

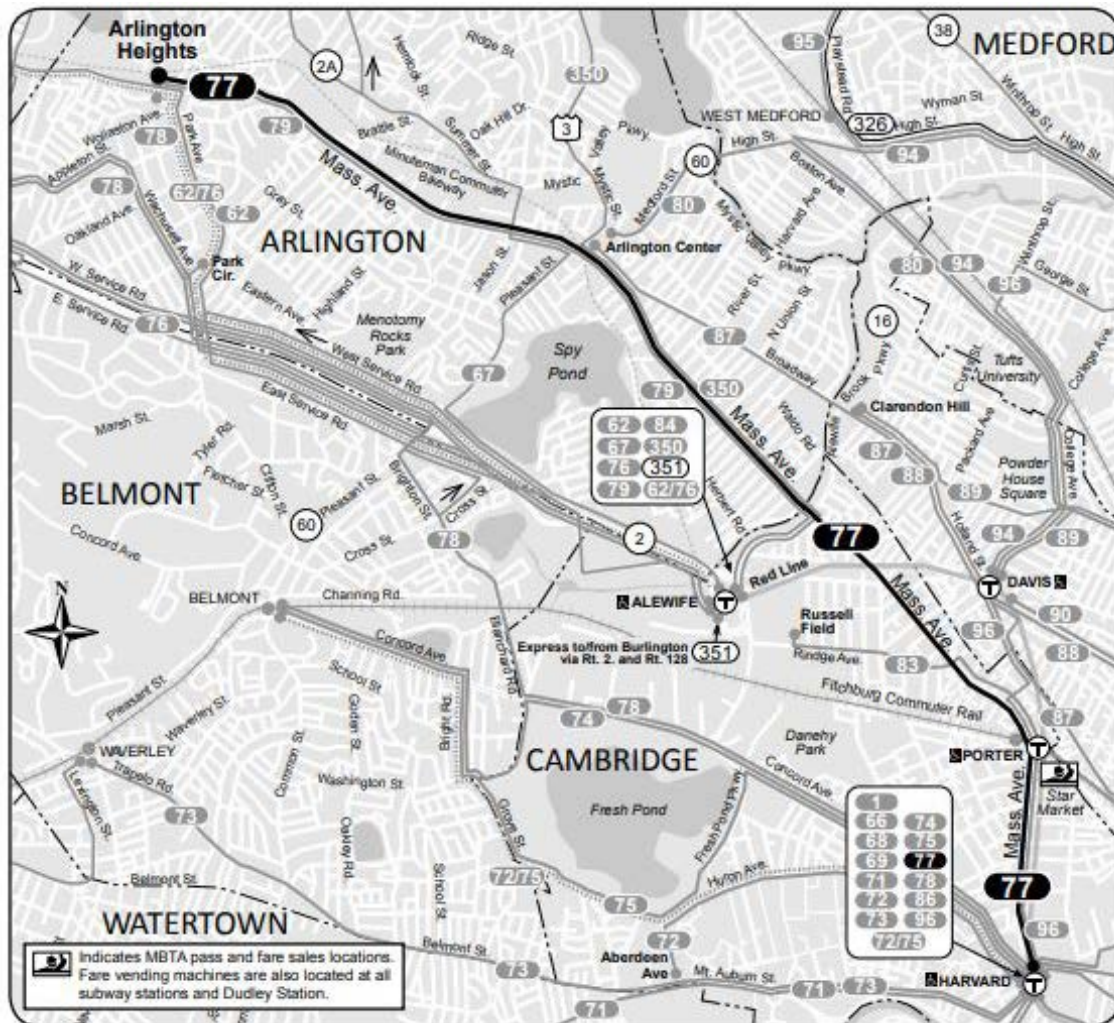
# Route 77

## Arlington Heights – Harvard Station

### Route Overview

Route 77 Arlington Heights – Harvard Station is a Key Bus route that operates between Arlington Heights and Harvard Station, primarily along Massachusetts Avenue (see Figure 1). Route 77 serves as the main feeder bus route between the Town of Arlington and the Red Line in Cambridge, with major transfer opportunities at Porter Commuter Rail Station and Harvard Station. As described further below, Route 77 shares most of its alignment with Route 79 Arlington Heights-Alewife Station.

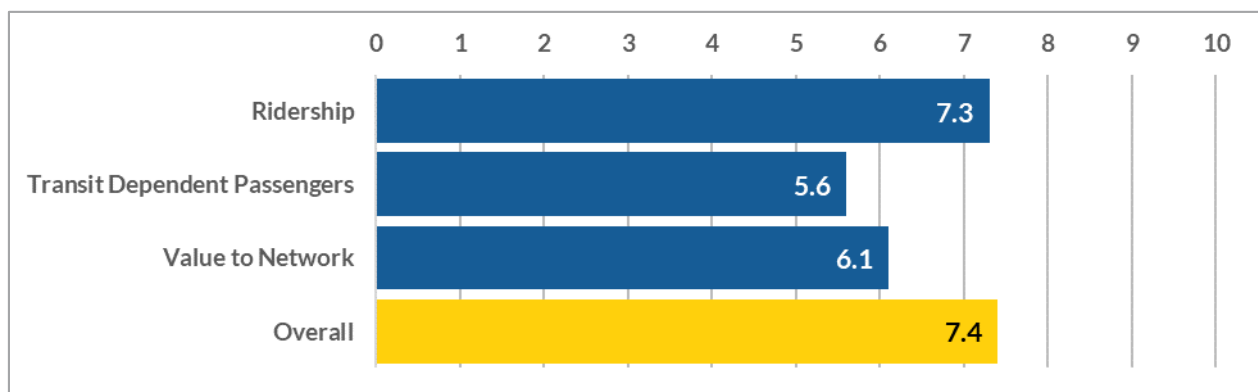
Figure 1 | Route 77 Service Map



## Network Importance

Route 77 is of high importance within the overall system (see Figure 2). On a scale of 0 to 10, the route rates 7.3 in terms of ridership, 5.6 in terms of transit dependent ridership, and 6.1 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). Its overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 7.4.

Figure 2 | Relative Importance within MBTA Bus Network (on a scale of 0 to 10)



## Service Overview

### Schedule

Route 77 provides frequent service seven days a week (see Table 1). On weekdays, service operates between 4:48 AM and 1:00 AM. Full length trips operate with frequencies ranging from every six to 13 minutes. Additionally, Route 71 Watertown Square - Harvard and 73 Waverley Square - Harvard buses entering service provide additional frequency along Massachusetts Avenue. These trips operate as frequently as one minute apart, and thus when these trips operate (in the morning inbound between 4:41 AM and 6:21 AM and outbound between 7:35 AM and 9:21 AM and at night outbound from 7:35 to 1:42 AM), service between North Cambridge and Harvard Station is very frequent.

On Saturdays, the span of services is similar to weekdays and full length service operates every 10 to 15 minutes. As on weekdays, the operation of Route 71 and 73 buses entering service means that service is much more frequent between North Cambridge and Harvard Station during the times that those trips operate (in the morning inbound between 4:42 AM and 9:50 AM and at night outbound from 6:55 to 1:32 AM)

On Sundays, the route operates from 6:00 AM to 1:00 AM with service generally every 10 to 15 minutes.

Route 77 meets the span of service and service frequency standards for Key Bus Routes during all time periods and days of service.

**Table 1 | Schedule Statistics**

SERVICEDAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
<b>Monday-Friday</b>	<b>4:48 AM to 1:00 AM</b>			<b>121/122</b>
Sunrise	4:48 AM to 5:59 AM	12	12	6/4
Early AM	6:00 AM to 6:59 AM	10 - 12	11	6/6
AM Peak	7:00 AM to 8:59 AM	6 - 10	8	15/14
Midday Base	9:00 AM to 1:29 PM	8 - 12	10	26/27
Midday School	1:30 PM to 3:59 PM	8 - 12	9	18/17
PM Peak	4:00 PM to 6:29 PM	7 - 9	8	18/18
Evening	6:30 PM to 9:59 PM	7 - 13	10	20/22
Late Evening	10:00 PM to 11:59 PM	13	13	9/9
Night	12:00 AM to 1:00 AM	13	13	3/5
<b>Saturday</b>	<b>4:48 AM to 1:00 AM</b>	<b>8 - 17</b>	<b>12</b>	<b>101/102</b>
<b>Sunday</b>	<b>6:00 AM to 1:00 AM</b>	<b>12 - 25</b>	<b>17</b>	<b>70/70</b>

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

### Service Patterns

Most Route 77 service operates between Arlington Heights and Harvard Station as shown in Figure 1. In addition, during weekday peak periods and at night and on Saturdays in the morning and at night, additional short trips along Massachusetts Avenue operate between North Cambridge and Harvard Station (Pattern 77.4). These trips are operated on weekdays and Saturdays with trackless trolley buses traveling from the North Cambridge carhouse (bus garage) to Harvard Station to begin service on Routes 71 and 73 and from Harvard Station back to the carhouse after ending service.

Route 77 also shares the majority of its alignment with Route 79. That route provides significantly less service and operates to Alewife Station instead of Harvard Square. The schedules of Routes 77 and 79 are not well coordinated and the different service frequencies provided by each makes any coordination extremely difficult.

Table 2 | Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
<b>INBOUND</b>				<b>133</b>	<b>107</b>	<b>70</b>
77.0	Arlington Heights Busway	Eliot Street at Bennett Street	Via Porter Commuter Rail Station and Harvard Station	121	101	70
77.4	North Cambridge	Harvard Station	Route 71 and 73 operated as Route 77 between bus garage and Harvard Station	12	6	-
<b>OUTBOUND</b>				<b>139</b>	<b>107</b>	<b>70</b>
77.0	Harvard Station	Arlington Heights Busway	Via Porter Commuter Rail Station and Harvard Station	122	102	70
77.4	Harvard Station	North Cambridge	Route 71 and 73 operated as Route 77 between Harvard Station and bus garage	17	5	-

## Ridership

Ridership data is only available for full length trips and not for short trips provided by the Route 71 and 73. Ridership on the full length trips is 6,900 per weekday, 4,800 per Saturday, and 3,200 on Sundays.

### Ridership by Stop

Ridership on Route 77 is consistently high along the entire route from Arlington Heights to Harvard Station. On weekday inbound trips (see Figure 3):

- The first stop in Arlington Heights has the highest number of boardings, at 320.
- At the next six stops before Mount Vernon Street, activity consists almost entirely of boardings, and all stops except one serve 140 or more boardings.
- Beginning at Mount Vernon Street, activity begins to consist of both boardings and alightings, although boardings typically outnumber alightings by two or three to one. Most stops until and through Arlington Center serve more than 120 boardings. The highest volume alighting stop is Massachusetts Avenue at Broadway, with 110 alightings.

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- East of Broadway, both boardings and alightings are lower with most stops serving fewer than 100 boardings.
  - 760 passengers, or 22% of all riders alight in Porter Square, which is the first opportunity to transfer to the Red Line.
  - 1,190 passengers, or 33%, alight at Harvard Station.

Saturday and Sunday ridership mirrors weekday patterns and generates volumes roughly 70% and 40% less than weekday volumes, respectively.

### **Ridership by Trip**

Route 77's ridership is high for most of the day on all days. On weekdays, ridership is highest in the AM peak inbound and PM peak outbound, and ridership per trip ranges from 50 to 80 passengers (see Figures 4 and 5). During the midday, it generally ranges from 20 to 40 passengers. In the evening, inbound ridership tapers off after 7:00 PM, but remains fairly strong outbound until close to midnight.

On Saturdays ridership per trip is highest during the middle of the day. Inbound, it ranges from 20 to over 40 passengers between approximately 7:30 AM and 7:00 PM (see Figure 6). Outbound, it ranges from 14 to over 40 passengers between approximately 8:00 AM until after midnight (see Figure 7).

Sunday ridership per trip patterns mirror those on Saturdays, but with slightly lower volumes (see Figures 8 and 9).



Figure 3 | Weekday Inbound Ridership by Stop Map



Figure 4 | Weekday Ridership by Trip: Inbound

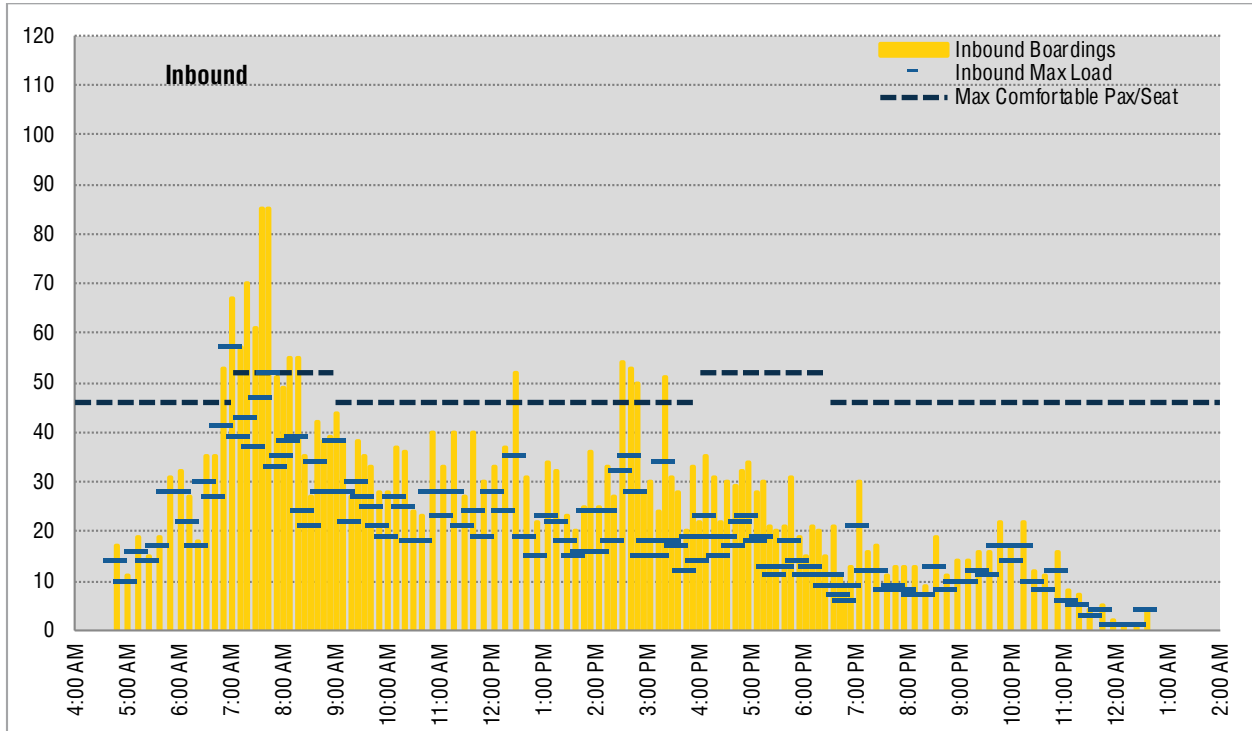


Figure 5 | Weekday Ridership by Trip: Outbound

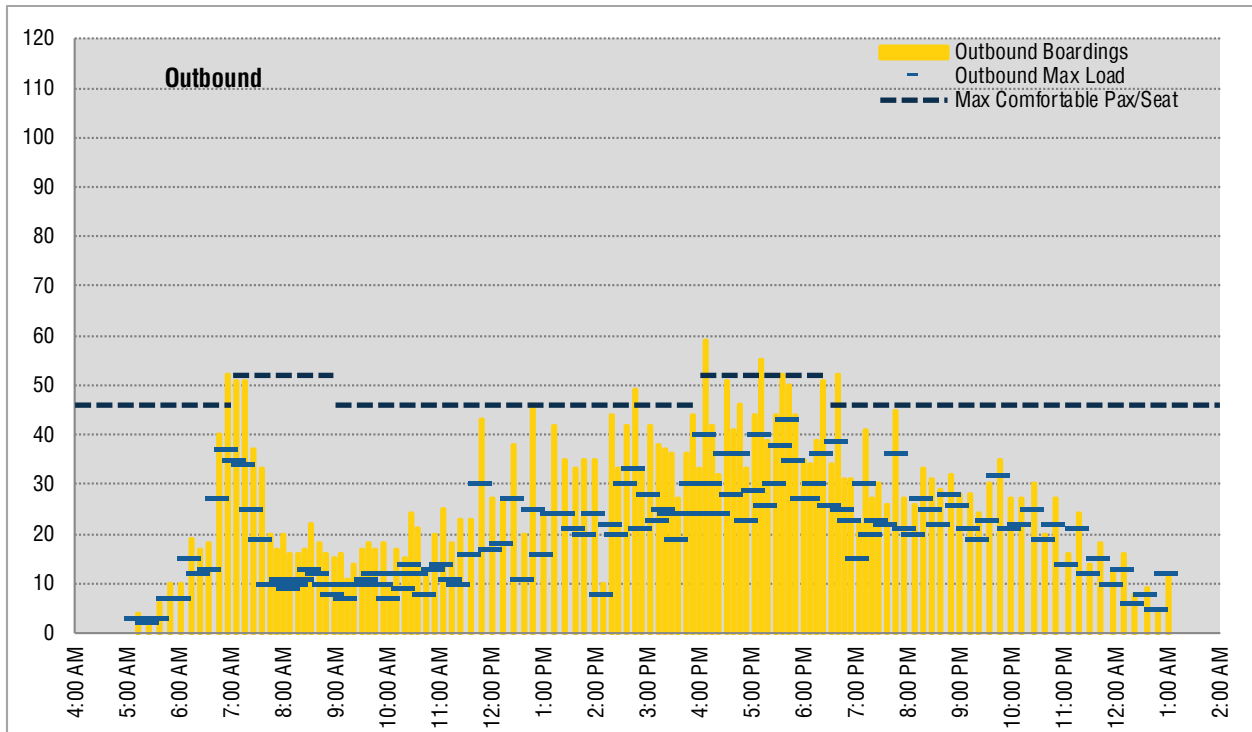


Figure 6 | Saturday Ridership by Trip: Inbound

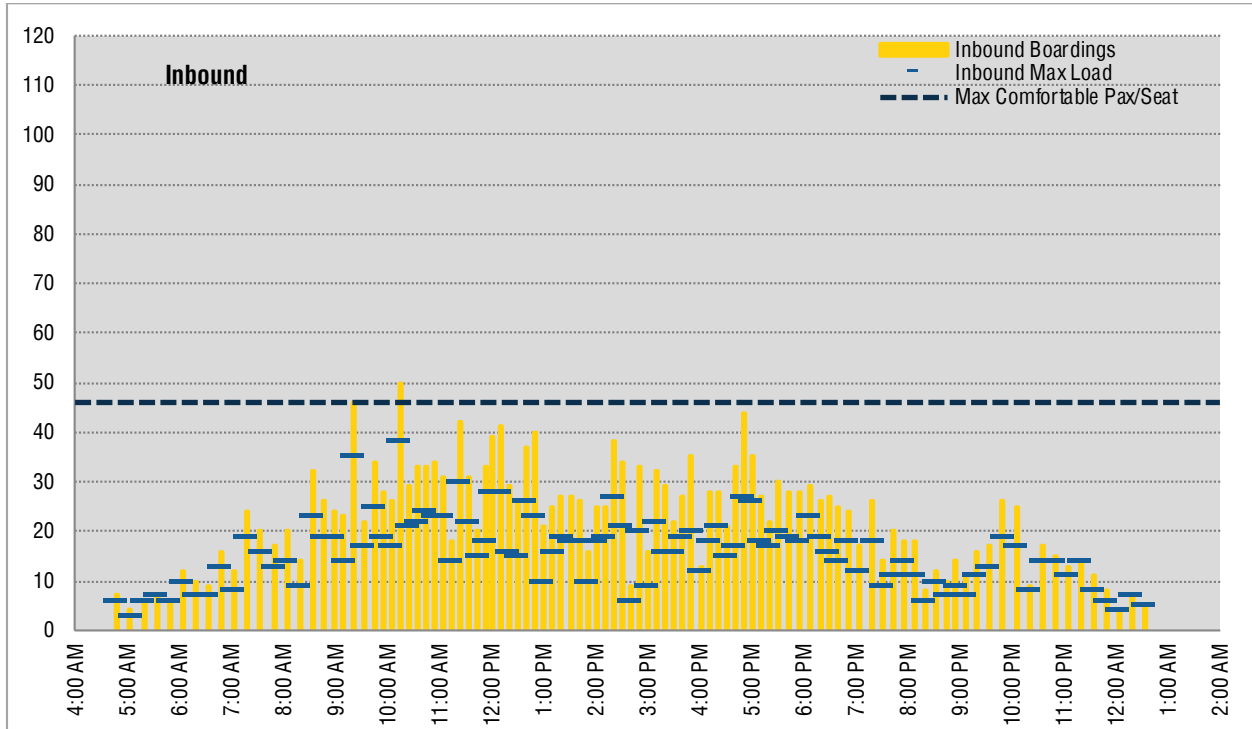


Figure 7 | Saturday Ridership by Trip: Outbound

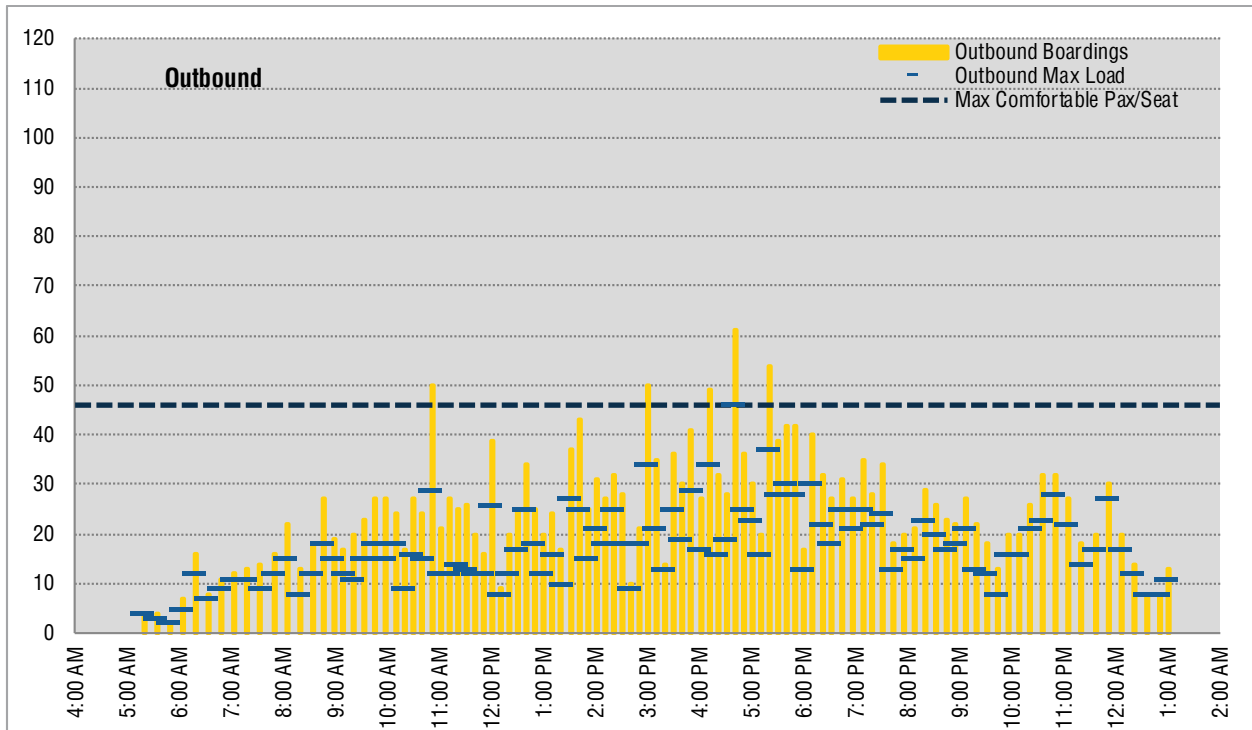




Figure 8 | Sunday Ridership by Trip: Inbound

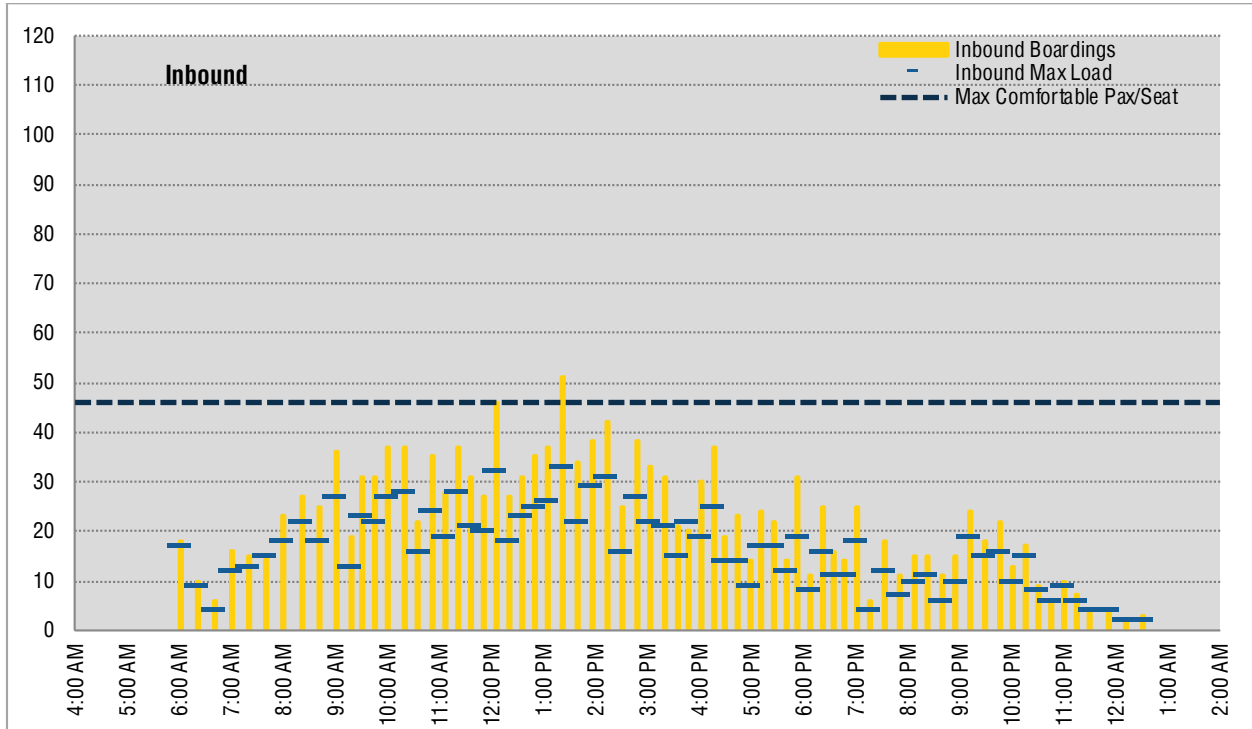
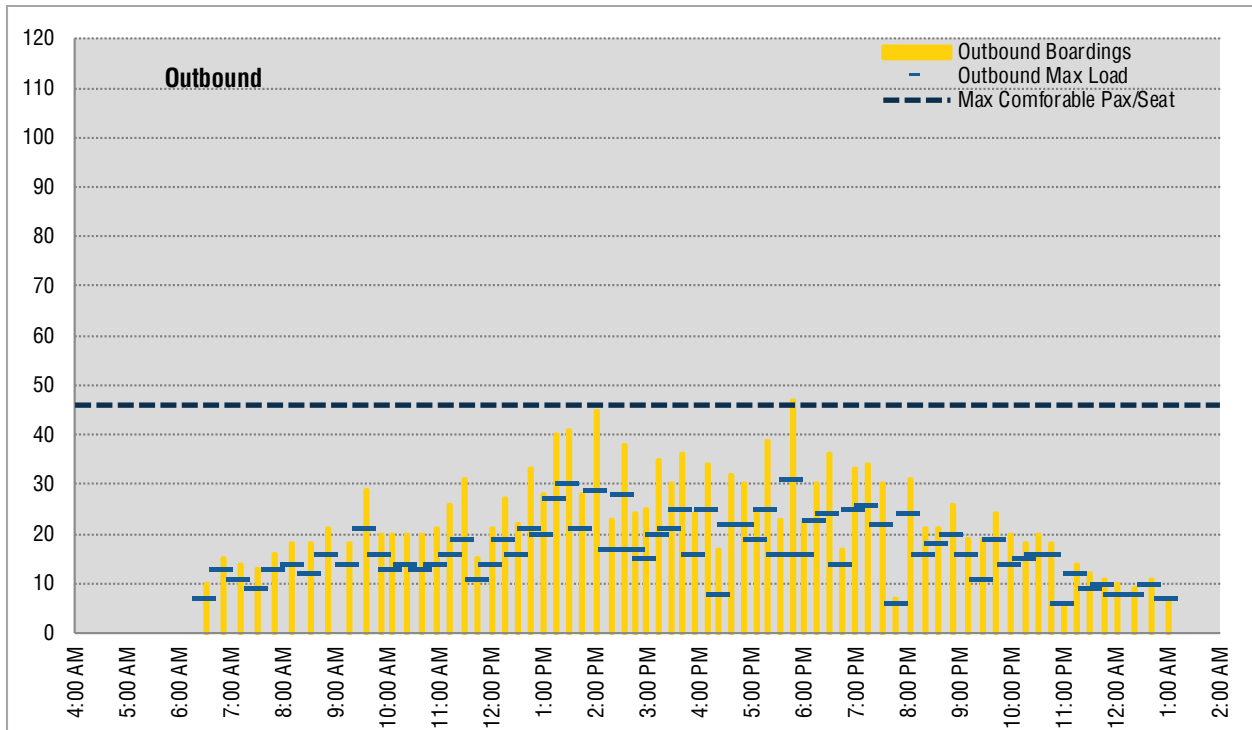


Figure 9 | Sunday Ridership by Trip: Outbound



## 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.

On Route 77, 93.8% of passenger minutes are in comfortable conditions, which is above the minimum standard (see Table 3).

Table 3 | 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</b>	93.8%	99.1%	98.4%

## Reliability and Speed

### Reliability

Route 77’s is at or slightly above the MBTA’s minimum standard of 75% on all days (see Table 6). Missed trips are a major problem, with 7.2% of trips not run in Fall 2017. Missed trips are known to cause overcrowding on the next operated trip and cause large gaps in service. Gaps in weekday service of greater than 20 minutes often due to missed trips.

Table 4 | Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
<b>Monday-Friday</b>	75%	83%	76%	7.2%
<b>Saturday</b>	77%	87%	78%	-
<b>Sunday</b>	74%	86%	75%	-

### Running Times

Route 77 trips regularly exceed their scheduled running times, with actual running times longer than scheduled times by three to eight minutes at most times of the day (see Figure 10 and Figure 11). PM peak trips typically run about eight to ten minutes behind schedule, and mid-day trips regularly operate about five minutes behind schedule.

Figure 10 | Scheduled & Median Travel Time by Trip: Route 77 Inbound

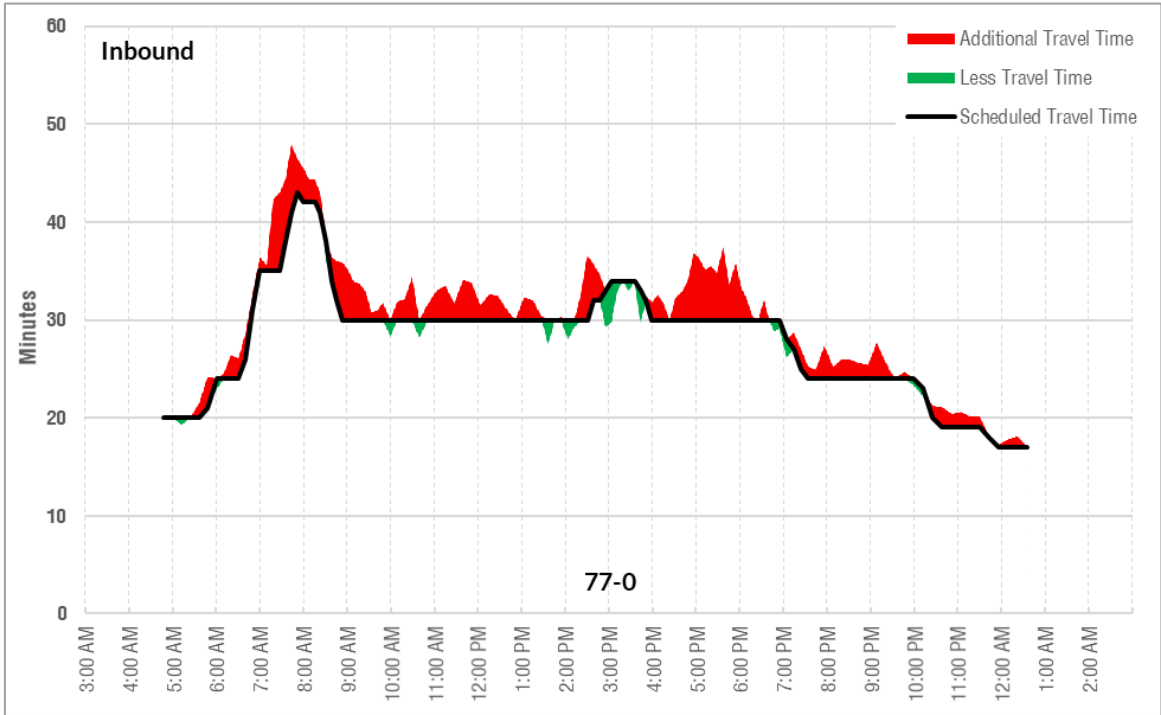
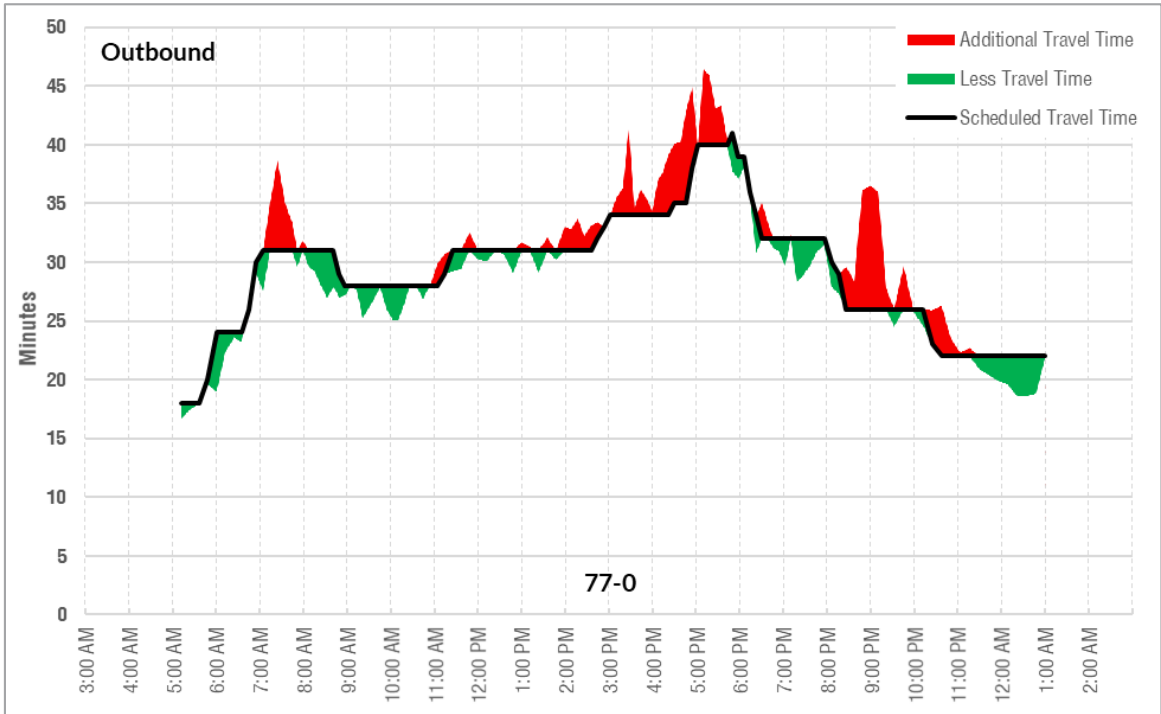


Figure 11 | Scheduled & Median Travel Time by Trip: Route 77 Outbound



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## Stop Spacing

Route 77 has approximately five stops per mile, which is within the MBTA's guideline of four to seven stops per mile for urban routes.

## Summary

Route 77 is a strong route with high ridership along its entire length. Its weaknesses are largely limited to relatively slow service, missed trips, and somewhat low on-time performance. Additionally, the shared segment with Route 79 creates a notable bus corridor within the MBTA's network. However, the lack of schedule coordination between the two routes results in inconsistent frequencies in the corridor.