

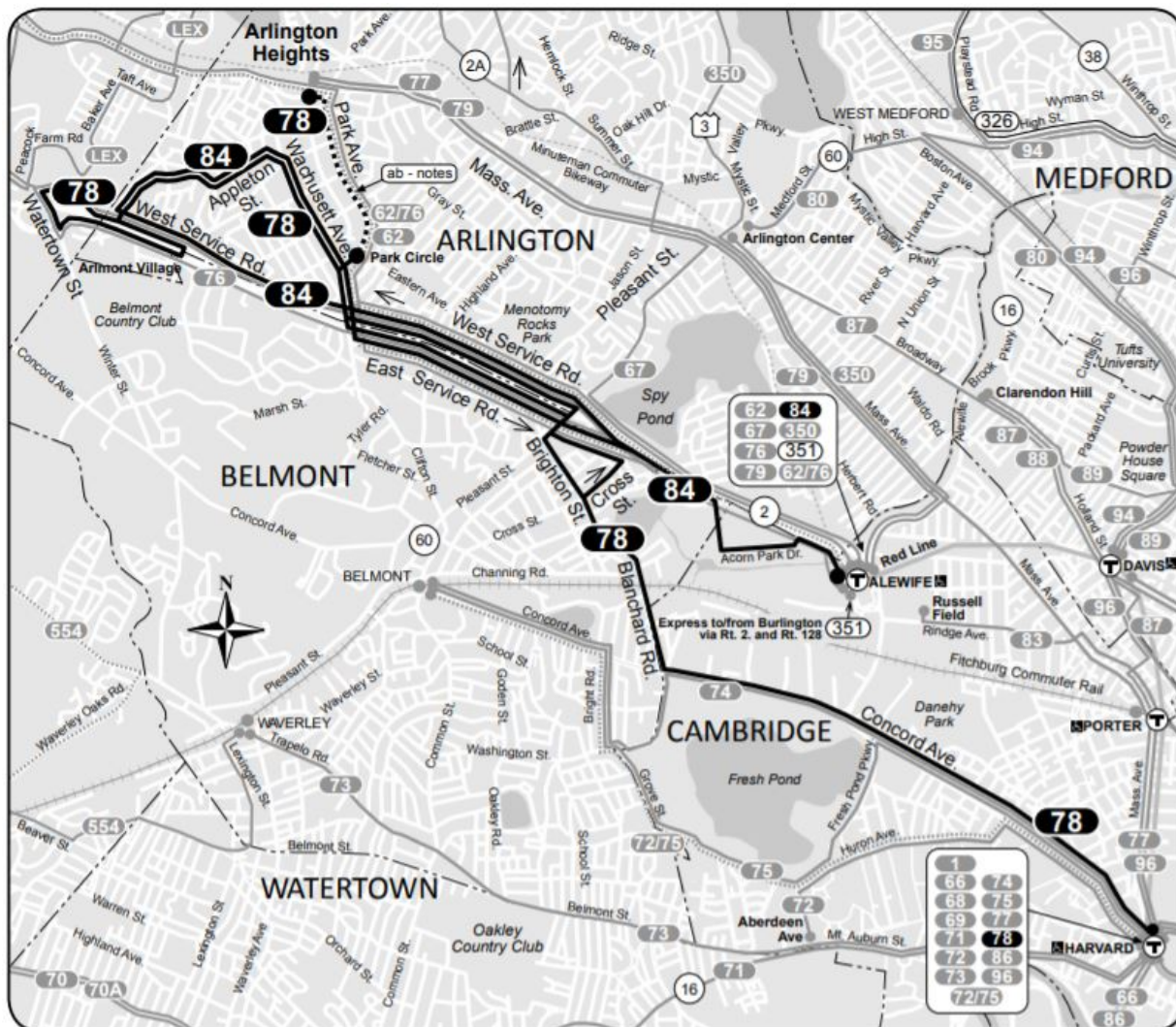
Route 78

Arlmont Village – Harvard Station

Route Overview

Route 78 Arlmont Village – Harvard Station is a Local route that operates between the residential neighborhood of Arlmont Village in Arlington and Harvard Station via Route 2's service roads in Arlington and Belmont and via Concord Avenue in Cambridge (see Figure 1). It is closely related to Route 84 Arlmont Village-Alewife Station: Route 78 provides off-peak service between Arlmont Village and Harvard Station and Route 84 provides peak period service between Arlmont Village and Alewife Station.

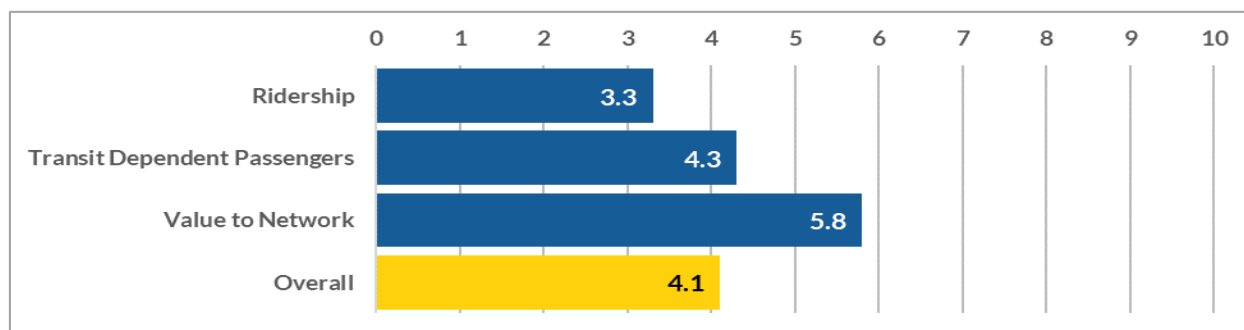
Figure 1 | Route 78 Service Map



Network Importance

Route 78 is of moderate importance within the overall bus network (see Figure 2). On a relative scale of 0 to 10, the route rates 3.3 in terms of ridership, 4.3 in terms of transit dependent ridership, and 5.8 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% weight to overall ridership and a 15% weight to both other measures, is 4.1.

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



Service Overview

Schedule

Route 78 operates seven days a week, and generally provides infrequent service on all service days (see Table 1). On weekdays, service operates between 5:42 AM and 12:30 AM with the following service frequencies:

- Every 15 to 35 minutes from the beginning of service through 9:00 AM, but mostly every 23 to 27 minutes.
- Every 35 minutes between 9:00 AM and 4:00 PM.
- Every seven to 40 minutes during the PM peak period, but mostly every 24 minutes.
- Every 20 to 45 minutes until 10:00 PM, but mostly every 45 minutes.
- Every 60 minutes between 10:00 PM and the end of service at 12:30 AM.

On Saturdays, service operates from 6:27 AM to 12:35 AM, mostly every 60 minutes. On Sundays, it operate from 6:10 AM to 12:40 AM and mostly every 60 minutes.

On weekdays and Sundays, Route 78 meets both the service span and service frequency standards. On Saturdays, it meets the service span standards, but technically not the service frequency standards as two trips are spaced 65 minutes apart versus the standard of at least every 60 minutes.

Table 1 | Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	5:42 AM to 12:30 AM			34/34
Sunrise	5:42 AM to 5:59 AM	25	25	1/1
Early AM	6:00 AM to 6:59 AM	15 – 30	23	3/2
AM Peak	7:00 AM to 8:59 AM	15 – 35	27	4/4
Midday Base	9:00 AM to 1:29 PM	25 – 40	35	8/8
Midday School	1:30 PM to 3:59 PM	35 – 40	35	4/4
PM Peak	4:00 PM to 6:29 PM	7 – 40	24	7/6
Evening	6:30 PM to 9:59 PM	20 – 60	45	4/6
Late Evening	10:00 PM to 11:59 PM	60	60	2/2
Night	12:00 AM to 12:30 AM	60	60	1/1
Saturday	6:27 AM to 12:35 AM	56 -65	57	18/19
Sunday	6:10 AM to 12:40 AM	56 - 60	57	19/19

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

Service Patterns

Route 78 operates with two very different service patterns (see Table 2). Its primary alignment operates as shown in Figure 1 and serves Arlmont Village (Pattern 78.1). This pattern provides most off-peak service and limited peak period service.

Most peak period and early evening service (inbound from 7:10 AM to 9:18 AM and 4:40 PM to 7:07 PM, and outbound from 6:40 AM to 8:25 AM and 4:00 PM to 6:39 PM) operates between Arlington Heights and Harvard Station via Park Avenue as shown with the dotted line in Figure 1 (Pattern 78.2). During these times, service to Arlmont Village is provided by Route 84 Arlmont Village-Alewife Station, which operates to Alewife Station instead of Harvard Station.

Table 2 | Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
INBOUND				34	18	19
78.1	Wadsworth Road at Dow Avenue	Eliot Street at Bennett Street	Arlmont Village terminus	24	18	19
78.2	Arlington Heights	Eliot Street at Bennett Street	Arlington Heights via Park Avenue	10	-	-
OUTBOUND				34	19	19
78.1	Harvard Station	Wadsworth Road at Dow Avenue	Arlmont Village terminus	24	19	19
78.2	Harvard Station	Arlington Heights	Arlington Heights via Park Avenue	10	-	-

Ridership

Route 78 carries 1,420 riders on weekdays, 440 riders on Saturdays, and 410 riders on Sundays.

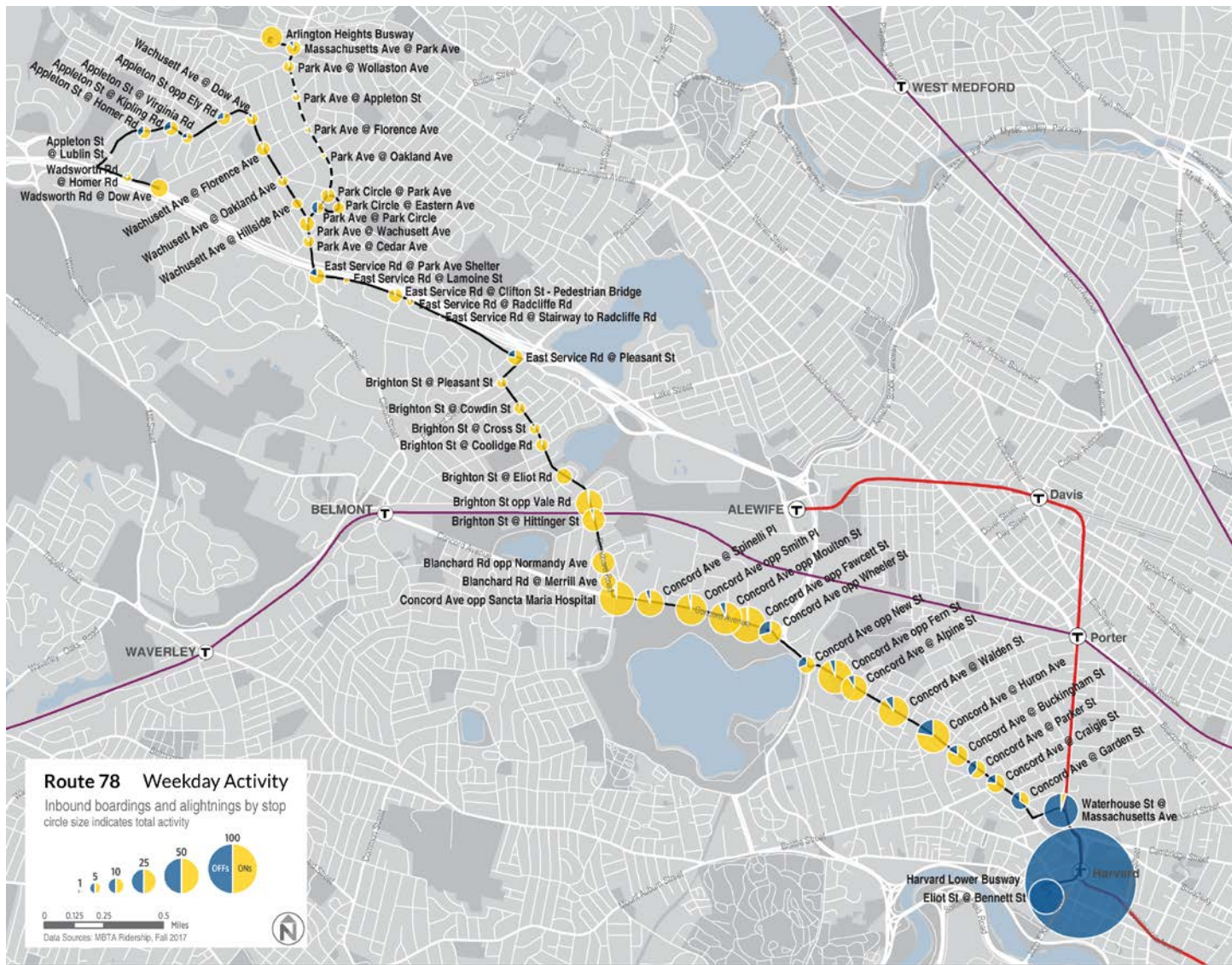
Ridership by Stop

The large majority of Route 78 passengers use the route to travel to and from Harvard Station. On weekday inbound trips (see Figure 3):

- 70 passengers board and 12 alight along the outer loop through Arlmont along Wadsworth Road, Appleton Street, Wachusett Avenue, and Park Circle. This is the portion of the route that is served during off-peak hours only. During peak periods, this loop is served by Route 84 Arlmont Village-Alewife Station.
- 40 passengers board and five alight between the Arlington Heights Busway and Park Circle at Park Avenue. This segment is served during peak periods and the early evening. It is also served by Route 62 Bedford VA Hospital-Alewife Station.
- 40 passengers board and five alight along Park Avenue and Route 2's East Service Road between Park Circle and Pleasant Street. This segment is also served by Route 62, Route 84, and Route 76 Hanscom Air Force Base-Alewife Station.
- 110 passengers board and fewer than five alight along Brighton Street and Blanchard Road. This is the only segment where Route 78 provides unique service.
- 420 passengers board and 100 alight along Concord Avenue and at the one stop on Waterhouse Street before Harvard Station. This segment is also served by Route 74 Belmont Center-Harvard Station.
- 500 passengers, or 74% of all inbound passengers, alight at Harvard Station.
- 50 passengers alight at the last stop on Eliot Street.

Outbound ridership patterns are generally the reverse of inbound ridership. Weekend ridership patterns are similar, but with lower volumes.

Figure 3 | Weekday Inbound Ridership by Stop Map



Ridership by Trip

On weekdays, Route 78 has moderate ridership throughout most of the day. On inbound trips (see Figure 4):

- Ridership before 6:30 AM is low, with both early morning trips carrying 12 passengers.
- Ridership is highest during the AM peak period, ranging from 26 to 45 passengers per trip between 7:00 AM and 9:00 AM, with the highest ridership on the 7:45 AM trip.
- Between 9:30 AM and 3:30 PM, all trips carry between 18 and 30 passengers.
- The 4:05 PM trip carries the highest ridership in the afternoon with 32 passengers. Ridership by trip then decreases steadily until 6:00 PM.
- Ridership is lowest after 6:00 PM, with no trip carrying more than 10 riders.

On outbound trips (see Figure 5):

- Between 5:50 AM and 1:30 PM, ridership per trip ranges between 10 and 22 passengers.
- Ridership increases steadily between 1:30 PM and 3:00 PM, reaching 38 passengers on the 2:50 PM trip.
- Between 3:00 PM and 4:45 PM, ridership per trip drops to 24 passengers.
- Ridership is highest during the PM peak period between 4:45 PM and 6:15 PM at about 35 passengers per trip.
- From 6:15 PM to 9:30 PM, ridership per trip decreases steadily from 35 to 20 passengers. Ridership then steadily declines through the end of service.

Saturday inbound ridership per trip ranges from two to 22 riders, with highest volumes around 12:00 PM and the lowest volumes from 6:00 PM onward (see Figure 6). Outbound Saturday ridership ranges from five to 16 riders per trip. Ridership is highest between 2:30 PM and 7:30 PM followed by an immediate drop on the 8:30 PM trip. This drop is then followed by a spike back up to 16 passengers on the 9:30 PM trip and then a steady decrease until end of service (see Figure 7).

On Sundays, inbound ridership is highest between 8:00 AM and 3:30 PM, with trips carrying 15 to 22 passengers. Ridership is lowest from 6:00 PM onward, with no trip carrying more than six passengers (see Figure 8). Outbound ridership is highest between 2:30 PM and 10:30 PM, with most trips carrying 15 passengers. Ridership is lowest on the 8:30 PM and 12:30 AM trips, which carry just six passengers each (see Figure 9).

Figure 4 | Weekday Ridership by Trip: Inbound

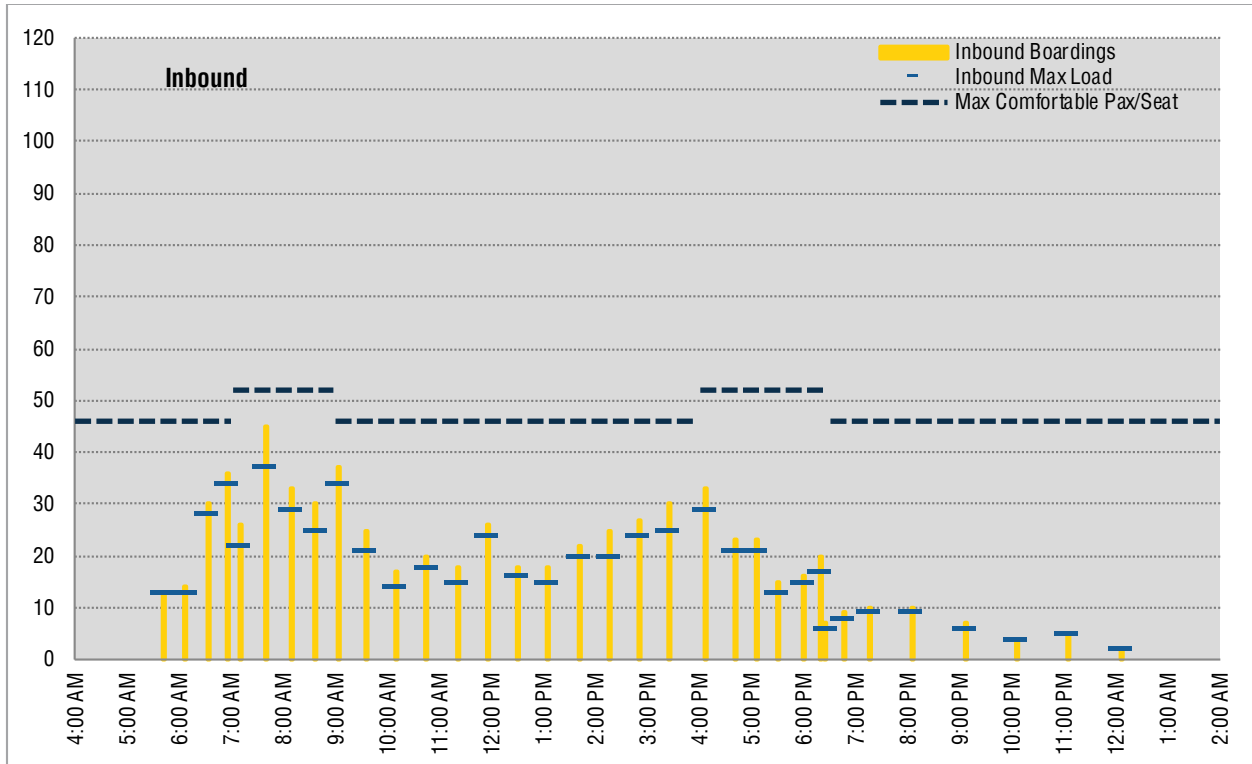


Figure 5 | Weekday Ridership by Trip: Outbound

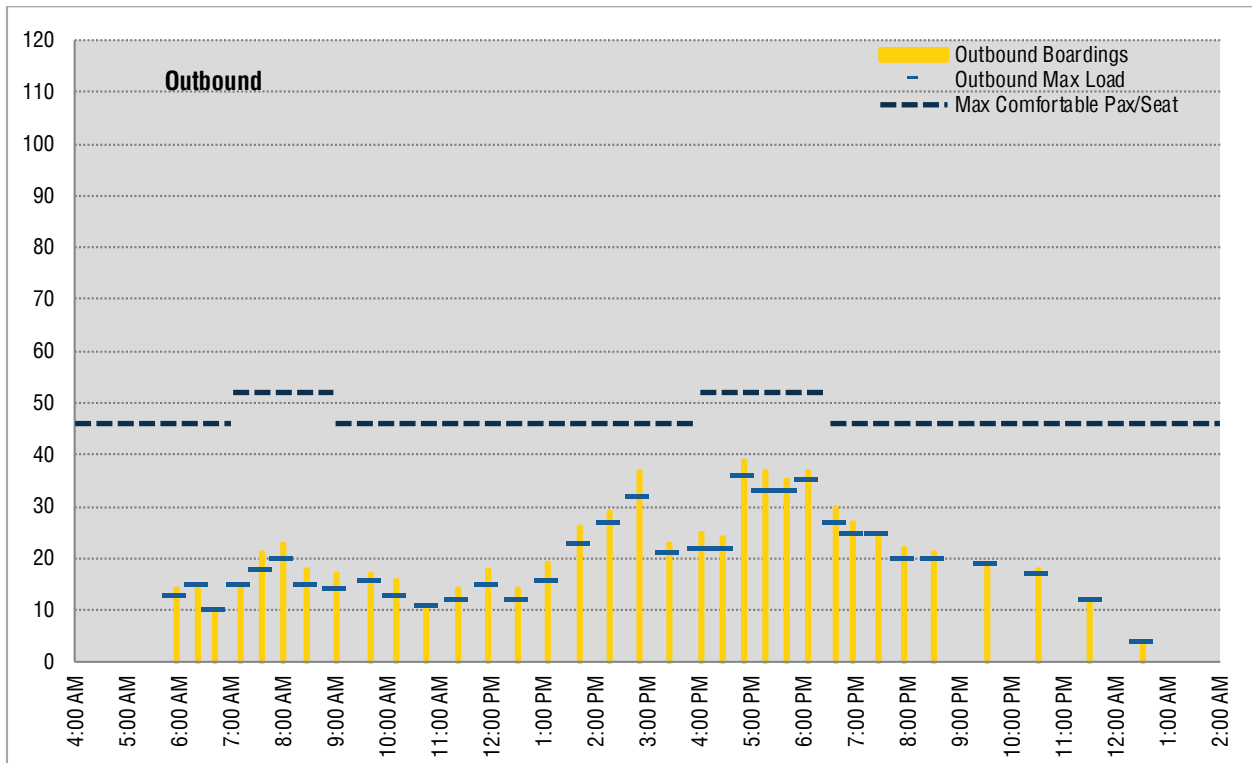


Figure 6 | Saturday Ridership by Trip: Inbound

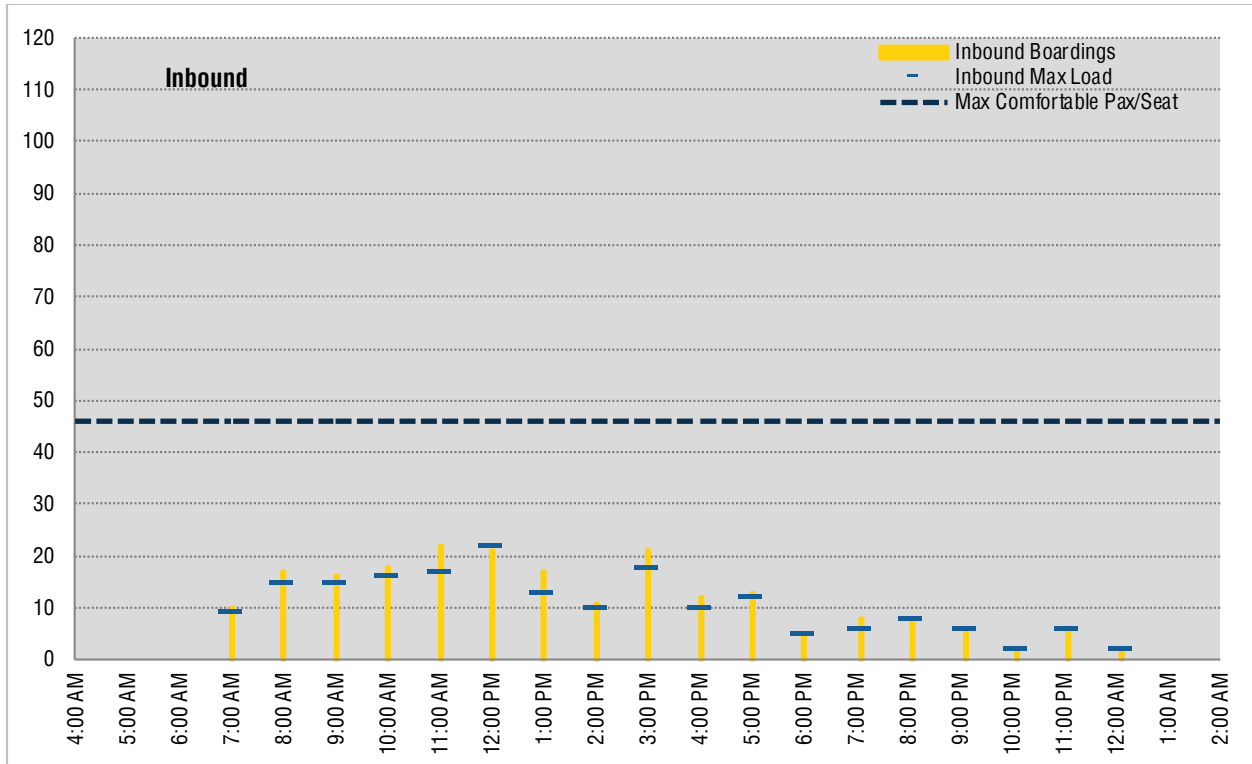


Figure 7 | Saturday Ridership by Trip: Outbound

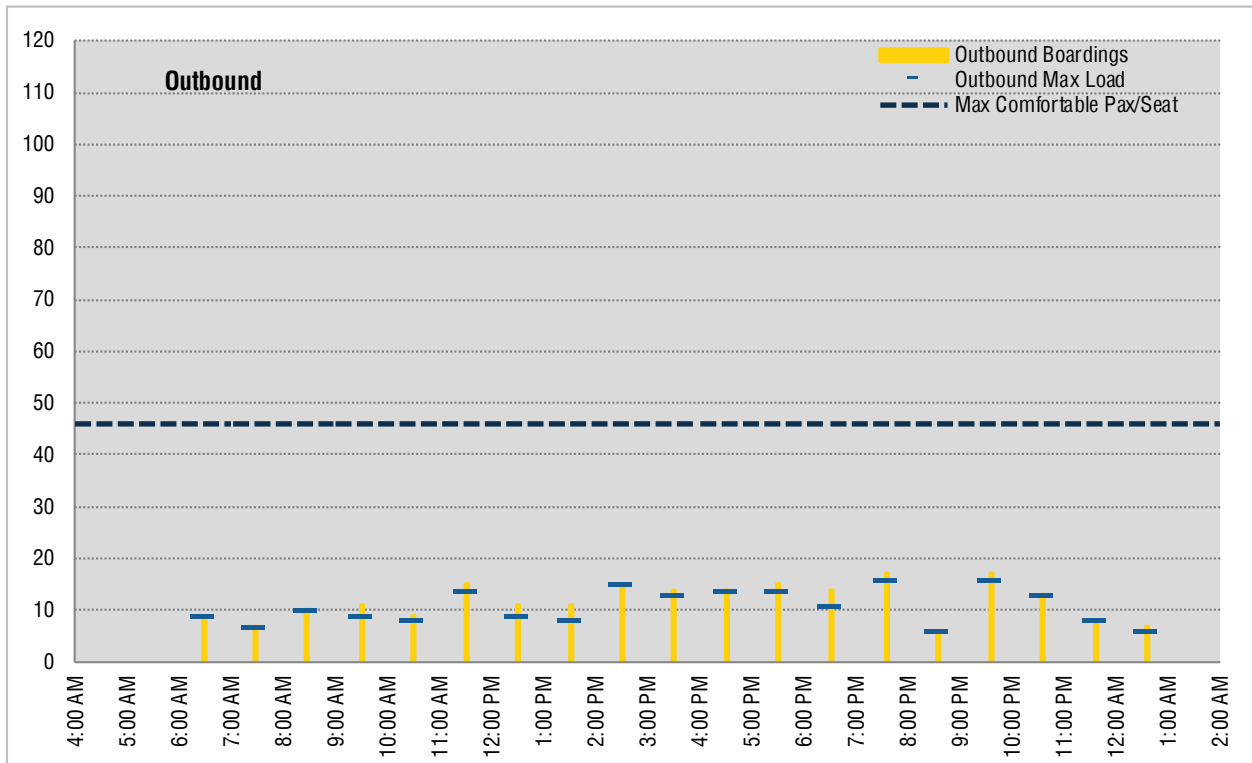


Figure 8 | Sunday Ridership by Trip: Inbound

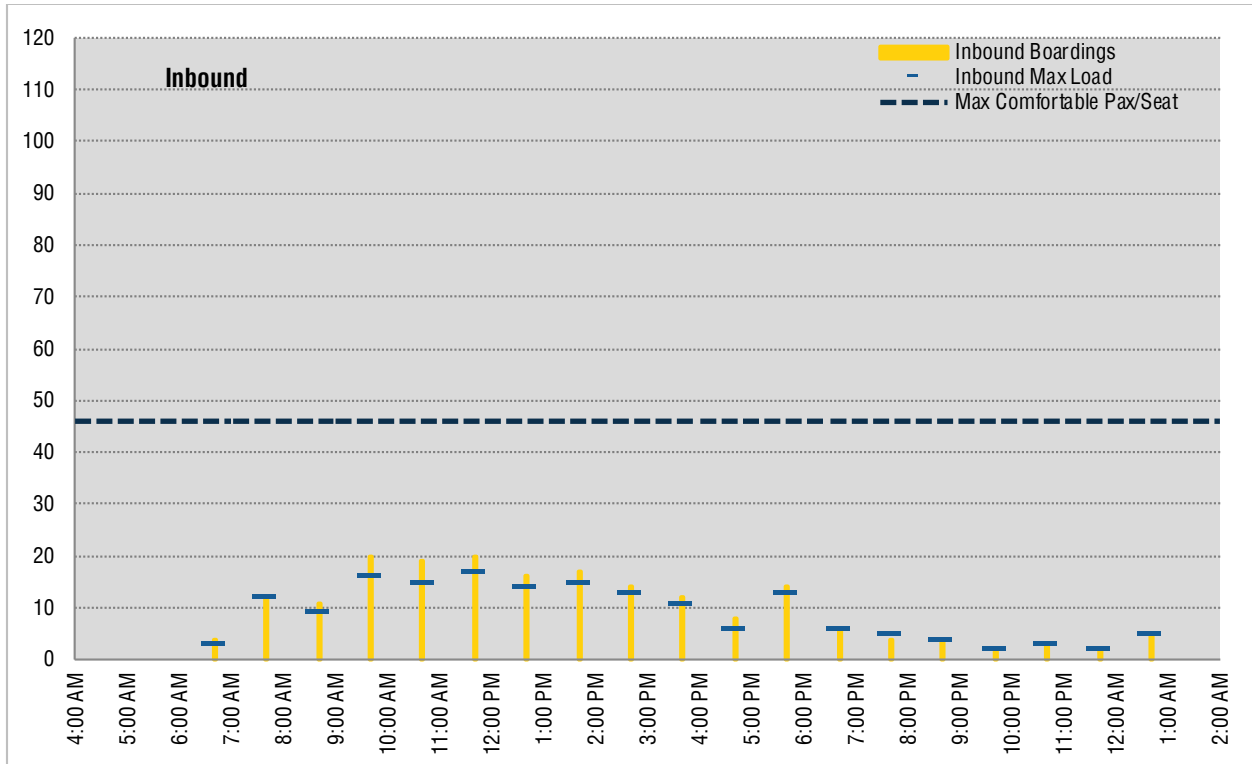
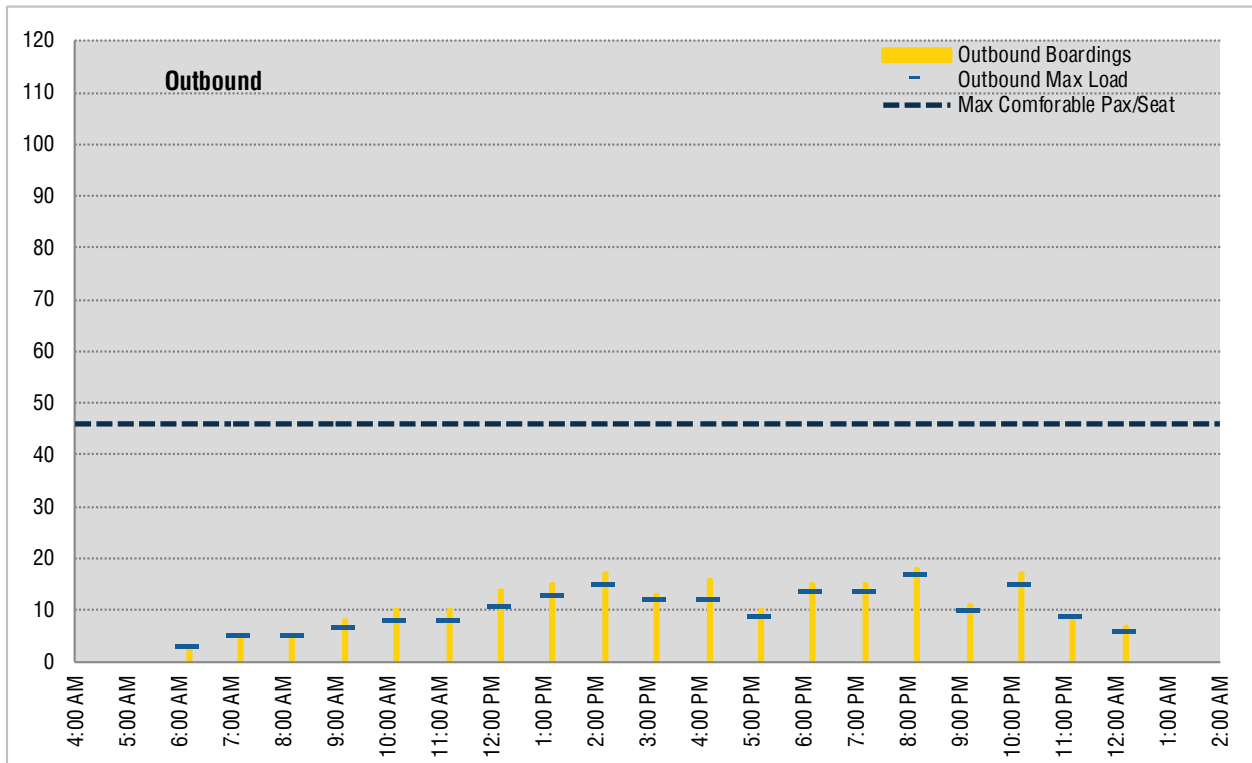


Figure 9 | Sunday Ridership by Trip: Outbound



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 weekdays, 99% of passenger minutes are in comfortable conditions (see Table 3). On weekends, 100% of passenger minutes are in comfortable conditions.

Table 3 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
Minimum Standard	92%	92%	92%
Target	96%	96%	96%
Actual	99%	100%	100%

Reliability and Speed

Reliability

On weekdays, Route 78's overall reliability is 66%, which is below the MBTA's minimum standard of 70% for Local bus routes. Saturday reliability, at 68%, is also below standard. Sunday overall reliability, at 76%, exceeds the target of 75%.

Table 4 | Reliability

SERVICEDAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	65%	73%	66%	0.1%
Saturday	67%	74%	68%	-
Sunday	76%	77%	76%	-

Running Times

On weekdays, actual running times on nearly all trips are longer than scheduled travel times. Inbound trips exceed scheduled running times by as long as 10 minutes (see Figure 10) and outbound trips exceed scheduled running times by up to six minutes (see Figure 11).

Figure 10 | Scheduled & Median Travel Time by Trip: Route 78 Inbound

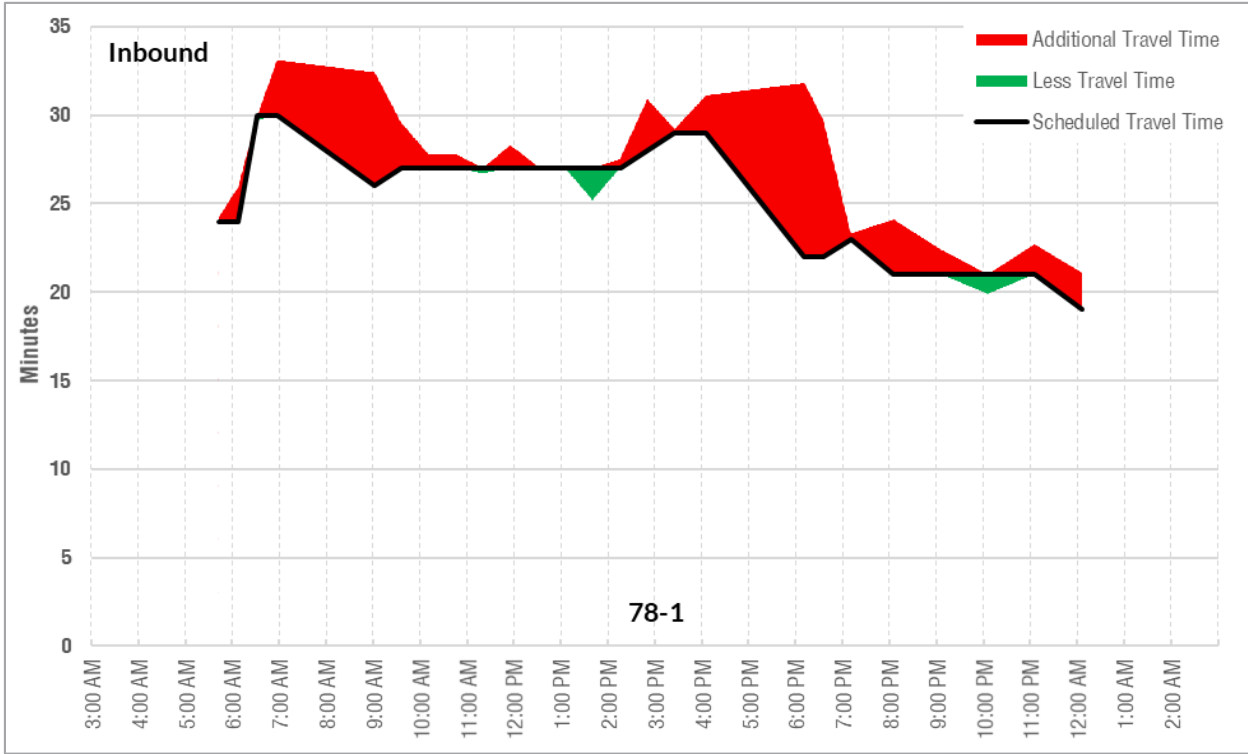
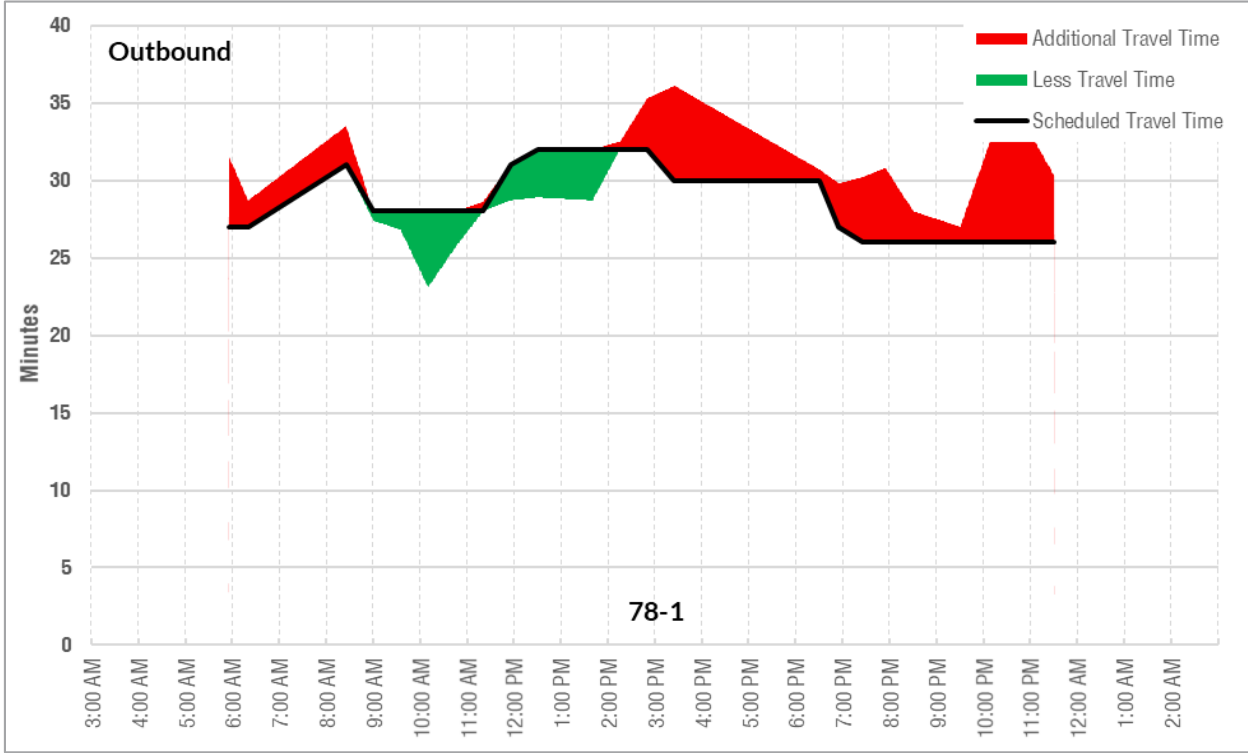


Figure 11 | Scheduled & Median Travel Time by Trip: Route 78 Outbound



Stop Spacing

Most of Route 78's alignment has about 10 stops per mile, which is well in excess of the MBTA's guidelines of four to five stops per mile in suburban areas and four to seven stops per mile in urban areas. Areas with particularly close stop spacing include:

- Along Appleton Road, where stops are an average of 500 feet apart.
- The five stops between East Service Road at Pleasant Street and Brighton Street at Coolidge Road, where stops are an average of 450 feet apart.
- The five stops between Park Avenue and Cedar Avenue and Park Circle at Park Avenue, which are an average of 300 feet apart.

Stop consolidation could make service faster and improve reliability.

Summary

Route 78 and Route 84 Arlmont Village-Alewife Station both provide service to Arlmont Village, with Route 78 providing off-peak service to Harvard Station and Route 84 providing peak-period service to Alewife Station.

Route 78 also mostly overlaps other routes, and provides unique service only along Brighton Street and Blanchard Street in Belmont. Operating issues include actual running times that are longer than scheduled running times (which results in below standard on-time performance on weekdays and Saturdays), too many stops, and minor non-compliance with Saturday frequency standards.