

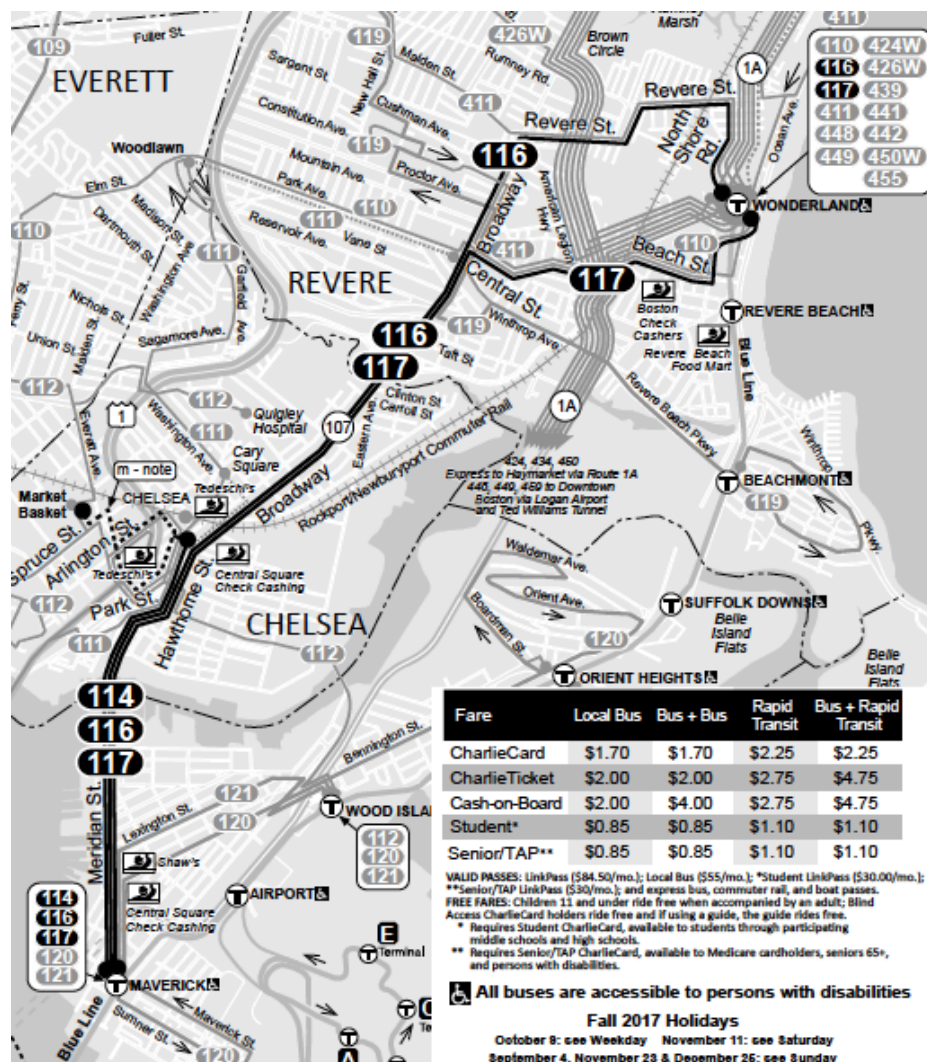
# Routes 116/117

116 Wonderland Station-Maverick Station via Revere Street  
 117 Wonderland Station-Maverick Station via Beach Street

## Route Overview

Routes 116 Wonderland Station-Maverick Station via Revere Street and Route 117 Wonderland Station-Maverick Station via Beach Street are two closely related Key Bus routes that serve the Broadway/Meridian Street corridor between Wonderland Station and Maverick Station (see Figure 1). The two routes operate along the same alignment except at their outer ends between Wonderland Station and the intersection of Broadway and Central Avenue in Revere.

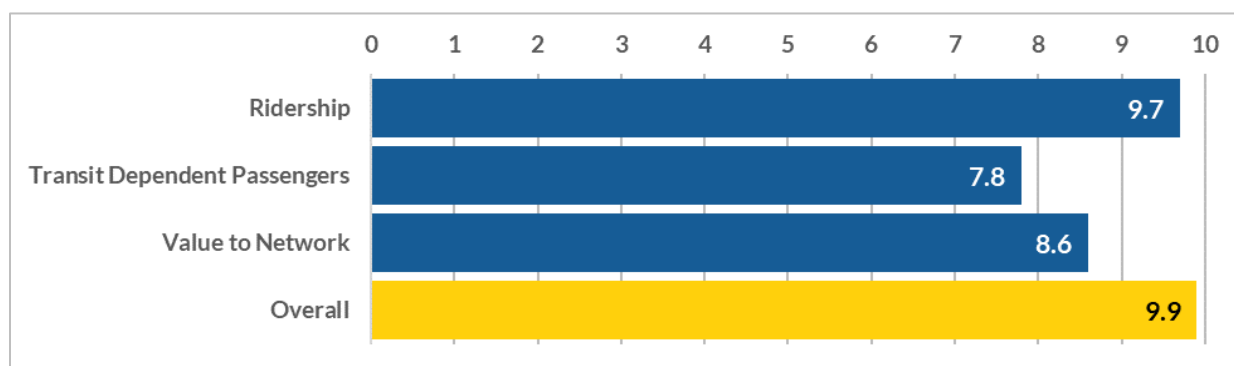
Figure 1 | Service Map



## Network Importance

Taken together, 116 and 117 play an extremely important role in the MBTA bus network. The combined routes serve a very high volume of riders and serve a large share of transit dependent riders. On a relative scale of 0 to 10, they rate 9.7 in terms of ridership, 7.8 in terms of transit dependent ridership, and 8.6 in terms of its value to the network (which reflects the number of people who are uniquely served, the number of jobs and other important destinations, and the number of transferring passengers). Their overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 9.9.

Figure 2 | Relative Importance within MBTA Bus Network (on a scale of 0 to 10) – Route 116/117



## Service Overview

### Alignments

Route 116 and Route 117 are very similar and differ only along their northern ends between Wonderland Station and the intersection of Broadway and Central Avenue in Revere. The two routes are, in effect, the same route with different outer branches:

- Route 116 inbound service operates north from Wonderland Station along North Shore Road, and then west via Revere Street to Broadway. It then operates south along Broadway, Hawthorne Street, Park Street, Pearl Street, and Meridian Street to Maverick Station. It operates outbound along the same alignment in reverse.
- Route 117 inbound service operates south from Wonderland Station along North Shore Road to southwest on VFW Parkway to west on Beach Street to Central Avenue to Broadway. From there it follows the same alignment as Route 116.

### Schedule

Route 116 and Route 117 both operate for long hours seven days a week (see Table 1 and Table 2). Service on both routes is fairly frequent, and frequent when combined service levels are considered:

### Route 116 (via Revere Street)

- On weekdays, service operates from 5:15 AM to 1:20 AM. Average frequencies are every 15 minutes before 6:00 AM, eight minutes in the early AM and AM peak, 19 to 26 minutes during the two midday periods, every 17 minutes during the PM peak, and 32 to 44 minutes from evening to night.
- On Saturdays, service operates from 5:25 AM to 1:19 AM. Frequencies range from 28 to 43 minutes but average every 32 minutes.

Table 1 | Route 116 Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
<b>Monday-Friday</b>	<b>5:15 AM to 1:20 AM</b>			<b>63/63</b>
Sunrise	5:30 AM to 5:59 AM	15	15	3/2
Early AM	6:00 AM to 6:59 AM	4 - 15	8	8/5
AM Peak	7:00 AM to 8:59 AM	1 - 20	8	16/15
Midday Base	9:00 AM to 1:29 PM	16 - 30	26	10/10
Midday School	1:30 PM to 3:59 PM	16 - 23	19	8/8
PM Peak	4:00 PM to 6:29 PM	16 - 26	17	8/9
Evening	6:30 PM to 9:59 PM	26 - 34	32	7/8
Late Evening	10:00 PM to 11:59 PM	28 - 44	35	3/4
Night	12:00 AM to 1:20 AM	44 - 44	44	1/2
<b>Saturday</b>	<b>5:25 AM to 1:19 AM</b>	<b>28 - 43</b>	<b>32</b>	<b>36/37</b>
<b>Sunday</b>	<b>5:25 AM to 1:18 AM</b>	<b>36 - 44</b>	<b>40</b>	<b>29/32</b>

Note: Span of service reflects the time the first bus begins service until the time the last bus finishes service.

Table 2 | Route 117 Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
<b>Monday-Friday</b>	<b>4:25 AM to 12:54 AM</b>			<b>43/49</b>
Sunrise	4:25 AM to 5:59 AM	3 - 27	15	7/2
Early AM	6:00 AM to 6:59 AM	12 - 15	14	4/4
AM Peak	7:00 AM to 8:59 AM	15 - 20	17	7/7
Midday Base	9:00 AM to 1:29 PM	19 - 30	26	11/10
Midday School	1:30 PM to 3:59 PM	16 - 23	20	7/9
PM Peak	4:00 PM to 6:29 PM	16 - 27	19	8/9
Evening	6:30 PM to 9:59 PM	25 - 36	31	7/8
Late Evening	10:00 PM to 11:59 PM	30 - 45	35	4/4
Night	12:00 AM to 12:54 AM	45 - 45	45	1/1
<b>Saturday</b>	<b>5:25 AM to 1:30 AM</b>	<b>20 - 51</b>	<b>32</b>	<b>39/36</b>
<b>Sunday</b>	<b>5:25 AM to 1:27 AM</b>	<b>26 - 51</b>	<b>37</b>	<b>33/33</b>

Note: Span of service reflects the time the first bus begins service until the time the last bus finishes service.

- On Sundays, service operates from 5:25 AM to 1:18 AM, essentially the same as on Saturdays, but with slightly lower frequencies that range from 36 to 44 minutes and average every 40 minutes.

### **Route 117 (via Beach Street)**

- On weekdays, service operates from 4:25 AM to 12:54 AM. Average frequencies are every 15 minutes before 6:00 AM, 14 minutes in the early AM, 17 minutes in the AM peak, 26 to 20 minutes during the two midday periods, every 19 minutes during the PM peak, and 31 to 45 minutes from evening to night.
- Compared to Route 116, Route 117 starts earlier and provides less weekday service. However, this is largely because short-turn trips between Bellingham Square and Maverick Station are designated as Route 116 trips.
- On Saturdays, service operates from 4:33 AM to 1:30 AM. Frequencies range from 20 to 51 minutes but average every 32 minutes.
- On Sundays, service operates from 4:33 AM to 1:27 AM, which is similar as on Saturdays, but with slightly lower frequencies that range from 26 to 51 minutes and average every 37 minutes.

### **Combined Service**

- On weekdays, inbound service before 5:00 AM is provided as Route 117 via Beach Street.
- Between then and slightly after 6:15 AM, Route 116 and Route 117 trips alternate and provide combined headways of every six to 9 minutes.
- From 6:15 AM to slightly after 8:00 AM, Route 116 short-trips between Bellingham Square and Maverick Station are added to the schedule. There is no regular pattern with which short-turns are slotted between regular trips; sometimes short-trips alternative with long trips and sometimes there are two regular trips followed by two short-trips. Combined headways along the outer end of the route range from four to 12 minutes, and headways between Bellingham Square and Maverick Station are very frequent and generally range from every four to six minutes.
- For the rest of the day, Route 116 and Route 117 trips alternate. Approximate average headways are 13 minutes in the midday base period, 10 minutes in the midday school period, nine minutes in the PM peak, 15 minutes in the evening period, 18 minutes in the late evening, and every 20 to 25 minutes at night.
- Note that since this document was developed, the MBTA has added earlier and later service to Route 117.

When considered separately, both routes meet the span of service standards, but not the evening and late evening frequency standards, when service on each route operates every

25 to 45 minutes versus the standard of 20 minutes. When considered together, there are some minor instances of longer than standard headways around midnight.

## Service Patterns

Service patterns for Route 116 and Route 117 are (see Table 3 and Table 4):

Table 3 | Route 116 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
<b>INBOUND</b>				<b>64</b>	<b>36</b>	<b>29</b>
116.4	Wonderland Station	Maverick Station	Primary pattern	52	36	29
116.7	Hawthorne Street at Broadway	Maverick Station	Short-turn service	12	-	-
<b>OUTBOUND</b>				<b>63</b>	<b>37</b>	<b>32</b>
116.4	Maverick Station	Wonderland Station	Primary pattern	54	37	31
116.7	Maverick Station	Hawthorne at Broadway	Short-turn service	9	-	-
116.9	Broadway at Central Avenue	Wonderland Station	First Sunday AM outbound trip	-	-	1

Table 4 | Route 117 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
<b>INBOUND</b>				<b>56</b>	<b>39</b>	<b>33</b>
117.0	Wonderland Station	Haymarket Station	Early morning service to downtown before Blue Line is open	2	1	3
117.5	Wonderland West Busway	Maverick Station	Via Beach Street	53	36	29
117.8	Broadway at Central Avenue	Haymarket Station	Early morning service to downtown before Blue Line is open	1	-	-
117.9	Wonderland West Busway	Broadway at Central Avenue	Last outbound trips	-	2	1
<b>OUTBOUND</b>				<b>54</b>	<b>36</b>	<b>33</b>
117.1	Haymarket Station	Logan Airport Terminal C	First outbound trip	1	1	1
117.5	Maverick Station	Wonderland Station	Via Beach Street	53	35	30
117.2	Haymarket Station	Maverick Station	Early morning trips	-	-	2

## Route 116 (via Revere Street)

### Weekdays

- Pattern 116.4 makes 52 of 64 inbound trips and 54 of 63 outbound trips operating the main alignment from Wonderland Station to Maverick Station.
- Pattern 116.7 makes 12 inbound trips and nine outbound during the early AM and AM peak operating a shortened version of the route from Hawthorne Street at Broadway in Chelsea to Maverick Station.

### Saturdays and Sundays

- Pattern 116.4 makes all inbound trips except one, operating the full length of the route.
- Pattern 116.9 makes one trip, the first Sunday outbound trip that operates only as far as Broadway at Central Avenue in Revere.

## Route 117 (via Beach Street)

### Weekdays

- Pattern 117.5 makes 53 of 56 inbound trips and 53 of 54 outbound trips operating the main route from Wonderland Station to Maverick Station.
- Pattern 117.8 makes the first inbound trip at 4:25 AM beginning service on Broadway at Central Avenue and operating to Maverick Station, and then continues on to Haymarket Station.
- Pattern 117.0 makes the next two inbound trips at 4:35 AM and 4:38 AM running the full length of the route, and then continuing inbound from Maverick Station to Haymarket Station.
- Pattern 117.1 makes an outbound trip at 5:10 AM beginning service at Haymarket Station and operating to Terminal C at Logan Airport. (Although this trip is designated as Route 117, it does not operate along any of the regular route.)

### Saturdays

- Pattern 117.5 makes 36 of 39 inbound trips and 35 of 36 outbound trips operating along the primary alignment.
- Pattern 117.0 makes the first inbound trip at 4:33 AM operating the full length of the route and then continuing inbound from Maverick Station to Haymarket Station.
- Pattern 117.9 makes the last two inbound trips at 1:03 AM and 1:23 AM, only operating to Broadway at Central Avenue.
- Pattern 117.1 makes the first outbound trip at 5:10 AM beginning service at Haymarket Station and operating to Terminal C at Logan Airport.

### Sundays

- Pattern 117.5 makes 29 of 33 inbound trips and 30 of 33 outbound trips operating along the primary alignment.
- Pattern 117.0 makes the first three inbound trips at 4:33 AM, 5:03 AM, and 5:33 AM operating the full length of the route and then continuing inbound from Maverick Station to Haymarket Station.
- Pattern 117.9 makes the last two inbound trips at 1:03 AM and 1:23 AM only operating to Broadway at Central Avenue.
- Pattern 117.1 makes the first outbound trip at 5:10 AM, beginning service at Haymarket Station and operating to Terminal C at Logan Airport.

## Ridership

Route 116 carries 6,140 riders on weekdays, 3,590 on Saturdays, and 2,630 on Sundays, and Route 117 carries 5,450 riders on weekdays, 3,250 on Saturdays, and 2,640 on Sundays. Considered individually, and in terms of weekday ridership, Route 116 is the MBTA's 19<sup>th</sup> highest ridership route and Route 117 the 24<sup>th</sup> highest.

However, when considered together, the two routes carry 11,590 riders on weekdays, 6,840 on Saturdays, and 5,270 on Sundays. This equates to the seventh highest weekday ridership, sixth highest Saturday ridership, and sixth highest Sunday ridership. The Broadway/Meridian Street corridor is one of the MBTA's highest ridership bus corridors.

### **Ridership by Stop**

Most passengers travel to and from Maverick Station. However, there is also a significant amount of intermediate ridership: Combined ridership on 116 and 117 weekday inbound trips is (see Figure 3):

- 872 passengers, or 14% of all passengers, board at Wonderland Station. This is the third highest ridership stop on the route after Maverick Station and Broadway at Washington Street in Bellingham Square.
- A total of 360 passengers board and 276 alight at the nine stops along the unique segment of Route 116 between Wonderland Station and Broadway at Central Avenue (mostly along Revere Street).
- A total of 490 passengers board and 210 alight at the eight stops along the unique segment of Route 117 between Wonderland Station and Broadway at Central Avenue (mostly along Beach Street).
- 1,180 passengers board and 320 alight at the 13 stops along Broadway before Washington Street.

- 650 passengers board and 400 alight at Broadway at Washington Street in Bellingham Square. This is the second busiest stop on the route after Maverick Station.
- 2,060 passengers board and 1,270 alight at the 11 stops between Bellingham Square and Maverick Station. The highest activity stops at are just south of the main Bellingham Square stop.
- 3,040, or 51% of all passengers, alight at Maverick Station.

In addition, 140 passengers use the three early morning trips that operate to Haymarket Station before the Blue Line opens.

## Ridership by Trip

### Weekdays

Inbound, both Route 116 and Route 117 start with very high ridership per trip (see Figure 4 and Figure 5). The first three Route 117 trips, which travel to Haymarket Station, carry a total of 160 riders and two of three have maximum loads that exceed the MBTA's maximum loading standards. Ridership remains high on all full length trips through the end of the AM peak, and many of these trips also have loads that exceed the MBTA's maximum load standards. The short-turn trips all carry fewer passengers and none are overcrowded. Ridership fluctuates through the midday but remains high at 50 to 70 riders on most trips. However, none are overcrowded. Ridership remains strong on Route 116 through 6:00 PM but is lower on Route 117. On both routes, ridership declines steadily until service ends.

Outbound, Route 116's first trip at 5:29 AM carries 69 riders, with a maximum load of 41, indicating demand for earlier service (see Figure 6 and Figure 7). Ridership on the next trip at 6:00 AM is less than half that, but morning ridership peaks again 7:14 AM with 70 riders. Ridership per trip on both routes then declines to fewer than 40 passengers until around 9:30 AM, and then increases steadily to over 80 passengers in the PM peak. Ridership then declines but remains steady at around 45 passengers per trip for the remainder of day.



Figure 3 | Weekday Inbound Ridership by Stop

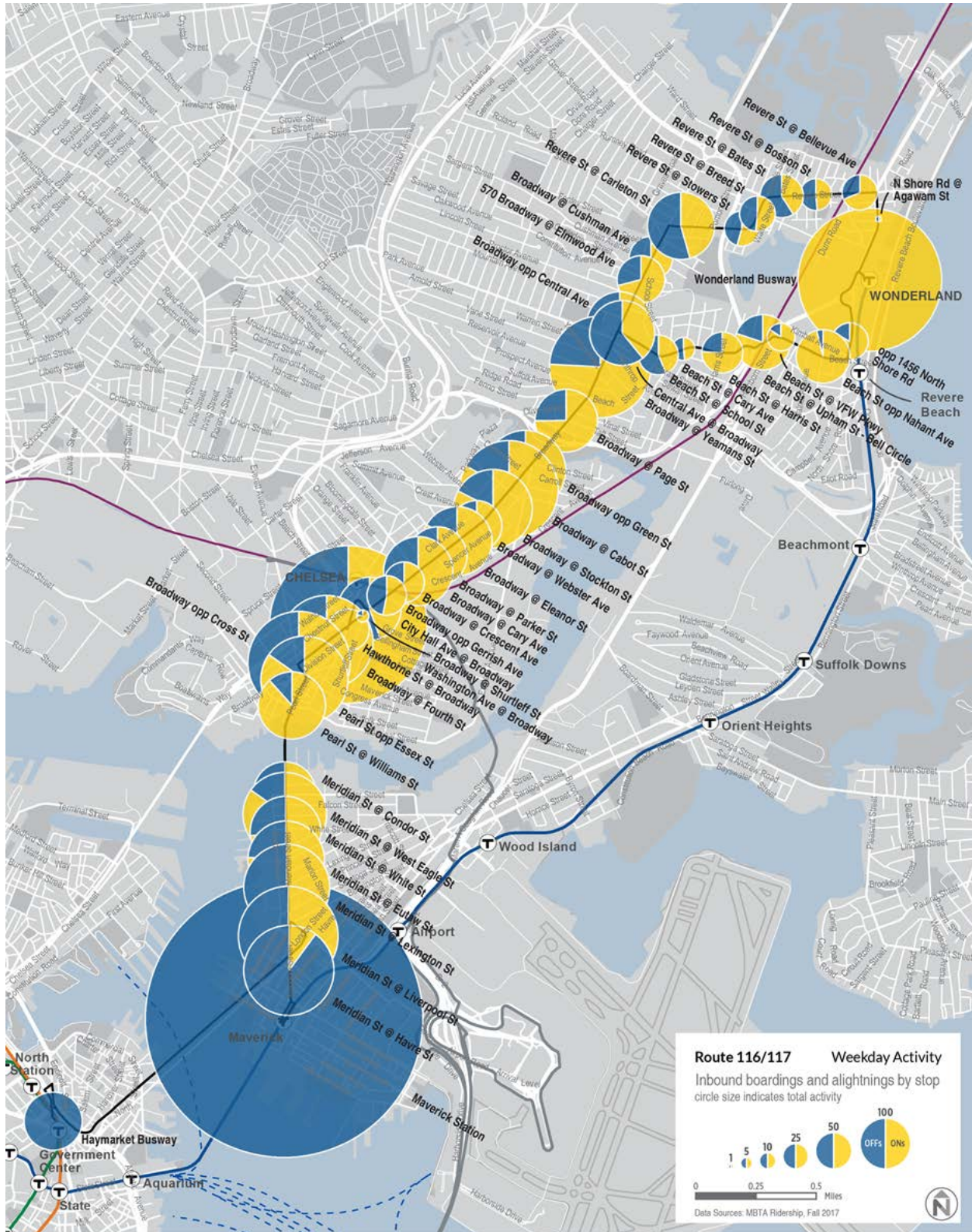


Figure 4 | Route 116 Weekday Ridership by Trip: Inbound

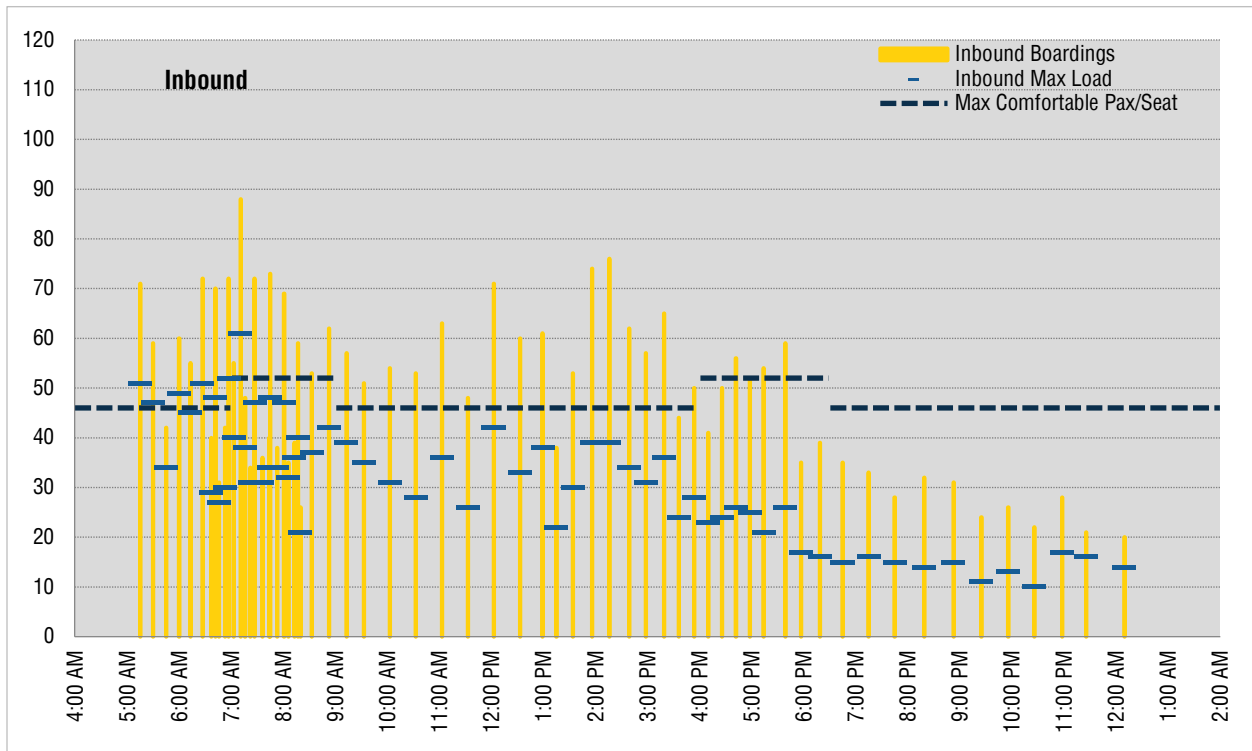


Figure 5 | Route 117 Weekday Ridership by Trip: Inbound

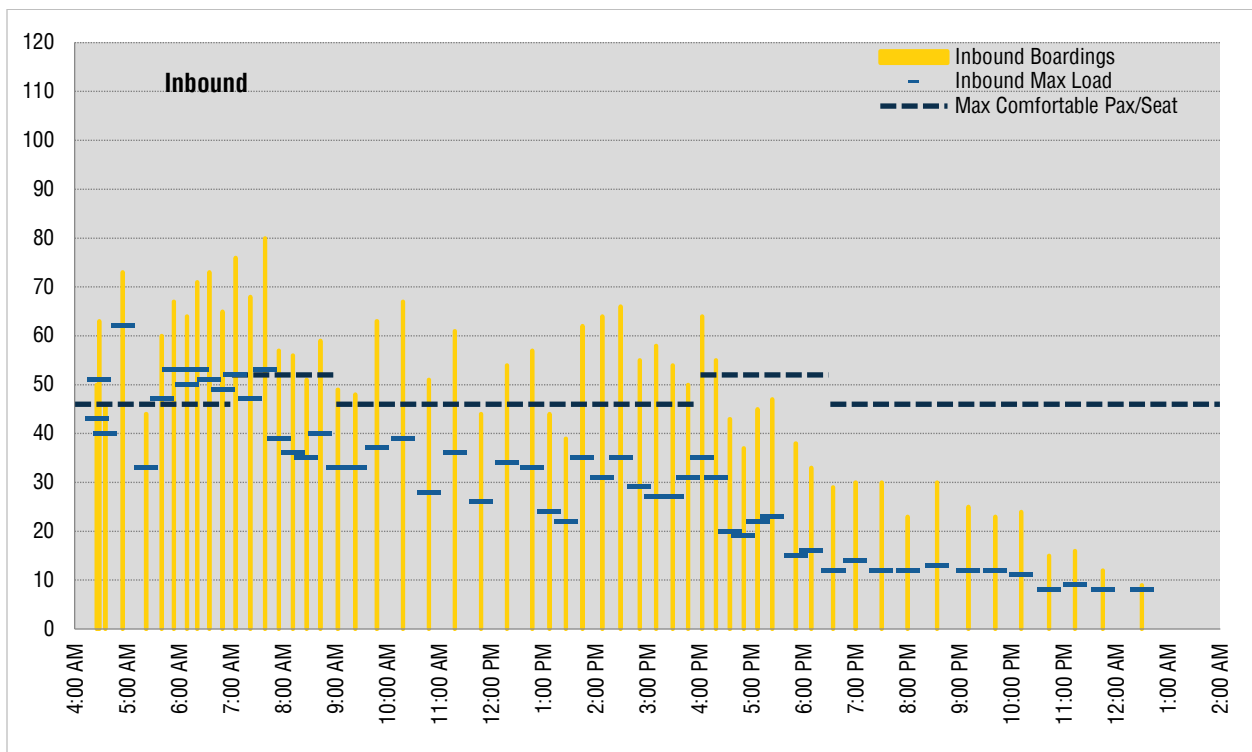


Figure 6 | Route 116 Weekday Ridership by Trip: Outbound

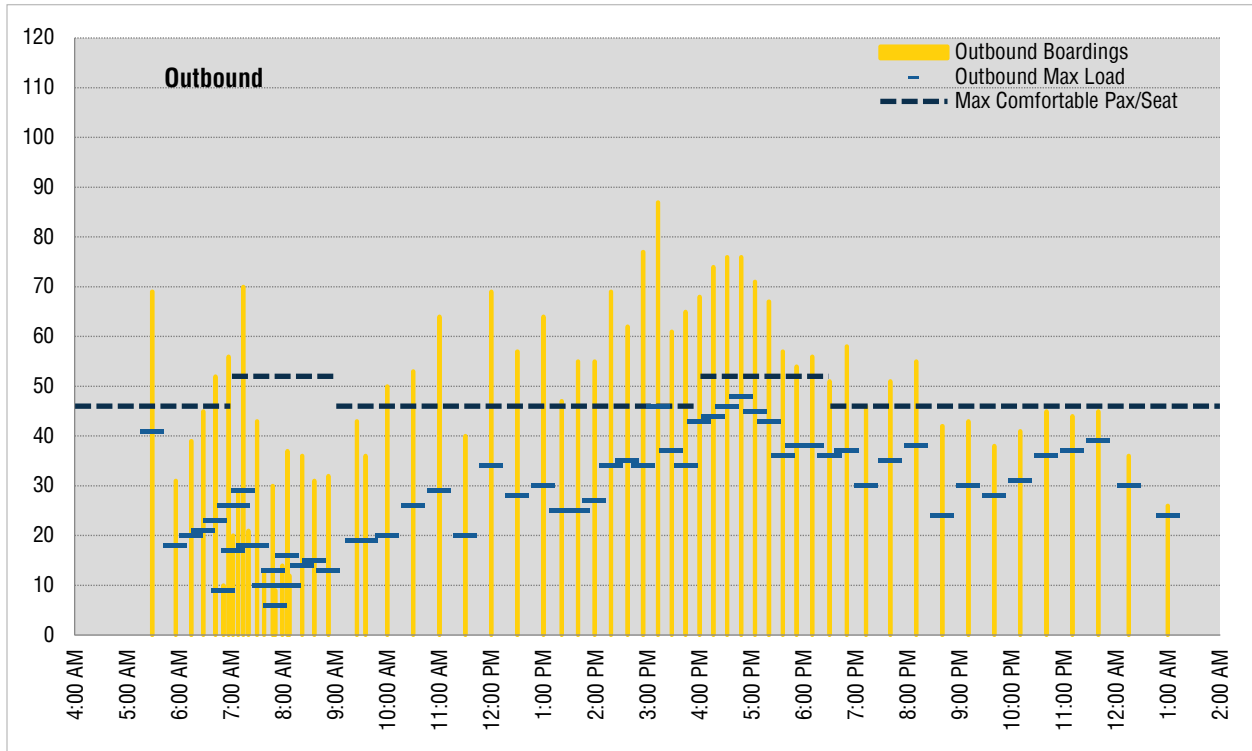
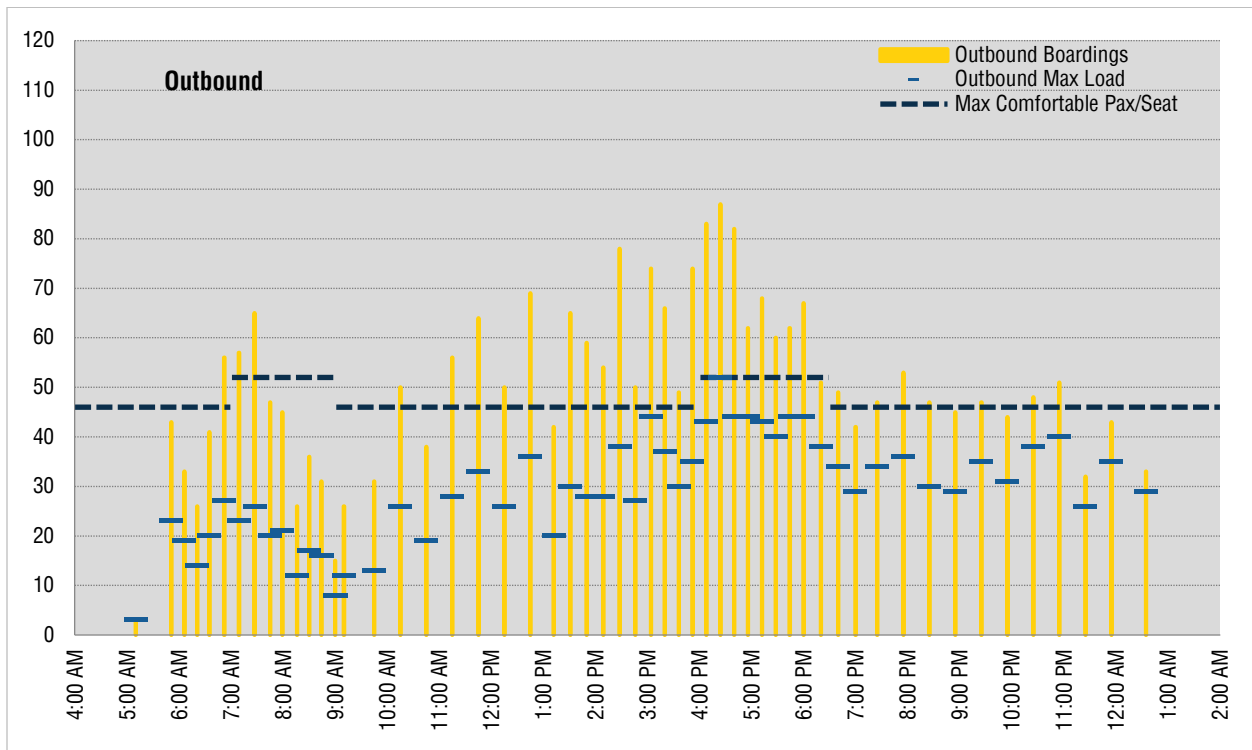


Figure 7 | Route 117 Weekday Ridership by Trip: Outbound



## Saturdays

Inbound ridership per trip on both routes is high for most of the service day, with between 55 and 70 passengers on most trips from 6:00 AM to 6:00 PM (see Figure 8 and Figure 9). The first Route 117 inbound trip and many Route 116 early morning trips are overcrowded. Ridership stays high until around 7:00 PM and then begins to decline.

Outbound, ridership per trip increases gradually through the day, from a low of 20 to 30 passengers in the early morning to highs of around 50 to 70 passengers between 3:00 PM and 5:00 PM (see Figure 10 and Figure 11). Ridership on both routes plateaus at roughly 50 passengers per trip from 5:00 PM to the end of service. Ridership on the last trip at 12:34 AM is 38 passengers, which indicates demand for later service.

## Sundays

Sunday ridership patterns on Route 116 and Route 117 are altogether different from weekdays and Saturdays. Inbound, Route 116 ridership per trip is highest from 9:00 AM to 5:00 PM, with most trips carrying between 60 and 80 riders (see Figure 12 and Figure 13). Route 117's first three early morning trips serve Haymarket Station and carry between 38 and 62 riders per trip. Ridership during the day is highest from about 1:00 PM to 7:00 PM, with 50 to 75 passengers per trip. It then drops off sharply after 8:00 PM.

Outbound, Route 116 Sunday ridership is steady throughout the day, with the exception of one midday trip and two evening trips that carry between 70 and 90 riders per trip (see Figure 14). Route 117 also has consistent ridership for much of the day, with a peak in the late afternoon from 2:30 PM to 5:30 PM when ridership exceeds 60 riders per trip (see Figure 15).

Figure 8 | Route 116 Saturday Ridership by Trip: Inbound

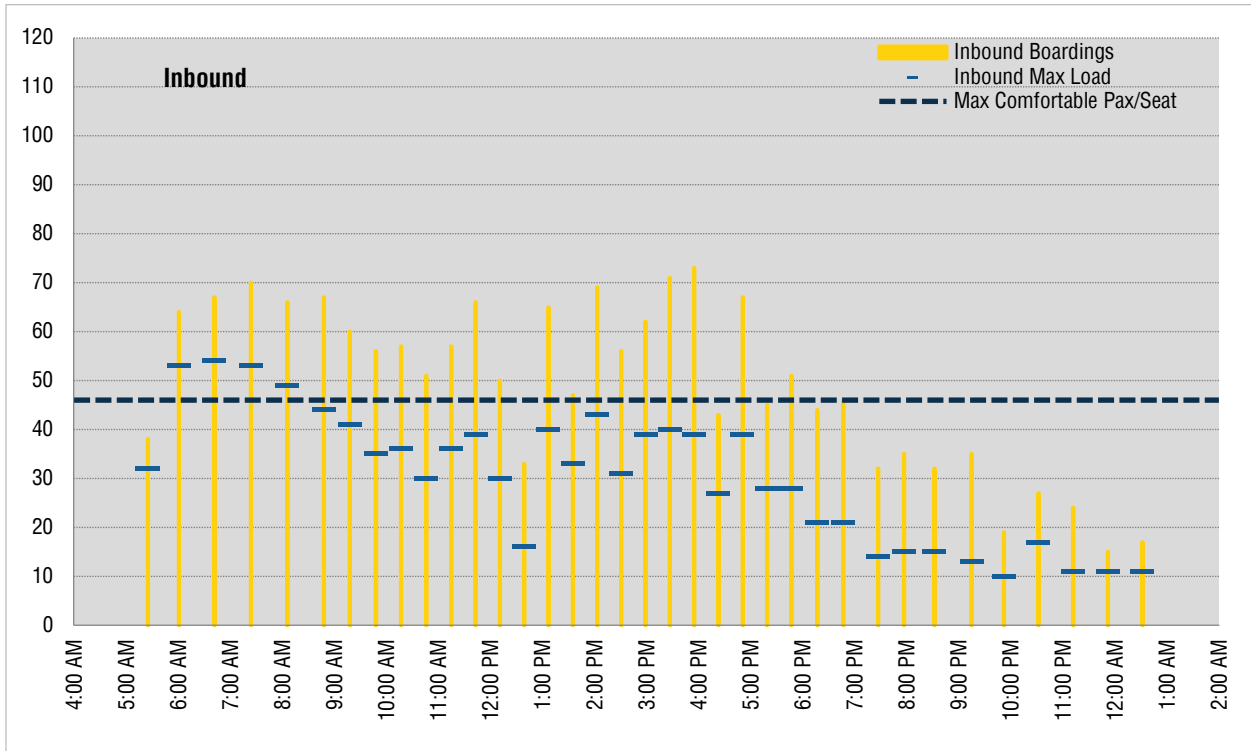


Figure 9 | Route 117 Saturday Ridership by Trip: Inbound

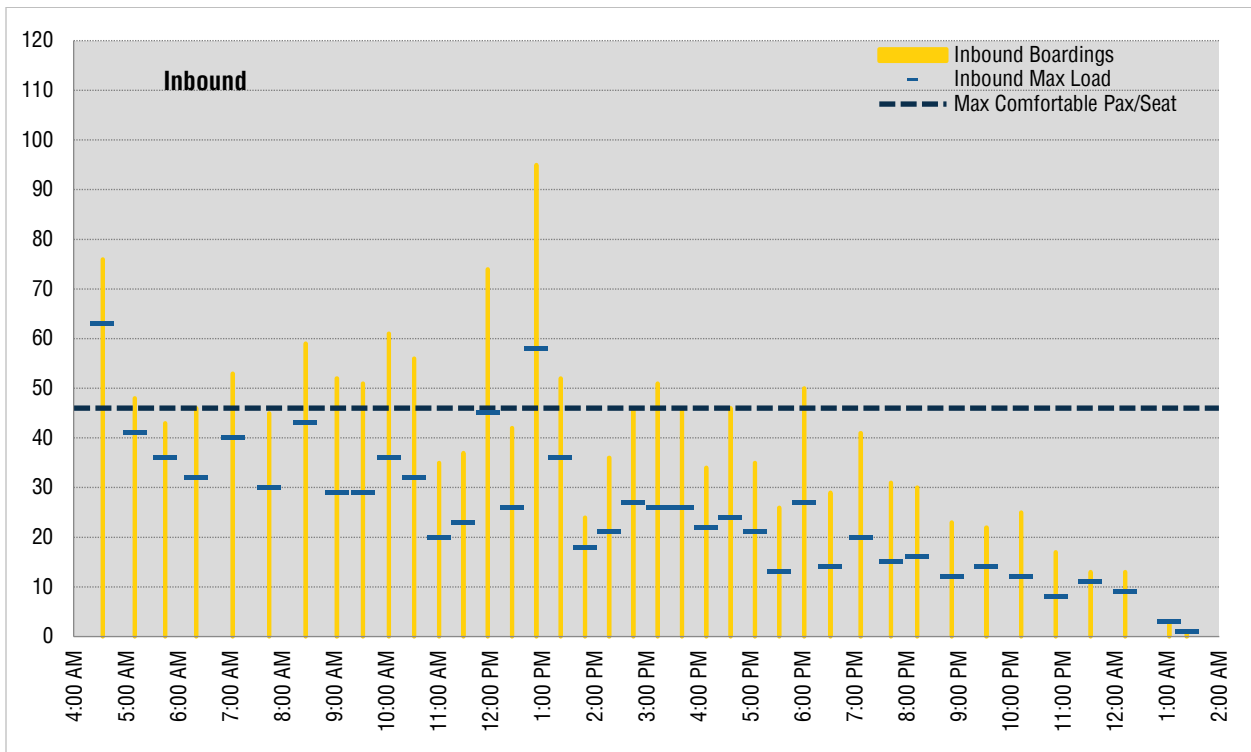


Figure 10 | Route 116 Saturday Ridership by Trip: Outbound

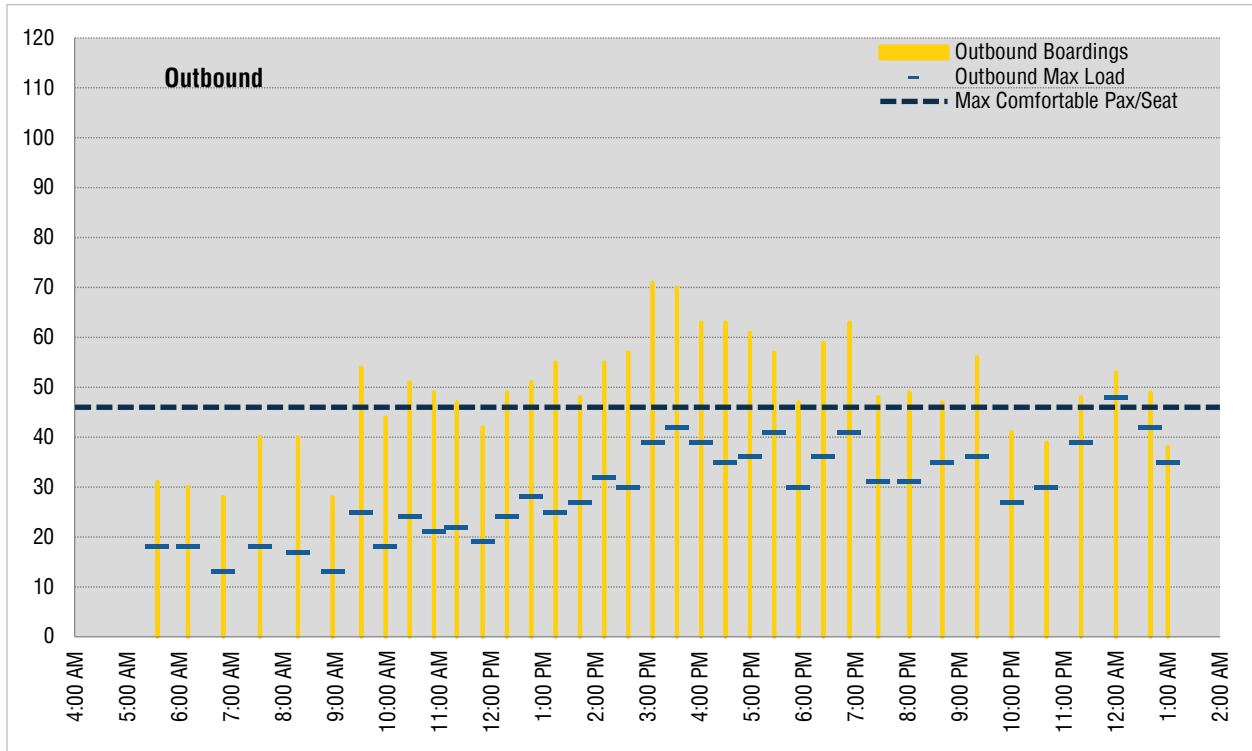


Figure 11 | Route 117 Saturday Ridership by Trip: Outbound

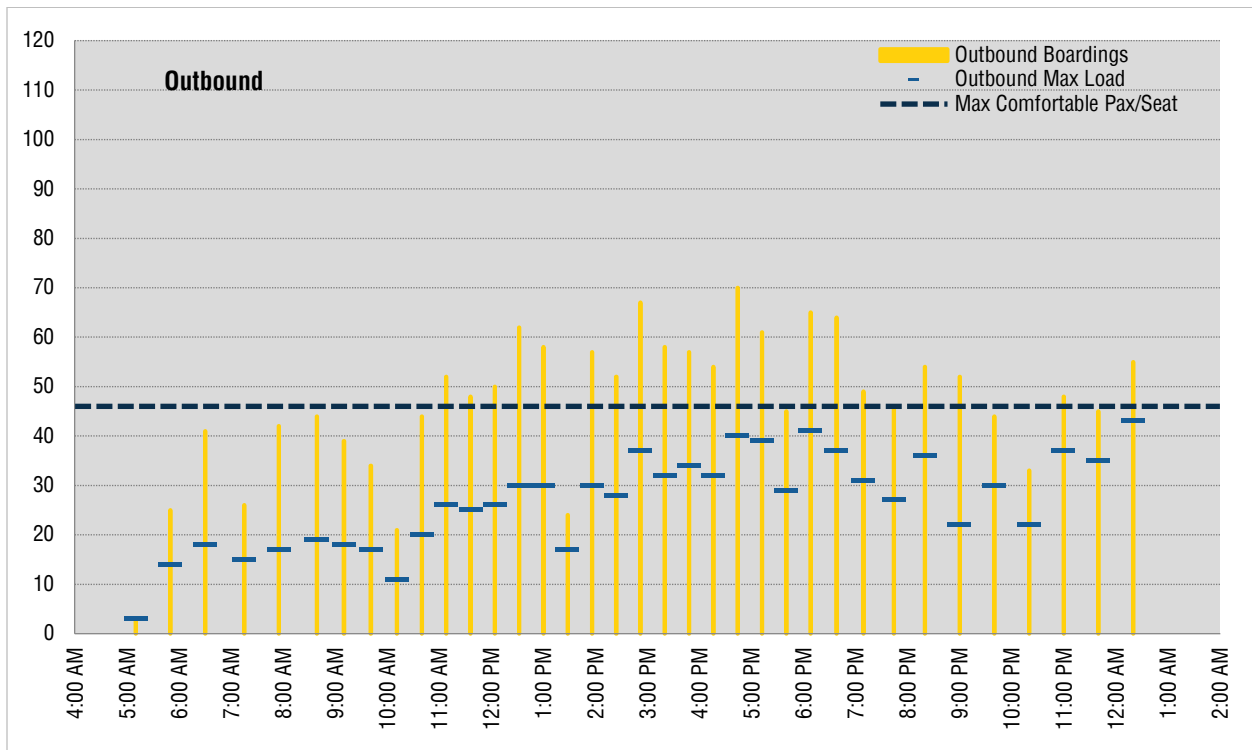


Figure 12 | Route 116 Sunday Ridership by Trip: Inbound

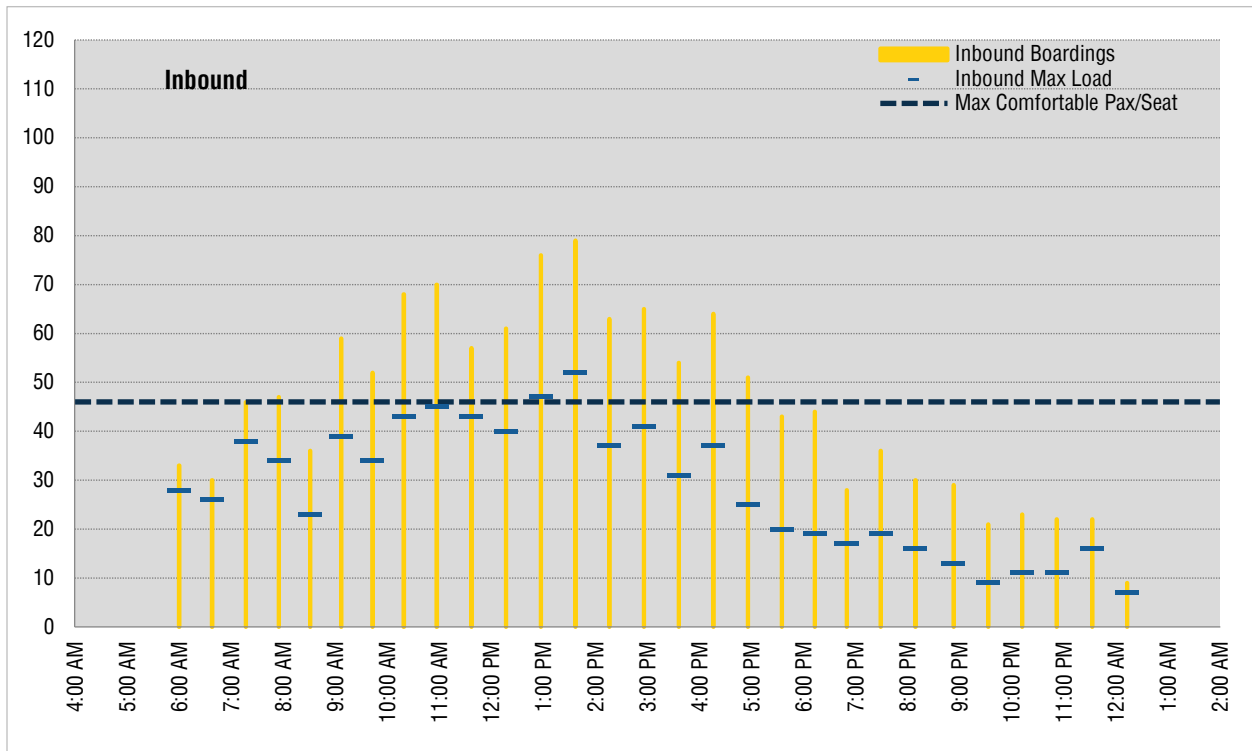


Figure 13 | Route 117 Sunday Ridership by Trip: Inbound

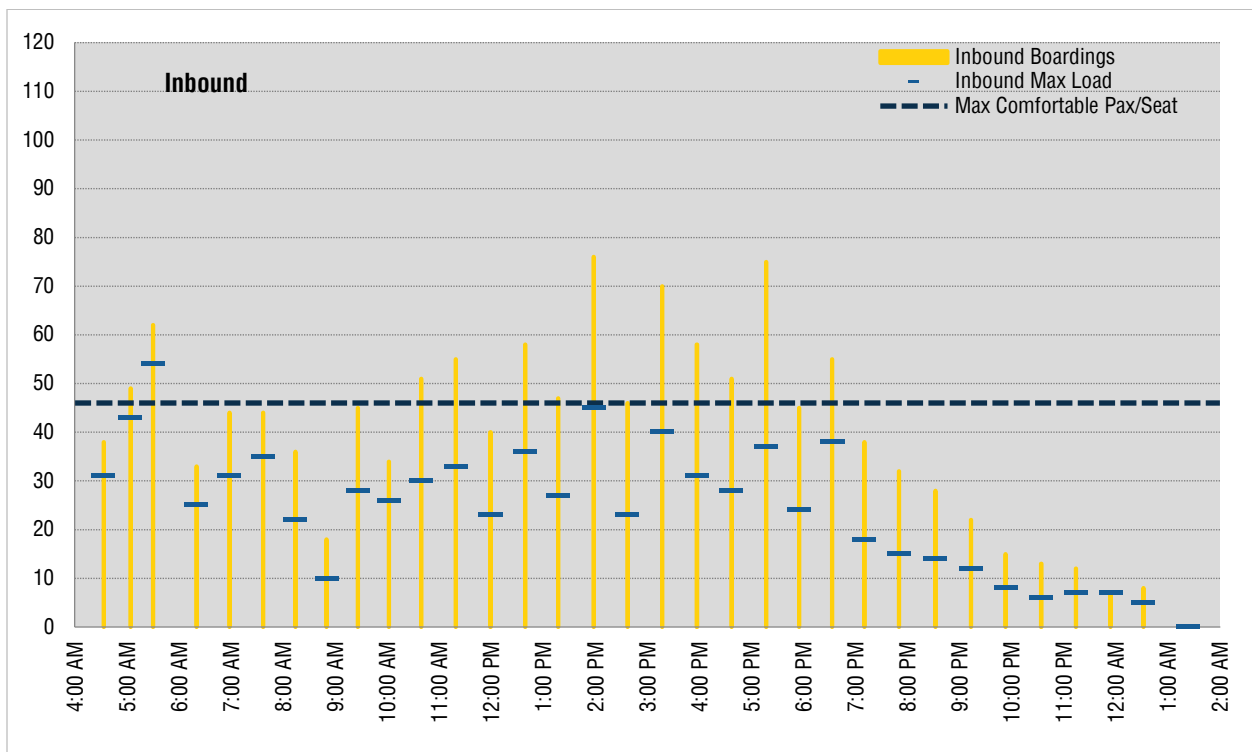


Figure 14 | Route 116 Sunday Ridership by Trip: Outbound

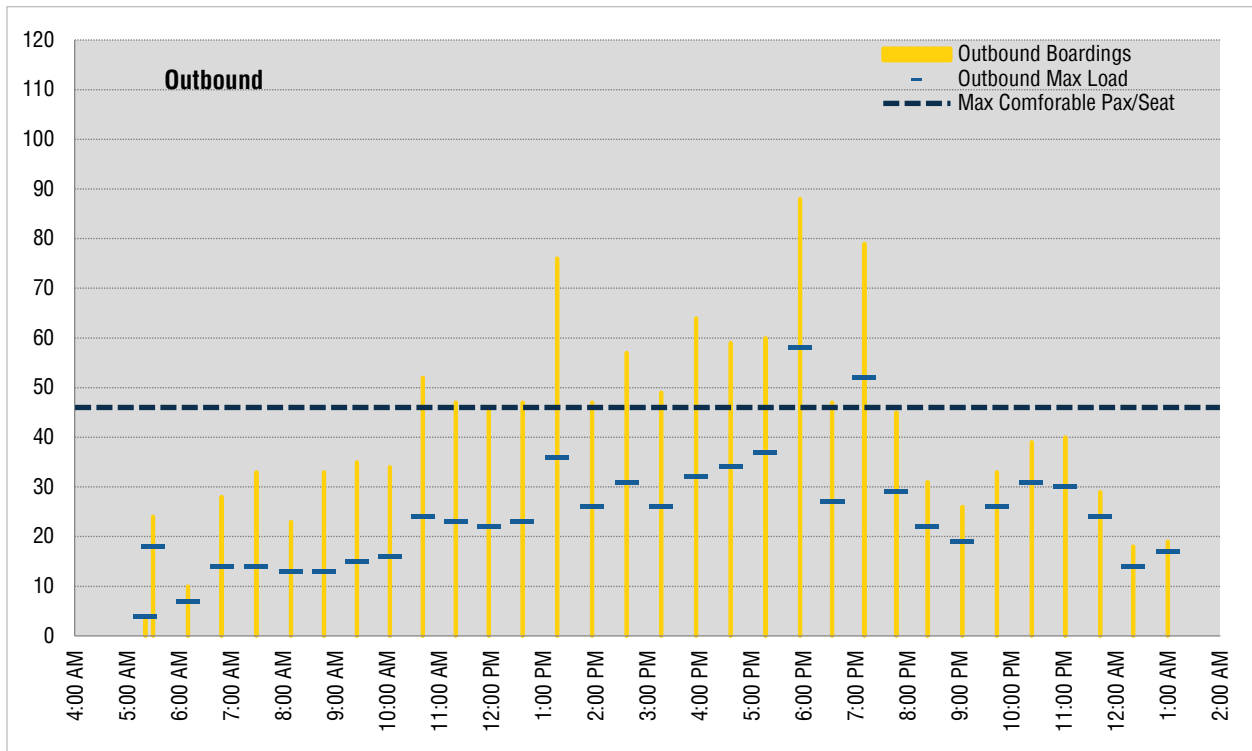
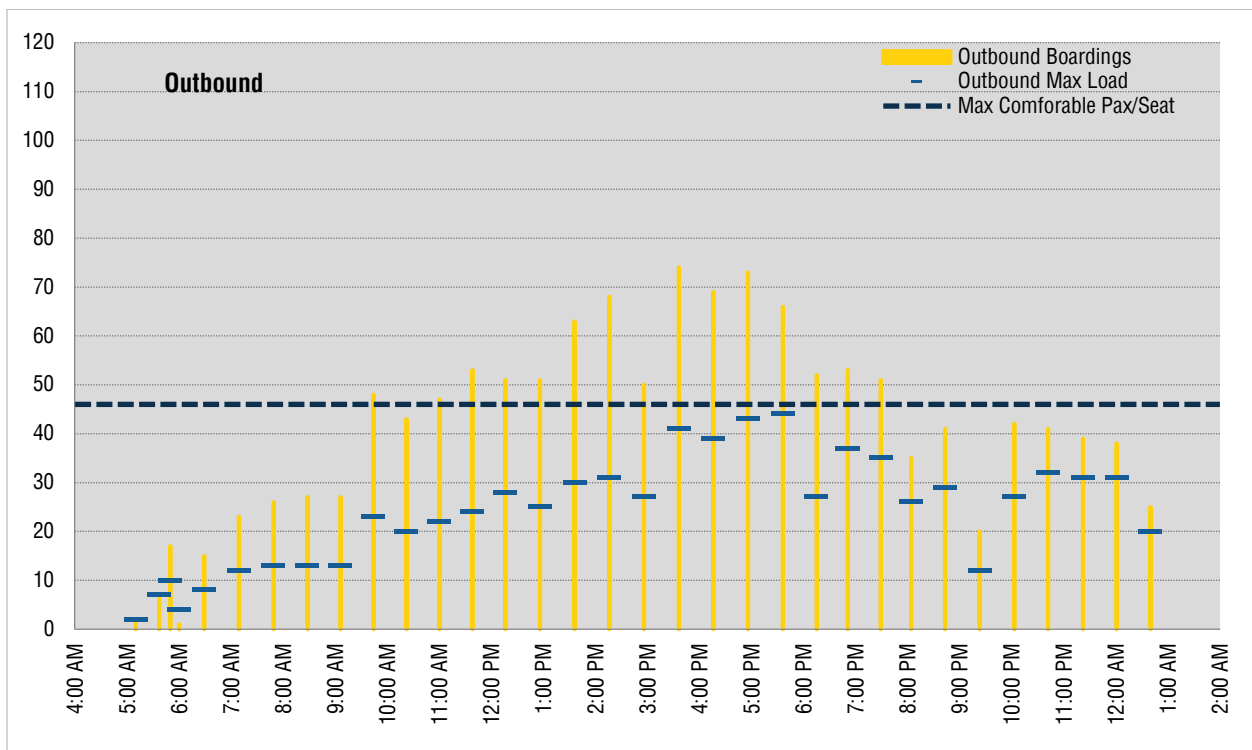


Figure 15 | Route 117 Sunday Ridership by Trip: Outbound





## Passenger Comfort

The MBTA desires that passengers travel in relatively comfortable conditions. At the same time, the MBTA's definition of comfort reflects the very high volume environment in which the MBTA operates, and that some passengers may have to stand for a portion of their trip. More specifically, at least 92% of passengers' travel times should be in comfortable conditions, and ideally, at least 96% of travel times should be in comfortable conditions. Comfortable conditions are considered to be 140% or less of seated capacity during high volume periods and 125% or less during other periods.

Route 116 and Route 117 both experience significant levels of overcrowding. Weekday comfort levels, at 90.7% and 88.7% fail to meet the minimum standard of 92% (see Table 5). However, weekend comfort levels on both routes are near or above the target of 96%.

Table 5 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
<b>Minimum Standard</b>	92%	92%	92%
<b>Target</b>	96%	96%	96%
<b>Actual: Route 116</b>	90.7%	95.4%	96.9%
<b>Actual: Route 117</b>	88.7%	96.5%	94.8%

## Reliability

Route 116 and Route 117 both have reliability problems (see Table 6 and Table 7). On weekdays, Route 116's overall reliability is 71%, and Route 117's is 74%. These levels are all below the minimum standard of 75% for Key Bus routes and the target of 80%.

Weekend reliability is better but still below target levels. Dropped trips are an issue, but to a lesser extent than on many other Key Bus routes.

Table 6 | Route 116 Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
<b>Monday-Friday</b>	71%	72%	71%	2.3%
<b>Saturday</b>	76%	75%	76%	-
<b>Sunday</b>	74%	79%	75%	-

Table 7 | Route 117 Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
<b>Monday-Friday</b>	73%	80%	74%	1.4%
<b>Saturday</b>	78%	81%	78%	-

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Sunday	76%	84%	78%	-

### Running Times

One major reason for poor reliability on Route 116 and Route 117 are that actual running times exceed scheduled running times (see Table 6 and Table 7):

- Route 116’s actual travel times consistently exceed scheduled time throughout the day, generally by two to five minutes (see Figure 16 and Figure 17). Delays are most pronounced traveling inbound between 7:00 AM to 8:00 AM and 2:00 PM to 4:30 PM and traveling outbound between 2:00 PM and 7:00 PM.
- Route 117’s travel times are also generally longer than scheduled in both directions (see Figure 18 and Figure 19). Inbound travel times generally exceed scheduled travel times by three to six minutes during most daytime hours (9:00 AM to 6:00 PM), while outbound travel times tend to run longer than scheduled later in the afternoon and into the evening (between noon and 9:00 PM).
- An additional factor affecting the reliability of Route 116 and Route 117 is the Andrew McArdle Draw Bridge, which connects Meridian Street and Perl Street. When the bridge is allowing ships to pass buses are forced to wait, causing significant schedule disruptions.

Figure 16 | Scheduled & Median Travel Time by Trip: Route 116 Inbound

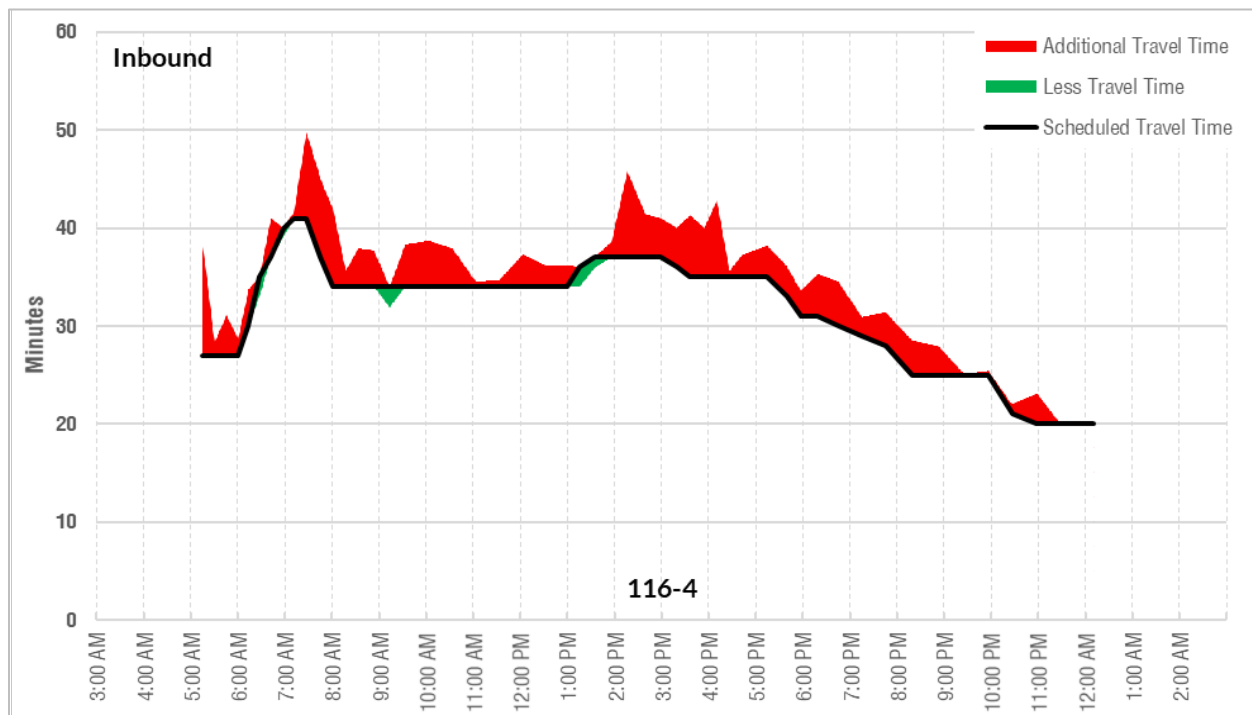


Figure 17 | Scheduled & Median Travel Time by Trip: Route 116 Outbound

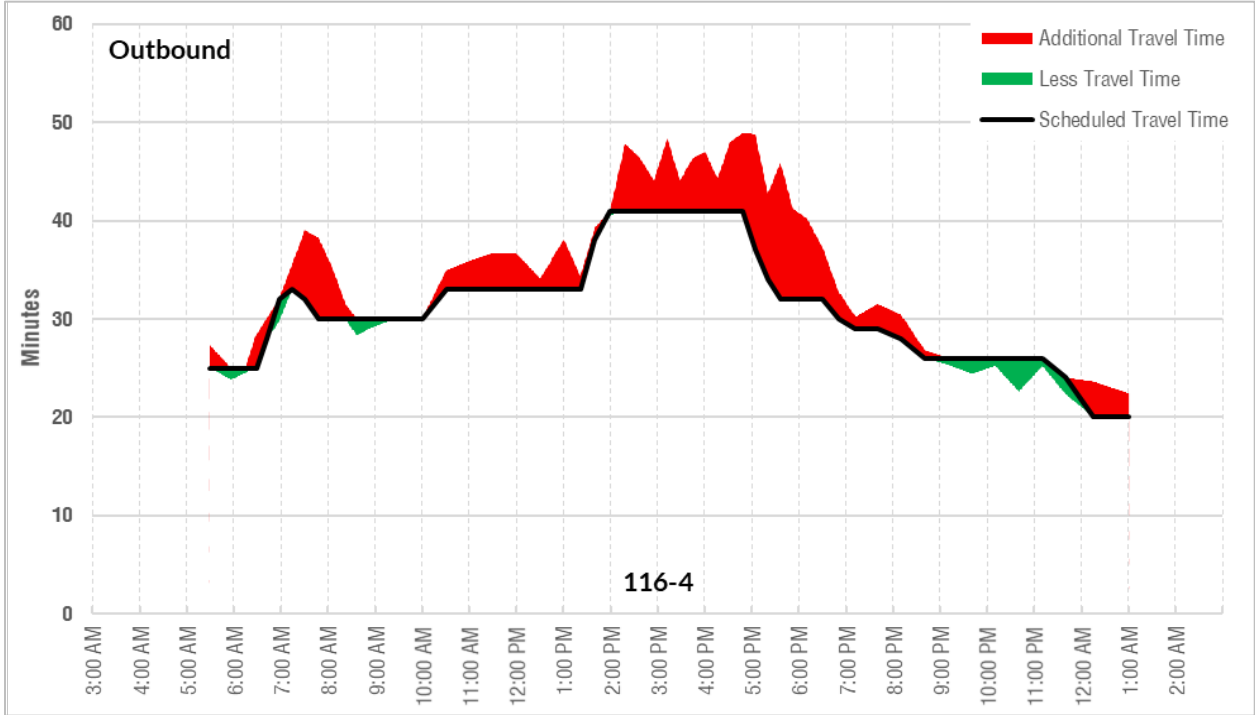


Figure 18 | Scheduled & Median Travel Time by Trip: Route 117 Inbound

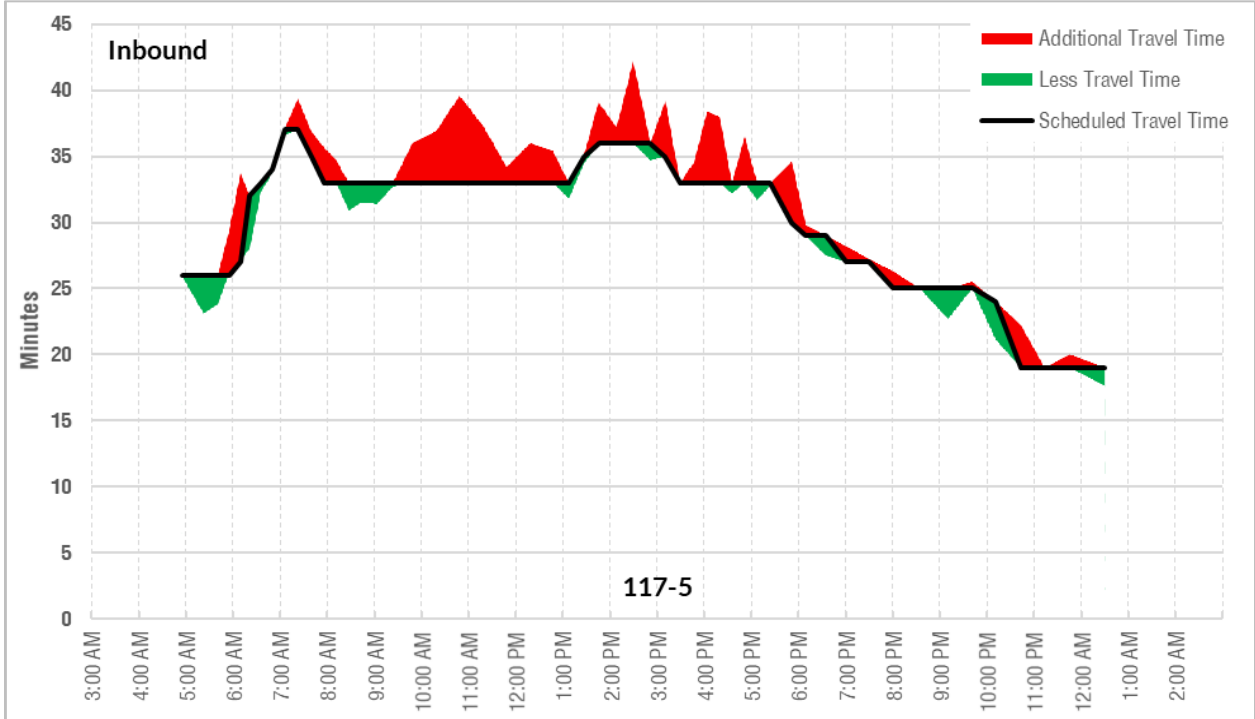
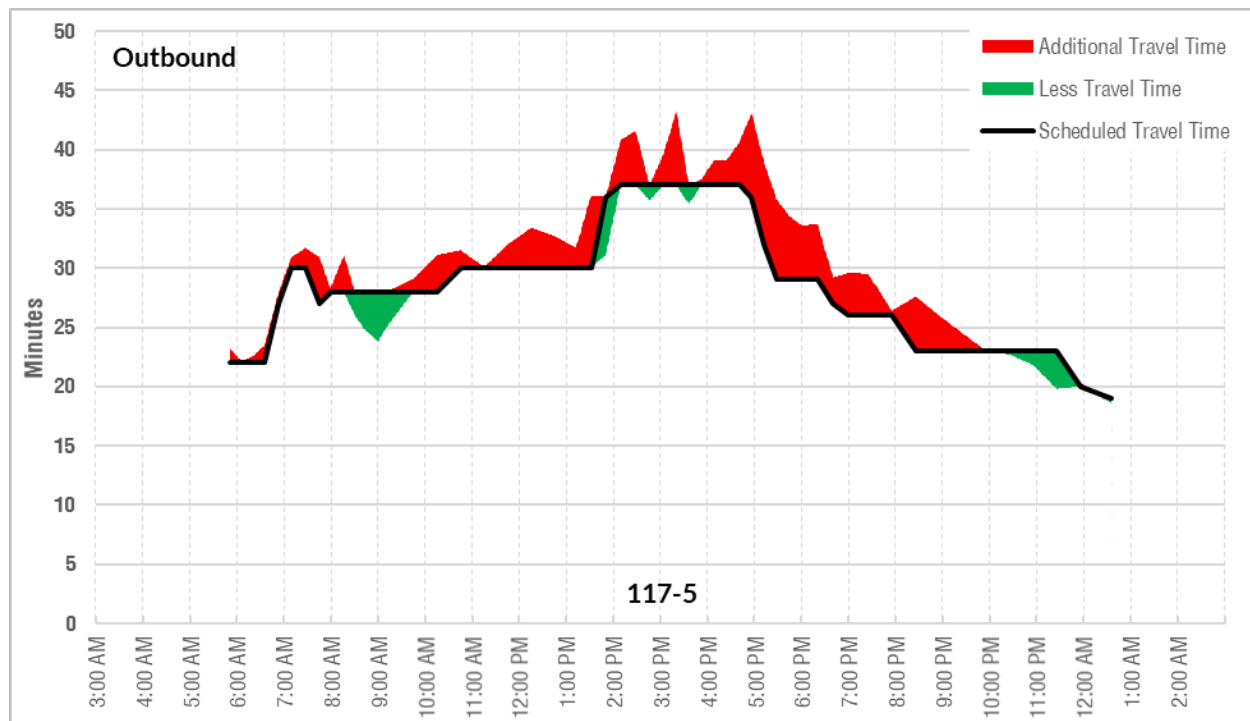


Figure 19 | Scheduled & Median Travel Time by Trip: Route 117 Outbound



## Stop Spacing

Route 116 and Route 117 have approximately 6.5 stops per mile, which is at the high side of the four to seven stops per mile recommended for urban areas under MBTA guidelines. Some route segments have tighter stop spacing, for example Broadway in Chelsea with 8.5 stops per mile. Stop consolidation to better balance walk distances and travel times would provide faster service and help improve overall service reliability.

## Summary

Routes 116 and 117, when considered together (which is how they operate in practice) comprise one of the MBTA's highest ridership routes. It provides frequent service over a very long span, including early morning service to downtown Boston. Its major issues are related to overcrowding and below-standard one-time performance. Additionally, the high number of boardings on the first and last trips of the day indicates a potential demand for service to start earlier and end later (since this document was developed, the MBTA has added earlier and later service to Route 117). Similarly, the high number of boardings throughout the day on weekend indicates a need for additional frequency.