

Route 47

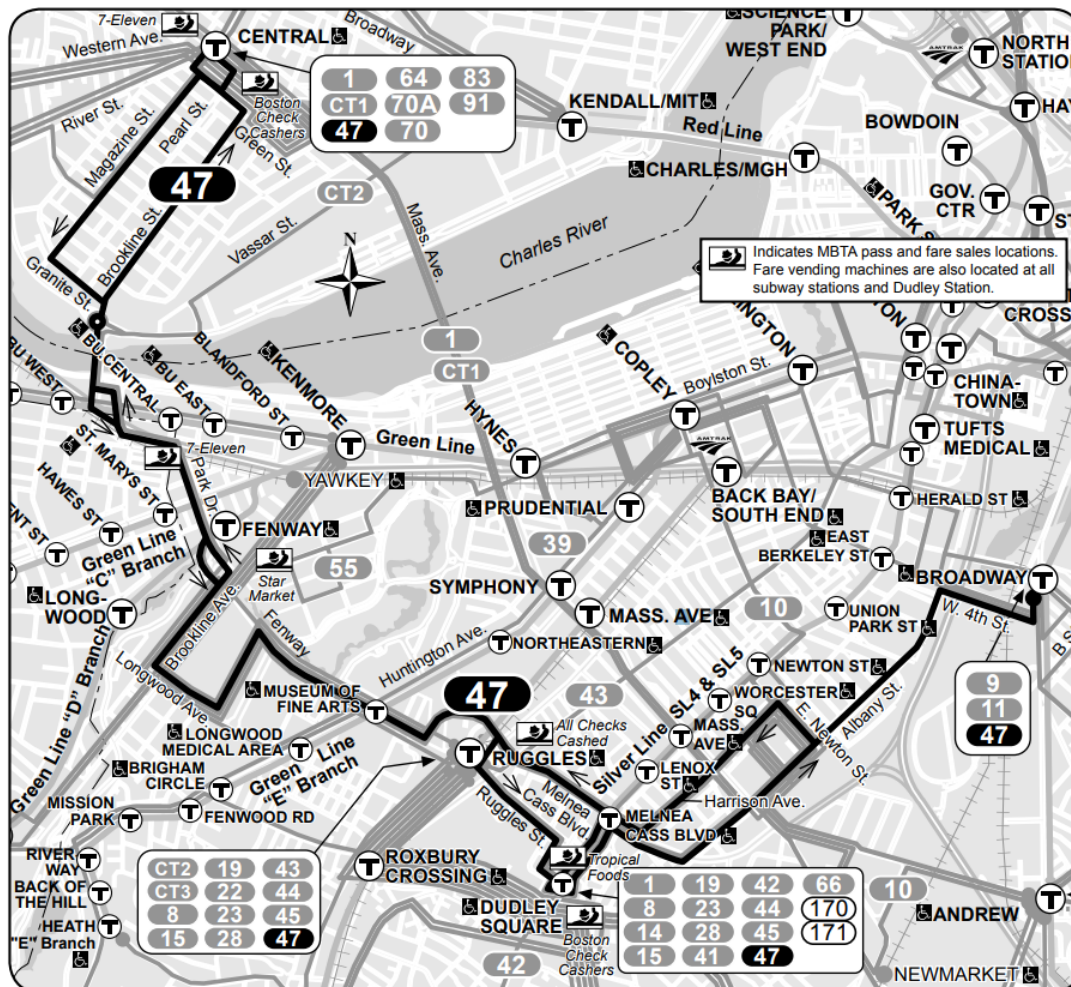
Central Square, Cambridge – Broadway Station

Route Overview

Route 47 is a Local route that provides crosstown service between Central Square in Cambridge and Broadway Station in South Boston (see Figure 1). Route 47 travels between Central Square and Broadway Station via Boston University (BU), the Fenway, the Longwood Medical Area (LMA), Ruggles Station, Dudley Square, and the Boston University Medical Campus.

Relatively little of Route 47’s alignment is entirely unique (in that other routes operate along the same streets). However, the route does provide unique and important crosstown connections to major employment centers and several rapid transit stations.

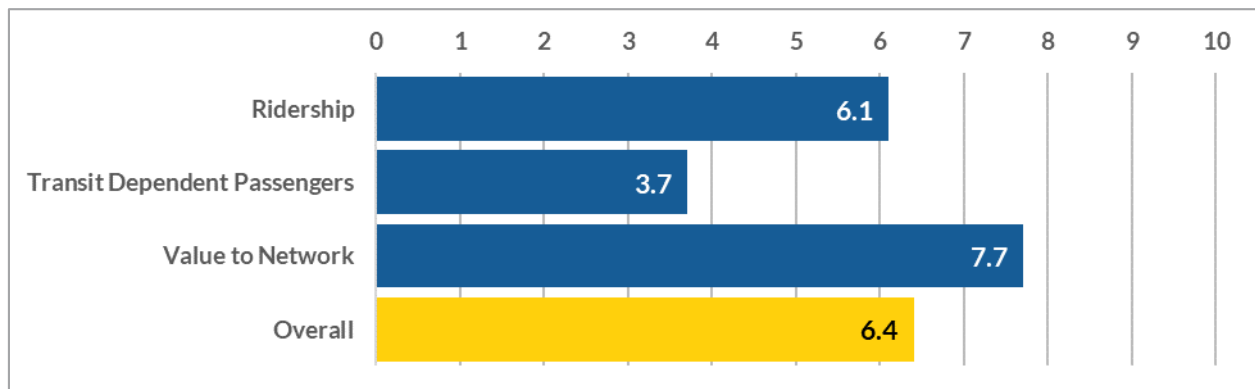
Figure 1 | Service Map



Network Importance

Route 47 is an important route within the MBTA's bus network (see Figure 2). On a relative scale of 0 to 10, the route rates 6.1 in terms of ridership, 3.7 in terms of transit dependent ridership, and 7.7 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 6.4.

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



Service Overview

Schedule

Route 47 provides moderately frequent service on weekdays and Saturdays and infrequent service on Sundays (see Table 1). On weekdays, it operates from 5:15 AM to 1:24 AM, with trips every 10 to 25 minutes during peak periods, every 21 to 24 minutes during the midday, and every 25 to 45 minutes during the evening and at night.

Route 47 operates with a similar span of service on Saturdays, beginning fifteen minutes earlier in the morning and running every 20 to 45 minutes. Sunday service is more limited, with service from 7:30 AM to 1:04 AM, running every 40 to 60 minutes.

Route 47 meets the span of service and service frequency standards for Local Bus routes during all service days and periods.

Service Patterns

Nearly all service operates Pattern 47.8, which serves the full length of the route in both directions (see Table 2). The only exception is on Sundays, when the first two inbound (southbound) trips and first three outbound (northbound) trips are short-turns that operate between Central Square and the BU Medical Campus.

Table 1 | Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	5:15 AM to 1:24 AM			49/51
Sunrise	5:15 AM to 5:59 AM	-	-	0/3
Early AM	6:00 AM to 6:59 AM	20	20	3/3
AM Peak	7:00 AM to 8:59 AM	10 - 22	15	9/5
Midday Base	9:00 AM to 1:29 PM	21 - 24	21	12/13
Midday School	1:30 PM to 3:59 PM	20 - 24	21	7/7
PM Peak	4:00 PM to 6:29 PM	15 - 25	19	8/10
Evening	6:30 PM to 9:59 PM	25 - 45	42	5/6
Late Evening	10:00 PM to 11:59 PM	45	45	3/3
Night	12:00 AM to 1:24 AM	45	45	2/1
Saturday	5:00 AM to 1:40 AM	20 - 45	31	38/38
Sunday	7:30 AM to 1:04 AM	40 - 60	54	22/24

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

Table 2 | Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
INBOUND				49	38	22
47.3	Central Square	BU Medical Campus	Early morning Sunday service	-	-	2
47.8	Central Square	Broadway Station	Primary pattern	49	38	20
OUTBOUND				51	38	24
47.3	BU Medical Campus	Central Square	Early morning Sunday service	-	-	3
47.8	Broadway Station	Central Square	Primary pattern	51	38	21

Ridership

Ridership on Route 47 is high, with 4,800 daily riders on weekdays, 1,800 riders on Saturdays, and 1,000 riders on Sundays.

Ridership by Stop

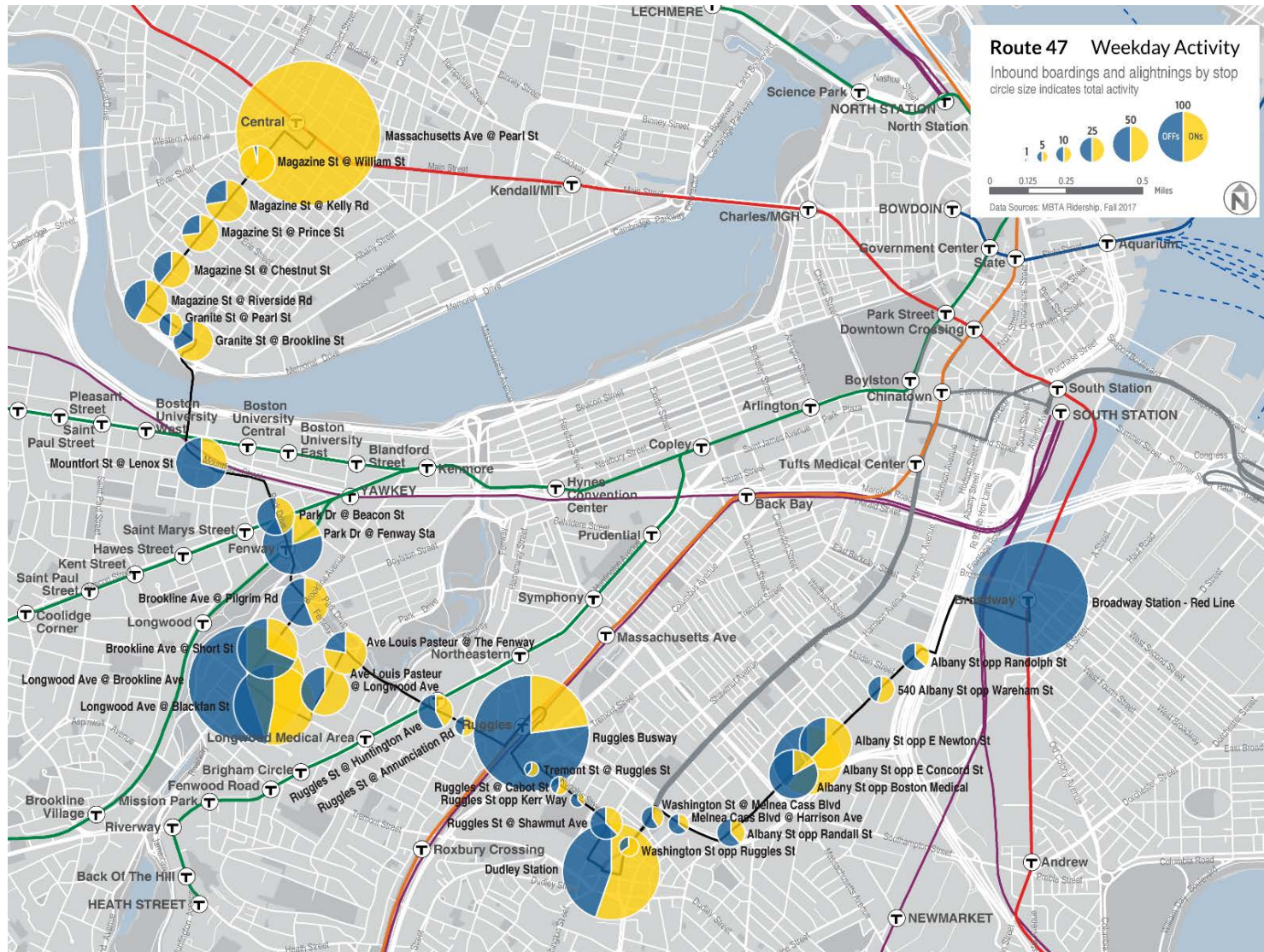
Route 47's ridership is high along the entire route, but higher on the northern end between Central Station and Ruggles Station than between Ruggles Station and Broadway Station (see Figure 3). Throughout the route, high activity stops are clustered around major activity centers and rapid transit stations, including Central Square, the LMA, Ruggles Station, Dudley Square, the Boston Medical Center area, and Broadway Station. Because Route 47 is a crosstown route, there is a high degree of turnover throughout the route.

On weekdays heading inbound from Central Square:

- The highest ridership stops are clustered around several major activity generators and transfer locations. 70% of all boardings and 66% of all alightings occur at the eight stops located at or near Central Station, the LMA, Ruggles Station, Dudley Station, and Broadway Station.
 - More than one-third of the route's inbound riders (800) board at Central Square, the stop with the most activity along the route. This is more than three times as many boardings as any other stop along the route.
 - 110 passengers alight and 30 board at Park Drive at the Fenway, where riders can connect to the Green Line at Fenway Station (B, C, and D Branches).
 - 600 passengers alight at the six stops in the LMA, which is equal to 50% of those who boarded between Central Square and the LMA.
 - Over 550 passengers board at stops in the LMA. The stop at Longwood Avenue at Brookline Avenue is the route's second highest activity stop, with over 230 boardings and 285 alightings.
 - 100 passengers board and 400 alight at Ruggles Station. Approximately 390 passengers ride through Ruggles Station.
 - 200 passengers board and 160 alight at Dudley Station.
 - 190 passengers board and 190 alight at the three stops that serve Boston Medical Center and the BU Medical Campus.
 - Broadway Station is the third most active stop along the route, with over 500 alightings.
- Ridership is relatively low along Ruggles Street, with no stop serving more than 50 passengers.
- In total, 60% of ridership activity is concentrated along the first half of the route between and within Cambridge, the LMA, and Ruggles Station, and 40% use the second half between Ruggles and Broadway.

Weekend ridership follows roughly the same ridership patterns inbound, with fewer but similarly distributed boardings and alightings.

Figure 2 | Weekday Inbound Ridership by Stop Map



Ridership by Trip

Unlike the majority of MBTA Local routes, for which peak period ridership is much higher in one direction than the other, ridership on Route 47 is bi-directional (see Figure 3 and Figure 4). This is typical of a crosstown route.

On weekdays:

- Inbound ridership is highest during the AM and PM peaks, with trips serving 50 to 90 passengers. Average maximum loads on AM peak trips are generally over 40, meaning that some riders must stand on these trips. During the PM peak, while overall ridership is high, average maximum loads do not exceed 35 passengers. Inbound ridership is significantly lower after 8:00 PM, with no trip serving more than 30 passengers.
- Outbound patterns are similar to inbound patterns, except that ridership per trip is highest between 3:00 PM and 4:00 PM, and most of these trips are overcrowded. This is likely related to the timing of shift changes at medical centers along the route and indicates that more frequent service is needed during this time period.
- Because turnover along the route is so high, maximum loads for both inbound and outbound trips are much lower than total ridership, generally fewer than 50 passengers during peak periods and fewer than 30 passengers during midday. The only regular overcrowding that occurs is on the outbound trips between 3:00 PM and 4:00 PM.

On weekends (see Figure 5 through Figure 8):

- Inbound ridership on Saturdays is higher from midday through 7:30 PM, with few passengers on morning and late night trips. No inbound trip exceeds 40 passengers and maximum loads do not exceed 20 passengers.
- Saturday outbound ridership is almost identical to inbound ridership, with the exception of the 4:24 PM trip, which serves 70 passengers and has a maximum load of 40 passengers. Outbound ridership is highest during the midday through 6:00 PM.
- Sunday ridership is relatively low throughout the service day. Inbound ridership is highest in the midday through 7:00 PM, with seven trips serving more than 30 riders. Outbound ridership is highest in the midday, although one PM peak trip at 6:10 PM serves close to 40 riders with a maximum load near 30 passengers.

No Saturday or Sunday trips have standing riders.

Figure 3 | Weekday Ridership by Trip: Inbound

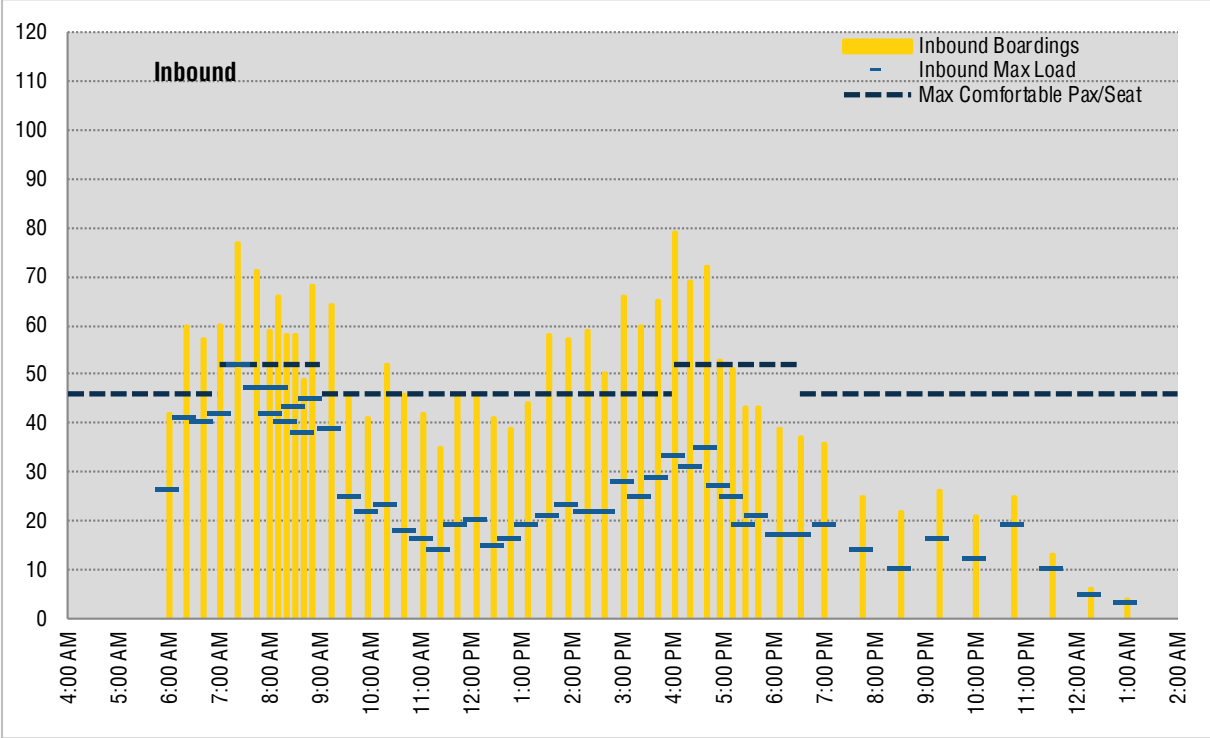


Figure 4 | Weekday Ridership by Trip: Outbound

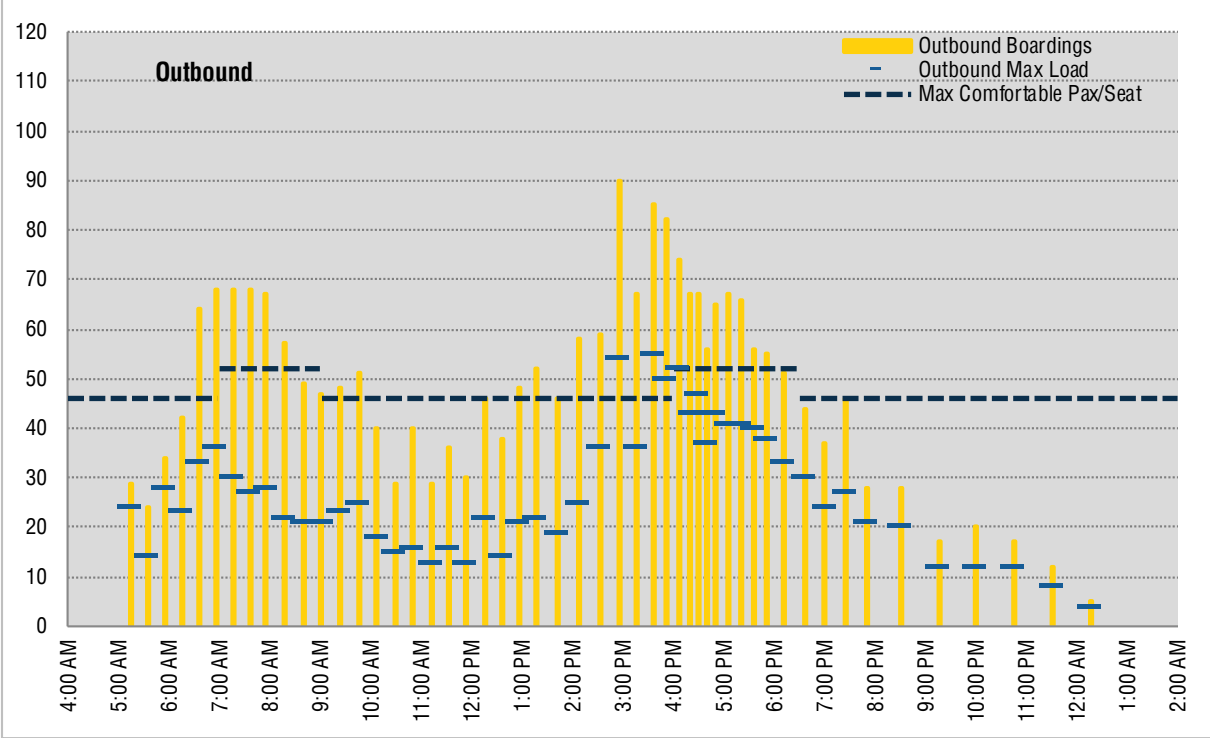


Figure 5 | Saturday Ridership by Trip: Inbound

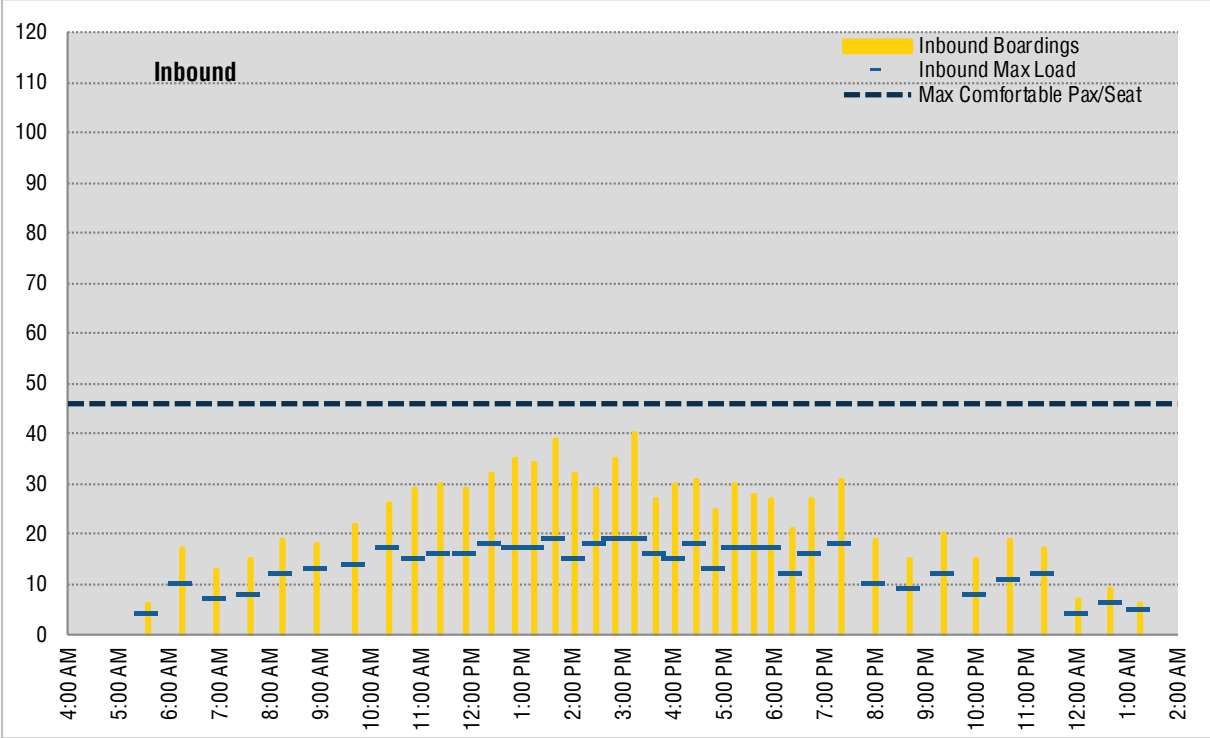


Figure 6 | Saturday Ridership by Trip: Outbound

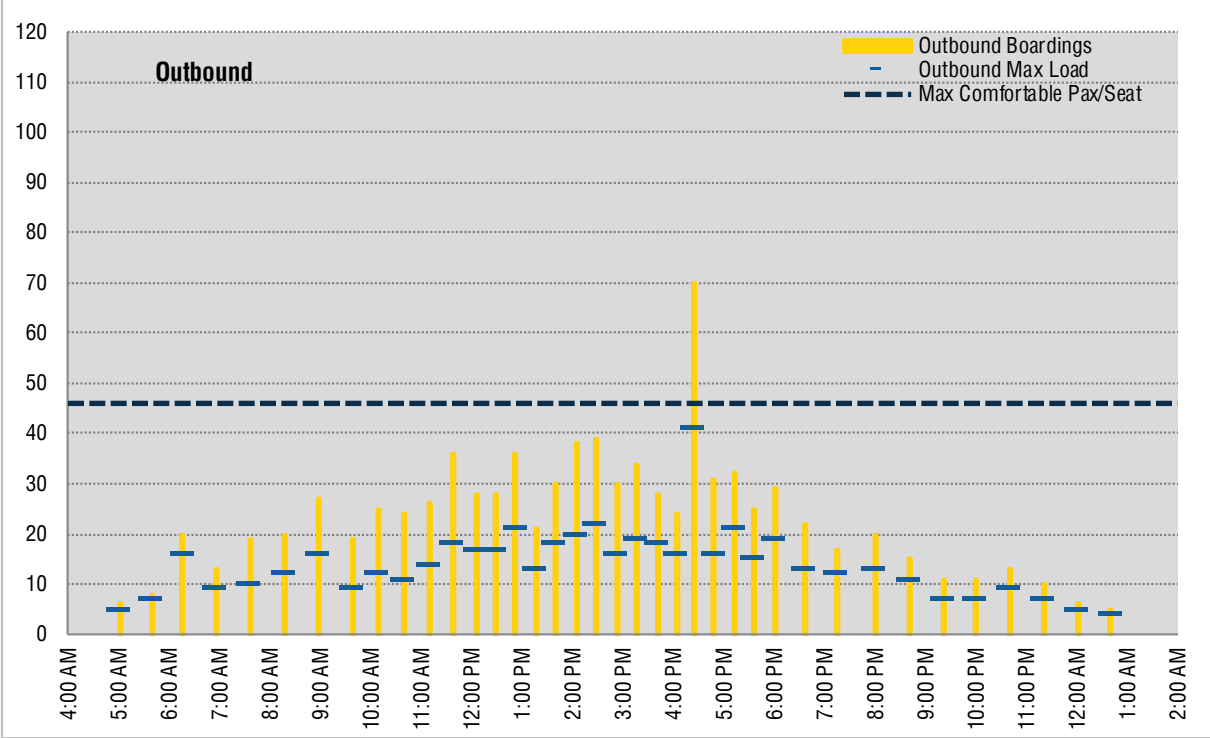


Figure 7 | Sunday Ridership by Trip: Inbound

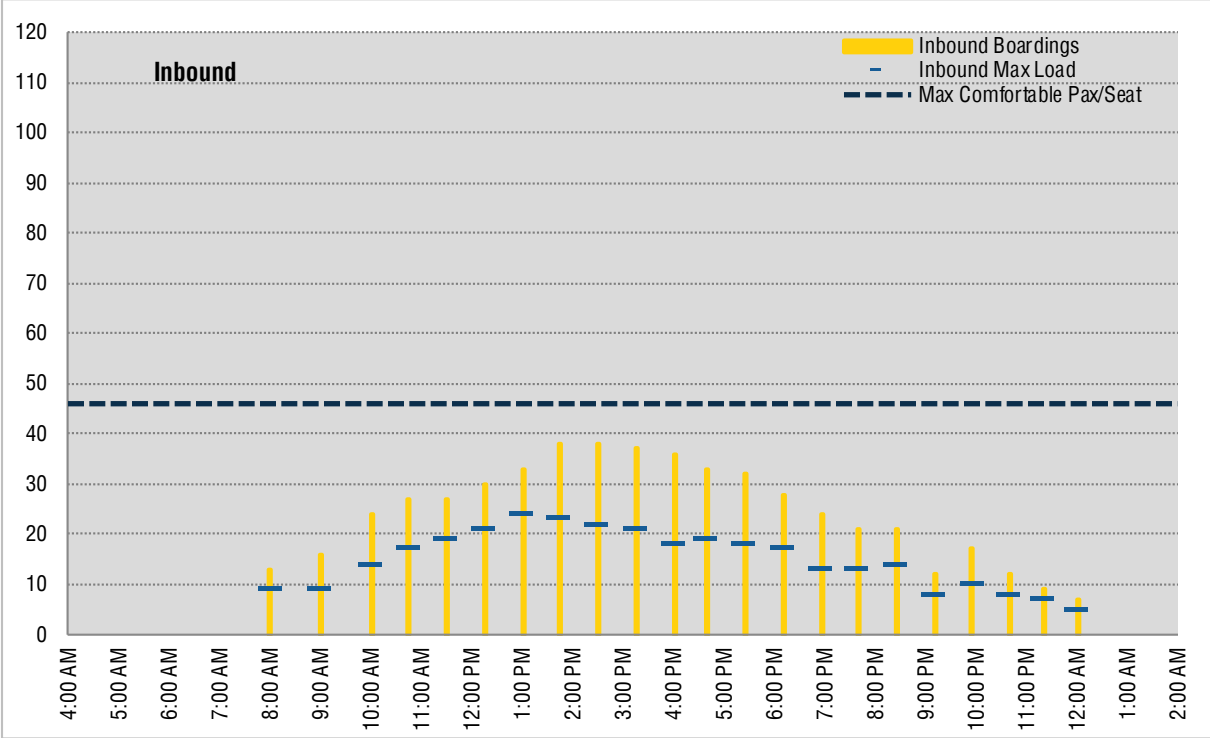
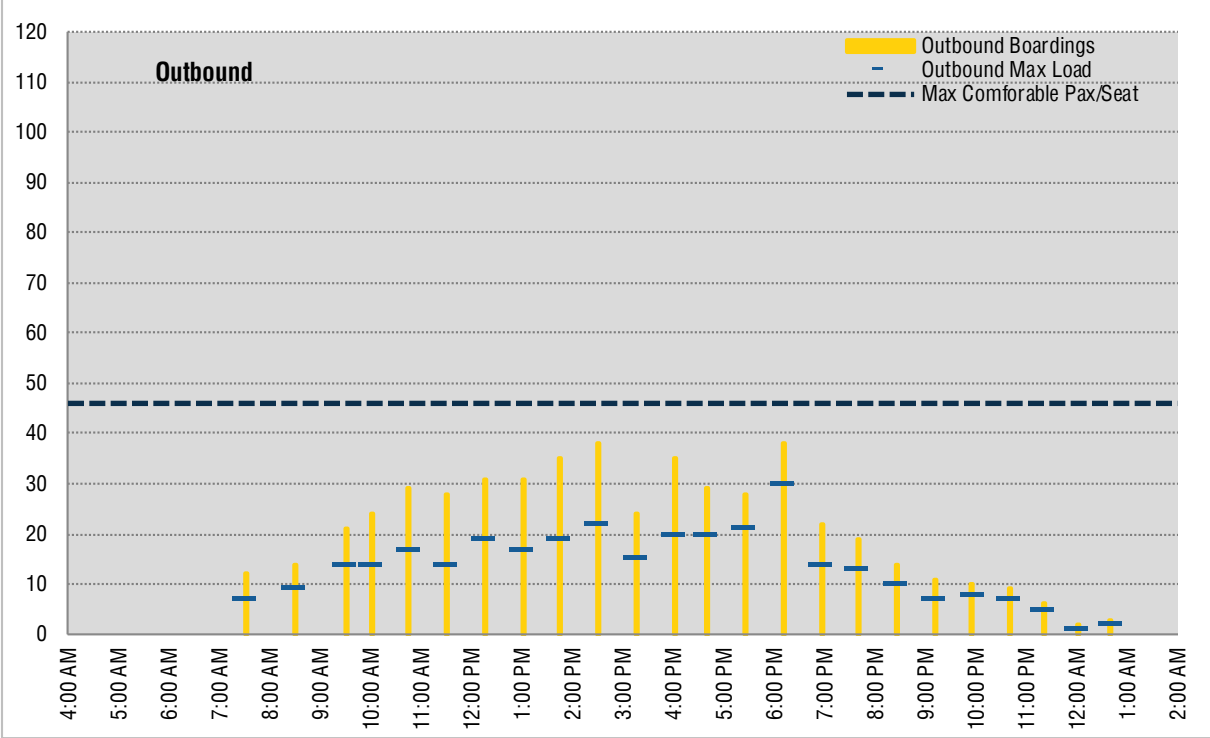


Figure 8 | Sunday Ridership by Trip: Outbound



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 47, 90% of passenger minutes are in comfortable conditions, which is below the minimum standard (see Table 3). As described above, on average, and except on outbound trips between 3:00 and 4:00 PM, loads are below the maximum desired levels. This indicates that crowding issues are caused by off-schedule performance.

Table 3 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
Minimum Standard	92%	92%	92%
Target	96%	96%	96%
Actual	89.7%	99.8%	100%

Reliability and Speed

Reliability

Route 47's service is unreliable, especially on weekdays (see Table 4). Only 50% of weekday trips are completed on-time, with service often running behind schedule and at uneven frequencies. Trips in both directions run an average of four to six minutes behind schedule during midday and evening service. Dropped trips are an issue on Route 47, with just over 1% of trips not operated in Fall 2017. This also contributes to overcrowding.

Table 4 | Reliability

SERVICEDAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	53%	50%	53%	1.1%
Saturday	57%	55%	57%	-
Sunday	64%	62%	63%	-

Route 47's reliability is poor, in large part because actual running times routinely exceed scheduled times, especially during midday and evening service (see Figure 9 and Figure 10). Midday trips typically run about four to eight minutes behind schedule, and evening trips operate about five minutes behind schedule. Since this document was developed, the MBTA has adjusted Route 47 schedules to better reflect actual running times.

Figure 9 | Scheduled & Median Travel Time by Trip: Route 47 Inbound

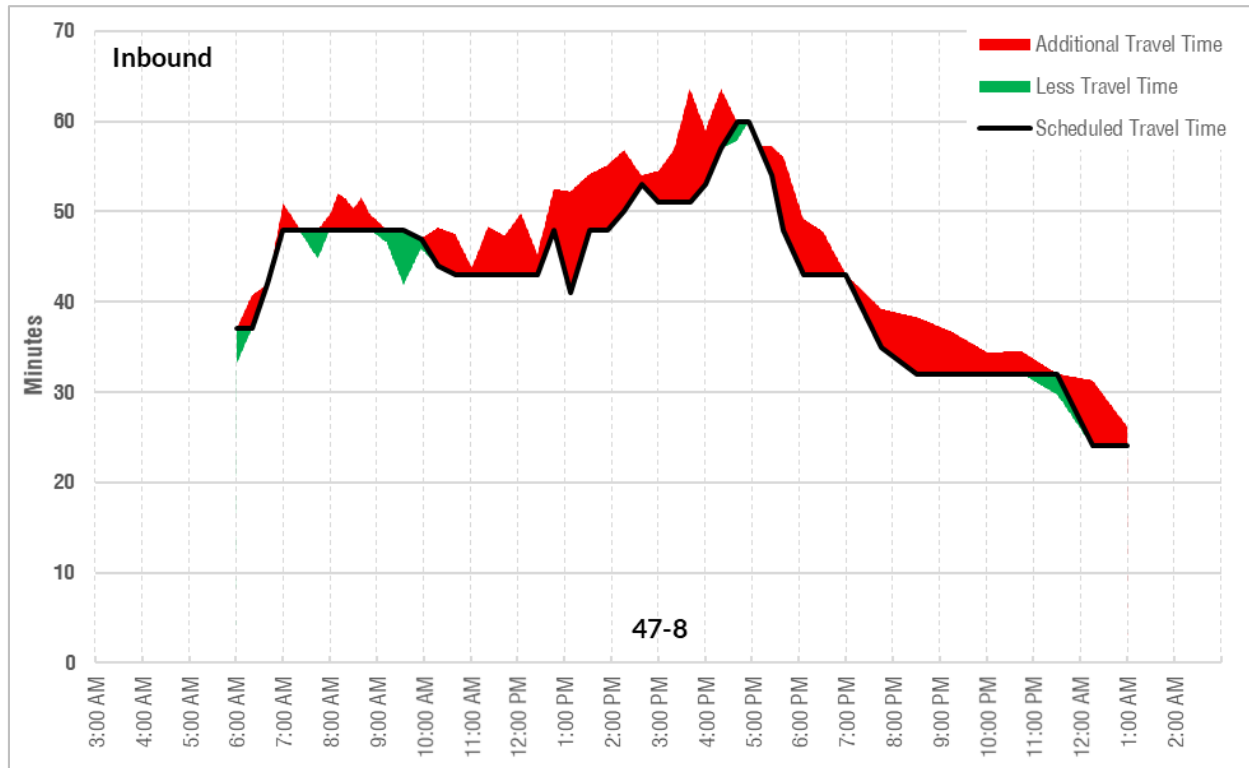
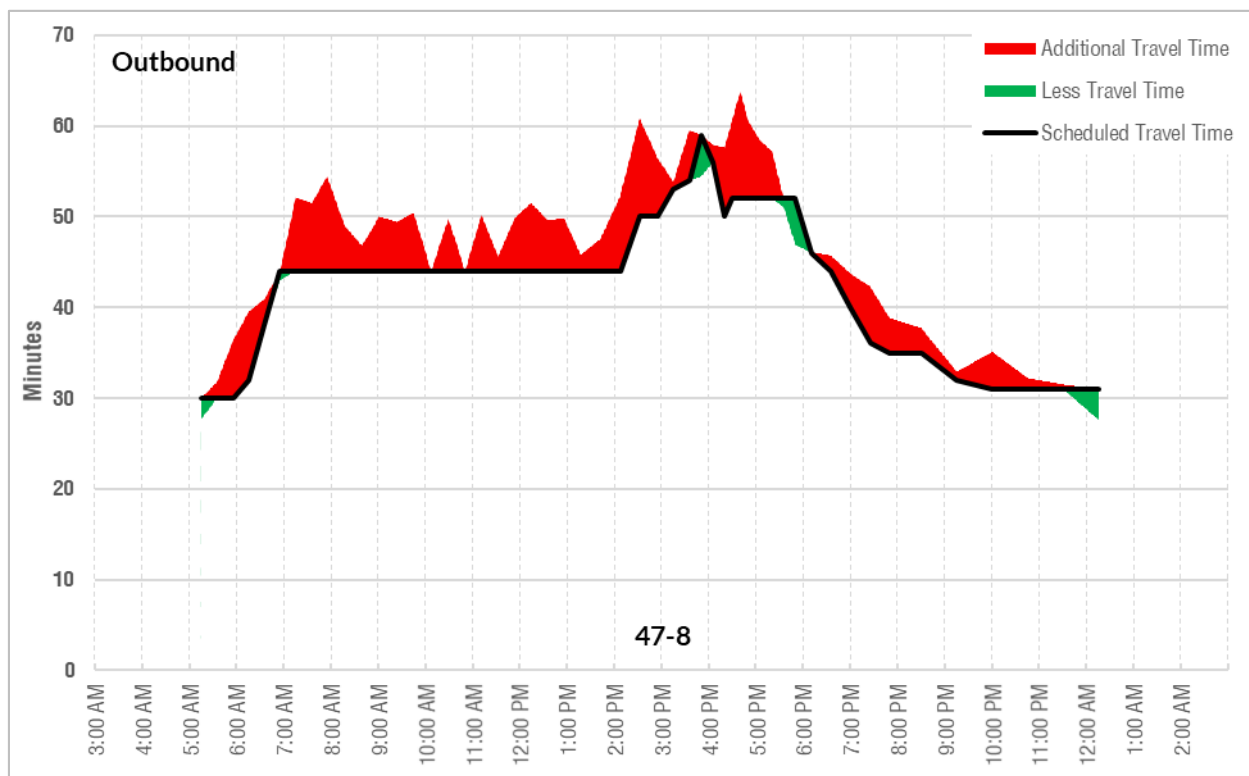


Figure 10 | Scheduled & Median Travel Time by Trip: Route 47 Outbound



Stop Spacing

Route 47 has an average of 5.4 stops per mile, which is consistent with the MBTA's standard of four to seven stops per mile for urban areas. There are only a few instances of closely spaced stops along the route, including on Ruggles Street and Albany Street by Boston Medical Center and the BU Medical Campus. The stops at Ruggles Street at Cabot Street, and at Ruggles Street opposite Kerr Way are only 400 feet apart, and are two of the lowest activity stops on the route.

Summary

Route 47 is a very high ridership route that provides important crosstown service to major employment centers, and connects to the Red Line, Green Line (multiple branches), Silver Line, and Orange Line, and the many bus routes that serve these rapid transit stations. A major issue is that service is unreliable, particularly on weekdays. Service is also relatively infrequent considering the route's high ridership.