Appendix 3.2-H

CTPS Updated Ridership Analyses for the FEIS/FEIR

Note: This appendix provides two CTPS riderhip memos. The February 26, 2013 memo provides the most up-to-date ridership results for the Stoughton and Whittenton Alternatives (both electric and diesel variants). An earlier CTPS memo (December 17, 2012) pertains only to the Stoughton and Whittenton Electric Alternatives, but is included in this appendix because it also provides a discussion of the updates incorporated in the CTPS regional travel demand model since the work conducted for the DEIS/DEIR. Finally, please note that there is an error in Table 2, "South Coast Rail FEIR Selected Daily Auto and Transit Metrics For Air Quality " in the February 26, 2013 memo. The table does not include transit vehicle emissions (displaying results for automobile mode only). See Table 4.9-20 of the FEIS/FEIR for the summary of total regional emissions (including bus and rail transit emissions). The information in Table 4.9-20 was derived from detailed backup provided in Appendix C of the February 26, 2013 CTPS Memo.

DRAFT MEMORANDUM

DATE **February 26, 2013**
TO **Jean Fox, South Coast Rail Manager at MassDOT**
FROM **Scott Peterson, Director of Technical Services**
RE **FEIR Analysis – Updated Results including Diesel Options**

Introduction

In support of the South Coast Rail (SCR) environmental analysis, the Central Transportation Planning Staff (CTPS) was requested by the Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning to conduct the travel demand analysis associated with the South Coast Rail Final Environmental Impact Report (FEIR) alternatives analysis. This was done using an updated version of the CTPS travel demand model that pivoted off of the work CTPS performed for the Draft Environmental Impact Report (DEIR). The improvements included updated demographic data for the future years and newer information on future year background transportation projects that are consistent with the Long Range Transportation Plans (LRTP) of the Metropolitan Planning Organizations (MPO's) in the study area. Seven scenarios were examined in this analysis. Five scenarios were examined using the travel demand model and the results of which were described in a memo dated December 17, 2012. Two new scenarios were added to the analysis since December 2012, which consist of diesel options for the Stoughton and Whittendon alternatives which have slower travel times and were examined using an elasticity based method.

1. Base Year – Year is 2010
2. True No-Build – Year is 2035
3. No-Build/Transportation System Management Option (TSM) – Year is 2035
4. Stoughton Electric Alternative – Year is 2035
5. Whittenton Electric Alternative – Year is 2035
6. Stoughton Diesel Alternative – Year is 2035
7. Whittenton Diesel Alternative – Year is 2035

The True No-build assumes land use changes and the transportation projects included in the LRTP. The True No-build includes existing private bus service from New Bedford, Fall River, and Taunton into Boston. The No-build/TSM pivots off of the True No-build and improves the frequency of the private bus operations serving the South Coast rail Study area. The two new scenarios examined using elasticities were diesel options of the Stoughton and Whittenton alternatives, number 6 and 7. 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 performance metrics examined, include linked and unlinked transit trips by mode, station boardings in the study area, Vehicle Miles Traveled (VMT) in the System, and emissions estimates for various pollutants.

Summary of Findings

The four key transit metrics presented in Table 1 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 systemwide transit results are included in Appendix A. Station level and mode of access data are presented in Appendix B.

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 TSM 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 9,310 unlinked transit trips to the True No-Build, while the Whittenton Electric option adds 8,210 unlinked trips to the True No-Build. Relative to the TSM they add 7,100 and 6,000 unlinked transit trips, respectively. 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 9,010 more unlinked trips than the True No-build, 300 less than the electric option. The Whittenton Diesel option has 8,010 more unlinked trips than the True 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 No-Build/TSM experiences a small improvement over the No-Build, adding 1,900 daily linked transit trips. The Stoughton Electric adds 7,400 more linked transit trips and the Whittenton Electric option adds 6,600 daily linked transit trips relative to the True No-build. The Stoughton Diesel option has 7,100 new linked transit trips and the Whittenton Diesel option 6,250 new linked transit trips relative

to the True No-build. The reasons for these differences are the same as for the unlinked transit trips described above.

The commuter rail system, based on conductor's counts, had 145,000 daily boardings in 2010, which grows to 178,200 in the 2035 No-Build scenario. This increase is due to demographic growth and some improvements to the commuter rail system, examples of which are listed below.

- Fitchburg commuter rail travel time improvements
- Additional stations on the Fairmount Line
- Additional stations in Rhode Island on the Providence Line
- Yawkey Station is made a full-time stop

The No-Build/TSM 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 9,810 boardings daily to the commuter rail system and the Whittenton Electric option adds 8,910 boardings daily to the commuter rail system relative to the True No-build. The Stoughton Diesel option adds 9,260 boardings and the Whittenton Diesel option adds 8,460 boardings relative to the True 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 the 2035 True No-Build scenario. The No-Build/TSM 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 True No-build. The Stoughton Diesel option has 1,250 private bus trips and the Whittenton Diesel option 1,350 new private bus trips relative to the True No-build. This is about 150 boardings more than the corresponding electric options.

Table 2 summarizes the traffic and CO2 metrics, while a more detailed breakdown of this information can be found in Appendix C. The emissions are a function of the change in passenger vehicles on the road due to the project and the change in transit vehicles being used. The No-Build/TSM with its improved bus service reduces passenger vehicle miles traveled (VMT) by 58,000 miles daily. The Stoughton Electric and Whittenton Electric options reduce VMT by 310,200 and 255,500 respectively. The change in VMT is a result people shifting from the auto mode to the transit option being improved. The vehicle hours traveled (VHT) is a proxy for time people spend in traffic as a result of congestion. The No-build/TSM reduces VHT by 3,300 hours daily. This reduction increases to 15,600 and 12,500 hours for the Stoughton Electric and Whittenton Electric options respectively. CO2 is a function of the VMT in this analysis and follows the same patterns, since this analysis didn't account for point source emissions (power plants) that produced the electricity. The diesel options, Stoughton and Whittendon, reduce VMT a little less than their electric counterparts: 297,200 and 243,500 respectively. Nitrous Oxide (NOx) experiences an increase in the TSM due to

more bus emissions being produced than the passenger vehicles emissions from auto trips being diverted to transit are being reduced for NOx. Both electric options experience the greatest reduction thanks to the technology being used, ranging from minus 50 kg to minus 40 kg. The diesel options produce more NOx, due to the characteristics of diesel fuel being burnt, with both alternatives showing an increase in NOx of 20 to 30 kg daily. The pattern for the Volatile Organic Compounds (VOC) follow a similar pattern as NOx, with the exception that the TSM ends up showing a reduction of minus 10 kg along with both diesel options.

Conclusion

The electric options attracts more riders than the diesel option due to the faster travel times, which is a function of faster acceleration of the electric technology being used by the locomotives. 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. Auto diversions, vehicle miles of travel, and air quality were also examined in this analysis and the results will be presented in a subsequent memo. The air quality analysis shows that the technology drives the benefits. Electric technology provides significantly more emissions savings than the diesel options and the TSM alternative when you combine the transit vehicle emissions with the passenger vehicle emissions being saved.

TABLE 1
South Coast Rail FEIR
Daily Transit Results

Year	2010	2035	2035	2035	2035	2035	2035
Scenario	Existing Conditions	True No-Build	No-Build / TSM	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 True No-Build	na	na	2,210	9,310	8,210	9,010	8,010
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 True No-Build	na	na	1,900	7,400	6,600	7,100	6,250
Commuter Rail (1)	145,000	178,200	177,710	188,010	187,110	187,460	186,660
Difference with True No-Build	na	na	-490	9,810	8,910	9,260	8,460
Study Area Private Buses (2)	1,600	4,100	6,000	1,100	1,200	1,250	1,350
Difference with True No-Build	na	na	1,900	-3,000	-2,900	-3,000	-2,900

(1) Commuter system calibrated to conductors counts

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

TABLE 2
South Coast Rail FEIR
Selected Daily Auto and Transit Metrics
For Air Quality

Year Scenario	**2035** True No-Build	**2035** No-Build / TSM	**2035** Stoughton Electric	**2035** Whittenton Electric	**2035** Stoughton Diesel	**2035** Whittenton Diesel
VMT	118,952,000	118,894,000	118,641,800	118,696,500	118,654,800	118,708,500
Difference with No-Build	na	-58,000	-310,200	-255,500	-297,200	-243,500
VHT	3,959,800	3,956,500	3,944,200	3,947,300	3,944,700	3,947,700
Difference with No-Build	na	-3,300	-15,600	-12,500	-15,100	-12,100
NOx (kg)						
Difference with No-Build	na	36	-61	-51	20	30
VOC (kg)						
Difference with No-Build	na	-10	-50	-40	-10	-10
CO2 (1)						
Difference with No-Build	na	-0.026	-0.193	-0.162	-0.106	-0.065

(1) in millions of kg

APPENDIX A
Systemwide Transit Summary

South Coast Rail FEIR
Systemwide Transit Summary

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Average Daily Performance Measures for Transit Trips in the 182 Community Model Area	2006 Alternative	2010 Alternative	2035 True No-Build			2035 No-build/TSM			2035 Stoughton Electric			2035 Whittenton Electric			2035 Stoughton Diesel			2035 Whittenton Diesel		
	Base Year	Base Year	Boardings	% Diff with Base Year	Diff with Base Year	Boardings	% Diff with No-build	Diff with No-build	Boardings	% Diff with TSM	Diff with TSM	Boardings	% Diff with TSM	Diff with TSM	Boardings	% Diff with TSM	Diff with TSM	Boardings	% Diff with TSM	Diff with TSM
Middleboro Route CRR Line Total	11,000	10,600	11,200	9.8%	600	11,000	-1.8%	-200	10,600	-3.6%	-400	10,600	-3.6%	-400	10,650	-3.2%	-350	10,650	-3.2%	-350
Middleboro Route Inbound Total	5,500	5,300	5,600	9.8%	300	5,500	-1.8%	-100	5,300	-3.6%	-200	5,300	-3.6%	-200	5,325	-3.2%	-175	5,325	-3.2%	-175
Attleboro Route CRR Line Total	19,850	21,800	25,000	14.9%	3,200	24,700	-1.2%	-300	22,800	-7.7%	-1,900	23,000	-6.9%	-1,700	22,900	-7.3%	-1,800	23,100	-6.5%	-1,600
Attleboro Route Inbound Total	9,925	10,900	12,500	14.9%	1,600	12,350	-1.2%	-150	11,400	-7.7%	-950	11,500	-6.9%	-850	11,450	-7.3%	-900	11,550	-6.5%	-800
Stoughton Route CRR Line Total	9,750	8,600	9,300	8.4%	700	9,200	-1.1%	-100	21,700	135.9%	12,500	20,600	123.9%	11,400	21,000	128.3%	11,800	20,000	117.4%	10,800
Stoughton Route Inbound Total	4,875	4,300	4,650	8.4%	350	4,600	-1.1%	-50	10,850	135.9%	6,250	10,300	123.9%	5,700	10,500	128.3%	5,900	10,000	117.4%	5,400
Study Area CRR Lines	**40,600**	**41,000**	**45,500**	**11.0%**	**4,500**	**44,900**	**-1.3%**	**-600**	**55,100**	**22.7%**	**10,200**	**54,200**	**20.7%**	**9,300**	**54,550**	**21.5%**	**9,650**	**53,750**	**19.7%**	**8,850**
Study Area Inbound Total	20,300	20,500	22,750	11.0%	2,250	22,450	-1.3%	-300	27,550	22.7%	5,100	27,100	20.7%	4,650	27,275	21.5%	4,825	26,875	19.7%	4,425
Other CRR Lines	96,400	104,000	132,700	24.7%	28,700	132,810	0.1%	100	132,910	0.1%	100	132,910	0.1%	100	132,910	0.1%	100	132,910	0.1%	100
Total CRR - ALL Lines	137,000	145,000	178,200	22.9%	33,200	177,710	-0.3%	-500	188,010	5.8%	10,300	187,110	5.3%	9,400	187,460	5.5%	9,750	186,660	5.0%	8,950
SCR Rapid Bus Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCR Private Buses	1,800	1,600	4,100	156.3%	2,500	6,000	46.3%	1,900	1,100	-81.7%	-4,900	1,200	-80.0%	-4,800	1,250	-79.2%	-4,750	1,350	-77.5%	-4,650
Study Area Transit (CRR+Prvt Bus)	**42,400**	**42,600**	**49,600**	**16.4%**	**7,000**	**50,900**	**2.6%**	**1,300**	**56,200**	**10.4%**	**5,300**	**55,400**	**8.8%**	**4,500**	**55,800**	**9.6%**	**4,900**	**55,100**	**8.3%**	**4,200**
MBTA Bus Total	370,600	380,700	464,800	22.1%	84,100	464,900	0.0%	100	465,200	0.1%	300	465,200	0.1%	300	465,300	0.1%	400	465,300	0.1%	400
Orange Line Total	159,600	170,200	226,900	33.3%	56,700	227,200	0.1%	300	227,800	0.3%	600	227,700	0.2%	500	227,800	0.3%	600	227,700	0.2%	500
Red Line Total	226,400	231,400	293,200	26.7%	61,800	293,300	0.0%	100	293,600	0.1%	300	293,500	0.1%	200	293,600	0.1%	300	293,500	0.1%	200
Blue Line Total	50,540	62,400	72,100	15.6%	9,700	72,100	0.0%	-	72,200	0.1%	100	72,200	0.1%	100	72,200	0.1%	100	72,200	0.1%	100
Green Line Total	237,400	249,400	312,000	25.1%	62,600	312,100	0.0%	100	312,300	0.1%	200	312,300	0.1%	200	312,300	0.1%	200	312,300	0.1%	200
Silver Line Phase I & II Total	20,200	25,600	56,100	119.1%	30,500	56,300	0.4%	200	56,500	0.4%	200	56,400	0.2%	100	56,500	0.4%	200	56,400	0.2%	100
Silver Line Phase I, II, & III Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Urban Ring Phase II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Transportation	5,000	4,400	4,600	4.5%	200	4,600	0.0%	-	4,600	0.0%	-	4,600	0.0%	-	4,600	0.0%	-	4,600	0.0%	-
Unlinked Transit Trips	**1,208,540**	**1,270,700**	**1,612,000**	**26.9%**	**341,300**	**1,614,210**	**0.6%**	**2,200**	**1,621,310**	**0.4%**	**7,100**	**1,620,210**	**0.4%**	**6,000**	**1,621,010**	**0.4%**	**6,800**	**1,620,010**	**0.4%**	**5,800**
Linked Transit Trips	**1,013,700**	**1,018,000**	**1,294,400**	**27.2%**	**276,400**	**1,296,300**	**0.1%**	**1,900**	**1,301,800**	**0.4%**	**5,500**	**1,301,000**	**0.4%**	**4,700**	**1,301,500**	**0.4%**	**5,200**	**1,300,650**	**0.3%**	**4,350**
Walk Access (Walk+Xfer)	899,200	903,300	1,164,960	29.0%	261,660	1,165,500	0.0%	540	1,167,300	0.2%	1,800	1,167,000	0.1%	1,500	1,167,200	0.1%	1,700	1,166,900	0.1%	1,400
Drive Access (KNR+PNR)	114,500	114,700	129,440	12.9%	14,740	130,800	1.1%	1,360	134,500	2.8%	3,700	134,000	2.4%	3,200	134,300	2.7%	3,500	133,750	2.3%	2,950
Transfer Ratio	1.19	1.25	1.25		1.23	1.25		1.16	1.25		1.29	1.25		1.28	1.25		1.31	1.25		1.33

APPENDIX B
Station Level and Mode of Access Data

South Coast Rail Study
Station Boarding Results

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Location		2010 Existing Conditions									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	3,410	1,710	0	100	1,600	0	0	0	0	0
2	Back Bay	1,270	950	0	10	310	710	500	140	50	20
3	Ruggles	170	100	0	10	60	100	60	20	10	10
4	Hyde Park	560	250	280	30	0	440	310	90	40	0
5	Rte 128 Station	710	0	600	110	0	590	410	120	60	0
6	Canton Junction	720	120	510	90	0	700	460	160	70	10
7	Canton Center	710	370	270	70	0	710	470	160	70	10
8	Stoughton	1,050	240	670	140	0	1,050	780	200	50	20
10	North Easton	na	na	na	na	na	na	na	na	na	na
11	Easton Village	na	na	na	na	na	na	na	na	na	na
12	Raynham	na	na	na	na	na	na	na	na	na	na
13	Taunton	na	na	na	na	na	na	na	na	na	na
14	Dana Street	na	na	na	na	na	na	na	na	na	na
15	Taunton Depot	na	na	na	na	na	na	na	na	na	na
16	Freetown	na	na	na	na	na	na	na	na	na	na
17	Fall River Depot	na	na	na	na	na	na	na	na	na	na
18	Battleship Cove	na	na	na	na	na	na	na	na	na	na
19	Kings Hwy	na	na	na	na	na	na	na	na	na	na
20	Whales Tooth	na	na	na	na	na	na	na	na	na	na
	Stoughton Line Totals	**8,600**	**3,740**	**2,330**	**560**	**1,970**	**4,300**	**2,990**	**890**	**350**	**70**
		4,300									

South Coast Rail Study
Station Boarding Results

Location		2035 True No-build									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	3,690	1,850	0	110	1,730	0	0	0	0	0
2	Back Bay	1,370	1,030	0	10	330	770	540	150	50	30
3	Ruggles	180	100	0	10	70	110	70	20	10	10
4	Hyde Park	600	260	300	30	10	470	330	100	40	0
5	Rte 128 Station	760	0	650	110	0	630	440	130	60	0
6	Canton Junction	780	120	550	90	20	760	500	170	80	10
7	Canton Center	770	410	280	80	0	770	510	170	80	10
8	Stoughton	1,140	260	730	150	0	1,140	850	220	50	20
10	North Easton	na	na	na	na	na	na	na	na	na	na
11	Easton Village	na	na	na	na	na	na	na	na	na	na
12	Raynham	na	na	na	na	na	na	na	na	na	na
13	Taunton	na	na	na	na	na	na	na	na	na	na
14	Dana Street	na	na	na	na	na	na	na	na	na	na
15	Taunton Depot	na	na	na	na	na	na	na	na	na	na
16	Freetown	na	na	na	na	na	na	na	na	na	na
17	Fall River Depot	na	na	na	na	na	na	na	na	na	na
18	Battleship Cove	na	na	na	na	na	na	na	na	na	na
19	Kings Hwy	na	na	na	na	na	na	na	na	na	na
20	Whales Tooth	na	na	na	na	na	na	na	na	na	na
	Stoughton Line Totals	**9,300**	**4,030**	**2,510**	**590**	**2,160**	**4,650**	**3,240**	**960**	**370**	**80**
		4,650									

South Coast Rail Study
Station Boarding Results

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Location		2035 TSM									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	3,650	1,830	0	110	1,710	0	0	0	0	0
2	Back Bay	1,360	1,020	0	10	330	780	540	150	50	40
3	Ruggles	180	100	0	10	70	110	70	20	10	10
4	Hyde Park	590	260	300	30	0	460	320	100	40	0
5	Rte 128 Station	750	0	640	110	0	620	430	130	60	0
6	Canton Junction	770	120	550	90	10	750	500	170	80	0
7	Canton Center	760	400	280	80	0	760	510	170	80	0
8	Stoughton	1,120	260	710	150	0	1,120	850	220	50	0
10	North Easton	na	na	na	na	na	na	na	na	na	na
11	Easton Village	na	na	na	na	na	na	na	na	na	na
12	Raynham	na	na	na	na	na	na	na	na	na	na
13	Taunton	na	na	na	na	na	na	na	na	na	na
14	Dana Street	na	na	na	na	na	na	na	na	na	na
15	Taunton Depot	na	na	na	na	na	na	na	na	na	na
16	Freetown	na	na	na	na	na	na	na	na	na	na
17	Fall River Depot	na	na	na	na	na	na	na	na	na	na
18	Battleship Cove	na	na	na	na	na	na	na	na	na	na
19	Kings Hwy	na	na	na	na	na	na	na	na	na	na
20	Whales Tooth	na	na	na	na	na	na	na	na	na	na
	Stoughton Line Totals	**9,200**	**3,990**	**2,480**	**590**	**2,120**	**4,600**	**3,220**	**960**	**370**	**50**
		4,600									

South Coast Rail Study
Station Boarding Results

DRAFT

Location		2035 Stoughton Electric									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	9,470	4,740	0	280	4,450	0	0	0	0	0
2	Back Bay	3,690	2,770	0	40	880	880	610	170	70	30
3	Ruggles	220	130	0	10	80	120	80	20	10	10
4	Hyde Park	620	270	310	30	10	460	320	100	30	10
5	Rte 128 Station	760	0	650	110	0	600	420	130	50	0
6	Canton Junction	730	120	520	90	0	710	470	160	80	0
7	Canton Center	700	370	260	70	0	700	470	150	80	0
8	Stoughton	940	220	590	120	10	900	680	180	40	0
10	North Easton	460	110	320	30	0	450	310	80	50	10
11	Easton Village	150	120	0	30	0	150	120	20	10	0
12	Raynham	430	90	280	60	0	410	310	60	40	0
13	Taunton	670	230	260	120	60	620	480	100	40	0
14	Dana Street	na	na	na	na	na	na	na	na	na	na
15	Taunton Depot	400	80	220	60	40	380	290	60	30	0
16	Freetown	180	30	130	20	0	180	140	20	20	0
17	Fall River Depot	840	290	460	70	20	840	600	140	80	20
18	Battleship Cove	240	180	0	50	10	240	80	60	50	50
19	Kings Hwy	520	110	340	70	0	520	390	80	40	10
20	Whales Tooth	680	190	310	90	90	680	460	60	140	20
	Stoughton Line Totals	**21,700**	**10,050**	**4,650**	**1,350**	**5,650**	**8,840**	**6,230**	**1,590**	**860**	**160**
		10,850									

South Coast Rail Study
Station Boarding Results

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Location		2035 Whittenton Electric									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	8,990	4,500	0	270	4,220	0	0	0	0	0
2	Back Bay	3,500	2,630	0	40	830	830	580	160	70	20
3	Ruggles	210	120	0	10	80	110	70	20	10	10
4	Hyde Park	610	270	310	30	0	450	310	100	30	10
5	Rte 128 Station	800	0	680	120	0	630	440	140	50	0
6	Canton Junction	740	120	530	90	0	720	480	160	80	0
7	Canton Center	720	370	280	70	0	720	480	160	80	0
8	Stoughton	990	210	650	130	0	950	720	190	40	0
10	North Easton	490	110	350	30	0	480	330	90	50	10
11	Easton Village	150	120	0	30	0	150	120	20	10	0
12	Raynham	520	90	360	70	0	500	380	70	50	0
13	Taunton	na	na	na	na	na	na	na	na	na	na
14	Dana Street	320	50	220	50	0	310	240	50	20	0
15	Taunton Depot	360	70	210	60	20	340	260	50	30	0
16	Freetown	160	20	120	20	0	160	120	20	20	0
17	Fall River Depot	750	260	410	60	20	750	540	130	70	10
18	Battleship Cove	200	150	0	40	10	200	70	50	40	40
19	Kings Hwy	480	110	310	60	0	480	360	70	40	10
20	Whales Tooth	610	170	290	90	60	610	410	50	130	20
	Stoughton Line Totals	**20,600**	**9,370**	**4,720**	**1,270**	**5,240**	**8,390**	**5,910**	**1,530**	**820**	**130**
		10,300									

South Coast Rail Study
Station Boarding Results

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Location		2035 Stoughton Diesel									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	9,150	4,590	0	290	4,270	0	0	0	0	0
2	Back Bay	3,570	2,680	0	40	850	880	610	170	70	30
3	Ruggles	210	120	0	10	80	110	70	20	10	10
4	Hyde Park	600	260	300	30	10	460	320	100	30	10
5	Rte 128 Station	740	0	620	110	10	600	410	130	50	10
6	Canton Junction	710	110	490	90	20	710	460	160	80	10
7	Canton Center	680	360	250	70	0	670	440	140	80	10
8	Stoughton	910	210	560	120	20	860	650	170	40	0
10	North Easton	450	110	320	20	0	430	300	80	50	0
11	Easton Village	150	120	0	30	0	140	110	20	10	0
12	Raynham	420	90	280	50	0	390	290	60	40	0
13	Taunton	650	230	250	120	50	590	460	100	40	-10
14	Dana Street	na	na	na	na	na	na	na	na	na	na
15	Taunton Depot	390	80	220	60	30	360	270	60	30	0
16	Freetown	170	30	130	10	0	170	130	20	20	0
17	Fall River Depot	810	280	450	60	20	800	570	130	80	20
18	Battleship Cove	230	170	0	50	10	230	80	60	50	40
19	Kings Hwy	500	110	330	60	0	500	380	80	40	0
20	Whales Tooth	660	180	300	90	90	650	440	60	130	20
	Stoughton Line Totals	**21,000**	**9,730**	**4,500**	**1,310**	**5,460**	**8,550**	**5,990**	**1,560**	**850**	**150**
		10,500									

South Coast Rail Study
Station Boarding Results

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Location		2035 Whittenton Diesel									
Corridor		Daily Boardings	Access Mode				Inbound Boardings				
Station			Walk	PNR	KNR	Transit	Total	AM	MD	PM	NT
Stoughton											
1	South Station	8,720	4,370	0	290	4,060	0	0	0	0	0
2	Back Bay	3,400	2,550	0	30	820	830	580	160	70	20
3	Ruggles	200	110	0	10	80	110	70	20	10	10
4	Hyde Park	590	260	300	30	0	450	310	100	30	10
5	Rte 128 Station	780	0	650	120	10	630	430	140	50	10
6	Canton Junction	720	120	510	90	0	720	470	160	80	10
7	Canton Center	700	360	270	70	0	690	450	150	80	10
8	Stoughton	960	200	630	120	10	910	690	180	40	0
10	North Easton	480	110	350	20	0	460	320	90	50	0
11	Easton Village	150	120	0	30	0	140	110	20	10	0
12	Raynham	500	90	350	60	0	480	360	70	50	0
13	Taunton	na	na	na	na	na	na	na	na	na	na
14	Dana Street	310	50	220	40	0	300	230	50	20	0
15	Taunton Depot	350	70	200	60	20	330	250	50	30	0
16	Freetown	160	20	120	20	0	150	110	20	20	0
17	Fall River Depot	730	260	390	60	20	720	520	120	70	10
18	Battleship Cove	190	140	0	40	10	190	70	50	40	30
19	Kings Hwy	470	100	310	60	0	460	350	70	40	0
20	Whales Tooth	590	170	280	80	60	580	390	50	120	20
	Stoughton Line Totals	**20,000**	**9,100**	**4,580**	**1,230**	**5,090**	**8,150**	**5,710**	**1,500**	**810**	**130**
		10,000									

APPENDIX C
Highway and Transit Air Quality Metrics

South Coast Rail FEIR Study
Vehicle Emissions

Scenario	South Coast Rail FEIR Avg. Weekday Performance Measures								
	Auto Mode								
	VMT	VHT	MPH	CO kg	NOx kg	VOC kg	CO2 kg	PM2.5 kg	PM10 kg
2010 Base	109,926,000	3,655,700	30.07	1,516,100	118,010	48,810	61,190,310	3,010	4,780

Notes: VMT adjusted with HPMS data

All emission factors were developed using MOBILE 6.2, with inputs developed by MA DEP

CO emission factors are based on winter temperature and humidity assumptions

VOC, Nox, CO2, PM 2.5, and PM10 emission factors are based on summer temperature and humidity assumptions

South Coast Rail FEIR Study
Vehicle Emissions

Scenario	South Coast Rail FEIR 2035 Auto Mode Avg. Weekday Performance Measures										
	Linked Transit Trip	VMT	VHT	MPH	Avg Trip Length	CO kg	NOx kg	VOC kg	CO2 kg	PM2.5 kg	PM10 kg
Auto Mode Emissions											
NB	1,294,400	118,952,000	3,959,800	30.04	na	1,050,860	19,220	22,210	67,745,200	1,490	3,240
TSM	1,296,300	118,894,000	3,956,500	30.05	na	1,050,350	19,220	22,200	67,712,170	1,490	3,230
SLE	1,301,800	118,641,800	3,944,200	30.08	na	1,048,120	19,170	22,160	67,568,540	1,490	3,230
WLE	1,301,000	118,696,500	3,947,300	30.07	na	1,048,600	19,180	22,170	67,599,690	1,490	3,230
SLD	1,301,500	118,654,800	3,944,700	30.08	na	1,048,230	19,170	22,160	67,575,940	1,490	3,230
WLD	1,300,650	118,708,500	3,947,700	30.07	na	1,048,710	19,180	22,170	67,606,520	1,490	3,230
Auto Mode Emissions Deltas Relative to the No-build											
NB	na	na	na	na	na	na	na	na	na	na	na
TSM	1,900	-58,000	-3,300	0.01	30.5	-510	0	-10	-33,030	0	-10
SLE	7,400	-310,200	-15,600	0.04	41.9	-2,740	-50	-50	-176,660	0	-10
WLE	6,600	-255,500	-12,500	0.03	38.7	-2,260	-40	-40	-145,510	0	-10
SLD	7,100	-297,200	-15,100	0.04	41.9	-2,630	-50	-50	-169,260	0	-10
WLD	6,250	-243,500	-12,100	0.03	38.7	-2,150	-40	-40	-138,680	0	-10
Auto Mode Emissions Deltas Relative to the TSM											
NB	-1,900	58,000	3,300	-0.01	30.5	510	0	10	33,030	0	10
TSM	na	na	na	na	na	na	na	na	na	na	na
SLE	5,500	-252,200	-12,300	0.03	45.9	-2,230	-50	-40	-143,630	0	0
WLE	4,700	-197,500	-9,200	0.02	42.0	-1,750	-40	-30	-112,480	0	0
SLD	5,200	-239,200	-11,800	0.03	46.0	-2,120	-50	-40	-136,230	0	0
WLD	4,350	-185,500	-8,800	0.02	42.6	-1,640	-40	-30	-105,650	0	0

South Coast Rail FEIR Study
Vehicle Emissions

Scenario	South Coast Rail FEIR 2035 Transit Vehicles Avg. Weekday Performance Measures						
	VMT	CO kg	NOx kg	VOC kg	CO2 kg	PM2.5 kg	PM10 kg
Transit Vehicle Emissions Deltas Relative to the No-build							
NB	na	na	na	na	na	na	na
TSM	3,192	6	36	0	6,566	0	0
SLE	-540	-46	-11	0	-16,541	0	0
WLE	-540	-46	-11	0	-16,541	0	0
SLD	2,044	170	40	0	62,890	1	1
WLD	2,386	198	47	0	73,411	1	1
Transit Vehicle Emissions Deltas Relative to the TSM							
NB	-3,192	-6	-36	0	-6,566	0	0
TSM	na	na	na	na	na	na	na
SLE	-3,732	-51	-48	0	-23,108	0	0
WLE	-3,732	-51	-48	0	-23,108	0	0
SLD	-1,148	164	4	0	56,324	1	1
WLD	-806	192	11	0	66,845	1	1

South Coast Rail FEIR Study
Vehicle Emissions

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Scenario	South Coast Rail FEIR 2035 Total Avg. Weekday Performance Measures						
	VMT	CO kg	NOx kg	VOC kg	CO2 kg	PM2.5 kg	PM10 kg
Total Vehicle Emissions Deltas Relative to the No-build							
NB	na	na	na	na	na	na	na
TSM	-54,808	-504	36	-10	-26,464	0	-10
SLE	-310,740	-2,786	-61	-50	-193,201	0	-10
WLE	-256,040	-2,306	-51	-40	-162,051	0	-10
SLD	-295,156	-2,460	-10	-50	-106,370	1	-9
WLD	-241,114	-1,952	7	-40	-65,269	1	-9
Total Vehicle Emissions Deltas Relative to the TSM							
NB	54,808	504	-36	10	26,464	0	10
TSM	na	na	na	na	na	na	na
SLE	-255,932	-2,281	-98	-40	-166,738	0	0
WLE	-201,232	-1,801	-88	-30	-135,588	0	0
SLD	-240,348	-1,956	-46	-40	-79,906	1	1
WLD	-186,306	-1,448	-29	-30	-38,805	1	1

DRAFT MEMORANDUM

DATE **December 17, 2012**
TO **Jean Fox, South Coast Rail Manager at MassDOT**
FROM **Scott Peterson, Director of Technical Services**
RE **Results of the FEIR Analysis**

Introduction

In support of the South Coast Rail (SCR) environmental analysis, the Central Transportation Planning Staff (CTPS) was requested by the Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning to conduct the regional travel demand modeling work associated with the South Coast Rail Final Environmental Impact Report (FEIR) alternatives analysis. This was done using an updated version of the CTPS travel demand model that pivoted off of the work CTPS performed for the Draft Environmental Impact Report (DEIR). The improvements included updated demographic data for the future years and newer information on future year background transportation projects that are consistent with the Long Range Transportation Plans (LRTP) of the MPO's in the study area. Five scenarios were modeled:

1. Base Year – Year is 2010
2. No-Build – Year is 2035
3. No-Build/Transportation Management System Option (TSM) – Year is 2035
4. Stoughton Electric Alternative – Year is 2035
5. Whittendon Electric Alternative – Year is 2035

The performance metrics examined, include linked and unlinked transit trips by mode, station boarding's in the study area, Vehicle Miles Traveled (VMT) in the System, and emissions estimates for various pollutants.

Summary of Findings

The four key transit metrics presented in Table 1 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 No-Build scenario. Detailed breakdowns of the transit results are included in Appendix A. Station level and mode of access data are presented in Appendix B.

The transit system grows from 1.27 million unlinked transit trips in 2010 to 1.6 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 Stations are adding to the increase in transit trips in the future. The TSM represents a slight improvement of the private bus system and this adds 2,200 unlinked transit trips to the system daily. The Stoughton Electric option adds 9,310 unlinked transit trips to the No-Build, while the Whittendon Electric option adds a 8,210 unlinked trips to the No-Build. Relative to the TSM they add 7,100 and 6,000 unlinked transit trips. There are two reasons the Whittendon Electric option has less demand than the Stoughton Electric option:

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

TABLE 1
South Couth Rail FEIR
Daily Transit Results

Year Scenario	**2010** Existing Conditions	**2035** No-Build	**2035** No-Build / TSM	**2035** Stoughton Electric	**2035** Whittendon Electric
Unlinked Transit Trips	1,270,700	1,612,000	1,614,210	1,621,310	1,620,210
Difference with No-Build	na	na	2,210	9,310	8,210
Linked Transit Trip	1,018,000	1,294,400	1,296,300	1,301,800	1,301,000
Difference with No-Build	na	na	1,900	7,400	6,600
Commuter Rail (1)	145,000	178,200	177,710	188,010	187,110
Difference with No-Build	na	na	-490	9,810	8,910
Study Area Private Buses (2)	1,600	4,100	6,000	1,100	1,200
Difference with No-Build	na	na	1,900	-3,000	-2,900

(1) Commuter system calibrated to conductors counts
(2) Study area means the South Coast Rail project study area

The daily system wide linked transit trips grows from 1.02 million 2010 to 1.29 million in the 2035 No-build scenario. The No-Build/TSM experiences a small improvement over the No-Build, adding 1,900 daily linked transit trips. The Stoughton Electric adds 7,400

more linked transit trips and the Whittendon Electric option adds 6,600 daily linked transit trips. Relative to the TSM they add between 5,500 and 4,700 linked transit trips. The reasons for these differences are the same as for the unlinked transit trips described above. In this analysis, a linked transit trips is also closely related to auto diversions and discussed later in this section, differing only by the number of people that may carpool together.

The commuter rail system, based on conductor's counts, had 145,000 daily boardings in 2010, which grows to 178,200 in the 2035 No-Build scenario. This increase is due to demographic growth and some improvements to the commuter rail system, examples of which are listed below.

- Fitchburg commuter rail travel time improvements
- Additional stations on the Fairmount Line
- Additional stations in Rhode Island on the Providence Line
- Yawkey Station is made a full-time stop

The No-Build/TSM causes a decrease in commuter rail boardings, by 490. This option adds bus service in the study area, which siphons of commuter rail riders from the Providence, Stoughton, and Middleborough commuter rail lines. The Stoughton Electric option adds 9,810 boardings daily to the commuter rail system. The Whittendon Electric option adds 8,910 boardings daily to the commuter rail system.

The private bus system in the study area had 1,600 daily boardings in 2010, which is expected to grow to 4,100 in the 2035 No-Build scenario. The No-Build/TSM additional bus service adds service and increases ridership to 6,000, an increase of 1,900 boardings. Both commuter rail options provide more stations in the study area and offer faster travel times to South Station, resulting a loss of private bus boardings.

Table 2 summarizes the traffic and CO2 metrics, while a more detailed breakdown of this information can be found in Appendix C. The No-Build/TSM with its improved bus service reduces vehicle miles traveled (VMT) by 58,000 miles daily. The Stoughton Electric and Whittendon options reduce VMT by 310,200 and 255,500 respectively. The change in VMT is a result people shifting from the auto mode to the transit option being improved. The vehicle hours traveled (VHT) is a proxy for time people spend in traffic as a result of congestion. The No-build/TSM reduces VHT by 3,300 hours daily. This reduction increases to 15,600 and 12,500 hours for the Stoughton Electric and Whittendon Electric options respectively. CO2 is a function of the VMT in this analysis and follows the same patterns.

TABLE 2

South Couth Rail FEIR

Daily Highway and CO2 Results

Year	**2035**	**2035**	**2035**	**2035**
Scenario	No-Build	No-Build / TSM	Stoughton Electric	Whittendon Electric
VMT	118,952,000	118,894,000	118,641,800	118,696,500
Difference with No-Build	na	-58,000	-310,200	-255,500
VHT	3,959,800	3,956,500	3,944,200	3,947,300
Difference with No-Build	na	-3,300	-15,600	-12,500
CO2 (1)	67.745	67.712	67.569	67.600
Difference with No-Build	na	-0.033	-0.176	-0.145

(1) in millions of kg

Overview of the Model

The model set is of the same type as those used in most large urban areas in North America. It is used to simulate existing travel conditions and to forecast future-year travel on the entire transportation system spanning eastern Massachusetts, for the transit, auto, and walk/bike modes. The travel demand model is a tool that uses the best transportation networks, and input data available to CTPS at this time. The model set simulates multiple modes of travel for trips between areas in the modeled region, eastern Massachusetts. Population, employment, number of households, auto ownership, highway and transit levels of service, downtown parking costs, auto operating costs and transit fares are some of the most important inputs that are used in applying the model to a real world situation. These inputs are periodically updated so that the model set simulates current travel patterns with as much accuracy as possible.

The CTPS travel model set has been used in numerous modeling activities; examples include the Green Line Extension New Starts Study, and several Air Quality Conformity Determinations and LRTP for the Boston Region Metropolitan Planning Organization (MPO). In light of these activities, the four-step modeling methodology has been reviewed and accepted by the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) for regional planning activities.

Major Features of the Model

Some important features of the model set are listed below.

1. The modeled area encompasses 182 cities and towns in eastern Massachusetts. The area is divided into 2,918 internal Transportation Analysis Zones (TAZ's). There are 146 external stations around the periphery of the modeled area that allow for travel between the modeled area and adjacent areas of Massachusetts, New Hampshire, and Rhode Island.

2. The model set was developed using data from a Household Travel Survey, an External Cordon Survey, several Transit Passenger Surveys, the 2010 U.S. Census data, an employment database for the region, and a vast database of ground counts of transit ridership and traffic volume data collected over the last decade. CTPS obtained the most current transit ridership data and highway volumes available to help calibrate the model for use in this study.

3. The transportation system is broken down into three primary modes. The transit mode contains all the MBTA rail and bus lines, commuter boat services, regional transit agencies, and private express bus carriers. The auto mode includes all of the express highways, all of the principal arterials, and many minor arterials and local roadways. Walk/bike trips are also examined and are represented in the non-motorized mode.

4. The model is set up to examine travel on an average weekday for four time periods. The time periods are AM peak (3 hrs.), Midday (6 hrs.), PM peak (3 hrs.), and Night (12 hrs.) The base year is 2010. The forecast year is 2035.

The Four-Step Model Methodology

The model set is based on the traditional four-step urban transportation planning process of trip generation, trip distribution, mode choice, and trip assignment. This process is used to estimate the daily transit ridership and highway traffic volumes, based on changes to the transportation system. The model set as it relates to transit takes into consideration data on service frequency (i.e. how often trains and buses arrive at any given transit stop), routing, travel time, transit parking availability, and fares for all of the transit services. The model set on the roadway system is sensitive to roadway locations, connectivity, length, speeds, capacity, lanes, truck exclusions, turn prohibitions, and tolls. Results from the computer model provide us with detailed information relating to transit ridership demand and roadway travel.

The Four-Step Model

1. Trip Generation: In the first step, the total number of trips produced by the residents in the model area is calculated using demographic and socio-economic data. Similarly, the numbers of trips attracted by different types of land use such as employment centers, schools, hospitals, shopping centers etc., are estimated using

land use data and trip generation rates obtained from travel surveys. All of these calculations are performed at the TAZ level.

2. Trip Distribution: In the second step, the model determines how the trips produced and attracted would be matched throughout the region. Trips are distributed based on transit and highway travel times between TAZ and the relative attractiveness of each TAZ.

3. Mode Choice: Once the total number of trips between all combinations of TAZ's is determined, the mode choice step of the model splits the total trips among the available modes of travel. The modes of travel are walk/bike, auto, and transit. To determine what proportions of trips each mode receives, the model takes into account the travel times and costs associated with these options. Some of the other variables used in the mode choice modeling are auto ownership rates, household size, and income.

4. Assignment: After estimating the number of trips by mode for all possible TAZ combinations, the model assigns them to their respective transportation networks, auto or transit. Reports are produced showing the transit and highway usage and the impact on regional air quality.

Application of the Model

Once the calibration was complete, the model was run for the forecast year, 2035, using future year inputs such as projected population and employment by TAZ, in addition to transportation system characteristics. 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 currently adopted LRTP.

Service Plan

The project team provided CTPS with the service plan for the No-Build/TSM, Stoughton Electric and Whittendon Electric options. The service plan consisted station locations, fares, parking information, frequency of service by time period, and travel times between stations. The service plan information is included in the consultant's report.

Comparison with DEIR Analysis

The FEIR results are differ from the 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 FEIR. The list of transportation projects in the LRTP is also significantly different. The 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 FEIR service plans for the Stoughton Electric and Whittendon options also differ slightly from those used in the DEIR, being more refined and the FEIR now includes a feeder bus network that compliments the proposed stations.

All of these changes have led to demand estimates in the FEIR that are between 10% and 20% lower for the bus and commuter alternatives than were estimated in the 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.

Conclusion

The results of this analysis show that the Stoughton and Whittendon Electric options capture a significant number of trips, between 7,400 and 6,600 respectively on a daily basis in 2035 relative to the No-Build scenario that would have otherwise been made by auto. This translates into a VMT savings, VHT reduction, and emissions benefits, which are shown in Table 2. 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 Whittendon Electric option reduces demand at these stations (see Appendix B). The stations in Taunton also see a reduction in the Whittendon Electric option, but drive access demand increases at Raynham 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.

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Note: Appendices to the December 17, 2012 CTPS Ridership Memo are omitted because they are superseded by the appendices to the February 26, 2013 CTPS Ridership Memo, provided earlier in this appendix to the FEIS/FEIR.