

Route 70 and 70A

Route 70: Cedarwood, Market Place Drive, or Central Square, Waltham –University Park

Route 70A: North Waltham - University Park

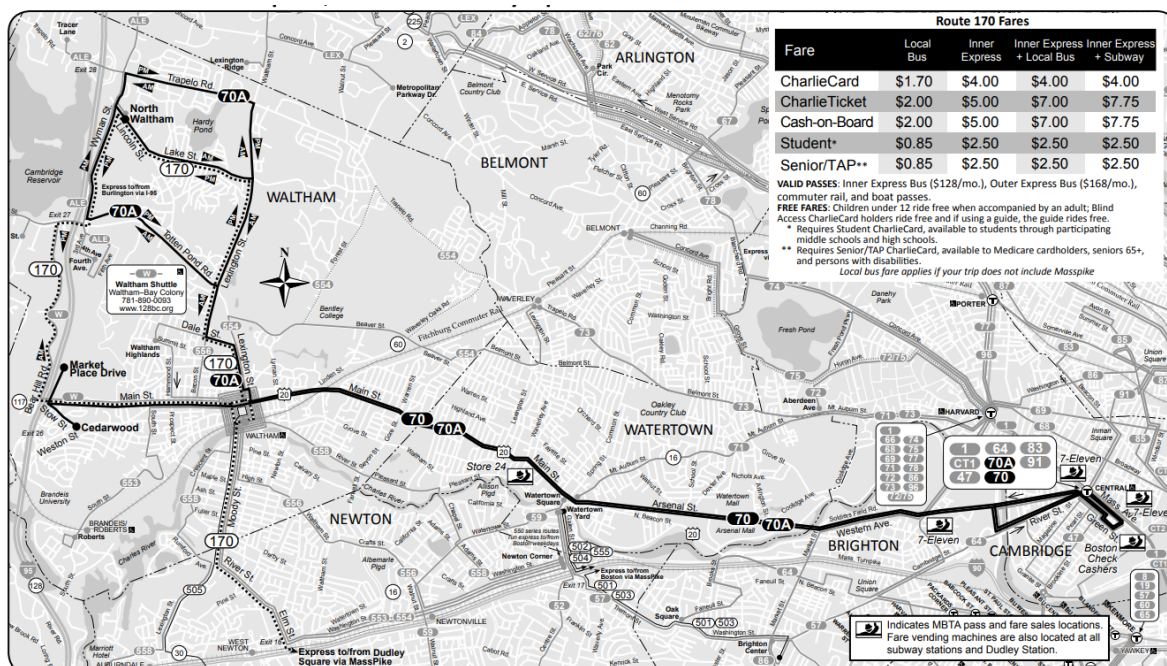
Route Overview

Routes 70 Cedarwood, Market Place Drive, or Central Square, Waltham –University Park and 70A North Waltham - University Park are local routes that provide service between Waltham and University Park in Cambridge via Watertown Square along the same alignment between Central Square in Waltham and University Park. West of Central Square:

- Route 70 provides service to two different outer terminals: (1) Market Place Drive and (2) Cedarwood. It also provides short-turn service between Central Square and University Park.
- Route 70A provides circuitous coverage service along different AM and PM alignments to North Waltham.

For all practical purposes, Routes 70 and 70A are a single route with four different outer terminals.

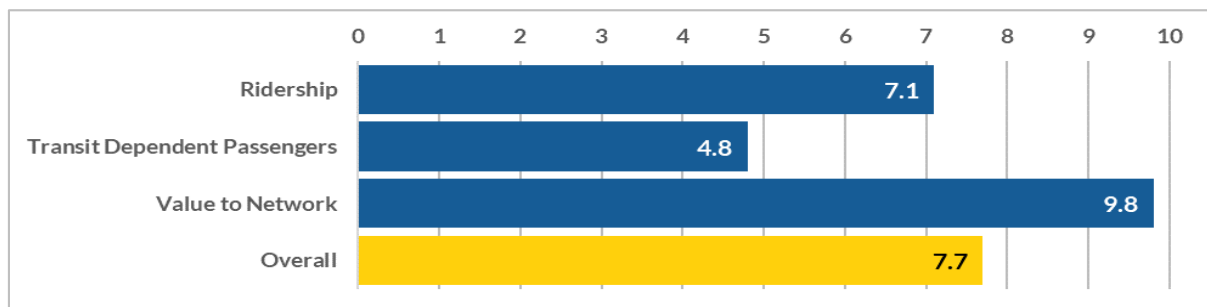
Figure 1 | Service Map



Network Importance

When Routes 70 and 70A are considered together, they represent an important component of the MBTA bus network (see Figure 2). On a relative scale of 0 to 10, the routes rates 7.1 in terms of ridership, 4.8 in terms of transit dependent ridership, and 9.8 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). The combined route's overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 7.7.

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



Service Overview

Schedules

Route 70 and 70A operates seven days a week. On weekdays, service operates from 5:30 AM to 1:04 AM (see Table 1 and Table 2). Because of the four different outer alignments, service frequencies are very irregular on all days. On weekdays:

- Frequencies on the core of the route between Central Square in Waltham and University Park range from three minutes to 35 minutes on Route 70A and from 30 to 55 minutes on Route 70.
- Route 70 average frequencies range from 16 minutes during the peaks to 35 minutes at night, with frequencies on the branches up to more than twice as long.
- Route 70A frequencies range from 30 minutes to 58 minutes.

On Saturdays, service operates from 5:40 AM to 12:45 AM:

- Route 70 service is even more irregular than on weekdays, with service operating every three to 70 minutes, and with average frequencies of every 23 minutes.
- Route 70A service operates every 35 to 70 minutes, with average frequencies of every 42 minutes.

On Sundays, only Route 70 operates, from 6:45 AM to 12:41 AM, with frequencies that range from every 15 to 46 minutes and that average 26 minutes.

Table 1 | Schedule Statistics for Route 70

SERVICEDAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	5:30 AM to 1:04 AM			57/58
Sunrise	5:30 AM to 5:59 AM	20	20	2/5
Early AM	6:00 AM to 6:59 AM	15 - 20	17	3/4
AM Peak	7:00 AM to 8:59 AM	3 - 25	16	8/7
Midday Base	9:00 AM to 1:29 PM	20 - 30	24	11/11
Midday School	1:30 PM to 3:59 PM	3 - 31	21	7/8
PM Peak	4:00 PM to 6:29 PM	4 - 30	16	9/10
Evening	6:30 PM to 9:59 PM	10 - 32	19	11/8
Late Evening	10:00 PM to 11:59 PM	25 - 35	34	4/3
Night	12:00 AM to 1:04 AM	25 - 35	25	2/2
Saturday	5:40 AM to 12:45 AM	3 - 70	23	50/51
Sunday	6:45 AM to 12:41 AM	15 - 46	26	44/45

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

Table 2 | Schedule Statistics for Route 70A

SERVICEDAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:10 AM to 7:30 PM			20/20
Sunrise	-	-	-	-
Early AM	6:10 AM to 6:59 AM	34 - 45	40	2/4
AM Peak	7:00 AM to 8:59 AM	26 - 34	30	3/4
Midday Base	9:00 AM to 1:29 PM	25 - 77	55	6/4
Midday School	1:30 PM to 3:59 PM	55 - 65	58	2/3
PM Peak	4:00 PM to 6:29 PM	30 - 55	31	4/5
Evening	6:30 PM to 7:30 PM	30	30	3/0
Late Evening	-	-	-	-
Night	-	-	-	-
Saturday	7:55 AM to 6:45 PM	35 - 75	42	17/17
Sunday	-	-	-	-

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

Routes 70 and 70A fails to meet the MBTA's service span and frequency standards in a number of respects:

Route 70

- Some Saturday trips operate as long as 70 minutes apart, compared to the standard of every 60 minutes.

Route 70A

- The last weekday outbound trip departs at 6:15 PM, which is before the standard of 7:00 PM.
- Local routes should operate at least every 60 minutes on weekdays during off-peak periods and on weekends. On weekdays during the midday and evening, some trips are spaced as much as 70 minutes apart. On Saturdays, some trips operate as much as 75 minutes apart.

If the two routes are considered as a single route with multiple outer end tails, then they would meet the standards. However, the fact would remain that service on the outer ends is sometimes very infrequent.

Service Patterns

Routes 70 and 70A operate with a total of six inbound and seven outbound patterns:

Route 70

Route 70 operates with four inbound service patterns and five outbound patterns. On weekdays:

- Pattern 70.5 makes up all inbound service before 6:45 AM and outbound service before 5:53 AM and operates between Cedarwood and University Park.

Table 3 | Route 70 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
INBOUND				57	50	44
70.3	Central Square, Waltham	Central Square, Cambridge	Via Watertown Square	1	1	1
70.5	Cedarwood Avenue	University Park	Outer terminal at Cedarwood Avenue	30	16	25
70.6	Market Place Drive	University Park	Outer terminal at Market Place Drive	21	11	18
70.8	Central Square, Waltham	University Park	Via Watertown Square	5	22	0
OUTBOUND				58	51	45
70.2	Central Square, Cambridge	Watertown Square	-	1	1	1
70.3	Central Square, Cambridge	Central Square, Waltham	Via Watertown Square	1	0	0
70.5	University Park	Cedarwood Avenue	Via Central Square T Station	30	16	25
70.6	University Park	Market Place Drive	Via Central Square T Station	21	11	18

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
70.8	University Park	Waltham Commuter Rail	Via Central Square T Station	5	23	1

Table 4 | Route 70A Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
INBOUND				57	50	44
70.1	Waltham (Silver Hill Lane)	University Park	AM alignment	10	6	-
70.4	Waltham (Silver Hill Lane)	University Park	PM alignment	10	11	-
OUTBOUND				58	51	45
70.1	University Park	Waltham (Silver Hill Lane)	PM alignment	10	6	-
70.4	University Park	Waltham (Silver Hill Lane)	AM alignment	10	1	-

- Patterns 70.5 and 70.6 run all inbound service after 6:45 AM, and outbound service after 5:53 AM, until approximately 2:30 PM, generally alternating between Cedarwood and Market Place Drive, where there is a Market Basket, but with some exceptions.
- Pattern 70.8 slots additional Central Square-University Park short-turns in between the Cedarwood and Market Place Drive trip from 2:30 PM until approximately 5:30 PM. There is no time-based pattern upon which these trips are scheduled.
- Patterns 70.5 and 70.6 return service to alternating trips between Cedarwood and Market Place Drive from 5:30 PM to approximately 10:00 PM.
- After 10:00 PM until midnight, all service operates to and from Cedarwood.
- Pattern 70.3 makes a single round trip between Central Square, Cambridge and Central Square, Waltham after midnight that departs from Cambridge at 12:10 AM and returns from Waltham at 12:40 AM. The last outbound trip runs from Central Square, Cambridge to Watertown Square at 1:04 AM and then returns to the garage.

Saturday service operates with the same mix of services as on weekdays. However, except in the early morning and at the end of service, the mix of Cedarwood, Market Place Drive and short-turns trips is even more irregular.

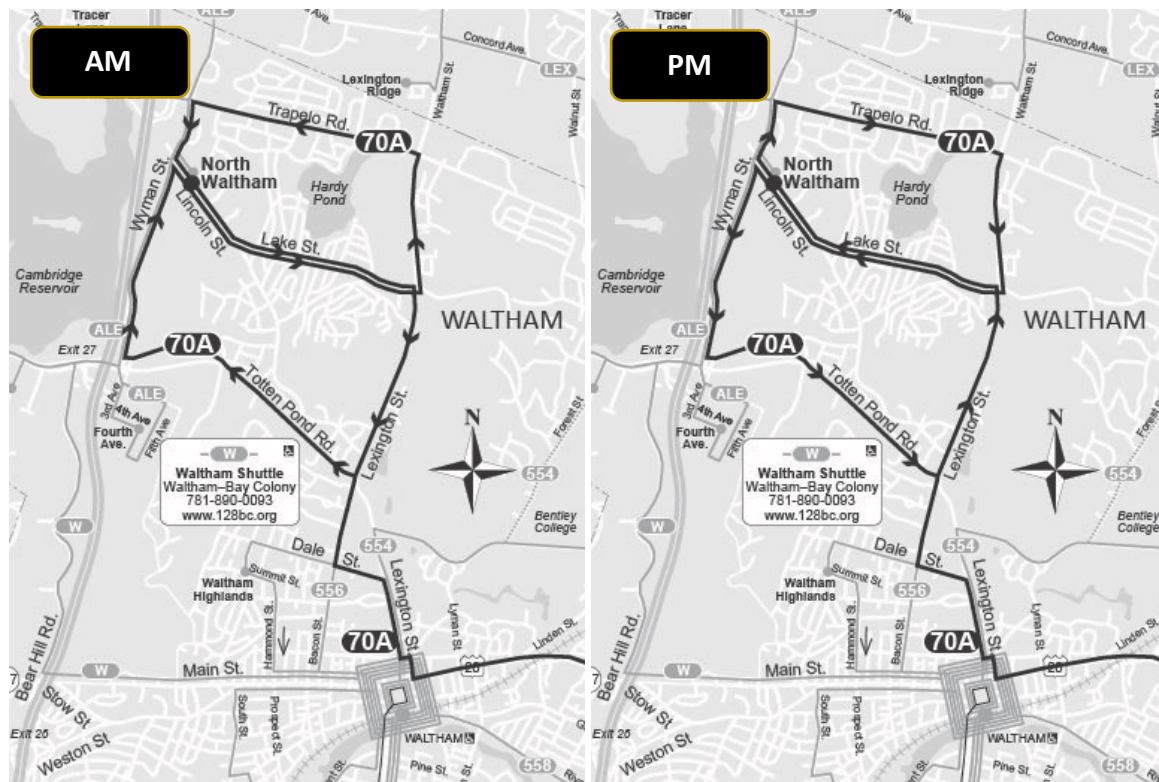
Sunday service is much simpler, with early morning and night service for the last trips operating to and from Cedarwood and service in between alternating between

Cedarwood and Market Place Drive. The last trips of the night operate according to the same pattern as on weekday and on Saturdays.

Route 70A

Route 70A operates with four complex service patterns that are intended to first provide AM outbound service to office parks along Wyman Street, followed by inbound service from residential areas, and the reverse in the PM. They differ in terms how they serve North Waltham in the AM and the PM (see Figure 3):

Figure 3 | Route 70A North Waltham Loops



- In the AM:
 - Pattern 70.1 provides an AM inbound service that departs from Lincoln Street at Silver Hill Lane and continues east on Lake Street to north on Lexington Street to west on Trapelo Road to south on Smith Street and then back along Lincoln and Lake Streets for a second time back to Lexington Street. It then travels south on Lexington Street to south on Bacon Street to east on Dale Street back to south on Lexington Street to Central Square in Cambridge.
 - Pattern 70.4 provides an AM outbound service that operates the reverse of inbound service from Central Square in Cambridge to the intersection of Dale and Lexington Streets, and then north on Lexington

Street to west on Totten Pond Road to north on Wyman Street to right on Lincoln Street to the outer terminal at Silver Hill Lane.

- In the PM:
 - Pattern 70.1 provides a PM outbound service that operates the reverse of inbound service from Central Square in Cambridge to the intersection of Dale and Lexington Streets. It then operates west on Lake Street to north on Smith Street to east on Trapelo Road to south on Lexington Street and then back along Lake Street.
 - Pattern 70.4 provides a PM inbound service that operates west along Lincoln Street to south on Wyman Street to east on Totten Pond Road to Bacon Street. It then operates south on Bacon Street to east on Dale Street to south on Lexington Street to Central Square in Waltham.

Ridership

Combined, Routes 70 and 70A carry 6,540 passengers per weekday, 3,780 on Saturdays, and 2,850 on Sundays. In terms of weekday ridership, this represents the second highest ridership among local routes and the 14th highest overall.

Ridership by Stop

Route 70 and 70A's highest ridership stops are at Waltham Central Square, Watertown Square, and Central Square in Cambridge. Stops along the Main Street/Arsenal Street/Western Avenue corridor are well used.

Inbound, most riders board and few alight west of Watertown Square. From East of Watertown Square, ridership begins to turnover, and by the time Route 70 and 70A reaches the Arsenal Yard shopping area in Watertown, most stops have more alightings than boardings. In more detail, on weekday trips inbound (see Figure 4):

Along the two Route 70 outer legs west of Central Square in Waltham:

- 41 passengers per day board at the two stops on the Cedarwood Avenue segment
- 71 riders board at the stop at Market Basket, which is the terminus, and only stop on the Market Place Drive service pattern, generating more ridership than the Cedarwood Avenue segment.
- Another 375 passengers board and 55 alight at the 12 stops along the 1.6-mile long corridor of Main Street between Stow Street and Waltham Central Square.

On Route 70A west of Central Square in Waltham:

- 75 passengers board and 32 alight at the 25 stops along the northern loop (Lexington Street, Trapelo Road to Lincoln Street). The highest ridership stop

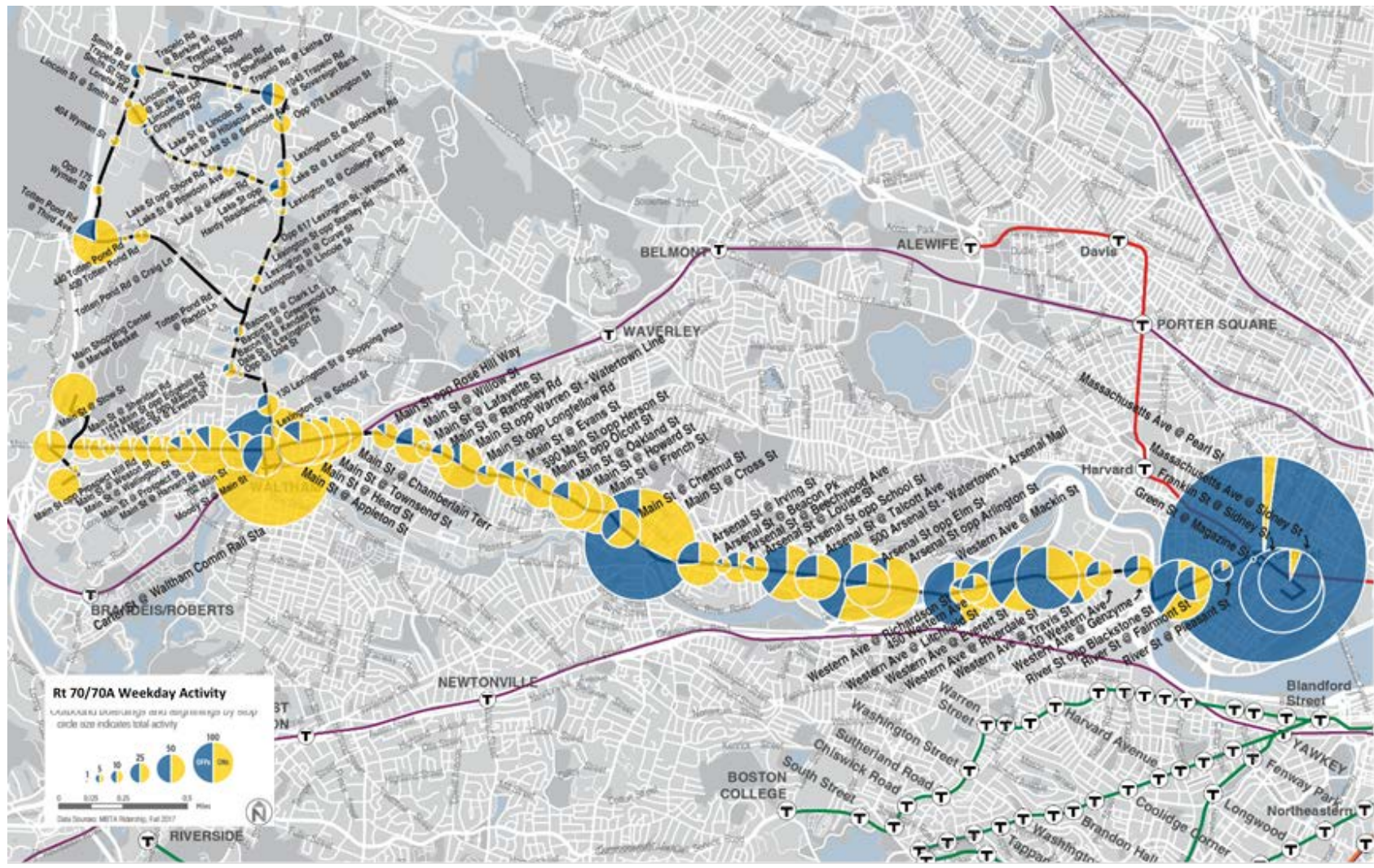
along this corridor is at 1045 Trapelo Road, near the Waltham Plaza Shopping Center.

- 100 passengers board and 15 alight at the nine stops along 2.5-mile segment along Totten Pond Road and Wyman Street. The highest ridership stop here is at Totten Pond Road at Third Avenue, adjacent to CityPoint, with 60 boardings and 15 alightings.
- 25 passengers board and 15 alight at the eight stops along the shared alignment that travels on Bacon Street and Lexington Street to Central Square in Waltham.

Ridership is strong along the entire corridor between Central Square in Waltham and Central Square in Cambridge. The highest ridership stops on this corridor include:

- A total of 410 passengers board and 80 alight at Waltham Central Square. This is the route's second highest stop (after Central Square in Cambridge).
- Inbound from Central Square in Cambridge:
 - 670 passengers board and 155 alight between Main Street between Waltham Central Square and Watertown Square.
 - 140 passengers board and 290 alight at Watertown Square.
 - 225 passengers board and 95 alight at the six stops along Arsenal Street between Watertown Square and Talcott Avenue.
 - 270 passengers board and 135 alight at the three stops that serve the Arsenal Yard Mall.
 - 390 passengers board and 340 alight at the nine stops along Western Avenue between Arsenal Street and River Street.
 - 100 passengers board and 85 alight at the three stops along River street and Central Square in Cambridge, a 0.6-mile long corridor.
 - A total of 20 passengers board and 1,440 alight at Central Square in Cambridge. This is the destination or transfer point for the largest number of Route 70 and 70A passengers.
- Beyond that point:
 - 125 passengers alight at Massachusetts Avenue @ Sidney Street.
 - 245 passengers alight at Franklin Street @ Sidney Street in University Park Cambridge.

Figure 4 | Weekday Inbound Ridership by Stop



Ridership by Trip

Weekdays

Route 70 has strong ridership in both directions for most of the day, with spikes in ridership during the morning peak period and afternoon (see Figure 5 and Figure 6). Several weekday trips during these periods carry more than 45 riders per trips, but in most cases turnover on the route means only a few trips are overcrowded. There are also a few trips at or near capacity on a couple of inbound early afternoon trips as well as a couple of outbound late afternoon trips.

Figure 5 | Weekday Ridership by Trip Route 70: Inbound

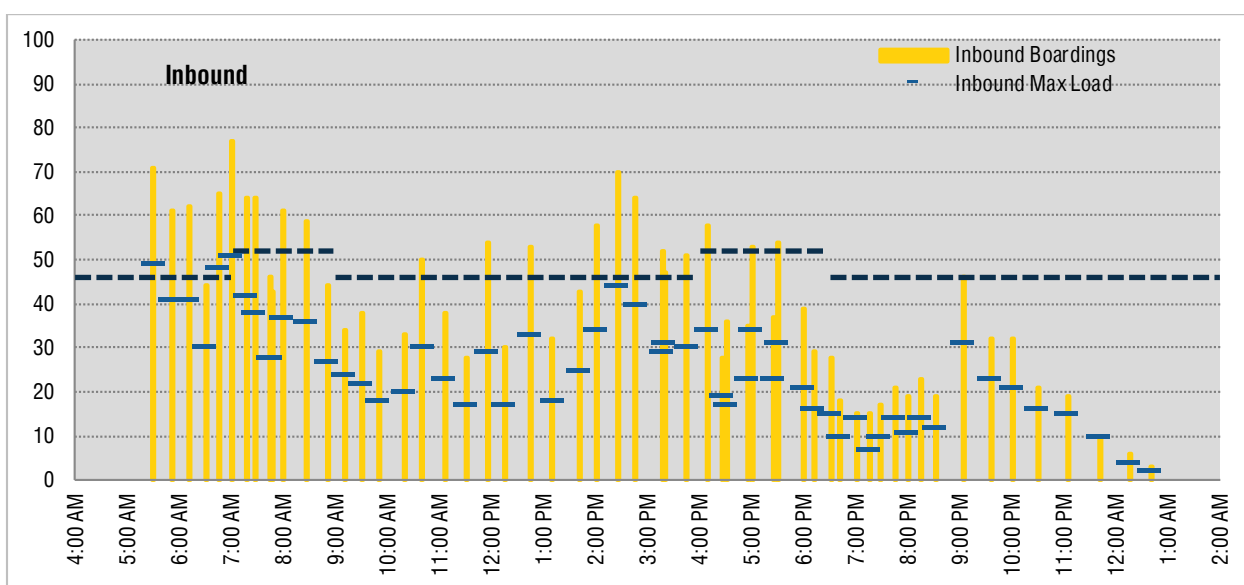
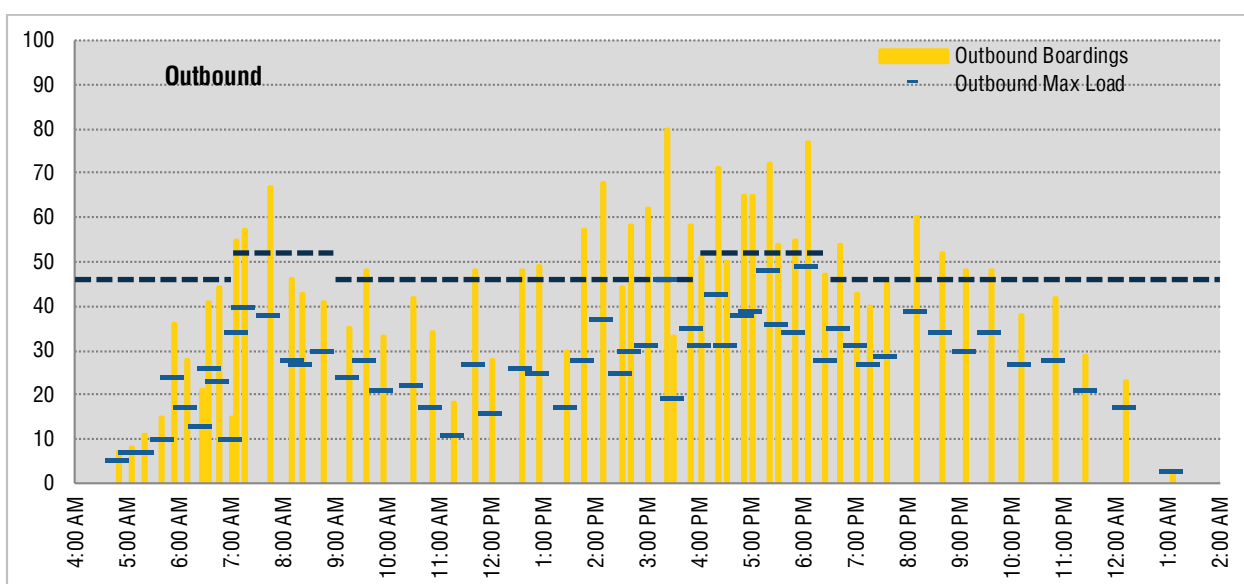


Figure 6 | Weekday Ridership by Trip Route 70: Outbound



Route 70A has similar ridership per trip patterns but with lower ridership overall (see Figure 7 and Figure 8). This largely reflects lower ridership to and from North Waltham during the midday. Weekday ridership peaks during traditional commuter times and the first inbound morning trips are at or near capacity. The last outbound trip at 6:15 PM carries 60 passengers, but only seven of whom are traveling to North Waltham.

Figure 7 | Weekday Ridership by Trip Route 70A: Inbound

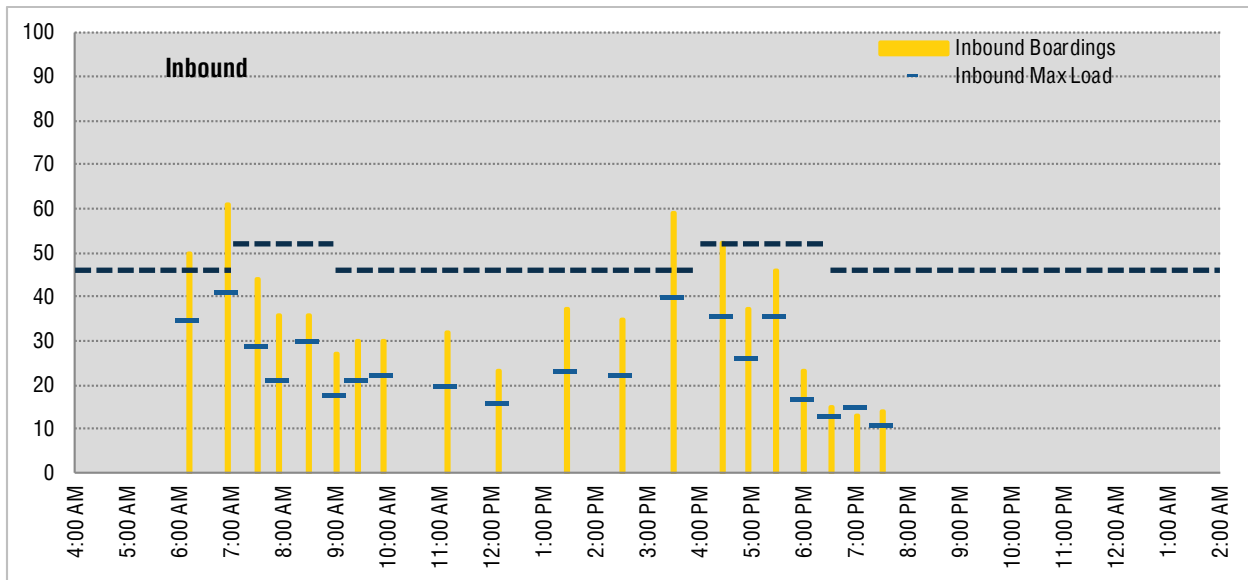
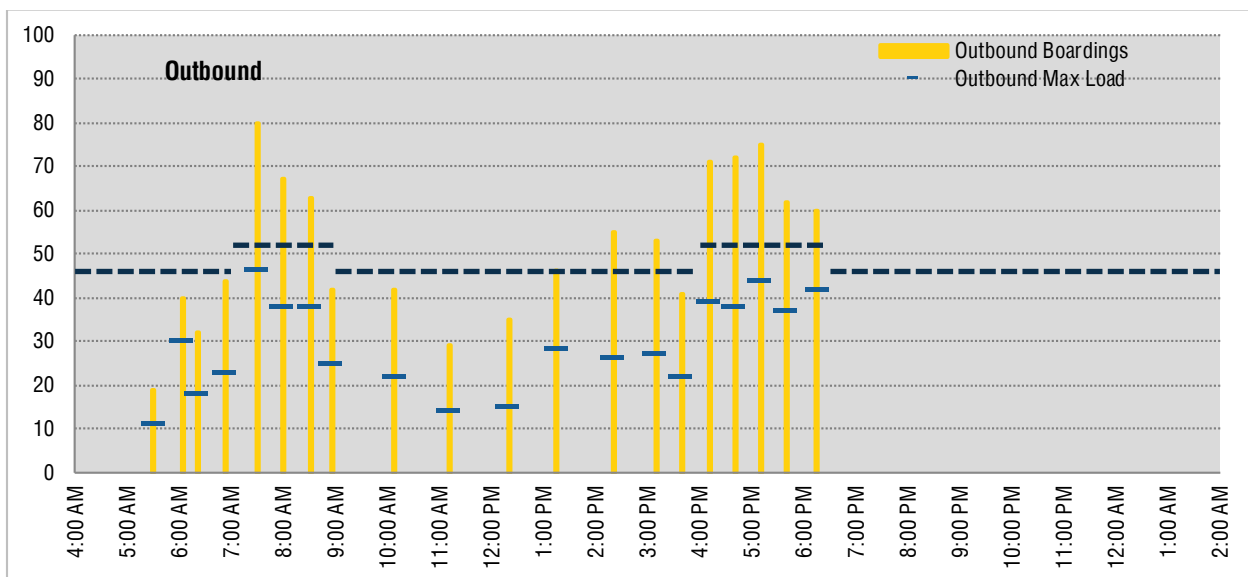


Figure 8 | Weekday Ridership by Trip Route 70A: Outbound



Saturdays

On Saturdays, Route 70 ridership is relatively strong and consistent throughout the day. Most trips carry between 20 and 30 riders (see Figure 9 and Figure 10). Demand is stronger inbound in the morning and outbound in the afternoon. The generally strong

pattern is interrupted by a handful of trips where ridership spikes above 50 riders and another handful where ridership is at or near zero. This suggests data errors in which some passenger trips are associated with the previous or next trip.

Figure 9 | Saturday Ridership by Trip Route 70: Inbound

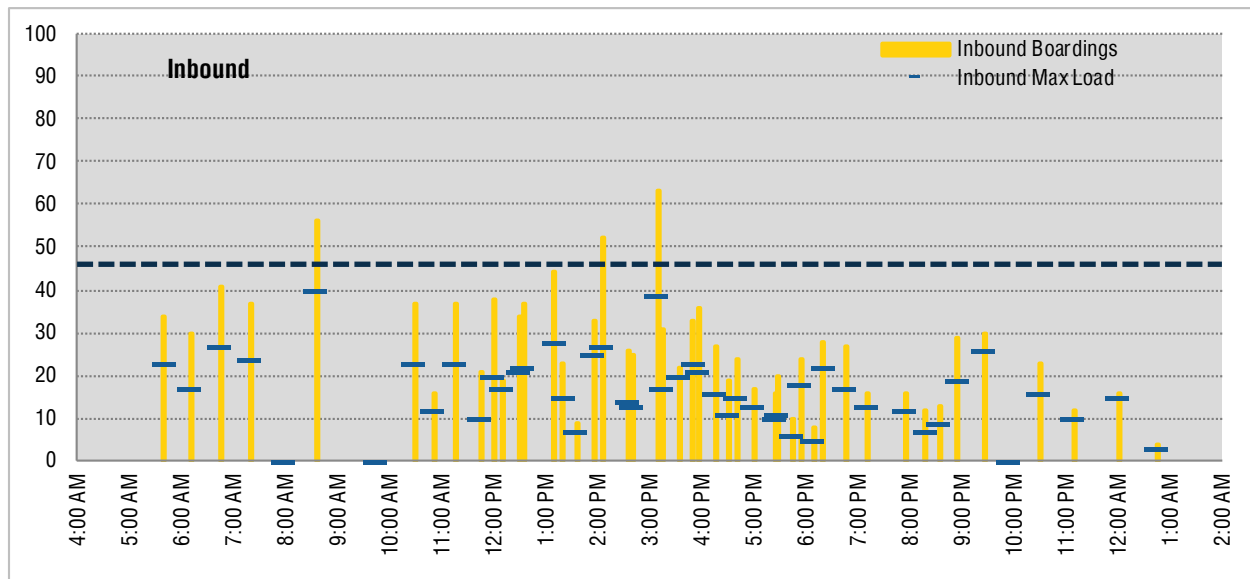
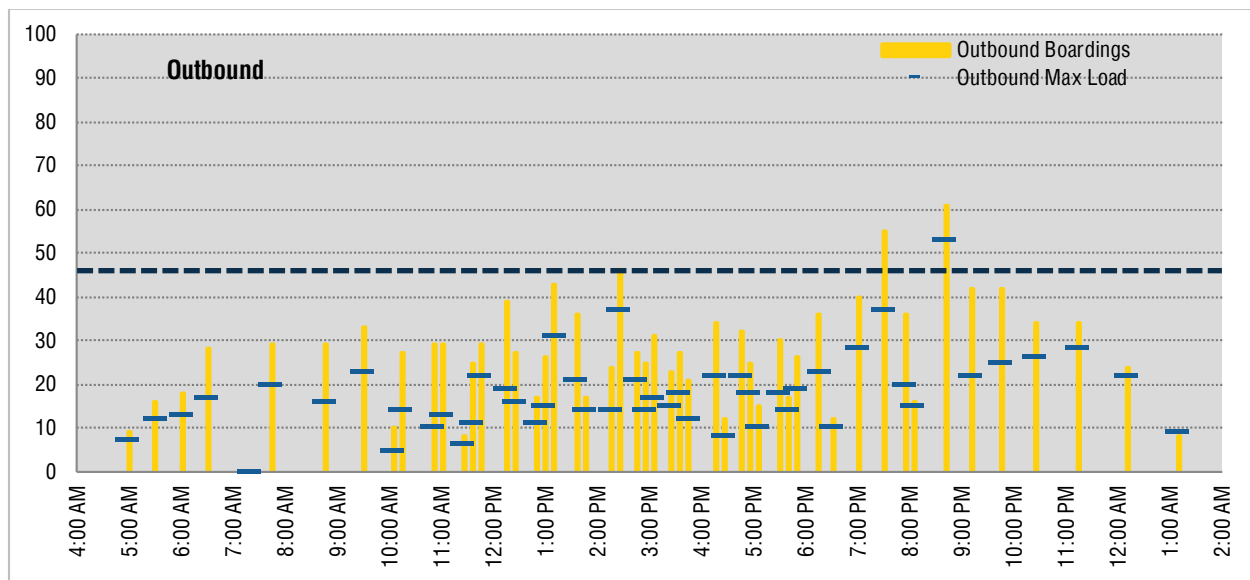


Figure 10 | Saturday Ridership by Trip Route 70: Outbound



Saturday ridership on Route 70A decreases throughout the day to generally around 30 passengers per trip range between 40 and 10 (see Figure 11 and Figure 12). A handful of trips carry more than 40 riders and several trips carry fewer than 20.

Figure 11 | Saturday Ridership by Trip Route 70A: Inbound

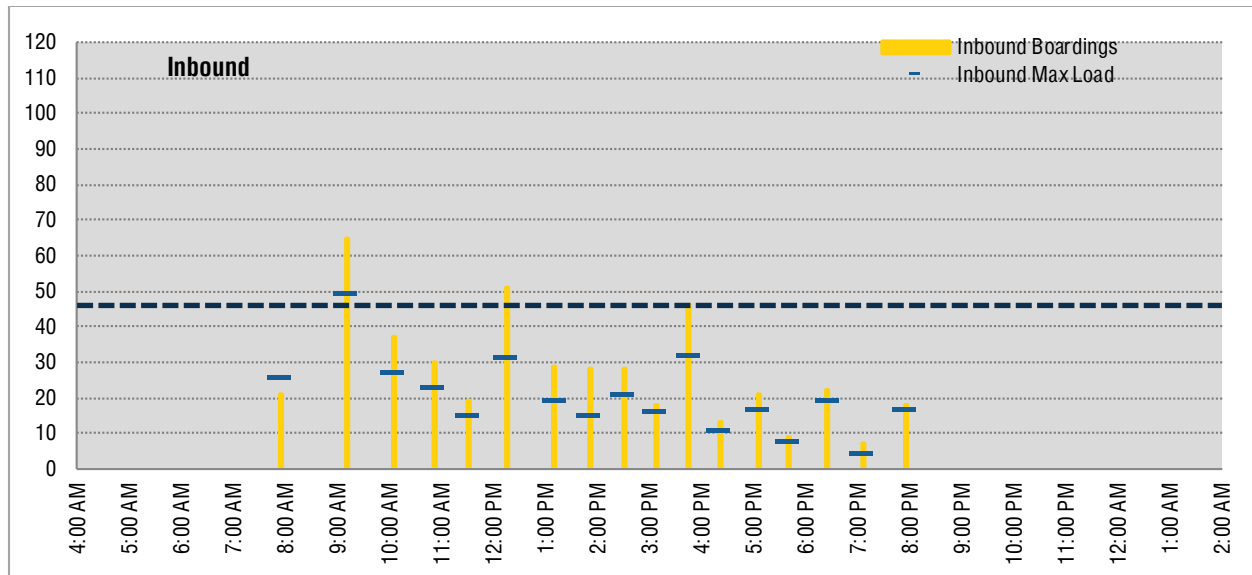
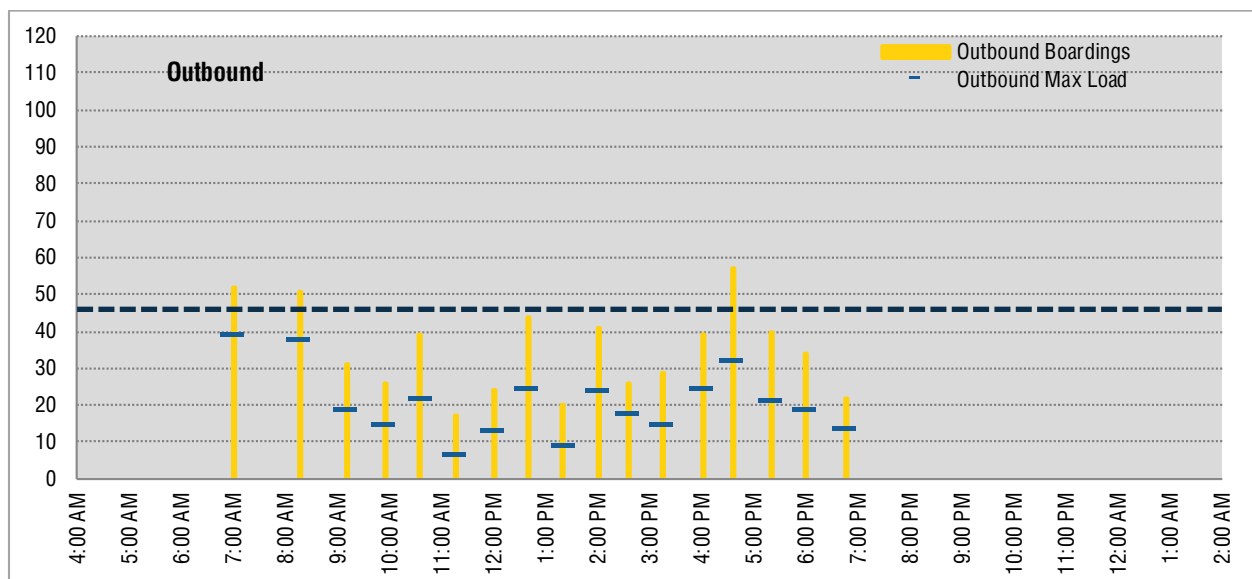


Figure 12 | Saturday Ridership by Trip Route 70A: Outbound



Sundays

On Sundays, service is provided on Route 70 but not Route 70A. With all ridership concentration on Route 70, ridership per trip on Sundays is higher than on Saturdays (see Figure 13 and Figure 14). Most inbound trips before 7:00 PM carry more than 30 passengers, and many carry more than 40. Most outbound trips carry over 30 passengers between 7:30 AM and 10:00 PM. The last three trips of the day (12:05 AM and 1:10 AM outbound and 12:41 AM inbound) carry few riders, with four, four, and seven passengers respectively.

Figure 13 | Sunday Ridership by Trip Route 70: Inbound

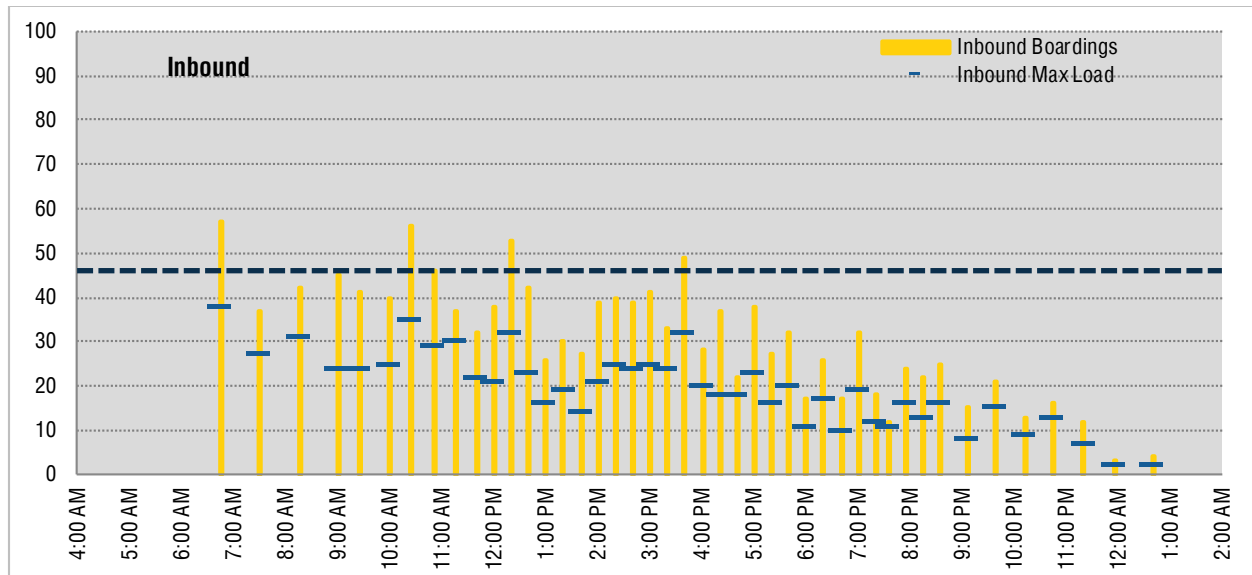
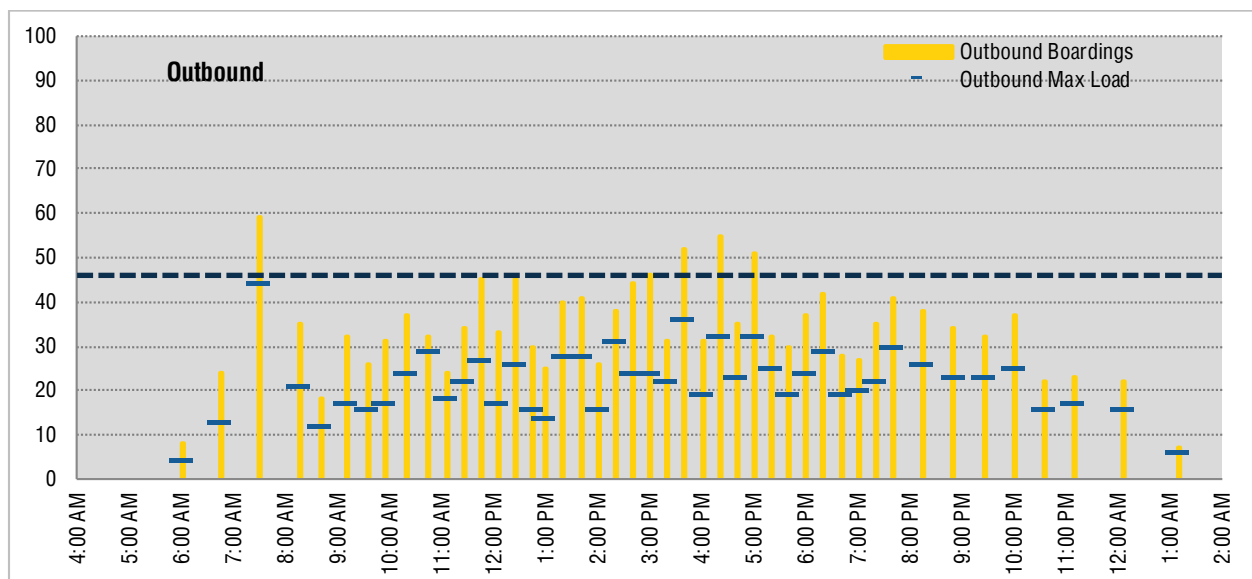


Figure 14 | Sunday Ridership by Trip Route 70: Outbound



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, 96% of passenger minutes on Route 70 and 70A are in comfortable conditions, which meets the MBTA’s target (see Table 5). On weekends, everyone travels in comfortable conditions unless there are service disruptions.

Table 5 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
Minimum Standard	92%	92%	92%
Target	96%	96%	96%
Actual	96%	99.7%	99.1%

Reliability and Speed

Reliability

The MBTA measures on-time performance on high frequency routes such as Route 70 and 70A based on the spacing of buses and arrival times at destination. Buses are considered to be on-time if the interval since the last bus is within three minutes of the scheduled interval and the overall travel time is no longer than 120% of the scheduled travel time.

Route 70 and 70A has poor reliability on all days, with reliability well below the minimum standard of 70% on weekdays and Saturdays, and marginally below on Sundays (see Table 6). Dropped trips are also a problem on this route, with 1.3% of all trips dropped.

Table 6 | Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	57%	49%	54%	1.3%
Saturday	62%	59%	62%	-
Sunday	68%	61%	67%	-

Running Times

Route 70 and 70A trips take 10 to 12 minutes longer than scheduled during the AM peak and one to five minutes longer than scheduled during the early AM period and five to seven minutes longer than scheduled after 5:00 PM. Route 70 and 70A’s alignment along the very congested Main Street/Arsenal Street/Western Avenue corridor slows down buses significantly.

Figure 15 | Scheduled & Median Travel Time by Trip: Route 70 Inbound

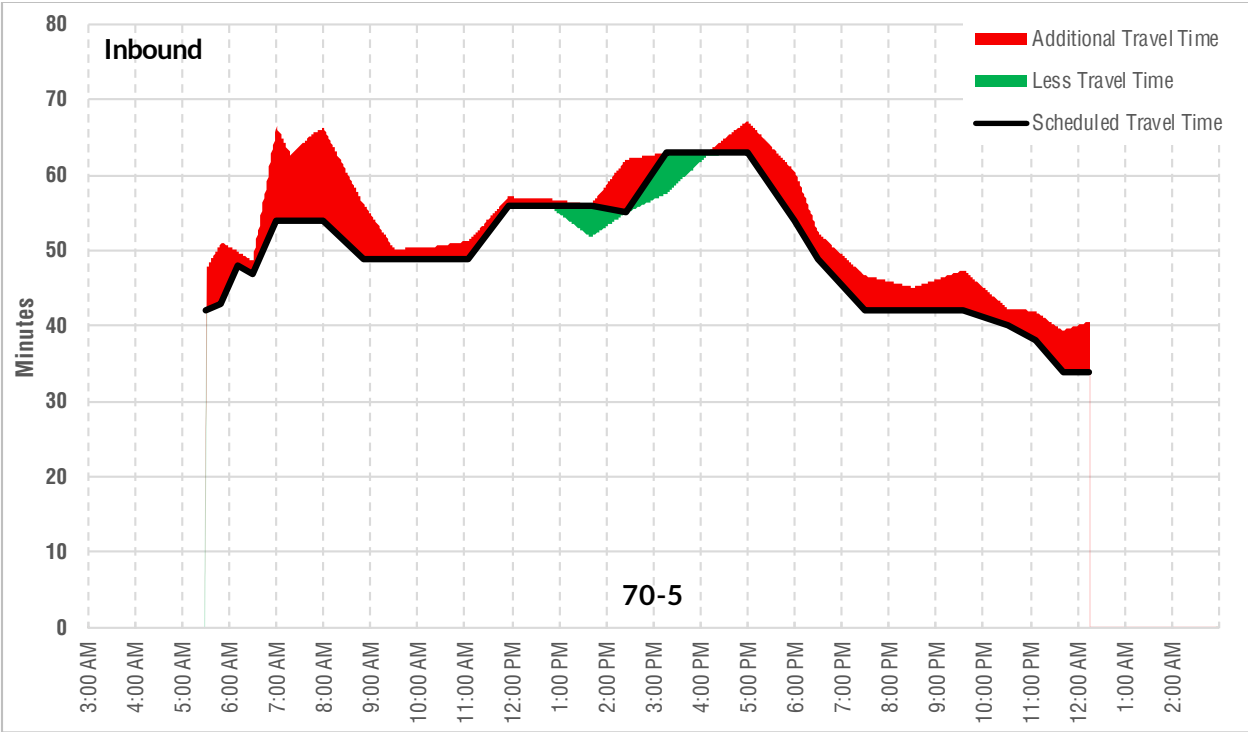


Figure 16 | Scheduled & Median Travel Time by Trip: Route 70 Outbound

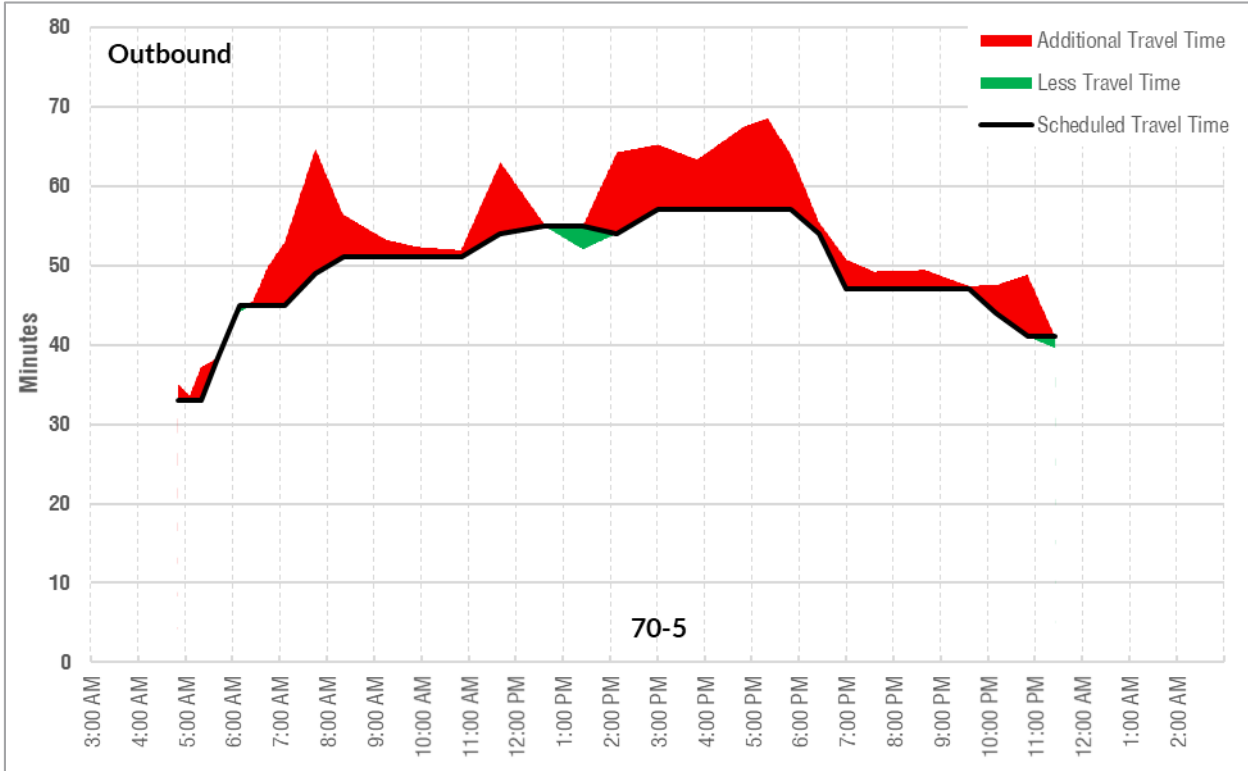


Figure 17 | Scheduled & Median Travel Time by Trip: Route 70A Inbound AM

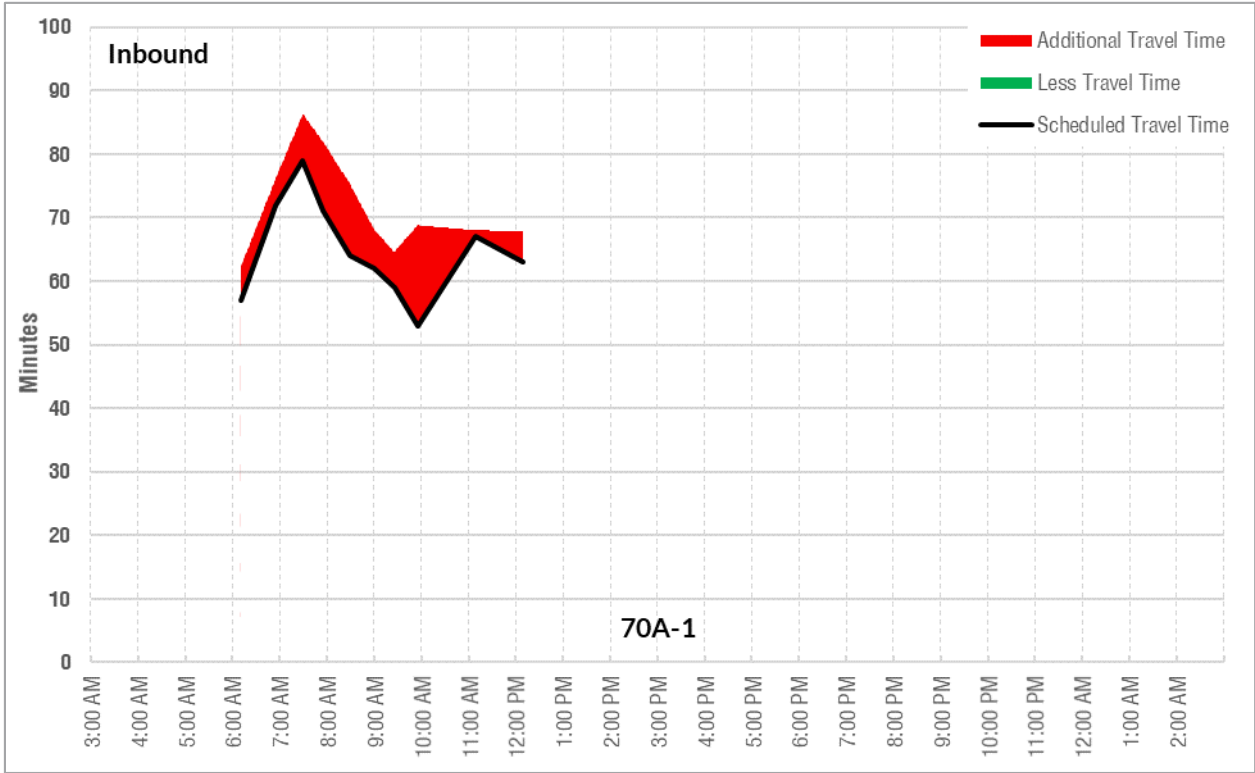


Figure 18 | Scheduled & Median Travel Time by Trip: Route 70A Outbound PM

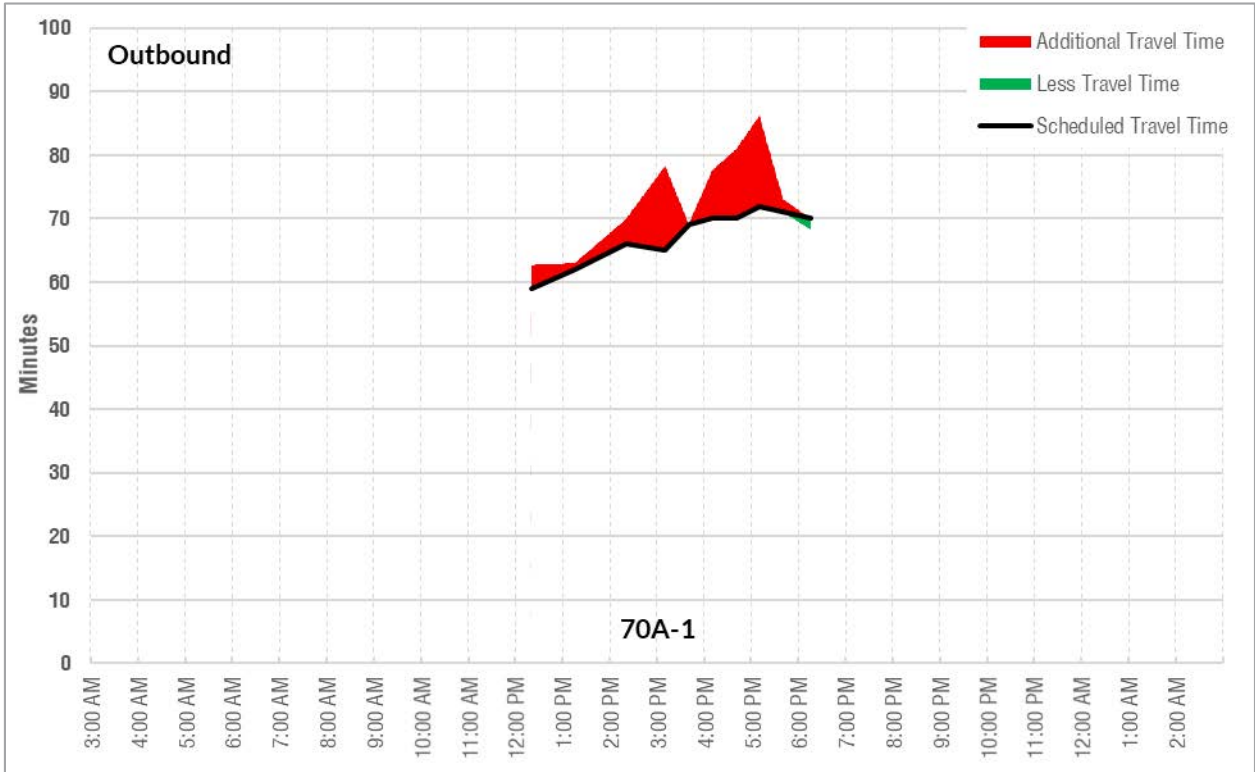


Figure 19 | Scheduled & Median Travel Time by Trip: Route 70A Inbound PM

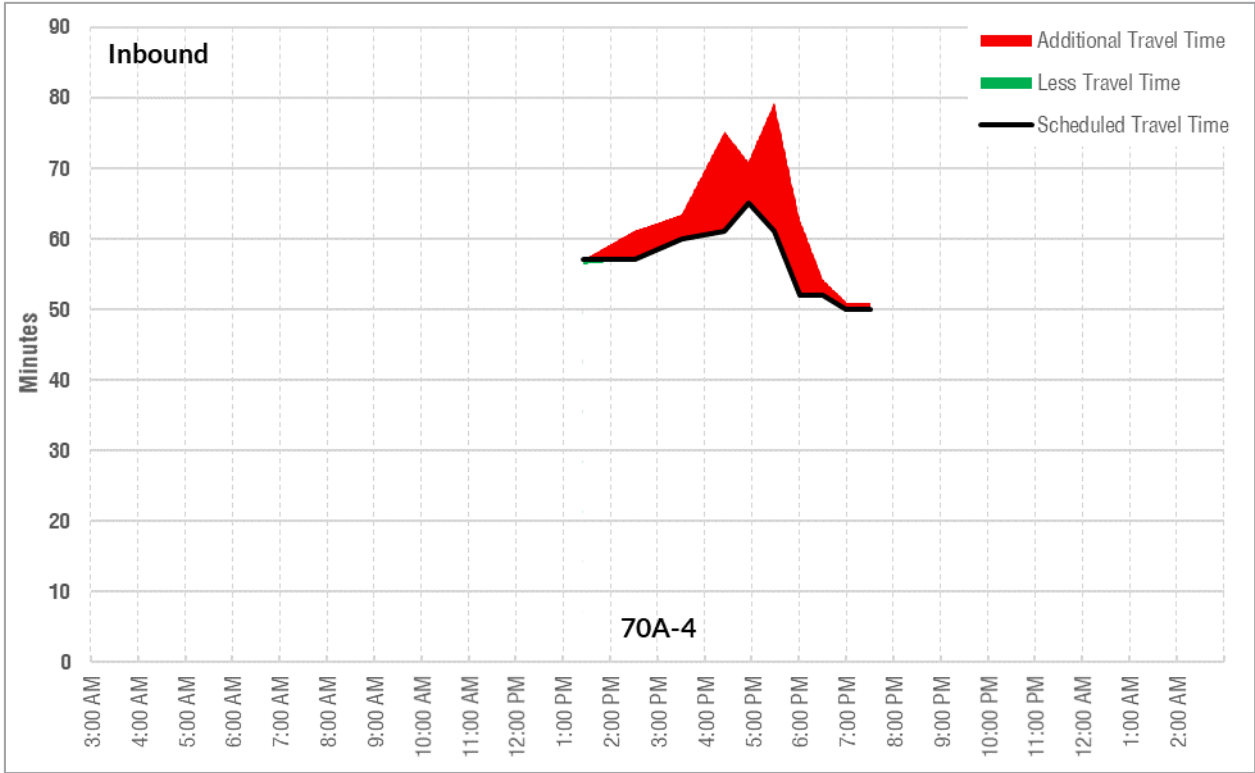
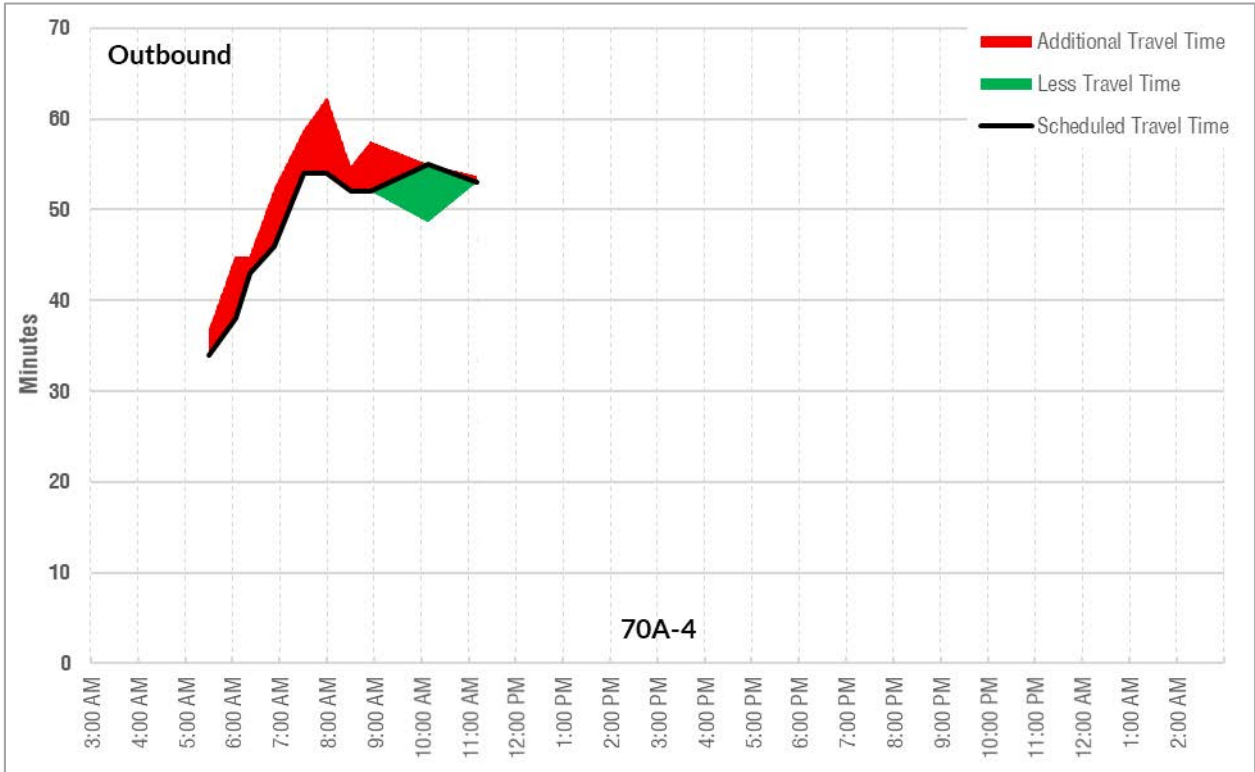


Figure 20 | Scheduled & Median Travel Time by Trip: Route 70A Outbound AM



Average Speeds

Route 70 and 70A experiences poor speeds near the major transit and activity centers it serves: Waltham Central Square, Watertown Square, and Central Square in Cambridge. Buses are also slowed by traffic congestion at Arsenal Street @ Western Avenue and in south Cambridge near Western Avenue and River Street near the entrance to the Massachusetts Turnpike. Route 70A is also slowed in the morning near Lexington Street at Totten Pond Road on inbound trips.

Stop Spacing

Route 70 and 70A would benefit from additional stop consolidation. While the route has an average of 900 feet between stops between Waltham Central Square and River Street. A handful of locations, including Main Street in Waltham and Watertown, and Western Avenue in Lower Allston have a stop spacing of less than 500 feet apart.

Summary

Overall, Routes 70 and 70A combined represent one of the MBTA's highest ridership services and carry more riders than five Key Bus routes. The route is very straight-forward between Central Square in Cambridge and Central Square in Waltham. West of Central Square in Waltham, however, it becomes complicated, with four outer alignments, including one (Route 70A) that serves a double loop. The operation of service as two different routes also means that service is very irregular between Central Square in Cambridge and Central Square in Waltham. Routes 70 and 70A often bunch in Waltham Central Square, which can cause gaps in service of greater than 20 minutes during the peak. This in turn leads to overcrowding and further delays.