CAPE COD COMMISSION

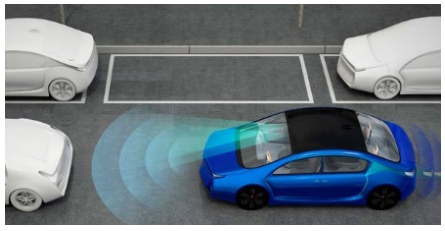
CAPE COD METROPOLITAN PLANNING ORGANIZATION

Cape Cod 2020 Regional Transportation Plan

2020-2040

Endorsed: July 15, 2019





COUNTY OF BARNSTABLE MASSACHUSETTS

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CAPE COD METROPOLITAN PLANNING ORGANIZATION

CAPE COD REGIONAL TRANSPORTATION PLAN (RTP)

FEDERAL FISCAL YEAR 2020

Anticipated Endorsement Date: July 15, 2019

Prepared by the

CAPE COD METROPOLITAN PLANNING ORGANIZATION (MPO) MEMBERS:

- Stephanie Pollack, Secretary and Chief Executive Officer, Massachusetts Department of Transportation (MassDOT)
- Jonathan Gulliver, Administrator, MassDOT Highway Division
- Tom Guerino, Chair, Cape Cod Regional Transit Authority
- Harold Mitchell, Cape Cod Commission
- James H. Crocker Jr., President, Barnstable Town Council
- Ronald Bergstrom, Barnstable County Commissioners
- Judith MacLeod-Froman, Bourne Selectman, for Bourne, Falmouth, Mashpee, and Sandwich
- Norman Holcomb, Yarmouth Selectman, for Dennis and Yarmouth
- Alan McClennen, Orleans Selectman, for Brewster, Chatham, Harwich, and Orleans
- Robert Weinstein, Truro Selectman, for Eastham, Provincetown, Truro, and Wellfleet
- Jason Steiding, Chairman, Mashpee Wampanoag Tribal Council

MPO EX-OFFICIO MEMBERS:

- Jeff Colby, Chairman, Cape Cod Joint Transportation Committee
- Kathy Tevyaw, National Park Service/Cape Cod National Seashore
- Lawrence T. Davis, US Army Corps of Engineers/Cape Cod Canal
- Robert B. Davis, Woods Hole, Martha's Vineyard, and Nantucket Steamship Authority
- Jeffrey McEwan, Federal Highway Administration
- Peter Butler, Acting Federal Transit Administration

AND THE CAPE COD JOINT TRANSPORTATION COMMITTEE:

- Thomas Andrade, Chairman, Dennis
- Thomas Temple, Vice-Chairman, Chatham

CAPE COD COMMISSION RTP STAFF CONTACT:

Steven Tupper, Transportation Program Manager, Cape Cod Commission

This report was funded in part through grants from the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), United States Department of Transportation (USDOT). The views and opinions of the Cape Cod Metropolitan Planning Organization (MPO) expressed herein do not necessarily state or reflect those of the USDOT.

CAPE COD METROPOLITAN PLANNING ORGANIZATION

Cape Cod Regional Transportation Plan (RTP)

ENDORSEMENT, RTP

The signatures to follow certify that the Cape Cod Metropolitan Planning Organization (MPO) hereby endorses the Cape Cod Regional Transportation Plan (RTP) for Federal Fiscal Year 2020 in fulfillment of the requirements of 23 CFR Part 450.324.

CERTIFICATION:

The Cape Cod Metropolitan Planning Organization (MPO) Planning Process

The signatures to follow certify that the Comprehensive, Continuing, Cooperative Transportation Planning Process for the current local, regional, state, and federal fiscal years in the Cape Cod Metropolitan Planning Organization planning area is addressing major issues facing the region and is being conducted in accordance with the requirements of:

1. Section 134 Title 23, U.S.C., and Title 49 U.S.C. 5303, and this subpart;
2. Sections 174 and 176(c) & (d) of the Clean Air Act, as amended {42 U.S.C. 7504, 7506 (c) & (d)} and 40 CFR part 93;
3. Title VI of the Civil Rights Act of 1964, as amended {42 U.S.C. 2000d-1} and 49 CFR part 21:
4. 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex, or age in employment or business opportunity;
5. Section 1101 (b) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (Pub. L. 109-59) and 49 CFR part 26 regarding the involvement of disadvantaged business enterprises (DBE) in USDOT funded projects;
6. Title 23 CFR part 230, regarding the implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;
7. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) and 49 CFR Parts 27, 37, and 38;
8. The Older Americans Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;
9. Section 324 of title 23 U.S.C. regarding the prohibition of discrimination based on gender; and
10. Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.
11. Anti-lobbying restrictions found in 49 USC Part 20. No appropriated funds may be expended by a recipient to influence or attempt to influence an officer or employee of any agency, a Member of Congress, in connection with the awarding of any Federal contract.

The currently endorsed Unified Planning Work Program, Regional Transportation Plan, and the Cape Cod Transportation Improvement Program (TIP) for Federal Fiscal Year 2020 were developed in accordance with FHWA/FTA regulations, EPA regulations, and fully incorporate the applicable requirements of the 1964 Civil Rights Act and the Americans with Disabilities Act of 1990.

CAPE COD METROPOLITAN PLANNING ORGANIZATION (MPO)

CAPE COD REGIONAL TRANSPORTATION PLAN (RTP)

The signatures to follow certify that the Cape Cod Metropolitan Planning Organization (MPO), at their meeting on July 15, 2019, hereby approves the following action in accordance with the Comprehensive, Cooperative and Continuing transportation planning process. In accordance with the requirements of 23 CFR Part 450 Section 308(c) of Federal Regulations, the MPO for Cape Cod has completed its review and hereby endorses the Regional Transportation Plan (RTP) for Federal Fiscal Year 2020.

Stephanie Pollack, Secretary/Chief Executive Officer – Massachusetts Department of Transportation (MassDOT)

Jonathan Gulliver, Administrator
Massachusetts Department of Transportation (MassDOT) Highway Division

Harold Mitchell
Cape Cod Commission

Tom Guerino, Chair
Cape Cod Regional Transit Authority

Ronald Bergstrom
Barnstable County Commissioners

for James H. Crocker Jr., President
Barnstable Town Council

Judith MacLeod-Froman
Bourne, Falmouth, Mashpee, Sandwich

Norman Holcomb
Dennis, Yarmouth

Alan McClennen
Brewster, Chatham, Harwich, Orleans

Jason Steiding
Mashpee Wampanoag Tribal Council

Robert Weinstein
Eastham, Provincetown, Truro, Wellfleet

CAPE COD COMMISSION

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Executive Summary

Cape Cod's transportation system has both shaped and been shaped by development patterns of the region. As our regional economy has evolved so too has our transportation infrastructure. From a reliance on ports and marine transport, to a steady growth by rail, and explosion of change fueled by the automobile – our region has undergone dramatic changes. All the while, our connection with our environment and our past has continued to define us. Demographic, climatic, and technological changes will present new transportation challenges over the next two decades and beyond. This plan presents a regional vision and sets of funding priorities to guide transportation investments that support the long-term vitality of the region.

The 2020 Regional Transportation Plan (RTP) is a **community-driven, performance-based** plan that considers the unique **challenges and opportunities** of the region and establishes spending **priorities** to allocate available surface transportation **funding** towards transportation **infrastructure**

COMMUNITY-DRIVEN

The RTP was developed through input from a wide range of federal, state, and local agencies and organizations, and the public. In addition to over two dozen meetings including six regional public meeting and two open houses, feedback was solicited through an online survey. The online survey provided valuable input into the process including the identification of 248 locations with transportation issues or challenges. The outreach will continue following release of the document for public comment including additional in-person public meetings, a virtual public meeting, signs on transit vehicles, and an outreach table at a major outdoor event.

PERFORMANCE-BASED

Consistent with new federal legislation, the RTP is built on a performance-based planning approach with a vision statement, goals, objectives, performance measures and targets, strategies, and policies.

The RTP vision statement established the overarching vision of the document and is as follows:

The Cape Cod Metropolitan Planning Organization, informed by public input, envisions a transportation system that supports the environmental and economic vitality of the region through infrastructure investment that focuses on livability, sustainability, equity, and preservation of the character that makes our special place special.

The goals of the RTP expand on the vision statement in seven areas of emphasis. The goals are:

- **Safety**: Provide safe travel options for all users
- **Environmental and Economic Vitality**: Maintain, protect, and enhance the natural environment while strengthening the economy
- **Livability and Sustainability**: Support livable communities and village centers that strengthen the long-term sustainability of the region
- **Multimodal Options/Healthy Transportation**: Provides a variety of healthy transportation options to all users
- **Congestion Reduction:** Reduce congestion and improve travel time reliability
- **System Preservation**: Preserve, maintain, and modernize the existing transportation system
- **Freight Mobility**: Improve efficiency and reliability of freight movement

The performance measures and targets established in the RTP are quantifiable targets that the region will work to achieve over the coming year through implementation of a series of strategies and policies.

CHALLENGES AND OPPORTUNITIES

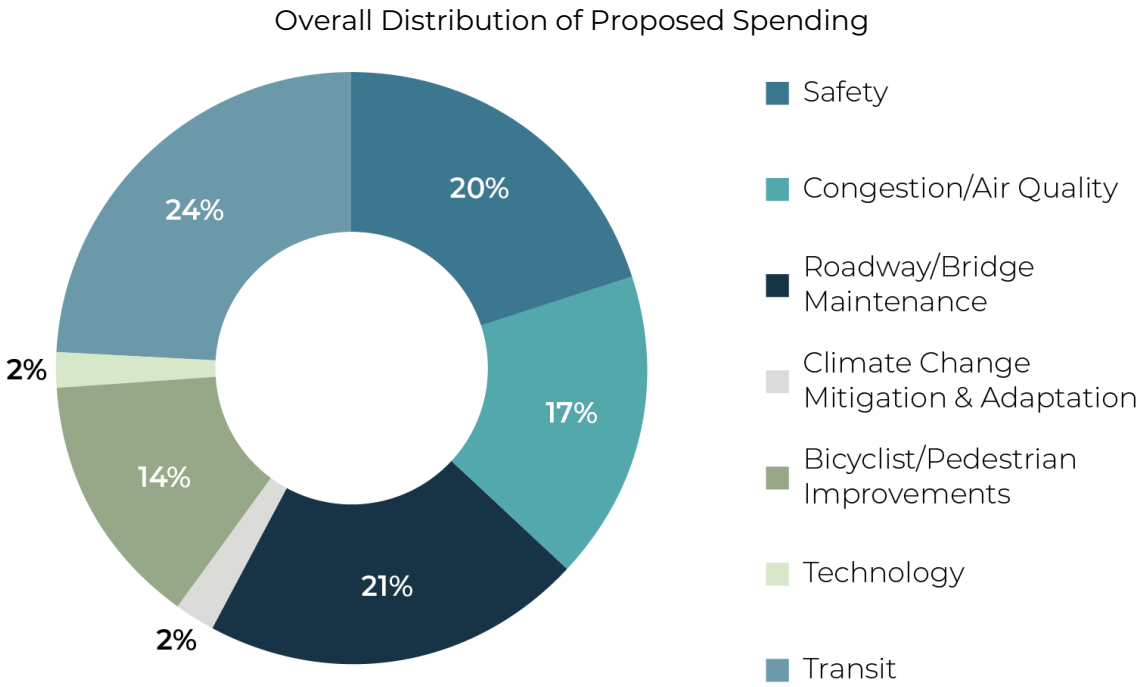
While the region faces many of the same transportation challenges as communities across the country and across the world, there are also many things that make Cape Cod unique. Developing transportation solutions for Cape Cod must take into account the things that make the region a special and desirable place to live, work, and play. Some of the challenges and opportunities for the region that are detailed in the RTP include:

- **Historical Context:** maintaining a sense of place and recognition of history while evolving to meet the need of the next generation
- **Aging Infrastructure**: repairing or placing a significant amount of transportation infrastructure that is at or near the end of its design life
- **Safety**: identifying the locations of greatest need and implementing proven safety countermeasures to improve safety for all users
- **Security**: being prepared for extraordinary events that would threaten the people and the infrastructure of the region
- **Freight**: recognizing the importance of freight to the region while exploring a variety of ways to safely and efficiently transport it
- **Bicycling, Pedestrians, and Transit**: identifying the unique needs of all users and improving options for a variety of modes of healthy transportation
- **Congestion Management**: identifying opportunities to reduce the intensity, duration, and extent of congestion for all modes of transportation
- **Stormwater Management**: identifying solutions to minimizing the contribution of nutrients and pollutants into the Cape's waterways from stormwater runoff

- **Climate Change**: preparing the region for the impacts of climate change through a focus on adaptation, sustainability, mitigation and energy sources
- **Access to Essential Services**: ensuring all users of the transportation have the same and convenient options to access essential services
- **Regional Cooperation**: ensuring that there is a cooperative and coordinated planning approach that involves all stakeholder agencies and the public
- **Economic Development**: supporting sustainable, year-round economic development opportunities through transportation infrastructure
- **Environmental Protection**: ensuring that transportation projects provide environment benefits including greenhouse gas (GHG) emissions reductions
- **Equity**: ensuring full and fair participation by communities in the transportation decision-making process, and equitable distribution of benefits and any potential burdens from transportation projects

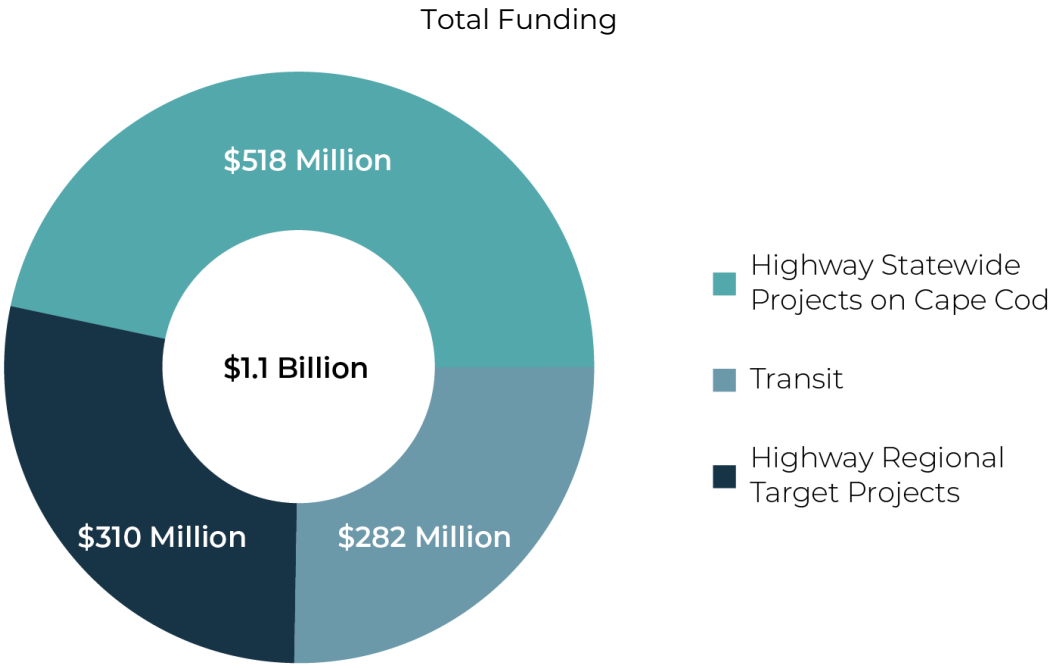
PRIORITIES

As a document that establishes the vision for the transportation system for the region, the RTP sets the framework for what will be built on Cape Cod. Based on a critical assessment of infrastructure needs, discussions at RTP development meetings, and feedback on the RTP survey, the following program of spending was developed. The overall distribution of proposed spending is shown below.



FUNDING

The anticipated funding in the region over the next 20 years totals approximately $1.1 billion. This total includes spending on transit as well as highway projects (including roads, bridges, sidewalks, multiuse paths, etc.) broken down as shown in the following figure.



INFRASTRUCTURE

Out of the nearly $310 million in funding for highway projects identified and selected by the region, the following projects were selected balancing a number of factors including potential benefit, estimated cost, consistency with the objectives and performance measures in the RTP, equity as it relates to minority, low income, Limited English Proficiency (LEP) and other protected populations, and GHG reduction potential:

- Mashpee Route 151 Improvements
- Yarmouth Road/Willow Street Improvements
- Scenic Highway Median Barrier
- Scenic Highway/Route 25 Connector Ramp
- Multimodal Improvements
- Cape Cod Rail Trail Extensions: Mid- and Upper-Cape
- Cape Cod Rail Trail Extensions: Outer Cape
- Route 28 Multimodal Improvements (various segments)
- Bike Path Connectors to Town Centers

- Route 6 Interchange and Route 6 Outer Cape Safety Improvements
- Various smaller-scale projects to be identified based on future evaluations

While many uncertainties exist about the future, the strength of the transportation infrastructure will undoubtedly be a key to Cape Cod's long-term vitality. The 2020 RTP sets forth this vision for the region and sets the framework for making smart transportation investments within the region through 2040.

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Chapter 1: Introduction and Plan Development

This 2020 Cape Cod Regional Transportation Plan (RTP) is a fiscally constrained set of transportation projects, programs, and transportation studies covering 2020 to 2040. The RTP establishes the long-range view of transportation based on existing system data and existing and projected needs. The RTP includes an assessment of the existing transportation system and its federal aid components—whether transit, highway, pedestrian, or other—and endeavors to improve the transportation system and its connections for better mobility for residents, commuters, and visitors. The RTP includes all modes of surface transportation throughout the 15 communities of Barnstable County.

Preparation of the document is undertaken by the Cape Cod Commission staff every four years on behalf of the Cape Cod Metropolitan Planning Organization (MPO).

This chapter includes background information on the transportation planning process, a synopsis of the public participation process, and regional survey results.

TRANSPORTATION PLANNING PROCESS

Cape Cod Metropolitan Planning Organization (MPO)

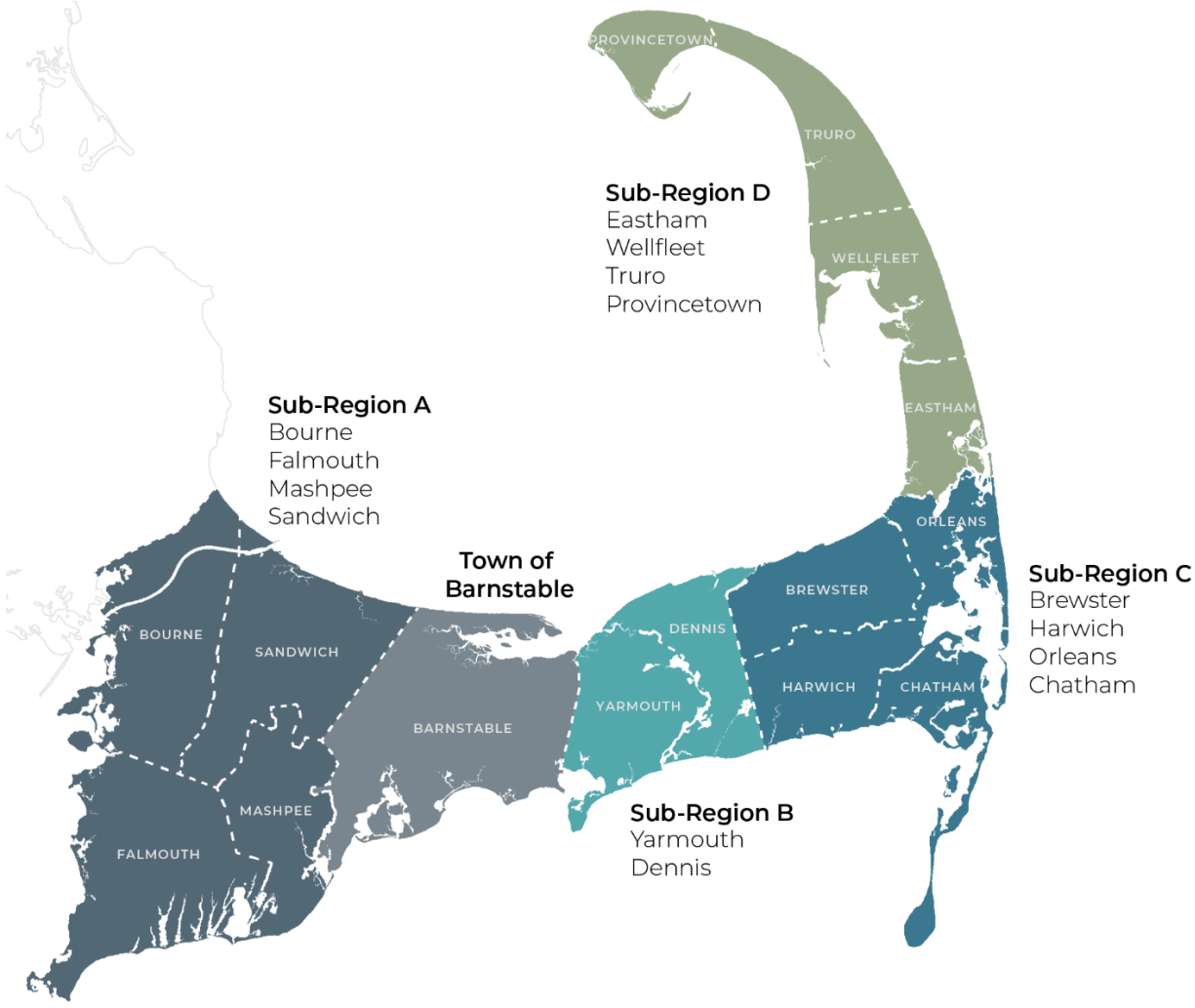
The Cape Cod Metropolitan Planning Organization (MPO) is the regional governing body established by federal law to oversee regional transportation planning and recommend the distribution of transportation funds locally. The MPO is responsible for reviewing, guiding, and endorsing the RTP.

The MPO is made up of eleven voting members that generally meet monthly. The membership is outlined in Table 1. Town representation on the body is depicted in Figure 1.

TABLE 1. Cape Cod MPO Membership

AGENCY	MPO SIGNATORY
Massachusetts Department of Transportation (MassDOT)	Secretary of Transportation
MassDOT Highway Division	Administrator
Cape Cod Regional Transit Authority (CCRTA)	Chairman
Cape Cod Commission (CCC)	Chairman
Barnstable County Commissioners	Commissioner
Mashpee Wampanoag Tribe	Tribal Chairman
Town of Barnstable	Town Council President
Sub-region A (Bourne, Falmouth, Mashpee, Sandwich)	Selectman
Sub-region B (Dennis, Yarmouth)	Selectman
Sub-region C (Brewster, Chatham, Harwich, Orleans)	Selectman
Sub-region D (Eastham, Provincetown, Truro, Wellfleet)	Selectman

FIGURE 1. MPO Regional Representatives



The MPO also includes non-voting Ex-Officio Members: Federal Highway Administration, Federal Transit Administration, Army Corps of Engineers, National Park Service/Cape Cod National Seashore, the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority, and the Chair of the Cape Cod Joint Transportation Committee.

The MPO is served by an advisory body: the Cape Cod Joint Transportation Committee (CCJTC). The CCJTC membership includes representatives from each of Barnstable County's fifteen towns and a bicycle advocate.

Development of the RTP also includes consultation with or consideration of a wide range of federal, state, and local agencies and organizations including:

- Barnstable County Government
- Massachusetts Coastal Railroad
- Cape Air
- Cape Cod Central Railroad
- Cape Cod Commission (CCC)
- Cape Cod Joint Transportation Committee (CCJTC)
- Cape Cod Metropolitan Planning Organization (MPO)
- Cape Cod National Seashore (CCNS)/ National Park Service (NPS)
- Cape Cod Regional Transit Authority (CCRTA)
- Cape Cod Towns
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- Hy-Line Cruises
- Joint Base Cape Cod (JBCC)
- Martha's Vineyard Commission
- Massachusetts Department of Recreation and Conservation
- Massachusetts Department of Transportation (MassDOT)
- MassBike
- MassRides
- Nantucket Air
- Nantucket Planning and Economic Development Commission (NPEDC)
- Old Colony Planning Council (OCPC)
- Freight Companies
- Peter Pan – Bonanza Bus Lines
- Plymouth and Brockton Street Railway Company
- Southeastern Regional Planning and Economic Development District (SRPEDD)
- U.S. Army Corps of Engineers
- Woods Hole, Martha's Vineyard and Nantucket Steamship Authority (SSA)

The staff of the CCC, CCRTA, and MassDOT, along with staff of the local towns, participates in the process through preparation of the documents for MPO action.

Federal Certification Documents

In addition to the RTP, the MPO is required to endorse other federal certification documents including the Transportation Improvement Program (TIP), Unified Planning Work Program (UPWP), and the Public Participation Plan (PPP).

The RTP establishes a regional vision for the transportation system, the UPWP studies investigate deficiencies in that system and identify potential solutions, and the TIP details specific transportation projects that are implemented to improve the transportation system. The PPP provides a framework to ensure public involvement and cooperative decision making throughout the transportation planning process. A summary of the primary function, time horizon, and updated timeline is presented in Table 2. The table also includes links to the Cape Cod MPO webpages that contain more detailed information on each of the documents.

TABLE 2. Federal Certification Documents

DOCUMENT	PRIMARY FUNCTION	TIME HORIZON	UPDATE TIMELINE
Regional Transportation Plan (RTP) www.capecodcommission.org/rtp	Establishes long-range vision and goals, identifies major projects, studies, and programs	20+ years	Every 4 years
Transportation Improvement Program (TIP) www.capecodcommission.org/tip	Identifies specific transportation investments (projects)	4 years	Annually
Unified Planning Work Program (UPWP) www.capecodcommission.org/upwp	Details planning studies and tasks	1 year	Annually
Public Participation Plan (PPP) www.capecodcommission.org/ppp	Establishes plan for public participation for transportation decision-making	Ongoing	Every 5 years or more frequently as needed

TITLE VI/NONDISCRIMINATION PROGRAM

The Cape Cod MPO follows federal and state non-discrimination laws and seeks to ensure that all interested parties in Barnstable County have access to the MPO's activities and services and that public involvement in the MPO's decision making comes from a diverse socioeconomic group that is representative of the county's population. The MPO has developed a nondiscrimination program, in accordance with federal and state requirements, to encourage broad public participation, representation, and equity in the region's transportation planning. The implementation of this program during the RTP development is summarized in the following sections and further detailed in Appendix L.

Title VI Background

Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin. Organizations that receive Federal funds are obligated to assure nondiscrimination in their programs and activities and are required to have a comprehensive Title VI enforcement program to prevent and eliminate discrimination in their federally funded programs. Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) set forth Title VI compliance requirements for "primary" funding recipients such as MassDOT and sub-recipients such as the MPOs to follow. Effective transportation decision making depends upon understanding and properly addressing the needs of different socioeconomic groups. The MPO's Title VI program includes identifying the demographic distribution of minority and limited English proficiency populations within the region and implementing a comprehensive strategy to ensure that the MPO conducts effective outreach to encourage their involvement in and access to the transportation planning and decision-making process.

The Massachusetts Department of Transportation (MassDOT) is responsible for ensuring that the state's MPOs comply with federal program requirements. Following MassDOT's 2013 Title VI program update, the Cape Cod MPO developed and adopted a Title VI Program in 2014. The Title VI plan provides information about beneficiaries' rights, how to file a complaint, regional demographic data, maps, a public participation plan, a language access plan, and analyses of transportation spending in the region, project locations and potential impacts from projects to ensure equity in the planning and implementation process for the region.

Although Title VI is the focal point of non-discrimination law in the United States, FHWA incorporates a broader spectrum of statutes, executive orders, and regulations into its requirements for states and MPOs. For example, Section 324 of the Federal-Aid Highway Act of 1973 prohibits discrimination based on sex; Section 504 of the Rehabilitation Act of 1973 prohibits discrimination on the basis of disability status, as does the Americans with Disabilities Act of 1990; and the Age Discrimination Act of 1975 prohibits age discrimination. In addition, the Civil Rights Restoration Act of 1987 (FHWA Notice 4720.6) clarified the original intent of Congress with respect to Title VI by restoring the broad, institution-wide scope and coverage of the nondiscrimination statutes to include all programs and activities of federal-aid recipients and enforcing the application of the laws that include nondiscrimination on the basis of race, color, national origin, age, gender, or disability.

In addition to mapping demographic data that identifies areas (census blocks) in the county with higher proportions of low income and minority populations, the staff conducts analyses on the geographic distribution of the region's transportation spending and project construction, to ensure equity in the distribution of transportation improvements. In examining the Title VI based project distribution analysis, the proximity, frequency, value and nature of projects are identified in relation to statistically significant population concentrations of the Title VI protected categories; i.e. race,

color or national origin (including limited English proficiency) for transit related projects with the addition of age, sex and disability for highway related projects. The analysis also includes a review of potential project impacts – positive and negative – to ensure that that potentially underserved areas neither adversely impacted by, nor denied the benefits of, transportation projects. A key piece of the program is engaging such communities in the MPO's activities and decision making through expanded and targeted public outreach. The Public Participation Plan, as discussed below, establishes the MPO's public involvement goals and strategies.

PUBLIC PARTICIPATION PROCESS

To ensure an inclusive and accessible public engagement processes for development of the Regional Transportation Plan (RTP), staff looked to the framework established in the Cape Cod MPO Public Participation Plan (PPP). Goals of the PPP are to:

1. Obtain Quality Input and Participation
2. Establish Consistent Commitment
3. Increase Diversity
4. Ensure Accessibility
5. Provide Relevance
6. Foster Participant Satisfaction
7. Clearly Define Potential for Influence
8. Establish and Maintain Partnerships
9. Provide Opportunities to Build Consensus

The MPO efforts to meet each goal are detailed in Appendix L.

The PPP is available in English and Portuguese at www.capecodcommission.org/ppp

Meetings and Open Houses

Numerous meetings have been held to discuss development of the RTP. Table 3 identifies meetings held solely for the plan, as well as meetings of various organizations at which the RTP was discussed. Meeting locations where selected to provide geographic and demographic diversity as well as ensure that persons with disabilities were able to actively participate. CCRTA DART paratransit services were available to bring interested parties to meetings. Notices were disseminated to English and Portuguese media outlets.

TABLE 3. Regional Transportation Plan Meetings

CAPE COD METROPOLITAN PLANNING ORGANIZATION MEETINGS		
Meetings beginning in August 2018 and continuing through July 2019 Generally held once per month on a Monday at 1:00 PM, Cape Cod Commission Office, Barnstable		
CAPE COD JOINT TRANSPORTATION COMMITTEE MEETINGS		
Meetings beginning in September 2018 and continuing through June 2019 Generally held once per month on a Friday at 8:30 AM, Cape Cod Commission Office, Barnstable		
LISTENING SESSIONS/OUTREACH TABLE EVENTS/PUBLIC MEETINGS		
Eastham Town Hall – Listening Session	Tuesday, February 5	5:00 PM
Mashpee Library – Listening Session	Wednesday, February 6	5:00 PM
Hyannis Transportation Center – Listening Session	Thursday, February 7	2:00 PM
Bourne Cape Cod Canal Bike Path – Outreach Table at Bike Week Event	Monday, May 13	3:00 PM
Hyannis Transportation Center – Outreach Table at Bike Week Event	Tuesday, May 14	8:00 AM
Yarmouth Cape Cod Rail Trail at Station Ave. – Outreach at Bike Week Event	Wednesday, May 15	3:00 PM
Orleans Cape Cod Rail Trail at Main Street – Outreach at Bike Week Event	Monday, May 16	3:00 PM
Falmouth Public Library – Outreach Table	Wednesday, May 22	6:30 PM
Provincetown Veteran Memorial Community Center – Public Meeting	Monday, June 3	5:00PM
Hyannis Transportation Center – Public Meeting	Wednesday, June 5	10:00 AM
Sandwich Town Hall – Public Meeting	Wednesday, June 5	5:00PM
RTP Office Hours	Week of June 24-28	Various
OTHER MEETINGS/ACTIVITIES		
Lower Cape Regional Bicycle Committees – Harwich Town Hall	Tuesday, January 15	5:00 PM
Cape Cod Commission/Cape Cod Metropolitan Planning Organization Joint Meeting – RTP Presentation and Discussion	Wednesday, January 21	3:00 PM
Eastham Route 6 Study Public Meeting	Wednesday, February 27	5:00 PM
Wellfleet Bike & Walkways Committee – RTP Presentation and Discussion	Wednesday, March 27	2:00 PM
Sierra Club Cape Cod Group – RTP Presentation and Discussion	Monday, April 8	5:00 PM
Mashpee Rotary Study Public Meeting	Thursday, April 11	1:00 PM
Mashpee Rotary Study Public Meeting	Thursday, April 11	5:00 PM
Cape and Islands Association of Realtors Leadership Institute – RTP Presentation and Discussion	Tuesday, April 30	10:00 AM
Bourne Town Administrator's Advisory Committee on Pedestrian Bicycle Pathway - Bourne Rail Trail Public Informational Meeting	Wednesday, May 1	6:00 PM

Collectively, the RTP meetings provided a wide array of opportunities for the public to learn about the document and share their comments. Comments received reflected both regional interests in the Cape Cod transportation system as well as more location specific concerns based on the location of the meeting.

Figure 2 shows a collection of photographs that were taken at various RTP outreach events.

FIGURE 2. Photographs of Outreach Activities

Other Outreach Strategies

In addition to the traditional outreach approaches, staff utilized a number of new strategies in an effort to increase public participation.

EXPANDED EMAIL OUTREACH DISTRIBUTION

In an effort to better connect with the various groups and agencies in the region that interact in different ways with the transportation system every day, an expanded email distribution list was created to share all notices and announcements on the development of the plan. This expanded outreach list including the following groups and agencies that were identified in the region:

- Community & human services programs and providers
- Community centers
- Councils on aging
- Day care and child development programs
- English language media outlets (print and audio)
- Financial institutions
- Fire districts
- Hospitals and health centers
- Interested citizens (those who requested to be included in the list)
- lesbian, gay, bisexual, and transgender (LGBT) organizations
- Libraries
- Local and area chambers of commerce
- Local and regional housing partnerships, authorities, and groups
- Local and regional transportation providers (all modes)
- Local community-based organizations
- Local financial development corporation and economic development corporations
- Local legislators
- Local police and fire departments
- MPO and CCJTC members
- Portuguese language media (print and radio)
- Public and private educational institutions and school departments
- Religious institutions
- Town clerks, managers, departments of public works directors, town planners, and other similar town personnel
- Town councils
- Transportation consulting firms
- Veterans services

PORTUGUESE-LANGUAGE COMMENT LINE

In an effort to ensure that anyone with questions or comments on the plan was heard, a Portuguese-language comment line was set up to field calls from Portuguese-speaking individuals. The recorded message, in Portuguese, thanked the caller for their interest in the plan and asked

that they leave their name and number so that staff, with the assistance of a translator, could respond to them.

PLAN WEBSITE AND SURVEY

The website dedicated to the development of the 2020 RTP was created as a place where members of the public could find general information about the plan development, learn about upcoming meeting, access materials from past meetings, complete the online survey, download the draft RTP, and provide comments. A link to the website was included on all project materials and linked from the Cape Cod MPO website. Each page of the website included a statement in Portuguese with contact information should they need the information in another language. A Portuguese-language version of the website was also provided through real-time Google translation.

BUS SIGNS

In addition to hosting an open house at the Hyannis Transportation Center, a regional intermodal hub, further efforts were made to ensure that transit riders had an opportunity to participate in the development of the document. Signs, as shown in Figure 3, were placed on all Cape Cod Regional Transit Authority buses and paratransit vehicles. The message on the sign was presented in both English and Portuguese.

FIGURE 3. Bus Signs

OUTREACH CARDS AND OTHER MATERIALS

Business card-sized outreach cards were developed to hand out at all public events attended by staff during the development in the plan. A few versions were created through the process, including a version to guide people to the online survey, but included a link to the website where information was kept up to date. Similar information was contained on water bottles and a banner used in outreach activities.

Regional Policy Plan Survey

The Cape Cod Commission (CCC) prepares a Regional Policy Plan (RPP) to guide development throughout Barnstable County. The Plan seeks to balance economic development with protection of the Cape's natural resources and community character. In order to produce an updated RPP that

meets the needs and goals of all Cape residents, the CCC engaged the University of Massachusetts Dartmouth Donahue Institute in 2014 to conduct a survey of Cape Cod residents to solicit their views about important local issues. A key finding from the report pertained to transportation. Under the category of "Current Problems for Towns and for the Cape:"

"Traffic congestion, coastal erosion, the availability of jobs and economic opportunities, and the pollution of ponds and coastal waters were consistently identified as current problems facing Cape Cod and its towns."

From a list of twenty potential problems, traffic congestion was identified by respondents as one of the most serious problem for their town (45% rated as "Serious"; 85% rated as "Serious or Moderate"). For the entire Cape, traffic congestion was also identified as the most serious problem (63% rated as "Serious"; 93% rated as "Serious or Moderate").

Respondents also identified "Future Problems for Towns and for the Cape." The top issue respondents believe will be a problem in the next five years is traffic congestion. 85% of respondents rated traffic congestion in their town as a serious problem in the next 5 years; for the entire Cape, this figure is 93%.

Regarding infrastructure development on Cape Cod, respondents were asked the extent to which they support or oppose a number of specific projects. The results of this question, along with the sample size (n), are presented in Table 4.

TABLE 4. RPP Transportation Infrastructure Question Survey Results

	N	STRONGLY SUPPORT	SUPPORT	UNSURE	OPPOSE	STRONGLY OPPOSE
A third automobile bridge across the Cape Cod Canal	369	25.5%	26.3%	18.2%	13.8%	16.3%
Expansion of state numbered roads (not including Rt. 6)	354	9.9%	20.6%	34.2%	22.9%	12.4%
Expansion of Rt. 6 after exit 9	359	19.2%	35.9%	19.8%	13.4%	11.7%
Expansion of Rt. 6 before exit 9	362	11.9%	25.1%	24.6%	26.0%	12.4%
A public parking garage	362	7.7%	23.5%	34.5%	23.2%	11.0%
Bike paths	368	43.2%	42.7%	7.6%	4.3%	2.2%

Regional Transportation Plan Survey

To facilitate public input in the development of the RTP, an online survey was developed and advertised through a number of outreach techniques as discussed earlier in this chapter. The RTP survey was advertised at RTP and other local and regional meetings and open houses distributed through the extended email distribution list, social media platforms, and picked up by a number of local media outlets.

The survey was open from February 5, 2019 through March 6, 2019 and a total of 273 responses were received.[1] A summary of results in presented in the section of the plan with additional data presented in Appendix O.

RTP VISION STATEMENT & GOALS

The online survey began with a draft vision statement and draft goals. In question 1 respondents were asked to provide any suggested additions or revisions. Responses were used in refining the vision statement included in this plan.

LIVE~WORK~PLAY

This section included a series of questions to better understand how respondents typically use the transportation system.

Question 2: "Where do you live?" There were 270 responses. All 15 Cape towns were represented with the highest frequency in Barnstable (64 responses) and Bourne (57 responses).

Question 3. "Employment Status" Respondents were presented with a list of checkboxes including: Employed, Self-Employed, out of work (looking for work), Out of work (not looking), Homemaker, Student, Military, Retired, Unable to work, and "Other." "Employed" had the largest number of responses (179) followed by "Retired" (56) and "Self-Employed" (35).

Question 4. "Where do you typically work/go to school?" Respondents were presented with a drop-down list of Cape Cod town names and "Other." There were 257 responses to this question with the largest frequency of respondents selecting Barnstable (65) and "Other" (44). Of the "Other" responses, there were 12 that specified a destination in the Boston area.

Question 5. "Besides home or work/school trips, what town do you spend most of your time? (visit, shopping, entertainment …)" Respondents were presented with a drop-down list of Cape Cod town names and "Other." There were 264 responses to this question. The most frequently selected towns include Barnstable (90), Falmouth (32) and Orleans (28).

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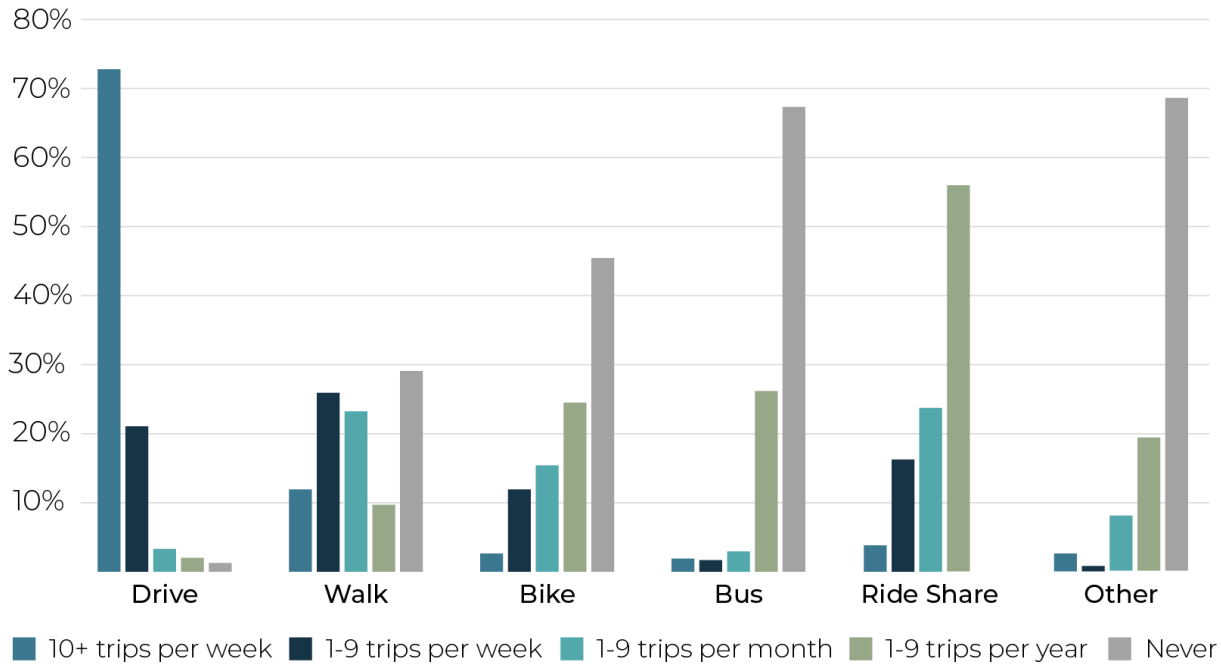
[1] Given the relatively small sample size and the potential for self-section bias, the survey results should not be assumed to be necessarily representative of the overall population of Cape Cod

Question 6. “How frequently do you travel by each of the following modes of transportation?” Possible choices included: Drive, Walk, Bike, Bus, Ride Share, Other. Choices of frequency included: 10+ trips per week, 1-9 trips per week, 1-9 trips per month, 1-9 trips per year, never.

As shown in Figure 4, the most frequently used mode of travel is to drive. Walking was generally the second most popular travel mode, followed by bicycling. The use of buses or ride share services were relatively rare.

FIGURE 4. Responses: "How frequently do you travel by each of the following modes of transportation"

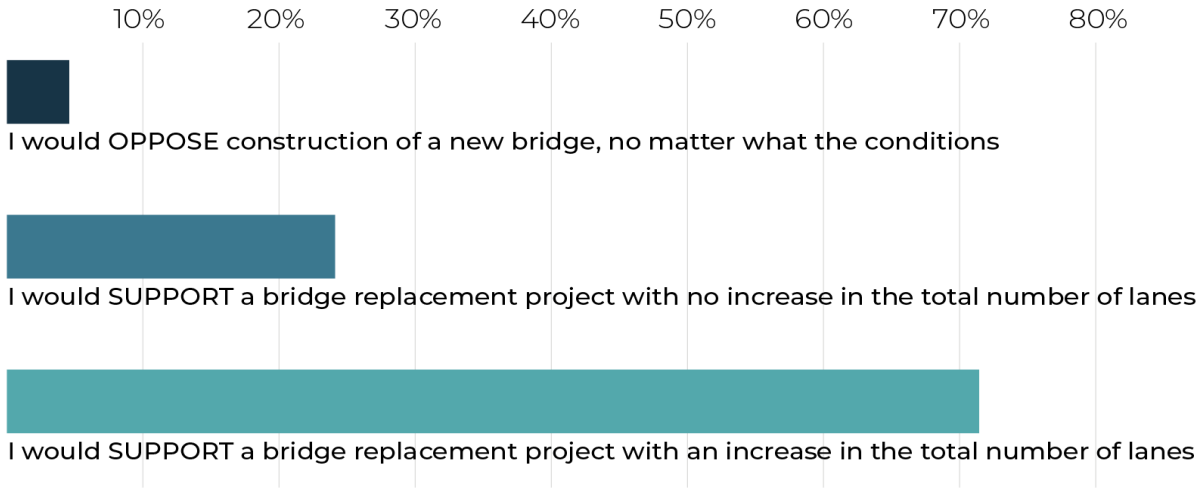


PROJECT SUPPORT: CAPE COD CANAL BRIDGES

Studies by the Massachusetts Department of Transportation (MassDOT) and the Army Corps of Engineers are currently looking at transportation alternatives in the Cape Cod Canal area. Respondents were asked a few questions about the alternatives being considered such as construction of a new vehicular bridge over the Cape Cod Canal.

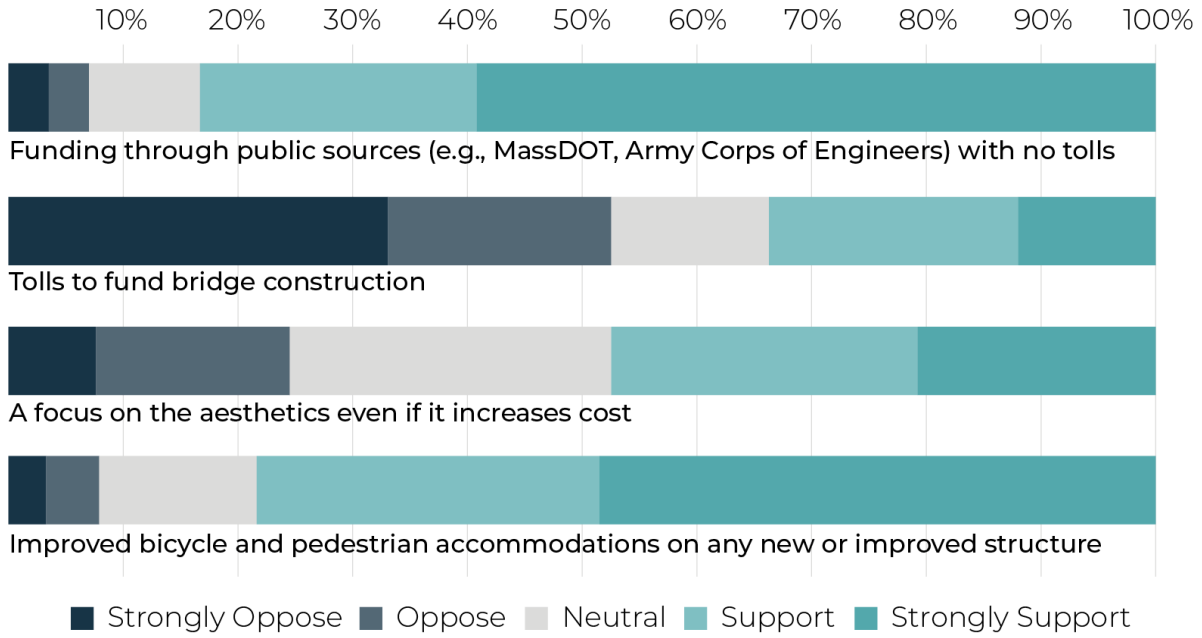
Question 7. "Which statement most accurately describes your position?" There were 257 responses to this question with responses summarized in Figure 5.

FIGURE 5. Support for Changes to Cape Cod Canal Bridges



Question 8. "Regarding Cape Cod Canal bridge construction, please indicate your level of support for." Results are summarized in Figure 6.

FIGURE 6. Support for Funding Options at Cape Cod Canal Bridges



PROJECT SUPPORT: OTHER PROJECTS

Respondents were then asked to indicate their support for the several projects. For each project, respondents were offered the following choices: Strongly oppose, Oppose, Neutral, Support, Strongly Support.

FIGURE 7. Level of Support for Potential Projects

BUDGET CHALLENGE

Recognizing that a limited amount of funding is available to address the transportation problems in the area, respondents were asked to indicate their level of support for the following types of transportation investment. For each investment type respondents could assign from 1 to 5 stars.

TABLE 5. Level of Support by Type of Investment

INVESTMENT TYPE	LEVEL OF SUPPORT (STARS)
Roadway projects to correct safety issues	4.15
Roadway projects to reduce congestion/improve air quality	3.91
Roadway pavement maintenance	3.75
Bicycle/pedestrian improvements	3.65
Transit service	3.67
Intelligent transportation systems (e.g., travel time message boards, real-time traffic monitoring)	2.89

OTHER

Lastly, a final text box was provided for respondents to provide any additional comments or suggestions. A summary of these comments is available in the appendix. Following this page, the respondents are taken to the Mapping Exercise.

MAPPING EXERCISE

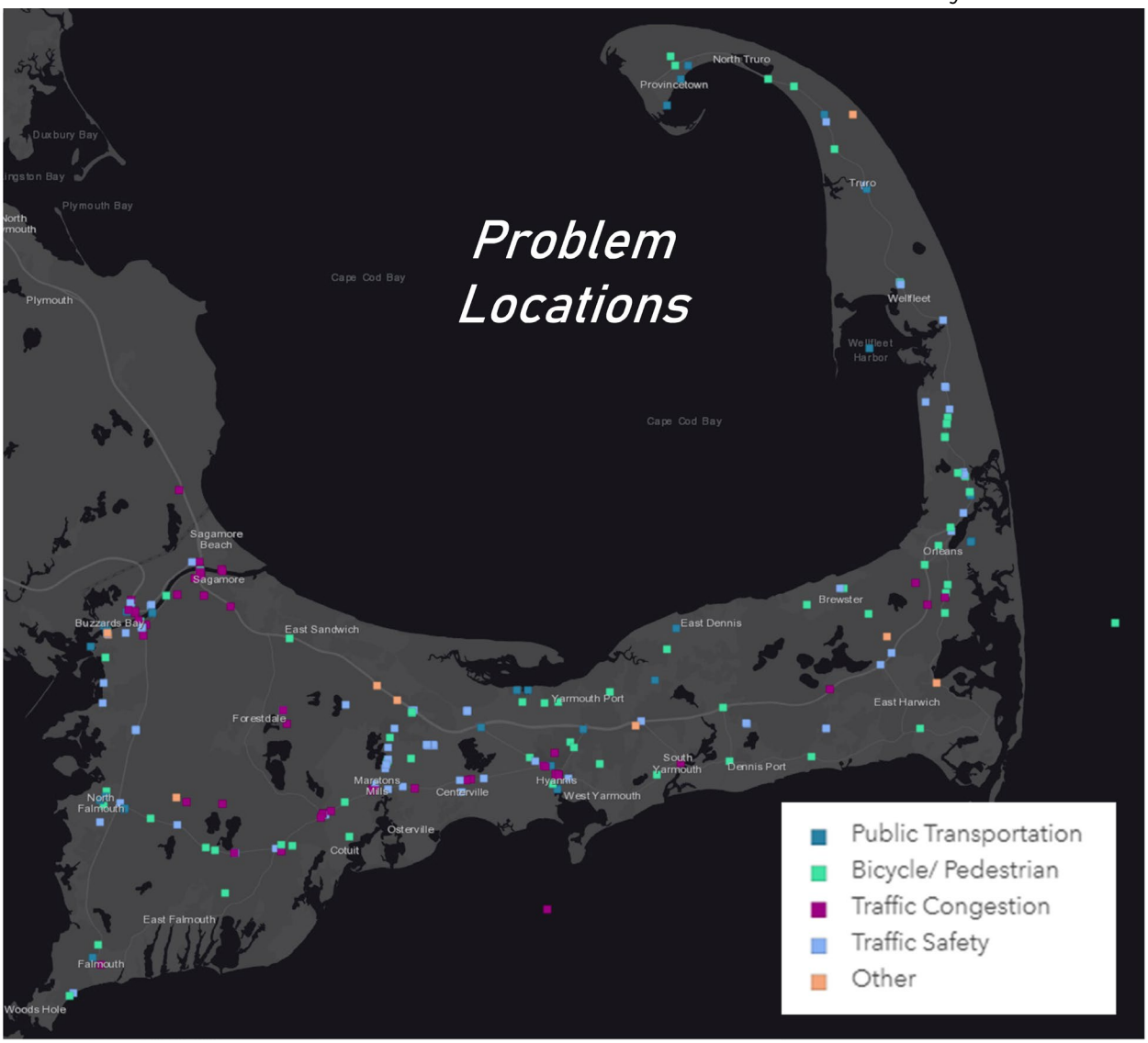
Cape Cod Commission GIS staff prepared an online mapping tool to help respondents identify specific locations under the following classifications:

- Traffic safety problems
- Traffic congestion
- Bicycle/Pedestrian trouble spots
- Other issues that impact daily transportation needs

A summary of the written comments is available in the appendix.

The responses gathered in this exercise are being formatted into an online map that will be shared with local Departments of Public Works Departments, MassDOT, the CCRTA, and other agencies.

FIGURE 8. Identified Problem Locations - RTP Online Survey



Chapter 2: Goals, Objectives, and Performance Measures and Targets

The Regional Transportation Plan (RTP) was developed through a performance-driven, outcome-based approach. This chapter details the Vision, Goals, Objectives, and Performance Measures and Targets of the RTP. This chapter also includes Policies and Strategies for reaching the Performance Targets. Finally, this chapter provides a framework for tracking progress towards performance targets and, to the greatest extent possible with the available data, provides an assessment of the current state of the transportation system with respect to the performance targets.

PERFORMANCE-BASED PLANNING AND PROGRAMMING

Performance-based planning and programming (PBPP) refers to the application of performance management principles within the planning and programming processes of transportation agencies to achieve desired performance outcomes for the multimodal transportation system.[2]

The Cape Cod MPO's PBPP approach consideration and implementation of projects, strategies, and services that will address the following factors:

- **Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;**
- **Increase the safety of the transportation system for motorized and non-motorized users;**
- **Increase the security of the transportation system for motorized and non-motorized users;**
- **Increase accessibility and mobility of people and freight;**
- **Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;**
- **Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;**

[2] Performance Based Planning Guidebook
http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/

- **Promote efficient system management and operation;**
- **Emphasize the preservation of the existing transportation system;**
- **Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation; and**
- **Enhance travel and tourism.**

While PBPP has been used by a variety of transportation agencies for the past two decades, recent transportation legislation has made a "performance-based approach" a requirement for the metropolitan transportation planning process. Federal surface transportation legislation, *Moving Ahead for Progress in the 21st Century* (MAP-21), requires that "*the metropolitan transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decision-making to support the national goals....*"[3]

The seven national performance goals for the Federal Highway programs, as established by MAP-21 and continued under the current federal transportation legislation, the Fixing America's Surface Transportation (FAST), are as follows:

- **Safety** - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure Condition** - To maintain the highway infrastructure asset system in a state of good repair
- **Congestion Reduction** - To achieve a significant reduction in congestion on the National Highway System
- **System Reliability** - To improve the efficiency of the surface transportation system
- **Freight Movement and Economic Vitality** - To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- **Environmental Sustainability** - To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- **Reduced Project Delivery Delays** - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices[4]

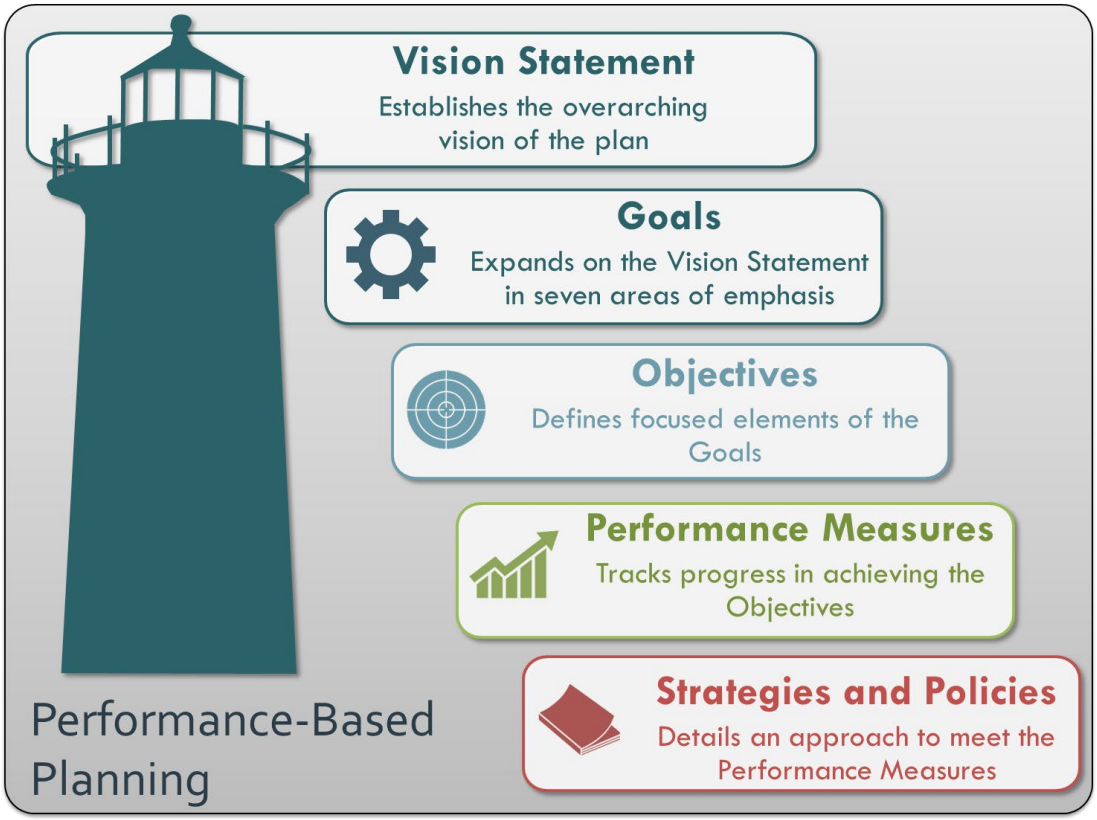
[3] 23 USC Section 134(h)(2); 49 USC Section 5303(h)(2)

[4] 23 USC Section 150(b)

The goals, objectives, and performance measures and targets set forth is this RTP reflect these national goals as well as priorities for the state and our planning region. State, regional, and local plans, including Freight, Bicycle Transportation, and Pedestrian Transportation plans, identify a number of these priorities and were considered in the development of goals, objectives, and performance measures and targets in this RTP.

The relationship of goals, objectives, and performance measures as well as polices and strategies are depicted in Figure 9.

FIGURE 9. Performance-based Planning Structure



VISION STATEMENT

The RTP vision statement establishes the overarching vision of the document. The vision statement for the 2020 RTP is as follows:

The Cape Cod Metropolitan Planning Organization, informed by public input, envisions a transportation system that supports the environmental and economic vitality of the region through infrastructure investment that focuses on livability, sustainability, equity, and preservation of the character that makes our special place special.

In support of this vision, the MPO identified the following goals for the 2020 RTP:

- Safety
- Environmental and Economic Vitality
- Livability and Sustainability
- Multimodal Options/Healthy Transportation
- Congestion Reduction
- System Preservation
- Freight Mobility

GOALS AND OBJECTIVES

The goals and objectives discussed in the following sections reflect the collective vision of the MPO in consideration of the thoughtful input provided from a wide range of individuals throughout the development of the RTP.

One of the ways that the RTP most directly affects change on the transportation system is through TIP projects that are programmed consistent with the framework of the RTP. The TIP details specific transportation projects that are anticipated to be advertised for construction within the next four federal fiscal years. For each year in the TIP, there is a limited amount of regional discretionary funding from which the MPO selects what are generally referred to as "TIP target projects." Within any given year there may be additional projects from other funding sources such as statewide roadway maintenance and statewide bridge projects. These projects are generally identified through systematic statewide analysis. Both "TIP target projects" and projects from other funding sources effect change in the transportation system but, given the different level of MPO input involved in identifying each type of project, they are dealt with in slightly different manners relative to performance measures. All "TIP target projects" are evaluated using TIP Transportation Evaluation Criteria which will be updated to reflect the goals, objectives, performance targets, and recommendation of this plan.

As our region, the state, and federal agencies gain more experience with performance measures there will likely be modification to these measures and targets. Additionally, as the region improves its ability to capture and analyze wider datasets more robust performance measures and targets may be possible. These performance measures and targets however represent an important first step in in establishing a true performance-based planning approach.

Safety

While the number of traffic-related fatalities generally trends down nationally, it is important to recognize that any fatality is a tragic event and the public expects that all efforts will be taken to ultimately eliminate traffic-related fatalities. To that end, the Federal Highway Administration,

Federal Motor Carrier Safety Administration, and National Highway Traffic Safety Administration have been actively involved in the *Towards Zero Deaths* initiative.[5]

The MPO is also supportive of the *Towards Zero Deaths* initiative and, as a step toward that ultimate vision, the first goal of the sets quantifiable measures and targets related to safety.

GOAL 1: PROVIDE SAFE TRAVEL OPTIONS FOR ALL USERS

Objectives:

- Reduce the number and severity of crashes associated with all modes of transportation
- Reduce fatality and serious injury rates associated with all modes of transportation

The performance measures reflect both a commitment to use available resources to improve safety as well as specific targets to track progress. The tracking of fatal crashes and serious injury crashes and rates is consistent with MAP-21 guidance and the goals of the Massachusetts Strategic Highway Safety Plan.[6] The decision to specifically analyze crashes involving bicyclists and pedestrians in addition to motor vehicle crashes reflects that region's recognition of improving safety for these vulnerable road users.

Strategies aimed at achieving the objectives under this goal include:

- **Continuously monitor** the condition of the transportation system to ensure that it is safe to travel on all modes throughout Cape Cod.
- **Fully program** minimum HSIP targets each TIP year and seek to program Statewide HSIP funds when available/feasible for priority safety related projects.
- Reduce crashes, serious injury crashes, fatal crashes, and crashes involving older drivers, crashes involving younger drivers, and crashes involving bicycles and pedestrians by **10% in 10 years**.
- Reduce the fatality and serious injury rates by **10% in 10 years**.
- Focus attention on the **strategic emphasis areas** identified in Massachusetts Strategic Highway Safety Plan that include: Impaired Driving, Young Drivers, Intersections, Older Drivers, Lane Departures, Pedestrians, Occupant Protection, Motorcycles, and Speeding/Aggressive Driving.6
- **Identify high priority safety locations** throughout Cape Cod and then determine measures to increase safety at those locations.

[5] http://safety.fhwa.dot.gov/tzd/

[6] https://www.mass.gov/files/documents/2019/01/18/dot_SHSP_2018.pdf

- **Separate high- and low-speed travel modes**, so that those traveling at slower speeds, such as bicycles and pedestrians, do not conflict with those traveling at higher speeds, such as rail and automobile traffic.
- Existing multilane roads (cross-sections of four or more lanes) are recommended to be modified via removal of unneeded lanes or installation of **landscaped median dividers** to provide a reasonable level of safety and access management.
- **Encourage safe use** of the transportation network through public awareness campaigns, promoting such things as seatbelts for motorists and helmet use for bicyclists.
- **Incorporate intelligent transportation systems**, such as variable message signs and other media alerts, into the emergency response system.
- Foster **communication and cooperation** between federal, state, and local agencies for the planning, practice, and implementation of emergency scenario plans.
- Designate and indicate, through road signs, **emergency evacuation routes and shelters**.
- Support enforcement of state and local **traffic laws**.
- Increase **surveillance and security efforts at transportation facilities** throughout Cape Cod, such as the Hyannis Transportation Center, Falmouth Bus Depot, Woods Hole port facilities, park-and-ride lots, and Cape Cod Canal Bridges.

Additionally, in support of this goal, the Cape Cod MPO supports the following policies:

- For proposed roadways with cross-sections of four or more lanes, **landscaped median dividers shall be included** to provide a reasonable level of safety and access management.
- To reduce injury crashes, when developing intersection improvements involving signalization of a previously unsignalized location, construction of a **modern roundabout** shall be considered as one of the alternatives.

Environmental and Economic Vitality

The importance of Cape Cod's environment to its economy cannot be overstated. Any threat to Cape Cod's environment is a threat to the vitality of the Cape economy as well the quality of life of those who live in, work in, or visit the region.

GOAL 2: MAINTAIN, PROTECT, AND ENHANCE THE NATURAL ENVIRONMENT WHILE STRENGTHENING THE ECONOMY

Objectives:

- Minimize negative impacts of the transportation system on the natural environment
- Reduce Greenhouse Gas (GHGs) generated by all transportation modes

- Improve stormwater management and treatment in transportation improvement projects
- Improve connections between housing, job, cultural centers, and essential services within and beyond the region

Strategies aimed at achieving the objectives under this goal include:

- Develop strategies to **reduce vehicle miles traveled (VMTs)**
- Encourage efforts that allow people to **work from home** and the development of **shared office space** in regional centers to reduce commuting traffic
- Encourage the use of **healthy transportation** modes that reduce air pollution, fuel consumption, and other environmental impacts such as greenhouse gas emissions.
- Pursue strategies that will get automobiles and trucks moving at **speeds that will minimize air pollution**.
- Replace public buses and vehicles with **fuel-efficient, hybrid, or bio-diesel** vehicles that will reduce fossil fuel consumption.
- Design roadways to **drain and cleanse oil and gasoline runoff** away from aquifers and other sensitive environmental areas.
- Encourage design decisions and construction practices that **minimize resource consumption** such use of reclaimed materials in paving projects, use of energy efficient lighting fixtures, and choice of drought-tolerant, low-maintenance landscaping elements
- **Protect drinking water** from materials used in the design, construction, operation, and maintenance of transportation facilities, such as road salt.
- Develop a transportation system that supports the **economic vitality of Cape Cod** and its metropolitan areas
- Prioritize projects that are consistent with the **economic development goals** of the Regional Policy Plan (RPP)[7] and the **regional priority projects** detailed in the Comprehensive Economic Development Strategy (CEDS)[8]
- Work with the Executive Office of Housing and Economic Development to identify **Priority Development Areas and Priority Protection Areas** on Cape Cod
- Implement projects in the Transportation Improvement Program (TIP) consistent with the goal. Specifically:
- 50% of TIP target projects should reduce GHGs and provide overall benefits to the natural system
- 50% of TIP projects outside of sensitive areas and 100% of TIP projects within sensitive areas should provide improved stormwater management and treatment

[7] Available at: www.capecodcommission.org/rpp

[8] Available at: www.capecodcommission.org/ceds

- TIP projects should improve signal operations at 5 locations along key corridors every 5 years
- TIP projects should close 5 gaps in the bicycle or pedestrian network every 5 years

Additionally, in support of this goal, the Cape Cod MPO supports the following policies:

- To reduce emissions from idling vehicles, when developing intersection improvements involving signalization of a previously unsignalized location, construction of a **modern roundabout** shall be considered as one of the alternatives.
- As roadway improvement projects are developed, **stormwater management** techniques shall be included to manage and treat surface runoff. Stormwater Best Management Practices (BMP), including Low Impact Development (LID) where feasible, shall be followed. Stormwater treatment benefits of all TIP projects shall be quantified by the design engineer and included in the design plans.

Livability and Sustainability

Livability and sustainability are about supporting strong communities that people will want to live in now and in the future.

Livability is about fostering communities where coordinated transportation, housing, and commercial development give people access to affordable and environmentally sustainable transportation. Incorporating livability approaches into transportation, land use, and housing policies can help improve public health and safety, lower infrastructure costs, reduce combined household transportation and housing costs, reduce vehicle miles traveled, and improve air and water quality, among many other benefits.[9]

Sustainability is about the future of the region. It is about incorporating environmental, economic, and societal considerations into policies, operations, investments, and research.[10]

GOAL 3: SUPPORT LIVABLE COMMUNITIES AND COMMUNITY ACTIVITY CENTERS THAT STRENGTHEN THE LONG-TERM SUSTAINABILITY OF THE REGION

Objectives:

- Support development in compact community activity centers

[9] http://www.fhwa.dot.gov/livability/fact_sheets/benefits.pdf

[10] http://www.dot.gov/sites/dot.gov/files/docs/2014-DOT-Strategic-Sustainability-Performance-Plan.pdf

- Improve the transportation system's resiliency to the effects of sea level rise
- Develop a transportation system that is consistent with the local character of Cape Cod

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Strategies aimed at achieving the objectives under this goal include:

- Support **community activity centers** with a broad range of transportation options, such as roadways, transit, bicycle and pedestrian facilities.
- Projects that **improve access to or within community activity centers** should be identified and prioritized.
- Focus on closing gaps in the bicycle and pedestrian network identified in previous analysis of **connections to community activity centers**.
- Projects that improve the transportation **system's resiliency** to the effects of sea level rise should be identified and prioritized.
- All transportation projects and programs must be **responsive to the natural and built environments** within which they are undertaken.
- Use **landscaping and noise barriers** to protect communities and minimize adverse impacts.
- Involve community and business leaders in transportation projects and programs to ensure that local concerns are addressed.
- Avoid, minimize or mitigate the impact of transportation improvements on parks, recreation areas, historic sites, and other **scenic or cultural resources** and minimize impact on overall community character.
- Support transportation projects consistent with **Local Comprehensive Plans**.
- Implement projects in the Transportation Improvement Program (TIP) consistent with the goal. Specifically:
- 25% of TIP target projects should improve access to or within community activity centers
- The potential impacts of sea level rise should be evaluated for all TIP projects during the 25% design review and adjustments to projects should be made as warranted
- All TIP projects should provide opportunities for local input including public meeting prior to development of design plans and throughout the design process and take into consideration the project's Placetype location

Additionally, in support of this goal, the Cape Cod MPO supports the following policies:

- Design of all TIP projects shall consider the **environmental, historic, and cultural context** in which a project they are being proposed. The eight Cape Cod Placetypes articulated in the RPP may be helpful in identifying the defining characteristics and context of a given project.

- Consistent with current MassDOT sign policy, **business logo signs** shall not be allowed on Route 6 east of the Cape Cod Canal. "Sponsor a highway" signs with business logos may be allowed at the discretion of the MassDOT District Office Director.
- For all TIP projects, potential **impacts of sea level rise**, any mitigating actions to be taken, and/or reasons such actions are infeasible shall be identified by the design engineer and included in the design plans.
- All TIP projects shall provide opportunities for **local input** including public meetings prior to development of design plans and throughout the design process.

Multimodal Options/Healthy Transportation

In October 2012 MassDOT announced an ambitious Mode Shift Goal of tripling mode share by walking, bicycling, and transit by 2030. In support of this goal, the Healthy Transportation Policy Directive was issued in September 2013 requiring that all MassDOT projects are designed and implemented in a way that all our customers have access to safe and comfortable healthy transportation options at all MassDOT facilities and in all the services. The recent Massachusetts Bicycle Transportation Plan[11] and Pedestrian Transportation Plan[12] build on these efforts with actionable recommendations.

As a region, Cape Cod has always been supportive of varied and healthy transportation options. Whether by choice or necessity, moving around the region without a personal automobile is critical to many users of the transportation system.

GOAL 4: PROVIDES A VARIETY OF HEALTHY TRANSPORTATION OPTIONS TO ALL USERS

Objectives:

- Improve accessibility of all modes to all users
- Expand the sidewalk and bicycle network and close gaps in these networks
- Improve coordination between all modes
- Increase the share of travel by means other than the single occupancy vehicle

Strategies aimed at achieving the objectives under this goal include:

[11] https://www.mass.gov/service-details/bicycle-plan

[12] https://www.mass.gov/service-details/pedestrian-plan

- **"Complete Streets"** designs are encouraged to accommodate all users including pedestrians, bicyclists, persons in wheelchairs or strollers, public transportation users, and motorists.
- Sufficient **mobility** must be provided to ensure that individuals and freight can travel safely and efficiently among the communities of Cape Cod and their neighbors.
- **Examine expansion of bus, rail and bicycle services** and infrastructure to villages and town centers currently un-served by alternative transportation modes.
- **Provide bicycle amenities**, such as racks and/or lockers, at park-and-ride lots, transit centers, and village centers that support bicycle networks.
- Assess ADA compliance of signalized and circular intersections and work to increase the number of **ADA-compliant intersections**.
- **Coordinate public transportation** services and schedules between regions and between providers to decrease wait times for users during connections.
- Focus on closing gaps in the bicycle and pedestrian network identified in previous analysis of **connections to transit routes and village centers**.
- Implement projects in the Transportation Improvement Program (TIP) consistent with the goal. Specifically:
- TIP projects should increase the number of ADA-compliant signalized and circular intersections by 10% in 10 years
- TIP projects should close 5 gaps in the bicycle or pedestrian network every 5 years

Congestion Reduction

Congestion has significant adverse impacts on the movement of people and goods. Delay and poor travel time reliability negatively impact the economy and can lead to driver frustration and safety concerns. Congestion affects all modes of travel including the personal automobile, public transportation vehicles, bicycles, and pedestrians. Additionally, congestion affects other entities, such as businesses that rely on transportation access for their employees and customers. Congestion also produces more air pollution and increases greenhouse gas emissions that contribute to global warming and decreases the overall attractiveness of the region.

The objectives and performance measures under this goal are a key part of a comprehensive Congestion Management Process (CMP) for the region.

GOAL 5: REDUCE CONGESTION AND IMPROVE TRAVEL TIME RELIABILITY

Objectives:

- Reduce delay for all modes
- Improve connectivity and reliability for all modes of transportation

- Minimize the impacts of construction delays on all users, particularly impacts of Cape Cod Canal Bridge maintenance

Strategies aimed at achieving the objectives under this goal include:

- Support the implementation of **advanced construction techniques** for Cape Cod Canal Bridge maintenance projects to reduce construction impacts compared to standard construction practices
- Consider strategies to **address the behavioral causes** of traffic congestion such as VMT reduction strategies as well as changes to transportation infrastructure.
- Where possible, **incorporate the Congestion Management Process**, including new roadways, intersection improvements, park-and-ride, and transit capacity, into transportation projects and programs.
- **Support all strategies** for transportation demand management including, but not limited to, Transportation Management Associations, flexible hours, carpooling, bus pass programs, preferential parking, and telecommuting.
- Encourage **transit-oriented development** and provide alternatives to automobile travel by linking land use decisions with transit, bikeway, pedestrian, and park-and-ride investments.
- Consider the feasibility of **congestion pricing** on major routes on Cape Cod.
- Assess the capacity of Cape Cod's ports and harbors in accommodating ferry traffic and recommend strategies to solve existing **ferry congestion** or prevent future congestion.
- Examine the **road traffic around Cape Cod's ports and harbors** to determine the ability of the current infrastructure to accommodate ferry-related auto traffic
- Assess the capacity of Cape Cod's airports in accommodating air traffic and recommend strategies to solve existing **air traffic congestion** or prevent future congestion.
- Examine the **road traffic around Cape Cod's airports** to determine the ability of the current infrastructure to accommodate air-related auto traffic.
- **Coordinate public transportation** services and schedules between regions and between providers to decrease wait times for users during connections.
- Encourage the Army Corps of Engineers to implement all feasible **advanced construction techniques** for Cape Cod Canal Bridge maintenance projects to reduce construction impacts. This should include, at a minimum, consideration of night work, 24-hour work schedules, innovative bid review and contracting practices such as incentives-disincentive clauses13.

[13] Work Zone Road User Costs: Concepts and Applications, December 2011, US Department of Transportation and Federal Highway Administration Publication No. FHWA-HOP-12-005, Available at: http://www.ops.fhwa.dot.gov/wz/resources/publications/fhwahop12005/fhwahop12005.pdf

- Implement projects in the Transportation Improvement Program (TIP) consistent with the goal. Specifically: TIP projects should improve operations at 2 bottleneck locations every 5 years

Additionally, in support of this goal, the Cape Cod MPO supports the following policy:

- To reduce traffic congestion and facilitate free-flowing traffic, when developing intersection improvements involving signalization of a previously unsignalized location, construction of a **modern roundabout** shall be considered as one of the alternatives.

System Preservation

As transportation infrastructure on Cape Cod ages, maintenance and preservation efforts will be critical to maintaining a safe and functional transportation system. Many of the elements of the transportation system are near the end of their design life meaning that significant investments will be needed to extend their useful lives or replace these elements.

A critical look at allocating limited funding as well as a deployment of new and emerging technologies will be critical in meeting the challenges of future generations.

GOAL 6: PRESERVE, MAINTAIN, AND MODERNIZE THE EXISTING TRANSPORTATION SYSTEM

Objectives:

- Improve the condition of all state and municipally owned bridges
- Improve the pavement condition on all federal-aid eligible roadways
- Maintain and improve on and off-road bicycle and pedestrian facilities
- Use modern technology to improve the efficiency of the transportation system
- Improve coordination and cooperation between agencies throughout all phases of project development and implementation for all improvement and maintenance projects

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Strategies aimed at achieving the objectives under this goal include:

- Reserve adequate funds for the maintenance of **alternative modes of transportation**, such as public transportation services, sidewalks, and bicycle paths.
- As transportation services are considered for areas subject to the effects of **sea-level rise**, new facilities shall be constructed with consideration to vulnerability.

- Create and implement asset management tools for **monitoring** and maintaining the existing transportation system. Include automatic traffic monitoring equipment as part of intersection upgrades.
- Support maintenance strategies and programs that **accommodate safe travel** throughout the transportation network, regardless of mode.
- Consider the **use of new technologies** that will lower costs, extend infrastructure life, lower environmental impacts, and reduce energy consumption and emissions.
- New transportation projects must consider inclusion of **intelligent transportation system (ITS)** elements, such as variable message signs, highway advisory radio, local television, web travel services, and smart signals that can provide travel data as well as react to changes in demand.
- Implement all feasible **advanced construction techniques** for Cape Cod Canal Bridge maintenance projects to reduce construction impacts. This should include, at a minimum, consideration of night work, 24-hour work schedules, innovative bid review and contracting practices such as incentives-disincentive clauses[14].
- Increase communications between agencies involved in transportation planning and utility operators to improve **coordination between utility planning and transportation planning**.
- Collaborate on the adoption of a memorandum of understanding between the MPO and MassDOT outlining how construction activities in the region (including maintenance projects) will be communicated to the MPO and how local input will be addressed by MassDOT

Freight Mobility

Safe and efficient movement of freight is critical to local economies.[15] The freight industry on Cape Cod is different from most areas because of the seasonal tourist industry, abundance of waterways, and historic culture. Congestion and poor travel time reliability affect the freight industry and, by extension, the local economics. Efforts to improve the freight network on Cape Cod will support long-term economic stability.[16] Truck travel time reliability performance measures can be found later in this chapter of the RTP.

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[14] Work Zone Road User Costs: Concepts and Applications, December 2011, US Department of Transportation and Federal Highway Administration Publication No. FHWA-HOP-12-005, Available at: http://www.ops.fhwa.dot.gov/wz/resources/publications/fhwahop12005/fhwahop12005.pdf

[15] https://www.mass.gov/files/documents/2018/09/04/Freight%20Plan508.pdf

[16] http://www.capecodcommission.org/resources/transportation/2015-Freight_Study_02132015.pdf

GOAL 7: IMPROVE EFFICIENCY AND RELIABILITY OF FREIGHT MOVEMENT

Objectives:

- Reduce delays and improve travel time reliability on the freight network
- Minimize Cape Cod Canal bridge maintenance impacts

Strategies aimed at achieving the objectives under this goal include:

- **Enhance the transportation of freight on Cape Cod** to decrease travel times, increase reliability and lower costs for freight transportation providers, with minimal disruption to other transportation activities.
- Where possible, work to **consolidate freight** so as to move goods in the most efficient manner.
- Make available **multiple modes for freight transportation**, with infrastructure and facilities that are designed to support quick and efficient changes in mode.
- Consider inclusion of alternatives to freight traffic over the bridges (increased airport freight, short sea shipping, etc.)

SUMMARY OF POLICIES

As a collection, the policies contained within this document are an important element of the approach needed to achieve the overall vision of the region:

- For proposed roadways with cross-sections of four or more lanes, **landscaped median dividers shall be included** to provide a reasonable level of safety and access management.
- When developing intersection improvements involving signalization of a previously unsignalized location, construction of a **modern roundabout** shall be considered as one of the alternatives.
- As roadway improvement projects are developed, **stormwater management** techniques shall be included to manage and treat surface runoff. Stormwater Best Management Practices (BMP), including Low Impact Development (LID) where feasible, shall be followed. Stormwater treatment benefits of all TIP projects shall be quantified by the design engineer and included in the design plans.
- Consistent with current MassDOT sign policy, **business logo signs** shall not be allowed on Route 6 east of the Cape Cod Canal. "Adopt a highway" signs with business logos may be allowed at the discretion of the MassDOT District 5 Highway Director.
- For all TIP projects, potential **impacts of sea level rise**, any mitigating actions to be taken, and/or reasons such actions are infeasible shall be identified by the design engineer and included in the design plans.

- All TIP projects shall provide opportunities for **local input** including public meetings prior to development of design plans and throughout the design process.

FEDERALLY REQUIRED PERFORMANCE MEASURE SUMMARY

The US Department of Transportation (USDOT), in consultation with states, MPOs, and other stakeholders, established measures in performance areas relevant to the national goals. Table 6 lists federally required performance measures for the highway system and Table 7 lists federally required performance measures for the transit system.

TABLE 6. Federally Required Highway Performance Measures

NATIONAL GOAL	HIGHWAY PERFORMANCE AREA	PERFORMANCE MEASURE
Safety	Injuries and Fatalities	■ Number of fatalities ■ Fatality rate per 100 million vehicle-miles traveled ■ Number of serious injuries ■ Serious injury rate per 100 million vehicle-miles traveled ■ Number of non-motorized fatalities and non-motorized serious injuries
Infrastructure Condition	Pavement Condition	■ Percent of pavements on the Interstate System in good condition ■ Percent of pavements on the Interstate System in poor condition ■ Percent of pavements on the non-Interstate NHS in good condition ■ Percent of pavements on the non-Interstate NHS in poor condition
Infrastructure Condition	Bridge Condition	■ Percent of NHS bridges by deck area classified as in good condition ■ Percent of NHS bridges by deck area classified as in poor condition
System Reliability	Performance of the National Highway System	■ Percent of person-miles traveled on the Interstate System that are reliable ■ Percent of person-miles traveled on the non-Interstate NHS that are reliable
System Reliability, Freight Movement, and Economic Vitality	Freight Movement on the Interstate System	■ Truck Travel Time Reliability Index
Congestion Reduction	Traffic Congestion	■ Annual hours of peak hour excessive delay per capita (for travel on NHS roadways) ■ Percent of non-single-occupant vehicle travel
Environmental Sustainability	On-Road Mobile Source Emissions	■ Total emissions reductions

TABLE 7. Federally Required Transit Performance Measures

NATIONAL GOAL	TRANSIT PERFORMANCE AREA OR ASSET CATEGORY	PERFORMANCE MEASURE
Safety	Fatalities	■ Total number of reportable fatalities and rate per total vehicle revenue-miles by mode
Safety	Injuries	■ Total number of reportable injuries and rate per total vehicle revenue-miles by mode
Safety	Safety Events	■ Total number of reportable events and rate per total vehicle revenue-miles by mode
Safety	System Reliability	■ Mean distance between major mechanical failures by mode
Infrastructure Condition	Equipment	■ Percent of vehicles that have met or exceeded their Useful Life Benchmark (ULB)
Infrastructure Condition	Rolling Stock	■ Percent of revenue vehicles within a particular asset class that have met or exceeded their ULB
Infrastructure Condition	Infrastructure	■ Percent of track segments with performance restrictions
Infrastructure Condition	Facilities	■ Percent of facilities within an asset class rated below 3.0 on the Federal Transit Administration's Transit Economic Requirements Model scale

Targets for federally required performance measures must be set according to timelines established in the current federal transportation legislation.

Safety Performance Measures (PM1)

The Cape Cod MPO has chosen to adopt the statewide safety performance measure targets set by MassDOT for Calendar Year (CY) 2019. In setting these targets, MassDOT has followed FHWA guidelines by using statewide crash data and Highway Performance Monitoring System (HPMS) data for vehicle miles traveled (VMT) in order to calculate 5 year, rolling average trend lines for all FHWA-defined safety measures. For CY 2019 targets, four of the five safety measures—total number of fatalities, rate of fatalities per 100 million vehicle miles traveled, total number of incapacitating injuries, and rate of incapacitating injuries per 100 million VMT—were established by extending their trend lines into the 2015-2019 period. All four of these measures reflect a modest decrease in statewide trends. The fifth safety measure, the total number of combined incapacitating injuries and fatalities for non-motorized modes, is the only safety measure for which the statewide trend line depicts an increase. MassDOT's effort to increase non-motorized mode share throughout the Commonwealth has posed a challenge to simultaneously reducing non-motorized injuries and fatalities. Rather than adopt a target that depicts an increase in the trend line, MassDOT has elected to establish a target of non-motorized fatalities and injuries and for CY 2019 that remains constant from the rolling average for 2012–2016. In recent years, MassDOT and the Cape Cod MPO

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

In all safety categories, MassDOT has established a long-term target of "Toward Zero Deaths" through MassDOT's Performance Measures Tracker[17] and will be establishing safety targets for the MPO to consider for adoption each calendar year. While the MPO is not required by FHWA to report on annual safety performance targets, FHWA guidelines require MPOs to adopt MassDOT's annual targets or to establish their own each year.

The safety measures MassDOT has established for CY 2019, and the Cape Cod MPO has adopted, are as follows:

1. Fatalities: The target number of fatalities for years CY 2019 is 353, down from an average of 364 fatalities for the years 2012–2016. [See Figure 10. and Figure 11. for the Cape Cod trend and statewide trend for this performance measure]
2. Rate of Fatalities per 100 million VMT: The target fatality rate for years CY 2019 is 0.58, down from a 0.61 average for years 2012–2016. [See Figure 10. and Figure 11. for the Cape Cod trend and statewide trend for this performance measure]
3. Serious Injuries: The target number of incapacitating injuries for CY2019 is 2801, down from the average of 3146 for years 2012–2016. [See Figure 12. and Figure 13. for the Cape Cod trend and the statewide trend for this performance measure]
4. Rate of Incapacitating Injuries per 100 million VMT: The incapacitating injury rate target for CY2019 is 4.37 per year, down from the 5.24 average rate for years 2012–2016. [See Figure 12. Cape Cod Incapacitating Injury Trend (5-year Averages)Figure 12. and Figure 13. for the Cape Cod trend and the statewide trend for this performance measure]
5. Total Number of Combined Incapacitating Injuries and Fatalities for Non-Motorized Modes: The CY2019 target number of fatalities and incapacitating injuries for non-motorists is 541 per year, the same as the average for years 2012–2016. [See Figure 14. and Figure 15. for the Cape Cod trend and the statewide trend for this performance measure]

[17] https://www.mass.gov/lists/tracker-annual-performance-management-reports

FIGURE 10. Cape Cod Fatalities Trend (5-year Averages)

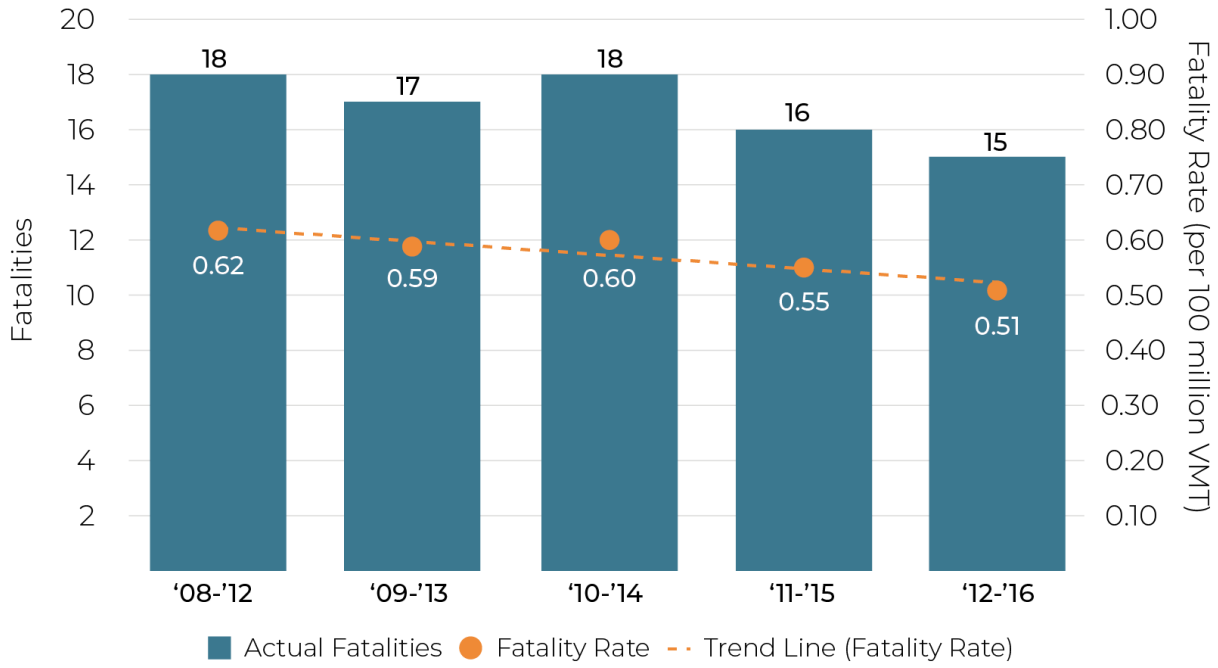


FIGURE 11. Statewide Fatalities Trend (5-year Averages)

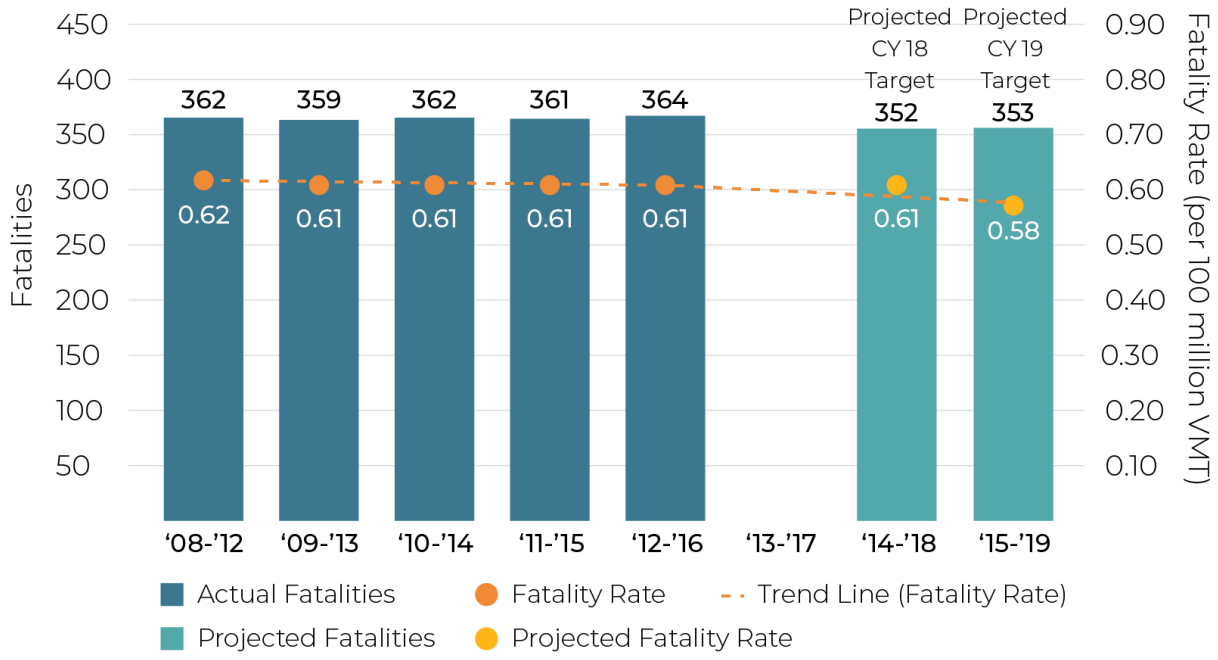


FIGURE 12. Cape Cod Incapacitating Injury Trend (5-year Averages)

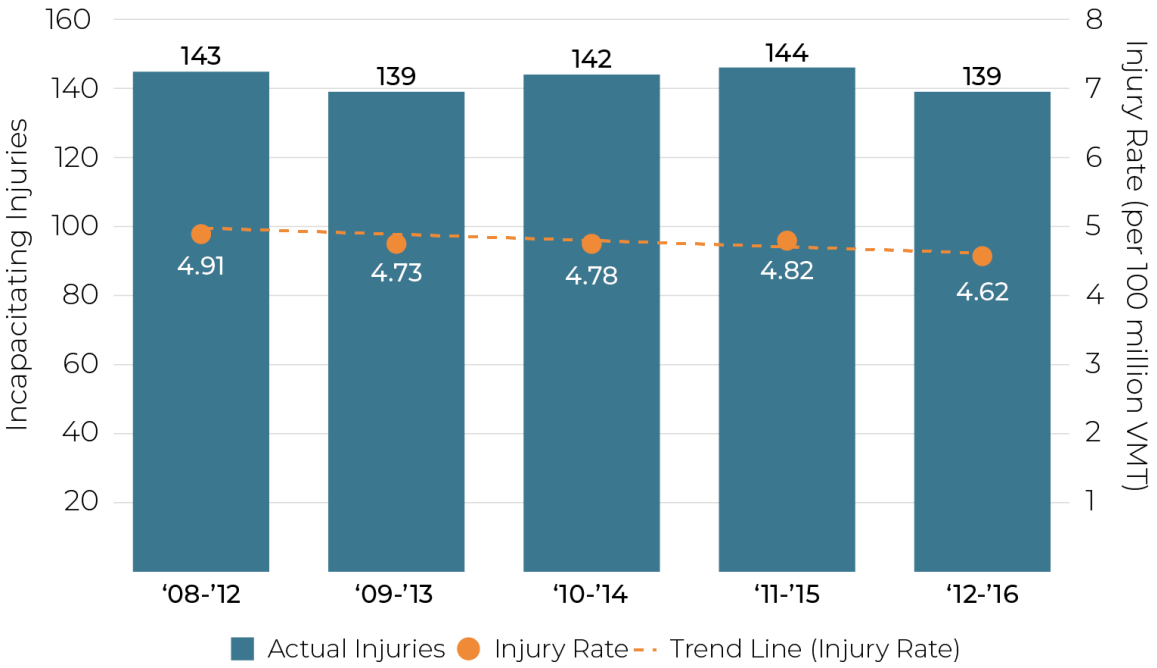


FIGURE 13. Statewide Incapacitating Injury Trend (5-year Averages)

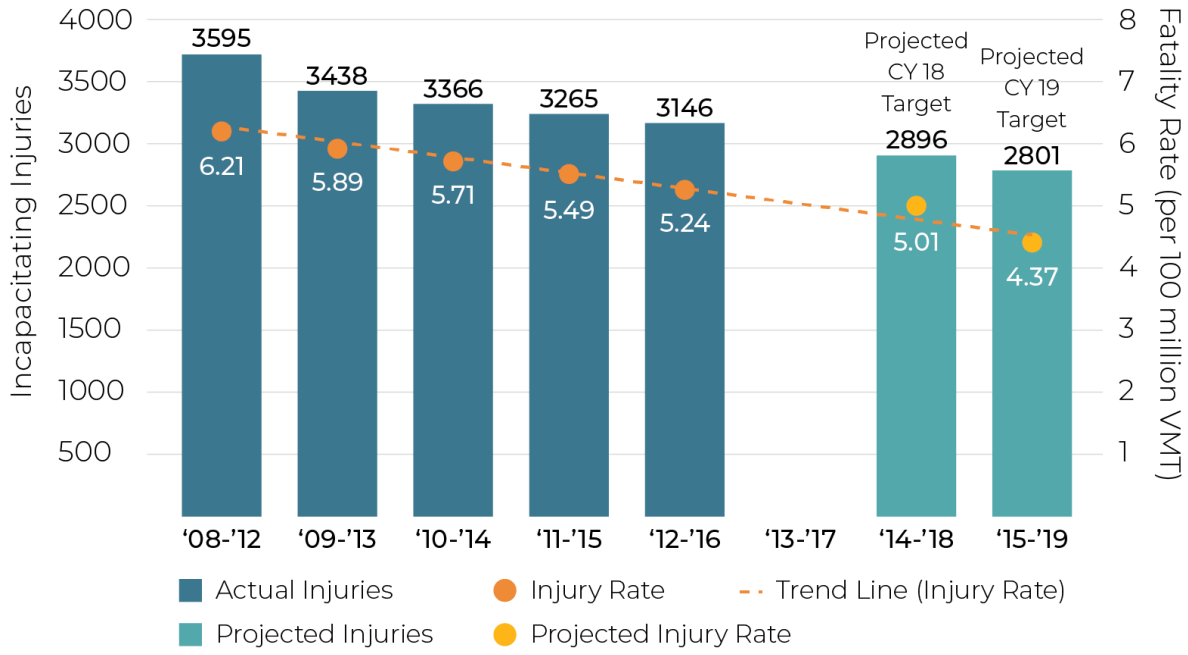


FIGURE 14. Cape Cod Non-Motorized Injury and Fatality Trend (5-year Averages)

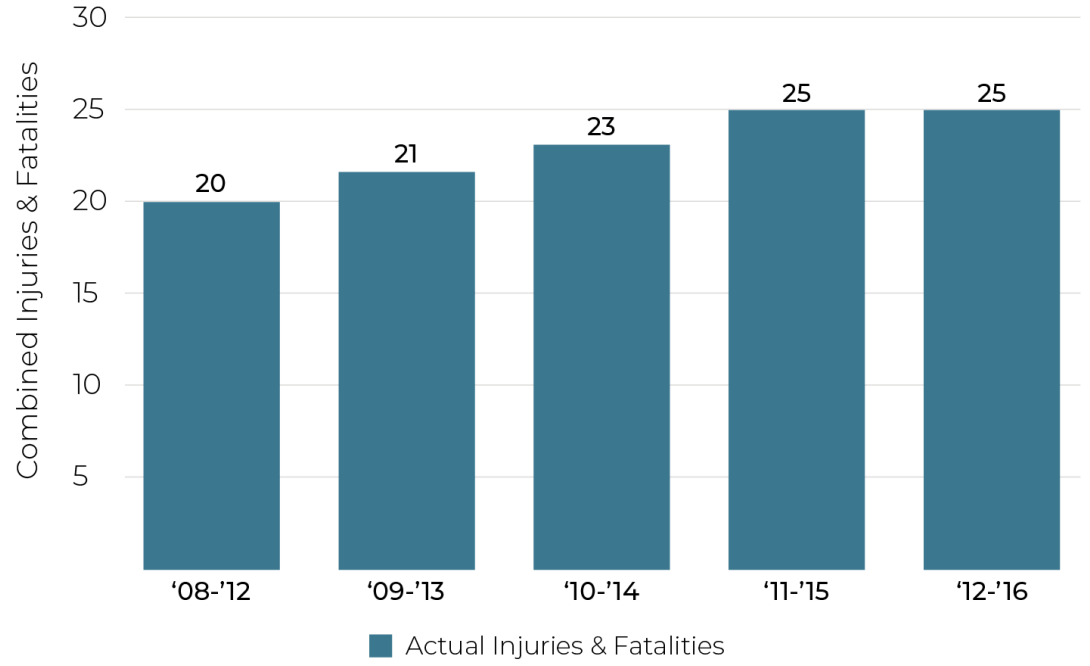
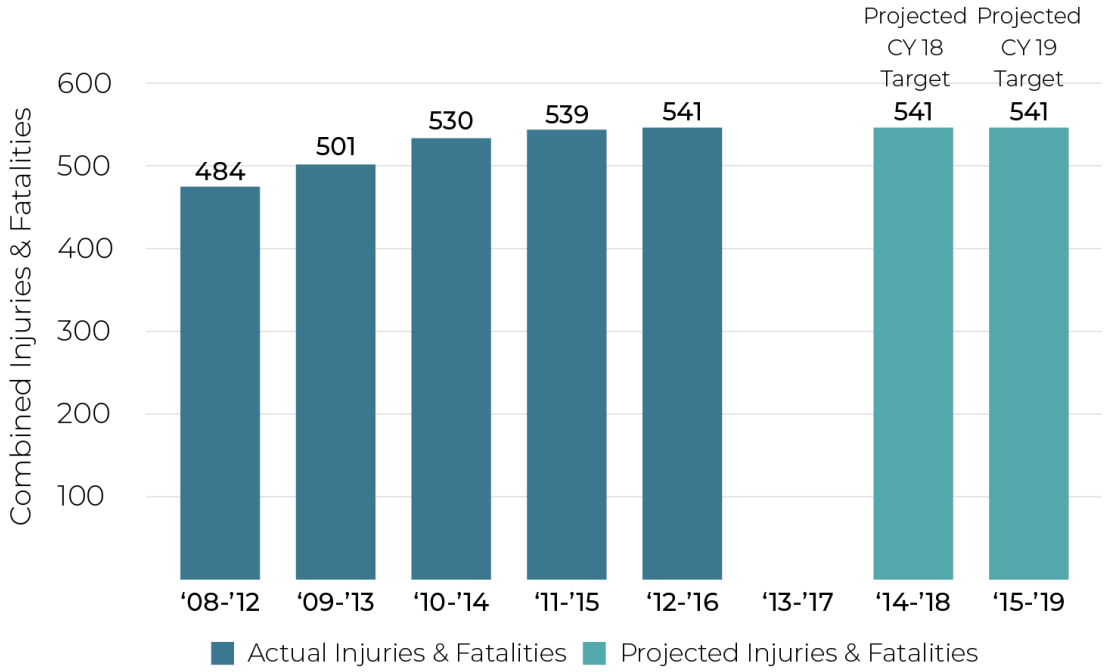


FIGURE 15. Statewide Non-Motorized Injury and Fatality Trend (5-year Averages)



Projects and programs identified in the Cape Cod Regional Transportation Plan and the Cape Cod Transportation Improvement Program are one way for the region to make strides towards achieving the region's safety targets. Anticipated motorist and non-motorist safety impacts are important criteria in the evaluation of projects considered for inclusion in the Cape Cod Transportation Improvement Program. The Cape Cod Regional Transportation Plan and the Cape Cod Transportation Improvement Program include projects that are anticipated to improve safety in a number of locations with demonstrated crash problems.

Bridge & Pavement Performance Measures (PM2)

The Cape Cod MPO has chosen to adopt the 2-year (2020) and 4-year (2022) statewide bridge and pavement performance measure targets set by MassDOT. MassDOT was required to adopt a statewide target by May 20th, 2018, with MPOs either adopting the statewide target or establishing their own by November 2018. In setting these targets, MassDOT has followed FHWA guidelines by measuring bridges and pavement condition using the 9-point National Bridge Inventory Standards (NBIS); the International Roughness Index (IRI); the presence of pavement rutting; and the presence of pavement cracking. 2-year and 4-year targets were set for six individual performance measures: percent of bridges in good condition; percent of bridges in poor condition; percent of Interstate pavement in good condition; percent of Interstate pavement in poor condition; percent of non-Interstate pavement in good condition; and percent of non-Interstate pavement in poor condition. All of the above performance measures are tracked in greater detail in MassDOT's Transportation Asset Management Plan (TAMP), which is due to be finalized in July 2019.

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

Performance targets for pavement-related performance measures were based on a single year of data collection, and thus were set to remain steady under the guidance of FHWA. These measures are to be revisited at the 2-year mark (2020), once three years of data are available, for more informed target setting.

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

TABLE 8. Bridge & Pavement Performance Measures (PM2) Target Summary

PERFORMANCE MEASURE	CURRENT (2017)	2-YEAR TARGET (2020)	4-YEAR TARGET (2022)
Bridges in good condition	15.22%	15%	16%
Bridges in poor condition	12.37%	13%	12%
Non-Interstate Pavement in good condition	32.9%	30%	30%
Non-Interstate Pavement in poor condition	31.4%	30%	30%

Note: Performance targets related to the Interstate System are not included in this table since there are no interstates in the Cape Cod region.

Projects and programs identified in the Cape Cod Regional Transportation Plan and the Cape Cod Transportation Improvement Program are one way for the region to make strides towards achieving the region's bridge and pavement performance targets. Asset condition is an important criterion in the evaluation of projects considered for inclusion in the Cape Cod Transportation Improvement Program. The Cape Cod Regional Transportation Plan and the Cape Cod Transportation Improvement Program include projects that are anticipated to improve roadway and pavement condition.

Reliability, Congestion, & Emissions Performance Measures (PM3)

The Cape Cod MPO chosen to adopt the 2-year (2020) and 4-year (2022) statewide reliability, congestion, and emissions performance measure targets set by MassDOT. MassDOT was required to adopt a statewide target by May 20th, 2018, with MPOs either adopting the statewide target or establishing their own by November 2018.

MassDOT followed FHWA regulation in measuring Level of Travel Time Reliability (LOTTR) on both the Interstate and non-Interstate NHS as well as Truck Travel Time Reliability (TTTR) on the Interstate system using the National Performance Management Research Dataset (NPMRDS) provided by FHWA. These performance measures aim to identify the predictability of travel times on the roadway network by comparing the average travel time along a given segment against longer travel times. For LOTTR, the performance of all segments of the Interstate and of the non-Interstate NHS are defined as either reliable or unreliable based on a comparison between the 50th percentile travel time and the 80th percentile travel time, and the proportion of reliable segments is reported. For TTTR, the ratio between the 50th percentile travel time and the 90th percentile travel time for trucks only along the Interstate system is reported as a statewide measure. As this data set has but one year of consistent data, FHWA guidance has been to set conservative targets and to adjust future targets once more data becomes available. To that end, MassDOT's reliability performance targets are set to remain the same.

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

TABLE 9. Reliability, Congestion, & Emissions Performance Measures (PM3) Target Summary

PERFORMANCE MEASURE	CURRENT (2017)	2-YEAR TARGET (2020)	4-YEAR TARGET (2022)
Non-Interstate LOTTR	80%	80%	80%
TTTR	1.85	1.85	1.85

Note: Performance targets not applicable to Cape Cod have been excluded from this table.

Transit Asset Management Measures and Targets

Transit Asset Management (TAM) is a business model that uses the condition of assets to guide optimal prioritization of funding at transit properties in order to keep our transit networks in a state of Good Repair (SGR).

Federal legislation requires all recipients of FTA funding to develop a TAM Plan and update the plan every four years. The Cape Cod Regional Transit Authority (CCRTA) is required to develop agency-specific TAM targets and the Cape Cod MPO is required to develop regional targets. The Cape Cod MPO has adopted CCRTA's FY 2019 CCRTA TAM targets for the Cape Cod region as represented in Table 10.

TABLE 10. Cape Cod Transit Asset Management Performance Measures and Targets

CATEGORY	CLASS	NUMBER	MEASURE	FY2018 PERFORMANCE	FY2019 TARGET
Rolling Stock	Bus	28	% at or past ULB	0%	0%
Rolling Stock	Cutaway Bus	100	% at or past ULB	1%	10%
Rolling Stock	Vans	7	% at or past ULB	0%	0%
Equipment	Service Vehicle/Trucks	10	% at or past ULB	40%	50%
Facilities	Maintenance	1	% under 3.0 on TERM scale	0%	0%
Facilities	Passenger Facilities	1	% under 3.0 on TERM scale	0%	0%

Note: Useful Life Benchmark (ULB) is defined by FTA as "the expected lifecycle of a capital asset for a particular transit provider's operating environment, or the acceptable period of use in service for a particular transit provider's operating environment." The CCRTA uses the FTA benchmark criteria for its analyses. For example, FTA's default ULB value for a bus is 14 years. FTA's Transit Economic Requirements Model (TERM) scale, which pertains to the facilities measure, is a rating system that describes asset condition. The scale values are 1 (poor), 2 (marginal), 3 (adequate), 4 (good), and 5 (excellent).

REGIONAL TRANSPORTATION PLAN PERFORMANCE MEASURES

In order to determine if the objectives of the RTP are being achieved, progress must be tracked in reaching the performance targets. By preparing and regularly updating a performance report annually, adjustments to the approach can be made.

Table 11 presents regional performance measures and targets derived from the goals and objectives of the RTP. Many of the performance measures identified are tied to multiple goals.

Baseline (2020) performance is reported for performance measures where data is currently available. Some data will be utilized from the MassDOT's Annual Performance Management Report

Tracker[18]. A near-term action item coming out of this RTP will be the development of baseline assessments for performance measures where data is currently unavailable. This effort may be included in the Cape Cod Unified Planning Work Program.

TABLE 11. Regional Performance Measures and Targets

SYSTEM MEASURES	EXISTING 2020	2030 TARGETS	% CHANGE	LONG-TERM TARGET
Number of crashes (per year)[1,2]	5,324	4,792	-10%	Move towards 0
Number of serious injury crashes (per year)[1,2]	122	110	-10%	Move towards 0
Serious injury crash rate per 100 Million VMT[1,2]	4.056	3.6504	-10%	Move towards 0
Number of fatal crashes (per year)[1,2]	17	15	-10%	Move towards 0
Fatal crash rate per 100 Million VMT[1,2]	0.585	0.5265	-10%	Move towards 0
Younger driver crashes (per year)[1,2]	1,577	1,420	-10%	Move towards 0
Older driver crashes (per year)[1,2]	1,471	1,324	-10%	Move towards 0
Bicycle and/ pedestrian crashes (per year)[1,2]	182	164	-10%	Move towards 0
Percent of signalized intersections[4] with pedestrian signal heads (some improvements needed for full ADA compliance)	65%	75%	+10%	100% with full ADA compliance
Percent of Route 28 transit corridor that does not have sidewalks	46.73%	36.73%	-10%	0%
Mode share - walking, bicycling, and transit	4.5%	13.5%	X 3	
Cape Cod multimodal congestion index-measure as developed in Congestion Management Plan				
Number of structurally deficient bridges	3	0	-3	0
Percent of roadway mileage[6] in fair or better condition	80.0%	85.0%	+5%	>95%
Number of active permanent counting stations	11	21	+10	
Parcels connected to the sidewalk network[7]				
Population within a half-mile of fixed route transit service				
Number of Electric Vehicle (EV) charging stations	39	100	+156%	

Notes: 1 - Based on 5-year rolling average, 2 - Existing based on most recent available data (2012-2016),

[18] https://www.mass.gov/lists/tracker-annual-performance-management-reports

3 - Regional VMT analysis currently under development, 4 - Signalized intersections, 5 - Will be inventoried as part of planned system assessments, 6 - Federal-aid eligible roads, ADA = Americans with Disabilities Act, CMAQ = Congestion Mitigation and Air Quality, HSIP =Highway Safety Improvement Program, GHG = greenhouse gases, MOU = Memorandum of Understanding, TIP = Transportation Improvement Program, VMT = vehicle miles travelled, 7 - Corresponds directly to the Cape Cod Commission Regional Policy Plan (RPP)

Chapter 3: Cape Cod and Transportation: Past, Present, and Future

Cape Cod and its transportation system is a story of a continually evolving community with ever-changing transportation needs. This chapter will touch on how the region arrived where it is today, what today's transportation landscape looks like, and what are the challenges and opportunities that lie ahead. Throughout the chapter there will be references to the appendices of the document where additional detail on any particular topic can be found.

PAST - HISTORICAL CONTEXT

The first recorded European expedition to Cape Cod was led by Bartholomew Gosnold, who was credited with naming the peninsula in 1602. In 1620, the Pilgrims landed at Provincetown. This was different than previous European appearances because the Pilgrims were more interested in settling somewhere, rather than exploring and trading with the native Wampanoag tribe. Although this is how we traditionally tell the story of Cape Cod's history, it actually extends long before that.

The following sections highlight some of the key developments in the transportation network on Cape Cod with thanks to the Massachusetts Historical Commission for much of the research work.[19] Additional detail is provided in Appendix A as well as available on Cape Cod Commission Chronology viewer available at: www.capecodcommission.org/chronology/

[19] *Historic & Archeological Resources of Cape Cod & the Islands*. Massachusetts Historical Commission. Originally published August 1986. PDF reprint version, 2007.

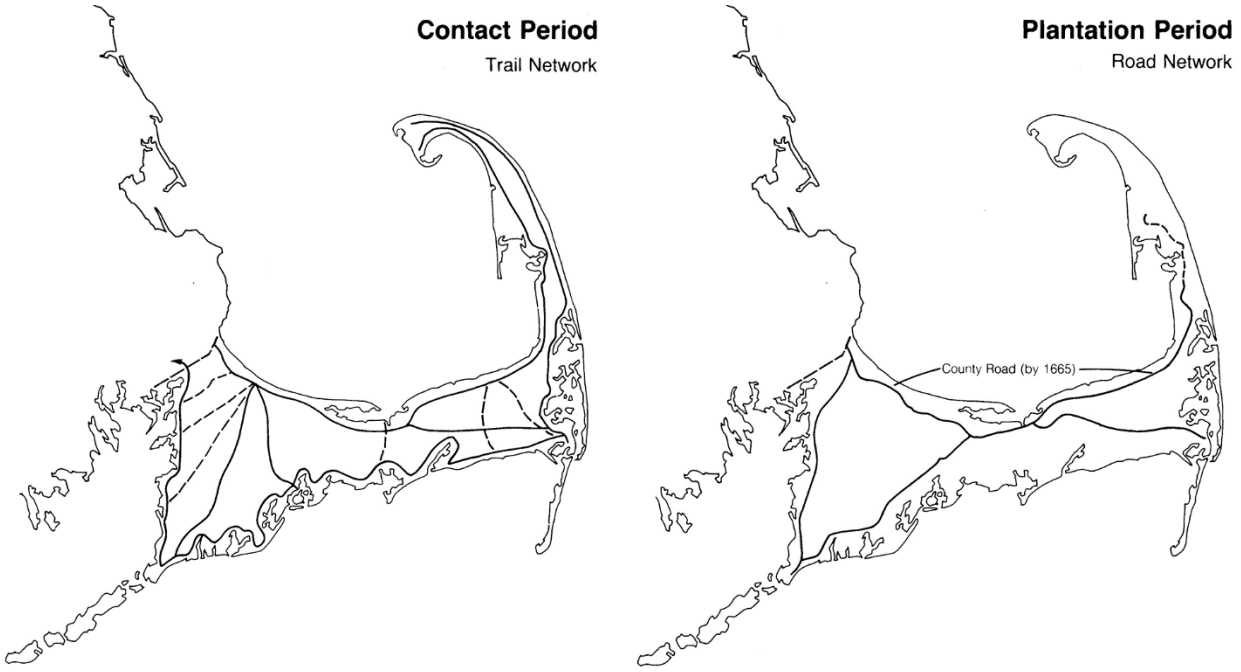
Early Trail and Road Network

CONTACT (1500 - 1620) AND PLANTATION (1620 - 1692) PERIODS

By the time the Pilgrims arrived, there was an extensive trail network stretching from one end of the region to the other as shown in Contact Period map in Figure 16. Even this far back, we can see connections that would eventually become the road network of Cape Cod. As Native Americans and

Europeans used the network more extensively; trails were upgraded to cartpaths or roadways. As shown in Figure 16. portions of present-day Route 6A took shape as County Road.

FIGURE 16. Early Trail and Road Network[19]



Solid lines on maps represent primary roads while dotted lines indicate secondary roads.

Expansion of Water Routes

COLONIAL (1692 - 1775) AND FEDERAL (1775-1830) PERIODS

As local transportation and commerce increased, water routes were the life blood of the region. Land routes were improved, widened, and expanded to support connection to the ports. Figure 17 shows the expansion of the road network and connection to water routes in these periods.

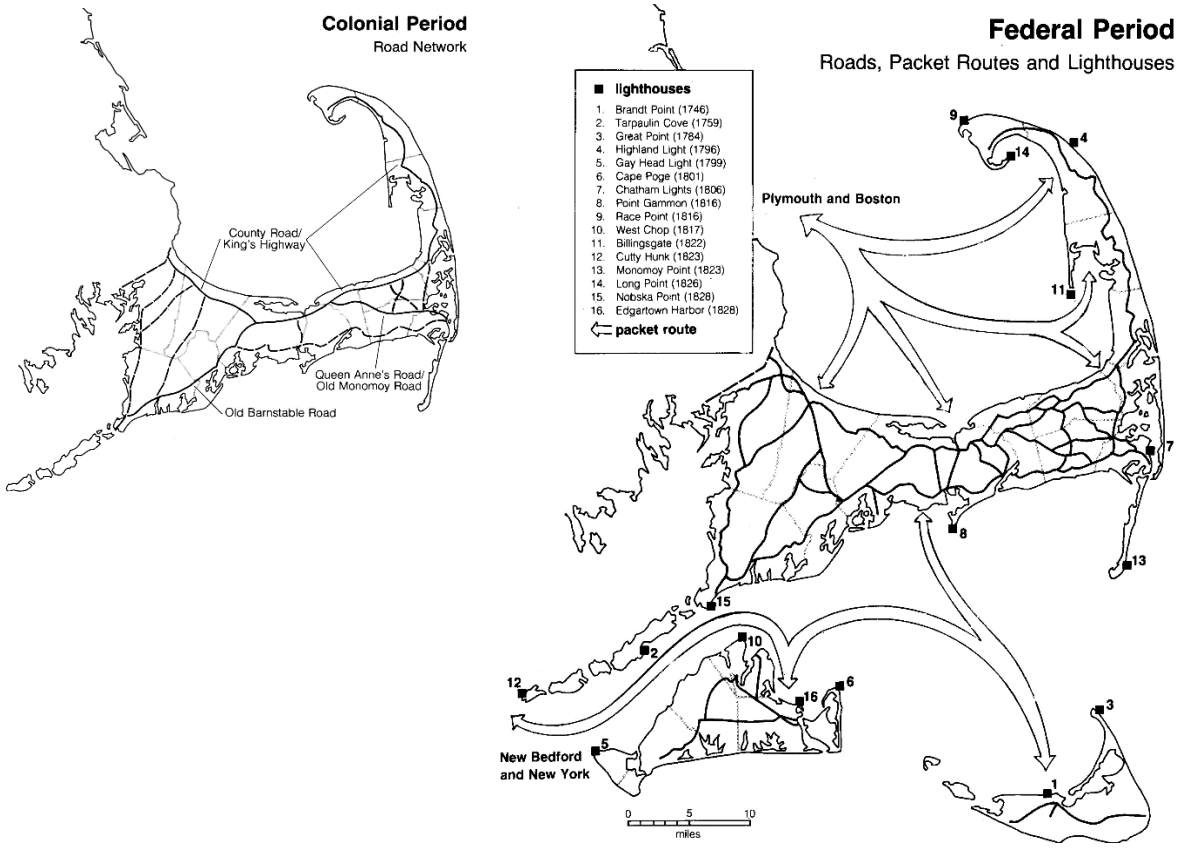


FIGURE 17. Expansion of Water Routes and Land Connections on Cape Cod[19]

Expansion of Railroads

EARLY AND LATE INDUSTRIAL PERIODS (1830-1915)

The industrial period saw the development and expansion of railroads across the region. Still tied to major ports, as shown in Figure 18, rail served both freight needs as well as the emerging tourism market.

This period saw multiple expansions of the rail network ultimately including connections to almost every town on Cape Cod. As the rail network expanded, development grew up around the train depot. These pockets of development thrived while rail transportation dominated the region. As the predominance of rail waned, some of these developments evolved to meet new needs while others did not.

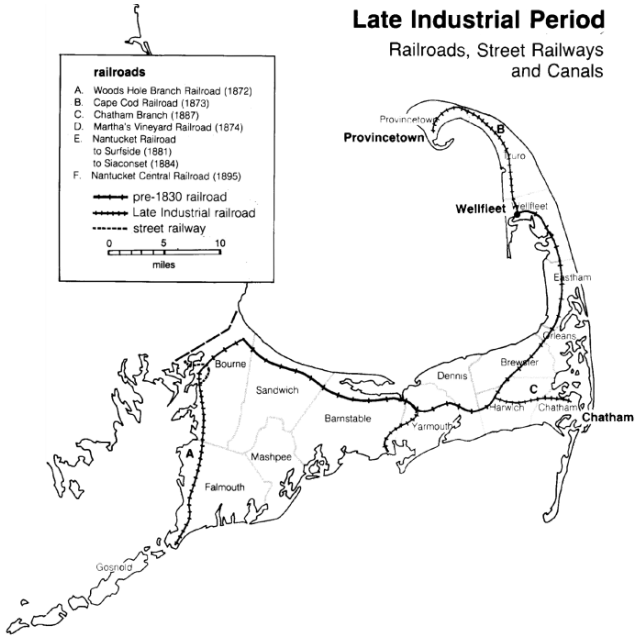


FIGURE 18. Rail Expansion[19]

Age of the Automobile

MODERN PERIOD TO PRESENT DAY (1915-)

The emergence of the automobile and tourism industry on Cape Cod forever changed the transportation network of the region. Construction of the Cape Cod Canal redefined the transportation landscape of the region. Expanding from the Cape Cod Canal, the transportation system was significantly expanded and modernized during the 20th century. As shown in Table 12, some of greatest expansions occurred in the 1950's.

TABLE 12. Industrial Period Infrastructure Expansion

YEAR	MILESTONE
1935	Bourne, Sagamore, and Railroad bridges over the Cape Cod Canal
1950	Rt. 6: Sagamore Bridge to Hyannis (exit 6) – 2 lanes
1954	Rt. 6: Sagamore Bridge to Hyannis (exit 6) – 4 lanes
1955	Rt. 6: Hyannis (exit 6) to Dennis (exit 9) – 2 lanes
1956	Rt. 6: Dennis (exit 9) to Harwich/Brewster (exit 11) – 2 lanes
1958	Rt. 6: Harwich/Brewster (exit 11) to Orleans (exit 12) – 2 lanes
1959	Rt. 6: Orleans (exit 12) to Orleans/Eastham Rotary – 2 lanes
1967	Rt. 6: Hyannis (exit 6) to Yarmouth (exit 7) – 4 lanes
1971	Rt. 6: Yarmouth (exit 7) to Dennis (exit 9) – 4 lanes

Sixty-five years after that great expansion, the region is struggling to face the tomorrow's challenges with an aging transportation network. While there is debate over whether we are still in the age of the automobile, it is clear that investments in all modes are required to meet the region's future transportation needs.

PRESENT – EXISTING CHALLENGES AND OPPORTUNITIES

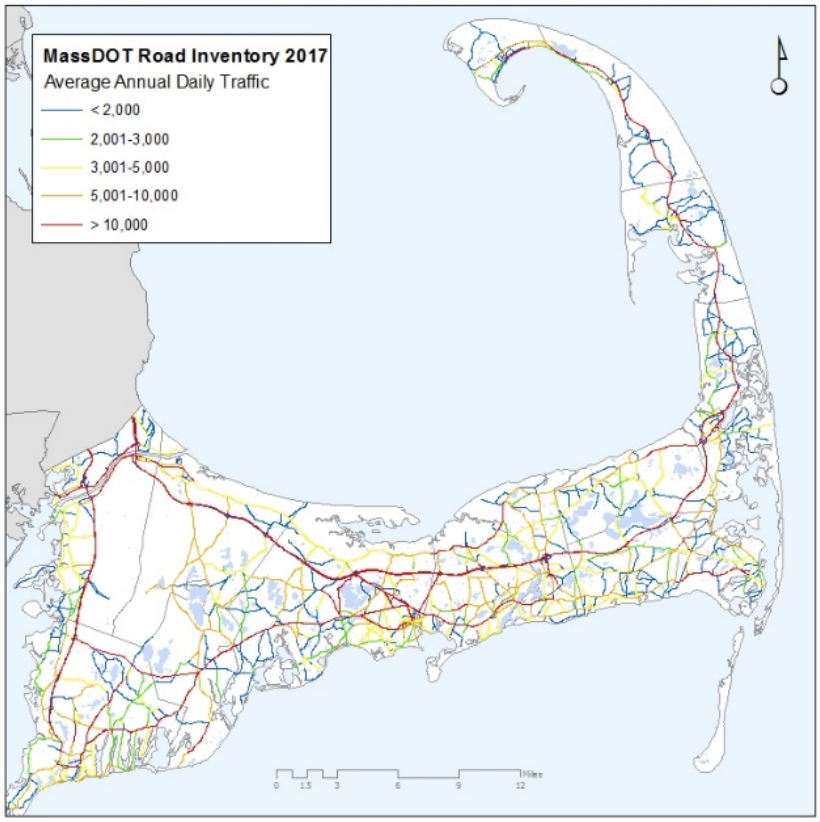
Existing Infrastructure

The transportation network on Cape Cod is made up of a wide variety of infrastructure that support travel by all modes. Summarized in this section, the existing condition of the transportation network is detailed in Appendix B.

VEHICLE INFRASTRUCTURE

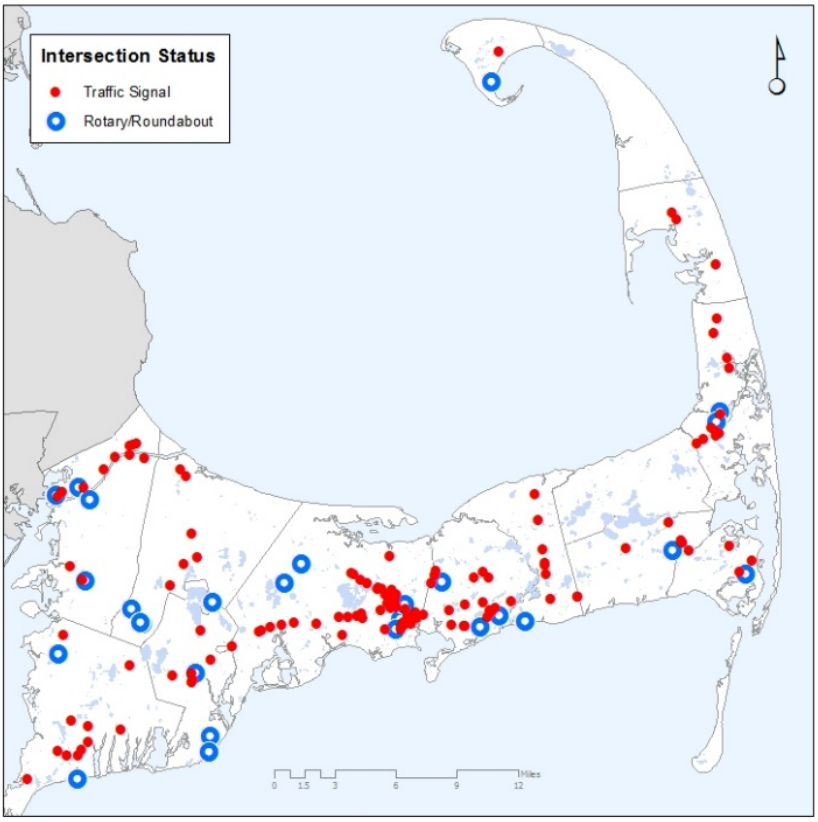
Roads: Cape Cod's three major routes, Route 6, Route 28, and Route 6A, comprise less than 6% of Cape Cod's roads by mileage. Over 80% of the roadways on Cape Cod are local roadways. The volumes of vehicles on the roadways of Cape Cod are shown in Figure 19.

FIGURE 19. Annual Average Daily Traffic



Intersections: As shown in Figure 20. , 136 are signalized and 29 are circular on Cape Cod. Circular intersections refer to rotaries and roundabouts. Rotaries tend to be larger in diameter, and their interior travel speed is often faster than a modern roundabout. Roundabouts are identified by smaller diameters and approaches that enter at a greater angle than rotaries – encouraging slower speeds and improved safety.

FIGURE 20. Intersections



Bridges: There are 103 municipal and state-owned bridges on Cape Cod including bridges over roadways (49), over railways (12), and over water (42). Out of these 103 bridges, three are classified as structurally deficient based on the National Bridge Inventory rating scale.[20][21]

Intelligent Transportation Systems (ITS) are an emerging aspect of infrastructure that has surfaced on Cape Cod. Along Route 6, permanent message boards display travel time to exits on the roadway. Figure 21. shows one of these roadside signs. This information is processed using Bluetooth technology to calculate drive times. This information has been effective at reducing distraction and driver confusion by presenting valuable information to automobile drivers outside of content received by cellphones or GPS devices. The project began in 2012 with signage installed on Route 3 approaching Cape Cod and plans to expand statewide.

[20] http://www.fhwa.dot.gov/bridge/nbi.cfm

[21] Based on 2013 bridge assessment data for state highway agency and town agency owned bridges

FIGURE 21. Travel Time Signs

BUS INFRASTRUCTURE

Intermodal facilities and sites are important locations where travelers can make seamless transfers between different mode of travel including regional bus service and intercity bus service. These include the Hyannis Transportation Center, MacMillan Pier and Bus Depot, Falmouth Bus Depot, Woods Hole Steamship Authority Piers, Tedeschi Food Shop in Bourne, Sagamore Park-and-Ride Lot, Barnstable Park-and-Ride-Lot, Harwich Park-and-Ride Lot, and Hyannis Park-and-Ride Lot.

Interregional bus service transports travelers to and from Cape Cod. Some examples are bus service from Hyannis to New York City, or Boston to Provincetown. Users of interregional bus service include commuters who work in Boston, Logan Airport users, and those traveling or vacationing. Plymouth and Brockton Street Railway Company as well as Peter Pan and Bonanza Bus Lines serve Cape Cod's interregional bus service needs.

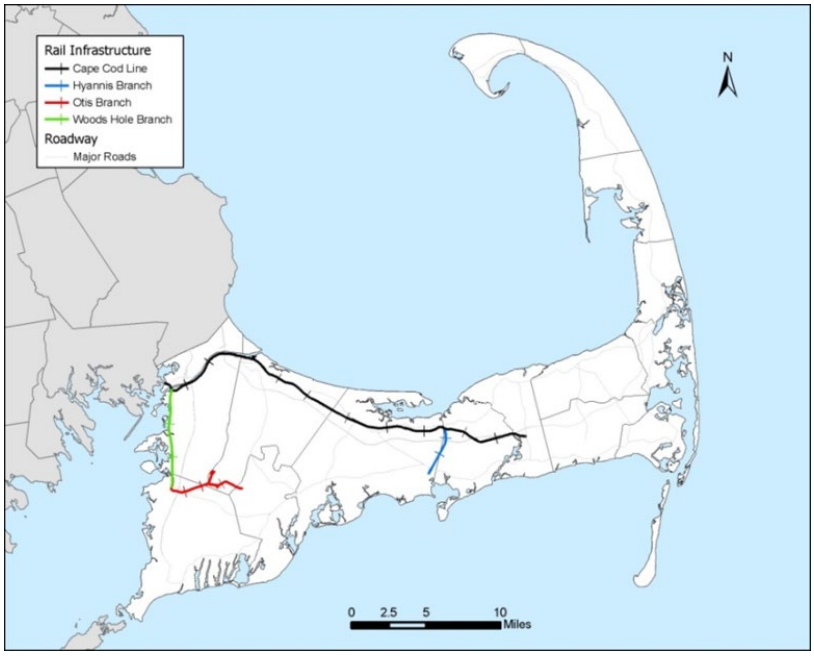
The Cape Cod Regional Transit Authority (CCRTA) is the agency in charge of operating and maintaining public transit services on Cape Cod. The CCRTA offers several types of services, including fixed route service, flexible route service, and demand-response or paratransit service. Some paratransit and demand response services are contracted services. Year-round fixed services routes include the Barnstable Villager, the Bourne Run, the Flex Route, the H2O Line, the Sandwich Line, and the Seamline. Seasonal services include the Hyannis Shuttle, the Provincetown/Truro Shuttle, and the WHOOSH Trolley. Demand-response service includes Dial-A-Ride Transportation (DART) and ADA Paratransit Service.

The Greater Attleboro-Taunton Regional Transit Authority (GATRA) also operates one line, the Onset-Wareham Link (OWL), with stops in Bourne.

RAIL INFRASTRUCTURE

Railways: Cape Cod has a single rail line, the Cape Cod Line, with three branches as shown in Figure 22. Together, they form a network of rail infrastructure to serve the freight services, scenic rail excursions, and CapeFLYER seasonal, weekend passenger service.

FIGURE 22. Cape Cod Rail Infrastructure



Rail infrastructure extended the entire length of Cape Cod, from Bourne to Provincetown, in the first half of the 1900s. Service was also available along the western end, extending from Bourne to Woods Hole in Falmouth, and to Chatham. Today the expanse and usage of rail is reduced. Active rail still exists starting in Bourne and ending in three locations, Joint Base Cape Cod, Hyannis, and Yarmouth.

Road Crossings: Exclusive rights-of-way can limit the interaction of rail and other modes, making rail transportation safer and faster. However, crossing at roadways can pose problems if the intersection is not properly signed and designed. Currently on Cape Cod, there are 66 at-grade roadway intersections along active rail lines. Some, such as the railroad crossing at Route 28 in Barnstable, can actually interfere with roadway traffic and cause congestion and delays. Of those, 21 are not gated, signalized or signed. Although most of these are minor roadways, they do represent a potential for mishap. Moreover, there are 18 grade separated roadway crossings, as well as 5 bridges over waterways along active rail lines. These bridges and overpasses must be maintained in order to ensure continued use. If rail service on Cape Cod is to be increased, further study of railroad crossings may be necessary to ensure safety and prevent interruptions to roadway traffic.

AVIATION INFRASTRUCTURE

For Cape Cod travelers, air transportation provides an important link from Cape Cod to Boston, New York, and the islands of Martha's Vineyard and Nantucket. Six airfields and airports serve Cape Cod as a base for air transportation (see Table 13).

TABLE 13. Airports and Airfields of Cape Cod

NAME	FAA IDENTIFIER	FACILITY TYPE
Barnstable Municipal Airport	HYA	Scheduled Air Carrier Service
Provincetown Municipal Airport	PVC	Scheduled Air Carrier Service
Chatham Municipal Airport	CQX	General Aviation
Falmouth Airpark	5B6	General Aviation
Cape Cod Airfield	2B1	General Aviation
Cape Cod Coast Guard Air Station	FMH	Military

The commercial service airports, Barnstable Municipal Airport and Provincetown Municipal Airport, supply data on total enplanements to the Federal Aviation Administration (FAA). In 2017, Barnstable Municipal Airport reported 29,455 enplanements and Provincetown Municipal Airport reported 8,900 enplanements.[22]

MARITIME INFRASTRUCTURE

Cape Cod has approximately 586 miles of tidal coastline, with many inlets and bays that provide marine access to the land. Major channels including the Cape Cod Canal, the Woods Hole Channel, and Nantucket Sounds Channels provide important connections for vessels. Major harbors including Woods Hole Harbor, Hyannis Harbor, Provincetown Harbor, Falmouth Harbor, Saquatucket Harbor (Harwich Port), Wellfleet Harbor, Stage Harbor (Chatham), Barnstable Harbor, Sandwich Marina, Red Brook Harbor (Bourne), and Sesuit Harbor (Dennis) provide connections to land-based transportation. The nine ferry routes provide connection from Falmouth (Falmouth Harbor and Woods Hole), Hyannis (Hyannis Harbor), Provincetown (Fisherman's Wharf), and Harwich Port (Saquatucket Harbor) to Martha's Vineyard, Nantucket, Boston, and Plymouth.

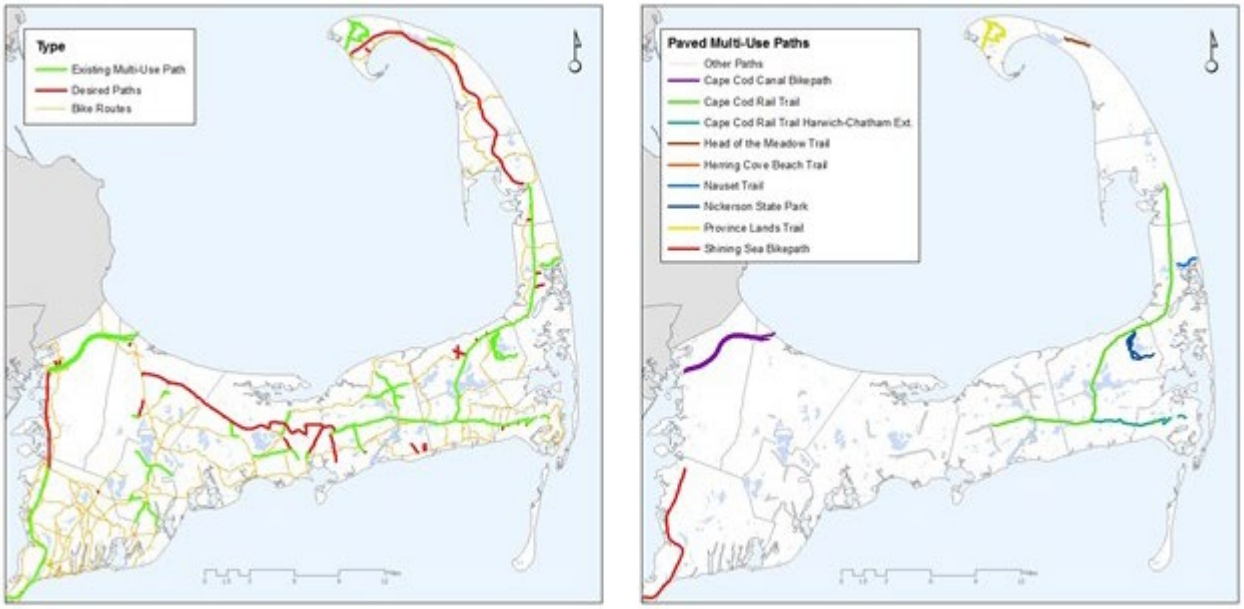
BICYCLE AND PEDESTRIAN INFRASTRUCTURE

There are numerous destinations and pathways for bicyclists and pedestrians to use on Cape Cod. There are three basic types of bicycle infrastructure: paths, lanes, and routes. Paths generally have their own separated right-of-way and follow certain standards for width, grade, and accessibility. Bicycle lanes are separate lanes within roadways marked for bicycle use. Bicycle routes are

[22] 2017 Air Carrier Activity Information System data

roadways with wide shoulders that have been designated for bicycle use. Figure 23. shows these facilities on Cape Cod.

FIGURE 23. Bicycle Paths and Routes

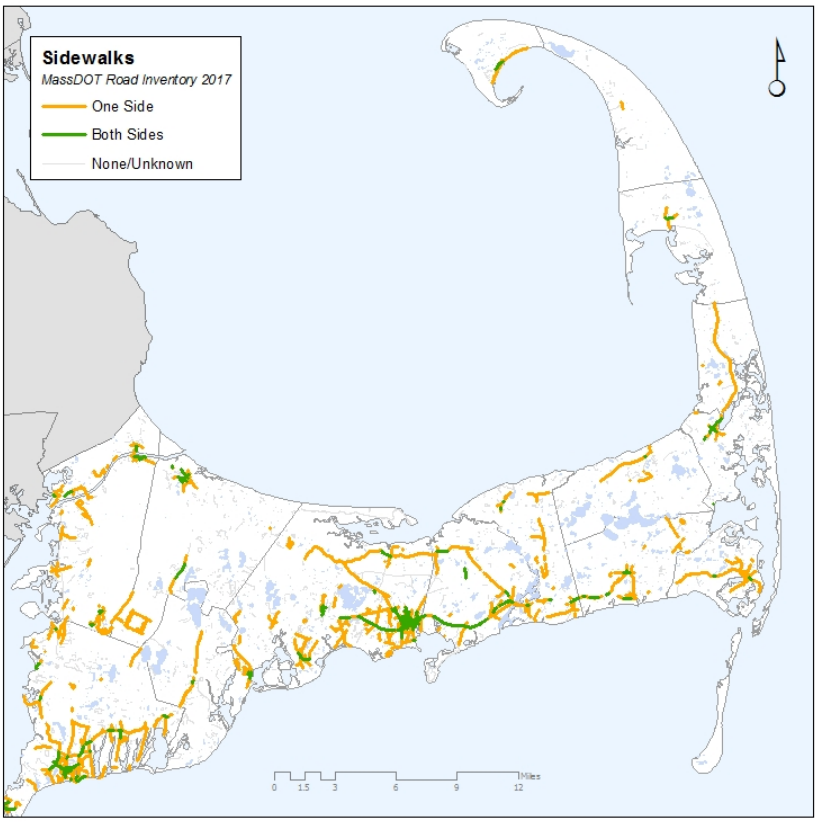


There are another 90 miles of multi-use paths on Cape Cod with the longest being the Cape Cod Rail Trail and Extension, Cape Cod Canal Bike Paths, Shining Sea Bikeway and Extension, and numerous paths in the Cape Cod National Seashore and Nickerson State Park.

Many bicycle routes exist on Cape Cod, some of which are better signed than others. They allow bicycle users a wide network of travel across Cape Cod. The Claire Saltonstall Bikeway, or State Bicycle Route 1, is a series of bicycle paths and on-street routes that travel from Boston to both Provincetown and Woods Hole. The Cape Cod section of the Claire Saltonstall Bikeway is 98.3 miles in length. The Bourne to Provincetown portion is about 75.4 miles long, while the Bourne to Woods Hole portion is 22.9 miles long.

Pedestrians utilize shared use paths and sidewalks. Facilities of this type support village centers and local businesses and encourage travelers to walk instead of driving. The Americans with Disabilities Act requires sidewalk curb cuts to be large enough and shallow enough for wheelchair usage. Telephone poles, road signs, and other architectural barriers must also be removed in order to create an unobstructed path for walking. In Massachusetts, bicyclists may ride on sidewalks outside business districts unless otherwise prohibited by local ordinances. As shown in Figure 24. , over 90% of Cape Cod roadways do not have sidewalks.

FIGURE 24. Cape Cod Sidewalk Network



The sidewalk network also includes crosswalks. Crosswalks provide a safe means for pedestrians and other sidewalk users to cross roadways. Generally, crosswalks located on lower volume roads have no traffic control devices, or a sign telling motorists to yield to pedestrians. However, many crosswalks have crossing signals that stop traffic, allow pedestrians to cross, and warn pedestrians when traffic is about to resume. Typically, crossing signals are located with traffic signals at roadway intersections.

Safety

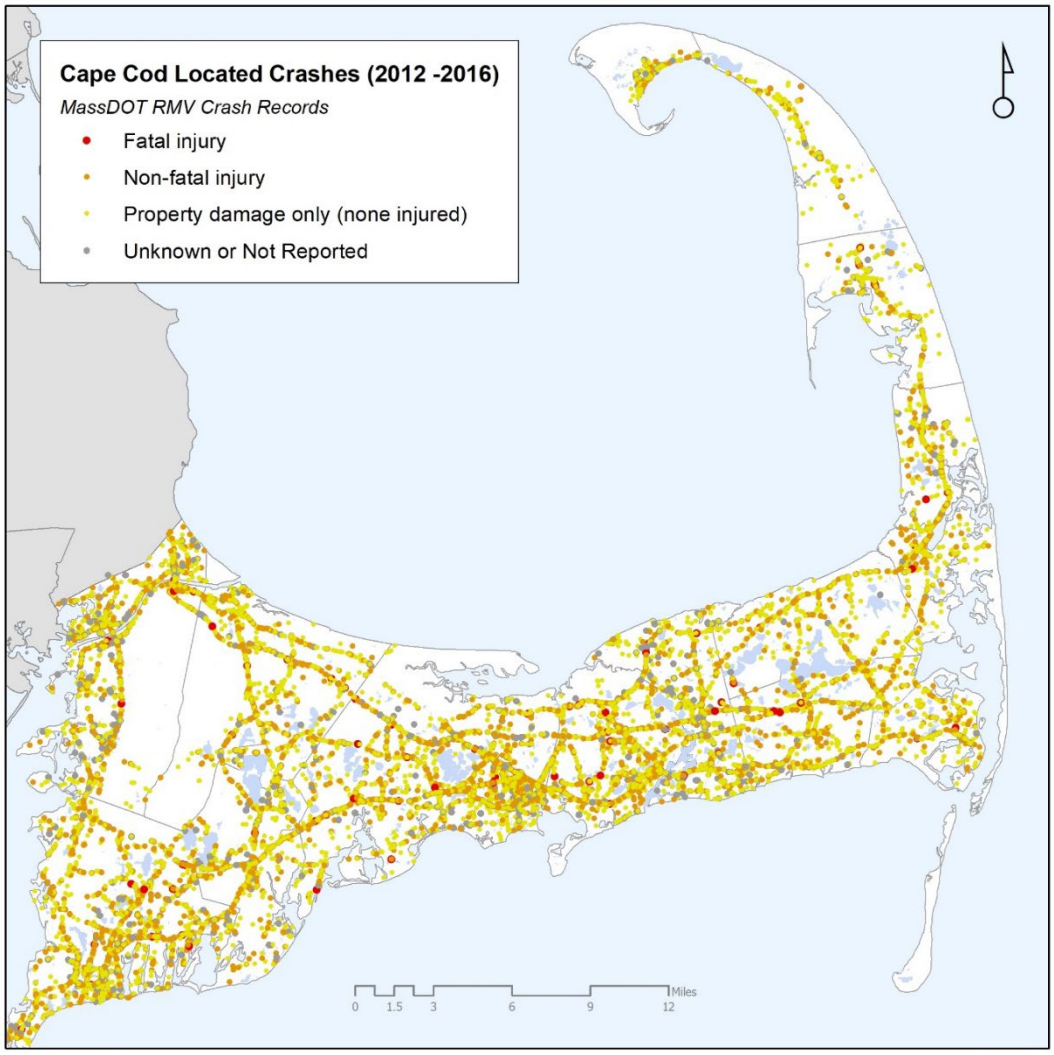
The concern over safety is made clear in the first goal of the Regional Transportation Plan:
"PROVIDE SAFE TRAVEL OPTIONS FOR ALL USERS"

Transportation users have a right to a transportation system where their person and possessions will arrive at their destinations unharmed and undamaged. Summarized in this section, Appendix B, provides additional detail on the seasonal and year-round issues affecting transportation safety on Cape Cod.

BARNSTABLE COUNTY HIGH CRASH LOCATIONS

In 2019, the Cape Cod Commission completed an effort to rank the top intersections of critical safety concern across Cape Cod. Base data for this analysis were provided by the Massachusetts Department of Transportation (MassDOT) in the form of geographically located crash clusters for the most recently available five years of data (2012-2016). The data provided by MassDOT included the number of reported crashes at each location and the severity of the crashes. It should be noted, however, that this dataset only includes incidents whose reports contained enough information to accurately locate them. There were 26,617 crashes reported during this five-year period. The incidents are mapped as shown in Figure 25.

FIGURE 25. Cape Cod Located Crashes (2012-2016)



CAPE COD DRIVERS

The demographics of Cape Cod depict a typical year-round resident that is older than the average population in the United States. A large and increasing percentage of Cape drivers are 65 and older. According to the Census Bureau 2017 estimates, 28.5% or 60,860 residents of Barnstable County are aged 65 or older. This steadily increasing proportion of drivers will experience declining vision, slowed decision making and reaction times, additional difficulty in dividing attention between potential conflicts and traffic information, and reductions in strength, flexibility, and overall fitness. In many cases, these difficulties will outweigh the additional experience that older drivers have operating an automobile. The large majority of drivers who suffer from age-related driving deficiencies are not aware that a problem exists.

Recommendations to accommodate older drivers include:

- Considering protected left turn phases at signalized intersections;
- Maintaining delineation through more frequent restriping and street cleaning;
- Improving signage standards to include larger lettering;
- Improving lighting level standards, in particular at intersections. Consider placing utilities underground and installing breakaway safety poles for lighting;
- Considering "all red" phases for signalized intersections;
- Establishing driver education programs for older drivers; and
- Providing education on other options for mobility.

On the roads with these older drivers is another group of drivers with a unique set of characteristics, younger drivers. Younger drivers are more prone to risk-taking behavior and are subject to influences of youth culture and peer pressure. Considering their exposure, young drivers involved in more fatal crashes than any other age group. There are slight differences between younger and older drivers in the types of crashes they experience. For example, young drivers have more speeding and alcohol-related crashes. Younger drivers' crashes are frequently caused by inexperience, poor judgment, and risk taking, while older drivers' crashes are more often related to reduced physical and cognitive capabilities.

Recommendations to accommodate younger driver safety issues are divided between residents and visitors:

- Increased education for local young drivers.
- Additional enforcement and warnings during the busy traffic season to reach out to young visitor drivers.
- Develop and implement an advertising campaign and roadside signage reminding drivers that traffic and drunk-driving laws are strictly enforced on Cape Cod.

SAFETY ANALYSIS AND RECOMMENDATIONS

Further analysis of crash data along with recommendations for reducing crashes on Cape Cod roadways is included in Appendix B. Additionally, analysis of bicycle and pedestrian crash and recommendations are presented in the Appendix F.

Security

Security is an important consideration when discussing the region's transportation network. Summarized in this section, Appendix D includes a discussion of the ways in which the transportation system is prepared to handle threats of any nature including natural events such as hurricanes as well and man-made hazards.

The most frequently identified security concern is the threat of a weather-related event such as a hurricane. In many cases, Cape Cod residents and visitors “shelter in place,” a term that refers to staying in homes or local shelters that are supplied with food, water, etc. Residents should heed warnings of public safety officials and evacuate accordingly. A “Cape Cod Emergency Traffic Plan” has been developed by the Massachusetts State Police in cooperation with the Massachusetts Emergency Management Agency and several other agencies to facilitate the egress of a high volume of traffic from Cape Cod in the event of a hurricane, particularly during peak tourist season.

Discussions of emergency traffic planning, public transportation security, air travel security, and intelligent transportation systems are also included in Appendix D.

Freight

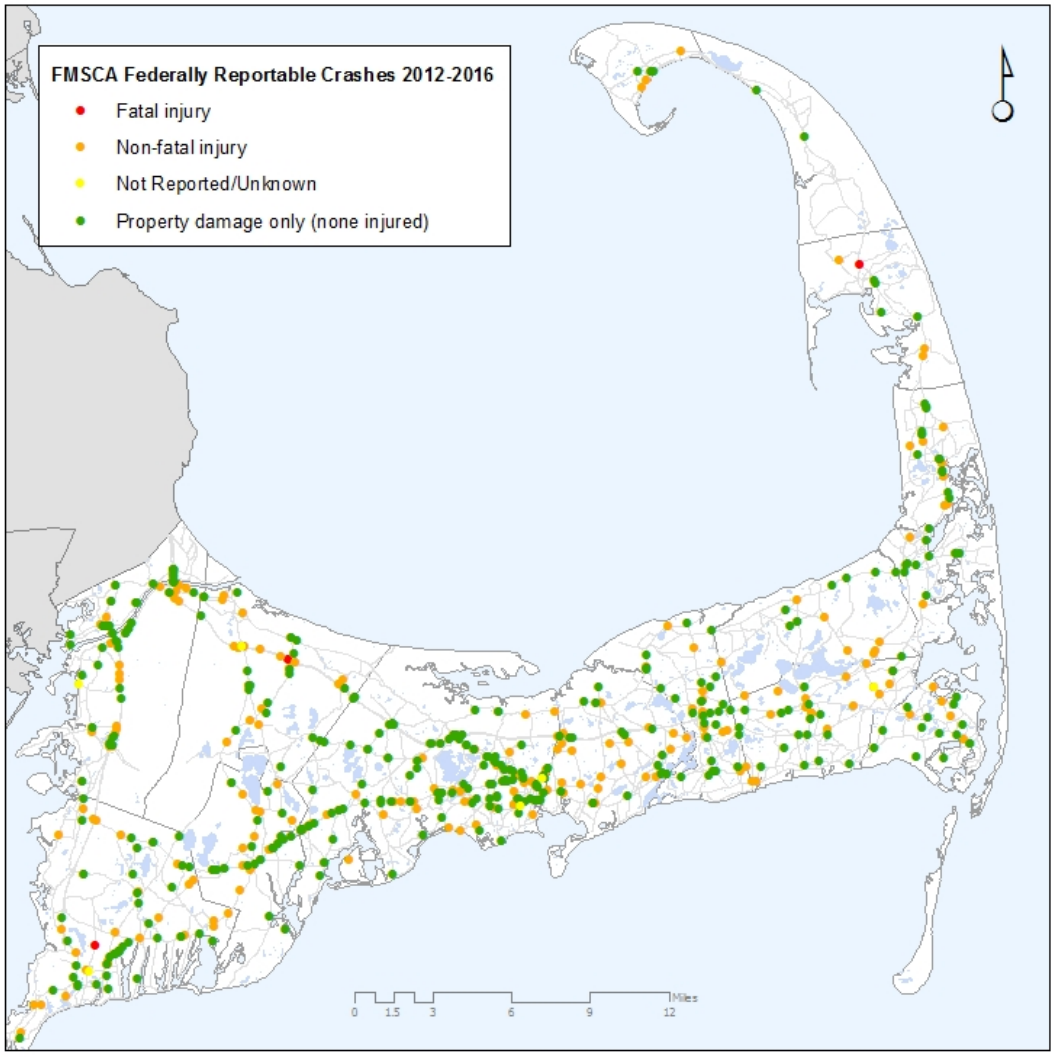
Safe and efficient movement of freight is critical to the local economies. Recognizing the importance of freight to the regional, the Cape Cod Commission conducted regional Freight Study in 2014. Summarized in this section, Appendix E, details some of the unique challenges the movement of freight on Cape Cod faces as well as identifies potential opportunity to improve the freight network on Cape Cod identified in the Freight Study.

There are over 250 miles of designated truck routes on Cape Cod. Freight transportation also relies on many roadways off their freight routes to make connection to their ultimate destinations.

Freight transportation presents unique safety challenges and crashes involving commercial motor vehicles deserve special consideration. As shown in Figure 26. freight crashes occur both on and off the designated truck routes on Cape Cod.

Freight by all modes, including truck, rail, and water are covered in Appendix E along with the results of a Freight Survey conducted as part of the 2014 Freight Study.

FIGURE 26. Truck Routes and Reported Crashes



Bicycle & Pedestrian

Bicyclists and pedestrians while having a minimal impact on the environment are our most vulnerable users and the most in need of providing a safe transportation network. Summarized in this section, Appendix F, details crashes, road safety audits, pedestrian safety and planning studies, planning tools, and planning efforts related to bicycles and pedestrians on Cape Cod.

CAPE COD BICYCLISTS AND PEDESTRIANS

To varying degrees, all travelers at some point in their journey are pedestrians. This occurs in the short walking trip from a parked car to a destination (or from a parked bicycle or after disembarking from a bus).

BICYCLE AND PEDESTRIAN CRASHES

Bicyclists and pedestrians face a number of challenges on Cape Cod roadways. The mixture of narrow roadways, high traffic volumes, and inconsistent accommodations create a great deal of difficultly for vehicle-bicycle and vehicle-pedestrian interactions. There was a total of 475 such crashes involving bicyclists and 435 such crashes involving pedestrians that occurred on Cape Cod from 2012 through 2016.[23] Additional crashes may have occurred between bicyclists and between bicyclists and pedestrians, but they often go unreported.

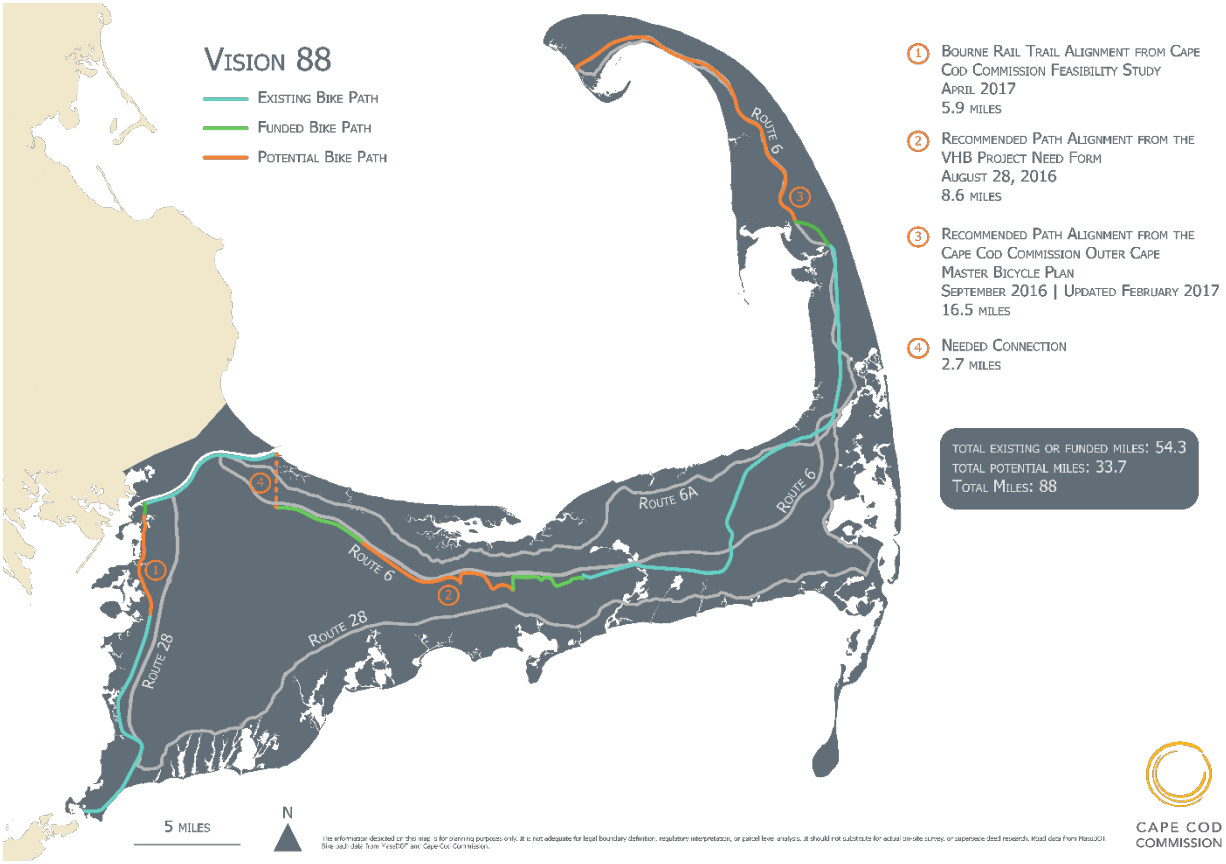
SHARED-USE PATH VISION

A priority for the region is providing improving on-road and off-road accommodation for bicyclists and pedestrians.

One means of improving these accommodations is by expanding the share-use path network as envisioned in Figure 27. Improved accommodation also comes from improved on-road bicycle routing and signage.

[23] MassDOT Registry of Motor Vehicle Crash Records

FIGURE 27. Shared-Use Path Vision



Congestion Management

In conjunction with the 2020 Regional Transportation Plan (RTP), an updated Congestion Management Program (CMP) was developed for the Cape Cod Region as described in brief below and detailed in Appendix G. The CMP network focuses on the two main route in the Cape Cod Region; Route 6 and Route 28. Route 6 and Route 28 provide access to all 15 towns within the region. Both corridors experience regular congestion with known crash history year-round, but also account for the corridors with the greatest potential to provide increased multi-modal options within the region.

Modeled after FHWA guidance, the Cape Cod CMP includes the following eight action items:

- Develop Regional Objectives
- Define CMP Network
- Develop Multimodal Performance Measures
- Collect Data/Monitor System Performance

- Analyze Congestion Problems and Needs
- Identify and Assess Strategies
- Program and Implement Strategies
- Evaluate Strategy Effectiveness [24]

The Cape Cod CMP has focused on the following three (3) goals and objectives:

Goal 1: Improve Safety

Objective: Reduce crashes on Route 28 and Route 6 for all modes of travel.

Goal 2: Increase Multi-modal Accommodations

Objective*:* Increase multi-modal options for non-motorists along Route 28 and Route 6 to reduce single occupancy vehicles and reduce congestion.

Goals 3: Reduce Congestion

Objective: Aim to reduce congestion at specific bottleneck intersections on Route 28 and Route 6 on Cape Cod.

The CMP will be monitored with the following multi-modal performance measures:

- Traffic volumes
- Volume to capacity ratios
- Vehicle occupancy
- Number of crashes (all modes)
- Transit ridership
- Park-and-Ride lot usage
- Walkability Rating
- Transportation Demand Management

Data collection efforts will focus on the CMP performance measures and will be summarized to assist in identification and assessment of potential strategies to meet the goals of the CMP. Potential strategies to reduce congestion within the Cape Cod region range from:

- Management and expansion of park-and-ride lots

[24] Congestion Management Process: A Guidebook. Federal Highway Administration. April 2011. Report No. FHWA_HEP_11_011.

- Implement MassDOT Canal Area Study recommendations
- Geometric improvements for certain bottleneck intersections
- Bicycle and pedestrian improvements
- Optimization of signal timings
- Increased transit service (including rail and inter-city bus)
- Leverage transit technology
- Access Management

Stormwater Management

Stormwater runoff is caused by precipitation from rain and snowmelt events which flows over land or impervious surfaces and is unable to percolate into the ground. In natural systems, precipitation may be directly infiltrated into the subsurface, stored in natural depressions, or reintroduced to the atmosphere through evapotranspiration. However, development such as buildings, roads, sidewalks, and paved driveways increases impervious surface area and alters natural hydrology. The increase in impervious cover that accompanies development results in two main issues related to stormwater: 1) greater volume and peak flows of runoff and 2) transportation of contaminants into water bodies.

WATER QUANTITY

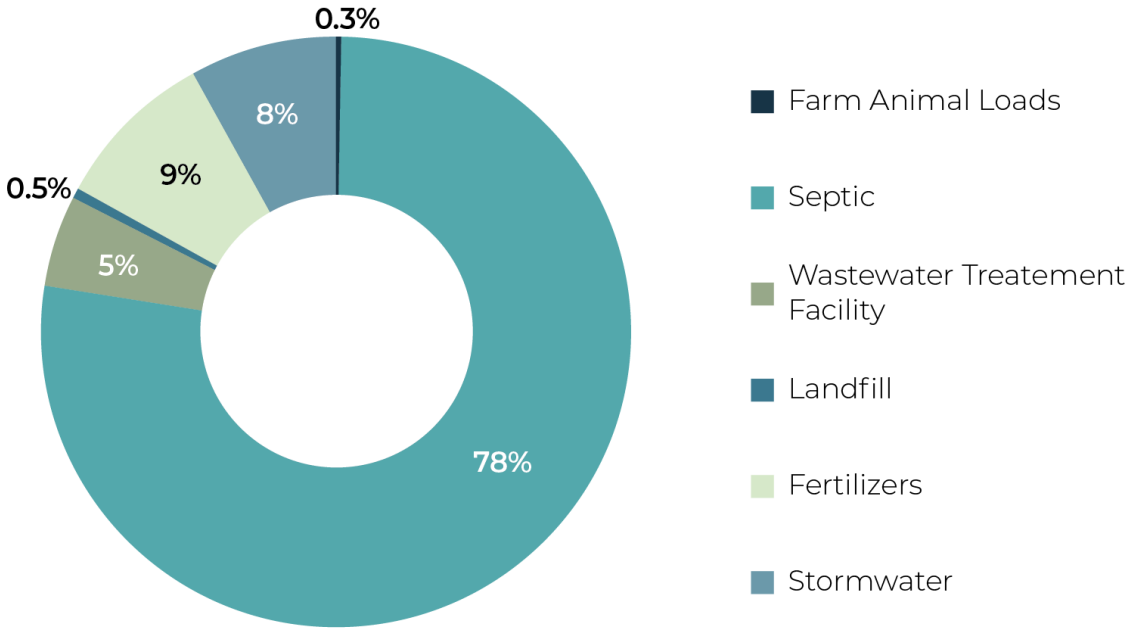
What makes Cape Cod a unique area for stormwater management is the combination of highly porous native soils left by the retreating glaciers and shallow groundwater levels, which are especially prevalent in coastal communities. Well-drained soils readily infiltrate runoff, providing excellent volume reduction of stormwater. A consequence of this rapid infiltration is that minimal natural reduction of nutrients and pollutants is provided, which in combination with the high water table can result in negative impacts to groundwater quality.

WATER QUALITY

Where most efforts to manage stormwater focus on moving the volume of water off roadways, stormwater management on Cape Cod also requires addressing the quality of stormwater that infiltrates to the Cape's groundwater (drinking water) resources and the Cape's coastal estuaries.

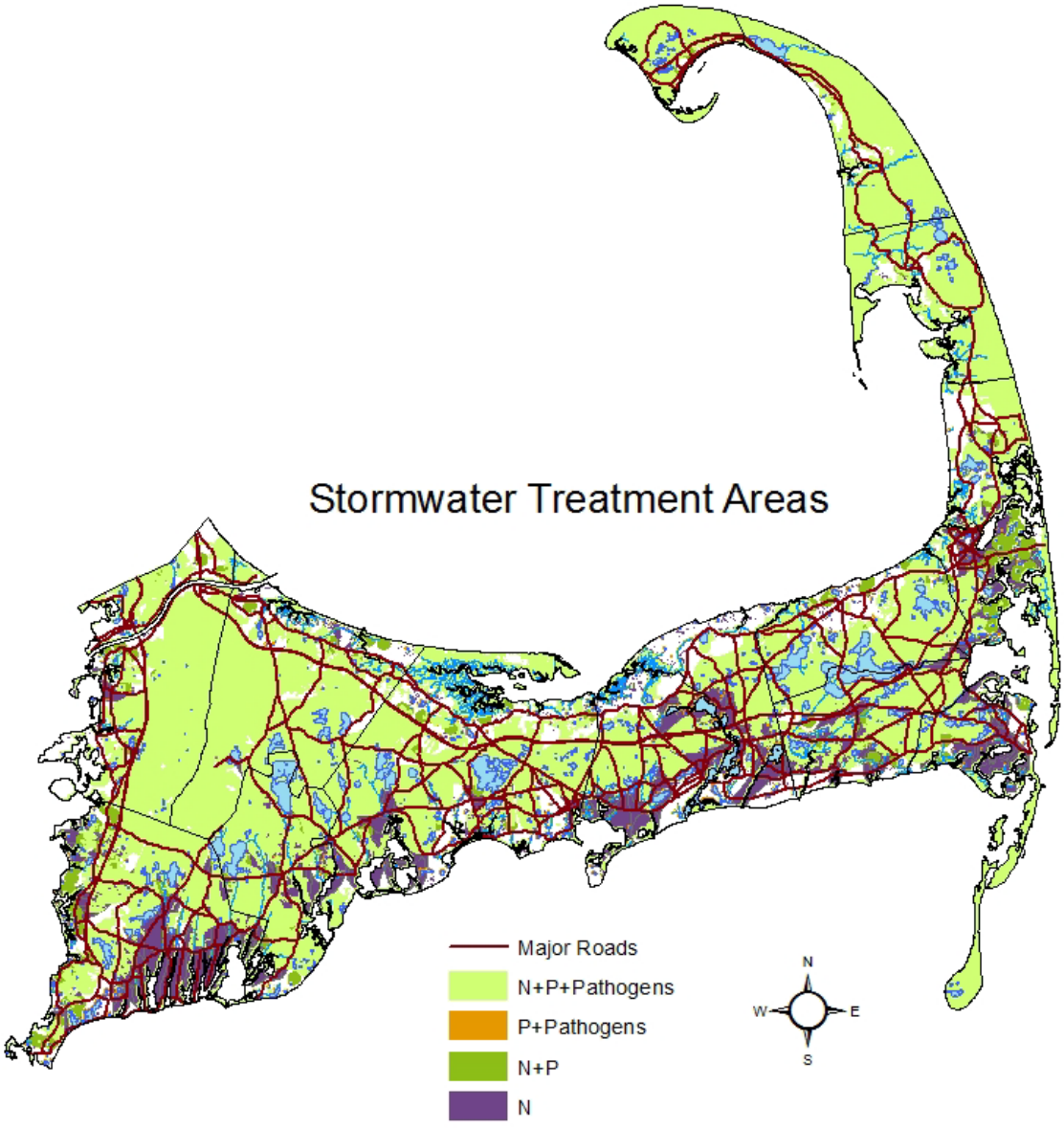
Of particular concern to the coastal estuaries is the introduction of additional nitrogen, a nutrient that through eutrophication can lead to hypoxia, fish kills, loss of eel grass, and aesthetically unpleasant conditions. While the largest share of nitrogen entering the Cape's embayments comes from septic systems, as shown in Figure 28. eight percent of the controllable nitrogen entering embayments Cape-wide comes from stormwater runoff. Stormwater's nitrogen contribution is significant, and in certain individual watersheds the stormwater contribution may be significantly larger than the Cape-wide average.

FIGURE 28. Controllable Nitrogen by Percentage



While nitrogen is the primary stormwater component of concern in marine waters, phosphorous is a similar concern for Cape Cod's freshwater resources, while bacteria and pathogens impact fresh and marine resources alike. Figure 29. presents several sensitive resource areas and pollutants of concern associated with them. These sensitive areas are detailed in Appendix I, and include (among others) pond buffers, river buffers, wetlands area, and watersheds requiring nitrogen removal to meet water quality standards.

FIGURE 29. Stormwater Sensitive Areas



LOW-IMPACT DEVELOPMENT AND STORMWATER BEST MANAGEMENT PRACTICES

Low-impact Development (LID) is a comprehensive, conservation-based approach to stormwater management systems. A LID approach is appropriate both at the site level as well as in roadway design. Environmentally sensitive roadway design involves incorporating LID techniques to prevent the generation of stormwater and non-point source pollution by reducing impervious surfaces,

disconnecting flow paths, treating stormwater at its source, maximizing open space, minimizing disturbance, protecting natural features and processes, and/or enhancing wildlife habitat.

Best management practices (BMPs) are control measures to limit untreated, polluted stormwater runoff from reaching waterbodies. BMPs can be categorized in to two categories: structural and non-structural BMPs.

Non-structural BMPs include street sweeping, environmentally conscious road salting procedures, maintenance of stormwater utilities, and education and public outreach programs.

Structural BMPs that have potential applicability on the Cape's roadways include

- Porous pavement (other)
- Leaching Catch Basins (infiltration)/ Infiltration Basins (infiltration)
- Sub-surface Sediment Chambers (pretreatment + infiltration)
- Retention Pond (treatment)
- Bioretention (treatment)
- Advanced Bioretention (treatment)
- Water Quality Swales (conveyance, treatment, infiltration)
- Constructed Stormwater Wetlands (treatment)

BMP costs, removal efficiencies, and maintenance notes are presented in Appendix I.

FIGURE 30. Bioswale/Rain-Garden in Bridgewater, CT

A comprehensive approach to stormwater management and treatment both at the site level and on the Cape's roadway network is essential to the long-term viability of the region's natural environment. Stormwater infrastructure management is an important long-term investment for maintaining the region's roadway safety and the quality of its water resources. When integrated into

larger planning and design efforts, it can fit seamlessly into the local character of the region, help meet stormwater permit requirements, and take advantage of cost savings. The bio-swale, shown in Figure 30. with long-maintenance ornamental grasses, provides an added green element to the streetscape. [25]

Pavement Management

Pavement Management is the practice of planning for pavement repairs and maintenance with the goal of maximizing the value and life of a pavement network. There are distinct advantages to managing pavement condition and significant cost savings that can take place with preventative or rehabilitation measures rather than waiting until a road is in need of reconstruction (see Figure 31).

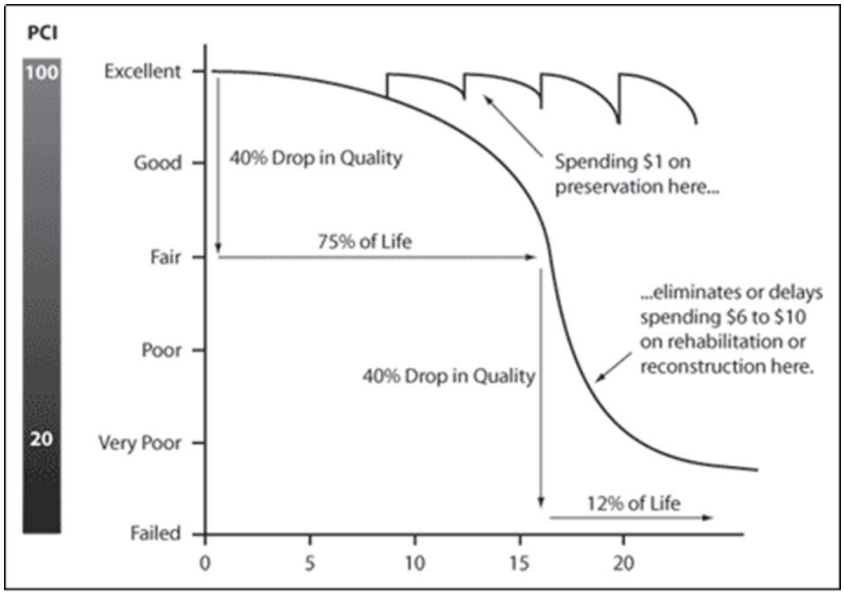


FIGURE 31. Pavement Deterioration Curve (FHWA)

The pavement condition of roadways under the jurisdiction of MassDOT is monitored by MassDOT. The pavement condition on municipally owned roadways is monitored by each town following varying methodologies. Most use commercial pavement management systems while others rely on local knowledge.

To supplement any data collected by MassDOT on roads under their jurisdiction and the data collected locally, Cape Cod Commission staff conducts regional pavement analysis on the federal-aid eligible municipal road network. Covering one-third of the road mileage each year, a three-year cycle provides an overall view of the pavement condition federal-aid eligible municipal roadways on Cape Cod. Evaluation criteria procedure and evaluation criteria are presented in Appendix J.

[25] Source: Bridgewater, CT

TABLE 14. Pavement Condition on Federal-aid Eligible Municipal Roadways

TOWN	VERY GOOD TO EXCELLENT	GOOD TO VERY GOOD	FAIR TO GOOD	POOR TO FAIR	POOR	TOTALS
Barnstable	9.2	51.8	40.7	8.8	1.0	111.6
Bourne	0.4	8.6	23.6	8.4	0.4	41.3
Brewster	4.2	5.9	11.0	4.6	0.8	26.5
Chatham	0.4	3.4	5.7	3.2	0.0	12.7
Dennis	3.7	29.8	9.6	2.2	0.0	45.3
Eastham	1.5	3.0	4.4	7.9	0.0	16.8
Falmouth	7.2	17.0	39.9	19.4	0.4	83.9
Harwich	1.3	19.8	13.3	8.6	0.2	43.1
Mashpee	0.0	4.2	19.0	4.7	1.7	29.5
Orleans	1.6	8.9	5.6	0.3	0.6	16.9
Provincetown	1.5	0.9	10.9	0.0	0.0	13.3
Sandwich	2.7	12.6	15.1	4.3	3.2	37.9
Truro	0.0	0.0	8.4	4.0	0.0	12.4
Wellfleet	0.5	10.4	7.0	1.5	0.0	19.5
Yarmouth	2.7	21.7	27.1	0.6	0.0	52.0
Totals	**36.8**	**198.0**	**241.2**	**78.5**	**8.3**	**562.8**

Access to Essential Services and Regional Cooperation

Safe and convenient access to essential housing, employment, healthcare, education, recreation and transportation services or facilities on Cape Cod are critical to the region's residents and visitors. The location and access opportunities and challenges to these services or facilities are detailed in Appendix K.

In order to improve access to and between these essential services the following will be addressed through various efforts outlined in this plan:

- Reduce congestion for all modes,
- Improve travel time reliability for all modes,

- Improve safety for all modes,
- Increase connections opportunities between different modes,
- Close gaps in the bicycle and pedestrian network, and
- Improve transit options.

As detailed in the discussion of RTP development in Chapter 1, this and other planning efforts include or consideration of a wide range of federal, state, and local agencies and organizations. As detailed in Appendix K, the partnerships within and beyond the region are critical to ensuring that the region maintains a comprehensive and inclusive approach to transportation planning.

FUTURE – REGIONAL TRENDS AND A VISION FOR 2040

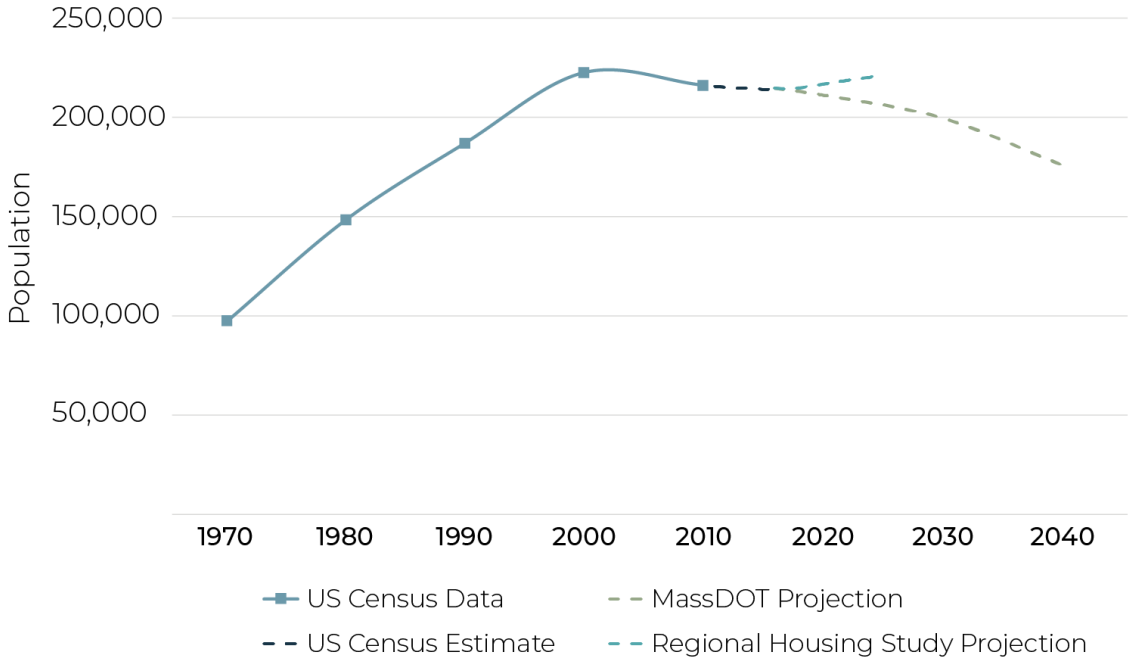
Regional Trends

Reviewing historic regional demographic trends, the future for Cape Cod is in many ways uncertain. While the regional experienced decades of growth through the 20th century, the population saw a slight decline between 2000 and 2010. As a result, projecting the Cape Cod population out to 2040 is a challenging task.

To assist the MPOs in preparing their RTPs, MassDOT provided population projections for each region. The MassDOT projections are largely based on the forecast work of the UMass Donahue Institute with adjustments made by the MassDOT Office of Transportation Planning. In reviewing the MassDOT population projections, Cape Cod MPO staff raised concerns that these projections do not effectively capture the factors that make Cape Cod's population patterns distinct from the many year-round working communities in Massachusetts. As a retirement destination, the Cape's population and economy is far more impacted by migration than by natural growth; we do not feel that the Mass DOT projections effectively account for future migration and retirement patterns and thus underestimates population and employment growth on Cape Cod going forward. To reflect these concerns and the uncertainty of population projections out to 2040, Figure 32. shows both the MassDOT projection as well as a projection developed as part of the Cape Cod Commission's Regional Housing Market Analysis and 10-year Forecast of Housing Supply and Demand by Crane Associates, Inc dated June 30, 2017 (available at www.capecodcommission.org/housing). The regional population projections developed for the Regional Housing Market Analysis take into account regional economic factors as well as local experience and are based on a longer period of historic data.

Regardless of how the region changes over the next 25 years, the Cape Cod MPO is committed to supporting a transportation system that best serves the residents and visitors to the region.

FIGURE 32. Cape Cod Population Trends and Projections



Cape Cod Canal Transportation Studies

The Bourne and Sagamore Bridges provide the only vehicle crossings of the Cape Cod Canal for motorists, pedestrians, bicyclists, and goods. The bridges have served as a vital economic link to Cape Cod since they were first opened to traffic in 1935. The United States Army Corps of Engineers (US Army Corps) owns and maintains the Cape Cod Canal, areas surrounding the canal, and the Bourne, Sagamore, and Railroad Bridges. The Massachusetts Department of Massachusetts (MassDOT) owns and maintains most of the roadway infrastructure approaching the Bourne and Sagamore Bridges. At the time of adoption of this plan, the US Army Corps and MassDOT are in the process of parallel, coordinated studies that will affect the future of infrastructure in the Cape Cod Canal area.

MAJOR REHABILITATION EVALUATION STUDY – CAPE COD CANAL BRIDGES (US ARMY CORPS)

The U.S. Army Corps of Engineers, New England District is conducting a multiyear Major Rehabilitation Evaluation (MRE) Study of the Bourne and Sagamore Highway Bridges. The purpose of the study is to determine whether major rehabilitation or replacement of either or both bridges will provide the most reliable, fiscally responsible solution for the future. The study will result in a Major Rehabilitation Evaluation Report (MRER), which evaluates the risk and reliability of the structures as well as the economic impacts/benefits of a number of alternatives, including continuation of routine maintenance, major rehabilitation, or bridge replacement.

The U.S. Army Corps of Engineers (USACE), New England District, is conducting a multi-year Major Rehabilitation Evaluation Study of the Bourne and Sagamore highway bridges spanning the Cape Cod Canal to evaluate the current conditions of the bridges and what alternatives are feasible for the future.

The existing bridges were constructed more than 83 years ago and require frequent maintenance, which is costly and causes significant impacts to traffic crossing the Cape Cod Canal. The Study will result in a Major Rehabilitation Evaluation Report (MRER) and determine whether standard operation and maintenance, major rehabilitation, or replacement of both bridges will provide the most reliable, fiscally responsible solution for the future. The MRER will provide the basis of decision-making for USACE and Congress on the most cost-effective, safe alternative for critical public transportation access across Cape Cod Canal for the next several decades.

As part of the MRER, the USACE will develop an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA) to examine the potential effects associated with the alternatives examined within the MRER and allow for public involvement in the evaluation process.

The MRER will compare the without project condition to all other alternatives. The “without project" condition refers to a baseline of continued regular inspections and standard maintenance construction on the bridges.

The MRER is the basis for USACE and Congressional decision-making between completing major rehabilitation or construction of new structures. While the MRER encompasses all necessary permitting of the selected plan, it will not result in a full design and construction. Additional efforts will be undertaken at the conclusion of the MRER to derive any additional Congressional authorization necessary leading to a full design.[26]

CAPE COD CANAL TRANSPORTATION STUDY (MASSDOT)

The Massachusetts Department of Transportation (MassDOT) commissioned the Cape Cod Canal Transportation Study (“the Study”) to gain a comprehensive understanding of multimodal travel within the Cape Cod Canal area — both the conditions that exist today and the forecast conditions for the future. The study identifies a series of multimodal transportation improvements that reflect the study findings and public feedback gathered as part of the study.

The study’s goals and objectives were developed by MassDOT in cooperation with the study Working Group; all recommended transportation improvements will advance the study’s goals and objectives.

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[26] Study description as presented in the December 2018 “Project Overview Fact Sheet” prepared by the US Army Corps. Additional information available at: www.capecodcanalbridgesstudy.com

Goal: Improve transportation mobility and accessibility in the Cape Cod Canal area and provide reliable year-round connectivity over the Canal and between the Sagamore and Bourne Bridges.

Objectives:

- Improve multimodal connectivity and mobility across the Canal to avoid degrading quality of life on the Cape.
- Ensure that cross-canal connectivity does not become a barrier to reliable intra community travel within Bourne and Sandwich.
- Create reliable multimodal connections across the Canal to ensure public safety in the event of an emergency evacuation of portions of the Cape and accommodate first responders trying to reach the Cape.

As guided by the study's Public Involvement Plan, the community played a key role in shaping the study framework and providing detailed and comprehensive comments to build agreement and support for the study recommendations. Four public meetings and 11 Working Group meetings shaped the framework of the entire study.

The Working Group is made up of representatives from:

- Municipal departments and locally elected officials
- State agencies & elected officials
- Federal agencies
- Metropolitan planning organizations
- Chambers of commerce
- Key businesses
- Other interested parties

The study, and ultimately the report, follows a five-step process and framework:

- Step 1: Define the Study Goals, Objectives, and Evaluation Criteria
- Step 2: Review & Evaluate Existing and Future Conditions
- Step 3: Develop a Range of Design Alternatives
- Step 4: Analyze Design Alternatives Based on Evaluation Criteria
- Step 5: Provide Recommendations[27]

[27] Study description as presented in the Summer 2019 DRAFT MassDOT Cape Cod Canal Transportation Study prepared by Stantec.

Detailed discussion of the of each of these steps are presented in the Summer 2019 DRAFT MassDOT Cape Cod Canal Transportation Study prepared by Stantec. Recommendation in that draft report included improvements categorized as multimodal improvements, local intersection roadway improvements, and gateway intersection improvements (referred to as Case 3A). These recommendations are summarized in the following figure.

FIGURE 33. MassDOT Canal Study Recommended Transportation Improvements[28]

TRANSPORTATION MODE	RECOMMENDED IMPROVEMENT	LOCATION	MAJOR STAKEHOLDERS	COST ($ MILLION)
MULTIMODAL				2017 COST
New bicycle/pedestrian connections to Canal bike trail		Various locations in Bourne	Town of Bourne / MassDOT / USACE	$25K - $50K per location
Bicycle/Pedestrian Facility Improvements		Sagamore Bridge Approaches / Adams Street	MassDOT / USACE	3.9
Bicycle/Pedestrian Facility Improvements		Bourne Bridge Approach (north)	MassDOT / USACE	0.8
Bicycle/Pedestrian accommodation along bus routes: add sidewalks /crosswalks / roadway shoulder /bike racks / bus shelters		Various locations along bus routes in Bourne & Sandwich	Towns of Bourne and Sandwich / MassDOT	Varies by location
Park and Ride Lot		Route 6 Exit 2 (Route 130)	MassDOT	2.8
LOCAL INTERSECTION ROADWAY IMPROVEMENTS				2017 COST
Route 6 at Cranberry Highway		Bourne	Town of Bourne / MassDOT	0.6
Route 130 at Cotuit Road		Sandwich	Town of Sandwich / MassDOT	1.0
Sandwich Road at Bourne Rotary Connector		Bourne	Town of Bourne / MassDOT	1.9
GATEWAY INTERSECTION ROADWAY IMPROVEMENTS (CASE 3A IMPROVEMENTS[1])				2030 COST
Scenic Highway to Route 25 Westbound Ramp			Town of Bourne / MassDOT	11
Belmont Circle Reconstruction			Town of Bourne / MassDOT	23
Bourne Rotary Interchange[2]			Town of Bourne / MassDOT	87
Route 6 Exit 1C Relocation			Town of Bourne / MassDOT	51
Additional Travel Lane on Route 6 Eastbound to Exit 2			Towns of Bourne and Sandwich / MassDOT	48
Sagamore Bridge Approaches[3]			Town of Bourne / MassDOT / USACE	64
Bourne Bridge Approaches[3]			Town of Bourne / MassDOT / USACE	84

1 Case 3A assumes the prior replacement of the Sagamore and Bourne Bridge by the USACE.
2 Includes cost of Bourne Rotary Reconstruction (Alternative 2, Three Signalized Intersections).
3 Includes approach roadway and bridge relocation and retaining walls.

The multimodal and local intersection improvements have independent utility and can move forward at any time. The gateway intersection projects, listed in the figure above and show in the

[28] As presented in the Summer 2019 DRAFT MassDOT Cape Cod Canal Transportation Study prepared by Stantec.

graphic on the following page, could move forward as a single project or in phases. A potential phasing scenario is presented in the draft report. The gateway intersection projects assume the prior replacement of the Sagamore and Bourne Bridges by the US Army Corps. The draft report notes a commitment of MassDOT to work closely with the US Army Corps on future project development concerning the Bourne and Sagamore Bridges and their approaches.

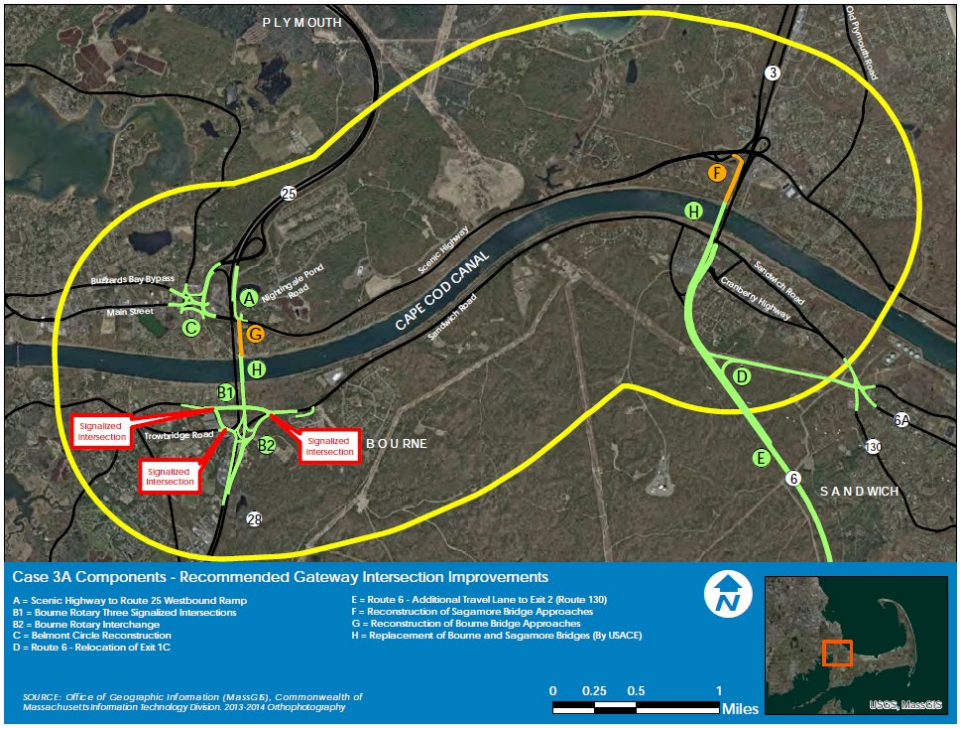


FIGURE 34. MassDOT Canal Study Gateway Intersection Improvement Overview[29]

The Cape Cod MPO is encouraged by the continued dialog at the federal, state, regional, and local levels regarding Cape Cod Canal infrastructure and looks forward to implementation of solutions, including all modes of transportation, that meets the needs of the regional and the travelling public. Continued dialogue and coordination between the with the US Army Corps, MassDOT, towns potentially impacted by the project, and the entire region should occur as the projects move forward into the design phase. With the majority of potential infrastructure changes and potential direct impacts occurring within the Town of Bourne, particular attention should be paid to ensuring that the Town is well-presented throughout the design and decision-making process.

[29] As presented in the Summer 2019 DRAFT MassDOT Cape Cod Canal Transportation Study prepared by Stantec.

A Vision for 2040

Cape Cod's transportation system has both shaped and been shaped by development patterns of the region. As our regional economy has evolved so too has our transportation infrastructure. From a reliance on ports and marine transport, to a steady growth by rail, and explosion of change fueled by the automobile – our region has undergone dramatic changes. All the while, our connection with our environment and our past has continued to define us. What will define our region for the next 20 years?

As a region, Cape Cod we face a number of challenges that will have to be addressed over the coming decades. The region faces limited vacant land, a lack of housing affordability, potential loss of habitat as a result of development pressure, impaired watershed from excess nitrogen loading, tourism dependence with a lack of year-round jobs paying a living wage, automobile dependence, and the impacts of climate change. In different ways, smart transportation investment decisions can help to address these challenges facing the region.

While many uncertainties exist about the future, strength of the transportation infrastructure will undoubtedly be a key to our long-term vitality. As a region, we must establish a vision for our region's transportation system and identify our priorities for investing financing resources in maintaining and improving this system. The 2020 Regional Transportation Plan (RTP) sets forth this vision for the region and sets the framework for making smart transportation investments within the region through 2040.

Chapter 4: Livability, Climate Change Resiliency, and Scenario Planning

Livability, climate change resiliency, and scenario planning are important planning concepts that are incorporated through the region's transportation planning process and directly into the Regional Transportation Plan (RTP).

LIVABILITY

Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safer streets and roads. Livability can be supported through funding transportation related projects and sponsoring activities like Context Sensitive Solutions and public involvement that help enable people to live closer to jobs, save households time and money, and reduce pollution. This principle reinforces the growth policy in the updated RPP, which promotes guiding new development and redevelopment into existing centers of activity. Focusing development in areas of existing centers of activity can provide more opportunities for people to live closer to jobs, friends and family, and activities, and can allow for more efficient use of resources and infrastructure.

As part of the United States Department of Transportation's (USDOT) Livability Initiative, the Federal Highway Administration (FHWA) works within the Interagency Partnership for Sustainable Communities to coordinate and leverage federal housing, transportation, water, and other infrastructure policies and investments. The Partnership for Sustainable Communities developed the following principles to guide efforts:

1. Provide more transportation choices
2. Promote equitable, affordable housing
3. Enhance economic competitiveness
4. Support existing communities
5. Coordinate policies and leverage investment
6. Value communities and neighborhoods[30]

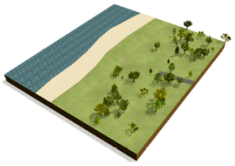
[30] http://www.fhwa.dot.gov/livability/

Livability directly benefits people who live on, work on or visit Cape Cod, increases property values and business activity, and it can improve public health and safety. Transportation decisions can have a major impact on livability and the region's character.

The character of Cape Cod is a critical component of the communities and livability of the region. Many different and unique places with varying character exist across the region. The 2018 Regional Policy Plan identifies eight Cape Cod Placetypes—areas with similar natural and built characteristics—that illustrate the different character areas and contexts found throughout the region: Natural Areas, Rural Development Areas, Suburban Development Areas, Historic Areas, Maritime Areas, Community Activity Centers, Industrial Activity Centers, and Maritime and Transportation Areas. Each Placetype has its own vision, as well as a description of its defining characteristics and development patterns. To ensure that transportation projects protect the existing character of the region and foster greater livability, the context of a project must be considered and integrated into the design of the project. The Cape Cod Placetypes provide a framework for such context-sensitive design. The Cape Cod Placetypes are illustrated in Figure 35.

Transportation projects within and connecting Community Activity Centers will be key to improving the livability of the region. Because Community Activity Centers already have a concentration of commercial and community activity and compact form, there exists an opportunity for people to live, work, and play in a smaller area. Streetscapes within and connecting Community Activity Centers need to be attractive, safe, and suitable for a variety of transportation modes (particularly walking). Further developing these centers of activity and their transportation networks can create opportunities for people to meet and interact, helping to create community networks, reduce traffic and the amount of resources needed for transportation infrastructure, improve public health by promoting pedestrian activity and reducing pollution, all of which are components of livability. Additionally, integrating context-sensitive design into the transportation project process will help preserve environmental and historical assets, which are critical components of the region's character, economy, and livability. Context-sensitive design and Community Activity Centers are central to the Livability and Sustainability goal and associated objectives and performance measures discussed in Chapter 2.

FIGURE 35. Cape Cod Placetypes



NATURAL AREAS

Natural Areas are generally the region's least developed and most sensitive areas.

RURAL DEVELOPMENT AREAS

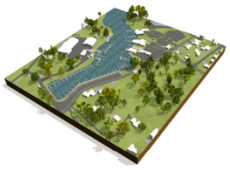
Rural Development Areas are defined by a high percentage of open lands and sparse building development patterns that contribute to the unique rural and scenic character of the region.

SUBURBAN DEVELOPMENT AREAS

Suburban Development Areas include residential neighborhoods built primarily between the 1950s and 1990s as well as automobile-oriented commercial and light industrial development established during the same time period.

HISTORIC AREAS

Historic Areas consist of concentrations of historic structures, including local and/or National Register districts located in a small-scale village setting.



MARITIME AREAS

Maritime Areas are clusters of commercial and mixed-use development that contribute to Cape Cod's working waterfronts and harbors.

COMMUNITY ACTIVITY CENTERS

Community Activity Centers are areas with a concentration of business activity, community activity, and a compact built environment. Buildings are generally smaller in scale and connected by a network of streets, ways or alleys.

INDUSTRIAL ACTIVITY CENTERS

Industrial Activity Centers are lands containing industrial uses that are suitable for future industrial activity as well as emerging industries.

MILITARY AND TRANSPORTATION AREAS

Military and Transportation Areas consist of large land areas developed with and devoted to infrastructure such as airports, transfer stations, waste disposal facilities, and Joint Base Cape Cod.

CLIMATE CHANGE RESILIENCY

The Cape Cod Metropolitan Planning Organization's (MPO) approach to climate change is based on FHWA's policies on climate change, defined by a vision for improved coastal resiliency, and includes the following initiatives:

- **Adaptation** - Preparing for the impacts of global climate change on the nation's transportation infrastructure and systems;
- **Sustainability** - Ensuring that balanced choices are made among environmental, economic, and social values that will benefit current and future road users;
- **Mitigation** - Identifying strategies that reduce greenhouse gas (GHG) emissions from transportation sources.
- **Energy** - Promoting the use of alternative and renewable fuels, and vehicle technologies to reduce oil dependence, vehicle pollution and energy use.[31]

Impacts and Vulnerabilities[32]

Scientists have concluded that some level of climate change has already occurred, weather patterns are changing, and these changes are expected to continue or accelerate in the future[33]. Additionally, past weather and climate patterns appear to be much less reliable indicators of future weather and climate than in recent decades, which necessitates greater flexibility in planning and decision-making processes. As stated in the USDOT Policy Statement on Climate Adaptation, DOT shall integrate consideration of climate impacts and adaptation into the planning, operations, policies, and programs of DOT in order to ensure that taxpayer resources are invested wisely and that transportation infrastructure, services, and operations remain effective in current and future climate conditions.

The DOT recognizes that climate variability and change pose potential threats to U.S. transportation systems and Cape Cod is no exception. The range of impacts from these threats may include roadway deterioration, flooding, limited waterway access, and weakened structures. Severe conditions may reduce the life of capital assets and increase operational disruptions. Some consequences may require changes in the design, construction, and maintenance of infrastructure.

Building resilience to, and mitigating, climate change and weather-related risk is common sense management to protect current and future investments and to maintain safe operational

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[31] http://www.fhwa.dot.gov/environment/climate_change/

[32] Excerpt from U.S. DOT Climate Adaptation Plan: Ensuring Transportation Infrastructure and System Resilience

[33] See USGCRP, Global Climate Change impacts in the United States, particularly pp.27-40. http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts/full-report

capabilities. Mitigating and adapting to climate change and its impacts can include adjusting how transportation infrastructure is planned, designed, built and operated. Making climate change mitigation and adaptation a standard part of agency planning can ensure that resources are invested wisely, and that services and operations remain effective.

Climate Change Mitigation and Adaptation

Climate change mitigation and adaptation involves adjusting the way the transportation community plans, designs, constructs, operates, and maintains transportation infrastructure to reduce greenhouse gas emissions and protect against the impacts caused by changes in climate and extreme weather events.

While actions taken to mitigate climate change may not be able to fully stop climate change, they can help the effort to slow the rate of change and provide more time for the region to adapt to a changing climate and its impacts. Climate change mitigation strategies related to transportation focus around reducing greenhouse gas emissions through actions including trip reduction, electrification of vehicles, improved and expanded transit systems, and improved and expanded bicycle and pedestrian networks to reduce the amount of vehicle trips in an area.

Adaptation strategies for coping with extreme events and future climate change are most likely forms of coastal engineering and planning already utilized today[34]. However, the challenges facing today's engineers and planners may be among the greatest ever because of the on-going migration of people to coastal areas and the projected rise of sea level to elevations unprecedented in modern times. Adaptation strategies to respond to coastal infrastructure problems related to natural hazards and climate change may be categorized as follows:

- Maintain existing infrastructure for optimal performance and manage the response to extreme events through advanced preparation.
- Increase redundancy of the transportation system by ensuring that services provided by infrastructure can be supplied by other means or alternatives.
- Protect the existing system by providing physical barriers to climate stressors and extreme events.
- Accommodate by modifying or redesigning infrastructure to better coexist in a climate-stressed environment.
- Relocate infrastructure away from the coast to lessen or eliminate exposure to climate stressors.

[34] Highways in the Coastal Environment: Assessing Extreme Events, US Department of Transportation and Federal Highway Administration Publication No. FWHA-NHI-14-006, October 2014

Climate Change Mitigation and Adaptation on Cape Cod

Barnstable County is a unique community almost completely surrounded by water with over 500 miles of vulnerable coastline. All 15 towns in Barnstable County have access to the coast, making the Cape a popular place to live, but the coastline also makes Cape Cod particularly vulnerable to the impacts of climate change. These impacts may include degradation of air quality, strain on local indigenous flora and fauna, changes in sea surface temperature, potential saltwater intrusion threats, and flooding, which can result in property, economic, and environmental damage and loss. Flooding from storm and non-storm surges is expected to increase due to projected sea level rise and more intense storms.

Rising waters and inundation from flooding events, storm surge, and sea level rise are concerns for the region's transportation network because many valuable transportation assets exist close to the water's edge. Thus, it is important to understand and actively engage in long-range planning activities to ensure that the transportation system in Barnstable County will both mitigate climate change and be resilient to its impacts.

An important initial step in preparing transportation infrastructure on Cape Cod for climate change is to identify which transportation assets are vulnerable to climate stressors. Current Cape Cod Commission efforts identify transportation assets throughout the region vulnerable to climate change impacts. The Commission has worked with several towns throughout the region to develop Multi-Hazard Mitigation Plans. Development of these plans includes a vulnerability assessment of critical infrastructure and assets within the town, as well as specific actions to reduce the vulnerability of critical infrastructure and improve its resilience. For example, a town may include widening a culvert to prevent flooding of a key roadway as an action to improve resiliency. Currently, the Commission is also working with several towns to carry out the Municipal Vulnerability Preparedness Program. This program involves an intensive stakeholder process to identify vulnerabilities, and strengths, in the community and actions to mitigate or adapt these features to increase their resiliency to priority hazards such as flooding and sea level rise. The Commission also created an online Sea Level Rise Viewer that highlights impacted roadways, and other past work on vulnerability assessments. These efforts supplement past vulnerability assessments carried out using the FHWA Climate Change & Extreme Weather Assessment Framework and past work with the John A. Volpe National Transportation Systems Center.

Restoring River and Stream Continuity

Long before the construction of roads, rail lines, and bike paths, the Cape's waterways flowed freely. As the first line of defense, these waterways could absorb the impact of many of the natural events that faced the region. Bridge, culverts, and other tidal restrictions can inhibit the natural flows and become vulnerable points in storm events. By restoring river and stream crossing the region can see coastal resiliency as well as environmental benefits.

TIDAL STREAM CROSSINGS

Culverts and bridges that are too small to pass the full tidal range are known as tidal restrictions, and their impacts can be severe. By limiting tidal flow, restrictions alter water levels and chemistry, diminish exchange of ocean nutrients, and can degrade entire upstream aquatic systems. When properly designed, replacing a tidally-restrictive crossing with a larger culvert or bridge restores the natural tidal flow needed to sustain healthy tidal wetland habitats.

FRESHWATER STREAM CROSSINGS

Undersized or improperly placed crossings impact natural stream processes and prevent fish and wildlife from moving about the watershed. Stream crossings can disrupt stream continuity and impact freshwater ecosystems in the following ways:

- Undersized crossings restrict water flow, particularly during storms. These crossings may contribute to extensive channel scour, bank erosion, flooding, and crossing failure. Undersized crossings may be too small, and the flow may be too fast, to pass fish or wildlife.
- Shallow crossings have water depths that are too shallow for fish and other aquatic life to migrate through.
- Perched crossings have an outlet that is elevated above the level of the stream bed at the downstream end. Perched crossings block fish and wildlife from moving upstream.

The Massachusetts Division of Ecological Restoration (MassDER)[35] leads the charge for restoring aquatic ecosystems in the Commonwealth and has been an invaluable partner to the region. In providing much of the language for this section, as well as additional analysis presented in Appendix H, MassDER is involved in numerous tidal restoration projects currently ongoing in the region.

Restoring river and stream crossing has a number of economic and community benefits and are important projects for the region. A MassDER study[36] found that each $1.0 million dollars spent on its restoration projects (including stream barrier removals, as well as salt marsh restoration) supported 10 to 13 jobs and $1.5 to $1.8 million in regional economic output (2009 dollars). Such projects are a particular benefit to the region when coupled with roadway improvements projects. Appendix H details a number of ongoing and potential river and stream crossing restoration projects that should be considered by the region either as part of planned transportation improvements or as standalone projects.

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[35] More information on the MassDER available at: http://www.mass.gov/eea/agencies/dfg/der/

[36] Massachusetts Division of Ecological Restoration. "The Economic Impacts of Ecological Restoration in Massachusetts." March 201.

Greenhouse Gases Analysis

The transportation system is a critical component of the Commonwealth of Massachusetts' infrastructure; it facilitates economic development, access to goods and services, and social interaction and enrichment. While the system has numerous benefits that users depend upon daily, it also contributes over one-third of the Bay State's greenhouse gas (GHG) emissions, a key cause of climate change. Sprawling development patterns and automobile dependence also contribute to physical inactivity, which is associated with various negative health outcomes, while motor vehicle pollution contaminates the air, causing respiratory and other health conditions.

GLOBAL WARMING SOLUTIONS ACT AND THE ROLE OF METROPOLITAN PLANNING ORGANIZATIONS

The Global Warming Solutions Act (GWSA), which was signed into law in August 2008, makes Massachusetts a leader in setting aggressive and enforceable GHG reduction targets, and implementing policies and initiatives to achieve these targets. In keeping with the law, on December 29, 2010 the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies and the public, released the Massachusetts Clean Energy and Climate Plan for 2020. In December 2014, DEP issued new regulations that require MPOs to quantify impacts from project investments, track, progress towards reductions, and consider impacts in the prioritization of project investments. The targets for overall statewide GHG emissions are:

- By 2020: 25 percent reduction below statewide 1990 GHG emission levels
- By 2050: 80 percent reduction below statewide 1990 GHG emission levels

The Commonwealth's MPOs are integrally involved in supporting the GHG reductions mandated under the GWSA. The MPOs are most directly involved in helping to achieve the GHG emissions reductions through the promotion of healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments – and assisting smart growth development patterns through the creation of a balanced multi-modal transportation system. This is realized through the transportation goals and policies espoused in the 2020 Regional Transportation Plans (RTPs); the major projects planned in those RTPs; and the mix of new transportation projects that are programmed and implemented through the TIPs. GHG tracking and evaluation processes enable the MPOs to identify anticipated GHG impacts of planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects.

Additional information air quality conformity can be found in Appendix N.

Alternative and Renewable Energy

There are numerous projects in Barnstable County that are investing public resources to conserve energy, implement efficiency measures, and produce or purchase renewable energy, such as:

- Cape Cod Regional Transit Authority (CCRTA) is currently meeting 94% of the energy needs of its intermodal center and maintenance facility with solar and wind power and is pursuing grant funding to deploy low or no emissions vehicles on some of its routes.
- Energy Star Passenger Terminal at the Barnstable Municipal Airport: The new 35,000 square-foot passenger terminal building at Barnstable Municipal Airport was constructed with multiple energy saving design features including white roofs, high performance windows, high efficiency HVAC systems, point of service water heaters, and fluorescent lighting.
- Solar Collection Field at the Barnstable Municipal Airport: Nearly 25,000 photovoltaic modules were installed across 18.8 acres of airfield. Energy from the solar array will benefit the airport, the Barnstable Fire District and eventually, rate payers in Barnstable and other jurisdictions.
- Electric Car Charging Stations at various locations throughout the county.

The Commission also supports development of appropriate renewable energy resources, as demonstrated by the energy goal and objectives and action items in the updated RPP, which are part of a framework for future planning work and development project regulatory review. The energy goal in the RPP is "to provide an adequate, reliable, and diverse supply of energy to serve the communities and economies of Cape Cod," and is supported by three objectives:

- Support renewable energy development that is context-sensitive
- Increase resiliency of energy generation and delivery
- Minimize energy consumption through planning and design (including energy efficiency and conservation measures)

Additionally, two action items in the updated RPP include conducting GIS analyses to identify potential electric vehicle charging station locations and appropriate potential solar photovoltaic array or energy storage facilities sites to encourage development of on-site renewable energy.

SCENARIO PLANNING

Transportation and land use are inextricably linked and only with a shared vision for both can the ultimate visions of a region be achieved. Scenario planning is one way in which these disciplines can be looked at in a comprehensive way.

FHWA defines scenario planning an analytical tool that can help transportation professionals prepare for what lies ahead. Scenario planning provides a framework for developing a shared vision for the future by analyzing various forces (e.g., health, transportation, economic, environmental, land use, etc.) that affect growth.[37] This framework has been used and continues to be an important tool for the region.

Climate Change Scenario Planning

The Cape Cod Commission has developed two tools to help illustrate both different potential climate change scenarios and ways of mitigating the impacts of climate change: the Sea Level Rise Viewer and the Cape Cod Coastal Planner. The Sea Level Rise viewer is an online tool that allows a user to see what the impacts of sea level rise of one, two, three, four, five, or six feet would be on critical facilities and roadways in the region.[38] This tool shows that with one foot of sea level rise, over 50 miles of roads become disconnected or isolated, limiting emergency and day-to-day access to these locations. With three feet of sea level rise, this number jumps up to almost 160 miles and with six feet of sea level rise, over 700 miles of the region's roadways become disconnected. Being able to look at the impacts of possible future sea level rise and climate change scenarios can help inform future planning efforts so that ways to address these potential access and safety issues are incorporated into future projects. Further analysis using this tool's data shows that at one foot of sea level rise, almost 1,300 residences may be inaccessible, at three feet of sea level, over 6,200 residences are potentially isolated or inaccessible, and this number jumps to over 26,000 with six feet of sea level rise.

While the Sea Level Rise viewer identifies potential vulnerabilities, the Cape Cod Coastal Planner, built by the Cape Cod Commission and its partners, is an interactive map-based communication and decision-support tool to help residents and decision makers understand the relative environmental and socio-economic effects of implementing different adaptation strategies and scenarios to address sea level rise, storm surge, and erosion. The tool integrates research on potential adaptation strategies for Cape Cod communities and how ecosystem services are impacted by hazards and strategy selection. Cape Cod Coastal Planner's development was also informed by an extensive stakeholder process, integrating feedback from potential users across the region, and is being tested through a pilot project with the Town of Barnstable. Using these two tools can help guide future projects and efforts by identifying vulnerable areas and providing ways to test different ways to address those vulnerabilities.

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[37] http://www.fhwa.dot.gov/planning/scenario_and_visualization/scenario_planning/

[38] Analysis conducted using 2012 road data

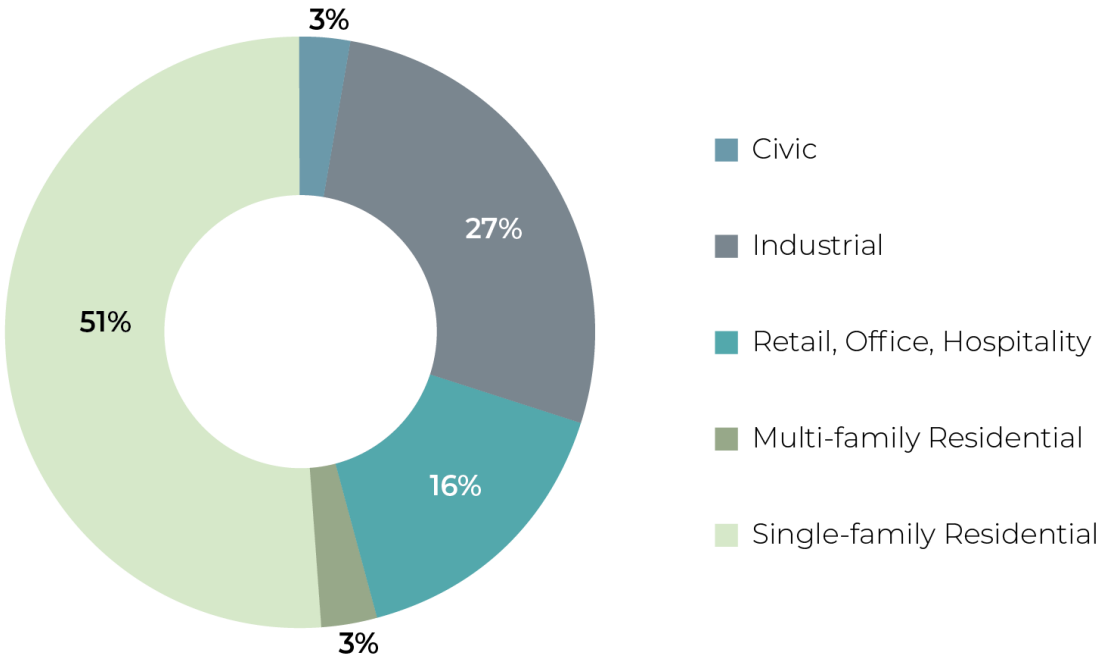
Land Use Scenario Planning

Where the RTP sets the regional vision for transportation, the Regional Policy Plan (RPP) sets the overarching regional vision for how Cape Cod will grow and develop in the future. An updated RPP was adopted in January 2019. As part of the update process, stakeholders engaged in a regional scenario planning exercise conducted using the Envision Tomorrow suite of regional planning tools.[39]

Using this software, users are able to test multiple development scenarios and then compare the impacts of each development scenario. The business as usual, or the "Trend Scenario," answers the question: "What happens if current land use policies remain unchanged?" Based on existing zoning and constraints such as wetlands, the Trend Scenario builds on existing vacant land to see what Cape Cod would look like in 2030.

The Trend Scenario was largely characterized by the development of large single-family homes as shown in Figure 36.

FIGURE 36. RPP Trend Scenario (Land Use Mix – Percent of Total Acres)



The results of these continued development patterns for the regions are characterized by more sprawling development resulting in a loss of habitat, perpetuation of unaffordable housing, and continued wastewater challenges, in addition to climate change challenges. Focusing just on the

[39] http://www.envisiontomorrow.org

transportation impacts, the Trend Scenario results in disperse, auto-dependent development that would result in a significant need for new infrastructure including:

- Over 300 miles of new roadway construction – enough to stretch from the Sagamore Bridge to the Provincetown Monument five times
- Over 80,000 new parking spaces – the equivalent of paving over all of the 700-acre Shawme-Crowell State Forest for parking

The updated RPP articulates a growth policy that promotes guiding new development and redevelopment to existing centers of activity. During the RPP update process, the Envision Tomorrow tool was used to construct an alternate scenario more aligned with the RPP growth policy, which focuses on guiding development and redevelopment to more compact centers of existing activity. The resulting development would be denser with more redevelopment, putting 70% more development in already developed areas, requiring 80% less impervious surface and 13 times less land than the trend scenario, which would result in less habitat loss. In the trend scenario, much of the additional housing developed would be multi-family housing, which would also be more affordable for households earning $50,000-$75,000 per year. In particular, because most of the development would occur in areas already developed, this alternate scenario would utilize existing infrastructure, requiring 90% fewer miles of new roadway than the trend scenario. Additionally, the alternate scenario of more compact and dense development allows for greater walkability as people can live closer to jobs and amenities.

Planning for the Future of the Cape Cod Economy: Comprehensive Economic Development Strategy

In 2009, Cape Cod was designated an Economic Development District creating new regional opportunity for Federal Economic Development funding for projects and programs consistent with the Comprehensive Economic Development Strategy (CEDS) for Cape Cod. This important and valued designation followed an intense stakeholder driven regional planning effort to adopt a CEDS for Cape Cod, an economic blueprint for the region.

The CEDS planning effort on Cape Cod is led by the Barnstable County Economic Development Council and staffed by the Cape Cod Commission. The planning process and plan are informed by a comprehensive analysis of the region's economy, its strengths, opportunities, weaknesses, and threats. The result is an action plan and an evaluation process specifically designed to address priority issues through achievable projects and programs. A number of projects and programs involve investments in transportation infrastructure consistent with the goals and objectives of the RTP.

"Future of Transportation in the Commonwealth" Report

With many changes facing the transportation system in the coming decades, the Cape Cod MPO looks to work with state and federal agencies to understand and plan for these changes. The Commonwealth of Massachusetts in a leader in transportation profession in terms of forward-thinking transportation planning and policy. A recent report, "Future of Transportation in the Commonwealth" Report, covers a number of key topics that are relevant to the Cape Cod region.

In January of 2018 Governor Baker established the Commission on the Future of Transportation to investigate the following topics as they affect transportation during the 2020-2040 time span:

- Climate and Resiliency
- Transportation Electrification
- Autonomous and Connected Vehicles
- Transit and Mobility Services
- Land Use and Demographics.

The Governor's commission identified 18 recommendations for how to best prepare Massachusetts' transportation network for the challenges and opportunities of 2040. A discussion from the Cape Cod MPO perspective is included following each recommendation and is shown in *italics*.

1. PRIORITIZE INVESTMENT IN PUBLIC TRANSIT

The Commonwealth must continue to focus on modernizing its existing public transit assets, including vehicles, to prepare the current system to perform better long before 2040. The public transit agencies of Massachusetts need to reinvent transit operations to offer better, more responsive, and more customer-focused service, in concert with new mobility. *As an MPO partner, the Cape Cod Regional Transit Authority (CCRTA) continues to innovate and expand its services. For example, the CCRTA has been integrating support for bicyclists with transit service and adopting ride sharing services as part of its network*.

2. TRANSFORM ROADWAYS AND TRAVEL CORRIDORS

MassDOT, municipalities, and other roadway owners should redesign them to prioritize person-throughput rather than vehicle-throughput, so that limited corridor capacity is allocated to moving as many people as possible, while accommodating mobility alternatives. *Several communities in Barnstable County have already expressed interest in MassDOT's "Complete Streets" program; the Town of Sandwich has received funding through the program; the Cape Cod Commission has already completed a prioritization plan with one of the Cape's towns (Eastham) and expects to support others in the near future. Applying Complete Street's principles has and will continue to improve state and local roads to accommodate all users. In addition, accommodating transit service can lead to increased use of intercity buses thereby shifting travelers away from personal automobiles.*

3. BETTER MANAGE TRAFFIC CONGESTION

The Commonwealth must consider a full set of options to address roadway congestion, including improvements to public transit, better systems operations, and the consideration of congestion pricing. The Commonwealth should prioritize and target investments in public transit and other high-capacity transportation modes to make these more efficient, attractive, and reliable to reduce single occupancy vehicle (SOV) use, particularly on our most congested roads in the urban core. *The Cape Cod MPO's Regional Transportation Plan has and will continue to support comprehensive strategies to address traffic congestion. Cape Cod is fortunate to have pleasant weather during its busiest season – making bicycling and walking attractive options for shorter trips; additionally, the CCRTA deploys expanded services during the busy season. Intersection operations can be improved through deployment of signal preemption – allowing Opticom-equipped CCRTA buses to improve travel times. The use of Congestion Pricing could be effective both as a traffic management strategy as well has a funding mechanism to support transportation alternatives.*

4. ESTABLISH A COMMONWEALTH TRANSPORTATION TECHNOLOGY TRANSFORMATION INITIATIVE

The Governor's commission believes that we are in the early stages of a transportation revolution as impactful as any that has come before it. In order to harness the talent of our workforce, academia, and innovators to take full advantage of this opportunity, the Commission calls for the establishment of the Commonwealth Transportation Technology Transformation Initiative (T3I) to partner public and private resources with innovators to tackle some of the Commonwealth's most difficult transportation issues. *Cape Cod MPO staff will continue to monitor developments in this area and participate in MassDOT efforts such as training and workshops*.

5. SUPPORT AND ACCELERATE EFFORTS TO CONSUME TRANSPORTATION DIFFERENTLY

MassDOT should lead the development of policies related to changes in mobility practices, including ride-sharing, vehicle-sharing, Mobility as a Service (MaaS), on-demand mobility (ODM), and micro-mobility. The Commonwealth should continue to be an innovation proving ground for shared mobility initiatives. *Cape Cod MPO staff will continue to participate with MassDOT's efforts in this area. One area of emphasis will be to explore deployment of bikeshare, dockless bicycles and/or scooters in some of the Cape's higher-density villages*.

6. PROMOTE A STATEWIDE TELECOMMUNICATIONS INFRASTRUCTURE

The Commonwealth should promote full statewide communications infrastructure (5G, Wi-Fi, and their future counterparts) that can support and enable new transportation technologies and services, from connected and autonomous vehicles (C/AVs), to real-time traffic and asset management systems, to telecommuting opportunities. Since the siting of infrastructure to support new technologies includes municipal approval, MassDOT and other state agencies will need to expedite their review and approval processes while better coordinating them with local communities. *Improving the Cape's wireless communications systems continues to be a priority of the*

Cape Cod Commission and stakeholders such as OpenCape. Cape Cod MPO staff will continue to work with MassDOT and Cape Cod communities to deploy an improved system.

7. DEVELOP A STRATEGY TO SUPPORT CONNECTED AND AUTONOMOUS VEHICLES

MassDOT should dedicate resources to the management of an interagency Connected and Autonomous Vehicle (C/AV) Committee, to understand how the Commonwealth can prepare for and maximize the positive impacts of C/AVs. To continue Massachusetts' leadership position, the Governor should consider proposing legislation to establish statutory and regulatory structures that enable the safe and reliable deployment of C/AVs. *C/AVs can be expected to have a significant impact on mobility and traffic operations. Positive impacts include improved safety and efficiency. It is uncertain what effect C/AVs would have on parking demand since the vehicles could operate independently and avoid the need to park (and may circulate on the road network). Another concern is that since the arduous task of driving a car would be eliminated, more people may be attracted to travel by automobile since they could spend the time working or relaxing. Cape Cod MPO staff will work with MassDOT help prepare the County's transportation system to maximize the benefits and minimize the detriments of C/AV deployment.*

8. ENABLE AND PROMOTE A UBIQUITOUS ELECTRIC CHARGING (AND/OR ALTERNATIVE FUEL) INFRASTRUCTURE

The Commonwealth should continue to facilitate the establishment of a statewide electric charging network –and/or the infrastructure needed for other alternative fuels –that is fast, equitable, robust, and resilient in order to support a growing fleet of zero emission vehicles (ZEVs). The Commonwealth should develop standards or incentives for vehicle (driven by humans or driverless) to be electric, to charge during off-peak hours, and to be available to deliver energy back to the grid at peak times. *Cape Cod MPO staff will work with MassDOT to identify strategic locations for deployment of charging infrastructure. Through the County's Regional Policy Plan, the Cape Cod Commission encourages land development projects to include appropriate charging equipment*.

9. ESTABLISH A GOAL THAT ALL NEW CARS, LIGHT DUTY TRUCKS, AND BUSES SOLD IN MASSACHUSETTS WILL BE ELECTRIC BY 2040

Achieving the Commonwealth's 2050 Global Warming Solutions Act (GWSA) mandate will require the near-complete transition of our vehicle fleet (cars, trucks and buses) to electric vehicles or other zero-emission vehicle (ZEV) technology. Because vehicle fleets turn over slowly, for vehicles on the road to be electric by 2050, the Commonwealth should establish the goal for vehicle sales to be electric by no later than 2040 (perhaps sooner in some vehicle classes). *The Cape Cod MPO supports this policy*.

10. ESTABLISH A REGIONAL, MARKET-BASED PROGRAM TO REDUCE TRANSPORTATION SECTOR GREENHOUSE GAS (GHG) EMISSIONS

The Commonwealth should publicly support the prompt development and implementation of a regional program that uses market mechanisms and public investment as a means to limit GHG emissions from the transportation sector. The Commission also recommends exploring the adoption of a regional Low Carbon Fuel Standard. The Massachusetts EOEA has produced a policy statement for a Transportation Climate Initiative (TCI). A goal of this initiative is to "design a regional low-carbon transportation policy proposal that would cap and reduce carbon emissions from the combustion of transportation fuels… and allow each TCI jurisdiction to invest proceeds from the program into low-carbon and more resilient transportation infrastructure." *The Cape Cod MPO staff will work with MassDOT to explore these strategies.*

11. MAKE TRANSPORTATION INFRASTRUCTURE RESILIENT TO A CHANGING CLIMATE

The Commonwealth should develop vulnerability assessments for all publicly-owned or funded transportation infrastructure in Massachusetts across all agencies, the outcomes of which can then inform capital planning. MassDOT should develop and disseminate resiliency-oriented statewide design standards for transportation infrastructure, including infrastructure owned by the MBTA and the RTAs; by 2020, no transportation-related project should be built that does not conform to those standards. *Cape Cod MPO staff continue to work with member towns to develop plans for strategic improvement of critical transportation infrastructure. This of particular concern to Cape Cod as each of the 15 towns in Barnstable County are of varying degree susceptible to damage from flooding and other hazards associated with climate change*.

12. ENSURE SUFFICIENT ELECTRIC CAPACITY

As electric vehicle penetration accelerates, Massachusetts should work in close coordination with ISO New England (ISO-NE) and other states to ensure that sufficient electricity continues to be available to provide reliable, clean, and competitively priced power supplies for all electricity users in the Commonwealth. *The Cape Cod MPO supports state and local efforts to provide these services.*

13. ADOPT DENSE, MIXED-USE, AND TRANSIT-ORIENTED LAND USE POLICIES

Municipalities should accelerate the adoption of land use regulations that promote density and the use of shared vehicles and active and shared transportation modes. The Commonwealth should consider accelerating local progress in this area through incentives and regulations. *The Cape Cod Commission, through Barnstable County's Regional Policy Plan, works with member communities and developers through regulation and local comprehensive plans to locate development in Activity Centers. These centers are intended to create the density necessary for public transit, bicycling, and walking to succeed as transportation options*.

14. ENABLE GATEWAY CITIES AND THE REGIONS THEY ANCHOR TO COMPETE FOR RESIDENTS AND JOBS

The Commonwealth's transportation providers –including MassDOT, MBTA, and the RTAs –should support opportunities for housing and economic development in Gateway Cities and other regional hubs that have the potential to act as economic anchors within their respective regions. *Cape Cod MPO staff will work with MassDOT to explore this strategy. Part of this effort will be coordinated with the Cape Cod Commission's Regional Policy Plan's strategies to guide development.*

15. COORDINATE THE PLANNED REINVENTION OF THE MBTA COMMUTER RAIL SYSTEM WITH LOCAL, REGIONAL, AND STATE LAND USE AND ECONOMIC DEVELOPMENT STRATEGIES

MBTA should work with stakeholders to compile a menu of new service options for the commuter rail network by the end of 2019 and then develop detailed information on the costs (both capital and operating) and benefits of each of the service models. Regional planning officials and local elected officials in commuter rail-served communities should develop plans to support near-term increases in ridership and the transition to broader, interconnected service models. *Cape Cod MPO staff will work with MassDOT to explore extending passenger rail service to Cape Cod communities such as Buzzards Bay and Hyannis. Service to these areas has been identified as a priority of several updates of the Regional Transportation Plan.*

16. PROVIDE BETTER MOBILITY OPTIONS IN RURAL COMMUNITIES

MassDOT, working with MPOs and local municipalities, should develop strategies for providing rural Massachusetts with viable transportation options to supplement privately-owned vehicles. The Commonwealth should designate appropriate state agencies to work with the private sector to ensure that necessary infrastructure is available to support deployment of C/AV and TNC technologies throughout the state, including in rural areas. Many of Cape Cod's communities share rural limitations such as remoteness from activity centers and lower densities that make transit less viable. Challenges are particularly acute for residents of the Outer Cape towns who must travel great distances for many critical services such as healthcare; this has a direction impact on community health. The trip from Provincetown to the nearest hospital (Cape Cod Hospital in Hyannis) is the longest among all communities across the Commonwealth. *Cape Cod MPO staff will work with MassDOT, the Cape Cod Regional Transit Authority, municipalities, and local transportation, health and community organizations to explore strategies and implement solutions that improve mobility options for the rural communities on Cape Cod.*

17. PREPARE MASSDOT AND OTHER TRANSPORTATION-RELATED ENTITIES TO EFFECTIVELY OVERSEE A CHANGING TRANSPORTATION SYSTEM

To prepare the Commonwealth's transportation system for the inevitable changes of tomorrow, the Governor should consider specific organizational changes to MassDOT and other agencies that allow better focus, alignment, and results, including the continuation of a dedicated MBTA Board, a new paradigm for MassDOT, MBTA, and Regional Transit Authorities, and plans for data-sharing to

enable improved services and options for the transportation system. *The Cape Cod MPO supports this effort.*

18. DEVELOP A FISCALLY SOUND AND RESPONSIBLE TRANSPORTATION RESOURCE PLAN

Among the most significant contributions that today's decision makers could make to the public for the year 2040 is to commit to providing sufficient resources for the proper maintenance, operation, and upgrades to the state's transportation network. The Governors' commission concludes its report with this recommendation, not because it is the least important, but because the promise found in our earlier recommendations can only be achieved through a long-term commitment to providing the resources necessary to operate and maintain the Commonwealth's evolving transportation system. This begins with a commitment to eliminate the longstanding backlog of today's identified priority deferred MBTA and MassDOT maintenance projects to achieve safe, efficient services and asset conditions by 2030. Only then will the Commonwealth be able to fully turn its attention to effectuating the Commission's vision for 2040. *The Cape Cod MPO supports this effort.*

Chapter 5: Financial Plan

The Financial Plan sent forth in this chapter sets the regional priorities for surface transportation spending for the next 25 year.

LEGISLATIVE BACKGROUND

Federal legislation that contains requirements for transportation plans, programs and projects includes the current legislation: *Fixing America's Surface Transportation* (FAST) and the outgoing legislation *Moving Ahead for Progress in the 21st Century* (MAP-21) as well as the *Clean Air Act Amendments of 1990*.

On December 4, 2015, President Obama signed the *Fixing America's Surface Transportation* (FAST) Act (Pub. L. No. 114-94) into law—the first federal law in over a decade to provide long-term funding certainty for surface transportation infrastructure planning and investment. The FAST Act authorizes $305 billion over fiscal years 2016 through 2020 for highway, highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail, and research, technology, and statistics programs. The FAST Act maintains a focus on safety, keeps intact the established structure of the various highway-related programs managed by USDOT, continues efforts to streamline project delivery and, for the first time, provides a dedicated source of federal dollars for freight projects.

FAST creates a streamlined, performance-based, and multimodal program to address the many challenges facing the U.S. transportation system. These challenges include improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery.

FUNDING SOURCES

The primary source of funding for implementation of the RTP projects and programs is from the federal Highway Trust Fund. Distribution of Highway Trust Fund revenues are appropriated by Congress for surface transportation purposes through the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA) and the USDOT Federal Transit Administration (FTA) as dedicated through federal legislation. The current federal legislation, *Fixing America's Surface Transportation* (FAST), was signed into law in 2015.

In addition to federal funds, the Commonwealth of Massachusetts provided significant funds to the region. Highway projects can either be funded by a combination of federal and state funds (typically 80-90% federal funding) or fully funded by the state. For transit projects typically the state amount may average at a higher percentage due to the state funding a large percent of operating cost.

Receipts for the federal Highway Trust Fund are collected primarily from the federal fuel tax. Funding for transportation in Massachusetts comes from a combination of the state fuel tax, toll revenue, transportation-related fees (i.e. motor vehicle registration), and a portion of the state sales tax.

Local funds also play a large role in the advancement of projects with towns paying for the design of most highway projects with their borders. A town may even pay for the design of an improvement at a state-owned location if it sees the advancement of the project as a benefit to the town. Local funds are also occasionally used to cover items not covered by other sources such as landscaping above standard design or improvements to utilities. Transit services also have a local share in funding, with a portion of service operating costs assessed to the towns through the Cape Cod Regional Transit Authority.

ESTIMATED AVAILABLE FUNDS

Both the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), in partnership will MassDOT, provide funding to the region through a number of programs.

Federal Highway Administration Source Funds

MassDOT divides the federal highway funding that it receives between "regional target funding," which is allocated at the discretion of the MPOs for regional priority projects on the federal aid transportation system, and funding that is allocated at MassDOT's discretion for use principally on the state-owned transportation system.

Each MPO's regional target funding is composed of shares of Congestion Mitigation and Air Quality Improvement Program (CMAQ), Highway Safety Improvement Program (HSIP), Transportation Alternatives Program (TAP), and Surface Transportation Program (STP) funding. "Statewide" funding that is allocated at MassDOT's discretion includes funding from the federal highway sources detailed in Table 15.[40]

[40] https://www.mass.gov/service-details/funding-considerations

TABLE 15. FHWA Funding Programs

PROGRAM	DESCRIPTION
Congestion Mitigation and Air Quality Improvement (CMAQ)	A wide range of projects in air quality nonattainment and maintenance areas for ozone, carbon monoxide, and small particulate matter, which reduce transportation-related emissions.
Highway Safety Improvement Program (HSIP)	Implementation of infrastructure-related highway safety improvements
National Highway Performance Program (NHPP)	Improvements to interstate routes, major urban and rural arterials, connectors to major intermodal facilities, and the national defense network. Also includes replacing or rehabilitating any public bridge, and resurfacing, restoring, and rehabilitating routes on the Interstate Highway System.
Surface Transportation Block Grant (STBG) [Surface Transportation Program (STP) under MAP-21]	A broad range of surface transportation capital needs, including roads; transit, sea, and airport access; and vanpool, bicycle, and pedestrian facilities.
Transportation Alternatives (TA) [Transportation Alternatives Program (TAP) under MAP-21]	Construction of infrastructure-related projects (for example, sidewalk, crossing, and on-road bicycle facility improvements).
Bridge Replacement and Rehabilitation Program (BR)	Replacement or repair of bridges on or off the federal aid system.
Ferry Boat Program (FBP)	Project to construct ferry boats and ferry terminal facilities.
National Highway Freight Program (NHFP)	Projects that improve the efficient movement of freight on the National Highway Freight Network

In early 2019, MassDOT provided estimated available funds for the Cape Cod region from Federal Highway Administration (FHWA) including the state matching funds as presented in Table 16.

TABLE 16. Federal Highway Administration Funding for Cape Cod with State Match

TIME FRAME	FUNDING AVAILABLE FOR MPO (REGIONAL DISCRETIONARY)	NON-INTERSTATE DOT PAVEMENT	REMAINING STATEWIDE PROGRAMS (EXCLUDING STATEWIDE BRIDGE PROGRAM)	NON-FEDERAL AID PRESERVATION (BRIDGES AND ROADWAYS)	TOTAL ESTIMATED AMOUNT
2020-2024	$56,895,130	$25,313,081	$51,463,970	$22,925,500	$156,597,681
2025-2029	$65,230,867	$30,132,209	$57,837,802	$23,429,861	$176,630,739
2030-2034	$80,095,056	$36,998,450	$71,017,330	$23,945,318	$212,056,154
2035-2039	$88,773,417	$41,007,261	$78,712,113	$24,472,115	$232,964,906
2040	$18,881,933	$8,722,164	$16,741,913	$5,002,100	$49,348,110
2020-2040 Totals	$309,876,403	$142,173,165	$275,773,128	$99,774,894	$827,597,590

Federal Transit Administration Source Funds

The Federal Transit Administration (FTA) provides financial assistance to develop new transit systems and improve, maintain, and operate existing systems. FTA oversees thousands of grants to state and local transit providers through the FTA regional offices. The grantees are responsible for managing their programs in accordance with federal requirements and FTA is responsible for ensuring that these grantees follow the mandates along with statutory and administrative requirements. FTA funding programs are summarized in Table 17. [41]

[41] https://www.massdot.state.ma.us/planning/Main/PlanningProcess/FundingConsiderations.aspx

TABLE 17. FTA Funding Programs[41]

PROGRAM	DESCRIPTION
Section 5307 – Urbanized Area Formula Grant Program	This program funds routine capital investments, including bus purchases, but for some smaller systems, a portion can be used to defray transit system operating expenses.
Section 5310 – Elderly Persons and Persons with Disabilities Formula Program	This program is intended to enhance mobility for seniors and persons with disabilities by providing funds for programs to serve the special needs of transit-dependent populations beyond traditional public transportation services and Americans with Disabilities Act (ADA) complementary paratransit services.
Section 5339 – Bus and Bus Facilities	This program seeks to provide capital funding to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities.

In early 2019, MassDOT provided estimated available funds for the Cape Cod region from Federal Transit Administration (FTA) including the state matching funds as presented in Table 18. The CCRTA is actively seeking additional funding through various FTA discretionary programs and any other sources that become available to better advance the goals of the RTP.

TABLE 18. Federal Transit Authority Funding for Cape Cod with State Match

TIME FRAME	SECTION 5307	SECTION 5310	SECTION 5339	TOTAL
2020-2024	$49,201,229	$1,737,859	$4,798,282	$55,737,370
2025-2029	$54,535,495	$1,927,217	$5,790,287	$62,252,999
2030-2034	$60,448,088	$2,137,208	$6,987,382	$69,572,678
2035-2039	$67,001,707	$2,370,079	$8,431,964	$77,803,750
2040	$14,247,997	$504,146	$1,885,011	$16,637,154
2020-2040 Totals	$245,434,516	$8,676,509	$27,892,926	$282,003,951

UNIVERSE OF PROJECTS

The universe of projects identified for funding can be divided into one of four funding categories:

- Transportation Projects
- Transportation Programs
- Smart Solutions
- Transportation Studies

A "**transportation project**" is specific in the location and nature of construction or other activity that is anticipated. Examples of potential transportation projects include the reconfiguration of Exit 1C on Route 6 and the construction of a new multi-use trail from the end of the existing Shining Sea Bikeway to the Cape Cod Canal Path. Any project over $20 Million in total cost must be included in the RTP to receive federal funding. Projects under $20 Million may be included in the RTP depending on the level to which the project has been developed.

Given that the RTP covers a 25-year time-span it beyond our ability to define every specific transportation project that will implemented. Therefore, "**transportation programs**" identifying categories of specific transportation projects that are anticipated to be implemented and identifying funds to pay for these bundles of transportation projects. Examples of potential transportation programs include roadway resurfacing, intersections improvements, and transit operating assistance and capital needs.

"**Smart solutions**" are initiatives that do not require major investments in capital or operations. Examples of potential smart solutions include coordination of Cape Cod Regional Transit Authority and ferry schedules with each other and the development of a Cape-wide bicycle route system.

Finally, "**transportation studies**," seek to solve problems through planning efforts that focus on analysis of alternatives and public participation. These transportation studies ultimately identify solutions to problems that may be in the form of future transportation projects, programs, and/or smart solutions.

See Appendix M for a complete listing of the Universe of Projects for the 2020 RTP. This list constitutes unmet need for the region.

As is demonstrated by the extensive program of projects, the anticipated system wide need for the region greatly exceeds the anticipated revenues. Strategic decisions will need to be made to determine where the limited funded will be spent and which project will have to be delayed.

PROJECT ANALYSIS

In order to determine the projects to be contained within the financial constraint of the document, analysis was conducted on the universe of projects. Analysis of projects was limited to projects $10 million or greater with the expectation that smaller projects could be programmed in the bundle of "other TIP projects" included in the financial constraint of this document. Some projects under $10 million were included if it was determined that the potential benefits were commensurate with these larger scale projects. Analysis was conducted with a subcommittee of the CCJTC where each project was considered for potential benefit, estimated cost, consistency with the objectives of the RTP, impact on performance targets, project score (where available), equity as it relates to minority, low income, Limited English Proficiency (LEP) and other protected populations, and GHG reduction potential. Considering these factors and the anticipated available funding, a financially constrained

program of projects was developed with the CCJTC subcommittee and reviewed and approved by the Cape Cod MPO.

TRANSIT IMPROVEMENT/EXPANSION PROJECTS

The CCRTA evaluates its routes and schedules on a regular basis in an effort to best meet the needs of the region. Where potential improvements or expansions are identified, funding is sought to support their implementation. Most often service expansions begin as demonstration projects and, when successful, long term-term funding is sought for their continued operation.

Two recent examples of demonstration projects are the Bourne Run and the Sandwich Line. After successful demonstration periods, their operation continues extending transit options to a larger portion of the Cape's population.

The CCRTA also continually reviews their existing routes to look for ways to improve the customer experience and system-wide efficiency. In consultation with a variety of community members, the CCRTA made such changes to their routes servicing Hyannis to improve access to pharmacies, grocery stores, the senior and youth centers, shopping areas, and a wide range of other locations.

Other service improvements or expansions that have been or are under considered include:

- Extending evening service hours on fixed routes
- Extending weekend service on fixed routes including Sunday service
- Providing fixed route service in underserved areas of the Mid-Cape
- Providing increased frequency on fixed routes in urban areas (i.e. Hyannis, Provincetown, Falmouth)
- Providing new seasonal services (i.e. Chatham Shuttle)

At this time there is not sufficient demand to sustain these services and/or the CCRTA does not anticipate sufficient funding for their operation. Based on current projections, the CCRTA anticipates that all of the levels of transit funding included in this document will maintain existing service, but not be sufficient to support significant expansions to the system.

In addition to service improvements or expansions, the CCRTA considers investments in parking and in transit-oriented-development in the vicinity of the Hyannis Transportation Center as critical to the increase use of transit in the region. The CCRTA is also supportive of expansions to Cape Flyer rail service as it provides an important non-automobile option to Cape Cod that complements that transit services provided by the CCRTA.

As funding opportunities arise, the CCRTA will consider these and any other service improvement, expansion, or transit-supportive project that improves transit options for the region.

HIGHWAY PROGRAM OF PROJECTS

It is the responsibility of the Cape Cod MPO to select regional priority projects to be funded by the available highway regional target funds. With only $304 million anticipated in highway regional target funds available from 2020 through 2040, there is significantly more need than available funding.

Table 19 presents the Cape Cod MPO's recommended program of project for 2020 through 2040. This program of projects balances the need for large-scale regional projects that are specifically identified with smaller-scale projects included as a bundle of "Programs and Smart Solutions."

Project costs are shown with both 2020 estimated costs and, in order to account for inflation, year of expenditure (YOE) costs that include a 4 percent annual inflation rate.

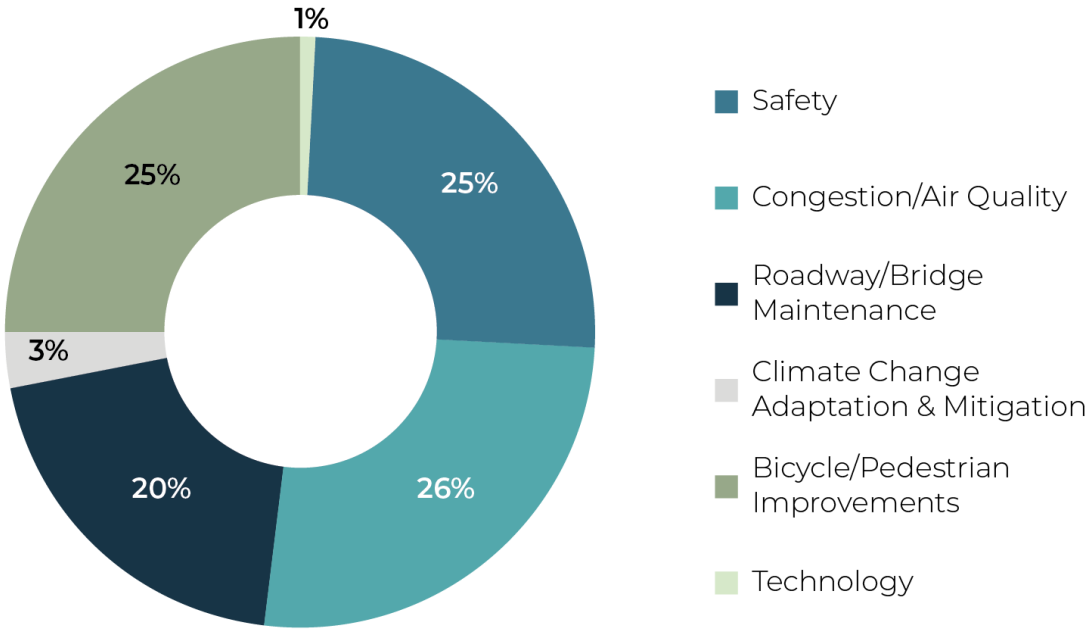
TABLE 19. Highway Regional Target Funding – Program of Projects

YEARS OF FUNDING	PROJECT / PROGRAM	2020 TOTAL ESTIMATED COST	TOTAL-YEAR OF EXPENDITURE (YOE) ESTIMATED COST
2020-2024	Mashpee 151	$15,000,000	$16,224,000
	Route 28 Multimodal Improvements	$13,000,000	$14,060,800
	Rail Trail Extensions (Mid- and Upper-Cape)[1]		[$16,780,305]
	Scenic Highway Median Barrier	$10,000,000	$10,816,000
	Programs		$15,794,330
	Subtotal Funding		$56,895,130
2025-2029	Rail Trail Extensions (Outer Cape)	$20,000,000	$26,318,636
	Hyannis Access Phase II (Yarmouth Road Corridor)	$12,000,000	$15,791,181
	Scenic Highway/Rte. 25 Connector Ramp	$7,000,000	$9,211,522
	Route 6 Exit 1C Relocation[2]		[$51,000,000]
	Route 6 Eastbound Additional Travel Lane to Exit 2[2]		[$48,000,000]
	Sagamore Bridge Approach[2,3]		[$64,000,000]
	Bourne Bridge Approach[2,3]		[$84,000,000]
	Programs		$13,909,528
	Subtotal Funding		$65,230,867
2030-2034	Route 6 Outer Cape Safety & Multimodal Improvements	$17,000,000	$27,217,548
	Rail Trail Extensions (Mid- and Upper-Cape) remainder	$19,000,000	$30,419,612
	Route 28 Multimodal Improvements	$7,000,000	$11,207,226
	Belmont Circle Reconstruction[2]		[$23,000,000]
	Bourne Rotary Reconstruction (Interchange)[2]		[$87,000,000]
	Programs		$11,250,671
	Subtotal Funding		$80,095,056
2035-2039	Interchange Improvements Route 6 – priority locations	$20,000,000	$38,958,010
	Bike Path Connectors to town centers	$10,000,000	$19,479,005
	Programs		$30,336,402
	Subtotal Funding		$88,773,417
2040	Programs		$18,881,933
	Subtotal Funding		$18,881,933
2020 - 2040 Total			$309,876,403

[1] Projects funded in the *Federal Fiscal Year Cape Cod 2020-2024 Transportation Improvement Program* through a combination of state and federal sources outside of the regional target. Includes the Yarmouth-Barnstable Cape Cod Rail Trail extension, the Sandwich Shared Use Path along Service Road, and Phase I of the Bourne Rail Trail.
[2] Projects recommended in the *Summer 2019 DRAFT MassDOT Cape Cod Canal Transportation Study*. Projects to be funded through a combination of state and federal sources outside of the regional target.
[3] Contingent upon United States Army Corps of Engineers' *Major Rehabilitation Evaluation Report* recommending replacement of the Bourne and Sagamore Bridges.

In allocating the available highway regional target funding, particularly for the bundled "Programs and Smart Solutions," it is important to keep a balance between different types of projects. Based on feedback from the budget challenge in the RTP survey, recommendations from the CCJTC project selection subcommittee, and, ultimately the recommendation of the Cape Cod MPO, Figure 37. represents the recommended distribution of funding across the range of programs. This recommended distribution will be used to inform TIP project selection through the development of revised TIP scoring criteria, as needed. Roadway maintenance, bridge maintenance, and transit are also often elements of these highway regional target projects but are addressed primarily through statewide funding streams. A discussion of the overall RTP funding distribution is presented in the next section.

FIGURE 37. Highway Regional Target Funding Distribution



Analysis of Highway Regional Target Projects

An analysis of potential impacts (positive or negative) on low income, minority, and LEP populations was conducted on regional target projects and is presented in Table 20. Of the approximately $304 million in highway regional target funding, approximately $218 is programmed for specific projects while the remainder will go to "Programs and Smart Solutions." Analysis was limited to the specific

projects, with existing TIP analysis procedures ensuring that the "Programs and Smart Solutions" will be programmed in an equitable way.[42]

TABLE 20. Highway Regional Target Projects – Income, Minority, and LEP Population Impacts

PROJECT	LOW INCOME [I], MINORITY [M], OR LIMITED ENGLISH PROFICIENCY [LEP] POPULATION AREA PROXIMATE	NATURE OF IMPACT ON LOW INCOME, MINORITY, OR LEP AREA
Mashpee: Route 151	M, LEP	Improved bicycle/ pedestrian access, safety, traffic flow
Route 28 Multimodal Improvements: Various Locations	TBD	Improved bicycle/ pedestrian access, safety
Rail Trail Extensions (Mid- and Upper-Cape)	I, M, LEP	Improved bicycle/ pedestrian access, safety
Scenic Highway Median Barrier	M	Improved traffic flow, safety
Rail Trail Extensions (Outer Cape)	I, LEP	Improved bicycle/ pedestrian access, safety
Hyannis Access Phase II (Yarmouth Road Corridor)	I, M, LEP	Improved bicycle/ pedestrian access, safety, traffic flow
Route 6 Outer Cape Safety & Multimodal Improvements	I, LEP	Improved bicycle/ pedestrian access, safety, traffic flow
Cape Cod Canal Area Transportation Improvements	M	Improved traffic flow, safety
Interchange Improvements – Priority Locations	TBD	Improved traffic flow, safety
Bike Path Connectors to Town Centers	TBD	Improved bicycle/ pedestrian access, safety

[42] A recent review of the past ten years of highway projects in the Cape Cod TIP indicated that approximately 67% of spending was on projects within and proximate to low income, minority, and LEP populations. This represents an investment in transportation infrastructure serving these areas that is proportionally higher than other areas on Cape Cod.

Of the approximately $138 million programmed for specific projects, approximately 61% was on projects within and proximate to minority populations, 84% was on projects within and proximate to low income populations, and 72%, was on projects within and proximate to LEP populations. Given the regional nature of these projects, even projects that are not proximate to these identified population are likely to positively impact these identified populations as they travel through these locations to access regional services. This represents an investment in transportation infrastructure serving these areas proportionally higher than other areas on Cape Cod. In summary, the areas with higher proportions of low income and minority populations see more transportation dollars spent than other areas on Cape Cod. Further analysis of highway regional target projects is presented in Appendix M.

An analysis of regional target projects was also analyzed in relation to greenhouse gas (GHG) emissions. As presented in Table 21, it is anticipated that most of the projects will result in nominal decreases in emissions for sidewalk and/or bicycle infrastructure or other improvements. It is anticipated that other projects will result in a quantifiable decrease in emissions that will need to be verified by statewide modeling efforts.

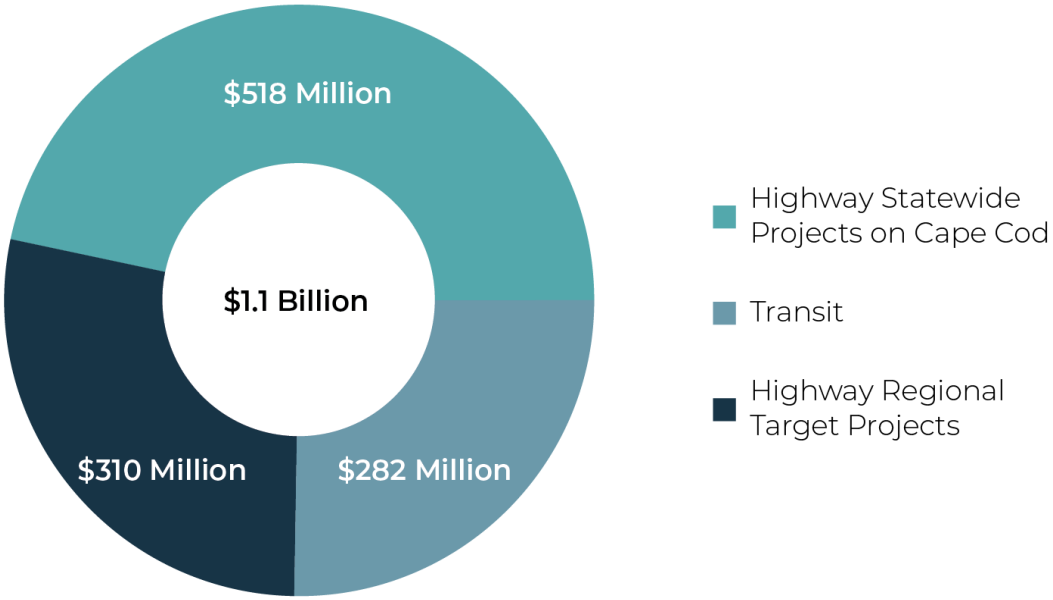
TABLE 21. Highway Regional Target Projects – Anticipated GHG Impacts

PROJECT	ANTICIPATED GHG IMPACT
Mashpee: Route 151	Assumed Nominal Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Route 28 Multimodal Improvements: Various Locations	Assumed Nominal Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Rail Trail Extensions (Mid- and Upper-Cape)	Assumed Nominal Decrease in Emissions from Bicycle Infrastructure
Scenic Highway Median Barrier	Assumed Nominal Decrease in Emissions from Roadway Infrastructure
Rail Trail Extensions (Outer Cape)	Assumed Nominal Decrease in Emissions from Bicycle Infrastructure
Hyannis Access Phase II (Yarmouth Road Corridor)	Assumed Nominal Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Route 6 Outer Cape Safety & Multimodal Improvements	Assumed Nominal Decrease in Emissions from Sidewalk and Bicycle Infrastructure
Cape Cod Canal Area Transportation Improvements	Project included MassDOT modeling used to develop the "Evaluation and Reporting of Statewide Greenhouse Gas Reductions in Transportation" presented in s Appendix N
Interchange Improvements – Priority Locations	Assumed Nominal Decrease in Emissions from Roadway Infrastructure
Bike Path Connectors to Town Centers	Assumed Nominal Decrease in Emissions from Bicycle Infrastructure

CONCLUSION

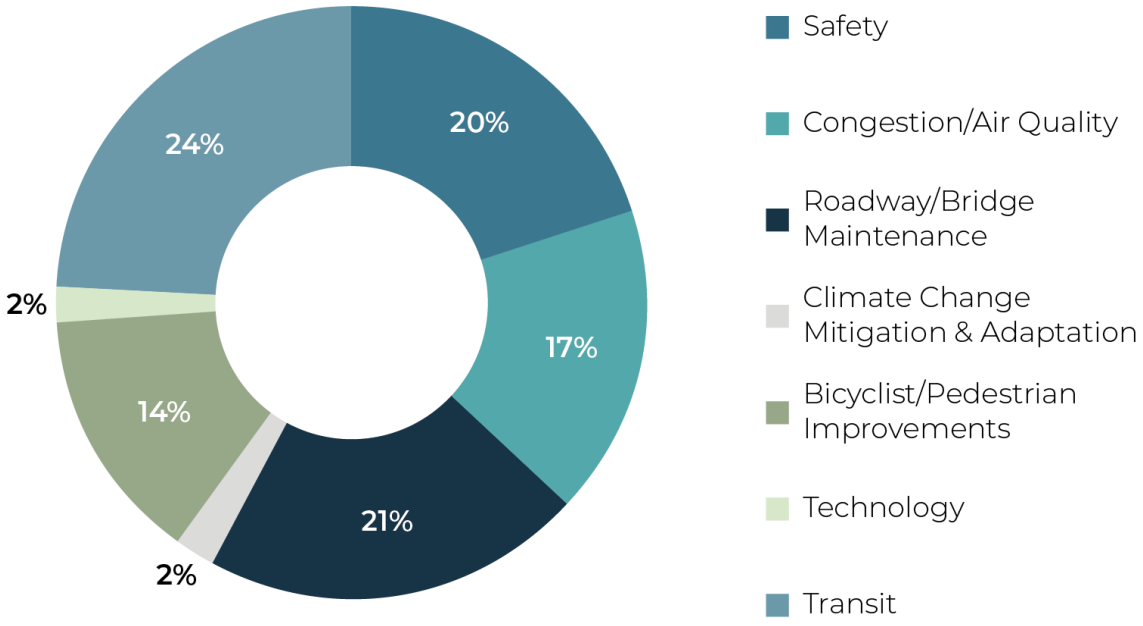
The spending on highway regional target projects, highway statewide projects on Cape Cod, and the transit service and projects, summarized in Figure 38. , all contribute to the development of a transportation system that will serve the region for years to come.

FIGURE 38. Summary of Anticipated Funding



The RTP vision, goals, and objectives set a framework for the spending of surface transportation funds in the region. Based on the overall program established in this report, the anticipated $1.1 billion is allocated to overall spending categories as summarized in Figure 39.

FIGURE 39. Summary of Recommended RTP Spending Distribution



While there is still significant unmet need for the region, see Appendix M, the $1.1 billion of anticipated surface transportation funding available over the next 25 years represents a significant investment in the region.

List of Abbreviations

ADA	Americans with Disabilities Act
BMP	Best Management Practices
CCC	Cape Cod Commission
CCJTC	Cape Cod Joint Transportation Committee
CCRTA	Cape Cod Regional Transit Authority
CEDS	Comprehensive Economic Development Strategy
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CMP	Congestion Management Process
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FFY or FY	Federal Fiscal Year or Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information System
GWSA	Global Warming Solutions Act
ITS	Intelligent Transportation System(s)
LEP	Limited English Proficiency
LID	Low-impact Development
MAP-21	Moving Ahead for Progress in the 21st Century
MassDER	Massachusetts Division of Ecological Restoration
MassDOT	Massachusetts Department of Transportation
MPO	Metropolitan Planning Organization
NHPP	National Highway Performance Program
NHS	National Highway System
PPP	Public Participation Plan
RPP	Regional Policy Plan
RTA	Regional Transit Authority
RTP	Regional Transportation Plan
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TAP	Transportation Alternatives Program
TCI	Transportation & Climate Initiative
TDM	Transportation Demand Management
TIP	Transportation Improvement Program
Title VI	Title VI of the Civil Rights Act of 1964
UPWP	Unified Planning Work Program
USDOT	United States Department of Transportation
VMT	Vehicle Miles Traveled
YOE	Year of Expenditure

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