Principles to encourage planning and development that protects land, promotes social and economic health, conserves energy and resources, and meets the needs of our residents.

1. Concentrate Development and Mix Uses.

Support the revitalization of city and town centers and neighborhoods by promoting development that is compact, conserves land, protects historic resources, and integrates uses. Encourage remediation and reuse of existing sites, structures, and infrastructure rather than new construction in undeveloped areas. Create pedestrian-friendly districts and neighborhoods that mix commercial, civic, cultural, educational, and recreational activities with open spaces and homes.

2. Advance Equity.

Promote equitable sharing of the benefits and burdens of development. Provide technical and strategic support for inclusive community planning and decision making to ensure social, economic, and environmental justice. Ensure that the interests of future generations are not compromised by today's decisions.

3. Make Efficient Decisions.

Make regulatory and permitting processes for development clear, predictable, coordinated, and timely in accordance with smart growth and environmental stewardship.

4. Protect Land and Ecosystems.

Protect and restore environmentally sensitive lands, natural resources, agricultural lands, critical habitats, wetlands and water resources, and cultural and historic landscapes. Increase the quantity, quality, and accessibility of open spaces and recreational opportunities.

5. Use Natural Resources Wisely.

Construct and promote developments, buildings, and infrastructure that conserve natural resources by reducing waste and pollution through efficient use of land, energy, water, and materials.

6. Expand Housing Opportunities.

Support the construction and rehabilitation of homes to meet the needs of people of all abilities, income levels, and household types. Build homes near jobs, transit, and where services are available. Foster the development of housing, particularly multifamily, and smaller single-family homes, in a way that is compatible with a community's character and vision and with providing new housing choices for people of all means.

7. Provide Transportation Choice.

Maintain and expand transportation options that maximize mobility, reduce congestion, conserve fuel, and improve air quality. Prioritize rail, bus, boat, rapid and surface transit, shared-vehicle, and shared-ride services, bicycling, and walking. Invest strategically in existing and new passenger and freight transportation infrastructure that supports sound economic development consistent with smart growth objectives.

8. Increase Job and Business Opportunities.

Attract businesses and jobs to locations near housing, infrastructure, and transportation options. Promote economic development in industry clusters. Expand access to education, training, and entrepreneurial opportunities. Support the growth of local businesses, including sustainable natural resource-based businesses, such as agriculture, forestry, clean energy technology, and fisheries.

9. Promote Clean Energy.

Maximize energy efficiency and renewable energy opportunities. Support energy conservation strategies, local clean power generation, distributed generation technologies, and innovative industries. Reduce greenhouse gas emissions and consumption of fossil fuels.

10. Plan Regionally.
Support the development and implementation of local and regional, state and interstate plans that have broad public support and are consistent with these principles. Foster development projects, land and water conservation, transportation and housing that have a regional or multi-community benefit. Consider the long-term costs and benefits to the Commonwealth.

Transportation-Specific Planning Recommendations

- Increase accessibility at the neighborhood scale. One approach is to use the Subdivision Rules and Regulations to encourage pedestrian and bicycle ways to connect cul-de-sacs and local streets in subdivisions to one another and to nearby schools, stores and other destinations.

- Foster Healthy Communities and Neighborhoods By Supporting The Healthy Transportation Compact (HTC) and GreenDOT Initiatives. Healthy communities and neighborhoods can be achieved through supporting these State initiatives on the local level within the region.

- Develop healthier and more varied centers. So doing would increase opportunities available in compact settings, and reduce trips by concentrating local destinations and strengthening community character. Communities should seek means to guide public, commercial and high-density residential investment to selected multi-purpose centers. Larger communities with failed shopping centers should adopt Planned Unit Development regulations or other tools for redeveloping such sites with diverse complementary uses.

- Develop a North-South industrial access and service road through Brockton's discontinuous central industrial corridor. The City should study ways of acquiring land, constructing new segments and improving others between Court St. and Spark St. with minimum neighborhood impacts.

- Continue to study the implications of major development projects. Even after MEPA review and local approval, many large and complex projects can have ill-defined impacts or significant changes in major factors, particularly involving actions not requiring State permits. It is important to have the capacity to continue reviewing major traffic-generating projects such as the reuse of the South Weymouth Naval Air Station and the Pine Hills project in Plymouth.

- Increase transit accessibility to nearby, un-served, employment centers. Put high priority on extending fixed-route service and on encouraging growth in industrial areas whose location and configuration fit such service, but be open to limited demand-responsive service where required to give residents needed employment opportunities.

- Respond to the potential impacts of major highway and rail projects potentially encouraging continued overall sprawl development. Old Colony Planning council should continue to work with local communities on exploring issues raised by the Southeastern Massachusetts Vision 20/20 project examining and publicizing alternatives to current trends, refining goals, and objectives, developing a plan implementation effort; and working for region-wide acceptance of the program and meaningful commitments to it.

- 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.

- Modify transportation improvement projects and priorities to encourage the compact close-in development patterns envisioned in the Plan's Goals and Objectives. Take actions ranging from improving the flexibility of minor arterials, major collectors and minor collectors, to improving ease of pedestrian/ bicycle movement in and between neighborhoods and facilities and within the downtown. Examples in Brockton would be restoring the stairs at the Downtown Rail station, which allowed direct movement from the platform toward most downtown destinations and reopening the recently blocked 100-year old pedestrian underpass between Lincoln Street and the Post Office.

- Use traffic calming and other roadway alterations to protect neighborhoods in mixed residential/industrial areas. Study opportunities to lessen industrial impacts on neighborhoods by rerouting truck traffic, creating safe pedestrian ways, and working with firms to lessen impacts from noise, lighting, odors, and vibration.

- Develop new build out analysis based on most recent data and trends to better understand impacts of development and continued growth.

CHAPTER 5 – REGIONAL HIGHWAY SYSTEM

Adequately maintain and operate the highway and bridge network of the region. This includes, but is not limited to, supporting, implementing, and funding projects such as ongoing and/ or project review committee approved reconstruction, rehabilitation, preservation, and intersection improvement projects.

Continue the support of management systems. The Commonwealth of Massachusetts and the regional planning agencies should continue to support the management systems. Such systems are examples of how transportation planning and asset management can be effectively integrated.

Enhance town center circulation. Advocate for the initiation of improvement strategies for enhancing town center circulation. Implement the recommendations of Downtown Brockton Circulation Study by re-establishing two-way traffic flow.

Mitigate congestion along corridors. Support the mitigation of corridor segments currently experiencing congestion problems.

Improve safety and traffic flow at intersections. Support the initiation and continuation of an intersection analysis program as a means to improve safety and traffic flow. Conduct before and after intersection analyses to determine the effectiveness of implemented safety improvements. Support legislation for Red Light Running Camera enforcement.

Utilize regional access management polices, guidelines, and techniques to reduce arterial crashes.

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

Continue operation of pavement management systems that involve monitoring/evaluating pavement distresses along the federal aid eligible roadways toward the development of both maintenance and budgetary strategies, which produce increased efficiency in terms of utilization of federal and state money.

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

Encourage the provision of adequate parking and traffic mitigation, and direct pedestrian access from nearby neighborhoods at the Old Colony Rail Line facilities. It is imperative that local officials confer with MBTA planners and engineers to determine that access and egress to/from station sites are properly mitigated.

Encourage large employers 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.

Conduct additional studies concerning the movement of goods/materials within and through the region. Additional studies should be undertaken which address the movement of goods and materials, such as the movement of hazardous materials, the identification and designation of regional and local truck routes, the identification of additional intermodal facilities, and the overall enhancement of the efficient movement of freight.

Conduct studies to improve east-west access in the region. This should also include further study of the widening of Route 106 from Route 24 to just east of Route 28 in West Bridgewater.

Implement access management at the local level through a number of avenues (Master Plans, Zoning Ordinances, Subdivision regulations and site plan reviews).

Place stronger focus on maintenance of local bridges. Support increased emphasis on the rehabilitation needs of locally maintained bridges.

Continue support of bridge management. The Commonwealth should continue its support of the Bridge Management System.

Accommodate grade separation for pedestrian and vehicular bridges or underpasses along the planned or new commuter rail system. Bridges or underpasses should be a consideration at the grade crossings of existing or proposed commuter rail system currently under construction.

Accommodate pedestrians in all bridge maintenance and construction. Addition of sidewalks and bike lanes or shared bi-ways where appropriate, should be a considered whenever bridges are replaced or rehabilitated.

Promulgate policy to address need for raising bridge clearances to accommodate double stacking of containers in railroad freight hauling operations. This policy is essential to promoting increased intermodal opportunities in the movement of goods within and across state and international borders. In addition, expeditious movement of imported and exported goods serves to increase profitability and job creation in the end.

Continue to work with local and state agencies to rehabilitate and reconstruct the bridges in the region that are remaining in the structurally deficient category, or will enter into that category during the next 23 years.

Resurface Route 138 in Easton between the Stoughton line and the Raynham town line.

Resurface Route 106 Foundry Street in Easton between Eastman Street and Depot Street.

Resurface Route 3A State Road in Plymouth from Bartlett Road to the Bourne line.

Utilize Access Management techniques throughout the region. Areas within the region in which access management techniques should be a prime focus include.

- Route 3A in Kingston and Plymouth
- Route 18 in Abington
- Samoset Street in Plymouth

- Route 28 (Memorial Drive) in Avon from Harrison Boulevard south to Route 37 (Howard Street) in north Brockton
- Route 28 through the Brockton downtown (between Route 37 and Plain Street)
- Route 28 in south Brockton (Main Street)
- Route 28 in West Bridgewater (North Main Street and south Main Street)
- Route 28 (Bedford Street) Route 18 corridor south of Bridgewater center
- Route 123 Belmont Street east and west of Route 24 in Brockton
- Route 123 in Brockton east of the downtown to Abington
- Route 104 east of Route 24 in Bridgewater
- Route 106 east of Route 138 in Easton to West Bridgewater Center
- Route 138 north of Stoughton Center
- Route 138 in Easton

Study, analyze, and integrate Intelligent Transportation Systems. Opportunities for such technologies include:

- Downtown Brockton - Several ITS components are included in the recommended improvements for Downtown Brockton in the Brockton Central Area Traffic Study completed in 1999. Traffic signal preemption is recommended for emergency vehicles at all signalized intersections in the downtown area. In addition, it is recommended that all traffic signals be connected within a closed loop system, with a connection to a central monitoring system. Video surveillance at critical downtown area locations is also recommended. Although not specifically recommended in the study, a Traffic Operations Center (TOC) would also be recommended in order to provide a mechanism for managing these systems.

- Town of Plymouth - The Regional ITS Architecture for Southeastern Massachusetts contains provisions for a traffic management center in Plymouth. The traffic management center would be used to monitor and control the Town's traffic signals, traffic sensors, and variable message signage. The TMC would interface with a variety of equipment and departments, including the Plymouth Police Department; Plymouth Department of Public Works; the Massachusetts Highway Department; GATRA; Plymouth & Brockton Street Railway Company, and other agencies.

- Information Kiosk at Route 3 Exit 5 in Plymouth - There are many opportunities for the application of Intelligent Transportation Systems at the new MassHighway Rest Area at Exit 5 on Route 3 in Plymouth. This Rest Area includes a tourist information center, food services, and a terminal for the Plymouth and Brockton Street Railway Company (P&B). Automated kiosks can be used for transit fare sales for P&B, MBTA, and Steamship Authority routes. Variable message signs can be used to inform visitors of traffic conditions on lower Route 3, Routes 6, and 6A, and the Cape Cod Canal bridges. Since the P&B terminal provides connections to Logan Airport, systems informing travelers of flight and gate information, including delays, could be useful.

- Local DPW Maintenance and Construction Vehicle AVL - Many public works and emergency services departments around the country are installing automated vehicle locator systems on their equipment. The systems consist of GPS receivers and transmitters on vehicles that allow the tracking of vehicle activity. Not only are the systems very useful for administrative purposes, but also they exist as an invaluable asset for dispatch efficiency.

Route 3 Corridor

- Support the capacity enhancement project for Route 3 (from Route 18 to Route 44).

- Initiate a multi-agency Comprehensive Management Plan for the entire Route 3 corridor building upon past work to discern impacts of growth, and future highway deficiencies.

- Construct a southbound ramp to Route 3 from Cranberry Road for traffic from the Kingston commuter rail station.

- Implement improvements to Route 3 Exit 4 in Plymouth that include a off-ramp from Route 3 northbound to Plimouth Plantation Highway eastbound.

- Conduct a traffic study to define the operational deficiencies at Route 3 Exit 6 in Plymouth, and to analyze the potential improvement concept to construct an acceleration lane at the bottom of the southbound ramp to Samoset Street. Under existing peak hour conditions, traffic exiting Route 3 southbound at Exit 6 to Samoset Street westbound backs up on the exit ramp onto Route 3 southbound. These backups are due to delays at the end of the ramp as vehicles wait for sufficient gaps in the westbound Samoset traffic stream. The widening of Samoset Street with an additional lane with sufficient length that would allow vehicles to merge into Samoset westbound traffic will prevent vehicles from backing up this ramp and onto the Route 3 southbound travel lanes. The right of way in this section of Samoset is 80 feet according to the latest MassDOT road inventory.

- Recommended improvements at Exit 5 are based upon a traffic study completed for Plymouth by engineering consultants. The recommendations include the addition of a northbound slip ramp at Exit 5 that will allow traffic direct access from Long Pond Road. At present, the loop ramp at Exit 5 requires vehicles to turn left from Long Pond Road to access Route 3 for northbound access. This causes back-ups on Long Pond Road as vehicles making this movement wait for sufficient gaps in through traffic to make their move. A southbound slip ramp has already been added from Long Pond Road to Route 3 at Exit 5. In addition to the ramps, other improvements proposed at Exit 5 include adding a connector road between Long Pond Road and Camelot Drive and extending Holman Road to Long Pond Road to form the eastbound leg of a four-way intersection with Camelot Drive and Long Pond Road.

- Construct ramps to and from Route 3 southbound to be added at the end of Camelot Drive. This on-ramp would split and extend to Plantation Highway southbound. Northbound off ramps would also be added at Exit 4 to Plantation Highway to the east and Camelot Drive to the west. The cost of improvements at Camelot Drive is estimated at $ 23,400,000.

- Expand Route 3 Exit 3 at Clark Road to a full directional interchange, along with an access road and access improvements as related to the Plymouth Rock Studios. The cost is estimated at $28,000,000.

Route 18 Corridor

- Improvements to Route 18 in anticipation of the redevelopment of the former Weymouth Naval Air Station include the widening of Route 18 in Abington from Route 139 to Highland Place in Weymouth, which is currently in the design phase.

- Close monitoring of traffic growth within this corridor should continue within Abington, Whitman, East Bridgewater, and Bridgewater along with continued discussion with town officials regarding access management applications and specific congestion improvement projects. A comprehensive study of the Route 18 Corridor in Abington, Whitman, East Bridgewater, and Bridgewater should be

undertaken to discern the impacts of cumulative traffic growth due to development. The study should include an analysis of existing and future traffic operations at East Bridgewater Center, and an analysis of future alternative recommended improvements to address operational deficiencies at this location.

Route 24 Widening and Improvements

- Support interstate conversion and capacity enhancement for the Route 24 Corridor.

- Develop a comprehensive Corridor Management Plan (CMP). The CMP should be a joint effort that includes affected regional planning agencies, state agencies, local officials, and interested parties.

- Provide a northbound slip ramp from Route 104 in Bridgewater westbound to Route 24 northbound. This would place the northbound on and off ramps in the northeast quadrant of the interchange.

Route 25

- Provide a Route 25 interchange in Plymouth to Bourne Road as an access and egress improvements to mitigate impacts of developmental growth. The construction of this interchange would most likely require right of way takings.

- Implement improvements to Route 3A at Route 3 Exit 2 between Hedges Pond Road and Herring Pond Road in Plymouth. As part of the developer mitigation, the proponent of the project has proposed to widen Route 3A to a four-lane cross section between the Herring Pond Road intersection and the Hedges Pond Road/Old County Road intersection. The developer has proposed the installation of traffic signals at four locations: at the Route 3A/Hedges Pond Road/Old County Road intersection, at the Route 3A retail drive intersection, at the Herring Pond Road/State Road intersection, and at the Route 3 northbound ramps/Herring Pond Road intersection. The plan calls for the coordination the signals to minimize vehicle stops and maximize progression along the major road.

Bridgewater: Route 104

- Route 104 is mainly a two-lane highway except for the section between the Route 24 northbound ramps and the Elm Street intersection, which was recently widened to four lanes to accommodate a construction of a home improvement center on the north side of Route 104, just east of Route 24. Route 104 carries approximately 23,000 vehicles per day and is a major connector between Route 24 and Bridgewater Center and the Bridgewater State University Campus. The Town of Bridgewater is considering zoning changes that will encourage future commercial growth along this corridor near the Route 24 interchange. Similar to the Route 106 corridor in West Bridgewater, high through volumes on Route 104 with multiple drives and side streets creates congested conditions especially during the peak period. The recent home improvement center improvements to Route 104 included consolidation of curb cuts to create a common drive into the site, adding traffic signals to the Route 24 northbound and southbound ramps at Route 104, and adding a signal at the site drive. In addition, MassDOT has determined that the addition of an on ramp in the northeast quadrant carrying Route 104 westbound traffic to Route 24 northbound will improve traffic flow on Route 104, and relieve back-ups on Route 24 that currently occur due to vehicles waiting to turn onto the ramps under the current configuration. MassDOT has entered into an agreement with the owners of the retail site for a land swap that will enable MassDOT to relocate the northbound ramp to the northeast quadrant of the Exit 15 interchange. The construction of this ramp is recommended by OCPC;

however, it is recommended that monitoring of the corridor continue and that future studies regarding this corridor consider the widening of Route 104 to Bridgewater center.

Brockton: Downtown Improvements

- Recommendations from the Brockton Downtown Two-Way Circulation Study completed by an engineering consultant in 1999, included recommendation for traffic flow modifications in the downtown. These included: converting Main Street, Warren Avenue, Spring Street, West Elm Street, and Belmont Street from one-way to two-way in the downtown; upgrade traffic signals and pedestrian signals; upgrade state route designation signs; restrict parking in the vicinity of major intersections; evaluate and eliminate "no right turn on red" signs in the downtown; and complete hardwire interconnect and closed loop traffic control system in the downtown. In 2008, the study was updated and the recommendations have been revised, which no longer include the two-way reconversion. These improvements are in the FFY 2011-2014 Old Colony TIP and are currently in the design stage.

Brockton: Route 123 from Route 24 to Linwood Street

- Route 123 within this corridor has four lanes of travel; however, the lane widths and shoulder are substandard for the speeds and traffic volumes on this road. Average Daily Traffic on Route 123 within this section is approximately 25,000 to 30,000 vehicles per day. Major delays occur on Route 123 east of the Route 24 interchange in Brockton due to delays at the Route 123/Manley Street intersection. This intersection carries heavy right turns from Route 123 to Manley Street southbound, and heavy left turn movements from Manley Street to Route 123 westbound during the peak hours. MassDOT has completed Road Safety Audits for the Route 123/ Linwood Street/ Lorraine Avenue intersection (2010) and the Route 123/ Manley Street intersection and Route 123/ VA Hospital intersection (2011).

Plymouth: Route 25 Interchange

- The construction of an additional Route 25 interchange in Plymouth before Exit 1 has been considered as a long-term possible improvement to offset the impacts of potential developmental growth at the Plymouth 1,000 acre site by the Plymouth Area Chamber of Commerce. This exit would most likely be connected to Bourne Road in Plymouth. The construction of this interchange would most likely require right of way takings in Plymouth and possibly in Wareham. The 1,000 acre site in Plymouth represents an economic development opportunity for the Town of Plymouth, which has expressed interest in encouraging economic development in this area.

Plymouth: Route 3 Interchange 2 1/2

- The construction of an additional Route 3 exit (Exit 2 ½), between existing Exit 2 and Exit 3, has been considered as a long-term possible improvement to offset the impacts of developmental growth in Plymouth by both the Plymouth DPW and Planning Department. Planning and implementation of this concept are beyond the long-term scope of this plan (twenty years); therefore, a preliminary cost estimate is not included. It is expected that an Exit 2 ½ would be connected to Long Pond Road to the west and Route 3A to the east. An Exit 2 ½ would most likely require takings through a conservation area in Plymouth.

Plymouth: Commerce Way

- Commerce Way in Plymouth is a key road corridor that directly connects Route 44 (to Route 3) to an important commercial district, with a number of commercial areas including Colony Place

and Wal-Mart. This area also includes medical office buildings and some light industrial uses. Commerce Way also connects to Enterprise Drive and the Independence Mall in Kingston to the north. Although some sections of Commerce Way provide four lanes, the road should be widened to four lanes to provide consistency throughout the corridor.

Plymouth: Long Pond Road Northbound Ramp at Exit 5

- Currently, Long Pond Road westbound traffic from Route 3A and Plymouth downtown accesses Route 3 northbound at a signalized ramp intersection. This ramp creates added delay and lacks sufficient length for vehicles to accelerate as they enter Route 3 northbound traffic. A direct ramp from Long Pond Road westbound would provide more efficient direct access to Route 3 without added delays from a traffic signal. In addition, an acceleration lane can be added to the Route 3 northbound side to receive this traffic and improve safety.

Plymouth: Route 3 Exit 2 at Route 3A at between Hedges Pond Road and Herring Pond Road

- This segment of the Route 3A corridor in Plymouth has experienced rapid growth in commercial and residential growth in the recent decade. In addition to heavy volumes within the Route 3A corridor near the Route 3 interchange at Exit 2, because of rapid growth; the Route 3A corridor also contains numerous curb cuts that add an excess of turning movements. Widening Route 3A to a four lane cross section between the Herring Pond Road intersection and the Hedges Pond Road/Old County Road intersection has been included as part of development mitigation, along with the installation of traffic signals at four locations: at the Route 3A/Hedges Pond Road/Old County Road intersection, at the Route 3A retail drive intersection, at the Herring Pond Road/State Road intersection, and at the Route 3 northbound ramps/Herring Pond Road intersection. Although the retail development has been postponed, the potential for development in this are remains. The plan also called for the coordination the signals to minimize vehicle stops and maximize progression along the major road.

Easton: Main Street in North Easton Village

- Planned developments in the North Easton Village are expected to affect the traffic circulation and the pedestrian and bicycle traffic in North Easton Village. These developments include the construction of a commuter rail station adjacent to Sullivan Street and Mechanic Street (with the extension of the South Coast Rail), and the Ames Shovel Works residential development, which consists of adding 119 town house condominiums. The Ames Shovel Works development will include on site sewer treatment with extended capacity that will be shared with Main Street businesses. The North Easton Village consists of a mix of uses and includes offices, residences and apartments, historic estates and historic buildings, a commercial area along Main Street (with small shops, offices, and eateries), the public library, the Children's Museum on Mechanic Street. In addition, the village lies within the North Easton National Register Historic District that includes buildings designed by the renowned architect H. H. Richardson. The Town of Easton is planning streetscape improvements, along with pavement improvements and improvements to sidewalks and pedestrian crossings in anticipation of these developments to the village.

Easton: Route 106 at Prospect Street

- OCPC conducted a study of traffic operations at this intersection for the Town of Easton, which recommended the installation of a traffic signal in order to mitigate the lack of sufficient gaps in the major street, Route 106, traffic flow that would allow side street traffic to enter the major street safely. The signal would also improve safety at this intersection due to a lack of sight distance at the side street, Prospect Street, approaches. This is a high crash location with a

history of serious injury crashes including a fatality. Project is currently under construction by the town of Easton.

Easton: Route 138 at Elm Street

- A Road Safety was completed by MassDOT in 2009. A study of operations at this intersection by OCPC for the Town of Easton concluded that deficiencies exist due to poor alignment and heavy peak hour traffic flow on the major street, Route 138, which prevents sufficient gaps for side street traffic to enter the major street. In addition, the study showed that this is a high crash location with a history of serious injury crashes including a fatality. The study recommended the installation of a traffic signal at this intersection.

Easton: Route 138 at Union Street

- A Road Safety was completed by MassDOT in 2009. The installation of traffic signals at this intersection has been recommended in the Easton State Numbered Routes Corridor Study conducted by OCPC. The traffic on Route 138 is such that there are few sufficient gaps for side street traffic from Union Street safely enter traffic flow.

Kingston: Route 3A at Route 3 (Exit 9)

- This stretch of Route 3A at Exit 9 in Kingston is a major bottleneck in the Route 3A corridor, with signals at the southbound off ramp in close proximity to the northbound on off ramp. These signals should be coordinated to improve progression on Route 3A. In addition, the lack of acceleration and deceleration lanes, along with side streets and a multitude of curb cuts for restaurants and businesses, impede through progression on Route 3A.

Stoughton: Route 27 at School Street

- A Road Safety was completed by MassDOT in 2009. OCPC completed a traffic signal warrant analysis in response to a request from the Town of Stoughton in February of 2006. Based on the analysis of traffic data collected at the Canton Street (Route 27) and School Street intersection, geometric improvements and full signalization of this intersection was recommended. Upgrading the intersection with traffic signals was recommended based on a number of factors. The intersection has a crash rate of 2.46 crashes per million entering vehicles; a rate over three times higher (318%) than the MassDOT District 5 average crash rate (0.59) for un-signalized intersections. According to Registry of Motor Vehicles (RMV) crash records, thirty-seven (37) crashes occurred during the three-year period from January 1, 2002 through December 31, 2004. Of the 37 crashes reported in the three-year period, 17 (46 percent) involved personal injury. The majority of these crashes (31 of 37) were cross movement collisions between conflicting vehicle movements from perpendicular approaches. In addition, this intersection experiences very heavy delays on the School Street approaches during both the morning and afternoon peak hours with poor level-of-service (LOS F). Four of the eight warrants for traffic signals from the 2003 Manual on Uniform Traffic Control Devices (MUTCD) are satisfied for this intersection: the Eight-Hour Vehicular Volumes Warrant (Warrant 1); the Four-Hour Vehicular Volumes Warrant (Warrant 2); Crash Experience Warrant (Warrant 7); and the Roadway Network Warrant (Warrant 8).

West Bridgewater: Route 28 at Matfield Street

- Based on the Route 28 Corridor Study, which was completed by OCPC in 2006, Matfield Street at Route 28 in West Bridgewater operates under forced flow conditions (LOS “F) during the morning and afternoon peak hours. Currently, this intersection is stop controlled at the Matfield

approach, with police officers controlling traffic during the peak hours. The volume of traffic on Route 28 is such that there are few sufficient gaps on Route 28 for side street traffic from Matfield Street to safely enter traffic flow on Route 28. The plan to install traffic signals at this intersection requires MassDOT approval for TIP programming. Signal warrant analysis shows that this intersection satisfies the MUTCD Warrants for Warrant 2, Four-Hour Vehicular Volume. Level-of-service analyses for future 2010 peak hour conditions show that this intersection will operate at LOS "C" during the morning and afternoon peak hours under signalized operation.

West Bridgewater: Route 106

- Route 106 provides two lanes of travel within the corridor between Route 138 in Easton and Route 28 in West Bridgewater, with the exception of a short four-lane section over Route 24 between the Route 24 ramps. Very heavy through moving traffic combined with multiple high traffic generating land uses in the area (gas stations, convenience stores, and fast food establishments) creates congested conditions with long delays especially in vicinity just east and west of the Route 24 ramps. Route 106 carries approximately 25,000 vehicles per day east of the Route 24 ramps. These vehicles merge from two lanes eastbound to one lane eastbound just east of the Route 24 ramps. Vehicles on the through lanes waiting to make left turns into side driveways, along with vehicles turning out of side drives, create blockages and hazardous conditions due to turning movement conflicts. The heaviest volumes on Route 106 occur between Route 28 and Route 24. This is also the area with the densest commercial development. Widening Route 106 between Route 24 and Route 28, which has the support of the West Bridgewater Highway Department, along with the application of access management such as consolidating access drives, will improve traffic flow, and improve safety within this corridor. One of the major constraints to widening Route 106 from two to four lanes from the Route 24 ramps to Route 28 is the limitation in right of way. The right of way for Route 106 from the Easton town line to Route 24 is 50 feet, according to the latest MassDOT road inventory. This would leave only one foot on each side of the road for shoulders if the cross section were widened to four twelve foot lanes. An alternative widening of Route 106, to include a three lane cross section, two travel lanes for each direction of travel and a center two-way turning lane (TWTL), should be considered. This alternative can be used to avoid costly right of way takings while providing an additional lane for traffic on Route 106 that will not block the through lane as vehicles turn left into adjacent drives or side streets.

West Bridgewater: Route 106 at Howard Street

- The Route 106/Howard Street intersection, which is currently under stop sign control, is located just west of the Route 106/Route 28 intersection at the town center. Traffic on the Route 106 corridor in this section is so heavy that vehicles entering the Route 106 major street from the side streets experience very long delays, especially during the peak hours. The signalization of this intersection is necessary to mitigate impacts from development and allow safe efficient access to and from Route 106. In addition, this intersection lacks pedestrian amenities for people crossing Route 106.

West Bridgewater: Route 106 at Route 28

- Improvements to the intersection of Route 106 (East and West Center Street) and Route 28 (North and South Main Street) at the West Bridgewater Town Center are included in FFY 2013 the FFY 2012-2015 Old Colony TIP. The project is currently in the design stage. This intersection carries heavy commuter volumes during the morning and afternoon peak hours, providing access to Route 24 to the west via Route 106, and providing a north south alternative to Route

24 via Route 28, and it also lies at the center of the Town of West Bridgewater. This intersection operates under forced flow conditions with long delays (LOS "F") during the peak hours.

Utilize Access Management to reduce conflicts and improve safety. The goals of access management include conserving highway corridor capacity and improving safety. Access management is important throughout highway corridors in order to manage the placement, spacing, and width of curb cuts that provide access to adjacent properties. Areas within the region in which access management techniques should be a prime focus, at a minimum, include:

- Route 28 (Memorial Drive) in Avon from Harrison Boulevard south to Route 37 (Howard Street) in north Brockton.
- Route 123 Belmont Street east and west of Route 24 in Brockton
- Route 123 in Brockton east of the downtown to Abington
- Route 28 through the Brockton downtown (between Route 37 and Plain Street)
- Route 28 in south Brockton (Main Street)
- Route 28 in West Bridgewater (North Main Street and South Main Street)
- The Route 28 (Bedford Street) Route 18 corridor south of Bridgewater center
- Route 138 north of Stoughton Center
- Route 138 in Easton
- Route 106 east of Route 138 in Easton to West Bridgewater Center
- Route 104 east of Route 24 in Bridgewater
- Route 18 in Abington
- Route 3A in Kingston and Plymouth
- Samoset Street in Plymouth

CHAPTER 6 – REGIONAL TRANSIT SYSTEM

Transit Connectivity 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 to increase capacity and promote greater safety.

Support additional service. In 1999, BAT implemented Sunday service on both fixed and paratransit routes. This much-needed service provides access for residents of the BAT member communities to weekend jobs and shopping. Support such new programs, as well as the continuation of existing programs that support economic development in the region.

Maintain productivity and cost effectiveness. BAT contracts out transportation services to a variety of private carriers. Support this method of maintaining productivity and cost effectiveness.

Meet operations needs. BAT annually seeks FTA 49 U.S.C. Section 5307 grants to finance support equipment and operations costs. BAT should continue to seek this method of funding to meet operation's needs, for as long as such funding is available.

Maintain capital planning for BAT's paratransit services. BAT continues to seek funding each fiscal year through the Mobility Assistance Program for the replacement of paratransit vehicles as needed. This policy should be maintained so that BAT may replenish its rolling stock that is considered "beyond its useful life."

Support the development of a Human Services Coordinated Plan for the region. This is a requirement of the federal SAFETEA-LU legislation. This coordinated effort can enhance and improve human services in the region as a coordinated effort and merging of resources.

Improve mass transit linkages. Every effort should be made to promote improved linkages between mass transit and other modes of transportation. One example would be a public private relationship utilizing private carriers to connect localized RTA's.

Increase intermodal connections at the Montello Station. Currently an MBAT route, a BAT route, and passenger rail to Boston is serviced by the station. Coordinating the fixed routes there and making the station a mini –intermodal center will enhance the transportation options for the people in the area and using the station.

Support the development of a Plymouth Intermodal Center. GATRA and Plymouth is interested in building 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.

Provide feeder service to Old Colony commuter rail stations. Intercity bus carriers, such as P&B and JBL Bus Lines, Inc. should consider altering and/or adding routes, to serve as feeder routes to Old Colony commuter rail stations. GATRA provides service between Pembroke Town Center and the MBTA Commuter Rail Station in Hanson.

Encourage adequate parking and traffic mitigation at station sites. It is imperative that local officials confer with MBTA planners and engineers to determine that access and egress to/from station sites are properly mitigated.

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.

Develop additional park-and-ride facilities. OCPC transportation staff should interact with MassDOT in determining potential new sites for the construction of park-and-ride facilities to augment existing facilities.

Support creation of HOV lanes on congested highways leading into Boston. Intercity bus carriers throughout the region maintain that the creation of genuine High Occupancy Vehicle (HOV) lanes would reduce their commuting time into Boston, making commuter bus lines more competitive with commuter rail. In addition, HOV lanes would make commuter bus lines a more acceptable alternative to individuals who drive automobiles (primarily alone) into Boston, thereby reducing congestion.

Study the feasibility of HOV lanes for buses, carpools, and vanpools. As was mentioned earlier, HOV lanes installed along Principal Arterials such as the one on Interstate 93 would improve commuting times into Boston, reduce congestion, and improve air quality. A feasibility study should be conducted to determine the potential for HOV lanes along Principal Arterials in the region.

Support alternative means of funding mass transit. Support initiatives to determine dedicated sources of revenue, such as the fuel tax and Senate Bill 2315, which could fund transit operations throughout the Commonwealth.

Consider development of additional public moorings in Plymouth Harbor. The development of additional public moorings would better serve recreational and visiting boaters. Support such an initiative.

Consider expansion of North Plymouth Harbor. Such a development could potentially derive additional economic development as well as tourism benefits by instituting a water shuttle between Cordage Park and Town Wharf or State Pier.

Increase parking capacity in downtown Stoughton. The town-owned and MBTA-owned lots are at capacity on a daily basis. The MBTA should study the feasibility of constructing a multi-level parking garage in Downtown Stoughton adjacent to the station.

Develop park-and-ride facilities to maximize a multimode transportation system. Park-and-Ride facilities should be sited adjacent to major interchanges/arterials, rapid transit and passenger rail stations.

Transit Service Area Expansion Opportunities

Determine potential for regional airports to accommodate tilt-rotor aircraft. New tilt-rotor services could co-exist with fixed wing operations at existing airports, or operate directly out of additional capacity to the traveling public. The potential for regional airports to accommodate these services should be investigated.

Preserve abandoned railroad rights-of-way by use of Rail Banking. Support preservation abandoned railroad rights-of-way having the potential for construction of future transportation projects.

Support efforts to operate a full weekday schedule on holidays on which most retail stores are open--Martin Luther King Day, President's Day, Columbus Day, and Veteran's Day. Increasing the amount of service would provide access for both patrons and employees to businesses that do not observe those holidays.

Support the guidelines recommended by MARTA to bring service at BAT and GATRA to its most efficient levels. Service has been cut across the state over the last couple of years to complete with raising fuel and employee benefit costs. When service is cut and fares are raised to compensate for this, the transit riding public is put at a disadvantage. The proposal set out by the MARTA study would restore those cuts and bring transit up to a level that could best serve the community.

Study the feasibility of BAT expanding its service area.

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 the elderly and disabled communities.

Encourage private sector participation in public transit operations. BAT is encouraged to continue joint development initiatives with private sector concerns when feasible.

Support expanding the reach of fixed route transit as identified in the Route 3 Corridor Transit Options Study.

Study expansion of intercity bus service. Studies should be performed to consider the feasibility of implementing intercity bus service between Brockton and Plymouth, Taunton and Brockton.

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.
Support the restoration and extension of commuter rail to Fall River and New Bedford, while providing adequate community mitigation, and feeder regional transit services.

Support restoration and extension of commuter rail to Buzzards Bay, while providing adequate community mitigation, and feeder regional transit services.

Support provision of a commuter rail station in West Bridgewater along Old Colony Commuter Rail Line.

Encourage staggered work hour initiatives. Where feasible, encourage large employers to stagger their work hours to offset emissions from high concentrations of automobiles during peak hours.

Support employer-based transportation programs. 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. As well, managing demand for costly long-term parking by encouraging shared-ride commuting through preferential parking incentives or special discounts for employees. MassRides is a great first resource for an employer looking to establish commuter programs for their employees.

Support legislative initiatives affecting corporate commuter services program. Under the Massachusetts General Laws, Chapter 63, Section 31D, corporations doing business in Massachusetts are allowed a tax credit amounting to 30% of the cost of purchasing or leasing a commuter van for their employees to use in their daily work trips. This legislation also waives registration fees, creates a special license plate for commuter vans and established insurance requirements for participating vehicles. Corporations are encouraged to implement commuter services programs that provide incentives through the above legislative initiatives.

Encourage the use of Transit Tax Credits. Currently the federal government will allow employees to use up to 110 dollars of month pretax to pay for transit passes. In the state of Massachusetts, a similar benefit is extended only to the MBTA. The utilization of the federal benefit and the extension of a Massachusetts transit income tax benefit would benefit both employees and employers.

Enforce Massachusetts's rideshare regulation. To comply with Massachusetts's environmental regulation (310 CMR 7.16), employers with more than 250 employees at a single location must implement commuter programs geared to reducing drive alone commuting by 25%. Program options include instituting a transit pass program, creating incentives for bicycle commuting, posting transit schedules and maps, and promoting carpooling. In addition, companies with more than 1000 employees at one facility must implement a vanpool program.

Develop a plan for senior transition from personally operated vehicles to public transportation. Seniors as they lose their mobility and the reaction necessary to drive maybe more will to move to public transportation if they can achieve some level of flexibility while retaining their independence. A plan should be developed to enhance and encourage this transition.

Support Car Sharing. Car sharing programs like Zipcar and Flexcar can be a great way to offers residents flexible transportation options. Areas that would be great candidates in the region are Bridgewater State University, Stonehill College and the developing area around the BAT intermodal Centre.

Encourage the application of Smart Growth Principles to development in the region.

Support redevelopment of the former Weymouth Naval Air Station. Support mixed transit focused reuse of the land occupied by the former Weymouth Naval Air Station.

Transit Safety and Intelligent Transportation Systems

Support BAT's bus replacement program and system preservation to ensure a state of good repair. BAT should continue to seek funding to update its fixed route bus fleet and allied equipment on an as needed basis.

Support the Development of Transit Safety Plans As technologies improve so will the need to keep our safety and security systems up to date. Some steps are as simple as the cooperation amongst RTAs to develop a continuity of operations plan (COOP). This is a great first step. The next step, making sure that

the entire key stakeholders understand what is involved when the plan is invoked will be the key to its success.

Support the integration of technologies across modes of transportation. Examples of this would be a regional fare card or integrated AVL systems to improve transit connections across systems.

Support the use of Rail Education programs like Operation Life Saver Regional efforts to increase safety can come from many levels, for example the continuation of educational programs like operation lifesaver is important to communities that have to live with frequent rail traffic in their community.

Support transportation improvements save energy. Transportation improvements in the region should be undertaken with consideration to energy conservation. Support should be developed for increased promotion of ridesharing, HOV lanes, employer sponsored trip reduction plans and the use of alternative forms of energy.

Support the use of new technologies for transit vehicles. Hybrid and hydrogen technology on buses can reduce fuel consumption and pollution and AVL technology for DIAL-A-BAT and BAT and GATRA can improve safety and efficiency for the service.

Study the use of Signal Priority in the BAT and GATRA service areas. Expand signal priority for the BAT system especially near the BAT Centre would increase efficiency and on time performance. The same technology can be employed at intersections to the benefit of emergency services vehicles as well.

Develop park-and-ride facilities, which support and enhance state air quality goals and commitments. Facilities should serve as many alternative High-Occupancy Vehicle (HOV) modes as possible. Public and private transit operators should be encouraged to serve park-and-ride facilities. Site selection criteria should include consideration of bicycle and/or pedestrian accessibility to reduce the number of cold starts by vehicles.
Support the improvement of pedestrian safety around transit stations. For example, the streets surrounding the Montello station do not promote pedestrian safety and pedestrians are often forced to choose unsafe routes to the station.

Freight and Air Transportation Transit Networks

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.

Accommodate freight and passenger railroad operations. Old Colony commuter rail operations could affect existing freight train services by reducing the flexibility available to CSX and Bay Colony Railroad. However, the low frequency of operation of the Old Colony lines during off-peak periods, coupled with the provision of a modern signaling system, centralized traffic control and passing sidings at strategic locations would permit freight operations during the midday periods. Consideration of freight and passenger railroad impacts is encouraged.

Increase the level of freight/goods movement by rail on the Old Colony and Stoughton lines. Support such initiatives, which would serve to reduce truck traffic congestion, particularly if the double stacking of containers in railroad freight hauling operations is implemented in the near future.

Allow for freight rail operations and the Old Colony commuter rail service to co-exist. Coordination should be encouraged between the MBTA and the two railroad freight operators in the region: CSX (Middleboro Line) and Bay Colony Railroad (Plymouth Line). Although freight railroad service in the region generally should not conflict with the restored passenger rail service during its peak operating periods in the A.M. and P.M., contingencies will need to be addressed such as the installation of updated switching equipment and passing siding.

CHAPTER 7 - BICYCLE AND PEDESTRIAN TRANSPORTATION

Continue support and coordination of the Regional Bicycle and Pedestrian Taskforce: Old Colony Planning Council staff shall be responsible for scheduling and coordinating meetings of the Regional Bicycle and Pedestrian Taskforce. The Taskforce shall meet quarterly, unless otherwise directed by the majority opinion of the Taskforce members. Staff shall record and disseminate minutes of all Taskforce meetings, and report to the Joint Transportation Committee, Old Colony Planning Council, and Metropolitan Planning Organization in a timely manner.

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.

Plymouth MBTA Commuter Rail Station and Seaside Rail Trail: Construction of new connections and enhancements to existing ones should be made between the Plymouth Station, the Plymouth Seaside Trail, and the Historic Plymouth Waterfront and Downtown Plymouth. Currently there is some degree of disconnect between these three components to this underutilized transportation corridor.

Maintain and Regularly Update the Regional Bicycle and Pedestrian Transportation Plan. The Regional Bicycle and Pedestrian Transportation Plan examine the existing infrastructure in the region that supports bicycle and pedestrian transportation, and identify strengths and weaknesses in the system. The Plan identifies key areas to address for the creation of a contiguous, region-wide network of sidewalks, walkways, bicycle paths, and bicycle lanes, as well as identify strategies to accomplish the goals of the plan.

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.

Continue bicycle and pedestrian transportation safety efforts in Safety Management System. The Safety Management System promotes and plans for safety improvements throughout all modes on the transportation network.

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.

Enhance pedestrian consideration during the planning and design phases. Too often municipalities overlook the safety and access of pedestrians in areas with high volumes of automobiles. Only as an afterthought, safety amenities are added or design conditions are changed. A coordinated effort of planners, engineers, and local officials, should encourage pedestrian needs to be of higher priority during the initial design process.

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 and Support the Bay State Greenway and Boston to Cape Cod Corridor. OCPC shall promote and support the Bay State Greenway and Boston to Cape Cod Corridor through its planning efforts and public outreach activities. Signage indicated the bike route should be upgraded to both better serve cyclists using the facilities as well as to notify drivers that the on-road portions are designated bike routes.

Continue to study/identify additional pedestrian facilities. Continue to conduct studies in the region as needed to identify, designate, and implement additional pedestrian facilities. These facilities should improve linkages between existing pedestrian walkways, transit facilities, activity areas, and residential neighborhoods, and provide a safe and accessible means of short distance travel and recreation.

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. Raised medians provide the following benefits to pedestrians on the roadway network:

- Allow pedestrians to cross few lanes at a time, reducing exposure time;
- Provide a refuge so slower pedestrians (older persons, physically disabled, etc.) can wait for a break in the traffic stream;
- Allow pedestrians to focus on one direction of traffic at a time;
- Reduce the total distance over which pedestrians are exposed to conflicts with motor vehicles; and,
- May provide easily accessible location for pedestrians signal call buttons.

Raised medians may also further enhance safety by functioning as a traffic-calming device, forcing drivers to reduce speed on approach to the crossing area.

Promote Pedestrian Level of Service B or Better at Intersections with High Pedestrian Activity – Pedestrian level of service is defined by the delay experienced by the pedestrian at an intersection, with guidance provided for by the Highway Capacity Manual (HCM). At Level of Service grades A and B, the likelihood of risk taking behavior (accepting dangerously small traffic gap, ignoring signals, etc.) in evaluated as "Low" by the HCM. The likelihood of risky behavior increases to "Moderate" at Level of Service grades C and D. At level of service E, the likelihood of risky behavior increases to "High." All reasonable efforts should be exercised in planning, design, and construction of pedestrian facilities at intersections to minimize the potential risk taking behavior by pedestrians at intersections.

CHAPTER 8 - ENVIRONEMTNAL QUALITY, HAZARDS, AND ENERGY

Strive to reduce vehicle emissions. Encourage research and technology development to find new solutions to air pollution problems created by motor vehicles.

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.

Make maximum use of existing facilities and programs. The Massachusetts Environmental Policy Act Unit is responsible for reviewing large-scale development projects and should be allowed to maximize their influence to help protect the quality of the environment. The MassDOT Project Development and Design Guidebook can be extremely helpful in the protection and preservation of the environment as it promotes an integrated multimodal approach to roadway planning and design, ensures that context sensitivity is integrated into the planning, design, and construction process, and provides a clear project development process.

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.

Encourage the Commonwealth's "Fix It First" Policy. The Old Colony MPO also realizes the continual need to maintain and preserve the transportation infrastructure in the region and fully supports the Commonwealth's "Fix it First" policy. Fix it First is a statewide commitment to repair and maintain the existing transportation infrastructure in order to avoid unnecessary environmental impacts.

Support programs that mitigate water resource shortages. The Taunton River Desalinization Plant in Dighton (Aquaria project) will help meet the water demand of the Old Colony MPO region.

Reduce nonpoint source pollution. 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.

Minimize the use of road salt and sand. Studies have shown that road salt can have negative effects on some roadside vegetation and aquatic life. Accumulated amounts of sand can be hazardous to both the natural environment (air, land, and water) as well as to the traveling public. MassDOT has taken a number of steps to reduce the environmental impact from winter sanding and salt practices on state highways; including the reduction of sand applied during storms, use of liquid and flake calcium chloride to reduce sodium levels in runoff; construction of covered facilities for sand and salt storage and establishment of certain zones where reduced salt is used.

Support programs that reduce transportation related litter. The MassDOT Adopt-A-Highway program is a public service program that utilizes volunteer teams to pick up litter along the roadways.

Develop solutions for controlling transportation related noise. Transportation-related noise impacts can be minimized through improved facility design, compatible land uses, and enforcement of noise regulations. Encourage all regional and local transportation-planning efforts deal with noise problems as a normal step in the planning process.

Work to reduce/prevent light and noise impacts. Develop solutions for controlling transportation-related noise. Include noise mitigation through improved facility design, compatible land uses, enforcement of noise regulations, and selective use of sound barriers. Relate takings and designs to the sensitivity of adjacent habitats and neighborhoods. Design/install highway lights and street lights to be directed down away from houses or other sensitive receptors or the sky.

Encourage Brownfield Redevelopment. Brownfields properties are often located where there is existing infrastructure, workforce and other amenities and therefore, are attractive for potential new business. Reuse of these facilities cleanses the existing site and eliminates the need to clear cut forest for more development. Fostering the cleanup and re-use of contaminated properties is a priority for the state and the Old Colony MPO and is consistent with the Sustainable Development Principles established by the Massachusetts Office of Commonwealth Development.

Encourage Smart Growth Development Strategies. Support the smart growth initiatives resulting in cluster and condensed development. These strategies aim to reduce vehicle trips and vehicle dependency, therefore, resulting in benefits to air quality and reduction of foreign fossil fuel dependency.

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.

Promote the use of Corridor Management Plans. The MassDOT Office of Transportation Planning is developing a Route 44 Plymouth-Taunton Corridor Management Plan. This type of planning is vital to the Southeastern Massachusetts region, as it encourages collaboration between corridor municipalities, the Commonwealth, and other agencies and identifies potential growth and transportation management strategies for the corridor.

Encourage the use of parking garage structures. As more development occurs along major transportation infrastructure, the pressure to make parking lots larger to accommodate more residents, shoppers, and visitors increases. Parking garage structures allow the impact of vehicle parking to happen on a smaller footprint, thus reducing the amount of impervious pavement.

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.

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.

Climate Change

Maintain and Expand Transit Services in the Region. The Old Colony MPO supports the increased use of mass transit and the possible expansion of regional transit services, as they reduce congestion on the roadways and will reduce the use of fossil fuels which will in turn reduce greenhouse gas emissions that are emitted into the atmosphere.

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.

The current-endorsed "Livability" and "Sustainable Development" movements encourage a "redevelop first" mentality, putting relatively high-density development near existing centers and in areas with well-established infrastructure, and doing so in ways that avoid additional energy consumption and the emission of greenhouse gases into the atmosphere.

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.

Support Congestion Relief Methods. An effective Congestion Management Process (CMP) identifies effective congestion reducing strategies that meet the needs of a particular region. State and local governments can use Access Management techniques to control access to highways, major arterials, and other roadways. The utilization of access management techniques can preserve capacity within the roadway, thereby increasing the efficiency of traffic flow and avoiding congestion, therefore reducing the amount of greenhouse gases being emitted into the atmosphere.

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.

Support Executive Order 484 - Leading by Example: Clean Energy and Efficient Buildings. The Old Colony MPO realizes the need to promote and invest and clean energy and supports the Commonwealth's efforts through Executive Order 484. Executive Order 484 builds on a number of the Division of Capital Asset Management's (DCAM's) current initiatives, while setting more specific and far-reaching targets for state facilities. All Commonwealth agencies as a whole to the greatest extent feasible individually, shall meet a number of energy and greenhouse gas emission reducing goals by 2012:

Support the Exploration of Alternative Funding Mechanisms. The Vehicle Mileage Tax (VMT), Road Pricing, and Congestion Pricing are all alternative funding mechanisms that are being explored here in the United States and that are already in use in many parts of the world. The premise for exploring these alternative funding mechanisms is that the current gasoline tax is not providing a sufficient source of revenue to fund highway infrastructure projects.

Hazards & Evacuations

Encourage pre-disaster planning. Many communities have participated in a multi-hazard pre-disaster planning effort, which focused on natural disasters and how the region's citizens will respond.

Reduce the loss of life, property, infrastructure, and cultural resources from natural disasters. A coordinated response to a natural disaster will reduce the loss of life, property, infrastructure, and cultural resources. Visible evacuation routes will also eliminate congestion on major routes.

Make maximum use of existing facilities and programs. Programs and facilities that are established to mitigate damage to transportation infrastructure, property, and cultural resources should be maintained and utilized to their greatest potential.

Increase the number of communities applying for FEMA Hazard Mitigation Assistance (HMA) grants

Communities can apply to receive funding for Hazard Mitigation Assistance (HMA) grant programs for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following five HMA grant programs: Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL).

Improve pre-disaster planning and communication/coordination between federal, state, regional, county, municipal, private, and non-profit agencies and major firms and institutions, especially prisons, colleges, and concentrations of population and employment. Pre-disaster planning can help reduce the loss of life and property by lessening the impact of a disaster. This can be achieved through risk analysis, where the results can then provide the information needed for mitigation activities that reduce the risk and impacts of hazards. Also, partnering and sharing information among the many stakeholders in the community as well as with the state and federal government can be beneficial to all parties involved. When lines of communication are open among stakeholders, solutions to hazards are usually easier to come by.

Energy, Fuels, and Emissions

Reduce dependency on foreign fossil fuels. Promote research, development, and implementation of standards, policies, and programs to reduce fuel consumption and the increase investments in alternative fuels.

Conserve Natural Resources

The southeastern portion of Massachusetts has seen substantial growth over the past decade. Water demand will be the limiting factor in terms of growth in the region and that water resource must be protected.

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.

Promote the increase and enforcement of Corporate Average Fuel Economy (CAFEE) 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.

Continue to enforce the emissions standards set by the Commonwealth. Enforcing the emissions standards for all vehicles of the Commonwealth plays a large role in improving the air quality of the State.

Promote new and forward thinking “green” technologies. The Carl Moyer Program in California is a prime example of how Massachusetts can encourage drivers to replace their old automobiles with newer and less polluting vehicles.

CHAPTER 9 - SAFETY

Reduce the rates of motor vehicle, bicycle, and pedestrian fatalities by incorporating engineering, enforcement, education, and emergency response into the planning process.

Support the increase of safety of highway and railroad grade crossings and other locations where modes intersect.

Support the increase and improvement of safety of services, vehicles, and facilities for transit, and for the transportation disadvantaged.

Support the implementation of emergency response and evacuation plans in cooperation with emergency management agencies.

Continue to utilize safety performance measures in the planning process.
Broaden the awareness of safety issues through dissemination of messages to the public and elected officials.

Identify top lane departure and crash location and work at the local and regional levels to develop and implement location specific strategies to mitigate the deficiencies.

Continue to provide technical support for Safe Routes to School and expand participation to local schools in the Old Colony Region

Support the increase of seat belt use in the State.
Increase the awareness of the dangers of speeding.

Support initiatives to educate and increase awareness on the dangers of distracted driving, and support legislation and law enforcement initiatives to curb the practice of distracted driving

Expand the use of Intelligent Transportation Systems technologies designed to enhance safety throughout the transportation network

Continue conducting Road Safety Audits at locations identified as high crash locations, soliciting input, and solutions using a multidisciplinary approach

Support new federal standards on sign retroreflectivity, and identify areas that must be upgraded

CHAPTER 10 - SECURITY

Foster communication and cooperation between federal, state, regional, and local agencies for the planning practice, and implementation of emergency scenario plans.

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 surveillance and security efforts at transportation facilities throughout the region.

Continue other security improvements at the public use airports, such as the installation of security fencing, gates, and access control and video monitoring systems.

Facilitate comprehensive evacuation planning and coordination procedures between state and local agencies.

Designate and indicate, through road signs, emergency evacuation routes, and shelters

Support enforcement of state and local traffic laws.

Continue to implement “Transit Watch” and the station improvement program of the MBTA, including station monitors and the new communications system.

Consider developing a general information booklet to be distributed to all human service agencies in the region. The basic information might include the following: What to do in the event of an emergency; the local community emergency/disaster contact person and phone; an outline of the proposed regional evacuation routes; a listing of local shelters; etc.

CHAPTER 11 – FINANCE

Preserve, operate, and maintain transportation assets for current and future generations.

Adequately maintain all elements of the transportation system to protect the public's investment.

Increase the efficiency of the transportation system using appropriate technologies.

Discuss, analyze, and incorporate, as deemed appropriate, the recommendations of the Transportation Finance Commission.

Support the increase of the annual Chapter 90 statewide total amount to at least $250 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 grow with inflation.

Establish and dedicate transit funding from sources that grow 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.

Support the changing of RTA financing from retroactive reimbursement to current financing (forward funding).