BOSTON REGION METROPOLITAN PLANNING ORGANIZATION
Richard A. Davey, MassDOT Secretary and CEO and MPO Chairman
Karl H. Quackenbush, Executive Director, MPO Staff

MEMORANDUM

DATE **July 11, 2013**

TO **David J. Mohler, Executive Director**
Office of Transportation Planning, MassDOT

FROM **Jonathan Belcher, MPO Staff**

RE **Early-Morning Transit Service**

1 STUDY DESCRIPTION

The MBTA operates a small network of eight "early-bird" bus routes, which provide service between 4:30 AM and 5:00 AM, prior to the typical time of the start of operations on the majority of routes on the MBTA bus and rail transit network. Most of these early-morning routes operate as direct routes to downtown Boston and follow slightly different paths than regular daytime service, in some cases combining sections of multiple regular routes. These routes generally provide one round-trip, and each appears on the schedule card for a regular route that has the same starting location for the first inbound trip of the day.

These early-bird services exist in part because of a historical anomaly. Most were initiated over 50 years ago, when the MBTA's predecessor agency discontinued systemwide overnight and early-morning service. In response to concerns from transit system employees, a limited amount of early-morning service was restored in 1960, primarily for the benefit of those transit workers assigned as fare collectors at subway stations at the start of the service day. Although originally intended for use by transit system employees to access their early-morning assignments, the routes were open to the general public, but were not marketed in any way, and did not appear in public schedules until 1999. Also in 1999, several new early-morning trips were initiated, primarily to provide access to employment at Logan Airport.

While some of these services have become well utilized, others have marginal ridership. No systematic study has been conducted to evaluate where the greatest demand for early-morning service exists and whether the present network is well positioned to meet that demand. Past service planning reviews have primarily only concentrated on the cost-effectiveness of individual trips of these unique routes, and have not reviewed service coverage and possible latent demand.

This memorandum examines existing ridership patterns on all early-morning bus and rapid transit services, determines where the demand for early-morning

service exists based primarily on ridership patterns during the first half-hour of service on the regular route network, and suggests possible modifications to current early-bird routes to better meet the identified demand. As there is already an existing, if small, early-morning network, there might be opportunities to better meet demand without increasing overall costs.

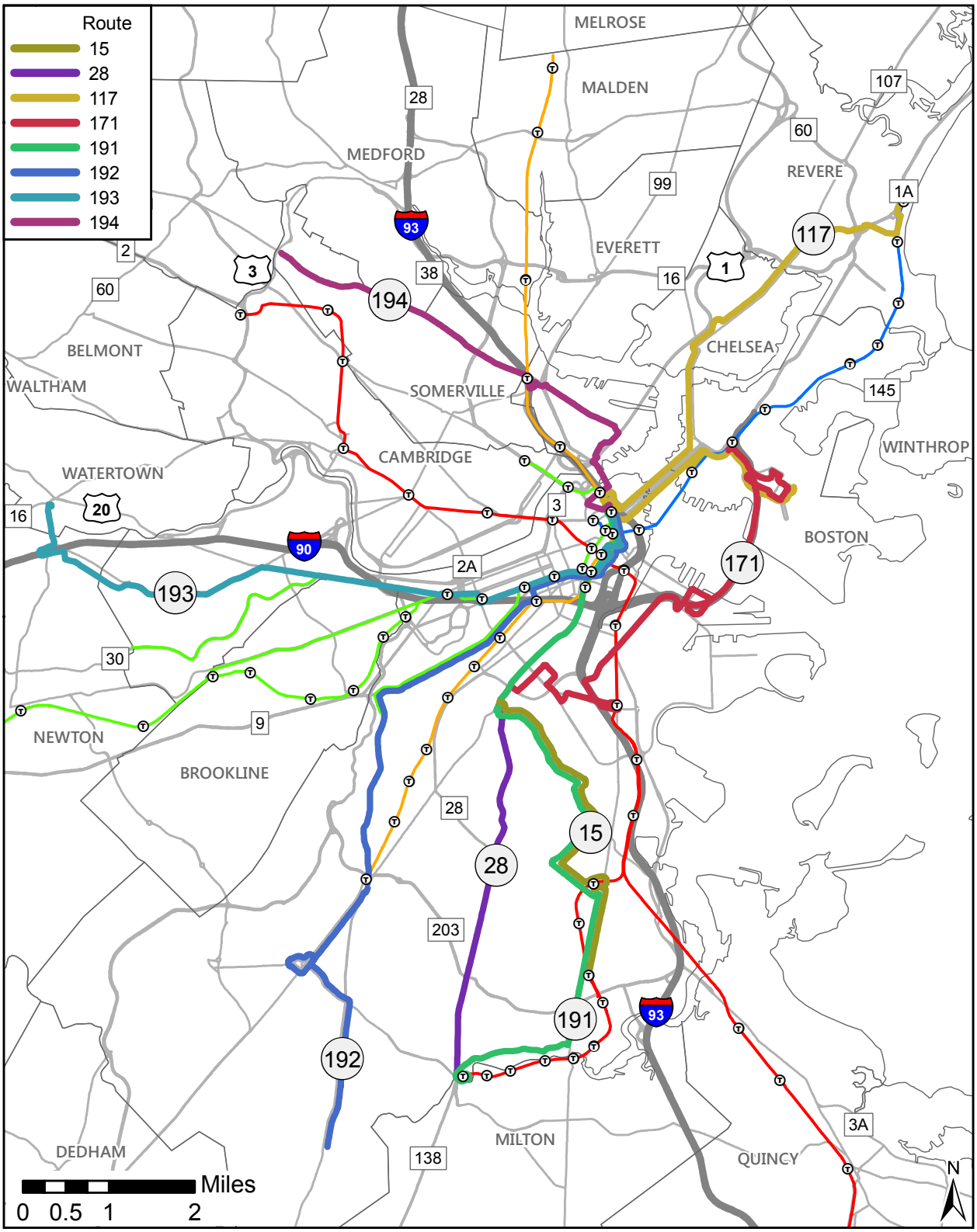
2 EXISTING CONDITIONS

The MBTA currently operates eight early-morning bus routes. Five of the eight early-morning routes operate through to Haymarket Station, which was the former central transfer point for the “owl” transit network that was in place prior to 1960. After the “owl” overnight service was discontinued, replacement early-morning routes were established for use by transit system employees. These routes continued the same pattern of utilizing Haymarket as a common destination location in downtown Boston. Four of the five routes that initially terminated at Haymarket have operated since 1960, while a fifth was established in 1999. The remaining three routes in the existing early-morning network were established in 1999, primarily to bring early-morning workers to Logan Airport either directly or via a connection at Dudley Station.

Figure 1 is a map of the existing early-morning bus routes. Descriptions of the eight “early-bird” routes are provided in the following subsections. MBTA automated passenger counter (APC) data for these routes are provided in the Appendix. CTP conducted manual ridership counts for the routes for which APC data were not available. The data from these counts are also provided in the Appendix.

2.1 Route 191 — Mattapan-Haymarket

Route 191 operates between Mattapan and Haymarket Square on weekdays, Saturdays, and Sundays. It is one of the routes that were established in 1960. Route 191 follows the path of regular Route 27 between Mattapan and Ashmont, regular Route 18 between Ashmont and Fields Corner, regular Route 15 between Fields Corner and Dudley Station, and the route of Silver Line Washington Street between Dudley and Downtown Boston. The outbound route returning to Mattapan follows the reverse of the inbound route. Rail rapid transit stations within walking distance of the route include Mattapan, Ashmont, Shawmut, Fields Corner, New England Medical Center, Chinatown, Downtown Crossing, State Street, and Haymarket. The inbound trip departs Mattapan at 4:30 AM. According to MBTA APC data from the Winter 2012 schedule period, there was a total of 52 inbound riders and 23 outbound riders on the weekday round-trip. The maximum load at any one point on the inbound trip was 30. Table A-1, in the Appendix, shows the APC data for this route.



BOSTON REGION MPO

FIGURE 1
Early-Morning MBTA Bus Routes

Early-Morning Transit Study

2.2 Route 192 — Cleary Square–Haymarket

Route 192 is one of the routes that were established in 1960. It operates from Cleary Square to Haymarket inbound. The return outbound trip operates only between Haymarket and Forest Hills. Service operates on weekdays and Saturdays. The inbound route follows the path of Route 32 from Wolcott Square to Cummins Highway at Hyde Park Avenue, and then follows the path of Route 30 via Cummins Highway, Roslindale Square, and Forest Hills, continues along the path of Route 39 from Forest Hills to Copley Square, and continues to Haymarket. Rail rapid transit stations served by the route include Forest Hills; surface E line stops from Heath Street to Northeastern; and Symphony, Prudential, Copley, Arlington, Boylston, Chinatown, Downtown Crossing, State, and Haymarket stations.

MBTA APC data from the Winter 2012 schedule period indicated that there were 40 inbound riders and 20 outbound riders on the weekday round-trip. The maximum load at any one point on the inbound trip was 28 passengers. Table A-2, in the Appendix, shows the APC data for this route.

2.3 Route 193 — Watertown–Haymarket

Route 193 operates on weekdays and Saturdays between Watertown Yard and Haymarket. It operates along the same path as Route 57 from Watertown to Kenmore, and then proceeds to Haymarket, passing several rail stations, including Hynes Convention Center, Copley, Arlington, Boylston, Chinatown, Downtown Crossing, and State Street.

MBTA APC data from the Winter 2012 schedule period indicated that there were 14 inbound riders and 16 outbound riders on the weekday round-trip. The maximum load at any one point on the inbound trip was 9 passengers. Table A-3, in the Appendix, shows the APC data for this route.

2.4 Route 194 — Clarendon Hill–Haymarket

Route 194 is one of the routes that were established in 1960. It operates from Clarendon Hill in Somerville to Haymarket on weekdays, Saturdays, and Sundays, following the path of Route 89 from Clarendon Hill to Sullivan and Route 93 from Sullivan to Haymarket. There is no scheduled return outbound trip, as the bus goes into service as a regular outbound Route 93 trip. Route 194 serves the Sullivan, North Station, and Haymarket rail rapid transit stations.

MBTA APC data from the Winter 2012 schedule period indicated that there were 24 inbound riders on the weekday round-trip. The maximum load at any one point on the inbound trip was 17 passengers. Table A-4, in the Appendix, shows the APC data for this route.

2.5 Route 117.0 — Wonderland-Haymarket

This route is a variation of regular Route 117. It operates inbound on weekdays, Saturdays, and Sundays from Wonderland to Maverick along the regular Route 117 through Revere, Chelsea, and East Boston, and then proceeds from Maverick to Haymarket. At Haymarket, the bus returns outbound to Terminal C at Logan Airport. This trip was established in 1999 and is the only trip of the five trips operating to Haymarket that was not established in 1960. Because the MBTA did not have recent APC data for Route 117.0, staff conducted a manual count to determine ridership by stop for one typical day.

There were 88 passengers on the inbound Route 117.0 trip and 1 passenger on the outbound trip, and the maximum load at any one point on the inbound trip was 82 passengers. This is a very full standing load on a 40-foot bus, well above the MBTA service delivery policy standard that states that a load should not exceed 140 percent of the seating capacity of the bus (54 passengers for a 40-foot bus). Table A-5, in the Appendix, shows the ridership data collected by CTPS staff for this route.

2.6 Routes 15 and 171 Ashmont-Dudley-Logan Airport Through Route, and Route 28 — Mattapan-Dudley Connecting Route

Route 171 operates between Dudley Station and Logan Airport, with an intermediate stop at Andrew Station. Two trips depart Dudley early in the morning—at 3:50 AM and 4:20 AM. Both trips operate as an extension of two Route 15 trips through from Ashmont, which depart Ashmont at 3:26 and 3:56 AM. Although given separate route numbers, both trips operate as a through route from Ashmont to Logan via Dudley and Andrew on weekdays, Saturdays, and Sundays.

In addition, three early-morning trips operate inbound on Route 28 between Mattapan and Dudley, departing Mattapan at 3:20, 3:59, and 4:40 AM. The first two trips are scheduled to meet with the combined Route 15/171 service at Dudley, allowing riders to transfer.

Early-morning service on Routes 15, 28, and 171 was initiated in September 1999, and access to jobs grant money was used to fund the initial service. The Dudley–Airport segment was originally numbered as part of Route CT3, which was extended from Andrew Station to Airport Station. When full-time CT3 service from Andrew to Airport was discontinued in 2002, the early-morning trips from Dudley were retained and given the Route 171 designation to replace the CT3.

CTPS recently completed manual counts for the early-morning Route 15, 28, and 171 weekday services, as the MBTA did not have available recent APC counts for these trips. The combined Route 15/171 trips had a total of 50 riders

when both the Route 15 and Route 171 portions of the two through trips are combined. The three trips on Route 28 had a total of 47 riders. Tables A-6 and A-7, in the Appendix, show the ridership data for these routes by stop location.

2.7 Summary of Existing Early-Morning Bus Route Ridership

Table 1 summarizes by route and direction the number of trips and ridership for all of the early-morning bus services. The total ridership of all 13 trips combined is 360 passengers.

TABLE 1
Summary of Ridership on Weekday Early-Morning Routes

Route and Direction	Number of Trips	Total Ridership
Route 28.2 Inbound	3	47
Route 117 Inbound	1	89
Route 117 Outbound	1	1
Route 171/15.2 Inbound	2	50
Route 191 Inbound	1	52
Route 191 Outbound	1	23
Route 192 Inbound	1	40
Route 192 Outbound	1	20
Route 193 Inbound	1	14
Route 193 Outbound	1	16
Route 194 Inbound	1	24
Total	**13**	**360**

Sources: MBTA Winter 2012 APC data and CTPS manual count data.

The review of ridership data for these trips shows:

- Extreme overcrowding occurred on the inbound Route 117.0 trip. The observed load of 89 passengers would be considered a full crush load.
- Routes 28.2, 15.2/171, 191, and 192 each had 40 or more passengers per trip in the inbound direction, while routes 191 and 192 also had passenger loads of 20 or slightly higher in the outbound direction.
- Route 194 carried a more modest number of passengers, slightly more than 20, in the inbound direction.
- Route 193 had the lowest total ridership of any of the unique early-morning services, with 14 passengers on the inbound trip and 16 on the outbound.

- The outbound ridership of Route 117 (operating from Haymarket to Logan) was only one passenger.

Although it cannot be fully verified with the information available, the outbound boardings at Haymarket on Routes 192 and 193 are most likely from passengers transferring from Route 117 or 194. There were just over 9 passengers (an average of multiple observations) boarding the Route 192 trip at Haymarket, and 2 boarding the Route 193 trip. One passenger boarded the outbound Route 117 trip at Haymarket, traveling to Logan Airport. This passenger could have transferred from any of the other routes at Haymarket.

3 EARLY SERVICE ON THE REGULAR ROUTE NETWORK

This section summarizes where the potential demand for early-morning service exists based on ridership patterns during the first 45 minutes of service on the regular weekday route network

3.1 Bus Routes

There are 85 trips on 57 MBTA regular weekday bus routes with scheduled departures from the route origin between 4:30 AM and 5:14 AM. Several of these trips are scheduled primarily for the purpose of positioning equipment; these trips have low ridership. Staff reviewed recent MBTA APC data for most of these trips; manual counts (undertaken by staff) were reviewed where more recent APC data were not available. The trips and the ridership per trip are listed by route number, direction, and departure time in Table 2.

TABLE 2
Ridership on Weekday MBTA Bus Routes Departing between 4:30 AM and 5:14 AM

Route	Direction	Departure Time	Total Riders
1	Outbound	4:39	12
1	Outbound	4:57	16
1	Inbound	5:10	23
9	Inbound	5:13	18
10	Inbound	4:55	9
11	Inbound	5:11	15
15	Inbound	5:11	19
16	Inbound	5:00	32
16	Outbound	5:06	27
17	Outbound	4:55	12
17	Inbound	5:12	32

(cont.)

TABLE 2 (Cont.)
Ridership on Weekday MBTA Bus Routes Departing between 4:30 AM and 5:14 AM

Route	Direction	Departure Time	Total Riders
21	Outbound	4:38	5
22	Inbound	5:00	44
23	Outbound	4:55	15
23	Inbound	5:09	36
26	Inbound	4:55	7
24	Inbound	5:07	15
27	Inbound	5:15	31
31	Outbound	4:38	3
31	Inbound	4:53	29
32	Outbound	4:38	2
32	Inbound	4:53	47
32	Outbound	4:55	5
34	Outbound	4:35	1
34	Outbound	4:50	4
34	Inbound	4:55	29
36	Outbound	4:37	0
36	Inbound	4:55	25
36	Outbound	4:55	2
39	Inbound	5:01	29
41	Outbound	4:58	2
42	Inbound	5:00	13
43	Inbound	5:00	7
44	Inbound	5:10	15
57	Inbound	5:03	28
60	Outbound	4:55	4
60	Inbound	5:12	9
66	Outbound	4:45	21
66	Inbound	5:00	18
70	Outbound	4:50	7
70	Outbound	5:05	6
73	Outbound	4:44	1
77	Inbound	4:48	12
77	Inbound	5:00	10
77	Inbound	5:12	16
77	Outbound	5:12	3
80	Inbound	5:05	No data

(cont.)

TABLE 2 (Cont.)
Ridership on Weekday MBTA Bus Routes Departing between 4:30 AM and 5:14 AM

Route	Direction	Departure Time	Total Riders
83	Inbound	5:10	14
86	Outbound	5:06	20
87	Inbound	5:10	15
89	Inbound	5:07	18
92	Inbound	5:00	10
93	Outbound	5:03	14
95	Outbound	4:55	2
100	Inbound	5:02	18
101	Inbound	4:56	51
104	Inbound	5:10	42
105	Inbound	5:00	38
106	Inbound	5:00	43
108	Inbound	5:10	27
109	Inbound	5:00	47
109	Inbound	5:02	68
110	Inbound	5:00	43
111	Inbound	4:49	33
111	Inbound	4:50	45
111	Inbound	5:02	29
111	Inbound	5:04	41
111	Inbound	5:12	No data
111	Inbound	5:13	21
111	Outbound	5:13	14
117	Inbound	4:55	50
119	Inbound	5:00	29
136	Outbound	5:00	6
210	Inbound	5:06	9
215	Inbound	5:06	20
216	Outbound	4:45	16
216	Inbound	5:05	21
220	Outbound	5:06	2
225	Outbound	5:10	8
230	Outbound	5:10	12
442	Outbound	5:08	No data
450	Outbound	4:46	No data

(cont.)

TABLE 2 (Cont.)
Ridership on Weekday MBTA Bus Routes Departing between 4:30 AM and 5:14 AM

Route	Direction	Departure Time	Total Riders
450	Outbound	5:01	No data
455	Inbound	5:00	29
455	Inbound	5:15	42

Source: MBTA Winter 2012 APC data.

Of these trips, there are 23 weekday routes with trips departing their origin point before 5:15 AM, to carry a total of 25 or more riders. The total ridership for these routes for trips departing between 4:45 AM and 5:14 AM is shown in Table 3, by route number and route direction. Table 3 also identifies the segments that overlap with the existing early-morning route network.

Route 111 had the heaviest total ridership in this time period—a total of 169 riders on the six trips operated between 4:45 AM and 5:14 AM. The heaviest ridership observed on any individual trip was the 5:02 AM inbound trip on Route 109 from Glendale Square, Everett to Sullivan Square, with 68 passengers.

3.2 Weekday Rapid Transit System Activity between 5:00 AM and 5:29 AM

Fall 2010 automated-fare-collection (AFC) data from the MBTA were analyzed to determine ridership by rapid transit station on weekdays between 5:00 and 5:29 AM. Total boardings from these data samples for the 29-minute period are identified in Table 4 (ranked by the highest usage to the lowest). Early-morning bus routes that also serve at least one of these stations are also identified.

There are eight rail rapid transit stations at which 100 or more passengers enter between 5:00 AM and 5:29 AM: Maverick, Sullivan, Forest Hills, Airport, Malden, Braintree, Ashmont, and Revere Beach. The present early-morning network provides alternative service to five of these eight stations, with Route 117.0 serving Maverick and Revere Beach, Route 191 and Route 15.2/171 serving Ashmont, Route 192 serving Forest Hills, and Route 194 serving Sullivan. While there is presently early-morning service operating near the area of Airport Station (Routes 117 and 171), the nearest early-morning service within walking distance of Airport Station from a residential area is Route 117 service along Meridian Street in East Boston.

TABLE 3
MBTA Weekday Bus Routes Operating between 4:45 AM and 5:14 AM with 25 or More Riders per Trip and Segments that Overlap with the Early-Morning Routes

Route	Direction	Total Riders	Segment Overlapping with Early-Morning Service
1	Outbound	28	None
16	Inbound	32	Uphams Corner served by Route 191
16	Outbound	27	Uphams Corner served by Route 191
17	Inbound	32	Route 15.2 and 191
22	Inbound	44	Route 28.2 and 191
23	Inbound	36	Routes 28.2 and 191
27	Inbound	31	Route 191
31	Inbound	29	Route 28.2
32	Inbound	47	Route 192
34	Inbound	29	Route 192 from Roslindale Square Inbound
36	Inbound	25	Route 192 from Roslindale Square Inbound
39	Inbound	29	Route 192
57	Inbound	28	Route 193
77	Inbound	28	None
101	Inbound	51	Route 194 serves Somerville segment
104	Inbound	42	None
105	Inbound	38	None
106	Inbound	43	None
108	Inbound	27	None
109	Inbound	47	None
109	Inbound	68	None
110	Inbound	43	None
111	Inbound	169	117.0 from Bellingham Square
119	Inbound	29	Route 117 in Revere Center
455	Inbound	71	None

Source: MBTA Winter 2012 APC data.

TABLE 4
Rapid Transit Station Total Weekday Boardings between 5:00 AM and 5:29 AM and Early-Morning Bus Routes with Stops near Stations

Station	Number of Boardings	Early-Morning Bus Route with Stop near Station
Maverick	183	117
Sullivan	171	194
Forest Hills	159	192
Airport	159	117
Malden	153	None
Braintree	143	None
Ashmont	123	191
Revere Beach	112	117
Fields Corner	98	191
Oak Grove	96	None
Haymarket–Orange Line	96	191, 194
Quincy Center	95	None
Orient Heights	95	None
Beachmont	94	None
Wellington	84	None
Wonderland	75	117
North Quincy	74	None
Green Line B Surface	68	193 portion
Green Line D Surface	66	None
Wood Island	66	None
Alewife	65	None
Quincy Adams	65	None
Andrew	63	171
Wollaston	59	None
Harvard	56	None
Jackson	55	None
Shawmut	54	None
Green Line C Surface	52	None
Haymarket–Green Line	48	191, 192, 193
Porter	46	None
Central	44	None
Savin Hill	38	None
Lechmere	35	None
Copley	35	192,193

(cont.)

TABLE 4 (Cont.)
Rapid Transit Station Total Weekday Boardings
between 5:00 AM and 5:29 AM and Early-Morning Bus Routes
with Stops near Stations

Station	Number of Boardings	Early-Morning Bus Route with Stop near Station
Kenmore	34	193
Davis	31	None
JFK/U Mass	30	None
Green St.	30	None
Broadway	28	None
Ruggles	25	None
Mass Ave.	24	None
Stony Brook	21	None
Back Bay	20	192, 193
South Station–Red Line	18	None
Roxbury Crossing	18	None
Hynes	15	None
Tufts Medical Center	15	191
Park St.–Red Line	14	192, 193
Mattapan–Ashmont all stops	14	191-portion
Aquarium	12	None
Arlington	11	192, 193
Suffolk Downs	11	None
Downtown Crossing–Red Line	10	191, 192, 193
Downtown Crossing–Orange Line	9	191, 192, 193
Kendall	8	None
Charles	8	None
Government Center–Green Line	6	193
Boylston	6	192, 193
Community College	6	None
North Station–Orange Line	6	194
North Station–Green Line	4	194
Symphony	4	192
State–Orange Line	4	191, 192, 193
Chinatown	4	191
Bowdoin	3	None
Silver Line Waterfront–Surface	3	None
Park St.–Green Line	2	191, 192
State–Blue Line	2	None
Government Center–Blue Line	2	None

(cont.)

TABLE 4 (Cont.)
Rapid Transit Station Total Weekday Boardings
between 5:00 AM and 5:29 AM and Early-Morning Bus Routes
with Stops near Stations

Station	Number of Boardings	Early-Morning Bus Route with Stop near Station
World Trade Center	2	None
Science Park	0	None
Prudential	0	192
Green Line E Surface	0	192
South Station–Silver Line	0	None
Courthouse	0	None

Source: MBTA Winter 2012 APC data.

There is no early-morning bus service within walking distance of Malden Station or of Braintree Station. The early-morning rapid transit demand at Braintree may reflect the reality that the only transit alternative for suburban commuters desiring an early arrival in Boston is to drive to a rapid transit park-and-ride facility, since the commuter rail network provides first arrival times in Boston between 6:14 and 6:50 AM. MBTA parking data indicate that the Braintree facility also fills to 100 percent of capacity at an early hour, providing further incentive for users to arrive very early in the morning to be guaranteed access. Early-morning bus service from Braintree would most likely not attract many park-and-ride users because of the added time needed to travel to Boston.

The early demand for service at Malden suggests there could be demand for an early-morning bus option.

4 INDICATIONS OF UNMET DEMAND FOR EARLY-MORNING BUS SERVICE

The high number of people making early-morning trips via modes other than the early buses is one indication of latent demand for early-morning bus service. In order to assess where the greatest unmet potential demand for early-morning bus service exists, CTPS obtained information about early-morning demand for transportation from the Boston-area transportation management associations and Boston taxicab data. The taxicab data were originally obtained from the Hackney Division of the Boston Police Department by an MIT student for his master's thesis. This section summarizes the information obtained from these sources and the potential implications for early-morning bus service.

4.1 Transportation Management Associations (TMAs)

CTPS interviewed the staffs of many of the Boston-area transportation management associations (TMAs) to discuss their members' early-morning transportation needs. These TMAs included:

- Route 128 Business Council
- Seaport TMA
- TransCOMM
- A Better City TMA
- Charles River TMA
- MASCO
- Logan TMA

The TMAs were asked if their members had requested early-morning transportation options, if their members had noted having had problems with staffing early-morning positions, and the nature of the shifts of their members' schedules. The results of these interviews are discussed in the following subsections.

4.1.1 Route 128 Business Council

The Route 128 Business Council provides shuttle services to businesses in the Waltham, Lexington, and Needham areas. They also provide service to business parks and commuter rail and rapid transit stations.

Many of the Route 128 Business Council's member organizations do not have early shifts. Some of their members are software or technology companies, whose employees tend to work irregular hours. If employees work early hours, they tend to drive their cars to work.

The Route 128 Business Council operates several shuttles, the earliest of which starts just after 6:00 AM. According to a representative of the Business Council, their early-morning routes have significant ridership levels, and they have had requests from a few passengers on the Needham Shuttle to operate service closer to 5:00 AM.

The Business Council schedules their bus operations in four-hour blocks. In order to begin service closer to 5:00 AM, they would need to increase the span of the first block; shift the first block to an earlier time, which would take service away from the end of the block (the mid- to late-morning); or add more vehicles.

4.1.2 Seaport TMA

The Seaport TMA is dedicated to easing commutes and reducing local congestion in the South Boston Waterfront area. The Seaport TMA does not

operate shuttle services as some of the other TMAs do; it provides discounted Zipcar membership and organizes vanpools and carpools.

Many area hotels, which are open all day, every day, are members of the Seaport TMA. Their employees tend to drive to work, and their origins are scattered. Some people choose to park in lots or garages in the area for, at best, approximately $13 per day. Others simply feed metered on-street parking all day.

The representative from the Seaport TMA had conducted an online survey of the members. The TMA attempted to contact their member companies in the area, including hotels, Au Bon Pain's main factory, the Harpoon Brewery, and the convention center. Of these companies, only Au Bon Pain and Harpoon responded to the survey.

The survey included questions about the following topics:

- If employees had asked explicitly about early-morning transit options
- The locations of employees' residences
- The time their earliest shift started
- How employees travel to get to early shifts
- Whether there have been any transportation-related problems with early-morning staffers (such as tardiness or absenteeism)

Both companies responded that they have had people ask about early-transit options. One company noted that many of their employees lived in Chelsea and East Boston. The other company listed a variety of locations, from Allston/Brighton to Medford to Jamaica Plain and the South Shore. The earliest shift at one company was at 5:00 AM; the other was at 6:00 AM. Au Bon Pain's employees presently drive, while Harpoon's employees drive, bike, walk, and carpool to work. They both have had problems with tardiness, absenteeism, and high turnover for some early-morning positions.

4.1.3 TransCOMM

TransCOMM operates shuttles that cater to the Boston University Medical Campus. TransCOMM helps riders organize carpools, administers an MBTA pass program, and operates several shuttles.

The representative from TransCOMM had not heard of any specific complaints about the lack of early-morning transportation options, and the nurses at the hospital tend to work shifts that start and end during normal MBTA operating hours.

4.1.4 A Better City TMA

A Better City TMA works to address member employee transportation issues in the downtown and Back Bay areas of Boston. They provide carpool services, vanpool subsidies, and Zipcar discounts.

The representative from the ABC TMA did not have any specific complaints or leads on possible early-morning transportation requests. Some of the shifts at Massachusetts General Hospital, a member of the TMA, start at 6:00 AM.

4.1.5 Charles River TMA

The Charles River TMA provides shuttle service between North Station, Kendall Square, and Cambridgeport. They also assist with organizing carpools and vanpools. Like many of the other TMAs, they also provide Zipcar discounts.

The shuttles run by the Charles River TMA (known as the EZRide Shuttle) are scheduled to meet the commuter rail trains that arrive at North Station. The earliest trains and the first EZRide shuttle arrive at North Station at approximately 6:20 AM. The Charles River TMA has not had any requests from their member companies for earlier service on this route. In the last decade they have only received a few requests to transport people in the early morning hours—not enough to justify a service change.

4.1.6 MASCO/CommuteWorks

MASCO provides transportation services for the Longwood Medical and Academic Area, and CommuteWorks, the Longwood Medical Area's TMA, also provides carpool and vanpool matching services, Zipcar discounts, and an emergency-ride-home service. MASCO provides the following shuttle services:

- The Ruggles Express runs between Ruggles Station and the Longwood Medical Area. The first trip, at 5:30 AM, carried 16 riders in December 2010. The next trip, at 5:50 AM, carried 19 passengers. After those two trips, ridership increased to a peak of 73 riders on the 7:21 AM trip.
- The Crosstown Shuttle operates between the Crosstown Garage on Melnea Cass Boulevard and the Longwood Medical Area. The first trip departs at 5:30 AM, and carried 20 riders. The second trip, at 5:50 AM, carried 23 passengers.
- The JFK/UMass Shuttle operates between JFK/UMass Station and the Longwood Medical Area. The first trip leaves at 6:00 AM. Thirty-three riders took this trip at the time of the count. The next trip, at 6:10 AM, carried 43 riders. Trips departed every 10 minutes thereafter with similar loads.

Table 5 summarizes ridership for the first trip, the second trip, and the highest-volume trip for each of the three MASCO shuttles.

Table 5
Summary of Early-Morning MASCO Trips

Route or Trip	Ruggles Express	Crosstown Shuttle	JFK/UMass Shuttle
Route	Ruggles Station–LMA	Crosstown Garage–LMA	JFK/UMass Station–LMA
First Trip	5:30 – 16 passengers	5:30 – 20 passengers	6:00 – 33 passengers
Second Trip	5:50 – 19 passengers	5:50 – 23 passengers	6:10 – 43 passengers
Highest Volume	7:21 – 76 passengers	8:00 – 49 passengers	7:30 – 59 passengers

Source: MASCO.

MASCO members employ over 6,000 workers who work either the early shift, which typically begins between 6:00 and 6:30 in the morning, or the night shift, which typically starts at 11:00 PM and ends at 7:00 AM. The night shift workers start and end work when the MBTA is still running service. However, at 11:00 PM the MBTA runs considerably less service, but this lower level of service should not inhibit people's ability to get to work because there are so few people using transit service at that time.

The MASCO representative noted that approximately 3,500 Longwood Medical Area employees reside in the Mattapan, Roxbury, and Dorchester zip codes. These riders could be served by MBTA Route 191 and Route 28. Neither of these routes comes particularly close in distance to adequately serving the medical area; therefore the routes would need to be modified to serve the area. A review of existing ridership trends suggests that modifying the coverage area of the routes is not justified based on the potential demand.

Approximately MASCO 3,000 employees reside in Hyde Park, Roslindale, and Jamaica Plain; Route 192 directly serves the medical area from these neighborhoods. Approximately 4,000 employees reside in Watertown, which is partially served by Route 193, since it passes through Kenmore Square, near the Longwood Medical Area.

4.1.7 Logan TMA

The Logan TMA is dedicated to serving Logan Airport employees. Their most notable service is the Logan Sunrise Shuttle, which serves each of the airport terminals, Orient Heights Maverick stations, and local stops in East Boston. The shuttle makes six trips, which start at 3:00 AM and end at 6:00 AM. At the time the TMA was surveyed, it was serving approximately 650 riders a month (about 4 riders per trip). MBTA Route 117 early-morning service connects with the

Sunrise Shuttle at Maverick Station. CTPS ridership counts of the Route 117 service showed two passengers alighting at Maverick Station, although it was unknown if they were transferring to the TMA shuttle.

Logan TMA Survey

In 2010 and 2011, the Logan TMA surveyed airport employees (2011) and airline passengers (2010). This section discusses the information obtained from the results of this survey about the mode of transportation used by people who arrive at the airport early in the morning.

The airport passenger survey indicated that 663 passengers arrived for flights that departed before 7:00 AM. Forty-four percent of these passengers arrived via a private vehicle and 24 percent arrived via taxi. The rest of the passengers arrived via rental cars, reserved vans or limousines, or express buses. Twenty-three percent of the passengers originated in Boston, and no other municipality contributed more than 3 percent of the passengers. The next five most popular origins were Revere, Cambridge, Newton, Quincy, and Salem.

The results of the airport employee survey showed that about half of the employees who arrived before 6:00 AM arrived via a private vehicle, a quarter of the employees used the Logan Express bus, and approximately 7 percent used the MBTA (most likely Route 171). Of the employees who arrived at the airport before 6:00 AM, about 34 percent came from locations in very close proximity to the airport (East Boston, Chelsea, Everett, Winthrop, and Revere). Another 9 percent of the employees came from some “other Boston neighborhood.”

Approximately 42 percent of the employees were government workers (most likely Transportation Security Administration agents), and another 30 percent were “general service” employees. Just over a quarter of the employee survey respondents worked for the airlines. Few worked at the airport shops.

4.2 Early-Morning Taxi-Trip Patterns

Recently, four days of Boston taxicab data were released to the public. These data include information about each taxi trip’s starting time and location and each trip’s ending time and location. With these four categories of data, we were able to determine the travel patterns of early-morning taxi users.

4.2.1 Description of the Taxi Data and Their Limitations

Of the four days for which data were released, the day with the largest number of early-morning passengers was May 12, 2010. An early-morning trip was defined as a trip that started later than 3:30 AM and ended before 6:00 AM.

Some of the trips toward the end of that range occurred during times when the MBTA operates limited, regular-route bus service.

While the dataset is quite robust, there are some limitations when using it to identify latent demand for early-morning bus service. The dataset only contains information for Boston-licensed taxis and, while some Boston taxis pick up passengers outside the city limits and some deliver people to locations outside of Boston, for the most part the trips are intra-Boston trips. A more thorough analysis could be completed if taxicab data were available for surrounding municipalities. Also, the data can only show trips that were actually made. Many people may be priced out of making trips by taxi, and some of these people would be good candidates for early-morning bus service.

4.2.2 Early-Morning Taxi-Trip Origins

The early-morning taxi trip origins were concentrated in downtown Boston, the Back Bay, and Fenway. There were some clusters of origins along Commonwealth Avenue near Washington Street in Allston/Brighton and a fair number of boardings near the Boston Convention and Exhibition Center, the World Trade Center, and South Boston. The taxi trip origin data are displayed in Figure 2.

4.2.3 Early-Morning Taxi-Trip Destinations

The airport is the most popular destination for early-morning taxi trips; 43 percent of the early-morning taxi trips ended at the airport. Other notable destinations are the area surrounding the Prudential Center, Fenway/Kenmore, Longwood Medical Area (especially the Beth Israel Deaconess Medical Center), Massachusetts General Hospital, South Station, Dudley Square, and the area around the Boston Convention and Exhibition Center. The taxi trip destination data are displayed in Figure 3.

Airport Taxi Trips

Some of the early-morning taxi trips to the airport might represent trips that are not taken by bus because no bus route serves an individual's location or schedule. Only three early-morning bus trips serve the airport. From the south, one can take Route 171 (which runs from Dudley Station to Logan Airport, with an intermediate stop at Andrew Station) at 3:50 or 4:20 AM (to arrive at the airport at 4:20 and 4:50 AM, respectively). Other riders can get to the airport by transferring from a 190-series route (Route 191 from Mattapan, Route 192 from Cleary Square, Route 193 from Watertown Yard via Kenmore, and Route 194 from Clarendon Hill in Somerville) to Route 117 at Haymarket, which departs at 5:10 AM and arrives at the airport at 5:19 AM.

Table 6 shows the temporal distribution of people who arrive at the airport via taxi between 3:30 AM and 6:00 AM, by number of trips and percent of arrivals before 6:00 AM. The people who want to arrive before 4:20 AM do not have many transportation options, since only a taxi or a private vehicle can get them to the airport by that time. People who live near Route 15, Route 28, or Dudley Square could make the first Route 171 bus at Dudley Station and get to the airport at 4:20 AM. For people who do not live near these routes, the first opportunity to get to the airport is the outbound 117 from Haymarket Station. The potential riders who could make the Route 117 to the airport include everyone who arrived at the airport after 5:20 and before 6:00 (roughly the time period during which one could get to the airport via the Blue Line).

TABLE 6
Airport Taxi Arrivals

Time Period	Number of Airport Trips	Percent of Arrivals
Before 4:20 AM	25	8%
4:20 to 4:50 AM	57	19%
4:51 to 5:19 AM	102	34%
5:20 to 6:00 AM	116	39%

Many people whose trips originate in locations in the area that includes downtown Boston, the Back Bay, and areas in between could begin their trips a little earlier to get to Haymarket Station (either by walking or by taking either Route 192 or 193) to catch the Route 117 to the airport. In some cases, it would not require a significant change in a person's departure time. Because airline passengers are usually carrying luggage and are therefore less likely to walk several blocks to get a bus, there is little to be gained by rearranging the route to serve these potential riders.

Other Early-Morning Destinations

South Boston Industrial Area

Five people took taxis from areas near Routes 15 and 28 and Dudley Station to areas close to the World Trade Center and the Boston Convention and Exhibition Center. Two of these people arrived close to the time when a Route 171 bus would be near the convention center, and one person arrived before the first Route 171 bus would have arrived. An alternative routing would provide access to the Convention Center area.

Longwood Medical Area/Fenway

Most of the people whose trips ended at the Longwood Medical Area began their trips in downtown Boston, and their origins were quite dispersed. People arriving in Fenway originated in the areas of Massachusetts General Hospital, the Back Bay, and Charlestown.

Beacon Hill/Massachusetts General Hospital

People bound for Massachusetts General Hospital originated in the Longwood Medical Area, Fenway, and North Brookline. One person came from East Cambridge and another person came from Roxbury.

Boston Medical Center

Most of the people who arrived at the area around the Boston Medical Center originated in the Longwood Medical Area near the Back Bay.

South Station

Many people arrived at South Station via taxi. Their origins included the area around Massachusetts General Hospital, the Financial District, the Fenway, and Allston/Brighton.

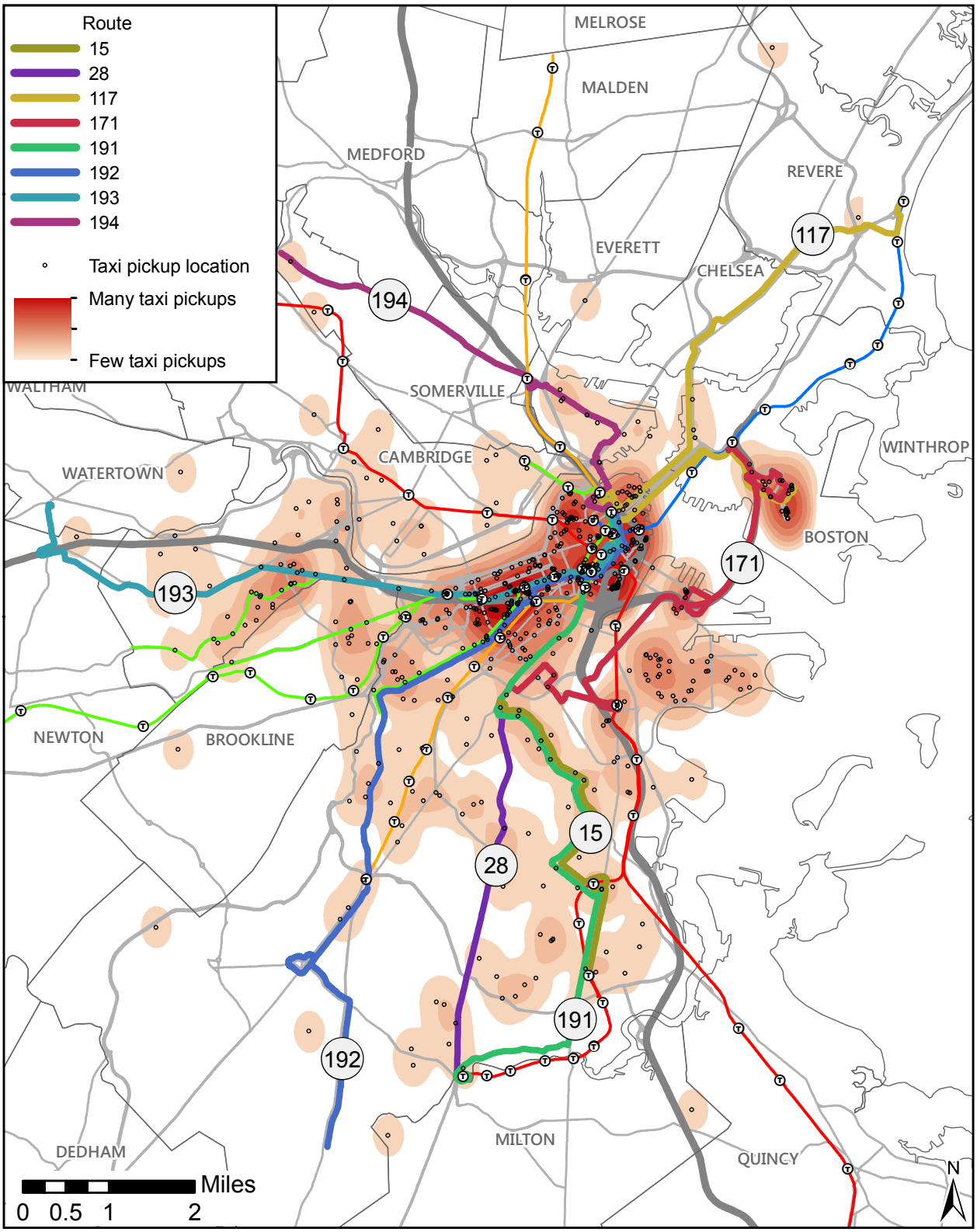
5 NETWORK EVALULATION AND POTENTIAL SERVICE CHANGES

The coverage provided by the existing weekday early-morning network was evaluated by comparing the heaviest usage of the existing early-morning route network with the demand patterns for early-morning service on the regular route network. The results of this comparison were then analyzed to determine what changes could be made to the early-morning network to better match demand.

5.1 Network Evaluation

Much of the existing early-morning bus service provided between 4:30 AM and 5:00 AM by Routes 15/171, 28, 117, 191, 192, 193, and 194 appears to provide sufficient service where ridership patterns on the regular bus and rail network between 5:00 and 5:15 AM also suggest a strong demand for early-morning transit service.

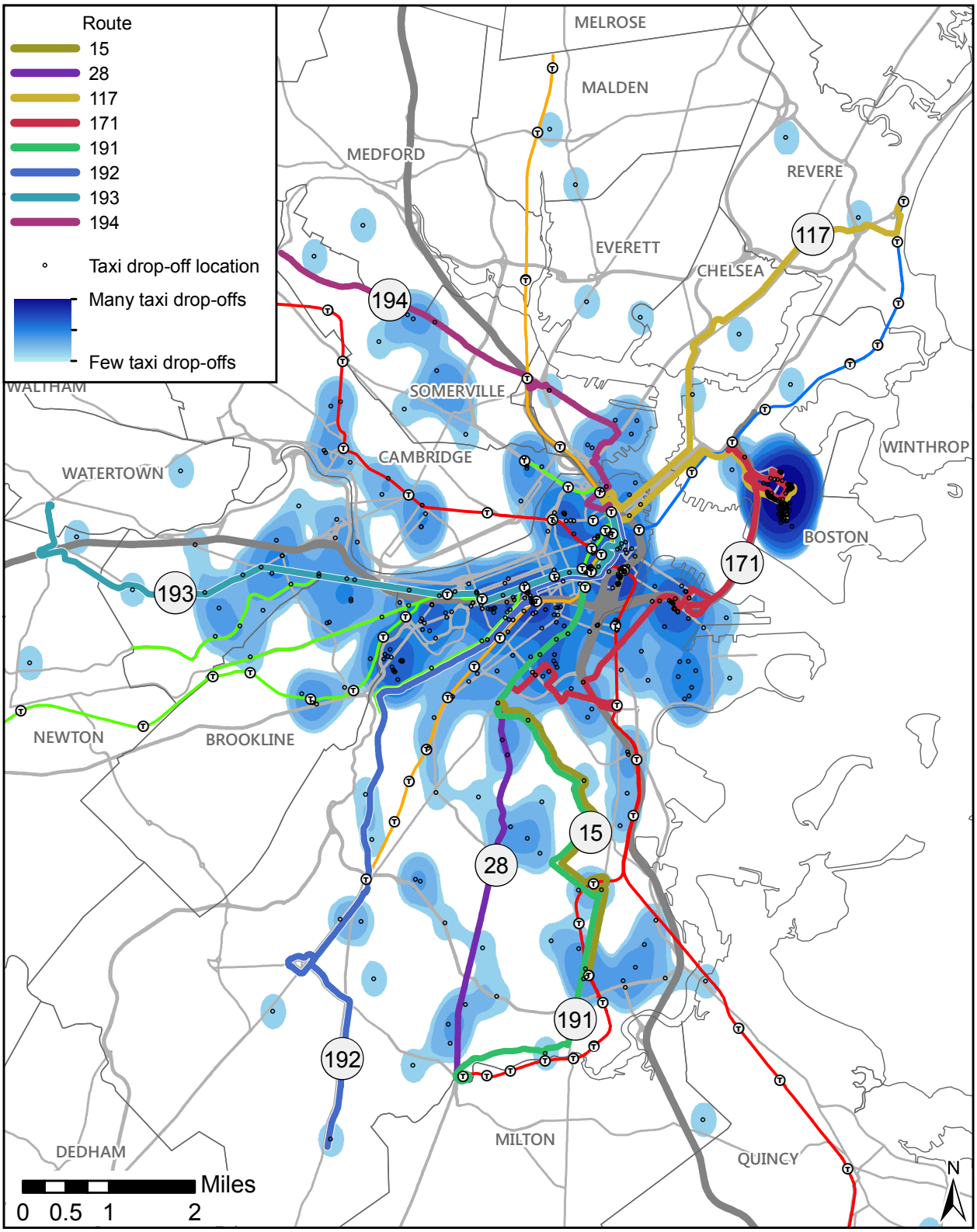
Figure 4 displays the existing eight early-morning bus routes, the rapid transit stations with heavy activity between 5:00 and 5:30 AM, and regular bus routes with 20 or more riders between 5:00 and 5:14 AM. Some of the heaviest demand for early-morning service both before and after 5:00 AM is from Chelsea and East Boston to downtown Boston.



BOSTON REGION MPO

FIGURE 2
Early-Morning Boston Area Taxi Origins
3:30 AM to 6:00 AM

Early-Morning Transit Study



BOSTON REGION MPO

FIGURE 3
Early-Morning Boston Area Taxi Destinations
3:30 AM to 6:00 AM

Early-Morning Transit Study

Ridership at Malden Station, as well as on the first trips at 5:00 AM. on Routes 101, 104, 105, 106, 108, 109, and 110, suggests that early-morning service before 5:00 AM from Malden and Everett to Boston could attract strong ridership.

Existing early-morning service from Watertown, Newton, Allston/Brighton, and parts of the Back Bay to downtown Boston and Haymarket has the lowest total ridership on the existing early-morning network. However, discontinuing this service could cause extreme hardship for existing users, as there is no other public transportation travel alternative available.

5.2 Potential Service Changes

This section describes potential improvements for early-morning bus service.

5.2.1 Relieve Overcrowding on Route 117.0

The excessive overcrowding on observed Route 117.0 required immediate attention; because the load carried on that trip was at full crush load, any potential new riders could not be accommodated by the existing trip. The MBTA added a second trip with the start of its Spring 2013 schedule, based on draft data collected for this study.

5.2.2 New Service to Everett

The MBTA could initiate an early trip on Route 109 from Glendale Square, Everett to Sullivan Station, and through-route it to Boston via the existing 5:00 AM Route 92 inbound trip. The first trip on Route 109 is extremely crowded; therefore, scheduling an additional trip that would leave at an earlier time than the current first trip could relieve crowding on the latter. Through-routing this trip with the existing Route 92 5:00 AM trip would also allow for an arrival in downtown Boston before the arrival of the first southbound Orange Line train from Sullivan Square Station.

5.2.3 Reroute Route 194 Service to Malden

There is high demand for service departing from Malden Center Station between 5:00 and 5:29 AM. Unlike most other stations with high early-morning demand, there is no alternative early-morning bus service available from Malden Station or from any area within a reasonable walking distance of Malden Center.

One possible option for providing early-morning service from Malden would be to reroute Route 194 so it would begin in Malden instead of Clarendon Hill. A rerouted Route 194 would follow the path of regular Route 101 instead of regular Route 89 (Routes 89 and 101 overlap through Winter Hill in Somerville).

A rerouted Route 194 would still serve most of the present stops along the route, along with Route 101 stops between Malden, Medford Square, and Winter Hill in Somerville. Several stops in Somerville between Clarendon Hill and Winter Hill would, however, lose early-morning service with this change; weekday ridership data indicate that five passengers boarded in that segment.

An alternative but more expensive method for adding early-morning service from Malden would be to add a new early-morning trip on Route 104 from Malden at 4:45 AM. This bus could be through-routed (continue in service as one trip without passengers needing to transfer) with the existing Route 92 trip from Sullivan to Downtown Boston at 5:02 AM. The new trip would also provide additional early-morning service to Everett, which would relieve overcrowding on Route 109.

5.2.4 Through-Route Service from Lynn

Route 117 service is operated out of the MBTA's Lynn Garage. Buses must "deadhead" (operate empty) from the garage to the start of the route at Wonderland. Given the relatively high ridership on the first Route 455 trip from Central Square in Lynn to Wonderland, the MBTA should investigate the added cost of starting early-morning service at Central Square, Lynn, as an extension of the existing Route 117.0 service from Wonderland to Haymarket.

5.2.5 Reroute Service through Cambridge

Route 193 has the lowest ridership of the existing early-morning services. Service could be rerouted via Central Square, Cambridge, in place of Kenmore Square, operating via the Boston University Bridge, Brookline Street (Cambridge), and Massachusetts Avenue in Cambridge. Such a detour would most likely add at least 10 minutes to the existing running time from Watertown to Haymarket and would require the trip to leave Watertown 10 minutes earlier to maintain the same arrival time at Haymarket. Demand for 5:00 AM to 5:30 AM service from Cambridge, however, does not seem particularly high when compared to the high-demand areas identified earlier in this memo. Any additional ridership might not be enough to justify the added cost to have the trip start earlier.

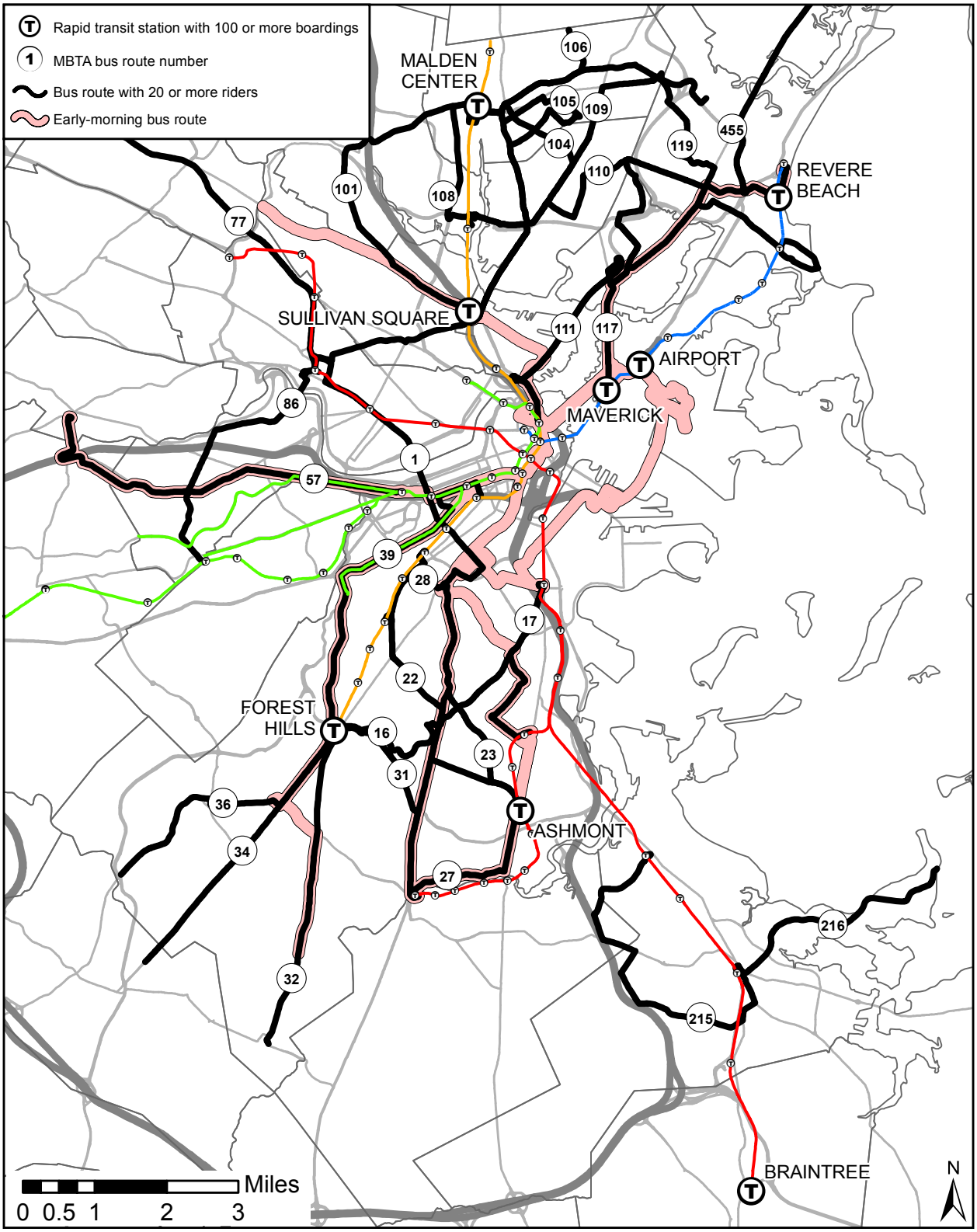


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FIGURE 4
Existing Early-Morning Transit Usage
5:00 AM to 5:30 AM

Early-Morning Transit Study

5.2.6 Presenting Early-Morning Schedule Data in a Combined Schedule

Potential early-morning transit riders might not be aware of the early-morning trip patterns available via transfers at Haymarket. Although much of the early-morning transit network connects at Haymarket, including connections via the outbound Route 117 trip to Logan Airport, data suggest that only a small number of riders are transferring between the routes. There are close to 10 passengers boarding the outbound Route 192 and 193 services at Haymarket who are traveling to stops in the Back Bay; many of these riders are most likely transferring from Route 117 or Route 194. Data indicate that only one rider traveled outbound using Route 117 service from Haymarket to Logan Airport. Publishing all of the schedules in a printed or in an electronic informational PDF file (available on the MBTA's website) could increase awareness of the total available service and increase transfer activity and total ridership.

In summary, a review of ridership of MBTA services operating before 5:30 AM shows patterns that suggest that several minor alterations could be made to the existing early-morning bus network to better meet demand at minimal added cost.

KQ/JB/jb

Appendix

Existing Early-Morning Routes

TABLE A-1a
Route 191 – Mattapan–Haymarket, Inbound Service:
Weekday Activity by Stop

Stop ID and Name	Passenger Ons	Passenger Offs	Passenger Load
1-185 - MATTAPAN STATION	3	0	3
12 - 591 - DORCHESTER AVE OPP ADIRONDACK	3	0	6
19 - 397 - DORCHESTER AVE @ ASHMONT BUSW	2	0	8
22 - 338 - DORCHESTER AVE @ LONSDALE ST	1	0	9
36 - 1468 - BOWDOIN ST @ GENEVA AVE	1	0	10
39 - 1471 - BOWDOIN ST @ HAMILTON ST	2	0	12
41 - 1473 - BOWDOIN ST @ QUINCY ST	2	0	14
43 - 1475 - HANCOCK ST @ BOWDOIN ST	1	0	15
48 - 1480 - COLUMBIA RD @ HANCOCK ST	1	2	14
49 - 1481 - DUDLEY ST @ BELDEN ST	0	0	14
50 - 1482 - DUDLEY ST @ HUMPHREYS ST	1	0	15
51 - 11482 - DUDLEY ST @ CLIFTON ST	2	0	17
53 - 1484 - DUDLEY ST @ E COTTAGE ST	2	0	19
54 - 1127 - DUDLEY ST @ SHIRLEY ST	1	1	19
55 - 1485 - DUDLEY ST @ LANGDON ST	5	0	24
56 - 1486 - DUDLEY ST @ MAGAZINE ST	3	0	27
57 - 1487 - DUDLEY ST @ HAMPDEN ST	2	1	28
61 - 1491 - DUDLEY ST @ WARREN ST	0	2	26
62 - 64 - DUDLEY STATION	14	13	27
64 - 2 - WASHINGTON ST @ MELNEA CASS B	0	1	26
65 - 4 - WASHINGTON ST @ LENOX ST	2	0	28
66 - 5 - WASHINGTON ST @ MASSACHUSETTS	2	1	29
68 - 1788 - WASHINGTON ST @ E NEWTON ST	1	0	30
69 - 5093 - WASHINGTON ST @ UNION PK	1	2	29
72 - 5095 - WASHINGTON ST @ E BERKELEY ST	0	2	27
74 - 6565 - WASHINGTON ST @ TUFTS MED CTR	0	3	24

(cont.)

TABLE A-1a (Cont.)
Route 191 – Mattapan–Haymarket, Inbound Service:
Weekday Activity by Stop

Stop ID and Name	Passenger Ons	Passenger Offs	Passenger Load
77 - 16539 - MILK ST @ DEVONSHIRE ST	0	12	12
78 - 11891 - PEARL ST @ CONGRESS ST	0	3	9
79 - 190 - CONGRESS ST @ STATE ST	0	7	2
80 - 191 - CONGRESS ST @ NORTH ST	0	2	0
83 - 8310 - HAYMARKET STATION	0	0	0
Total	**52**	**52**	**30**

Source: MBTA Winter 2012 APC data.

TABLE A-1b
Route 191 – Mattapan–Haymarket, Outbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
1 - 8310 - HAYMARKET STATION	0	0	0
2 - 49701 - NEW CHARDON ST @ NEW CONGRESS	0	3	0
7 - 10000 - TREMONT ST OPP WINTER ST	2	1	2
10 - 148 - HERALD ST @ WASHINGTON ST	2	0	4
11 - 5098 - WASHINGTON ST @ E BERKELEY ST	3	0	7
14 - 19402 - WASHINGTON ST @ W NEWTON ST	2	0	9
16 - 55 - WASHINGTON ST @ MASSACHUSETTS	1	2	8
18 - 61 - WASHINGTON ST @ MELNEA CASS B	0	1	7
21 - 64 - DUDLEY STATION	7	2	12
26 - 1497 - DUDLEY ST @ BLUE HILL AVE	1	0	13
29 - 1499 - DUDLEY ST @ W COTTAGE ST	0	2	11
30 - 1500 - DUDLEY ST @ HOWARD AVE	2	0	13
32 - 11501 - DUDLEY ST @ MONADNOCK ST	2	0	15
38 - 1508 - HANCOCK ST @ BOWDOIN ST	0	4	11

(cont.)

TABLE A-1b (Cont.)
Route 191 – Mattapan–Haymarket, Outbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
41 - 1511 - BOWDOIN ST @ QUINCY ST	1	0	12
50 - 556 - GENEVA AVE @ TONAWANDA ST	0	1	11
62 - 537 - DORCHESTER AVE @ GALLIVAN BLV	0	1	10
68 - 572 - RIVER ST @ WASHINGTON ST	0	1	9
73 - 577 - RIVER ST OPP LEAHAVEN RD	0	1	8
76 - 580 - RIVER ST @ FREMONT ST	0	3	5
77 - 185 - MATTAPAN STATION	0	1	4
Total	**23**	**23**	**15**

Source: MBTA Winter 2012 APC data.

TABLE A-2a
Route 192 – Cleary Square–Haymarket, Inbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
1 - 36466 - HYDE PARK AVE @ OAK STREET	3.0	0	3.0
2 - 6466 - HYDE PARK AVE @ CLAY STREET	0.6	0	3.6
4 - 6468 - HYDE PARK AVE @ WEST ST	1.2	0	4.8
5 - 6470 - HYDE PARK AVE @ WESTMINSTER S	0.2	0	5.0
6 - 6471 - HYDE PARK AVE @ THATCHER ST	1.8	0	6.8
7 - 6472 - OPP 945 HYDE PARK AVE	0.2	0	7.0
8 - 6473 - HYDE PARK AVE @ COLLINS STREE	2.2	0	9.2
9 - 6474 - HYDE PARK AVE @ AMERICAN LEGI	0.8	0	10.0
11 - 6476 - HYDE PARK AVE @ RAMSDELL AVE	1.4	0	11.4
12 - 6477 - HYDE PARK AVE @ CANTERBURY ST	3.8	0	15.2
18 - 636 - WASHINGTON ST @ CUMMINS HWY	4.0	0.6	18.6
22 - 637 - WASHINGTON ST @ FIRTH RD	1.0	0	19.0
23 - 638 - WASHINGTON ST @ GRANFIELD AVE	0.4	0	19.6

(cont.)

TABLE A-2a (Cont.)
Route 192 – Cleary Square–Haymarket, Inbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
26 - 641 - WASHINGTON ST @ ALDWIN RD	0.6	0	20.2
27 - 642 - WASHINGTON ST @ TOLLGATE WAY	1.4	2.2	19.4
28 - 10642 - FOREST HILLS STATION UPPER BU	3.0	2.6	19.8
31 - 1937 - SOUTH ST @ CHILD ST	1.6	0	21.4
33 - 1128 - SOUTH ST @ CENTRE ST	0	0.4	21.0
35 - 1130 - CENTRE ST @ LESTER PL	0.2	0	21.2
37 - 1132 - CENTRE ST @ ROBINWOOD AVE	0.4	0	21.6
38 - 11131 - CENTRE ST @ ROSEWAY	0.2	0.2	21.6
39 - 6570 - S HUNTINGTON AVE @ PERKINS ST	2.6	0	24.2
41 - 6572 - 222 S HUNTINGTON AVE	0.2	0	24.4
42 - 6573 - 150 S HUNTINGTON AVE	1.2	0	25.6
43 - 6574 - S HUNTINGTON AVE @ HEATH ST	0.6	0	26.2
44 - 65741 - 100 S HUNTINGTON AVE	1.4	0.4	27.2
45 - 6575 - S HUNTINGTON AVE @ HUNTINGTON	0.6	3.0	24.8
46 - 1315 - HUNTINGTON AVE @ PARKER HILL	0.4	0	25.2
48 - 1317 - HUNTINGTON AVE OPP FENWOOD RD	0.2	1.8	23.6
49 - 11317 - HUNTINGTON AVE @ TREMONT ST	1.2	0.6	24.2
50 - 21317 - HUNTINGTON AVE @ WIGGLESWORTH	1.0	1.2	24.0
51 - 31317 - HUNTINGTON AVE @ LONGWOOD AVE	0.4	0.4	24.0
52 - 51317 - HUNTINGTON AVE @ RUGGLES ST	0.2	0.6	23.6
54 - 81317 - 360 HUNTINGTON AVE	0	0.6	23.0
55 - 91317 - HUNTINGTON AVE @ GAINSBOROUGH	0	0.6	22.4
56 - 34513 - HUNTINGTON AVE @ MASS AVE	0.2	3.0	19.6
57 - 143 - BOYLSTON ST @ CLARENDON ST	0.8	4.4	16.0
58 - 16539 - MILK ST @ DEVONSHIRE ST	1.2	6.8	10.4
59 - 11891 - PEARL ST @ CONGRESS ST	0	1.0	9.4

(cont.)

TABLE A-2a (Cont.)
Route 192 – Cleary Square–Haymarket, Inbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
60 - 190 - CONGRESS ST @ STATE ST	0	1.6	7.8
63 - 117 - CONGRESS ST @ HAYMARKET STA	0	7.2	0.6
Total	**40**	**40**	**27**

Source: MBTA Winter 2012 APC data.

TABLE A-2b
Route 192 – Cleary Square–Haymarket, Outbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
1 - 117 - CONGRESS ST @ HAYMARKET STA	9.4	0	10.0
3 - 49702 - CAMBRIDGE ST @ BOWDOIN ST	0	0.6	9.4
4 - 28310 - CAMBRIDGE ST @ SALTONSTALL BL	0	0	9.4
5 - 49703 - CAMBRIDGE ST @ CENTER PLAZA -	0	0.6	8.8
7 - 10000 - TREMONT ST OPP WINTER ST	0	1.0	7.8
12 - 178 - SAINT JAMES AVE @ DARTMOUTH S	1.4	0.8	8.4
13 - 11388 - HUNTINGTON AVE @ BELVIDERE ST	0.2	0.2	8.4
15 - 31391 - HUNTINGTON AVE @ GAINSBOROUGH	0.4	0	8.8
17 - 51391 - HUNTINGTON AVE @ FORSYTH ST	1.2	0	10.0
18 - 71391 - HUNTINGTON AVE @ LOUIS PRANG	1.0	0	11.0
20 - 91391 - HUNTINGTON AVE @ LONGWOOD AVE	0	1.8	9.2
22 - 93391 - HUNTINGTON AVE @ FRANCIS ST	1.6	0.6	10.2
24 - 1365 - 835 HUNTINGTON AVE OPP PARKER	1.2	0	11.4
25 - 21365 - S HUNTINGTON AVE @ HUNTINGTON	1.0	0	12.4
28 - 31365 - S HUNTINGTON AVE OPP VA HOSPI	0.2	0	12.6
31 - 61365 - S HUNTINGTON AVE @ PERKINS ST	0.6	1.0	12.2
32 - 1160 - S HUNTINGTON AVE @ MORAINE ST	0.8	0	13.0

(cont.)

TABLE A-2b
Route 192 – Cleary Square–Haymarket, Outbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
33 - 1161 - CENTRE ST @ LOCHSTEAD AVE	0	0.8	12.2
37 - 1939 - 775 CENTRE ST	0.4	1.2	11.4
38 - 2005 - SOUTH ST @ CUSTER ST	0	0.8	10.6
39 - 2006 - SOUTH ST @ JAMAICA ST	0.4	0	11.0
42 - 10642 - FOREST HILLS STATION UPPER BU	0	10.2	0.8
Total	**20**	**20**	**13**

Source: MBTA Winter 2012 APC data.

TABLE A-3a
Route 193 – Watertown–Haymarket, Inbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
1 - 900 - WATERTOWN YARD	1	0	1
17 - 914 - WASHINGTON ST OPP MONTFERN AV	1	0	2
19 - 916 - WASHINGTON ST @ LAKE ST	3	0	5
20 - 917 - WASHINGTON ST @ FOSTER ST	1	0	6
22 - 919 - WASHINGTON ST OPP WALDO TERR	1	0	7
23 - 920 - CAMBRIDGE ST @ WASHINGTON ST	2	0	9
39 - 936 - COMMONWEALTH AVE @ AMORY ST	0	1	8
44 - 899 - KENMORE STATION BUSWAY	1	1	8
45 - 79 - MASSACHUSETTS AVE @ NEWBURY S	0	1	7
47 - 1389 - BOYLSTON ST OPP GLOUCESTER ST	0	2	5
48 - 175 - BOYLSTON ST @ DARTMOUTH ST	0	1	4
49 - 143 - BOYLSTON ST @ CLARENDON ST	2	0	6
50 - 6539 - 350 WASHINGTON ST	2	0	8
53 - 190 - CONGRESS ST @ STATE ST	0	1	7
56 - 117 - CONGRESS ST @ HAYMARKET STA	0	7	2
Total	**14**	**14**	**9**

Source: MBTA Winter 2012 APC data.

TABLE A-3b
Route 193 – Watertown–Haymarket, Outbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
1 - 117 - CONGRESS ST @ HAYMARKET STA	2	0	4
2 - 49701 - NEW CHARDON ST @ NEW CONGRESS	1	1	4
5 - 49703 - CAMBRIDGE ST @ CENTER PLAZA -	0	3	1
8 - 8279 - TREMONT ST OPP AVERY ST	0	2	0
10 - 177 - SAINT JAMES AVE @ ARLINGTON S	1	1	1
27 - 963 - BRIGHTON AVE @ HARVARD AVE	2	1	2
28 - 964 - BRIGHTON AVE OPP QUINT ST	5	0	7
29 - 965 - BRIGHTON AVE @ CRAFTSMAN ST	1	0	8
37 - 9721 - WASHINGTON ST @ MARKET ST	0	1	7
38 - 973 - WASHINGTON ST @ LEICESTER ST	1	0	8
42 - 977 - WASHINGTON ST @ MONTFERN AVE	0	1	7
43 - 9780 - WASHINGTON ST @ OAK SQ	2	0	9
47 - 982 - TREMONT ST OPP CUFFLIN ST	1	0	10
52 - 987 - PARK ST @ TREMONT ST	0	1	9
53 - 988 - CENTRE ST @ JEFFERSON ST	0	2	7
56 - 900 - WATERTOWN YARD	0	5	2
Total	**16**	**14**	**10**

Source: MBTA Winter 2012 APC data.

TABLE A-4
Route 194 – Clarendon Hill–Haymarket, Inbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
1 - 2637 - CLARENDON HILL BUSWAY	3.0	0	3.0
2 - 2575 - BROADWAY @ GARRISON AVE	1.0	0	4.0
11 - 2697 - BROADWAY @ JOSEPHINE ST – BAL	0	0.3	3.8
14 - 2701 - BROADWAY @ NORWOOD AVE	0.5	0	4.3

(cont.)

TABLE A-4 (Cont.)
Route 194 – Clarendon Hill–Haymarket, Inbound Service:
Weekday Activity by Stop

Seq - StopID - Stop Name	Passenger Ons	Passenger Offs	Passenger Load
16 - 2703 - BROADWAY OPP MAIN ST	2.5	0	6.8
17 - 2704 - BROADWAY @ THURSTON ST	0.5	0	7.3
18 - 2705 - BROADWAY OPP TEMPLE ST	3.3	0	10.5
20 - 2707 - BROADWAY @ MONTGOMERY AVE	1.5	0.5	11.5
21 - 2708 - BROADWAY @ MCGRATH HWY	0	0.5	11.0
22 - 2709 - BROADWAY ST @ MACARTHUR ST	0.5	0	11.5
23 - 2710 - BROADWAY @ CROSS ST	1.0	0	12.5
25 - 2712 - BROADWAY @ FRANKLIN ST	1.3	0	13.8
28 - 28741 - SULLIVAN STATION - LOWER BUSW	0.3	5.3	8.8
30 - 2844 - BUNKER HILL ST @ MAIN ST	0.3	0	9.0
31 - 2845 - BUNKER HILL ST @ BALDWIN ST	0.5	0	9.5
36 - 2850 - BUNKER HILL ST @ CONCORD ST	2.8	0	12.3
37 - 2851 - BUNKER HILL ST @ FERRIN ST	2.0	0	14.3
38 - 2852 - BUNKER HILL ST @ VINE ST	2.8	0	17.0
43 - 11200 - CANAL ST @ CAUSEWAY ST	0	2.3	14.8
44 - 8310 - HAYMARKET STATION	0	14.8	0
Total	**24**	**24**	**17.0**

Source: MBTA Winter 2012 APC data.

TABLE A-5a
Route 117.0 – Wonderland–Haymarket, Inbound Service:
Weekday Activity by Stop

Stop ID	Stop Name	Passenger Ons	Passenger Offs	Passenger Load
15795	Wonderland West Busway	1	0	1
15782	Opp 1456 North Shore Rd	2	0	2
5783	Beach St @ Walnut Ave	3	0	4
5784	Beach St @ VFW Pkwy	1	0	7

(cont.)

TABLE A-5a (Cont.)
Route 117.0 – Wonderland–Haymarket, Inbound Service:
Weekday Activity by Stop

Stop ID	Stop Name	Passenger Ons	Passenger Offs	Passenger Load
4733	Beach St @ Upham St	5	0	8
5786	Beach St @ Harris St	1	0	13
5788	Beach St @ School St	2	0	14
5789	Central Ave @ Broadway	3	0	16
5714	Broadway @ Yeamans St	2	0	19
5716	Broadway @ Page St	1	0	21
5719	Broadway @ Stockton St	3	1	22
5723	Broadway @ Parker St	1	0	24
5724	Broadway @ Cary Ave	7	0	25
46170	Broadway @ City Hall Ave	4	0	32
5605	Washington Ave @ Broadway	8	1	36
5606	Broadway @ Fourth St	3	0	43
5653	Broadway @ opp Cross St	3	3	46
5728	Pearl St @ opp Essex St	2	0	46
5730	Meridian St @ Condor St	6	0	48
5731	Meridian St @ W Eagle St	5	0	54
5732	Meridian St @ White St	2	0	59
5733	Meridian St @ Eutaw St	3	0	61
5734	Meridian St @ Lexington St	4	0	64
5735	Meridian St @ Saratoga St	4	0	68
5737	Meridian St @ Havre St	2	0	72
5740	Maverick Station	2	2	74
5741	Meridian St @ Paris St	8	0	74
8310	Haymarket Station	0	82	82
Total		**89**	**89**	**82**

Source: CTPS manual count data.

TABLE A-5b
Route 117.0 – Wonderland–Haymarket, Outbound Service: Weekday Activity by Stop

Stop ID	Stop Name	Passenger Ons	Passenger Offs	Passenger Load
8310	Haymarket Station	1	0	1
7094	Terminal C	0	1	1
Total		**1**	**1**	**1**

Source: CTPS manual count data.

TABLE A-6
Route 15.2/171 – Ashmont–Logan Airport, Through Service Inbound from Ashmont Station to Logan Airport: Weekday Activity by Stop

Stop ID	Stop Name	First Trip Ons	First Trip Offs	Second Trip Ons	Second Trip Offs	Total Ons	Total Ons
334	Ashmont Station	3	0	2	0	5	0
323	Fields Corner Station @ Red Line	1	0	0	0	1	0
55600	Fields Corner Sta @ Geneva Ave	2	0	0	0	2	0
561	Geneva Ave @ Levant St	1	0	0	0	1	0
1468	Bowdoin St @ Geneva Ave	0	0	1	0	1	0
1469	169 Bowdoin St @ opp Eunice St	0	0	1	0	1	0
1470	Bowdoin St @ Norton St	1	0	0	0	1	0
1475	Hancock St @ Bowdoin St	0	0	0	1	0	1
1478	Hancock St @ Rowell St	1	0	0	0	1	0
14831	Dudley St @ opp Howard Ave	1	0	0	0	1	0
64000	Dudley Station	0	0	0	2	0	2
99999	Passengers continuing to Route 171	0	10	0	2	0	12
64	Route 171 from this point on: Dudley Station	10	0	18	0	28	0

(cont.)

TABLE A-6 (Cont.)
Route 15.2/171 – Ashmont–Logan Airport, Through Service Inbound from Ashmont Station to Logan Airport: Weekday Activity by Stop

Stop ID	Stop Name	First Trip Ons	First Trip Offs	Second Trip Ons	Second Trip Offs	Total Ons	Total Ons
5089	91 E Concord St	0	1	0	0	0	1
855	Massachusetts Ave @ Albany St	1	0	0	2	1	2
8	Massachusetts Ave @ Island St	0	0	2	0	2	0
10	Theo Glynn Way @ Newmarket Sq.	0	0	0	1	0	1
13	Andrew Sta	3	2	2	1	5	3
7091	Terminal A	0	5	0	4	0	9
7092	Terminal B West 2	0	4	0	4	0	8
7093	Terminal B East	0	2	0	0	0	2
27094	Terminal C	0	8	0	6	0	14
7095	Terminal E	0	2	0	5	0	7
7096	Airport Station Busway	0	0	0	0	0	0
99999	EOL Dummy	0	0	0	1	0	1
Total		**24**		**26**		**50**	

Source: CTPS manual count data.

TABLE A-7
Route 28.2 – Mattapan–Dudley, inbound Service from Mattapan to Dudley: Activity by Trip and Stop

Stop ID	Stop	1st Trip Ons	1st Trip Offs	2nd Trip Ons	2nd Trip Offs	3rd Trip Ons	3rd Trip Offs	Total Ons	Total Offs
18511	Mattapan Station	3	0	1	0	0	0	4	0
1722	1624 Blue Hill Ave @ Mattapan Sq	0	0	1	0	0	0	1	0
1723	Blue Hill Ave @ Babson St	0	0	2	0	0	0	2	0

(cont.)

TABLE A-7 (Cont.)
Route 28.2 – Mattapan–Dudley, inbound Service from Mattapan to Dudley: Activity by Trip and Stop

Stop ID	Stop	1st Trip Ons	1st Trip Offs	2nd Trip Ons	2nd Trip Offs	3rd Trip Ons	3rd Trip Offs	Total Ons	Total Offs
1724	Blue Hill Ave @ opp Woodhaven St	0	0	1	0	2	0	3	0
1725	1458 Blue Hill Ave @ opp Almont St	0	0	0	0	1	0	1	0
1726	Blue Hill Ave @ Norfolk St	0	0	1	0	0	0	1	0
1728	Blue Hill Ave @ Wilmore St	0	0	2	0	0	0	2	0
1729	Blue Hill Ave @ Evelyn St	0	0	0	0	1	0	1	0
1732	Blue Hill Ave @ Woodrow Ave	0	0	0	0	3	0	3	0
1733	Blue Hill Ave @ Arbutus St	0	0	1	0	0	0	1	0
1734	Blue Hill Ave @ Callender St	0	0	0	0	3	0	3	0
1735	Blue Hill Ave @ Westview St	0	0	0	0	4	0	4	0
1737	Blue Hill Ave @ Talbot Ave	0	0	0	0	1	0	1	0
380	Blue Hill Ave @ Vesta St	0	0	0	0	2	0	2	0
381	Blue Hill Ave @ Wales St	0	0	0	0	1	0	1	0
383	Blue Hill Ave @ Ellington St	0	0	1	0	1	0	2	0
384	Blue Hill Ave @ Pasadena Rd	0	0	0	0	1	0	1	0
385	Blue Hill Ave @ Castlegate Rd	0	0	1	1	0	0	1	1
386	Warren St @ Sunderland St	0	0	1	0	2	0	3	0
387	Warren St @ Intervale St	1	0	1	0	2	0	4	0
388	Warren St @ Gaston St	0	0	0	0	1	0	1	0

(cont.)

TABLE A-7 (Cont.)
Route 28.2 – Mattapan–Dudley, inbound Service from Mattapan to Dudley: Activity by Trip and Stop

Stop ID	Stop	1st Trip Ons	1st Trip Offs	2nd Trip Ons	2nd Trip Offs	3rd Trip Ons	3rd Trip Offs	Total Ons	Total Offs
389	Warren St @ Holburn St	0	0	1	0	0	0	1	0
390	Warren St @ Quincy St	0	0	0	0	1	0	1	0
391	Warren St @ Savin St	1	0	0	0	0	0	1	0
393	Warren St @ Woodbine St	0	0	0	0	1	2	1	2
396	Warren St @ Moreland St	0	0	1	0	0	0	1	0
21151	Warren St @ Kearsarge Ave	0	0	0	0	0	0	0	0
64000	Dudley Station	0	5	0	14	0	25	0	44
Total		**5**		**15**		**27**		**47**	

Source: CTPS manual count data.