



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

Richard A. Davey, MassDOT Secretary and CEO and MPO Chairman
Karl H. Quackenbush, Executive Director, MPO Staff

MEMORANDUM

DATE September 20, 2012
TO Boston Region Metropolitan Planning Organization
FROM Thomas J. Humphrey, Chief Planner, Transit Service Planning
MPO Staff
RE CharlieCard Trip Paths Pilot Study

OVERVIEW OF STUDY AND ORGANIZATION OF THIS MEMORANDUM

This memorandum presents the methods and results of a pilot study conducted by CTPS to assess the feasibility of creating reasonably accurate station-to-station trip tables for the MBTA's rail rapid transit and light rail lines from data generated by the automated fare collection (AFC) system. These trip tables would show, for each station in the rapid transit system, the number of passengers entering that station in a given time interval that exit the system at each of the other stations.

The primary conclusion of the study is that the AFC records include enough information for them to be used to produce reasonably accurate trip tables. If such tables were to be produced on a regular basis, it is recommended that some refinements be made to the programs that were created in this study for producing them, in order to increase the efficiency with which the large databases involved can be processed.

First, an executive summary of the study is presented. Following the executive summary, is a relatively nontechnical, condensed presentation of the study. A full, detailed discussion of the study, including the methodology and procedures used to select, refine, and analyze the data, is presented in an appendix.

EXECUTIVE SUMMARY

PURPOSE, METHODOLOGY, AND ANALYSIS

The purpose of this project was to assess the feasibility of creating reasonably accurate station-to-station trip tables for the MBTA's rail rapid transit and light rail lines from data generated by the automated fare collection (AFC) system. Station-to-station trip tables show where the passengers who entered each station in a transit system during a given time interval eventually exited the system; they give the number of these passengers who exited at each of the other stations. From these tables, passenger volumes on each link in the system can be calculated. This in turn provides a basis for calculating passenger-miles of travel. Trip tables can also be used for calculating line-to-line

transfer volumes. Such information is needed as input for many long-range- and short-range-planning purposes, as well as for mandatory reporting such as for the National Transit Database (NTD).

Historically, much of the information required to produce trip tables could be obtained only through manual counts or passenger surveys. Those methods were labor intensive and time consuming, and it was difficult to ensure their accuracy. If trip tables could be generated from information that is already being collected through the AFC system, this could potentially result in substantial cost savings as well as improved accuracy.

The present AFC system collects very detailed information on the times and locations at which individual farecards are used to enter stations through faregates or to pay fares on-board surface light rail vehicles or buses, but does not record the times or locations where specific farecards exit the system.

For a typical weekday, the AFC system generates over 900,000 farecard-use records, but records for rapid transit station entries are intermingled with those for surface light rail and bus fareboxes. The major task in this project was to produce a series of computer programs that could efficiently extract from the full set of AFC records for a given day only those pertaining to the rapid transit and surface light rail system, and then match the individual identification numbers of cards recorded at each station or on each surface light rail line with those recorded at each other station or line.

The hypothesis underlying this project was that for any farecard used at more than one station in a given day, each station entered after the first one would be the same one where the cardholder had most recently exited the system and that the cardholder would finally return to the first station where the card was used. Some farecards are used only once and discarded; others are used multiple times, but only once in a given day. At the outset it was unknown how large a percentage of the card numbers recorded each day would appear more than once and would therefore be useful for this project.

The programs produced by CTPS were able to infer exit locations for between 80% and 90% of the faregate entries for the rapid transit system for each test set of all-day records. For comparison, the 2008-09 rapid transit passenger survey obtained an overall sample of about 8% of the passengers entering the rapid system between the hours of 6:00 AM and 3:30 PM. The travel patterns shown in the trip tables generated from the AFC records were consistent with those from the most recent manual entry and exit counts conducted by CTPS on the rapid transit system.

CONCLUSIONS

- The farecard use records compiled by the MBTA's automated fare collection system can be used to produce station-to-station trip tables for the MBTA rapid transit system that are at least as accurate as those that can be produced by any other method currently available.

- The computer programs created in this study to produce such tables are fairly complex, and there are a variety of ways to carry out the steps needed. During the course of this project, the programs were continually refined to improve execution time. Potential further refinements that would make the programs more efficient have been identified by CTPS. They should be implemented if the programs will be used frequently.

RECOMMENDATIONS

- This project should be continued with a second phase. The objectives would include more fully automating the programs to reduce the amount of operator intervention required between receipt of a raw data file and output of a finished station-to-station trip table.
- In the second phase, options would be added to calculate information such as line-volumes and passenger-miles of travel, and to break down results by hourly intervals. The program would also be expanded to allow tracking of trips transferring between the bus, commuter rail, and rapid transit systems.

CHARLIECARD TRIP PATHS PILOT STUDY: PURPOSE, METHODOLOGY, AND CONCLUSIONS

This presentation first describes the AFC system and then discusses the study's purpose and underlying assumptions, the method that was developed for producing trip tables, and conclusions that may be drawn from the study.

BACKGROUND: THE MBTA'S AUTOMATED FARE COLLECTION SYSTEM

On transit services operated directly by the MBTA (rail rapid transit, light rail, and bus), fares are collected via an electronic farecard system known as automated fare collection, or AFC. Two kinds of farecards are used: plastic cards called CharlieCards and paper cards called CharlieTickets. For most purposes in this discussion, both kinds will be referred to simply as farecards. These farecards can be purchased either as passes that allow unlimited rides on specified services over specified time intervals or as stored-value cards from which fares are deducted for each use. Regardless of the type of farecard, each one has a unique serial number.

At stations on the rail rapid transit system, light rail subway, and Silver Line Waterfront subway, entering passengers use farecards to open faregates. Each time a faregate opens, the date, time, type of farecard, and card serial number are recorded. On the surface segments of the light rail and Silver Line services and on the bus system, fares are collected via fareboxes on-board vehicles. These fareboxes have "targets" on which CharlieCards can be tapped, and card readers that CharlieTickets can be run through, to either deduct a stored value or verify that a valid pass is being used. Like the station

faregates, the fareboxes record fare transaction times and dates, card types, and serial numbers. Some surface light rail stations also have card validators on the platforms where farecards can be used in advance of boarding, and roving inspectors with portable card readers can also check cards. Fareboxes on vehicles can also be used for payment of fares in cash without involvement of farecards.

PURPOSE AND UNDERLYING ASSUMPTIONS OF THE STUDY

Although the AFC system collects extensive records as to the times and locations where passengers enter the MBTA system, it does not have the capability of recording the times or locations where passengers exit the system. The purpose of this study was to examine the feasibility of synthesizing reasonably accurate station-to-station trip tables on the basis of AFC entry records. This was undertaken primarily through attempting to synthesize a set of such tables.

Past CTPS surveys of MBTA passengers have shown that 90% of the riders on the rapid transit system in a given weekday make two or more one-way trips. Each trip would begin with entry through a station faregate or boarding a light rail or Silver Line Waterfront vehicle at a surface stop. CTPS used the following two essential underlying assumptions to create station-to-station trip tables from AFC station entry data.

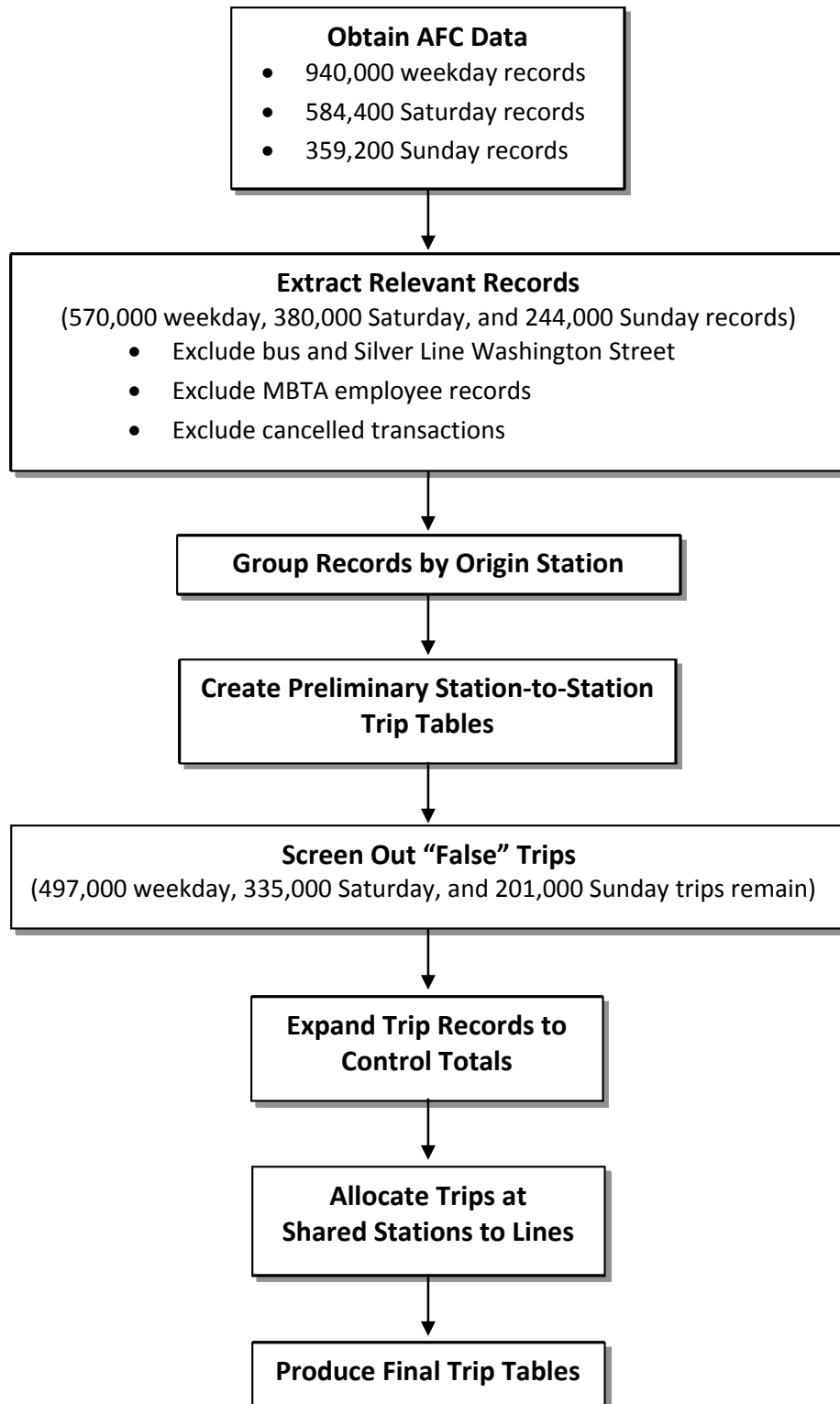
- If a given farecard was recorded more than once in a day, each station where it was recorded on entry after the first time it was used was the exit location from the preceding trip.
- The overall configuration of the travel of most passengers over the course of a day is a round-trip (they eventually end up at the station where they started out). This means it is reasonable to assume that the final exit station of the day—that is, the exit that follows the final station entry appearing in the AFC records—is the same as the first entry station of the day. For example, if a given card serial number was recorded at Harvard Station at 8:00 AM and at Park Street Station at 5:00 PM, the trip tables developed in this study showed this as one trip from Harvard to Park Street and one trip from Park Street to Harvard. As a slightly more complex example, if a given card serial number was recorded at Harvard at 8:00 AM, at Central at 10:00 AM, and at Park Street at 5:00 PM, the trip tables showed this as one trip from Harvard to Central, one trip from Central to Park Street, and one trip from Park Street to Harvard.

METHOD OF DEVELOPING THE TRIP TABLES

Select and Refine Test Data

This section describes the process used to select and refine the AFC data for use in the trip tables. An overview of this process is presented in Figure 1.

Figure 1
Process for Selecting and Refining Test Data



Obtain AFC Data

For purposes of developing and testing programs for creating trip tables, CTPS obtained the AFC records for five weekdays, one Saturday, and one Sunday in September 2010 from the MBTA. These records did not include any identification of the individuals using the farecards, and CTPS did not have access to any such identification. The AFC record set for each weekday contained approximately 940,000 records, with those for station faregates intermingled with records for surface light rail, Silver Line and bus fareboxes, platform card validators, and portable card readers. The Saturday set contained about 584,400 records and the Sunday set about 359,200.

Extract Relevant Records

The AFC records included much more information than was needed for the trip tables, and CTPS employed the following series of three procedures to extract the data relevant to developing the trip tables:

- *Exclude Bus and Silver Line Washington Street Records*
For this pilot study, only records from station faregates, Silver Line Waterfront and surface light rail fareboxes, and surface light rail card validators and portable card readers were relevant. These were extracted from the full record set for each day based on the fields in each record that identified it as being either from a station faregate or from a farebox, validator, or card reader on one of the routes of interest. (The Silver Line Waterfront was included because outside entries at South Station are made through the same faregates used for Red Line entries, and transfers to and from the Red Line at South Station are made within the paid area. The Silver Line Washington Street was not included, because its fare collection system is more like those of bus routes.)
- *Exclude MBTA Employee Records*
After extracting the AFC records for faregates, surface light rail, and Silver Line Waterfront, CTPS excluded records for MBTA employee passes. The majority of these were found to represent repeated station re-entries in the course of fixed-location assignments rather than beginnings of actual trips.
- *Exclude Cancelled Transactions*
Also excluded were records of “cancelled transactions” which occurred when card readers deducted too much stored value from cards that had accidentally been read more than once. The card readers immediately added the values back onto the cards, but records of both the extra fare deductions and the reimbursements, neither of which represented the starts of trips, were included in the original datasets.

After the selection steps above, each weekday AFC dataset had approximately 570,000 records, the Saturday dataset had approximately 380,000 records, and the Sunday

dataset had approximately 244,000 records from which to produce the station-to-station trip tables.

The only fields in each record that were needed to execute the subsequent program steps were those containing the card serial number, the date and time that the card was used, and the identification number of the fare-collection device. These fields were extracted from the dataset records in order to reduce program execution time.

Group Records by Origin Station

The extracted records were used as input to a program that grouped them, assigning each to a station, to a surface light rail route, or to the surface Silver Line Waterfront. This resulted in 73 groups of records for each day. For simplification, each such group is referred to below as a station.

Create Preliminary Station-to Station Trip Tables

The main program used standard database management functions to compare the farecard serial numbers recorded at each of the 73 stations with those recorded at each of the other 72. The results were placed in two spreadsheets in different formats. One of these had a matrix showing the total number of card matches between each possible station pair. The other had a set of lists showing for each of the 73 stations the other stations where each card used at that station had also been used, including the card serial numbers and entry times.

Screen Out “False” Trips

In the real world, each entry to the rapid transit or light rail system must have exactly one corresponding exit, but the initial matching steps described above generate too many exits for cards used more than twice. This occurs because the program finds one match between each station where a card is used and each other station where it is used regardless of entry times. Using again the example of a card used to enter Harvard Station at 8:00 AM, Central Station at 10:00 AM, and Park Street Station at 5:00 PM, the matching program would correctly show one trip from Harvard to Central, one trip from Central to Park Street, and one trip from Park Street to Harvard. It would also show “false” trips from Central to Harvard, from Park Street to Central, and from Harvard to Park Street. The more times a card was used in a day, the greater the number of false trips that were shown.

To depict station-to-station travel accurately, it was necessary to screen out false trips. This was done by the next set of steps in the program. These execute a series of tests on the lists of card matches for each entry station based on the entry times at that station and at each other station on the list. The results showed which trips should be retained in the matrix and which should be discarded. The number of false trips between each pair of stations was totaled and was subtracted from the total number of trips shown for that pair in the preliminary station-to-station trip matrix.

Expand Trip Tables to Control Totals

In order for the program to infer an exit station for any trip shown in the AFC database as entering the system, the farecard used in that entry must be recorded at a minimum of one other location on the same day. However, some cards are used only once in a day, because the card user makes only a single one-way trip, uses different farecards for different trips during the day, or makes one unrecorded system entry such as boarding a surface Green Line train without tapping the card on a fare box. To produce trip tables showing the total number of trips between each pair of stations, it is necessary to adjust for farecards for which no exit station could be inferred.

After screening out false trips as described above, the matrix for each weekday contained about 497,000 trips (87% of the approximately 570,000 entry records) that had been input to the program. The matrix for Saturday contained about 335,000 trips (88% of the 380,000 input Saturday records), and the matrix for Sunday contained about 201,000 trips (82% of the 244,000 input Sunday records). With match rates this high, it was reasonable to assume that they showed representative distributions of the exit locations of trips starting at each station and that similar distributions of exit locations would have occurred among those entries for which no exit matches were found.

The next step was to expand the approximately 497,000 entries per weekday, 335,000 per Saturday, and 201,000 per Sunday for which exit matches had been found ("matched entries") to accurate, full-day ridership totals ("control totals"). For each station entered through faregates, the total number of entries recorded by the AFC system, excluding employee passes and cancelled transactions, was assumed to be an accurate control total to which the matched entries at that station could be expanded. However, on surface lines, many of the boardings are not recorded (passengers paying with cash, showing farecards to vehicle operators without tapping the cards on fareboxes or running them through card readers, or evading fares entirely). To get more accurate control totals for surface boardings than those provided by the AFC system, the most recent manual counts of passengers by CTPS checkers were used. Control totals were applied to boardings on a station-by-station basis for stations with off-train fare collection and on a route-by-route basis for segments with on-board fare collection. These expansions, based on combined AFC data and surface manual counts, brought the total ridership on the rapid transit, light rail, and Silver Line Waterfront systems to about 585,000 per weekday, 388,000 on a Saturday, and 245,000 on a Sunday.

Allocate Trips at Shared Stations to Lines

The final program steps allocated entries and exits at stations, such as Park Street, that are shared by two or more lines to the appropriate line based on the opposite trip end. For example, trips from Park Street to Harvard were allocated to Park Street Red Line entries, and trips from Harvard to Park Street were allocated to Park Street Red Line exits, while trips between Park Street and Lechmere were allocated to Park Street

Green Line entries and exits. These programming steps also arranged and formatted the station-to-station trip tables for final presentation.

Produce Final Trip Tables

A series of trip tables was produced for one sample weekday, Saturday, and Sunday. Each table set shows the number of passengers entering at each station or line and exiting at each station or line in one of the four following groups, resulting in 16 tables for each day.

- All Green Line subway stations and surface branches
- All Red Line stations
- Mattapan High-Speed Line and all Orange Line stations
- All Blue Line stations, all Silver Line Waterfront stations with faregates, all Silver Line Waterfront stations surface segments, and all lines combined

A sample trip table, which presents the data on passengers who both entered and exited the system at a Green Line station on a weekday, is provided as Figure 2. The complete set of tables for each sample day may be obtained from CTPS upon request.

CONCLUSIONS

- The farecard use records compiled by the MBTA's automated fare collection system can be used to produce station-to-station trip tables for the MBTA rapid transit system that are at least as accurate as those that can be produced by any other method currently available.
- The computer programs created in this study to produce such tables are fairly complex, and there are a variety of ways to carry out the steps needed. During the course of this project, the programs were continually refined to improve execution time. Potential further refinements that would make the programs more efficient have been identified by CTPS. They should be implemented if the programs will be used frequently.

RECOMMENDATIONS

- This project should be continued with a second phase. The objectives would include more fully automating the programs to reduce the amount of operator intervention required between receipt of a raw data file and output of a finished station-to-station trip table.
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**Figure 2
Green Line to Green Line Trip Table
for Thursday, September 23, 2010**

	EXIT STATION on GREEN LINE													Total Green Line Subway	Surface B Line	Surface C Line	Surface D Line	Surface E Line	Total Green Line
	Lechmere	Science Park	North Sta. Green	Haymrket Green	Govt. Ctr Green	Park St. Green	Boylston	Arlington	Copley	Hynes Conv. Ctr	Kenmore	Prudential	Symphony						
ENTRY STATION on GREEN LINE																			
Lechmere	0	64	443	419	348	369	171	160	264	88	90	113	74	2,603	153	110	156	336	3,358
	0.0%	1.0%	6.9%	6.5%	5.4%	5.7%	2.7%	2.5%	4.1%	1.4%	1.4%	1.8%	1.2%	40.5%	2.4%	1.7%	2.4%	5.2%	52.3%
Science Park	67	0	12	37	41	37	20	21	49	16	25	27	12	364	22	16	44	48	494
	7.0%	0.0%	1.3%	3.9%	4.3%	3.9%	2.1%	2.2%	5.1%	1.7%	2.6%	2.8%	1.3%	38.2%	2.3%	1.7%	4.6%	5.0%	51.8%
North Sta. Green	519	16	0		211	326	234	654	470	231	294	179	46	3,180	227	194	255	321	4,177
	8.8%	0.3%	0.0%		3.6%	5.6%	4.0%	11.1%	8.0%	3.9%	5.0%	3.1%	0.8%	54.2%	3.9%	3.3%	4.3%	5.5%	71.2%
Haymarket Green	430	38		0	70	218	151	266	425	222	223	162	58	2,263	176	133	212	321	3,105
	9.1%	0.8%		0.0%	1.5%	4.6%	3.2%	5.6%	9.0%	4.7%	4.7%	3.4%	1.2%	47.9%	3.7%	2.8%	4.5%	6.8%	65.7%
Govt Ctr Green	385	47	191	71	0	171	173	297	541	448	459	186	92	3,061	836	530	1,051	546	6,024
	4.6%	0.6%	2.3%	0.8%	0.0%	2.0%	2.1%	3.5%	6.4%	5.3%	5.5%	2.2%	1.1%	36.4%	9.9%	6.3%	12.5%	6.5%	71.7%
Park St. Green	432	40	259	210	171	0	146	309	709	515	602	258	121	3,772	1,048	687	1,222	733	7,462
	4.9%	0.5%	2.9%	2.4%	1.9%	0.0%	1.7%	3.5%	8.0%	5.8%	6.8%	2.9%	1.4%	42.7%	11.8%	7.8%	13.8%	8.3%	84.4%
Boylston	181	16	196	143	190	170	0	79	372	380	439	146	135	2,447	918	473	732	695	5,265
	2.3%	0.2%	2.5%	1.9%	2.5%	2.2%	0.0%	1.0%	4.8%	4.9%	5.7%	1.9%	1.7%	31.7%	11.9%	6.1%	9.5%	9.0%	68.2%
Arlington	177	27	591	282	291	334	81	0	156	209	262	61	57	2,528	448	335	504	269	4,084
	2.1%	0.3%	7.0%	3.3%	3.4%	3.9%	1.0%	0.0%	1.8%	2.5%	3.1%	0.7%	0.7%	29.7%	5.3%	3.9%	5.9%	3.2%	48.0%
Copley	270	32	403	402	491	726	328	148	0	299	730	121	111	4,061	1,531	826	1,244	890	8,552
	1.8%	0.2%	2.7%	2.7%	3.3%	4.9%	2.2%	1.0%	0.0%	2.0%	4.9%	0.8%	0.7%	27.3%	10.3%	5.6%	8.4%	6.0%	57.5%
Hynes Conv. Ctr	101	20	241	237	436	571	410	222	306	0	388	46	37	3,015	1,468	755	1,017	194	6,449
	1.0%	0.2%	2.4%	2.4%	4.4%	5.8%	4.2%	2.3%	3.1%	0.0%	3.9%	0.5%	0.4%	30.6%	14.9%	7.7%	10.3%	2.0%	65.4%
Kenmore	94	27	277	242	459	597	431	245	676	329	0	66	28	3,471	663	348	412	165	5,059
	1.1%	0.3%	3.3%	2.9%	5.4%	7.1%	5.1%	2.9%	8.0%	3.9%	0.0%	0.8%	0.3%	41.1%	7.9%	4.1%	4.9%	2.0%	59.9%
Prudential	113	27	166	156	174	275	138	72	147	49	57	0	39	1,413	59	38	75	461	2,046
	3.0%	0.7%	4.4%	4.2%	4.6%	7.3%	3.7%	1.9%	3.9%	1.3%	1.5%	0.0%	1.0%	37.7%	1.6%	1.0%	2.0%	12.3%	54.5%
Symphony	75	14	43	59	87	126	120	67	137	37	23	21	0	809	57	34	59	361	1,320
	3.9%	0.7%	2.2%	3.0%	4.5%	6.5%	6.2%	3.4%	7.0%	1.9%	1.2%	1.1%	0.0%	41.6%	2.9%	1.7%	3.0%	18.6%	67.9%
Tot. G. L. Subway	2,844	368	2,822	2,258	2,969	3,920	2,403	2,540	4,252	2,823	3,592	1,386	810	32,987	7,606	4,479	6,983	5,340	57,395
	3.1%	0.4%	3.1%	2.5%	3.3%	4.3%	2.7%	2.8%	4.7%	3.1%	4.0%	1.5%	0.9%	36.5%	8.4%	5.0%	7.7%	5.9%	63.6%
Surface B Line	139	18	237	178	786	1,025	870	444	1,401	1,388	693	82	48	7,309	12,510	871	983	455	22,128
	0.5%	0.1%	0.9%	0.7%	3.0%	3.9%	3.3%	1.7%	5.3%	5.3%	2.6%	0.3%	0.2%	27.7%	47.4%	3.3%	3.7%	1.7%	83.8%
Surface C Line	106	21	182	131	490	629	441	336	752	665	322	52	47	4,174	867	4,101	671	332	10,145
	0.9%	0.2%	1.5%	1.1%	4.0%	5.1%	3.6%	2.7%	6.2%	5.4%	2.6%	0.4%	0.4%	34.1%	7.1%	33.5%	5.5%	2.7%	83.0%
Surface D Line	134	43	268	210	996	1,136	677	481	1,144	927	416	66	51	6,549	927	648	11,385	371	19,880
	0.6%	0.2%	1.1%	0.9%	4.1%	4.7%	2.8%	2.0%	4.7%	3.8%	1.7%	0.3%	0.2%	27.0%	3.8%	2.7%	46.9%	1.5%	81.9%
Surface E Line	294	52	300	318	508	685	670	263	942	198	163	402	312	5,107	540	435	425	1,753	8,260
	2.3%	0.4%	2.4%	2.5%	4.0%	5.4%	5.3%	2.1%	7.4%	1.6%	1.3%	3.2%	2.5%	40.3%	4.3%	3.4%	3.4%	13.8%	65.1%
Total Green Line	3,517	502	3,809	3,095	5,749	7,395	5,061	4,064	8,491	6,001	5,186	1,988	1,268	56,126	22,450	10,534	20,447	8,251	117,808
	2.1%	0.3%	2.3%	1.9%	3.5%	4.5%	3.1%	2.5%	5.1%	3.6%	3.1%	1.2%	0.8%	33.8%	13.5%	6.4%	12.3%	5.0%	71.0%

APPENDIX

CHARLIECARD TRIP PATHS PILOT STUDY

PRESENTATION OF THE STUDY

INCLUDING

FULL TECHNICAL DOCUMENTATION

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CHARLIECARD TRIP PATHS PILOT STUDY

BACKGROUND

The MBTA's automated fare collection (AFC) system records the number of passengers entering each rapid transit prepayment station through the electronic faregates, but does not directly provide any information as to the locations at which these passengers exit the rapid transit system. Historically, to obtain station-to-station ridership totals, it has been necessary to rely on passenger surveys. Such surveys are not conducted on a regular basis because of the amount of resources they require, and when they are conducted it is necessary to extrapolate findings from responses from small percentages of all riders.

Station-to-station ridership totals are needed to comply with the National Transit Database (NTD) requirement of reporting average passenger trip length by mode each year. They are also used in monitoring compliance of average vehicle loads with MBTA service standards and in calibrating the CTPS regional model, which provides forecasts of ridership on potential new transit services.

The 2008–09 MBTA systemwide survey results indicate that 90% of the riders who enter the rapid transit system on a given day make two or more one-way rapid transit trips over the course of the day. Each trip that begins with an entry through a faregate at a prepayment station (as opposed to a Green Line surface stop) is recorded as an entry at that station. Each farecard used to enter the system has a unique serial number that is recorded, along with a time and date stamp, every time it is used to open a faregate. Consequently, the AFC system can show all of the faregates where a given farecard has been used over a given span of hours.

The underlying hypothesis for this study was that a passenger making more than one one-way trip on the rapid transit system on a given day would start each trip at either the same station where the exit from the previous trip occurred or at another station in the same general area. If this hypothesis is correct, the station-to-station travel of any farecard appearing more than once in a report for a single day can be depicted by treating each entry point as the exit point from the previous trip, and treating the initial entry point as the exit point from the final trip.

To protect passenger confidentiality, when the AFC data are used to trace farecards through the system, the MBTA substitutes randomly assigned numbers for the actual numbers. For this study, CTPS was not given access to any databases that could identify individual farecard users.

TASK 1 - OBTAIN AFC DATA

The first task for this project was to obtain AFC data for seven sequential days from a week during which ridership would be expected to be representative. The MBTA had recently prepared such datasets for use in a research project being conducted at the

Massachusetts Institute of Technology, and agreed to provide the same datasets to CTPS. The dates included were from Monday, September 20, to Sunday, September 26, 2010. The datasets were provided in the form of seven Excel spreadsheets. Each spreadsheet contained the records of all faregate entries from the start to the end of one service day, mingled with records of use of farecards on board buses and light rail vehicles, records of validation of farecards on platforms at certain light rail stations, and records of reading of farecards by portable card-readers carried by MBTA inspectors. Each weekday dataset contained about 940,000 records. The Saturday set contained about 584,400 records and the Sunday set about 359,200.

TASK 2 - PROCESS AFC DATA

Extracting Relevant Records

The first step required in this task was to extract the relevant records from each dataset. For this project, only the records for entries at rapid transit stations or use of farecards at light rail vehicle fareboxes, on-platform validators, or portable card readers were of direct interest. However, the faregates at South Station do not distinguish between passengers entering to go to the Red Line and those entering to go to the Silver Line Waterfront bus rapid transit routes. To avoid below-average match rates for cards used at South Station, records from Silver Line faregates at the World Trade Center and Courthouse stations were also included, as were the records for cards used at fareboxes on vehicles on Silver Line Waterfront routes.

The records in the datasets provided to CTPS were not identified directly as being from faregates, fareboxes, or validators. However, each record included a field labeled "DEVICEID" containing a number. A number with four-digits or less identified an on-vehicle farebox. A six-digit number beginning with 4 identified an in-station faregate. A six-digit number beginning with 8 identified an on-platform card validator. A six-digit number beginning with 9 identified a portable card reader. Among the records from fareboxes, those from surface Green Line, Mattapan High-Speed Line, and Silver Line Waterfront vehicles could be distinguished by numbers in a field labeled "ROUTE." For internal purposes at the MBTA, surface Green Line routes have numbers between 810 and 883. The Mattapan High-Speed Line is Route 899. The Silver Line Waterfront routes are numbered from 741 to 746. The AFC records used these numbers, with a 0 or 1 added at the end to denote an outbound or inbound trip.

A data field labeled "TICKETDESC" identified the specific type of farecard involved in the transaction. An examination of transactions for Employee ID cards showed that high percentages of them involved frequent entries to one station in the performance of a work assignment there rather than the beginnings of trips. Others apparently reflected travel among stations by roving inspectors. For purposes of analysis in this study, all transactions involving Employee ID cards were excluded.

A field labeled "AMOUNT" showed the dollar value deducted when a stored-value card was used. Records with negative amounts indicated transactions that had been

cancelled immediately. Each such transaction matched another with an equal positive amount registered at the same device at the same time. Since cancelled transactions did not represent actual entries to the system, all such cancelling pairs were excluded from the test sets.

In processing the data, it was later found that a few ticket serial numbers had been assigned to more than one ticket, possibly because of use of older ticket stock. This was first recognized in cases where the same serial number was registered at two different stations at times too close together for trips to have been made between them. Further investigation found that in such cases the two cards had different descriptions, such as one being a monthly Link Pass and the other a commuter rail pass. Such cases were resolved by adding a decimal point and a two-digit code for the card type, so that both cards could remain in the database.

Subdividing Datasets for Manageability

For purposes of creating station-to-station trip tables, once subsets of records had been selected as described above, only three data fields were needed. These were the ticket serial number, the transaction time from the field labeled "CREATEDATE," and either the route number or the faregate, validator, or card reader number. After the selection process above, about 570,000 records from each weekday database were to be used in the analysis. Even with a reduction to three data fields, the computer memory requirements resulted in very slow execution of the programs that were to be used to find matching card numbers. It was determined by testing sets of various sizes that execution time could be improved significantly by dividing the data from each day into groups of about 25,000 records, with all transactions for a given card being included in the same group. After the matching program was executed, the results were recombined to produce the complete station-to-station tables for a given day.

Subdividing Records by Station or Surface Route

As noted above, the AFC datasets used numerical codes to identify the faregate, farebox, validator, or card reader where each farecard was used, but they did not include codes showing where each device was located. The MBTA provided CTPS with a separate key showing the correspondence between faregate identification numbers and stations, and between validator numbers and platforms. No records were available as to where each portable card reader had been deployed on a given day. For records from vehicle fareboxes, assuming that the route numbers were entered into the fareboxes correctly at the start of each trip, it was possible to determine which route a card was used on but not the boarding stop. (A more detailed analysis than was possible for this project might be used to approximate stop locations by clusters of card use times from each farebox.) In general, the number of surface Green Line fare transactions identified as outbound was higher than the daily totals found in recent manual counts by CTPS, while the number of transactions identified as inbound was much lower than the counts. In both directions, some fares are not registered at all because of the "show and go" policy that allows monthly, daily, or weekly pass users to

merely display their passes without tapping them on fareboxes or validators. Therefore, it was concluded that the inbound and outbound designations in the databases could not be relied on.

The only surface Green Line stop with faregates is Riverside, on the D Line. The other 12 surface stops on the D Line all have on-platform card validators, but only five surface stops on the E Line, three on the C Line and none on the B Line do. The Mattapan High-Speed Line also has no validators. One of the CTPS database programs used faregate numbers grouped by station as selection criteria to divide the fare transaction records in each set of about 25,000 by individual prepayment stations. Route numbers were used to divide farebox transactions into the four surface Green Line branches plus the Mattapan High-Speed Line and the Silver Line Waterfront. Records from fixed-location validators were grouped by line but not by stop, because the number of validator transactions reported from any individual stop was small. Records from portable card readers were placed in a separate group. Overall, this procedure resulted in a total of 73 potential groups of trip origins in each dataset, although some of the groups had no records in some of the datasets.

For reasons explained below, in addition to the data divided into 73 groups, the program also retained each set of approximately 25,000 records in an undivided format, but attached a new numerical code to each record, in place of the original AFC code, to identify the station or other location where the card was used.

Preliminary Calculation of Station-to-Station Trip Matrixes

As stated in the background section of this memorandum, the underlying assumption of this project was that the station-to-station travel of any farecard appearing more than once in a report for a single day could be depicted by treating each entry point as the exit point from the previous trip, and treating the initial entry point as the exit point from the final trip. The first set of steps in the matching program used the serial numbers of the records in each of the 73 groups of trip origins as selection criteria to extract from the full set of 25,000 all other records with the same serial numbers that appeared in that origin group. The extracted records were saved for use in subsequent processing. The matches between each origin location and each other location were counted and the totals were entered in a preliminary station-to-station matrix. When all sets of 25,000 records from a given day had been processed in this manner, the results from all sets were combined, as the impact of file sizes on execution time of subsequent steps was not significant.

Refinement of Station-to-Station Trip Matrixes

The next set of steps edited the preliminary station-to-station trip matrix from a given day to correct the results from cards used for more than two transactions each. In the preliminary matrix, a card appearing once at Station A and once at Station B and at no other locations was treated as representing one trip from A to B, and one trip from B to A, which required no further editing. For a card recorded first at station A, then Station

B, then Station C, the desired result was for the program to treat this as representing a trip from A to B followed by a trip from B to C and a trip back directly from C to A. The editing process removed “false” trips from A to C, from B to A, and from C to B that appeared in the preliminary matrix.

Greater numbers of card appearances required progressively more complex editing steps. The editing procedures were also designed to recognize legitimate multiple transactions such as two or more people traveling together on one stored-value card. Only about 0.33% of the distinct farecard numbers in the rapid transit and light rail datasets appeared in more than six records each on a given day. From comparison tests, it was found that the overall percentage distributions of station-to-station trips were essentially the same whether records with these high-use cards were included with no editing-out of false trips or if all records for these cards were excluded. It was, however, important to edit out false trips from cards appearing in three to six records each.

Expansion of Trip Tables

The passenger entries into the rapid transit system recorded at faregates, fareboxes, validators, or card readers should produce equal numbers of exits from the system. The station-to-station tables generated by the program steps described above inferred exit locations for about 90% of the entry records in each of the tested datasets. The program could only infer an exit location for a farecard recorded at more than one location on the same day. Entries for which exits could not be inferred presumably included farecards used by passengers who entered the system only once during a day, by passengers who used different farecards for different trips on the same day, or by passengers who made one registered entry and one entry by “show-and-go” or outright fare evasion on the surface Green Line, Mattapan High-Speed Line or Silver Line Waterfront. A 90% match rate is nevertheless much higher than the sample rates that have been obtained in past surveys of MBTA rapid transit passengers.

As in the case of surveys, expansion factors were applied to the numbers in the station-to-station trip matrixes to bring the totals up to total ridership in the same time span. For each station with faregates, the number of entry records in the database for a given day was assumed to be equal or nearly equal to the actual total number of passenger entries during the day. However, for surface lines on which many boardings are unregistered, it was necessary to use the most recent available manual counts as control totals, and it was necessary to expand alightings as well as boardings. In applying expansion factors, surface line boardings and alightings were adjusted first. Adjustments were then made to trip totals between each pair of faregate-entry stations to compensate for remaining discrepancies between the number of entries accounted for in the matrix and the entry control totals.

As an example of the surface-line trip expansion method, suppose that 1,000 passengers boarded trains at surface D Line stops to go to Park Street Station, with 700 tapping farecards on fareboxes, 100 tapping cards on the validators on station platforms

before boarding, and 200 showing farecards to the train operator but not tapping the cards on fareboxes or validators. If all 1,000 passengers later returned to surface D Line stops by entering through faregates at Park Street, the station-to-station matrix would show only 800 trips from the surface stops to Park Street and 800 from Park Street to the surface stops; the trips by the other 200 passengers would not appear in the matrix because use of their cards was recorded only at Park Street. If the most recent manual boarding counts of passengers on the surface D Line showed 25% more trips between the surface stops and the subway than accounted for in the unadjusted matrix, applying this factor to the 800 trips from the surface stops to Park Street and the 800 trips from Park Street to the surface would result in the correct number of 1,000 trips in each direction.

After adjustments were made to surface boardings and alightings as in the example above, there were still some shortfalls between entries recorded at most stations with faregates and total trips from those stations accounted for in the station-to-station matrixes. These were compensated for by distributing additional trips from each station with faregates among all destinations other than surface stops, in proportion to the number of trips from the entry location to each destination shown in the table prior to these distributions. For example, suppose that the total number of farecard entries recorded at a given station was 10,000 and that after applying expansion factors to surface line destinations, the matrix accounted for 3,400 trips from that station to surface lines and 6,000 trips to stations with faregates. The remaining discrepancy of 600 was then compensated for by increasing the trips to each station with faregates by a factor of $600/6,000$, or 10%.

The product of Task 2 called for in the work program was a set of station-to-station trip tables for each of five weekdays, one Saturday, and one Sunday for which AFC data were obtained. Comparisons of the unweighted results from the five weekdays indicated that there was very little difference in the percentage distributions of trips between station pairs. However, on the Monday, Tuesday, and Wednesday for which data had been provided, the Red Sox played home games at Fenway Park. This impacted the ridership patterns in the hours before and after the games, especially at Kenmore Station and on the surface B, C, and D Lines. There were no home games on the Thursday or Friday of the sample week, but for reasons that CTPS was unable to determine, the Friday set had no data from Back Bay Station on the Orange Line. This is usually one of the most heavily used stations in the rapid transit system. Because of these issues, processing of the weekday data beyond the unweighted tables was done only for the Thursday dataset.

As noted above, because of the large number of surface Green Line trips made without the recording of farecards, it was necessary to use information from the most recent past manual counts when weighting the total trips to or from surface Green Line segments in the preliminary station-to-station tables. CTPS has never done comprehensive counts of Saturday or Sunday Green Line ridership. Therefore, in

weighting the weekend results it was necessary to make assumptions as to the percentages of trips that were not recorded.

The station-to-station totals inferred from the AFC data and expanded as described above could be summarized in a number of ways, depending on how they are to be used. In the appendix to this document, the results for a sample day (September 23, 2010) are summarized in a series of tables in which the rows are entry stations or lines and the columns are exit stations or lines. Each table shows the number of passengers entering at each station or line in one of four groups and exiting at each station or line in one of four groups, resulting in a total of 16 tables. The groups are: 1) all Green Line subway stations and surface branches; 2) all Red Line stations; 3) the Mattapan High-Speed Line and all Orange Line stations; and 4) all Blue Line stations, all Silver Line Waterfront stations with faregates, all Silver Line Waterfront surface segments, and all lines combined. The order of the appended tables, in terms of their entry station groups, matches the sequence of the groups as just described; within the set of tables for each entry station group, the exit station groups also match that sequence. For example, the first four give data on trips with Green Line entry stations, Table 1 covering those trips with Green Line exit stations, Table 2 those with Red Line exit stations, and so on.

Ridership at stations shared by more than one line is divided on the basis of trip ends. For example, passengers entering Park Street Station and going to stations on the Red Line are included in the "Park Street Red" entries, but the "Park Street Green" entries do not include any passengers destined for Red Line stations. Similarly, passengers boarding at Red Line stations and destined for Park Street are included in the "Park Street Red" exits but not in the "Park Street Green" exits. Numbers in bold are line totals.

In the tables, the volume from each entry station or line to each exit segment or line is shown both as an absolute number and as the percentage of that number relative to the total number of trips from that entry location to all exit locations. For example, Table 6 shows 1,356 trips from Harvard Station to Charles/MGH Station. This is 5.8% of the total 23,377 trips from Harvard Station to all destinations, shown in the final summary column in Table 8.

TASK 3 - ANALYZE RESULTS

Data Sources Available for Comparisons with CharlieCard Trip-Path Tables

The objective of this task was to compare the results of the station-to-station trip matrixes produced as described above with other sources of information on station-to-station trips in order to determine whether the numbers in the matrixes would be sufficiently accurate to use for reporting and travel demand modeling purposes. It was anticipated from the outset that it would be difficult to evaluate the results, because there is no other source of station-to-station ridership that is known to be both complete and accurate. Unlike some electronic fare collection systems that require use of

farecards both when entering and when exiting, the MBTA's AFC system uses cards only for entry. In the case of surface lines, even entries are not fully recorded. At stations with faregates, to open a gate to exit, a passenger must simply walk up to it. The system is supposed to record the number of passengers exiting through each gate, but may undercount if several passengers exit in quick succession while a gate remains open. Many stations also have exit-only gates that are not part of the AFC system and do not have any automatic counters.

CTPS has conducted manual counts at each MBTA rapid transit station and surface light rail stop at various times in the past, but such efforts are so labor-intensive that they have not been done on a regular basis. Consequently, the most recent data from such counts can be as new as from 2011 or as old as from 1995. Even the most comprehensive past counting projects had to be done over spans of several months, during which time observations at a given station in a given span of hours were done on only one day. Because of both normal and unusual variations in day-to-day ridership, the production of tables in which total alightings equal total boardings has required numerous adjustments and assumptions.

CTPS has never done systemwide rapid transit passenger counts on Saturdays or Sundays. Travel on such days would be expected to consist largely of nonrepetitive discretionary trips, so it would be much more difficult to produce counts for a composite representative weekend day than for a composite representative weekday.

Manual counts as described above cannot ascertain station-to-station ridership totals directly. When counts are separated by travel direction, passengers alighting at the second station on a route must all have boarded at the first station; those alighting at the third station must be among those who boarded at the second station and those from the first station still remaining after the second station, etc.; but after the second station, assumptions must be used to estimate the split of alightings among entry locations.

Systemwide surveys of MBTA passengers have historically been conducted even less frequently than passenger counts, but CTPS conducted surveys of passengers on almost all MBTA transit services during 2008 and 2009. (The Silver Line Washington Street was surveyed in 2005 and the Silver Line Waterfront in 2006.) One of the main reasons for conducting these surveys was to obtain information on how passengers traveled through the system, from first boarding location to final alighting location, including intermediate transfers. In theory, the accuracy of the results of any such survey can be calculated from the total number of riders in each subgroup and the total number of surveys returned from riders in that group. However, these calculations require an underlying assumption that the passengers who return surveys are representative of overall ridership. With the large number of possible system exits by passengers entering at any given location, trips to less common destinations are likely to be underrepresented and trips to more common destinations to be overrepresented in survey results. Like the passenger counts, the surveys were conducted only on weekdays. Furthermore, the surveys were distributed only between about 6:00 AM and

3:30 PM on each route. The reason for this was that travel after 3:30 is dominated by riders making the return segments of round-trips on which the initial segments are made before 3:30. Passengers who were offered survey forms before 3:30 would most likely decline second opportunities to take forms after 3:30.

In addition to the 2008–09 survey, another source of survey information for which comparisons were called for in the work program for this project was a series of surveys conducted by TransitWorks between 2005 and 2009. However, as the sample sizes in those surveys were much smaller than those in the CTPS survey, it was concluded that the TransitWorks surveys would not provide a useful basis for comparisons.

Comparisons with 2008-09 Survey Results

The tables produced by the CTPS CharlieCard trip-paths programs started by including records from farecards used throughout an entire service day rather than those from a selected time interval within a day. The reason for this was that a card used for the first time in one interval would often be used for the second time within another interval. The shorter the intervals, the lower the chances would be of finding matching numbers within the same interval. However, the CTPS programs stored the matching records from each entry station in a form that allowed subsequent extraction of all records having one entry point at that station within a specified time interval regardless of the entry times at the opposite trip ends. This subprogram was used to create a station-to-station table for trips beginning between 6:00 AM and 3:30 PM for comparison with the 2008–09 rapid transit survey results.

Summarized at the rapid transit line level, the table generated from the CTPS CharlieCard trip path programs for 6:00 AM to 3:30 PM on a weekday showed higher percentages of riders on each line making transfers to other lines than the survey results showed. These differences appeared to have two underlying causes. One of these was that the number of trips between stations near the outer ends of two different rapid transit lines was so small that they were underrepresented in the survey results. For example, the survey had no responses from passengers going from Wonderland Station on the Blue Line to either Alewife Station or Ashmont Station on the Red Line. The CharlieCard program showed 10 trips from Wonderland to Alewife and 9 trips from Wonderland to Ashmont during the span of hours covered in the survey, but these accounted for only 0.24% and 0.22% of all trips from Wonderland during these hours.

Standard statistical formulas indicate that for the Wonderland survey responses overall, the confidence interval was 4.1% at the 95% confidence level. This means in effect that there was a 95% chance that the percentage of riders with a certain travel characteristic according to the survey was within 4.1% above or below the actual percentage of riders with that characteristic in the survey population. For actual travel characteristics shared by very small percentages of the survey population (such as those making trips from Wonderland to Alewife or Ashmont), the confidence interval would be much narrower, but a valid survey could still indicate that 0% of the riders boarding at Wonderland went to Alewife or Ashmont.

The survey indicated that 4.2% of passengers boarding at Wonderland were going from that station to any station on the Red Line, compared with 11.2% indicated by the CharlieCard program. This was a much larger discrepancy than would be expected according to the statistical formulas. In addition to undersampling of less common trips, another likely source of discrepancies between the survey results and the CharlieCard table was that some survey respondents did not correctly describe their complete transit trips. For example, to make a trip from Wonderland Station to any station on the Red Line using only the rapid transit system, a passenger would either have to alight from the Blue Line at State Station and use the Orange Line as a connecting link to the Red Line at Downtown Crossing, or alight from the Blue Line at Government Center and use the Green Line as the connecting link to the Red Line at Park Street. Some passengers making such trips may have reported only the segments on the Blue Line on their survey forms.

The survey results show 31.5% of the passengers boarding at Wonderland as exiting from the rapid transit system at State and 12.1% as exiting at Government Center. The CharlieCard table showed only 18.6% of Wonderland riders as exiting at State and 8.7% as exiting at Government Center. The most recent CTPS passenger boarding and alighting counts at all stations on the Blue Line were done in 2003. From these counts, travel volumes over each link between successive stations tables were calculated by adding cumulative boardings and subtracting cumulative alightings up to the station preceding each link. The entry stations for the passengers on any link on the Blue Line can be estimated by assuming that all inbound passengers alighting at Revere Beach boarded at Wonderland, inbound alightings at Beachmont were distributed in proportion to inbound boardings at Revere Beach and inbound Wonderland passengers remaining after Revere Beach, etc. Carrying these calculations through the entire Blue Line for boardings between 6:00 AM and 3:30 PM in the 2003 counts indicates that of the passengers boarding at Wonderland, 17.6% exited from the rapid transit system at State and 9.6% at Government Center. These are much closer to the results in the CharlieCard table than the survey results are.

Conclusions

Time constraints on this project did not allow for comparisons of all station-to-station travel volumes calculated by the CTPS CharlieCard programs with results from the survey and with volumes calculated from boarding and alighting counts. To the extent that comparisons were done (of which the Blue Line figures cited above are just one example), they indicate that the methods developed by CTPS for estimating station-to-station travel volumes on the MBTA rapid transit system from AFC data can produce results as least as accurate as those of other methods used in the past. Use of the AFC programs would be far more cost-effective than manual passenger counts or surveys, because the AFC programs only require input data that are being collected by the MBTA anyway. The AFC programs could be used to generate new tables as often as desired instead of using data from counts or surveys that may be years old.

TASK 4 - RECOMMENDATIONS

The programs produced by CTPS for generating station-to-station trip tables from CharlieCard data should be put to practical use after some relatively minor refinements. It is suggested that new tables be generated at yearly intervals unless the results from year to year are found not to change significantly. It would also be interesting to generate tables for different seasons. Because of nonrepetitive travel on weekend days, tables should be generated from data from several Saturdays and from several Sundays.

In testing the CTPS CharlieCard programs, the most time-consuming tasks included converting the AFC data from the form provided by the MBTA into the forms used within the CTPS programs, and applying expansion factors to the tables generated by the programs. If the programs are to be used to generate new tables regularly, it would be worthwhile to add steps to more fully automate the process from start to finish. In the test phase of the project, the programs were designed to pause frequently during execution to allow the results to be examined for coding errors or instructions that worked in unintended ways. Seeing evidence of problems close to where they first occurred rather than allowing them to be perpetuated through many subsequent program steps facilitated the process of correcting them. As editing of the programs progressed, the number of places where they were required to pause either within individual programs or in transitions from one program to another was gradually reduced. However, at the end of the pilot study it was not yet possible to take a set of AFC data in the form in which it was provided by the MBTA and use it directly as an input to the first of a series of programs that would run without further intervention to produce a final station-to-station trip table. One objective of a future phase of this project would be to produce a program that would reduce as much as possible the required number of operator interventions between the receipt of data and the production of trip tables.

Although it was not called for in the work program, the computer programs produced by CTPS for this project include a subprogram to break down station-to-station travel by time periods within a day. Work was also nearly completed on a subprogram to calculate travel volumes on each link within the rapid transit system. These volumes could then be used in calculating passenger-miles for reporting requirements.

As written, the programs use only data from the rapid transit and light rail lines and the Silver Line Waterfront routes, but they could be adapted to calculate travel through the rapid transit system by passengers transferring to or from the bus system. At present, the commuter rail system has no means of automatically recording use of farecards. However, the records in the databases for the rapid transit and bus systems show the type of farecard used in every transaction. Therefore, it would be possible to trace the travel of passengers with monthly commuter rail passes through the rapid transit and bus networks. The commuter rail passes are identified by zone levels and by entry points and entry times into the rapid transit system. This information would allow the commuter rail boarding point for a given card to be narrowed down to a limited number

of possible stations. The CTPS programs could also be used to generate station-to-station trip tables for specific categories of passengers, such as students or senior citizens.

It should be noted that the objective of this project called for CTPS to test the feasibility of generating reasonably accurate station-to-station trip tables from AFC data and that CTPS found that this is in fact feasible. There are often multiple ways to approach a particular computer programming problem. It is likely that the CTPS CharlieCard programs will evolve over time to become more efficient and user-friendly than they were at the conclusion of this project.

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
for Thursday, September 23, 2010

TABLE 1
GREEN LINE to GREEN LINE

ENTRY STATION on GREEN LINE	EXIT STATION on GREEN LINE													Total Green Line Subway	Surface B Line	Surface C Line	Surface D Line	Surface E Line	Total Green Line
	Lechmere	Science Park	North Sta. Green	Haymarket Green	Govt. Ctr Green	Park St. Green	Boylston	Arlington	Copley	Hynes Conv. Ctr	Kenmore	Prudential	Symphony						
Lechmere	0	64	443	419	348	369	171	160	264	88	90	113	74	2,603	153	110	156	336	3,358
	0.0%	1.0%	6.9%	6.5%	5.4%	5.7%	2.7%	2.5%	4.1%	1.4%	1.4%	1.8%	1.2%	40.5%	2.4%	1.7%	2.4%	5.2%	52.3%
Science Park	67	0	12	37	41	37	20	21	49	16	25	27	12	364	22	16	44	48	494
	7.0%	0.0%	1.3%	3.9%	4.3%	3.9%	2.1%	2.2%	5.1%	1.7%	2.6%	2.8%	1.3%	38.2%	2.3%	1.7%	4.6%	5.0%	51.8%
North Sta. Green	519	16	0		211	326	234	654	470	231	294	179	46	3,180	227	194	255	321	4,177
	8.8%	0.3%	0.0%		3.6%	5.6%	4.0%	11.1%	8.0%	3.9%	5.0%	3.1%	0.8%	54.2%	3.9%	3.3%	4.3%	5.5%	71.2%
Haymarket Green	430	38		0	70	218	151	266	425	222	223	162	58	2,263	176	133	212	321	3,105
	9.1%	0.8%		0.0%	1.5%	4.6%	3.2%	5.6%	9.0%	4.7%	4.7%	3.4%	1.2%	47.9%	3.7%	2.8%	4.5%	6.8%	65.7%
Govt Ctr Green	385	47	191	71	0	171	173	297	541	448	459	186	92	3,061	836	530	1,051	546	6,024
	4.6%	0.6%	2.3%	0.8%	0.0%	2.0%	2.1%	3.5%	6.4%	5.3%	5.5%	2.2%	1.1%	36.4%	9.9%	6.3%	12.5%	6.5%	71.7%
Park St. Green	432	40	259	210	171	0	146	309	709	515	602	258	121	3,772	1,048	687	1,222	733	7,462
	4.9%	0.5%	2.9%	2.4%	1.9%	0.0%	1.7%	3.5%	8.0%	5.8%	6.8%	2.9%	1.4%	42.7%	11.8%	7.8%	13.8%	8.3%	84.4%
Boylston	181	16	196	143	190	170	0	79	372	380	439	146	135	2,447	918	473	732	695	5,265
	2.3%	0.2%	2.5%	1.9%	2.5%	2.2%	0.0%	1.0%	4.8%	4.9%	5.7%	1.9%	1.7%	31.7%	11.9%	6.1%	9.5%	9.0%	68.2%
Arlington	177	27	591	282	291	334	81	0	156	209	262	61	57	2,528	448	335	504	269	4,084
	2.1%	0.3%	7.0%	3.3%	3.4%	3.9%	1.0%	0.0%	1.8%	2.5%	3.1%	0.7%	0.7%	29.7%	5.3%	3.9%	5.9%	3.2%	48.0%
Copley	270	32	403	402	491	726	328	148	0	299	730	121	111	4,061	1,531	826	1,244	890	8,552
	1.8%	0.2%	2.7%	2.7%	3.3%	4.9%	2.2%	1.0%	0.0%	2.0%	4.9%	0.8%	0.7%	27.3%	10.3%	5.6%	8.4%	6.0%	57.5%
Hynes Conv. Ctr	101	20	241	237	436	571	410	222	306	0	388	46	37	3,015	1,468	755	1,017	194	6,449
	1.0%	0.2%	2.4%	2.4%	4.4%	5.8%	4.2%	2.3%	3.1%	0.0%	3.9%	0.5%	0.4%	30.6%	14.9%	7.7%	10.3%	2.0%	65.4%
Kenmore	94	27	277	242	459	597	431	245	676	329	0	66	28	3,471	663	348	412	165	5,059
	1.1%	0.3%	3.3%	2.9%	5.4%	7.1%	5.1%	2.9%	8.0%	3.9%	0.0%	0.8%	0.3%	41.1%	7.9%	4.1%	4.9%	2.0%	59.9%
Prudential	113	27	166	156	174	275	138	72	147	49	57	0	39	1,413	59	38	75	461	2,046
	3.0%	0.7%	4.4%	4.2%	4.6%	7.3%	3.7%	1.9%	3.9%	1.3%	1.5%	0.0%	1.0%	37.7%	1.6%	1.0%	2.0%	12.3%	54.5%
Symphony	75	14	43	59	87	126	120	67	137	37	23	21	0	809	57	34	59	361	1,320
	3.9%	0.7%	2.2%	3.0%	4.5%	6.5%	6.2%	3.4%	7.0%	1.9%	1.2%	1.1%	0.0%	41.6%	2.9%	1.7%	3.0%	18.6%	67.9%
Tot. G. L. Subway	2,844	368	2,822	2,258	2,969	3,920	2,403	2,540	4,252	2,823	3,592	1,386	810	32,987	7,606	4,479	6,983	5,340	57,395
	3.1%	0.4%	3.1%	2.5%	3.3%	4.3%	2.7%	2.8%	4.7%	3.1%	4.0%	1.5%	0.9%	36.5%	8.4%	5.0%	7.7%	5.9%	63.6%
Surface B Line	139	18	237	178	786	1,025	870	444	1,401	1,388	693	82	48	7,309	12,510	871	983	455	22,128
	0.5%	0.1%	0.9%	0.7%	3.0%	3.9%	3.3%	1.7%	5.3%	5.3%	2.6%	0.3%	0.2%	27.7%	47.4%	3.3%	3.7%	1.7%	83.8%
Surface C Line	106	21	182	131	490	629	441	336	752	665	322	52	47	4,174	867	4,101	671	332	10,145
	0.9%	0.2%	1.5%	1.1%	4.0%	5.1%	3.6%	2.7%	6.2%	5.4%	2.6%	0.4%	0.4%	34.1%	7.1%	33.5%	5.5%	2.7%	83.0%
Surface D Line	134	43	268	210	996	1,136	677	481	1,144	927	416	66	51	6,549	927	648	11,385	371	19,880
	0.6%	0.2%	1.1%	0.9%	4.1%	4.7%	2.8%	2.0%	4.7%	3.8%	1.7%	0.3%	0.2%	27.0%	3.8%	2.7%	46.9%	1.5%	81.9%
Surface E Line	294	52	300	318	508	685	670	263	942	198	163	402	312	5,107	540	435	425	1,753	8,260
	2.3%	0.4%	2.4%	2.5%	4.0%	5.4%	5.3%	2.1%	7.4%	1.6%	1.3%	3.2%	2.5%	40.3%	4.3%	3.4%	3.4%	13.8%	65.1%
Total Green Line	3,517	502	3,809	3,095	5,749	7,395	5,061	4,064	8,491	6,001	5,186	1,988	1,268	56,126	22,450	10,534	20,447	8,251	117,808
	2.1%	0.3%	2.3%	1.9%	3.5%	4.5%	3.1%	2.5%	5.1%	3.6%	3.1%	1.2%	0.8%	33.8%	13.5%	6.4%	12.3%	5.0%	71.0%

CharlieCard Trip Paths Pilot Study
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TABLE 2
GREEN LINE to RED LINE

ENTRY STATION on GREEN LINE	EXIT STATION on RED LINE																					Total Red Line	
	Alewife	Davis	Porter	Harvard	Central	Kendall/ MIT	Charles/ MGH	Park St. Red	Downtown Cross. Red	South Sta. Red	Broadway	Andrew	JFK/ UMass	Savin Hill	Fields Corner	Shawmut	Ashmont Red	North Quincy	Wollaston	Quincy Center	Quincy Adams		Braintree
Lechmere	24	32	21	103	80	33	77			121	23	49	60	18	51	15	55	25	27	37	16	15	882
	0.4%	0.5%	0.3%	1.6%	1.2%	0.5%	1.2%			1.9%	0.4%	0.8%	0.9%	0.3%	0.8%	0.2%	0.9%	0.4%	0.4%	0.6%	0.2%	0.2%	13.7%
Science Park	4	9	8	29	24	5	17			23	5	4	15	2	9	1	8	2	4	9	19	5	202
	0.4%	0.9%	0.8%	3.0%	2.5%	0.5%	1.8%			2.4%	0.5%	0.4%	1.6%	0.2%	0.9%	0.1%	0.8%	0.2%	0.4%	0.9%	2.0%	0.5%	21.2%
North Sta. Green	85	92	83	414	241	195	70																1,180
	1.4%	1.6%	1.4%	7.1%	4.1%	3.3%	1.2%																20.1%
Haymarket Green	125	133	107	409	249	213	69																1,305
	2.6%	2.8%	2.3%	8.7%	5.3%	4.5%	1.5%																27.6%
Govt Ctr Green	134	119	85	317	187	142	44		70	133	69	65	86	29	80	41	83	66	44	88	75	70	2,027
	1.6%	1.4%	1.0%	3.8%	2.2%	1.7%	0.5%		0.8%	1.6%	0.8%	0.8%	1.0%	0.3%	1.0%	0.5%	1.0%	0.8%	0.5%	1.0%	0.9%	0.8%	24.1%
Park St. Green																							
Boylston	54	78	53	172	207	104	39		60	55	27	31	57	6	30	24	26	45	32	45	28	34	1,207
	0.7%	1.0%	0.7%	2.2%	2.7%	1.3%	0.5%		0.8%	0.7%	0.3%	0.4%	0.7%	0.1%	0.4%	0.3%	0.3%	0.6%	0.4%	0.6%	0.4%	0.4%	15.6%
Arlington	202	248	149	331	208	142	72		126	136	26	47	85	28	52	31	103	121	89	165	101	109	2,571
	2.4%	2.9%	1.8%	3.9%	2.4%	1.7%	0.8%		1.5%	1.6%	0.3%	0.6%	1.0%	0.3%	0.6%	0.4%	1.2%	1.4%	1.0%	1.9%	1.2%	1.3%	30.2%
Copley	217	286	220	523	280	245	126		235	260	44	107	201	64	107	67	110	132	106	176	82	80	3,668
	1.5%	1.9%	1.5%	3.5%	1.9%	1.6%	0.8%		1.6%	1.7%	0.3%	0.7%	1.4%	0.4%	0.7%	0.5%	0.7%	0.9%	0.7%	1.2%	0.6%	0.5%	24.7%
Hynes Conv. Ctr	107	185	98	257	100	106	114		137	216	51	60	130	29	43	23	59	54	38	83	41	39	1,970
	1.1%	1.9%	1.0%	2.6%	1.0%	1.1%	1.2%		1.4%	2.2%	0.5%	0.6%	1.3%	0.3%	0.4%	0.2%	0.6%	0.5%	0.4%	0.8%	0.4%	0.4%	20.0%
Kenmore	69	168	101	202	115	98	85		144	215	50	48	122	22	54	24	74	65	32	84	39	40	1,851
	0.8%	2.0%	1.2%	2.4%	1.4%	1.2%	1.0%		1.7%	2.5%	0.6%	0.6%	1.4%	0.3%	0.6%	0.3%	0.9%	0.8%	0.4%	1.0%	0.5%	0.5%	21.9%
Prudential	54	87	33	194	49	62	36		61	84	12	22	43	12	18	11	16	43	26	57	37	35	992
	1.4%	2.3%	0.9%	5.2%	1.3%	1.7%	1.0%		1.6%	2.2%	0.3%	0.6%	1.1%	0.3%	0.5%	0.3%	0.4%	1.1%	0.7%	1.5%	1.0%	0.9%	26.4%
Symphony	28	22	17	46	14	29	31		38	35	6	2	14	1	3	1	4	10	7	16	7	10	341
	1.4%	1.1%	0.9%	2.4%	0.7%	1.5%	1.6%		2.0%	1.8%	0.3%	0.1%	0.7%	0.1%	0.2%	0.1%	0.2%	0.5%	0.4%	0.8%	0.4%	0.5%	17.5%
Tot. G. L. Subway	1,103	1,459	975	2,997	1,754	1,374	780		871	1,278	313	435	813	211	447	238	538	563	405	760	445	437	18,196
	1.2%	1.6%	1.1%	3.3%	1.9%	1.5%	0.9%		1.0%	1.4%	0.3%	0.5%	0.9%	0.2%	0.5%	0.3%	0.6%	0.6%	0.4%	0.8%	0.5%	0.5%	20.2%
Surface B Line	79	139	87	241	127	183	196		157	286	61	99	186	30	64	31	117	82	66	112	47	49	2,439
	0.3%	0.5%	0.3%	0.9%	0.5%	0.7%	0.7%		0.6%	1.1%	0.2%	0.4%	0.7%	0.1%	0.2%	0.1%	0.4%	0.3%	0.3%	0.4%	0.2%	0.2%	9.2%
Surface C Line	32	72	44	139	79	98	100		97	173	34	28	82	8	16	11	23	34	23	39	28	14	1,174
	0.3%	0.6%	0.4%	1.1%	0.6%	0.8%	0.8%		0.8%	1.4%	0.3%	0.2%	0.7%	0.1%	0.1%	0.1%	0.2%	0.3%	0.2%	0.3%	0.2%	0.1%	9.6%
Surface D Line	80	159	110	270	188	206	202		228	293	42	78	139	24	59	28	117	75	41	105	34	74	2,552
	0.3%	0.7%	0.5%	1.1%	0.8%	0.8%	0.8%		0.9%	1.2%	0.2%	0.3%	0.6%	0.1%	0.2%	0.1%	0.5%	0.3%	0.2%	0.4%	0.1%	0.3%	10.5%
Surface E Line	116	236	140	393	130	188	126		186	171	37	33	189	23	40	26	40	96	72	129	80	93	2,544
	0.9%	1.9%	1.1%	3.1%	1.0%	1.5%	1.0%		1.5%	1.3%	0.3%	0.3%	1.5%	0.2%	0.3%	0.2%	0.3%	0.8%	0.6%	1.0%	0.6%	0.7%	20.1%
Total Green Line	1,410	2,065	1,356	4,040	2,278	2,049	1,404		1,539	2,201	487	673	1,409	296	626	334	835	850	607	1,145	634	667	26,905
	0.9%	1.2%	0.8%	2.4%	1.4%	1.2%	0.8%		0.9%	1.3%	0.3%	0.4%	0.8%	0.2%	0.4%	0.2%	0.5%	0.5%	0.4%	0.7%	0.4%	0.4%	16.2%

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
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TABLE 3
GREEN LINE to MATTAPAN LINE or ORANGE LINE

ENTRY STATION on GREEN LINE	EXIT STATION on MATTAPAN LINE or ORANGE LINE																			Total Orange Line	
	Mattapan Line	Oak Grove	Malden	Wellingt n	Sullivan Square	Comm. College	North Sta. Orange	Haymrket Orange	State Orange	Downtown Cross. Or.	Chinatown	Tufts Med. Ctr	Back Bay	Mass. Ave	Ruggles	Roxbury Crossing	Jackson Square	Stony Brook	Green St.		Forest Hills
Lechmere	24	35	178	80	97	60			86	165	61	49	110	42	106	47	72	34	27	175	1,424
	0.4%	0.5%	2.8%	1.2%	1.5%	0.9%			1.3%	2.6%	0.9%	0.8%	1.7%	0.7%	1.7%	0.7%	1.1%	0.5%	0.4%	2.7%	22.2%
Science Park	6	5	11	4	14	7			6	12	11	8	11	4	11	6	11	6	4	14	145
	0.6%	0.5%	1.2%	0.4%	1.5%	0.7%			0.6%	1.3%	1.2%	0.8%	1.2%	0.4%	1.2%	0.6%	1.2%	0.6%	0.4%	1.5%	15.2%
North Sta. Green																					
Haymarket Green																					
Govt Ctr Green	50	28	69	38	69	40															244
	0.6%	0.3%	0.8%	0.5%	0.8%	0.5%															2.9%
Park St. Green		33	138	71	119	69															430
		0.4%	1.6%	0.8%	1.3%	0.8%															4.9%
Boylston	13	12	48	36	42	21					0	38	96	40	48	50	19	15	14	37	516
	0.2%	0.2%	0.6%	0.5%	0.5%	0.3%					0.0%	0.5%	1.2%	0.5%	0.6%	0.6%	0.2%	0.2%	0.2%	0.5%	6.7%
Arlington	33	62	127	95	86	43					15	15	46	24	41	15	11	6	11	42	639
	0.4%	0.7%	1.5%	1.1%	1.0%	0.5%					0.2%	0.2%	0.5%	0.3%	0.5%	0.2%	0.1%	0.1%	0.1%	0.5%	7.5%
Copley	37	48	107	64	116	48					76	43	0	61	118	47	56	32	40	150	1,006
	0.2%	0.3%	0.7%	0.4%	0.8%	0.3%					0.5%	0.3%	0.0%	0.4%	0.8%	0.3%	0.4%	0.2%	0.3%	1.0%	6.8%
Hynes Conv. Ctr	23	41	84	53	71	45					33	21	62	64	32	17	26	26	18	43	636
	0.2%	0.4%	0.9%	0.5%	0.7%	0.5%					0.3%	0.2%	0.6%	0.6%	0.3%	0.2%	0.3%	0.3%	0.2%	0.4%	6.4%
Kenmore	23	56	118	68	88	60					23	34	156	39	24	16	28	22	22	81	835
	0.3%	0.7%	1.4%	0.8%	1.0%	0.7%					0.3%	0.4%	1.8%	0.5%	0.3%	0.2%	0.3%	0.3%	0.3%	1.0%	9.9%
Prudential	7	9	41	14	29	28					26	11	0	16	39	17	12	12	5	11	270
	0.2%	0.2%	1.1%	0.4%	0.8%	0.7%					0.7%	0.3%	0.0%	0.4%	1.0%	0.5%	0.3%	0.3%	0.1%	0.3%	7.2%
Symphony	2	6	11	8	8	7					12	6	23	23	16	14	8	4	3	10	159
	0.1%	0.3%	0.6%	0.4%	0.4%	0.4%					0.6%	0.3%	1.2%	1.2%	0.8%	0.7%	0.4%	0.2%	0.2%	0.5%	8.2%
Tot. G. L. Subway	218	335	932	531	739	428			92	177	257	225	504	313	435	229	243	157	144	563	6,304
	0.2%	0.4%	1.0%	0.6%	0.8%	0.5%			0.1%	0.2%	0.3%	0.2%	0.6%	0.3%	0.5%	0.3%	0.3%	0.2%	0.2%	0.6%	7.0%
Surface B Line	21	49	120	90	99	73					62	46	248	68	61	31	60	21	20	143	1,191
	0.1%	0.2%	0.5%	0.3%	0.4%	0.3%					0.2%	0.2%	0.9%	0.3%	0.2%	0.1%	0.2%	0.1%	0.1%	0.5%	4.5%
Surface C Line	11	16	88	38	60	42					30	14	99	27	19	17	16	11	14	37	528
	0.1%	0.1%	0.7%	0.3%	0.5%	0.3%					0.2%	0.1%	0.8%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.3%	4.3%
Surface D Line	41	52	160	92	75	73					47	31	168	38	43	51	36	16	21	80	983
	0.2%	0.2%	0.7%	0.4%	0.3%	0.3%					0.2%	0.1%	0.7%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.3%	4.1%
Surface E Line	25	64	139	88	84	64					79	49	125	63	127	59	57	12	19	49	1,078
	0.2%	0.5%	1.1%	0.7%	0.7%	0.5%					0.6%	0.4%	1.0%	0.5%	1.0%	0.5%	0.4%	0.1%	0.1%	0.4%	8.5%
Total Green Line	316	516	1,439	839	1,057	680			92	177	475	365	1,144	509	685	387	412	217	218	872	10,084
	0.2%	0.3%	0.9%	0.5%	0.6%	0.4%			0.1%	0.1%	0.3%	0.2%	0.7%	0.3%	0.4%	0.2%	0.2%	0.1%	0.1%	0.5%	6.1%

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TABLE 4
GREEN LINE to BLUE LINE or SILVER LINE WATERFRONT

ENTRY STATION on GREEN LINE	EXIT STATION on BLUE LINE or SILVER LINE WATERFRONT											Total Blue Line	South Sta. Silver	Courthouse	World Trade Ctr	Surface Silver Wat	Total Silver Waterfront	Total All Lines
	Wonder- land	Revere Beach	Beachmont	Suffolk Downs	Orient Heights	Wood Island	Airport	Maverick	Aquarium	State Blue	Govt Ctr Blue							
Lechmere	60	60	40	11	73	34	150	203	60		4	695		6	8	26	40	6,423
	0.9%	0.9%	0.6%	0.2%	1.1%	0.5%	2.3%	3.2%	0.9%		0.1%	10.8%		0.1%	0.1%	0.4%	0.6%	100.0%
Science Park	10	10	2	0	9	6	9	21	33		1	101		2	0	3	5	953
	1.0%	1.0%	0.2%	0.0%	0.9%	0.6%	0.9%	2.2%	3.5%		0.1%	10.6%		0.2%	0.0%	0.3%	0.5%	100.0%
North Sta. Green	62	46	33	8	57	17	91	131	48		16	509						5,866
	1.1%	0.8%	0.6%	0.1%	1.0%	0.3%	1.6%	2.2%	0.8%		0.3%	8.7%						100.0%
Haymarket Green	39	33	9	5	22	12	61	103	30		4	318						4,728
	0.8%	0.7%	0.2%	0.1%	0.5%	0.3%	1.3%	2.2%	0.6%		0.1%	6.7%						100.0%
Govt Ctr Green														0	26	33	59	8,404
														0.0%	0.3%	0.4%	0.7%	100.0%
Park St. Green	92	67	63	10	96	52	157	268	54	87	6	952						8,844
	1.0%	0.8%	0.7%	0.1%	1.1%	0.6%	1.8%	3.0%	0.6%	1.0%	0.1%	10.8%						100.0%
Boylston	84	53	38	13	60	37	99	216	46	35	3	684		3	14	17	34	7,719
	1.1%	0.7%	0.5%	0.2%	0.8%	0.5%	1.3%	2.8%	0.6%	0.5%	0.0%	8.9%		0.0%	0.2%	0.2%	0.4%	100.0%
Arlington	173	78	66	17	132	53	170	266	79	74	8	1,116		8	10	41	59	8,502
	2.0%	0.9%	0.8%	0.2%	1.6%	0.6%	2.0%	3.1%	0.9%	0.9%	0.1%	13.1%		0.1%	0.1%	0.5%	0.7%	100.0%
Copley	163	92	96	17	165	56	245	401	120	125	8	1,488		14	49	49	112	14,863
	1.1%	0.6%	0.6%	0.1%	1.1%	0.4%	1.6%	2.7%	0.8%	0.8%	0.1%	10.0%		0.1%	0.3%	0.3%	0.8%	100.0%
Hynes Conv. Ctr	63	36	33	10	66	28	112	180	94	76	6	704		8	36	39	83	9,865
	0.6%	0.4%	0.3%	0.1%	0.7%	0.3%	1.1%	1.8%	1.0%	0.8%	0.1%	7.1%		0.1%	0.4%	0.4%	0.8%	100.0%
Kenmore	59	38	25	6	48	42	122	168	37	56	6	607		12	21	32	65	8,440
	0.7%	0.5%	0.3%	0.1%	0.6%	0.5%	1.4%	2.0%	0.4%	0.7%	0.1%	7.2%		0.1%	0.2%	0.4%	0.8%	100.0%
Prudential	54	31	22	4	40	9	65	66	45	55	5	396		9	12	19	40	3,751
	1.4%	0.8%	0.6%	0.1%	1.1%	0.2%	1.7%	1.8%	1.2%	1.5%	0.1%	10.6%		0.2%	0.3%	0.5%	1.1%	100.0%
Symphony	6	7	5	1	7	3	11	34	9	26	1	110		4	4	4	12	1,944
	0.3%	0.4%	0.3%	0.1%	0.4%	0.2%	0.6%	1.7%	0.5%	1.3%	0.1%	5.7%		0.2%	0.2%	0.2%	0.6%	100.0%
Tot. G. L. Subway	865	551	432	102	775	349	1,292	2,057	655	534	68	7,680		66	180	263	509	90,302
	1.0%	0.6%	0.5%	0.1%	0.9%	0.4%	1.4%	2.3%	0.7%	0.6%	0.1%	8.5%		0.1%	0.2%	0.3%	0.6%	100.0%
Surface B Line	65	25	26	9	49	26	111	117	38	56	7	529		13	38	39	90	26,398
	0.2%	0.1%	0.1%	0.0%	0.2%	0.1%	0.4%	0.4%	0.1%	0.2%	0.0%	2.0%		0.0%	0.1%	0.1%	0.3%	100.0%
Surface C Line	20	24	16	3	26	16	64	71	30	24	6	300		18	18	33	69	12,227
	0.2%	0.2%	0.1%	0.0%	0.2%	0.1%	0.5%	0.6%	0.2%	0.2%	0.0%	2.5%		0.1%	0.1%	0.3%	0.6%	100.0%
Surface D Line	83	40	48	8	68	35	124	168	46	95	8	723		11	33	37	81	24,260
	0.3%	0.2%	0.2%	0.0%	0.3%	0.1%	0.5%	0.7%	0.2%	0.4%	0.0%	3.0%		0.0%	0.1%	0.2%	0.3%	100.0%
Surface E Line	115	60	33	12	70	28	88	169	23	107	9	714		28	14	16	58	12,679
	0.9%	0.5%	0.3%	0.1%	0.6%	0.2%	0.7%	1.3%	0.2%	0.8%	0.1%	5.6%		0.2%	0.1%	0.1%	0.5%	100.0%
Total Green Line	1,148	700	555	134	988	454	1,679	2,582	792	816	98	9,946		136	283	388	807	165,866
	0.7%	0.4%	0.3%	0.1%	0.6%	0.3%	1.0%	1.6%	0.5%	0.5%	0.1%	6.0%		0.1%	0.2%	0.2%	0.5%	100.0%

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
for Thursday, September 23, 2010

TABLE 5
RED LINE to GREEN LINE

EXIT STATION on GREEN LINE

ENTRY STATION on RED LINE	EXIT STATION on GREEN LINE												Total Green Line Subway	Surface B Line	Surface C Line	Surface D Line	Surface E Line	Total Green Line	
	Lechmere	Science Park	North Sta. Green	Haymarket Green	Govt. Ctr Green	Park St. Green	Boylston	Arlington	Copley	Hynes Conv. Ctr	Kenmore	Prudential							Symphony
Alewife	23	7	90	132	154	69	226	230	94	65	54	26	1,170	88	28	70	130	1,486	
	0.2%	0.1%	0.9%	1.3%	1.5%	0.7%	2.2%	2.3%	0.9%	0.6%	0.5%	0.3%	11.5%	0.9%	0.3%	0.7%	1.3%	14.6%	
Davis	33	8	93	132	148	96	233	279	155	156	81	37	1,451	151	82	166	253	2,103	
	0.3%	0.1%	0.8%	1.1%	1.2%	0.8%	1.9%	2.3%	1.3%	1.3%	0.7%	0.3%	11.9%	1.2%	0.7%	1.4%	2.1%	17.3%	
Porter	33	6	73	106	93	66	154	211	90	102	33	16	983	90	50	118	140	1,381	
	0.4%	0.1%	0.8%	1.2%	1.0%	0.7%	1.7%	2.4%	1.0%	1.1%	0.4%	0.2%	11.1%	1.0%	0.6%	1.3%	1.6%	15.6%	
Harvard	137	37	389	411	339	211	339	558	270	191	214	51	3,147	256	132	271	382	4,188	
	0.6%	0.2%	1.7%	1.8%	1.5%	0.9%	1.5%	2.4%	1.2%	0.8%	0.9%	0.2%	13.5%	1.1%	0.6%	1.2%	1.6%	17.9%	
Central	110	26	227	254	175	201	199	241	83	101	45	15	1,677	136	90	188	131	2,222	
	0.7%	0.2%	1.5%	1.7%	1.1%	1.3%	1.3%	1.6%	0.5%	0.7%	0.3%	0.1%	11.0%	0.9%	0.6%	1.2%	0.9%	14.5%	
Kendall/MIT	43	4	187	211	158	106	147	246	108	101	63	29	1,403	188	105	203	195	2,094	
	0.3%	0.0%	1.2%	1.4%	1.0%	0.7%	1.0%	1.6%	0.7%	0.7%	0.4%	0.2%	9.2%	1.2%	0.7%	1.3%	1.3%	13.7%	
Charles/MGH	77	14	54	66	42	46	64	124	100	81	41	26	735	170	100	188	129	1,322	
	0.7%	0.1%	0.5%	0.6%	0.4%	0.4%	0.6%	1.1%	0.9%	0.7%	0.4%	0.2%	6.4%	1.5%	0.9%	1.6%	1.1%	11.6%	
Park St. Red																			
Dwntwn Cross. Red						43	65	195	128	89	43	28	591	128	62	147	165	1,093	
						0.4%	0.5%	1.6%	1.1%	0.7%	0.4%	0.2%	4.9%	1.1%	0.5%	1.2%	1.4%	9.1%	
South Sta. Red	149	32			153	72	139	269	209	225	95	39	1,382	256	140	298	176	2,252	
	0.7%	0.2%			0.7%	0.3%	0.7%	1.3%	1.0%	1.1%	0.5%	0.2%	6.7%	1.2%	0.7%	1.4%	0.9%	10.9%	
Broadway	31	6			88	31	23	39	46	52	7	4	327	59	35	46	35	502	
	0.7%	0.1%			1.9%	0.7%	0.5%	0.8%	1.0%	1.1%	0.1%	0.1%	6.9%	1.3%	0.7%	1.0%	0.7%	10.6%	
Andrew	37	6			77	37	48	100	39	39	20	1	404	90	28	84	45	651	
	0.7%	0.1%			1.4%	0.7%	0.8%	1.8%	0.7%	0.7%	0.4%	0.0%	7.1%	1.6%	0.5%	1.5%	0.8%	11.5%	
JFK/UMass	62	7			106	75	90	189	114	113	53	20	829	174	79	144	185	1,411	
	0.6%	0.1%			1.0%	0.7%	0.9%	1.9%	1.1%	1.1%	0.5%	0.2%	8.2%	1.7%	0.8%	1.4%	1.8%	13.9%	
Savin Hill	18	2			34	9	28	63	35	22	13	1	225	30	7	29	24	315	
	0.8%	0.1%			1.5%	0.4%	1.3%	2.8%	1.6%	1.0%	0.6%	0.0%	10.1%	1.3%	0.3%	1.3%	1.1%	14.2%	
Fields Corner	42	6			65	31	47	102	31	62	15	5	406	81	17	63	52	619	
	0.9%	0.1%			1.4%	0.7%	1.0%	2.2%	0.7%	1.3%	0.3%	0.1%	8.6%	1.7%	0.4%	1.3%	1.1%	13.2%	
Shawmut	21	1			38	22	32	63	23	23	14	1	238	31	12	37	25	343	
	0.9%	0.0%			1.6%	1.0%	1.4%	2.7%	1.0%	1.0%	0.6%	0.0%	10.3%	1.3%	0.5%	1.6%	1.1%	14.8%	
Ashmont Red	57	7			99	27	100	115	54	80	14	4	557	111	26	120	45	859	
	0.8%	0.1%			1.5%	0.4%	1.5%	1.7%	0.8%	1.2%	0.2%	0.1%	8.2%	1.6%	0.4%	1.8%	0.7%	12.6%	
North Quincy	35	2			76	58	132	143	52	57	44	12	611	85	26	71	111	904	
	0.5%	0.0%			1.1%	0.8%	1.9%	2.1%	0.8%	0.8%	0.6%	0.2%	8.8%	1.2%	0.4%	1.0%	1.6%	13.0%	
Wollaston	24	6			59	37	98	96	33	39	25	8	425	63	19	49	90	646	
	0.5%	0.1%			1.3%	0.8%	2.2%	2.2%	0.7%	0.9%	0.6%	0.2%	9.7%	1.4%	0.4%	1.1%	2.0%	14.7%	
Quincy Center	42	7			95	60	169	180	75	77	51	13	769	110	45	118	140	1,182	
	0.5%	0.1%			1.2%	0.7%	2.1%	2.2%	0.9%	0.9%	0.6%	0.2%	9.4%	1.3%	0.5%	1.4%	1.7%	14.4%	
Quincy Adams	17	18			81	30	108	81	45	36	42	6	464	47	30	41	80	662	
	0.4%	0.5%			2.0%	0.8%	2.7%	2.0%	1.1%	0.9%	1.1%	0.2%	11.7%	1.2%	0.8%	1.0%	2.0%	16.7%	
Braintree	17	6			83	45	118	89	39	41	41	11	490	55	12	79	101	737	
	0.4%	0.1%			1.9%	1.0%	2.7%	2.0%	0.9%	0.9%	0.9%	0.3%	11.3%	1.3%	0.3%	1.8%	2.3%	17.0%	
Total Red Line	1,008	208	1,113	1,312	2,163	1,372	2,559	3,613	1,823	1,752	1,008	353	18,284	2,399	1,125	2,530	2,634	26,972	
	0.5%	0.1%	0.5%	0.6%	1.0%	0.7%	1.2%	1.8%	0.9%	0.9%	0.5%	0.2%	8.9%	1.2%	0.5%	1.2%	1.3%	13.1%	

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
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TABLE 6
RED LINE to RED LINE

ENTRY STATION on RED LINE	EXIT STATION on RED LINE																						Total Red Line
	Alewife	Davis	Porter	Harvard	Central	Kendall/ MIT	Charles/ MGH	Park St. Red	Downtown Cross. Red	South Sta. Red	Broadway	Andrew	JFK/ UMass	Savin Hill	Fields Corner	Shawmut	Ashmont Red	North Quincy	Wollaston	Quincy Center	Quincy Adams	Braintree	
Alewife	0	376	224	1,091	734	1,012	651	916	923	913	38	64	163	17	43	24	73	51	36	62	24	20	7,455
	0.0%	3.7%	2.2%	10.7%	7.2%	10.0%	6.4%	9.0%	9.1%	9.0%	0.4%	0.6%	1.6%	0.2%	0.4%	0.2%	0.7%	0.5%	0.4%	0.6%	0.2%	0.2%	73.4%
Davis	427	0	236	1,762	1,207	1,058	710	1,058	754	766	102	79	259	36	51	32	70	82	34	71	20	34	8,848
	3.5%	0.0%	1.9%	14.5%	9.9%	8.7%	5.8%	8.7%	6.2%	6.3%	0.8%	0.6%	2.1%	0.3%	0.4%	0.3%	0.6%	0.7%	0.3%	0.6%	0.2%	0.3%	72.7%
Porter	238	267	0	951	900	1,121	502	731	533	633	72	59	151	19	50	29	62	62	23	52	25	22	6,502
	2.7%	3.0%	0.0%	10.7%	10.1%	12.6%	5.7%	8.2%	6.0%	7.1%	0.8%	0.7%	1.7%	0.2%	0.6%	0.3%	0.7%	0.7%	0.3%	0.6%	0.3%	0.2%	73.3%
Harvard	1,100	1,886	996	0	1,421	1,970	1,356	1,785	1,058	1,482	201	199	453	92	171	100	257	202	143	266	155	178	15,471
	4.7%	8.1%	4.3%	0.0%	6.1%	8.4%	5.8%	7.6%	4.5%	6.3%	0.9%	0.9%	1.9%	0.4%	0.7%	0.4%	1.1%	0.9%	0.6%	1.1%	0.7%	0.8%	66.2%
Central	730	1,171	893	1,313	0	883	964	1,289	829	941	159	139	304	66	118	83	224	137	69	184	74	89	10,659
	4.8%	7.7%	5.8%	8.6%	0.0%	5.8%	6.3%	8.4%	5.4%	6.2%	1.0%	0.9%	2.0%	0.4%	0.8%	0.5%	1.5%	0.9%	0.5%	1.2%	0.5%	0.6%	69.8%
Kendall/MIT	973	996	1,088	1,866	903	0	713	737	569	1,547	179	106	250	57	107	71	148	197	124	233	154	192	11,210
	6.4%	6.5%	7.1%	12.2%	5.9%	0.0%	4.7%	4.8%	3.7%	10.1%	1.2%	0.7%	1.6%	0.4%	0.7%	0.5%	1.0%	1.3%	0.8%	1.5%	1.0%	1.3%	73.3%
Charles/MGH	646	682	518	1,375	1,015	775	0	245	276	696	135	193	215	77	154	172	270	221	175	260	265	313	8,678
	5.7%	6.0%	4.5%	12.0%	8.9%	6.8%	0.0%	2.1%	2.4%	6.1%	1.2%	1.7%	1.9%	0.7%	1.3%	1.5%	2.4%	1.9%	1.5%	2.3%	2.3%	2.7%	76.0%
Park St. Red	833	1,014	732	1,701	1,292	734	240	0	217	412	267	320	545	154	222	143	377	421	349	533	376	385	11,267
	6.6%	8.1%	5.8%	13.5%	10.3%	5.8%	1.9%	0.0%	1.7%	3.3%	2.1%	2.5%	4.3%	1.2%	1.8%	1.1%	3.0%	3.3%	2.8%	4.2%	3.0%	3.1%	89.6%
Dwntwn Cross. Red	812	708	486	960	810	526	237	215	0	254	318	505	670	220	465	273	578	681	458	671	332	316	10,495
	6.8%	5.9%	4.1%	8.0%	6.8%	4.4%	2.0%	1.8%	0.0%	2.1%	2.7%	4.2%	5.6%	1.8%	3.9%	2.3%	4.8%	5.7%	3.8%	5.6%	2.8%	2.6%	87.6%
South Sta. Red	938	810	668	1,670	1,067	1,757	802	518	292	0	394	483	899	214	275	228	499	1,049	743	987	693	563	15,549
	4.6%	3.9%	3.2%	8.1%	5.2%	8.5%	3.9%	2.5%	1.4%	0.0%	1.9%	2.3%	4.4%	1.0%	1.3%	1.1%	2.4%	5.1%	3.6%	4.8%	3.4%	2.7%	75.5%
Broadway	46	102	73	199	179	196	152	283	372	347	0	123	173	56	136	59	192	122	82	188	40	86	3,206
	1.0%	2.2%	1.5%	4.2%	3.8%	4.2%	3.2%	6.0%	7.9%	7.4%	0.0%	2.6%	3.7%	1.2%	2.9%	1.3%	4.1%	2.6%	1.7%	4.0%	0.8%	1.8%	67.9%
Andrew	73	79	53	175	150	109	193	302	494	391	119	0	163	68	188	50	255	155	106	301	44	77	3,545
	1.3%	1.4%	0.9%	3.1%	2.6%	1.9%	3.4%	5.3%	8.7%	6.9%	2.1%	0.0%	2.9%	1.2%	3.3%	0.9%	4.5%	2.7%	1.9%	5.3%	0.8%	1.4%	62.5%
JFK/UMass	154	232	149	450	321	263	217	564	647	780	165	149	0	94	235	141	384	326	200	398	122	183	6,174
	1.5%	2.3%	1.5%	4.4%	3.2%	2.6%	2.1%	5.6%	6.4%	7.7%	1.6%	1.5%	0.0%	0.9%	2.3%	1.4%	3.8%	3.2%	2.0%	3.9%	1.2%	1.8%	60.9%
Savin Hill	22	35	25	99	62	55	73	168	221	187	45	53	75	0	70	35	95	20	4	30	13	9	1,396
	1.0%	1.6%	1.1%	4.5%	2.8%	2.5%	3.3%	7.6%	9.9%	8.4%	2.0%	2.4%	3.4%	0.0%	3.1%	1.6%	4.3%	0.9%	0.2%	1.3%	0.6%	0.4%	62.8%
Fields Corner	38	53	42	159	107	114	165	240	456	240	116	178	226	76	0	86	389	39	21	73	14	28	2,860
	0.8%	1.1%	0.9%	3.4%	2.3%	2.4%	3.5%	5.1%	9.7%	5.1%	2.5%	3.8%	4.8%	1.6%	0.0%	1.8%	8.3%	0.8%	0.4%	1.6%	0.3%	0.6%	60.8%
Shawmut	23	22	24	101	79	75	168	158	260	194	51	45	114	30	71	0	39	16	1	17	6	3	1,497
	1.0%	1.0%	1.0%	4.4%	3.4%	3.2%	7.3%	6.8%	11.2%	8.4%	2.2%	1.9%	4.9%	1.3%	3.1%	0.0%	1.7%	0.7%	0.0%	0.7%	0.3%	0.1%	64.7%
Ashmont Red	92	75	69	283	225	180	325	440	635	487	189	309	450	107	426	55	0	98	20	70	30	42	4,607
	1.4%	1.1%	1.0%	4.2%	3.3%	2.7%	4.8%	6.5%	9.4%	7.2%	2.8%	4.6%	6.6%	1.6%	6.3%	0.8%	0.0%	1.4%	0.3%	1.0%	0.4%	0.6%	67.8%
North Quincy	58	74	58	200	138	200	228	474	716	898	114	154	308	24	42	12	75	0	99	604	70	132	4,678
	0.8%	1.1%	0.8%	2.9%	2.0%	2.9%	3.3%	6.8%	10.3%	13.0%	1.6%	2.2%	4.4%	0.3%	0.6%	0.2%	1.1%	0.0%	1.4%	8.7%	1.0%	1.9%	67.5%
Wollaston	34	29	17	138	79	139	183	378	462	654	73	107	215	3	19	1	20	107	0	256	36	62	3,012
	0.8%	0.7%	0.4%	3.1%	1.8%	3.2%	4.2%	8.6%	10.5%	14.9%	1.7%	2.4%	4.9%	0.1%	0.4%	0.0%	0.5%	2.4%	0.0%	5.8%	0.8%	1.4%	68.4%
Quincy Center	58	77	52	255	175	233	264	589	734	874	166	282	386	30	87	21	57	615	267	0	89	116	5,427
	0.7%	0.9%	0.6%	3.1%	2.1%	2.8%	3.2%	7.2%	9.0%	10.7%	2.0%	3.4%	4.7%	0.4%	1.1%	0.3%	0.7%	7.5%	3.3%	0.0%	1.1%	1.4%	66.3%
Quincy Adams	24	20	24	161	65	169	275	414	376	635	39	50	120	15	16	5	24	68	33	80	0	34	2,647
	0.6%	0.5%	0.6%	4.1%	1.6%	4.3%	6.9%	10.5%	9.5%	16.0%	1.0%	1.3%	3.0%	0.4%	0.4%	0.1%	0.6%	1.7%	0.8%	2.0%	0.0%	0.9%	66.8%
Braintree	18	26	23	166	96	207	319	440	346	516	75	73	187	7	33	3	45	134	61	113	33	0	2,921
	0.4%	0.6%	0.5%	3.8%	2.2%	4.8%	7.3%	10.1%	8.0%	11.9%	1.7%	1.7%	4.3%	0.2%	0.8%	0.1%	1.0%	3.1%	1.4%	2.6%	0.8%	0.0%	67.2%
Total Red Line	7,337	8,734	6,450	15,075	11,025	11,776	8,737	11,944	11,170	13,847	3,017	3,670	6,326	1,462	2,979	1,623	4,133	4,803	3,048	5,449	2,615	2,884	148,104
	3.6%	4.2%	3.1%	7.3%	5.3%	5.7%	4.2%	5.8%	5.4%	6.7%	1.5%	1.8%	3.1%	0.7%	1.4%	0.8%	2.0%	2.3%	1.5%	2.6%	1.3%	1.4%	71.9%

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TABLE 7
RED LINE to MATTAPAN LINE or ORANGE LINE

		EXIT STATION on MATTAPAN LINE or ORANGE LINE																			
ENTRY STATION on RED LINE	Mattapan Line	Oak Grove	Malden	Wellingt n	Sullivan Square	Comm. College	North Sta. Orange	Haymrket Orange	State Orange	Downtown Cross. Or.	Chinatown	Tufts Med. Ctr	Back Bay	Mass. Ave	Ruggles	Roxbury Crossing	Jackson Square	Stony Brook	Green St.	Forest Hills	Total Orange Line
Alewife	22 0.2%	13 0.1%	79 0.8%	43 0.4%	51 0.5%	60 0.6%			67 0.7%	28 0.3%	58 0.6%	118 1.2%	43 0.4%	65 0.6%	40 0.4%	37 0.4%	17 0.2%	14 0.1%	83 0.8%	816 8.0%	
Davis	20 0.2%	11 0.1%	48 0.4%	26 0.2%	53 0.4%	69 0.6%			64 0.5%	31 0.3%	72 0.6%	143 1.2%	46 0.4%	74 0.6%	34 0.3%	32 0.3%	26 0.2%	39 0.3%	66 0.5%	834 6.9%	
Porter	11 0.1%	19 0.2%	56 0.6%	35 0.4%	32 0.4%	45 0.5%			26 0.3%	25 0.3%	29 0.3%	91 1.0%	29 0.3%	75 0.8%	26 0.3%	17 0.2%	28 0.3%	28 0.3%	70 0.8%	631 7.1%	
Harvard	105 0.4%	118 0.5%	279 1.2%	136 0.6%	119 0.5%	132 0.6%			186 0.8%	127 0.5%	106 0.5%	248 1.1%	84 0.4%	148 0.6%	69 0.3%	97 0.4%	110 0.5%	82 0.4%	255 1.1%	2,296 9.8%	
Central	85 0.6%	72 0.5%	209 1.4%	106 0.7%	114 0.7%	118 0.8%			86 0.6%	54 0.4%	86 0.6%	122 0.8%	39 0.3%	90 0.6%	54 0.4%	67 0.4%	48 0.3%	49 0.3%	183 1.2%	1,497 9.8%	
Kendall/MIT	89 0.6%	96 0.6%	191 1.2%	101 0.7%	57 0.4%	48 0.3%			74 0.5%	58 0.4%	60 0.4%	130 0.8%	49 0.3%	77 0.5%	43 0.3%	54 0.4%	58 0.4%	49 0.3%	181 1.2%	1,326 8.7%	
Charles/MGH	96 0.8%	37 0.3%	94 0.8%	54 0.5%	85 0.7%	38 0.3%			48 0.4%	44 0.4%	40 0.4%	104 0.9%	42 0.4%	89 0.8%	34 0.3%	57 0.5%	24 0.2%	42 0.4%	200 1.8%	1,032 9.0%	
Park St. Red	174 1.4%									57 0.5%	42 0.3%	241 1.9%	89 0.7%	120 1.0%	90 0.7%	58 0.5%	42 0.3%	42 0.3%	189 1.5%	970 7.7%	
Dwntwn Cross. Red	222 1.9%																				
South Sta. Red	264 1.3%	133 0.6%	254 1.2%	158 0.8%	146 0.7%	76 0.4%	317 1.5%	142 0.7%	101 0.5%	29 0.1%	44 0.2%	168 0.8%	51 0.2%	101 0.5%	46 0.2%	69 0.3%	45 0.2%	47 0.2%	156 0.8%	2,083 10.1%	
Broadway	48 1.0%	18 0.4%	51 1.1%	24 0.5%	61 1.3%	59 1.3%	74 1.6%	90 1.9%	48 1.0%	18 0.4%	13 0.3%	38 0.8%	26 0.6%	43 0.9%	42 0.9%	49 1.0%	14 0.3%	10 0.2%	63 1.3%	741 15.7%	
Andrew	63 1.1%	11 0.2%	53 0.9%	24 0.4%	100 1.8%	91 1.6%	85 1.5%	137 2.4%	64 1.1%	38 0.7%	56 1.0%	72 1.3%	33 0.6%	56 1.0%	41 0.7%	38 0.7%	16 0.3%	27 0.5%	65 1.1%	1,007 17.8%	
JFK/UMass	152 1.5%	73 0.7%	160 1.6%	96 0.9%	132 1.3%	109 1.1%	187 1.8%	210 2.1%	109 1.1%	55 0.5%	74 0.7%	142 1.4%	66 0.7%	93 0.9%	61 0.6%	60 0.6%	32 0.3%	56 0.6%	175 1.7%	1,890 18.7%	
Savin Hill	35 1.6%	4 0.2%	15 0.7%	12 0.5%	23 1.0%	40 1.8%	28 1.3%	45 2.0%	15 0.7%	8 0.4%	18 0.8%	56 2.5%	7 0.3%	45 2.0%	16 0.7%	8 0.4%	4 0.2%	6 0.3%	35 1.6%	385 17.3%	
Fields Corner	133 2.8%	13 0.3%	44 0.9%	29 0.6%	67 1.4%	102 2.2%	51 1.1%	82 1.7%	52 1.1%	37 0.8%	45 1.0%	90 1.9%	28 0.6%	40 0.9%	31 0.7%	36 0.8%	17 0.4%	21 0.4%	85 1.8%	870 18.5%	
Shawmut	18 0.8%	4 0.2%	16 0.7%	16 0.7%	30 1.3%	51 2.2%	31 1.3%	38 1.6%	26 1.1%	7 0.3%	22 1.0%	47 2.0%	18 0.8%	18 0.8%	10 0.4%	5 0.2%	4 0.2%	4 0.2%	30 1.3%	377 16.3%	
Ashmont Red	0 0.0%	8 0.1%	49 0.7%	35 0.5%	80 1.2%	114 1.7%	119 1.8%	112 1.6%	63 0.9%	42 0.6%	43 0.6%	146 2.1%	38 0.6%	68 1.0%	31 0.5%	27 0.4%	4 0.1%	5 0.1%	32 0.5%	1,016 15.0%	
North Quincy	25 0.4%	27 0.4%	72 1.0%	33 0.5%	86 1.2%	54 0.8%	100 1.4%	63 0.9%	56 0.8%	53 0.8%	99 1.4%	235 3.4%	36 0.5%	81 1.2%	12 0.2%	14 0.2%	13 0.2%	7 0.1%	51 0.7%	1,092 15.8%	
Wollaston	10 0.2%	11 0.2%	46 1.0%	9 0.2%	22 0.5%	43 1.0%	65 1.5%	54 1.2%	16 0.4%	47 1.1%	76 1.7%	119 2.7%	13 0.3%	47 1.1%	10 0.2%	3 0.1%	1 0.0%	10 0.2%	17 0.4%	609 13.8%	
Quincy Center	34 0.4%	23 0.3%	82 1.0%	46 0.6%	87 1.1%	91 1.1%	103 1.3%	92 1.1%	51 0.6%	54 0.7%	96 1.2%	192 2.3%	40 0.5%	102 1.2%	18 0.2%	24 0.3%	9 0.1%	12 0.1%	64 0.8%	1,186 14.5%	
Quincy Adams	13 0.3%	7 0.2%	24 0.6%	14 0.4%	16 0.4%	16 0.4%	66 1.7%	67 1.7%	60 1.5%	15 0.4%	21 0.5%	95 2.4%	8 0.2%	31 0.8%	4 0.1%	6 0.2%	2 0.1%	4 0.1%	14 0.4%	470 11.9%	
Braintree	14 0.3%	1 0.0%	17 0.4%	14 0.3%	20 0.5%	30 0.7%	87 2.0%	36 0.8%	29 0.7%	16 0.4%	39 0.9%	112 2.6%	13 0.3%	49 1.1%	10 0.2%	16 0.4%	6 0.1%	5 0.1%	24 0.6%	524 12.1%	
Total Red Line	1,633 0.8%	699 0.3%	1,839 0.9%	1,011 0.5%	1,381 0.7%	1,386 0.7%	1,313 0.6%	1,168 0.6%	1,241 0.6%	843 0.4%	1,139 0.6%	2,709 1.3%	798 0.4%	1,512 0.7%	722 0.4%	774 0.4%	520 0.3%	559 0.3%	2,038 1.0%	21,652 10.5%	

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TABLE 8
RED LINE to BLUE LINE or SILVER LINE WATERFRONT

ENTRY STATION on RED LINE	EXIT STATION on BLUE LINE or SILVER LINE WATERFRONT														Total Silver Waterfront	Total All Lines		
	Wonder-land	Revere Beach	Beachmont	Suffolk Downs	Orient Heights	Wood Island	Airport	Maverick	Aquarium	State Blue	Govt Ctr Blue	Bowdoin	Total Blue Line	South Sta. Silver			World Trade Ctr	Surface Silver Wat
Alewife	17	28	19	6	9	9	47	56	27		2	220		34	53	68	155	10,154
	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.5%	0.6%	0.3%		0.0%	2.2%		0.3%	0.5%	0.7%	1.5%	100.0%
Davis	13	18	13	6	15	5	26	83	27		1	207		32	56	70	158	12,170
	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.2%	0.7%	0.2%		0.0%	1.7%		0.3%	0.5%	0.6%	1.3%	100.0%
Porter	29	27	12	6	22	5	37	68	14		5	225		25	35	64	124	8,874
	0.3%	0.3%	0.1%	0.1%	0.2%	0.1%	0.4%	0.8%	0.2%		0.1%	2.5%		0.3%	0.4%	0.7%	1.4%	100.0%
Harvard	122	84	58	11	92	49	181	294	129		29	1,049		43	67	158	268	23,377
	0.5%	0.4%	0.2%	0.0%	0.4%	0.2%	0.8%	1.3%	0.6%		0.1%	4.5%		0.2%	0.3%	0.7%	1.1%	100.0%
Central	67	53	43	6	55	33	114	191	60		8	630		37	47	96	180	15,273
	0.4%	0.3%	0.3%	0.0%	0.4%	0.2%	0.7%	1.3%	0.4%		0.1%	4.1%		0.2%	0.3%	0.6%	1.2%	100.0%
Kendall/MIT	66	29	20	3	30	20	77	110	40		9	404		24	25	129	178	15,301
	0.4%	0.2%	0.1%	0.0%	0.2%	0.1%	0.5%	0.7%	0.3%		0.1%	2.6%		0.2%	0.2%	0.8%	1.2%	100.0%
Charles/MGH	35	30	10	2	10	17	26	42	18		4	194		17	33	51	101	11,423
	0.3%	0.3%	0.1%	0.0%	0.1%	0.1%	0.2%	0.4%	0.2%		0.0%	1.7%		0.1%	0.3%	0.4%	0.9%	100.0%
Park St. Red														21	55	81	157	12,568
														0.2%	0.4%	0.6%	1.2%	100.0%
Dwntwn Cross. Red														32	32	102	166	11,976
														0.3%	0.3%	0.9%	1.4%	100.0%
South Sta. Red	40	27	30	5	31	25	75	140	53		13	439						20,587
	0.2%	0.1%	0.1%	0.0%	0.2%	0.1%	0.4%	0.7%	0.3%		0.1%	2.1%						100.0%
Broadway	29	17	8	6	10	11	31	59	8		0	179		14	10	20	44	4,720
	0.6%	0.4%	0.2%	0.1%	0.2%	0.2%	0.7%	1.3%	0.2%		0.0%	3.8%		0.3%	0.2%	0.4%	0.9%	100.0%
Andrew	28	21	12	5	18	11	60	107	29		2	293		9	27	73	109	5,668
	0.5%	0.4%	0.2%	0.1%	0.3%	0.2%	1.1%	1.9%	0.5%		0.0%	5.2%		0.2%	0.5%	1.3%	1.9%	100.0%
JFK/UMass	64	36	28	10	59	22	40	83	53		4	399		22	22	61	105	10,131
	0.6%	0.4%	0.3%	0.1%	0.6%	0.2%	0.4%	0.8%	0.5%		0.0%	3.9%		0.2%	0.2%	0.6%	1.0%	100.0%
Savin Hill	3	4	4	0	3	6	14	16	6		2	58		4	11	19	34	2,223
	0.1%	0.2%	0.2%	0.0%	0.1%	0.3%	0.6%	0.7%	0.3%		0.1%	2.6%		0.2%	0.5%	0.9%	1.5%	100.0%
Fields Corner	12	18	5	0	4	12	32	58	4		4	149		8	17	49	74	4,705
	0.3%	0.4%	0.1%	0.0%	0.1%	0.3%	0.7%	1.2%	0.1%		0.1%	3.2%		0.2%	0.4%	1.0%	1.6%	100.0%
Shawmut	3	2	2	0	0	0	11	8	5		3	34		2	14	30	46	2,315
	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.5%	0.3%	0.2%		0.1%	1.5%		0.1%	0.6%	1.3%	2.0%	100.0%
Ashmont Red	14	11	10	1	17	15	45	59	19		7	198		17	30	64	111	6,791
	0.2%	0.2%	0.1%	0.0%	0.3%	0.2%	0.7%	0.9%	0.3%		0.1%	2.9%		0.3%	0.4%	0.9%	1.6%	100.0%
North Quincy	12	13	13	4	10	5	17	35	23		4	136		12	27	58	97	6,932
	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.5%	0.3%		0.1%	2.0%		0.2%	0.4%	0.8%	1.4%	100.0%
Wollaston	3	6	6	2	4	2	4	15	5		6	53		5	27	42	74	4,404
	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%	0.1%	0.3%	0.1%		0.1%	1.2%		0.1%	0.6%	1.0%	1.7%	100.0%
Quincy Center	8	13	8	3	8	17	36	63	24		4	184		36	45	89	170	8,183
	0.1%	0.2%	0.1%	0.0%	0.1%	0.2%	0.4%	0.8%	0.3%		0.0%	2.2%		0.4%	0.5%	1.1%	2.1%	100.0%
Quincy Adams	7	7	3	3	4	7	21	21	32		7	112		4	24	28	56	3,960
	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.5%	0.5%	0.8%		0.2%	2.8%		0.1%	0.6%	0.7%	1.4%	100.0%
Braintree	6	5	3	0	3	4	11	29	8		7	76		11	25	38	74	4,346
	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.3%	0.7%	0.2%		0.2%	1.7%		0.3%	0.6%	0.9%	1.7%	100.0%
Total Red Line	578	449	307	79	404	275	905	1,537	584		121	5,239		409	682	1,390	2,481	206,081
	0.3%	0.2%	0.1%	0.0%	0.2%	0.1%	0.4%	0.7%	0.3%		0.1%	2.5%		0.2%	0.3%	0.7%	1.2%	100.0%

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TABLE 9
MATTAPAN LINE or ORANGE LINE to GREEN LINE

ENTRY STATION on MATTAPAN LINE	EXIT STATION on GREEN LINE												Total Green Line Subway	Surface B Line	Surface C Line	Surface D Line	Surface E Line	Total Green Line		
	Lechmere	Science Park	North Sta. Green	Haymarket Green	Govt. Ctr Green	Park St. Green	Boylston	Arlington	Copley	Hynes Conv. Ctr	Kenmore	Prudential							Symphony	
Total Line	23	3			40		11	29	38	23	22	8	3	200	11	9	36	19	275	
	0.6%	0.1%			1.1%		0.3%	0.8%	1.0%	0.6%	0.6%	0.2%	0.1%	5.4%	0.3%	0.2%	1.0%	0.5%	7.4%	
ENTRY STATION on ORANGE LINE																				
Oak Grove	36	4			49	56	15	68	57	37	51	13	3	389	53	13	67	77	599	
	0.6%	0.1%			0.8%	1.0%	0.3%	1.2%	1.0%	0.6%	0.9%	0.2%	0.1%	6.6%	0.9%	0.2%	1.1%	1.3%	10.2%	
Malden	163	16			82	185	81	134	113	72	107	34	10	997	115	85	164	164	1,525	
	1.3%	0.1%			0.7%	1.5%	0.7%	1.1%	0.9%	0.6%	0.9%	0.3%	0.1%	8.2%	0.9%	0.7%	1.3%	1.3%	12.5%	
Wellington	88	7			58	125	44	96	71	50	63	19	7	628	80	43	102	84	937	
	1.1%	0.1%			0.8%	1.6%	0.6%	1.2%	0.9%	0.6%	0.8%	0.2%	0.1%	8.2%	1.0%	0.6%	1.3%	1.1%	12.2%	
Sullivan Square	89	19			83	172	52	87	138	67	80	29	16	832	104	57	80	119	1,192	
	1.0%	0.2%			0.9%	1.9%	0.6%	1.0%	1.5%	0.7%	0.9%	0.3%	0.2%	9.1%	1.1%	0.6%	0.9%	1.3%	13.1%	
Community Coll.	71	6			52	104	24	37	60	49	45	23	14	485	79	43	86	76	769	
	1.1%	0.1%			0.8%	1.7%	0.4%	0.6%	1.0%	0.8%	0.7%	0.4%	0.2%	7.8%	1.3%	0.7%	1.4%	1.2%	12.3%	
North Sta Orange																				
Haymarket Orange																				
State Orange	68	7												75					75	
	0.8%	0.1%												0.9%					0.9%	
Dwntwn Cross. Or.	157	9												166					166	
	1.6%	0.1%												1.7%					1.7%	
Chinatown	49	7					0	8	61	26	12	25	14	202	24	22	42	90	380	
	0.8%	0.1%					0.0%	0.1%	1.0%	0.4%	0.2%	0.4%	0.2%	3.4%	0.4%	0.4%	0.7%	1.5%	6.3%	
Tufts Med Ctr	50	10					33	12	51	22	31	14	14	237	41	10	18	49	355	
	0.8%	0.2%					0.5%	0.2%	0.8%	0.4%	0.5%	0.2%	0.2%	3.9%	0.7%	0.2%	0.3%	0.8%	5.9%	
Back Bay	111	15					115	44	0	38	73	0	20	416	118	71	94	99	798	
	0.7%	0.1%					0.7%	0.3%	0.0%	0.2%	0.4%	0.0%	0.1%	2.4%	0.7%	0.4%	0.6%	0.6%	4.7%	
Mass. Ave	33	4					46	14	40	43	22	8	19	229	31	18	30	48	356	
	0.6%	0.1%					0.8%	0.2%	0.7%	0.7%	0.4%	0.1%	0.3%	3.9%	0.5%	0.3%	0.5%	0.8%	6.1%	
Ruggles	107	14					56	32	128	31	24	29	17	438	44	13	36	100	631	
	1.0%	0.1%					0.5%	0.3%	1.2%	0.3%	0.2%	0.3%	0.2%	4.2%	0.4%	0.1%	0.3%	1.0%	6.0%	
Roxbury Crossing	43	5					44	18	53	20	14	20	17	234	23	12	56	49	374	
	0.9%	0.1%					0.9%	0.4%	1.1%	0.4%	0.3%	0.4%	0.4%	4.9%	0.5%	0.3%	1.2%	1.0%	7.9%	
Jackson Square	66	7					24	17	84	27	25	14	11	275	46	21	44	63	449	
	1.3%	0.1%					0.5%	0.3%	1.6%	0.5%	0.5%	0.3%	0.2%	5.2%	0.9%	0.4%	0.8%	1.2%	8.5%	
Stony Brook	27	3					28	11	77	29	21	18	7	221	15	13	23	20	292	
	0.8%	0.1%					0.8%	0.3%	2.3%	0.9%	0.6%	0.5%	0.2%	6.5%	0.4%	0.4%	0.7%	0.6%	8.6%	
Green St.	26	3					20	20	76	26	16	5	7	199	23	11	26	25	284	
	0.8%	0.1%					0.6%	0.6%	2.3%	0.8%	0.5%	0.2%	0.2%	6.0%	0.7%	0.3%	0.8%	0.8%	8.5%	
Forest Hills	166	15					47	74	307	61	94	13	19	796	149	34	72	62	1,113	
	1.1%	0.1%					0.3%	0.5%	2.1%	0.4%	0.6%	0.1%	0.1%	5.4%	1.0%	0.2%	0.5%	0.4%	7.5%	
Tot. Orange Line	1,350	151			324	642	629	672	1,316	598	678	264	195	6,819	945	466	940	1,125	10,295	
	0.9%	0.1%			0.2%	0.4%	0.4%	0.4%	0.9%	0.4%	0.4%	0.2%	0.1%	4.5%	0.6%	0.3%	0.6%	0.7%	6.8%	

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TABLE 10
MATTAPAN LINE or ORANGE LINE to RED LINE

ENTRY STATION on MATTAPAN LINE	EXIT STATION on RED LINE																						Total Red Line
	Alewife	Davis	Porter	Harvard	Central	Kendall/ MIT	Charles/ MGH	Park St. Red	Downtown Cross. Red	South Sta. Red	Broadway	Andrew	JFK/ UMass	Savin Hill	Fields Corner	Shawmut	Ashmont Red	North Quincy	Wollaston	Quincy Center	Quincy Adams	Braintree	
Total Line	22	18	9	97	70	78	83	160	185	230	40	56	145	33	133	23	0	29	8	33	15	11	1,478
	0.6%	0.5%	0.2%	2.6%	1.9%	2.1%	2.2%	4.3%	5.0%	6.2%	1.1%	1.5%	3.9%	0.9%	3.6%	0.6%	0.0%	0.8%	0.2%	0.9%	0.4%	0.3%	39.8%
ENTRY STATION on ORANGE LINE																							
Oak Grove	17	19	12	127	67	107	47			132	18	11	80	4	8	3	8	37	12	19	8	2	738
	0.3%	0.3%	0.2%	2.2%	1.1%	1.8%	0.8%			2.2%	0.3%	0.2%	1.4%	0.1%	0.1%	0.1%	0.1%	0.6%	0.2%	0.3%	0.1%	0.0%	12.6%
Malden	85	48	57	272	204	204	99			235	48	53	174	20	41	14	57	70	45	80	23	18	1,847
	0.7%	0.4%	0.5%	2.2%	1.7%	1.7%	0.8%			1.9%	0.4%	0.4%	1.4%	0.2%	0.3%	0.1%	0.5%	0.6%	0.4%	0.7%	0.2%	0.1%	15.2%
Wellington	43	21	31	142	103	112	65			145	24	23	104	9	20	16	30	32	8	50	15	13	1,006
	0.6%	0.3%	0.4%	1.8%	1.3%	1.5%	0.8%			1.9%	0.3%	0.3%	1.4%	0.1%	0.3%	0.2%	0.4%	0.4%	0.1%	0.6%	0.2%	0.2%	13.1%
Sullivan Square	35	52	31	101	95	54	83			147	59	97	133	25	68	29	76	81	20	95	16	22	1,319
	0.4%	0.6%	0.3%	1.1%	1.0%	0.6%	0.9%			1.6%	0.6%	1.1%	1.5%	0.3%	0.7%	0.3%	0.8%	0.9%	0.2%	1.0%	0.2%	0.2%	14.4%
Community Coll.	43	64	36	129	116	45	38			63	47	86	97	33	90	39	98	52	34	67	16	25	1,218
	0.7%	1.0%	0.6%	2.1%	1.9%	0.7%	0.6%			1.0%	0.8%	1.4%	1.6%	0.5%	1.4%	0.6%	1.6%	0.8%	0.5%	1.1%	0.3%	0.4%	19.5%
North Sta Orange										341	83	106	193	33	65	37	109	107	76	98	71	82	1,401
										3.6%	0.9%	1.1%	2.0%	0.3%	0.7%	0.4%	1.1%	1.1%	0.8%	1.0%	0.7%	0.9%	14.7%
Haymarket Orange										136	93	143	216	46	84	33	104	62	57	89	66	34	1,163
										2.0%	1.4%	2.1%	3.2%	0.7%	1.2%	0.5%	1.5%	0.9%	0.8%	1.3%	1.0%	0.5%	17.0%
State Orange	56	46	28	127	61	65	27			84	28	53	79	12	37	18	48	37	17	40	45	21	929
	0.7%	0.6%	0.3%	1.6%	0.8%	0.8%	0.3%			1.0%	0.3%	0.7%	1.0%	0.1%	0.5%	0.2%	0.6%	0.5%	0.2%	0.5%	0.6%	0.3%	11.5%
Dwntwn Cross. Or.																							
Chinatown	23	27	25	92	46	39	42	54		22	11	29	41	9	32	9	31	47	35	49	16	13	692
	0.4%	0.5%	0.4%	1.5%	0.8%	0.7%	0.7%	0.9%		0.4%	0.2%	0.5%	0.7%	0.2%	0.5%	0.2%	0.5%	0.8%	0.6%	0.8%	0.3%	0.2%	11.6%
Tufts Med Ctr	54	60	26	96	65	53	48	61		40	22	51	70	23	36	22	38	78	65	89	21	36	1,054
	0.9%	1.0%	0.4%	1.6%	1.1%	0.9%	0.8%	1.0%		0.7%	0.4%	0.8%	1.2%	0.4%	0.6%	0.4%	0.6%	1.3%	1.1%	1.5%	0.3%	0.6%	17.5%
Back Bay	117	151	88	238	138	117	106	246		195	45	102	155	57	99	52	136	231	123	189	96	116	2,797
	0.7%	0.9%	0.5%	1.4%	0.8%	0.7%	0.6%	1.4%		1.1%	0.3%	0.6%	0.9%	0.3%	0.6%	0.3%	0.8%	1.4%	0.7%	1.1%	0.6%	0.7%	16.5%
Mass. Ave	31	55	21	60	33	38	45	94		52	23	29	59	13	28	19	44	31	13	36	11	15	750
	0.5%	0.9%	0.4%	1.0%	0.6%	0.7%	0.8%	1.6%		0.9%	0.4%	0.5%	1.0%	0.2%	0.5%	0.3%	0.8%	0.5%	0.2%	0.6%	0.2%	0.3%	12.9%
Ruggles	63	73	76	175	95	76	95	142		102	37	47	86	41	64	18	67	61	51	102	30	44	1,545
	0.6%	0.7%	0.7%	1.7%	0.9%	0.7%	0.9%	1.4%		1.0%	0.4%	0.5%	0.8%	0.4%	0.6%	0.2%	0.6%	0.6%	0.5%	1.0%	0.3%	0.4%	14.8%
Roxbury Crossing	43	24	28	65	46	44	40	114		43	47	31	59	14	23	8	37	23	10	20	5	10	734
	0.9%	0.5%	0.6%	1.4%	1.0%	0.9%	0.8%	2.4%		0.9%	1.0%	0.7%	1.2%	0.3%	0.5%	0.2%	0.8%	0.5%	0.2%	0.4%	0.1%	0.2%	15.5%
Jackson Square	41	32	15	82	73	55	50	82		64	40	43	60	8	26	6	33	18	3	25	3	16	775
	0.8%	0.6%	0.3%	1.6%	1.4%	1.0%	1.0%	1.6%		1.2%	0.8%	0.8%	1.1%	0.2%	0.5%	0.1%	0.6%	0.3%	0.1%	0.5%	0.1%	0.3%	14.7%
Stony Brook	16	26	21	98	44	55	23	73		45	12	21	36	7	14	2	5	6	0	11	2	5	522
	0.5%	0.8%	0.6%	2.9%	1.3%	1.6%	0.7%	2.2%		1.3%	0.4%	0.6%	1.1%	0.2%	0.4%	0.1%	0.1%	0.2%	0.0%	0.3%	0.1%	0.1%	15.4%
Green St.	13	36	31	80	50	62	41	63		50	13	29	45	9	17	4	12	8	6	16	4	6	595
	0.4%	1.1%	0.9%	2.4%	1.5%	1.9%	1.2%	1.9%		1.5%	0.4%	0.9%	1.4%	0.3%	0.5%	0.1%	0.4%	0.2%	0.2%	0.5%	0.1%	0.2%	17.9%
Forest Hills	90	59	75	279	183	187	220	275		155	74	63	173	33	67	25	50	59	17	83	14	17	2,198
	0.6%	0.4%	0.5%	1.9%	1.2%	1.3%	1.5%	1.9%		1.0%	0.5%	0.4%	1.2%	0.2%	0.5%	0.2%	0.3%	0.4%	0.1%	0.6%	0.1%	0.1%	14.8%
Tot. Orange Line	770	793	601	2,163	1,419	1,313	1,069	1,204		2,051	724	1,017	1,860	396	819	354	983	1,040	592	1,158	462	495	21,283
	0.5%	0.5%	0.4%	1.4%	0.9%	0.9%	0.7%	0.8%		1.3%	0.5%	0.7%	1.2%	0.3%	0.5%	0.2%	0.6%	0.7%	0.4%	0.8%	0.3%	0.3%	14.0%

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TABLE 11
MATTAPAN LINE or ORANGE LINE to MATTAPAN LINE or ORANGE LINE

		EXIT STATION on MATTAPAN LINE or ORANGE LINE																			
ENTRY STATION	Mattapan	Oak Grove	Malden	Wellingt	Sullivan	Comm.	North Sta.	Haymrket	State	Downtown	Chinatown	Tufts	Back Bay	Mass. Ave	Ruggles	Roxbury	Jackson	Stony	Green St.	Forest Hills	Total
on MATTAPAN LINE	Line																				Orange Line
Total Line	1,380	3	23	6	23	30	27	35	27	12	14	42	26	41	25	24	6	8	121	493	
	37.2%	0.1%	0.6%	0.2%	0.6%	0.8%	0.7%	0.9%	0.7%	0.3%	0.4%	1.1%	0.7%	1.1%	0.7%	0.6%	0.2%	0.2%	3.3%	13.3%	
ENTRY STATION on ORANGE LINE																					
Oak Grove	3	0	115	50	139	167	454	279	703	709	385	283	572	73	306	27	16	4	4	42	4,328
	0.1%	0.0%	2.0%	0.9%	2.4%	2.8%	7.7%	4.8%	12.0%	12.1%	6.6%	4.8%	9.7%	1.2%	5.2%	0.5%	0.3%	0.1%	0.1%	0.7%	73.8%
Malden	24	115	0	183	368	623	694	531	823	1,168	758	532	945	238	802	91	85	27	25	220	8,228
	0.2%	0.9%	0.0%	1.5%	3.0%	5.1%	5.7%	4.4%	6.8%	9.6%	6.2%	4.4%	7.8%	2.0%	6.6%	0.7%	0.7%	0.2%	0.2%	1.8%	67.6%
Wellington	6	55	213	0	214	323	499	433	810	890	273	281	740	109	287	51	38	17	18	155	5,406
	0.1%	0.7%	2.8%	0.0%	2.8%	4.2%	6.5%	5.6%	10.5%	11.6%	3.5%	3.6%	9.6%	1.4%	3.7%	0.7%	0.5%	0.2%	0.2%	2.0%	70.2%
Sullivan Square	22	149	415	227	0	375	505	535	545	785	324	247	674	161	305	112	105	55	33	340	5,892
	0.2%	1.6%	4.5%	2.5%	0.0%	4.1%	5.5%	5.9%	6.0%	8.6%	3.5%	2.7%	7.4%	1.8%	3.3%	1.2%	1.2%	0.6%	0.4%	3.7%	64.5%
Community Coll.	21	151	546	282	320	0	178	193	137	323	166	135	297	119	231	97	137	48	41	358	3,759
	0.3%	2.4%	8.7%	4.5%	5.1%	0.0%	2.9%	3.1%	2.2%	5.2%	2.7%	2.2%	4.8%	1.9%	3.7%	1.6%	2.2%	0.8%	0.7%	5.7%	60.2%
North Sta Orange	35	512	808	543	558	242	0	119	517	800	361	407	1,414	211	484	130	160	129	125	520	8,040
	0.4%	5.4%	8.5%	5.7%	5.8%	2.5%	0.0%	1.2%	5.4%	8.4%	3.8%	4.3%	14.8%	2.2%	5.1%	1.4%	1.7%	1.4%	1.3%	5.5%	84.3%
Haymarket Orange	43	275	554	444	572	244	107	0	77	376	193	201	620	234	385	139	203	128	124	667	5,543
	0.6%	4.0%	8.1%	6.5%	8.4%	3.6%	1.6%	0.0%	1.1%	5.5%	2.8%	2.9%	9.1%	3.4%	5.6%	2.0%	3.0%	1.9%	1.8%	9.7%	80.9%
State Orange	24	669	826	749	513	167	436	91	0	154	91	117	659	256	295	198	285	283	234	961	6,984
	0.3%	8.3%	10.2%	9.3%	6.4%	2.1%	5.4%	1.1%	0.0%	1.9%	1.1%	1.4%	8.2%	3.2%	3.7%	2.5%	3.5%	3.5%	2.9%	11.9%	86.5%
Dwntwn Cross. Or.		676	1,189	831	741	337	651	311	134	0	105	125	531	340	521	303	496	314	256	1,250	9,111
		6.8%	12.0%	8.4%	7.4%	3.4%	6.5%	3.1%	1.3%	0.0%	1.1%	1.3%	5.3%	3.4%	5.2%	3.0%	5.0%	3.2%	2.6%	12.6%	91.6%
Chinatown	11	372	787	261	328	171	293	178	86	112	0	61	300	154	311	96	146	132	135	432	4,355
	0.2%	6.2%	13.1%	4.4%	5.5%	2.9%	4.9%	3.0%	1.4%	1.9%	0.0%	1.0%	5.0%	2.6%	5.2%	1.6%	2.4%	2.2%	2.3%	7.2%	72.7%
Tufts Med Ctr	14	275	537	279	241	160	353	193	119	145	63	0	403	210	223	92	162	114	95	515	4,179
	0.2%	4.6%	8.9%	4.6%	4.0%	2.7%	5.8%	3.2%	2.0%	2.4%	1.0%	0.0%	6.7%	3.5%	3.7%	1.5%	2.7%	1.9%	1.6%	8.5%	69.2%
Back Bay	39	640	1,065	804	737	350	1,352	689	741	684	365	434	0	253	749	353	556	437	439	1,563	12,211
	0.2%	3.8%	6.3%	4.7%	4.3%	2.1%	8.0%	4.1%	4.4%	4.0%	2.1%	2.6%	0.0%	1.5%	4.4%	2.1%	3.3%	2.6%	2.6%	9.2%	71.8%
Mass. Ave	34	80	262	116	178	129	203	235	266	362	168	222	227	0	157	184	277	242	227	764	4,299
	0.6%	1.4%	4.5%	2.0%	3.1%	2.2%	3.5%	4.0%	4.6%	6.2%	2.9%	3.8%	3.9%	0.0%	2.7%	3.2%	4.8%	4.2%	3.9%	13.1%	74.0%
Ruggles	32	308	828	280	325	305	451	437	359	588	373	231	677	156	0	181	348	237	208	1,136	7,428
	0.3%	3.0%	7.9%	2.7%	3.1%	2.9%	4.3%	4.2%	3.4%	5.6%	3.6%	2.2%	6.5%	1.5%	0.0%	1.7%	3.3%	2.3%	2.0%	10.9%	71.1%
Roxbury Crossing	20	29	105	56	125	129	108	133	190	313	97	93	309	184	174	0	251	121	129	717	3,263
	0.4%	0.6%	2.2%	1.2%	2.6%	2.7%	2.3%	2.8%	4.0%	6.6%	2.0%	2.0%	6.5%	3.9%	3.7%	0.0%	5.3%	2.6%	2.7%	15.2%	69.0%
Jackson Square	18	18	88	40	105	178	157	206	287	493	150	153	451	233	308	197	0	71	101	488	3,724
	0.3%	0.3%	1.7%	0.8%	2.0%	3.4%	3.0%	3.9%	5.5%	9.4%	2.9%	2.9%	8.6%	4.4%	5.9%	3.7%	0.0%	1.3%	1.9%	9.3%	70.8%
Stony Brook	4	5	29	20	48	50	111	106	292	342	150	1									

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TABLE 12
MATTAPAN LINE or ORANGE LINE to BLUE LINE or SILVER LINE WATERFRONT

	EXIT STATION on BLUE LINE or SILVER LINE WATERFRONT														Total Silver Waterfront	Total All Lines			
	Wonderland	Revere Beach	Beachmont	Suffolk Downs	Orient Heights	Wood Island	Airport	Maverick	Aquarium	State Blue	Govt Ctr Blue	Bowdoin	Total Blue Line	South Sta. Silver			World Trade Ctr	Surface Silver Wat	
ENTRY STATION on MATTAPAN LINE																			
Total Line	5	0	4	2	2	4	11	13	4		1	46		5	11	22	38	3,710	
	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.3%	0.4%	0.1%		0.0%	1.2%		0.1%	0.3%	0.6%	1.0%	100.0%	
ENTRY STATION on ORANGE LINE																			
Oak Grove	15	12	10	4	11	9	34	35	21		6	157		9	16	17	42	5,867	
	0.3%	0.2%	0.2%	0.1%	0.2%	0.2%	0.6%	0.6%	0.4%		0.1%	2.7%		0.2%	0.3%	0.3%	0.7%	100.0%	
Malden	34	37	26	9	35	15	110	131	41		12	450		32	23	49	104	12,178	
	0.3%	0.3%	0.2%	0.1%	0.3%	0.1%	0.9%	1.1%	0.3%		0.1%	3.7%		0.3%	0.2%	0.4%	0.9%	100.0%	
Wellington	16	19	16	6	19	14	58	106	41		8	303		8	10	26	44	7,702	
	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.8%	1.4%	0.5%		0.1%	3.9%		0.1%	0.1%	0.3%	0.6%	100.0%	
Sullivan Square	47	42	24	6	36	30	156	225	65		7	638		11	19	36	66	9,129	
	0.5%	0.5%	0.3%	0.1%	0.4%	0.3%	1.7%	2.5%	0.7%		0.1%	7.0%		0.1%	0.2%	0.4%	0.7%	100.0%	
Community Coll.	39	53	38	7	62	23	82	111	18		10	443		6	11	16	33	6,243	
	0.6%	0.8%	0.6%	0.1%	1.0%	0.4%	1.3%	1.8%	0.3%		0.2%	7.1%		0.1%	0.2%	0.3%	0.5%	100.0%	
North Sta Orange														20	16	28	64	9,540	
														0.2%	0.2%	0.3%	0.7%	100.0%	
Haymarket Orange														12	30	59	101	6,850	
														0.2%	0.4%	0.9%	1.5%	100.0%	
State Orange														3	13	44	60	8,072	
														0.0%	0.2%	0.5%	0.7%	100.0%	
Dwntwn Cross. Or.	91	63	39	21	67	25	99	170	29		57	10	671					9,948	
	0.9%	0.6%	0.4%	0.2%	0.7%	0.3%	1.0%	1.7%	0.3%		0.6%	0.1%	6.7%					100.0%	
Chinatown	87	42	40	9	46	27	59	141	31		44	5	531		2	2	16	20	5,989
	1.5%	0.7%	0.7%	0.2%	0.8%	0.5%	1.0%	2.4%	0.5%		0.7%	0.1%	8.9%		0.0%	0.0%	0.3%	0.3%	100.0%
Tufts Med Ctr	66	34	31	9	34	36	57	101	17		31	5	421		1	3	9	13	6,036
	1.1%	0.6%	0.5%	0.1%	0.6%	0.6%	0.9%	1.7%	0.3%		0.5%	0.1%	7.0%		0.0%	0.0%	0.1%	0.2%	100.0%
Back Bay	131	78	58	18	80	51	138	278	80		145	15	1,072		7	30	44	81	16,998
	0.8%	0.5%	0.3%	0.1%	0.5%	0.3%	0.8%	1.6%	0.5%		0.9%	0.1%	6.3%		0.0%	0.2%	0.3%	0.5%	100.0%
Mass. Ave	39	41	17	8	36	15	43	67	9		51	4	330		2	11	30	43	5,812
	0.7%	0.7%	0.3%	0.1%	0.6%	0.3%	0.7%	1.2%	0.2%		0.9%	0.1%	5.7%		0.0%	0.2%	0.5%	0.7%	100.0%
Ruggles	89	64	26	22	67	24	144	172	42		78	9	737		3	19	45	67	10,440
	0.9%	0.6%	0.2%	0.2%	0.6%	0.2%	1.4%	1.6%	0.4%		0.7%	0.1%	7.1%		0.0%	0.2%	0.4%	0.6%	100.0%
Roxbury Crossing	24	20	8	8	18	22	47	115	6		39	0	307		3	15	16	34	4,732
	0.5%	0.4%	0.2%	0.2%	0.4%	0.5%	1.0%	2.4%	0.1%		0.8%	0.0%	6.5%		0.1%	0.3%	0.3%	0.7%	100.0%
Jackson Square	26	13	9	6	21	9	50	73	5		29	7	248		2	11	35	48	5,262
	0.5%	0.2%	0.2%	0.1%	0.4%	0.2%	1.0%	1.4%	0.1%		0.6%	0.1%	4.7%		0.0%	0.2%	0.7%	0.9%	100.0%
Stony Brook	13	7	2	2	4	3	16	23	15		24	4	113		5	12	6	23	3,393
	0.4%	0.2%	0.1%	0.1%	0.1%	0.1%	0.5%	0.7%	0.4%		0.7%	0.1%	3.3%		0.1%	0.4%	0.2%	0.7%	100.0%
Green St.	8	10	6	1	19	6	31	29	7		31	3	151		4	3	12	19	3,322
	0.2%	0.3%	0.2%	0.0%	0.6%	0.2%	0.9%	0.9%	0.2%		0.9%	0.1%	4.5%		0.1%	0.1%	0.4%	0.6%	100.0%
Forest Hills	48	30	20	21	33	39	159	187	50		126	21	734		18	19	28	65	14,805
	0.3%	0.2%	0.1%	0.1%	0.2%	0.3%	1.1%	1.3%	0.3%		0.9%	0.1%	5.0%		0.1%	0.1%	0.2%	0.4%	100.0%
Tot. Orange Line	773	565	370	157	588	348	1,283	1,964	477		655	126	7,306		148	263	516	927	152,318
	0.5%	0.4%	0.2%	0.1%	0.4%	0.2%	0.8%	1.3%	0.3%		0.4%	0.1%	4.8%		0.1%	0.2%	0.3%	0.6%	100.0%

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
for Thursday, September 23, 2010

TABLE 13
BLUE LINE or SILVER LINE WATERFRONT to GREEN LINE

ENTRY STATION on BLUE LINE	EXIT STATION on GREEN LINE												Total Green Line Subway	Surface B Line	Surface C Line	Surface D Line	Surface E Line	Total Green Line	
	Lechmere	Science Park	North Sta. Green	Haymarket Green	Govt. Ctr Green	Park St. Green	Boylston	Arlington	Copley	Hynes Conv. Ctr	Kenmore	Prudential							Symphony
Wonderland	54	12				104	92	172	183	59	56	53	8	793	61	20	93	129	1,096
	1.0%	0.2%				2.0%	1.7%	3.2%	3.4%	1.1%	1.1%	1.0%	0.2%	14.9%	1.1%	0.4%	1.8%	2.4%	20.6%
Revere Beach	48	7				78	49	72	90	30	30	29	8	441	33	31	44	53	602
	1.6%	0.2%				2.6%	1.6%	2.4%	3.0%	1.0%	1.0%	1.0%	0.3%	14.8%	1.1%	1.0%	1.5%	1.8%	20.2%
Beachmont	32	3				63	37	66	83	33	22	26	6	371	27	13	50	39	500
	1.2%	0.1%				2.4%	1.4%	2.5%	3.2%	1.3%	0.8%	1.0%	0.2%	14.2%	1.0%	0.5%	1.9%	1.5%	19.1%
Suffolk Downs	13	2				7	10	17	17	7	8	2	0	83	11	6	11	10	121
	1.7%	0.3%				0.9%	1.3%	2.2%	2.2%	0.9%	1.0%	0.3%	0.0%	10.8%	1.4%	0.8%	1.4%	1.3%	15.7%
Orient Heights	60	6				101	49	131	138	55	44	37	8	629	47	24	67	79	846
	1.6%	0.2%				2.7%	1.3%	3.5%	3.7%	1.5%	1.2%	1.0%	0.2%	16.9%	1.3%	0.6%	1.8%	2.1%	22.7%
Wood Island	32	5				44	34	55	55	22	33	9	4	293	28	13	44	39	417
	1.7%	0.3%				2.3%	1.8%	2.8%	2.8%	1.1%	1.7%	0.5%	0.2%	15.1%	1.4%	0.7%	2.3%	2.0%	21.5%
Airport	167	14				220	110	193	275	119	118	73	12	1,301	115	77	132	88	1,713
	2.3%	0.2%				3.1%	1.5%	2.7%	3.9%	1.7%	1.7%	1.0%	0.2%	18.2%	1.6%	1.1%	1.8%	1.2%	24.0%
Maverick	179	19				287	198	227	349	145	131	61	29	1,625	103	81	161	164	2,134
	2.0%	0.2%				3.2%	2.2%	2.5%	3.9%	1.6%	1.5%	0.7%	0.3%	18.2%	1.2%	0.9%	1.8%	1.8%	24.0%
Aquarium	70	28				52	46	66	94	68	31	37	14	506	38	34	45	21	644
	1.5%	0.6%				1.1%	1.0%	1.4%	2.0%	1.4%	0.7%	0.8%	0.3%	10.7%	0.8%	0.7%	1.0%	0.4%	13.6%
State Blue						84	32	37	93	54	35	44	23	402	33	17	61	79	592
						1.8%	0.7%	0.8%	2.0%	1.2%	0.7%	0.9%	0.5%	8.6%	0.7%	0.4%	1.3%	1.7%	12.6%
Govt Ctr Blue																			
Bowdoin	3	1	18	3		11	4	7	8	7	5	5	1	73	5	3	12	10	103
	0.2%	0.1%	1.3%	0.2%		0.8%	0.3%	0.5%	0.6%	0.5%	0.4%	0.4%	0.1%	5.3%	0.4%	0.2%	0.9%	0.7%	7.4%
Total Blue Line	658	97	18	3		1,051	661	1,043	1,385	599	513	376	113	6,517	501	319	720	711	8,768
	1.4%	0.2%	0.0%	0.0%		2.2%	1.4%	2.2%	3.0%	1.3%	1.1%	0.8%	0.2%	13.9%	1.1%	0.7%	1.5%	1.5%	18.7%
ENTRY STATION on SILVER LINE WATERFRONT																			
South Sta Silver																			
Courthouse	5	3			2		4	6	14	12	12	10	5	73	10	20	15	30	148
	0.6%	0.3%			0.2%		0.5%	0.7%	1.6%	1.4%	1.4%	1.2%	0.6%	8.4%	1.2%	2.3%	1.7%	3.5%	17.1%
World Trade	8	0			23		16	16	51	37	27	15	4	197	46	21	35	11	310
	0.4%	0.0%			1.1%		0.8%	0.8%	2.4%	1.8%	1.3%	0.7%	0.2%	9.4%	2.2%	1.0%	1.7%	0.5%	14.8%
Surface Silv. Wat.	37	7			37		62	69	107	71	37	32	9	468	35	31	42	20	596
	0.7%	0.1%			0.7%		1.1%	1.2%	1.9%	1.3%	0.7%	0.6%	0.2%	8.4%	0.6%	0.6%	0.8%	0.4%	10.7%
Total Silver Wat.	50	10			62		82	91	172	120	76	57	18	738	91	72	92	61	1,054
	0.5%	0.1%			0.6%		0.8%	0.9%	1.7%	1.2%	0.8%	0.6%	0.2%	7.4%	0.9%	0.7%	0.9%	0.6%	10.6%
Total All Lines	6,606	971	4,940	4,410	8,338	9,088	7,816	8,458	15,015	9,164	8,227	3,701	1,950	88,684	26,397	12,525	24,765	12,801	165,172
	1.1%	0.2%	0.8%	0.8%	1.4%	1.6%	1.3%	1.4%	2.6%	1.6%	1.4%	0.6%	0.3%	15.2%	4.5%	2.1%	4.2%	2.2%	28.2%

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
for Thursday, September 23, 2010

TABLE 14
BLUE LINE or SILVER LINE WATERFRONT to RED LINE

ENTRY STATION on BLUE LINE	EXIT STATION on RED LINE																					Total Red Line	
	Alewife	Davis	Porter	Harvard	Central	Kendall/ MIT	Charles/ MGH	Park St. Red	Downtown Cross. Red	South Sta. Red	Broadway	Andrew	JFK/ UMass	Savin Hill	Fields Corner	Shawmut	Ashmont Red	North Quincy	Wollaston	Quincy Center	Quincy Adams		Braintree
Wonderland	16	14	25	128	72	70	42			50	21	30	72	4	19	4	17	14	2	12	7	5	624
	0.3%	0.3%	0.5%	2.4%	1.4%	1.3%	0.8%			0.9%	0.4%	0.6%	1.4%	0.1%	0.4%	0.1%	0.3%	0.3%	0.0%	0.2%	0.1%	0.1%	11.8%
Revere Beach	23	20	22	67	50	29	27			27	11	27	41	7	17	1	11	13	8	9	7	6	423
	0.8%	0.7%	0.7%	2.2%	1.7%	1.0%	0.9%			0.9%	0.4%	0.9%	1.4%	0.2%	0.6%	0.0%	0.4%	0.4%	0.3%	0.3%	0.2%	0.2%	14.2%
Beachmont	15	9	11	57	41	16	18			30	8	9	36	5	3	1	4	10	7	5	2	4	291
	0.6%	0.3%	0.4%	2.2%	1.6%	0.6%	0.7%			1.1%	0.3%	0.3%	1.4%	0.2%	0.1%	0.0%	0.2%	0.4%	0.3%	0.2%	0.1%	0.2%	11.1%
Suffolk Downs	6	5	8	9	8	5	3			4	4	6	9	0	1	0	4	2	2	6	2	0	84
	0.8%	0.6%	1.0%	1.2%	1.0%	0.6%	0.4%			0.5%	0.5%	0.8%	1.2%	0.0%	0.1%	0.0%	0.5%	0.3%	0.3%	0.8%	0.3%	0.0%	10.9%
Orient Heights	8	15	18	79	45	30	17			35	8	19	64	3	5	0	15	10	3	8	4	3	389
	0.2%	0.4%	0.5%	2.1%	1.2%	0.8%	0.5%			0.9%	0.2%	0.5%	1.7%	0.1%	0.1%	0.0%	0.4%	0.3%	0.1%	0.2%	0.1%	0.1%	10.5%
Wood Island	14	6	2	45	33	31	15			22	9	11	27	8	9	0	9	6	1	15	9	4	276
	0.7%	0.3%	0.1%	2.3%	1.7%	1.6%	0.8%			1.1%	0.5%	0.6%	1.4%	0.4%	0.5%	0.0%	0.5%	0.3%	0.1%	0.8%	0.5%	0.2%	14.2%
Airport	46	33	37	186	135	80	39			73	31	57	50	20	30	7	44	21	5	37	19	7	957
	0.6%	0.5%	0.5%	2.6%	1.9%	1.1%	0.5%			1.0%	0.4%	0.8%	0.7%	0.3%	0.4%	0.1%	0.6%	0.3%	0.1%	0.5%	0.3%	0.1%	13.4%
Maverick	54	72	60	254	164	100	47			116	47	92	78	21	60	9	50	35	12	56	19	17	1,363
	0.6%	0.8%	0.7%	2.9%	1.8%	1.1%	0.5%			1.3%	0.5%	1.0%	0.9%	0.2%	0.7%	0.1%	0.6%	0.4%	0.1%	0.6%	0.2%	0.2%	15.3%
Aquarium	21	22	12	111	52	32	22			39	3	23	48	2	4	3	15	18	5	18	31	8	489
	0.4%	0.5%	0.3%	2.3%	1.1%	0.7%	0.5%			0.8%	0.1%	0.5%	1.0%	0.0%	0.1%	0.1%	0.3%	0.4%	0.1%	0.4%	0.7%	0.2%	10.3%
State Blue																							
Govt Ctr Blue																							
Bowdoin	2	1	4	17	6	4	8			14	0	2	1	1	3	3	5	3	4	5	7	7	97
	0.1%	0.1%	0.3%	1.2%	0.4%	0.3%	0.6%			1.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.2%	0.4%	0.2%	0.3%	0.4%	0.5%	0.5%	7.0%
Total Blue Line	205	197	199	953	606	397	238			410	142	276	426	71	151	28	174	132	49	171	107	61	4,993
	0.4%	0.4%	0.4%	2.0%	1.3%	0.8%	0.5%			0.9%	0.3%	0.6%	0.9%	0.2%	0.3%	0.1%	0.4%	0.3%	0.1%	0.4%	0.2%	0.1%	10.6%
ENTRY STATION on SILVER LINE WATERFRONT																							
South Sta Silver																							
Courthouse	30	25	25	45	37	21	21	27	29		7	10	16	7	5	2	17	11	5	33	2	11	386
	3.5%	2.9%	2.9%	5.2%	4.3%	2.4%	2.4%	3.1%	3.3%		0.8%	1.2%	1.8%	0.8%	0.6%	0.2%	2.0%	1.3%	0.6%	3.8%	0.2%	1.3%	44.5%
World Trade	54	56	31	78	44	33	32	68	57		10	26	24	12	19	13	28	23	25	49	26	25	733
	2.6%	2.7%	1.5%	3.7%	2.1%	1.6%	1.5%	3.2%	2.7%		0.5%	1.2%	1.1%	0.6%	0.9%	0.6%	1.3%	1.1%	1.2%	2.3%	1.2%	1.2%	35.0%
Surface Silv. Wat.	107	123	110	258	174	176	64	137	171		37	107	89	32	87	59	91	89	66	142	32	55	2,206
	1.9%	2.2%	2.0%	4.6%	3.1%	3.2%	1.2%	2.5%	3.1%		0.7%	1.9%	1.6%	0.6%	1.6%	1.1%	1.6%	1.6%	1.2%	2.6%	0.6%	1.0%	39.6%
Total Silver Wat.	191	204	166	381	255	230	117	232	257		54	143	129	51	111	74	136	123	96	224	60	91	3,325
	1.9%	2.1%	1.7%	3.8%	2.6%	2.3%	1.2%	2.3%	2.6%		0.5%	1.4%	1.3%	0.5%	1.1%	0.7%	1.4%	1.2%	1.0%	2.3%	0.6%	0.9%	33.5%
Total All Lines	9,935	12,011	8,781	22,709	15,653	15,843	11,648	13,540	13,151	18,739	4,464	5,835	10,295	2,309	4,819	2,436	6,261	6,977	4,400	8,180	3,893	4,209	206,088
	1.7%	2.1%	1.5%	3.9%	2.7%	2.7%	2.0%	2.3%	2.2%	3.2%	0.8%	1.0%	1.8%	0.4%	0.8%	0.4%	1.1%	1.2%	0.8%	1.4%	0.7%	0.7%	35.2%

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
for Thursday, September 23, 2010

TABLE 15
BLUE LINE or SILVER LINE WATERFRONT to MATTAPAN LINE or ORANGE LINE

ENTRY STATION on BLUE LINE	EXIT STATION on MATTAPAN LINE or ORANGE LINE																			Total Orange Line		
	Mattapan Line	Oak Grove	Malden	Wellingt n	Sullivan Square	Comm. College	North Sta. Orange	Haymrket Orange	State Orange	Downtown Cross. Or.	Chinatown	Tufts Med. Ctr	Back Bay	Mass. Ave	Ruggles	Roxbury Crossing	Jackson Square	Stony Brook	Green St.		Forest Hills	
Wonderland	4	16	46	17	48	46	59	53		130	81	73	126	42	82	25	23	16	11	48	942	
	0.1%	0.3%	0.9%	0.3%	0.9%	0.9%	1.1%	1.0%		2.4%	1.5%	1.4%	2.4%	0.8%	1.5%	0.5%	0.4%	0.3%	0.2%	0.9%	17.7%	
Revere Beach	0	9	44	20	41	49	36	32		79	40	35	68	34	57	18	13	6	6	37	624	
	0.0%	0.3%	1.5%	0.7%	1.4%	1.6%	1.2%	1.1%		2.6%	1.3%	1.2%	2.3%	1.1%	1.9%	0.6%	0.4%	0.2%	0.2%	1.2%	20.9%	
Beachmont	3	10	23	12	28	41	29	12		44	38	26	44	13	24	8	12	2	5	21	392	
	0.1%	0.4%	0.9%	0.5%	1.1%	1.6%	1.1%	0.5%		1.7%	1.5%	1.0%	1.7%	0.5%	0.9%	0.3%	0.5%	0.1%	0.2%	0.8%	15.0%	
Suffolk Downs	2	4	9	7	5	8	8	8		16	10	8	13	7	19	4	9	2	1	19	157	
	0.3%	0.5%	1.2%	0.9%	0.6%	1.0%	1.0%	1.0%		2.1%	1.3%	1.0%	1.7%	0.9%	2.5%	0.5%	1.2%	0.3%	0.1%	2.5%	20.4%	
Orient Heights	1	10	37	17	39	66	47	30		95	43	36	74	30	69	16	19	2	14	25	669	
	0.0%	0.3%	1.0%	0.5%	1.0%	1.8%	1.3%	0.8%		2.6%	1.2%	1.0%	2.0%	0.8%	1.9%	0.4%	0.5%	0.1%	0.4%	0.7%	18.0%	
Wood Island	3	9	12	13	32	21	18	15		34	27	34	43	18	26	18	9	3	4	46	382	
	0.2%	0.5%	0.6%	0.7%	1.7%	1.1%	0.9%	0.8%		1.8%	1.4%	1.8%	2.2%	0.9%	1.3%	0.9%	0.5%	0.2%	0.2%	2.4%	19.7%	
Airport	11	44	135	61	175	99	95	82		164	66	73	135	49	153	52	63	18	32	149	1,645	
	0.2%	0.6%	1.9%	0.9%	2.5%	1.4%	1.3%	1.1%		2.3%	0.9%	1.0%	1.9%	0.7%	2.1%	0.7%	0.9%	0.3%	0.4%	2.1%	23.0%	
Maverick	9	28	127	87	217	115	115	98		210	137	93	213	78	149	81	61	23	22	182	2,036	
	0.1%	0.3%	1.4%	1.0%	2.4%	1.3%	1.3%	1.1%		2.4%	1.5%	1.0%	2.4%	0.9%	1.7%	0.9%	0.7%	0.3%	0.2%	2.0%	22.9%	
Aquarium	4	20	33	29	54	17	53	33		34	24	16	59	8	31	6	6	7	12	33	475	
	0.1%	0.4%	0.7%	0.6%	1.1%	0.4%	1.1%	0.7%		0.7%	0.5%	0.3%	1.2%	0.2%	0.7%	0.1%	0.1%	0.1%	0.3%	0.7%	10.0%	
State Blue																						
Govt Ctr Blue											46	34	136	48	75	32	24	13	21	76	505	
											1.7%	1.3%	5.0%	1.8%	2.8%	1.2%	0.9%	0.5%	0.8%	2.8%	18.7%	
Bowdoin	1	6	14	9	5	5				16	2	5	19	2	12	1	6	2	2	18	124	
	0.1%	0.4%	1.0%	0.6%	0.4%	0.4%				1.2%	0.1%	0.4%	1.4%	0.1%	0.9%	0.1%	0.4%	0.1%	0.1%	1.3%	8.9%	
Total Blue Line	38	156	480	272	644	467	460	363		822	514	433	930	329	697	261	245	94	130	654	7,951	
	0.1%	0.3%	1.0%	0.6%	1.4%	1.0%	1.0%	0.8%		1.8%	1.1%	0.9%	2.0%	0.7%	1.5%	0.6%	0.5%	0.2%	0.3%	1.4%	17.0%	
ENTRY STATION on SILVER LINE WATERFRONT																						
South Sta Silver																						
Courthouse	5	8	32	8	13	6	18	10		1	4	5	11	4	4	3	3	3	2	14	149	
	0.6%	0.9%	3.7%	0.9%	1.5%	0.7%	2.1%	1.2%		0.1%	0.5%	0.6%	1.3%	0.5%	0.5%	0.3%	0.3%	0.3%	0.2%	1.6%	17.2%	
World Trade	11	13	17	9	17	11	22	32		33	5	8	34	12	20	13	10	10	2	16	284	
	0.5%	0.6%	0.8%	0.4%	0.8%	0.5%	1.1%	1.5%		1.6%	0.2%	0.4%	1.6%	0.6%	1.0%	0.6%	0.5%	0.5%	0.1%	0.8%	13.6%	
Surface Silv. Wat.	25	32	73	32	48	23	41	87		78	30	18	59	50	57	32	53	9	5	46	773	
	0.4%	0.6%	1.3%	0.6%	0.9%	0.4%	0.7%	1.6%		1.4%	0.5%	0.3%	1.1%	0.9%	1.0%	0.6%	1.0%	0.2%	0.1%	0.8%	13.9%	
Total Silver Wat.	41	53	122	49	78	40	81	129		112	39	31	104	66	81	48	66	22	9	76	1,206	
	0.4%	0.5%	1.2%	0.5%	0.8%	0.4%	0.8%	1.3%		1.1%	0.4%	0.3%	1.0%	0.7%	0.8%	0.5%	0.7%	0.2%	0.1%	0.8%	12.1%	
Total All Lines	3,821	5,809	12,540	7,531	9,090	7,027	9,075	7,196		8,879	10,836	6,538	6,240	15,796	5,805	10,049	4,632	5,434	3,430	3,333	14,240	153,480
	0.7%	1.0%	2.1%	1.3%	1.6%	1.2%	1.6%	1.2%		1.5%	1.9%	1.1%	1.1%	2.7%	1.0%	1.7%	0.8%	0.9%	0.6%	0.6%	2.4%	26.2%

CharlieCard Trip Paths Pilot Study
Rapid Transit and Light Rail Station-to-Station Trip Tables
for Thursday, September 23, 2010

TABLE 16
BLUE LINE or SILVER LINE WATERFRONT to BLUE LINE or SILVER LINE WATERFRONT

	EXIT STATION on BLUE LINE or SILVER LINE WATERFRONT													Total Silver Waterfront	Total All Lines				
	Wonderland	Revere Beach	Beachmont	Suffolk Downs	Orient Heights	Wood Island	Airport	Maverick	Aquarium	State Blue	Govt Ctr Blue	Bowdoin	Total Blue Line			South Sta. Silver	Courthouse	World Trade Ctr	Surface Silver Wat
ENTRY STATION on BLUE LINE																			
Wonderland	0	50	74	20	67	25	168	160	472	863	427	280	2,606		3	5	28	36	5,308
	0.0%	0.9%	1.4%	0.4%	1.3%	0.5%	3.2%	3.0%	8.9%	16.3%	8.0%	5.3%	49.1%		0.1%	0.1%	0.5%	0.7%	100.0%
Revere Beach	45	0	108	32	96	48	150	169	163	268	173	66	1,318		1	4	12	17	2,984
	1.5%	0.0%	3.6%	1.1%	3.2%	1.6%	5.0%	5.7%	5.5%	9.0%	5.8%	2.2%	44.2%		0.0%	0.1%	0.4%	0.6%	100.0%
Beachmont	63	97	0	17	82	34	121	149	201	334	201	94	1,393		0	6	29	35	2,614
	2.4%	3.7%	0.0%	0.7%	3.1%	1.3%	4.6%	5.7%	7.7%	12.8%	7.7%	3.6%	53.3%		0.0%	0.2%	1.1%	1.3%	100.0%
Suffolk Downs	23	25	13	0	23	13	33	46	59	99	39	28	401		0	0	6	6	771
	3.0%	3.2%	1.7%	0.0%	3.0%	1.7%	4.3%	6.0%	7.7%	12.8%	5.1%	3.6%	52.0%		0.0%	0.0%	0.8%	0.8%	100.0%
Orient Heights	66	92	77	24	0	37	170	203	314	403	232	155	1,773		3	8	33	44	3,722
	1.8%	2.5%	2.1%	0.6%	0.0%	1.0%	4.6%	5.5%	8.4%	10.8%	6.2%	4.2%	47.6%		0.1%	0.2%	0.9%	1.2%	100.0%
Wood Island	24	50	34	12	36	0	33	80	173	239	102	65	848		0	2	10	12	1,938
	1.2%	2.6%	1.8%	0.6%	1.9%	0.0%	1.7%	4.1%	8.9%	12.3%	5.3%	3.4%	43.8%		0.0%	0.1%	0.5%	0.6%	100.0%
Airport	206	203	167	48	213	43	0	182	611	581	349	98	2,701		11	15	87	113	7,140
	2.9%	2.8%	2.3%	0.7%	3.0%	0.6%	0.0%	2.5%	8.6%	8.1%	4.9%	1.4%	37.8%		0.2%	0.2%	1.2%	1.6%	100.0%
Maverick	132	164	161	48	231	83	139	0	752	939	475	167	3,291		9	17	46	72	8,905
	1.5%	1.8%	1.8%	0.5%	2.6%	0.9%	1.6%	0.0%	8.4%	10.5%	5.3%	1.9%	37.0%		0.1%	0.2%	0.5%	0.8%	100.0%
Aquarium	449	192	229	63	337	177	619	848	0	79	64	29	3,086		1	10	25	36	4,734
	9.5%	4.1%	4.8%	1.3%	7.1%	3.7%	13.1%	17.9%	0.0%	1.7%	1.4%	0.6%	65.2%		0.0%	0.2%	0.5%	0.8%	100.0%
State Blue	825	312	361	99	436	260	580	1,071	84	0	61	14	4,103						4,695
	17.6%	6.6%	7.7%	2.1%	9.3%	5.5%	12.4%	22.8%	1.8%	0.0%	1.3%	0.3%	87.4%						100.0%
Govt Ctr Blue	422	202	205	42	237	121	320	517	49	63	0	22	2,200						2,705
	15.6%	7.5%	7.6%	1.6%	8.8%	4.5%	11.8%	19.1%	1.8%	2.3%	0.0%	0.8%	81.3%						100.0%
Bowdoin	268	79	97	31	156	63	103	193	32	19	20	0	1,061		0	1	1	2	1,388
	19.3%	5.7%	7.0%	2.2%	11.2%	4.5%	7.4%	13.9%	2.3%	1.4%	1.4%	0.0%	76.4%		0.0%	0.1%	0.1%	0.1%	100.0%
Total Blue Line	2,523	1,466	1,526	436	1,914	904	2,436	3,618	2,910	3,887	2,143	1,018	24,781	28	68	277	373	46,904	
	5.4%	3.1%	3.3%	0.9%	4.1%	1.9%	5.2%	7.7%	6.2%	8.3%	4.6%	2.2%	52.8%	0.1%	0.1%	0.6%	0.8%	100.0%	
ENTRY STATION on SILVER LINE WATERFRONT																			
South Sta Silver														0	126	647	638	1,411	1,411
														0.0%	8.9%	45.9%	45.2%	100.0%	100.0%
Courthouse	3	2	0	0	4	0	7	5	1			0	22	115	0	8	35	158	868
	0.3%	0.2%	0.0%	0.0%	0.5%	0.0%	0.8%	0.6%	0.1%			0.0%	2.5%	13.2%	0.0%	0.9%	4.0%	18.2%	100.0%
World Trade	5	5	3	0	8	1	27	23	14			1	87	570	5	0	94	669	2,094
	0.2%	0.2%	0.1%	0.0%	0.4%	0.0%	1.3%	1.1%	0.7%			0.0%	4.2%	27.2%	0.2%	0.0%	4.5%	31.9%	100.0%
Surface Silv. Wat.	25	16	27	7	37	11	112	73	30			2	340	1021	46	178	379	1,624	5,564
	0.4%	0.3%	0.5%	0.1%	0.7%	0.2%	2.0%	1.3%	0.5%			0.0%	6.1%	18.4%	0.8%	3.2%	6.8%	29.2%	100.0%
Total Silver Wat.	33	23	30	7	49	12	146	101	45			3	449	1,706	177	833	1,146	3,862	9,937
	0.3%	0.2%	0.3%	0.1%	0.5%	0.1%	1.5%	1.0%	0.5%			0.0%	4.5%	17.2%	1.8%	8.4%	11.5%	38.9%	100.0%
Total All Lines	5,060	3,203	2,792	815	3,945	1,997	6,460	9,815	4,812	4,703	2,798	1,367	47,767	1,706	903	2,140	3,739	8,488	584,816
	0.9%	0.5%	0.5%	0.1%	0.7%	0.3%	1.1%	1.7%	0.8%	0.8%	0.5%	0.2%	8.2%	0.3%	0.2%	0.4%	0.6%	1.5%	100.0%