DRAFT

Analysis of South Coast Rail Alternatives: Phase 2 Report

Prepared for **Executive Office of Transportation and Public Works**
Boston, Massachusetts

Prepared by ***VHB*/Vanasse Hangen Brustlin, Inc.**
Boston, Massachusetts

SOUTH COAST RAIL

September 2009

Table of Contents

List of Tables

List of Figures

List of Acronyms

ACEC	Area of Critical Environmental Concern
CTPS	Central Transportation Planning Staff
DEIR	Draft Environmental Impact Report
DEP	Department of Environmental Protection
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ENF	Environmental Notification Form
EEA	Executive Office of Energy and Environmental Affairs
EOT	Executive Office of Transportation and Public Works
EPA	United States Environmental Protection Agency
FEIR	Final Environmental Impact Report
HOV	High Occupancy Vehicles
LEDPA	Least Environmentally Damaging Practicable Alternative
MAPC	Metropolitan Area Planning Council
MBTA	Massachusetts Bay Transportation Authority
MEPA	Massachusetts Environmental Policy Act
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
OCPC	Old Colony Planning Council
SRPEDD	Southeastern Regional Planning and Economic Development District
VMT	Vehicle miles travelled

1 Introduction

The purpose of the Executive Office of Transportation and Public Works (EOT) South Coast Rail project Alternatives Report is to define the most appropriate strategy to provide public transportation between Boston to the cities of Fall River and New Bedford within the South Coast region. The South Coast Rail project investigates transit solutions that will increase transit accessibility, ensure equitable distribution of transit services, increase transit ridership, improve regional air quality and support opportunities for smart growth initiatives and sustainable development.

The following document outlines the project purpose and the need for transportation improvements in the Massachusetts South Coast region. It summarizes data on the alternatives developed since the ENF filing in November 2008. Chapters 6, 7 and 8 provide data on each of the Phase 2 alternative's performance with respect to project purpose, cost, schedule, ridership, and environmental impacts.

Since the South Coast Rail project will result in greater than one acre of wetland fill, an individual Section 404 permit is required by the U.S. Army Corps of Engineers (Corps). The Corps regulates the discharge of dredged or fill material into "waters of the United States," including wetlands, under Section 404 of the Clean Water Act.

The Corps, New England District, has developed a set of non-regulatory pre-application guidelines known as the *Highway Methodology* to screen alternatives and to ensure that the transportation agency's preferred alternative is consistent with federal wetlands regulations. This Alternatives Report was developed in accordance with the *Highway Methodology* Phase 2 guidelines, and further refines data on those alternatives advanced from the Phase 1 Alternatives Analysis into the state (Massachusetts Environmental Policy Act [MEPA]) and federal (NEPA) environmental review and appropriate permitting processes.

1.1 Phase 1 Alternatives Analysis Overview

The purpose of the Phase 1 Alternatives Analysis was to identify those alternative concepts that met or exceeded the project evaluation criteria, then to narrow the initial broad range of alternatives to a reasonable number of practicable options that could be carried forward to a more detailed level of analysis in the MEPA/NEPA process. This section explains the process of how the alternatives were identified, evaluated, and dismissed or advanced for further evaluation. The Corps has not issued formal written approval of the Phase 1 analysis.

1.1.1 How Alternatives were Identified

EOT identified a broad range of 65 potential alternatives by reviewing previous studies and soliciting ideas from the MBTA, the Interagency Coordinating Group, the Commuter Rail Task Force, and interested stakeholders through the Civic Engagement process. Table 3-1 of the *Analysis of South Coast Rail Alternatives: Phase 1 Report* presents the full list of potential alternatives.[1]

The 65 alternatives included various mode types such as commuter rail, including conventional, diesel multiple unit, and electrified, heavy rail (similar to the Red Line), light rail (similar to the Green Line), monorail, bus rapid transit, and enhanced bus service.

1.1.2 Screening Criteria

Specific screening criteria were developed for each tier of the three-tiered Phase 1 evaluation process after taking into account input received during the January 2008 Civic Engagement Meetings (see *Analysis of South Coast Rail Alternatives: Phase 1 Report* Chapters 5, 6, and 7). Step 1 evaluated whether an alternative met the project purpose and included two sub-criteria:

- Criterion 1.1 – *Improve regional mobility*
- Criterion 1.2 – *Improve quality of service*

Step 2 evaluated those alternatives that met the project purpose as determined in Step 1. In Step 2, "practicable" was defined as capable of being constructed and operated after taking into consideration cost, ridership, construction impacts and existing technology. Five sub-criteria were used including:

[1] Executive Office of Transportation and Public Works. *Analysis of South Coast Rail Alternatives: Phase 1 Report*, April 30, 2008.

- Criterion 2.1 – *Is operationally compatible with the existing transportation infrastructure.*
- Criterion 2.2 – *Does not significantly adversely affect the existing or future capacity, reliability and quality of the regional transportation system.*
- Criterion 2.3 – *Could be constructed without substantial impacts to the existing system and in a reasonable (four-year) timeframe.*
- Criterion 2.4 – *Provides transportation system benefits at a reasonable capital cost.*
- Criterion 2.5 – *Provides sufficient capacity to meet demand.*

The third step of screening determined if any of the reasonable alternatives could be dismissed based on potential impacts to the aquatic or natural environment and consistency with smart growth strategies, which included six sub-criteria:

- Criterion 3.1 – *The approximate level of wetland loss (in acres) and relative indirect impacts to wetlands.*
- Criterion 3.2 – *The number of new stream or river crossings.*
- Criterion 3.3 – *The number of acres of mapped Priority Habitat (state-listed rare species) that would be lost.*
- Criterion 3.4 – *The number of acres of protected public open space that would be directly impacted. These are lands that are protected under Massachusetts' State Constitution, Article 97 (parks, conservation lands, recreation areas, wildlife refuges).*
- Criterion 3.5 – *The number of acres of protected public water supply lands (Mapped Wellhead Zone 1, Mapped Surface Water Supply Zone A) that would be directly impacted.*
- Criterion 3.6 – *Consistency with smart growth strategies.*

At the conclusion of Step 3, eleven alternatives remained. These eleven included ten that passed through Steps 1, 2, and 3, and one alternative, eliminated in a previous step, for which further analysis was requested. In order to reduce the list of alternatives to a reasonable yet comprehensive number and range for the MEPA/NEPA process of the project, it was necessary to "circle back" and look at the remaining alternatives in the context of the project purpose and all three steps in the Phase 1 screening. In addition, a new alternative was developed at the request of the Interagency Coordinating Group, bringing the total number of alternatives for this analysis to twelve.

This process took into account input received from the South Coast Commuter Rail Task Force, the Interagency Coordinating Group, and three Civic Engagement meetings held on March 10, 11, and 12, 2008. The recommendations of Step 4 were

reviewed with the Interagency Coordinating Group on March 21 and April 1, 2008, which resulted in expanding the list of alternatives recommended by EOT.

The common issues and concerns identified for those alternatives dismissed during the three-tiered analysis are provided in the Phase 1 Alternatives Analysis[2] particularly for those alternatives that were dismissed in Step 2 because they are not reasonable or practicable when measured against other alternatives that would better meet the purpose and need of the project.

In concurrence with the Interagency Coordinating Group, three of 12 alternatives were dismissed based on the results of the Step 4 Screening Evaluation. Nine alternatives were advanced to the MEPA/NEPA process of the project for a more detailed evaluation as first presented in the ENF.

1.2 ENF Alternatives

The alternatives that were identified through the Phase 1 analysis were combined to form five alternatives, encompassing four routes and three modes, that were advanced for further analysis in addition to the No-Build Alternative. In May 2008 EOT began a detailed analysis of operational issues and a full environmental review. The five build alternatives included:

- **No-Build Alternative – Enhanced Bus**
  The No-Build Alternative would provide enhancements to existing bus services with limited improvements to the existing transit and roadway system.

  Alternative 1 – Through Attleboro
  Alternative 1 would provide new commuter rail service to South Station through Attleboro using the New Bedford Main Line, Fall River Secondary, Attleboro Secondary, a new bypass track and the Northeast Corridor. Both electric and diesel commuter rail options were evaluated for this alternative.
- **Alternative 2 – Through Middleborough**
  Alternative 2 would provide commuter rail service to South Station through Middleborough by using the New Bedford Main Line, Fall River Secondary, Middleborough Secondary, Middleborough Line and the Old Colony Main Line Corridors. Variations to this alternative include: 1) providing major infrastructure improvements, also called Middleborough Full, and 2) providing this service without major infrastructure improvements to the Old Colony Main Line between Braintree and South Station, also called Middleborough Simple.
- **Alternative 3 – Through Attleboro/Middleborough**
  Alternative 3 would provide commuter rail service to South Station through

[2] Executive Office of Transportation and Public Works. *Analysis of South Coast Rail Alternatives: Phase 1 Report*, April 30, 2008.

Attleboro and Middleborough using the corridors described in Alternatives 1 and 2. Both electric and diesel commuter rail options were evaluated for the route through Attleboro, while only diesel commuter rail were evaluated for the route through Middleborough.

- **Alternative 4 – Through Stoughton**
  Alternative 4 would provide commuter rail service to South Station through Stoughton, by the New Bedford Main Line, Fall River Secondary, Attleboro Secondary to Weir Junction in Taunton and an extension of the existing Stoughton Branch to Taunton, with an option to serve the Whittenton section of Taunton. Both electric and diesel commuter rail options were evaluated for this alternative.
- **Alternative 5 – Rapid Bus**
  Alternative 5 would provide rapid express bus service to Boston using a proposed dedicated, primarily reversible bus lane to be built along Routes 24 and I-93/128, the existing Interstate-93 HOV zipper lane, and a short portion through mixed traffic.

The ENF provided a comprehensive summary of these alternatives with a preliminary comparison of the alternatives in terms of quality of service, constructability, schedule and cost. Since the submittal of the ENF, more detailed alternatives data emerged, which assessed the value offered by each alternative. Chapter 3 of this report outlines the analysis since the ENF.

1.3 Scoping

Scoping is the initial process that was conducted under both MEPA and NEPA. Under MEPA, EOT prepared an ENF that described the range of alternatives proposed to be evaluated in detail, identified the environmental resources likely to be affected, and identified the regulatory reviews and permits likely to be required for each alternative. The ENF was circulated for review by the public and the environmental resource agencies. At the conclusion of the ENF review process, the Secretary of EOEEA issued a Certificate that specified the analysis, studies, and information that must be included in the DEIR.

Under NEPA, the Corps invited public and agency input on the range of alternatives and on the analyses, studies, and information that must be included in the Draft Environmental Impact Statement (DEIS). No written scope was issued.

Joint scoping meetings were held during process.

1.4 DEIR/DEIS – Phase 2 Alternatives Analysis

A single detailed environmental document, the joint Draft Environmental Impact Report/Draft Environmental Impact Study (DEIR/DEIS), is being prepared by the Corps. This document will be circulated for public and agency review and comment. A joint public hearing will be held during the public comment period. The document will present detailed descriptions of the alternatives, descriptions of existing environmental conditions (for all natural resources as well as social, economic, land use, air quality, etc.) and analyses of the environmental impacts of each alternative for each resource category. In accordance with Phase 2 of the Highway Methodology, EOT filed a draft Section 404 Permit Application and public notice was issued November 10, 2008 (NAE 2007-00698).

1.5 Community Involvement

To ensure effective and inclusive public outreach throughout the various stages of project development, EOT has implemented a comprehensive community involvement process for the South Coast Rail project that includes an Interagency Coordinating Group, the Southeastern Massachusetts Commuter Rail Task Force (Commuter Rail Task Force), Civic Engagement meetings and the Smart Growth Corridor Plan, as described below.

1.5.1 Interagency Coordinating Group

In cooperation with the Corps, EOT developed an Interagency Coordinating Group of federal and state regulatory agencies to guide the Phase 2 Alternatives Analysis process. The group consists of:

- United States Corps of Engineers (the Corps)
- United States Environmental Protection Agency (EPA)
- United States Fish and Wildlife Service
- National Marine Fisheries Service
- Massachusetts Executive Office of Energy and Environmental Affairs (EEA)
- Massachusetts Environmental Policy Act Office (MEPA)
- Massachusetts Department of Environmental Protection (DEP)
- Massachusetts Office of Coastal Zone Management

- Massachusetts Department of Conservation and Recreation, Areas of Critical Environmental Concern
- Massachusetts Department of Fish and Game Natural Heritage and Endangered Species Program
- Southeastern Regional Planning and Economic Development District

The objective of this group in Phase 2 is, through consensus at key milestone points, to provide input on the in-depth environmental review and to assist the EOT and the Corps with determination of EOT's Preferred Alternative (The Corps' LEDPA). Table 1-1 outlines the Interagency Coordination Group meetings since Phase 1 and their dates.

Table 1-1 Interagency Coordinating Group Meetings to Date – Phase 2 Alternatives

Meeting Topic	Date
Concurrence on Advancing Alternatives	April 1, 2008
Discussion of Smart Growth Corridor Plan	May 27, 2008
Presentation on ridership modeling, discussion on environmental data collection	June 19, 2008
Discussion of operations simulation and station siting	July 17, 2008
Review of draft outline for ENF and EOT station site selections	September 16, 2008
Preliminary assessment of feasibility for Phase 2 Alternatives	October 24, 2008
Discussion of Phase 2 alternatives and resource data	December 15, 2008
Review of PPA/PDA maps and ENF comment letters	January 22, 2009
Discussion of ridership projections	February 26, 2009
Discussion of wetlands mapping and cost-effectiveness methodology	March 26, 2009
Discussion of ways to coordinate state and federal review of wetlands issues	April 16, 2009
Discussion of ways to meet the requirements of the Secretary's Certificate	May 5, 2009
Discussion of how to measure secondary and cumulative impacts generated by the project	May 7, 2009
Review of resource mapping; CAPS model; secondary growth impacts; greenhouse gas modeling and wetlands issues	June 18, 2009
Presentation on UMass's CAPS Model; Secondary Growth Impacts methodology; Greenhouse Gas methodology; and schedule of upcoming technical reports	July 21, 2009
Presentation of bus and rail operating plans	August 20, 2009

1.5.2 Commuter Rail Task Force

The 2000 MEPA Certificate for the New Bedford/Fall River Commuter Rail Extension DEIR recognized the induced growth that could result from the rail line

construction and called for a growth management task force to be created. In 2004, the Commuter Rail Task Force was formed to help the region prepare for the impacts of the re-introduction of passenger rail to the South Coast. Its membership includes representatives from the MBTA, other regional transit authorities, municipal and regional representatives, environmental groups, and business and economic development organizations.

The Commuter Rail Task Force provides a forum for state and local officials to review and discuss all aspects of the project and to work toward consensus on the design and operational aspects of the project, as well as provide assistance to the EOT. Table 1-2 outlines the commuter rail task force meetings for the Phase 2 Alternatives and their dates.

Table 1-2 Commuter Rail Task Force Meetings to Date – Phase 2 Alternatives

April 9, 2008	September 10, 2008	February 11, 2009
May 14, 2008	November 19, 2008	March 11, 2009
June 11, 2008	December 10, 2008	April 15, 2009
July 9, 2008	January 14, 2009	May 13, 2009
		July 15, 2009

1.5.3 Civic Engagement

The Civic Engagement process seeks to engage stakeholders in a manner that enables the EOT to integrate and address concerns of all interested parties. The process intensively relies on the efforts of the stakeholder working group developed by the Commuter Rail Task Force. Efforts also include dialogue with corridor municipalities, area legislators, members of the public and community groups throughout the corridor. Table 1-3 outlines the civic engagement meetings, their topics, and dates.

Table 1-3 Civic Engagement Meetings to Date – Phase 2 Alternatives

Meeting Topic	Date	Location
Station Siting	July 30, 2008	SRPEDD, Taunton
	November 13, 2008	Corson Maritime Learning Center
	November 19, 2008	Corson Maritime Learning Center
Scoping for DEIR/DEIS	December 2, 2008	UMass Dartmouth
	December 3, 2008	Taunton High School
Station Siting	December 9, 2008	Freetown Elementary School
	December 11, 2008	Fall River City Hall
	January 21, 2009	Raynham Town Hall
	February 11, 2009	Stoughton Town Hall
	February 18, 2009	Middleborough Town Hall
Project Update	March 3, 2003	Easton Town Hall
Presentation of draft concept to town officials and RPA	June 1, 2009	Easton Town Hall
	June 1, 2009	Stoughton Town Hall
	June 11, 2009	SRPEDD
	June 11, 2009	Raynham Town Hall
	June 22, 2009	Freetown Senior Center
	June 22, 2009	New Bedford City Hall
Presentation of draft environmental consequences	September 14, 2009	Raynham Senior Center
	September 17, 2009	Fall River Heritage Park

1.5.4 Economic Development and Land Use Corridor Plan

The South Coast Rail project is intended to result in strong economic development, transportation mobility for the region, and environmental benefits. However, transportation facilities may have major impacts on land use by controlling the ease of access to neighborhoods, communities, and commercial and industrial areas. Improved access to rural and undeveloped lands typically results in more rapid development of these areas, potentially resulting in suburban sprawl and reducing the amount of open space. With this in mind, the Commonwealth, through the EOT and Executive Office of Housing and Economic Development, released a comprehensive *Economic Development and Land Use Corridor Plan*[3] on August 5, 2009, consistent with smart growth objectives, to accompany the construction of the South Coast Rail.

Implementation of the Corridor Plan will result in economic growth for the South Coast region, enhanced quality of life and environmental resources for the people of the region, and the potential for new funding that can be captured to help finance the construction and/or operation of the rail line. This effort seeks to coordinate

[3] Massachusetts Executive Office of Transportation and Public Works. *South Coast Rail Economic Development and Land Use Corridor Plan.* June 2009.

transportation infrastructure investments with implementation of regional and local land use changes that will foster smart growth.

1.5.5 Contents of this Report

The remaining chapters of this Alternatives Report provide details of the Phase 2 Alternatives Analysis with supporting materials provided in the appendices.

- **Chapter 2 –** This chapter provides information on the project purpose, and the need for transportation improvements in the Massachusetts South Coast region. It includes a discussion of the planning and policy context, discusses state and regional policy goals and objectives, and defines and describes existing transportation conditions within the study area.
- **Chapter 3 –** This chapter outlines the Alternatives Analysis since the ENF.
- **Chapter 4 –** This chapter describes the Phase 2 Alternatives that were selected to address the Purpose and Need of the South Coast Rail project, and examines an alternative recommended by EPA.
- **Chapter 5 –** This chapter describes the methodology that was developed to screen the Phase 2 Alternatives.
- **Chapter 6 –** This chapter which identifies those alternatives capable of achieving the objectives of the project purpose.
- **Chapter 7 –** This chapter identifies those alternatives that are practicable to construct and operate.
- **Chapter 8 –** This chapter identifies the beneficial effects of each alternative and the relative magnitude of potential impacts that each alternative would have on the aquatic and natural environment.
- **Chapter 9 –** This chapter summarizes the alternatives data.

2

Purpose and Need

This chapter provides information on the project purpose and the need for transportation improvements in the Massachusetts South Coast region. To support the purpose and need, this chapter describes the existing transportation system and identifies deficiencies/needs of the regional transportation system. It also includes a discussion of the planning and policy context, and discusses state and regional policy goals and objectives.

2.1 Project Purpose

The purpose of the South Coast Rail project is to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts to enhance regional mobility, while supporting smart growth planning and development strategies in affected communities.

The Basic Project Purpose that the Corps will use in evaluating alternatives in its Section 404 permit review (to determine if the project is water-dependant) is to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts.

2.2 Need for the Project

As documented in the following sections, the current transportation system serving the South Coast region is primarily a highway system composed of major, limited-access state routes, regional highways, and local roadways. This highway network is supplemented by private bus services, local bus and demand-response transit services operated by the two regional transit authorities, park-and-ride lots, and vanpool services. Few additional investments in the regional transportation facilities and services are programmed, which primarily address localized congestion or safety concerns, or repair aging infrastructure. The current transportation system serving the South Coast region is inadequate to meet the current needs of the region

and will not meet the future demand placed upon it, as indicated by increasing traffic congestion and accidents.

Major transportation needs and deficiencies include:

- Lack of transportation capacity to downtown Boston.
- Congestion on highway and transit facilities serving the region.
- Air quality that does not meet federal Clean Air Act standards.

New transportation solutions for the South Coast region must be developed within the context of regional transportation issues, national and local transportation policy, and the transportation goals and objectives for the region. There has been a repeated mandate from the Massachusetts Legislature to design and construct commuter rail extension to New Bedford and Fall River.[4] The long-term transportation plans for all three planning regions support the development and enhancement of transit services. The Old Colony Planning Council's Long Range Transportation Plan specifically identifies the extension of commuter rail service from Stoughton, south to Easton and beyond, as a more efficient mode of transportation for the area.

Solutions to these regional transportation issues can be found within the context of local and national policy, goals, and objectives on transportation. Current policy indicates that a multimodal/intermodal transportation system is important in the solution to the region's transportation issues. This policy is outlined in the federal Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users of 2005, Transportation Equity Act for the 21st Century, Intermodal Surface Transportation Efficiency Act and the Clean Air Act Amendments. The need for a multimodal transportation system is further reinforced by local transportation policy regarding transportation projects beginning in the 1970s and continuing through today.

The solution to South Coast transportation issues must be in line with the transportation goals and objectives set forth in the regional transportation plans specifically created by the Metropolitan Planning Organizations (MPOs). The region hopes to develop transportation solutions that maintain downtown Boston as a strong economic hub and encourage transit-oriented development patterns. Progress toward these goals is measured in terms of several specific objectives.

[4] *Transportation Bond Bill*, Chapter 273 of 1994; Chapter 205 of 1996, 1997.

The region's goals and objectives can be summarized as:

- Goal: Improve transportation service to improve mobility

  Objective: Increase transit accessibility

- Goal: Provide transit services which are cost-effective

  Objective: Increase transit ridership

- Goal: Provide a more equitable distribution of transportation services

  Objective: Increase transit service for regions now poorly or under-served.

Improving the transportation facilities and services in the region is necessary to address the transportation issues facing the region. These solutions must be in line with a transportation policy that encourages a multimodal transportation system and addresses the region's transportation goals and objectives. Because highway solutions are discouraged by policy, largely infeasible, and likely ineffective given the physical constraints of the metropolitan Boston area, public transit enhancements linking the region to downtown Boston are the only remaining practical solution.

2.3 Transportation Needs

Many different types of transportation facilities and services provide mobility throughout the South Coast area. These services also provide important links to the metropolitan Boston area and facilitate access to economic, recreational, and social opportunities located throughout the region. The transportation system providing mobility and accessibility in the South Coast area is composed of:

- Limited-access highways;
- Regional highways;
- Local roadways;
- Intercity, commuter, and local bus services;
- Demand responsive transit services; and
- Carpool and vanpool facilities.

Existing transportation in the South Coast region is overwhelmingly auto-oriented. Local bus public transit is provided in Taunton by Greater Attleboro Taunton Regional Transit Authority and in New Bedford and Fall River by Southeastern Regional Transportation Authority. Greater Attleboro Taunton Regional Transit Authority also operates intercity bus service between Taunton and Providence, Rhode Island. Other intercity bus service is provided by private carriers, connecting

Fall River, New Bedford, and Taunton with each other and with Boston, Providence, Newport, and points beyond.

Commuter rail service is available both to the northwest and northeast of the South Coast region, on the MBTA's Providence Line and Middleborough Line. The closest commuter rail stations to the South Coast region are Middleborough/Lakeville on the Middleborough Line, and Attleboro Station and Providence Station, both on the Providence Line. Although physically located outside the South Coast area, existing commuter rail service provides some mobility through connections in neighboring communities.

The main highway facilities in the South Coast region are Route 24, Route 140, I-195, and I-495. Together, Routes 24 and 140 link New Bedford and Fall River to the metropolitan Boston region, while I-195 provides east-west access connecting Cape Cod, Wareham, New Bedford, Fall River, and Providence. I-495 runs northwest-southeast, connecting Cape Cod, Wareham, and Taunton. Just west of the region, I-95 connects Providence with greater Boston.

Southeastern Massachusetts experienced a 4.5 percent population growth between 1990 and 2000. As the affordable housing market has moved further from the Boston metropolitan area, the region has become one of the fastest growing areas in the Commonwealth. Many of the people relocating to the area are retaining their jobs in the Boston market. Most of the commuter trips from the region to the Boston market are in single occupant vehicles and public transit accounts for a minor proportion of work trips in the service area. To a large extent, this can be attributed to the lack of public transit alternatives other than privately-operated bus service.

The transportation system serving the South Coast communities is inadequate to meet the current and projected needs of the region. An evaluation of transportation and demographic data and trends has identified the following principal needs for transportation improvements:

- Many communities in the South Coast Massachusetts Area lack public transit facilities other than private bus services. Major population centers are as much as 25 miles from existing commuter rail stations all of which are located outside the South Coast region. Those stations are currently at capacity.
- Highways linking the South Coast area with metropolitan Boston are inadequate to serve the current demand, and congestion, safety, and air quality are expected to continue to worsen as travel demand grows. Few additional transportation improvements are programmed.
- The South Coast region is classified as a Severe Non-Attainment Area for ozone.[5]

[5] A non-attainment area is defined by the EPA as an area that does not meet one or more of the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act.

- State and federal transportation planning goals encourage the development of a multi-modal transportation system that is consistent with growth management and smart growth objectives. Currently, the region lacks access to the passenger/commuter rail mode and is dependent on private automobiles, which contributes to sprawl and uncontrolled growth.
- The long-term transportation plans of the region support the development of transportation improvements that enhance accessibility, increase mobility, encourage alternatives to automobiles, and provide a more equitable distribution of transit services. The extension of commuter rail service from Stoughton south to North Easton, New Bedford, and Fall River is identified in the long-range transportation plans of the local planning organizations.

The following sections provide additional details on these specific South Coast transportation needs, and the benefits of an improved transit system.

2.4 Highway Congestion

The South Coast area is served by a network of roadways varying from limited-access facilities to local roads. The primary highway facilities link the major urban areas of New Bedford, Fall River, and Taunton with each other and to the metropolitan Boston region. These facilities have different physical and operating characteristics, described below.

2.4.1 Physical and Operating Characteristics

There are six highways in the South Coast area. These major facilities provide the primary access routes within the South Coast area and to adjacent regions. The two interstate routes serving the South Coast area are not part of the primary highway access system to the metropolitan Boston region. The six regional highways are:

- The main north-south highway link between the South Coast area and the metropolitan Boston area is Route 24, which passes through Fall River, Freetown, Berkley, Taunton, and Raynham. This limited-access facility begins at the Rhode Island state line at Tiverton, connects with I-195 on the east side of Fall River, and terminates at I- 93/Route 128.
- Route 140 is a limited-access facility connecting New Bedford and Taunton. It passes through the South Coast area communities of New Bedford, Freetown, Lakeville, and Taunton. The limited-access portion of Route 140 ends at Route 24 in Taunton, providing an important link between the South Coast cities and towns of New Bedford, Dartmouth, Mattapoisett, Acushnet, and Taunton.

Route 140 continues north from Taunton, roughly paralleling I-495, but not as a limited-access facility.

- The limited-access segment of Route 79 is approximately four miles long, beginning at I-195 on the west side of downtown Fall River and ending at Route 24 in northern Fall River. Route 79 provides a link from downtown Fall River and the communities located along I-195 west of Fall River to Route 24.
- Route 138 is primarily a two-lane facility that passes through the South Coast area communities of Fall River, Somerset, Dighton, and Taunton, and provides access north to Raynham, Easton, and Stoughton. It connects with I- 195 and the limited-access segment of Route 79 in Fall River, the non-access controlled section of Route 140 in Taunton, and I-495. Route 138 also provides access to the MBTA's Stoughton Station.
- Although designated as a north-south route, I-495 runs primarily northwest/ southeast in the vicinity of the South Coast area, linking Route 24 to the I-90 and I- 95 corridors. This facility does not provide a direct link to the metropolitan Boston area. It does provide access for a portion of the region to MBTA commuter rail stations in Middleborough/Lakeville and Mansfield. I-495 passes through Wareham, Rochester, Middleborough, Raynham, Taunton, and Norton, connecting with I-95 near the Mansfield/Foxborough Line and Route 24 in Raynham.
- I-195 is an east-west limited-access highway linking the towns within the southern portion of the South Coast area to Providence, Rhode Island. The highway facilitates connections to Routes 79, 24, and 140 and among some South Coast communities. It does not provide an important link between the South Coast area communities and the metropolitan Boston area. I-195 passes through Seekonk, Rehoboth, Swansea, Somerset, Fall River, Westport, Dartmouth, New Bedford, Fairhaven, Mattapoisett, Marion, and Wareham.

Off-peak travel speeds on the major limited-access highways are typical of interstate roads, with traffic traveling at the posted speed limit of 55 or 65 mph. Travel speeds are reduced during peak periods as the traffic volumes increase. The highway exhibiting the greatest peak period strain is Route 24, where some of the highest traffic volumes in the South Coast area are recorded. On Route 24, the major north-south corridor in the South Coast area, the average daily traffic ranges from 26,700 vehicles per day in Fall River to over 115,000 vehicles per day in Randolph. Traffic congestion and long delays are common on the northern segments of this highway during weekday peak commuting periods.

2.4.2 Access to Metropolitan Boston Area

Traffic generated within the South Coast area must travel on I-93/Route 128 and I-93/Route 3 (Southeast Expressway) to reach downtown Boston. Route 128 is Boston's inner circumferential highway that provides access to much of the metropolitan Boston region. Following I-93 north/Route 128 south from Route 24 leads to I-93/Route 3 (Southeast Expressway) and downtown Boston, approximately eight miles from the I-93/Route 128/Route 3 interchange in Braintree. Following I-93 south/Route 128 north from Route 24 leads to I-95 approximately three miles to the north, and to I-90 approximately 15 miles to the north. I-90 (Massachusetts Turnpike) provides the only limited-access highway to Boston from west of the city. Route 128 and the Southeast Expressway are heavily congested roadways, particularly during peak periods.

Traffic volumes on Route 128 are approximately 135,000 vehicles per day north of Route 24 (towards I-95) and 167,000 vehicles per day to the south (towards I-93/Route 3). I-93/Route 128 provides four general purpose travel lanes in each direction between Route 24 and I-93/Route 3. North of the I-93/Route 3 interchange in Braintree, four general-access lanes and one high occupancy vehicle (HOV) lane in the peak direction and three general access lanes in the non-peak direction are provided during peak periods. During off-peak periods, the roadway provides four lanes in each direction through Southampton Street Massachusetts Highway Department operates HOV lanes on I-93/Route 3 from just south of the Furnace Brook Parkway exit in Quincy to the Columbia Road exit in Dorchester. Currently, the HOV lanes are open to all two-person carpools. Traffic volumes on I-93/Route 3 are as high as approximately 191,000 vehicles per day.

2.4.3 Regional Traffic Volume Growth

As the population in the South Coast area and employment in the Boston area have grown, the demands on the roadway system linking Southeastern Massachusetts to the rest of the region have increased rapidly. Traffic volumes on the limited-access state routes linking the South Coast area to the employment centers of Boston have been growing steadily over the past decade, as shown in Table 2-1. Overall, traffic volumes on the roadways in the South Coast area have grown at an annual rate of two to three percent over the past decade. However, traffic volumes have grown more rapidly in some areas.

The most dramatic increases in traffic volumes are on Route 24 in Raynham and Taunton, where the traffic volumes have had annual increases of 4.1 and 5.0 percent respectively. Traffic volumes on Route 140 in Taunton have been increasing at an annual rate of 2.2 percent. In some cases, projected volumes for the year 2020 that were made in 1997 were already reached in 1999.

Only Route 128 and I-93 (the Southeast Expressway) exhibit relatively stable traffic volumes. These roadways are known as some of the most congested highways in the

state and traffic volumes on these roadways are at or near capacity for long portions of the day, making further increases in average daily traffic volumes infeasible. Furthermore, the very slight decrease in traffic on portions of I-93 may reflect changes in motorist route choices due to Central Artery/Tunnel project construction, and demand reductions from the Route 3 corridor due to the restoration of the Old Colony Commuter Rail service.

The significant increases in traffic volumes on the principal highways linking the South Coast area to downtown Boston have led to deteriorating levels of service, especially during peak periods. Delays on these roadways are now common and have become much worse over the past decade. These delays are especially prevalent on Route 24 as it approaches Route 128/I-93 in Randolph. Furthermore, as discussed in greater detail later in this section, traffic accidents occur with increasing frequency along these corridors, indicating that these traffic volume increases may be resulting in increased risk of injury and property damage for the commuting public.

Southeastern Massachusetts is one of the fastest growing areas in the Commonwealth. Between 1960 and 2000, this area experienced a growth rate of 31 percent. Between 1960 and 1990, this area had an annual growth of over 2,500 people per year from a base population of 343,353 to its 1990 population of 430,846. Growth slowed somewhat between 1990 and 2000, to an annual growth of approximately 1,950 people per year. These figures translate to a growth of 4.5 percent between 1990 and 2000, which is greater than the growth rate of the Commonwealth as a whole. Each 10,000 new residents coming into the area are expected to generate a need for 3,500 new residential units, and are predicted to generate 27,650 new vehicle trips per day, further degrading the level of service provided by the regional transportation system.

Table 2-1 Average Daily Traffic Volume Growth [YEAR]

	Average Daily Traffic (vehicles per day)			Growth Rate (percent)		
Count Location	**Historic**	**Recent**	**Change**	**Total**	**Period**	**Annual**
Route 24						
Randolph (south of Route 128)	96,601	115,440	18,839	20%	1989-2008	0.9%
Avon (south of Pond Street)	90,196	109,840	19,644	22%	1989-2008	1.1%
Raynham (north of Route 44)	42,168	74,810	32,642	77%	1989-2008	3.1%
Taunton (north of Route 140)	37,734	68,109	30,375	80%	1989-2005	3.7%
Freetown (at Fall River City Line)	29,822	48,650	18,828	63%	1989-2008	2.6%
Fall River (south of Wilson Road)	19,000	26,700	7,700	41%	1989-2003	2.5%
Route 140						
Taunton (south of Route 24)	23,133	32,580	9,447	41%	1989-2008	1.8%
Freetown (north of New Bedford City Line)	25,250	32,447	7,197	29%	1989-2004	1.7%
New Bedford (north of Phillips Road)	23,449	32,400	8,951	38%	1989-2005	2.0%
New Bedford (north of Hathaway Road)	35,631	51,580	15,949	45%	1989-2008	2.3%
Route 79						
Fall River (north of Hermon Street)	16,460	25,400	8,940	54%	1989-2004	2.9%
I-95						
Foxborough (north of I-495)	57,800	93,200	35,400	61%	1997-2003	8.2%
Canton (south of I-93 / Route 128 / Route 1)	80,800	98,700	17,900	22%	1997-2004	2.9%
I-495						
Mansfield (south of Route 140)	37,400	69,900	32,500	87%	1996-2005	7.2%
Taunton (south of Bay Street)	40,400	69,100	28,700	71%	1996-2005	6.1%
Raynham (north of Route 24)	48,277	67,098	18,821	39%	1996-2005	3.7%
Middleborough (between Route 44 and Route 18)	35,100	56,100	21,000	60%	1996-2005	5.4%
I-195						
Fall River (west of Route 24)	66,053	81,339	15,286	23%	1996-2005	2.3%
New Bedford (east of Route 140)	55,300	73,500	18,200	33%	1996-2005	3.6%
Route 3						
Braintree (north of Union Street)	130,000	133,600	3,600	3%	1996-1997	3.0%
Route 128 / I-93 / I-95						
Quincy (north of Route 28, east of Route 24)	168,955	166,670	-2,285	-1%	1989-2008	-0.1%
Canton (at Dedham town line, west of Route 24 / I-95	128,537	134,684	6,147	5%	1989-2004	0.3%
Route 3 / I-93 (S.E. Expressway)						
Boston (north of Granite Avenue)	174,612	190,993	16,381	9%	1999-2004	1.7%
Boston (north of Southampton Street)	176,322	174,284	-2,038	-1%	1989-2006	-0.1%

ADT Average Daily Traffic (vehicles per day)
Source: Massachusetts Highway Department

Access from South Coast area communities to Boston is primarily via Route 24 to Interstate 93. These principal, limited-access highways currently operate at or over capacity, with peak-hour volumes of up to 4,000 vehicles per hour and level-of-service F on Route 24 in Raynham, and 3,500 vehicles per hour and level-of-service F on I-93/Route 128 in Braintree. Although several mitigation measures have been implemented on I -93 to reduce congestion (high-occupancy vehicle lanes, improved MBTA Red Line service, and Old Colony Commuter Rail service), this highway continues to operate at poor levels-of-service, resulting in substantial congestion and decreased safety. There are no alternatives to the use of Route 24 and I-93, and no proposed mitigation measures to reduce congestion.

2.4.4 Safety

The number of accidents on the primary travel routes within the South Coast area has generally been increasing over the past years, as shown in Table 2-2.

Table 2-2 Accidents on Primary Study Area Highways

	2004	2005	2006	Annual Percent Change
Accidents				
Route 24	865	1021	1025	9.2%
Route 140	247	253	256	1.8%
Route 93	659	1002	1056	28.7%
Total	1771	2276	2337	15.6%
Injuries				
Route 24	428	487	533	11.6%
Route 140	134	116	118	-5.9%
Route 93	330	433	367	8.0%
Total	892	1016	1018	7.0%
Fatalities				
Route 24	7	9	6	-2.4%
Route 140	3	4	5	29.2%
Route 93	4	3	5	20.8%
Total	14	16	16	7.1%

Massachusetts Highway Department, Accident Database, 2006.

Projected future growth in traffic volume on the principal South Coast area roadways cannot be sustained by the current regional transportation system. Recurrent traffic congestion is becoming a more significant problem for the region, as is the increasing frequency of traffic accidents (Table 2-2). Not only has the number of accidents

increased, but also the number of injuries has increased on two area highways. The annual growth rate in injuries was 11.6 percent on Route 24 and 8.0 percent on Route 93. However, Route 140 experienced an annual decline rate in injuries of -5.9%.

Although increasing the capacity of the region's highways might improve safety, highway capacity expansions are not in line with national and local transportation policy and physical expansion of the highway links is likely to be infeasible.

2.5 Air Quality and Climate Change

Ozone at the earth's surface is a health concern, as high concentrations can harm lung function. Motor vehicles are the predominant sources of ozone precursor emissions within the South Coast area, which has been designated as a severe non-attainment area for ozone by the EPA.[6] Automobiles also emit carbon monoxide through the partial combustion of carbon-containing compounds in gasoline.

Reducing greenhouse gas emissions is a priority for the Commonwealth. State agencies, particularly DEP, are working to cut greenhouse gas emissions from motor vehicles and fuels through several initiatives, including efforts to promote transit-oriented development.

As documented in previous sections, the highways serving the South Coast region convey high volumes of automobile traffic, and have high levels of congestion (which increases vehicle emissions). There are currently no alternatives for South Coast commuters that would reduce the emissions of greenhouse gases. A shift in travel from automobiles to rail could reduce vehicle emissions and improve regional air quality.

2.6 Inadequate Regional Transit System Capacity

Transit services within the South Coast area include bus and demand-response services operated by regional transit authorities and private carriers. Park-and-ride facilities and carpool/vanpool services are offered along the primary regional travel corridors in the South Coast area. Outside of the South Coast area, the MBTA operates commuter rail service.

[6] A non-attainment area is defined by the EPA as an area that does not meet one or more of the National Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act.

2.6.1 Bus and Demand-responsive Services

Two public transit authorities provide local bus service in the South Coast area, including some feeder service to commuter rail stations:

- The Greater Attleboro Taunton Regional Transit Authority (GATRA) provides local fixed-route bus service in the Attleboro/Taunton/Norton/Mansfield and Middleborough areas. GATRA also provides demand response and peak hour transportation throughout the Southeastern Region. GATRA operates 14 fixed routes in Attleboro/Taunton/Norton/Mansfield with service Monday through Friday from 6:00 AM to 6:30 PM and Saturday from 9:00 AM to 5:00 PM. Eight routes serve the city of Attleboro. Of these, one connects Attleboro and Taunton via Norton, and another connects Attleboro and Pawtucket. Six routes serve Taunton, one of which connects Taunton and Attleboro via Norton.

- The Southeastern Regional Transportation Authority (SRTA) serves the communities of Fall River, New Bedford, Dartmouth, Fairhaven, Somerset and Westport with fixed-route and demand-response service. SRTA offers eleven routes in the New Bedford area and twelve routes in the Fall River area. These routes include a regional route between New Bedford and Fall River serving all intermediate communities. The weekday service spans from 5:30 AM to 6:30 PM in New Bedford and 6:00 AM to 6:00 PM in Fall River. Saturday service runs from 7:00 AM to 6:00 PM in New Bedford and 6:30 AM to 6:00 PM in Fall River.

Four private carriers currently provide service from the South Coast area to South Station in Boston:

- Bloom Bus provides service from Taunton and Raynham to Boston via Route 138 and Route 24. Service is offered on 30-minute headways during the peak periods and 120-minute headways during off-peak hours. The scheduled travel time is 70 to 75 minutes during peak periods and 60 to 75 minutes during off-peak periods. Bus stops are located at the Bloom Terminal in downtown Taunton, an intermediate stop in northern Taunton, the Raynham Park Park-and-Ride in Raynham, a MassHighway Park and Ride in West Bridgewater, a shopping center in Brockton, Boston's Park Plaza area, and the South Station vicinity in Boston.

- Peter Pan Bus provides service from Fall River to Boston via Route 24. During the morning peak period, two buses are scheduled to operate from Fall River to Boston, departing at 6:00 AM, 6:40 AM. Additional trips depart Fall River at 8:40 AM and 1:10 PM. In the evening, three buses are scheduled to leave Boston between 5:30 PM and 7:30 PM on hourly headways. The scheduled peak period travel time is 60 to 75 minutes. During off-peak periods, the scheduled travel time is 60 minutes. The only bus stops on the route are the Southeastern Regional Transportation Authority (SRTA) terminal in downtown Fall River and Boston's South Station. Some outbound trips extend beyond Fall River to either Providence or Newport.

- DATTCO provides service from Fairhaven, New Bedford, and East Taunton to Boston via Route 140 and Route 24. Scheduled trips depart on 30 minute headways during the peak periods and every two hours during off-peak times. The scheduled peak period travel time is 105 minutes from downtown New Bedford and 75 minutes from East Taunton. Bus stops are located at the DATTCO garage in Fairhaven, the SRTA terminal in downtown New Bedford, the Mount Pleasant Street Park-and-Ride lot in New Bedford, the Silver City Galleria Park-and-Ride lot in East Taunton, and Boston's South Station.

All three services terminate at or near South Station in Boston. Only Bloom Bus offers service to the greater Back Bay area. Round trip cash fares range from $18 to $20 for Taunton, $24 for New Bedford, and $36 for Fall River. Multi-ride tickets are available at a lower cost per trip.

2.6.2 Carpools and Vanpools

MassRides, a program of the Executive Office of Transportation, coordinates vanpools in all communities of the South Coast area. As with buses, vanpool and

carpool travel times are severely impacted by slow travel speeds on the expressway and secondary roads.

2.6.3 Existing Park-and-Ride Facilities

Currently, there are nine park-and-ride lots located in the South Coast area. Five facilities are located along the primary access routes from the region to the Boston metropolitan area. The locations of these five park-and-rides, the service provided, and usage is summarized below. There are no data on the destinations of commuters who use these facilities.

- The park-and-ride facility in New Bedford is located on Mount Pleasant Street at Exit 4 from Route 140. This lot provides 202 free parking spaces for commuters. Utilization of this lot has been fairly steady from 1996 to 2006, increasing slightly from 79 percent to 81 percent. Carpool, vanpool, and bus patrons use this lot. DATTCO provides bus service to this facility.
- A park-and-ride lot is located adjacent to Route 24 at Exit 10 (Gramp Deane Road) in Freetown. There are 32 parking spaces provided at no charge. Utilization of this facility increased from 27 percent in 1996 to 88 percent in 2006. Carpool and vanpool patrons use this facility. No bus service is provided.
- In Raynham, a park-and-ride lot is located on Route 138 at the Raynham Park entertainment complex. The facility is located within the Raynham Park customer parking area. There are no specific spaces identified for park-and-ride patrons, but Southeastern Regional Planning and Economic Development District (SRPEDD) estimates capacity at 150 spaces. Utilization was 16 percent in 2006, down from 41 percent in 1996. Carpool, vanpool, and bus patrons use this lot. Bloom Bus provides bus service to this facility.
- Park-and-ride space is designated at the Silver City Galleria Mall near Exit 11 on Route 140 in Taunton. This lot contains 187 spaces, with utilization increasing from 34 percent to 82 percent between 1996 and 2006. This lot is serviced by DATTCO Bus Lines and the Greater Attleboro Taunton Regional Transit Authority (GATRA).

In addition to these five lots, there are four park-and-ride facilities located in the South Coast area but not in the immediate vicinity of the primary access routes to Boston. The locations of the four park-and-rides, the service provided, the daily fees, and usage are summarized below:

- The Somerset park-and-ride facility is located at the intersection of Routes 6 and 138. The facility is located within a larger parking lot at a shopping mall. There are currently 80 spaces designated for commuter parking. Between 1996 and

2006, utilization rates at this site decreased from 98 percent to 79 percent. The lot is used only by carpool and vanpool patrons. There is no charge for parking.

- A second park-and-ride lot is located in Somerset on Route 103 at the I-195 Exit 4 interchange. This lot primarily serves commuters to the Providence area. Usage at the lot increased between 1996 and 2006, rising from 54 percent to 103 percent. There is no charge for parking at the 67 spaces provided.
- The Mattapoisett park-and-ride facility is located on Route 6 near I-195 Exit 19. This lot provides 80 free spaces, with utilization increasing from nine percent to 20 percent between 1996 and 2006.
- The Westport park-and-ride lot provides free parking for 20 vehicles at the intersection of Route 88 and Briggs Road. Use of this lot decreased from 45 percent to zero percent between 1996 and 2006.

Several park-and-ride lots are outside the South Coast area, but still along the Route 24 access corridor to Boston:

- The West Bridgewater park-and-ride lot is located at the Route 24 interchange with Route 106 (Exit 16). The lot contains free parking for 140 cars. Average utilization of this lot is near 100 percent. Vanpool, carpool, and bus patrons use this facility. Bloom Bus stops at this park-and-ride lot.
- A second West Bridgewater park-and-ride lot is located on Route 106 in Elm Square, approximately three miles east of Route 24 and the Exit 16 interchange. Approximately 65 spaces are available in this unpaved lot at no charge. Average daily usage is very light, under 10 percent. The Elm Square lot is used primarily as an overflow lot for the Exit 16 lot. It is used by vanpool and carpool patrons.
- The Bridgewater park-and-ride lot is located on Route 104 at the Route 24 Exit 15 interchange. The lot currently provides 60 free spaces. The utilization rate at this location is about 77 percent. Interstate Coach provides bus service to this facility. Vanpools and carpools also use the lot.

There are also three private park-and-ride lots in the South Coast area:

- A private park-and-ride lot is operated by DATTCO in Fairhaven. The capacity of this private, secured lot is 80 vehicles. Parking is available for DATTCO customers only at no charge. In 2006, utilization was 12 spaces, or 15 percent.
- A private park-and-ride lot is operated by Bloom Bus at the company's Taunton Terminal. It contains 160 spaces with a 2006 utilization rate of 44 percent.
- Peter Pan Bus operates a private park-and-ride lot in Fall River. There is an hourly fee for parking.

2.6.4 Commuter Rail Service

No commuter rail service is offered within the South Coast area. Although commuter rail service is offered outside of the South Coast area by the MBTA, this service is difficult for residents to access and is at or over capacity under existing conditions.

The Attleboro/Providence Line has stations in Providence, Attleboro, Mansfield, and Sharon. The Stoughton Line has a station in Stoughton and the Middleborough Line has stations in Brockton, Bridgewater, and Middleborough/Lakeville. Several communities located on the fringes of the South Coast area, including Easton, Raynham, Norton, and Lakeville, are near existing commuter rail stations.

Communities in the heart of the South Coast area, however, are outside a six-mile access radius of these stations, and some are more than 20 miles from the nearest commuter rail station.[7] Commuter rail is currently not a practical alternative for most South Coast area residents traveling to Boston. This is especially true from the communities of Taunton, Berkley, Freetown, Fall River, and New Bedford due to distance from the nearest station. The proximity of commuter rail service to the population centroid of each South Coast area community is shown in Table 2-3.

[7] According to CTPS, most commuters live within a 6- to 8-mile radius of a commuter rail station. This distance is generally used for estimating ridership.

Table 2-3 Proximity of South Coast Communities to Commuter Rail Service

Community	Closest Station	Proximity[1] (mile)
Acushnet	Middleborough/Lakeville	15.7
Attleboro	Attleboro	0.0
Berkley	Middleborough/Lakeville	10.7
Bridgewater	Bridgewater	0.7
Canton	Canton Center	0.0
Dartmouth	Middleborough/Lakeville	20.9
Dighton	Middleborough/Lakeville	13.7
Easton	Stoughton	5.1
Fairhaven	Middleborough/Lakeville	22.5
Fall River	Middleborough/Lakeville	19.6
Foxborough	Mansfield	3.4
Freetown	Middleborough/Lakeville	10.8
Lakeville	Middleborough/Lakeville	3.3
Mansfield	Mansfield	0.0
Marion	Middleborough/Lakeville	19.8
Mattapoisett	Middleborough/Lakeville	19.4
Middleborough	Middleborough/Lakeville	1.5
New Bedford	Middleborough/Lakeville	20.8
North Attleborough	Attleboro	4.8
Norton	Mansfield	5.7
Raynham	Bridgewater	7.5
Rehoboth	Attleboro	8.8
Rochester	Middleborough/Lakeville	13.7
Seekonk	Providence	7.5
Sharon	Sharon	0.3
Somerset	Providence	19.4
Stoughton	Stoughton	0.0
Swansea	Providence	15.5
Taunton	Middleborough/Lakeville	9.7
Wareham	Middleborough/Lakeville	15.8
Westport	Middleborough/Lakeville	28.3

Source: Google Maps
1 Proximity measured to population centroid

While residents from Lakeville are able to use commuter rail to commute to Boston, system capacity is limited due to the lack of adequate parking. Commuter rail

parking lots in Attleboro, Mansfield, Stoughton, and on the Middleborough Line are either unable or will not be able to handle any more growth, and communities are reluctant to increase parking lot capacity. In addition, some peak hour trains experience heavy passenger loads. This was especially evident before the recent economic downturn. Therefore, the existing commuter rail service, although within reach of some communities in the South Coast area, will not be sufficient to handle the anticipated growth in ridership. Parking utilization rates for the Providence, Stoughton, and Middleborough Lines and ridership are provided in Tables 2-4 and 2-5.

Table 2-4 Ridership on Providence, Stoughton and Middleborough Lines

Line	AM Peak Passengers	AM Peak Seating Capacity	AM Peak Utilization*
Providence	11,017	8,532	129%
Stoughton	2,771	3,558	78%
Middleborough	3,743	3,696	101%

Sources: MBCR Ride Check December 2006, MBTA South Side Equipment Schedule
* Assumes all passengers continue to South Station, Stoughton, Providence/Stoughton and Middleborough/Lakeville Lines.

Table 2-5 Parking Utilization at Providence, Stoughton and Middleborough Lines Stations

Station	Occupied Spaces	Total Spaces	Utilization
Providence Line+			
Providence	N/A	330	N/A
South Attleboro	918	992	93%
Attleboro	756	770	98%
Mansfield	812	805	101%
*Stoughton Line**			
Stoughton	350	441	79%
*Middleborough Line**			
Middleborough/Lakeville	595	852	70%
Bridgewater	430	500	86%

\+ MBTA, 2000
* OCPC 2004

Currently, there are limited regional transit services provided in the South Coast area and they provide inadequate links between centers of activity in the region; specifically, between Taunton, Fall River, New Bedford, and Boston. The only regional transit services currently provided in the South Coast area are private express bus services to South Station in Boston and local bus services operated by the GATRA and the SRTA. The private express bus service is subject to the same congestion and safety problems on the highway system as other vehicles. That service also charges a significantly higher cash fare than Massachusetts Bay Commuter Rail, which travels similar distances. The local bus routes provide services only within the three urban areas of New Bedford, Fall River, and Taunton, with the exception of one regional bus between Fall River and New Bedford.

Commuter rail service currently does not extend into the South Coast area, making access to commuter rail difficult for area residents. The Middleborough Line serves areas east of the South Coast region and southeast of Boston, with stations in Lakeville and Bridgewater, while the Attleboro/Providence and Stoughton lines serve communities to the north and west of the South Coast region. The Attleboro and Mansfield stations are the primary access points on the Attleboro/ Providence Line. The Stoughton Station serves as the primary access point on the Stoughton Line. The major population centers of the communities in the southern half of the South Coast area are as much as 25 miles from existing commuter rail stations, with access over local secondary roads. Parking lots at most existing stations are heavily utilized, which also limits access to rail service.

2.6.5 Freight Rail Service

Freight railroad service in the South Coast area is provided by CSX and Mass Coastal. Regular freight service is provided on the New Bedford Secondary, the Fall River Secondary, and the Middleborough Secondary, which connect to the Northeast Corridor via the Attleboro Secondary. CSX also operates freight service on the existing Stoughton Line between Canton and Stoughton. Mass Coastal serves customers on the southern portion of the old Stoughton Line between Weir Junction and Winter Street in Taunton, on the Dartmouth Secondary, and on the Buzzards Bay Secondary. Mass Coastal connects with CSX to move freight in and out of the region. Freight service operated on commuter rail lines constrains the potential movement and operations of commuter rail.

2.7 Access to Opportunity

Poor or limited transportation opportunities also constrain access by South Coast area residents to important Boston destinations, including education opportunities provided by numerous private and public colleges and universities, the highest concentration of medical facilities and specialties in the Commonwealth, cultural facilities, and sporting events. Existing highway congestion, extended travel times,

and limited (and often expensive) parking affect the ability of many area residents to access these destinations.

The City of Boston continues to provide substantial employment opportunities at all levels, and also contains a substantial employment labor force. Many of the South Coast area communities, particularly in the towns of Easton, Raynham and Taunton, have a substantial work orientation to Boston. Access between South Coast area communities and downtown Boston is constrained by the limited, overtaxed highway system and the lack of alternative transit modes. The ability to park in Boston is constrained by the limited space available to provide parking, high demand for parking resulting from new development, the high cost of parking, and the metropolitan area parking freeze. Residents of South Coast area communities would benefit substantially from improved employment access and reduced cost of commuting and parking.

2.8 Mode Choice and Connectivity

Travel options within the region and to the metropolitan Boston area are currently limited to the automobile and limited bus service, as the infrastructure of the region consists only of highways. The proposed project, which is consistent with the current transportation policy both at the federal and state levels, would introduce a fixed-guideway transit option to a region currently under-served by all modes of transit. Introduction of commuter rail service would increase mode choice for area residents and offer a new mode option to travelers to the region. The proposed project would also increase opportunities for multimodal connections by creating a major intermodal transportation center in New Bedford that provides commuter rail, freight, bus, and waterfront trolley connections with links to the water terminal for ferry and water taxi services.

2.9 Smart Growth

The South Coast region also has identified economic development and environmental preservation as two key needs that are related to transportation. Southeastern Massachusetts has been the fastest growing region in the Commonwealth for many years both in terms of population and housing units. At the same time, population and housing growth has been inequitably distributed, and the historic cities of Fall River and New Bedford are experiencing a decline in population. The South Coast region has also been characterized by exurban sprawl, the decline of gateway cities, and the consumption of natural areas at a rate that far exceeds the population growth rate. This type of uncontrolled growth results in the loss of farms, fields and forests and damages the character of the historic villages and cities within the region.

At the same time, growth is needed. The poor connectivity to the metropolitan Boston area may constrain economic activity in the urban areas of New Bedford and Fall River. These two cities currently have higher unemployment rates than the state average. In 2006, the New Bedford metropolitan area had an unemployment rate of 8.2 percent, while Fall River had an unemployment rate of 8.6 percent. The state average was 5.0 percent.[8]

Improved access to employment markets in Boston would provide employment opportunities for the New Bedford and Fall River labor force that would provide economic benefits for these communities. Commuter rail service could also allow limited "reverse commutes" from area communities like Taunton to New Bedford and Fall River, which would thereby gain access to a larger labor pool within the Southeastern Massachusetts region. Economic benefits are predicted based on data from other regions, which demonstrates that the introduction of commuter rail into previously unserved areas typically has a significant positive impact on residential property values.

The scale and geographic reach of the South Coast Rail project offer an unprecedented opportunity to generate new economic development and to shape this growth so that the project helps preserve environmental resources. By partnering with municipalities to jointly plan the transportation project along with local land-use, the project can help cluster people and jobs near train stations, opening up new economic development opportunities, while directing growth away from natural areas. This approach curbs sprawl.

2.10 Planning and Policy Context

Public transportation policy has evolved over the past decades as society has become more aware of the consequences of increased traffic congestion. This awareness has resulted in significant changes in transportation policy and the types of solutions proposed to address transportation needs. The interstate highway program was the driving force in transportation policy from the 1950s through the 1980s. This system of limited access highways greatly increased the nation's mobility and allowed people to live further from their jobs located in the urban core. It also encouraged businesses to locate outside the urban core away from much of the public transit system's infrastructure and services.

Several events over the past 35 years on both the federal and state levels helped to shape the current transportation system and the transportation policies of the Commonwealth. The first of these events occurred during the 1970s. On a national level, the gasoline crisis of 1973 and stronger opposition to new highway projects led to an evolution in transportation policy. The focus of public policy began to shift from the single occupant vehicle toward obtaining the greatest efficiency from the existing transportation infrastructure and providing a balanced transportation system.

8 Massachusetts Executive Office of Labor and Workforce Development website. viewed December 2007.

In early 1970, Massachusetts Governor Francis Sargent signed legislation that removed the construction of the I-95 Southwest Expressway and the Inner Beltway from the state's transportation program. This legislation particularly impacted the Southeastern Massachusetts region as it removed the final link of I-95 between Route 128 in Canton and downtown Boston. This left commuters in the region with limited highway access choices to the metropolitan job core.

The next significant change in transportation policy was the passage of the Clean Air Act Amendments in 1990. The Clean Air Act Amendments established stringent requirements for attaining and maintaining national air quality standards. One approach to achieving these air quality goals is to reduce the number of vehicle miles traveled on the nation's roadways. Providing and promoting alternate travel modes are one way to achieve the vehicle miles traveled reduction goal.

The final major policy change was reflected in the Intermodal Surface Transportation Efficiency Act enacted in 1991 and subsequently, the Transportation Equity Act for the 21st Century enacted in 1998. This federal legislation established a national goal of a balanced intermodal transportation system. For the first time, the policy component of the federal transportation funding legislation considered the interaction of the various modes. It encouraged solutions that made intermodal transfers easier and more convenient and attractive to the consumer. The act required coordinated transportation planning between the regions and the state, and mandated that transportation improvements be consistent with and contribute to attaining and maintaining national air quality standards. The Transportation Equity Act for the 21st Century continues many of the integrated goals established under Intermodal Surface Transportation Efficiency Act and provides higher funding levels for transit projects. These goals are shared by the Commonwealth and establish the basis of its transportation policy.

2.10.1 Anticipated Investment in Transportation Facilities and Services

Each metropolitan area in the Commonwealth must prepare a Long Range Transportation Plan and a Transportation Improvement Program for their region. These two documents define the programmed transportation improvements to be implemented for that specific metropolitan area. The transportation policy and plan developments of three MPOs impact the South Coast area. The three MPOs are:

- SRPEDD represents the Taunton, New Bedford and Fall River metropolitan areas;
- The Old Colony Planning Council (OCPC) represents the Brockton metropolitan area; and

- The Metropolitan Area Planning Council (MAPC) is the regional planning agency for the Boston metropolitan area. The Boston Metropolitan Planning Organization is the regional MPO.

Two of the regions, SRPEDD and OCPC, represent South Coast communities. The third region, MAPC, represents communities along the primary transportation access routes from the South Coast communities.

The following is a summary of transportation system changes that have occurred or are programmed to occur within the South Coast area by these three MPOs. In addition, changes to the primary access routes to the Boston metropolitan area are included.

New Bedford/Fall River Region (SRPEDD)

A number of small and medium sized transportation improvement projects are programmed for the SRPEDD region; however, major transportation improvement projects that would increase peak period capacity on the region's major highways are not included. Projects included in SRPEDD's Transportation Improvement Plan and Long Range Transportation Plan that affect the South Coast communities and/or the primary access routes to the Boston metropolitan area include:

- Corridor improvements to Route 18 in New Bedford;
- Reconstruct Route 24/Route 140 interchange in Taunton;
- Relocate Route 79 in Lakeville;
- Reconstruct Route 79 in Fall River;
- New interchange on Route 24 in Fall River and Freetown;
- Study Route 24 between Route 140 and I-495 (corridor and interchange improvements);
- Reconstruct Route 140 and Route 6 in New Bedford; and
- Study the cost to convert Route 24 to interstate highway design standards (completed in 2003).

Brockton Region (OCPC)

Several small and medium sized transportation improvement projects are programmed for the OCPC region, but none are major transportation improvement projects that would increase peak period capacity on the region's major highways. Projects included in OCPC's TIP and LRTP that impact the South Coast communities and/or the primary access routes to the Boston metropolitan area include:

- Developing a comprehensive Route 24 major investment study as described under SRPEDD;
- Studying creating HOV lanes on highways to Boston; and
- Studying to provide additional parking capacity at the Stoughton Commuter Rail Station.

Boston Region (MAPC)

Although no South Coast communities fall within the Boston region, the primary corridor from the South Coast – Route 24 to I-93/Route 128 to I-93/Route 3 – is included in the region. Planned and programmed improvements to the highway, commuter rail, and transit systems within the Boston region that could impact access from the South Coast area include:

- Modifications to the Route 128/Route 24 Interchange;
- Providing additional parking capacity at the Quincy Adams Red Line station located at the junction of I-93/Route 128 and I-93/Route 3 in Quincy;
- Reconstructing Columbia Junction on the Red Line; and
- Studying extending commuter rail service along the Middleborough Line to Wareham.

2.10.2 Transportation Goals and Objectives

The South Coast Rail Study is part of a comprehensive effort to achieve a series of broad study area transportation and development goals, as well as specific objectives for improving the quality of transportation services and the equity of the distribution of services within the South Coast area. These goals and objectives have been developed as part of both broad-based policies and specific regional documents. The following two sections summarize the relevant studies and policies and their applicability to this project.

Statewide Policy Documents and Studies

A number of important studies, reports, and policy statements have helped to document the development of transportation policy in eastern Massachusetts. Among these are:

- The MBTA's Program for Mass Transportation. The Program for Mass Transportation is the mass transit plan for the Boston region and was updated in 1978, 1994, and 2003. The objective of the Program for Mass Transportation is to identify and recommend projects that will result in a cost-effective transit system that serves the greatest number of people in a way that respects the environment

and enhances responsible economic development. The 2003 update identified mass transit needs through the year 2030 that would require capital expenditures. Commuter rail service to New Bedford and Fall River was included as a transit project in the 1994 and 2003 updates of the Program for Mass Transportation.[9]

- The Boston Transportation Planning Review (1970-1973) re-examined the highway construction program in the Boston area following Governor Sargent's cancellation of the I-95 Southwest Expressway and Inner Beltway highway projects in 1970. The results of the Boston Transportation Planning Review established a new transportation strategy with a strong emphasis on transit as a means to provide additional transportation capacity into Boston. This document helped define the Central Artery Project as well as the highway system that connects the Boston core with Southeastern Massachusetts.
- Toward a New Growth Policy for Massachusetts (1977), a state cabinet-level report, documented the need to maintain downtown Boston as a strong and healthy economic and employment core for the eastern Massachusetts region, and encouraged redevelopment of the older urban areas across the state. This document is related to the South Coast communities in two ways. First, it encourages redevelopment of older urban areas across the state. Both New Bedford and Fall River are older urban areas seeking economic development opportunities. The two cities are designated as both federal and state economic target zones. Second, the Southeastern Massachusetts area provides affordable housing opportunities for professionals working in the metropolitan Boston area.
- South Coast Rail Plan for Action (2007) identified the South Coast of Massachusetts as one of the fastest growing regions in the state, and stated that restoration of passenger rail service could be a catalyst for economic development and job growth in the region. The plan also stated that the project would reach under-served populations and promote smart growth.

Goals and Objectives for Each Metropolitan Planning Region

Regional transportation goals provide the basis for evaluating options for improvement of transportation services and facilities in the South Coast area. They support improvements to transportation services, increase mobility, provide transit services that are cost effective, and provide a more equitable distribution of transportation benefits. The objectives have been utilized, in part, for evaluating the alternatives described in this document. These locally adopted goals and objectives support the broad, long-term study area development and transportation strategy.

[9] *Commuting Into a New Century:* The New Program for Mass Transportation, Executive Office of Transportation and Construction, March 1, 1994.

New Bedford/Fall River/Taunton Region

The SRPEDD has adopted a multi-level set of transportation goals and objectives in the region's 2007 Regional Transportation Plan.[10] This planning document includes eight goals and objectives in support of the region's overall goal of developing and maintaining an effective, safe, and accessible transportation system that promotes sustainable economic development and preserves the region's quality of life. Those relevant to the Purpose and Need of this project include:

- Support the economic vitality of the metropolitan area, especially enabling global competitiveness, productivity, and efficiency;
- Increase the accessibility and mobility options available to all people and freight;
- Protect and enhance the environment, promote energy conservation, and improve quality of life;
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and for freight; and
- Emphasize preservation of the existing transportation system.

The plan specifically states that continued support for extending commuter rail service to Taunton, Fall River, and New Bedford helps achieve these goals.

Brockton Region

The OCPC has adopted a multi-level set of transportation goals and objectives in the region's 2007 Regional Transportation Plan.[11] This planning document includes 14 goals and objectives in support of community vision. Those relevant to the Purpose and Need of this project include:

- Provide an aesthetic transportation system that supports the economic vitality of the region and enables global competitiveness, productivity, and efficiency;
- Increase the accessibility and mobility options available to all people and freight;
- Promote a transportation system that protects and enhances the environment, conserves scenery, and improves quality of life in the region;
- Enhance the integration and connectivity of the transportation system, across and between a well-balanced network of modes, for people and freight;
- Emphasize preservation and modernization of the existing transportation system; and

[10] *2007 Regional Transportation Plan*, Southeastern Regional Planning and Economic Development District, 2007.
[11] *2007 Regional Transportation Plan*, Old Colony Planning Council, March 31, 2007.

- Support smart growth principles and provide a transportation system that is regionally coordinated and based on effective transportation and land use planning.

Boston Region

The MAPC adopted eight visions and corresponding policies in their 2007 Regional Transportation Plan.[12] These goals and policies are based on a vision for the region that emphasizes the maintenance, management, and operation of a multimodal transportation system that provides a high degree of mobility for all people. The visions of the Boston area's transportation program relevant to the Purpose and Need of this project include:

- Emphasize preservation, modernization, and efficiency of the existing transportation system;
- Provide a coordinated mix of transportation modes and services to give users increased opportunities for convenient, reliable, speedy, affordable, and accessible travel;
- Reduce air quality degradation and other environmental degradations caused by transportation;
- Ensure that low-income and minority residents share equally in access to the transportation network and its mobility benefits; and
- Integrate transportation planning with land-use and economic-development planning, and use transportation rights-of-way to maximize public benefits.

2.11 Other Regional Transportation Projects

The communities, regional planning agencies, and state transportation agencies are pursuing a number of transportation and development projects within the study area. The key features of these undertakings are described below. As the information provided in this section demonstrates, the projects currently included in regional transportation planning will not meet the transportation needs of the region, identified in the previous sections.

Projects included in the Transportation Improvement Plans are projects under design for which funding has been allocated (Table 2-6). The projects below are listed in the Transportation Improvement Plan for the Boston MAPC, OCPC, and SRPEDD. Only projects of significance to South Coast Rail are included. Other projects under consideration, but not currently funded, are listed in Table 2-7.

[12] *2007 Transportation Plan of the Boston Region Metropolitan Planning Organization*, Boston Metropolitan Planning Organization, 2007.

Table 2-6 Projects Funded in Regional Transportation Improvement Plans

Project	Year Programmed
Replace Brightman Street Bridge, Fall River/Somerset	2010-2013
Replace Southeastern Regional Transportation Authority Terminal, Fall River	2010
Attleboro Intermodal Center, Engineering and Construction	2010-2009
Route 128 Add-A-Lane Project, Randoph-Wellesley	2010-2013
Relocate Route 79, Lakeville	2009
Reconstruct Route 18, New Bedford	2010
Reconstruct Columbia Junction, Red Line	2009-2011
New Route 24 Interchange, Fall River/Freetown	2009
Route 140 Safety Improvements (Route 24 to Taunton Depot Drive), Taunton	2011
Reconstruct Route 6/Route 140 Intersection, New Bedford	2011
Reconstruct Route 24/Route 44 Interchange	2013
Relocate Route 6 Bridge, Acushnet River New Bedford/Fairhaven, Feasibility Study, Design and Environmental Study	2010
Multi-Modal Center Improvements and Facilities, New Bedford	2010
Southeastern Massachusetts Freight Rail Corridor Improvements	2010
MBTA/GATRA Improvements, South Attleboro/Attleboro/Mansfield	2010-2013
Freight Rail Improvements, New Bedford	2011

Table 2-7 Projects Not Yet Funded or Approved

Project	Notes
Reconstruct Route 24-Route 140 Interchange, Taunton	FY 2006 "earmark"
Relocate Route 79, Fall River	FY 2003-2006 "earmark"
Construct Attleboro Intermodal Center ($200M)	TIP Future Element
Reconstruct Route 24 to Interstate Standards, Fall River – Raynham ($84M)	TIP Future Element
Widen Route 24 between Route 140 and I-495 ($50M)	TIP Future Element
Reconstruct Route 24 – Route 140 Interchange ($50M)	TIP Future Element

2.11.1 Route 24 Corridor Study

Over the last decade, there has been considerable interest in improving Route 24 to meet modern interstate safety and geometric standards, in order that the highway might receive an interstate number. In 2003, SRPEDD produced a Special Report on Route 24, summarizing studies on this and other initiatives along the Route 24 Corridor.

The study recommends upgrading Route 24 to an interstate by increasing bridge clearances, widening shoulders, and lengthening substandard acceleration and deceleration lanes. To distribute the cost, the work is proposed to occur over a twelve-year period. The study also recommends for reconstructing substandard interchange ramps, constructing an additional travel lane between I-495 and Route 140, and studying the need for an additional travel lane between Route 140 and Airport Road in New Bedford.

To date, these proposals have not advanced beyond the study level, and no funds for improvements to Route 24 have been allocated. Other initiatives discussed in the report have advanced, and are discussed in more detail in sections below.

2.11.2 Route 24 – Route 140 Interchange

Although Route 140 is a limited-access facility south of Route 24, which is limited-access throughout, the interchange between the two in Taunton is a simple partial cloverleaf interchange, with ramps in the northeast and southwest quadrants (traffic exiting Route 24 on the inner loop) and an additional slip ramp from Route 24 north to Route 140 south. Major traffic movements between the two limited-access roadways are not directly subject to delays at the ramp intersections, but regular congestion occurs due to the tight geometry, substandard acceleration and deceleration lanes, and proximity of at-grade intersections. It is not unusual for traffic to back up onto Route 24 at the southbound exit.

Long-range SRPEDD plans have recommended that this interchange be reconstructed into a more standard freeway to freeway interchange. Short-term improvements, including extending acceleration and deceleration lanes, were recently completed. The FFY 2010 TIP includes funding for environmental studies and 25% Engineering Design. Congress has earmarked funds for this project.

2.11.3 Route 24 – I-93 Interchange

A major source of congestion on the primary access route from the South Coast region to the Boston metropolitan area is the interchange of Route 24 and I-93 in Randolph. Problems include a center lane merges on Route 24 south and I-93 north, a two-lane merge into the high speed lane on I-93 south, a left exit on I-93 south, and short weaving distances to the exits on I-93.

Central Transportation Planning Staff (CTPS) has recently completed a study evaluating a range of potential improvements to the interchange. These options include reconstructing the direct ramps as semi-direct ramps to eliminate left exits and merges, auxiliary lanes to eliminate center lane merges, and modifying Exit 3 (Ponkapoag Trail) and Exit 5 (Route 28) on I-93 to ease congestion caused by weaving movements. These proposals have not advanced beyond study, and no funds have been allocated.

2.11.4 Braintree Split Study

Another major source of congestion on the primary access route from the South Coast region to the Boston metropolitan area is the interchange of I-93, Route 3, and the Southeast Expressway in Braintree. This interchange suffers many of the same problems as the Route 24 /I-93 interchange, including left exits and merges, and short weaving distances to the next interchange on all approaches. The Southeast Expressway HOV lane begins/terminates just north of the interchange, resulting in heavy weaving for vehicles entering or exiting HOV lane. Problems further from the interchange, including the Route 24/I-93 interchange, the Granite Avenue and Neponset Circle interchanges on the Southeast Expressway, the Union Street and Route 18 interchanges on Route 3, and the lane drop on Route 3 also caused congestion.

CTPS has recently completed a study on this interchange, offering two potential packages of improvements, one to improve traffic safety only and one to improve traffic flow. The proposed traffic safety improvements include lengthening deceleration lanes, prohibiting some movements to eliminate the worst weaves, and relocating one on-ramp to increase weaving distance. The proposed traffic flow improvements include extending the HOV lane through the interchange, adding a fourth lane on Route 3 south, adding a fifth lane to Route 128/I-93 between the split and Route 24, and improving ramps at Exit 6 (Route 37) on Route 128/I-93. These proposals have not advanced beyond study, and no funds have been allocated.

2.11.5 Route 18 Reconstruction

Route 18 is a major, partially access-controlled, north-south arterial in New Bedford, connecting the city's core with I-195. However, it also effectively separates the urban core of the city from the waterfront. Between I-195 and Cove Street, a distance of 2.8 miles, there are only eight locations where pedestrians can cross the highway. Three of these are at pedestrian bridges, while several others are at busy intersections. The highway makes it especially difficult to access the central waterfront, including commercial and tourist destinations, such as New Bedford Whaling National Historic Park, the New Bedford Oceanarium, and State Pier.

As part of efforts to promote economic development downtown, plans have been developed to reconstruct Route 18 by Massachusetts Highway Department, especially near the urban core. The plan includes new "gateway" intersections, more at-grade intersections, and design elements to transform Route 18 from an expressway into an urban boulevard. Plans have completed the 25% Review stage of the Massachusetts Highway Department design process.

2.11.6 New Bedford/Fairhaven Harbor Plan

In August 2002, New Bedford and Fairhaven partnered to develop the New Bedford/Fairhaven Harbor Master Plan, with assistance from the Coastal Zone Management Office at EOEEA. This plan includes a wide range of goals, reflecting the wide variety of harbor uses. New Bedford remains one of the country's most important seaports, especially for the fishing industry. The New Bedford waterfront includes many commercial and industrial enterprises dependent on a quality harbor for trade. The harbor is also important for transportation services, including ferry service to Vineyard Haven and Cuttyhunk. There are also proposals to expand service to Martha's Vineyard and introduce passenger and freight service to Nantucket.

The Harbor Plan proposes improvements to Fish Island, Popes Island, North Terminal, South Terminal, and a new terminal adjacent to North Terminal. It also recommends integrating transportation services at the new terminal, including bus, ferry, and future commuter rail. The plan also recommends relocating the Route 6 Bridge to the north between Popes Island and the New Bedford mainland. The existing bridge is a swinging truss that must open for large vessels to reach Popes Island, Fish Island, North Terminal, and points north. The aging span is a significant barrier to commercial and industrial development along the harbor to the north; mechanical failures on the bridge could cripple a venture dependent on access to ocean shipping. The proposed span would run north along Popes Island, and then cross the harbor at the proposed terminal north of North Terminal. This would directly connect Route 6 to the proposed intermodal transportation facility and would be consistent with plans to reconstruct Route 18 downtown by freeing up land at the Route 18/Route 6 interchange. Funds for study, design, and environmental review have been appropriated for 2010.

2.11.7 Route 24 – New Fall River/Freetown Interchange

Several parties have expressed interest in developing a new office, commercial, and industrial area near the border of Fall River and Freetown. This project, known as Fall River Executive Park, would contain up to 9 million square feet of new development. Other developments in the area include Fall River Industrial Park, Riverside Business Park, and Campanelli Industrial Park. The vehicular traffic generated by these developments is expected to overload existing interchanges connecting local roads to Route 24.

A new interchange on Route 24 near the city line is required to support this development. This interchange will connect with a new roadway, linking the proposed development and South Main Street. The project will receive funding from the American Recovery and Reinvestment Act and is expected to begin construction in fall 2009.

2.11.8 Route 79 Relocation – Fall River

Route 79 in Fall River is a major, limited-access, north-south arterial, connecting with I-195. It separates the urban core from the waterfront, in Fall River the Taunton River separates the city from commercial and industrial enterprises, and forms a pedestrian barrier to the waterfront and tourist attractions, such as Battleship Cove. Between Columbia Street and North Main Street, a distance of 2.8 miles, there are only five locations where pedestrians can cross the highway. Several of these are underpasses, and another is at a very busy intersection.

In order to reconnect the city with the waterfront, Fall River has proposed to eliminate the Route 79 freeway south of the Brightman Street Bridge, and replace it with an at-grade urban boulevard. A study of potential impacts on adjacent neighborhoods and traffic began in 2007.

2.11.9 Route 128 Add-a-Lane Project, Randolph to Wellesley

This project consists of adding a fourth general purpose travel lane in each direction to Route 128 between Route 24 in Randolph and Route 9 in Wellesley. Construction is underway on several project elements, but the project is not expected to be complete for several years. This project will have an indirect impact on access from the South Coast region to Boston, because changes to traffic patterns on Route 128 could affect traffic on Route 24 in the vicinity of the Route 24/Route 128 interchange.

2.12 Information Sources

Information in this chapter was obtained from the following sources:

- *United States Census*, 1990 and 2000
- *Journey-to-Work*, 1990 and 2000
- SRPEDD planning documents, reports, and studies
- OCPC planning documents, reports, and studies
- MAPC planning documents, reports, and studies
- CTPS planning documents, reports, and studies
- Executive Office of Labor and Workforce Development
- EOT
- Massachusetts Highway Department Accident Database
- Massachusetts Highway Department Traffic Volume Database
- Massachusetts Highway Department record right-of-way plans
- MBTA
- Southeastern Regional Transportation Authority
- Greater Attleboro Taunton Regional Transit Authority
- Brockton Area Transit Authority
- *New Bedford/Fall River Commuter Rail Extension Final Environmental Impact Report*, MBTA, 2002
- *New Bedford/Fall River Commuter Rail Extension Supplemental Draft Environmental Impact Report*, MBTA, 2000
- *New Bedford/Fall River Commuter Rail Extension Draft Environmental Impact Report*, MBTA, 1999
- *New Bedford/Fall River Commuter Rail Project Expanded Alternatives Analysis*, MBTA, 1997
- *New Bedford/Fall River Commuter Rail Project Environmental Notification Form*, MBTA, 1995
- *New Bedford/Fall River Commuter Rail Extension Feasibility Study*, MBTA, 1990
- *South Station Operations Analysis Report*, MBTA, 1999
- *Commuter Rail Infrastructure Needs Assessment*, MBTA, 2004

- Community master plans, housing plans, transportation plans, open space plans, and community development plans
- *New Bedford/Fairhaven Harbor Master Plan*, 2002
- MBTA and CSX existing track charts
- New York, New Haven, and Hartford Railroad historic track charts; and
- Peter Pan Bonanza, DATTCO Inc., and Bloom bus schedules.

3

Alternatives Analysis since the ENF

This chapter outlines the analysis conducted since the November 2008 ENF submittal. It describes the supplemental ridership analysis, which helped further narrow the alternatives to be further evaluated. This chapter also provides data on an alternative EPA requested be studied.

3.1 Supplemental Ridership Analysis

EOT filed the ENF with MEPA on November 17, 2008 to initiate the public review process. Two public scoping and consultation meetings were held by the MEPA Office and the Corps on December 2 and December 3, 2008. Based on comments received by MEPA and the Corps during the public comment period, EOT requested that MEPA extend the comment period in order for EOT to conduct supplemental ridership analysis. The *Supplemental Ridership Memorandum* submitted February 17, 2009, measured each ENF alternative against two standards: 1) mode shift (trips that shift from automotive to transit use) and 2) transit ridership (the increase in total transit ridership along the entire transit system). Following the review of this document, the Secretary of Energy and Environmental Affairs issued April 3, 2009 Certificate stating the following alternatives should be evaluated in the DEIR:

- **No-Build Alternative**
- **Attleboro Electric Alternative**
  (previously referred to as Alternative 1 – Through Attleboro, Option 1B)
- **Attleboro Diesel Alternative**
  (previously referred to as Alternative 1 – Through Attleboro, Option 1A)
- **Stoughton Electric Alternative**
  (previously referred to as Alternative 4 – Through Stoughton, Option 4B)
- **Stoughton Diesel Alternative**
  (previously referred to as Alternative 4 – Through Stoughton, Option 4A)

- **Whittenton Electric Alternative**
  (MEPA requested an electric option be evaluated for Alternative 4 – Through Stoughton, Option 4C)
- **Whittenton Diesel Alternative**
  (previously referred to as Alternative 4 – Through Stoughton, Option 4C)
- **Rapid Bus Alternative**
  (previously referred to as Alternative 5 – Rapid Bus)

The findings of the Supplemental Ridership Memorandum, or *Travel Demand Analysis Results*,[13] indicates that Alternative 2 – Through Middleborough, Option 2A (Middleborough Full) is impracticable due to its low projected ridership numbers, high cost and significant construction-related disruption to the existing public transit system and to the City of Quincy. Option 2B (Middleborough Simple) does not include the major infrastructure improvements of the Option 2A (Middleborough Full). However, without these improvements it would not meet the minimum capacity requirements of MBTA for quality of service and the ridership would result in significantly lower projections than that of other alternatives. As a result, Secretary Bowles determined that Alternative 2 – Through Middleborough should be eliminated from further review.[14]

In addition to Alternative 2 – Through Middleborough, Secretary Bowles determined that Alternative 3 – Through Attleboro and Middleborough (Hybrid) should also be eliminated from further review. Alternative 3 would consist of commuter service to South Station using the Old Colony line and the Northeast Corridor with the intention of sending half the trains from the South Coast area via Attleboro and half via Middleborough to avoid the need for major infrastructure upgrades on either the Northeast Corridor or the Old Colony mainline. However, adding more than one new peak period train would require constructing a third track on the Northeast Corridor, which would result in combined costs and environmental impacts associated with the Alternative 1 – Through Attleboro and Alternative 2 – through Middleborough, Option 2A (Middleborough Simple), while achieving similar ridership outcome as Alternative 1 alone. Therefore, it was concluded that Alternative 3 is impracticable because of cost and should be removed from further review.[15]

[13] Central Transportation Planning Staff, *South Coast Travel Demand Analysis Results*, February 17, 2009.

[14] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, *Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form*, South Coast Rail Project (EEA# 14346), April 3, 2009.

[15] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, *Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form*, South Coast Rail Project (EEA# 14346), April 3, 2009.

3.2 Middleborough Simple/Rapid Bus Combination Alternative

Although not discussed during Phase 1, EPA requested that the project evaluate a new alternative in addition to the 64 alternatives analyzed in the Phase 1 Alternatives Analysis Report. This is a hybrid alternative combining Middleborough Simple and Rapid Bus. This alternative was not identified through the public process, in the ENF nor the MEPA Certificate. This chapter performs a review at a level of detail consistent with the analysis done in the Phase 1 report. This chapter also includes a qualitative assessment of the alternative, and incorporates information from the DEIR/DEIS level analysis, where applicable.

The Middleborough Simple / Rapid Bus Combination Alternative would reroute the Middleborough Line to New Bedford and provide Rapid Bus service to Fall River. This option would meet the MBTA Service Delivery Policy for commuter rail to New Bedford, and provide a comparable level of bus service to Fall River.

The Rapid Bus alternative, as described in the ENF, would provide express bus service to Boston using a proposed dedicated, primarily reversible bus lane to be built along Routes 24 and I-93/128, the existing I-93 HOV zipper lane, and a short portion through mixed traffic.

This Alternative would require adding a midday layover facility near South Station for trains and a midday layover for buses. It would also require highway improvements to Route 24. The same capital improvements required for the Rapid Bus Alternative north of Taunton would be required for the Middleborough Simple / Rapid Bus Combination Alternative.

The following section evaluates the performance of the Middleborough Simple / Rapid Bus Alternative when applied to the criteria from the Phase 1 Alternatives Analysis. Since the April 2008 Phase 1 Alternatives Analysis, the data that was used in that evaluation has been revised and updated. For the purposes of this evaluation, the more recent data was used in order to more accurately analyze the viability and practicability of the alternative. This data includes:

- ***Travel Time*** – Travel time for Rapid Bus has been refined to reflect future travel conditions particularly at the Southeast Expressway zipper lane.
- ***Ridership*** – The ridership projections used in the Phase 1 Alternatives Analysis were based on data and tools available at the time. Since Phase 1, CTPS has developed a robust Travel Demand Model that more accurately projects the future transportation demand from the South Coast Region.
- ***Capital Cost*** – Capital cost has been refined based on a better understanding of the Rapid Bus and Middleborough Simple designs.

- ***Cost Effectiveness*** – The measure of cost effectiveness has not changed since Phase 1. However, the values that are used within this calculation include cost and ridership, both of which changed as detailed above.

3.2.1 Phase 1 Criteria Applied to the Middleborough Simple/Rapid Bus Hybrid Alternative

Step 1 Evaluation

The Middleborough Simple / Rapid Bus Hybrid Alternative meets the Basic Project Purpose because:

- Criterion 1.1 – *Improve regional mobility*
  - It would provide public transit connections between New Bedford/Fall River and Boston.
- Criterion 1.2 – *Improve quality of service*
  - It would provide a peak commuter rail transit trip of 89 minutes from New Bedford to Boston. The morning peak Rapid Bus travel time from Fall River to Boston is estimated at 91 minutes. This alternative would provide a comfortable transit trip with no transfers. The Rapid Bus connection between Fall River and Boston would provide low reliability service because portions of the route are shared with general purpose traffic and mixed HOV traffic.

Recommend: Advance to Step 2 evaluation.

Step 2 Evaluation

The Middleborough Simple / Rapid Bus Hybrid Alternative was determined to not be practicable to construct and operate. See below for the alternatives ability to meet Step 2 criteria:

- Criterion 2.1 – *Is operationally compatible with the existing transportation infrastructure*
  - Would need to reroute the Middleborough Line west along the Middleborough Secondary, providing a new commuter rail station stop at East Taunton (South).
  - Would need to provide track and railroad bridge improvements along the New Bedford Main Line south of Cotley Junction.
  - Would need to construct all the infrastructure improvements of the Rapid Bus Alternative, except the station stops in New Bedford (Whale's Tooth and King's Highway) and Taunton (Taunton Galleria and Taunton Depot).

- Would need to provide expanded capacity at Boston's South Station Bus Terminal and new Rapid Bus station stops at Fall River Depot and Freetown.
- Storage/maintenance facilities required for both the bus and rail vehicles.

- Criterion 2.2 – *Does not significantly adversely affect the existing or future capacity, reliability, and quality of the regional transportation system*
  - Reduces reliability of the Middleborough line and the Old Colony Main Line service by extending trips for all trains, and using all available capacity.
  - Implementation of the Middleborough Simple /Rapid Bus Hybrid Alternative precludes future commuter or passenger rail service from Boston to Wareham and Cape Cod without costly improvements on the Old Colony Main Line.
  - Restricts windows for freight operations on the Middleborough Secondary.
  - Decreases non-peak-direction capacity on Route 24 by taking a lane for use in the peak direction as the Rapid Bus zipper lane.
  - Decreases user capacity of existing Southeast Expressway HOV lane by increasing traffic volume in the lane.
- Criterion 2.3 – *Could be constructed without substantial impacts to the existing transportation system and within a reasonable timeframe*
  - Would need to close the existing Middleborough/Lakeville Station and replace it with a station stop on the Middleborough Secondary close to Middleborough Center. The existing Middleborough/Lakeville Station would need to be closed because the extension of the line via the Middleborough Secondary bypasses this station. This station is heavily used and is the site of a new TOD; TOD implementation is one of the main goals of the South Coast Rail project.
  - Minimal impact to existing passenger service north of Middleborough/Lakeville commuter rail station.
  - Impacts existing freight service.
  - Can be constructed within a 4-year timeframe.
  - Significant impacts to Route 3 at Braintree Split to construct bus lane.
  - Significant impacts to Route 24 to construct zipper lane (including bridge and interchange improvements).
- Criterion 2.4 – *Provides transportation system benefits at a reasonable capital cost*
  - Combined cost effectiveness score of 30 percent. In Phase 1, cost effectiveness below 40 percent was considered failing.

- Criterion 2.5 – *Provides sufficient capacity to meet demand*
  - Capacity of operating plan is 5,220 passengers, 65% of the regional demand of 8,000 work trips.

Recommend: Dismiss from further consideration. The arguments include cost and ridership:

- The cost of the alternative is estimated at $1.41 billion in year of expenditure. This is as expensive as the Stoughton Diesel and Whittenton Diesel.
- Ridership is estimated to be 1,950 on-way boardings (3,800 daily boardings).

The redundant infrastructure, considering the cost and ridership, makes this alternative impracticable. The alternative would require the entire Rapid Bus infrastructure, save a few stations, plus a major investment in rail improvements, which includes much of the Rapid Bus Alternative and Middleboro Simple infrastructure improvements. Some speculation included that combining the two alternatives would provide a combined ridership. However, results indicate that the ridership draw would fall in the middle of the two individual alternatives. For instance, Rapid Bus ridership is projected to have approximately 2,100 one-way passengers per day and the Middleboro Simple approximately 1,550 passengers. The Hybrid Alternative is projected to have approximately 1,950 daily passengers.

When comparing the ridership projections to the capital cost of each alternative, it is estimated that the Rapid Bus Alternative would expend a capital cost of approximately $0.8 billion and Middleboro Simple would be roughly $1 billion. The Hybrid Alternative, however, would essentially require much of the infrastructure improvements of both alternatives, which would amount to approximately $1.4 billion. With ridership less than Rapid Bus and just slightly more than Middleboro Simple, the cost of the Hybrid Alternative becomes impractical (i.e. fewer riders but higher cost of either Rapid Bus or Middleboro Simple alone). By ways of comparison, the Rapid Bus Alternative would be approximately $100 per rider and the Hybrid Alternative would be roughly $107 per rider.[16]

The disparity of service to the Fall River and New Bedford communities should also be taken into consideration. New Bedford would be served by commuter rail, which is not affected by traffic conditions or accidents, and is less affected by weather; while snow occasionally causes switching problems, the speed of commuter rail is not affected by snow. Fall River would be served by bus, which is greatly affected by traffic conditions and accidents, and is severely affect by weather; during snow conditions, the zipper lanes would be inoperable, and traffic in general purpose lanes would move much slower due to hazardous road conditions. Lastly, Taunton would

[16] Cost per rider is demonstrated in terms of annualized capital cost and annual operating and maintenance cost in reference to annual boardings.

be served by only one station: East Taunton South, the furthest from downtown of all Taunton station options, which decreases the potential for smart growth and provides less of a catalyst for revitalization of downtown Taunton.

This Page Intentionally Left Blank

4

Phase 2 Alternatives

This chapter describes the Phase 2 alternatives. After a comprehensive screening evaluation, eight alternatives advanced into Phase 2 of the *Highway Methodology* and MEPA/NEPA processes for a detailed evaluation of operational issues and a full environmental review. Evaluation of these alternatives is required by the MEPA certificate.

- No-Build Alternative
- Attleboro Electric Alternative
- Attleboro Diesel Alternative
- Stoughton Electric Alternative
- Stoughton Diesel Alternative
- Whittenton Electric Alternative
- Whittenton Diesel Alternative
- Rapid Bus Alternative

During the Phase 2 evaluation, conceptual operating plans, capital improvement requirements, capital costs, and operating and maintenance costs were developed for each alternative. Phase 2 alternatives were modeled by CTPS using the regional transportation model, providing quantitative results on the performance of each alternative in terms of ridership, highway/vehicular travel, air quality, and environmental justice. Detailed analyses of environmental impacts (to natural resources, air quality, noise and vibration, historic resources, social and economic impacts among others) were conducted and documented in a series of Technical Reports for 18 resources. Smart growth strategies were recommended for all alternatives; these are identified in the South Coast Rail Corridor Plan.

4.1 Description of Phase 2 Alternatives

The following section describes and graphically depicts the eight Phase 2 alternatives, organized by route. The alternatives are: No-Build, Attleboro Electric, Attleboro Diesel, Stoughton Electric, Stoughton Diesel, Whittenton Electric, Whittenton Diesel, and Rapid Bus. Figures 4-1 illustrate the routes of the alternatives.

4.1.1 No-Build Alternative

The No-Build Alternative would improve transit service to Boston from New Bedford, Fall River and Taunton by adding more buses with smaller capital investments than are proposed in the Build Alternatives. Under this alternative, no new rail or bus service would be provided to Southeastern Massachusetts.

Existing commuter bus service to Boston from New Bedford, Fall River, and Taunton is currently provided by three commuter bus carriers: DATTCO provides Boston – New Bedford service; Peter Pan provides Boston – Fall River bus service; and Bloom provides Boston – Taunton service. Figure 4-2 shows these routings.

The No-Build Alternative plan includes bus schedule enhancements, transportation demand management, and transportation policy enhancements for commuter bus. In addition to these enhancements, incentives and other means would be considered to enable the private commuter bus service operators to acquire a new fleet of fuel efficient and clean emission buses. Ideally, these buses would provide rider comfort and amenities comparable to commuter rail service.

4.1.2 Attleboro Alternatives

The Attleboro Alternative would provide commuter rail service to South Station using the Northeast Corridor, proposed Attleboro Bypass, Attleboro Secondary, New Bedford Main Line, and Fall River Secondary. Both electric (Attleboro Electric) and diesel (Attleboro Diesel) commuter rail options were evaluated for this alternative. The New Bedford route would be 60.4 miles long and the Fall River route would be 57.9 miles long. Figure 4-3 shows the route of the Attleboro Alternative.

This alternative requires improvements to track infrastructure along the Northeast Corridor (construct a third track between the proposed Attleboro Bypass and the Readville Interlocking in Boston, a distance of 18.7 miles); the Attleboro Bypass (a new two-track railroad on a new right-of-way between the Northeast Corridor and the Attleboro Secondary, a distance of 2.8 miles); and the Attleboro Secondary (reconstruct existing freight rail tracks from the Attleboro Bypass to Weir Junction, as a single track with one siding, a distance of 9.7 miles). This alternative also requires reconstructing track on the Southern Triangle, which is common to all rail alternatives, including the New Bedford Main Line (reconstruct existing freight rail

tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction and single track with three sidings from Myricks Junction to New Bedford, a distance of 19.1 miles); and the Fall River Secondary (reconstruct existing freight rail tracks from Myricks Junction to Fall River, as single track with three sidings, a distance of 12.0 miles). Infrastructure improvements also include constructing, reconstructing, or widening 45 bridges and constructing or reconstructing 40 railroad at-grade crossings.

This alternative would include eight new commuter rail stations (Barrowsville, Downtown Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction at three existing commuter rail stations (Canton Junction, Sharon, Mansfield) as well as minor work at the existing commuter rail station at Route 128 and expansion of South Station. This alternative would include two overnight layover facilities, one on the New Bedford Main Line and one on the Fall River Secondary, to be chosen from the four overnight layover alternatives.

For the electrified option, the traction power system would include one main substation in Taunton, one switching station in Attleboro, and six paralleling stations (one in Norton, one in Berkley, two in Freetown, one in New Bedford, and one in Fall River).

4.1.3 Stoughton Alternatives

The Stoughton Alternative would provide commuter rail service to South Station using the Northeast Corridor, Stoughton Line, New Bedford Main Line, and Fall River Secondary. Both electric (Stoughton Electric) and diesel (Stoughton Diesel) commuter rail options were evaluated for this alternative. The New Bedford route would be 54.9 miles long and the Fall River route would be 52.4 miles long. Figure 4-4 shows the route of the Stoughton Alternative.

This alternative requires improvements to track infrastructure along the Stoughton Line (reconstruct existing passenger rail tracks from Canton Junction to Stoughton, as double track, a distance of 4.2 miles; construct new passenger rail tracks on existing right-of-way from Stoughton to Winter Street in Taunton, as one to two tracks, a distance of 14.8 miles; and reconstruct existing freight tracks from Winter Street in Taunton to Weir Junction, as a single track, a distance of 1.7 miles). This alternative also requires reconstructing track on the Southern Triangle, which is common to all rail alternatives, including the New Bedford Main Line (reconstruct existing freight rail tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction and single track with three sidings from Myricks Junction to New Bedford, a distance of 19.1 miles); and the Fall River Secondary (reconstruct existing freight rail tracks from Myricks Junction to Fall River, as single track with three sidings, a distance of 12.0 miles). Infrastructure improvements also include constructing, reconstructing, or widening 43 bridges and constructing or reconstructing 47 railroad at-grade crossings.

This alternative would include ten new commuter rail stations (North Easton, Easton Village, Raynham Place, Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction at two existing commuter rail stations (Canton Center and Stoughton), as well as expansion of South Station. This alternative would include two overnight layover facilities, one on the New Bedford Main Line and one on the Fall River Secondary, to be chosen from the four overnight layover alternatives.

For the electrified option, the traction power system would include two main substations (one in Easton and one in New Bedford), two switching stations (one in Canton and one in Berkley), and six paralleling stations (one in Easton, one in Taunton, two in Freetown, one in New Bedford, and one in Fall River).

4.1.4 Whittenton Alternatives

The Whittenton Alternative would provide commuter rail service to South Station through Stoughton, connecting to the existing Stoughton Line using the Whittenton Branch through the City of Taunton. Both electric (Whittenton Electric) and diesel (Whittenton Diesel) commuter rail options were evaluated for this alternative. The New Bedford route would be 56.5 miles long and the Fall River route would be 54.0 miles long. Figure 4-5 shows the Whittenton Alternative.

This alternative requires improvements to track infrastructure along the Stoughton Line (reconstruct existing passenger rail tracks from Canton Junction to Stoughton, as double track, a distance of 4.2 miles; and construct new passenger rail tracks on existing right-of-way from Stoughton to Route 138 in Raynham, as one to two tracks, a distance of 12.2 miles); Whittenton Line (construct new passenger rail tracks on existing right-of-way from Route 138 in Raynham to Whittenton Junction, as a single track, a distance of 3.5 miles); and Attleboro Secondary (reconstruct existing freight rail tracks from Whittenton Junction to Weir Junction, as a single track with one siding, a distance of 2.4 miles). This alternative also requires reconstructing track on the Southern Triangle, which is common to all rail alternatives, including the New Bedford Main Line (reconstruct existing freight rail tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction and single track with three sidings from Myricks Junction to New Bedford, a distance of 19.1 miles); and the Fall River Secondary (reconstruct existing freight rail tracks from Myricks Junction to Fall River, as single track with three sidings, a distance of 12.0 miles). Infrastructure improvements also include constructing, reconstructing, or widening 40 bridges and constructing or reconstructing 54 railroad at-grade crossings.

This alternative would include ten new commuter rail stations (North Easton, Easton Village, Raynham, Downtown Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction at two existing commuter rail stations (Canton Center and Stoughton), as well as

expansion of South Station. This alternative would include two overnight layover facilities, one on the New Bedford Main Line and one on the Fall River Secondary, to be chosen from the four overnight layover alternatives.

For the electrified option, the traction power system would include two main substations (one in Easton and one in New Bedford), two switching stations (one in Canton and one in Berkley), and six paralleling stations (one in Easton, one in Taunton, two in Freetown, one in New Bedford, and one in Fall River).

4.1.5 Rapid Bus Alternative

The Rapid Bus Alternative would provide commuter bus service to South Station via Route 140, Route 24, and I-93. South of the I-495 interchange in Raynham, buses would travel in the general purpose lanes with mixed traffic. North of I-495, buses would use a combination of new zipper bus lanes, new reversible bus lanes, two-lane bus roadways, existing zipper HOV lanes, and existing HOV lanes, along with a short section in mixed traffic. Figure 4-6 shows the Rapid Bus Alternative.

This alternative requires improvements to highway infrastructure along Route 24 (construct third lane from Route 140 to I-495, a distance of 5.4 miles; construct reversible bus lane at I-495 interchange, a distance of 1.1 miles; and construct zipper bus lane from I-495 to Harrison Boulevard, a distance of 15.7 miles); and Route 128/I-93 (construct reversible bus lane from Harrison Boulevard on Route 24 to Logan Express Lot, a distance of 4.2 miles; and construct two-lane bus roadway from Logan Express Lot to existing HOV zipper lane on the Southeast Expressway, a distance of 1.6 miles). Infrastructure improvements also include constructing, reconstructing, or widening 27 bridges and reconstructing 11 highway interchanges.

This alternative would include six new rapid bus stations (Downtown Taunton, Galleria Station, King's Highway, Whale's Tooth, Freetown and Fall River Depot). The Rapid Bus Alternative would also require a major expansion of Boston's South Station bus terminal. This expansion has been studied and designed separately from the South Coast Rail project, though it would be constructed as part of the Rapid Bus Alternative.

4.2 Description of Corridors

The following sections describe the rail and highway corridors under consideration as part of the eight Phase 2 alternatives. The first section describes the transportation corridors, including location, current conditions, constraints, issues, and ownership.

4.2.1 Rail Alternatives

This section describes those transportation corridors associated with the Attleboro, Stoughton, and Whittenton (electric and diesel) rail options.

4.2.1.1 The "Southern Triangle"

This section, common to all rail alternatives, provides an overview of two components of the transportation system south of Weir Junction, referred to as the "Southern Triangle." These components include the New Bedford Main Line and the Fall River Secondary.

New Bedford Main Line

The New Bedford Main Line is an active rail line running from the Attleboro Secondary at Weir Junction in Taunton to the waterfront piers in New Bedford. The line connects with the Middleborough Secondary at Cotley Junction and the Fall River Secondary at Myricks Junction. The line is in service for freight only at the present time. The line is mostly single track (but was constructed to carry two tracks), with a two-track section north of Cotley Junction. The line is owned and operated by CSX.

The line passes through some environmentally sensitive areas, including the Assonet Cedar Swamp in Berkley and Lakeville and is adjacent to the Acushnet Cedar Swamp State Reservation in New Bedford. Other constraints include dense development along the line in New Bedford.

Fall River Secondary

The Fall River Secondary is an active rail line running between the New Bedford Main Line at Myricks Junction in Berkley and the waterfront in Fall River. The line is in service for freight only at the present time. The line is all single-track, and is owned and operated by CSX.

The line passes through some environmentally sensitive areas, including the Assonet Cedar Swamp in Berkley. Other constraints include dense development along the line in Fall River, and large slopes above and below the line in Fall River along the Taunton River.

4.2.1.2 Attleboro Alternatives

This section provides an overview of three components of the transportation corridor associated with the electric and diesel Attleboro alternatives that are under consideration. These components include the Northeast Corridor, the Attleboro Bypass, and the Attleboro Secondary.

Northeast Corridor

The Northeast Corridor is an active rail line running between New York and South Station in Boston. The portion of interest for this project runs from Attleboro to Boston. The corridor experiences heavy use, including Amtrak Regional and Acela service, MBTA commuter rail service, and freight rail service. The MBTA Providence Line uses the entire length of this portion of the corridor; the Stoughton Line, Franklin Line, and Needham Line join further north at Canton Junction, Readville, and Forest Hills, respectively.

The corridor has at least two tracks on this section, with three tracks from Readville to Boston. There are also two station siding tracks at Attleboro Station. The corridor is electrified, meaning that both diesel and electric trains can operate, and is designed and signaled for high-speed rail operations. The corridor is owned by the MBTA. Train operations are controlled by Amtrak.

Attleboro Bypass

The Attleboro Bypass would be a new double-track rail corridor connecting the Northeast Corridor and the Attleboro Secondary (described in the following section). The line would roughly follow an existing National Grid electric transmission line right-of-way from the Northeast Corridor near the Attleboro/Norton/Mansfield town line to the Attleboro Secondary near Chartley Pond at the Attleboro/Norton town line. The line would be owned by the MBTA.

Attleboro Secondary

The Attleboro Secondary is an active rail line running from the Northeast Corridor in Attleboro to the Stoughton Line and New Bedford Main Line at Weir Junction in Taunton. The line is in service for freight only at the present time. The line is mostly single track, with a two-track section just east of the Northeast Corridor in Attleboro. The line is currently owned by CSX.

The line runs through some environmentally sensitive areas, including Chartley Pond and the Three Mile River Area of Critical Environmental Concern (ACEC). It also has many grade crossings in downtown Taunton, because it runs directly through the densely developed core of the city.

4.2.1.3 Stoughton Alternatives

This section provides an overview of the Stoughton Main Line, the main component of the transportation corridor for the Stoughton alternatives under consideration. Alternatives through Stoughton would also use the Northeast Corridor north of Canton Junction (for a description of the Northeast Corridor, see Section 3.2.1).

The Stoughton Main Line is a rail line running from the Northeast Corridor at Canton Junction to the Attleboro Secondary and New Bedford Main Line at Weir Junction in

Taunton. The line is active between Canton Junction and Stoughton Station serving commuter rail on the MBTA Stoughton Line and freight rail to customers in Canton and Stoughton. A short piece of the line north of Weir Junction is active, serving freight only. The remainder of the line, from Stoughton Station to Taunton, is abandoned, and some tracks were removed. The active sections of the corridor are single-track, except at the approach to Canton Junction, where there are two tracks. The corridor is owned by the MBTA, north of Britton Street in Raynham. Parts of the right-of-way north of Longmeadow Road in Taunton were sold and in various public/private ownership. The active rail segment north of Weir Junction is owned by EOT and operated by the MassCoastal Railroad.

The corridor runs through some environmentally sensitive areas, including the Pine Swamp in Raynham and the Hockomock Swamp ACEC in Easton. The Hockomock Swamp is one of the most important wetlands in the state for rare species habitat and protects regional water quality.

4.2.1.4 Whittenton Alternatives

This section provides an overview of the main component of the transportation corridor for the Whittenton alternatives under consideration. Like the Stoughton alternatives, the Whittenton alternatives would use the Northeast Corridor north of Canton Junction to the Stoughton Main Line to the Whittenton Branch. The Whittenton Branch is an abandoned rail line in Raynham and Taunton, running around the northwest edge of the core of the City of Taunton and connecting the Stoughton Line with the Attleboro Secondary.

The corridor runs through the Hockomock Swamp ACEC in Easton but would avoid impacts to the Pine Swamp in Raynham. The Whittenton Branch is currently owned by the MBTA.

4.2.2 Rapid Bus Alternative

This section provides an overview of four components of the highway transportation system. These components include using Route 24, Route 140, Route 128 (Interstate 95/Interstate 93) and the Southeast Expressway (Interstate 93/Route 3).

4.2.2.1 I-93 and the Southeast Expressway (I-93/Route 3)

I-93 runs through the City of Boston, traveling from Canton to New Hampshire. The Southeast Expressway (I-93/Route 3) is the only freeway connecting the downtown core of Boston to points south and the Route 128 beltway. It runs from the "Braintree Split" (the Route 3/I-93 Interchange) to downtown. It is four lanes in each direction throughout, with one lane from the off-peak direction used to make an HOV lane for

the peak direction during rush hours between the "Braintree Split" and Columbia Road in Boston.

The highway runs through very densely developed areas in Quincy, Milton, and Boston. It often experiences severe congestion in both directions, even during off-peak hours and on weekends.

South of the Southeast Expressway, the portion of concern for this project runs from the "Braintree Split" to Route 24 in Randolph. This section is four lanes in each direction. The median varies, and is widest near Route 24, but is generally less than 40 feet wide.

The highway runs through some environmentally sensitive areas, including the Fowl Meadow – Ponkapoag Bog ACECs in Randolph. It also borders the Blue Hills State Reservation on both sides in Quincy and Randolph. The highway experiences severe congestion in both directions during peak periods.

4.2.2.2 Route 24

Route 24 is a major north-south freeway, providing the primary link between the South Coast region and the Boston region. The highway is two lanes in each direction between I-195 and I-495, and three lanes in each direction between I-495 and Route 128. The median width varies, but is generally less than 20 feet wide.

The highway runs through some environmentally sensitive areas, including the Hockomock Swamp ACEC in West Bridgewater and the Fowl Meadow – Ponkapoag Bog ACECs in Randolph. It also borders portions of the Blue Hills State Reservation in Randolph. The highway experiences congestion during the peak periods, especially between Route 140 in Taunton and Route 128 in Randolph.

4.2.2.3 Route 140

Route 140 is a major north-south freeway connecting New Bedford to Route 24 in Taunton. The highway is two lanes in each direction throughout. The median width varies, but outside of New Bedford it is generally at least 40 feet wide.

4.3 Description of Modes

The following sections describe the modes used by the eight Phase 2 alternatives and the operating assumptions used to evaluate each mode.

4.3.1 Diesel Commuter Rail

Diesel commuter rail refers to a fixed-guideway system with steel wheels operating on steel rails, with one or two locomotives pulling a number of passenger coaches; on the MBTA system, trains are generally six to nine coaches. Coaches would be bi-level, to increase capacity. Figures 4-7 and 4-8 depict a typical cross-section of a conventional commuter rail.

Diesel commuter rail maximum speed was assumed to be 79 mph, the maximum currently operated on the MBTA system. For purposes of comparing alternatives, headways for commuter rail alternatives were set at 40 minutes on the branches and 20 minutes on the trunk, during the peak period in the peak direction. Scheduled travel times on existing services were not altered.

4.3.2 Electric Commuter Rail

Electrified commuter rail refers to a fixed-guideway system with steel wheels operating on steel rails, with one or two locomotives pulling a number of passenger coaches. For consistency with the MBTA system, trains are assumed to be six to nine coaches. Coaches would be bi-level to increase capacity. Commuter rail locomotives are powered by an overhead electrical contact system. Figures 4-9 through 4-11 depict a typical cross-section of an electrified commuter rail.

For electric commuter rail, the maximum speed was assumed to be 100 mph, the maximum speed that can be operated without incurring significant signal costs because of the need to signal civil restrictions. For purposes of comparing alternatives, headways for electric commuter rail alternatives were set at 40 minutes on the branches and 20 minutes on the trunk, during the peak period in the peak direction. Travel times on existing tracks were based on Amtrak schedules for the Attleboro and Stoughton corridors where possible or on track geometry.

4.3.3 Rapid Bus

Rapid Bus is a bus system designed to provide the quality and reliability of rail and the flexibility of bus. Buses operate in mixed traffic, exclusive lanes, or exclusive roadways. Vehicles have a capacity similar to a standard 45-foot highway motor coach (approximately 50 passengers) and would be clean diesel powered. Figure 4-12 depicts the typical cross-sections of a commuter bus envisioned for this alternative.

For Rapid Bus Alternative, travel times were based on projected future conditions along the highway corridor, taking into consideration that the bus would operate within exclusive lanes for segments of the corridors. For purposes of comparing alternatives, the Rapid Bus Alternative was envisioned to operate at 15 minutes headways during peak hours in the peak direction.

This Page Intentionally Left Blank

5

Phase 2 Screening Methodology

This chapter describes the Phase 2 screening process, which follows the process described in the *Highway Methodology*. [17] Phase 2 screening was conducted in consultation with the Interagency Coordinating Group.

As stated in the *Highway Methodology*, Phase 2 is intended to refine and supplement the Phase 1 alternatives with any additional available office data and some additional limited field data in order to provide input to the Corps as the Corps selects the Least Environmentally Damaging Practicable Alternative (LEDPA).

During the Phase 2 evaluation, conceptual operating plans, capital improvement requirements, capital costs, and operating and maintenance costs were developed for each alternative. Phase 2 alternatives were modeled by CTPS using the regional transportation model, providing quantitative results on the performance of each alternative in terms of ridership, highway/vehicular travel, air quality, and environmental justice. Detailed analyses of environmental impacts (to natural resources, air quality, noise and vibration, historic resources, social and economic impacts among others) were conducted and documented as well as mitigation measures and smart growth strategies recommended for each alternative.

The evaluation compares seven build alternatives to a refined set of project evaluation criteria. The No-Build Alternative was not evaluated as part of this Alternatives Analysis as it will continue to the FEIR/SEIR regardless of which Build Alternative is selected for further consideration.

Specific screening criteria were refined from the Phase 1 Alternatives Analysis based on critical operational and environmental issues. These Phase 1 Alternatives Analysis criteria were expanded to include an evaluation of how well the alternatives would meet the project purpose, how practicable they are to construct and operate, and the magnitude of environmental impacts and benefits would be.

[17] United States Army Corps of Engineers. NEDEP-360-1-30, *The Highway Methodology.* October 1993.

Each alternative was screened based on a scoring process. The scoring was developed for each of the criteria individually using the best performing alternative as a baseline. How well an alternative performed on a criterion was weighed against that baseline. For instance, if evaluating ridership, the highest ridership would be the baseline – the measure against which all other alternatives were weighed. If evaluating cost, the lowest cost would be the baseline.

For criteria, like ridership, where the focus is to achieve the highest possible draw, the scoring formula was:

Score = criteria value of alternative / MAXIMUM value in that criteria metric

For criteria, like cost, where the focus is to achieve the lowest possible value, the scoring formula was:

Score = MINIMUM value in that criteria metric / criteria value of alternative

Which of the two the scoring formulas was used is explained in the individual discussions of each criteria. The numeric scores were then converted to letter grades as shown in Table 5-1 to enable easier digestion of the large amounts of data contained in this report.

Table 5-1 Scoring of Alternatives

Percentage Range	Letter Grade
90% to 100%	A
80% to 89%	B
70% to 79%	C
60% to 69%	D
0% to 59%	F

Chapters 6, 7, and 8 of this report provide detailed analysis of the alternatives.

6

Project Purpose Measure

This chapter describes the screening to determine how well each of the proposed alternatives would meet the project purpose "to more fully meet the existing and future demand for public transportation between Fall River/ New Bedford and Boston, Massachusetts to enhance regional mobility, while supporting smart growth planning and development strategies in affected communities." Five sub-criteria were applied to the eight Phase 2 alternatives.

- *Ridership demand* – This screening criterion evaluates how well each alternative meets the demand for public transportation.
- *Improve quality of service* – This screening criterion evaluates how well each alternative provides a transit trip that is competitive to travel by car. It also evaluates how well each alternative meets MBTA's Service Delivery Policy.
- *Reduce vehicle miles traveled* – This screening criterion evaluates how well each alternative provides public transit connections between New Bedford/Fall River and Boston that offers the opportunity to shift from auto mode reliance to using the transit mode.
- *Improve regional mobility* – This screening criterion evaluates how well each alternative provides public transit connections between New Bedford/Fall River and Boston and provides public transit connections between South Coast cities (New Bedford, Fall River, Taunton and others).

6.1 Ridership Demand

This criterion evaluates how well an alternative would be able to meet existing and future demand for public transportation between Fall River/New Bedford and Boston. In order to estimate overall transit demand for the region, an optimal transit system with no constraints such as construction costs or environmental impacts

would have to be simulated. While this optimal transit demand has not been quantified, demand was measured in terms of the number of daily work-related trips between South Coast communities and Boston. For this screening analysis, transit demand was based on 2000 Journey-to-Work (JTW) data.

Total service to the South Coast Region was considered the total station boardings as projected for each alternative in addition to boardings at existing commuter bus services, which is anticipated to continue to operate with the South Coast Rail project in place. According to the JTW data, the number of daily work trips from the South Coast region to Boston is approximately 8,000. The ability of the alternative to meet possible future ridership potential was calculated as the percent of met ridership demand.

Table 6-11 Ridership Demand by Alternative

Name	New Station Boardings	Boardings at Existing Commuter Bus Services	Total Service to South Coast Region	Percentage of Met Ridership Demand [1]	Score [2]	Grade
Attleboro Electric Alternative	4,680	125	4,805	60%	95%	A
Attleboro Diesel Alternative	4,020	455	4,475	56%	89%	B
Stoughton Electric Alternative	4,790	85	4,875	61%	97%	A
Stoughton Diesel Alternative	4,070	355	4,425	55%	88%	B
Whittenton Electric Alternative	4,820	230	5,050	63%	100%	A
Whittenton Diesel Alternative	4,020	440	4,460	56%	88%	B
Rapid Bus Alternative	2,100	1,430	3,530	44%	70%	C

1 Total Service to South Coast Region divided by the number of daily work trips from the South Coast region to Boston (approximately 8,000)

2 Percentage of met ridership demand of an alternative divided by the maximum percentage of met ridership demand (in this case, the maximum ridership demand met by an alternative would be provided by the Whittenton Electric Alternative)

As shown in Table 6-1, the Whittenton Electric Alternative meets best the ridership demand out of the South Coast region, with 5,050 daily boardings. Attleboro Electric and Stoughton Electric provide the best service after Whittenton Electric with Rapid Bus trailing in last place.

6.2 Quality of Service

The following two sections evaluate how well each alternative provides a transit service. It focuses on two factors: travel time and reliability. Travel time measures how quickly an alternative would be able to get a passenger from the South Coast Region into Boston and reliability measures how often that service would be on time and, therefore, how dependable the service would be to the passengers who ride it. An alternative that does not improve the quality of transit services over the existing services provided in the region provides no functional benefit to the communities. Quality of service is assessed based on commuting time, reliability, comfort,

convenience and safety. For the purposes using quantifiable criteria, only run time and reliability are used as subcriteria.

6.2.1 Travel Time

Since New Bedford/Fall River commuters currently rely on cars and private bus services, an improved quality of service would provide a comparable or competitive travel time and improved reliability with respect to existing commuter options during peak commuting periods. The average commuting time by car during rush hour is currently 90 minutes. The CTPS travel demand model projects slower commutes as congestion along already slow corridors continues to increase. A future (2030) commute from New Bedford and Fall River to Boston is expected to be approximately 10 to 30 minutes longer than in 2009 (in the peak period).

Travel time for the rail alternatives was based on Systra's operations report[18], which identifies the segments of the rail corridors that would operate at top speed as well as segments where speed is constrained due to speed restrictions, geometry, vehicles, power mode, dwell times and number of stations and civil restrictions. Each commuter rail alternative has two overall run times: one for electric locomotives and one diesel locomotives as maximum speeds under the electric alternatives are 100 mph and under diesel alternatives 70 mph to 79 mph. Rapid Bus travel time was calculated based on existing travel times projected to future conditions and the posted speed limit in the exclusive lanes. Speed data provided by CTPS were used to determine future travel time along these corridors.

For this evaluation, the alternatives were weighted against each other based on their longest travel time (New Bedford to Boston) and their reliability. Table 6-2 summarizes travel time provided by each alternative and how the alternatives score against each other with regards to meeting the quality of service project purpose.

Table 6-2 Travel Times by Alternative

Name	Travel Time (min)	Travel Time Score [1]	Grade
Attleboro Electric Alternative	75	100%	**A**
Attleboro Diesel Alternative	84	89%	**B**
Stoughton Electric Alternative	76	99%	**A**
Stoughton Diesel Alternative	85	88%	**B**
Whittenton Electric Alternative	87	86%	**B**
Whittenton Diesel Alternative	96	78%	**C**
Rapid Bus Alternative	103	73%	**C**

1 Minimum travel time (in this case, Attleboro Electric with a 75-minute travel time) divided by the travel time provided by an alternative.

[18] Capacity Utilization Analyses Technical Memorandum, Systra USA, November 17, 2008.

The Attleboro Electric and Stoughton Electric Alternatives achieve the fastest travel times. The Rapid Bus Alternative receives the worst score, with travel times exceeding 100 minutes, which would still be faster than travel by car in the year 2030.

6.2.2 Service Delivery Policy

While an alternative might offer many benefits for the transit system in the South Coast region, it may be an unattractive service for the communities it is designed to serve because it offers too few trips. In order to maintain acceptable service, the MBTA has established a Service Delivery Policy[19] to ensure it provides quality transit services that meet the needs of the riding public. The minimum frequency of service levels provides the guidelines by which the MBTA maintains accessibility to the transportation network within a reasonable waiting period. The minimum frequency of service standards is the minimum frequency that must be maintained in a service. Commuter Rail and Commuter Bus minimum frequencies should provide 3 trips in a peak direction during the AM and PM peak periods.[20]

Although the South Coast Rail alternatives were all designed to provide this minimum standard, analysis has shown that the Attleboro Alternatives would not be able to meet the minimum service standard during the PM peak period.
There are many factors that contribute to the Attleboro Alternatives' inability to meet the service delivery standard. These factors are outlined in greater detail Chapter 7, Practicability Measure. Table 6-3 summarizes whether the alternatives meet the MBTA's Service Delivery policy.

Table 6-3 MBTA Service Delivery Policy by Alternative

Name	Meets MBTA Service Delivery Policy?	Travel Time Score	Grade
Attleboro Alternatives	No	0%	**F**
Stoughton Alternatives	Yes	100%	**A**
Whittenton Alternatives	Yes	100%	**A**
Rapid Bus Alternative	Yes	100%	**A**

6.3 Vehicle Miles Traveled

Vehicle Miles Travelled (VMT) is an important gauge for an alternative's transportation system benefits. VMT measures the extent of motor vehicle operation or the total number of vehicle miles travelled within the study area on given day. This particular measure quantifies how many miles of travel would be removed from the regional roadway network by commuters who elect to travel by train or bus

[19] Massachusetts Bay Transportation Authority, *Service Delivery Policy*, MBTA Board of Directors approved January 14, 2009.

[20] Between LIRR, MNRR, MBTA, and METRA, the average service provided is 2.9 peak period trains.

rather than drive. This reduction in driving has several environmental benefits, notably cleaner air and a reduction in greenhouse gas emissions. Fewer cars on the road also eases congestion along highway corridors. The alternative with the greatest VMT change (reduction) receives the highest score under this criterion.

Table 6-4 summarizes the daily reduction in vehicle miles traveled provided by each alternative based on CTPS projections and how the alternatives score against each other with regards to meeting the project purpose to reduce vehicle miles traveled.

Table 6-4 VMT Reductions by Alternative

Name	VMT Reduction (daily miles)	VMT Score [1]	Grade
Attleboro Electric Alternative	(296,569)	100%	A
Attleboro Diesel Alternative	(256,421)	86%	B
Stoughton Electric Alternative	(295,922)	100%	A
Stoughton Diesel Alternative	(228,705)	77%	C
Whittenton Electric Alternative	(228,018)	77%	C
Whittenton Diesel Alternative	(173,961)	59%	F
Rapid Bus Alternative	(81,495)	27%	F

1 Reduction in VMTs provided by an alternative divided by the maximum reduction of VMTs (in this case, Attleboro Electric and Stoughton Electric with roughly 296,000 fewer vehicle miles traveled per day)

The Attleboro Electric and Stoughton Electric Alternatives achieve the greatest reduction in daily vehicle miles travelled of all the alternatives. The reduction difference between these alternatives and their respecting Diesel alternatives is approximately 40,000 for Attleboro and 47,000 for Stoughton. The Rapid Bus Alternative would achieve the least reduction in vehicle miles traveled of all the alternatives.

6.4 Regional Mobility

The following sections discuss the interregional connection provided by each alternative and how well each alternative meets the project purpose to improve regional mobility. As all the alternatives provide a connection from Fall River and New Bedford to Boston, an alternative will be considered more favorable if it also enhances mobility between points within the region. An interregional link that provides a one-seat ride from one municipality to another. Connections within a municipality were not counted. For instance, New Bedford, which would accommodate two stations, would provide a one-seat ride from Whale's Tooth to King's Highway. However, this connection was not considered an improvement to regional mobility as it is contained to just New Bedford.

Table 6-5 summarizes the number of interregional links provided by each alternative and how the alternatives score against each other with regards to meeting the regional mobility project purpose.

Table 6-5 Regional Mobility Improvements by Alternative

Name	Interregional Links	Interregional Links Score [1]	Grade
Attleboro Alternatives	34	83%	**B**
Stoughton Alternatives	41	100%	**A**
Whittenton Alternatives	41	100%	**A**
Rapid Bus Alternative	5	12%	**F**

1 Interregional links provided by an alternative divided by the maximum number of interregional links of an alternative (in this case, Stoughton and Whittenton with 41 interregional links)

The following sections provide a detailed discussion of the results presented in Table 6-5.

6.4.1 Attleboro Alternatives

The Attleboro Alternatives would provide commuter rail service to South Station using the Northeast Corridor, proposed Attleboro Bypass, Attleboro Secondary, New Bedford Main Line and Fall River Secondary. This alternative would include eight new commuter rail stations (Barrowsville in Norton, Downtown Taunton in Taunton, Taunton Depot in Taunton, King's Highway in New Bedford, Whale's Tooth in New Bedford, Freetown in Freetown, Fall River Depot in Fall River and Battleship Cove in Fall River). Table 6-6 illustrates the interregional links provided by the alternative.

Table 6-6 Interregional Links – Attleboro Alternatives[1]

	Boston	Westwood	Canton	Sharon	Mansfield	Norton	Taunton	Freetown	Fall River	New Bedford
Boston		X				X	X	X	X	X
Westwood	X					X	X	X	X	X
Canton						X	X	X	X	X
Sharon						X	X	X	X	X
Mansfield						X	X	X	X	X
Norton	X	X	X	X	X		X	X	X	X
Taunton	X	X	X	X	X	X		X	X	X
Freetown	X	X	X	X	X	X	X		X	
Fall River	X	X	X	X	X	X	X	X		
New Bedford	X	X	X	X	X	X	X			

1 Inter-municipal connections not included.

As shown in Table 6-6, the Attleboro Alternatives would provide 34 interregional one-way links (68 two-way links), which would connect Fall River and New Bedford not only to Boston but also to communities that include Westwood, Canton, Sharon, Mansfield, Norton and Taunton. In comparison to the other alternatives, the Attleboro Alternatives score 83 percent. This is the second highest score for meeting the regional mobility project purpose.

6.4.2 Stoughton Alternatives

The Stoughton Alternatives would provide commuter rail service to South Station using the Northeast Corridor, Stoughton Line, New Bedford Main Line and Fall River Secondary. This alternative would have ten new commuter rail stations (North Easton in Easton, Easton Village in Easton, Raynham Place in Raynham, Downtown Taunton in Taunton, Taunton Depot in Taunton, King's Highway in New Bedford, Whale's Tooth in New Bedford, Freetown in Freetown, Fall River Depot in Fall River and Battleship Cove in Fall River). Table 6-7 highlights the interregional links provided by the alternative.

Table 6-7 Interregional Links – Stoughton Alternatives[1]

	Boston	Westwood	Canton	Stoughton	Easton	Raynham	Taunton	Freetown	Fall River	New Bedford
Boston		X		X	X	X	X	X	X	X
Westwood	X			X	X	X	X	X	X	X
Canton				X	X	X	X	X	X	X
Stoughton	X	X	X		X	X	X	X	X	X
Easton	X	X	X	X		X	X	X	X	X
Raynham	X	X	X	X	X		X	X	X	X
Taunton	X	X	X	X	X	X		X	X	X
Freetown	X	X	X	X	X	X	X		X	
Fall River	X	X	X	X	X	X	X	X		
New Bedford	X	X	X	X	X	X	X			

1 Inter-municipal connections not included.

As shown in Table 6-7, the Stoughton Alternatives would provide 41 interregional links, which would connect Fall River and New Bedford not only to Boston but also to communities such as Canton, Stoughton, Easton, Raynham and Taunton. In comparison to the other alternatives, the Stoughton Alternatives score 100 percent and are tied for the highest score for meeting the regional mobility project purpose.

6.4.3 Whittenton Alternatives

The Whittenton Alternatives would provide commuter rail service to South Station through Stoughton, connecting to the existing Stoughton Line using the Whittenton Branch through the City of Taunton. This alternative would have ten new commuter rail stations (North Easton in Easton, Easton Village in Easton, Raynham Place in Raynham, Downtown Taunton in Taunton, Taunton Depot in Taunton, King's Highway in New Bedford, Whale's Tooth in New Bedford, Freetown in Freetown, Fall River Depot in Fall River and Battleship Cove in Fall River). Table 6-8 highlights the interregional links provided by the alternative.

Table 6-8 Interregional Links – Whittenton Alternatives[1]

	Boston	Westwood	Canton	Stoughton	Easton	Raynham	Taunton	Freetown	Fall River	New Bedford
Boston		X		X	X	X	X	X	X	X
Westwood	X			X	X	X	X	X	X	X
Canton				X	X	X	X	X	X	X
Stoughton	X	X	X		X	X	X	X	X	X
Easton	X	X	X	X		X	X	X	X	X
Raynham	X	X	X	X	X		X	X	X	X
Taunton	X	X	X	X	X	X		X	X	X
Freetown	X	X	X	X	X	X	X		X	
Fall River	X	X	X	X	X	X	X	X		
New Bedford	X	X	X	X	X	X	X			

1 Inter-municipal connections not included.

As shown in Table 6-8, the Whittenton Alternatives would provide 41 interregional one-way links (82 two-way links), which would connect Fall River and New Bedford not only to Boston but also to communities such as Canton, Stoughton, Easton, Raynham and Taunton. In comparison to the other alternatives, the Whittenton Alternatives score 100 percent and are tied for the highest score for meeting the regional mobility project purpose.

6.4.4 Rapid Bus Alternative

The Rapid Bus Alternative would provide commuter bus service to South Station via I-93, Route 140 and Route 24. The Rapid Bus Alternative proposes four service branches in the southern project area. Inbound service would originate from downtown New Bedford, Fall River, downtown Taunton, and Taunton Silver City Galleria. Each branch would operate with a maximum of two stations in the South Coast region. The Taunton branches would have only one Taunton station per branch. While all four Rapid Bus routes converge on Route 24 near Taunton, the only shared station shared by the all the routes is South Station. This alternative would include six new rapid bus stations (Downtown Taunton in Taunton, Galleria Station in Taunton, King's Highway in New Bedford, Whale's Tooth in New Bedford, Freetown in Freetown and Fall River Depot in Fall River). Table 6-9 highlights the interregional links provided by the alternative.

Table 6-9 Interregional Links – Rapid Bus Alternative[1]

	Boston	Taunton	Freetown	Fall River	New Bedford
Boston		X	X	X	X
Taunton	X				
Freetown	X			X	
Fall River	X		X		
New Bedford	X				

1 Inter-municipal connections not included.

As shown in Table 6-9, the Rapid Bus Alternatives would provide only five interregional one-way links (10 two-way links), which would connect Fall River, New Bedford and Taunton to Boston. In comparison to the other alternatives, the Rapid Bus Alternative scores 12 percent, which does not meet the regional mobility project purpose. The Rapid Bus Alternative received the lowest score of all alternatives in terms of meeting the regional mobility project purpose. This is because it only enables five regional connections, compared to 41 provided by the Stoughton and Whittenton Alternatives.

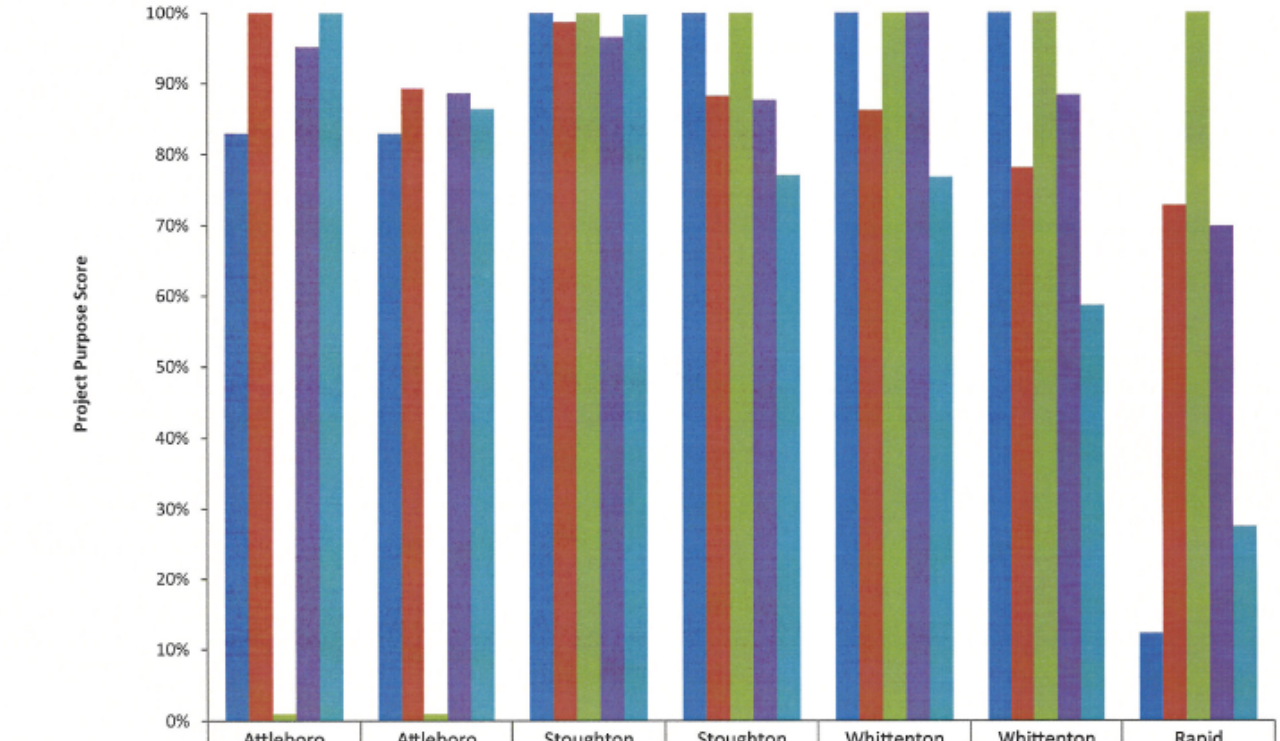
The Rapid Bus Alternative has two inherent constraints that prevent it from linking to more communities. The first constraint includes the need to minimize travel time of the service in order for it to remain competitive between alternatives and appealing to potential riders. The alternative was designed for fast, attractive connections from Taunton, Fall River and New Bedford to Boston, which would be provided in four express branches. Serving additional communities with these branches would significantly slow service to unacceptable levels, which would result in fewer transit riders.

The second constraint that limits the alternative's regional connections is bus capacity. The Rapid Bus routes would need to operate on short headways and in a platooning-effect (multiple buses leaving a station at one time) in order to accommodate ridership demand. The buses would operate at or near capacity, which would preclude additional stops along the branches. Any additional stations would need to operate as exclusive routes and would not provide any additional interregional connectivity.

6.5 Project Purpose Summary

The following sections describe how well each alternative meets the project purpose performance and is illustrated in Figure 6-1.

Figure 6-1 Summary of Project Purpose Results



	Attleboro Electric	Attleboro Diesel	Stoughton Electric	Stoughton Diesel	Whittenton Electric	Whittenton Diesel	Rapid Bus
Regional Mobility	B	B	A	A	A	A	F
Travel Time	A	B	A	B	B	C	C
Service Delivery Policy	F	F	A	A	A	A	A
Ridership Demand	A	B	A	B	A	B	C
VMTs	A	B	A	C	C	F	F

As shown in Figure 6-1, Stoughton Electric meets all five project purpose measures with scores greater than or equal to 97 percent and fares best of all the alternatives. Stoughton Diesel and Whittenton Electric follows closely behind, meeting all five project purpose measures with scores equal to or greater than 77 percent. Rapid Bus, however, fails on two points: Regional Mobility and VMT reduction. The Attleboro Alternative, while it meets four of the five, it fails to meet the basic service delivery requirements. The next chapter documents the cascading negative effect this would have on the entire MBTA commuter rail system and the subsequent decrease in ridership.

7

Practicability Measure

This chapter describes the second screening step which assessed the practicability of construction or operation for each of the proposed alternatives
The first step of this assessment (Chapter 6) documented how each of the seven build alternatives meet the Project Purpose. The second step provides data on how practicable each of the alternatives would be to implement based on the Permit 404 definition of practicable: "capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose." The Corps, New England District, has developed a set of non-regulatory pre-application guidelines known as the *Highway Methodology*[21] to screen alternatives and to ensure that the transportation agency's preferred alternative is consistent with federal wetlands regulations. This Phase 2 Alternatives Analysis was conducted in accordance with the *Highway Methodology* guidelines, and recognizes a full range of NEPA alternatives and impacts to determine first which alternatives are practicable, which is assessed in this chapter, and second which are environmentally less damaging, which is assessed in Chapter 8. Four sub-criteria were used to evaluate how practicable the alternatives are:

- *Cost per Rider*– Measures how costly it would be to provide an alternative compared to the number of riders expected to use the system.
- *Construction Schedule* – The time required to construct each alternative is also a measure of practicability because longer construction schedules become increasingly more expensive, as well as delay the delivery of project benefits.
- *On-Time Performance* – Measures how well the alternatives would be able to serve the South Coast Region in terms of providing the passengers an assurance that they will arrive on time and measures how capacity constraints translate into impacts on the overall MBTA commuter rail system.
- *Local Support* – Qualitatively documents the support and opposition for each of the alternatives, providing an indication of how likely an alternative is to be legally challenged or delayed by local opponents or whether the state and local

[21] United States Army Corps of Engineers. NEDEP-360-1-30, *The Highway Methodology Workbook*. October 1993.

support provides funding by the state and federal agencies. This metric is particularly important if an alternative has strong political opposition.

7.1 Cost per Rider

This criterion evaluated how well an alternative performs based on how a balance of capital and operating and maintenance cost to the benefit of the service, or the number of riders projected to use the system. The metric for this criterion is cost per rider, which includes infrastructure construction, land acquisition, environmental mitigation, brownfields site remediation and other construction elements based on the more refined preliminary engineering design as well as the cost of operating and maintaining the system. Detailed breakdown of capital cost and operation and maintenance cost estimates can be found in the *Alternatives Description*.

As previously mentioned, a measure of 2030 ridership for each alternative was evaluated using the Central Transportation Planning Staff (CTPS) regional model. CTPS refined their regional travel demand model set to include regional transportation projects, land use alternatives based on regional plans for the study area, and the proposed operation plan for each project alternative. Further information incorporated into their analysis includes station locations, station parking availability and cost, and fares. Table 7-1 compares the cost per rider of each alternative.

Table 7-1 Cost per Rider by Alternative

Name	Cost per Rider [1]	Score [2]	Letter Grade [3]
Attleboro Electric	$57.03	77%	C
Attleboro Diesel	$58.29	75%	C
Stoughton Electric	$45.76	96%	A
Stoughton Diesel	$43.73	100%	A
Whittenton Electric	$48.16	91%	A
Whittenton Diesel	$46.25	95%	A
Rapid Bus	$99.79	44%	F

1 Annualized capital cost and annual operating and maintenance cost estimates divided by annual passengers.

2 Cost per rider of an alternative divided by the minimum cost effectiveness (in this case, Stoughton Electric with $43.73 per trip)

3 90% to 100% = Grade A; 80% to 89% = Grade B; 70% to 79% = Grade C; 60% to 69% = Grade D; 0% to 59% = Grade F

As shown in Table 7-1, the Rapid Bus Alternative would be the least cost-effective of all the alternatives with a cost of approximately $100 per rider. The Attleboro Alternatives would be roughly $58 per rider. The Stoughton and Whittenton Alternatives would provide the most cost-effective service with approximately $44 to $48 per rider.

7.2 Construction Schedule

The time required for construction affects the length of short-term impacts and the startup date for new transit services. Alternatives were evaluated to determine whether each alternative could be constructed within a reasonable, four-year, timeframe in order to achieve the project. With construction slated to begin December 2012, the four-year timeframe would need to be maintained to meet the December 2016 opening date, as outlined in Governor Patrick's *South Coast Rail, A Plan for Action*. In addition to trying to maintain a December 2016 opening date, a shorted construction period would ensure lower construction costs. Construction costs, which typically escalate over time, would increase significantly with longer construction periods (particularly with regard to the cost of materials such as steel and concrete).

Construction schedules were established based on construction sequencing outlined in the Alternatives Description Technical Report. Construction of track, bridges, culverts, grade crossings, electrification and whether the construction would occur along active or inactive corridors, among other components, all contribute to the construction length required. Table 7-2 compared the construction schedules of the alternatives.

Table 7-2 Schedule by Alternative

Name	Construction Schedule (years)	Score [1]	Grade [2]
Attleboro Electric	7.0	57%	**F**
Attleboro Diesel	7.0	57%	**F**
Stoughton Electric	4.5	89%	**B**
Stoughton Diesel	4.0	100%	**A**
Whittenton Electric	4.5	89%	**B**
Whittenton Diesel	4.0	100%	**A**
Rapid Bus	4.5	89%	**B**

1 Construction schedule of an alternative divided by the minimum construction time (in this case, Stoughton and Whittenton Diesel which could be constructed in 4.0 years)

2 90% to 100% = Grade A; 80% to 89% = Grade B; 70% to 79% = Grade C; 60% to 69% = Grade D; 0% to 59% = Grade F

As shown in Table 7-2, the Attleboro Alternative has the longest construction duration (7 years). The reason the Attleboro Alternatives would have a lengthier construction period than the rest is largely due to the fact that construction activity along the existing Northeast Corridor would need to be limited to a few hours during the night.[22] Night construction would not begin until the electrified catenary system is de-energized after the last Acela or Amtrak Regional train. This caternaty system would need to be re-energized prior to the first train of the following morning. The

[22] According to August 13, 2009 meeting with Amtrak.

process of de-energizing and re-energizing the catenary would require approximately 2.5 hours, leaving a maximum of 4.5 hours nightly (approximately 1 AM to 5 AM). The rest of the alternatives, including Stoughton, Whittenton, and Rapid Bus, fare relatively well against each other with approximate construction schedules of 4 to 4.5 years.

7.3 On-Time Performance

As mentioned in Chapter 6, an alternative may seem that it would offer a quality service based only on the projected travel time. However, its projected on-time performance could make the alternative an unattractive option for the South Coast riders as infrastructure constraints make a particular alternative unreliability. "On time" is defined as being no more than 5 minutes late, particularly for routes with published schedules such as a commuter rail or commuter bus service and for this particular metric, the system on-time performance is evaluated. While on-time performance of one commuter rail or bus route is an important measure, the on-time performance of a combined system more accurately measures how well both a particular alternative will perform and how well it will do so without impacting the commuter system as a whole. At point of reference, the MBTA System Wide Commuter Rail On-Time Performance for calendar year 2008 ranged from 78 to 95 percent. The on-time performance of each alternative is summarized in Table 7-3.

Table 7-3 On-Time Performance by Alternative

Name	On-Time Performance [1]	Score [2]	Grade [3]
Attleboro Electric Alternative	52.4%	54%	**F**
Attleboro Diesel Alternative	47.6%	49%	**F**
Stoughton Electric Alternative	97.9%	100%	**A**
Stoughton Diesel Alternative	95.9%	98%	**A**
Whittenton Electric Alternative	97.9%	100%	**A**
Whittenton Diesel Alternative	95.9%	98%	**A**
Rapid Bus Alternative	88.3%	90%	**A**

1 On-time performance for south side terminals as a result of the alternative's operating plan. On-time performance based on Systra's Network Simulation Analysis of Proposed 2030 MBTA/Amtrak Operations

2 On-time performance by an alternative divided by the maximum on-time performance (in this case, Stoughton and Whittenton Electric with a 97.9% on-time performance).

3 90% to 100% = Grade A; 80% to 89% = Grade B; 70% to 79% = Grade C; 60% to 69% = Grade D; 0% to 59% = Grade F

As shown in Table 7-3, the Stoughton, Whittenton and Rapid Bus Alternatives achieve an acceptable on-time performance, while the Attleboro Alternative does not. There are many factors that contribute to the Attleboro Alternatives' on-time performance. Some of these factors are outlined in Chapter 6, Project Purpose Measure. In addition to the reliability factors in Chapter 6, Systra's Network Simulation Analysis indicates that the Attleboro Alternative is operationally infeasible based on its failure to achieve the MBTA on-time standard in the morning

peak. In the evening, the Attleboro Alternative would experience even worse on-time performance. The report summarizes that the "RAILSIM Network Simulator, which is a very robust, capable, and well-tested simulation tool, was unable to complete the [evening] simulation and spontaneously aborted around 5:30 PM. This is a very striking result, and one which points to a serious fatal flaw in the Attleboro Alternative operating plan.[23]" It is important to stress that while the Attleboro Alternatives would have poor on-time performance on that particular route, they would also contribute to a cascading negative impact on the on-time performance of the entire south side commuter rail system, including Worcester, Franklin, Needham, and Providence Lines.

It should be noted that had this information been available during the Phase 1 Alternatives Analysis evaluation, the Attleboro Alternatives would have been eliminated from further consideration during "Criterion 2.2 – *Does not significantly adversely affect the existing or future capacity, reliability and quality of the regional transportation system*."

7.4 Local Support

EOT has conducted a robust civic engagement process to include South Coast communities in the process of analyzing alternatives for the South Coast Rail project. EOT has included a wide variety of public involvement strategies and stakeholders in this outreach, including:

- ***Commuter Rail Task Force***: composed of representatives from 31 corridor communities, this group focuses on the development aspects of the project, and its representatives participate in a wide range of project meetings and planning.
- ***Legislative Briefings***: 29 state Senators and Representatives represent the area; many of them participate in briefings conducted every quarter and also come to community meetings, forums and public meetings.
- ***Regional and individual community meetings***: About two dozen regional or local community public meetings have been held to date on the project.
- ***Station workshops***: In communities expected to host a station, EOT has conducted planning meetings to gather comments on the community's vision, siting and smart growth development.
- ***Property owner meetings; meetings with Conservation Agents and planners; meeting with elected officials***: These meetings take place frequently.
- ***Tours***: Route tours have been provided for members of the Interagency Coordinating Group, the Corps and its consultants, and elected officials.

[23] Systra Consulting, Inc., Technical Memorandum, Network Simulation Analysis of Proposed 2030 MBTA/Amtrak Operations, August 11, 2009

- ***Website; fact sheets; email blasts; correspondence; summary meeting notes; editorials and position papers***: Each of these is a source of project information. The team responds to all written comments and letters.

Feedback from this outreach process has provided various points of view and qualitative assessments of the level of support for each alternative. Thus far, rail as a mode has received near unanimous support from elected officials compared to Rapid Bus. The main opposition to commuter rail as a mode has come from several environmental organizations who oppose the alignment through the sensitive habitat of the Hockomock Swamp and other wetlands. Other groups have recognized the environmental benefits of commuter rail, particularly electrified rail.
This section provides an overview of comments pertaining to the alternative corridors. Because the Whittenton Alternatives are variations of the Stoughton Corridor, they are discussed with the Stoughton Alternatives.

7.4.1 Attleboro Alternatives

The Attleboro alternative has opponents in the communities along the line and supporters from other areas in the region. The Norton Board of Selectmen is unified against the Attleboro/Norton route due to newly developed subdivisions in both Norton and Attleboro, among other reasons. Norton selectmen unanimously voted months ago to oppose the Attleboro Alternative and to support the Stoughton Alternative, which avoids Norton but crosses Easton. The town has voted to set aside a fund for legal action against the selection of an Attleboro route alternative[24].
Mayor Charles Crowley of Taunton and Mayor Ken Dumas of Attleboro also oppose the Attleboro Alternatives. Mayor Crowley bases his opposition on the number of grade crossings in the downtown Taunton area. These alternatives would also preclude Mayor Crowley's preferred station location, Taunton Station at Dean Street. George Dentino, Mansfield Selectman, has said that Mansfield is against the Attleboro alternatives[25]. A number of property owners near the proposed Attleboro Bypass are concerned about environmental impacts and they have also pointed out that the ENF listed more wetlands impacts resulting from the Attleboro route than the Stoughton Alternative.

7.4.2 Stoughton and Whittenton Alternatives

Mayor Charles Crowley reiterated his support for bringing commuter train service back to Taunton, about 50 years after it left. "We want to be the gateway to the South Coast." Of the three proposed paths for the train, Crowley said city officials oppose the Attleboro and Middleboro lines while favoring the Stoughton route. He

[24] Norton Town Meeting, 1/15/2008

[25] Attleboro Public Meeting, 3/10/2008

identified that the Stoughton route (and not the Whittenton route) "offers two train stops and a transit center in the city."[26]

Mayor Crowley has opposed the Whittenton Alternatives. He expressed concern about the number of grade crossings the route would revive in Taunton. These alternatives would also preclude Mayor Crowley's preferred station location, Taunton Station at Dean Street.

Frank Cook, Attleboro City Council President and Ward Councilor, said the City Council passed a resolution on January 22 supporting the Stoughton alternative. (Attleboro Public Meeting, 3/10/2008); other communities opposing the Attleboro alternative have taken similar actions to support the Stoughton route.

"The Stoughton route [as opposed to the Whittenton route] is the most practical and feasible of all the rail alternatives. It is the most direct connection from Taunton to the main line; it will provide the best service to Taunton, Raynham, Easton and Stoughton; the environmental issues involving the Hockomock and Pine Swamps can be satisfactorily resolved; this alternative was the one selected approximately ten years ago when this project was last studied; and it was the route utilized for nearly one hundred years when it was discontinued approximately fifty years ago." George Spatcher, who opposes the Attleboro route, made this comment in a letter dated 1/9/2009 on the ENF.

While many people in the Town of Easton opposed the Stoughton routings initially, there are indications of a softening of this position: "Many people in Easton support the return of rail service to the town; whether they are in the majority or the minority is not known. What is known is that a town-wide vote (where even ordinary people could vote) was taken last year to determine if the voters wanted to spend town money to oppose the Stoughton Alternative. The vote was no, and since then the opponents of the railroad don't seem to be very eager for another town-wide vote on the matter. A highly vocal few will tell you that Easton is anti-train. But that statement, at this point, is no more than a guess and a wish"[27].

In advance of release of the environmental consequences reports, it seems likely that some environmental organizations will oppose the Stoughton alternative solely due to its passage through the Hockomock Swamp. Mass Audubon, PEER, the Taunton River Watershed Alliance and others may take this position. Some may express a preference for the Whittenton Alternatives because they avoid the Pine Swamp. The Nature Conservancy and others have applauded the smart growth approach to the commuter rail alternatives in general. They note that "poorly planned development constitutes one of the primary causes of wildlife habitat loss and fragmentation in Massachusetts,"[28]

[26] Taunton Gazette 12/3/08 "Proposed South Coast commuter rail project stays on track"

[27] Fred Ames, Boston Globe, Letter to the Editor, 10/19/08

[28] Robb Johnson, January 9, 2009, comment letter on the ENF

7.4.3 Rapid Bus Alternative

Positions in the region on the Rapid Bus alternative typically depend on geography. Towns and residents in the northern part of the project area are more likely to support buses traveling north on Route 24. This support is generally not based on bus service as an attractive or popular form of transportation; instead, it is typically a position taken by:

- Those who don't want a station in their community because of traffic, construction or other impacts;
- Property owners along the railroad right-of-way who do not want active rail along or adjacent to their properties; and/or
- People who feel the project is too expensive and suggest that residents to the south could be served by buses.

The New England office of Public Employees for Environmental Responsibility (PEER), represented by its executive director, a resident of Easton, is a strong supporter of the bus alternative. "The only solution" to concerns of project cost and long commutes, she said, "is rapid bus."[29]

Moving to the southern part of the corridor, opinions are different. The New Bedford Area Chamber of Commerce, for example, does not favor a particular train route but does not want a bus. "It won't have the same economic impact," said Roy Nascimento, the chamber's president and CEO. "History has shown that commuter rail has had a tremendous impact on communities," he added, citing Brockton and the South Shore[30]. Mayor Scott Lang of New Bedford has stated in several public forums that rail attracts more investment, could support reverse commuting and intra-regional movement and would serve Environmental Justice populations. "Connecting us with a transportation rail will make it easier for people to move in and out of the city, out of the region to jobs, or to come down to work in jobs," said New Bedford Mayor Scott Lang. "It will help fuel the whole recreational, entertainment and tourism industry that our area has."[31]

Other mayors and elected officials representing the southern tier express similar opinions in legislative briefings and community meetings. They focus on both transportation and economic development. For example, "what is important to me is economic growth but in a smart growth environment," Freetown Selectman Lisa A Pacheco said. "Not only are we looking for ridership from New Bedford and Fall River to go to Boston, but with the Riverfront Business Park and the Fall River Business Park, we may be looking for people from Boston or Stoughton or anywhere upward to come down and work in our area and use our facilities. We need to do that in a smart growth way to protect the people both in Assonet and in (East)

[29] Fall River Herald, 4/7/2009 "Swapping bus for train locally unpopular"

[30] Fall River Herald, 4/7/2009 "Swapping bus for train locally unpopular"

[31] Providence Business News, 11/24/08 "Commuter Rail a Long Wait for Some

Freetown, because remember, Freetown is the only town to have the rail going in on two sides"[32]

Research and modeling for the project's Economic Development and Land Use Corridor Plan (June 2009) indicates that rail service will generate new economic growth in every year through 2030, the planning horizon. Professional firms are more likely to locate in the area if there is reliable commuter rail, as opposed to commuter bus service only. Rapid Bus is estimated to have about 60 percent the economic development value of the rail alternatives.

7.4.4 Summary

"Anywhere that commuter rail has gone in, it brings vitality into the city," Mayor Scott Lang of New Bedford. "What it does is bring a tremendous economic development opportunity. I think it opens our city up."[33] Mayor Lang's approach is likely to be shared by business groups, developers, cities and residents in the South Coast Region and a growing number of supporters in the northern regions. Elected officials in the South Coast Region have voiced their strong preference for commuter rail over Rapid Bus. This preference has also been plainly voiced by Congressman Barney Frank, Senator John Kerry, and Governor Deval Patrick. Previous legislation required a rail alternative for access from the South Coast region. Business communities in the South Coast cities also appear to support commuter rail, citing the permanent investment of rail and its advantages for economic development.

Elected officials from project area towns have voiced more support for commuter rail than for Rapid Bus. Many of these officials have shown clear preferences for one alternative over another. Some elected officials have indicated support for the Attleboro Alternatives, while several have shown support for Stoughton alternatives. Taunton officials have expressed their preference for Stoughton alternatives as opposed to Attleboro or Whittenton.

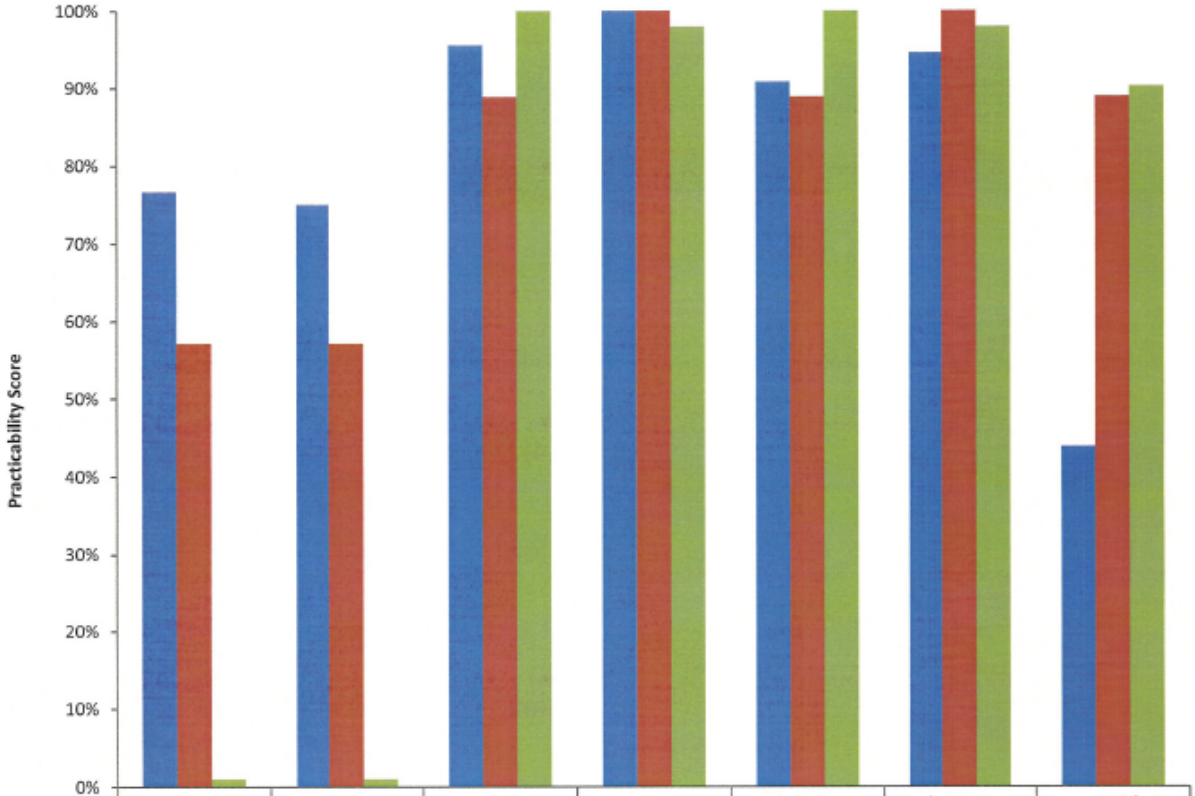
7.5 Practicability Summary

The following sections describe the results for the seven build alternatives evaluated in the alternatives analysis for practicability (Figure 7-1).

[32] New Bedford Standard-Times, 3/17/08 "Freetown Residents have their say on rail"

[33] Boston Globe, 2/17/08 "New Rail Service to Hub called Economic Boon

Figure 7-1 Summary of Practicability by Alternative



	Attleboro Electric	Attleboro Diesel	Stoughton Electric	Stoughton Diesel	Whittenton Electric	Whittenton Diesel	Rapid Bus
Cost per Rider	C	C	A	A	A	A	F
Schedule	F	F	B	A	B	A	B
On-Time Performance	F	F	A	A	A	A	A

As shown in Figure 7-1, the Attleboro Alternatives perform poorest on the practicability measure. This is largely due to the results which found that the Attleboro Alternatives are operationally infeasible based on its failure to achieve the MBTA on-time standard in the morning peak and would experience even worse on-time performance during the evening peak commute. It is important to stress that while the Attleboro Alternatives would have poor on-time performance on that particular route, they would also contribute to a cascading negative impact on the on-time performance of the entire southerly commuter rail system, including Worcester, Franklin, Needham and Providence commuter rail lines.

Likewise, the Rapid Bus alternative does not perform well on the practicability measure particularly on the cost per rider, which has the Rapid Bus Alternative close to $100 per rider.

The Stoughton and Whittenton Alternatives perform very well across the board on the practicability measure with all grade B or better.

8

Beneficial Effects and Environmental Impacts Measure

This chapter describes the screening process used to determine the relative magnitude of each alternative's beneficial and adverse impacts to the aquatic, natural and human environment.

The first two levels of analysis assessed how well each of the alternatives would meet the project purpose and then how practicable each of the alternatives would be to implement. The final step in evaluating the alternatives measures the environmental impacts. As previously mentioned, the Corps, New England District, has developed a set of non-regulatory pre-application guidelines known as the *Highway Methodology*[34] to screen alternatives and to ensure that the transportation agency's preferred alternative is consistent with federal wetlands regulations. This Phase 2 Alternatives Analysis was conducted in accordance with the *Highway Methodology* guidelines, and recognizes a full range of NEPA alternatives and impacts to determine first which alternatives are practicable (in terms of logistics, technical aspects and cost, which was assessed in Chapter 7) and second which are environmentally less damaging. This portion of the screening process identified beneficial or adverse impacts to the aquatic, natural and human environment to occur as a result of each alternative, particularly to wetlands, Areas of Critical Environmental Concern (ACECs), threatened and endangered species, protected open space, public water supplies, land use, noise, air quality and environmental justice communities. These resources were selected from a full range of environmental impacts criteria because they are principal categories that either must be considered for permits and approvals and/or resulted in the greatest magnitude of change between all of the alternatives.

As stated in the EPA Guidelines at 40 Code of Federal Regulations 230.10(a), "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse

[34] United States Army Corps of Engineers. NEDEP-360-1-30, *The Highway Methodology Workbook*. October 1993.

environmental consequences." Therefore, this portion of the screening process assessed impacts to the aquatic environment under the Clean Water Act, but also assessed other impacts to the overall natural environment, as is required under the EPA guidelines, and also to the human environment. The specific measures for each criterion are listed below.

The environmental impacts measure was based on two primary criteria: "What are the beneficial effects and what are the adverse impacts?" These criteria were evaluated based on the following sub-criteria:

- ***Beneficial Effects***
  - How well does an alternative serve environmental justice populations?
  - What are the air quality benefits that would be provided by each alternative?
  - What are the climate change benefits that would be provided by each alternative?
  - What smart growth opportunities would be provided by each alternative?

- ***Adverse Impacts***
  - What would be the permanent wetland loss (in acres) (edge and interior wetlands and floodplains) and wetland loss in ACECs?
  - What would be the number of acres of protected open space[35] that would be directly impacted, acres of land acquisition and municipal tax loss?
  - What would be the number of acres of protected public water supply lands (active and inactive Mapped Wellhead Zone 1) that would be directly impacted?
  - What would be the noise impacts of each alternative?
  - What would be the number of acres of mapped Priority Habitat (state-listed rare species) that would be lost (edge and interior habitat)?

The following chapters document the impacts of the Build Alternatives only as the No-Build Alternative would not have impacts on the environment and would improve any existing environmental conditions.

Section 8.1 identifies the beneficial environmental effects of each alternative in terms of environmental justice, air quality, climate change, and smart growth. Sections 8.2 and 8.3 compare the alternatives based on five environmental impacts criteria:

[35] Protected public open space lands are protected under Massachusetts' State Constitution, Article 97 (parks, conservation lands, recreation areas, wildlife refuges) and Section 4(f) of the Department of Transportation Act.

8.1 Beneficial Effects

This section focuses on the environmental benefits of each alternative by summarizing the benefits that would be provided to environmental justice populations, air quality, climate change, and smart growth. Environmental Justice and smart growth were evaluated qualitatively and do not receive scores. Air quality and climate change were evaluated quantitatively and follow the Alternatives Analysis scoring system.

8.1.1 Environmental Justice

Potential benefits to environmental justice communities were evaluated as an indirect effect of the South Coast Rail project. A study[36] conducted by the Central Transportation Planning Staff (CTPS) of the Boston Metropolitan Planning Organization examined how the South Coast Rail alternatives would affect travel accessibility and mobility for environmental justice communities in Taunton, Fall River, and New Bedford. Table 8-1 summarizes the beneficial effects to environmental justice populations potentially resulting from implementing each alternative of the South Coast Rail Project.

The beneficial effects to environmental justice populations that would result from the South Coast Rail Project vary considerably by alternative and community. Compared to the No-Build Alternative, improvements in access and travel time to jobs, colleges, hospitals, and Boston would result from most alternatives. Some alternatives would result in no change (as compared to the No-Build Alternative) or even decreases in access or increases in travel time.

The environmental justice populations in Fall River would see the most improvement in access and travel time to jobs, while the environmental justice populations in New Bedford would receive the least benefit. A broad range of improvements in access to jobs for environmental justice populations in Taunton would result from the range of alternatives.

None of the impacts would result in disproportionately high and adverse human health or environmental effects to environmental justice populations, meeting the requirements of the Executive Order, DOT Order, and EPA guidance.

[36] Central Transportation Planning Staff (CTPS). 2009. *South Coast Rail Environmental Justice Study*. Memorandum from CTPS to the South Coast Rail Project Interested Parties. Boston Metropolitan Planning Organization, Central Transportation Planning Staff: Boston.

Table 8-1 Benefits to Environmental Justice Populations [1]

Effects	Attleboro Electric	Attleboro Diesel	Stoughton Electric	Stoughton Diesel	Whittenton Electric	Whittenton Diesel	Rapid Bus
Access to Jobs-[2]							
Taunton	143	94	118	77	67	44	16
Fall River	167	134	187	151	140	113	103
New Bedford	17	3	21	4	-1	-2	11
Travel Time to Jobs-[3]							
Taunton	2	2	2	3	0	1	1
Fall River	9	9	9	10	8	8	6
New Bedford	1	2	0	1	-1	0	3
Access to Colleges[4]	108	63	78	46	53	33	15
Travel Time to Colleges[5]	2	5	3	4	3	4	4
Access to Hospitals[4]	196	136	188	135	133	102	144
Travel Time to Hospitals[5]	39	39	38	39	35	37	45
Travel Time to Boston[6]	53	39	47	32	33	23	51
Station Area TOD[7]	Yes	Yes	Yes	Yes	Yes	Yes	Yes

1- Beneficial Effects (percent improvement compared to No-Build Alternative)

2- Provided as an average in improvement, as compared to the No-Build Alternative, in access to basic, service, and retail jobs within a 90-minute radius of each municipality. Source: CTPS 2009.

3- Provided as an average in improvement, as compared to the No-Build Alternative, in travel time to basic, service, and retail jobs. Source: CTPS 2009.

4- Provided as an average in improvement, as compared to the No-Build Alternative, in access from Taunton, Fall River, and New Bedford to colleges and hospitals. Source: CTPS 2009.

5- Provided as an average in improvement, as compared to the No-Build Alternative, in travel times from Taunton, Fall River, and New Bedford to colleges and hospitals. Source: CTPS 2009.

6- Provided as an average in improvement, as compared to the No-Build Alternative, in travel times from Taunton, Fall River, and New Bedford to Boston's South Station. Source: CTPS 2009.

7- Qualitative assessment of the potential for transit-oriented development in the vicinity of the station site that would benefit environmental justice populations. Source: Goody-Clancy 2009.

The Attleboro Electric Alternative would show the most improvement in the greatest number of parameters (averaged access to jobs from Taunton, access and travel time to colleges, access and travel time to hospitals, and travel time to Boston). The Attleboro Diesel Alternative and both Stoughton Alternatives also have the most improvement results for other parameters. The Rapid Bus Alternative showed the least improvements for all parameters.

The Stoughton Electric Alternative would provide the greatest improvement in access to jobs for both Fall River and New Bedford environmental justice populations (187 and 21 percent, respectively). The Attleboro Electric Alternative would result in the greatest improvement in access to jobs for environmental justice populations in Taunton.

In summary, the Attleboro and Stoughton Alternatives would provide the greatest benefits to environmental justice populations, while the Rapid Bus Alternative would provide the least benefits.

8.1.2 Air Quality

The predominant sources of air pollution anticipated from the proposed South Coast Rail project include emissions of carbon monoxide (CO), nitrogen oxides (NOx), and volatile organic compounds (VOCs) from locomotive engines and from motor vehicles traveling to and from the train stations. To document impacts of the alternatives, the mesoscale analysis evaluated the regional air quality impacts (VOCs, NOx_x, CO, and PM emissions) from the proposed project by determining the change in total ozone precursor emissions (volatile organic compounds and nitrogen oxides) for the existing and future conditions within the study area; the microscale analysis calculated the CO and PM concentrations for the same conditions at congested intersections near the proposed stations. Results for this criterion are provided in Table 8-2.

Table 8-2 Air Quality Benefits by Alternative

Name	Reduction in VOCs (kg/day)	Score	Reduction in NO_X (kg/day)	Score	Reduction in $PM_{2.5}$ (kg/day)	Score	Reduction in CO (kg/day)	Score
Attleboro Electric	(55.9)	100%	(43.3)	100%	(1.7)	100%	(2,575.5)	100%
Attleboro Diesel	(46.3)	83%	(10.9)	25%	(0.7)	41%	(2,115.2)	82%
Stoughton Electric	(52.9)	95%	(40.8)	94%	(1.5)	88%	(2,459.7)	96%
Stoughton Diesel	(41.5)	74%	(8.7)	20%	(0.3)	18%	(1,884.0)	73%
Whittenton Electric	(41.9)	75%	(31.3)	72%	(0.7)	41%	(1,890.5)	73%
Whittenton Diesel	(23.3)	42%	(3.5)	8%	0	0%	(1,501.3)	58%
Rapid Bus	(9.3)	17%	0	0%	0	0%	(612.3)	24%

As shown in Table 8-2 and Figure 8-1, the Attleboro Electric and Stoughton Electric Alternative would have the most substantial air quality benefits of all the alternatives. The Whittenton Electric alternative would follow closely behind with the Rapid Bus Alternative offering the least air quality benefits of all the alternatives.

8.1.3 Contribution to Climate Change

Climate change is an important consideration in evaluating the South Coast Rail project alternatives. Recent studies predict the effects of climate change in New England that could dramatically change the distribution of plant communities and the distribution of some animal species. The primary greenhouse gas emitted by transportation sources is Carbon Dioxide, or CO_2. This analysis looked at CO_2 emitted by locomotives as well as reduction from reduced vehicle miles traveled. Results for this criterion are provided in Table 8-3.

Table 8-3 Greenhouse Gas Benefits by Alternative

Name	Reduction in CO_2 (tons/year)	Score
Attleboro Electric	(62,333.7)	100%
Attleboro Diesel	(49,612.0)	80%
Stoughton Electric	(59,715.1)	96%
Stoughton Diesel	(44,007.1)	71%
Whittenton Electric	(45,583.9)	73%
Whittenton Diesel	(32,601.3)	52%
Rapid Bus	(6,588.0)	11%

As shown in Table 8-3 and Figure 8-2, all of the commuter rail alternatives perform fairly well in reducing CO_2. Attleboro Electric and Stoughton Electric perform the best in this regard, with scores at or near 100 percent (CO_2 is a leading contributor to climate change). The alternatives achieve this by shifting commuters from cars to electrified commuter rail. These two real world comparisons offer perspective on how well the Attleboro Electric and Stoughton Electric perform in reducing CO_2 emissions:

- The Attleboro Electric and Stoughton Electric alternatives would reduce as much regional CO_2 production as removing an 18 megawatt power plant from operation.
- One mature deciduous tree (such as a large maple or oak found in eastern Massachusetts) removes 31 pounds of CO2 from the atmosphere in a year. 65 mature deciduous trees remove approximately one ton of CO2 over a year. During a one-year operating period, the Attleboro Electric and Stoughton Electric alternatives reduce about 61,400 tons of regional CO2 production compared to present conditions. To reduce that same amount, eastern Massachusetts would need an additional four million trees.

8.1.4 Smart Growth

As stated in the *South Coast Rail Economic Development and Land Use Corridor Plan,*[37] commuter rail service to the South Coast will generate nearly $500 million in new economic activity every year. This is new growth by the year 2030 that would not occur without the new infrastructure. The rail connection is projected to create between 3,500 and 3,800 net new jobs within the Commonwealth by 2030—about two-thirds of which would locate in the South Coast region with the remaining third in Boston-Cambridge and other communities outside the region.

[37] Massachusetts Executive Office of Transportation and Massachusetts Executive Office of Housing and Economic Development. *South Coast Rail Economic Development and Land Use Corridor Plan*. June 2009.

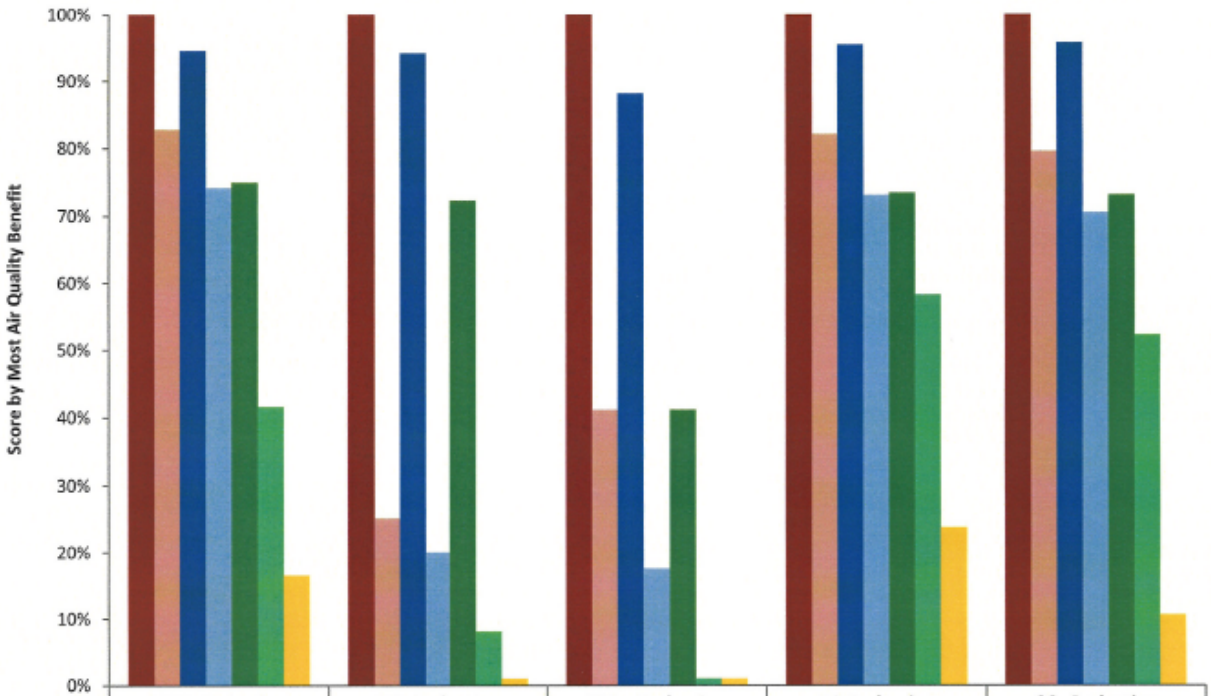
The Corridor Plan would be implemented by EOT throughout the 31-community region regardless of which alternative was selected, so there would be no substantive difference among alternatives with regard to the majority of smart growth benefits. These benefits include protecting the Priority Preservation Areas, and concentrating development in the Priority Development Areas. The principal differences among the alternatives would be with regard to their ability to promote concentrated development (transit-oriented development) at station areas. Transit-oriented development (or redevelopment), as illustrated by the concepts included in the Corridor Plan report, would include mixed high-density residential, retail, and commercial/office development at certain station locations. The benefits of this transit-oriented development would be to increase local tax revenues, decrease vehicle miles traveled, and decrease Greenhouse Gas emissions. As outlined in the Corridor Plan, transit-oriented development would be likely as new development or re-development at the Downtown Taunton, Taunton, Freetown, Fall River Depot, King's Highway, Whale's Tooth, Easton Village, and Raynham Place stations.

While the alternatives would provide varying magnitude TOD potential, all the alternatives provide opportunity for smart growth.

8.1.5 Summary of Beneficial Effects

The following section summarizes the beneficial effects results for the seven alternatives evaluated in this evaluation. Figure 8-1 provides a visual summary of the results of this analysis.

Figure 8-1 Summary of Beneficial Effects



	VOCs Reduction	NO_x Reduction	$PM_{2.5}$ Reduction	CO Reduction	CO_2 Reduction
Attleboro Electric	A	A	A	A	A
Attleboro Diesel	B	F	F	B	B
Stoughton Electric	A	A	B	A	A
Stoughton Diesel	C	F	F	C	C
Whittenton Electric	C	C	F	C	C
Whittenton Diesel	F	F	F	F	F
Rapid Bus	F	F	F	F	F

As shown in Figure 8-1, Stoughton Electric, with scores 88 percent or higher, would provide the most consistent beneficial effects as compared to the other alternatives. Attleboro Electric would also provide air quality benefits. Rapid Bus performs worst for beneficial effects with scores no higher than 67 percent on all beneficial effects criteria.

8.2 Adverse Impacts

The following sections compare the alternatives based on five adverse environmental impacts:

- The amount of permanent wetland loss (in acres) (edge and interior wetlands and floodplains) and wetland loss in ACECs.

- The number of acres of protected open space that would be directly impacted, acres of land acquisition and municipal tax loss. Protected public open space lands are protected under Massachusetts' State Constitution, Article 97 (parks, conservation lands, recreation areas, wildlife refuges) and Section 4(f) of the Department of Transportation Act.
- The number of acres of protected public water supply lands (active and inactive Mapped Wellhead Zone 1) that would be directly impacted.
- The amount of noise impacts.
- The number of acres of mapped Priority Habitat (state-listed rare species) that would be lost (edge and interior habitat).

8.2.1 Permanent Wetland Loss

Wetland impacts are the principal category of environmental impacts that must be considered for Section 404 permits and variances under the Massachusetts Wetlands Protection Act. Direct wetland impacts, both temporary and permanent, are anticipated for each of the proposed alternatives. Temporary impacts include short term disturbances (erosion controls, temporary structures, etc.) to wetlands and waterways during construction that would cease once construction activities are complete.

Permanent impacts are those that would result in the loss of wetlands. Permanent impacts may include, but are not limited to, wetland fill, dredging, and watercourse relocation or alteration. This analysis also evaluated the amount of wetland fill within an ACEC, as wetlands within ACECs receive a higher level of state regulatory protection. Results for this criterion are provided in Table 8-5.

Table 8-5 Permanent Wetland Impacts by Alternative

Name	Edge (Acres)	Interior (Acres)	Interior Score	Interior Grade	Total Wetlands (Acres)	Total Wetlands Score	Total Wetlands Grade	ACEC (Acres)	ACEC Score	ACEC Grade
Attleboro Electric	15.85	4.71	100%	A	20.56	50%	F	2.59	68%	D
Attleboro Diesel	15.56	4.71	100%	A	20.27	51%	F	2.59	68%	D
Stoughton Electric	5.46	6.40	74%	C	11.86	87%	B	1.77	100%	A
Stoughton Diesel	5.43	6.40	74%	C	11.83	87%	B	1.77	100%	A
Whittenton Electric	5.45	4.89	96%	A	10.34	100%	A	1.77	100%	A
Whittenton Diesel	5.43	4.88	97%	A	10.31	100%	A	1.77	100%	A
Rapid Bus	21.48	0.00	100%	A	21.48	48%	F	4.03	44%	F

As shown in Table 8-5, the Attleboro, Whittenton and Rapid Bus Alternatives have the least interior wetland impact. However, in terms of total wetland and ACEC impact, Stoughton and Whittenton fare the best.

8.2.2 Protected Open Space Impacts and Land Acquisition

The Phase 2 analysis evaluated direct impacts to public open space, land acquisition, and municipal tax loss. The following sections summarize each of these criteria.

8.2.2.1 Open Space

The Phase 2 analysis evaluated direct impacts to public open space (parks, conservation lands, recreation lands, and wildlife refuges), which are protected under Article 97 of the Massachusetts Constitution, and to publicly-owned wildlife sanctuaries and refuges which are considered "special aquatic sites" under the federal 404(b)(1) Clean Water Act Guidelines. Although this Project is currently not anticipated to require review or funding by a federal transportation agency (except for Rapid Bus), this criterion also includes those properties protected under Section 4(f) of the federal Department of Transportation Act because the FTA and FHWA are cooperating agencies under NEPA. Table 8-6 presents the results of the public open space analysis by alternative.

Table 8-6 Protected Open Space Impacts by Alternative

Name	Land Acquisition (Acres)	Score	Grade
Attleboro Electric	8.93	11%	**F**
Attleboro Diesel	8.93	11%	**F**
Stoughton Electric	2.22	45%	**F**
Stoughton Diesel	1.57	64%	**D**
Whittenton Electric	<1.00	100%	**A**
Whittenton Diesel	<1.00	100%	**A**
Rapid Bus	4.50	22%	**F**

As shown in Table 8-6, the Whittenton Alternatives have the least open space impact. The Attleboro Alternatives fare the worst largely due to the projected need to acquire land along the Attleboro Bypass.

8.2.2.2 Land Acquisition

In addition to open space analysis, a land use impacts analysis was conducted to determine if land acquisition would be required, and identify the ownership and use of parcels designated for acquisition. Final engineering plans may show an increase or decrease of the actual area of acquisition required. Table 8-7 presents the results of the acquisitions summary by alternative.

Table 8-7 Land Acquisition by Alternative

Name	Acquisition (Acres)	Acquisition Score	Acquisition Grade
Attleboro Electric	90.59	28%	F
Attleboro Diesel	87.67	29%	F
Stoughton Electric	106.80	24%	F
Stoughton Diesel	103.05	25%	F
Whittenton Electric	79.05	33%	F
Whittenton Diesel	75.36	34%	F
Rapid Bus	25.70	100%	A

As shown in Table 8-7, the Rapid Bus Alternative would require the least amount of land acquisition and, in comparison to other alternatives, fares the best in this criterion.

8.2.2.3 Municipal Tax Loss

Property tax revenue data were obtained from review of on-line resources of the municipalities through which the alternatives pass. Estimates of annual (in 2009 dollars) property tax revenue loss from parcels were made based upon each municipality's property tax formula. Results for this criterion are provided in Table 8-8.

Table 8-8 Municipal Tax Loss by Alternative[1]

Name	Municipal Tax Loss ($)	Tax Loss Score	Tax Loss Grade
Attleboro Electric	-$81,333	51%	F
Attleboro Diesel	-$81,333	51%	F
Stoughton Electric	-$68,186	61%	D
Stoughton Diesel	-$68,186	61%	D
Whittenton Electric	-$59,614	70%	C
Whittenton Diesel	-$59,614	70%	C
Rapid Bus	-$41,638	100%	A

1 Provided values are for 100 percent acquisitions of parcels at station sites. Additional property tax revenue losses may result from small and/or partial acquisitions, such as those that would occur along the alignment corridors and cannot be determined at this phase.

As shown in Table 8-8, the Rapid Bus Alternative would have the least municipal tax loss of all the alternatives. Trailing close behind on municipal tax loss would be the Whittenton Alternatives.

8.2.3 Protected Public Water Supply Land Impacts

This criterion considered impacts to protected public water supply lands. Surface and ground water resources are protected under several state and federal regulatory programs, including the federal Clean Water Act (Section 404) and the Massachusetts Clean Waters Act (MGL Chapter 21, §26-53). Other applicable regulations include the Massachusetts Section 401 Discharge Regulations (314 CMR 9.00), Groundwater Quality Standards (314 CMR 6.00), Surface Water Quality Standards (314 CMR 4.00), and Wetland Protection Regulations (310 CMR 10.00).

The limits of work proposed for each alternative were assumed to be the maximum extent of direct impacts. Results for this criterion are provided in Table 8-9.

Table 8-9 Protected Public Water Supply Land Impacts by Alternative

Name	Zone 1 Existing Active (linear feet)	Zone 1 New Inactive (linear feet)	Impacts YES/NO?
Attleboro Electric	3,482	0	YES, active
Attleboro Diesel	3,482	0	YES, active
Stoughton Electric	0	0	NO
Stoughton Diesel	0	0	NO
Whittenton Electric	0	750	YES, inactive
Whittenton Diesel	0	750	YES, inactive
Rapid Bus	0	0	NO

As shown in Table 8-9, the Attleboro and Whittenton Alternatives would both have impact to public water supply. The remaining alternatives would have no impact to active or inactive water supply.

8.2.4 Noise Impacts

The noise analysis for the South Coast Rail project identified potential noise impacts by comparing the existing sound levels to projected future sound levels. The projected future noise levels would impact the human environment. There were two levels of impact (severe and moderate). Results for this criterion are provided in Table 8-10.

Table 8-10 Noise Impacts by Alternative

Name	Moderate Impacts (# of Sensitive Receptors)	Severe Impacts (# of Sensitive Receptors)	Total	Score	Grade
Attleboro Electric	2,199	469	2,668	67%	**D**
Attleboro Diesel	1,863	405	2,268	79%	**C**
Stoughton Electric	1,728	408	2,136	84%	**B**
Stoughton Diesel	1,446	347	1,793	100%	**A**
Whittenton Electric	1,826	417	2,243	80%	**B**
Whittenton Diesel	1,617	370	1,987	90%	**A**
Rapid Bus	0	0	0	n/a	**n/a**

As shown in Table 8-10, the Stoughton Diesel and Whittenton Diesel Alternatives would have the least noise impact of all the alternatives. Noise impacts are lower for diesel alternatives largely due to the traveling speeds of commuter trains; electric-powered trains travel faster than diesel-powered trains and therefore generate more noise. Trailing close behind on least noise impacts are the Stoughton and Whittenton Electric Alternatives. Attleboro Electric and Diesel perform worst on this criterion.

8.2.1 Loss of Priority Habitat

Rare species habitat impacts are considered because rare species are considered an important environmental resource, protected under the Massachusetts Endangered Species Act and Wetlands Protection Act. Temporary and permanent direct impacts to rare species and their habitat are anticipated for each of the alternatives. Direct impacts include impacts from construction, grading, vegetation management, and mortality associated with potential collisions with rail traffic. These activities may result in degradation of ecological function, loss of habitat, as well as loss of rare plant and animal species.

This criterion also describes the amount of 'barrier effect' for each alternative. A railroad corridor may act as a barrier that interferes with the movement of some mammals, amphibians, birds and reptiles from one habitat to another. The width of a railroad corridor can influence the frequency of wildlife crossings, as well as the mortality associated with potential collisions with rail traffic. The rail itself can create a barrier to smaller species such as amphibians, reptiles, and smaller mammals.

Table 8-11 summarizes the results of this criterion.

Table 8-11 Loss of Priority Habitat by Alternative

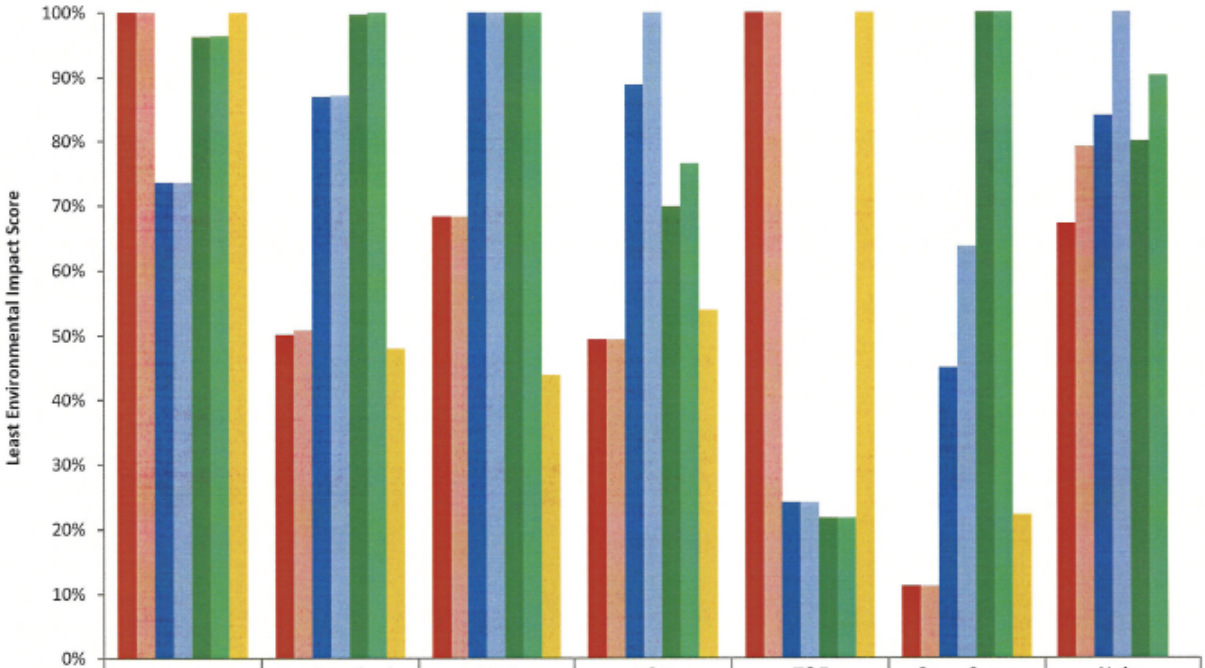
Name	Habitat Loss, Edge (Acres)	Habitat Loss, Interior (Acres)	Total (Acres)	Score	Habitat Loss Grade	Barrier Effect (Linear Feet)	Score	Barrier Effect Grade
Attleboro Electric	13.4	4.4	17.8	49%	**F**	4,700	100%	**A**
Attleboro Diesel	13.4	4.4	17.8	49%	**F**	4,700	100%	**A**
Stoughton Electric	6.5	3.4	9.9	89%	**B**	19,500	24%	**F**
Stoughton Diesel	6.5	2.3	8.8	100%	**A**	19,500	24%	**F**
Whittenton Electric	6.5	6.1	12.6	70%	**C**	21,600	22%	**F**
Whittenton Diesel	6.5	5.0	11.5	77%	**C**	21,600	22%	**F**
Rapid Bus	16.3	0.0	16.3	54%	**F**	0	100%	**A**

As shown in Table 8-11, the Stoughton Diesel Alternative would have the least habitat loss of all the alternatives. However, in evaluating the barrier effect, the Rapid Bus and Attleboro Alternatives would have the least impact.

8.3 Summary of Environmental Impacts

The following sections describe the results for the seven alternatives evaluated in this evaluation. Figure 8-2 provides a summary of the results of this analysis.

Figure 8-2 Summary of Magnitude of Impacts



	Interior Wetlands Score	Total Wetlands Score	ACEC Score	T&E Habitat Score	T&E Barrier Score	Open Space Acquisition Score	Noise Score
Attleboro Electric	A	F	D	F	A	F	D
Attleboro Diesel	A	F	D	F	A	F	C
Stoughton Electric	C	B	A	B	F	F	B
Stoughton Diesel	C	B	A	A	F	D	A
Whittenton Electric	A	A	A	C	F	A	B
Whittenton Diesel	A	A	A	C	F	A	A
Rapid Bus	A	F	F	F	A	F	F

As shown in Figure 8-2, there is no clear alternative with least overall environmental impact. While the Stoughton and Whittenton Alternatives have the least amount of failing grades on resource impacts, it is important to note that not all resources have equal weight.

This Page Intentionally Left Blank

9

Summary

As presented in previous chapters, this summary provides an overview of the alternatives and how they compare to one another with respect to the Phase 2 Criteria: purpose, practicability and environmental consequences. The first alternatives analysis measure includes how well the project meets the project purpose. Table 9-1 summarizes how well each alternative performed on the project purpose measure and how often the alternative received an "F" in that measure.

Table 9-1 Summary of Project Purpose Scores

	Meeting Ridership Demand Score	Travel Time Score	Service Delivery Policy	VMT Score	Interregional Links Score	Counts of Grade "F"
Attleboro Electric	95% (A)	100% (A)	0% (F)	100% (A)	83% (B)	**1**
Attleboro Diesel	89% (B)	89% (B)	0% (F)	86% (B)	83% (B)	**1**
Stoughton Electric	97% (A)	99% (A)	100% (A)	100% (A)	100% (A)	**0**
Stoughton Diesel	88% (B)	88% (B)	100% (A)	77% (C)	100% (A)	**0**
Whittenton Electric	100% (A)	86% (B)	100% (A)	77% (C)	100% (A)	**0**
Whittenton Diesel	88% (B)	78% (C)	100% (A)	59% (F)	100% (A)	**1**
Rapid Bus	70% (C)	73% (C)	100% (A)	27% (F)	12% (F)	**2**

As shown in Table 9-1, the Rapid Bus Alternative receives two Fs out of four project purpose measures. While it was not eliminated from the remaining analysis, the focus remained only on the alternatives that met the project purpose. The Attleboro Alternatives and the Whittenton Diesel Alternative all receive one F. The Stoughton Alternatives and Whittenton Electric receive no Fs in the measure of how well the alternative meets project purpose.

The second alternatives analysis measure includes practicability. Table 9-2 summarizes how well each alternative performed on the practicability measure and how often the alternative received an "F" in that measure.

Table 9-2 Summary of Practicability Scores

	Cost per Rider Score	Construction Schedule Score	On-Time Performance	Counts of Grade "F"
Attleboro Electric	77% (C)	57% (F)	54% (F)	**2**
Attleboro Diesel	75% (C)	57% (F)	49% (F)	**2**
Stoughton Electric	96% (A)	89% (B)	100% (A)	**0**
Stoughton Diesel	100% (A)	100% (A)	98% (A)	**0**
Whittenton Electric	91% (A)	89% (B)	100% (A)	**0**
Whittenton Diesel	95% (A)	100% (A)	98% (A)	**0**
Rapid Bus	*44% (F)*	*89% (B)*	*90% (A)*	***1***

As shown in Table 9-2, the Attleboro Alternatives received two Fs in the practicability measure. While it was not eliminated from the remaining analysis, the focus remained only on the alternatives that met the practicability measure. The Rapid Bus Alternative received one F, which was on the Cost per Rider criterion. The Stoughton and Whittenton Alternatives received no Fs on the practicability measure and had scores no less than 89 percent.

The third alternatives analysis measure includes two sub-criteria: beneficial environmental effects and environmental impacts. Table 9-3 summarizes how well each alternative performed on the measure of beneficial environmental effects and how often the alternative received an "F" in that measure.

Table 9-3 Summary of Beneficial Effects Scores

Name	VOCs Score	NO_X Score	$PM_{2.5}$ Score	CO Score	CO_2 Score	Counts of Grade "F"
Attleboro Electric	*100% (A)*	*100% (A)*	*100% (A)*	*100% (A)*	*100% (A)*	***0***
Attleboro Diesel	*83% (B)*	*25% (F)*	*41% (F)*	*82% (B)*	*80% (B)*	***2***
Stoughton Electric	95% (A)	94% (A)	88% (B)	96% (A)	96% (A)	**0**
Stoughton Diesel	74% (C)	20% (F)	18% (F)	73% (C)	71% (C)	**2**
Whittenton Electric	75% (C)	72% (C)	41% (F)	73% (C)	73% (C)	**1**
Whittenton Diesel	42% (F)	8% (F)	0% (F)	58% (F)	52% (F)	**5**
Rapid Bus	*17% (F)*	*0% (F)*	*0% (F)*	*24% (F)*	*11% (F)*	***5***

As shown in Table 9-3, the Attleboro Electric and Stoughton Electric Alternatives receive no "F"s on the beneficial effects measure. Whittenton Electric received one F and the Attleboro Diesel and Stoughton Diesel receive two "Fs. Whittenton Diesel and the Rapid Bus Alternative receive the most Fs in this measure with four and five Fs, respectively.

Table 9-4 summarizes how well each alternative performed on the measure of environmental impacts and how often the alternative received an "F" in that measure.

Table 9-4 Summary of Environmental Impacts Scores

	Interior Wetlands Score	Total Wetlands Score	ACEC Score	T&E Habitat Score	T&E Barrier Score	Open Space Acquisition Score	Land Acquisition Score	Municipal Tax Score	Noise Score	Counts of Grade "F"
Attleboro Electric	*100% (A)*	*50% (F)*	*68% (D)*	*49% (F)*	*100% (A)*	*11% (F)*	*28% (F)*	*51% (F)*	*67% (D)*	***5***
Attleboro Diesel	*100% (A)*	*51% (F)*	*68% (D)*	*49% (F)*	*100% (A)*	*11% (F)*	*29% (F)*	*51% (F)*	*79% (C)*	***5***
Stoughton Electric	74% (C)	87% (B)	100% (A)	89% (B)	24% (F)	45% (F)	24% (F)	61% (D)	84% (B)	**3**
Stoughton Diesel	74% (C)	87% (B)	100% (A)	100% (A)	24% (F)	64% (D)	25% (F)	61% (D)	100% (A)	**2**
Whittenton Electric	96% (A)	100% (A)	100% (A)	70% (C)	22% (F)	100% (A)	33% (F)	70% (C)	80% (B)	**2**
Whittenton Diesel	97% (A)	100% (A)	100% (A)	77% (C)	22% (F)	100% (A)	34% (F)	70% (C)	90% (A)	**2**
Rapid Bus	*100% (A)*	*48% (F)*	*44% (F)*	*54% (F)*	*100% (A)*	*22% (F)*	*100% (A)*	*100% (A)*	*n/a*	***4***

As shown in Table 9-4, the Attleboro Alternatives received fives on the measure of environmental impact, while the Rapid Bus Alternative followed as a close second with four Fs. Stoughton Electric received three Fs while Stoughton Diesel and the Whittenton Alternative performed best on the measure of Environmental impact with only two Fs out of nine criteria.

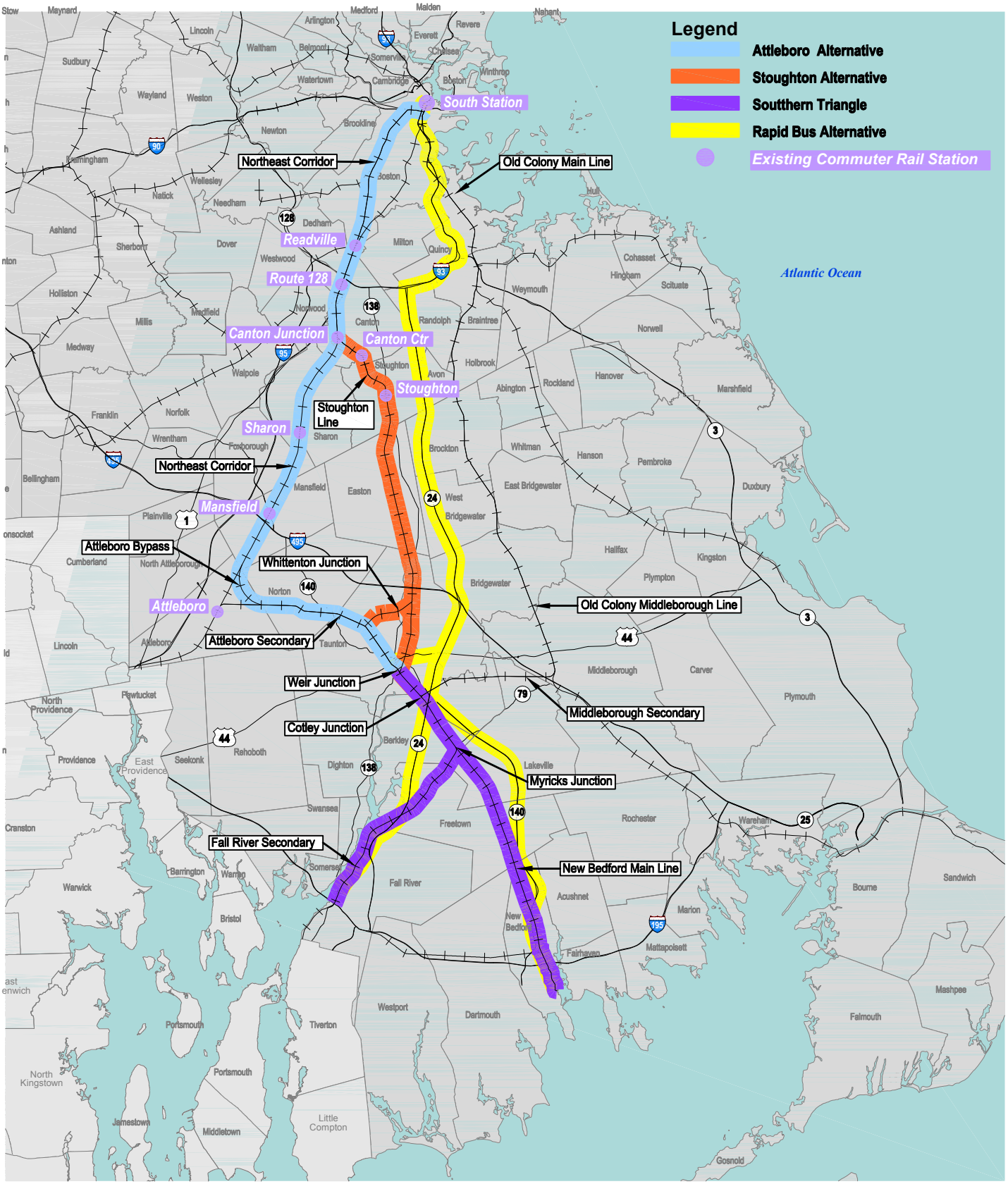
In summary, Table 9-5 shows the cumulative Fs across all measures included in the Alternatives Analysis.

Table 9-5 Summary of Performance Measures

	PROJECT PURPOSE: Counts of Grade "F"	PRACTICABILITY: Counts of Grade "F"	BENEFICIAL EFFECTS: Counts of Grade "F"	ENVIRONMENTAL IMPACTS: Counts of Grade "F"	TOTAL Count of Grade "F"
Attleboro Electric	*1*	*2*	*0*	*5*	***8***
Attleboro Diesel	*1*	*2*	*2*	*5*	***10***
Stoughton Electric	0	0	0	3	**3**
Stoughton Diesel	0	0	2	2	**4**
Whittenton Electric	0	0	1	2	**3**
Whittenton Diesel	1	0	5	2	**8**
Rapid Bus	*2*	*1*	*5*	*4*	***12***

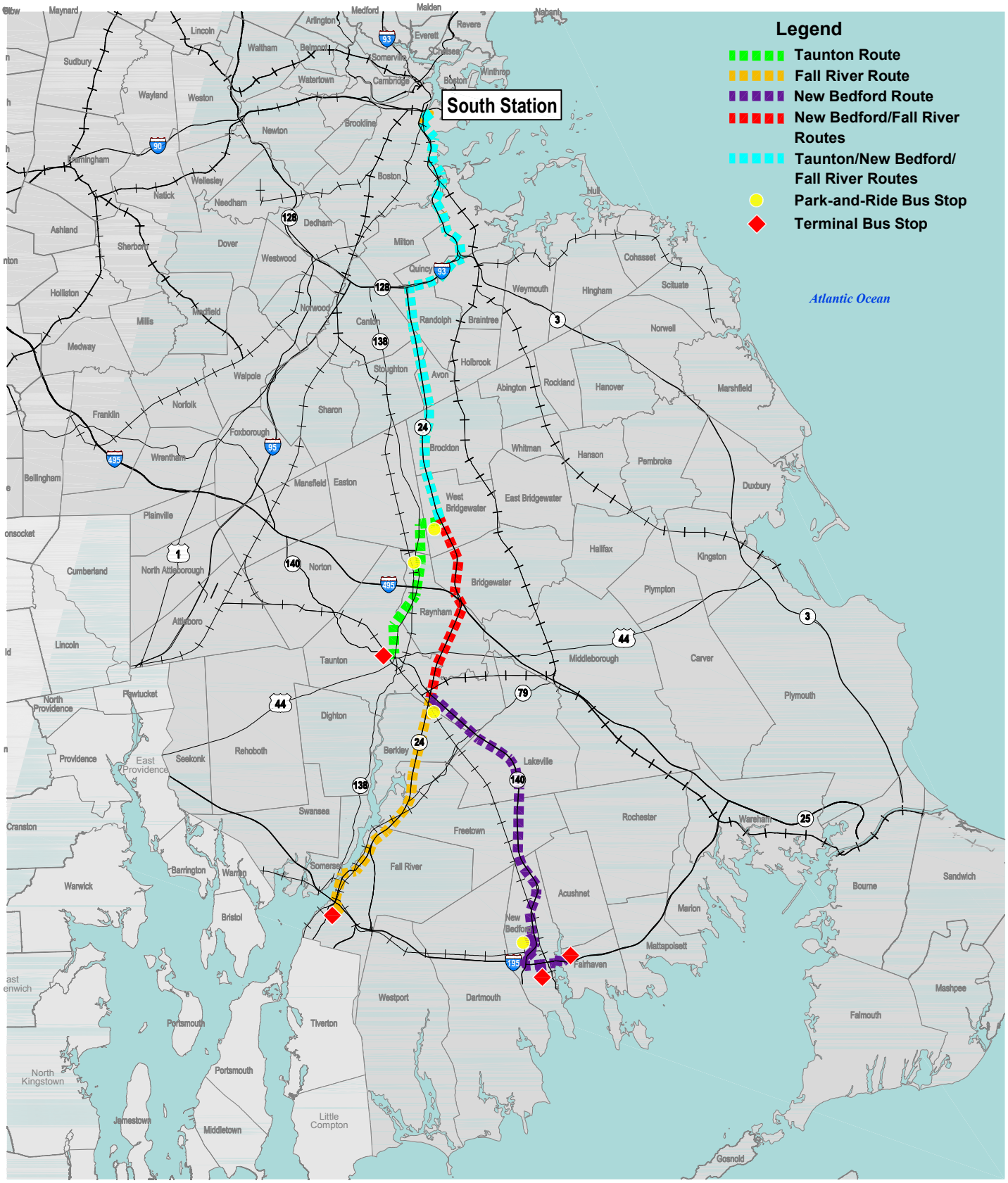
As shown in Table 9-5, the Stoughton Electric and Whittenton Electric Alternatives receive the least Fs across the cumulative measures. Stoughton Diesel is a close second with four Fs while Attleboro Electric and the Rapid Bus Alternatives perform the worst.

Figures



\\mabos\projects\10111.00\graphics\FIGURES\Alternatives_Analysis\10111_Figure 4-1.dwg Printing Date: 9/22/2009

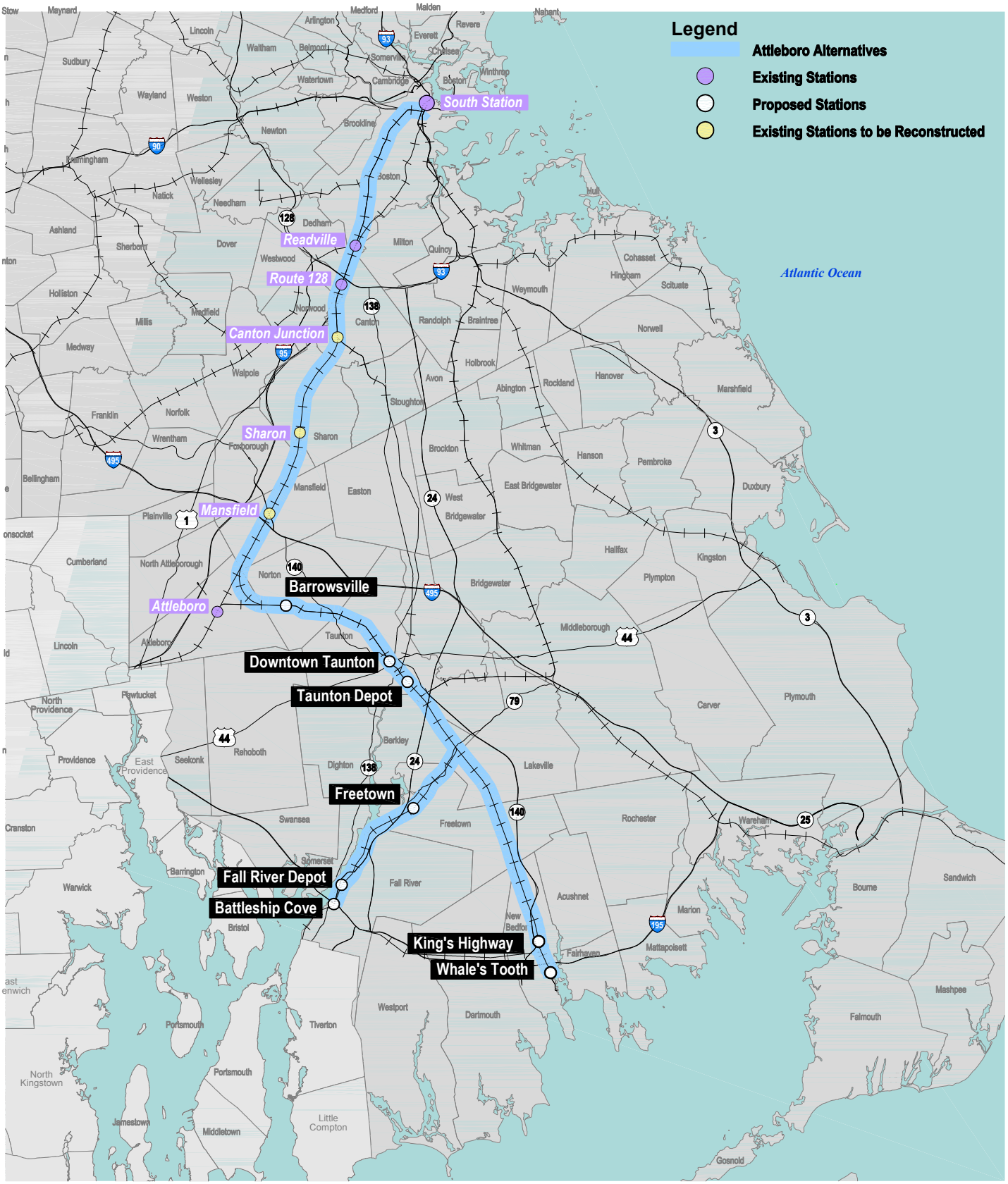
Figure 4-1



\\mabos\projects\10111.00\graphics\FIGURES\Alternatives_Analysis\10111_Figure 4-2.dwg Printing Date: 9/22/2009

Figure 4-2
No-Build Alternative

Source: MassGIS
Prepared by: Bhatti Group



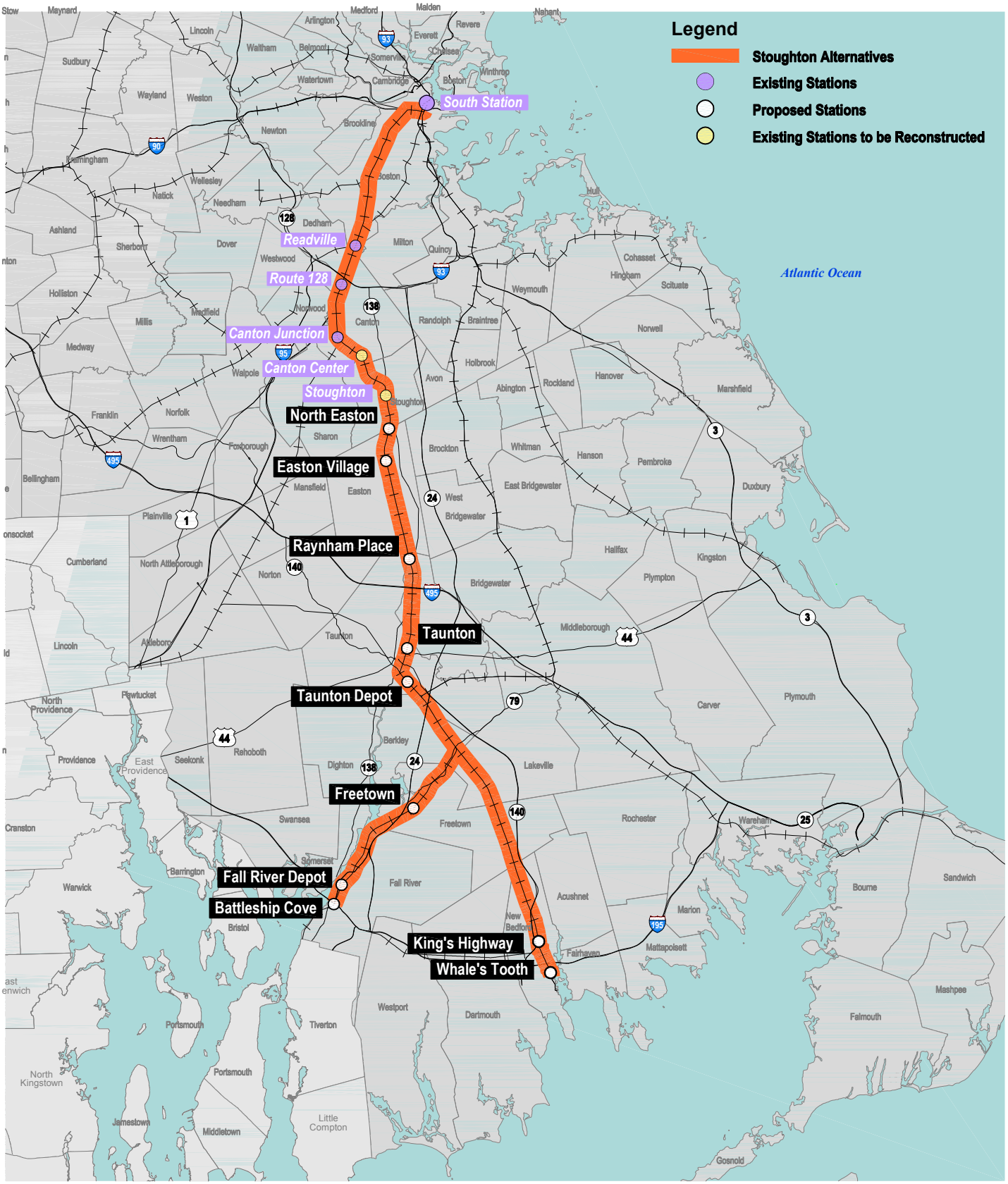
\\MABOS\projects\10111.00\graphics\FIGURES\Alternatives_Analysis\10111_Fig_4-3_thru_4-6.dwg Printing Date: 9/22/2009

EOT

SOUTH COAST RAIL

Figure 4-3
Attleboro Alternatives

Data Source: MassGIS 2002
Prepared by: VHB



\\MABOS\projects\10111.00\graphics\FIGURES\Alternatives_Analysis\10111_Fig_4-3_thru_4-6.dwg Printing Date: 9/22/2009

EOT

SOUTH COAST RAIL

0 4 8 Miles

Figure 4-4
Stoughton Alternatives

Data Source: MassGIS 2002
Prepared by: VHB

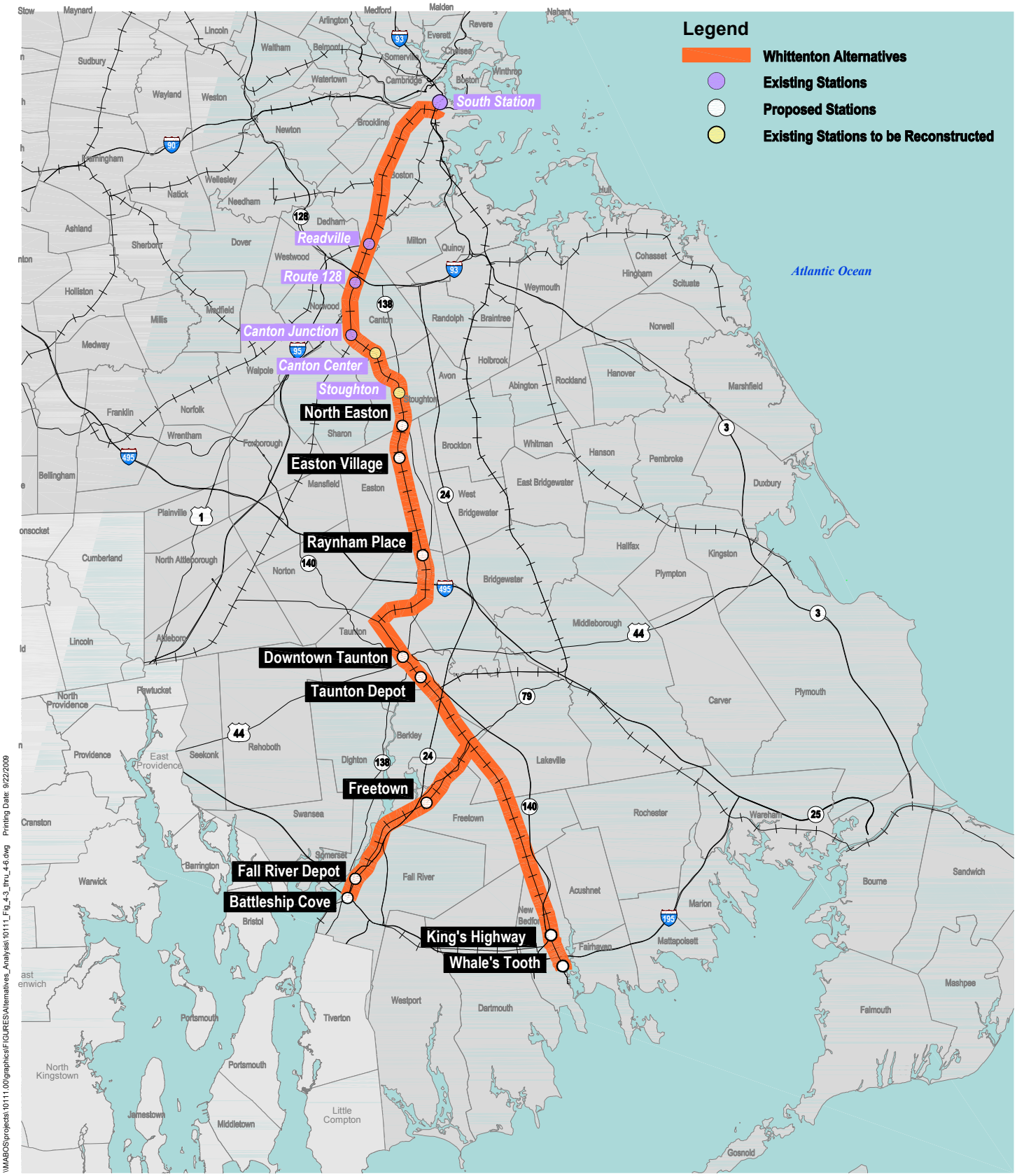


Figure 4-5
Whittenton Alternatives

Data Source: MassGIS 2002
Prepared by: VHB

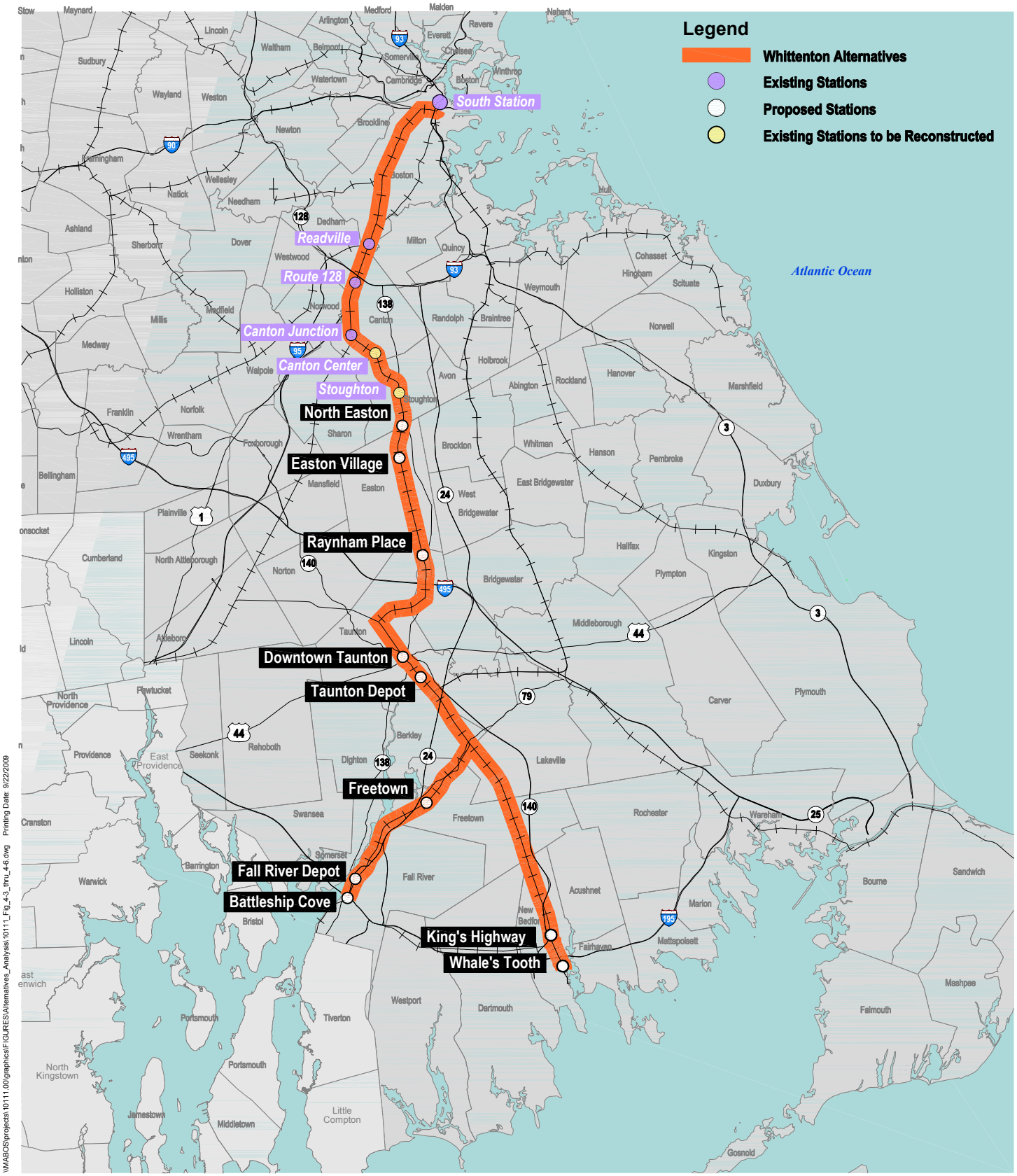
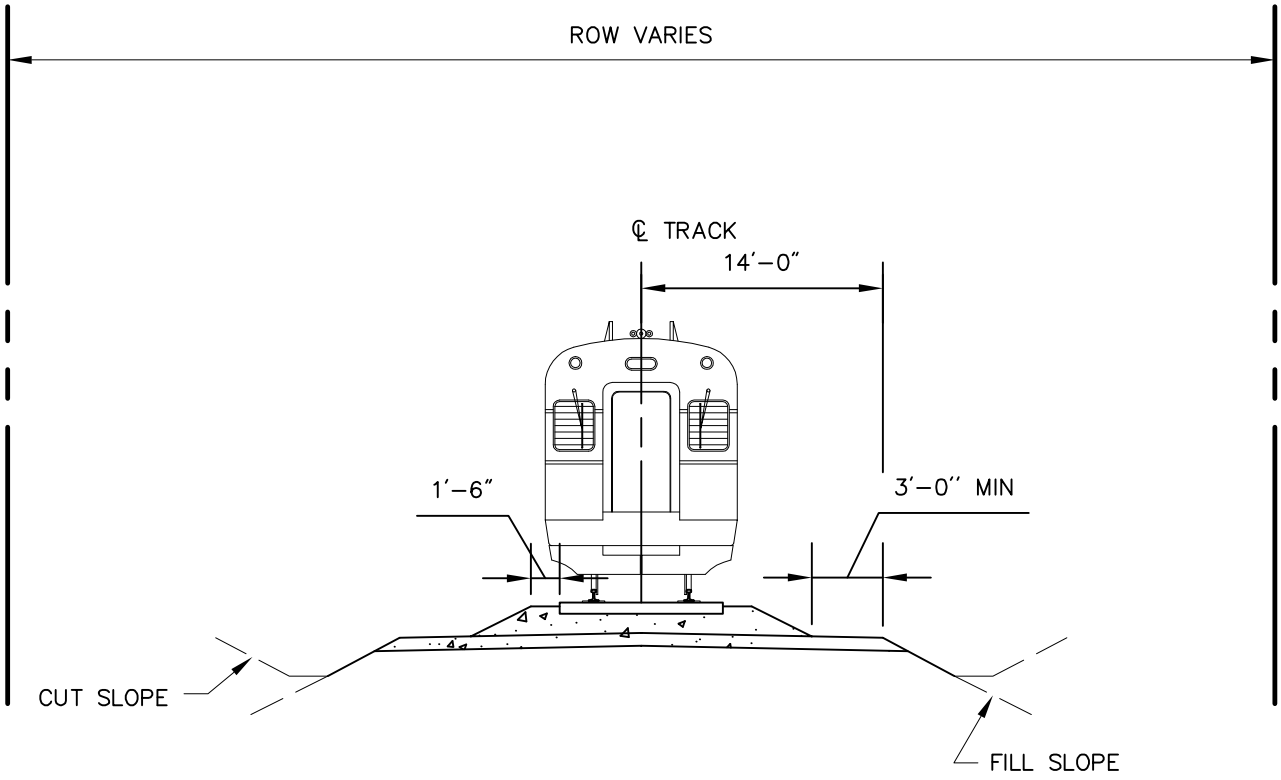


Figure 4-5
Whittenton Alternatives

Data Source: MassGIS 2002
Prepared by: VHB



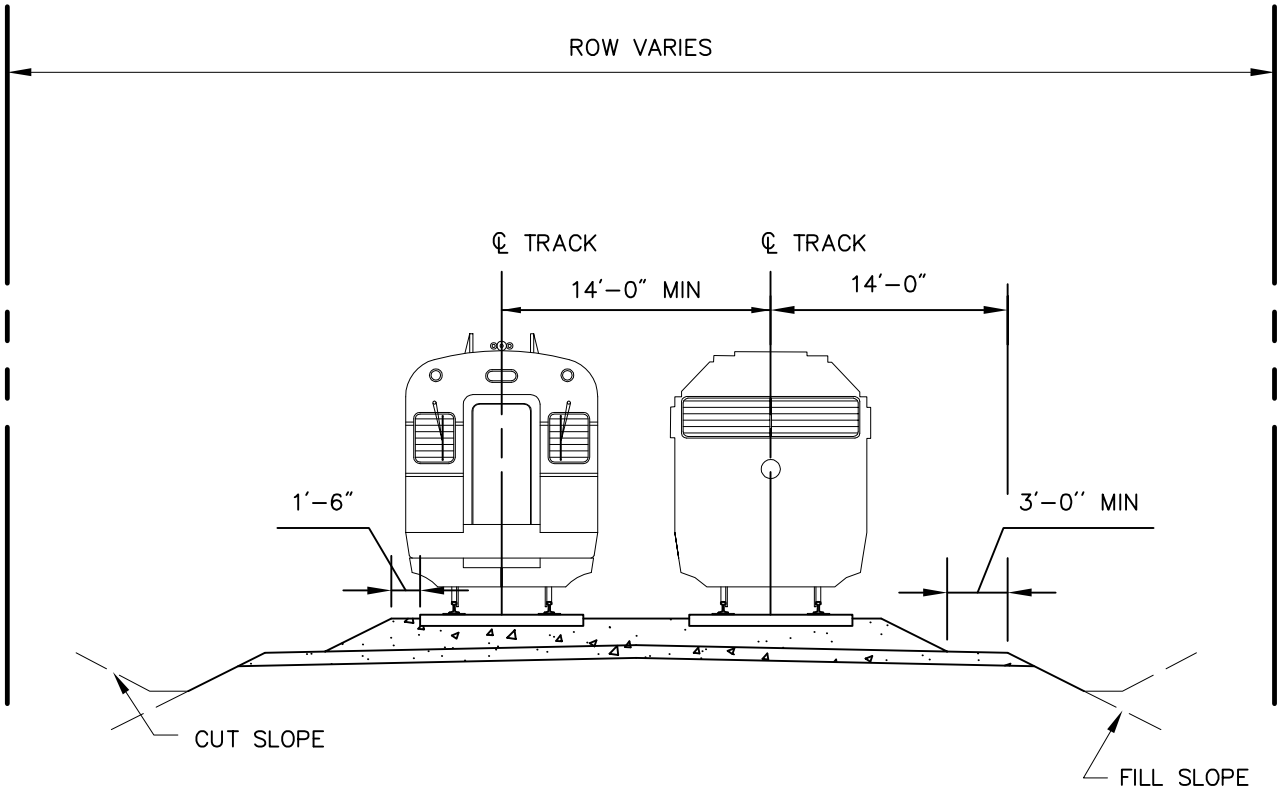
EOT

SOUTH COAST RAIL

Figure 4-7
Conventional Commuter Rail
Single Track
Typical Cross Section

Not to Scale

Prepared by: VHB

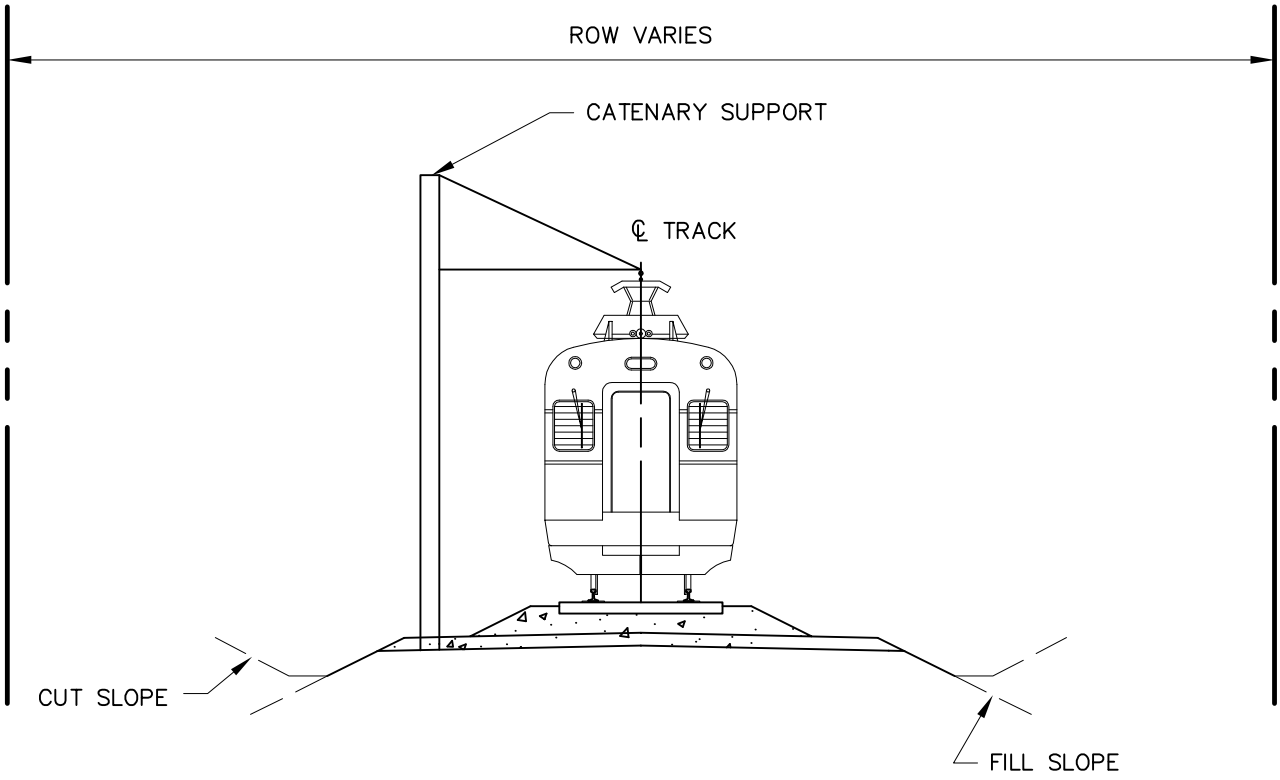


EOT SOUTH COAST RAIL

Figure 4-8
Conventional Commuter Rail
Double Track
Typical Cross Section

Not to Scale

Prepared by: VHB



\\MABOS\projects\10111.00\graphics\FIGURES\Alternatives_Analysis\10111_Figure 4-9 - 4-10_4-11_ECRtyp.dwg Printing Date: 9/23/2009

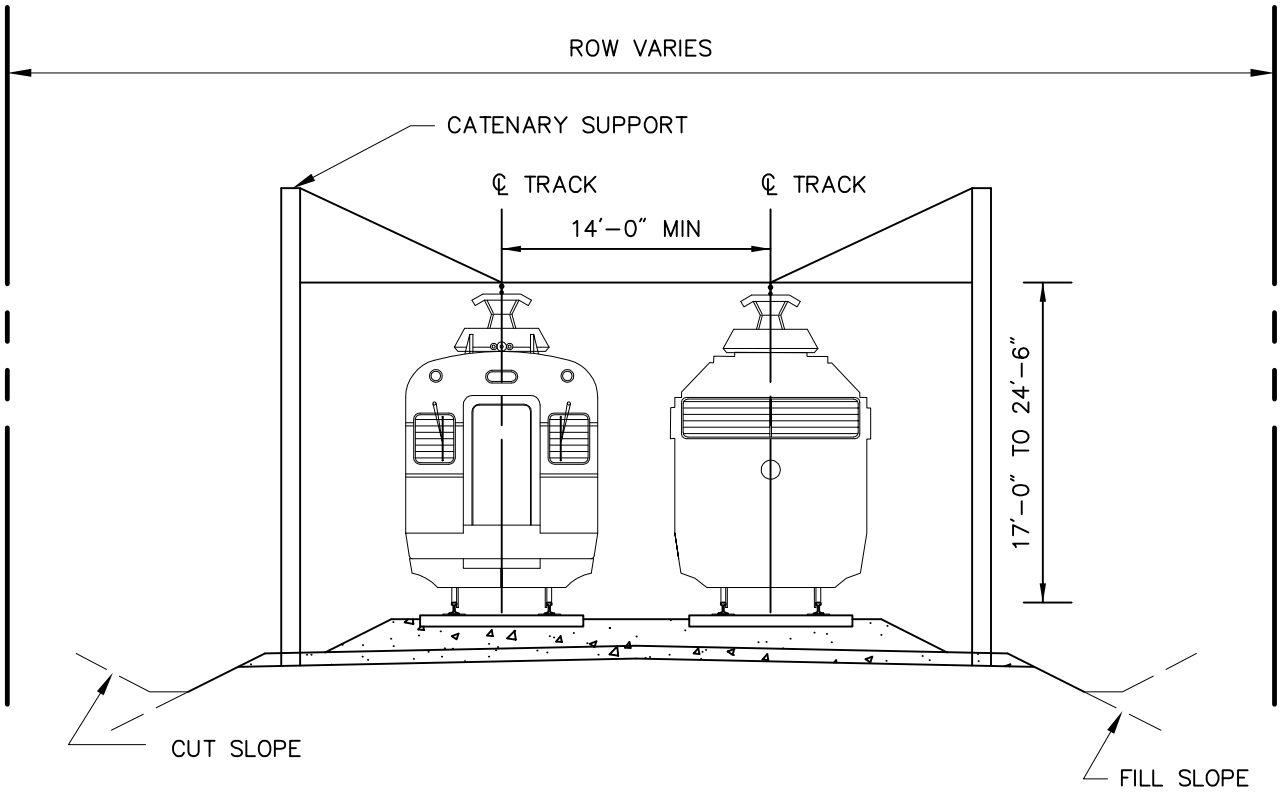
EOT

SOUTH COAST RAIL

Figure 4-9
Electrified Commuter Rail
Single Track
Typical Cross Section

Not to Scale

Prepared by: VHB



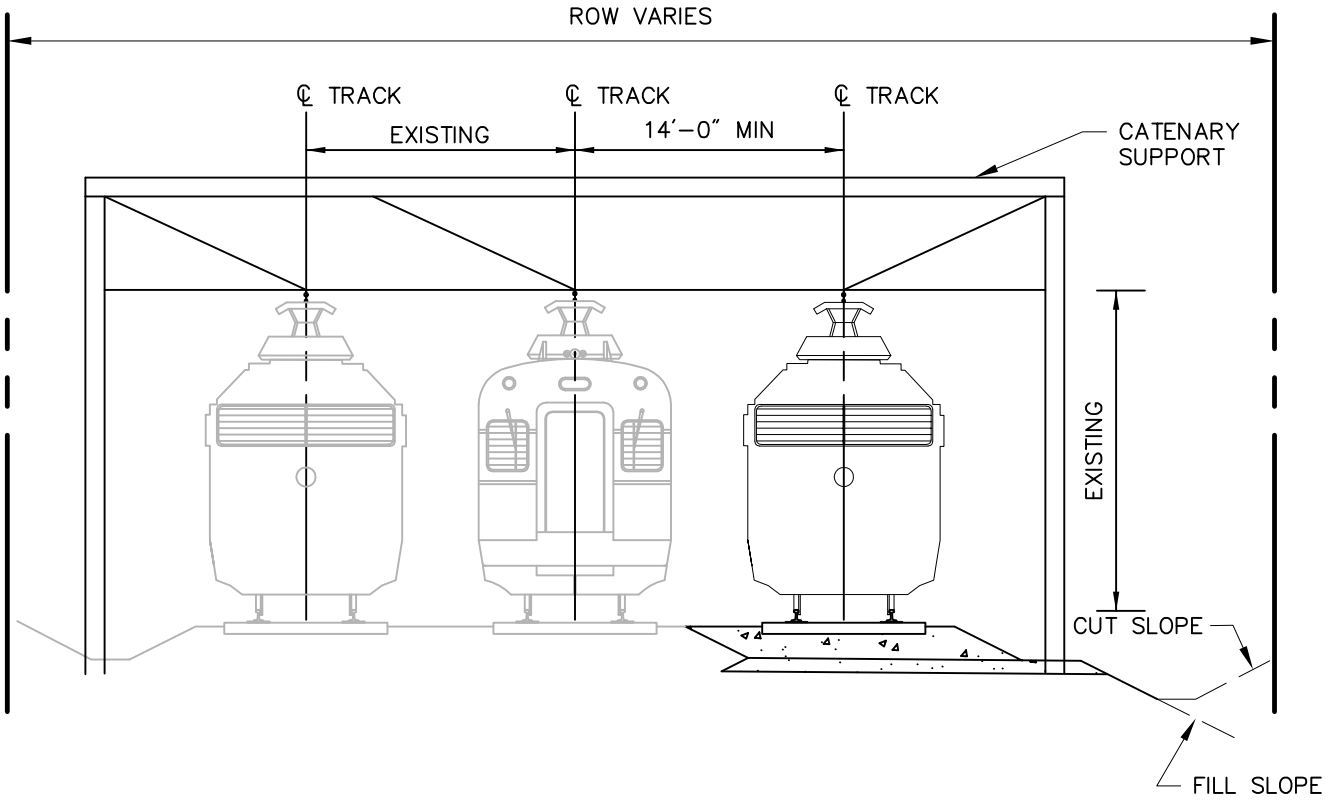
EOT

SOUTH COAST RAIL

Figure 4-10
Electrified Commuter Rail
Double Track
Typical Cross Section

Not to Scale

Prepared by: VHB



\\MABOS\projects\10111.00\graphics\FIGURES\Alternatives_Analysis\10111_Figure 4-9 - 4-10_4-11_ECRtyp.dwg Printing Date: 9/23/2009

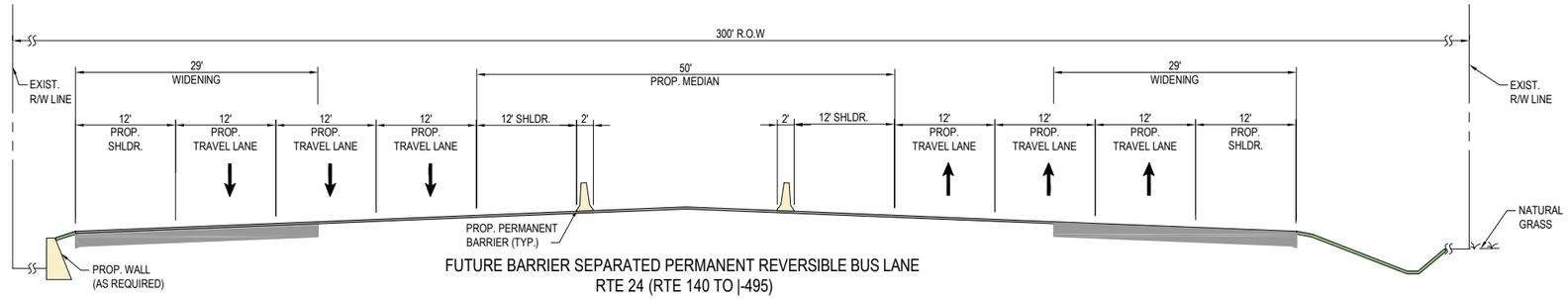
EOT

SOUTH COAST RAIL

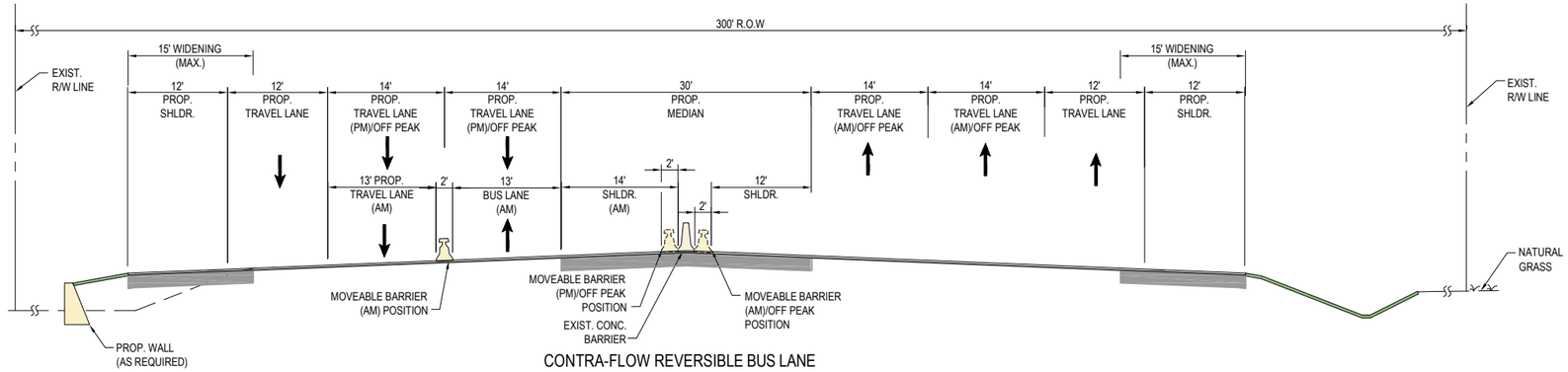
Figure 4-11
Electrified Commuter Rail
Triple Track
Typical Cross Section

Not to Scale

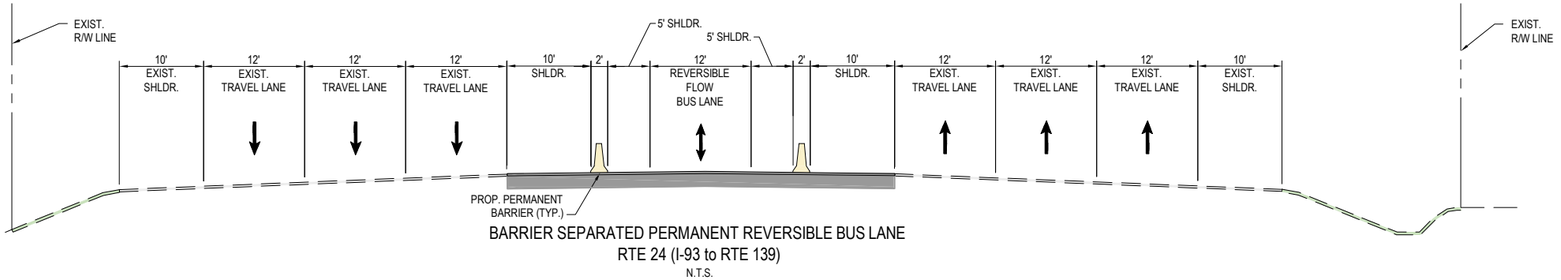
Prepared by: VHB



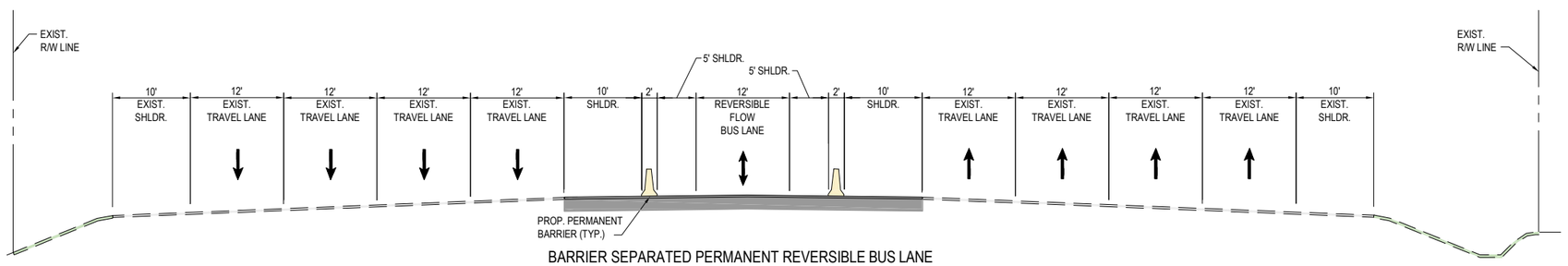
FUTURE BARRIER SEPARATED PERMANENT REVERSIBLE BUS LANE
RTE 24 (RTE 140 TO I-495)
N.T.S.



CONTRA-FLOW REVERSIBLE BUS LANE
RTE 24 (RTE 139 TO I-495)
N.T.S.



BARRIER SEPARATED PERMANENT REVERSIBLE BUS LANE
RTE 24 (I-93 to RTE 139)
N.T.S.



BARRIER SEPARATED PERMANENT REVERSIBLE BUS LANE
I-93 (LOGAN EXPRESS TO RTE 24)
N.T.S.

Figure 4-12
Rapid Bus Cross Sections

Prepared by: VHB