MBTA Youth Pass Pilot Evaluation

Preliminary Report

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ABSTRACT

The Youth Pass Pilot has increased transit access for primarily low-income and minority youth allowing them access to recreational opportunities, work, school, and medical appointments they would not have had otherwise. Participants are 93% minority and 73% low-income and their MBTA usage on average increased approximately 30%. Participants report that without the Youth Pass they would have still taken 60% of their trips on the MBTA, but 13% of their trips they would have been unable to make. Three-quarters of the applicants for the Youth Pass are eligible for the existing MBTA reduced fare Student Pass, but unable to access it due to their school not offering it or the limitations on summer months.

Due to low participation the pilot is having minimum impacts on the MBTA revenues or service. Data does suggest it is reducing payments in cash onboard vehicles. The collaborative partnership with municipalities has yielded an auditable reduced fare program with limited administrative impact for the MBTA. However, there is a high burden on the municipal partners due to the cash handling; the recommendation to continue the program past a pilot would be to put payment for the pass on the MBTA fare vending machines.

The pilot has provided data to measure the preliminary impacts of the pilot, but the estimates for the full program range widely based on assumptions of municipal opt-in and participation rates by eligible youth. The conservative cost estimate of all interested and eligible youth participating ranges from $2.2- $5 million in net lost program revenue. These estimates also include the cost of effectively increasing the access to the existing Student Pass.

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Chapter 1—Youth Pass Pilot Program Background

The Massachusetts Bay Transportation Authority (MBTA) is currently conducting a pilot program for a Youth Pass, a new reduced-fare product that complements the existing Student Pass. The existing Student Pass provides unlimited travel on MBTA rapid transit and buses for $26 per month for middle and high school students, but access to the Student Pass is limited by the following factors:

- Boston Public Schools subsidizes the pass only for the students who meet the minimum-distance-from-school requirement.
- Many other schools in the MBTA service area do not distribute Student Passes (either subsidized or for sale) to their students.
- The Student Pass is available only to currently enrolled full-time students, which excludes youth who are enrolled in alternative education programs.
- Most students cannot obtain reduced-fare passes during the summer months.

In order to explore ways to address some of these barriers, the MBTA, along with community stakeholders and municipal partners, developed a Youth Pass Pilot program. The Youth Pass pilot program was designed to test the feasibility of implementing a full youth pass program, which would provide all eligible youth in participating municipalities with equal access to a reduced-fare product and close some of the access gaps in the current Student Pass program. This program also pilots providing the same reduced fare pass to young people 19 to 21 years old who are either enrolled in an alternative education program or satisfy a means test. This pilot program was approved by the MBTA / MassDOT Board of Directors in December 2014 and officially launched in July 2015, with the intention of running for one year.

1.1 MBTA and Partner Collaboration

The Youth Pass Pilot is the result of a multi-year campaign by youth transportation advocates. In the summer of 2014, the leadership of MBTA / MassDOT created a Youth Pass Working Group with members of the advocacy community to develop the details of a pilot program. The pilot was approved by the MBTA / MassDOT Board, along with a pilot for a University Pass program, in December 2014. Four municipalities agreed to participate in the pilot: Boston, Chelsea, Malden and Somerville (with a non-profit serving as the implementing agency in Chelsea). The details of the program were developed through a collaborative effort between the MBTA and the municipal partners. Each implementing agency signed a Memorandum of Understanding with the MBTA and agreed to follow the rules for the program laid out in a policy handbook written by the MBTA. Since the program launched on July 1, 2015 the MBTA and the municipal partners have met monthly to review the program's progress.

1.2 Youth Pass Pilot Program

The Youth Pass Pilot program is limited to 1,500 participants between the ages of 12 and 21 in the cities of Boston, Chelsea, Malden, and Somerville, which serve as municipal partners in administering the program. For the pilot program, all individuals ages 12 through 18 who live in participating municipalities are eligible, and individuals 19 to 21 years old are eligible if they meet needs-based criteria by demonstrating one or more of the following: enrollment in high school, a GED program, or another education program; a job training program; a state or federal public benefit program (such as SNAP, WIC, TAFDC, public housing or other assistance programs); or Mass Health. Youth who are accepted into the pilot program can purchase a Youth Pass product through their local municipal partner organization. The Youth Pass functions like a LinkPass (providing unlimited travel on MBTA local bus and subway), but is branded as a Youth Pass and is sold at the Student Pass price of $26 monthly, or $7 for a 7-day validity pass.

The Youth Pass Pilot was designed to meet the following major goals:

- Create affordable transit access for pilot participants.
- Provide the data required to assess the impact of a Youth Pass on the mobility of youth and their engagement in civic and community activities.
- Have a limited impact on the MBTA's revenue.
- Provide the data required to estimate the impact of a permanent Youth Pass program on MBTA fare revenue and service delivery.
- Assess whether municipal partners can distribute reduced fare MBTA passes in an audit-proof manner that minimizes the MBTA administrative burden.

Municipal partners were responsible for the following aspects of the program:

- Recruiting participants.
- Receiving enrollment forms and verifying eligibility for the program (including the collection of required documents).
- Taking photos and producing the Youth Pass cards using card printers provided by the MBTA. The Youth Pass Card is a picture ID printed on a blank Charlie Card with its own unique design.
- Administering surveys to participants.
- Collecting payment from participants for passes each month (or week, if applicable) and using MBTA-provided retail sales terminals (RSTs) to add the appropriate product onto the pass.
- Administering the program in a way that could be tracked and audited.
- Providing language assistance, including interpretation and translation of materials into languages other than English, based on the needs of their

community and consistent with the protocols identified in the MBTA's Limited English Proficiency Plan.

The MBTA and the partners worked together to market the Youth Pass pilot, and sign-up is ongoing. Youth who are interested in participating in the program can apply via an online form on the MBTA website. During the initial application period, waiting lists were established because the number of applicants exceeded the number of available pilot slots in some municipalities. All applicants have been given a chance to participate after these initial waiting lists were cleared.

Youth from the applicant pool are contacted by the partner agency to arrange a time to enroll. The enrollment process includes determining eligibility, taking an intake survey, filling out a permission form allowing the MBTA to anonymously track their trips, and receiving a CharlieCard without value to use to gather 30 days of pre-participation data (participants must add value to the card during the first 30 days). After 30 days, the participant can return and have their picture taken for a Youth Pass card. Once they have completed this process, participants can purchase a monthly or weekly Youth Pass (depending on availability at each partner). Participants must fill out a survey each month when they return to purchase the pass.

1.3 Pilot Evaluation

The proposal for the Youth Pass Pilot, passed by the MBTA/MassDOT Board of Directors, identified research questions the pilot was designed to answer. This report provides a mid-program evaluation of these questions, focusing on three main areas: the benefits of the program to the participants, the costs of the program to the MBTA, and the administrative feasibility of the program model.

1. ***Impacts on Youth Riders***

   a. Does the Youth Pass increase use of public transit and access to opportunities for program participants?
   b. Does the Youth Pass change youth riders' attitudes toward the MBTA and public transit?

2. Impacts on the MBTA

   a. What is the impact of the Youth Pass program on MBTA fare revenues?
   b. Does increased ridership from the Youth pass result in violations of MBTA service standards? In particular, does the Youth Pass program result in additional trips taken during peak ridership periods?
   c. Does the Youth Pass improve MBTA service by decreasing cash handling, conflict with MBTA employees, and fare evasion?

3. Administrative Feasibility

a. What are the administrative costs of the pilot program to the MBTA?
b. What are the administrative costs to the municipal partners, and is it sustainable?
c. Does the pilot create a procedure that is audit-proof, limits fraud, and is able to be replicated?

While this report includes the information collected up to this point, the MBTA is continuing to collect data to answer these questions. Much of the data is coming from the participants, either from surveys or from the Automated Fare Collection (AFC) system records of their transit usage. A full list of the data sources used for this report is in Appendix 1. The analysis of the data is being done by MBTA staff and the Central Transportation Planning Staff (CTPS).

This report is paired with a Title VI fare equity analysis that is required by the Federal Transit Administration for the pilot to proceed beyond six months, as planned. A final program evaluation report will be prepared after the conclusion of the pilot program.

Chapter 2—Pilot Impacts on Youth Riders

This chapter presents an overview of Youth Pass participants' characteristics and usage and then addresses the impact of the Youth Pass on pilot participants.

2.1 Applicant Pool Characteristics

Tables 2-1, 2-2, and 2-3 provide data on the number of participants from each municipality and within each reported age group, and their reported usage of the Student Monthly LinkPasses and Student Stored Value cards.[1] This data is taken from applications received as of September 1, 2015, which show a total count of 3,817 applicants. While applications continue to be accepted and processed, anyone who had *not* applied by September 1 was unlikely to have received and used a Youth Pass by the time the usage data was gathered for this report. Therefore, September 1 was chosen as a cutoff date.

Tables 2-1 and 2-2 show that most applicants reported that they live in Boston (approximately 78 percent), and most were in the 13-to-18-year-old age group (approximately 77 percent). Approximately half of 13-to-18-year-old applicants and approximately 20 percent of 19-to-21-year-old applicants reported using Student Monthly LinkPasses; fewer in each group reported using Student Stored Value CharlieCards.

TABLE 2-1
Pilot Program Applicants
by Reported Municipality and Age Group

City	13-18 Years Old	19-21 Years Old	Total
Boston	2,295	700	2,995
Chelsea	310	49	359
Malden	237	77	314
Somerville	97	52	149
Grand Total	**2,939**	**878**	**3,817**

Data source: MBTA

[1] The MBTA was restricted by law from collecting data on youth ages 12 and under as part of the pilot program.

TABLE 2-2
Student Fare Media used by Pilot Program Applicants

Age of Applicant in Years	Number Reported Paying with Monthly Student Pass	Percentage Reported Paying with Monthly Student Pass	Number Reported Paying with Student Stored-Value	Percentage Reported Paying with Student Stored-Value	Number Reported Paying with Student Stored-Value or Pass	Percentage Reported Paying with Student Stored-Value or Pass
13-18	1,457	49.6%	591	20.1%	1,999	68.0%
19-21	141	16.1%	52	5.9%	191	21.8%

Data source: MBTA

TABLE 2-3
School Enrollment by Pilot Program Applicants

Age Of Applicant	Enrolled in Middle/High School	Total Applicants	Percentage of Applicants in School
13-18 years old	2,714	2,939	92.3%
19-21 years old	223	878	25.4%
All Ages	2397	2,817	76.9%

Data source: MBTA

Table 2-3 above indicates that while nearly 77 percent of the applicants are in school and thus eligible for the Student Pass, 57 percent of applicants reported paying with either student fare product. This suggests barriers or problems with distribution of the student fare products.

Based on the data, we believe that the applicants using the Monthly Student Pass mostly applied to the program to get a Youth Pass for the summer months, when they do not have access to a Student Pass. This was particularly an issue in the City of Boston where there was a large turnover of Youth Pass users when school started.

The applicants using the Student Stored Value card meet the eligibility requirements for the Student Pass, but likely have no easy method to obtain one. For example, Malden High School provides students with Student Stored Value cards, but no method to purchase the Student Pass.

2.2 Youth Pass Rider Characteristics

Pilot Participation Rates

For this preliminary report, the MBTA and CTPS reviewed data from the pilot program from the end of June through October 2015.[2] As of September 1, 3,817 people had applied for the program. Of these, 792 had taken an enrollment survey by September 1. For the period between the end of June and the end of October, CTPS identified 676 individual serial numbers associated with Youth Pass purchases according to data from the Retail Sales Terminals (RSTs) provided to participating municipalities[3]. The drop in these numbers likely reflects the multiple steps needed and time taken for participants to enroll in the program and receive a pass.

The MBTA and CTPS reviewed usage data from the MBTAs Automated Fare Collection (AFC) system for Youth Pass participants for the period between the end of June and the end of October, and identified 496 individuals who had purchased passes. [4]

This is a subset of the total number of individuals who had purchased passes according to the RST data. This highlights a data collection issue that will be addressed in future months of the pilot program. For this preliminary report, CTPS used the application and pass usage data available for the 496 participants shown in the AFC data as a basis for making inferences about the larger population of individuals who had purchased passes according to the RST data (676).

Table 2-4 shows these individuals by their age and school enrollment status. As shown approximately 75 percent of the individuals in the AFC data that used a Youth Pass between July and October 2015 are between 13 and 18 years old, while the remaining 25 percent are between 19 and 21 years old. Most are between 13 and 18 years old and are enrolled in school (70 percent). Youth who are 19 to 21 years old and are not enrolled in school make up the next largest subcategory of Youth Pass users (19 percent).

[2] Though the Youth Pass program officially started on July, 1, 2015, some 7-Day Youth Passes were active and in use during the last several days of June 2015.

[3] This amount likely approximates the number of individuals who are participating in the pilot program, although it may be a slight overestimate of total participants, as some individuals received replacement Youth Passes and thus would have two or more serial numbers in the system.

[4] This information is based on data provided by the MBTA on December 3, 2015. There were a total of 525 individuals who used a Youth Pass between July and October 2015; however, 29 individuals were removed from the data set because their application forms listed incomplete, invalid, or conflicting information relating to factors analyzed in this preliminary report.

TABLE 2-4
School Enrollment and Age Characteristics
of Youth Pass Participants in AFC Data (Through October 31)

School Enrollment	13-18 Years Old	Percentage of All Youth Pass Users	19-21 Years Old	Percentage of All Youth Pass Users	All Youth Pass Users
Middle School	29	5.8%	0	0.0%	29
High School	319	64.3%	33	6.7%	352
Not Enrolled in School	21	4.2%	94	19.0%	115
Total	**369**	**74.4%**	**127**	**25.6%**	**496**

Data source: MBTA

The results in Table 2-4 also show that the sample sizes in some of these age- and school-enrollment categories are small. To increase sample sizes for analysis and estimation purposes, the MBTA and CTPS examined Youth Pass user behavior according to whether or not a participant was in school. Table 2-5 shows the shares of Youth Pass participants in the AFC data by whether or not they were enrolled in school.

TABLE 2-5
Youth Pass Participants in AFC Data,
by School Enrollment Category (July through October)

School Enrollment	Number of Participants (AFC data)	Percentage of Participants (AFC data)
Enrolled in School	381	76.8%
Not Enrolled in School	115	23.2%
Total	**496**	**100.0%**

Table 2-6 shows the number of individuals in the AFC data who purchased a Youth Pass during each month, organized by school enrollment.

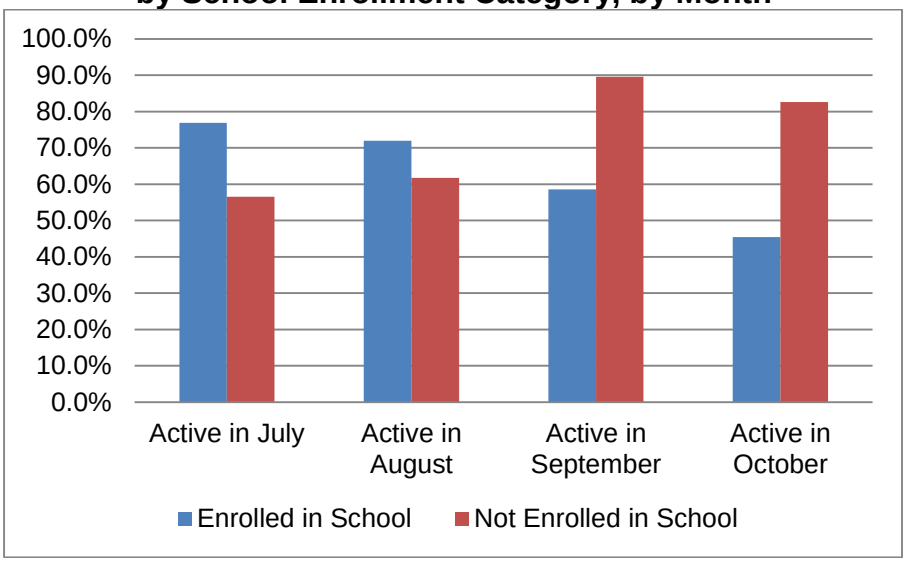
TABLE 2-6
Active Youth-Pass Users in AFC Data, by month

Youth Pass User Category	Active in July	Active in August	Active in September	Active in October	Total Participants in Category
Enrolled in School	293	274	223	173	381
Not Enrolled in School	65	71	103	95	115
Total	**358**	**345**	**326**	**268**	**496**

As shown in Table 2-6 the levels of participation in the Youth Pass program are generally higher in the summer than during the school year. In September and October, a number of the participants who were enrolled in school may have been able to take advantage of student passes (which cost the same as the Youth Pass), or reduced single-ride fares for students, and thus no longer found it advantageous to obtain a Youth Pass.

Figure 2-1 shows the percentage of each category of participants that were active during each month.

FIGURE 2-1
Percentage of Active Youth Pass Users by School Enrollment Category, by Month



Data source: MBTA

For all students, participation in the pilot program peaked in July (approximately 78 percent) and steadily decreased through October. Non-student participation increased in the later months of the pilot. For participants who were not enrolled in school, participation peaked in September at nearly 90 percent.

2.3 Youth Riders' Use of Public Transit

Pre-Pilot Data

As discussed in Chapter 1, pre-pilot trip data was collected for a month before participating youth received a Youth Pass. This pre-pilot data enables the MBTA and CTPS to examine the travel behavior and transit fare purchases made by youth before they participated in the Youth Pass pilot program and compare it to their travel behavior in the program. The participants who began using a Youth Pass in July provided pre-pilot data during the month of June, while those who began participating after July provided their data during the month before they received the Youth Pass. Table 2-7 describes the number of people who provided pre-pilot data during each month between June and October, 2015.

TABLE 2-7
Number of Youth Providing Pre-Pilot Data, by Month and Category

Pre-Pilot Participant Category	June	July	August	September	October	All Months
13-18, Enrolled in School	272	32	30	28	3	356
13-18, Not Enrolled in School	11	1	1	9	2	22
19-21, Enrolled in School	18	8	9	1	0	33
19-21, Not Enrolled in School	46	20	25	5	1	94
Total	**347**	**61**	**65**	**43**	**6**	**505**

Data source: MBTA

When individuals providing pre-pilot data are sorted by age and school enrollment, it becomes apparent that some months have very few people that fall into particular age-and-school-enrollment categories. These samples may be too small to represent the pre-pilot travel behavior for particular category of pre-pilot participants. CTPS aggregated these categories such that pre-pilot participants are organized only by school-enrollment status, as shown in Table 2-8. These aggregated categories create

larger samples of participants, which may better represent the travel behavior for youth enrolled in school, and those not enrolled in school.

TABLE 2-8
Number of Youth Providing Pre-Pilot Data, by Month and Category

Pre-Pilot Participant Category	June	July	August	September	October	All Months
Enrolled in School	290	40	39	29	3	389
Not Enrolled in School	57	21	26	14	3	116
Total	**347**	**61**	**65**	**43**	**6**	**505**

Data source: MBTA

TABLE 2-9
Number of Participants in the Pre-Pilot Data Sets, by Category and Analysis Month

Participant Category	School Month (June)	Composite Summer Month
Enrolled in School	290	76
Not Enrolled in School	57	47
Total	**347**	**123**

Data source: MBTA

As shown in Table 2-8, June has the largest number of participants providing pre-pilot data. The number of people providing pre-data during a given month decreases significantly starting in July, which makes it challenging to examine youth pre-pilot travel behavior at other points in the calendar year.

To make comparisons between Youth Pass data and pre-pilot data for school year and summer months, and to maximize the available pre-pilot data, CTPS established "model" months of pre-pilot data to represent months during the school year or during the summer. CTPS selected June 2015 to represent youth pre-pilot travel behavior during the school year. While June may be a somewhat atypical school month, this month was richer in data than September or October. CTPS also created a composite summer month of data by using one month of data for youth who provided pre-data

during July and / or August. Table 2-9 describes the number of participants, by school enrollment category, during these model school and composite summer months.

Youth Pass Data

CTPS analyzed the average number of trips made by youth each month for school and summer months. Comparisons between Youth Pass data and pre-pilot data show that in general, Youth Pass participants increased their ridership once they received the pass.

Table 2-10 describes the average number of unlinked trips that youth made during a school month, according to June 2015 pre-pilot data, and youth pass pilot program data (average number of trips per month for September and October).[5] This table shows the net difference and percentage change in the average number of monthly trips across the two data sets.

TABLE 2-10
Average Unlinked Trips per Month for School Months

Participant Category	Pre-Data: School Month	Youth Pass: School Month	Change (Total)	Change (Percentage)
Enrolled in School	49	55	6	+12%
Not Enrolled in School	36	69	33	+92%
Total	**47**	**60**	**13**	**+28%**

Participants who are not enrolled in school show the largest increase in average unlinked trips per month when the pre-pilot data and Youth Pass pilot program data are compared. In an average school month, out-of-school participants make an additional 33 unlinked trips, or an increase of 92 percent. Prior to the Youth Pass pilot program, on average, these individuals were making fewer trips per school month than those who were enrolled in school, and they are making more trips per month on average than youth enrolled in school once they are in the pilot program.

Table 2-11 describes the average unlinked trips per month that youth made during a summer month, according to the pre-pilot data and youth pass pilot program data (average number of trips per month, averaged over July and August). This table shows the net difference and percentage change in the average number of monthly trips across the two data sets.

[5] An unlinked trip is an individual trip on any single transit vehicle; a single journey, often composed of many unlinked trips on multiple vehicles, is a “linked” trip.

TABLE 2-11
Average Unlinked Trips per Month for Summer Months

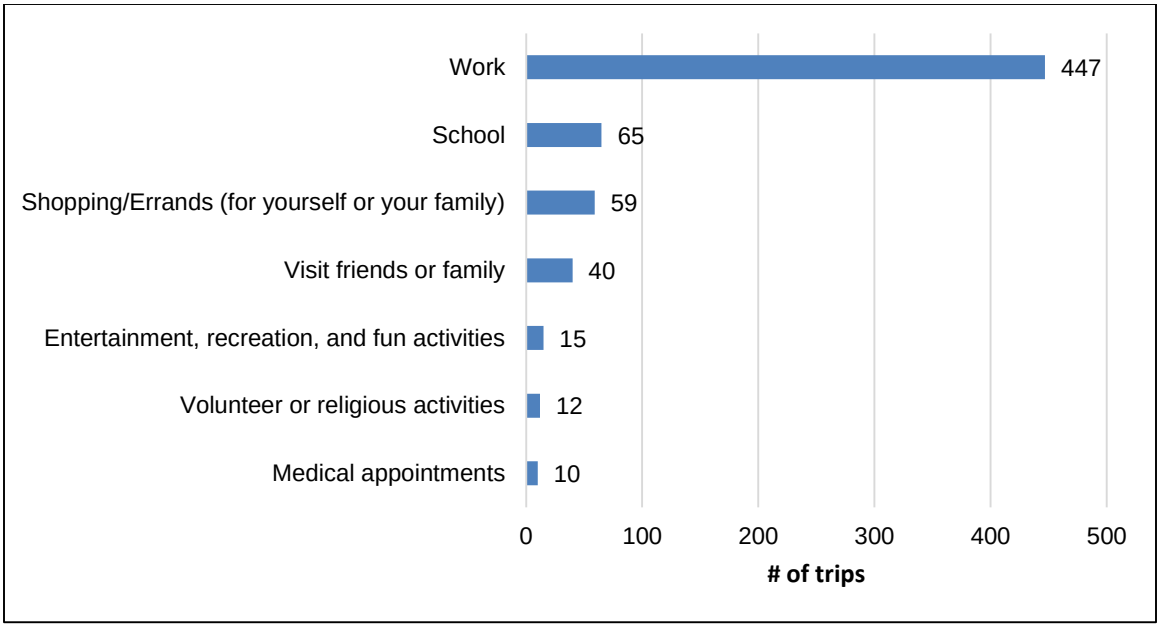
Participant Category	Pre-Data: Summer Month	Youth Pass: Summer Month	Change (Total)	Change (Percentage)
Enrolled in School	23	49	25	+104%
Not Enrolled in School	40	55	14	+34%
Total	**31**	**50**	**19**	**+61%**

Participants who are enrolled in school have the largest increase in average monthly unlinked trips in a typical summer month, when the pre-pilot data and Youth Pass pilot program data are compared. In an average summer month, in-school participants make an additional 25 unlinked trips, or an increase of 104 percent, moving from the pre-pilot into the pilot program.

2.4 Trip Purpose and Potential Foregone Trips

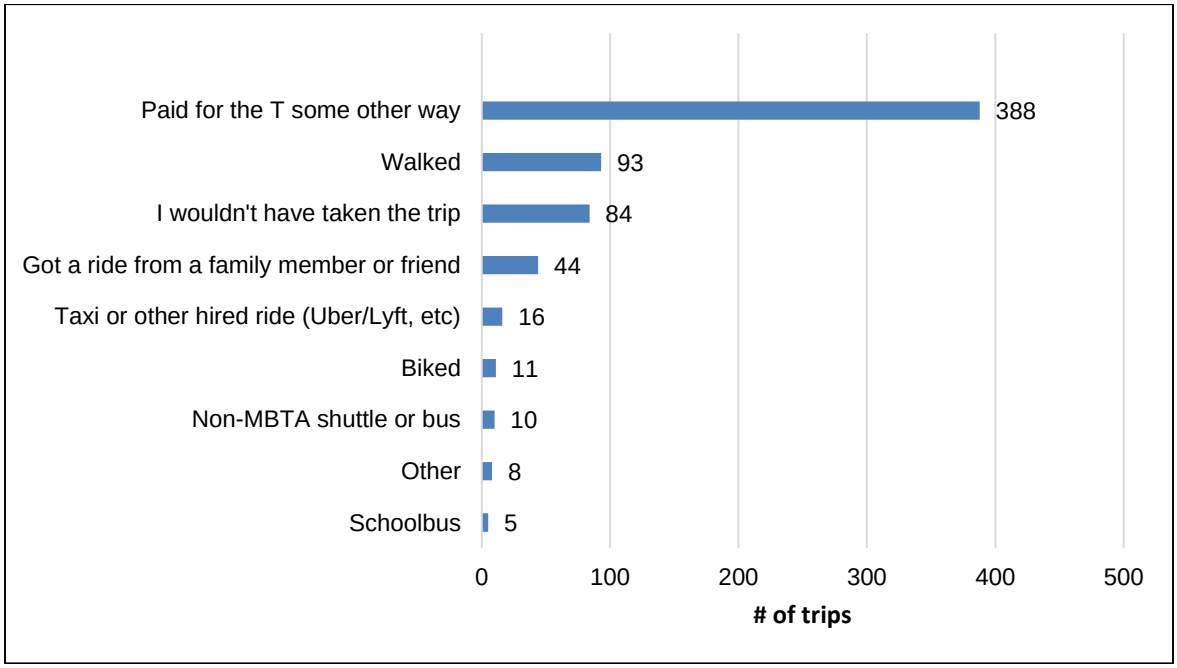
The MBTA conducted monthly surveys of Youth Pass participants to measure the impact of the program. Each month, participants were asked questions about all of the trips they took on the day prior to the day they received the survey. Participants were asked to describe the purposes of these trips and how they would have made the trips (or whether they would have made them) if they did not have a Youth Pass. The results of these surveys for one summer month (July) and one month during the school year (September) are displayed in Figures 2-2 through 2-5. It should be noted that since respondents were asked about the previous day, the trips in question nearly all took place from Sunday through Thursday.

FIGURE 2-2
Purpose of Trips Taken during July 2015, All Municipalities



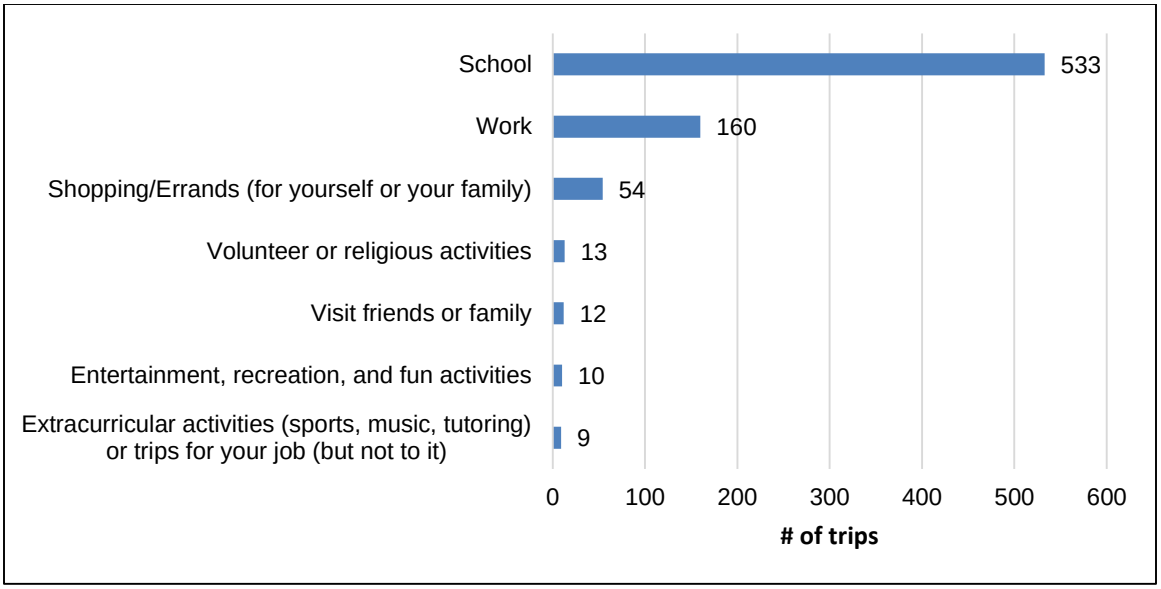
Data source: MBTA

FIGURE 2-3
Participants' Responses to the Question
"Without a Youth Pass, how would you have made the trip?" (July 2015)



Data source: MBTA

FIGURE 2-4
Purpose of Trips taken during September 2015, All Municipalities



Data source: MBTA

FIGURE 2-5
Participant Responses to the Question
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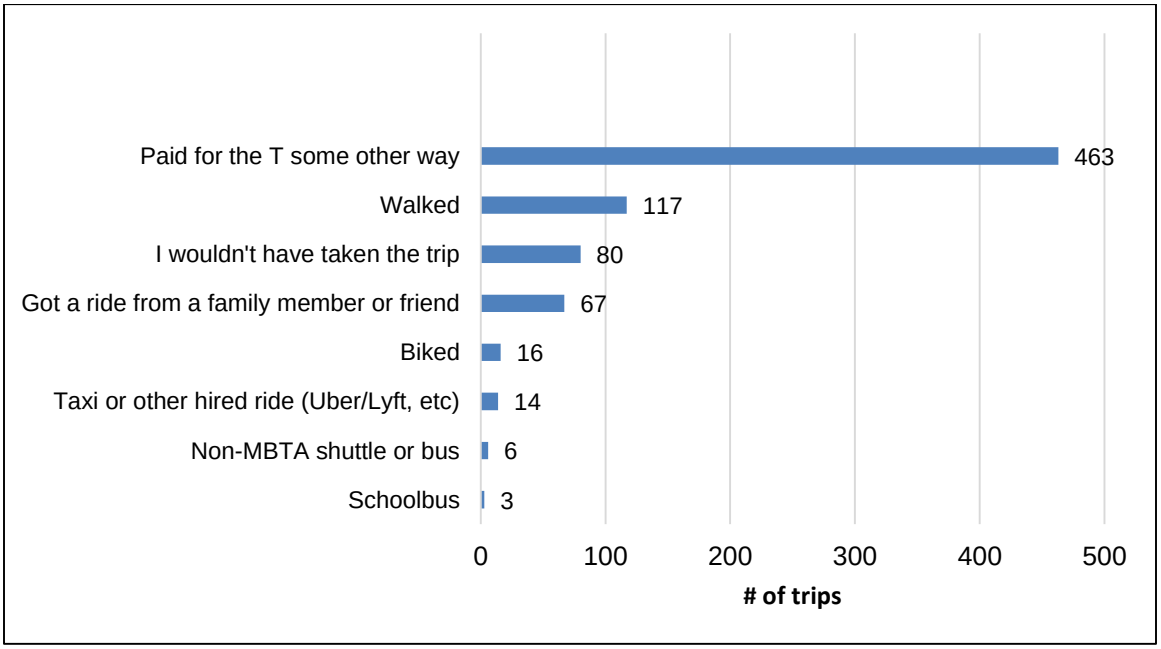


Data source: MBTA

As Figures 2-2 and 2-4 show, the vast majority of trips among participants were either to or from work or school, depending on the season. These two categories accounted for 79 percent of the trips in July, and 88 percent of the trips in September. The Shopping/Errands category accounted for the next largest portion of trips in both months. More trips to visit friends and family occurred during July.

The majority of participants responded that they would have paid to ride the MBTA system another way if they did not have a Youth Pass (59 percent of the July respondents and 60 percent of the September respondents, shown in Figures 2-3 and 2-5). Fourteen percent of the July respondents said they would have walked if they did not have the Youth Pass, compared to 25 percent in September. Finally, 13 percent of respondents in July and just over 10 percent in September responded that they wouldn't have made the trip at all without a Youth Pass.

In surveys administered between July and October, 2015, participants responded that they would have foregone 12 percent of their reported trips if they did not have a Youth Pass. Conversely, they would have found another way to make 88 percent of those trips, primarily by paying another way to ride the transit system. Although the surveys did not ask the reason why participants would forego making trips using the MBTA, it is likely because of their cost. Table 2-12 shows the percent of trips that survey respondents *would not* have taken, by type of trip. The largest share of these trips would have been for entertainment, recreation and fun activities (24 percent). Twenty-one percent of these trips would have been for shopping or errands, 14 percent would have been to visit friends or family, and 10 percent of these trips would have been for work.

TABLE 2-12
Trips Survey Respondents Would Not Have Taken without a Youth Pass

Trip Purpose	Percent of Trips Foregone without Youth Pass
Entertainment, recreation, and fun activities	23.9%
Extracurricular activities (sports, music, tutoring) or trips for your job (but not to it)	9.1%
Medical appointments	6.9%
School	7.8%
Shopping/Errands (for yourself or your family)	21.0%
Visit friends or family	14.3%
Volunteer or religious activities	0.0%
Work	10.4%
Total Trips Foregone	**13.3%**

Data source: MBTA

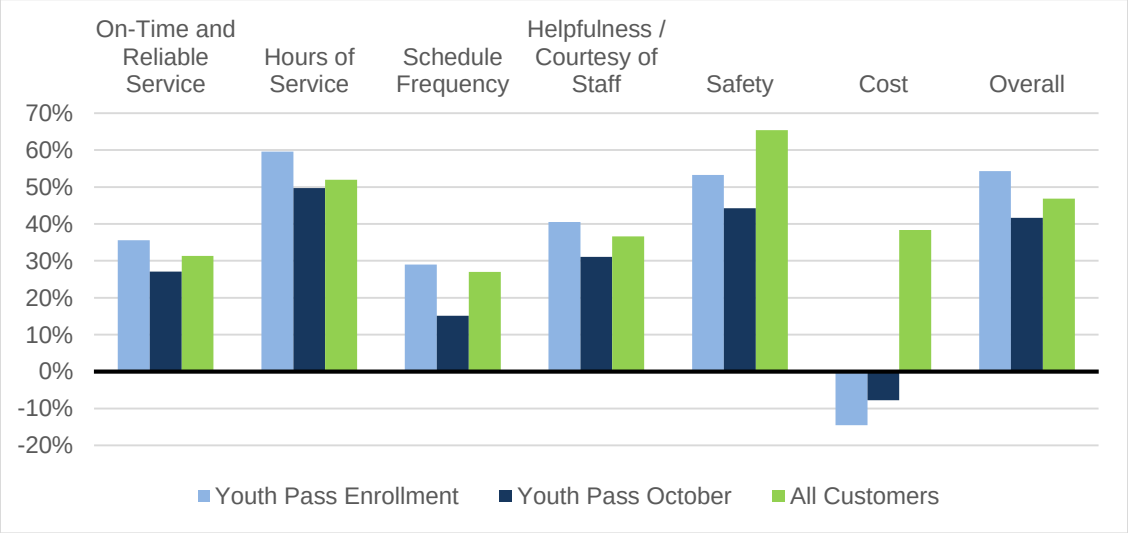
These preliminary results indicate that the Youth Pass is increasing young people's mobility. As expected, transit usage increases with a reduced fare pass. The first four months of Youth Pass data show an average of a 30 percent increase in the number of trips for all participants. The survey results show that without a Youth Pass approximately 42% of trips would not have been taken on the MBTA, and 13% of trips would not have been taken at all.

2.5 Youth Riders' Attitudes about the MBTA and Public Transit

One objective of the Youth Pass Pilot research is to determine whether or not the availability of the Youth Pass changes participants' attitudes towards the MBTA and public transit. To gather information on this, the MBTA surveyed Youth Pass participants regarding their level of satisfaction with the MBTA, both overall and in specific categories. Participants were asked to complete these surveys when they enrolled in the pilot program (the month may vary by participant) and then again in October. The questions in these surveys matched those that were asked of all MBTA riders during a system-wide customer satisfaction survey from earlier in 2015.

The responses to these survey questions are shown in Figures 2-6. This figure shows the net satisfaction for each category for three datasets: Youth Pass participants at the time of enrollment, Youth Pass participants in October, and all MBTA customers from the system-wide customer satisfaction survey. The net satisfaction rating is determined by subtracting the percentage of respondents answering below neutral satisfaction (1, 2, or 3) from the percentage answering better than neutral satisfaction (5, 6, or 7).

FIGURE 2-6
Net Satisfaction with Various Aspects of MBTA Service



Youth Pass enrollees tended to have a more favorable opinion of the MBTA than respondents to the 2015 system-wide customer satisfaction survey, except in the “cost” and “safety” categories. Youth Pass participants were slightly less satisfied with safety on the MBTA than all passengers, but the vast majority still responded positively. When asked to rate their satisfaction with the MBTA’s cost, Youth Pass participants’ responses differed greatly from the survey of all passengers. In fact, the majority of Youth Pass participants rated their satisfaction with the MBTA’s cost as negative, which was the only negative response in either group of respondents.

Satisfaction with the MBTA decreased slightly among Youth Pass participants during the course of the pilot, with the exception of the “cost” category. That said, the two surveys do not provide a perfect comparison, as not everyone who took the first survey remained in the program long enough to participate in the second survey, or even completed the requirements to obtain a Youth Pass.

As might be expected, Youth Pass respondents’ satisfaction with the MBTA’s cost improved during the pilot; however, this category was still rated poorly. This could be due to the way the question was asked. Respondents were not told to assume that the Youth Pass Pilot would continue when answering the second survey, so some respondents could have answered this question thinking that the program would be ending.

Data collection will continue on the topic. It is possible that as use of the MBTA services increases, satisfaction with the MBTA will decrease. This effect appeared in the 2015 system-wide customer satisfaction survey, with regular users expressing less satisfaction than people who use the system less frequently.

Chapter 3—Pilot Impacts on the MBTA

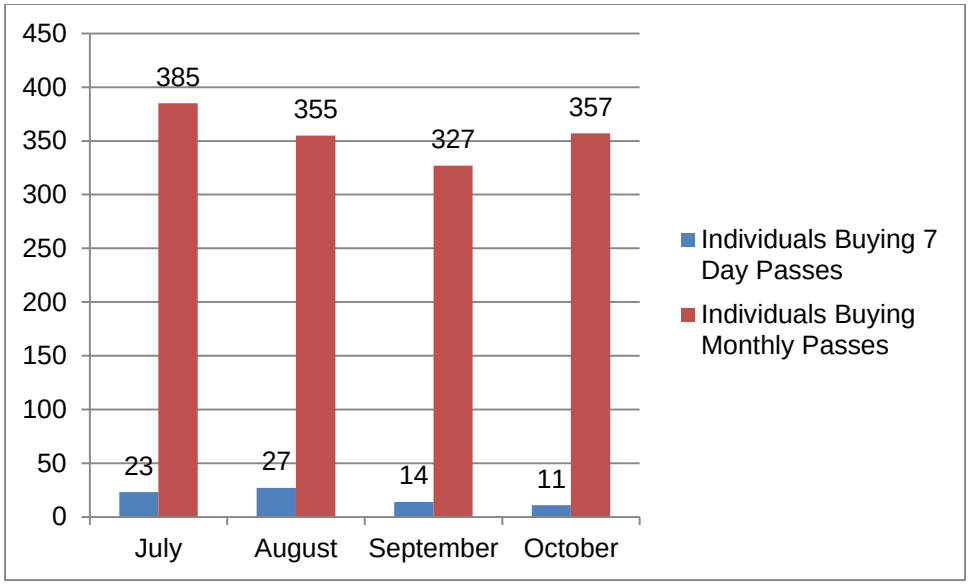
3.1 Impacts on MBTA Fare Revenues

Youth Pass Use Profile

During each month of the pilot, participants could purchase a monthly Youth Pass ($26) or one or more 7-Day Youth Passes ($7 each). Availability of the 7-day pass depended on the municipal partner; it is not offered by the City of the Boston. As mentioned in Chapter 2, CTPS estimated the number of individuals that purchased passes of each type during a given month based on the number of unique serial numbers that appeared in the Retail Sales Terminal (RST) output data.

Figure 3-1 shows the estimated number of youth that purchased 7-Day Youth Passes and monthly Youth Passes during each month from July through October.

FIGURE 3-1
Individuals who purchased 7-Day or Monthly Youth Passes, by Month (RST Data)



Data source: MBTA
Note: The number of individuals who purchased 7-Day passes in July includes one person who purchased a 7-Day pass in June only.

The majority of Youth Pass participants purchased monthly passes. During each of the pilot months, less than 10 percent of youths making trips with their Youth Pass had purchased one or more 7-Day Youth Passes. Those who did purchase 7-Day passes varied in the number of 7-Day passes that they chose to purchase in a month, but for all

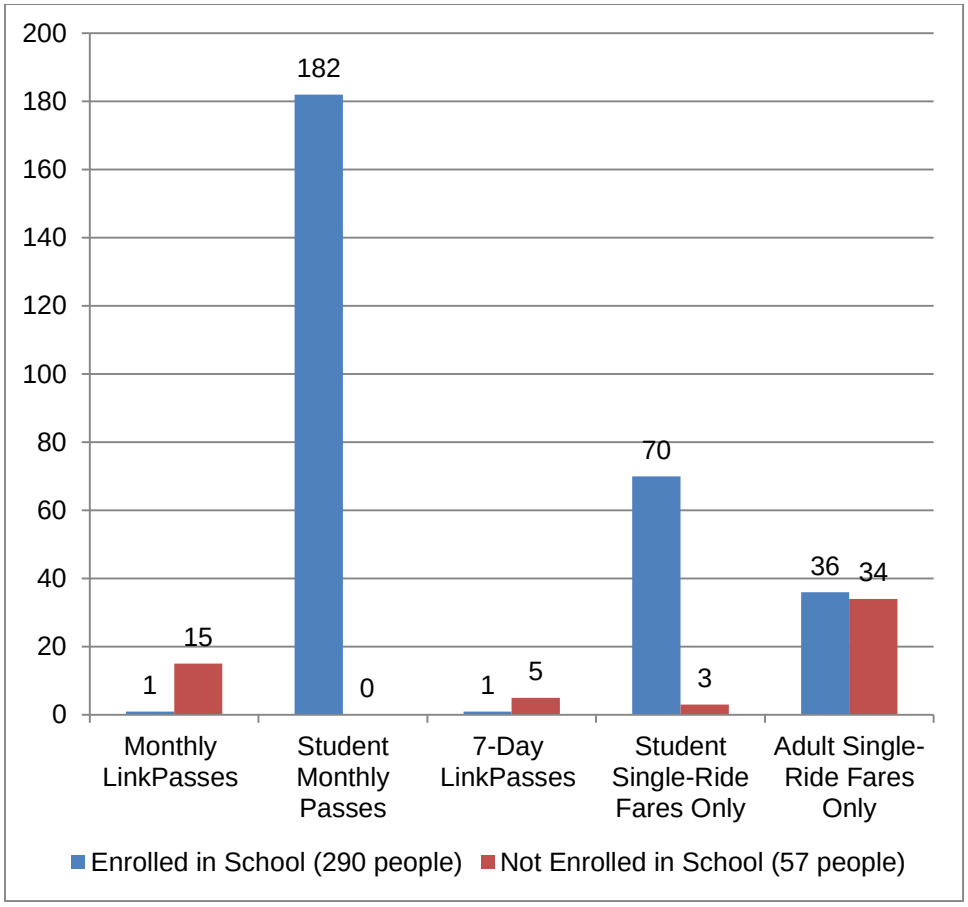
months except September, the majority of people who purchased 7-Day passes only purchased one pass for the month.

Estimated Youth Pass Revenues

Pre-Pilot Fare Data

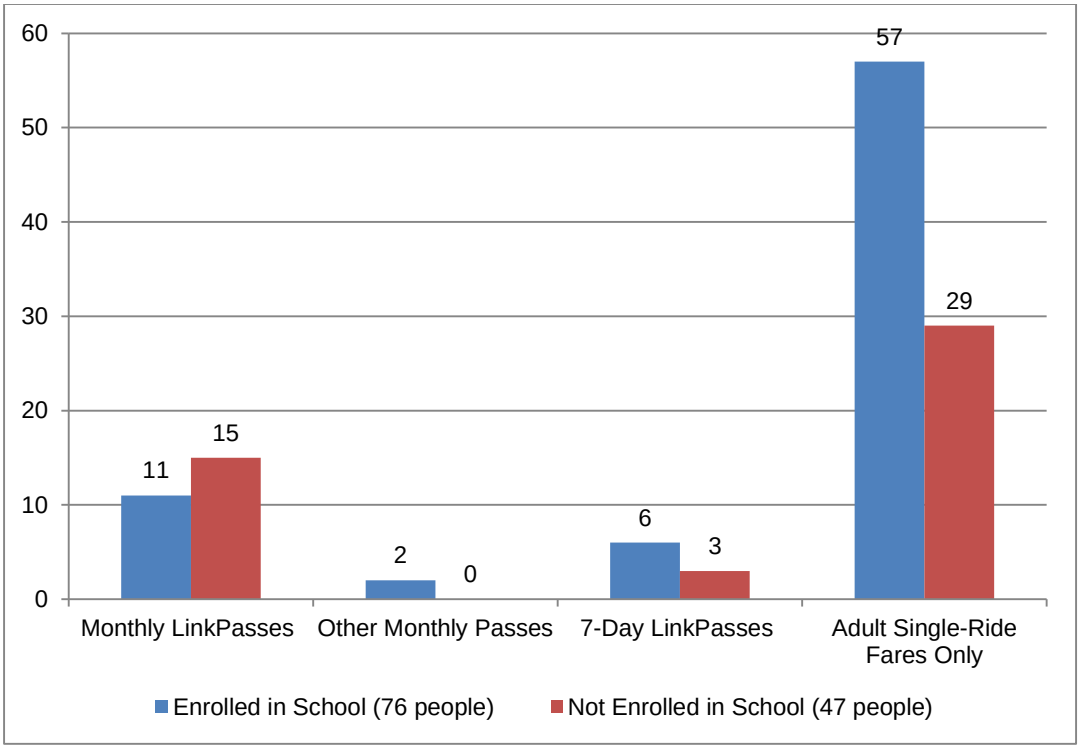
Chapter 2 describes the processes that CTPS used to develop samples of pre-pilot data to represent youth travel behavior during school and summer months. Figure 3-2 shows the types of fare media youth in the June 2015 pre-pilot data sample used to make trips on the MBTA, and Figure 3-3 shows the types of fare media youth in the summer composite month pre-pilot data sample used to ride the MBTA.

FIGURE 3-2
Individuals in Pre-Pilot Data by Fare Product Used, School Month



Data source: MBTA

FIGURE 3-3
Individuals in Pre-Pilot Data by Fare Product Used, Summer Month



Data source: MBTA
Note: Other monthly passes include the monthly bus pass and the monthly Transportation Access Pass.

Figure 3-2 shows that for June, most individuals who were enrolled in school were paying with a student monthly pass, with smaller numbers of people paying with student or adult single-ride fares only. The majority of those not enrolled in school paid for their trips with single-ride fares only, followed by monthly LinkPasses. Figure 3-3 shows that for the summer month, the largest shares of individuals in both the school-enrolled and non-school-enrolled groups paid for trips with adult single-ride fares only.

Estimated Youth Pass Revenues

To estimate the net Youth Pass revenues for the first four months of the pilot program, CTPS followed these steps:

- **Step 1:** Calculate the value of all the pass purchases assigned to a given month in the RST data.[6]

[6] Monthly youth passes were assigned to a month based on the purchase date; a pass bought on the 15th of the month or earlier was assigned to that month, while a pass purchased on the 16th or later was assigned to the following month. 7-day Youth Passes were assigned to the month in which they were purchased.

- **Step 2:** Identify each month as a school month (to be represented by June 2015 pre-pilot data) or as a summer month (to be represented by the Summer composite month pre-pilot data).

- **Step 3:** Identified the share of youth pass participants in each month who identified as being enrolled in school, based on the AFC data. Apply this percentage to the number of individuals who used passes that month, based on the RST data.

- **Step 4:** Multiply the estimated number of Youth Pass users in each school-enrollment category by the average pre-pilot expenditure-per-person for that month type and category. For Youth Pass users enrolled in school, CTPS applied an average pre-pilot monthly expenditure that assumed that youth did not have access to a student pass. Table 3-1 shows the estimated pre-pilot data monthly expenditure values that were used to make these estimates.

- **Step 5:** Sum the foregone revenue values for all age-and-school-enrollment categories for that month.

- **Step 6:** Use the information from the previous steps to calculate the net revenues for the program.

Table 3-2 shows the estimated net revenues for the first four months of the Youth Pass pilot program, using the above methodology.

TABLE 3-1
Average Expenditures per Month from Pre-Pilot Data, by Month and School Enrollment

Category	Average Monthly Expenditure: Summer Pre-Pilot Data	Average Monthly Expenditure: School (June) Pre-Pilot Data
Enrolled in School	$31.37	$20.74
Not Enrolled in School	$46.77	$42.23

Data source: MBTA
Note: CTPS estimated the June pre-pilot data value for those enrolled in school using data from pre-pilot participants who did not use monthly student passes.

TABLE 3-2
Estimated Net Youth Pass Pilot Program Revenues, July-October 2015

Pilot Program Month	Youth Pass Users	Youth Pass Revenues	Estimated Foregone Revenues	Net Revenues
July 2015	408	$10,290	$14,062	($3,772)
August 2015	382	$9,461	$13,154	($3,693)
September 2015	341	$8,710	$9,264	($554)
October 2015	366	$9,420	$10,342	($922)
		$37,881	**$46,822**	**($8,941)**

Data source: MBTA

As shown in Table 3-2, CTPS estimates that the program earned approximately $38,000 between July (including June purchases) and October. The net revenue loss for this program for the first four months, using the methodology described above, is just under $9,000. Based on this methodology, net revenue losses are estimated to be highest in the summer months.

To estimate the net revenue for a full year of the pilot program at the current participation rate CTPS applied the number of Youth Pass users that were estimated to be active in September (341) to the remaining eight months of the school year. CTPS also assumed the September 2015 Youth Pass revenue amount (approximately $8,710) and the September foregone revenue amount ($9,264) for all remaining months. Using this approach, CTPS estimated that a full year of the pilot would generate approximately $108,000 in Youth Pass sales revenue, and a net revenue loss of approximately $13,400.

3.2 Impacts on MBTA Service Standards

CTPS reviewed and analyzed data sets which included records of the trips made by pre-pilot participants before the Youth Pass pilot program and by participants using a Youth Pass in the Youth Pass Pilot program. CTPS analyzed each data set to determine whether and how participants' trip-making characteristics change when they have access to a Youth Pass. For this preliminary report, the discussion of service impacts focuses on the change in the percentage of trips made during the AM and PM peak periods and by bus and rapid transit lines. Additional analysis of the share of trips made on the rapid transit system and on buses by each MBTA service period is found in Appendix 2.

AM and PM Peak Period Trip Share Changes

Table 3-3 shows the change in the AM- and PM-peak-period share of trips for school and summer months. This table also shows the change in the share of peak period trips in both percentage points and percentage change between the pre-pilot program and Youth Pass pilot program data sets.

TABLE 3-3
Change in AM- and PM-Peak-Period Trip Share between Pre-Pilot and Youth Pass Pilot

Month Type And Service Period	Pre-Pilot	Youth Pass	Change in Percentage Points	Percentage Change
School: AM-Peak-Period Share	14.9%	16.1%	1.2%	7.9%
School: PM-Peak-Period Share	19.4%	20.1%	0.7%	3.8%
Summer: AM-Peak-Period Share	11.9%	15.6%	3.7%	30.7%
Summer: PM-Peak-Period Share	22.3%	21.6%	-0.7%	-3.2%

Data source: MBTA

During school months, the share of AM- and PM-peak-period trips increases for all Youth Pass participants. However, as shown in Table 3-3, the number of Youth Pass riders shifting to the peak periods is small, and is unlikely to have an adverse impact on service.

During the summer months, the share of AM-peak-period trips increases for all participants, while the share of trips made during the PM-peak-period decreases.

AM and PM Peak Period Trip Shares by Bus and Rapid Transit Line

Table 3-4 shows the change in AM- and PM-Peak-period trip share for all bus routes aggregated and for each rapid transit line during school months. The highlighted cells show an increase in trip share from the pre-pilot data set to the youth pass pilot data set.

During school months, the share of trips made by Youth Pass participants increased during the AM-Peak period on bus routes and on the Blue and Orange lines. During the PM-Peak period, the share of trips made by Youth Pass participants increased on bus routes and the Silver Line.

TABLE 3-4
Change in AM- and PM-Peak-Period Trip Share for All Bus Routes and Rapid Transit Lines between Pre-Pilot and Youth Pass Pilot (School Month)

Service Period and Data Set	Bus: All Routes	Rapid Transit: Blue Line	Rapid Transit: Green Line	Rapid Transit: Orange Line	Rapid Transit: Red Line	Rapid Transit: Silver Line
AM-Peak-Period Share: Pre-Pilot	16.7%	5.9%	6.8%	11.1%	12.4%	18.1%
AM-Peak-Period Share: Youth Pass	17.0%	28.5%	6.3%	13.9%	10.7%	15.9%
PM-Peak-Period Share: Pre-Pilot	17.4%	16.1%	28.0%	21.3%	23.7%	14.2%
PM-Peak-Period Share: Youth Pass	20.5%	12.1%	22.4%	19.4%	21.2%	19.8%

Data source: MBTA

TABLE 3-5
Change in AM- and PM-Peak-Period Trip Shares for All Bus Routes and Rapid Transit Lines between Pre-Pilot and Youth Pass Pilot (Summer Month)

Service Period and Data Set	Bus: All Routes	Rapid Transit: Blue Line	Rapid Transit: Green Line	Rapid Transit: Orange Line	Rapid Transit: Red Line	Rapid Transit: Silver Line
AM-Peak-Period Share: Pre-Pilot	11.8%	11.9%	6.5%	6.8%	17.0%	5.6%
AM-Peak-Period Share: Youth Pass	16.6%	16.4%	4.8%	12.1%	15.0%	11.9%
PM-Peak-Period Share: Pre-Pilot	22.4%	21.4%	23.9%	20.4%	22.9%	27.5%
PM-Peak-Period Share: Youth Pass	20.8%	24.4%	26.8%	19.2%	20.9%	24.9%

Data source: MBTA

Table 3-5 shows the change in AM- and PM-peak period trip shares for all bus routes and for each rapid transit line during summer months. Highlighted cells show an increase from the value calculated from the pre-pilot data set to the youth pass pilot program data set.

During summer months, the share of trips made by Youth Pass participants increased on bus routes and on the Blue, Orange, and Silver lines during the AM Peak period. During the PM Peak period, the share of trips made by Youth Pass participants increased on the Blue and Green lines.

3.4 Summary of Title VI Fare Equity Analysis

The Federal Transit Administration (FTA) requires that the MBTA conduct a fare equity analysis for any fare reduction that lasts longer than six months—as is the case for the Youth Pass Pilot program—to evaluate whether the fare changes would have a discriminatory impact based on race, color, or national origin, and whether low-income populations would bear a disproportionate burden or non-low-income populations would receive disproportionate benefits because of the changes.

CTPS conducted a Title VI Fare Equity Analysis of the Youth Pass Pilot program using program data available through October 15, 2015, in order to meet these federal requirements and support continuation of the pilot program beyond six months. Using data available from application surveys through October 15, 2015, CTPS identified the share of Youth Pass riders that identified themselves as minority or low-income youth. CTPS then compared these values to the combined minority and low-income youth (12 to 21 years old) population of Boston, Chelsea, Malden, and Somerville, using the US Census Public Use Micro Area (PUMA) and decennial US Census data. These results are included in Table 3-6, which shows that a very large share of Youth Pass participants identify themselves as minority (93.3 percent) or low-income (72.9 percent). These percentages are significantly higher than the percentages of minority youth and low-income youth in the population of the four municipalities.

The Youth Pass monthly and weekly fare products provide a benefit to eligible users because they provide access to the bus and rapid transit system at a significant discount compared to similar pass products. The monthly Youth Pass, which is priced the same as MBTA Student CharlieCard passes ($26), represents a 65 percent discount compared to a full-price monthly LinkPass ($75).

TABLE 3-6
Minority and Low-Income Characteristics of
Youth Pass Pilot Program Participants (through October 15, 2015)
and Eligible Youth in Participating Municipalities

	Minority	Percentage Minority	Low-Income	Percentage Low-Income	Total
Youth Pass participants	402	93.3%	314	72.9%	431
Population of eligible youth	74,716	56.3%	60,834	50.2%	131,671

Data Sources: MBTA; 2007-2011 PUM; 2010 US Census.

As shown in Table 3-6, CTPS has found that the percentages of minority youth and low-income youth participating in the Youth Pass Pilot program are higher than the percentages of minority youth and low-income youth living in the four municipalities participating in the pilot program (Boston, Chelsea, Malden, and Somerville); this suggests that there is no disparate benefit to non-minority youth in the program, and no disproportionate benefit to non-low-income youth in the program. When analyzing the effective per-trip costs for minority, low-income, and all Youth Pass participants, CTPS found that the two Youth pass products result in no disparate benefit to non-minority youth in the program, and no disproportionate benefit to non-low-income youth in the program.

To supplement these results, CTPS examined several other trends pertaining to low-income and minority Youth Pass pilot program participants.

- The percentage of participants in the Youth Pass Pilot program in each municipality who are minority and the percentage who are low-income. This is compared to the percentage of who are minorities and people who are low income in the whole youth population for each municipality.
- The percentage of minority and low-income Youth Pass participants at each key stage of pilot program enrollment.
- Changes in the overall number of monthly trips made by minority participants and low-income participants before and during the Youth Pass Pilot program.
- Changes in the number of monthly trips made by the bus and rapid transit modes by minority participants and low-income participants before and during the Youth Pass Pilot program.

The results of these analyses are detailed in the Youth Pass Pilot Program: Title VI Fare Equity Analysis memorandum (December 15, 2015).

3.5 Impacts on MBTA Service (Cash Handling, Conflicts with Employees, Fare Evasion)

In addition to the other topics discussed in this chapter, the Youth Pass Pilot was intended to examine whether the pass improved the MBTA's operations and riders' experiences on the system. In particular, it was theorized that additional passes would have the following impacts:

- Reduction of the amount of cash used on-board buses and above-ground trolleys, which slows boarding and increases dwell times;
- Reduction in the amount of fare evasion by pass-holders; and
- Improvement in the interactions between MBTA staff and pilot participants.

These impacts proved difficult to address, but the preliminary data does suggest minor impacts, which are explained below. Data collection and examination of these topics will continue for the remainder of the pilot.

First, it is likely that the Youth Pass decreased cash payment on-board vehicles for participants. While detailed data is not available on cash transactions as there was no way to track cash payments, youth who applied for the pass reported a high level of cash payment when compared to the population of all riders. Twenty-six percent of applicants reported that they pay for rides with cash at some point recently. While we do not know exactly how many trips were paid for with cash, this is significantly higher than the system-wide average cash payment rate of 2 percent. With a pass, participants would obviously use no cash to board buses and other vehicles.

The MBTA also asked participants their opinions of the Youth Pass's impact on fare evasion and interactions between participants and MBTA employees. When asked if they thought the Youth Pass reduces fare evasion, 75 percent or respondents said yes, while just 3 percent responded no (the remainder were not sure). When asked if the Youth Pass reduces conflicts between riders and employees, 59 percent believed that it did, while just 11 percent responded no. While this is subjective data, the perception is clearly that the Youth Pass impacts both these issues positively.

Chapter 4—Pilot Administrative Feasibility

4.1 Pilot Administrative Procedures

Municipal Partnerships

The MBTA and the partner organizations worked together for six months to create the pilot program structure. Each partner signed a Memorandum of Understanding with the MBTA that specified the responsibilities of each side. The MBTA wrote a Policy Handbook that detailed all of the rules of the program for the partners to use in implementation. After the program was launched, the MBTA and representatives of the partner municipalities held monthly meetings to check in on the program and resolve outstanding issues.

The municipal partners were free to develop their own administration procedures, so long as these procedures could be later audited, and the municipalities collected and verified the necessary paperwork. Some scanned the necessary documents and stored them in an online filing system, while others stored hard copies in folders. Partners were provided with a spreadsheet by the MBTA to track participants, their enrollment and their payment status. For the means-tested group of participants, municipal partners were expected to collect documentation of their enrollment in a means-tested program. They also were expected to conduct a “second-step” verification of 10 percent of their participants. This was conducted via phone calls to the organizations or programs that participants claimed enrollment in and revealed no cases of fraud. Staff at the MBTA also reviewed the pass usage data for any suspicious usage of the pass (very high numbers of trips on one pass) and found no evidence of suspicious usage.

The MBTA conducted site visits of each municipal office to observe operations, ensure that partners followed proper procedure and interview partner staff about their experiences administering the Youth Pass. This section details the results of these audits. Overall, the municipal partners seemed to follow the agreed-upon procedure. While there were some slight irregularities, there were no major problems in administration, nor did MBTA oversight reveal any major errors or cases of fraud.

Municipal Partner Feedback

Partners generally believed the Youth Pass was an important program and wanted it to become permanent, but expressed concerns about the resources required to handle the program in its current design – particularly the handling of cash.

Major positive comments reported by partners included:

- General appreciation of the program by the youth participants. This showed partners that it was a valuable program for these participants and that their work was appreciated. Additionally, the program helped partner offices to fulfill their mission and connect face-to-face with youth constituents who may be difficult to reach via other methods.

- The RSTs provided by the MBTA to refill the cards were reliable and easy to use.

- Invoicing from the MBTA was smooth and no major errors were reported by either the MBTA or municipal partners.

Negative comments from partners included the following:

- Partners reported that the workload was highly variable. For example, during the initial enrollment period, the workload was very high, but at mid-month times when few participants were coming in, there was little to do.

- The card printers used to print the Youth Passes were very slow (especially for the first printing of the day) and sometimes created duplicates.

- Participants often wished they could purchase passes online or with a credit or debit card rather than cash.

Finally, partners expressed concerns about having enough staff and other resources to administer the program if continued, especially if the enrollment were expanded. It was clear from comments that continuing to vend passes monthly via RSTs in municipal partner offices was not only infeasible for partner staff but also presented barriers to participants, which reduced the reach of the pass and could prevent a full program from meeting its goal of providing access to those who need it.

Having the passes available on fare vending machines throughout the MBTA system would address most of these negative comments. The workload would still be variable as most participants would likely enroll in July, but would be much lower overall. Problems due to limitations of purchasing and cash handling would be eliminated as well.

4.2 Administrative **Feasibility**

The Youth Pass Pilot proposal asked three questions about the administration of the program. First, what are the administrative costs of the pilot program to the MBTA?

To date, the pilot is expected to cost the MBTA significantly less than the $443,000 of administrative costs presented in the December 2014 proposal; this is mostly due to

changes in the structure of the pilot's administration. However, the pilot does consume staff resources. Staff have had to:

- Design the program with the partners and write the legal documents.
- Train the partners to use the RST and card printer machines.
- Design and order the special cards, work with Scheidt & Bachmann (the MBTA's fare systems contractor) to make tariff changes, and deal with lost cards.
- Design the data collection and survey components of the research aspect of the pilot.
- Analyze the data from the pilot and oversee CTPS's work.
- Meet with the partners monthly to address issues.
- Make site visits to audit the partners.

Some of those resources would not be necessary for a full program, but it would still take oversight of the partner agencies, and supplying the cards and card printers to partners.

Second, what are the administrative costs to the municipal partners, and is it sustainable? The interviews with the partners determined that the current model of the Youth Pass, with participants paying at the partner's offices, is not sustainable. The City of Boston reported that they cannot continue the program after the pilot is over under this model.

Third, does the pilot create a procedure that is audit proof, limits fraud, and is able to be replicated? The pilot created a procedure that is auditable and limits fraud. This was in part due to the collaborative nature of the development of the program so that the partners were onboard with the goals along with the MBTA. However, the program as designed is unlikely to be able to continue. The partnership model of implementing reduced and means-tested fares could continue if cash handling is removed from the partners and done instead on MBTA Fare Vending Machines.

Chapter 5—Pilot Program Evaluation and Next Steps

5.1 Summary of Program Evaluation Findings

The Youth Pass Pilot was designed to meet the five major goals.

Goal 1. Create affordable transit access for pilot participants
The pilot has accomplished this goal for the applicants who finished all of the steps to enroll in the pilot.

Goal 2: Provide the data required to assess the impact of a Youth Pass on the mobility of youth and their engagement in civic and community activities.
The pilot has collected data and the preliminary results indicate the Youth Pass has increased access to a range of activities for participants.

Goal 3: Have a limited impact on the MBTA's revenue.
The pilot is estimated to have a very limited impact on MBTA fare revenue.

Goal 4: Provide the data required to estimate the impact of a permanent Youth Pass program on MBTA fare revenue and service delivery.
The pilot has generated data to assist in the estimates of a full Youth Pass, but these estimates still require assumptions outside the score of the Pilot data collection.

Goal 5: Assess whether municipal partners can distribute reduced fare MBTA passes in an audit-proof manner that minimizes the MBTA administrative burden.
The pilot has demonstrated a proof of concept for a collaborative model of administering reduced fare MBTA products that is auditable and limits the MBTA administrative burden.

Limitations to the preliminary results

The amount of existing Youth-Pass-Pilot-program and pre-pilot-program data is limited since we are only 5 months into the pilot; this presents some challenges and limitations for the program evaluation:

- The steps to enroll in the pilot have limited participation.
- Except for June, pre-pilot-data samples are small.
- The data set may be missing some of the Youth Pass users. Our earlier reviews of data initially compiled in October only showed people from Malden and Boston; while it appears that pass information for Chelsea was corrected later in November and some corresponding participant AFC data has been made available. New analysis will include this larger sample.

5.2 Full Program Recommendations

Based on the preliminary results there are changes that would be recommended to implement the Youth Pass as a full program:

- Allow sales of the monthly pass on the MBTA fare vending machines to ease the administrative burden on the municipal partners.
- Continue to have municipal partners verify eligibility and provide the photo ID cards with an annual expiration date.
- Allow additional municipalities to opt-in to the program.
- Continue to analyze the means-testing portion of the program for future extensibility.
- Address the distribution of the Student Pass.

5.3 Scenario Evaluation

To assess the possible revenue and service impacts of a full program, this section explores two possible scenarios for continuing or expanding the Youth Pass program beyond the 12-month pilot period. These scenarios are based on the following assumptions:

- After eligible youth enroll in the Youth Pass program, they would be able to purchase their monthly Youth Pass on MBTA fare vending machines.
- Only the monthly Youth Pass will be available, at a price of $26. The 7-Day Youth Pass offered during the pilot will be discontinued.
- The MBTA will phase out the 5-day student monthly pass, which is currently the same price as the 7-Day student monthly pass ($26). The 7-day student monthly pass will continue to provide the same benefits as the Youth Pass, at the same price. Students who currently receive student passes will not have an incentive to switch to a youth pass during the school year (10 months), but could utilize the Youth Pass over the summer.

Two scenarios are presented, representing a low and high number of municipalities that might participate in the program. In both cases, it is expected that more municipalities will participate than are currently participating in the pilot, because a considerable portion of the municipal administrative burden is eliminated if eligible youth will be able to purchase the Youth Pass at a fare vending machine. Table 5-1 lists the municipalities that might participate in each scenario; these are not based on any discussion with municipalities and only serve to give ranges for possible impacts of a full program.

TABLE 5-1
Possible Future Youth Pass Scenarios

Scenario	Representative Participating Municipalities
A- Two Additional	Boston, Cambridge, Chelsea, Malden, Quincy, Somerville
B- Full core participation	Arlington, Belmont, Boston, Brookline, Cambridge, Chelsea, Everett, Lynn, Malden, Medford, Melrose, Milton, Newton, Quincy, Revere, Somerville, Watertown

Youth Pass Program Market Estimation Methodology

General Program Eligibility

For each scenario, CTPS estimated potential fare and service impacts to the MBTA. Each set of impacts varies depending on the size of the market for the Youth Pass, which changes depending on the number of participating municipalities. To estimate the market size for eligible youth in each scenario, CTPS followed the general process used to define the anticipated Youth Pass market size in the 2014 *Pilot Project Outline and Financial Impacts: Youth Pass (YPass) Program* report. Several of the data sources mentioned below are described in Appendix 1: Data Sources.

- **Step 1: Estimate the population of youths in the study area who live near transit.** Using 2010 census data and geographic information systems, CTPS calculated the number of youths in the study area, grouped by age, who live within a quarter-mile of a bus stop or a half-mile of a rapid transit station or Zone 1A commuter rail station.

- **Step 2: Determine the population of college students, secondary school students, and non-students who live in the study area.** Using 2007-2011 Public Use Microdata (PUM) from the American Community Survey, CTPS found the percentage of people, by age group, who were (1) enrolled in colleges, (2) enrolled in secondary schools, and (3) not enrolled in any school for each PUM area (PUMA). CTPS then applied these ratios to the estimate of the population of youths who live near transit (from step 1) to obtain the percentage of people in each category. The resulting information could be sorted by municipality, which made it possible to more closely define the populations for specific scenarios.

- **Step 3: Determine the percentage of people who live near public transit and also use public transit.** Using data from the 2010-11 Massachusetts Travel Survey, a statewide survey of how people use the Commonwealth's

multimodal transportation system, CTPS estimated the percentage of people, by age group, who live in the densely-populated areas of the study area and use transit. It is assumed in the scenario analyses that these people might consider purchasing a Youth Pass depending on the number of trips they make using transit.

- **Step 4: Separate out the youth population who already receives a student pass from the estimate.** Using data from the previous steps and information about the number of monthly student passes distributed to schools within the study area, CTPS reduced the market size estimate for the school year to account for students who already receive a subsidized pass from their school.[7] These student pass users are assumed to not have access to product Student Pass during the summer, and may be interested in purchasing the Youth Pass during the summer months.

By following the steps described above, CTPS developed Table 5-2, which shows the eligible population of youths by age group and eligibility category for each scenario. For all three scenarios, approximately four-fifths of the 12-to-18-year-old "other eligible population" are college students.

TABLE 5-2
Scenario Estimates of the Number of Transit Users who are Eligible to Purchase the Youth Pass and Live Near Transit

Scenario	Age Group	Secondary School Students Without Student Passes	Student Pass Users (Summer Only)	Other Eligible Population (Not Enrolled in School)
A	12-18	1,950	16,510	6,300
	19-21	590	5,020	Means-Tested
B	12-18	11,950	18,150	8,420
	19-21	3,140	4,760	Means-Tested

Data Source: 2007-2011 PUM; 2010 US Census; MTS results, MBTA active Student Pass figures for September 2015.

Note: Values have been rounded to the nearest 10 people.

[7] CTPS used MBTA data on the number of invoiced Monthly Student Passes from September 2015, which was selected to serve as a representative month. In this month, no passes were active for Malden, Lynn, Melrose, Medford, Revere, and Watertown-area schools.

Table 5-2 highlights that 19-to-21-year-old non-students who would seek to participate in the Youth Pass program would need to satisfy income-testing requirements. To determine the number of youth in this category that would be eligible and interested in purchasing a youth pass, CTPS first estimated the number of 19-to-21-year-old non-students that live near and use transit for each scenario, using the four-step method described earlier. After completing these steps, CTPS reviewed various statistics from US census data to generate estimates of the number of potential 19-to-21-year-old non-student Youth Pass purchasers who would qualify for the Youth Pass. Using this information, CTPS developed three factors for estimating a range of eligible youth from this group:

- The percentage of 19-to-21-year-olds who live in low-income households (approximately 50 percent).[8] This percentage is close to the percentage of 19-to-21-year-olds who live in households that earn less than 125% of the federal poverty level (approximately 47 percent).
- The percentage of 19-to-21-year-olds who receive public assistance (approximately 9 percent).
- An intermediate estimate (25 percent).

Tables 5-3 shows the variation in the number of 19-to-21-year-old non-students who may be eligible for the program and likely to use transit.

[8] Median household income for the MBTA Service area in 2011 was $69,393. The low income threshold is 60% of this level, or $41,636.

TABLE 5-3
Scenario Estimates of the Number of 19-to-21-year-old Transit Users who are Eligible to Purchase the Youth Pass and Live Near Transit

Criteria	19-21-Year-Old Population Receiving Public Assistance Income or Food Stamp Benefits	Intermediate Estimate	19-21-Year-Old Population Living in Low-Income Households
Percentage of Population	**9%**	**25%**	**50%**
Scenario A	537	1,491	2,982
Scenario B	745	2,069	4,137

Data Source: 2007-2011 PUM; 2010 US Census; MTS results.
Note: College students living off-campus are included in the low-income household values. This distorts the percentage of the 19-to-21-year-old population living in low-income households for this analysis, because the Youth Pass is not intended for college students.

Eligible Youth Expected to Benefit from a Youth Pass

In order to estimate the number of youths who might be expected to purchase the Youth Pass, CTPS then reduced the market size for each scenario by the number of people who are not likely to benefit financially from purchasing the pass based on their current spending behavior. CTPS reviewed the spending patterns of pre-pilot youth included in the School (June 2015) month and Summer composite month to identify the percentage of each age-and-school-enrollment category that spent less than $26 per month (the price of the monthly Youth Pass).

- In the School month of pre-pilot data, approximately **35 percent** of youth enrolled in school who did not have access to a student pass spent more than $26 per month. During school months, students who have access to student passes were assumed to have no financial incentive to obtain a Youth Pass. Approximately **55 percent** of those not enrolled in school spent more than $26 per month.

- In the summer month of pre-pilot data, approximately **40 percent** of youth enrolled in school spent more than $26 per month, while approximately **65 percent** of those not enrolled in school spent more than $26 per month.

The scenario descriptions below describe the reduced market sizes that were calculated using this methodology. Appendix 3 describes the methodologies that were used to estimate the net revenues and service impacts for each scenario.

Scenario A

Scenario A Enrollment

Table 5-4 lists the number of people, by age-and-school-enrollment category, who would be eligible and would have an incentive to purchase a Youth Pass under Scenario A.

TABLE 5-4
Scenario A: Estimates of Youth who are Eligible and Would Benefit from Purchasing a Youth Pass

Month Type	Age-and-School-Enrollment Category	Number of Potential Participants
School	12-18, Enrolled in School (No Student Pass)	680
	12-18, Not Enrolled in School	3,470
	19-21, Enrolled in School (No Student Pass)	210
	19-21, Means Testing Group (range)	300–1,640
Summer	12-18, Enrolled in School	7,380
	12-18, Not Enrolled in School	4,100
	19-21, Enrolled in School	2,250
	19-21, Means Testing Group (range)	350–1,940

Data Source: 2007-2011 PUM; 2010 US Census; MTS results, MBTA active Student Pass figures for September 2015.

Note: Values have been rounded to the nearest 10 people.

Scenario A Fare Impacts

CTPS estimated the expected annual net revenues for a Youth Pass program under Scenario A using the enrollment estimates in Table 5-4 and the revenue estimation methodology described in Appendix 3. These results are shown in Table 5-5. This table shows three possible estimates, depending on the number of means-tested 19-to-21-year-olds that could be included in the program.

TABLE 5-5
Scenario A Net Revenue Estimates – Annual

Participant Category	Total Youth Pass Revenues	Total Foregone Revenues	Net Program Revenues
Total Annual Revenue (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	$1,941,000	$4,146,000	($2,205,000)
Total Annual Revenue (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	$2,110,000	$4,489,000	($2,379,000)
Total Annual Revenue (reflects 19-21, Out-of-School, High-Enrollment Estimate)	$2,373,000	$5,025,000	($2,652,000)

Data Sources: MBTA Youth Pass Pilot data; 2007-2011 PUM; 2010 US Census; MTS results.
Note: Amounts have been rounded to the nearest $1,000.

As shown in the table above, the net revenue losses under scenario A could range from $2.2 million to approximately $2.65 million. As detailed in Appendix 3, CTPS developed an alternate, low-end range of estimates by reducing the enrollment estimates to ten percent of their original values, to reflect a lower rate of participation. Using the reduced enrollment numbers, the net revenue losses are expected to range from $220,000 to $265,000.

Scenario A Service Impacts

CTPS estimated the expected additional annual unlinked trips that would be made on the MBTA system under Scenario A using the enrollment estimates in Table 5-4 and the service impacts estimation methodology described in Appendix 3. As shown in Table 5-6, CTPS estimates that an additional 540,000 to 691,000 annual unlinked trips would be made in this scenario, depending on the number of 19-to-21-year-old non-student enrollees.

TABLE 5-6
Scenario A: Estimates of Additional Annual Unlinked Trips

Participant Category	Total Youth Pass Trips	Total Pre-Youth Pass Trips	Net Program Trips
Total Annual Trips (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	4,320,000	3,780,000	540,000
Total Annual Trips (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	4,699,000	4,100,000	599,000
Total Annual Trips (reflects 19-21, Out-of-School, High-Enrollment Estimate)	5,294,000	4,603,000	691,000

Data Sources: MBTA Youth Pass Pilot data; 2007-2011 PUM; 2010 US census; MTS results.

Note: Numbers have been rounded to the nearest thousand.

As shown in Table 5-6, the number of additional annual unlinked trips that could take place under Scenario A range from 540,000 to 691,000. CTPS then developed an alternate, low-end range of estimates by reducing the enrollment numbers to ten percent of their original values, as discussed in Appendix 3. Using the reduced enrollment numbers, the estimated increase in annual unlinked trips on the MBTA system ranges from 54,000 to 69,000.

Tables 5-7 and 5-8 highlight the additional annual AM- and PM-peak period unlinked trips that would be made in this scenario. CTPS estimates that 144,000 additional annual unlinked trips would be made during the AM peak and 96,000 additional annual unlinked trips in the PM peak periods on the bus and rapid transit network, or an average of 580 additional weekday AM-peak-period unlinked trips and 380 weekday PM-peak-period unlinked trips. Using the various estimates of 19-to-21-year-old non-school enrolled participants, CTPS found that these amounts range from 133,000 to 161,000 annual unlinked trips in the AM peak, and from 87,000 to 110,000 annual unlinked trips in the PM peak.

TABLE 5-7
Scenario A: Estimates of Additional Annual Unlinked AM-Peak-Period Trips

Participant Category	Total Youth Pass AM Peak Period Trips	Total Pre-Youth Pass AM Peak Period Trips	Net Program AM Peak Period Trips
Total Annual Trips (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	572,000	439,000	133,000
Total Annual Trips (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	623,000	479,000	144,000
Total Annual Trips (reflects 19-21, Out-of-School, High-Enrollment Estimate)	702,000	541,000	161,000

Data Sources: MBTA Youth Pass Pilot data; 2007-2011 PUM; 2010 US Census; MTS results.

Note: Numbers have been rounded to the nearest thousand.

TABLE 5-8
Scenario A: Estimates of Additional Annual Unlinked PM-Peak-Period Trips

Participant Category	Total Youth Pass PM Peak Period Trips	Total Pre-Youth Pass PM Peak Period Trips	Net Program PM Peak Period Trips
Total Annual Trips (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	743,000	656,000	87,000
Total Annual Trips (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	807,000	711,000	96,000
Total Annual Trips (reflects 19-21, Out-of-School, High-Enrollment Estimate)	908,000	798,000	110,000

Data Sources: MBTA Youth Pass Pilot data; 2007-2011 PUM; 2010 US Census; MTS results.

Note: Numbers have been rounded to the nearest thousand.

Using the reduced participation rate described in Appendix 3, the estimated net increase in unlinked trips ranges from 13,000 to 16,000 annual unlinked trips in the AM Peak, and from 9,000 to 11,000 annual unlinked trips in the PM peak.

Scenario B

Scenario B Enrollment

Table 5-9 lists the number of people, by age-and-school-enrollment category, who would be eligible and would have a financial incentive to purchase a Youth Pass under Scenario B.

TABLE 5-9
Scenario B: Estimates of Youth who are Eligible and Would Benefit from to Purchasing a Youth Pass

Month Type	Group	Number of Potential Participants
School	12-18, Enrolled in School (No Student Pass)	4,180
	12-18, Not Enrolled in School	4,630
	19-21, Enrolled in School (No Student Pass)	1,100
	19-21, Means Testing Group (range	410–2,280
Summer	12-18, Enrolled in School	12,040
	12-18, Not Enrolled in School	5,470
	19-21, Enrolled in School	3,160
	19-21, Means Testing Group (range)	480–2,690

Data Source: 2007-2011 PUM; 2010 US Census; MTS results, MBTA active Student Pass figures for September 2015.

Note: Values have been rounded to the nearest 10 people.

Fare Impacts

CTPS estimated the expected annual net revenues for a Youth Pass program under Scenario B using the enrollment estimates in Table 5-9 and the revenue estimation methodology described in Appendix 3. These results are shown in Table 5-10. This table shows three possible estimates, depending on the number of means-tested 19-to-21-year-olds that could be included in the program.

TABLE 5-10
Scenario B Net Revenue Estimates – Annual

Participant Category	Total Youth Pass Revenues	Total Foregone Revenues	Net Program Revenues
Total Annual Revenue (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	$3,618,000	$7,900,000	($4,282,000)
Total Annual Revenue (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	$3,852,000	$8,376,000	($4,524,000)
Total Annual Revenue (reflects 19-21, Out-of-School, High-Enrollment Estimate)	$4,218,000	$9,119,000	($4,901,000)

Data Sources: MBTA Youth Pass Pilot data; 2007-2011 PUM; 2010 US Census; MTS results.
Note: Amounts have been rounded to the nearest $1,000.

As shown in Table 5-10 above, the net revenue losses under scenario B could range from $4.28 million to approximately $4.9 million. As described in Appendix 3, CTPS developed an alternate, low end range of estimates by reducing the enrollment numbers to ten percent of their original values, to reflect a lower rate of participation. Using the reduced adjusted enrollment numbers, the net revenue losses are expected to range from $428,000 to $490,000.

Scenario B Service Impacts

CTPS estimated the expected additional annual unlinked trips that would be made on the MBTA system under Scenario B using the enrollment estimates in Table 5-9 and the service impacts estimation methodology described in Appendix 3. These results are shown in Table 5-11. This table shows three possible estimates, depending on the number of means-tested 19-to-21-year-olds that could be included in the program.

TABLE 5-11
Scenario B: Estimates of Additional Annual Unlinked Trips

Participant Category	Total Youth Pass Trips	Total Foregone Trips	Net Program Trips
Total Annual Trips (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	8,456,000	7,279,000	1,177,000
Total Annual Trips (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	8,982,000	7,723,000	1,259,000
Total Annual Trips (reflects 19-21, Out-of-School, High-Enrollment Estimate)	9,804,000	8,417,000	1,387,000

Data Source: MBTA

Note: Numbers have been rounded to the nearest thousand.

As shown in Table 5-11 above, the net increase in annual unlinked trips under scenario B could range from 1.177 million to approximately 1.387 million. After reducing the estimated number of enrolled participants to ten percent of the original total, as described in Appendix 3, CTPS estimates that the net increase in annual unlinked trips under scenario B could range from 118,000 to 139,000 annual unlinked trips.

Tables 5-12 and 5-13 highlight the additional annual AM- and PM-peak period unlinked trips that would be made in this scenario. CTPS estimates that 269,000 additional annual unlinked trips would be made during the AM peak period and 199,000 additional annual unlinked trips would be made in the PM peak period, or an average of 1,100 additional weekday AM-peak-period unlinked trips and 800 additional weekday PM-peak-period unlinked trips. Using the various estimates of 19-to-21-year-old non-school enrolled participants, CTPS found that these amounts range from 254,000 to 293,000 annual unlinked trips in the AM Peak, and from 186,000 trips to 219,000 annual unlinked trips in the PM peak.

TABLE 5-12
Scenario B: Estimates of Additional Annual Unlinked AM-Peak-Period Trips

Participant Category	Total Youth Pass AM Peak Period Trips	Total Foregone AM Peak Period Trips	Net Program AM Peak Period Trips
Total Annual Trips (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	1,123,000	869,000	254,000
Total Annual Trips (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	1,193,000	924,000	269,000
Total Annual Trips (reflects 19-21, Out-of-School, High-Enrollment Estimate)	1,303,000	1,010,000	293,000

Data Source: MBTA

Note: Numbers have been rounded to the nearest thousand.

TABLE 5-13
Scenario B: Estimates of Additional Annual Unlinked PM-Peak-Period Trips

Participant Category	Total Youth Pass PM Peak Period Trips	Total Foregone PM Peak Period Trips	Net Program PM Peak Period Trips
Total Annual Trips (reflects 19-21, Out-of-School, Low-Enrollment Estimate)	1,445,000	1,259,000	186,000
Total Annual Trips (reflects 19-21, Out-of-School, Intermediate-Enrollment Estimate)	1,534,000	1,335,000	199,000
Total Annual Trips (reflects 19-21, Out-of-School, High-Enrollment Estimate)	1,673,000	1,454,000	219,000

Data Source: MBTA

Note: Numbers have been rounded to the nearest thousand.

After reducing the estimated number of enrolled participants to ten percent of the original total, as described in Appendix 3, CTPS estimates that , the net increase in

unlinked trips ranges from 25,000 to 29,000 additional unlinked trips in the AM Peak, and from 19,000 to 22,000 annual unlinked trips in the PM peak.

5.4 Conclusions

The Youth Pass Pilot has increased transit access for primarily low-income and minority youth allowing them access to recreational opportunities, work, school, and medical appointments they would not have had otherwise. The collaborative partnership with municipalities has yielded an auditable reduced fare program with limited administrative impact for the MBTA. A key result of the pilot is that three-quarters of the participants are eligible for an existing MBTA reduced fare pass, but unable to access it due to their school not offering it or the limitations on summer months.

The pilot has provided data to measure the impacts of the pilot, but the estimates for the full program range widely based on assumptions of municipal opt in and participation rates by eligible youth. These estimates also include the cost of effectively increasing the access to the existing Student Pass.

Appendices

A. DATA SOURCES

The Youth Pass Pilot generates information about participant characteristics and travel behavior through both surveys and through CharlieCard validations at fare gates and fareboxes, which are tracked through the MBTA's automated fare collection (AFC) system. Details about specific data and collection methods are provided below.

Application and Enrollment Survey Data

Youth who were interested in participating in the pilot program filled out an online application, as mentioned in Chapter 1. They were asked to identify their date of birth, home zip code, age group (13 to 18 years old or 19 to 21 years old), race and ethnicity, and household income, and whether they were enrolled in middle or high-school.[9] Applicants who were 19 to 21 years old were asked to identify whether they were enrolled in a jobs program, a benefit program (such as Women, Infants, and Children (WIC) program or MassHealth), or a GED or other adult education program, to help municipalities determine whether they met means-testing requirements. The application survey also included questions about the number of trips applicants take on the MBTA bus or rapid transit system during the school year and summer, as well as questions about how applicants currently pay MBTA fares. All applicants, regardless of whether they were ultimately enrolled in the program, were issued a participant number, which the MBTA and CTPS could track across various data sets.

Youth who were accepted into the program were asked to complete additional surveys, both upon enrollment and on a monthly basis throughout the pilot. The enrollment survey requested that participants provide information about the purposes of the trips they make on the transit system and the other modes of transportation they regularly use. It also asked participants to indicate their levels of satisfaction with various aspects of MBTA service, such as safety, cost, reliability, and interactions with MBTA staff. The MBTA also asked participants to complete regular surveys, once enrolled in the program, which asked about the number and purposes of the trips they took on the transit system the day before receiving the survey, and whether and how they might have made those trips if they did not have access to a Youth Pass.

[9] While youth younger than 13 were permitted to sign up for the program, data they submitted online was not included in this analysis. If CTPS identified a person as younger than 13 by calculating their age using their reported date of birth from the online application form, AFC data associated with that participant was excluded from further analyses.

Interviews and Audit of Partner Agencies

The MBTA conducted an audit of each partner agency to ensure they were following the procedures for the program as detailed in the MOU and Policy Handbook. In addition staff at the partner agencies were asked a series of qualitative questions about the administration of the program.

MBTA Data

The MBTA's automated fare collection (AFC) system records information about the date, time, travel mode, and location at which a rider used their pass product at a fare gate or fare box, along with information about the price of the trip and the fare product that was used to pay for the trip. Two sets of AFC data were used to begin evaluation of the Youth Pass Pilot program: transaction data generated by the fare cards enrollees used prior to the beginning of the pilot ("pre-pilot data") and transaction data generated by Youth Passes. Detail regarding these two data sources is available below. The MBTA and CTPS also used data on pass purchases from the retail sales terminals (RSTs) distributed to the four participating municipalities make estimates regarding pilot participants that may not be reflected in the AFC data.

Pre-Pilot AFC Data

When Youth Pass applicants were enrolled in the pilot program, MBTA staff requested that they provide an existing CharlieCard number and sign a release allowing MBTA staff to access AFC data associated with their individual card. This information allowed MBTA staff to track a participant's CharlieCard use for a month prior to that participant receiving and using a Youth Pass, and would enable MBTA and CTPS staff to analyze whether the participant's travel behavior changed after having access to the Youth Pass. If a participant did not already have a CharlieCard or ticket, the MBTA provided the participant with a new CharlieCard to facilitate pre-pilot data collection. To preserve anonymity, each applicant was assigned a participant number. The MBTA replaced CharlieCard numbers with participant numbers in the AFC data sets they provided to CTPS, while the actual CharlieCard numbers and the participant's personal information were kept confidential. This participant number was also used in the data sets that included information from the pilot application form, the enrollment survey, and other surveys administered during the pilot.

Youth Pass AFC Data

After the month-long pre-pilot data collection period, participating youth would return to municipal offices to have monthly or 7-Day Youth Pass products loaded onto their CharlieCard, which the MBTA could track through the AFC system. If a Youth Pass participant had been using his or her own CharlieCard during the pre-data collection period, that person was issued a new CharlieCard for the Youth Pass pilot program. In some cases, youth who may have completed the pre-pilot data collection steps did not return to obtain the Youth Pass. As with the pre-pilot data, the MBTA replaced

CharlieCard numbers with participant numbers in the pilot AFC data sets they provided to CTPS.

The participant numbers enabled the MBTA and CTPS to link the pre-pilot and Youth Pass data sets with age, minority status, household income, school- and program-enrollment, home municipality, and other information included in the application survey. This made it possible for CTPS to complete the Title VI fare equity analysis for the Youth Pass Pilot program. This information also enabled the MBTA and CTPS to more closely examine the travel behavior of specific age groups within the overall Youth Pass participant pool, as well as to compare the behavior of students to that of youth not enrolled in school.

Retail Sales Terminal (RST) Data

The Retail Sales Terminal (RST) outputs track the date and time of pass purchases, the type and value of the pass that was purchased, and an identifier associated with the card or ticket on which the pass was loaded. Using this identifier, CTPS could determine how many and what type of Youth Passes (monthly or 7-Day) individuals purchased over time. Each RST also had a unique identifier, which made it possible to determine the number of passes sold in individual cities. However, CTPS could not connect this information to AFC data or to information participants provided in the application form and surveys, so findings for the samples of participants included in the AFC data sets described above were used to make estimate of how these other individuals may have made trips and purchased fares before and during the pilot program.

Other Data Sets

CTPS used several other sets of data to complete the Title VI fare equity analysis and full program scenarios.

2010 U.S. Census

CTPS used 2010 U.S. Census data to estimate the size of the youth population in the study areas associated with the scenarios described in Chapter 6. 2010 U.S. Census data was also used to estimate the number and proportion of minority and low-income youth between the ages of 12 and 21 in the pilot program's four partner municipalities: Boston, Chelsea, Malden and Somerville. From the 2010 U.S. Census, CTPS used the unit of geography known as the census block group. A census block group is the smallest unit of analysis provided by the Census Bureau, and each census block group generally contains 600 to 3,000 people. CTPS obtained the number of people living in each census block group by age from the census block group data.

2007–2011 Public Use Microdata

CTPS used the 2007–2011 Public Use Microdata to obtain the number of college students, secondary school students, and non-students in the study areas associated

with the scenarios described in Chapter 6. This data was also used to estimate the number and proportion of minority and low-income youth between the ages of 12 and 21 in the pilot program's four partner municipalities. The geography associated with Public Use Microdata (PUM) is the Public Use Microdata Area (PUMA). A PUMA is a relatively large geographic area; each PUMA contains at least 100,000 residents. While the geography is large and imprecise, the Census Bureau provides extremely detailed American Community Survey (ACS) data that is not available for smaller geographies. A PUMA may contain more than one municipality, and a municipality can contain more than one PUMA. For example, PUMA 2700 encompasses Arlington, Belmont, Lexington, Watertown, and Waltham; Boston includes PUMAs 3301–3305.

2010–2011 Massachusetts Travel Survey

CTPS determined the percentage of youths who live in the scenario study areas who might purchase a Youth Pass using the Massachusetts Travel Survey (MTS), which was a large-scale, statewide survey that collected data on people's travel patterns. The survey was distributed to over 15,000 households between June 2010 and November 2011. From this survey CTPS determined the percentage of the survey's respondents by age who lived within the study area who used transit on any of their trips as they should be more likely to purchase a Youth Pass than those who did not use transit. The level of geography associated with the MTS for this analysis is the "ring"—two roughly concentric circles emanating from downtown Boston extending out to Route 128. CTPS used these rings because of their relationship to the study areas associated with the scenarios. Ring 0 and the dense portions of Ring 2 are included because they roughly overlap with people who live near transit in the 17 municipalities that are included in the various scenarios.

B. Additional Service Impacts Information

CTPS analyzed additional service impact statistics beyond the ones presented in Chapter 3 Section 2. These included rapid transit and bus share by month type, trip shares for individual service periods, and trip share by day of week. These tables are presented below.

Table A-1 presents changes to the share of trips made on bus and rapid transit in school months and in summer months in the pre-pilot and youth pass program data sets.

TABLE A-1
Changes to Rapid Transit and Bus Share Before and During Youth Pass Pilot Program in School and Summer Months

Month Type and Mode	Pre-Pilot	Youth Pass	Change in Percentage Points	Percentage Change
School: Bus Share	43.8%	38.1%	-5.7%	-13.0%
School: Rapid Transit Share	56.2%	61.9%	5.7%	10.1%
Summer: Bus Share	35.0%	39.5%	4.5%	13.0%
Summer: Rapid Transit Share	65.0%	60.5%	-4.5%	-7.0%

Data source: MBTA

In an average school month, the share of trips made on the rapid transit network increases by 5.7 percentage points from before to during the youth pass program. In an average summer month, the share of rapid transit trips made by Youth Pass pilot program participants decreases by 4.5 percentage points.

Table A-2 presents changes to the share of weekday trips made during all MBTA service periods, as defined in the MBTA Service Delivery Policy. This table shows these shares for summer months and before and during the Youth Pass pilot program. Highlighted cells are an increase from statistic calculated for the pre-pilot program to the pilot program data sets.

TABLE A-2
Changes to Service Period Trip Share Before and During Youth Pass Pilot Program in School and Summer Months

Service Period	Pre-Pilot: School Month	Youth Pass: School Month	Pre-Pilot: Summer Month	Youth Pass: Summer Month
Early AM (06:00-06:59)	8.6%	3.8%	0.7%	2.4%
AM Peak (07:00-08:59)	14.9%	16.1%	11.9%	15.6%
Midday Base (09:00-13:30)	15.3%	22.9%	26.8%	23.0%
Midday School (13:30-15:59)	27.9%	19.4%	18.7%	18.4%
PM Peak (16:00-18:29)	19.4%	20.1%	22.3%	21.6%
Evening (18:29-21:59)	10.9%	13.7%	13.9%	14.4%
Late Evening (22:00-23:59)	2.3%	3.2%	4.2%	3.4%
Night & Sunrise (24:00-05:59)	0.7%	0.8%	1.4%	1.2%

Data source: MBTA

In the school months, the share of trips made on weekdays in the Early AM and Midday School service periods decrease, while the share of trips increases in AM Peak, Midday Base, PM Peak, Evening, Late Evening, and Night & Sunrise service periods. In addition, the largest share of trips in the pre-pilot program data set is the Midday School service period, while in the youth pass pilot program, this is now the Midday Base service period. In summer months, the share of trips made on weekdays increases in the Early AM, AM Peak, and Evening service periods.

Table A-3 presents changes to the share of trips made on weekdays and weekends in school months and in summer months in the pre-pilot and youth pass program data sets.

TABLE A-3
Changes to Weekday and Weekend Trip Share Before and During Youth Pass Pilot Program in School and Summer Months

Service Period	Pre-Pilot	Youth Pass	Change in Percentage Points	Percentage Change
School: Weekday	87.8%	83.1%	-4.7%	-5.4%
School: Weekend	12.2%	16.9%	4.7%	38.7%
Summer: Weekday	80.0%	83.6%	3.6%	4.5%
Summer: Weekend	20.0%	16.4%	-3.6%	-17.8%

Data source: MBTA

In school months, the share of trips made on the weekend increases by 4.7 percentage points. This shift to weekend trips during the school year may indicate increased non-work or school related trips being made with the Youth Pass. In summer months, the share of trips made on the weekdays increases by 3.6 percentage points. This shift to weekday trips in summer months may indicate additional trips being made for work or recreation.

C. SCENARIO REVENUE ESTIMATION AND SERVICE IMPACTS METHODOLOGY

Revenue Estimation Methodology

The estimated enrollment numbers described in Tables 5-4 and 5-10 provide the basis for calculating expected net revenues for a continued Youth Pass program under each scenario. To calculate the expected net revenues for the Youth Pass program during the school year (10 months), CTPS multiplied the number of expected program enrollees for each age-and-school-enrollment category by the number of monthly passes they would purchase during the school year (10) and the price of the monthly pass ($26). CTPS calculated the average June 2015 foregone revenue for a person who spent more than $26 per month (and thus would have an incentive to purchase a Youth Pass). For school months, the average monthly foregone revenue per person was $50. These foregone revenues were subtracted from the expected Youth Pass revenue to generate net revenues, which were summed for all categories. To generate net revenues, CTPS followed a similar process to calculate expected Youth Pass program revenues and expected foregone revenues for the summer (2 months). For summer months the average monthly foregone revenue per person was $64. This information was used to generate an estimate of net program revenues for one year.

Under each scenario, several variables could affect net revenues; CTPS developed ranges of possible values to account for these. First, CTPS provided a range for the number of 19-to-21-year-old participants who are not enrolled in school, because it is challenging to capture how many of these individuals would meet the means-testing requirements for the program. Second, CTPS conducted a sensitivity analysis by considering a lower rate of participation. As a starting point, CTPS looked at the current rate of participation from the eligible population in the four participating municipalities, which was estimated at less than seven percent. CTPS also looked at the share of participants, as shown in the RST data, compared to the total number of applicants, which was approximately 18 percent. CTPS ultimately chose to adjust the enrollment numbers to 10 percent of their original value to calculate a low-end estimate for the two scenarios.

Service Impacts Methodology

The estimated enrollment numbers described in Tables 5-4, and 5-10 provide the basis for calculating expected service impacts for a continued Youth Pass program under each scenario. To calculate the expected net trips for the Youth Pass program during

the school year (10 months), CTPS multiplied the number of expected program enrollees by the number of trips per month they would be expected to make during a school year month with a Youth Pass. CTPS calculated the average school month (June 2015) pre-pilot trips for a person who spent more than $26 per month on fares (and thus would have an incentive to purchase a Youth Pass). For school months, the average monthly pre-pilot trips per person was 48 trips. These pre-pilot trips were subtracted from the expected Youth Pass trips to generate a net number of trips per school month. CTPS followed a similar process to calculate expected Youth Pass program trips and expected pre-pilot trips per month for the summer (2 months); for summer months the average monthly pre-pilot trips per person was 53 trips. This information was used to generate an estimate of net annual unlinked trips that would be made on the MBTA system. CTPS factored this estimate using trip share data from before and during the pilot program for the AM Peak and PM Peak service periods. The factor was developed using data that are included in the service impacts section in Chapter 3 (for peak period share before and during the Youth Pass pilot program) and Appendix 3 (for weekday share of trips before and during the Youth Pass pilot program).

As in the revenue estimation methodology described above, CTPS conducted a sensitivity analysis using a range of values based on adjusting the number of 19-to-21 year old participants who would be subject to the means testing criteria and an alternative estimated rate of participation, as described above in the fare impacts methodology. In addition, CTPS ultimately adjusted the number of net annual unlinked trips to reflect the number of trips that would take place during the AM-peak and PM-peak service periods.