SOUTH STATION
EXPANSION

Appendix F - Transportation Documentation

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massDOT
Massachusetts Department of Transportation

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1. Introduction

This supplemental Transportation Documentation was prepared to support the South Station Expansion (SSX) project Final Environmental Impact Report (FEIR), in response to comments received on the SSX Draft Environmental Impact Report (DEIR). The purpose of this documentation is to present an updated transit capacity analysis that further clarifies the impacts an increase in ridership at South Station, due to the Preferred Alternative (DEIR Alternative 1 – Transportation Improvements Only), would have on future capacity of the MBTA's rapid transit services, including light rail and bus rapid transit lines.

2. Summary of Findings

Projected ridership demands for the MBTA's Red, Silver, Green, Orange, and Blue Lines were compared to available vehicle capacities as informed by the MBTA's current policy for acceptable levels of crowding. Findings of the transit vehicle loading analysis indicate that the Preferred Alternative would not result in crowding that exceeds the maximum load capacity as informed by MBTA policy beyond those impacts that would otherwise occur in the No Build Alternative. Therefore, no additional mitigation measures would be required to address capacity constraints on rapid transit services.

3. Methodology

This section presents the methodology used to identify the impacts of the Preferred Alternative on public transportation vehicle crowding. The updated transit capacity analysis was developed and provided by the Central Transportation Planning Staff (CTPS) based on 2035 Build Year forecasts from the CTPS travel demand model. DEIR Appendix 9 (Part 3), *Ridership Forecasting Technical Report*, provides a detailed description of the methodology and assumptions used to prepare travel demand forecasts for the SSX project.

The rapid transit vehicle loading analysis considered the Peak Load Point on each rapid transit line that directly serves South Station as well as major connecting services, including the:

- Red Line;
- Silver Lines 1, 2, and proposed Silver Line Gateway service to Chelsea;
- Silver Line 4;
- Silver Line 5 (connection at Downtown Crossing);
- Green Line (connection at Park Street);
- Orange Line (connection at Downtown Crossing); and
- Blue Line (connection at Government Center and State Street).

For each rapid transit line analyzed, the Peak Load Points during the AM and PM peak periods were first identified. By analyzing the passenger loads at the highest demand segment, and confirming that there is available capacity remaining, it would stand to reason that there is excess capacity on the remainder of the line. The Peak Load Points, and their associated projected passenger volumes, were identified from the CTPS travel demand model for the 2035 No Build and 2035 Preferred Alternatives. The modeled three hour peak period passenger volumes were then factored by CTPS to represent the peak 15 minutes, the time period when the highest ridership occurs. The ratio between the peak three hours and the peak 15 minutes was calculated by CTPS utilizing Automated Fare Collection (AFC) data from FY2012 for the AM and PM time periods. This ratio was applied to the three hour peak period passenger demands to derive the peak 15 minute results. The peak 15 minute passenger demands were then compared to the system's capacity for handling them, as informed by the MBTA's policy for vehicle load standards. Maximum policy capacities were calculated by adding the number of seats in a vehicle to the maximum number of standing passengers permitted. The number

of standing passengers permitted was calculated by dividing the available floor square footage per vehicle by the maximum allowed square footage per standing passenger on a MBTA rapid transit vehicle (3.76 square feet per passenger, as derived from fleet roster policy capacities in the MBTA's *Ridership and Service Statistics*[1] and vehicle specifications).

It is important to note that the capacity analyzed per the vehicle load standard is not the absolute maximum number of passengers that can fit into a transit vehicle (also referred to by the MBTA as "crush capacity"). The calculated vehicle load standards informed by MBTA policy are established for passenger comfort and assume fewer passengers per vehicle than the "crush capacity". For the purposes of this analysis, the more conservative vehicle load standard was assessed.

Based on the proposed 2035 Build Year rapid transit operating headways for each line and direction, which were assumed to be the same as 2012 Existing Year headways, the number of trainsets in service during the AM and PM peak 15 minutes was estimated. Fractional trainsets were rounded up to reflect the peak number of trains in the peak 15 minute period. The following trainset lengths were assumed for the 2035 Build Year analysis: six car trainsets were assumed for all heavy rail lines, consisting of the Red, Orange and Blue Lines; three car trainsets were assumed for the Green Line (light rail line); and single cars were assumed for the Silver Line bus rapid transit (BRT) service. Using the maximum policy capacity per trainset and the number of trainsets per peak 15 minutes, the maximum policy load capacity for the peak 15 minutes was established for each rapid transit service.

Tabular summaries of capacity, demand, and the associated volume-to-capacity (V/C) ratios for the rapid transit lines evaluated as part of the transit vehicle loading analysis were prepared by CTPS and are provided in the following section.

4. Analysis Results

Results of the transit vehicle loading analysis for the AM peak period, for the 2035 No Build Alternative and the 2035 Preferred Alternative, are summarized in Tables 1 and 2, respectively. The PM peak period results for the 2035 No Build Alternative and the 2035 Preferred Alternative, respectively, are summarized in Tables 3 and 4. The analysis compared the projected peak 15 minute demand from the CTPS travel demand model to available capacity using the conservative loading standards informed by MBTA policy. V/C ratios greater than 1.0 indicate that the average demand during the peak 15 minutes exceeds available capacity as informed by MBTA policy. Findings of the transit vehicle loading analysis indicate that the Preferred Alternative would not result in crowding that exceeds the maximum load capacity as informed by MBTA policy beyond those impacts that would otherwise occur in the No Build Alternative.

[1] Massachusetts Bay Transportation Authority. *Ridership and Service Statistics, Fourteenth Edition.* 2014.

Table 1 — 2035 No Build Alternative, AM Peak Analysis Using Scheduled Headways

			AM Peak Period Train Set Info						AM Peak 15 minute Service Info						3-hour Data
Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period	Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	N Quincy - JFK/UMass	8:00 - 8:15	8.5	6	59	142	354	852	2	708	1,704	1,700	2.40	1.00	13,700
Red Line SB	Central Square - Kendall Square	8:30 - 8:45	4.3	6	59	142	354	852	4	1,416	3,408	3,030	2.14	0.89	18,620
Green Line Central Subway EB	Hynes - Copley	8:15 - 8:30, 8:30 -8 :45	2.2	3	46	100	138	300	7	966	2,100	1,980	2.05	0.94	12,310
Green Line Central Subway WB	Haymarket - Government Center	8:30 - 8:45	1.9	3	46	100	138	300	8	1,104	2,400	1,960	1.78	0.82	13,490
Silver Line WFL/Gateway EB	South Station - Courthouse	8:15 - 8:30	1.7	1	45	65	45	65	9	405	585	670	1.65	1.15	4,120
Silver Line WFL/Gateway WB	Courthouse - South Station	8:45 - 9:00	1.7	1	45	65	45	65	9	405	585	340	0.84	0.58	2,120
Silver Line 4 NB	E Berkeley - Herald	8:15 - 8: 30	10.0	1	57	79	57	79	2	114	158	110	0.96	0.70	940
Silver Line 4 SB	Tufts Med Ctr - Herald	7:00 - 7:15	10.0	1	57	79	57	79	2	114	158	60	0.53	0.38	530
Silver Line 5 NB	E Berkeley - Herald	7:45 - 8:00	10.0	1	57	79	57	79	2	114	158	150	1.32	0.95	1,300
Silver Line 5 SB	Tufts Med Ctr - Herald	8:15 - 8:30	10.0	1	57	79	57	79	2	114	158	100	0.88	0.63	830
Orange Line NB	Tufts Med Ctr - Chinatown	8:30 - 8:45	4.5	6	58	124	348	744	4	1,392	2,976	1,870	1.34	0.63	14,200
Orange Line SB	Community College - North Station	8:15 - 8:30	4.5	6	58	124	348	744	4	1,392	2,976	2,210	1.59	0.74	16,840
Blue Line NB	State - Aquarium	7:00 - 7:15	4.5	6	35	95	210	570	4	840	2,280	250	0.30	0.11	2,410
Blue Line SB	Maverick - Aquarium	8:30 - 8:45	4.5	6	35	95	210	570	4	840	2,280	1,470	1.75	0.64	13,380

Table 2 — 2035 Preferred Alternative, AM Peak Analysis Using Scheduled Headways

			AM Peak Period Train Set Info						AM Peak 15 minute Service Info						3-hour Data
Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period	Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	N Quincy - JFK/UMass	8:00 - 8:15	8.5	6	59	142	354	852	2	708	1,704	1,700	2.40	1.00	13,700
Red Line SB	Central Square - Kendall Square	8:30 - 8:45	4.3	6	59	142	354	852	4	1,416	3,408	3,030	2.14	0.89	18,620
Green Line Central Subway EB	Hynes - Copley	8:15 - 8:30, 8:30 -8 :45	2.2	3	46	100	138	300	7	966	2,100	1,980	2.05	0.94	12,310
Green Line Central Subway WB	Haymarket - Government Center	8:30 - 8:45	1.9	3	46	100	138	300	8	1,104	2,400	1,960	1.78	0.82	13,490
Silver Line WFL/Gateway EB	South Station - Courthouse	8:15 - 8:30	1.7	1	45	65	45	65	9	405	585	700	1.73	1.20	4,320
Silver Line WFL/Gateway WB	Courthouse - South Station	8:45 - 9:00	1.7	1	45	65	45	65	9	405	585	350	0.86	0.60	2,170
Silver Line 4 NB	E Berkeley - Herald	8:15 - 8: 30	10.0	1	57	79	57	79	2	114	158	110	0.96	0.70	940
Silver Line 4 SB	Tufts Med Ctr - Herald	7:00 - 7:15	10.0	1	57	79	57	79	2	114	158	60	0.53	0.38	530
Silver Line 5 NB	E Berkeley - Herald	7:45 - 8:00	10.0	1	57	79	57	79	2	114	158	150	1.32	0.95	1,300
Silver Line 5 SB	Tufts Med Ctr - Herald	8:15 - 8:30	10.0	1	57	79	57	79	2	114	158	100	0.88	0.63	830
Orange Line NB	Tufts Med Ctr - Chinatown	8:30 - 8:45	4.5	6	58	124	348	744	4	1,392	2,976	1,940	1.39	0.65	14,700
Orange Line SB	Community College - North Station	8:15 - 8:30	4.5	6	58	124	348	744	4	1,392	2,976	2,210	1.59	0.74	16,840
Blue Line NB	State - Aquarium	7:00 - 7:15	4.5	6	35	95	210	570	4	840	2,280	250	0.30	0.11	2,410
Blue Line SB	Maverick - Aquarium	8:30 - 8:45	4.5	6	35	95	210	570	4	840	2,280	1,470	1.75	0.64	13,380

Table 3 — 2035 No Build Alternative, PM Peak Analysis Using Scheduled Headways

			PM Peak Period Train Set Info						PM Peak 15 minute Service Info						3-hour Data
Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period	Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	Park St - Charles/MGH	5:30 - 5:45	4.3	6	59	142	354	852	4	1,416	3,408	3,630	2.56	1.07	27,830
Red Line SB	JFK/Umass - N Quincy	5:00 - 5:15	8.5	6	59	142	354	852	2	708	1,704	1,830	2.58	1.07	13,380
Green Line Central Subway EB	Boylston - Park St	5:15 - 5:30	1.3	3	46	100	138	300	12	1,656	3,600	1,690	1.02	0.47	16,100
Green Line Central Subway WB	Arlington - Copley	5:00 - 5:15	1.3	3	46	100	138	300	12	1,656	3,600	2,070	1.25	0.58	16,670
Silver Line WFL/Gateway EB	South Station - Courthouse	5:15 - 5:30	1.7	1	45	65	45	65	9	405	585	330	0.81	0.56	2,380
Silver Line WFL/Gateway WB	Courthouse - South Station	5:30 - 5:45	1.7	1	45	65	45	65	9	405	585	830	2.05	1.42	5,000
Silver Line 4 NB	E Berkeley - Herald	5:15 - 5:30	10.0	1	57	79	57	79	2	114	158	70	0.61	0.44	660
Silver Line 4 SB	Herald - E Berkeley	5:00 - 5:15	10.0	1	57	79	57	79	2	114	158	70	0.61	0.44	630
Silver Line 5 NB	Herald-Tufts Med	5:00 - 5:15	10.0	1	57	79	57	79	2	114	158	110	0.96	0.70	1,670
Silver Line 5 SB	Herald - E Berkeley	5:00 - 5:15	10.0	1	57	79	57	79	2	114	158	140	1.23	0.89	1,350
Orange Line NB	State - Haymarket	5:00 - 5:15	4.5	6	58	124	348	744	4	1,392	2,976	1,780	1.28	0.60	13,650
Orange Line SB	Chinatown - Tufts Med	5:15 - 5:30	4.5	6	58	124	348	744	4	1,392	2,976	1,830	1.31	0.61	14,580
Blue Line NB	Aquarium - Maverick	5:00 - 5:15	4.5	6	35	95	210	570	4	840	2,280	1,560	1.86	0.68	13,510
Blue Line SB	Maverick - Aquarium	5:15 - 5:30	4.5	6	35	95	210	570	4	840	2,280	510	0.61	0.22	5,290

Table 4 — 2035 Preferred Alternative, PM Peak Analysis Using Scheduled Headways

			PM Peak Period Train Set Info						PM Peak 15 minute Service Info						3-hour Data
Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period	Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	Park St - Charles/MGH	5:30 - 5:45	4.3	6	59	142	354	852	4	1,416	3,408	3,630	2.56	1.07	27,830
Red Line SB	JFK/Umass - N Quincy	5:00 - 5:15	8.5	6	59	142	354	852	2	708	1,704	1,840	2.60	1.08	13,390
Green Line Central Subway EB	Boylston - Park St	5:15 - 5:30	1.3	3	46	100	138	300	12	1,656	3,600	1,690	1.02	0.47	16,110
Green Line Central Subway WB	Arlington - Copley	5:00 - 5:15	1.3	3	46	100	138	300	12	1,656	3,600	2,080	1.26	0.58	16,680
Silver Line WFL/Gateway EB	South Station - Courthouse	5:15 - 5:30	1.7	1	45	65	45	65	9	405	585	340	0.84	0.58	2,440
Silver Line WFL/Gateway WB	Courthouse - South Station	5:30 - 5:45	1.7	1	45	65	45	65	9	405	585	870	2.15	1.49	5,220
Silver Line 4 NB	E Berkeley - Herald	5:15 - 5:30	10.0	1	57	79	57	79	2	114	158	70	0.61	0.44	660
Silver Line 4 SB	Herald - E Berkeley	5:00 - 5:15	10.0	1	57	79	57	79	2	114	158	70	0.61	0.44	630
Silver Line 5 NB	Herald-Tufts Med	5:00 - 5:15	10.0	1	57	79	57	79	2	114	158	110	0.96	0.70	1,670
Silver Line 5 SB	Herald - E Berkeley	5:00 - 5:15	10.0	1	57	79	57	79	2	114	158	140	1.23	0.89	1,350
Orange Line NB	State - Haymarket	5:00 - 5:15	4.5	6	58	124	348	744	4	1,392	2,976	1,780	1.28	0.60	13,650
Orange Line SB	Chinatown - Tufts Med	5:15 - 5:30	4.5	6	58	124	348	744	4	1,392	2,976	1,900	1.36	0.64	15,110
Blue Line NB	Aquarium - Maverick	5:00 - 5:15	4.5	6	35	95	210	570	4	840	2,280	1,560	1.86	0.68	13,510
Blue Line SB	Maverick - Aquarium	5:15 - 5:30	4.5	6	35	95	210	570	4	840	2,280	510	0.61	0.22	5,290

5. Analysis Sensitivity Test

Because there are differences between scheduled headways and actual observed headways, it is important to understand how actual service levels can influence the severity of crowding issues. An additional analysis, using average observed headways from FY2012 AFC data as opposed to scheduled headways, was prepared by CTPS. This additional analysis is a sensitivity test of how the difference in capacity supplied from observed headways (as compared to the capacity supplied from scheduled headways) impacts crowding. Travel demand modeling was performed using only the scheduled headways, and therefore this sensitivity test assumed that demand does not change with less than optimal headways.

Results of the transit vehicle loading analysis using average observed headways for the AM peak period, for the 2035 No Build Alternative and the 2035 Preferred Alternative, are summarized in Tables 5 and 6, respectively. The PM peak period results for the 2035 No Build Alternative and the 2035 Preferred Alternative, respectively, are summarized in Tables 7 and 8. The analysis compared the projected peak 15 minute demand from the CTPS travel demand model to available capacity using the conservative loading standards informed by MBTA policy. V/C ratios greater than 1.0 indicate that the average demand during the peak 15 minutes exceeds available capacity as informed by MBTA policy. Findings of the transit vehicle loading analysis indicate that the Preferred Alternative would not result in crowding that exceeds the maximum load capacity as informed by MBTA policy more than impacts that would otherwise occur in the No Build Alternative.

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Table 5 — 2035 No Build Alternative, AM Peak Analysis Using Average Observed Headways

			AM Peak Period Vehicle Set Info						AM Peak 15 minute Service Info						3-hour Data
Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period or Peak bus for SL4 and SL5	Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	N Quincy - JFK/UMass	8:00 - 8:15	9.3	6	59	142	354	852	2	708	1,704	1,700	2.40	1.00	13,700
Red Line SB	Central Square - Kendall Square	8:30 - 8:45	4.8	6	59	142	354	852	4	1,416	3,408	3,030	2.14	0.89	18,620
Green Line Central Subway EB	Hynes-Copley	8:15 - 8:30, 8:30-8:45	2.3	3	46	100	138	300	7	966	2,100	1,980	2.05	0.94	12,310
Green Line Central Subway WB	Haymarket-Government Center	8:30 - 8:45	2.1	3	46	100	138	300	8	1,104	2,400	1,960	1.78	0.82	13,490
Silver Line WFL/Gateway EB	South Station - Courthouse	8:15 - 8:30	1.7	1	45	65	45	65	9	405	585	670	1.65	1.15	4,120
Silver Line WFL/Gateway WB	Courthouse - South Station	8:45 - 9:00	1.7	1	45	65	45	65	9	405	585	340	0.84	0.58	2,120
Silver Line 4 NB	Union Park - E Berkeley	0.359	15.0	1	57	79	57	79	1	57	79	110	1.93	1.39	940
Silver Line 4 SB	E Berkeley - Union Park	0.331	15.0	1	57	79	57	79	1	57	79	60	1.05	0.76	530
Silver Line 5 NB	E Berkeley - Herald	0.349	15.0	1	57	79	57	79	1	57	79	150	2.63	1.90	1,300
Silver Line 5 SB	Herald - E Berkeley	0.351	15.0	1	57	79	57	79	1	57	79	100	1.75	1.27	830
Orange Line NB	Tufts Med Ctr - Chinatown	8:30 - 8:45	5.6	6	58	124	348	744	3	1,044	2,232	1,870	1.79	0.84	14,200
Orange Line SB	Community College - North Station	8:15 - 8:30	5.3	6	58	124	348	744	3	1,044	2,232	2,210	2.12	0.99	16,840
Blue Line NB	State - Aquarium	6:30 - 6:45	4.2	6	35	95	210	570	4	840	2,280	250	0.30	0.11	2,410
Blue Line SB	Maverick - Aquarium	8:00 - 8:15	4.8	6	35	95	210	570	4	840	2,280	1,470	1.75	0.64	13,380

Table 6 — 2035 Preferred Alternative, AM Peak Analysis Using Average Observed Headways

			AM Peak Period Vehicle Set Info						AM Peak 15 minute Service Info						3-hour Data
Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period or Peak bus for SL4 and SL5	Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	N Quincy - JFK/UMass	8:00 - 8:15	9.3	6	59	142	354	852	2	708	1,704	1,700	2.40	1.00	13,700
Red Line SB	Central Square - Kendall Square	8:30 - 8:45	4.8	6	59	142	354	852	4	1,416	3,408	3,030	2.14	0.89	18,620
Green Line Central Subway EB	Hynes-Copley	8:15 - 8:30, 8:30-8:45	2.3	3	46	100	138	300	7	966	2,100	1,980	2.05	0.94	12,310
Green Line Central Subway WB	Haymarket-Government Center	8:30 - 8:45	2.1	3	46	100	138	300	8	1,104	2,400	1,960	1.78	0.82	13,490
Silver Line WFL/Gateway EB	South Station - Courthouse	8:15 - 8:30	1.7	1	45	65	45	65	9	405	585	700	1.73	1.20	4,320
Silver Line WFL/Gateway WB	Courthouse - South Station	8:45 - 9:00	1.7	1	45	65	45	65	9	405	585	350	0.86	0.60	2,170
Silver Line 4 NB	Union Park - E Berkeley	0.359	15.0	1	57	79	57	79	1	57	79	110	1.93	1.39	940
Silver Line 4 SB	E Berkeley - Union Park	0.331	15.0	1	57	79	57	79	1	57	79	60	1.05	0.76	530
Silver Line 5 NB	E Berkeley - Herald	0.349	15.0	1	57	79	57	79	1	57	79	150	2.63	1.90	1,300
Silver Line 5 SB	Herald - E Berkeley	0.351	15.0	1	57	79	57	79	1	57	79	100	1.75	1.27	830
Orange Line NB	Tufts Med Ctr - Chinatown	8:30 - 8:45	5.6	6	58	124	348	744	3	1,044	2,232	1,940	1.86	0.87	14,700
Orange Line SB	Community College - North Station	8:15 - 8:30	5.3	6	58	124	348	744	3	1,044	2,232	2,210	2.12	0.99	16,840
Blue Line NB	State - Aquarium	7:00 - 7:15	4.2	6	35	95	210	570	4	840	2,280	250	0.30	0.11	2,410
Blue Line SB	Maverick - Aquarium	8:30 - 8:45	4.8	6	35	95	210	570	4	840	2,280	1,470	1.75	0.64	13,380

Table 7 — 2035 No Build Alternative, PM Peak Analysis Using Average Observed Headways

Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period or Peak bus for SL4 and SL5	PM Peak Period Train Set Info						PM Peak 15 minute Service Info						3-hour Data
			Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	Park St - Charles/MGH	5:30 - 5:45	4.1	6	59	142	354	852	4	1,416	3,408	3,634	2.57	1.07	27,830
Red Line SB	South Station - Broadway	5:00 - 5:15	5.1	6	59	142	354	852	3	1,062	2,556	3,037	2.86	1.19	13,380
Green Line Central Subway EB	Prudential - Copley	5:15 - 5:30	9.1	3	46	100	138	300	2	276	600	393	1.42	0.66	16,100
Green Line Central Subway WB	Copley-Hynes	5:15 - 5:30	3.4	3	46	100	138	300	5	690	1,500	1,680	2.43	1.12	16,670
Silver Line WFL/Gateway EB	South Station - Courthouse	5:15 - 5:30	1.7	1	45	65	45	65	9	405	585	328	0.81	0.56	2,380
Silver Line WFL/Gateway WB	Courthouse - South Station	5:30 - 5:45	1.7	1	45	65	45	65	9	405	585	830	2.05	1.42	5,000
Silver Line 4 NB	E Berkeley - Herald	0.228	15.0	1	57	79	57	79	1	57	79	65	1.13	0.82	660
Silver Line 4 SB	Herald - E Berkeley	0.243	15.0	1	57	79	57	79	1	57	79	55	0.96	0.69	630
Silver Line 5 NB	Herald - Tufts Med Ctr	0.201	15.0	1	57	79	57	79	1	57	79	108	1.89	1.36	1,670
Silver Line 5 SB	Tufts Med Ctr - Herald	0.126	15.0	1	57	79	57	79	1	57	79	77	1.35	0.98	1,350
Orange Line NB	State - Haymarket	5:00 - 5:15	5.7	6	58	124	348	744	3	1,044	2,232	1,783	1.71	0.80	13,650
Orange Line SB	Chinatown - Tufts Med Ctr	5:15 - 5:30	5.2	6	58	124	348	744	3	1,044	2,232	1,830	1.75	0.82	14,580
Blue Line NB	Aquarium - Maverick	5:00 - 5:15	4.9	6	35	95	210	570	4	840	2,280	1,559	1.86	0.68	13,510
Blue Line SB	Maverick - Aquarium	3:15 - 3:30	6.1	6	35	95	210	570	3	630	1,710	474	0.75	0.28	5,290

Table 8 — 2035 Preferred Alternative, PM Peak Analysis Using Average Observed Headways

Rapid Transit Service	Most Crowded Segment (From CTPS Travel Demand Model)	Peak 15 minute period or Peak bus for SL4 and SL5	PM Peak Period Train Set Info						PM Peak 15 minute Service Info						3-hour Data
			Headway (min.)	Cars / Train Set	Car Seated Capacity	Car Policy Max Load	Train Set Seated Capacity	Train Set Policy Max Load	Train Sets	Seated Capacity	Service Policy Max Load	Modeled Volume	Volume / Seated Capacity	Volume / Policy Max Load	Modeled Volume
Red Line NB	Park St - Charles/MGH	5:30 - 5:45	4.1	6	59	142	354	852	4	1,416	3,408	3,634	2.57	1.07	27,830
Red Line SB	South Station - Broadway	5:00 - 5:15	5.1	6	59	142	354	852	3	1,062	2,556	3,037	2.86	1.19	13,390
Green Line Central Subway EB	Prudential - Copley	5:15 - 5:30	9.1	3	46	100	138	300	2	276	600	393	1.42	0.66	16,110
Green Line Central Subway WB	Copley-Hynes	5:15 - 5:30	3.4	3	46	100	138	300	5	690	1,500	1,680	2.43	1.12	16,680
Silver Line WFL/Gateway EB	South Station - Courthouse	5:15 - 5:30	1.7	1	45	65	45	65	9	405	585	329	0.81	0.56	2,440
Silver Line WFL/Gateway WB	Courthouse - South Station	5:30 - 5:45	1.7	1	45	65	45	65	9	405	585	882	2.18	1.51	5,220
Silver Line 4 NB	E Berkeley - Herald	0.228	15.0	1	57	79	57	79	1	57	79	65	1.13	0.82	660
Silver Line 4 SB	Herald - E Berkeley	0.243	15.0	1	57	79	57	79	1	57	79	55	0.96	0.69	630
Silver Line 5 NB	Herald - Tufts Med Ctr	0.201	15.0	1	57	79	57	79	1	57	79	108	1.89	1.36	1,670
Silver Line 5 SB	Tufts Med Ctr - Herald	0.126	15.0	1	57	79	57	79	1	57	79	77	1.35	0.98	1,350
Orange Line NB	State - Haymarket	5:00 - 5:15	5.7	6	58	124	348	744	3	1,044	2,232	1,783	1.71	0.80	13,650
Orange Line SB	Chinatown - Tufts Med Ctr	5:15 - 5:30	5.2	6	58	124	348	744	3	1,044	2,232	1,842	1.76	0.83	15,110
Blue Line NB	Aquarium - Maverick	5:00 - 5:15	4.9	6	35	95	210	570	4	840	2,280	1,559	1.86	0.68	13,510
Blue Line SB	Maverick - Aquarium	3:15 - 3:30	6.1	6	35	95	210	570	3	630	1,710	474	0.75	0.28	5,290