3 ALTERNATIVES

3.1 DEVELOPMENT OF ALTERNATIVES

3.1.1 Introduction

The restoration of passenger rail service to the South Coast region has been extensively studied for almost 20 years. Prior to 1958, the Middleborough, Stoughton and Attleboro rail lines were part of the New York, New Haven and Hartford Railroad system that provided service to Fall River and New Bedford from Boston's South Station, via Canton Junction, along the Stoughton Branch railroad (which included the Whittenton Branch 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). Since discontinuation of this service, commuter rail has only been available to southeastern Massachusetts along the Boston-Providence Northeast Corridor, with stops in Attleboro and South Attleboro, and the Old Colony Middleborough Line, which terminates in Lakeville. Starting in May 2013, MBTA, in cooperation with the Cape Cod Regional Transit Authority, established a seasonal weekends-only service known as the Cape Flyer, extending the Middleborough line from its current terminus in Lakeville, to Hyannis. However, this service is limited to three round-trips per week, all on weekends, and thus serves weekend tourists rather than daily commuters between Boston and the South Coast. Thus, none of these services provide an opportunity for commuters from the Fall River or New Bedford areas to easily or efficiently access rail transportation to Boston.

In 2000, the MBTA completed a Draft EIR that analyzed six alternative routes for providing improved transportation between downtown Boston and the cities of Fall River and New Bedford. The Draft EIR focused on the following alternatives: (1) extending the existing MBTA Stoughton Line, (2) extending the existing MBTA Middleborough Line and (3) providing new service, branching off from the Providence Line near Attleboro. In 2002, a Final EIR was prepared by the MBTA and on August 30, 2002, the Secretary of Environmental Affairs issued a Final Certificate (Executive Office of Environmental Affairs [EEA] File # 10509).

Section 404 of the Clean Water Act Requires a Department of the Army permit for the discharge of dredged or fill material into waters of the United States, including adjacent wetlands. The Department of the Army permit program is administered by the U.S. Army Corps of Engineers (Corps). Since the South Coast Rail Build Alternatives would result in the discharge of fill material into greater than 1 acre of waters of the United States, including wetlands, a Department of the Army Individual Standard Permit is required.[1]

Because the project would require a Clean Water Act permit from the Corps in order to proceed with construction, federal environmental review is required under NEPA. Previous environmental review studies did not take into consideration federal requirements. The Massachusetts Executive Office of Energy and Environmental Affairs also requires review, pursuant to the Massachusetts Environmental Policy Act, due to the lapse of time. To minimize duplication of effort, the Corps and MEPA office agreed that the concurrent NEPA and MEPA reviews should proceed through a combined state and federal environmental review document, in accordance with CEQ regulations at 40 CFR 1506.2. MassDOT (then, the Executive Office of Transportation, or EOT) filed a draft Section 404 Permit Application.

[1] 33 CFR 325.3(b)(1)

Subsequently, the Corps issued a Notice of Intent to prepare an EIS in the Federal Register on October 31, 2008. A public notice was issued by the Corps on November 10, 2008 (NAE 2007-00698).

Both NEPA and MEPA require consideration of a reasonable range of alternatives that could meet the project purpose and need and explanation of why alternatives were eliminated from detailed study (40 C.F.R. § 1502.14(a) and MEPA 301 CMR 11.00(f)). This chapter explains the process that led to the Build Alternatives that are evaluated in this FEIS/FEIR.

In addition, the U.S. Environmental Protection Agency, pursuant to its authority under Section 404(b)(1) of the Clean Water Act, developed *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (USEPA Section 404(b)(1) Guidelines) and codified same under 40 CFR 230 *et seq*. The USEPA Guidelines stipulate that "...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 environmental consequences." The USEPA Section 404(b)(1) Guidelines further define, "practicable" as "available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes." This has generally been interpreted to mean that, in order to comply with the USEPA 404(b)(1) Guidelines, the Corps cannot issue a permit for any project unless it constitutes the least environmentally damaging practicable alternative (LEDPA) for fulfilling the overall project purpose.

The alternatives evaluation described in this chapter was conducted in a manner compatible with the Corps' *Highway Methodology*[2] guidance document to screen alternatives. The Highway Methodology was established to ensure that a transportation agency's preferred alternative under NEPA is consistent with federal wetland regulations, in particular, the Clean Water Act Section 404(b)(1) Guidelines. This chapter also summarizes the characteristics of the alternatives evaluated in this FEIS/FEIR in terms of their anticipated achievement of the overall project purpose, their practicability and their environmental impacts, which together with input from the public and relevant parties will form the basis for the determination of the LEDPA by the Corps.

The alternatives analysis process began with the initial analysis of 65 potential alternatives and subsequent screening, followed by the Corps' Notice Of Intent to prepare an Environmental Impact Statement, the ENF prepared by the applicant, the Certificate on the ENF by the Secretary of the Executive Office Energy and Environmental Affairs (EOEA Secretary) and subsequent studies and analyses during the preparation of the DEIS/DEIR. This process continued through the preparation of the FEIS/FEIR with consideration and analysis of public and agency comments received after publication of the DEIS/DEIR as well as the EOEA Secretary's Certificate on the DEIR.

Throughout this process public, agency and stakeholder input was taken into consideration in the development and evaluation of alternatives, through the federal process, the state environmental review process and public involvement efforts. The Interagency Coordinating Group (ICG)[3] provided an

[2] U.S. Army Corps of Engineers New England Division. 1993. The Highway Methodology Workbook: Integrating Corps Section 404 Permit Requirements with Highway Planning and Engineering and the NEPA EIS Process. Corps Tech. Rpt. NEDEP-360-1-30, 28pp.

[3] The ICG was convened by MassDOT and includes representatives of the United States Army Corps of Engineers; United States Environmental Protection Agency; United States Fish and Wildlife Service; Federal Highway Administration; Federal Transit Administration; National Marine Fisheries Service; Narragansett Indian Tribe; Wampanoag Tribe of Gay Head (Aquinnah); Massachusetts Executive Office of Energy and Environmental Affairs; Massachusetts Environmental Policy Act Office; Massachusetts Bay Transportation Authority; Massachusetts Department of Environmental Protection; Massachusetts Office of Coastal Zone Management; Massachusetts Department of Conservation and Recreation, Areas of Critical Environmental Concern Program; Massachusetts Department of Fish and Game, Natural Heritage and Endangered Species Program; Massachusetts Historical Commission and the Southeastern Regional Planning and Economic Development District.

opportunity for input into the technical analyses for the DEIS/DEIR and was also consulted during the FEIS/FEIR process.

An overview of key steps in the alternatives analysis process is provided below.

3.1.2 Initial (PRE-DEIS/DEIR) Alternatives Analysis Overview

The purpose of the initial 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 options that could be carried forward to a more detailed level of analysis in the NEPA/MEPA process.

An initial 65 potential alternatives were identified by reviewing previous studies and soliciting input from the MBTA, the Interagency Coordinating Group, the Commuter Rail Task Force,[4] and interested stakeholders through an extensive civic engagement process conducted by MassDOT. The alternatives are described in detail in the *Analysis of South Coast Rail Alternatives: Phase 1 Report,* Appendix 3.1-A to this FEIS/FEIR. Table 3.1-1, presents the initial list of potential alternatives.[5] Section 3.1.2 of the DEIS/DEIR explained the process of how the alternatives were identified, evaluated, and dismissed or advanced for further evaluation.

These alternatives also included several different components along five main corridors (shown on Figure 3.1-1):

- The Attleboro route (using the active freight rail lines from New Bedford and Fall River to Attleboro, then using the Northeast Corridor from Attleboro to South Station) with a new track bypass or connecting at the existing Attleboro Station.

- The Mansfield route (using the active freight rail lines from New Bedford and Fall River to Taunton, then using the abandoned rail line north to Mansfield Station, then using the active commuter rail line to South Station).

- The Stoughton route (using the active freight rail lines from New Bedford and Fall River to Taunton, then using the inactive rail bed north to Stoughton, then using the active commuter rail tracks to South Station).

- The Middleborough route (using the active freight rail lines from New Bedford and Fall River to the existing Middleborough/Lakeville Station, then using the Old Colony Middleborough Line to South Station)

[4] The Commuter Rail Task Force was formed in 2004 and provides a forum for state officials and local representatives to review and discuss all aspects of the Project and to work toward consensus on strategies and actions to plan ahead for new growth in the region. The Task Force provides advice and assistance to MassDOT and the MBTA in the design of the South Coast Rail Project and in the implementation of the South Coast Rail Economic Development and Land Use Corridor Plan. Its membership includes representatives from the MBTA, regional transit authorities, cities and towns, environmental groups, and business and economic development organizations.

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

Table 3.1-1 Initial List of Potential Alternatives

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
THROUGH ATTLEBORO	***ATTLEBORO SECONDARY***				
	1	Commuter Rail to South Station via Attleboro Bypass	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary; new track bypass along National Grid right-of-way to tie into Northeast Corridor north of Attleboro station	Advanced for further consideration	Executive Office of Transportation
	2	Commuter Rail to South Station via Attleboro Station with Reverse Move	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary to Northeast Corridor; reverse move at Attleboro Station to merge onto Northeast Corridor	Advanced for further consideration	Executive Office of Transportation
	3	Commuter Rail to South Station via Dartmouth Secondary, New Bedford Secondary, and Attleboro Bypass	Commuter rail along Dartmouth Secondary and New Bedford Mainline north to Cotley Junction, then west along Attleboro Secondary; new track bypass along National Grid right-of-way to tie into Northeast Corridor near Mansfield/Attleboro/Norton town line	Advanced for further consideration	Civic Engagement Process
	4	Bus Rapid Transit to Attleboro Station	Bus Rapid Transit adjacent to New Bedford Main Line track and Fall River Secondary track north to Cotley Junction, then adjacent to Attleboro Secondary west; transfer to Northeast Corridor at Attleboro Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	5	Diesel Multiple Units Commuter Rail to Attleboro Station	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary; transfer to Attleboro Station	Advanced for further consideration	Civic Engagement Process
	6	Diesel Multiple Units to Attleboro Station with New Bedford to Fall River Connection via Dartmouth Secondary	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary; transfer to Attleboro Station; additional line along Dartmouth Secondary between New Bedford and Fall River	Advanced for further consideration	Civic Engagement Process
	7	Electrified Commuter Rail to South Station via Attleboro Bypass	Electrified commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary; new track bypass along National Grid right-of-way to tie into Northeast Corridor near Mansfield/Attleboro/Norton town line	Advanced for further consideration	Civic Engagement Process
	8	Light Rail to Attleboro	Light rail transit along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary; transfer to Commuter Rail at Attleboro Station	Similar operational benefits to Alternative 5 but requires additional infrastructure due to incompatibility of light rail vehicles operating on national rail network	Civic Engagement Process

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
THROUGH ATTLEBORO	9	Light Rail to Attleboro w/ New Bedford to Fall River connection	Light rail transit along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then west along Attleboro Secondary; transfer to Attleboro Station; additional line along Interstate 195 or Dartmouth Secondary between New Bedford and Fall River	Similar operational benefits to Alternative 6 but requires additional infrastructure due to incompatibility of light rail vehicles operating on national rail network	Civic Engagement Process
	10	Combination Connection to Boston and Providence via Northeast Corridor	Combination of commuter rail on Attleboro Secondary to Boston and commuter bus to connect to Providence, using Interstate 195 corridor	Boston service covered by other alternatives. Providence service does not meet basic project purpose	Civic Engagement Process
	MANSFIELD FORMER RIGHT-OF-WAY				
	11	Commuter Rail to South Station via Mansfield	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, northwest along Attleboro Secondary, then northwest along former right-of-way through Taunton, Norton, and Mansfield to tie into Northeast Corridor near Mansfield Commuter Rail Station	Advanced for further consideration	Corps of Engineers
	12	Bus Rapid Transit to Mansfield Station	Bus Rapid Transit adjacent to New Bedford Main Line track and Fall River Secondary track north to Cotley Junction, then adjacent to Attleboro Secondary track, then northwest along former right-of-way through Taunton, Norton, and Mansfield; transfer to Northeast Corridor at Mansfield Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	13	Diesel Multiple Units Commuter Rail to Mansfield Station	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then northwest along Attleboro Secondary, then northwest along former right-of-way through Taunton, Norton, and Mansfield; then transfer to Mansfield Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	14	Diesel Multiple Units to Mansfield Station with New Bedford to Fall River Connection via Dartmouth Secondary	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then northwest along Attleboro Secondary to Whittenton Junction, then northwest along former right-of-way through Taunton, Norton, and Mansfield; then transfer to Mansfield Commuter Rail Station; additional line along Dartmouth Secondary between New Bedford and Fall River	Advanced for further consideration	Civic Engagement Process
	15	Electrified Commuter Rail to South Station via Mansfield	Electrified commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then northwest along Attleboro Secondary to Whittenton Junction, then northwest along former right-of-way through Taunton, Norton, and Mansfield to tie into Northeast Corridor near Mansfield Commuter Rail Station	Advanced for further consideration	Civic Engagement Process

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
THROUGH MIDDLEBOROUGH	16	Light Rail to Mansfield	Light rail transit along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then northwest along Attleboro Secondary to Whittenton Junction, then northwest along former right-of-way through Taunton, Norton, and Mansfield; then transfer to Mansfield Commuter Rail Station	Similar operational benefits to Alternative 13 but requires additional infrastructure due to incompatibility of light rail vehicles operating on national rail network	Civic Engagement Process
	MIDDLEBOROUGH SECONDARY				
	17	Commuter Rail to South Station via Middleborough	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary to tie into Middleborough Line	Advanced for further consideration	Executive Office of Transportation
	18	Commuter Rail to South Station via Middleborough, convert Red Line Braintree Branch to Commuter Rail	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary to tie into Middleborough Line at new Middleborough/Lakeville Commuter Rail Station relocated north; convert Red Line Braintree Branch to commuter rail	Advanced for further consideration	Civic Engagement Process
	19	Heavy Rail to Middleborough	Extend the Red Line to Middleborough/Lakeville Station via the Middleborough Commuter Rail Line with feeder bus from New Bedford and Fall River	Variation of Alternative 61 (greater infrastructure requirements with no transportation benefits)	Civic Engagement Process
	20	Bus Rapid Transit to Middleborough/Lakeville Station	Bus Rapid Transit adjacent to New Bedford Main Line track and Fall River Secondary track north to Cotley Junction, then east adjacent to Middleborough Secondary; transfer to Middleborough Line at Middleborough/Lakeville Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	21	Diesel Multiple Units Commuter Rail to Middleborough/Lakeville Station	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary; transfer to Middleborough/Lakeville Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	22	Diesel Multiple Units to Middleborough/Lakeville Station with New Bedford to Fall River Connection via Dartmouth Secondary	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary; transfer to Middleborough/Lakeville Commuter Rail Station; additional line along Dartmouth Secondary between New Bedford and Fall River	Advanced for further consideration	Civic Engagement Process
	23	Commuter Rail to South Station via Middleborough (via Cotley) -w/ reverse	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary to tie into Middleborough Line just north of Middleborough/Lakeville Commuter Rail Station w/	Variation of Alternative 17 (similar infrastructure requirements with no transportation benefits)	Executive Office of Transportation

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
THROUGH MIDDLEBOROUGH		move	reverse move to serve Middleborough/Lakeville Station		
	24	Light Rail to Middleborough (via Cotley)	Light rail transit along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary; transfer to Middleborough/Lakeville Commuter Rail Station	Similar operational benefits to Alternative 21 but requires additional infrastructure due to incompatibility of light rail vehicles operating on national rail network	Civic Engagement Process
	63	Commuter Rail to South Station via Middleborough, also extend Middleborough line to Wareham	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary to tie into Middleborough Line; then extend Middleborough Commuter Rail Line to Wareham and/or Buzzards Bay	Advanced for further consideration	Civic Engagement Process
	64	Commuter Rail to South Station via Middleborough without Old Colony Main Line Improvements	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then east along Middleborough Secondary to tie into Middleborough Line; no improvements to Old Colony Main Line	Advanced for further consideration	Interagency Coordinating Group
	MIDDLEBOROUGH FORMER RIGHT-OF-WAY				
	25	Commuter Rail to South Station via Middleborough (via Myricks)	Commuter rail along New Bedford Main Line and Fall River Secondary north to Myricks Junction, then northeast along former right-of-way parallel to Route 79 through Berkley and Lakeville to tie into Middleborough Line at new Middleborough/Lakeville Commuter Rail Station relocated north	Variation of Alternative 17 with minimal transportation improvements and significant environmental impacts (right-of-way takings)	Civic Engagement Process
	26	Commuter Rail to South Station via Middleborough (via Myricks) -w/ reverse move	Commuter rail along New Bedford Main Line and Fall River Secondary north to Myricks Junction, then northeast along former right-of-way parallel to Route 79 through Berkley and Lakeville to tie into Middleborough Line just north of Middleborough/Lakeville Commuter Rail Station w/ reverse move to serve Middleborough/Lakeville Station	Variation of Alternative 17 with minimal transportation improvements and significant environmental impacts (right-of-way takings)	Civic Engagement Process
	27	Light Rail to Middleborough (via Myricks)	Light rail transit along New Bedford Main Line and Fall River Secondary north to Myricks Junction, then northeast along former right-of-way parallel to Route 79 through Berkley and Lakeville; transfer to Middleborough/Lakeville Commuter Rail Station	Similar operational benefits to Alternative 21 but requires additional infrastructure due to incompatibility of light rail vehicles operating on national rail network	Civic Engagement Process

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
THROUGH STOUGHTON	28	Bus Rapid Transit to Middleborough (via Myricks)	Bus Rapid Transit adjacent to New Bedford Main Line track and Fall River Secondary track north to Myricks Junction, then northeast along former right-of-way parallel to Route 79 through Berkley and Lakeville; transfer to Middleborough Line at Middleborough/Lakeville Commuter Rail Station	Variation of Alternative 20 with minimal transportation improvements and significant environmental impacts (right-of-way takings)	Civic Engagement Process
	29	Diesel Multiple Units Commuter Rail to Middleborough (via Myricks)	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Myricks Junction, then northeast along former right-of-way parallel to Route 79 through Berkley and Lakeville; transfer to Middleborough/Lakeville Commuter Rail Station	Variation of Alternative 21 with minimal transportation improvements and significant environmental impacts (right-of-way takings)	Civic Engagement Process
	30	Commuter Rail to South Station via Stoughton	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then north along existing right-of-way through Raynham, Easton, and Stoughton to tie into Stoughton Line at Stoughton Commuter Rail Station	Advanced for further consideration	Executive Office of Transportation
	31	Bus Rapid Transit to Stoughton Station	Bus Rapid Transit adjacent to New Bedford Main Line track and Fall River Secondary track north to Cotley Junction, then north along existing right-of-way through Raynham, Easton, and Stoughton; transfer to Stoughton Line at Stoughton Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	32	Diesel Multiple Units Commuter Rail to Stoughton Station	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then north along existing right-of-way through Raynham, Easton, and Stoughton; transfer to Stoughton Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	33	Diesel Multiple Units to Stoughton Station with New Bedford to Fall River Connection via Dartmouth Secondary	Diesel Multiple Units commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then north along existing right-of-way through Raynham, Easton, and Stoughton; transfer to Stoughton Commuter Rail Station; additional line along Dartmouth Secondary between New Bedford and Fall River	Advanced for further consideration	Civic Engagement Process
	34	Electrified Commuter Rail to South Station via Stoughton	Electrified commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then north along existing right-of-way through Raynham, Easton, and Stoughton to tie into Stoughton Line at Stoughton Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
THROUGH STOUGHTON	35	Commuter Rail to South Station via Stoughton (Whittenton Branch)	Variation on Stoughton Alternative using Whittenton Branch and Attleboro Secondary to avoid the Pine Swamp	Variation of Alternative 30 with similar transportation benefits (could be evaluated in Phase 2 as option to Alternative 30	Corps of Engineers

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
THROUGH ATTLEBOROAND MIDDLEBOROUGH	36	Light Rail to Stoughton	Light rail transit along New Bedford Main Line and Fall River Secondary north to Cotley Junction, then north along existing right-of-way through Raynham, Easton, and Stoughton; transfer to Stoughton Commuter Rail Station	Similar operational benefits to Alternative 32 but requires additional infrastructure due to incompatibility of light rail vehicles operating on national rail network	Civic Engagement Process
	62	Commuter Rail to South Station via Attleboro Bypass and Middleborough Line	Commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction; then one branch west along Attleboro Secondary with new track bypass along National Grid right-of-way to tie into Northeast Corridor north of Attleboro station; second branch along Middleborough Secondary to tie into Middleborough Line just north of Middleborough/Lakeville	Advanced for further consideration	Executive Office of Transportation
	65	Electrified Commuter Rail to South Station via Attleboro and Middleborough	Diesel and electric commuter rail along New Bedford Main Line and Fall River Secondary north to Cotley Junction; then one electric branch west along Attleboro Secondary with new track bypass along National Grid right-of-way to tie into Northeast Corridor north of Attleboro station; one diesel branch along Middleborough Secondary to tie into Middleborough Line just north of Middleborough/Lakeville Station (Middleborough Line not electrified)	Advanced for further consideration	Interagency Coordinating Group
USING HIGHWAY SYSTEM	37	Monorail to South Station via Route 140, Route 24, Route 128, and Southeast Expressway	Monorail along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east and Southeast Expressway right-of-way north to South Station	Advanced for further consideration	Civic Engagement Process
	38	Monorail to Quincy Adams Station via Route 140, Route 24, and Route 128	Monorail along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east; transfer to Quincy Adams Red Line Station	Advanced for further consideration	Civic Engagement Process
	39	Monorail to Route 128 Station via Route 140, Route 24, and Route 128	Monorail along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128 right-of-way west; transfer to Route 128 Commuter Rail Station	Advanced for further consideration	Civic Engagement Process

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
USING HIGHWAY SYSTEM	40	Commuter Rail to South Station via Route 24 and Route 128 to Northeast Corridor	Commuter rail along New Bedford Main Line and Fall River Secondary north to just south of Cotley Junction, then new track along Route 24 right-of-way north to Randolph and along Route 128/I-93 right-of-way west; tie into Northeast Corridor north of Route 128 Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	41	Light Rail/Heavy Rail to Route 128 Station via Route 140, Route 24, and Route 128	Heavy or light rail transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128 right-of-way west; transfer to Route 128 Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	42	Heavy Rail to South Station via Route 140, Route 24, Route 128, and Red Line	Heavy rail transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east; tie into Red Line at Quincy Adams Red Line Station	Advanced for further consideration	Civic Engagement Process
	43	Express Bus in Dedicated Lane to Route 128 Station via Route 24 and Route 128	Add HOV lanes on Route 24 from Interstate 495 north to Randolph, then on Route 128 west; transfer to Route 128 Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	44	Express Bus in Dedicated Lane to South Station via Route 24, Route 128, and Southeast	Add HOV lanes on Route 24 from Interstate 495 north to Randolph, then on Route 128/93 east to Southeast Expressway HOV Lane to South Station	Advanced for further consideration	Civic Engagement Process
	45	Enhanced Bus Service on Existing Private Carrier Routes	Increased bus service and increased parking for bus commuters along existing private bus carrier lines from Fall River, New Bedford, and Taunton to South Station	Advanced for further consideration	Executive Office of Transportation
	46	Light Rail to Route 128 Station	Light rail transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128 right-of-way west; transfer to Route 128 Commuter Rail Station	Included in Alternative 41	Civic Engagement Process
	47	Light Rail to Quincy Adams Station	Light rail transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east; transfer to Quincy Adams Red Line Station	Provides fewer transportation benefits (requires transfer) than Alternative 42 with similar environmental impacts/benefits	Civic Engagement Process
	48	Light Rail to South Station	Light rail transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east and Southeast Expressway right-of-way north	Provides similar transportation benefits to HOV lane and similar environmental impacts	Civic Engagement Process

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
USING HIGHWAY SYSTEM (cont'd)			to South Station	than Alternative 43	
	49	Bus Lane to Route 128	Bus lanes on Route 24 from 495 north to Randolph, then on Route 128 west; transfer to Route 128 Commuter Rail Station	Same transportation and environmental benefits as Alternative 43	Civic Engagement Process
	50	Bus Lane to South Station	Bus lanes on Route 24 from 495 north to Randolph, then on Route 128/93 east to Southeast Expressway HOV Lane to South Station	Same transportation and environmental benefits as Alternative 44	Civic Engagement Process
	51	Combination Connection to Boston and Providence via Route 24	Combination of commuter bus services along I-195 and Routes 24/140 to connect South Coast cities with Providence and Boston	Boston service covered by other alternatives. Providence service does not meet basic project purpose	Civic Engagement Process
	52	Park-and-Ride Improvements	Improve the Park-and-Ride system serving the South Coast	Not a public transit alternative. Does not meet basic project purpose	Civic Engagement Process
	53	Advanced Rapid Transit to Route 128 Station	Advanced rapid transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128 right-of-way west; transfer to Route 128 Commuter Rail Station	Provides same transportation and environmental benefits/impacts as Alternative 37 (could be evaluated in Phase 2 as option to Alternative 37)	Civic Engagement Process
	54	Advanced Rapid Transit to Quincy Adams Station	Advanced rapid transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east; transfer to Quincy Adams Red Line Station	Provides same transportation and environmental benefits/impacts as Alternative 38 (could be evaluated in Phase 2 as option to Alternative 38)	Civic Engagement Process
	55	Advanced Rapid Transit to South Station	Advanced rapid transit along Routes 24/140 right-of-way from Fall River/New Bedford north to Randolph, then along Route 128/93 right-of-way east and Southeast Expressway right-of-way north to South Station	Provides same transportation and environmental benefits/impacts as Alternative 39 (could be evaluated in Phase 2 as option to Alternative 39)	Civic Engagement Process
Other	56	Commuter Rail to South Station via Providence	Commuter rail along Dartmouth Secondary and old right-of-way through Rhode Island to Providence; tie into Northeast Corridor just north of Providence Commuter Rail Station	Advanced for further consideration	Civic Engagement Process
	57	Enhanced bus on Interstate 195	Public transit service along Interstate 195 between Wareham and Providence	Advanced for further consideration	Civic Engagement Process

Route	Alt #	Name	Description	How the Alternative was Addressed	Origin
Other	58	Commuter Rail to Wareham via Middleborough	Extend the Middleborough Commuter Rail Line to Wareham and/or Buzzards Bay	Advanced for further consideration	Civic Engagement Process
	59	Appoint a czar		Not a public transportation alternative	Civic Engagement Process
	60	Encourage Telecommuting/Video Conferencing		Not a public transportation alternative	Civic Engagement Process
	61	Feeder Bus Network to Middleborough/Lakeville Station	Feeder bus network from New Bedford/Fall River area feeding into existing commuter rail network (may require new station)	Advanced for further consideration	Interagency Coordinating Group

- The Highway route (using Routes 140, 79, 24, 128, and I-93 to the existing Route 128 commuter rail station, the existing Quincy Adams Red Line station, or South Station).

These 65 alternatives were combined into 38 alternatives (Table 3.1-2) by grouping similar alternatives together and dismissing alternatives that were not transportation alternatives. For supporting information on methodology used to develop the ratings shown in Table 3.1-2, refer to Analysis of South Coast Rail Alternatives: Phase 1 Report, Appendix 3.1-A to this FEIS/FEIR.

The alternatives analysis also evaluated using other transportation corridors, including the Dartmouth Secondary (a partially active and partially abandoned freight rail line between New Bedford and Fall River); Interstate 195 between New Bedford and Providence; and active freight rail lines between Lakeville and Wareham.

At the conclusion of the ENF review and public scoping process, the Secretary of the Executive Office of EEA on April 3, 2009 issued a Certificate that specified the analyses, studies, and information to be included in the DEIR and the alternatives to be evaluated:

- No-Build Alternative (Enhanced Bus)
- Attleboro Electric Alternative (Previously referred to as Alternative 1, Option 1B)
- Attleboro Diesel Alternative (Previously referred to as Alternative 1, Option 1A)
- Stoughton Electric Alternative (Previously referred to as Alternative 4, Option 4B)
- Stoughton Diesel Alternative (Previously referred to as Alternative 4, Option 4A)
- Whittenton Electric Alternative (Alternative 4, Option 4D)
- Whittenton Diesel Alternative (Previously referred to as Alternative 4, Option 4C)
- Rapid Bus Alternative (Previously referred to as Alternative 5, Rapid Bus)

Table 3.1-2 Initial Screening List of 38 Alternatives

Route	Alt #	Name	Step 1 Analysis - *Would the Proposed Alternative Achieve the Project Purpose?*	Step 2 Analysis - *Is the Proposed Alternative Practicable?*	Step 3 Analysis - *Compare the Magnitude of Impacts to the natural Environment and Consistency with Smart Growth*
THROUGH ATTLEBORO OR MANSFIELD		***ATTLEBORO SECONDARY***			
	1	Commuter Rail to South Station via Attleboro Bypass	◑	○	○
	2	Commuter Rail to South Station via Attleboro Station with Reverse Move	○	⊗	
	3	Commuter Rail to South Station via Dartmouth Secondary, New Bedford Secondary, and Attleboro Bypass	◑	○	⊗
	4	Bus Rapid Transit to Attleboro Station	⊗		
	5	Diesel Multiple Units Commuter Rail to Attleboro Station	○	○	◑
	6	Diesel Multiple Units to Attleboro Station with New Bedford to Fall River Connection via Dartmouth Secondary	◑	○	⊗
	7	Electrified Commuter Rail to South Station via Attleboro Bypass	◑	○	○
		MANSFIELD FORMER RIGHT-OF-WAY			
	11	Commuter Rail to South Station via Mansfield	◑	⊗	
	12	Bus Rapid Transit to Mansfield Station	○	⊗	
	13	Diesel Multiple Units Commuter Rail to Mansfield Station	○	⊗	
	14	Diesel Multiple Units to Mansfield Station with New Bedford to Fall River Connection via Dartmouth Secondary	◑	⊗	
	15	Electrified Commuter Rail to South Station via Mansfield	◑	⊗	
THROUGH MIDDLEBOROUGH		***MIDDLEBOROUGH SECONDARY***			
	17	Commuter Rail to South Station via Middleborough	◑	⊗[1]	◑
	18	Commuter Rail to South Station via Middleborough, convert Red Line Braintree Branch to Commuter Rail	◑	⊗	
	20	Bus Rapid Transit to Middleborough/Lakeville Station	⊗		
	21	Diesel Multiple Units Commuter Rail to Middleborough/Lakeville Station	⊘		
	22	Diesel Multiple Units to Middleborough/Lakeville Station with New Bedford to Fall River Connection via Dartmouth Secondary	⊘		
	63	Commuter Rail to South Station via Middleborough, also extend Middleborough line to Wareham	◑	⊗	
	64	Commuter Rail to South Station via Middleborough without Old Colony Main Line Improvements	◑	○	◑
THROUGH ATTLEBORO AND MIDDLEBOROUGH	62	Commuter Rail to South Station via both Attleboro Bypass and Middleborough Line	◑	◑	○
THROUGH STOUGHTON	30	Commuter Rail to South Station via Stoughton	◑	◑	⊘
	31	Bus Rapid Transit to Stoughton Station	⊘		
	32	Diesel Multiple Units Commuter Rail to Stoughton Station	○	○	⊗
	33	Diesel Multiple Units to Stoughton Station with New Bedford to Fall River Connection via Dartmouth Secondary	◑	○	⊗
	34	Electrified Commuter Rail to South Station via Stoughton	◑	◑	⊘
USING HIGHWAY SYSTEM	37	Monorail to South Station via Route 140, Route 24, Route 128, and Southeast Expressway	◑	⊗	
	38	Monorail to Quincy Adams Station via Route 140, Route 24, and Route 128	○	⊗	
	39	Monorail to Route 128 Station via Route 140, Route 24, and Route 128	○	⊗	
	40	Commuter Rail to South Station via Route 24 and Route 128 to Northeast Corridor	◑	⊗	
	41	Light Rail/Heavy Rail to Route 128 Station via Route 140, Route 24, and Route 128	○	⊗	
	42	Heavy Rail to South Station via Route 140, Route 24, Route 128, and Red Line	◑	⊗	
	43	Express Bus in Dedicated Lane to Route 128 Station via Route 24 and Route 128	○	○	◑
	44	Express Bus in Dedicated Lane to South Station via Route 24, Route 128, and Southeast Expressway HOV Lane	◑	○	◑
	45	Enhanced Bus Service on Existing Private Carrier Routes	◑	◑	◑
Other	56	Commuter Rail to South Station via Providence	⊗		
	57	Enhanced bus on Interstate 195	⊗		
	58	Commuter Rail to Wareham via Middleborough	⊗		
	61	Feeder Bus Network to Middleborough/Lakeville Station	⊘		

LEGEND
- ● **Highly Favorable**
- ◑ **Favorable**
- ○ **Neutral**
- ⊘ **Unfavorable** (Step 1 alternatives resulting in unfavorable designations were dismissed from further consideration in Phase 1)
- ⊗ **Highly Unfavorable** (Any alternative resulting in highly unfavorable designations were dismissed from further consideration in Phase 1)
- Alternative dismissed from further consideration

1 Alternative 17 was removed from further consideration in Step 2, Part 1 but was carried forward to Step 2, Part 2 for comparison purposes at the request of EOT.

The Secretary's certificate and the public and agency comments received in response to the Notice of Intent, ENF, as well as other comments and input from agencies through the Interagency Coordinating Group (ICG) and other channels were taken into consideration by the Corps in its subsequent preparation of the DEIS/DEIR. The Corps and the Executive Office of EEA reached consensus that the above alternatives should be evaluated in the DEIS/DEIR; however, before concluding that they represented a sufficient suite of alternatives to study in detail, the Corps examined an additional permutation. Specifically, during the preparation of the DEIS/DEIR a new alternative that combined the Middleborough Simple Rail Alternative (ENF Alternative 2) with the Rapid Bus Alternative (ENF Alternative 5) was evaluated at the request of EPA. The evaluation (provided in Appendix 3.1--B) indicated that complementing the low ridership of the Middleborough Simple Alternative with the ridership of the Rapid Bus Alternative would result in a combined ridership for the Hybrid Alternative less than that of the Rapid Bus Alternative by itself and just slightly more than the Middleboro Simple Alternative (which was already considered underperforming in terms of ridership). The combination alternative would require much of the infrastructure improvements needed for each individual alternative, resulting in a higher cost of the hybrid alternative than either the Rapid Bus Alternative or the Middleboro Simple Alternative. This would render the cost of the combination alternative not practicable considering costs and logistics in light of overall project purposes (i.e., fewer riders but higher cost of either Rapid Bus or Middleboro Simple alone). This alternative was therefore not advanced for further analysis in the DEIS/DEIR.

Along with the identification of alternative alignments, described in Section 3.1 of the DEIS/DEIR, potential station sites were identified, as described in Section 3.1.4 of the DEIS/DEIR with further detail in the Station Siting Report (FEIS/FEIR Appendix 3.1-C).[6]

3.1.2.1 Station Site Screening

Potential station locations to serve each of the five public transportation alternatives were identified and evaluated with regard to their ability to meet the purpose and need under NEPA, and the overall project purpose under the USEPA Section 404(b)(1) Guidelines pursuant to 40 CFR 230.10(a)(2).

Potential station locations for each of the alternatives were identified early in the process in order to identify potential environmental issues and to be able to calculate the number of riders projected to use each of the alternatives. The number of riders was projected by CTPS using the regional ridership/travel demand computer model commonly used forecast the number of users of a new transit service. The model is based on demographic and geographical factors and service quality variables. Identification of potential station locations also provided insight into the economic development potential of each alternative and opportunities to support economic development in accordance with Smart Growth principles.[7] In addition to the consideration above, a list of guiding principles was used in station screening, consistent with the Commonwealth's Sustainable Development Principles[8,] as described in the Station Siting Report.

Potential station locations for the South Coast Rail alternatives were initially identified by SRPEDD,[9] and screened in an iterative process by the multi-disciplinary project team. SRPEDD staff with input from the public identified a total of 73 rail and bus station locations, some of which overlapped, totaling 55 rail stations and 30 bus stations. The locations identified and remaining in the FEIS/FEIR analysis include

[6] Station Siting Report. EOT's Final Recommendations (October 10, 2008).
[7] http://www.epa.gov/smartgrowth/about_sg.htm.
[8] http://www.mass.gov/envir/smart_growth_toolkit/pdf/patrick-principles.pdf.
[9] SRPEDD is a regional planning agency serving 27 cities and towns in Southeastern Massachusetts.

stations that are located on all potential rail segments, including the Fall River Secondary, New Bedford Main Line, the rail bed that extends south of the Stoughton Station, Whittenton Branch variation on the Stoughton Alternative, and the Attleboro Secondary.

3.1.3 Alternatives Analyzed in the DEIS/DEIR

The following alternatives were analyzed in the DEIS/DEIR. Evaluation of these alternatives was required by the Corps and the Executive Office of EEA, and defined in the MEPA certificate. The alternatives analyzed in the DEIS/DEIR were distinguished between No-Build and Build. Among the Build Alternatives there was a rail mode and a bus mode. Within the rail mode, there were three different corridors (Attleboro, Stoughton and Whittenton) and two different propulsion alternatives: electrically powered and diesel powered, as follows:

- **No-Build (Enhanced Bus) Alternative**
- **Commuter Rail Alternatives**
    - **Attleboro Alternatives**
        - Attleboro Electric
        - Attleboro Diesel
    - **Stoughton Alternatives**
        - Stoughton Electric
        - Stoughton Diesel
    - **Whittenton Alternatives**
        - Whittenton Electric
        - Whittenton Diesel
- **Rapid Bus Alternative**

Figure 3.1-2 provides an overview of the alignments of the alternatives analyzed in the DEIS/DEIR.

The corridor for the Whittenton Alternative is a variant of the Stoughton Alternative. The Whittenton Alternative corridor avoids the Pine Swamp by using the abandoned Whittenton Branch right-of-way. It is identical to the Stoughton Alternative corridor in all other respects.

During the DEIS/DEIR analysis, conceptual operating plans, capital improvement requirements, capital costs, and operating and maintenance costs were developed for each alternative. The DEIS/DEIR alternatives were modeled using the CTPS 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. Smart growth strategies were as identified in the South Coast Rail Corridor Plan were evaluated for all Build Alternatives analyzed in the DEIS/DEIR. A detailed description of the alternatives analyzed in the DEIS/DEIR was provided in Section 3.2 of the DEIS/DEIR. Section 3.3 of the DEIS/DEIR summarized the characteristics of each alternative with regard to their achievement of the project purpose and

associated goals and objectives, their practicability and their beneficial effects and environmental impacts.

3.1.4 Comments on the DEIS/DEIR

The DEIS/DEIR was published on February Notice of Availability was published in the Federal Register on March 25, 2011 and made available at various repositories including public libraries, and distributed in hard copy and electronically and on the Corps' web site. The Corps issued a Public Notice on the project on March 23, 2011, coinciding with the MEPA notice in the *Environmental Monitor.* A public comment period ensued following publication of the DEIS/DEIR, inviting written comments on the DEIS/DEIR. Verbal comments were solicited during two public hearings on the DEIS/DEIR. A description of the public and agency involvement following publication of the DEIS/DEIR is provided in Chapter 9, *Public Involvement and Agency Coordination*.

3.1.4.1 Requirements of the Secretary's Certificate

In the Draft Massachusetts Environmental Policy Act Certificate issued on June 2011, the Secretary of Energy and Environmental Affairs stated the following: "I am satisfied that MassDOT has made the case for the Stoughton Route to be brought forward as the preferred alternative in the FEIR…. MassDOT did not identify the preferred mode among the diesel and electric alternatives. However, because the electric option is preferable from an air quality perspective, the Stoughton Electric should be the focus of the FEIR." The Stoughton Alternative is MassDOT's preferred alternative, however MassDOT has not identified a preferred mode (diesel or electric), as discussed in MassDOT's Preface to the FEIS/FEIR.

USACE must comply with NEPA and the Section 404(b)(1) Guidelines, and therefore has different regulatory requirements with respect to alternatives evaluations than the state requirements applicable to MassDOT under MEPA. The FEIS/FEIR analyzes both the Stoughton and Whittenton Alternatives. In addition to electric rail alternatives, the FEIS/FEIR also evaluates the diesel variants to inform the USACE in making its Least Environmentally Damaging Preferred Alternative (LEDPA) determination.

The Secretary's Certificate also requested that the FEIR address the comments listed below. Volume III of this FEIS/FEIR provides detailed responses to all relevant requirements of the Certificate.

- The FEIR should expand on the analysis of the proposed layover facilities with detailed plans for the layover facilities and a comparative analysis of environmental impacts. The FEIR should include a rationale for selection of the preferred layover facilities and for elimination of others from further consideration.

- The FEIR should describe MassDOT's work with the City of New Bedford to develop a feeder bus system and discuss the additional benefits of the system including potential increases in ridership.

- The FEIR should also clarify the enhanced bus measures assumed as part of the No-Build scenario.

- Several stations do not include accommodations for feeder bus. The FEIR should explain this and consider measures to enhance shuttle/feeder bus service to the proposed stations.

- The FEIR should include additional information on station sites, including analysis of decked parking.

- The FEIR should include additional detail on plans to support pedestrian and bicycle access.

- The FEIR should clarify the annual operating schedule for the Battleship Cove Station.

- The FEIR should clarify whether freight currently exists at these [station] sites or not, and if there are any changes to freight routes as a result of the proposed project.

- The FEIR should evaluate the engineering feasibility of constructing the proposed trestle in wetland soils and evaluate the feasibility of constructing a trestle through Pine swamp. The FEIR should also discuss how access will be achieved for any maintenance or emergency situations along the rail right-of-way, including sections of the rail located in the Hockomock and Pine Swamps.

3.1.4.2 Other Comments on the DEIS/DEIR

Other comments on the DEIS/DEIR are summarized below. Volume III of this FEIS/FEIR provides detailed responses to all relevant comments.

- Provide a description of bridge construction techniques and address potential impacts from in-water construction.

- Describe the potential for upgraded at-grade crossing treatments to eliminate the need for whistles and horns within populated areas.

- Provide additional design information regarding the physical improvements, including structures, visual impacts to abutters, and right-of-way impacts associated with the implementation of the electric rail alternatives.

- Provide additional information related to the revised parking layouts at Canton Center Station associated with the Stoughton/Whittenton Alternatives.

- Describe potential construction impacts associated with the construction of new stations and modification of existing stations associated with the Stoughton/Whittenton Alternatives.

- Provide a graphic that shows track assumptions (e.g. single track/dual track and other relevant alignment aspects that affect travel time, including side spurs). Information is needed as to whether or not single tracking in these areas has been fully considered in the calculation of travel time.

- Identify the width of the right-of-way and width of (construction and operation) disturbance of proposed alternatives. Clarify whether all work (construction and maintenance) will fall within the right-of-way and delineate the construction and maintenance zone.

- Include in the capital and operations and maintenance cost of each alternative the costs of mitigation and the financing to construct, operate and maintain each alternative.

- Provide updated or additional information about maintenance and fueling requirements and facilities (fueling stations, inspection tracks and crew quarters, rolling stock maintenance) and how those needs may affect the requirements for a layover facility in Boston.

- Provide updated design plans for station sites with additional information on proposed Transit-oriented Development (TOD).

- Provide a Finance Plan, describe impacts on South Station, describe construction impacts to commuter rail and freight service, and provide a (stations) Parking Plan.

- Describe the feasibility of project phasing, such as sequential completion of lines south of Boston, eventually reaching both Fall River and New Bedford.

- Provide additional information on the number of existing and forecasted freight and passenger trips during the weekday and weekends, with specific attention to the number of existing and future passenger trips at South Station.

- Clarify the specific future improvements and service modifications to the rail corridors that were assumed to be in place for calculating the travel times of rail alternatives (including the No-Build Alternative) by 2030.

- Update the construction schedule for the alternatives and clarify the basis for changes in the construction schedule or lack thereof.

- Provide more specific information regarding freight service under the Stoughton/Whittenton Alternatives, including (if freight service would occur) the hours of operation and potential cargo.

- Provide additional documentation regarding the operational feasibility of the Rapid Bus Alternative, potential necessary improvements and their associated costs, schedule and environmental impacts, both for the Rapid Bus Alternative proposed in the DEIS and any modifications thereto (the additional evaluations of the Rapid Bus Alternative are described below in Section 3.1.5)

- Provide information on the No-Build (Enhanced Bus) Alternative similar to that provided for the Build Alternatives in Section 3.3.

- Provide the mitigation costs associated with the Stoughton, Whittenton and Rapid Bus Alternatives (so they can be incorporated in DEIS Table 3.3-11). Including any additional mitigation costs informed by impact analyses conducted after the DEIS/DEIR was published, including mitigation costs associated with indirect impacts.

- Clarify changes, if any, in cost per rider estimates for the Rapid Bus Alternative and other alternatives, as applicable, in the DEIS relative to earlier (pre-DEIS) estimates.

- Provide a discussion of areas like Route 24 where the bus will operate in its own designated lane and whether the bus route can be designed to operate safely at higher speeds to reduce overall travel time.

- Identify measures to reduce congestion that the bus service will face as it enters the mixed traffic portion of its route along the Southeast Expressway.

- Confirm that rapid bus vehicles would incorporate passenger comfort and convenience features (such as Wi-Fi).

- Conduct further evaluation of issues associated with the Rapid Bus Alternative to determine the extent to which there could be improvements in that alternative's overall performance.

- Clarify whether any one change or combination of changes, to the Rapid Bus Alternative would result in a meaningful change in ridership.

- Provide information on the feasibility and ridership effects of a connection between the proposed Rapid Bus service and the MBTA's Orange Line.

- Provide information on the feasibility and ridership effects of additional stations in areas of proposed growth.

- Clarify the specific (traffic/congestion/roadway configuration) data and how this caused an increase in reported Rapid Bus travel time compared to previous analyses.

- Update on-time arrival data of existing services to reflect more current data and clarify how on-time performance data relates to the total estimated travel time of proposed alternatives and their on-time performance.

- Clarify the definitions of the South Coast Region for different purposes, including the definition of the South Coast Region that was used to calculate the (8,000) daily work trips to the Boston area and how the ridership demand for a region relates to the ridership demand for a specific service/alternative.

3.1.5 Alternatives Eliminated following the DEIS/DEIR

This section briefly describes the alternatives eliminated from further analysis following the DEIS/DEIR and the rationale for not advancing these alternatives to this FEIS/FEIR.

3.1.5.1 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.

The Attleboro Alternative (electric and diesel) 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.

The Attleboro Alternatives would require improvements to track infrastructure along the Northeast Corridor (construction of 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 (reconstruction of existing 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 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 18.9 miles); and the Fall River Secondary (reconstruct existing tracks from Myricks Junction to Fall River, as single track with three sidings, a distance of 11.8 mile).

Based on RAILSIM capacity simulations, the Attleboro Alternatives would operate with very poor on-time performance (especially in the evening peak period) (See Appendix 3.1-D). The analysis indicated that the Attleboro Alternatives would be operationally infeasible as they would not meet the MBTA on-time standard in the morning peak and would experience even worse on time performance during the evening peak commute. The Attleboro Alternatives 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.

In order to address the operational infeasibility of the Attleboro Alternative, capacity on the Northeast Corridor (NEC) would have to be increased through construction of a fourth track along the NEC between Forest Hills Station and Back Bay Station. An analysis was conducted in the DEIS/DEIR of the construction costs and schedule implications as well as key property and other impacts associated with the construction of a fourth track.

The analysis in the DEIS/DEIR (Section 1.4.6.2) indicated that the potential impacts, construction costs and construction schedule and other aspects of the fourth track along the NEC would render implementation of this infrastructure requirement not practicable considering costs, existing technology and logistics in light of overall project purposes. In a previous study, the Federal Railroad Administration (FRA; a cooperating federal agency) also explored the option to expand capacity of the NEC north of Canton Junction Station. However, due to substantial constraints, it was proposed that such capacity expansion end at Forest Hills in Jamaica Plain. In reviewing the RAILSIM capacity simulations conducted for the Attleboro Alternative, the FRA indicated to the Corps during the preparation of the DEIS/DEIR that it considered the Attleboro Alternatives infeasible and appropriate to eliminate from further environmental review/ consideration.[10]

3.1.5.2 Rapid Bus Alternative

As proposed at the time of the DEIS/DEIR, the Rapid Bus Alternative would provide commuter bus service to South Station via I-93, Route 140 and Route 24. North of I-495, buses would use a combination of new zipper bus lanes, new reversible bus lanes, two-way bus lanes, existing zipper HOV lanes, and existing HOV lanes, along with a short section in mixed traffic. South of the I-495 interchange in Raynham, buses would travel in the general purpose lanes with mixed traffic. The New Bedford route would be 56.4 miles long and the Fall River route would be 51.5 miles long.

This alternative requires improvements to highway infrastructure along Route 24 (construct third lane from Route 140 to I-495, a distance of 5.8 miles; widen Route 24 to accommodate movable barriers; construct zipper bus lane from I-495 to Harrison Boulevard, a distance of 15.4 miles); and Route 128/I-

[10] Email correspondence from FRA to Army Corps. March 3, 2010.

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 20 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).

After publication of the DEIS/DEIR several comments were received on the Rapid Bus Alternative described and analyzed in the DEIS/DEIR, prompting additional analysis of this alternative. The comments received on the DEIS/DEIR Rapid Bus Alternative can be summarized as follows:

Performance: Travel speed of the DEIS/DEIR Rapid Bus Alternative was identified as too slow. The slow travel speed did not make the alternative competitive with rail. Further analysis of speed improvements was requested, including additional opportunities for the Rapid Bus Alternative to operate in its own designated lane or at higher speeds. Overall reductions in travel time would be the objective of these modifications.

Congestion: It was noted that the Rapid Bus Alternative was subjected to congestion "hot spots," which would affect its projected travel time and reliability. It was suggested that the Rapid Bus Alternative include additional measures to address congestion.

Ridership: Ridership on the Rapid Bus Alternative was noted as being lower than the commuter rail alternatives. The May 2010 memo from Central Transportation Planning Staff (CTPS) accompanying the projections indicated the following major factors contributing to lower performance of the Rapid Bus Alternative than the commuter rail alternatives:

1. Run times of the Rapid Bus Alternative are longer to South Station than commuter rail alternatives;

2. The commuter rail alternatives serve several more stations than the Rapid Bus Alternative ;

3. Lack of connectivity of the Rapid Bus Alternative with the Orange Line;

4. Transfer times between the Rapid Bus Alternative and the rapid transit lines are a little longer than with the commuter lines;

5. The Rapid Bus Alternative would include fewer new stations in areas of projected growth compared to the commuter rail alternatives

6. The Rapid Bus Alternative's lack of intra-regional connectivity/no intermediate stations, compared to the commuter rail alternatives.

As described in the DEIS/DEIR the Rapid Bus Alternative had by far the lowest ridership among the alternatives, while having the greatest impact on wetlands (a loss of 21.5 acres of wetlands, of which 4.0 acres were in state designated Areas of Critical Environmental Concern (ACEC); a loss of 16.3 acres of priority habitat for three state-listed species; and a loss of 4.5 acres of Article 97 public open space), coupled with the lowest air quality benefits (a 9.3 kg/day reduction in volatile organic compounds

[VOCs] and a 6,588 tons/year reduction in carbon dioxide [CO_2]), resulting in a greater overall environmental impact.

In response to the comments received on the DEIS/DEIR the Rapid Bus Alternative was re-evaluated and modified as described below.

3.1.5.3 Modified Rapid Bus Alternative

To address the concerns summarized above and make the Rapid Bus Alternative more competitive with rail and increase its ridership several operational and infrastructure improvements to the Rapid Bus Alternative were identified. These improvements were designed to reduce travel times, increase reliability, and connectivity of the Rapid Bus Alternative by:

- Eliminating bottlenecks associated with the Zipper Lane;
- Improving connection to Back Bay employment area by directly routing some service; and
- Providing additional Rapid Bus Alternative stations in the vicinity of stations proposed for the commuter rail alternative, specifically the Raynham and Easton areas.

Multiple alternatives were developed and evaluated based on the criteria established in the DEIS/DEIR. The changes that were selected and became part of the Modified Rapid Bus Alternative are described in detail in Appendix 3.1-E: *Modified Rapid Bus Alternative Technical Memorandum*.

In developing the Modified Rapid Bus Alternative several major constraints and concerns were identified:

- A fully exclusive bus lane (to reduce travel time) could not be feasibly constructed all the way into Boston;
- Because the Modified Rapid Bus Alternative requires using a section of the existing highway system that is already subject to heavy congestion and is vulnerable to significant delays, the reliability of the Modified Rapid Bus Alternative would be severely impacted, which would negatively affect ridership;
- While capital costs would be lower, the operating and maintenance costs of the Modified Rapid Bus Alternative would be more than double those of the Stoughton Electric Alternative, while the Modified Rapid Bus Alternative would have substantially lower ridership than the Stoughton Electric Alternative. This would result in a cost per boarding of the Modified Rapid Bus Alternative almost twice that of the Stoughton Electric Alternative; and
- The Modified Rapid Bus Alternative would have twice as much wetland impact (in area) as the DEIS/DEIR Stoughton Electric Alternative and approximately 30 percent less air quality benefit based on a reduction of annual CO_2 emissions.

In sum, the Modified Rapid Bus Alternative would still have substantially lower ridership, much higher cost and greater adverse environmental impact compared to the commuter rail alternatives.

The Federal Highway Administration (FHWA) provided its review of the DEIS/DEIR Rapid Bus Alternative and subsequent related information (including the Modified Rapid Bus Alternative).[11] The role of the FHWA as a cooperating agency on the EIS for the South Coast Rail project is to provide special expertise and technical assistance with respect to issues concerning the transportation system.

The FHWA, if it were expected to have an approval action on the selected alternative, would need to comply with NEPA for its action, and as a cooperating agency in the current NEPA review FHWA could adopt the environmental document that is prepared for the project in compliance with NEPA. Its review of the Modified Rapid Bus Alternative therefore examined the alternative from the perspective of both responsibilities as cooperating agency for the Corps NEPA review and as a potential decision-maker for such an alternative. The Rapid Bus Alternative would use a segment of the National Highway System, which includes the Interstate System in which the FHWA also has a special interest: FHWA's Policy on Access to the Interstate System reflects Congressional intent and direction provided in transportation legislation, reiterates FHWA's responsibility to preserve and enhance the Interstate System, and meets the needs of the 21st Century by assuring that the Interstate System provides the highest level of service in terms of safety and mobility.

The FHWA commented that "Based on the information provided in the DEIS and related materials, it is our opinion that the analysis of the Rapid Bus Alternative accurately presents the impacts to the transportation corridor and the region. Furthermore, FHWA believes that the impacts to the roadway network, in particular those which degrade service on the Interstate System associated with the Rapid Bus Alternative and its various modifications are unacceptable, and thus the alternative is not a viable option"

In sum, the substantial analysis conducted for the Rapid Bus Alternative during the DEIS/DEIR and subsequent consideration of optimized Modified Rapid Bus Alternatives (see Appendix 3.1-E), including its multiple design variations, indicates very low ridership, fewer regional mobility benefits (interregional links), greater impact on the environment and on the transportation system than the rail alternatives and high cost of the (Modified) Rapid Bus Alternative and its variants. The Corps has thoroughly considered this data and the determination by the FHWA (in its capacity as a Cooperating Agency with technical expertise on this alternative) of this alternative as non-viable. The Corps concludes that, at best, the Modified Rapid Bus Alternative (1) meets the overall project purpose only marginally by generating approximately 1/3 fewer riders than MassDOT's preferred alternative, (2) is unreasonably costly to construct and maintain (more than double the annual operating and maintenance cost of the Stoughton Electric Alternative), and (3) is logistically infeasible to construct in a manner that would not be highly likely to eventually degrade the already stressed Interstate Highway transportation system. Accordingly, the Corps has determined that the Modified Rapid Bus Alternative is not practicable, after taking into consideration cost, existing technology and logistics in light of overall project purposes (40 CFR 230.10(a)(2)), and therefore, the alternative was eliminated from further consideration in the FEIS/FEIR.

3.2 DESCRIPTION OF ALTERNATIVES EVALUATED IN THE FEIS/FEIR

This section provides a description of the alternatives evaluated in the FEIS/FEIR: the No-Build (Enhanced Bus) Alternative (which does not meet the purpose and need for the project, but serves as a

[11] Letter from FHWA to USACE re: South Coast Rail Project. January 17, 2013.

baseline for the analysis of the Build Alternatives), the Stoughton Alternative (electric and diesel variants) and the Whittenton Alternative (electric and diesel variants).

Consistent with the Secretary's Certificate on the DEIR, MassDOT advanced the design of the Stoughton Electric Alternative. This included a more accurate estimate of project impacts, constructability, mitigation measures, and costs. The operating plan has also been refined to optimize travel times and reduce conflicts with freight service. Specific alterations to the DEIS/DEIR alternative design are identified in each specific section.

Subsequent to the publication of the DEIS/DEIR, the Corps requested MassDOT to provide additional data such that the Corps could further evaluate alternatives in the FEIS/FEIR. The Corps did not disagree with any of the items contained in the Secretary's certificate on the FEIR; however the Corps noted that additional data was necessary to ensure that options other than the Stoughton Electric Alternative were addressed. Accordingly, the Corps required additional information concerning the Rapid Bus (discussed above) and Whittenton Alternatives, and also required additional data concerning cultural resource impacts to ensure that (1) all practicable alternatives would be fully analyzed in the FEIS/FEIR, and (2) due consideration would be given to the potential effects of the alternatives on cultural resources as well as other environmental considerations.

This section includes information on the engineering design of the track infrastructure, bridges, stations, and layover facilities associated with the Stoughton and Whittenton Alternatives. It also includes an updated operations analysis in Section 3.2.8.2. Section 3.2.19 provides information on construction of each of the project elements. Additional information on the feeder bus system, grade crossings, bridges, and the layover facility site selection is presented in the appendices 3.2-A and 3.2-E to this FEIS/FEIR.

3.2.1 Overview of Build Alternatives Corridors

The following sections describe the rail corridors within which the proposed Build Alternatives would be constructed. Aspects discussed include corridor location, current conditions, constraints, issues, and ownership.

This section describes those transportation corridors associated with the Stoughton, and Whittenton (electric and diesel) rail options. The organization of the description of these corridors forms the basis for the characterization of the affected environment and environmental consequences of the rail alternatives in Chapter 4.

3.2.1.1 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 Rail Segment

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 was acquired from CSX by MassDOT.

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

Fall River Secondary Rail Segment

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 was acquired by MassDOT from CSX.

The line passes through some environmentally sensitive areas, including 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.

3.2.1.2 Northeast Corridor Rail Segment

The Northeast Corridor is an active rail line running between New York City 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 Lines join farther 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. In general, the majority of the Northeast Corridor north of Canton Junction is highly developed and lacks environmentally sensitive areas.

3.2.1.3 Attleboro Secondary Rail Segment

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 MassDOT and operated by CSX.

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

3.2.1.4 Stoughton Alternatives Corridor

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 3.2.1.2).

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. Service along the remainder of the line, from Stoughton Station to Raynham Junction was discontinued in 1958, and the segment between Raynham Junction and Taunton, has been abandoned since approximately 1916. Tracks have been removed between Longmeadow Road, Taunton and Short Street, Easton.

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 are today in various public/private ownership. The active rail segment north of Weir Junction is owned by MassDOT and operated by the MassCoastal Railroad.

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

3.2.1.5 Whittenton Alternatives Corridor

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 Pine Swamp in Raynham. The Whittenton Branch is currently owned by the MBTA.

The Whittenton Alternative represents the corridor that was last used to carry passenger trains between South Station and New Bedford. Use of the Whittenton line by rail ceased as passenger service was discontinued in 1958.

3.2.2 Description of Build Alternative Modes

The following sections describe the modes used by the FEIS/FEIR alternatives and the operating assumptions used to evaluate each mode.

3.2.2.1 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, train sets are generally six to nine coaches. Coaches would be bi-level, to increase capacity. Figures 3.2-1 and 3.2-2 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[12] for commuter rail alternatives were set at 30 minutes on the branches (Fall River Secondary and New Bedford Mainline) and 18 minutes on the trunk, during the peak period in the peak direction. Scheduled travel times on existing services were not altered.

3.2.2.2 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, train sets are assumed to be six to nine coaches. Coaches would be bi-level to increase capacity. Electrified commuter rail locomotives are powered by an overhead electrical contact system. Figures 3.2-3 through 3.2-5 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 30 minutes on the branches and 18 minutes on the trunk, during the peak period in the peak direction.

3.2.3 No-Build Alternative – Enhanced Bus

The No-Build Alternative is described here in further detail to respond to the Secretary's Certificate. Under this alternative, no new rail or bus service would be provided to Southeastern Massachusetts; however, existing bus routes would be enhanced. 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 (i.e., Stoughton and Whittenton) Alternatives.

The South Coast Rail study area includes commuter rail and bus service and associated infrastructure such as commuter rail stations and park-and-ride lots. Also included in the No-Build Alternative is the reconstruction of existing railroad bridges, already underway in New Bedford. This reconstruction addresses existing maintenance needs to ensure safe operation of active freight trains currently using the New Bedford Main Line. The analysis of the No-Build Alternative also assumes the expansion of South Station and the construction of a new mid-day facility in Boston, as currently proposed by MassDOT to better meet existing passenger rail needs (see below). These improvements would be implemented irrespective of the South Coast Rail alternatives.

3.2.3.1 No-Build Commuter Rail Service

No commuter rail service is offered within the South Coast area. Although commuter rail service is offered in nearby southeastern Massachusetts communities by the MBTA, this service is difficult for most residents to access and is approaching or over capacity under existing conditions, as shown in Table 3.2-1.

[12] The interval of time between two trains boarded by the same unit at the same point. Dictionary of Military and Associated Terms. US Department of Defense 2005.

The Attleboro/Providence Line has stations in Providence, South Attleboro, Attleboro, Mansfield, and Sharon. The Stoughton Line has stations in Stoughton, Canton Center and Canton Junction 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 6-mile access radius of these stations, and some are more than 20 miles from the nearest commuter rail station.[13] Commuter rail is currently not a reasonable alternative for most South Coast area residents traveling to Boston, especially from the communities of Taunton, Berkley, Freetown, Fall River, New Bedford, Dartmouth, and Westport due to the distance from the nearest station.

Table 3.2-1 Ridership on Providence, Stoughton and Middleborough Rail 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%

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

While residents from Lakeville are able to use commuter rail to commute to Boston, system capacity is limited. Commuter rail station parking lots in Attleboro, Mansfield, Stoughton, and on the Middleborough Line are either currently unable or will soon 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. Therefore, the existing commuter rail service, although within reach of some communities in the South Coast area, is not sufficient to handle the current demand and anticipated growth in ridership.

3.2.3.2 No-Build Commuter Bus Service

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 3.2-6 shows these routes.

These bus companies offer a fare structure that is competitive to commuter rail service. The three commuter bus routes travel through the downtown core of New Bedford, Taunton, and Fall River. The routes all board passengers in the downtown before traveling to other locations to pickup/drop-off passengers at external bus stops/park-and-ride lots and intermediate flag stops. The Fall River commuter bus runs express to Boston with no intermediate stops.

In addition to the private commuter bus service to Boston, two regional transit authorities (RTAs) provide transit service in the study corridor: SRTA operates in New Bedford and Fall River sub-region, and GATRA operates in the Taunton/Attleboro area sub-region. Each RTA shares terminal facilities with commuter bus companies. These authorities share infrastructure and terminals with the commuter bus

[13] According to CTPS, most commuter rail riders live within 6- to 8-miles of a commuter rail station. This distance is generally used for estimating ridership.

carriers and provide passengers an intermodal link from other points within the local communities to the Boston commuter bus service.

South Coast Regional Bus Service

SRTA serves the communities of New Bedford, Fall River, and Somerset with fixed route and demand responsive services. SRTA operates 10 routes in the New Bedford area, 11 routes in the Fall River area, and one route between New Bedford and Fall River. SRTA has downtown terminal stations, both in Fall River and New Bedford, where the commuters could transfer directly to the commuter buses to Boston. New Bedford weekday service generally begins between 5:30 and 6:30 AM and ends roughly between 6:30 and 7:30 PM. Fall River weekday service begins between 6:00 and 7:00 AM and ends between 5:30 and 6:30 PM. SRTA operates on Saturday from 7:00 AM to 6:00 PM in New Bedford and from 6:30 AM to 7:00 PM in Fall River. There is no Sunday bus service in either New Bedford or Fall River.

GATRA primarily serves the communities of Attleboro and Taunton with fixed route bus service and demand responsive service. GATRA operates 14 fixed routes and two intercity routes. GATRA has a terminal station on Oak Street in Taunton where commuters could transfer directly to commuter buses to Boston. The various GATRA bus routes operate Monday through Friday beginning between 5:30 and 6:30 AM and ending between 6:00 and 7:00 PM. GATRA Saturday bus service begins at 9:00 AM and ends at 5:00 PM. There is no Sunday bus service.

New Bedford to Boston Bus Service

New Bedford to Boston commute originates in Fairhaven at the bus terminal and maintenance facility at 72 Sycamore Street. This service has three intermediate stops along the route to Boston: SRTA Terminal in downtown New Bedford, Mt. Pleasant Street park-and-ride in New Bedford, and Silver City Galleria park-and-ride in Taunton. The SRTA terminal in downtown New Bedford is the main station stop that provides service to the SRTA fixed route bus service and provides covered terminal area for loading and unloading passengers for SRTA and DATTCO buses. The terminal is located in Downtown New Bedford at the corner of Elm Street and Pleasant Street. There is covered parking above the terminal for approximately 80 cars, but is allowed by permit only and is at capacity. These spaces are primarily used by employees who work in the downtown area.[14] Commuters to Boston use the Elm Street Garage nearby or travel north to the Mt. Pleasant Street park-and-ride for all-day parking. The commuter bus terminates and originates service from South Station Bus Terminal in Boston. Figure 3.2-6 depicts the New Bedford bus route to Boston.

There is a small terminal area at the Fairhaven location that DATTCO uses to provide bus storage, maintenance, office space, and a waiting area for up to two buses. There are 28 striped parking spaces in the surface lot adjacent to the bus waiting area for commuters. Additional passengers are also likely to be dropped-off/picked-up and walk or bike to the terminal from the local neighborhoods.

SRTA's FY 2009-2012 Transportation Improvement Program (TIP) includes funds for renovations to the terminals and garages.

New Bedford to Boston Bus Operations—The weekday schedule for the bus from New Bedford to Boston includes 11 trips inbound and 11 trips outbound. The weekday inbound morning commute operates five trips on half-hour headways from 4:50 AM to 6:50 AM and then 120-minute headways for the remaining inbound trips. The weekday outbound evening commute operates five trips on various

[14] Based on discussion with SRTA administration.

headways beginning with a 45-minute headway at 4:00 PM, and then half-hour headways, followed by one 60-minute headway with the last peak trip leaving at 6:45 PM. One final outbound trip departs at 9:00 PM. Weekend service includes four trips inbound and four trips outbound stopping at the same stops served during weekday service. The inbound service begins at 6:50 AM and operates on four-hour headways until 6:50 PM. The outbound service begins at 9:00 AM and also operates on four hour headways until 9:00 PM.

Based on the schedule, travel times inbound range from 120 minutes in the peak period to 95 minutes in off peak periods. Travel times outbound range from 100 minutes during peak period to 85 minutes during the off peak period.

Fall River to Boston Bus Service

The Fall River commuter bus service to Boston is an express service from downtown Fall River at the corner of Third Street and Borden Street to South Station Bus Terminal in Boston. The service originates in Newport, Rhode Island and then travels to the temporary trailer bus terminal located on Borden Street in Fall River. This temporary terminal serves both SRTA and Peter Pan buses and provides for ticketing purchases within the trailer bus terminal building. A new bus terminal is planned near or at the location of the current terminal. Figure 3.2-6 depicts the Fall River bus route to Boston.

The SRTA FY 2009 TIP includes plans to replace the SRTA bus terminal in Fall River (razed for the construction of the Fall River Courthouse). SRTA also plans continual renovations to the terminals and garages listed in the fiscal year 2009-2012 TIP.

Fall River to Boston Bus Operations—The weekday schedule for the bus from Fall River to Boston is more limited than that of New Bedford, offering six trips inbound and six trips outbound. The weekday inbound morning commute operates three trips with the first departing at 6:00 AM and then the next on a 40-minute headway and the next on a 120-minute headway. The weekday outbound evening commute operates three trips on 60-minute headways beginning at 4:30 PM. Weekend service is the same schedule as weekday except the 6:00 AM and 6:40 AM buses are eliminated inbound and the 5:30 PM and 6:30 PM are eliminated outbound.

Based on the bus schedule, travel times for the Fall River bus route vary from 85 minutes during peak periods to 60 minutes during off -peak periods.

Taunton to Boston Bus Service

The Taunton to Boston commuter bus service originates in Taunton at the GATRA/Bloom bus terminal and maintenance facility on Oak Street. The service has two official stops along the route to Boston: Raynham/Taunton Greyhound Track park-and-ride lot on Route 138 in Raynham and Route 106 near Route 24 overpass park-and-ride lot in West Bridgewater. Other flag stops are offered at the Friendly's restaurant on Route 138 and at the corner of Route 138/Route 106 in Easton. If requested, the inbound trip will stop at the Westgate Mall in Brockton. Based on requests for stops, the outbound trip includes up to four stops at the Westgate Mall throughout the day as needed.

Taunton to Boston service differs from the Fall River and New Bedford services as it does not use South Station Bus Terminal. The Taunton service has street rights to drop-off/pick-up passengers on street at Park Square at 212 Stuart Street and near South Station at the corner of Lincoln Street/Kneeland Street inbound, and at the corner of Lincoln Street/Beach Street, outbound. Figure 3.2-6 depicts the Taunton bus route to Boston.

The Taunton bus terminal has recently been upgraded with a new paved parking lot, new lot striping, and new lighting. There was also a new pedestrian walkway added down the center of the lot to link to the Oak Street sidewalks and emphasize pedestrian activity and multi-modal shared space at the terminal. The terminal parking lot has a capacity of 158 parking spaces, of which five are designated as handicapped parking.

GATRA has plans for terminal improvements identified in the fiscal year 2009-2012 TIP. The TIP does not indicate the nature or extent of the planned terminal improvements.

Taunton to Boston Bus Operations—The weekday schedule for the bus from Taunton to Boston provides 15 trips inbound and 14 trips outbound to Boston. The weekday inbound morning commute operates seven trips from 5:30 AM to 9:00 AM. The first five trips are on half-hour headways and the final two on 45-minute headways. The weekday outbound evening commute operates six trips from 3:35 PM to 7:05 PM. on various headways beginning with 45-minute headways, a 25-minute headway during peak period, back to a 45-minute headway and ending outbound service with 60-minute headways to the final bus at 7:05 PM.

Weekend commuter bus service is limited to two trips inbound and two trips outbound. During weekend service there is a 9:00 AM and 3:45 PM inbound trip and 9:50 AM and 4:55 PM outbound trip.

Based on the published schedule, travel times inbound range from 90 minutes during the peak periods to 60 minutes during the off- peak periods. Travel times outbound are consistent with times approximately 70 minutes throughout the day.

Commuter Park-and-Ride Lots for Bus Service from South Coast to Boston

Park-and-ride lots are located throughout the southeastern Massachusetts sub-region from Wareham to Attleboro. The following are the primary park-and-ride locations for buses to Boston, based on the MassHighway database and research of the study area:

- Route 106 near Route 24 – West Bridgewater, Massachusetts
- Route 24 Exit 12 – Silver City Galleria- Taunton, Massachusetts
- Oak Street Bloom/GATRA Terminal – Taunton, Massachusetts
- I-495 Exit 8 – Route 138/Greyhound Track – Raynham, Massachusetts
- Mt. Pleasant Street – New Bedford, Massachusetts
- 72 Sycamore Street – Fairhaven, Massachusetts

Figure 4.1-1 depicts the major park-and-ride locations in southeastern Massachusetts. The following section describes each park-and-ride location and existing capacity for each lot.

Route 106 near Route 24 – West Bridgewater Park-and-Ride Lot

This parking lot is located on the southwest corner of the Route 24/Route 106 interchange in West Bridgewater. The lot has a capacity of 140 vehicles and is in high demand during all times of the year. During recent parking surveys at this lot, many vehicles are illegally parked with overflow parking

exceeding capacity by five to 15 vehicles. Commuters can park here free and take the Bloom Bus to Boston. Bloom Bus drops-off/picks-up passengers at the corner of Pleasant Street and the southwest corner of the park-and-ride lot. The bus cannot circulate through the narrow parking lot so it stops just outside the lot at this location. Bus shelters are not provided at this lot. There are MassDOT plans to expand the park-and-ride lot by 40 parking spaces within the next five years.

Route 24 Exit 12 – Silver City Galleria – Taunton Park-and-Ride Lot

This parking lot is located within the main Silver City Galleria mall parking area as a separate small parking lot. The parking lot is designed as several rows of parking with a parking capacity for 187 vehicles that is near capacity in summer months based on field observations conducted in summer 2008.

The New Bedford bus serves this parking lot for the commute to Boston. Commuters can park here for free and take the New Bedford bus to Boston. The parking lot is designed so that buses can circulate the parking lot to pick-up/drop-off passengers. One small bus shelter is provided at the rear of the lot.

During a survey completed in October 2008 another new park-and-ride area was identified near the existing lot. This 24-space parking lot is located within the main mall parking area across the street from the main park-and-ride lot. It was signed and striped with red paint for park-and-ride use and was observed at full capacity during the survey.

Oak Street Bloom/GATRA Bus Terminal – Taunton Park-and-Ride Lot

This parking lot is attached to the Taunton bus terminal located on Oak Street in downtown Taunton, Massachusetts. The lot has a capacity of 158 parking spaces including five designated for handicapped commuters. Commuters can park here for free and take the Taunton bus to Boston. Based on historic parking utilization counts, the lot is underutilized with excess capacity during the typical weekday. Commuters board the buses via the rear of the terminal building at the bus bay. The terminal provides a ticket booth, café, and waiting area for passengers. Retail space is available for additional businesses.

Route 138 – Raynham/Taunton Greyhound Track – Raynham Park-and-Ride Lot

This parking lot is a small section of the overall Greyhound Track parking lot that has been designated for park-and-ride usage. There is no parking lot striping delineating the number of parking spaces. Based on data provided in the 2007 Southeastern Regional Planning Regional Transportation Plan, the capacity of this lot is 150 spaces. In June 2008 this lot was underutilized and partially being used for storage of telephone poles so the actual capacity may be less. There is one glass enclosed bus shelter at this park-and-ride.

Mount Pleasant Street – New Bedford Park-and-Ride Lot

This parking lot is a large surface lot with several rows of parking located off Mt. Pleasant Street, north of King's Highway in New Bedford. Based on a field visit to the site the lot has a capacity of 201 spaces, with five designated as handicapped parking. The lot is approaching capacity although there were a number of spaces available to the rear of the lot. The buses can access the parking lot easily and pick-up passengers at the two internal bus shelters. A field visit revealed illegal dumping occurring at the back of the site and drainage issues with large standing water occupying five parking spaces in the southeast corner of the parking lot. Due to the site design and depth of the parking lot from the street, there is concern about safety and security and a lack of adequate lighting.

72 Sycamore Street, DATTCO Bus Terminal – Fairhaven Park-and-Ride Lot

This parking lot is a small surface lot adjacent to the terminal. The lot has a capacity of 28 vehicles. Based on MassHighway data, this location has up to 80 spaces available. However, based on discussions with DATTCO these additional spaces are located in the fenced area located adjacent to the main terminal building and are no longer available due to safety and security concerns and should not be included in the total available parking. Based on recent parking surveys, there were available spaces to park in this small lot. Bus shelters are not provided at this lot but there is a covered overhang attached to the terminal that is used as a waiting area.

Bus Schedule Enhancements

Bus service plan and schedule enhancements are an essential part of improving commuter bus service to the South Coast study area. The current bus schedules from Taunton and New Bedford offer good service for the most part with reasonable headways based on their current schedules. The Fall River service requires schedule improvements to provide more inbound and outbound options that would offer shorter headways and enhanced commuter flexibility on arrival and departure times. The following sections summarize possible enhancements to the existing services.

Fall River Bus Service

The current Peter Pan commuter bus service for the Fall River to Boston commute is limited, with six inbound and six outbound trips. To offer better service and shorter headways, it is recommended that 30-minute headways be added to the schedule to enhance ridership during inbound and outbound peak periods to offer more flexible service for the Fall River commuters. During travel time surveys some Fall River commuters using the Taunton bus service (Bloom) indicated that the infrequent Peter Pan service is the reason they commuted via the Taunton bus service. The current schedule does not provide Fall River commuters with a flexible schedule and discourages ridership.

New Bedford Bus Service

The New Bedford commuter bus service (DATTCO) uses five buses constantly running throughout the day and provides 11 inbound trips and 11 outbound trips to South Station Bus Terminal. The service for the Boston commute offers a schedule similar to the Taunton service plan, although less extensive. There are 30-minute headways in the peak period direction. To enhance service, it is recommended that 30-minute bus headways for the evening commute begin at 4:00 PM and continue to 6:00 PM. This would require a minor adjustment to the existing schedule by including an additional bus for the evening commute. This schedule would offer more frequent service and shorter headways and provide more flexible service for New Bedford commuters.

Taunton Bus Service

The Taunton commuter bus service (Bloom) is extensive with 15 inbound trips and 14 outbound trips daily. This schedule provides 30-minute headways during the morning and evening peak period commuter times and is adequate for current demands. The addition of more buses for 15-minute headways during the peak period is not warranted at this time based on current ridership demands.

Park-and-Ride Lot Expansion/Bus Stations

The No-Build Alternative does not include any new or expanded park-and-ride lots or bus stations, and therefore the environmental impacts of any such expansions are not addressed in this FEIS/FEIR. Nevertheless, to be responsive to comments on the DEIS/DEIR requesting more information on the No-Build Alternative transportation conditions, information on locations potentially warranting expanded or new park-and-ride/bus station facilities are discussed below.

Based on parking utilization counts completed at the Silver City Galleria park-and-ride lot in Taunton in summer 2008, the existing lot is at capacity. During an October 2008 parking survey, additional parking was observed to have been established and was also filled to capacity. There are existing paved parking lots nearby that appear to be vacant. These lots could be used for a potential new expanded park-and-ride/bus station, or other sites could be identified in the immediate area around the Silver City Galleria and the Route 24/Route 140 highway interchange. A new facility at or near the mall could easily integrate local fixed route GATRA bus service which already serves the mall throughout the day. This linkage to local fixed route bus service could also encourage ridership on commuter bus.

Based on a review of available information and parking occupancy studies, a bus station/park-and-ride facility in the Bridgewater/West Bridgewater area, near the existing Route 106/Route 24 park-and-ride lot, would be readily utilized. A bus station and park-and-ride could be combined into one potential intermodal station near the existing park-and-ride lot. Both the existing park-and-ride lots at Route 106 (West Bridgewater) and Route 104 (Bridgewater) are operating at capacity. These two lots also do not allow buses to enter or exit the lots to pick-up or drop-off commuters. Although plans are underway to provide 40 more spaces at the West Bridgewater park-and-ride, a new park-and-ride/bus station could provide full bus access /egress and larger park-and-ride facilities. This might capture additional riders for all three commuter bus services that travel by this location via Route 24.

Based on review of available parking utilization studies for the Mt. Pleasant Street park-and-ride lot in New Bedford, this lot is operating at 80 percent of capacity. If future ridership projections for the area indicate a significant increase in ridership for this region, an expanded park-and-ride/bus station may have merit in the existing lot, on adjacent land, or at another suitable location in the general area.

Joint Ticketing System Bus/Rail

The commuter rail monthly fare provides a free ride on the MBTA bus or rapid transit for those commuters that purchase monthly passes. This service is a significant advantage to commuter rail versus private commuter bus, as the bus companies do not offer this benefit, making bus travel less attractive to commuters.

SRPEDD and the commuter bus operators have advocated for transportation policymakers to address the transit fare inequity between modes with a joint ticketing system allowing the bus operators to offer the same pass as commuter rail with free access to MBTA bus and rapid transit. A joint ticket for commuter bus would enhance bus service to the region.

3.2.3.3 South Station Expansion Project

One of the rail improvements anticipated to be undertaken under No-Build condition is the expansion of South Station. MassDOT, with funding from the Federal Railroad Administration (FRA), is undertaking a project to evaluate the expansion of Boston's South Station. The South Station Expansion project includes planning, NEPA/MEPA reviews, and preliminary engineering. The South Station Expansion

project is being undertaken to allow for expansion of intercity and high-speed rail (HSR) service into Boston's South Station, and to improve existing rail operations and service delivery at South Station provided by the National Railroad Passenger Corporation (Amtrak) and the MBTA.[15] The key elements of the South Station Expansion Project include:

- Expand the South Station terminal facilities, including the addition of up to seven tracks and platforms and construction of a new passenger concourse and other amenities.
- Acquire and demolish the U.S. Postal Service (USPS) General Mail Facility located on Dorchester.
- Avenue adjacent to South Station, which will provide an approximate 16-acre site onto which to expand South Station.
- Create an extension of the Harborwalk along reopened Dorchester Avenue.
- Provide for the possibility of future joint/private development adjacent to and over an expanded South Station.
- Provide adequate rail layover space to address existing and future intercity and commuter rail service needs. Currently, there are not sufficient train layover facilities to meet existing South Station operational requirements, resulting in restrictive scheduling of revenue and non-revenue trains in and out of South Station. To accommodate existing needs and to facilitate future Amtrak and MBTA service expansions and other planned improvements, additional layover space is required. The three sites currently under consideration are the Boston Transportation Department-owned Tow Lot, Beacon Park Yard, and Readville-Yard 2.

As described in the South Station Expansion ENF and federal funding application, the increase in South Station capacity and the midday layover facility is needed for both existing and future operations of both Amtrak and MBTA. Expansion of South Station has independent utility (40 CFR 1508.25(a)) from the South Coast Rail project because, while it would be required to accommodate any of the commuter rail alternatives of the South Coast Rail project, the need for expansion of South Station capacity exists without the South Coast Rail project and the expansion of South Station would be constructed absent the construction of other projects in the project area. The expansion of South Station will be subject to its own environmental review process, which is ongoing. The South Station Expansion DEIR is anticipated in summer 2014.

3.2.4 Stoughton Electric Alternative

The Stoughton Electric Alternative would provide commuter rail service to South Station using the Northeast Corridor (NEC), Stoughton Line, New Bedford Main Line, and Fall River Secondary. The New Bedford route would be 55.0 miles long and the Fall River route would be 52.7 miles long. Figure 3.2-7 shows the route of the Stoughton Alternative.

The Stoughton Alternative would:

- Utilize 15.5 miles of existing NEC track infrastructure between Boston and Canton Junction (no new track infrastructure would be required along this 15.5-mile length of the NEC);

[15] http://www.massdot.state.ma.us/Portals/25/Docs/efs/EnvironmentalNotificationForm.pdf

- Require improvements to track infrastructure along the Stoughton Line including:
- Reconstructing existing tracks from Canton Junction to Stoughton, as double track, a distance of 3.8 miles; and
- Constructing new tracks on existing right-of-way from Stoughton Station to Longmeadow Road in Taunton, as one to two tracks, a distance of 14.9 miles;
- Require reconstructing track from Longmeadow Road to Weir Junction in Taunton, from one to two tracks, a distance of 1.7 miles;
- Require reconstructing track on the Southern Triangle (common to both the Stoughton and Whittenton Alternatives), including:
- Reconstructing the existing New Bedford Main Line tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction, a distance of 4.9 miles; and single track with three sidings from Myricks Junction to New Bedford, a distance of 14.5 miles; and
- Reconstructing the existing Fall River Secondary tracks from Myricks Junction to Fall River, as single track with four sidings, a distance of 12.3 miles.
- Infrastructure improvements for the Stoughton Alternative also include constructing, reconstructing, or widening 40 bridges and constructing or reconstructing 46 railroad at-grade crossings. A summary of the Stoughton Alternative is provided in Tables 3.2-2 and 3.2-3.

Table 3.2-2 Summary of Alternatives—Track

	Stoughton Alternative			Whittenton Alternative		
Segment	Length (miles)	Number of Tracks	Number of Sidings	Length (miles)	Number of Tracks	Number of Sidings
Canton to Stoughton Station	3.8	2		3.8	2	
Stoughton Station to Weir Junction	16.4	1-2		17.9	1-2	1
Weir Junction to Myricks Junction	4.9	2-3		4.9	2-3	
Myricks Junction to New Bedford	14.5	1	3	14.5	1	3
Myricks Junction to Fall River	12.3	1	4	12.3	1	4
Total Length (South Station to New Bedford)	55.0			56.6		
Total Length (South Station to Fall River)	52.7			54.3		

Table 3.2-3 Summary of Alternatives—Crossings

Alternatives	Bridges	At-Grade Crossings
Stoughton	40[1]	46[2]
Whittenton	38[1]	53[2]

[1] Does not include existing bridges that would not require reconstruction
[2] Includes private crossings

This alternative would have ten new commuter rail stations (North Easton, Easton Village, Raynham Park, Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction of two existing commuter rail stations (Canton Center and

Stoughton). This alternative would include two overnight layover facilities, one in New Bedford and one in Fall River.

To support electric locomotives, a traction power system would be built and 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).

3.2.5 Stoughton Diesel Alternative

The Stoughton Diesel Alternative would be identical to the Stoughton Electric Alternative with the exception of the electrical facilities, which would not be required for the diesel alternative.

3.2.6 Whittenton Electric Alternative

The Whittenton Alternative would provide commuter rail service to South Station through Stoughton, connecting to the existing Stoughton Line using the Whittenton Branch and a short segment of the Attleboro Secondary through the City of Taunton. Figure 3.2-8 shows the Whittenton Alternative. The New Bedford route would be 56.6 miles long and the Fall River route would be 54.3 miles long.

The Whittenton Alternative would:

- Utilize 15.5 miles of existing NEC track infrastructure between Boston and Canton Junction;
- Require improvements to track infrastructure along the Stoughton Line, including:
    - Reconstructing existing tracks from Canton Junction to Stoughton, as double track, a distance of 3.8 miles; and
    - Constructing new tracks on existing right-of-way from Stoughton to Raynham Junction, as one to two track sections a distance of 11.9 miles;
- Require constructing new single track on existing Whittenton Branch right-of-way from Raynham Junction in Raynham to Whittenton Junction;
- Require reconstructing existing Attleboro Secondary tracks from Whittenton Junction to Weir Junction, as a single track with one siding, a distance of 6.0 miles);
- Require reconstructing track on the Southern Triangle (common to both rail alternatives) including:
    - Reconstructing the existing New Bedford Main Line tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction, a distance of 4.9 miles; and single track with three sidings from Myricks Junction to New Bedford, a distance of 14.5 miles; and
    - Reconstructing the existing Fall River Secondary tracks from Myricks Junction to Fall River, as single track with four sidings, a distance of 12.3 miles.

Infrastructure improvements for the Whittenton Alternative also include constructing, reconstructing, or widening 38 bridges and constructing or reconstructing 53 railroad at-grade crossings. A summary of the Whittenton Alternative is provided in Tables 3.2-2 and 3.2-3.

This alternative would have ten new commuter rail stations (North Easton, Easton Village, Raynham Park, Dana Street, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction of 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 in New Bedford and one in Fall River.

To support electric locomotives, a traction power system would be built and 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).

3.2.7 Whittenton Diesel Alternative

The Whittenton Diesel Alternative would be identical to the Whittenton Electric Alternative with the exception of the electrical facilities, which would not be required for the diesel alternative.

3.2.8 Operations of the Rail Alternatives

This section provides a description of the major components of the Stoughton and Whittenton Alternatives. Specific topics addressed are Operations, Track Infrastructure, Grade Crossings, Bridges and Culverts, Signals and Communications, Rolling Stock, Electrification, & Diesel, Stations, Layover Facilities, and Cost.

Operations of the South Coast Rail alternatives were evaluated and modeled to optimize travel times and ridership. Based on this effort, the operating plan was revised to include a zone-express type operating pattern. In the DEIS/DEIR, all trains made all stops from Fall River/New Bedford to South Station. Under the revised operating plan, peak-period trains between New Bedford and Boston would stop at all stations between Whale's Tooth and North Easton, but would skip the Stoughton, Canton Center, and Canton Junction stations. Trains operating between Fall River and Boston during the peak periods would stop at Battleship Cove, Fall River Depot, Freetown, and all stops from North Easton to Boston. Peak period Fall River trains would not stop at Easton Village, Raynham Park, Taunton (Dean Street Station for the Whittenton Alternatives), or Taunton Depot stations. This change in operations results in reduced trip times for both the Fall River and New Bedford trains which is used for the 2035 ridership projections.

The following sections describe the existing operations on the NEC, Stoughton Line, Fall River Secondary, and New Bedford Main Line, as well as the proposed operating plans for both the South Coast Rail alternatives, and the station stopping patterns.

3.2.8.1 Existing Operations

The NEC, Stoughton Line, Attleboro Secondary, Fall River Secondary, and New Bedford Main Line all currently provide some element of freight or passenger service. The following sections describe the existing passenger and freight operations along these alignments. The Whittenton Branch, which would be utilized for the Whittenton Alternative, does not provide any freight or passenger service at this time. Figures 3.2-9 and 3.2-10 show the existing rail transportation system and its ownership.

Northeast Corridor

The MBTA, Amtrak and CSX operate over the NEC within the state of Massachusetts. The MBTA owns the line, but it is dispatched by Amtrak from their South Station Centralized Electric and Traffic Control facility. That facility exchanges data between Metro North Railroad Operations Control Center, the MBTA Operations Control Center, and Amtrak's Penn Station Control facility.

The NEC between Providence and Readville is predominately a two track electrified (25 kV 60 Hz) Class 8 railroad that is authorized at speeds up to 150 mph where civil infrastructure permits. Currently, only Amtrak reaches speeds above 79 mph on this section of the NEC. The MBTA commuter rail currently operates using diesel locomotives (F40s) with speeds up to 79 mph. CSX operates freight service predominately south of Mansfield.

Over the past two decades a multitude of operational studies have been completed reviewing the type, amount, and frequency of service that can be provided in this section of the NEC. All of these studies agree that this is a very congested portion of the NEC and that the addition of high-speed service has reduced the reserve capacity on the NEC. This reduction in reserve capacity is amplified by the great discrepancy in operating speeds between the different types of service on the corridor.

The MBTA operates five commuter lines on the NEC between South Station and the state line. Each line branches off the corridor, with the exception of the Providence Line service which travels the entire NEC in the state of Massachusetts. The MBTA uses diesel locomotives with up to eight bi-level or single level coaches. The MBTA's maximum authorized speed on the NEC is 79 mph and 70 mph off of the NEC where civil infrastructure conditions permit. The five branch lines include the Worcester Line, Needham Line, Franklin Line, Stoughton Line, and Providence Line. The existing (2008) service for these lines is summarized in Table 3.2-4.

Table 3.2-4 Existing (2008) MBTA and Amtrak Rail Operations

Passenger Service	AM Peak	PM Peak	Off Peak NB	Off Peak SB	Total NB Trips	Total SB Trips
Worcester	8	7	15	13	21	20
Needham	5	5	11	11	16	16
Franklin	7	6	12	12	19	18
Stoughton	4	5	9	12	17	17
Providence	8	5	9	14	20	19
Amtrak	1	3	13	14	19	19

Note: Short turn trains counted

Stoughton Line, Attleboro Secondary, Fall River Secondary, New Bedford Main Line

Passenger rail operations dominate existing railroad operations on the Stoughton Line. There is only one existing freight train that typically operates in a window of availability between Stoughton Line passenger services during the off-peak afternoon period.

The existing freight service for the South Coast Region is shared between CSX Transportation (CSX) and the Massachusetts Coastal Railroad (MCRR). CSX operates on the Attleboro Secondary and Middleboro Secondary. MCRR operates on the Fall River Secondary, New Bedford Main Line, a section of the Attleboro Secondary, and on the Stoughton Line in Taunton. CSX operates long haul freight service and

transfers cars with MCRR at Attleboro, Cotley Junction, and Middleborough. CSX dispatches these lines from its Selkirk, New York dispatch center.

3.2.8.2 FEIS/FEIR Proposed Operations

The Stoughton and Whittenton Electric Alternatives have similar operating plans. The plans were developed to meet the current minimum requirements of the MBTA Service Delivery Plan for commuter rail. The infrastructure proposed for each alternative has been designed to support these levels of operation.

Commuter Rail Operations

The proposed operations would have four peak period trains to each of the terminal stations of New Bedford and Fall River. This translates to approximately 30-minute service on both the Fall River Secondary and the New Bedford Main Line, and an 18 minute headway on the trunk (shared) portion of the route north of Myricks Junction. During the off-peak periods, six additional trains would operate on a 3 hour frequency from the terminal stations and 90 minutes on the trunk portion. This provides 10 round trip trains per weekday from each terminal station.

Both commuter rail alternatives would use the same station stops south of Taunton Depot. By employing a zone-express service pattern (where trains stop at a few stations and then run express), travel times for passengers traveling from Fall River and New Bedford would decrease as compared to those presented in the DEIS/DEIR. Table 3.2-5 summarizes the proposed station stopping pattern for each of the alternatives.

Table 3.2-6 summarizes the total trip time from each terminal station (New Bedford and Fall River) to South Station based on the station stopping pattern in Table 3.2-5. These trip times are between 5 and 7 minutes faster than shown in the DEIS/DEIR due to the revised service plan. As shown in Table 3.2-6, the Stoughton Electric Alternative would be 6 to 7 minutes faster than the Whittenton Electric Alternative for service to New Bedford, and 8 minutes faster for service to Fall River.

The average trip times in Table 3.2-6 are based on simulation of the Stoughton Electric Alternative. Diesel alternatives would add approximately 20 seconds per station due to the additional time diesel locomotives need to accelerate from the stations and their lower maximum speeds. Deceleration rates would be identical to those of the electric alternatives. It is noted that although its operating plan skips a few stops, the peak period service has a longer travel time due to longer dwell times at each station in order to load and unload the higher numbers of passengers using the service during peak commuting hours. The off-peak period service would stop at every station but would have much shorter dwell times and would, therefore, have a slightly shorter average travel time than the peak service.

Table 3.2-5 Proposed Stopping Patterns (Stoughton and Whittenton Alternatives)

	Stoughton Alternative				Whittenton Alternative			
	Fall River Line		New Bedford Line		Fall River Line		New Bedford Line	
Station	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Battleship Cove	■	■			■	■		
Fall River	■	■			■	■		
Freetown	■	■			■	■		
Whale's Tooth			■	■			■	■
Kings Highway			■	■			■	■
Taunton Depot		■	■	■		■	■	■
Dana Street						■	■	■
Taunton		■	■	■				
Raynham Park		■	■	■		■	■	■
Easton Village		■	■	■[1]		■	■	■[1]
North Easton	■	■	■	■	■	■	■	■
Stoughton	■	■		■	■	■		■
Canton Center	■	■		■	■	■		■
Canton Junction	■	■		■	■	■		■
Route 128[2]								
Hyde Park[2]								
Ruggles[2]								
Back Bay	■	■	■	■	■	■	■	■
South Station	■	■	■	■	■	■	■	■
	■	■	■	■	■	■	■	■

1 One train in the evening would not stop at Easton Village.

2 Stopping patterns vary at Route 128, Hyde Park and Ruggles. Existing service to Route 128, Hyde Park and Ruggles stations does not stop every Providence and Stoughton train at these stops. The Stoughton Electric Alternative would provide additional opportunity to connect to these stations with a service to New Bedford and Fall River. The operating plan proposed seven additional morning peak period stops at Route 128, four additional morning stops at Hyde Park and three additional at Ruggles. The evening peak service would generally remain unchanged.

Table 3.2-6 Average Trip Time Table, Stoughton and Whittenton Electric Alternatives (hr:min)

	Stoughton Electric Alternative		Whittenton Electric Alternative	
Operation	New Bedford Trains	Fall River Trains	New Bedford Trains	Fall River Trains
Peak Period Service	1:17	1:15	1:24	1:23
Non-Peak Period Service	1:16	1:18	1:22	1:26

1 Overall travel times for each branch of the Stoughton and Whittenton Electric Alternatives were developed using the Rail Traffic Controller model.
2 Assumptions were made based on track and signal layout.
3 Express trains may have longer travel times than local trains since they only operate during peak periods.

Feeder Bus

The Feeder Bus plan for the South Coast Rail project is envisioned to connect the urbanized communities in the study area to the South Coast stations. A Feeder Bus network would provide an alternative to driving to stations and would support transit oriented development and other smart growth initiatives in the study area by connecting surrounding areas to the train station. The Feeder Bus network would provide frequent, convenient service connections with trains.

Three regional transit authorities currently provide local bus service within the region: Brockton Area Transit Authority (BAT), Southeastern Regional Transit Authority (SRTA) and Greater Attleboro Taunton Regional Transit Authority (GATRA). The SRTA and GATRA operators use a fleet of buses that accommodate bicycles, which would encourage multi-modal integration for the South Coast Rail project. Current bus operators would provide enhanced Feeder Bus service to the proposed stations for the selected Build Alternative. On February 8, 2012, a meeting was hosted by SRPEDD with representatives of each of the bus operators to review a draft version of the feeder bus plan and receive their input on the proposed plan. The following objectives guided the development of the plan:

- Identify potential route modifications to existing bus routes to integrate South Coast Rail and local bus services to the extent possible;
- Minimize the number of transfers required by transit riders to use the South Coast Rail system;
- Limit route modifications to the extent possible to avoid inconveniencing current bus users;
- For stations served by bus, accommodate buses within the station site and as close as possible to the station platforms; and
- Plan for ADA compliant pedestrian connections to bus stops adjacent to the station sites and within the South Coast Rail station sites.
- Feeder Bus service would connect the South Coast Rail stations with the services shown in Table 3.2-7. Further details on the decisions made in selecting these stations and service changes are provided in the Feeder Bus Service Analysis Report, Appendix 3.2-Aof this FEIS/FEIR.

Table 3.2-7 Proposed Feeder Bus Operations

Station Name	Operator	Route #	Extension Length (miles)	Existing Headway (minutes)	Proposed Peak Frequency
Easton Village	BAT	8	3.0	40	same
Taunton Station	GATRA	7	0.4	30	same
Dana Street Station	GATRA	18	0.3	30	same
Taunton Depot	GATRA	8	0.2	60	same
Freetown Station	SRTA	2	1.0	30	same
Fall River Depot	SRTA	2	0.4	20	same
Kings Highway	SRTA	8	0	45	same
Whale's Tooth	SRTA	1	0.7	20	same
Whale's Tooth	SRTA	2	0	20	same

3.2.8.3 Layover Facility Operations

The following sections describe midday and overnight layover facility operations.

Midday Facilities

The South Coast Rail project would require midday storage in the Boston area, and would utilize the same midday layover facilities that are envisioned for the planned expansion of South Station. For the purpose of the operations simulations, all South Coast Rail trains are assumed to enter and leave the system over the Fort Point Channel Bridge. The operation simulations have been conducted by modeling these movements to identify any impacts that might occur to the NEC and South Station. As discussed above in Section 3.2.3.3, the South Station Expansion Project (including the layover facility component) has independent utility from the South Coast Rail project because it is necessary to meet future demand regardless of whether or not the South Coast Rail project is constructed and operated.

Overnight Layover Facilities

Both of the commuter rail alternatives would require overnight layover facilities along the Fall River Secondary and New Bedford Main Line. The preferred locations for these facilities are near the terminal stations to minimize non-revenue movements. A layover facility has been selected for each of the terminal stations – these locations are identified in Section 3.2.16. Trains either completing or initiating revenue runs would need to change ends (engineer walks through train to operate from other end), perform the required brake tests, and then proceed north into the layover facility. It is estimated that this movement would consume approximately 10 to 15 minutes, but would not reduce main line capacity.

Freight Operations

Although future freight demand was not modeled as part of the project, future operating windows for freight trains were included. Freight trains would be allowed to operate on the sections of track listed in Table 3.2-8, during the times specified. Each segment provides at least 10 hours per day of freight operations, typically in 1-hour windows during the day. These windows will allow existing freight customers to continue to receive goods via freight train service and eliminate conflicts between freight and passenger train operations.

Table 3.2-8 Freight Operating Windows

Time of Day		Length of Window
From	To	
Canton Junction to Stoughton Center (CSX)		
9:06:52	10:09:00	1:02:08
10:37:24	11:39:02	1:01:38
12:06:31	13:09:26	1:02:55
13:37:35	14:41:05	1:03:30
15:08:40	16:09:14	1:00:34
19:46:52	20:47:33	1:00:41
20:58:52	21:56:29	0:57:37
0:14:18	5:39:38	5:25:20
9:06:52	10:09:00	1:02:08
Total Freight Operating Window Time:		12:34:23
Winter Street Siding to Weir Junction North (MCRR)		
9:12:26	10:04:42	0:52:16
10:39:32	11:33:49	0:54:17
12:12:26	13:04:53	0:52:27
13:41:57	14:35:58	0:54:01
15:14:26	16:04:42	0:50:16
16:42:26	17:38:51	0:56:25
20:30:03	21:15:15	0:45:12
21:19:51	22:24:09	1:04:18
21:19:51	22:09:22	0:49:31
22:37:08	0:16:50	1:39:42
0:43:51	5:09:42	4:25:51
Total Freight Operating Window Time		14:04:16
Weir Junction South to Cotley Junction (CSX and MCRR)		
9:15:46	10:01:28	0:45:42
10:42:56	11:30:32	0:47:36
12:15:46	13:01:39	0:45:53
13:45:17	14:32:41	0:47:24
20:23:39	21:22:28	0:58:49
22:32:05	0:23:51	1:52:41
0:47:23	5:06:23	4:19:00
Total Freight Operating Window Time		10:17:05

Time of Day		Length of Window
From	To	
Myricks Junction to Fall River (MRCC)		
8:35:45	10:45:47	2:10:02
11:27:46	13:48:08	2:20:22
14:29:55	16:48:37	2:18:42
20:20:00	22:10:00	1:50:00
23:04:58	0:50:14	1:45:16
1:20:34	4:53:06	3:32:32
Total Freight Operating Window Time		13:56:54
Myricks Junction to New Bedford (MCRR)		
7:35:53	9:18:20	1:42:27
9:58:40	12:18:20	2:19:40
12:58:51	15:20:20	2:21:29
15:58:20	17:33:08	1:34:48
20:21:38	21:25:57	1:04:19
22:03:20	0:27:20	2:24:00
1:05:24	4:33:26	3:28:02
Total Freight Operating Window Time		14:54:45

Freight service would be restricted to standard freight size and weight, and would not support high-and-wide or double-stack operations where it does not currently provide high-and-wide or double-stack operations. Freight services is anticipated to continue on the track segments where freight is currently provided (on the Stoughton Line north of Stoughton Station, on the Attleboro Secondary, on the Stoughton Line in Taunton between Longmeadow Road and Weir Junction, and on the New Bedford Main Line and Fall River Secondary south of Weir Junction). No future freight service is currently

planned or anticipated on the currently out-of-service Whittenton Branch or Stoughton Line between Stoughton Station and Longmeadow Road.

3.2.8.4 Fare Collection

Fare collection for the commuter rail alternatives would be the same as the existing MBTA commuter rail lines. Fares would be collected on board the trains by conductors. Passengers would have the option to purchase individual tickets on board the trains or purchase single ride, multiple ride, or monthly passes from the MBTA or retail sites.

3.2.9 Track Infrastructure of the Rail Alternatives

Subsequent to the DEIS/DEIR, MassDOT has advanced the preliminary track design for the Stoughton Alternative and the Whittenton Alternative. All track changes have been minor. The design of bridge structures has been advanced, particularly for the Hockomock Trestle between Foundry Street and the Raynham Greyhound Park.

The FEIS/FEIR track layout for the Stoughton Alternative varies from the track layout included in the DEIS/DEIR in the following ways:

- A proposed north end double track on the New Bedford Main Line was cut back from Pig Farm Road to Tarkiln Hill Road;
- In the DEIS/DEIR, a passing siding was added on the Fall River Secondary near the Fall River Golf Club; and a siding was proposed from Freetown to Fall River Depot Station. This has since been changed to three separate sidings in an effort to reduce environmental impacts while maintaining operational flexibility. The sidings would be located at Freetown Station, near the Fall River Golf Club, and at the Fall River Depot Station;
- Weir Junction was reconfigured to provide 45 mph operations through the curve;
- A short second track was added at Battleship Cove; and
- A passing siding for freight trains was added at Taunton Depot Station.

3.2.9.1 FEIS/FEIR Track Design

All of the rail alternatives require reconstructing existing active tracks and constructing new tracks either on abandoned or new rights-of-way. The new track infrastructure would consist of new 132RE rail, new rail ties, new stone ballast, subballast and other track material. The horizontal and vertical geometry for the new track has been designed to conform to the applicable design speed for the alternatives in accordance with the MBTA commuter rail design standards and American Railway Engineering and Maintenance-of-Way Association design standards. The alignments have also been designed to minimize impacts to adjacent environmental resources and private properties. The proposed track typical sections are shown in Figures 3.2-1 and 3.2-2 (for the diesel alternatives) and 3.2-3 through 3.2-5 (for the electric alternatives).

3.2.9.2 Track Infrastructure—Stoughton Alternative

The New Bedford Main Line from Weir Junction in Taunton to the Whale's Tooth Station, and the Fall River Secondary from Myricks Junction to Battleship Cove Station, are segments of track common to

both commuter rail alternatives as is the track from Raynham Junction to South Station. Only the segment from Raynham Junction to Weir Junction would differ between the alternatives. Except in certain locations, the track would be designed for a maximum authorized speed (MAS) of 100 MPH. Locations which would be designed for less than 100 MPH MAS would be at certain sidings (which would be too short to achieve 100 MPH), and south of the King's Highway Station, where it would be precluded by single track operations.

Stoughton Line

The existing single track commuter rail line would be upgraded and maintained to FRA Class 7. A new second track would be constructed from Canton Junction to the existing Stoughton Station, where existing passenger service ends. A new double track would extend south of Stoughton Station to the proposed North Easton Station. The remainder of the line south to Weir Junction would be single- track, with a 2.2-mile long double-track section in Raynham, and a 0.6 mile long double-track section in Taunton. Approaching Weir Junction, an additional 0.4 mile siding track would be provided for freight use only. Weir Junction would also be reconfigured to accommodate four tracks as well as 45 MPH for operations through the curve while maintaining existing rail connections. These track segments are listed in Table 3.2-9.

A frontage road would be constructed in Stoughton connecting to Morton Street to eliminate multiple grade crossings, and a new grade-separated crossing is proposed at Route 138 in Raynham. A trestle section is proposed in Easton and Raynham to minimize environmental impacts to the Hockomock Swamp Area of Critical Environmental Concern.

Table 3.2-9 Track Infrastructure – Stoughton Alternative

Track Segment	Single Track	Double Track	Triple Track	Quadruple Track	Total (miles)
Canton Junction to Stoughton Station[1]	-	3.8	–	–	3.8
Stoughton Station to Raynham Junction[1]	7.1	4.8	–	–	11.9
Raynham Junction to Weir Junction[1]	2.9	1.1	–	0.4	4.5
Weir Junction to Cotley Junction[2]	–	0.7	0.9	–	1.6
Cotley Junction to Myricks Junction[2]	–	3.3	–	–	3.3
Myricks Junction to Battleship Cove[3]	9.4	2.9	–	–	12.3
Myricks Junction to Whale's Tooth[2]	10.1	4.5	–	–	14.5
TOTAL (miles)	**29.5**	**21.1**	**0.9**	**0.4**	**51.9**

1 Stoughton Line
2 New Bedford Main Line
3 Fall River Secondary

New Bedford Main Line

The 19.4-mile existing track along the New Bedford Main Line would be upgraded and maintained to FRA Class 7 options. The line would be double-track from Weir Junction to Myricks Junction, with a 0.9-mile third track for freight movements near Taunton Depot Station. A short segment of the line would be double-track south of Myricks Junction, 0.8 mile. The remainder of the line would be single-track, with the exception of 1.8-mile double-track section in Freetown and a 1.7-mile section in New Bedford. These sidings are required by the operations analysis and also allow flexibility between commuter and freight operations.

Fall River Secondary

The 12.3 miles of existing track along the Fall River Secondary would be upgraded and maintained to FRA Class 7 options. The majority of this line would be single-track with a 0.7 mile double-track segment at Myricks Junction. A 1.0-mile-long section of double track would be installed adjacent to the Fall River Golf Club. Three double-track sections are also proposed in Freetown and Fall River, at 0.6, 0.3, and 0.2 mile long, respectively, to allow flexibility between commuter and freight operations.

3.2.9.3 Track Infrastructure—Whittenton Alternative

The route for the Whittenton Alternative is similar to the Stoughton Alternative except in Raynham and Taunton. The New Bedford route would be 56.6 miles long and the Fall River route would be 54.3 miles long. This alternative would extend through the abandoned Stoughton Line, as previously described, and connect to the abandoned Whittenton Branch at Raynham Junction. The Whittenton Branch would extend south and west to the Attleboro Secondary at Whittenton Junction. Along the Attleboro Secondary, the Whittenton Alternative would extend to Weir Junction in Taunton. South of Taunton, the alternative would continue on the New Bedford Main Line and Fall River Secondary track, identical to the Stoughton Alternative.

Track infrastructure improvements would include 3.6 miles of new single-track on the Whittenton Branch and 2.2 miles of single-track reconstruction on the Attleboro Secondary with a 0.3-mile siding reserved for the proposed Dana Street Station. Improvements on the Stoughton Line between Canton Junction and Route 138 in Raynham would be the same as the Stoughton Alternative. Table 3.2-10 summarizes the track infrastructure improvements along the Whittenton Alternative.

Table 3.2-10 Track Infrastructure – Whittenton Alternative

Track Segment	Single Track	Double Track	Triple Track	Quadruple Track	Total (miles)
Canton Junction to Stoughton Station[1]	–	3.8	–	–	3.8
Stoughton Station to Raynham Junction[1]	7.1	4.8	–	–	11.9
Raynham Junction to Whittenton Junction[2]	3.6	–	–	–	3.6
Whittenton Junction to Weir Junction[3]	2.2	0.3	–	–	2.5
Weir Junction to Cotley Junction[4]	–	0.7	0.9	–	1.6
Cotley Junction to Myricks Junction[4]	–	3.3	–	–	3.3
Myricks Junction to Battleship Cove[5]	9.4	2.9	–	–	12.3
Myricks Junction to Whale's Tooth[4]	10.1	4.5	–	–	14.5
TOTAL (miles)	**32.4**	**20.3**	**0.9**	**0.4**	**53.5**

1 Stoughton Line
2 Whittenton Branch
3 Attleboro Secondary
4 New Bedford Main Line
5 Fall River Secondary

3.2.10 Grade Crossings

The majority of existing public grade crossings on the active railroad rights-of-way have automatic grade crossing gates and flashers installed. All existing grade crossings to remain and all reactivated crossings would be equipped with new, state-of-the-art Automatic Highway Crossing Warning (AHCW) systems. Trains would use horns when they approach grade crossings. Sounding a horn while approaching a grade

crossing is a well-proven and effective method of providing warning of an approaching train. MassDOT is not recommending Quiet Zones for noise mitigation and has committed to designing the South Coast Rail project grade crossings to the FRA safety standards.

Grade crossings would be closed or consolidated whenever feasible. Private grade crossings would be closed, gated, and locked if possible; if not, new AHCW systems would be installed. At a minimum each public grade crossing would consist of automatic gates, LED flashers, and an electronic bell. Where required, this standard arrangement may be supplemented with additional equipment such as additional gates and cantilevered flashers to optimize visibility for the roadway approaches.

The AHCW train detection would be based upon constant warning technology known as predictors. This system detects the speed of the train as it moves towards the crossing and "predicts" the arrival time. Each crossing would be set to provide a consistent 30 seconds of warning ahead of the train's arrival at the crossing. The AHCW system would communicate with the MBTA Operational Control Center (OCC) through a dedicated Fiber Optic line that would be provided as part of the South Coast Rail project. This Fiber Optic line would allow MBTA train dispatchers to communicate with and receive indications directly from the AHCW system at each grade crossing.

Each crossing would be supported by a minimum 8-foot by 8-foot aluminum shed that would house the AHCW system. The houses would be placed at the most advantageous quadrant of the crossing to not impede sight distance of pedestrians, motorists, and train engineers.

Each crossing would require a power utility feed from the nearest commercial source. Additional or supplemental devices may require additional system infrastructure to support a particular application such as traffic preemption or advance active warning signs. Each AHCW system would be supported by storage batteries during times of power outages. These batteries would be housed in a separate box (battery well) located adjacent to the AHCW housing.

Table 3.2-11 is a summary of the number of grade crossings by alternative. Information on the improvements proposed for each crossing is provided in Chapter 4.1. See Figures 4.1-44 through 4.1-53 in Volume II for mapping of existing and proposed grade crossings.

Table 3.2-11 Summary of Public Grade Crossings by Alternative

Commuter Rail Alternative	Existing Active Grade Crossings	Existing Grade Crossings Recommended for Closure	Proposed New Grade Crossings[1]	Total Proposed Grade Crossings
Stoughton Alternative	31	3	15	43
Whittenton Alternative	40	3	13	50

1 Includes grade crossings that are existing but not active

3.2.11 Bridges and Culverts

All of the rail alternatives require reconstructing undergrade bridges (railroad over road or river) and overhead bridges (highway over railroad) along the active and restored rights-of-way.

The conditions of the existing railroad bridges were evaluated to determine each bridge's current state of repair and whether the bridge can meet industry design standards. The bridges were also evaluated

to determine if it was feasible to install additional track where required for the rail operations. Based on this evaluation, the following recommended improvements were developed.

Existing culverts along the rail corridors would typically be replaced in-kind (or widened, as feasible and appropriate, for environmental enhancement) to resist increased loading and to accommodate the wider track bed where necessary.

3.2.11.1 Typical Railroad (Undergrade) Bridge Structure Types

The following bridge structure types are currently proposed for the undergrade bridges on the rail alternatives. The structure type considered for specific locations is dependent on span length, number of spans, structure depth constraints, cost and constructability. For overhead (roadway bridges), a detailed type study in accordance with MassDOT criteria would be performed during preliminary design to determine the most appropriate structure type.

Concrete Box Girder—Concrete box girder superstructures are primarily used for single span bridges with smaller spans up to approximately 25 feet in length (Figure 3.2-11). The box girders are placed adjacent to each other, providing a deck for the ballast and track. This minimizes field construction duration and associated impacts to track service. The open deck configuration allows for adjustability in track alignments which can be advantageous during construction staging.

Steel Tub—Steel tub superstructures are primarily used for single span bridges with spans ranging from roughly 25 feet to 60 feet in length (Figure 3.2-12). Ballast is placed onto a ballast plate deck, which is supported by longitudinal stringers and intermediate diaphragms. Much of the fabrication can be done in the shop, minimizing field construction times and associated impacts to track service. The open deck configuration allows for adjustability in track alignments which can be advantageous during construction staging.

Steel Thru Girder—Steel thru girder superstructures are primarily used for single or multiple span bridges with spans greater than 60 feet in length (Figure 3.2-13). Ballast is placed onto a ballast plate deck supported by floor beams and the main load carrying plate girders. Multiple track thru girder bridges utilize a shared plate girder between each set of tracks. This structure type minimizes structure depth for longer spans, although field construction is more time consuming than that for concrete box girder and steel tub superstructures. These structures do not allow for much adjustability in track alignment, in some instances making them difficult to stage.

3.2.11.2 New Bedford Main Line Railroad Bridges

Of the 18 bridges (both undergrade and overhead) on the New Bedford Main Line, nine would require rehabilitation or reconstruction as part of the South Coast Rail project. The bridges being replaced are either unable to meet the load requirements for the commuter rail, have open decks, are too narrow, or are recommended for replacement to reduce maintenance costs.

Several bridges originally carried two tracks. Currently, each bridge carries a single track. Four of the new bridges would be designed to carry two tracks, while the other five would still carry a single track. Many of the existing bridges have open timber decks. The new bridges would have solid decks on which ballast, ties, and rails would be placed.

Where the new bridge would have a longer span than the current structure, the new abutments would be located behind the old ones, the old ones would be demolished to the high water line (as currently

proposed), and the land between the old and new abutments restored to provide wildlife passage under the bridge. This condition exists at the Cotley River (MP 38.93 and MP 39.46), the Cedar Swamp River (MP 42.14), and Fall Brook (MP 45.43).

Where a new bridge would have an equal span to the current structure, the existing stone abutments would be rehabilitated and reused, if feasible. In some cases, the current bridge has multiple spans that the new bridge would replace with a single span, eliminating the mid-bridge piers required to support multiple spans. This occurs at Wamsutta Street (MP 54.21).

Table 3.2-12 provides a list of bridge crossings (both undergrade and overhead) and indicates which ones would require rehabilitation or reconstruction as part of the currently envisioned New Bedford Main Line segment of the South Coast Rail project. Appendix 3.2-B includes a description of the proposed work at each of the bridge locations.

Table 3.2-12 Summary of Bridges – New Bedford Main Line

Bridge	Municipality	Type	Mile Post	Improvements Required
Taunton River	Taunton	Undergrade	35.56	Yes
Brickyard Road	Taunton	Undergrade	35.79	Yes
Route 24	Taunton	Overhead	37.69	Yes
Cotley River	Berkley	Undergrade	38.93	Yes
Cotley River	Berkley	Undergrade	39.46	Yes
Cedar Swamp River	Lakeville	Undergrade	42.14	Yes
Howland Road	Lakeville	Overhead	43.26	No
Fall Brook	Freetown	Undergrade	45.43	Yes
Route 140	New Bedford	Overhead	50.66	No
Dean Street[1]	New Bedford	Undergrade	53.31	No
Sawyer Street[1]	New Bedford	Undergrade	53.57	No
Coggeshall Street[1]	New Bedford	Undergrade	53.67	No
Cedar Grove Street	New Bedford	Undergrade	53.79	No
I-195 Ramp	New Bedford	Overhead	53.81	No
Weld Street/Route 18 Ramp	New Bedford	Undergrade	53.95	No
Logan Street	New Bedford	Undergrade	54.01	No
Route 18	New Bedford	Undergrade	54.17	Yes
Wamsutta Street	New Bedford	Undergrade	54.21	Yes

1 Reconstructed in 2011-2012

3.2.11.3 Fall River Secondary Railroad Bridges

Of the 30 existing bridges (both undergrade and overhead) on the Fall River Secondary, 11 would require rehabilitation or reconstruction as part of the South Coast Rail project. One new bridge would be required (the Golf Cart Road pedestrian bridge). The bridges being replaced are either unable to meet the load requirements for the commuter rail, or are too narrow.

Five of the new bridges would be designed to carry two tracks, while the other seven would carry a single track. Many of the existing bridges have open timber decks. The new bridges would have solid decks on which ballast, ties, and rails would be placed. Where a new bridge would have an equal span to the current structure, the existing stone abutments would be rehabilitated and reused, if feasible. In

some cases the current bridge has multiple spans that the new bridge would replace with a single span, eliminating the mid-bridge piers required to support multiple spans. This would be the case for at the Cedar Swamp River (MP 41.51), Golf Club Road (MP 48.11), and President's Avenue (MP 51.11).

Table 3.2-13 provides a list of bridges (both undergrade and overhead) and indicates which ones would require construction, rehabilitation, or reconstruction as part of the currently envisioned Fall River Secondary segment of the South Coast Rail project. Appendix 3.2-B provides a description of the proposed work at each of the bridge locations.

Table 3.2-13 Summary of Bridges – Fall River Secondary

Bridge	Municipality	Type	Mile Post	Improvements Required
Cedar Swamp River	Freetown	Undergrade	41.51	Yes
Route 24/79	Freetown	Undergrade	45.58	No
South Main Street/Route 79	Freetown	Overhead	46.25	No
Farm Road	Freetown	Undergrade	46.63	Yes
Farm Road	Fall River	Undergrade	47.75	No
Golf Cart Road (Pedestrian)	Fall River	Overhead	47.90	New
Golf Club Road	Fall River	Overhead	48.11	Yes
Miller's Cove Road	Fall River	Undergrade	48.62	Yes
Clark Street	Fall River	Overhead	48.93	No
Collins Road	Fall River	Undergrade	49.06	Yes
Ashley Street	Fall River	Undergrade	49.21	Yes
Canedy's Underpass	Fall River	Undergrade	49.57	No
New Street	Fall River	Overhead	49.81	No
Western Expressway/Route 79	Fall River	Overhead	49.96	No
Western Expressway Ramps	Fall River	Overhead	50.06	No
Weaver Street	Fall River	Overhead	50.09	No
Cove Street	Fall River	Undergrade	50.43	No
Clinton Street	Fall River	Undergrade	50.49	No
Brightman Street	Fall River	Overhead	50.69	No
Brownell Street	Fall River	Undergrade	51.03	Yes
President's Avenue	Fall River	Undergrade	51.11	Yes
Pearce Street	Fall River	Undergrade	51.20	Yes
Turner Street	Fall River	Undergrade	51.40	Yes
Central Street	Fall River	Overhead	52.05	No
NB Ramp	Fall River	Overhead	52.05	No
SB Ramp	Fall River	Overhead	52.06	No
I-195	Fall River	Overhead	52.07	No
Route 138/Davol Street	Fall River	Overhead	52.09	No
Western Expressway, NB & SB	Fall River	Overhead	52.09	No
Anawan Street	Fall River	Overhead	52.19	No
Channel near Battleship Cove	Fall River	Undergrade	52.38	Yes

3.2.11.4 Stoughton Line Railroad Bridges

Of the 18 existing bridges (both undergrade and overhead) along the Stoughton Line, 14 would require rehabilitation or reconstruction as part of the Stoughton Alternative. The bridges being replaced are unable to meet the load requirements for the commuter rail.

Five completely new bridges are required. Three of the new bridges that pass over the rail right-of-way are in locations where previous bridges have been filled in (Main Street and Bridge Street in Easton and Thrasher Street in Taunton). At these locations the bridges would be constructed on new abutments or the existing abutments that remain, and the embankment excavated to track grade below. One new bridge would be built where none now exists (Route 138 Bridge, at MP 31.31 in Raynham) to provide a grade separation. The largest new bridge would be the trestle through the Hockomock Swamp with about 284 spans. It would be about 8,500 feet long and 24 feet wide at the level of the bridge deck. The structure would consist of multiple precast pre-stressed concrete superstructure spans on driven h-pile bent piers. Figure 3.2-14 shows the typical cross section of the trestle through the Hockomock Swamp. The basis for the trestle design and methods for construction are described in the Hockomock Swamp Trestle Technical Memorandum (Appendix 3.2-C).

The bridges listed for replacement have open timber decks (or none at all). The new bridges would have solid decks on which ballast, ties, and rails would be placed. Where the existing bridge abutments are stone, and the span length remains the same, the stonework may be rehabilitated and reused, if feasible. Two of the bridges that would be reconstructed would be built over existing stone masonry arched bridges (Forge Pond and Beaver Meadow Brook) to preserve these historic structures.

In some cases the current bridge has multiple spans that the new bridge would replace with two spans, eliminating the mid-bridge piers required to support multiple spans. This would be the case for at the Taunton River where the three bridges currently have 11 spans, 16 spans and 17 spans. Each would be replaced by a two-span bridge. The Taunton River bridges would be constructed to enhance wildlife passage by moving the abutments back from the riverbank.

Table 3.2-14 provides a list of bridge crossings (both undergrade and overhead) and indicates which ones would require rehabilitation or reconstruction as part of the currently envisioned Stoughton Alternative for the South Coast Rail project. Appendix 3.2-B provides a description of the proposed work at each of the bridge locations.

As required by the Secretary's Certificate on the DEIR, the feasibility of a trestle through the Pine Swamp was evaluated. As documented in Appendix 3.2-D, a trestle could be constructed through Pine Swamp but is not practicable based on cost, particularly when considered in the context of impacts to biological resources. Pine Swamp therefore does not have the extraordinary wildlife habitat value on both sides of the right-of-way that justifies the additional $45 million expenditure necessary to construct a trestle. The proposed mechanically stabilized reinforced earth stabilized track bed through the Pine Swamp along with other proposed mitigation including modifications to existing culverts and additional wildlife crossings provide a reasonable cost-effective solution to reduce the barrier effect resulting from replacing the former tracks that is in keeping with the biological diversity and overall value of the Pine Swamp.

Table 3.2-14 Summary of Bridges – Stoughton Line

Bridge	Municipality	Type	Mile Post	Improvements Required
Revere Street	Canton	Undergrade	15.21	No
Forge Pond	Canton	Undergrade	15.79	Yes
Bolivar Street	Canton	Undergrade	16.11	Yes
Mill Brook (also called Beaver Meadow Brook)	Canton	Undergrade	16.56	Yes
Coal Yard Road	Stoughton	Undergrade	19.07	Yes
Totman Farm Road	Stoughton	Undergrade	20.85	Yes
Day's Farm Road (private)	Easton	Undergrade	21.57	Yes
Cowessett Brook (also called Whitman Brook)	Easton	Undergrade	21.75	Yes
Ames & Pond Streets	Easton	Undergrade	22.80	Yes
Small Creek (also called Queset Brook)	Easton	Undergrade	22.84	Yes
Main Street	Easton	Overhead	22.93	New
Bridge Street	Easton	Overhead	23.27	New
Hockomock Swamp Trestle	Easton	Undergrade	27.00 to 28.60	New
Bridge Street	Raynham	Overhead	30.20	Yes
I-495	Raynham	Overhead	30.48	No
Route 138	Raynham	Overhead	31.31	New
Thrasher Street	Taunton	Overhead	33.33	New
Taunton River	Taunton	Undergrade	34.38	Yes
Taunton River	Taunton	Undergrade	34.38	Yes
Taunton River	Taunton	Undergrade	34.73	Yes
Summer Street	Taunton	Overhead	34.80	No
Mill River	Taunton	Undergrade	34.90	Yes
High Street	Taunton	Overhead	35.00	No

3.2.11.5 Whittenton Alternative Bridges and Culverts

The Whittenton Alternative would require all of the bridge work described for the Stoughton Alternative with the exception of six bridges. These include Route 138 in Raynham, Thrasher Street, the three Taunton River bridges in Taunton, and the Mill River Bridge in Taunton (the Whittenton Alternative crosses the Mill River at a bridge upstream from the Stoughton Alternative crossing). The Whittenton Alternative would also require rehabilitation or reconstruction of all three of the existing bridges on the Whittenton Branch. A new bridge would replace the bridge that once spanned King Phillip Street. The existing stacked stone abutments do not provide adequate lateral or vertical roadway clearance. A new superstructure and abutments would be constructed to provide clearances in accordance with current standards including travel lanes and sidewalks. The Bay Street Bridge was recently filled in and would need to be reconstructed to provide adequate track clearance for the rail service. A new superstructure would be constructed on new abutments and the embankment fill excavated below to the proposed track grade. The Mill River Bridge associated with the Whittenton Alternative is now a five span structure; it would be replaced by a two-span bridge carrying a single track. The existing abutments would be demolished and the new abutments constructed behind the existing abutments. The existing abutments would then be demolished down to the high water level and the space between the old and new abutments graded to recreate the stream banks under the bridge.

Table 3.2-15 provides a summary of the bridges along the Whittenton Branch. Appendix 3.2-B provides a description of the proposed work at each of the bridge locations.

Table 3.2-15 Summary of Bridges – Whittenton Alternative

Bridge	Municipality	Type	Mile Post	Improvements Required
King Phillip Street	Taunton	Undergrade	30.38	New
Bay Street	Taunton	Overhead	31.58	Yes
Mill River	Taunton	Undergrade	32.16	Yes

3.2.11.6 Summary of Bridge Improvements

Table 3.2-16 provides a summary of bridge improvements for the Stoughton and Whittenton Alternatives. The table is a general summary of the required bridge work among the alternatives. The summary includes existing bridges to be reconstructed and new bridges required to restore/provide grade separation or traverse sensitive areas.

Table 3.2-16 Summary of Bridge Improvements by Alternative

Commuter Rail Alternative	Reconstruct Undergrade (Railroad) Bridges	Reconstruct Overhead (Highway) Bridges	New Bridges for Grade Separation or Environmental
Stoughton Alternative	31	3	6
Whittenton Alternative	29	4	5

3.2.12 Signals and Communications

The Signals and Communications design remains the same as described in the DEIS/DEIR. The following sections summarize the design and compare the Stoughton and Whittenton Alternatives.

3.2.12.1 Signals and Communications—General Overview

The rail alternatives require a new signal system throughout, with the exception of the NEC. The new signal systems would be required to include Positive Train Control (PTC) as mandated by Congress in the Rail Safety Act of 2008; the new signal system would be capable of stopping the train ("positive stop") if the train engineer fails to operate the vehicle as directed by the signal system. For the purposes of this document, it has been assumed that the new signal system would be the same as the existing signal system technology implemented on the NEC. The FRA has already deemed this system compliant with the Act. The NEC system is a cab-based signal system, meaning that the signal and the allowable speed are presented to the engineer in the cab of the locomotive.

The communications system would include a new fiber optic conduit. This would allow the signal system and grade crossings to be connected to the MBTA OCC. The communications system would also connect the MBTA OCC to systems at station stops, including passenger warning, public information and address, security, fire alarm, and police call back systems. Provisions would be made for future expansion of systems, such as for fare collection.

3.2.12.2 Stoughton Alternative Signals and Communications

The Stoughton Alternative requires a new PTC signal system for the New Bedford Main Line, Fall River Secondary, and the Stoughton Line. Modifications to the existing NEC signal system are limited to updating the signal logic at the Junction Interlocking. These minor improvements would be needed to make the signal logic on the corridor consistent with the signal logic of the new system on the Stoughton Line.

3.2.12.3 Whittenton Alternative Signals and Communications

The Whittenton Alternative requires a new PTC signal system for the New Bedford Main Line, Fall River Secondary, Attleboro Secondary, Whittenton Branch, and Stoughton Line. Modifications to the existing NEC signal system are limited to updating the signal logic at the Junction Interlocking. These minor improvements would be needed to make the signal logic on the corridor consistent with the signal logic of the new system on the Stoughton Line.

3.2.13 Rolling Stock

Both the Stoughton and Whittenton Alternatives would use commuter rail technology on a fixed-guideway system with steel wheels operating on steel rails, with typically a single locomotive pulling (outbound) or pushing (inbound) a number of passenger coaches. On the MBTA system, coaches can be either single level or bi-level. Commuter rail trains would be powered by diesel or electric locomotives, depending on the alternative. The electric locomotives would be powered by a 25 kV/60 Hz overhead contact system (OCS). The diesel alternative would not require an OCS.

3.2.13.1 Coaches

Commuter rail trains would consist of eight coaches. The coaches would be either single level or bi-level if additional capacity is needed. The MBTA currently uses coaches manufactured by Bombardier, Kawasaki, Messerschmitt-Bolkow-Blohm and Pullman Standard BTC. Existing coaches on the MBTA system are rated for a top operating speed of 90 MPH. It is anticipated that modified versions of these same coaches would be used for electric operations to achieve a 100 MPH rating. This would not be required for diesel operations that would operate at a top operating speed of 79 MPH. Single level coaches can carry 125 to 130 passengers and bi-level coaches can carry 175 to 185 passengers.

3.2.13.2 Locomotives

There are three differences between diesel and electric locomotives that are noteworthy. First, electric trains have higher performance characteristics, particularly in terms of quicker acceleration. Second, top travel speeds differ: for diesel-powered commuter rail, the maximum speed is assumed to be 79 mph, the maximum current operating speed on the MBTA system; for electric commuter rail, the maximum speed is assumed to be 100 MPH, which is the maximum speed that can be operated without incurring significant signal costs. Electric locomotives require an overhead wire (a catenary) to distribute power to the electric locomotive. The MBTA does not currently have electric locomotives in their commuter rail system, though some diesel powered trains travel on the electrified NEC.

The following is a description of the diesel and electric locomotives:

Electric Locomotives

- Type – HHP-8 manufactured by Bombardier or similar

- Acceleration performance is better than diesel locomotives
- Top Travel Speed – 125 MPH
- Fuel – electric using an 25 kV/60 Hz overhead wire (catenary) to distribute power to the electric locomotive

Diesel Locomotives

- Type – F40PH's manufactured by EMD or similar
- Acceleration performance is less than electric locomotives
- Top Travel Speed – 103 mph
- Fuel – diesel or bio-diesel

Table 3.2-17 summarizes the number of new coaches and locomotives required for each commuter rail alternative. Figure 3.2-15 depicts the typical diesel and electric locomotives.

Table 3.2-17 Rolling Stock Requirements[1]

Alternatives	Locomotives	Coaches	Cab Cars
Stoughton	10	72	10
Whittenton	10	72	10

1 Includes spare locomotive, coaches, and cab cars since the MBTA currently does not have electric locomotives.

3.2.14 Electrification System

A new traction electrification system is required to provide electric power to locomotives for the electric commuter rail alternatives. The diesel alternatives would not require these infrastructure improvements.

The new traction electrification system would tie into the existing NEC electrification system with some modifications to that system. The traction electrification system would provide power to the trains from wayside traction power facilities through an OCS that distributes the power to the trains' pantographs. The pantographs, mounted on the roof of the rolling stock, would collect the electrical power from the OCS through mechanical contact by sliding under the OCS contact wire. The electrical circuit would be completed back to the source substation via multiple return paths, including running rails and static wires.

Three major elements would make up the traction electrification system:

- Traction Power System, which include traction power substations, switching stations and paralleling stations. Figure 3.2-16 illustrates a typical Traction Power Station.
- Overhead Contact System (OCS), which distributes the electrical power to the rolling stock, and includes the messenger and contact wires, and the associated supporting structures and

hardware. The track negative feeder wires are considered associated with the OCS. Figure 3.2-17 illustrates a typical OCS.

- Traction Power Return System, which makes up the running rails, impedance bonds and static wires.

The traction power system and OCS are described below.

3.2.14.1 Traction Power System

The traction power system would provide a network of electric traction power facilities that transform power from the utility power grid at 115 kV to the 25 kV voltage required by electric locomotives. The power is distributed from the traction power facilities to the trains via the OCS. For South Coast Rail, the proposed traction power system would be similar to the one currently in use on the NEC between New Haven, CT and Boston, Massachusetts, in order to take advantage of this existing infrastructure. This system is a 2x25 kV autotransformer alternating current system requiring three types of traction power facilities:

- **Main Substations (AKA Traction Power Substations)—**that draw power from the utility power grid. They are typically located near high voltage, overhead transmission lines. A typical main substation site is 150 feet by 200 feet.

- **Switching Stations—**here two sections of the traction power system powered from different main substations meet. Electricity can be distributed to different sections, and different sections can be energized, de-energized, isolated or interconnected. They are typically mid-way between main substations and switching station sites can be as large as 60 feet by 150 feet.

- **Paralleling Stations—**that are between main substations and switching stations, spaced about 6 miles apart. They allow sections to be connected in parallel. They contain less equipment than the main substation and switching stations and require a 40-foot by 80-foot site.

- **Wayside Power—**provide power and remote control of interlocking lighting and OCS disconnect switches. Wayside power locations are also used to power other systems such as signals and lighting. The wayside power cubicle, which would house much of the equipment, would be located at interlocking.

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). A switching station would be required at the point where the Stoughton and Whittenton Alternatives join with the NEC. Figures 3.2-18 through 3.2-19 show the Traction Power System for the Stoughton and Whittenton Alternatives.

3.2.14.2 Overhead Contact System

The OCS would be a network of catenary wires that distributes power from the traction power system to electric locomotives. This system would have a contact wire and a messenger wire strung above every electrified track in the system, negative feeder wires and static wires and supporting structures to hold the catenary wire in place. The support system for the catenary would consist of pole structures with foundations, poles, guys, insulators, brackets, cantilevers, and other assemblies and components. For

the South Coast Rail project, there would be three types of catenary supports: single-track cantilever poles, twin-track cantilever structures and multiple track portals.

3.2.15 Stations

Station locations have remained as shown in the DEIS/DEIR, with the exception of the Stoughton Station and Downtown Taunton Station. Stoughton Station was relocated to eliminate grade crossing conflicts with traffic in Stoughton Center and to support downtown revitalization efforts. A discussion is provided of the site options considered for Stoughton Station relocation. Downtown Taunton Station as described in the DEIS/DEIR was replaced by Dana Street Station, due to development of the originally selected site near the GATRA bus terminal since the publication of the DEIS/DEIR. The Dana Street site was chosen as a replacement for the Downtown Taunton station site since it is a sizable vacant parcel along the right-of-way and is proximate to the previously selected Downtown Taunton site.

Station layout, parking, grading, and drainage designs for the North Easton, Raynham Park, Taunton, Taunton Depot, and Freetown locations have been advanced since completion of the DEIS/DEIR.

3.2.15.1 Station Description

New commuter rail stations generally would consist of high-level platforms, canopies, commuter parking, and a pick-up/drop-off area for buses and “kiss & ride” that conform to MBTA Commuter Rail Station design criteria and the Americans with Disabilities Act (ADA). High-level platforms would be constructed at a height that is 4 feet above the top-of-rail level, allowing for level-boarding onto all the commuter rail coaches for a 9-car train set (approximately 800 feet long). Platform configurations (i.e., side platform or center island platform) are dependent on the number of tracks, operations, and existing site constraints.

Most of the new commuter rail parking lots were sized to accommodate the park and ride ridership projected by CTPS for the particular station, plus a 20 percent increase to meet the 2030 parking demand and potential future growth. However, two of the station parking areas were designed to provide parking space counts that differ from the unconstrained park and ride projections. Taunton Station was designed with fewer spaces than the ridership model projected. Although there would be sufficient area to provide the required parking, the number of parking spaces was constrained to provide an area that could be used for transit-oriented development opportunities to improve the economic conditions of the local communities. The second commuter rail parking lot with a different design than projected demand levels was the Taunton Depot Station parking lot. This station would have more spaces than the projected demand in order to capture the ridership that might be unable to find adequate parking at Taunton Station, because these stations would be in close proximity to each other and Taunton Station was designed with constrained parking.

Local roads and parking lots would also be impacted due to installation of additional tracks/platforms. Existing parking and access drives have been replicated as closely as possible to avoid major disruption to existing stations and communities.

It is a goal of the project that the new commuter rail station designs would include amenities such as bike storage areas, pedestrian connections to neighboring streets/developments (where applicable), and commuter-related services such as newspaper stands and payment boxes. The MBTA would also explore implementing green technologies such as solar panels, Energy Star-compliant products, and environmentally friendly designs to the maximum extent practicable. Stations are intended to function

similarly to the majority of existing MBTA commuter rail stations; they would be unattended and would require self-pay parking. The proposed stations would not include station buildings, and water/sewerage facilities would not be required.

3.2.15.2 Station Sites

This section provides a description of each proposed station, including a general site description, number of parking spaces, platform description, driveway access, and bus/kiss & ride accommodations. A summary of the stations is provided in Table 3.2-18. Stormwater management and drainage designs for each station are described in Chapter 4.17, *Water Resources*.

Table 3.2-18 Summary of Stations

Station Name	Municipality	Station Type	Parking Spaces	Platform Type[4]	Stoughton Alternative	Whittenton Alternative
Canton Center	Canton	Existing	210 [1]	Side (2,Low)	x	x
Stoughton	Stoughton	Relocated	636	Side (2)	x	x
North Easton	Easton/Stoughton	New	501	Center Island	x	x
Easton Village	Easton	New	0 [2]	Side	x	x
Raynham Park	Raynham	New	432	Center Island	x	x
Taunton	Taunton	New	210	Side	x	-
Taunton Depot	Taunton	New	398	Center Island	x	x
Freetown	Freetown	New	173	Side	x	x
Fall River Depot	Fall River	New	518	Side	x	x
Battleship Cove	Fall River	New	0 [2]	Side	x	x
King's Highway	New Bedford	New	360 [3]	Side	x	x
Whale's Tooth	New Bedford	New	748	Side	x	x
Dana Street	Taunton	New	477	Side	-	x
TOTAL – NEW STATIONS					**10**	**10**
TOTAL – MODIFICATIONS TO EXISTING STATIONS					**2**	**2**

1 Existing lot
2 Pick up/Drop off only
3 Shared parking
4 All platforms are single high-level unless denoted otherwise

Canton Center

Canton Center Station is an existing station site off of Washington Street that would be modified to accommodate a second track (Figure 3.2-20). Two new 800 foot long low-level platforms with mini-high platforms would be constructed (one adjacent to each track). Modifications to the tracks and platforms would require minor changes to the parking layout in the existing lots near the station, and no adjustments to the amount of existing parking spaces would be expected. This station would continue to serve walk-in, bike-in and drive-in customers. The Canton Center Station design is summarized as follows:

- Parking Spaces – approximately 210 existing parking spaces would remain.

- Parking Lot Type – existing paved surface parking.
- Station Access Drive – driveway access from Washington Street.
- Bus/Kiss & ride Accommodations – no designated areas for bus or kiss & ride.
- Platform Type – two side platforms.
- Platform Dimension – 800-foot low-level platforms, 9.5 to 12 feet wide with mini-high platforms.
- Track Configuration – double track.
- Pedestrian Accommodations – a walkway would be installed from each platform to existing sidewalks along the Washington Street.
- Stormwater Management – existing drainage would remain.

Stoughton

The Stoughton Station would be relocated as part of the South Coast Rail project to eliminate conflicts with traffic in Stoughton Center and to meet regulatory requirements for access. Relocating the station would also be consistent with downtown revitalization efforts.

The existing Stoughton Station is currently the terminal station on the Stoughton Branch of the MBTA commuter rail service. At the current station location, stopped trains block the Wyman Street at-grade crossing while passengers board and alight the train. This situation has contributed to congestion in downtown Stoughton. Expanding commuter rail service to the South Coast will require modifications to this station to accommodate a second track, which would exacerbate the traffic congestion at the Wyman Street at-grade crossing under the current station configuration. The low-level platforms of the current station do not meet Americans with Disabilities Act (ADA) accessibility requirements and must be replaced by a high-level platform.

The DEIS/DEIR described the station relocation south towards Brock Street, out of the Wyman Street at-grade crossing. The crossing gates at Wyman Street would be deactivated while trains dwell at the station, allowing traffic to pass through the downtown area with fewer interruptions. At the location proposed in the DEIS/DEIR, the station would be on a track curve and, due to spatial constraints of train cars on the curve, would need to maintain low-level platforms with "mini high" sections to allow persons with disabilities to enter or exit the cars. However, low-level platforms with mini-high platforms do not meet current ADA accessibility requirements that stipulate high-level platforms at all new or reconstructed stations, where possible.

MassDOT analyzed four location options (with one additional variation); each option relocates the station south of the current Wyman Street at-grade crossing and provides high-level platforms to meet ADA accessibility requirements. The options are described below and summarized in Table 3.2-19.

- **Option 1**—Realign tracks and relocate station between Wyman Street and Brock Street with high-level platforms and parking on both sides of the tracks. This option is close to downtown. It would require acquisition of 0.3 acre of residential and 9.5 acres of industrial or commercial

properties, vertical circulation for access (a pedestrian bridge), and one connection across the tracks (via the pedestrian bridge). The estimated cost of this option would be $16 million.

Table 3.2-19 Stoughton Station Options

Option	Description	Cost ($M)
1	-Realign tracks and relocate station between Wyman Street and Brock Street with high-level platforms and parking on both sides of the tracks. -Close to downtown -Requires acquisition of 0.3 acre of residential and 9.5 acres of industrial or commercial properties, vertical circulation for access, and one connection across the tracks.	16
2	-Realign tracks and relocate station between Wyman Street and Brock Street with high-level platforms and parking on both sides of the tracks. -Close to downtown and has two means of crossing the tracks. -Requires acquisition of 0.2 acre of residential and 9.6 acres of industrial or commercial properties.	16
3	-Realign tracks and relocate station north of Brock Street with high-level platforms and parking on the west side of the tracks. -Close to downtown, opens 2.5 acres of land for potential development, and has two means of crossing the tracks. -Requires acquisition of up to 0.2 acre of residential and 9.6 acres of industrial or commercial properties, and vertical circulation.	16
3A	-Realign tracks and relocate station north of Brock Street with high-level platforms and structured parking on the west side of the tracks. -Close to downtown, opens 1.4 acres of land for potential development, has two means of crossing the track, and the second level of the garage provide easier access across the pedestrian bridge. -Requires acquisition of 0.2 acre of residential and 9.6 acres of industrial or commercial properties, and vertical circulation.	38
4	-Realign tracks and relocate station south of Brock Street with high-level platforms. -Does not require a pedestrian bridge, opens 1.2 acres of land for potential development. -Farthest from downtown, requires pedestrian crossings at Brock Street, impacts an on-site wetland and intermittent stream, and requires acquisition of 0.2 acre of residential property and 7.7 acres of industrial or commercial properties.	13

- **Option 2**—Realign tracks and relocate station between Wyman Street and Brock Street with high level platforms and parking on both sides of the tracks. This option is close to downtown and has two means of crossing the tracks (pedestrian bridge and at-grade crossing). It would require acquisition of 0.2 acre of residential and 9.6 acres of industrial or commercial properties. The estimated cost of this option would be $16 million.

- **Option 3**—Realign tracks and relocate station north of Brock Street with high level platforms and parking on the west side of the tracks. This option is close to downtown, would open 2.5 acres of land east of the tracks for potential development, and has two means of crossing the tracks (pedestrian bridge and at-grade crossing). It would require acquisition of up to 0.2 acre of residential and 9.6 acres of industrial or commercial properties, and vertical circulation (pedestrian bridge). The estimated cost of this option would be $16 million.

- **Option 3A**—Realign tracks and relocate station north of Brock Street with high level platforms and structured parking on the west side of the tracks. This option is the same as Option 3 except with the addition of a parking structure, which would allow for development on part of the parcel that would be used for surface parking under Option 3. It is close to downtown, opens 1.4 acres of land east of the tracks for potential development, has two means of crossing the track (pedestrian bridge and at-grade crossing), and the second level of the garage would provide

easier access across the pedestrian bridge. It would require acquisition of 0.2 acre of residential and 9.6 acres of industrial or commercial properties, and would require vertical circulation (pedestrian bridge). The estimated cost of this option would be $38 million due to the high cost of the parking structure.

- **Option 4**—Realign tracks and relocate station south of Brock Street with high level platforms. This option does not require a pedestrian bridge, opens 1.2 acres of land east of the tracks for potential development and requires fewer takings than the other options; this option is also the least expensive of the build options. It would be the farthest from downtown (via a 0.25-mile pedestrian path), would impact an on-site wetland and intermittent stream, would require pedestrian crossings at Brock Street to access the platforms, and would require acquisition of 0.2 acre of residential property and 7.7 acres of industrial or commercial properties. The estimated cost of this option would be $13 million.

Each option was reviewed with regard to operations and accessibility to select a station location and configuration that would meet operational and regulatory requirements and provides benefits to the community at a reasonable cost. Four options were eliminated from further consideration:

- Options 1 and 2, which provide parking on both sides of the tracks, were not favored because they would require vertical circulation (stairs/elevators). Keeping the parking on one side of the tracks, with the platform close to Brock Street, would make it less likely that vertical circulation would be required.

- Option 3A, which includes a parking garage, was not favored because of the high project cost. However, locating parking on the west side of the tracks under Option 3 does not preclude a future parking garage. Locating parking only on the west side of the tracks would also open up development opportunity for the downtown, including the Rose Street extension.

- All the alternatives require some land acquisition. Option 4 requires the least land acquisition but would require pedestrians to cross both the Brock Street at grade crossing and the Brock Street traffic flow to access the station from the parking area west of the track. Option 4 would also impact an on-site wetland and intermittent stream to accommodate the parking lot and stormwater storage area. This option was not favored.

The remaining option—Option 3—was advanced for analysis in the FEIS/FEIR as it would provide the best balance of cost and convenience of the options considered. Figure 3.2-21 shows the Stoughton Station relocation site plan. The existing Stoughton Station would be relocated from its present location between Porter and Wyman streets to a new location south of the Wyman Street at-grade crossing, where it would accommodate a second track. Two new 800-foot-long, full-length high-level platforms would be constructed (one adjacent to each track). A pedestrian bridge with stairs and ramps would connect the two platforms. These modifications to the tracks and platforms would require a new parking layout to the west of the platforms. This station would continue to serve walk-in, bike-in and drive-in customers. The Stoughton Station design is summarized as follows:

- Parking Spaces – a new parking lot on the west side of the tracks would provide 636 total spaces consisting of 17 handicapped accessible and 619 standard spaces.

- Parking Lot Type –paved surface parking.

- Station Access Drive – main driveway access on the south side from Brock Street and also on the west side from Morton Street.
- Bus/Kiss & ride Accommodations – a 100-foot pick-up/drop-off area would accommodate up two 40-foot buses and provide a waiting area for kiss & ride.
- Platform Type – two side platforms with a pedestrian bridge (stairs and ramps).
- Platform Dimension – 800-foot high-level platforms, 12 feet wide.
- Track Configuration – double track.
- Pedestrian Accommodations – sidewalks would be constructed at the northern end of each platform connecting to existing sidewalks. South of the platforms, pedestrians may utilize the existing at-grade pedestrian crossing at Brock Street. A pedestrian bridge provides a link between the inbound and outbound platforms.
- Stormwater Management – space has been reserved for an infiltration basin and drainage would tie in to the municipal system.

North Easton

North Easton Station would be located in Stoughton and Easton at the rear of the Roche Brothers Plaza off of Route 138 (Figure 3.2-22). This existing retail plaza is anchored by Roche Brothers supermarket and recently constructed medical buildings. This station would primarily serve drive-in customers, although the station may attract some walk-in customers from the existing development in the plaza and from some nearby residences. The North Easton Station design is summarized as follows:

- Parking Spaces – 501 total spaces consisting of 10 handicapped accessible and 491 standard spaces.
- Parking Lot Type – paved surface parking.
- Station Access Drive – driveway access from Roche Bros. Way.
- Bus/Kiss & ride Accommodations –110-foot pick-up/drop-off area that would accommodate two 40-foot buses and 5 kiss & ride parking spaces.
- Platform Type – one center platform with a pedestrian bridge (stairs and ramps).
- Platform Dimension – 800-foot high level platform, 22 feet wide.
- Track Configuration – double track.
- Pedestrian Accommodations – a sidewalk would be installed along the access road that would connect with an existing sidewalk along Roche Bros. Way.
- Feeder Bus – there are no feeder bus connections envisioned for this station.

- Stormwater Management – stormwater would be collected and treated on site. The majority of runoff at this site would be directed to one of four infiltration basins. Runoff from the northern portion of the parking lot would flow to a bioretention basin.

Easton Village

Easton Village Station would be located immediately south of the historic Old Colony Railroad station that is part of the H.H. Richardson National Historic Landmark and is located along Sullivan Street in Easton (Figure 3.2-23). The site is within walking distance of downtown Easton and would be a village-style station serving walk-in and bike-in customers. The existing Old Colony Railroad Station now houses the Easton Historical Society and includes a small parking facility that would be partially reconfigured for pick-up/drop-off traffic flow through the lot. A small number of the spaces in the existing lot would be designated for kiss & ride. The Easton Station design is summarized as follows:

- Parking Spaces – no commuter parking would be provided, though some spaces in an existing private lot would be designated for kiss & ride.
- Parking Lot Type – kiss & ride only.
- Station Access Drive – existing driveway access from Mechanic Street and new exit to Mechanic Street.
- Bus/Kiss & ride Accommodations – no accommodation for buses is proposed within the existing lot. An existing parking facility would provide approximately 12 kiss & ride spaces and a new exit would be constructed to improve traffic flow through the lot.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high-level platform, 10 feet wide.
- Track Configuration – single track.
- Pedestrian Accommodations – a ramp from the northern end of the platform down to Oliver Street would convey pedestrians to an existing sidewalk on Oliver Street. A ramp near the southern end of the platform down to an existing pedestrian underpass (under the tracks) would connect to an existing sidewalk on Sullivan Street.
- Feeder Bus – A Stonehill College shuttle would be provided and the existing BAT Route 9 would be extended.
- Stormwater Management – existing drainage conditions would be maintained.

Raynham Park

Raynham Park Station would be located adjacent to the Raynham-Park Simulcast Center (formerly, the Raynham-Taunton Greyhound Park) off of Route 138 (Figure 3.2-24). The station would serve walk-in, bike-in and drive-in customers. The Raynham Park Station design is summarized as follows:

- Parking Spaces – 432 total spaces consisting of 10 handicapped accessible and 422 standard spaces.

- Parking Lot Type – paved surface parking.
- Station Access Drive – access from Route 138 through the existing complex to station area.
- Bus/Kiss & ride Accommodations – independent access driveway leading to a 110-foot pick-up/drop-off area that would accommodate two 40 foot buses and kiss & ride.
- Platform Type – one center platform with a pedestrian bridge (stairs and ramps).
- Platform Dimension – 800-foot high level platform, 22 feet wide.
- Track Configuration – double track.
- Pedestrian Accommodations – walkways would be added in conjunction with future transit oriented development.
- Feeder Bus – there are no feeder bus connections envisioned for this station.
- Stormwater Management – stormwater would be collected and treated on site. Runoff would be directed to a bioretention basin to the north of the site or bioretention swale south of the site.

Taunton (Stoughton Alternative)

Taunton Station would be located along Arlington Street near Dean Street (Route 44), adjacent to the historic Old Colony Railroad Station that currently serves an existing real estate business (Figure 3.2-25). The City of Taunton has begun the process of remediating this brownfield site in anticipation of a future train station. The site is within walking distance of downtown and would be utilized for future transit-oriented development. The station would serve walk-in, bike-in and drive-in customers. The Taunton Station design is summarized as follows:

- Parking Spaces – 210 total spaces consisting of 8 handicapped accessible and 202 standard spaces.
- Parking Lot Type – paved surface parking.
- Station Access Drive – driveway access from Arlington Street.
- Bus/Kiss & ride Accommodations – a 110-foot pick-up/drop-off area would accommodate up two 40-foot buses and provide a waiting area for kiss & ride. Wide aisles and adequate turning radii provide a bus route through the parking lot.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high level platform, 12 feet wide.
- Track Configuration – single track (with a freight siding).
- Pedestrian Accommodations – walks would be installed from the platform along the access driveway out to Arlington Street for future walkway connections.

- Feeder Bus – reroute GATRA Route 7 for access to the station; reroute GATRA Routes 6 and 18 for better transfer access at Taunton Green.

- Stormwater Management – stormwater would be collected and treated on site. Runoff would be directed to a bioretention basin. A perforated underdrain would convey treated water to the municipal system.

Taunton Depot

Taunton Depot Station would be located off of Route 140 in Taunton at the rear of a shopping plaza that contains Target, Home Depot, and other stores (Figure 3.2-26). This station would serve walk-in, bike-in and drive-in customers. The Taunton Depot Station design is summarized as follows:

- Parking Spaces – 398 total spaces consisting of 9 handicapped accessible and 389 standard spaces.

- Parking Lot Type – paved surface parking.

- Station Access Drive – driveway access through the existing Target Plaza off of Route 140 connecting with a new driveway behind the Target to the new station parking area.

- Bus/Kiss & ride Accommodations –a 155-foot pick-up/drop-off area would accommodate up to three 40-foot buses and provide a waiting area for kiss & ride. Wide aisles and adequate turning radii provide a bus route through the parking lot.

- Platform Type – one center platform with a pedestrian bridge over the tracks (stairs and ramps).

- Platform Dimension – 800-foot high-level platform, 22 feet wide.

- Track Configuration – triple track (two for commuter rail adjacent to the platform and one freight track not adjacent to the platform).

- Pedestrian Accommodations – a sidewalk would be installed adjacent to the proposed access driveway out through the Target Plaza, connecting with the existing sidewalk on Taunton Depot Drive.

- Feeder Bus – The existing GATRA Route 8 would be extended a short distance to provide a stop at the station.

- Stormwater Management – stormwater would be collected and treated on site. Runoff would be collected in three lined bioretention basins.

Freetown Station

Freetown Station would be located on South Main Street (Figure 3.2-27). The site is currently occupied by a self-storage business, and is near the Fall River Executive Park and the proposed Riverfront Business Park. The station would serve drive-in customers and customers shuttled between the station and the industrial parks. The area around the site has been considered for future transit oriented development. The Freetown Station design is summarized as follows:

- Parking Spaces – 173 total spaces consisting of 7 handicapped accessible, and 166 standard spaces.
- Parking Lot Type – paved surface parking.
- Station Access Drive – driveway access off South Main Street.
- Bus/Kiss & ride Accommodations – a 110-foot pick-up/drop-off area would accommodate up two 40-foot buses and provide a waiting area for kiss & ride. Wide aisles and adequate turning radii provide a bus route through the parking lot.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high-level platform, 16 feet wide.
- Track Configuration – double track.
- Pedestrian Accommodations – sidewalks would be installed from the platform out to South Main Street for future walk connections.
- Feeder Bus – The existing SRTA Route 2 would be extended 1 mile to the proposed station.
- Stormwater Management – stormwater would be collected and treated on site. Runoff is directed to infiltration basins.

Fall River Depot

Fall River Depot Station would be located 1 mile north of downtown Fall River at Route 79 and Davol Street at the site of the former train station (Figure 3.2-28). A proposed parking deck would be installed at this location to limit surface parking and provide space for future transit-oriented development. This station would serve walk-in, bike-in and drive-in customers. The Fall River Depot Station design is summarized as follows:

- Parking Spaces – 518 total spaces consisting of 11 handicapped accessible and 507 standard spaces.
- Parking Lot Type – paved surface parking with a one-level parking deck.
- Station Access Drive – driveway access from Davol Street and Pearce Street.
- Bus/Kiss & ride Accommodations – independent access driveway that would accommodate up to four 40-foot buses and 10 kiss & ride parking spaces.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high-level platform; 12 feet wide.
- Track Configuration – double track.

- Pedestrian Accommodations – sidewalks would be installed along the frontage of Davol, Pearce, and Turner Streets connecting to existing sidewalks in the vicinity of the site. Sidewalks would be extended through the site and connect with ramps and stairs for platform access.

- Feeder Bus – Pedestrian access would be improved providing a connection to SRTA Route 2; reroute SRTA Route 14 to access the station;

- Stormwater Management – stormwater would be collected by catch basins which would tie in to the municipal system.

Battleship Cove

Battleship Cove Station would be located behind the Ponta Delgada monument along Water Street in Fall River (Figure 3.2-29). The station is a platform-only station that would not operate year-round. Serving the downtown and the Battleship Cove tourist area, the station is planned to accommodate walk-in and pick-up/drop-off customers. The City of Fall River constructed the Ponta Delgada monument, which includes a pick-up/drop off loop road, in anticipation that this site would be utilized as a commuter rail station. Work on Battleship Cove Station would need to be coordinated with the Route 79 construction project that is proposed by MassDOT's Highways Division (MassHighways). The Battleship Cove Station design is summarized as follows:

- Parking Spaces – pick-up/drop-off only.

- Parking Lot Type – pick-up/drop-off area on existing paved loop driveway.

- Station Access Drive – driveway access off Water Street.

- Bus/Kiss & Ride Accommodations – the paved loop driveway would accommodate up to three 40-foot buses and passenger vehicles for pick-up and drop-off of commuter rail passengers.

- Platform Type – one side platform.

- Platform Dimension – 800-foot high-level platform, 12 feet wide.

- Track Configuration – single track.

- Pedestrian Accommodations – a walkway would be installed from the platform to existing sidewalks along the pick-up/drop-off loop road.

- Feeder Bus –SRTA Routes 6 and 7 were rerouted in May 2012 to better serve the Battleship Cove area.

- Stormwater Management – existing drainage would be maintained.

King's Highway

King's Highway Station would be located in northern New Bedford south of King's Highway, immediately east of Route 140 (Figure 3.2-30). This station would occupy part of a site that is an existing shopping plaza. The station would serve walk-in, bike-in, and drive-in customers. The King's Highway Station design is summarized as follows:

- Parking Spaces – 360 total existing spaces consisting of 12 handicapped accessible and 348 standard spaces. Spaces would be shared with existing retail (movie theater) uses.
- Parking Lot Type – existing paved surface parking (shared).
- Station Access Drive – access from King's Highway through existing shopping complex to shared parking area and pick-up/drop-off area.
- Bus/Kiss & Ride Accommodations – 115-foot pick-up/drop-off area would accommodate up to two 40-foot buses and provide a waiting area for kiss & ride.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high-level platform, 12 feet wide.
- Track Configuration – double track.
- Pedestrian Accommodations – a ramp would be installed at the northern end of the platform down to a sidewalk that would be extended adjacent to the tracks northward to connect into existing sidewalks on King's Highway.
- Feeder Bus –SRTA Route 8 provides service to the station.
- Stormwater Management – existing drainage would be maintained.

Whale's Tooth

Whale's Tooth Station would be located on Acushnet Avenue at the existing Whale's Tooth parking lot, which was constructed by the City of New Bedford in anticipation of the commuter rail project (Figure 3.2-31). The lot would be modified to include accessible spaces near the station platform, a pick-up/drop off area for buses and kiss & ride, and to provide better connections to Acushnet Avenue. The station would include intermodal connections, potentially including ferry services. The station would serve walk-in, bike-in, and drive-in customers. The Whale's Tooth Station design is summarized as follows:

- Parking Spaces – 748 total spaces consisting of 32 handicapped accessible and 716 standard spaces.
- Parking Lot Type – existing paved surface parking.
- Station Access Drive –driveway access off of Acushnet Avenue.
- Bus/Kiss & ride Accommodations – a 135-foot pick-up/drop-off area would accommodate up two 40-foot buses and provide a waiting area for kiss & ride. Wide aisles and adequate turning radii provide a bus route through the parking lot.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high-level platform, 16 feet wide.
- Track Configuration – double track.

- Pedestrian Accommodations – ramps and stairs from the platform would be installed to connect with existing sidewalks adjacent to the existing parking facility.
- Feeder Bus – Pedestrian connections to the station would be improved and SRTA Routes 1, 3 and 11 would be extended.
- Stormwater Management – existing drainage would be maintained.

Dana Street (Whittenton Alternative)

Dana Street Station would be located just south of the Danforth Street grade crossing, within walking distance of downtown Taunton (Figure 3.2-32). The site is a currently vacant lot. The station would serve walk-in, bike-in, and drive-in customers. The Dana Street Station design is summarized as follows:

- Parking Spaces – 477 total spaces consisting of 9 handicapped accessible spaces and 468 standard spaces.
- Parking Lot Type – paved surface parking.
- Station Access Drive – driveway access from Dana Street.
- Bus/Kiss & ride Accommodations – a 110-foot pick-up/drop-off area would accommodate up two 40-foot buses and provide a waiting area for kiss & ride. Wide aisles and adequate turning radii provide a bus route through the parking lot.
- Platform Type – one side platform.
- Platform Dimension – 800-foot high-level platform, 12 feet wide.
- Track Configuration – double track.
- Pedestrian Accommodations – walkways would be provided that lead to the platform. Additional sidewalks would be constructed along Dana Street and Danforth Street, and future walkways could provide a continuous connection to downtown.
- Feeder Bus – GATRA Route 18 would be rerouted to provide access to the station.
- Stormwater Management – space has been reserved for a basin and drainage would tie into the municipal system.

South Station – All Rail Alternatives

The South Coast Rail alternatives would utilize future expanded operational capacity at South Station already being planned by MassDOT to fulfill existing and future needs independent of the South Coast Rail project; described in Section 3.2.3.3 as part of the No-Build Alternative.

The initial operational analyses conducted for the rail alternatives assumed expansion of South Station up to a capacity of fifteen tracks, which was the expansion considered reasonably foreseeable at that time. The operational analyses showed that the Stoughton and Whittenton Alternatives would be

operationally feasible. Without expansion of South Station the operational performance of these alternatives would suffer.

3.2.16 Layover Facilities

Both of the rail alternatives would require two overnight layover facilities, one on the Fall River Branch and one on the New Bedford Main Line. A midday layover facility would also be necessary near South Station in Boston. The overnight layovers would be necessary to store trains when they complete their evening runs and before morning service. The midday layover would be needed to store trains near South Station in between the AM and PM peak periods.

The overnight layover facilities ideally would be located close to the terminal stations at the end of the New Bedford Main Line and Fall River Secondary. If the layover facilities are near the termini, trains would not have to travel far to get to the start of their morning trips or from the end of their evening trips. If the layover facilities are distant from the termini, trains would need to make a long distance non-revenue (deadhead) movement before they start their morning trips or after they end their evening trips. The same logic is true for locating the midday layover facility as close to South Station as possible.

3.2.16.1 Overnight Layover Facilities

The DEIS/DEIR identified five alternative sites for overnight layover facilities. Church Street and Wamsutta sites were identified on the New Bedford Main Line, and the ISP Site, Weaver's Cove East, and Weaver's Cove West were identified on the Fall River Secondary. The DEIS/DEIR did not identify a preferred site on either branch. These sites were identified since they provide ample space for the layover facility program that includes:

- Six tracks approximately 950 feet long: five to store train sets and one track for maintenance equipment;
- 25-foot-wide roadway around the perimeter and between track pairs;
- Parking for approximately 40 cars including two handicapped spaces;
- Lighting for parking lot and between the tracks; and
- Storage building and electrical substation.

This program results in a need for a site that has a rectangular shape that is approximately 1,500 feet long and 180 feet wide.

Subsequent to the DEIS/DEIR, the alternative sites were reviewed and recommended sites identified on each branch, as documented in the February 2012 Layover Facility Site Selection (provided in Appendix 3.2-E). Drainage and stormwater management for these sites is described in the Chapter 4.17, *Water Resources*.

On the *New Bedford Main Line*, Wamsutta was considered the most favorable location to site a New Bedford layover facility as it has less environmental impact than the Church Street site from the perspective of land acquisition, tax revenue loss, wetlands, and hazardous materials. Wamsutta would also be operationally more efficient with its close proximity to the terminal station, saving the project roughly $500,000 annually.

On the *Fall River Secondary*, Weaver's Cove East was considered the most favorable location for a Fall River layover facility as it has the least environmental impacts of the Fall River sites with the fewest land acquisition requirements, wetland impacts, impacts to cultural resources and to wild and scenic rivers, and from the perspective of encountering hazardous materials. Weaver's Cove East would also be operationally more efficient than the ISP site with its close proximity to the terminal station, saving the project roughly $500,000 annually.

Wamsutta Site Overnight Layover Facility Site

This site is located on the east side of the right-of-way, opposite the proposed Whale's Tooth Station and adjacent to an existing CSX freight yard, near MP 54.7 (Figure 3.2-33). The Wamsutta site layover facility design is summarized as follows:

- Distance from Terminal – 0.3 mile south of Whale's Tooth Station
- Lead Track – single lead track
- Length of Yard – 1,200 feet
- Width of Yard – 200 feet
- Highway Access – 400-foot driveway to Wamsutta Street

Weaver's Cove East Overnight Layover Facility Site

This site is located on the east side of the right-of-way, opposite the formerly proposed Weaver's Cove LNG Site in Fall River, near MP 49.8 (Figure 3.2-34). The Weaver's Cove East site layover facility design is summarized as follows:

- Distance from Terminal – 1.5 miles north of Fall River Depot Station; 2.6 miles north of Battleship Cove Station
- Lead Track – single lead track
- Length of Yard – 1,050 feet
- Width of Yard – 200 feet
- Highway Access – 440-foot driveway to North Main Street

3.2.16.2 Midday Layover Facilities

The South Coast Rail would require midday storage in the Boston area. This is being investigated separately as part of the South Station Expansion Project, which has independent utility from the South Coast Rail project.

On April 19, 2013 the Secretary of Energy and Environmental Affairs issued the Certificate on the Environmental Notification Form (ENF) for the South Station Expansion project. The project also includes the construction of layover facilities at one or more sites within the greater Boston area. After completion of a layover facility alternative analysis that evaluated 28 potential locations, three sites for

new and/or expanded layover facilities were further considered as part of the ENF. These potential layover locations include:

- The Boston Transportation Department-owned Tow Lot located along Frontage Road approximately 1 track-mile from South Station;
- Beacon Yard Park a freight yard and intermodal terminal most recently used by CSX Transportation, Inc. (CSX) located along Cambridge Street in the Allston section of Boston, approximately 4 track-miles on the MBTA Framingham/Worcester Line from South Station;
- Readville Yard 2, an existing MBTA layover yard and maintenance facility located off Wolcott Court in the Hyde Park section of Boston) approximately 9 track-miles from South Station.

It was determined that no single remaining layover facility alternative has the physical space to fulfill the entire projected 2040 layover need, while layover of too many train sets approaching South Station from one location could cause conflicting railroad operations and create a bottleneck. The Secretary's Certificate requires MassDOT to evaluate a combination of the three recommended sites to assess how they can be integrated with the existing four layover sites serving South Station.

Should a midday layover solution in Boston not be available at the projected opening year of the South Coast Rail project, the projected operational performance for the rail alternatives may not be attainable, reducing the rail alternatives' ability to meet the project purpose and potentially affecting system-wide rail operational performance.

3.2.17 Property Acquisition

This section describes the property acquisition required for the rail alternatives. Property acquisition for the commuter rail alternatives includes land required for the construction of the railbed and track, bridges and culverts, rights-of-way, retaining walls, grade crossings, stations, layover facilities, and electrification of the alternatives.

For purposes of this discussion, "property acquisition" is defined as obtaining greater than a 500-square-foot portion, or a sliver of land more than 10 feet wide, of any parcel outside of the existing rights-of-way to accommodate permanent construction impacts, based upon conceptual engineering plans. Narrow slivers of parcels are not considered in the evaluation of property acquisition, given the scale and accuracy of the conceptual design. Temporary construction impacts beyond the limits of the existing rights-of-way would not require land acquisition (utilizing temporary construction easements instead) and are therefore not considered in this evaluation. Aerial photographs and public Massachusetts GIS information were examined in reference to preliminary engineering plans to identify encroachments onto adjacent parcels. Final engineering plans may show an increase or decrease of the actual area of acquisition required.

When evaluating each property acquisition, conceptual design plans (in CAD format) were compared with public GIS information. Where proposed construction required full-parcel acquisition, property size for each of these parcels was gathered from existing information contained at Assessors' offices in each municipality. The design endeavored to limit property impact to partial acquisitions wherever possible, unless partial-parcel acquisitions resulted in the remaining parcel being unusable to the existing owner. In these instances, the analysis accounts for full-parcel acquisitions. Where partial-parcel acquisition was required, property acquisition was calculated utilizing the public GIS information contrasting to

proposed limits of work at each function. Parcel acquisition needs would be re-evaluated during final design using more detailed property boundary data and refined right-of-way requirements mapping.

For new track right-of-way, layover facilities and electrification equipment, property acquisition has been limited to minimum footprints required to support each function (as described above) and related amenities. Related amenities include access roads for maintenance, stormwater management facilities, and employee parking areas where required.

Where property acquisition is required, the goal for MassDOT would be to reach agreements with existing owners for purchase of properties required by the project. However, the Eminent Domain process may be required. Once property has been acquired for the project, it is expected that the Commonwealth (or one of its assigns) would retain ownership of each parcel.

Property acquisition by alternative has been summarized in Table 3.2-20. Values in the table reflect both full and partial takings required for each alternative. Table 3.2-21 provides a summary of property acquisitions by layover facility.

Table 3.2-20 Summary of Property Acquisition by Alternative (Acres)

	Stations	Right of Way	Electrification	Total
Stoughton Electric	62.50	47.70	2.20	112.40
Stoughton Diesel	62.50	47.70	0.00	110.20
Whittenton Electric	54.80	55.50	2.20	112.50
Whittenton Diesel	54.80	55.50	0.00	110.30

Table 3.2-21 Summary of Property Acquisition by Layover Site (Acres)

Layover Facility	Total
Weaver's Cove East Layover Facility (Fall River Secondary)	18.43
Wamsutta Layover Facility (New Bedford Main Line)	5.90

Chapter 4.2, *Land Use and Zoning*, provides a more detailed breakdown of property acquisition requirements of each alternative by municipality and project element.

3.2.18 Cost

This section summarizes the estimated capital costs for the rail alternatives presented as incremental funding needs over a 30-year period, a typical financing period. Capital equipment costs are presented as the incremental cost of the life of the equipment as defined by FTA guidelines. The net result of this analysis is the identification of the annual funding requirements above and beyond the costs already programmed for the horizon year (No-Build Alternative).

Capital costs include the cost of new infrastructure such as new track and stations, and cost of new transportation equipment, such as rail cars. The first step in developing the financial impact analysis is to convert the capital and operating cost estimates from base year (2012) dollars to the projected year-of-expenditure dollars.

The capital cost estimates for both infrastructure and equipment were escalated to year-of-expenditure based on current FTA criteria. These costs were then annualized based on the useful life of each element and a discount rate of 7 percent, in accordance with FTA guidelines.

Table 3.2-22 provides a summary of the cost estimate and analysis for the Stoughton Electric Alternative. The Whittenton Alternative would have a similar cost. Based on the cost estimates developed for the DEIS/DEIR, the cost of the diesel alternatives would be approximately 30 percent lower than the electric alternatives.

Table 3.2-22 Stoughton Electric Alternative Capital Cost

Item	
Total Infrastructure Cost	$1,090,568,000
Real Estate Cost	$ 52,430,000
Professional Services Cost	$ 147,767,000
Contingency	$ 345,700,000
Vehicle Cost	$ 180,970,000
Total	$1,817,435,000

Notes: Total infrastructure costs were estimated in 2012 dollars.
Professional services are 13.55 percent of infrastructure costs without contingency. Professional services include Design, Permitting, Construction Phase Inspection & Project Management.
Contingencies are 31.70 percent of infrastructure costs and include Indirect Soft Costs, Mitigation Contingency, and Construction Contingency.
Escalation was calculated at 3.25 percent per year per FTA criteria.

The Operations and Maintenance Cost (O&M) was calculated for the Stoughton Electric Alternative. The total amount in 2012 dollars is $ $33,914,000. The O&M cost for the Whittenton Electric Alternative would be $36,210,000 because of the longer length of track compared to the Stoughton Electric Alternative. Based on the O&M cost estimates developed for the DEIS/DEIR, the diesel alternatives would be approximately three percent lower than the electric alternatives.

3.2.19 Construction of the Rail Alternatives

This section describes the methodologies that would be used to construct the Stoughton or Whittenton Alternatives, including railbed and track, bridges and culverts, retaining walls, grade crossings, stations, layover facilities and electrification systems. The following sections describe the conceptual construction methodology. Detailed construction plans and sequencing would be developed in final design.

3.2.19.1 Track Construction—General Description

The proposed track work consists of construction of new track structure along existing active freight and passenger service areas as well as construction of new track along abandoned or new rights-of-way. The new track construction consists of single, double, and triple track sections and passing sidings, replacement of existing industry turnouts, and special track work. Common elements of the track construction include excavation, new track bed, ditches, ballast, concrete ties, and new steel rail. These improvements include the specific elements listed below.

- The existing ballast would either be undercut to remove silt, returning the existing ballast material to current specifications, or be removed and replaced by new ballast. Undercutting would clean the entire ballast section by lifting it into vibrating screens and returning the clean ballast to the rail bed, while silt would be wasted onto the shoulder or carried away. Regardless of which technique is utilized, at least 12 inches of clean ballast is required below the ties.

- The existing subballast would either remain in place with possible regrading or would be excavated and replaced with new material to meet current specifications.

- Ties would be completely replaced. It is anticipated that the entire line would be outfitted with concrete ties, elastomeric pads, and compression Pandrol rail clips.

- The existing jointed rail would be replaced with new 132 pound continuously welded rail.

- Existing embankments would be modified to accommodate the new track cross section, including (where appropriate) side drainage ditches, ballast side slopes, and retaining walls.

The methodology for the track construction for each segment is described in the following sections.

Track Construction on Active Rail Lines

Segments of the construction would occur on active track where service would need to be maintained during construction activities. The goal of the construction method for these segments is to minimize disruption to these services. Following is a summary of track segments with active track.

- **Northeast Corridor—**The NEC has passenger and freight service by Amtrak, the MBTA and CSX. The MBTA operates from 4 AM to 2 AM; Amtrak operates from 5 AM to 1 AM. Service operates seven days per week.

- **Stoughton Line—**The MBTA's Stoughton Line has commuter rail service from the existing Stoughton Station north to Canton Junction, where it connects to the NEC. The MBTA operates from 5 AM to 12 AM during weekdays only. MCRR has an active freight railroad operation that utilizes the MassDOT-owned Stoughton Line track through Taunton to the Dean Street area. MCRR operates on this section one to three days per week.

- **New Bedford Main Line—**CSX and MCRR have active freight railroad operations on the MassDOT owned New Bedford Main Line from New Bedford to Taunton where it connects to the Attleboro Secondary at Weir Junction. CSX currently operates along this line two days a week between Weir Junction and Cotley Junction and MCRR operates three days per week between Weir Junction and Whale's Tooth in New Bedford.

- **Fall River Secondary—**MCRR has an active freight railroad operation on the MassDOT owned Fall River Secondary from Fall River to where it connects to the New Bedford Main Line at Myricks Junction. MCRR currently operates on this line three days per week.

- **Attleboro Secondary—**CSX has an active freight railroad operation on the MassDOT owned Attleboro Secondary lines from Weir Junction to the NEC. CSX operates on this line five days per week.

The construction sequencing for the track construction would allow freight operations to be maintained throughout the majority of the track construction activities. Freight operations on the New Bedford Main Line and Fall River Secondary currently operate at a low frequency schedule. The construction activities would occur in small segments so the contractor can ensure that existing freight activities are maintained.

Certain segments of the existing Stoughton Line have active MBTA commuter rail and freight service that would need to be maintained during construction activities to construct a new second track. Construction would be similar to double track construction where freight lines currently operate.

However, due to the higher frequency of commuter rail service during the morning and evening peak periods (higher than the freight service), construction activities would be restricted during those times to minimize service impacts. It is assumed that freight deliveries can occur during the week and the corridor would be available for any construction activity for the entire weekend (Friday night through Monday morning), as there is currently no passenger service on the weekend. The following sections summarize the construction sequence.

Single Track Sections

In proposed single track sections, work must be staged to maintain passenger and freight traffic during the construction period. The general sequence of work in single-track sections would be as follows:

- Construct retaining walls and earthworks to the extent possible without affecting existing track.
- Construct bridges in the recommended phasing as outlined in Section 3.2.19.5, Construction of Bridges and Culverts, in order to maintain passenger and freight service.
- Install culverts while the track is temporarily out of service, both precast concrete box and pipe culverts. Many new culverts would be an extension of existing culvert structures.
- Construct new track in final position. Construction would be coordinated with passenger and freight service since existing track would be removed and existing ballast excavated in order to install the new track structure; temporary connections to existing tracks would be provided at limits of work segments.

Double/Triple Track Sections

In proposed double and triple track sections, the new track can be constructed without significantly disturbing the existing track, facilitating the construction of the new track structure while maintaining passenger and freight service on the existing track during construction. The existing track would be reconstructed after the new second track is constructed. The general sequence of work would be as follows:

- Construct retaining walls and earthworks to the extent possible without affecting existing track.
- Construct bridges in the recommended phasing as outlined in Section 3.2.19.5, Construction of Bridges and Culverts, in order to maintain passenger and freight service.
- Construct second track and third track (where proposed) in final position while maintaining passenger and freight operations on the existing track. The existing freight track may need to be realigned in some segments to allow space for construction of the new track structure on its proposed alignments.
- Construct turnouts at ends of double-track section. It is assumed that turnouts can be constructed while the track is out of service (i.e., overnight or during weekends).
- Shift passenger and freight service to completed second track.
- Construct remaining portions of abutments and bridges.

- Reconstruct first track in final position.

3.2.19.2 Track Construction – Stoughton Alternative

This section describes the track construction required for the inactive right-of-way of the existing Stoughton Line and the grade-separated crossing at Route 138.

Stoughton Line

The inactive Stoughton Line segment of the corridor is an existing railroad right of way that connects the Dean Street area in Taunton and the existing Stoughton Line at Stoughton Station. Construction can proceed unimpeded by active service. Construction would be similar to the single and double track construction as outlined in Section 3.2.19.1, subsection on Track Construction on Active Rail Lines.

Route 138 Crossing

The Route 138 crossing in Raynham is recommended for grade separation due to the high traffic volume on Route 138 and severe skew angle of the crossing. After analysis of several options, the preferred design would depress the railroad under Route 138. Since the profile of the railroad cannot exceed a 3 percent slope and the topography is very flat in this area, a boat section and retaining walls would be required for approximately 600 feet on either side of the underpass to depress the railroad into a cut section.

3.2.19.3 Track Construction—Whittenton Alternative

New track construction would be required on the inactive Whittenton Branch between Raynham Junction and Whittenton Junction. This segment of the corridor would be a new railroad on an abandoned right-of-way and would connect the Attleboro Secondary in Taunton to the Stoughton Line in Raynham. Construction can proceed unimpeded by active service. Construction would be similar to the single track construction as outlined in Section 3.2.19.1, subsection on Track Construction on Active Rail Lines.

3.2.19.4 Construction of Stations and Layover Facilities

Both rail alternatives include the construction of ten new stations and two new overnight layover facilities, as well as modifications to two existing stations. Work at Canton Center, Easton Village, Battleship Cove, King's Highway, and Whale's Tooth Stations would be predominantly platform construction. More substantial construction would be needed at Stoughton, North Easton, Raynham Park, Taunton (Stoughton Alternative), Dana Street (Whittenton Alternative), Taunton Depot, Freetown, and Fall River Depot Stations as well as the Weaver's Cove East and Wamsutta layover facilities. The general sequence of work would be:

- Prepare the site including the placement of trailers, equipment, and supplies;
- Place erosion and sedimentation controls;
- Begin earthwork including construction of water quality management structures;
- Relocate existing utilities and place new utilities;
- Survey land and layout the site;

- Construct buildings, platforms, pedestrian overpasses, sidewalks, roadways, and parking lot;
- Construct tracks as described in Section 3.2.19.1, Track Construction;
- Construct catenary structures and signal systems; and
- Clean up the site.

3.2.19.5 Construction of Bridges and Culverts

Many of the existing undergrade (railroad) bridges along the New Bedford Main Line, Fall River Secondary, Attleboro Secondary, and Stoughton Line do not meet current design standards for commuter rail service. In order to accommodate the requirements for the commuter rail alternatives, the bridges would be rehabilitated or replaced as described in Section 3.2.11, Bridges and Culverts. Since the majority of the existing freight and passenger service must be maintained during construction activities, the proposed undergrade bridge improvements would be constructed and staged to allow the passage of trains while they are under construction. The construction staging strategy is especially important where bridges are over environmental resource areas like rivers and wetlands to minimize impacts to these resources.

In some cases, the overhead (highway) bridges would need to be reconstructed to increase the railroad vertical or horizontal clearance under the bridge. However, if existing vertical and horizontal clearances are sufficient, overhead bridges would not be modified.

For all undergrade bridges, the majority of the work area would be limited to the area behind the existing abutments. Only during erection of the superstructure would work be done over existing roadways or waterways. This phase of construction must be coordinated with local and state officials and would follow an accepted traffic management plan for bridges over roadways.

For bridges over waterways, the contractor would ensure that all construction is performed within the temporary and permanent impact limits set forth by the environmental permits. Any dewatering, if required, would also be performed in accordance with the environmental conditions. No debris would be allowed to enter the watercourse. For longer spans over watercourses, particularly the Taunton River, it may be necessary for the work to be done using barges. The three Taunton River bridges on the Stoughton Line and the Cedar Swamp River bridge on the Fall River Secondary would be constructed while the tracks are out of service or during temporary track shutdowns since constructing temporary bridges would have a significant impact on the environmental resources at these locations.

For construction in areas where the track is active, the construction must be properly phased so that service is not interrupted. In order to maintain service, support of excavation and of the track may be necessary. All work would be coordinated with the railroad and accepted prior to construction. For all bridges, any demolition materials would be removed from the site and properly disposed of off-site. For construction of the three Taunton River bridges on the Stoughton Line, it is assumed that the existing track would be taken out of service for a period to construct the new bridges to minimize impacts to the river.

Construction sequencing is an important consideration at railroad bridges where active rail must be maintained. For track segments without active rail service, or with rail service which can be deactivated, construction on undergrade bridges can proceed unimpeded. At locations where rail service must be

kept active, bridge staging would generally be similar to one of the schemes described below depending on the number of tracks the existing structure can accommodate and the number of tracks being proposed over the crossing. Structural staging may be affected by track staging along the alignment, staging requirements of nearby structures, and property or wetland boundaries. For more details on construction staging of the bridges, refer to the Construction Staging Memorandum, included as Appendix 3.2-F.

For culverts that would remain in place, the existing culverts would be extended to accommodate the wider rail bed. The culvert extensions would be installed before the slope embankment is modified for the new track structure. At each location, the inlet could be sand bagged to temporarily stop the flow of water and pumps can be used to divert the flow for construction of the culvert end base of gravel and stone in the dry. The pipe extensions would be fitted to the existing culverts and stone pads installed to minimize erosion at the culvert ends.

For construction of new culverts to replace existing culverts, the typical sequence of construction would be to excavate above the slab and behind the abutment walls of the existing culvert. The inlet could be sand bagged to stop the flow of water and pumps can be used while constructing the new gravel and stone foundation in the dry. After the foundations are constructed a precast concrete box culvert and cast-in-place headwalls can be installed. For more details on construction staging of the culverts, including a list of culverts, refer to the Construction Staging Memorandum, included as Appendix 3.2-F.

3.2.19.6 Construction of Grade Crossings

Grade crossing improvements would be constructed with construction work zones that may require temporary travel lane closures and/or lane width reductions. The majority of the work would be performed while maintaining vehicular and rail traffic during construction activities. Existing grade crossing equipment would be removed and new equipment installed in place. A list of grade crossings can be found in the Construction Staging Memorandum, Appendix 3.2-F.

3.2.19.7 Construction of Electrification Systems

Construction for the electric commuter rail alternatives includes constructing a new electrification system and connecting to the existing electrification system on the NEC at Canton Junction. Diesel alternatives would not require this infrastructure. Section 3.2.14 of this chapter describes the proposed electrification system.

New electrification infrastructure would be required for the electric commuter rail alternatives south of where the route diverges from the NEC in Canton.

The new electrification infrastructure would include traction power facilities and an OCS as well as modification to the signal system to make it compatible with electrified rail service. Since operations would utilize part of the electrified NEC, the project would use a similar system.

The traction power system providing power to the OCS is made of three different types of traction power facilities: Traction Power Substation, Switching Station, and Paralleling Station.

The Stoughton and Whittenton Alternatives electrification system would consist of two main substations, two switching stations, and six paralleling stations.

Each traction power facility would include:

- Switchgear
- Transformers (main traction power and autotransformers)
- Protection relaying & controls
- Disconnect switches (structure mounted)
- Auxiliary transformers and power systems
- Grounding and Bonding System
- SCADA Equipment

The traction power substation is the largest type of facility and requires a high voltage (115 kV) utility power interface to provide power to the rest of the system. Switching stations and paralleling stations are smaller facilities that do not require a high voltage utility supply.

The traction power facilities would be adjacent to the existing right-of-way, so construction could be staged with little or no impacts to the existing train service. Typically, the construction of each site would proceed independently early in the overall construction process. The main substations are more complex and construction would be started as early as possible. Once construction is complete, each substation would be tested and energized prior to completion of the OCS and other systems.

The OCS consists of concrete foundations, steel poles, contact wire, feeder wire, static wires and sectionalizing switches. It is largely dependent on the track installation. Therefore, the OCS would typically be installed after the track is in place. OCS pole foundations are set with respect to the center of the track. Poles are typically placed a minimum of 10 feet from the track centerline, which is within the track right-of-way. Pole footings would be installed using off track equipment during times when no train service is operating to minimize impact to existing operations. In areas where access along the right-of-way is limited, excavation for the foundations would be completed by on-track equipment. This would have more impact on rail operations, especially in single track areas, and may be restricted to nights or weekends. Precast foundations could be used to reduce the installation time. In areas where there is no existing service, construction could proceed more quickly, as construction would not be restricted by operations.

After the foundations are in place, the catenary poles would be erected. Pole mounted steel work (cantilevers, drop tubes, disconnect switches, etc.) would then be installed. With the steel and poles in place, the OCS conductors would be strung, tensioned and anchored, hangers installed, clipped in place and registered. This work would all be done during foul time or track out-of-service using on or off track, space permitting. Once a section is complete, cable connections, wire terminations, and jumpers would be installed.

The system would not be energized until all signal and communications systems were fully installed and operational, to ensure that all remote monitoring and control facilities were working correctly.

The wayside power system requirements are set with respect to the track alignment and location of equipment at interlockings. Therefore, the wayside power cubicles, required to remotely control and

operate the OCS sectionalizing switches and control interlocking lighting, would be installed at the same time as the OCS.

3.2.20 Ridership

In order to estimate future ridership projections for the South Coast Rail alternatives in greater detail, the Central Transportation Planning Staff (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 plans for the alternatives.

The ridership analysis of the DEIS/DEIR was updated for the FEIS/FEIR using an updated version of the CTPS travel demand model. The analysis took into account the results of the 2010 Census, changes to the No-Build condition projects, and changed the analysis year from 2030 to 2035.

3.2.20.1 Model Basis

The CTPS model used a modeling process consistent with those of other major transportation projects in eastern Massachusetts. This travel demand model was refined specifically for the South Coast Rail study area, utilizing the current Boston region MPO travel model and the statewide model for the south coast rail study area. The model set that CTPS uses for forecasting travel demand is based on procedures and data that have evolved over many years and incorporated assumptions based on accepted practice, professional judgment and policy decisions relating to items such as model method, service plans and demographic assumptions. This modeling method allowed for a consistent comparison of the alternatives based on their projected ridership. The CTPS regional model and its underlying assumptions are subject to review and approval by FHWA and FTA because the model is used to develop the regional emissions estimates used for transportation conformity determinations on the long-range transportation plan and transportation improvement program.

The basis for the CTPS model is summarized below, with supporting technical information provided in Appendix 3.2-G. (prepared in 2009). Updates to the CTPS model incorporated for the FEIS/FEIR analyses are discussed in Appendix 3.2-H.

Existing Transit Modes

Connectivity to other transit modes provides a larger coverage area for the project while it increases mobility and regional opportunity. The model includes all of the major transit modes, such as commuter rail lines, the subway system (including both light and heavy rail lines), ferry service, and bus routes in regional communities. The model allows for transfers between all of these modes. Access to the transit system is allowed via walk/bike, transit, park-and-ride, and kiss-and-ride modes.

Regional Plan

The demographic forecasts were created by the local Regional Planning Agencies (RPAs) in the model area such as the Southeastern Regional Planning and Economic Development District (SRPEDD), Old Colony Planning Council (OCPC), and Metropolitan Area Planning Council (MAPC) for use in their most recently adopted Regional Transportation Plan (RTP). The land use assumptions do not include the possible casino developments. The transportation improvements included in this study are those highway improvement projects most likely to be built by 2035 and are included in the last federally approved and fiscally constrained Regional Transportation Plans in the model area. This includes the

major transit projects assumed in the State Implementation Plan (SIP) and included in the Boston Region RTP, such as:

- Green Line Extension Project
- Fitchburg commuter rail improvements
- Assembly Square, Orange Line Station
- Fairmont commuter rail station improvements
- 1,000 additional parking spaces throughout the commuter rail system

Other transportation projects assumed in the analysis are based on the SRPEDD and the OCPC Regional Transportation Plan Highway Improvements Projects.

Ridership forecasts were developed for all alternatives for the 2035 forecast year. For the No-Build (Enhanced Bus) Alternative, the ridership model assumes enhancements to the existing commuter bus service. For the Build Alternatives, the ridership model assumed that the transportation network would be updated to reflect the project improvements and the model was re-run for the various options. The outputs of these model runs were compared to the No-Build Alternative to see what changes in travel patterns would occur to the transportation system due to the South Coast Rail alternatives.

Population and Employment Densities

To establish where people are coming from and going to, the travel demand / ridership model takes into account the population and employment densities of the region. This is the basis for an origin/destination summary that ultimately translates into the number of people who would use the rail or bus alternatives. The model also accounts for the proximity of population densities to establish how the riders access the stations. Knowing whether riders walk, bike, drive or take the bus, for instance, is also relevant to ensure that the stations are properly designed with adequate sidewalks, bike storage capacity, parking capacity, and good connections to other transit modes.

3.2.20.2 Ridership Model Inputs

The travel demand model relies on the following elements and assumptions to estimate future ridership projections:

- Operating Plan
- Station Locations
- Station Parking, Availability and Cost
- Fares

These elements are discussed below.

Operating Plan

The operating plan for the travel demand model was developed using minimum acceptable service assumptions based on the MBTA Service Delivery Policy. Rail travel times for the Stoughton/Whittenton Alternatives, which include dwell times at the stations, were calculated for the 2035 operation and reflect future improvements and service modifications to the rail corridors.

The operating plan includes 30 minute peak period peak direction service along the Fall River Secondary and New Bedford Mainline. Peak period peak direction headways would be approximately 18 minutes on the portion of the alignment north of Myricks Junction.

Station Locations

How well a transit alternative appeals to potential riders is directly related to how easily patrons can get to a station. The travel demand model, therefore, takes into account the surrounding transportation infrastructure and any barriers that make access to the station difficult, which could potentially add to the in-vehicle travel time to the stations.

Station Parking, Availability and Cost

In order to plan for and design station parking that accommodates future demand, the majority of proposed stations were modeled as if there were no constraints on the amount of available parking. Running the model unconstrained at the proposed stations ensures that the true attractiveness of a station would be reflected in the total number of riders who would be expected to use the new service. This applies to the riders who would arrive to the station by car. All other modes (i.e. patrons arriving to the station by walking or riding a bicycle) would be unaffected by the parking supply. Stations that do not offer parking were modeled without parking. Parking constraints were applied at Taunton station where the desire to accommodate future transit-oriented development (TOD) was a driving factor. Stations where TOD is projected would limit the parking supply to the benefit of greater development intensity in the immediate vicinity of the station to encourage future transit riders to live and work within walking distance of the station.

Fares

The model also considers the economics of using the proposed transit system. This allows the model to weigh the economic attractiveness of riding the proposed system compared to the economics of continuing to drive or using the existing commuter bus service. Fares for the No-Build Alternative were based on the existing commuter bus monthly fare structure; fares for the Build Alternatives including both the rail and bus alternatives were based on the current MBTA commuter rail monthly fare structure.

3.2.20.3 Ridership Modeling Results

Overview

For the purpose of portraying the ways in which the South Coast Rail project shifts and adds new ridership, the results presented are new transit trips at the proposed South Coast Rail project stations, new linked-trips, new system-wide trips and the total reduction in vehicle miles travelled (VMT).

A summary of new station boardings pertains to the new South Coast Rail stations only and gauges the overall benefit to the region provided by each alternative.

The total number of linked trips per alternative represents the shift in mode choice due to a South Coast Rail project alternative. For instance, for mode of access, residents of the South Coast communities currently have few options outside driving to work. With the South Coast Rail project, people would have regional transit opportunity, which was previously not available, giving South Coast residents an additional mode by which they could get to work. The additional transit choice presented by the project would increase the number of people who would choose to take transit to work. This number is represented in the linked trips increase and represents the number of people who, without the project, would have otherwise driven to work.

New system-wide boardings represent the overall draw to the commuter rail transit system due to the South Coast Rail project, which represents an increase in capacity along other commuter rail lines as a particular alternative attracts system-wide new ridership. This total is also used to calculate overall cost-effectiveness of the project.

The VMT measure quantifies how many miles of auto travel would be removed from the region due to the project. As people switch from driving to using the new transit project, the reduction in VMT correlates to air quality benefits due to the project.

The CTPS modeling for the FEIS/FEIR included updated demographic data for 2035 and newer information on future year background transportation projects that are consistent with the Long Range Transportation Plans (LRTP) of the Metropolitan Planning Organizations (MPOs) in the study area.

The base year, No-Build, Stoughton Electric and Whittenton Electric Alternatives were assessed using the CTPS regional travel demand model. The Stoughton and Whittenton Diesel Alternatives were examined using an elasticity based method that took into account the electric variant modeling results and the effect of the slower travel time of the diesel alternatives compared to the electric alternatives. Elasticities were used since the diesel operating plans mirrored those of the electric options, except for travel time. It is an accepted practice in the transportation planning profession to use elasticities when only one service plan variable changes, such as travel time.

The No-Build assumes land use changes and the transportation projects included in the LRTP, and existing private bus service from New Bedford, Fall River, and Taunton into Boston. The No-Build also improves the frequency of the private bus operations serving the South Coast rail Study area.

The performance metrics examined, include linked and unlinked transit trips by mode, station boardings in the study area and VMT.

Ridership

An overview of changes in ridership among the alternatives conducted for the DEIS/DEIR and the FEIS/FEIR is presented in Table 3.2-23. The FEIS/FEIR results differ from the DEIS/DEIR in several ways. The base year was updated from 2006 to 2010. The forecast year was extended out to from 2030 in the DEIR to 2035 in the FEIS/FEIR. The list of transportation projects in the LRTP is also significantly different. The DEIS/DEIR included the Urban Ring Phase II, the Silver Line Phase III connection, and a host of other projects that are not included in the most current fiscally constrained LRTP. The land use is another important change. The 2030 forecasts were developed with an eye towards a lot of population growth in the suburbs and employment growth in the major cities, like Boston and Taunton in the study area. Given the current economic climate, the 2035 forecasts have been scaled back in absolute numbers, along with a more targeted smart growth approach. The FEIS/FEIR service plans for the Stoughton

Electric and Whittenton Alternatives also differ slightly from those used in the DEIS/DEIR, being more refined and the FEIS/FEIR now includes a feeder bus network that complements the proposed stations.

Table 3.2-23 Ridership of Alternatives (DEIS/DEIR and FEIS/FEIR)

	DEIS Stoughton Electric	FEIS Stoughton Electric	DEIS Whittenton Electric	FEIS Whittenton Electric
Battleship Cove	210	240	200	200
Downtown Taunton/Dana Street	n/a	n/a	890	320
Easton Village	320	150	320	150
Fall River Depot	740	840	640	750
Freetown	240	180	160	160
King's Highway	460	520	390	480
North Easton	750	460	750	490
Raynham Park	550	430	600	520
Taunton	510	670	n/a	n/a
Taunton Depot	410	400	360	360
Whale's Tooth	600	680	510	610
Total Station Inbound Boardings	4,790	4,570	4,820	4,040
Total Reduction in VMT (compared to No-Build (Enhanced Bus))	295,900	-255,932	228,000	-201,232

All of these changes led to demand estimates in the FEIS/FEIR that are between 10 and 20 percent lower for the Build Alternatives than were estimated in the DEIS/DEIR. The most significant change is the land use assumed in 2035, which drives the trip making from population locations (South Coast Rail Study area) to employment centers, namely Boston and Cambridge. The change in station location from Downtown Taunton to Dana Street also substantially reduced ridership of the Whittenton Electric Alternative compared to the DEIS/DEIR.

Transit Metrics

The four key transit metrics presented in Table 3.2-24 consist of daily linked transit trips, daily unlinked trips, boardings on the commuter rail system, and boardings on the private buses serving the study area compared to the True No-Build scenario. Detailed breakdowns of the system-wide transit results are included in Appendix 3.2-H.

The transit system grows from 1.27 million unlinked transit trips in 2010 to 1.61 million in 2035 if there are no improvements to the transportation system other than what was included in the LRTP. The growth in unlinked transit trips is primarily due to demographics, but some transit improvements such as the Green Line Extension, Assembly Square Orange Line Station, and the new Fairmount Line Stations are adding to the increase in transit trips in the future.

The enhanced bus service under the No-Build Alternative represents a slight improvement of the private bus system and this adds 2,210 unlinked transit trips to the system daily. The Stoughton Electric option adds 7,100 unlinked transit trips compared to the No-Build/Enhanced Bus, while the Whittenton Electric option adds 6,000 unlinked trips.

Table 3.2-24 2035 Regional Transit Modeling Results (Daily)

Year	2010	2035	2035	2035	2035	2035	2035
Scenario	Existing Conditions	True No-Build	No-Build / Enhanced Bus	Stoughton Electric	Whittenton Electric	Stoughton Diesel	Whittenton Diesel
Unlinked Transit Trips	1,270,700	1,612,000	1,614,210	1,621,310	1,620,210	1,621,010	1,620,010
Difference with No-Build/Enhanced Bus	na	-2,210	na	7,100	6,000	6,800	5,800
Linked Transit Trip	1,018,000	1,294,400	1,296,300	1,301,800	1,301,000	1,301,500	1,300,650
Difference with No-Build/Enhanced Bus	na	-1,900	na	5,500	4,700	5,200	4,350
Commuter Rail (1)	145,000	178,200	177,710	188,010	187,110	187,460	186,660
Difference with No-Build/Enhanced Bus	na	490	na	10,300	9,400	9,750	8,950
Study Area Private Buses (2)	1,600	4,100	6,000	1,100	1,200	1,250	1,350
Difference with No-Build/Enhanced Bus	na	-1,900	na	-4,900	-4,800	-4,750	-4,650

(1) Commuter system calibrated to conductors counts

(2) Study area means the South Coast Rail project study area

There are two reasons the Whittenton Electric option has less demand than the Stoughton Electric option:

- The service plan for the Whittenton Electric option has slower travel times from the southernmost stations to South Station than the Stoughton Electric option.
- The Whittenton Electric option has a different stop pattern in Taunton, which causes the additional travel time.

The diesel options for the Stoughton and Whittenton Alternatives have slower travel times into Boston from New Bedford, Fall River, and Taunton, resulting in less demand relative to their electric options. The Stoughton Diesel option has 6,800 more unlinked trips than the No-Build, 300 less than the electric option. The Whittenton Diesel option has 5,800 more unlinked trips than the No-Build, 200 less than the electric option.

The daily system wide linked transit trips grows from 1.02 million 2010 to 1.29 million in the 2035 No-Build scenario. The enhanced bus service to the No-Build Alternative provides a small improvement, adding 1,900 daily linked transit trips.

The Stoughton Electric adds 5,500 more linked transit trips and the Whittenton Electric option adds 4,700 daily linked transit trips relative to the No-Build/Enhanced Bus Alternative. The Stoughton Diesel option has 5,200 new linked transit trips and the Whittenton Diesel option 4,350 new linked transit trips relative to the No-Build. The reasons for these differences are the same as for the unlinked transit trips described above.

The No-Build/Enhanced Bus Alternative causes a decrease in commuter rail boardings, by 490. This option adds bus service in the study area, which siphons off commuter rail riders from the Providence, Stoughton, and Middleborough commuter rail lines. The Stoughton Electric option adds 10,300 boardings daily to the commuter rail system and the Whittenton Electric option adds 9,400 boardings daily to the commuter rail system relative to the No-Build/Enhanced Bus. The Stoughton Diesel option adds 9,750 boardings and the Whittenton Diesel option adds 8,950 boardings relative to the No-Build. This is between 450 and 550 lower than their corresponding electric options.

The private bus system in the study area had 1,600 daily boardings in 2010, but is forecasted to grow to 4,100 in 2035 without any service improvements (primarily due to population and employment growth and demographic trends increasing transit usage). The No-Build/Enhanced Bus Alternative improves the private bus service in the South Coast rail corridor by adding frequency and this increases ridership to 6,000, an increase of 1,900 boardings. The Stoughton Electric option has 1,100 and the Whittenton Electric option 1,200 private bus trips relative to the No-Build/Enhanced Bus. The Stoughton Diesel option has 1,250 private bus trips and the Whittenton Diesel option 1,350 new private bus trips relative to the No-Build/Enhanced Bus. This is about 150 boardings more than the corresponding electric options.

Conclusion

The results of this analysis show that the Stoughton and Whittenton Electric options both capture a significant number of trips, between 4,700 and 5,500, respectively, on a daily basis in 2035 relative to the No-Build/Enhanced Bus scenario that would have otherwise been made by auto. This translates into a VMT savings, Vehicle Hours Traveled (VHT) reduction, and emissions benefits, which are discussed in

Chapter 4.9, *Air Quality*.[16] The major difference between the two commuter rail alternatives are travel times for trains traveling the outer stations, south of Taunton, into Boston. The longer travel times from New Bedford and Fall River up through Taunton in the Whittenton Electric option reduces demand at these stations.

The stations in Taunton also see a reduction in the Whittenton Electric option, but drive access demand increases at Raynham Park Station, due to people willing to bypass the slower segment of train travel and pick up the line north of the delay during the AM time inbound commute. These results show the same pattern as observed in the DEIR for the electric options, although they are showing less demand. This is primarily a function of the most current RPA adopted land use assumptions in the model area and represents a more conservative view of future smart growth strategy consistent with the South Coast Rail Corridor Plan.

In general, the electric options attract more riders than the diesel options due to the faster travel times, which is a function of faster acceleration of the electric technology being used by the locomotives.

However, regardless of the technology, electric or diesel, the Stoughton Alternative consistently attracts more riders than the Whittenton Alternative especially for trips south of Taunton, where additional travel time is needed to traverse the Whittenton Junction. The travel time difference between the Stoughton and Whittenton Alternatives is a more significant factor in attracting riders than the travel time differences associated with the technology, diesel versus electric.

3.3 EVALUATION OF FEIS/FEIR ALTERNATIVES

This section provides an overview of the performance of the alternatives with regard to achievement of the project purpose, their practicability and their environmental impacts, in particular with regard to aquatic resources. The following alternatives are analyzed in this FEIS/FEIR:

- No-Build (Enhanced Bus) Alternative
- Stoughton Electric Alternative
- Stoughton Diesel Alternative
- Whittenton Electric Alternative
- Whittenton Diesel Alternative

The characteristics of the above alternatives are described in Section 3.2. The analysis of their impacts in detail is presented in Chapter 4. Chapter 7 provides a summary of the mitigation commitments incorporated into the project.

This section summarizes and compares the characteristics of the Build Alternatives analyzed in this FEIS/FEIR and is a continuation of the alternatives screening process that began prior to the DEIS/DEIR. The discussion includes a set of evaluation criteria that are consistent with the evaluation criteria utilized in the earlier stages of alternatives screening, but more refined in consideration of the more

[16] The air quality analysis shows that the technology drives the benefits. Electric technology provides substantially more emissions savings than the diesel options and the TSM alternative when the transit vehicle emissions are combined with the passenger vehicle emissions being saved.

detailed level of information available and taking into consideration the comments on the DEIS/DEIR. Specific screening criteria were refined from the earlier stages of the alternatives analysis based on operational and environmental issues. The earlier analysis criteria were expanded with subcriteria to include a more detailed evaluation of how well the alternatives would meet the project purpose, whether or not they are practicable to construct and operate, and the magnitude of their environmental impacts and/or benefits.

The results of the evaluation process are used to reach a conclusion regarding the least environmentally damaging practicable alternative (LEDPA) for the South Coast Rail project. As explained in Section 3.3.4, USACE has concluded the Stoughton Electric Alternative is the LEDPA and has identified the Stoughton Electric Alternative as the preferred alternative under NEPA.

3.3.1 Project Purpose

This section evaluates the alternatives that advanced to the FEIR/FEIS with regard to the overall 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. The following aspects were considered in the evaluation. The Build Alternatives were compared against the No-Build Alternative as well as with each other.

- Ridership demand – This aspect relates to meeting the demand for public transportation.
- Improve quality of service – This aspect evaluates how well each alternative provides a transit trip that is competitive to travel by car and meets MBTA's Service Delivery Policy.
- Reduce vehicle miles traveled – This aspect evaluates to which extent 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 aspect evaluates the extent to which 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).

3.3.1.1 Ridership Demand

The Build Alternatives are predicted to result in 3,930 to 4,570 daily boardings at the new stations (see Table 3.3-1). Private bus service boardings under the Build Alternatives would decline substantially to 1,100 to 1,350 (compared to 6,000 in the 2035 No-Build condition) as a result of the diversion of passengers to the new rail options. When the rail ridership and remaining bus ridership are considered together, the Build Alternatives would meet 65.5 to 71.0 percent of the demand for approximately 8,000 work trips from the South Coast region to Boston.

Due to a faster travel time to Boston, the Stoughton Alternatives achieve greater ridership in the Southern Triangle than the Whittenton Alternatives. For example, the Stoughton Electric would have 840 daily boardings at Fall River Depot compared to 750 under the Whittenton Electric Alternative.

The Whittenton Alternatives ridership is also less than the Stoughton Alternatives because the Whittenton alignment does not include the Taunton Station, which has 670 daily boardings under the Stoughton Electric Alternative. The Whittenton Alternative station closest to downtown Taunton (Dana

Street) has substantially lower ridership (320 daily boardings under the electric alternative). The Whittenton Electric Alternative boardings at Raynham Park (520) would be higher than under the Stoughton Electric (430). This is because under the Whittenton Alternative, the Raynham Park Station would be more convenient to some commuters than would Dana Street; however, under the Stoughton Alternative, the Taunton (Dean Street) station would in theory be more convenient to those same commuters than would Raynham Park.

Table 3.3-1 Daily Ridership Demand by Alternative (2035)

Name	New Rail Station Boardings[2]	Boardings at Existing Commuter Bus Services	Total Service to South Coast Region	Percentage of Met Ridership Demand [1]
No-Build (Enhanced Bus) Alternative	na	6,000[3]	6,000	75.0%[3]
Stoughton Electric Alternative	4,570	1,100	5,670	70.9%
Stoughton Diesel Alternative	4,430	1,250	5,680	71.0%
Whittenton Electric Alternative	4,040	1,200	5,240	65.5%
Whittenton Diesel Alternative	3,930	1,350	5,280	66.0%

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 Relocated Stoughton Station not considered "new" for purposes of calculating new boardings
3 This is an artifact of the model; whether such private bus service would actually occur is uncertain. Future private bus operations would be far less attractive due to increased travel time but because travel time would still be better than by car and there would be no alternative it would absorb the demand in the model.

The difference in ridership between the electric and diesel versions of the alternatives is small, with the diesel alternative rail ridership at new stations being approximately three percent lower than the corresponding electric alternative due to slightly longer travel times. Despite having lower rail ridership, the Stoughton Diesel Alternative has the highest total service to the South Coast Region when considered together with bus service (although the difference from the electric version is negligible—10 boardings).

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 (2035) 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 operational analyses, which identified 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 for diesel locomotives, as maximum speeds under the electric alternatives are greater than under diesel alternatives.

The Stoughton Electric Alternative achieves the fastest travel times (77 minutes between New Bedford and Boston during the peak period). The Stoughton Diesel Alternative takes approximately 5 minutes

longer than the electric alternative to travel the same route because of the additional time diesel locomotives need to accelerate from the stations. Travel times are presented in Table 3.3-2.

Table 3.3-2 Average Travel Times by Alternative (New Bedford to South Station Peak Period)

Name	Travel Time (min)
No-Build (Enhanced Bus) Alternative	100
Stoughton Electric Alternative	77
Stoughton Diesel Alternative	82
Whittenton Electric Alternative	84
Whittenton Diesel Alternative	89

The longer route of the Whittenton Electric Alternative results in a total travel time approximately seven minutes longer than the Stoughton Electric Alternative (84 minutes compared to 77 minutes). The Whittenton Diesel Alternative takes 5 minutes longer to travel from New Bedford to Boston than the Whittenton Electric Alternative and has the longest travel time of the rail alternatives.

Service Delivery Policy

While an alternative might offer 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[17] 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.[18]

The Stoughton and Whittenton Alternatives (electric and diesel variants) would all meet the minimum service delivery policy standard. The No-Build Alternative would not meet this standard.

3.3.1.2 Vehicle Miles Traveled

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 traveled 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 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.

Table 3.3-4 summarizes the daily reduction in VMT provided by each alternative based on updated CTPS projections for 2035 (Appendix 3.2-H).

The Stoughton Electric Alternative achieves the greatest reduction in daily VMT of all the alternatives, approximately 54,700 VMT per day greater than the Whittenton Electric Alternative. The Stoughton Diesel Alternative has the second greatest VMT reduction, approximately 6.5 percent less than the

[17] Massachusetts Bay Transportation Authority, Service Delivery Policy, MBTA Board of Directors approved January 14, 2009.
[18] Between LIRR, MNRR, MBTA, and METRA, the average service provided is 2.9 peak period trains.

Stoughton Electric Alternative. With the longest travel time and lowest ridership, the Whittenton Diesel Alternative is also the least effective of the rail alternatives in reducing regional VMT, although it still provides substantial benefits (reduction of 186,306 VMT per day).

Table 3.3-4 Regional VMT Reductions by Alternative (2035, Auto and Bus Transit)

Alternative	VMT Reduction (daily miles)
No-Build (Enhanced Bus) Alternative	0
Stoughton Electric Alternative	-255,932
Stoughton Diesel Alternative	-240,348
Whittenton Electric Alternative	-201,232
Whittenton Diesel Alternative	-186,306

1 Reduction in VMTs provided by an alternative divided by the maximum reduction of VMTs (in this case, Stoughton Electric with roughly 255,932 fewer vehicle miles traveled per day)

3.3.1.3 Regional Mobility

This section discusses the number of interregional links provided by each alternative consistent with the goal of the project to improve regional mobility. An interregional link is a link that provides a one-seat ride from one municipality to another. The Stoughton and Whittenton Alternatives generate similar benefits with regard to interregional mobility and each provides 41 interregional links. The No-Build Alternative retains existing regional mobility but does not provide many of the interregional links provided by the Build Alternatives, nor does it provide a direct link between any of the communities served by the Build Alternatives and Boston.

Table 3.3-5 highlights the interregional links provided by the Stoughton and Whittenton Alternatives.

Table 3.3-5 Interregional Links – Stoughton and Whittenton Alternatives[1]

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

3.3.1.4 Summary

The No-Build (Enhanced Bus) Alternative does not meet the project purpose and need nor its goals and objectives. All Build Alternatives meet the purpose and need. Among them the Stoughton Electric Alternative best meets the project's goals and objectives as reflected in the aspects discussed above.

The Stoughton Diesel Alternative and the Whittenton Electric Alternative follow closely behind, generally performing well in meeting the goals and objectives, although to a lesser degree than the Stoughton Electric Alternative. The Whittenton Diesel Alternative performs the worst relative to the other Build Alternatives.

3.3.2 Practicability

This section describes the practicability of construction or operation for each of the proposed alternatives analyzed in this FEIS/FEIR.

Section 3.3.1 documented how each of the Build Alternatives meets the project purpose. The discussion below 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." 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.

3.3.2.1 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, brownfield 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. A breakdown of capital cost and operation and maintenance cost estimates can be found in Section 3.2.18.

Table 3.3-6 compares the cost per rider of each alternative based on the cost estimates and the 2035 CTPS ridership projections. The Stoughton Diesel Alternative would have the lowest cost per rider, at $29.71. The Stoughton Diesel and Stoughton Electric Alternatives are more cost effective than the corresponding Whittenton Alternatives, due to the higher annual maintenance cost associated with the longer track length and lower ridership under the Whittenton Alternatives. The diesel variants of the alternatives are more cost effective than the electric variants for both the Stoughton and Whittenton

corridors because of lower capital and operating costs. It was assumed the capital cost of the diesel alternatives would be 30 percent less than the electric alternatives and operating and maintenance costs would be 3 percent less.

Table 3.3-6 Cost per Rider by Alternative

Name	Cost per Rider [1]
Stoughton Electric	$35.28
Stoughton Diesel	$29.71
Whittenton Electric	$39.60
Whittenton Diesel	$33.32

1 Annualized capital cost (over 30 years) and annual operating and maintenance cost estimates divided by 2035 annual commuter rail system passengers. CTPS daily ridership annualized assuming 260 weekdays per year.

3.3.2.2 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. A 4-year construction schedule has been outlined in Governor Patrick's *South Coast Rail, A Plan for Action*. In addition to trying to maintain this schedule, a shortened 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 Section 3.2. 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 duration required. Table 3.3-7 compares the construction schedules of the alternatives.

Table 3.3-7 Construction Schedule by Alternative

Name	Construction Schedule (years)
No-Build	0.0
Stoughton Electric	4.5
Stoughton Diesel	4.0
Whittenton Electric	4.5
Whittenton Diesel	4.0

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)

All Build Alternatives would have an approximate construction schedule of 4 to 4.5 years, which is considered within an acceptable range.

3.3.2.3 On-Time Performance

While project travel time is an important initial criterion in evaluating the practicability of an alternative (as was done during the initial evaluation phases), the reliability of meeting that travel time on a

consistent basis (as expressed by on-time performance) is another key factor to consider. Infrastructure constraints in particular can affect on-time performance and an alternative's reliability. "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 which 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. As a 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 3.3-8.

Table 3.3-8 On-Time Performance by Alternative

Name	On-Time Performance [1]
Stoughton Electric Alternative	97.9%
Stoughton Diesel Alternative	95.9%
Whittenton Electric Alternative	97.9%
Whittenton Diesel Alternative	95.9%

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

As shown in Table 3.3-8, all Build Alternatives achieve an acceptable on-time performance.

3.3.2.4 Practicability Summary

The Corps has determined that the Stoughton and Whittenton Alternatives (electric and diesel) are both practicable alternatives.

3.3.3 Beneficial Effects and Environmental Impacts

This section compares each alternative's beneficial and adverse impacts to the aquatic, natural and human environment, and was undertaken in a manner compatible with the Corps' *Highway Methodology*[19] to evaluate alternatives and ensure that a transportation agency's preferred alternative is consistent with federal wetlands regulations, including 30 CFR 320-334 and 40 CFR 230 *et seq*.

The discussion below identifies beneficial or adverse impacts to the aquatic, natural and human environment to occur as a result of each alternative, particularly to wetlands, 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 Guidelines at Title 40 of the 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 environmental consequences." Therefore, the discussion below identifies impacts to the aquatic environment under the Clean Water Act, but also identifies other impacts to the

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

overall natural environment (including the human environment), as is required under the Guidelines. The specific measures for each aspect are listed below.

The environmental impacts evaluation was based on two factors: "What are the beneficial effects and what are the adverse impacts?" These factors were further specified and evaluated based on their relevance to the project purpose, relationship to applicable statutes and regulations and the extent to which they would be likely to differ among alternatives:

- Beneficial Effects
    - To what extent would an alternative improve transportation conditions?
    - 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 benefits that would be provided by each alternative to reduce greenhouse gas emissions that contribute to global climate change?
    - 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)?
    - What would be the number of acres of protected open space[20] 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)?

In addition to the aspects above, all other environmental aspects analyzed in Chapter 4 and 5 were also taken into consideration in evaluating the impacts and beneficial effects of the alternatives. Section 3.3.3.1 identifies the beneficial environmental effects of each alternative. Section 3.3.3.2 compares the alternatives based on key environmental impact criteria.

3.3.3.1 Beneficial Effects

This section focuses on the environmental benefits of each alternative by summarizing the benefits that would be provided to the transportation system, environmental justice populations, air quality, climate change, and smart growth. Environmental Justice and smart growth were evaluated qualitatively. Air quality and climate change were evaluated quantitatively.

Transportation

Public Transportation

The Build Alternatives would provide new public transportation service between the South Coast region and Boston with up to 4,570 daily boardings at new rail stations plus 1,100 boardings on existing bus

[20] 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.

services or approximately 71.0 percent of the demand of 8,000 daily (i.e., weekday) work trips from the South Coast region to Boston.

The Stoughton Electric Alternative would result in the greatest beneficial effect, with the largest number of people benefitting from this new service (4,570 daily riders compared to 4,040 for Whittenton Electric) originating from the South Coast communities such as Fall River and New Bedford, which currently have the longest commute to Boston without public transportation. The Whittenton Alternative would benefit fewer people and a relatively smaller number of people would originate from the South Coast communities. Because the Whittenton Alternative would have relatively fewer riders from the municipalities that are the most distant from Boston, it would also result in a smaller decrease in daily VMT compared to the No-Build/Enhanced Bus Alternative than the Stoughton Alternative (201,232 vs. 255,932) and thus less benefits to the transportation system.

All Build Alternatives would provide a highly reliable public transportation service.

Regional Transportation Connectivity

The Stoughton and Whittenton Alternatives would have similar beneficial effects in terms of providing a one-seat ride from one municipality to another; so called interregional links.

Regional Freeway Conditions

The Build Alternatives would result in similar benefits to the regional freeway system. The four freeway segments analyzed on Route 24 between I-495 and I-93/Route 128 would see an improvement in Level of Service (LOS) under the Build Alternatives, including during the morning peak hour for all four segments (LOS E to LOS D or better; further information on these designations is provided in Chapter 4, [Section 4.1: Transportation]). The two segments of Route 24 south of I-93 and south of Pond Street would experience similar improvement in the southbound direction in the evening peak hour. Because of these changes, all Route 24 freeway segments from I-495 to I-93 under the Build Alternatives would operate at LOS D or better. There would also be improvements on I-93. I-93 south of Furnace Brook Parkway would also improve in the northbound direction in the morning peak hour (from LOS F to LOS E or better) and the two segments of I-93 south of Furnace Brook Parkway and south of Route 3 would improve (from LOS E to LOS D or better). Under the Build Alternatives, the two segments of Route 140 that were analyzed would continue to operate at LOS C or better.

Environmental Justice

This section compares the alternatives with regard to disproportionate adverse impacts and benefits to environmental justice populations, including property acquisition, change in noise or vibration levels or air quality, and the presence of traditional cultural properties and open space, improved access to transit services making it easier to reach employment and educational opportunities, general mobility, and improved air quality.

No-Build (Enhanced Bus) Alternative

Although there would be a minor improvement in the quality of transit service under the No-Build Alternative, the benefits resulting from improved transit access under the Build Alternatives would not occur.

Build Alternatives

Benefits associated with the Build Alternatives would be available to all populations regardless of designation. Increased access would reduce travel times to Boston and other employment centers. Average travel time savings from Fall River, Taunton, and New Bedford greatest under the Stoughton Electric Alternative, followed by the Whittenton Alternative which would improve travel times by 14 percent. The Stoughton Electric also represents the greatest travel time savings to colleges and hospitals. The Whittenton Diesel Alternative typically represents the least travel time savings of the rail alternatives.

The beneficial effects (Table 3.3-9) to environmental justice populations that would result from the South Coast Rail project vary considerably by alternative and community. Property values in environmental justice neighborhoods near stations may increase as a result of improved access to transit and subsequent TOD. If property values get too high, environmental justice populations may be priced out of their current locations. Conversely, property values in environmental justice neighborhoods along the alternative alignments may decrease as a result of increased noise from train operations.

Table 3.3-9 Summary of Beneficial Effects on Environmental Justice Populations

	Stoughton Electric	Stoughton Diesel	Whittenton Electric	Whittenton Diesel
Beneficial Effects (percent improvement compared to No-Build Alternative)				
Access to Jobs-[2]				
Taunton	118	77	67	44
Fall River	187	151	140	113
New Bedford	21	4	-1	-2
Access to Colleges[3]	78	46	52	33
Access to Hospitals[3]	188	135	132	102
Travel Time to Boston[4]	47	32	33	23
Station Area TOD[5]	Yes	Yes	Yes	Yes

1 Business and job displacements would result from private property acquisition for the Mansfield and Fall River Depot Stations, and would be minor as compared to the overall workforce in the surrounding community. See Chapter 4.2, *Land Use*, and Chapter 4.3, *Socioeconomics*.

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 access from Taunton, Fall River, and New Bedford to colleges and hospitals. Source: CTPS 2009.

4 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.

5 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

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).

Air Quality

This section compares the impacts of the alternatives on air quality. This includes a mesoscale analysis which estimates the area wide emissions in 2035 of VOCs, NO_X, CO_2, CO, and PM emissions based upon changes in the average daily traffic volumes, roadway lengths, and vehicle emission rates (including trains).

This section also compares the alternatives at the microscale level by assessing the potential for impact of motor vehicles and train locomotives on typically congested intersections ("hotspot locations") around stations, added the emissions of the diesel commuter rail trains to the intersection receptor locations to calculate the highest concentrations of CO, PM_{10}, and $PM_{2.5}$.

Greenhouse Gas (GHG) emissions were compared for the alternatives with regard to motor vehicle and train locomotive GHG emissions. The stations and layover facilities will all be open to the outside and will not need heating/air conditioning equipment. Because no buildings are associated with any of the alternatives, no discussion and consideration of recommendations of the Massachusetts Zero New Energy Building Task Force was included.

The air quality study qualitatively evaluated the potential for impact due to air toxics, as required in the Secretary of Environmental Affairs Certificate on the ENF. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries).

Table 3.3-10 presents the mesoscale analysis results for all the alternatives.

No-Build Alternative

The No-Build Alternative would consist of enhancing current bus service along existing roads and highways. The limited increase in bus service along the roadways would have a minimal effect on the air quality within the study area.

Mesoscale Results—The No-Build Alternative VOC and NO_X emissions are typically lower than the Existing Conditions emissions due to the implementation of state and federal emission control programs, such as the Federal Motor Vehicle Emission Control Program, the Stage II Vapor Recovery System, and the Massachusetts Inspection and Maintenance program.

Microscale Results—The No-Build Alternative will meet the National Ambient Air Quality Standards (NAAQS) for CO, PM10, and PM2.5, and will not cause any new violation of the NAAQS; increase the frequency or severity of any existing violations; or delay attainment of any NAAQS.

Build Alternatives

Mesoscale Results—All rail alternatives would reduce emissions of NO_X, CO, and CO_2, in comparison to the No-Build Alternative (See Table 3.3-10). All of the rail alternatives have a negligible effect on particulate matter emissions. The electric alternatives all have lower in emissions than the corresponding diesel alternative for all of the pollutants. The difference between the diesel and electric is most notable with the NO_X emissions where the emissions for the electric alternative are substantially less than the corresponding diesel alternative. This is due to the higher NO_X output related to the locomotives burning diesel fuel. The Stoughton Electric Alternative generally results in the greatest reduction in emissions which is consistent with the estimated highest reduction in VMT for the Stoughton Electric Alternative.

Table 3.3-10 Summary of the 2035 Mesoscale (Regional) Air Quality Analysis for the South Coast Rail Alternatives

		Vehicle Miles Traveled (VMT)[1]	Volatile Organic Compound (VOC) (kg/day)	Oxides of Nitrogen (NO_x) (kg/day)	Particulate Matter 10 (PM_{10}) (kg/day)	Particulate Matter 2.5 ($PM_{2.5}$) (kg/day)	Carbon Monoxide (CO- Winter) (kg/day)	Carbon Dioxide (CO_2) (tons/year)
No-Build	Total	118,897,192	22,200	19,256	3,240	1,490	1,050,356	24,717,339
Stoughton Electric	Total	118,641,260	22,160	19,159	3,240	1,490	1,048,074	24,656,479
	Difference from No-Build	-255,932	-40	-98	0	0	-2,281	-60,859
Stoughton Diesel	Total	118,656,844	22,160	19,210	3,241	1,491	1,048,400	24,688,173
	Difference from No-Build	-240,348	-40	-46	1	1	-1,956	-29,166
Whittenton Electric	Total	118,695,960	22,170	19,169	3,240	1,490	1,048,554	24,667,849
	Difference from No-Build	-201,232	-30	-88	0	0	-1,801	-49,490
Whittenton Diesel	Total	118,710,886	22,170	19,227	3,241	1,491	1,048,908	24,703,175
	Difference from No-Build	-186,306	-30	-29	1	1	-1,448	-14,164

1 VMT represents the vehicle miles traveled on an average weekday in 2035.
2 The Build Alternatives used for the air quality analysis include the physical and operational mitigation proposed to improve traffic operations (as outlined in Chapter 4.1, *Transportation*).
Note: Includes transit-related emissions changes (bus and rail)

Microscale Results—The trains that will be used on the rail alternatives could be electric or diesel. The electric trains do not emit air pollutants and will not have any contribution to air quality impacts on receptor locations around the stations. All of the pollutant concentrations are below (in compliance with) the NAAQS. The rail alternatives will not substantially change any of the concentrations of CO, PM_{10}, and $PM_{2.5}$. All of the increases are less than 1ppm for CO and less than 0.3 $\mu g/m^3$ for PM_{10} and $PM_{2.5}$ and all Build Alternatives will meet NAAQS for CO, PM10, and PM2.5, nor will they cause any new violation of the NAAQS; increase the frequency or severity of any existing violations; or delay attainment of any NAAQS.

Contribution to Climate Change/Greenhouse Gas Emissions

Climate change is an important consideration in evaluating the South Coast Rail project alternatives. The primary greenhouse gas emitted by transportation sources is CO_2. This analysis looked at CO_2 emitted by locomotives as well as reduction from reduced VMT (see Table 3.3-10).

No-Build Alternative

The No-Build Alternative would not reduce VMT and would thus not decrease GHG emissions.

Build Alternatives

The reduction in GHG emissions is directly related to the reduction in VMT. The Build Alternatives achieve the reduction in VMT by shifting commuters from cars to commuter rail. The Stoughton Electric Alternative would result in the greatest reduction in GHG emissions (60,859 tons/year of CO2), a greater reduction than the Whittenton Electric Alternative which would reduce GHG emissions by 49,490 tons/year. Overall the diesel alternatives would result in less reduction of GHG compared to the electric alternatives for both the Stoughton and Whittenton Alternatives.

Smart Growth

Each Build Alternative is anticipated to induce additional growth within the South Coast region as a result of improved transit access. However, the induced growth from each is relatively small (3.7 percent) in comparison to the No-Build Alternative, which is projected to increase the number of households by 75,212 by 2035. Local effects would vary considerably, especially in communities with stations. However, the cumulative impact even at the local level would be minimal. From a regional perspective the differences between the alternatives are minimal; cumulative effects are not a differentiator. As compared to the No-Build Alternative, the economic trends in combination with the impacts from both Build Alternatives would beneficially contribute to economic growth in the South Coast region. Under scenario 1 a wide range of local impacts would be broadly distributed, whereas under Scenario 2 these impacts are expected to be more concentrated in Priority Development Areas (PDAs).

As stated in the *South Coast Rail Economic Development and Land Use Corridor Plan,*[21] 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

[21] 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.

two-thirds of which would locate in the South Coast region with the remaining third in Boston-Cambridge and other communities outside the region.

The Corridor Plan would be implemented by MassDOT 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 (PPAs), and concentrating development in the PDAs. 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 VMT, 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.

In summary, the increases in population and jobs from induced growth are expected to increase economic activity and property tax revenues within the South Coast region. The Build Alternatives would support the TOD and smart growth strategies outlined in the Corridor Plan.

3.3.3.2 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).

In addition to the above, other, related impacts are also disclosed, including:

- Secondary and/or Indirect Wetland Impacts
- Biodiversity Impacts, including wildlife habitat fragmentation.

Permanent Direct Wetland Loss

Impacts to waters of the United States, including adjacent wetlands, are the principal category of environmental impacts that must be considered by the Corps for Clean Water Act Section 404 permits

and by the Massachusetts Department Environmental Protection for variances under the Massachusetts Wetlands Protection Act (WPA). 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 waters of the United States, including 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.

No-Build (Enhanced Bus) Alternative

No wetland impacts would occur under the No-Build Alternative.

Stoughton Electric Alternative

The Stoughton Electric Alternative would impact 12.3 acres of waters of the United States—1.9 acres of open water and 10.4 acres of vegetated wetlands (primarily forested wetlands).

In terms of state wetland resources, Stoughton Electric Alternative would permanently impact 16,813 linear feet of Bank, 9.6 acres of Bordering Vegetated Wetland (BVW), 6.7 acres of Bordering Land Subject to Flooding (BLSF), and 7.9 acres of new development Riverfront Area. The largest impacts would occur in Raynham (1.3 acres of BVW) and Stoughton (2.0 acres of BVW), particularly south of the former Greyhound Park where the corridor forms the border of the Hockomock Swamp and then crosses through Pine Swamp. These impacts would occur in and along the edge of the abandoned railroad embankment. Minor impacts would occur along the components of the Southern Triangle, along the remainder of the Stoughton Line north of the Hockomock Swamp, at the Canton, East Taunton, Easton Village, and Raynham Park stations, and at traction power stations Stoughton TPSS-2 in New Bedford, Stoughton PS-1 in Easton, and Stoughton SWS-1 in Canton. Impacts would be closely evaluated during final design and would be minimized or avoided to the maximum extent practicable. Potential permanent wetland impacts along the Stoughton Line include 0.2 acre within the Hockomock Swamp ACEC. Indirect impacts within the Hockomock swamp would be minimal due to the existing rail bed and the proposed elevated trestle that would span 1.6 miles of the Hockomock Swamp. The elevated trestle would facilitate free wildlife passage across the proposed route, as well as maintain the current hydrology of the area. Additionally, approximately 1.5 acres of ORWs would be impacted along the Stoughton Electric Alternative.

Stoughton Diesel Alternative

Impacts to wetlands for the Stoughton Diesel Alternative are similar to the impacts identified above for the Stoughton Electric Alternative. The diesel alternative does not require traction power substations and would result in approximately 0.01 acre of permanent wetland impacts less than the Stoughton Electric Alternative along the New Bedford Main Line.

Whittenton Electric Alternative

The Whittenton Electric Alternative would impact 11.2 acres of waters of the United States—1.8 acres of open water and 9.4 acres of vegetated wetlands (primarily forested wetlands).

In terms of state wetland resources, the Whittenton Electric Alternative would permanently impact 16,581 linear feet of Bank, 8.4 acres of BVW, 5.0 acres of BLSF, and 7.8 acres of new development Riverfront Area. By town, the largest amount of impacts would occur in Berkley (1.4 acres of BVW) and Stoughton (2.0 acres).This alternative would leave the Stoughton Line corridor at Raynham Junction and instead would follow the Whittenton Branch to the Attleboro Secondary. This diversion would avoid wetland impacts in Pine Swamp. As with the Stoughton Alternative, the majority of impacts would occur in and along the edge of the abandoned railroad embankments. Minor impacts would occur along the components of the Southern Triangle, along the remainder of the Stoughton Line north of the Hockomock Swamp, at the Canton, East Taunton, Easton Village, and Raynham Park stations, and at traction power stations Whittenton TPSS-2 in New Bedford, Whittenton PS-1 in Easton, and Whittenton SWS-1 in Canton. Impacts would be avoided or minimized during final design to the maximum extent practicable.

Potential permanent wetland impacts along the Stoughton Line segment of this alternative include 0.2 acre within the Hockomock Swamp ACEC. Indirect impacts within the Hockomock swamp would be minimal due to the existing rail bed and the proposed elevated trestle that would span 1.6 miles of the Hockomock swamp. The elevated trestle would facilitate free wildlife passage across the proposed route, as well as maintain the current hydrology of the area. Additionally, approximately 1.1 acres of ORWs would be impacted along the Whittenton Electric Alternative.

Whittenton Diesel Alternative

Impacts to wetlands for the Whittenton Diesel Alternative are similar to the impacts identified above for the Whittenton Electric Alternative. The diesel alternative does not require traction power substations and would result in approximately 0.01 acre of permanent wetland impacts less than the Whittenton Electric Alternative along the New Bedford Main Line.

Secondary and/or Indirect Wetland Impacts

The secondary and/or indirect impact analysis evaluated the effects of the alternatives on wetland functions and values for all wetlands within 100 feet of the project limits (see Section 4.16.7.2). These impacts cannot be quantified, but are presented in a qualitative approach that identifies, for each wetland, the principal functions and values provided by that wetland, the magnitude of impact to those functions based on the physical extent of the impacts in comparison to the overall size of the wetland.

The results of the analysis are summarized in Table 3.3-11 and described below.

No-Build Alternative

The No-Build Alternative would not have any secondary and/or indirect impacts.

Table 3.3-11 Secondary and/or Indirect Effects on Wetlands within 100 feet of the Rail Segments along the Stoughton/Whittenton Alternative[1,4,5]

Function	Total Wetlands[2]	Negligible/ Minor		Moderate/ High		Total
		Active	Out-of-Service	Active	Out-of-Service	
Groundwater recharge/discharge	339/333	0	0/3	0	0/1	10/14[3]
Floodflow alteration	112/122	33	18/17	9	8	68/72
Fish and shellfish habitat	84/78	16	15/11	0	0	32/35
Sediment/toxicant/pathogen retention	145/151	45	11/8	20	5/2	88/88
Nutrient removal/retention/transformation	145/152	45	11/8	20	5/2	87/87
Production export	206/203	38	23/14	11	10/7	86/86
Sediment/shoreline stabilization	203/204	8	2/0	0	5	19/19
Wildlife habitat	144/145	39/40	52/50	13	12/10	118/127
Recreation	52/49	4	10/7	0	0	14/14
Educational/scientific value	10	0	5	0	0	5/5
Uniqueness/heritage	9/8	0	0	0	0	0/0
Visual quality/aesthetics	77/73	33	25/22	6	0	64/67
Endangered species habitat	96/102	27	15/12	4	22	68/69

1 Includes all wetlands within 100 feet of the right-of-way
2 Wetlands that perform each function as a principal function
3 Includes wetlands that would receive stormwater discharge that are more than 100 feet from the right-of-way
4 Where the alternatives are identical only one value is shown
5 The No-Build Alternative would have no indirect/secondary effects on wetlands

Build Alternatives

For both the Stoughton and the Whittenton Alternatives the majority of wetlands along either the active or inactive segments of the Stoughton Alternative would experience negligible to minor impacts to functions and values. In most cases, the wetlands are relatively large in comparison to the area in which functions would be lost or altered, and there would be little overall effect on the ability of the wetland to provide these functions. For both alternatives the wetland functions most affected would be wildlife habitat.

Although wetlands along both the active and inactive segments would experience a decrease in their ability to support wildlife habitat functions, including rare species habitat, these changes would be greater in the inactive segments due to the barrier effect of the reconstructed tracks. For both alternatives, the segment through the Hockomock Swamp would result in a minor effect on wildlife habitat through creation of a canopy gap although there would be no barrier to wildlife movement.

Stoughton Electric Alternative—The Stoughton Electric Alternative would affect the habitat function of 116 of the 144 wetlands, with 77 percent of the affected wetland experiencing negligible or minor impacts (see Table 3.3-11). The overhead catenary system would affect 58 wetlands as a result of the overhead catenary structures required to provide electric rail service, a majority of the wetlands which provide visual or aesthetic value.

Stoughton Diesel Alternative—The Stoughton Diesel Alternative would affect the habitat function of wetlands to the same degree as the Stoughton Electric Alternative with the exception of the effects to the 58 wetlands as a result of the catenary system.

Whittenton Electric Alternative—The Whittenton Electric Alternative would affect the habitat function of 113 of the 145 wetlands, with 80 percent of the affected wetland experiencing negligible or minor impacts (see Table 3.3-11). The overhead catenary system would affect 52 wetlands as a result of the overhead catenary structures required to provide electric rail service, a majority of which provide visual or aesthetic value.

Whittenton Branch—Along the Whittenton Branch, overall indirect or secondary impacts to wetlands are generally small, due to the proportionately small direct impacts along the route. A large portion of one wetland, Wetland TWB-08.1, would be eliminated to construct the railroad. This is a disturbed, mainly unvegetated wetland that has developed within the right of way due to compression of soils from ATV and other use of the path, and provides little function or value. The remaining impacts to wetlands along the Whittenton Branch are negligible or minor. The most affected wetland function is wildlife habitat, as barrier and noise effects along the currently inactive right of way could impact existing habitat or reduce the effective contiguous habitat size of wetlands. This effect is most likely to be seen in the approximately 0.3 mile section of the Whittenton Branch where the right of way branches off from the stone quarry access road. In this section, in the vicinity of Wetlands TWB 03.1 through TWB 01, both the western and eastern sides of the tracks have large areas of undeveloped land with only a narrow, mostly-vegetated path between them, whose size may be effectively reduced by constructing the railroad.

In summary, the effects of the Build Alternatives would be similar. The No-Build Alternative would not have any secondary and/or indirect impacts.

Open Space

This section discusses 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 the South Coast Rail project is currently not undergoing review by a federal transportation agency, 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.

No-Build (Enhanced Bus) Alternative

Minor increases in existing bus service along existing major roadways would have no impact on open space resources.

Build Alternatives

Table 3.3-12 provides a comparison of the ACEC land acquisition requirements for each South Coast Rail alternative. The Stoughton and Whittenton Electric Alternatives would each require acquisition of the same small portion (0.5 acre) of conservation land in the Hockomock Swamp ACEC. The parcel would be used for traction power substation for the Stoughton or Whittenton Electric Alternatives. None of the

ACEC land acquisitions would substantively impact any of the resources of concern for the respective ACECs. The diesel alternatives would not require any acquisition of ACEC lands.

Table 3.3-12 Summary of ACEC Land Acquisition Requirements for All Alternatives

	ACEC Lands	
Alternative	Acquisition Area (acres)	Number of Parcels
No-Build	0	0
Stoughton Electric	0.50	1
Stoughton Diesel	0	0
Whittenton Electric	0.50	1
Whittenton Diesel	0	0

Property Acquisition

In addition to open space analysis, a land use impacts analysis was conducted to determine if property 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.

No-Build (Enhanced Bus) Alternative

No new construction or land acquisition would be required for the No-Build Alternative. Therefore, the No-Build Alternative would have no direct impacts on land use.

Build Alternatives

The Build Alternatives would all require property acquisitions outside existing rights-of-way to accommodate the new stations and rail infrastructure. Summary tables of property impacts by municipality for the Stoughton Alternatives (Diesel and Electric) and Whittenton Electric Alternative are provided in Table 3.3-13.

The total acreage of property acquisition impacts of the Stoughton Electric Alternative (136.7 acres) and Whittenton Electric Alternative (136.8 acres) are nearly identical. The diesel versions of the rail alternatives result in 2.2 fewer acres of impact because of the need for traction power substations with the electric alternatives.

Table 3.3-13 Build Alternatives: Land Acquisition Summary by Municipality

Municipality	Public Ownership Area in acres (number of parcels)	Private Ownership Land Use Area in acres (number of parcels)				
		Commercial	Industrial	Residential	Undeveloped	Subtotal
Alignment						
Stoughton Alts.	4.1 (13)	0.9 (10)	11.8 (12)	15.7 (32)	15.2 (26)	43.6 (80)
Whittenton Alts.	2.2 (9)	9.0 (8)	14.6 (19)	13.7 (21) -	16.0 (28)	53.3 (76)
Substations						
Stoughton Alts.	1.1 (2)	-	<0.1 (1)	<0.1 (2)	1.1 (4)	1.1 (7)
Whittenton Alts.	1.1 (2)	-	<0.1 (1)	<0.1 (2)	1.1 (4)	1.1 (7)
Stations						
Stoughton Alts.	1.2 (2)	20.9 (15)	6.8 (11)	0.1 (1)	33.5 (12)	61.3 (39)
Whittenton Alts.	1.1 (2)	20.2 (14)	10.9 (20) -	0.1 (1)	22.5 (11)	53.7 (46)
Layover Facilities						
Stoughton Alts.	5.9 (1)	-	18.4 (2)	-	-	18.4 (2)
Whittenton Alts.	5.9 (1)	-	18.4 (2)	-	-	18.4 (2)
TOTAL						
Stoughton Alts.	12.3 (18)	21.8 (25)	37.0 (26)	15.8 (35)	49.8 (42)	124.4(128)
Whittenton Alts.	10.3 (14)	29.2 (22) -	43.9 (42)	13.8 (25)	39.6 (43)	126.5 (131)

Sources: MassGIS 2002, 2005; municipal data 2009, aerial mapping, and online research (various).

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.

No-Build (Enhanced Bus) Alternative

No new construction or land acquisition would be required for the No-Build Alternative. There would be no impacts to property tax revenues.

Build Alternatives

Table 3.3-14 provides a comparative summary of the direct and indirect impacts to the social and economic environment potentially resulting from the Build Alternatives. There is no difference between the electric and diesel options for each Build Alternative.

The variations in property tax revenue losses do not correlate with the variations in private property acquisitions for each alternative. The Stoughton Alternatives would result in a greater amount of property tax revenue loss than the Whittenton Alternatives. Tax losses for both alternatives are dominated by the loss associated with the acquisition of the Fall River Depot Station site at $70,777—the single largest loss.

Table 3.3-14 Summary of Potential Effects to the Social and Economic Environment from All Alternatives

Alternative	Property Tax Revenue Loss[1]	Job Loss	Neighbor-hood Fragmentation	Residential Displacements (homes)	Business Displacements	Induced Jobs[3]	Induced Households[3]	Residential Property Value Change[2]
No-Build Alternative	0	No	None	0	0	0	0	No
Stoughton Alternatives	$197,251	Yes	Moderate	4	6	1,341	2,804	Yes
Whittenton Alternatives	$181,351	Yes	Moderate	3	6	1,341[4]	2,804[4]	Yes

1 Additional property tax revenue losses may result from small and/or partial acquisitions that cannot be determined at this phase.
2 Anticipated to increase in the vicinity of new stations and decrease in areas with moderate to severe noise impacts (railroad alignments and layover facilities).
3 Increase from No-Build Alternative; the total number of induced jobs and households is the same for Scenario 1 and 2.
4 Induced jobs and households for the Whittenton Alternatives were not estimated but are assumed to be similar to impacts of the Stoughton Alternatives.

All alternatives would result in job losses due to business displacements resulting from acquisition of private property with commercial lots for the station sites. It is not possible to project numbers of actual jobs lost at this phase of analysis, but only a few commercial buildings would be acquired and related job loss is assumed to be relatively minor. All Build Alternatives would result to a similar degree in residential displacements from acquisition of privately owned parcels with occupied residences. No-Build Alternative would result in community facility displacements.

Based on a review of residential and commercial property availability,[22] communities that would be impacted by residential displacements (Raynham) or business displacements (Fall River) have sufficient real estate capacity to absorb these displacements.

There are moderate differences in neighborhood fragmentation effects between the rail alternatives. Where active rail service is currently provided (Fall River Secondary, New Bedford Main Line, Attleboro Secondary, active portion of Stoughton Line, and Northeast Corridor), no neighborhoods would be fragmented by the construction, reconstruction, or operation of the commuter rail service. Where rail lines are out-of-service (inactive portion of Stoughton Line and Whittenton Branch) or have never previously existed, varying degrees of neighborhood fragmentation may result. Along the inactive portion of the Stoughton Line, some residential and commercial activity encroachment into the right-of-way has occurred, and over time some neighborhoods on either side of the alignment have developed continuity across the inactive railroad bed as residents have used the alignment for pedestrian transit. This appears to have been less common along the out-of-service Whittenton Branch, where residential neighborhoods tend to be located on one side of the alignment or the other. Accordingly, there would be less of a neighborhood fragmentation effect along the Whittenton Branch.

[22] Online research of residential real estate property availability conducted by reviewing current listings of similar homes (based on zoning of affected properties) in the affected communities at www.realtor.com. Commercial real estate vacancy rates conducted by telephone inquiries to chambers of commerce in the affected communities.

Protected Public Water Supply Land Impacts

This section discusses potential direct and indirect effects on water resource including protected public water supply lands. Surface and groundwater 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.

No-Build Alternative

The No-Build Alternative does not include capital improvements that could increase impervious surface cover and impact water resources.

Build Alternatives

All of the Build Alternatives would have the potential to affect waterbodies and drinking water protection areas. All would require construction within public water supply Zone I areas, which is the area within 400 feet of a well that is generally afforded the greatest protection from development. All would upgrade existing transit corridors, which would have a negligible effect on pollutant loading. The Build Alternatives would build new rail lines on disused rail corridors, potentially introducing new pollutant sources in those areas. With mitigation and drainage features in place, none of the Build Alternatives are expected to impair any water resources. Potential impacts to the Hockomock Swamp and Fowl Meadow ACEC would occur due to stormwater discharges to Black Brook and the East Branch of the Neponset River, respectively from the Stoughton and Whittenton Alternatives. However, minimal impacts to ACECs from stormwater discharges would occur from the project. None of the above-mentioned discharges are associated with constructed stations, station platforms or parking areas. These discharges would primarily occur from conveyed overland flow from ditches along the railroad, which would carry negligible pollutant loads (with the exception of sediment). None of the proposed actions are expected to impair surface or groundwater resources within the ACEC. Compliance with the Massachusetts Stormwater Management Standards is provided for all stations except Stoughton and Dana Street. Compliance will be documented for these stations (as necessary) during later project design phase phases.

Stoughton Electric Alternative—The Stoughton Electric Alternative would involve construction within Zone II areas for six wells, and the IWPA for two wells. These areas would be disturbed only temporarily and would not receive any long-term impacts. This alternative would also require stormwater discharges to Zone II areas for six wells, the IWPA for two wells, and 10 different waterbodies, including one ORW within the Hockomock Swamp ACEC and the East Branch of the Neponset River in the Fowl Meadow ACEC. No Zone I areas would be affected by the construction on this line.

Along the Fall River Secondary no Zone A areas or groundwater protection areas (Zone I, Zone II, etc.) would be crossed by this line or receive any stormwater discharges. The stormwater discharges from the New Bedford Main Line would not be expected to contribute contaminants that would impair any waterbodies or water supplies. The existing stormwater discharges to the Zone A area for Fall Brook, Assawompset Pond, Long Pond, and Pocksha Pond would continue, but there would be no new impervious surfaces or pollutant sources tributary to this Zone A area. Due to the low potential for pollutant generation on the rail line, no impacts are expected to groundwater quality.

No electrical substations would be located in any IWPAs, Zone I areas, or Zone A areas. One electrical substation would be located in the Zone II for Easton GP Wells #1, #2, and #4 and would include secondary containment to minimize the risk of any surface or groundwater contamination from this location. With stormwater management measures in place, none of the stations or layover facilities is expected to impair any surface or groundwater resources. With mitigation and drainage features in place, the Stoughton Electric Alternative is not expected to impair any surface or groundwater resources.

Stoughton Diesel Alternative—The Stoughton Diesel Alternative would be comprised of the same elements as the Stoughton Electric Alternative as listed above and would have the potential to affect the same water resources. The Stoughton Diesel Alternative would have a slightly greater potential for pollutant loading due to the use of diesel fuel.

Whittenton Electric Alternative—The Whittenton Electric Alternative would involve construction within one Zone A area, the Zone I area for one well, Zone II areas for 10 wells, and the IWPA for two wells. These areas would be disturbed only temporarily and would not receive any long-term impacts. One new station, Easton Village Station, would be located in a Zone II area but would not have any impact on groundwater quality. This alternative would also require stormwater discharges to the Hockomock Swamp ACEC and the East Branch of the Neponset River in the Fowl Meadow ACEC.

While much of the rail corridor for this alternative already conveys diesel rail traffic under existing conditions, using the Whittenton Branch and reconstructing the Stoughton Line south of Stoughton Station would reintroduce rail traffic to a historic rail corridor. However, the Whittenton Electric Alternative is not expected to contribute contaminants that would impair surface or groundwater resources. The proposed drainage design includes measures to control new potential pollutant sources and would meet Massachusetts Stormwater Management Standards.

Along the Fall River Secondary no Zone A areas or groundwater protection areas (Zone I, Zone II, etc.) would be crossed by this line or receive any stormwater discharges. The stormwater discharges from the New Bedford Main Line would not be expected to contribute contaminants that would impair any waterbodies or water supplies. The existing stormwater discharges to the Zone A area for Fall Brook, Assawompset Pond, Long Pond, and Pocksha Pond would continue, but there would be no new impervious surfaces or pollutant sources tributary to this Zone A area. Due to the low potential for pollutant generation on the rail line, no impacts are expected to groundwater quality.

No electrical substations would be located in any IWPAs, Zone I areas, or Zone A areas. One electrical substation would be located in the Zone II for Easton GP Wells #1, #2, and #4 and would include secondary containment to minimize the risk of any surface or groundwater contamination from this location. With stormwater management measures in place, none of the stations or layover facilities is expected to impair any surface or groundwater resources.

With mitigation and drainage features in place, the Whittenton Electric Alternative is not expected to impair any surface or groundwater resources.

Whittenton Diesel Alternative—The Whittenton Diesel Alternative would be comprised of the same elements as the Whittenton Electric Alternative as listed above and would have the potential to affect the same water resources. The Whittenton Diesel Alternative would have a slightly greater potential for pollutant loading due to the use of diesel fuel.

Summary

The Whittenton Alternatives would be constructed and operated within a greater number of water protection zones. With regard to public water supply resources it is noted that the Whittenton Alternatives would require construction within public water supply Zone 1 areas (i.e. within 400 feet of the well), whereas the Stoughton Alternatives would avoid construction within public water supply Zone 1 areas. With mitigation and drainage features in place, none of the Build Alternatives are expected to impair any surface or groundwater resources.

Vibration Impacts

No-Build (Enhanced Bus) Alternative

Under the No-Build Alternative there would be no vibration impacts.

Build Alternatives

The Whittenton Alternatives result in 48 more impacted receptors than the Stoughton Alternatives, with the Attleboro Secondary segment of the Whittenton Alternatives being the primary cause of the greater impacts (Table 3.3-15). The noted vibration levels reflect annoyance and would not rise to a level considered to cause structural damage.

Table 3.3-15 Summary of Potential Vibration Impacts without Mitigation by Alternative

Alternative	Impacted Residences
No-Build (Enhanced Bus) Alternative	0
Stoughton Alternatives	369
Whittenton Alternatives	417

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).

No-Build (Enhanced Bus) Alternative

Under the No-Build Alternative there would be no noise impacts.

Build Alternatives

Table 3.3-16 summarizes the total number of moderate and severe noise impacts by alternative for the operations of the rail line. All of the severe noise impact locations were evaluated for noise mitigation measures.

Stoughton Alternative—The Stoughton Electric Alternative (Stoughton, Southern Triangle-Fall River, and Southern Triangle-New Bedford segments) would result in 1,106 moderate and 341 severe impacts to residential receptors. The diesel operations would have similar impacts, with 1,085 moderate and 344 severe impacts.

Table 3.3-16 Summary of Projected Noise Impacts for South Coast Rail Alternatives

Alternative	Electric Alternative			Diesel Alternative		
	Moderate Impacts	Severe Impacts	Total	Moderate Impacts	Severe Impacts	Total
No-Build	0	0	0	0	0	0
Stoughton						
Stoughton	404	159	563	330	128	458
Southern Triangle - Fall River	466	135	601	570	181	751
Southern Triangle - New Bedford Main Line	236	47	283	185	35	220
Total	**1,106**	**341**	**1,447**	**1,085**	**344**	**1,429**
Whittenton						
Stoughton*	359	164	523	279	109	388
Whittenton	171	35	206	194	42	236
Southern Triangle - Fall River	466	135	601	570	181	751
Southern Triangle - New Bedford Main Line	236	47	283	185	35	220
Total	**1,232**	**381**	**1,613**	**1,228**	**367**	**1,595**

* Excludes the portion of the Stoughton line that is bypassed by the Whittenton Alternative (south of Raynham Junction).

Whittenton Alternative—The Whittenton Electric Alternative (Stoughton partial, Whittenton, Southern Triangle-Fall River, and Southern Triangle-New Bedford segments) would result in 1,232 moderate and 381 severe impacts to residential receptors. The diesel operations would have lower impacts, with 1,228 moderate and 367 severe impacts.

Summary

The Whittenton Alternative has the greatest track-related noise impacts (166 more impacts than the Whittenton Alternative), largely associated with the Whittenton Branch and the Attleboro Secondary Branch, which are located within densely populated areas. The Stoughton Alternative, by contrast traverses the Pine Swamp, a sparsely populated area located east of Taunton.

The diesel alternatives have somewhat lower noise impacts than the electric alternatives (18 fewer impacts) due to their slower operational speed compared to the electric alternatives.

Train Horn Noise

Severe noise impacts typically result from the close proximity to locomotive and rail car noise and from locomotive warning horns, which must be sounded one-quarter mile prior all public grade crossings. It should be noted that the majority of train horn impacts will occur at the same locations where rail operation impacts will occur. The train horn, however, is a uniquely different noise than the operations and was evaluated separately. A summary of these results can be found in Table 3.3-17. All of the severe noise impact locations were evaluated for noise mitigation measures.

Table 3.3-17 Summary of Projected Train Horn Noise Impacts for South Coast Rail Alternatives

Alternative	Moderate Impacts	Severe Impacts	Total
Stoughton			
Stoughton	437	457	894
Southern Triangle - Fall River	98	164	262
Southern Triangle - New Bedford Main Line	93	76	169
Total	**628**	**697**	**1,325**
Whittenton			
Stoughton*	368	374	742
Whittenton	460	708	1,168
Southern Triangle - Fall River	98	164	262
Southern Triangle - New Bedford Main Line	93	76	169
Total	**1,019**	**1,322**	**2,341**

* Excludes the portion of the Stoughton line that is bypassed by the Whittenton Alternative (south of Raynham Junction).

Train horns along the Stoughton Alternative would have 628 moderate and 697 severe impacts. The Whittenton Electric Alternative would result in the train horns producing 1,019 moderate and 1,322 severe impacts. The Whittenton Alternative results in the highest railroad grade crossing noise impacts.

In general, the Whittenton Alternatives have the greatest overall noise impact, both due to train movement and train horn usage at grade crossings.

Environmental Justice Impacts

This section compares the alternatives with regard to disproportionate adverse impacts to environmental justice populations, including property acquisition, change in noise or vibration levels or air quality, and the presence of traditional cultural properties and open space.

No-Build (Enhanced Bus) Alternative

Under the No-Build Alternative there would be no disproportionate impacts to Environmental Justice communities.

Build Alternatives

Impacts to environmental justice populations that would result from the South Coast Rail project are similar for all applicable resource topics with the exception of noise, as described below, and are summarized in Table 3.3-18.

Among the Build Alternatives, the Whittenton Alternatives would impact the greatest number of residences, and the Stoughton Alternatives the least. A greater percentage of noise and vibration impacts would be experienced by designated environmental justice populations under the Whittenton

Alternatives than the Stoughton Alternatives. This difference is attributable to the impacts of the Whittenton Alternative along the Attleboro Secondary through downtown Taunton.

Table 3.3-18 Summary of Adverse Effects on Environmental Justice Populations

Adverse Effects	No-Build	Stoughton Electric	Stoughton Diesel	Whittenton Electric	Whittenton Diesel
Neighborhood Disruption/Fragmentation	None	None	None	None	None
Residential Displacements	None	None	None	None	None
Business/Job Displacements[1]	None	Minimal	Minimal	Minimal	Minimal
Noise Impacts in Environmental Justice Neighborhoods (number of residences impacted by moderate and severe increases in noise levels)[2]	None	361	361	842	842
Percent of Total Noise Impacts in Environmental Justice Neighborhoods	None	25%	25%	30%	30%
Vibration Impacts in Environmental Justice Neighborhoods (impacted sensitive receptors)[3]	None	86	86	105	105
Percent of Total Vibration Impacts in Environmental Justice Neighborhoods	None	23%	23%	25%	25%

1 Business and job displacements would result from private property acquisition for the Fall River Depot Station, and would be minor as compared to the overall workforce in the surrounding community. See Chapter 4.2, *Land Use*, and Chapter 4.3, *Socioeconomics*.

2 Noise impacts data is based on the Stoughton and Whittenton Electric Alternatives; however the impacts of the diesel alternatives would be similar.

3 Diesel and electric vibration impacts would be the same.

Under all Build Alternatives and on a regional level, adverse noise impacts would not be disproportionately borne by state-listed environmental justice communities. However, on the municipal level, the analysis concludes that state-listed environmental justice populations in Fall River would experience disproportionately high and adverse noise impacts as compared to non-environmental justice populations under the Stoughton and Whittenton Alternatives prior to mitigation. Noise impacts to environmental justice and non-environmental justice areas would be mitigated.

Vibration impacts would be experienced across the region in both designated and non-designated environmental justice communities. Overall, adverse impacts would not be predominately borne by designated environmental justice communities under the Stoughton or Whittenton Alternatives. At the local level, designated environmental justice communities would experience a disproportionately high share of vibration impacts in Fall River under both the Stoughton and Whittenton Alternatives. Environmental justice communities in Taunton would experience a disproportionately high share of vibration impacts under the Whittenton Alternatives. Vibration impacts to environmental justice and non-environmental justice areas would be mitigated.

Loss of Priority Habitat

Rare species are considered an important environmental resource, protected under the Massachusetts Endangered Species Act and WPA. 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 section 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 3.3-19 summarizes the results of this analysis.

Table 3.3-19 Direct and Indirect Effects to Rare Species from the South Coast Rail Alternatives

Alternative	# of Priority Habitat (PH)	# of Rare Species Impacted	Migratory Route (Barrier effect)
No-Build Alternative	0	0	0 miles
Stoughton Electric Alternative	5	8	3.2 miles
Stoughton Diesel Alternative	5	8	3.2 miles
Whittenton Electric Alternative	6	8	3.6 miles
Whittenton Diesel Alternative	6	8	3.6 miles
Stations	0	--	0 miles
Layover Facilities	0	--	0 miles

No-Build (Enhanced Bus) Alternative

None of the proposed park-and-ride facilities are within Estimated and Priority Habitats. Therefore, none of the components of the No-Build Alternative are expected to impact rare species and/or their habitat.

Build Alternatives

All Build Alternatives could impact eight state listed species, and would result in the loss of migratory route habitat because all rail alternatives require construction of new rail lines where currently there are none. An overview of potential direct and indirect effects is presented in Table 3.3-21.

Both Stoughton Alternatives would result in the loss of migratory route habitat (barrier effect) of approximately 3.2 miles.

Both Whittenton Alternatives would result in the loss of migratory route habitat (barrier effect) of approximately 3.6 miles.

In summary, the Whittenton Alternative would have greater impacts on Threatened and Endangered Species with a 11 percent greater barrier effect compared to the Stoughton Alternatives. The diesel alternatives would have slightly less potential impacts compared to the electric alternatives.

Impacts on Biodiversity

A comparison of the effects of the South Coast Rail alternatives on biological diversity (plant, wildlife and fish communities and habitats) is shown in Table 3.3-20.

Table 3.3-20 Summary of Environmental Consequences on Biodiversity

Alternative	Upland Habitat Loss (ac.)	Wetland Habitat Loss (ac.)	Fragmentation	Vernal Pool Habitat Loss (ac.)[1]	Loss of Surrounding Vernal Pool Upland Habitat[2] (ac.)
No-Build	0	0	No	0	0
Stoughton Electric	182.27	12.3	Yes	1.43	43.40
Stoughton Diesel	178.78	12.3	Yes	1.43	43.40
Whittenton Electric	187.98	11.2	Yes	0.8	41.61
Whittenton Diesel	183.87	11.2	Yes	0.8	41.61

1 Includes impacts (fill) to vernal pools and to any wetland area within 100 feet of the boundary of a vernal pool, where the pool is within a wetland.

2 Loss of supporting vernal pool upland habitat includes loss of buffer habitat defined as loss of forested wetland within 100 feet of VHP, and includes loss of upland habitat defined as upland habitat loss calculated for forested upland habitat between 100 and 750 feet of a vernal pool.

No-Build (Enhanced Bus) Alternative

The No-Build Alternative would not impact natural communities or biodiversity.

Build Alternatives

All Build Alternatives would result in the loss of upland habitat, wetland habitat, and vernal pool habitat (including direct and indirect impacts to vernal pools as well as supporting upland habitat used by vernal pool amphibians). All Build Alternatives, would result in habitat fragmentation and would create or exacerbate a barrier to wildlife movement (see Section 4.14.3).

Stoughton Electric Alternative—The Stoughton Electric Alternative includes improvements to existing active freight or rail lines from Canton Junction to Stoughton Station, and on the two Southern Triangle segments (the Fall River Secondary and New Bedford Main Line), as well as restoring out-of-service rail line from Stoughton Station to Longmeadow Street in Taunton. This alternative would include constructing a trestle through part of the Hockomock Swamp to reduce impacts to wetlands, biodiversity, and rare species.

Hockomock Swamp and Pine Swamp have been identified as areas of concern for biodiversity impacts. Potential impacts could include direct loss of habitat, fragmentation (either by creating a canopy gap or reducing the ability of wildlife species, including state-listed rare species, to cross the rail bed), introduction of invasive species, and increased noise.

The Stoughton Alternatives would exacerbate existing fragmentation of wetland and upland communities, particularly through the Hockomock Swamp and Pine Swamp, although the barrier effect would be reduced by constructing a trestle in the Hockomock Swamp.

The majority of this would result from reconstructing the Stoughton Line. This segment of the Stoughton Electric Alternative would increase habitat fragmentation (the existing rail bed, although out-of-service, has fragmented habitats and acts as a barrier to some organisms) within the Hockomock Swamp ACEC and the Pine Swamp. This barrier may affect several vernal pool complexes.

Stoughton Electric Diesel Alternative—The Stoughton Diesel Alternative would result in similar impacts to biodiversity as the Stoughton Electric Alternative. Because it would not require electrical power substations, the Stoughton Diesel Alternative would result in 3.49 acres less upland habitat loss, and 0.01 acre less wetland habitat loss when compared to the Stoughton Electric Alternative.

Whittenton Electric Alternative—The Whittenton Alternative includes improvements to existing active freight or rail lines from Canton Junction to Stoughton Station, along the Attleboro Secondary through downtown Taunton, and on the two Southern Triangle segments (the Fall River Secondary and New Bedford Main Line), as well as restoring out-of-service rail line from Stoughton Station to Raynham Junction on the Stoughton Line and along the out-of-service Whittenton Branch in Raynham and Taunton. This alternative would include constructing a trestle through part of the Hockomock Swamp to reduce impacts to wetlands, biodiversity, and rare species.

Areas subject to biodiversity impacts have been identified as the Hockomock Swamp, and the private land adjacent to the right-of-way near Prospect Pond in Taunton. Potential impacts could include direct loss of habitat, fragmentation (either by creating a canopy gap or reducing the ability of wildlife species, including state-listed rare species, to cross the rail bed), introduction of invasive species, and increased noise.

The Whittenton Alternatives would fragment wetland and upland communities, particularly through the Hockomock Swamp and along the Whittenton Branch, although the barrier effect would be reduced by constructing a trestle in the Hockomock Swamp. The majority of this would result from reconstructing the Stoughton Line north of Raynham Junction

It would also result from reconstructing the Whittenton Branch from Raynham Junction to Whittenton Junction. This segment of the Whittenton Electric Alternative would increase habitat fragmentation (the existing rail bed, although out-of-service, has fragmented habitats and acts as a barrier to some organisms). This barrier may affect vernal pools adjacent to the alignment.

The Hockomock Swamp ACEC is the only ACEC that would be impacted by the Whittenton Alternatives. Approximately 0.14 acre of vernal pool habitat, 2.31 acres of buffer habitat, and 6.12 acres of upland habitat would be impacted within the Hockomock Swamp ACEC.

Whittenton Diesel Alternative—The Whittenton Diesel Alternative would result in similar impacts to biodiversity as the Whittenton Electric Alternative. Because it would not require power substations, the Whittenton Diesel Alternative would require 4.11 acres less upland habitat loss, and 0.01 acre less wetland habitat loss, when compared to the Whittenton Electric Alternative.

In summary, the Whittenton Alternatives would have 1.1 acres less wetland loss than the Stoughton Alternatives and 0.63 acre less vernal pool wetland habitat loss than the Stoughton Alternatives. Overall, the diesel alternatives would have slightly less impact compared to the electric alternatives. The Stoughton Alternatives would result in approximately 5 acres less Upland Habitat loss than the Whittenton Alternatives.

Impacts on Biodiversity—CAPS Analysis

The University of Massachusetts' Conservation Assessment and Prioritization System (CAPS) model was used as a supplemental method of evaluating indirect impacts to biodiversity. CAPS is a software program designed to assess the ecological integrity and biodiversity value of every location based on

natural community-specific models. It is typically used to help prioritize lands for conservation action based on their assessed ecological value and provides a quantitative assessment of ecological integrity that can be used to compare various scenarios. The CAPS model was used to analyze the impacts of the South Coast Rail alternatives on ecological integrity taking into account both their physical barrier effects (measured as the presence or absence of rail tracks and ballast, the number of tracks, the presence and height of a trestle, and the presence and height of retaining walls) and their noise or disturbance effects (measured as the number of trains per day and the number of cars per train).

The CAPS analysis results showed similar impacts of the Stoughton and Whittenton Alternatives on ecological integrity, with the Whittenton Alternatives showing a slightly higher loss of Index of Ecological Integrity (IEI) Units compared to the Stoughton Alternatives. The trestle through the Hockomock Swamp would reduce the biodiversity effects for either the Stoughton or Whittenton Alternatives. A discussion of the CAPS analysis is presented in Chapter 4.14, *Biodiversity*.

The Stoughton and Whittenton Alternatives would equally reduce connectivity in the Hockomock Swamp with a gradient ranging from major impacts close to the rail line to negligible impacts at greater distances, compared to the existing connectedness. Without a trestle, these alternatives would result in substantial losses in connectivity in the Hockomock Swamp east of the rail line, between the former Raynham Greyhound Track and Foundry Street and between the rail line and Route 138, and in some areas west of the rail line. Moderate impacts would extend through much of the Hockomock, including areas east of Route 138. These impacts would be reduced by the trestle, with major losses restricted to a smaller area east of the rail line and north of the former Raynham Greyhound Track. Impacts would also extend over a smaller area compared to the "no-trestle" option.

The restoration of commuter rail through Pine Swamp in Raynham, for the Stoughton Alternatives, would result in a decrease in connectivity throughout the swamp when compared to the existing connectedness. The effect is moderate, with some higher areas of decrease occurring west of the rail line.

While a useful tool for considering landscape-level impacts and relative comparison of scenarios, there are several important limitations to the CAPS analysis. CAPS as applied to this project does not account for the effects of the existing railroad grade on overall landscape condition, as the analysis tool does not have this level of granular information. The CAPS analysis also does not take into account existing uses of the right-of-way, such as ATVs and their effect on ecological integrity (both in terms of physical disruption and noise disturbance). These frequent uses of the existing grade itself also serve to maintain at least a partial canopy gap, particularly north of the existing power line and also adjacent to portions of the existing Raynham Park racetrack. The CAPS program software does not account for these disruptive and fragmenting conditions and instead treats the Hockomock Swamp in its current condition as a single, unfragmented, continuous, uniformly intact habitat. Thus while it provides a measure of the potential benefits of the trestle, CAPS seemingly overestimates and overstates the existing ecological integrity of Hockomock and Pine swamps, and thus likewise overestimates the effects of South Coast Rail alternatives on ecological integrity.

Cultural Resources Impacts

This section identifies the potential direct and indirect, as well as the permanent and temporary construction impacts to historic and archaeological resources from implementation of the South Coast Rail alternatives. For each alternative and segment or element of alternative (e.g. station), direct, impacts on historic resources were analyzed.

No-Build Alternative

No impacts would result from construction and operation of the No-Build Alternative.

Build Alternatives

The overall impacts to historic and archaeological resources resulting from improving or constructing the Build Alternatives vary considerably between the alternative alignments (see Table 3.3-21).

Each of the alternatives would be similar in their adverse effects to historic structures. The majority of these effects, for all alternatives, would result from reconstructing historic bridges to accommodate an additional track, or to meet Federal Railroad Administration loading standards for commuter rail trains.

Each of the alternatives would also result in indirect impacts to historic properties as a result of a change in setting (visual impacts) or increased noise (which could affect a quiet setting or could result in noise mitigation that would alter the appearance or setting of a structure). These indirect effects (only visual, only noise, or a combination of the two) would impact the largest number of properties (72) for the Whittenton Electric Alternative.

Each of the alternatives would also have the potential to affect as yet to be determined archaeological resources and areas of archaeological sensitivity (which would require further investigation to determine if archaeological resources were present).

Adverse effects, including unanticipated discoveries will be further addressed through a Programmatic Agreement, a draft of which is included in Appendix 4.8-A.

Table 3.3-21 Summary of Potential Impacts to Historic and Archaeological Resources

Alternative	Historic Resources				Archaeological Sites
	Direct Impacts	Indirect Impacts			Recommended as Eligible
		Visual	Noise	Noise + Visual	
No-Build	0	0	0	0	0
Stoughton Electric	5	25	0	35	10
Stoughton Diesel	5	9	16	19	10
Whittenton Electric	5	32	0	33	11
Whittenton Diesel	5	11	14	19	11

Based on a comparison of the results of the Intensive Archaeological Survey on the Stoughton Line between Route 138 and Weir Junction, and the Whittenton Alternatives within the same section, the Whittenton Alternatives would have greater impacts to archaeological resources recommended as eligible for the National Register.

The Stoughton Alternatives would likely affect three sites: the King Philip Street Site and the Chickering Road site , and the East Brittania Street Site. Each of these sites yielded a low density of quartz chipping debris and other stone tools (a broken rhyolite point tip and an argillite cobble cortex, and a quart scraper). These three sites show evidence of stone tool manufacturing/maintenance.

The Whittenton Alternatives would affect three sites near the northern end of the Whittenton Branch: the Mel's Diner Site, Brown Couch Site, and ATV Site. Each of these yielded a low density of quartz chipping debris, and one granite hammerstone. These sites appear similar to the Pine Swamp sites.

More importantly, the Whittenton Alternatives would likely affect the Cedar Swamp Site, potentially related to a known Village Site. The Cedar Swamp Site yielded a more complex array of pre-contact materials, including quart chipping debris, an argillite flake, a chert flake, fire-cracked rock, and a "bowl-shaped cultural feature" potentially associated with a hearth.

Based on this information, the Whittenton Alternatives likely have greater adverse effects to cultural resources protected under Section 106 of the National Historic Preservation Act than do the Stoughton Alternatives.

3.3.3.3 Other Environmental Impacts

In addition to the benefits and impacts described above, other impacts were analyzed as well that are considered in the overall evaluation of environmental impacts of the alternatives.

Transportation

No-Build (Enhanced Bus) Alternative

Under the No-Build Alternative no impacts would occur to the regional highway system; however the benefits to the regional highway system provided by the Build Alternatives (discussed below) would not be realized. No impacts to grade crossings would occur and local intersections would not be impacted, other than impacts associated with background growth through 2035.

Build Alternatives

The traffic analysis evaluated the traffic impacts of each of the commuter rail stations proposed as part of the Build Alternatives. Additionally, regional highway operations were evaluated to determine projected benefits of the regional transit enhancement associated with each of the alternatives. Traffic conditions in the vicinity of each station and along the regional highway network were analyzed for existing conditions and future 2030 conditions with and without the project. Mitigation would be implemented for roadways and intersections that would be most impacted by traffic associated with commuter rail stations associated with rail alternatives. In cases where Build Alternatives-related traffic would result in a degradation of operating conditions when compared to the No-Build Alternative, mitigation measures were evaluated and would be implemented to address these impacts. An overview of each impact category is provided below.

Traffic Impacts associated with Grade Crossings

The Build Alternatives would have similar impacts on public grade crossings that would be in service along the Build Alternatives. A total of 52 existing active public grade crossings are present along the alignments of the Build Alternatives. Of these, four public crossings would be recommended for closure along the Fall River Secondary, which is common to all Build Alternatives.

The Stoughton Alternative would result in 43 active public grade crossings, and the Whittenton Alternative would result in 50 active public grade crossings. The Build Alternatives will require gates at grade crossings within Taunton, Raynham, Easton, Stoughton and Canton to be closed approximately six

times an hour, or approximately 10 percent of the peak hour. Two grade crossings are uniquely associated with the Whittenton Alternative and consist of the reactivation of two inactive grade crossings at Whittenton Street and Warren Street.

Traffic Impacts in Station Areas

The Build Alternatives would have similar impacts on intersections near stations along the Build Alternatives. The Whittenton Alternative would have impacts at the Dana Street Station while the Stoughton Alternative would have impacts at the Taunton Station. Impacts in both station areas would be effectively mitigated, as for all other impacted station areas.

No significant parking, bicycle and pedestrian impacts would be associated with the Build Alternatives, which would be similar in their extent of impact.

Impacts on Freight Operations

Feasible scenarios could be developed that would enable co-existence of freight operations and the Build Alternatives without impacting freight operations. While during the construction process of the Build Alternatives, freight operations would be temporarily impacted, the operation of the Build Alternatives would not interfere with freight operations. The permanent long-term infrastructure improvements to the rail network associated with the Build Alternatives would also benefit freight operations.

Visual and Aesthetic Resources

No-Build (Enhanced Bus) Alternative

The existing highway alignments that would be used by the No-Build (Enhanced Bus) Alternative present a visually disturbed environment from natural conditions. The alignments would not change and no new highway construction would be required for the No-Build Alternative. Using these highways for this alternative would not affect any visual or aesthetic resources.

Additional signage may be installed at the park-and-ride/bus facilities used by this alternative to direct motorists to parking areas. The impacts to the visual environment from streetscape changes as a result of potential park-and-ride lots/bus station expansions would be an incremental addition to the existing conditions.

Build Alternatives

The overall impacts to visual and aesthetic resources resulting from improving or constructing the Build Alternatives would not vary considerably between the alternative alignments. All Build Alternatives are rated with an overall moderate visual impact.

Both alternatives would require track and crossing upgrades, generally located in active, disturbed environments including rural and urban settings with one crossing of a designated “Wild and Scenic River” by the Fall River Secondary (see Chapter 4.10, *Open Space*). Stations and layover facilities would be located in developed or partially developed areas. The Weaver’s Cove East layover facility would be located near a Wild and Scenic River, resulting in moderate visual impacts. Tracks, stations and layover facilities would all have minimal to moderate visual impact, unless as noted otherwise below

Both the Stoughton and Whittenton Alternatives would substantially impact the visual environment at the historic Easton train station.

Both alternatives would substantially impact the visual environment in currently out-of-service segments for approximately 15 miles. For the Stoughton Alternative this includes the segment of the Stoughton Line through Pine Swamp, east of Taunton and for the Whittenton Alternative this includes the Whittenton Branch, located in the western portion of Taunton.

Common to both alternatives is the trestle through Hockomock Swamp, north of Taunton. Public views of the proposed 1.6-mile trestle would be limited throughout the Hockomock Swamp wildlife management area and will have a visual impact; however there is limited public access to this area.

Electric alternatives would have higher visual impacts than diesel alternatives due to the electrical infrastructure requirements (i.e. overhead catenary).

Farmland

This Section evaluates the specific impacts of each of the proposed alternatives to designated areas of mapped farmland soils.

No-Build (Enhanced Bus) Alternative

The No-Build Alternative (Enhanced Bus) would consist of enhancing current bus service along existing roads and highways. None of three existing park-and-ride facilities that would be modified as part of the No-Build Alternative are within mapped areas of designated farmland soils. Under the No-Build Alternative, minor modifications are proposed to these existing parking lots that would not disturb additional land. No impacts to farmland soils are anticipated under the No-Build Alternative.

Build Alternatives

Potential impacts to mapped areas of designated farmland soils for each of the Build Alternatives is presented in Table 3.3-22. Using the USDA scoring system, the impacts to farmland soils along all Build Alternatives all received similarly low scores. Such scores indicate that these impacts would not be considered significant under the FPPA, and that mitigation for these losses would not be required for any of the Build Alternatives.

Table 3.3-22 Impacts to Designated Farmland Soils by Alternative (acres)[1]

Alternative	Southern Triangle	Northern Element	Stations	Total
No-Build/Enhanced Bus Alternative	--	--	--	0
Stoughton Electric Alternative	--	2.6	16.0	18.6
Stoughton Diesel Alternative	--	--	16.0	16.0
Whittenton Electric Alternative	--	2.6	16.2	18.8
Whittenton Diesel Alternative	--	--	16.2	16.2

Does not include potential mid-day layover facility impacts.

Stoughton Electric Alternative—The Stoughton Electric Alternative would result in impacts to 12.9 acres of designated farmland soils. Much of this impact occurs as a result of development of the North Easton and Taunton Depot station sites (7.3 and 5.7 acres, respectively).The remaining impacts occur as a result of the traction power stations associated with the electrification of the Stoughton Line and the development of the Freetown station site. One of the traction power stations (TPSS-1) is located within the Hockomock Swamp ACEC and would impact 1.1 acres of designated farmland soils.

Stoughton Diesel Alternative—The Stoughton Diesel Alternative would result in impacts to 10.3 acres of designated farmland soils. This impact is slightly less than the electrification alternative because there are no traction power stations required along the Stoughton Line under the diesel alternative. The remaining impacts occur due to development of the North Easton and Freetown station sites.

Whittenton Electric Alternative—The Whittenton Electric Alternative would result in impacts to 18.6 acres of designated farmland soils, the largest impact to farmland soils of all of the alternatives. Much of this impact occurs as a result of development of the North Easton and Taunton Depot station sites (7.3 and 5.7 acres, respectively). The remaining impacts occur as a result of the traction power stations associated with the electrification of the Stoughton Line and the development of the Freetown station site and the Dana Street Station site. One of the traction power stations (TPSS-1) is located within the Hockomock Swamp ACEC and would impact 1.1 acres of designated farmland soils.

Whittenton Diesel Alternative—The Whittenton Diesel Alternative would result in impacts to 16.0 acres of designated farmland soils. This impact is 2.6 acres less than for the Whittenton Electric Alternative, because no traction power stations would be required for the diesel alternative.

Summary

The Stoughton Alternative would have substantially less impact on designated farmland soils compared to the Whittenton Alternative (which has additional impacts associated with the Taunton Depot and Dana Street station sites). The diesel alternatives have slightly less impacts overall than the electric alternatives due to the absence of traction power stations.

Hazardous Materials

No-Build Alternative

The No-Build Alternative would not require acquisition of properties with Recognized Environmental Conditions (RECs) and therefore would not require remediation or soil/groundwater management during construction.

Build Alternatives

Each of the Build Alternatives would require acquisition of properties with Recognized Environmental Conditions (RECs) that would require further investigation. In each case, remediation or soil/groundwater management during construction could be required. Table 3.3-23 summarizes the number of RECs and the impact that were identified for each alternative.

Table 3.3-23 Summary of RECs by Alternative

Alternative	Total Number of Stations/Bypasses	Total Number of RECs	Number of Low Impact RECs	Number of Medium Impact RECs	Number of High Impact RECs
Stoughton Alternatives	11/0	29	5	18	6
Whittenton Alternatives	11/0	32	6	21	5

The Stoughton, and Whittenton Alternatives each have at least seven high impact RECs that were identified, and these alternatives also have the potential to encounter soil or groundwater contamination. Taunton Station on the Stoughton Alternatives, and Dean Street on the Whittenton Alternatives have three and one high impact RECs, respectively, that were identified.

The Stoughton Alternatives and the Whittenton Alternatives would have environmental benefits associated with remediating contaminated sites, particularly the station sites with known soil and groundwater contamination such as the Taunton station site. Each of the two layover sites associated with the Build Alternatives would involve acquisition of five properties with RECs that would require further investigation and potentially requiring remediation or soil/groundwater management during construction could be required.

The Stoughton and Whittenton Alternatives are similar with regard to their impact related to hazardous materials and would benefit environmental conditions through remediation of Recognized Environmental Conditions.

Geology

No-Build Alternative

The No-Build Alternative (Enhanced Bus) would consist of enhancing current bus service along existing roads and highways. Construction activities would be limited to the modification of three existing Park and Ride facilities, requiring limited clearing and excavation. No long-term changes would be expected to geologic structures or faults, to bedrock, soils, or geologic stability, to seismicity, or to the rock and soil units surrounding excavations.

Maintenance and development activities within the South Coast Rail project area would be expected to continue, and would create changes in the built environment, but would not adversely impact soils and geologic conditions. Normal geologic processes, such as erosion and sedimentation, would also continue. No specific impacts with respect to soils or geology would be anticipated under the No-Build Alternative.

Build Alternatives

None of the Build Alternatives would require tunneling or other deep excavation that would significantly affect geological conditions. Most disturbance activities would encompass a relatively small area within or adjacent to previously disturbed areas and infrastructure. These include active rail and abandoned rail beds (Stoughton line and Whittenton Branch) that have previously been established to be compatible with subsurface conditions. No long-term changes would be expected as a result of the Build Alternatives to geologic structures or faults, to bedrock, soils, or geologic stability, to seismicity, or to

the rock and soil units surrounding excavations. No long-term adverse impacts to soils and geology would occur with the Build Alternatives; therefore, no mitigation will be required.

Indirect Effects

Potential indirect effects (beneficial and adverse) of the rail alternatives were evaluated with and without smart growth measures (including TOD). The Corridor Plan was the guiding land use development plan for this analysis. Induced growth that would result from the rail alternatives includes the creation of new residential development and jobs. In order to assess the indirect effects of this induced growth, two scenarios were developed to allocate growth in the South Coast region. The first scenario, Scenario 1, allocates induced growth under business as usual conditions, includes baseline conditions, and assumes that induced growth would occur in a traditional pattern. The second scenario, Scenario 2, assumes that growth would be directed to Priority Development Areas (PDAs) and away from PPAs, based on the planning efforts of each municipality in the South Coast region.

Because the same level of induced growth distributed among the municipalities is expected for either the Stoughton or the Whittenton Alternatives, there would be no discernible difference in indirect effects under each alternative for purposes of comparison among the Build Alternatives. The indirect effects of the No-Build Alternative are reflected in the baseline growth through 2035. A resource-specific analysis of indirect effects is provided in Chapter 5.

Cumulative Impacts

Table 3.3-24 summarizes the incremental changes to the evaluated resources from the South Coast Rail alternatives that, in combination with past activities or trends and other known current and future projects, would potentially result in a substantive cumulative effect. The comparison is provided for both scenarios for the two alternatives considered in this evaluation, in relationship to the status of these resources under the projected No-Build Alternative conditions in 2035. Because there is no substantive difference between the impacts from rail alternatives' electric- or diesel-powered trains, these options are not included in this summary comparison.

Table 3.3-24 shows that in comparison to the No-Build Alternative, the Stoughton and Whittenton Alternatives would not have an adverse cumulative impact on the evaluated resources. There would be only minor differences in the cumulative effects of the Stoughton and Whittenton Alternatives, attributable to the minor differences in direct effects. For many resources, the cumulative impacts of Scenario 1 represent an insubstantial change from the conditions that would exist under the No-Build Alternative. In general, the cumulative effects of either alternative would be beneficial, depending upon the extent of implementation of Smart Growth measures.

Table 3.3-24 Summary of Cumulative Impacts

	Resource					
	Land Use	**Wetlands**	**Biodiversity**	**Protected Open Space**	**Air Quality**	**Economy**
No-Build Alternative	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 928,031
	308,371 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1	116,675 acres of decreased habitat quality in 2035	64,795 acres of open space remaining in 2035	CO_2-equivalent emissions to be 80% of 1990 levels by 2050	Households: 75,212
		124,748 acres of wetlands remaining in 2035	307,813 acres of natural land remaining in 2035		28,691,855 tpy CO_2 emissions in 2035	Jobs: 417,864 Business Activity: $99B Tax Revenue: N/A
Stoughton Alternative Scenario 1	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040
	307,030 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1	120,605 acres of decreased habitat quality in 2035	64,794 acres of open space remaining in 2035	CO_2-equivalent emissions to be 80% of 1990 levels by 2050	Households: 78,016
		124,756 acres of wetlands remaining in 2035	303,883 acres of natural land remaining in 2035		27,842,309 tpy CO_2 emissions in 2035	Jobs: 419,206 Business Activity: $99.5B| Tax Revenue: +$8.5-9.5M (municipal) +$16-18M (state)

	Resource					
	Land Use	**Wetlands**	**Biodiversity**	**Protected Open Space**	**Air Quality**	**Economy**
Whittenton Alternative Scenario 1	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040
	307,045 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1	120,595 acres of decreased habitat quality in 2035	64,795 acres of open space remaining in 2035	CO_2-equivalent emissions to be 80% of 1990 levels by 2050	Households: 78,016
		124,754 acres of wetlands remaining in 2035	303,893 acres of natural land remaining in 2035		27,842,309 tpy CO_2 emissions in 2035	Jobs: 419,206 Business Activity: $99.5B Tax Revenue: +$8.5-9.5M (municipal) +$16-18M (state)
Stoughton Alternative Scenario 2	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040
	315,583 to 319,259 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1	58,760 to 75,021 acres of decreased habitat quality in 2035	>64,794 acres of open space remaining in 2035	CO_2-equivalent emissions to be 80% of 1990 levels by 2050	Households: 78,016
		124,759 to 124,760 acres of wetlands remaining in 2035	349,331 to 365,592 acres of natural land remaining in 2035		<27,842,309 tpy CO_2 emissions in 2035	Jobs: 419,206 Business Activity: $99.5B Tax Revenue: +$8.5-9.5M (municipal) +$16-18M (state)

	Resource					
	Land Use	**Wetlands**	**Biodiversity**	**Protected Open Space**	**Air Quality**	**Economy**
Whittenton Alternative Scenario 2	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040
	315,598 to 319,274 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1	58,750 to 75,011 acres of decreased habitat quality in 2035	>64,795 acres of open space remaining in 2035	CO_2-equivalent emissions to be 80% of 1990 levels by 2050	Households: 78,016
		124,757 to 124,758 acres of wetlands remaining in 2035	349,477 to 365,738 acres of natural land remaining in 2035		<27,842,309 tpy CO_2 emissions in 2035	Jobs: 419,206 Business Activity: $99.5B Tax Revenue: +$8.5-9.5M (municipal) +$16-18M (state)

Table 3.3-25 Summary of Direct Impacts

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Description	Minor bus schedule enhancements	Electric or diesel commuter rail service to South Station using the Northeast Corridor, Stoughton Line, New Bedford Main Line, and Fall River Secondary. Ten new commuter rail stations would be constructed (North Easton, Easton Village, Raynham Park, Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction would occur at two existing commuter rail stations (Canton Center and Stoughton).		Variation of the Stoughton Alternative route using the abandoned Whittenton Branch right-of-way through the City of Taunton to avoid the Pine Swamp in Raynham. Ten new commuter rail stations would be constructed (North Easton, Easton Village, Raynham Park, Dana Street, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove and major reconstruction would occur at two existing commuter rail stations (Canton Center and Stoughton).	
Capital Cost (billions)	N/A	$1.82	$1.27	$1.82	$1.27
Operating and Maintenance Cost (millions)	N/A	$33.9	$33.8	$36.2	$36.1
Cost per rider[1]	N/A	$35.28	$29.71	$39.60	$33.32
Years to Construct	N/A	4.5	4	4.5	4
Transportation (Section 4.1)					
Reduction in Daily Regional Vehicle Miles Traveled (2035)	N/A	-255,932	-240,348	-201,232	-186,306
Travel Time- New Bedford to South Station (peak period), 2035	100	77	82	84	89
Daily Ridership (2035) at new stations[2]	N/A	4,570	4,430	4,040	3,930
Increase in Total Commuter Rail System Daily Ridership (2035)	N/A	10,300	9,750	9,400	8,950

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Land Use and Zoning (Section 4.2)					
Total Acreage to be Acquired (private and public)	0	136.73	134.33	136.83	134.63
Socioeconomics (Section 4.3)					
Residential Displacements	0	4	4	3	3
Business Displacements	0	6	6	6	6
Property Tax Revenue[3] Loss	0	$197,251	$197,251	$181,351	$181,351
Environmental Justice (Section 4.4)					
Noise Impacts in Environmental Justice Neighborhoods (number of residences impacted by moderate and severe increases in noise levels)	N/A	361		842	
Percent of Total Noise Impacts in Environmental Justice Neighborhoods	N/A	25%		30%	
Vibration Impacts in Environmental Justice Neighborhoods (impacted sensitive receptors)	N/A	86		105	

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Percent of Total Vibration Impacts in Environmental Justice Neighborhoods	N/A	23%		25%	
Visual Resources (Section 4.5)					
	Minimal impact.	Moderate overall impact on visual resources. Substantial impacts would occur in the out-of-service portion of the Stoughton line segment, from the Stoughton Station south to Weir Junction.	Moderate impact on visual resources overall, but less than Stoughton Electric because overhead electrical infrastructure would not be needed.	Moderate overall impact on visual resources. Substantial impacts would occur in the out-of-service portion of the Stoughton line and Whittenton Branch segments, from the Stoughton Station south to Raynham Junction and on to Whittenton Junction.	Moderate impact on visual resources overall, but less than Whittenton Electric because overhead electrical infrastructure would not be needed.
Noise (Section 4.6)					
Moderate Impacts Before Mitigation (# of Sensitive Receptors)	N/A	1,106	1,085	1,232	1,228
Severe Impacts Before Mitigation (# of Sensitive Receptors)	N/A	341	344	381	367
Vibration (Section 4.7)					
Impacted Residences (Without Mitigation)	0	369	369	417	417
Cultural Resources (Section 4.8)					
Direct Impacts to Historic Resources	0	5	5	5	5

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Indirect Impacts to Historic Resources (Visual Impacts)	0	25	9	32	11
Indirect Impacts to Historic Resources (Noise Impacts)	0	0	16	0	14
Indirect Impacts to Historic Resources (Visual and Noise Impacts)	0	35	19	33	19
Known Archaeological Sites	0	10	10	11	11
Air Quality (Section 4.9)					
Exceedance of National Ambient Air Quality Standards?	No	No	No	No	No
Regional Volatile Organic Compound Emissions (kg/day)	22,200	22,160	22,160	22,170	22,170
Regional Oxides of Nitrogen Emissions (kg/day)	19,256	19,159	19,210	19,169	19,227
Regional Particulate Matter 10 Emissions (kg/day)	3,240	3,240	3,241	3,240	3,241
Regional Particulate Matter 2.5 Emissions (kg/day)	1,490	1,490	1,491	1,490	1,491

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Regional Carbon Monoxide Emissions (kg/day)	1,050,356	1,048,074	1,048,400	1,048,554	1,048,908
Regional Carbon Dioxide Emissions (Tons/Year)	24,717,339	24,656,479	24,688,173	24,667,849	24,703,175
Open Space (Section 4.10)					
Land Acquisition from Protected Open Space (acres)	0	0.16	0.16	0.16	0.16
Farmland (Section 4.11)					
Impacts to Designated Farmland Soils (Acres)	0	18.6	16.0	18.8	16.2
Hazardous Materials (Section 4.12)					
Recognized Environmental Conditions (including layover facilities)[23]	0	39	39	42	42
Geology (Section 4.13)					
	No long-term adverse impacts	No long-term adverse impacts		No long-term adverse impacts	

[23] Sites with the presence or likely presence of hazardous materials.

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Biodiversity (Section 4.14)					
Upland Habitat Loss (acres)	0	182.27	178.78	187.98	183.87
Wetland Habitat Loss (acres)	0	12.3	12.3	11.2	11.2
Vernal Pool Habitat Loss (acres)	0	1.43	1.43	0.8	0.8
Loss of Supporting Vernal Pool Upland Habitat (acres)	0	43.40	43.40	41.61	41.61
Habitat Fragmentation	None	Increase in existing habitat fragmentation would result from reconstructing the Stoughton Line on the currently unused railbed, including in the Hockomock Swamp ACEC and the Pine Swamp.		Increase in existing habitat fragmentation would result from reconstructing the Stoughton Line and Whittenton Branch on currently unused railbeds, including in the Hockomock Swamp ACEC.	
Threatened and Endangered Species (Section 4.15)					
Impacted Species Habitat	None	Impacts to the habitat of eight state-listed species (blue-spotted salamander, Blanding's turtle, eastern box turtle, coastal swamp amphipod, mocha emerald dragonfly, Hessel's hairstreak, pale green pinion moth, and water-willow stem borer). Barrier effect on blue-spotted salamander, Blanding's turtle, and eastern box turtle considered moderate impacts.		Impacts to the habitat of eight state-listed species (blue spotted salamander, Blanding's turtle, eastern box turtle, coastal swamp amphipod, mocha emerald, Hessel's hairstreak, pale green pinion moth, and water-willow stem borer moth). Barrier effect on Blue-spotted salamander, Blanding's turtle, and eastern box turtle considered moderate impacts.	
Loss of migratory route habitat (barrier effect) (linear feet)	0	3.2 miles	3.2 miles	3.6 miles	3.6 miles

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Wetland Resources (Section 4.16)					
Waterway Direct Permanent (acres)	0	1.9	1.9	1.8	1.8
Vegetated Wetland Direct Permanent Impacts (acres)	0	10.4	10.4	9.4	9.4
Total Federal Wetland Impacts (acres)	0	12.3	12.3	11.2	11.2
Wetlands Impacts within ACECs (acres)	0	0.2	0.2	0.2	0.2
Bank (lf)	0	16,813	16,813	16,581	16,581
Outstanding Resource Waters (acres)	0	1.5	1.5	1.1	1.1
Bordering Land Subject to Flooding (acres)	0	6.7	6.7	5.0	5.0
Riverfront Area (acres)	0	7.9	7.9	7.8	7.8
Water Resources (Section 4.17)					
	None	Surface and groundwater resources would not be impaired due to the use of stormwater treatment practices.		Surface and groundwater resources would not be impaired due to the use of stormwater treatment practices.	

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Coastal Zone (Section 4.18)					
Consistent with Massachusetts Coastal Zone Management Program (MCZMP) Policies?	N/A	Yes	Yes	Yes	Yes
Number of Chapter 91 Regulated Resources Crossed[5]	0	36	36	31	31

1 Annualized capital cost and annual operating and maintenance cost estimates divided by annual passengers.
2 New daily round-trip transit trips at proposed South Coast Rail stations
3 Additional property tax revenue losses may result from small and/or partial acquisitions.
4 Sites with the presence or likely presence of hazardous materials
5 Massachusetts General Law Chapter 91 is implemented by Massachusetts Regulations at 310 CMR 9.00 (Waterways Regulations). The purpose of Chapter 91 and the Waterways Regulation is to protect certain public rights that are inherent in tidal waters of the Commonwealth and certain non-tidal rivers and streams. New construction, changes in use or substantial expansions of existing structures within these jurisdictional areas require approval under these regulations.

3.3.4 APPLICANT'S PREFERRED ALTERNATIVE

The EPA regulations at 40 CFR part 230 (the Section 404(b)(1) Guidelines) state (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 environmental consequences."

This summary provides an overview of the alternatives. The first step in the alternatives analysis is to determine whether the alternative meets the project purpose. Based on the analysis it was determined that all four Build Alternatives meet the project purpose.

The second step in the evaluation determines whether an alternative is practicable. Based on the analysis it was determined that all four Build Alternatives are practicable.

The third step in the alternatives analysis includes two sub-criteria: beneficial environmental effects and environmental impacts. The full extent of this information is presented in Tables 3.3-24 and 3.3-25, in the preceding sections, and in Chapters 4 and 5 of this FEIS/FEIR. The results are summarized below.

3.3.4.1 Findings

Having determined that the Attleboro and Rapid Bus alternatives – including the various permutations of each – are not practicable alternatives, we are left to consider whether the Whittenton route, and diesel or electric mode of each, would have less adverse impact on the aquatic ecosystem than the alternative that is proposed (i.e., the applicant's preferred alternative), without having other significant adverse environmental consequences. We can conclusively state that the Stoughton Alternative meets the overall project purpose and that it is practicable. The Whittenton Alternative also meets the overall project purpose albeit to a lesser degree: It is predicted to have slightly lower overall ridership than the Stoughton Route, and in particular, it draws fewer riders from the target termini of New Bedford and Fall River. Some (notably, citizens and leaders of those cities) would argue that it therefore does not meet the intent of the overall project purpose: "to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts, and to enhance regional mobility." On this point however, others have reasonably questioned whether a roughly 8-minute longer (one-way) daily commute would indeed cause the non-trivial reductions in ridership predicted by the models. The Corps has concluded that the Whittenton Alternative ridership numbers are not so low that this alternative could be considered as failing to meet the overall project purpose.

From this, we are left to determine whether the Whittenton Alternative is practicable. As previously mentioned, practicable means "available and capable of being done considering costs and logistics in light of overall project purposes" (40 CFR 230.10(a)(2). The Whittenton route is wholly owned by MassDOT and was in fact the route last used for passenger service between Boston and New Bedford up until 1958 when operations ceased. Therefore, it is unquestionably available. Moreover, the costs of the Whittenton Alternative are only marginally higher than would be the Stoughton Alternative, and are not the deciding factor with respect to practicability. The practicability of the Whittenton Route, then, rests on its logistical feasibility. Some commenters (notably, citizens and leaders of Taunton) have argued that it is not, based on the substantially higher number of at-grade crossings and the overall impacts to the already congested downtown Taunton area. Public safety is another issue with regard to logistics, and it is not a trivial matter that doubling the number of at-grade crossings in Taunton at least doubles the likelihood of a serious incident such as a life-threatening collision between a train and a vehicle or

person in that community. The Federal Railroad Administration has indicated that such situations are not ideal; however they also are not insurmountable from the perspective of general rail operations, and there are examples of municipalities with similar or greater logistical constraints than would be encountered in the City of Taunton under a Whittenton Alternative. Therefore, we conclude that the Whittenton Alternative is indeed a practicable alternative.

The determination, therefore, rests on a comparison of the overall environmental impacts of the Stoughton and Whittenton Routes (and diesel or electric modes). On initial inspection, it is readily seen that the Stoughton Alternative has greater impacts to aquatic resources – approximately 1.0 acre more wetland would be filled under the Stoughton Route than under the Whittenton Route. While both routes would affect Hockomock Swamp equally, the Whittenton route would bypass Pine Swamp and other wetlands north and south of Pine Swamp, and thus would result in fewer acres of wetland loss than would the Stoughton Route. As noted in the USEPA Guidelines, "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 environmental consequences"* (emphasis added). The Guidelines do not limit other significant adverse environmental consequences to the aquatic environment.

Thus the determination rests on whether the impacts to other environmental resources of the Whittenton route outweigh the slightly higher aquatic resource impacts of the Stoughton Route. Such environmental resource impacts are relevant to the natural environment in general and the human environment in particular. These include effects to cultural resources, public safety and environmental justice communities, and other environmental resource impacts including (but not limited to) air quality, water quality, endangered species, biodiversity and open space.

The four Build Alternatives are similar in the extent of their benefits and impacts, due to the fact that they differ for only a small portion of their alignments.

In terms of alignment, the Stoughton Alternatives would have greater benefits to the South Coast Rail communities with respect to transportation, air quality, and fewer noise impacts (particularly to Environmental Justice communities) than the Whittenton Alternatives. The Stoughton Alternatives serve more people with public transportation, more people from the South Coast communities, and provide the shortest travel time and the greatest benefit to the Freeway system. The Whittenton Alternatives would result in higher emissions of CO, NOx, VOCs, and CO2 than the Stoughton Alternatives, due to the difference in VMT and the greater reduction in VMT associated with the Stoughton Alternatives.

With the exception of having slightly less impact to aquatic resources, the Whittenton Alternative would have greater adverse impacts to the upland habitat of state-listed species and to ecological integrity as measured by the CAPS analysis. The Whittenton Alternative would have less impact to vegetated wetlands (1.0 acre) than the Stoughton Alternative, as a result of avoiding the wetlands between Route 138 in Raynham and Longmeadow Road in Taunton – including wetlands within Pine Swamp. The wetlands and vernal pools that have formed on the right-of-way between East Brittania Street and Thrasher Street (0.9 acre) represent the majority of impacts; the impacts in Pine Swamp are comparatively small, since the new rail service would be placed on existing fill (the former Old Colony Dighton & Somerset right-of-way corridor abandoned ca. 1916). Otherwise, both alternatives have the same impacts to waterways, wetlands, vernal pools and rare species habitat within the Hockomock Swamp Area of Critical Environmental Concern. The Stoughton Alternative would have less impact to ecological integrity (as demonstrated by the CAPS analysis) and to upland habitat of state-listed species

(Blandings turtles; *Emydoidea blandingii* and eastern box turtles; *Terrapene carolina*) than the Whittenton Alternative (see Table 3.3-26).

Table 3.3-26 Comparison of Aquatic and Biotic Resource Impacts

Resource	Whittenton Electric Alternative	Stoughton Electric Alternative	Whittenton Difference (amount of loss)
Waterways	1.8 ac	1.9 ac	-0.1
Wetlands (federal)	9.4 ac	10.4 ac	-1.0 ac
Wetlands and Waterways in Hockomock Swamp ACEC	1.7 ac	1.7 ac	0
Loss of Vernal Pool Habitat (fill placed in vernal pool)	0.36 ac	0.53 ac	-0.2 ac
Loss of Vernal Pool Habitat (fill placed in adjacent wetlands)	0.8 ac	1.43 ac	-0.6 ac
Rare Species Barrier Effect	3.6 miles	3.2 miles	+0.4 mile
Loss of Ecological Integrity (IEUs)- With Trestle	484.6	474.5	+10.1 IEUs

The Whittenton Alternative, because of its route through downtown Taunton and the number of grade crossings in this segment, would have greater adverse noise impacts to populated areas in general and environmental justice populations in particular. An additional 1,341 residences would experience noise impacts, of which 481 would be minority or low-income families. As shown below in Table 3.3-27, the combined moderate and severe noise impacts (including the Southern Triangle) would be substantially higher for the Whittenton Alternative—with a 93 percent increase in the noise impacts to environmental justice residences. The Whittenton Alternative would also have greater vibration impacts in environmental justice areas than the Stoughton Alternative (105 compared to 86). While vibration impacts under both the Stoughton and Whittenton Alternatives would disproportionately impact environmental justice areas in Fall River, the Whittenton Alternative would also disproportionately impact environmental justice areas in Taunton.

Table 3.3-27 Comparison of Noise Impacts—Environmental Justice Populations

Noise Impacts	Whittenton Alternative	Stoughton Alternative	Whittenton Difference
Environmental Justice Residences	842	361	+ 481 (133%)
Non-Environmental Justice Residences	1,945	1,085	+ 860 (79%)
Total Residences	2,787	1,446	+1,341 (93%)

Note: Includes both moderate and severe impacts from train operation, plus horn noise impacts.

We also find that the Whittenton Alternative would result in greater overall air quality impacts than would the Stoughton Route. The result of the Whittenton Alternative would be that more vehicles would remain on the highways and thus there would be more VMT under a Whittenton option than under a Stoughton option, resulting in greater greenhouse gas emissions.

To be sure, the greater impacts to wetlands along the Stoughton Route are not trivial; however the loss of 1.0 more acre of wetlands must be weighed against the higher impacts to biodiversity, threatened and endangered species, air quality and cultural resources associated with the Whittenton Alternative.

Thus a comparison of the comprehensive environmental impacts (including secondary and cumulative impacts) of the Stoughton and Whittenton Alternatives leads us to conclude that, overall, there is no less environmentally damaging alternative than the Stoughton Alternatives. Furthermore, in terms of propulsion technology (electric or diesel) the diesel alternative has a greater overall impact on air quality compared to the electric alternatives.

The Corps has therefore determined that there is no practicable alternative to the Stoughton Electric Alternative which would have less adverse impact on the aquatic ecosystem, and also does not have other significant adverse environmental consequences.