

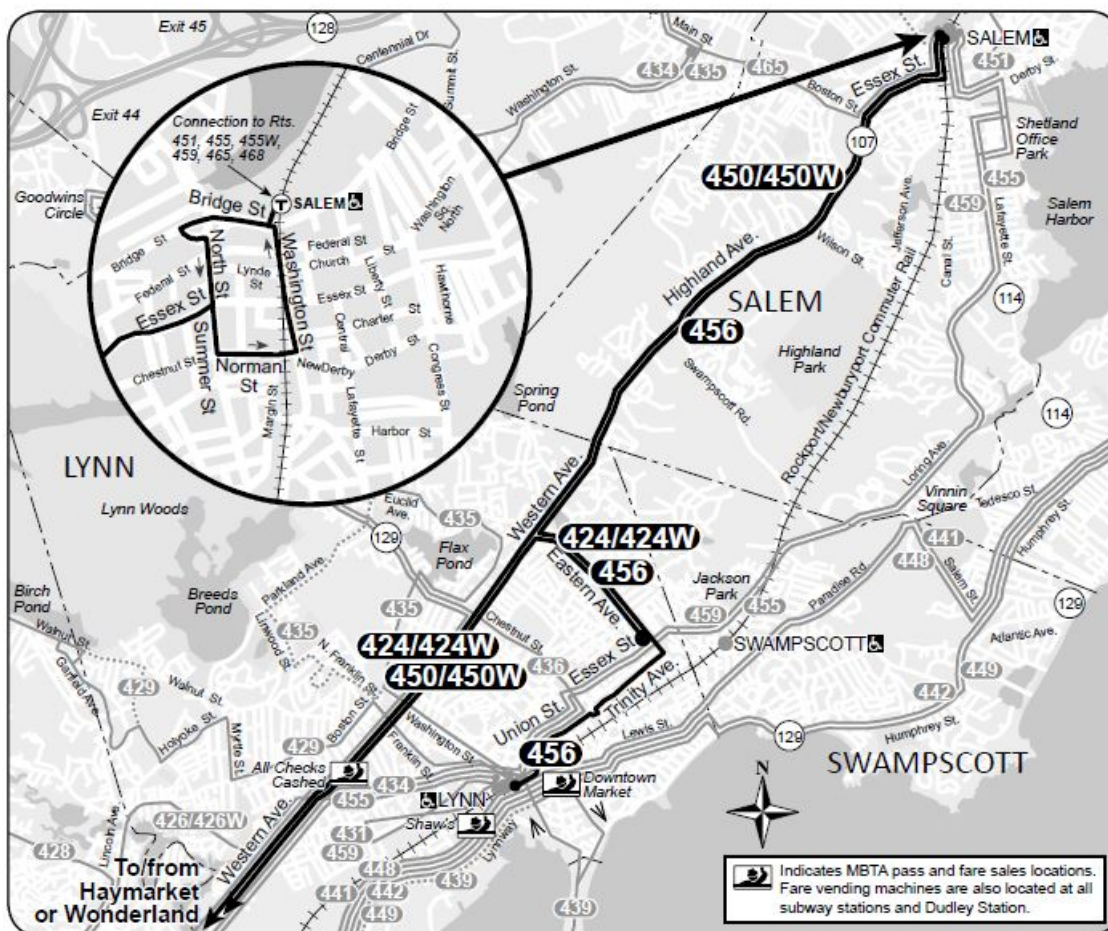
Route 450/450W

450 Salem Depot – Haymarket
450W Salem Depot – Wonderland

Route Overview

Route 450 Salem Depot – Haymarket provides local service between Salem Commuter Rail Station and Haymarket Station in Boston via Salem, Lynn, Saugus and Revere on weekdays (see Figure 1). Route 450W Salem Depot – Wonderland provides local service between Salem Commuter Rail Station and Wonderland with a single trip on weekdays and all service on weekends.

Figure 1 | Service Map



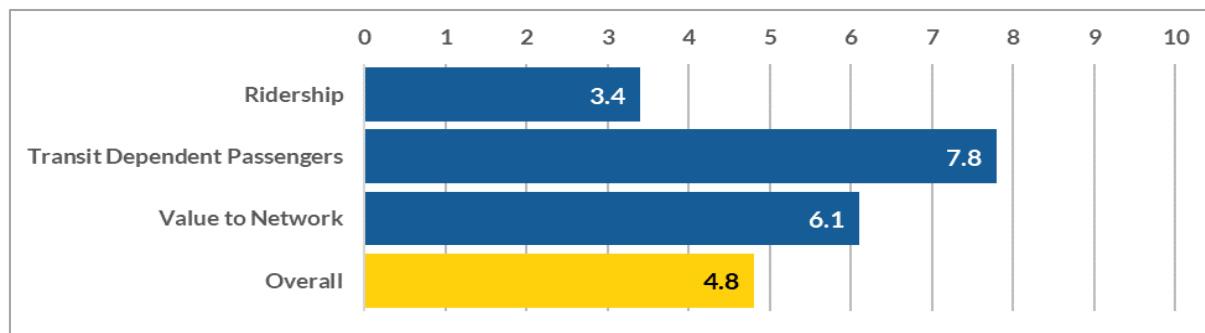
Route 450/450W is very similar to Route 424/424W Eastern Ave/Essex St. - Haymarket or Wonderland. As also shown in Figure 1, Route 424/424W starts at the intersection of Eastern Avenue and Essex Street in Lynn and serves a short section of Eastern Avenue

between Essex Street and Western Avenue, and then uses the same alignment as Route 450/450W to Haymarket or Wonderland.

Network Importance

Route 450/450W has moderate importance within the overall bus network (see Figure 2). On a relative scale of 0 to 10, Route 450 rates 3.4 in terms of ridership, 7.8 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 destination, 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 4.8.

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



Service Overview

Schedule

On weekdays, Route 450 operates between 5:40 AM and 1:30 AM and provides infrequent service throughout the day (see Table 1):

- From the start of service until approximately 9:00 AM, inbound service operates predominately every 30 minutes. Outbound headways range from 12 minutes to 60 minutes.
- During the midday (9:00 AM until 4:00 PM), service frequency is about every 75 minutes.
- From 4:00 PM to 8:00 PM, service operates approximately every 24 to 70 minutes outbound, but mostly every 30 minutes.
- After 8:00 PM, service operates every 57 to 65 minutes.

On Saturdays, Route 450W operates from 6:00 AM until 12:48 PM with headways that range from 25 to 75 minutes but that are generally every 60 to 70 minutes. On Sundays, Route 450W operates hourly from 7:45 AM until 12:15 AM except for the last two inbound trips at 10:30 PM and 11:50 PM which are 80 minutes apart.

Route 450 meets the MBTA’s span of service standards. However, it does not meet the minimum frequency standard of 60 minutes for weekday off-peak and weekend service, as headways exceed 60 minutes at time.

Table 1 | Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	5:40 AM to 1:30 AM			25/26
Sunrise	5:40 AM to 5:59 AM	26 – 52	32	1/3
Early AM	6:00 AM to 6:59 AM	12 – 52	25	2/2
AM Peak	7:00 AM to 8:59 AM	30 – 60	35	4/3
Midday Base	9:00 AM to 1:29 PM	30 – 80	77	4/4
Midday School	1:30 PM to 3:59 PM	30 – 80	59	2/3
PM Peak	4:00 PM to 6:29 PM	15 – 70	31	3/5
Evening	6:30 PM to 9:59 PM	24 – 70	43	5/4
Late Evening	10:00 PM to 11:59 PM	57 – 70	49	2/2
Night	12:00 AM to 1:30 AM	57 – 58	64	2/0
Saturday	6:00 AM to 12:48 PM	25 – 75	61	17/17
Sunday	7:45 AM to 12:15 AM	60 – 80	57	16/16

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

Service Patterns

Pattern 450.8 makes nearly all trips on weekdays, operating the full length of Route 450 between Salem Commuter Rail Station and Haymarket Station (see Table 2).

Table 2 | Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS per WKD	TRIPS per SAT	TRIPS per SUN
INBOUND				25	17	16
450.7	Salem Commuter Rail Station	Wonderland Station	Weekend service and one weekday trip	1	16	15
450.8	Salem Commuter Rail Station	Haymarket Station	Primary weekday pattern	20	-	-
450.9	Salem Commuter Rail Station	Lynn Garage	Final trips of the day	4	1	1
OUTBOUND				26	17	16
450.7	Wonderland Station	Salem Commuter Rail Station	Weekend service	-	15	16
450.8	Haymarket Station	Salem Commuter Rail Station	Weekday service	22	-	-
450.9	Lynn Garage	Salem Commuter Rail Station	AM trips from the Lynn Garage	4	2	-

Weekday exceptions are:

- Pattern 450.9 makes the first four outbound trips, entering service from the Lynn Garage.
- Pattern 450.7 makes one PM inbound trip at 7:01 PM, operating as Route 450W, to Wonderland Station.
- Pattern 450.9 makes the last two outbound trips, and going out of service at the Lynn Garage

On weekends:

- Pattern 450.7 makes most trips, operating as Route 450W, between Salem Commuter Rail Station and Wonderland
- Pattern 450.9 makes some early and late trips from and to the Lynn Garage.

Ridership

Route 450 serves 1,480 riders on weekdays, 870 riders on Saturdays, and 853 riders on Sundays.

Ridership by Stop

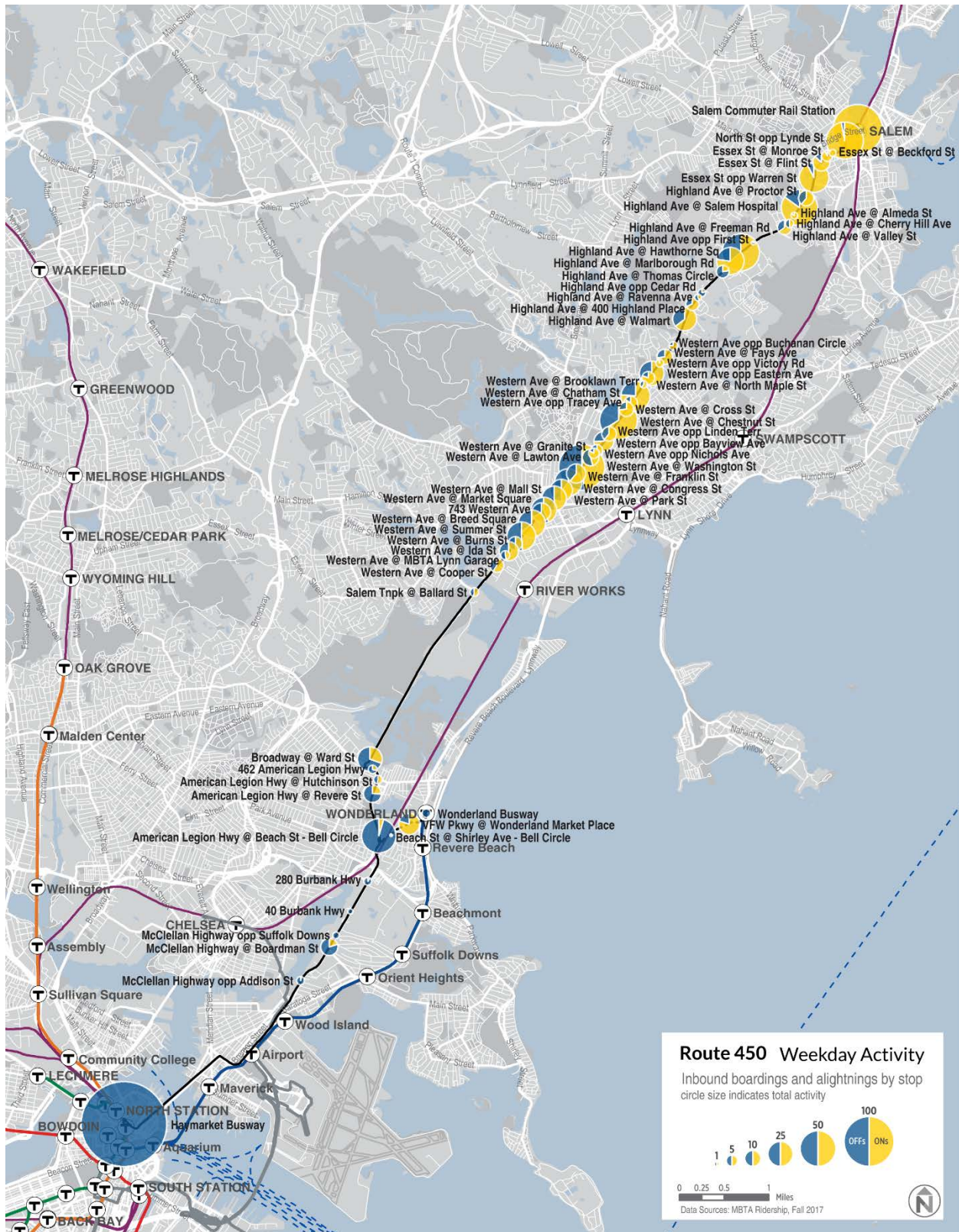
Route 450 serves passengers traveling to downtown Boston as well as those making intermediate trips. On weekday inbound trips (see Figure 3):

- 100 passengers board at the Salem Commuter Rail Station.
- 280 passengers board and 80 alight at the 23 stops along Western Avenue through Eastern Avenue.
- 260 passengers board and 190 alight at the 20 stops along Western Avenue between Eastern Avenue and Summer Street. This segment is also served by Route 424/424W Eastern Ave/Essex St. - Haymarket or Wonderland.
- 40 passengers board and 110 alight at the last 16 stops on Route 450 before Haymarket Station, which serve destinations outside of downtown. The only individual stop on this stretch with significant activity is Bell Circle (American Legion Highway at Beach Street), with 40 alightings.
- 290 passengers, or 42% of all inbound riders, alight at Haymarket Station.

Weekday outbound ridership patterns are generally the reverse of inbound patterns.

On weekends, Route 450 operates to and from Wonderland Station instead of Haymarket Station and downtown-bound passengers instead transfer to the Blue Line at Wonderland. The proportion of transferring passengers is generally similar to the proportion that travel to Haymarket on weekdays (47% versus 42%).

Figure 3 | Weekday Inbound Ridership by Stop Map



Ridership by Trip

On weekdays, ridership peaks inbound in the AM and outbound in the PM, but strong throughout the day and in both directions. There is also strong demand on reverse peak travel on weekdays (traveling outbound in the morning and inbound in the afternoon), suggesting that riders are using Route 450 to get to work or make connections. On weekday inbound trips (see Figure 4 and Figure 5):

- The first trip at 5:40 AM carries 51 passengers, which is among the highest ridership on any inbound trip and indicates demand for earlier service.
- Ridership on other inbound trips through the end of the AM peak ranges from close to 30 to 40.
- From 9:00 AM to 2:30 PM, ridership per trip gradually increases from just below 30 passengers per trip to 50. The next trip at 3:40 PM carries 48 passengers. Considering how infrequent service is (every 80 minutes), these numbers are very strong.
- Excluding trips that go out of service at the Lynn Garage that carry few passengers, ridership per trip gradually declines from 45 passengers per trip at just before 5:00 PM to less than five on the last trip at 1:10 AM.

On weekday outbound trips:

- Ridership starts very low, but builds to 40 passengers on the 6:28 AM trip.
- It then ranges from 30 to 40 passengers per trip until 7:30 AM.
- From 7:30 AM to 12:00 noon, it is between 20 and 30 passengers per trip.
- Beginning at 1:00 PM and through 4:30 PM, ridership increases to 40 to 50 passengers per trip.
- It then declines to generally around 30 passengers per trip through the end of service.

On Saturdays, most trips serve 20 to 40 passengers (see Figure 6 and Figure 7). Peak ridership occurs during the 12:25 PM trip with 66 passengers. Outbound trips on Saturday are less variable and carry 10 to 30 passengers per trip throughout the day. Ridership is highest during the 7:55 AM trip with 32 passengers and the 4:05 PM trip with 33 passengers.

On Sundays, most trips also carry 20 to 40 passengers (see Figure 8 and Figure 9).

Figure 4 | Weekday Ridership by Trip: Inbound

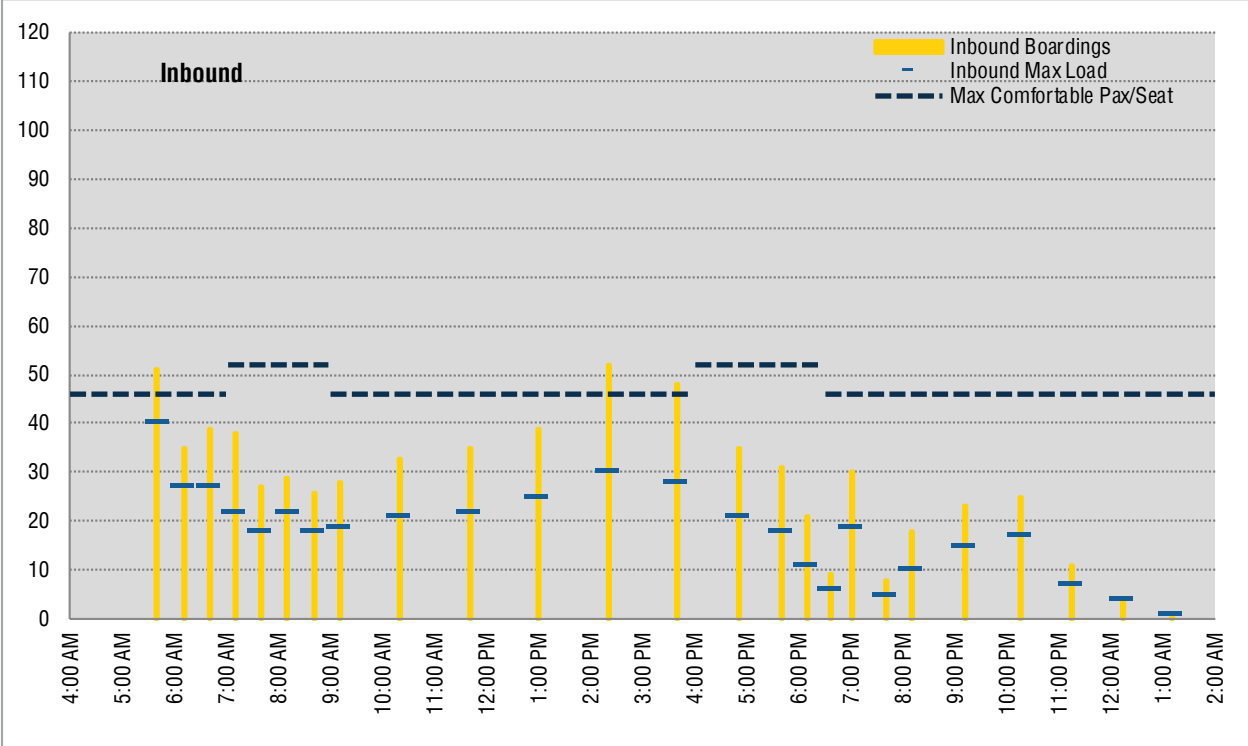


Figure 5 | Weekday Ridership by Trip: Outbound

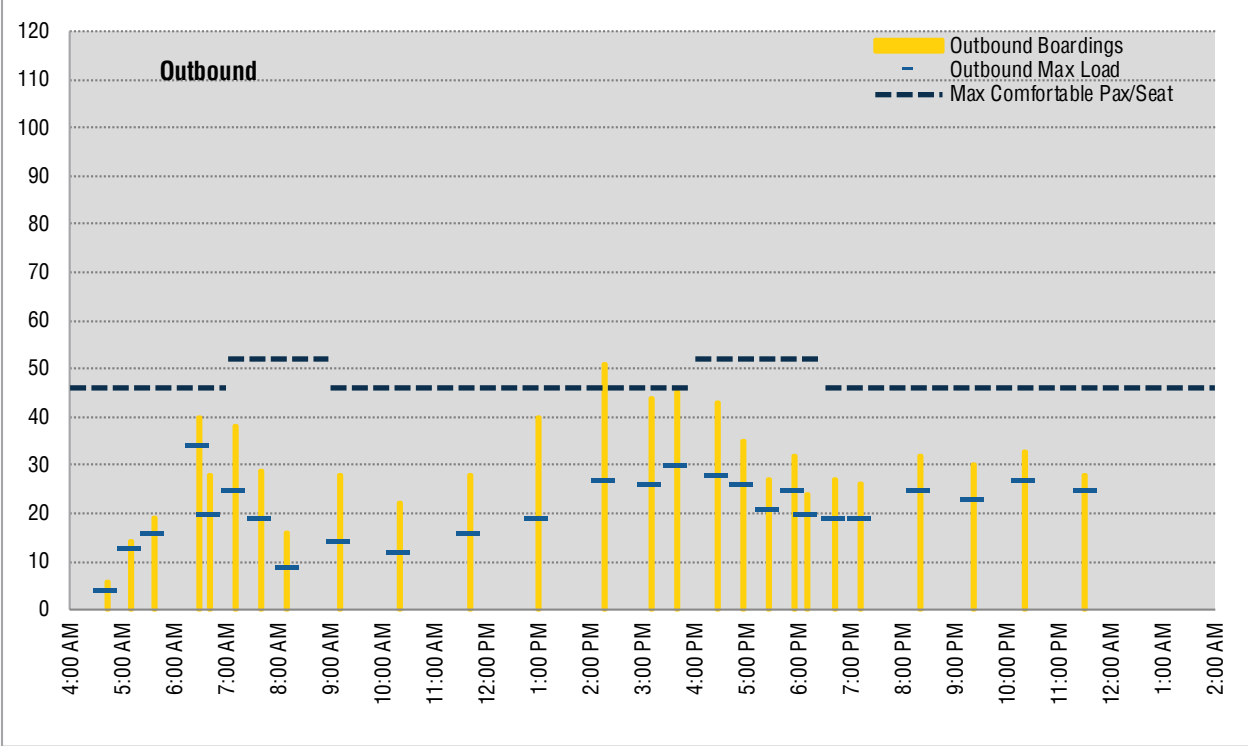


Figure 6 | Saturday Ridership by Trip: Inbound

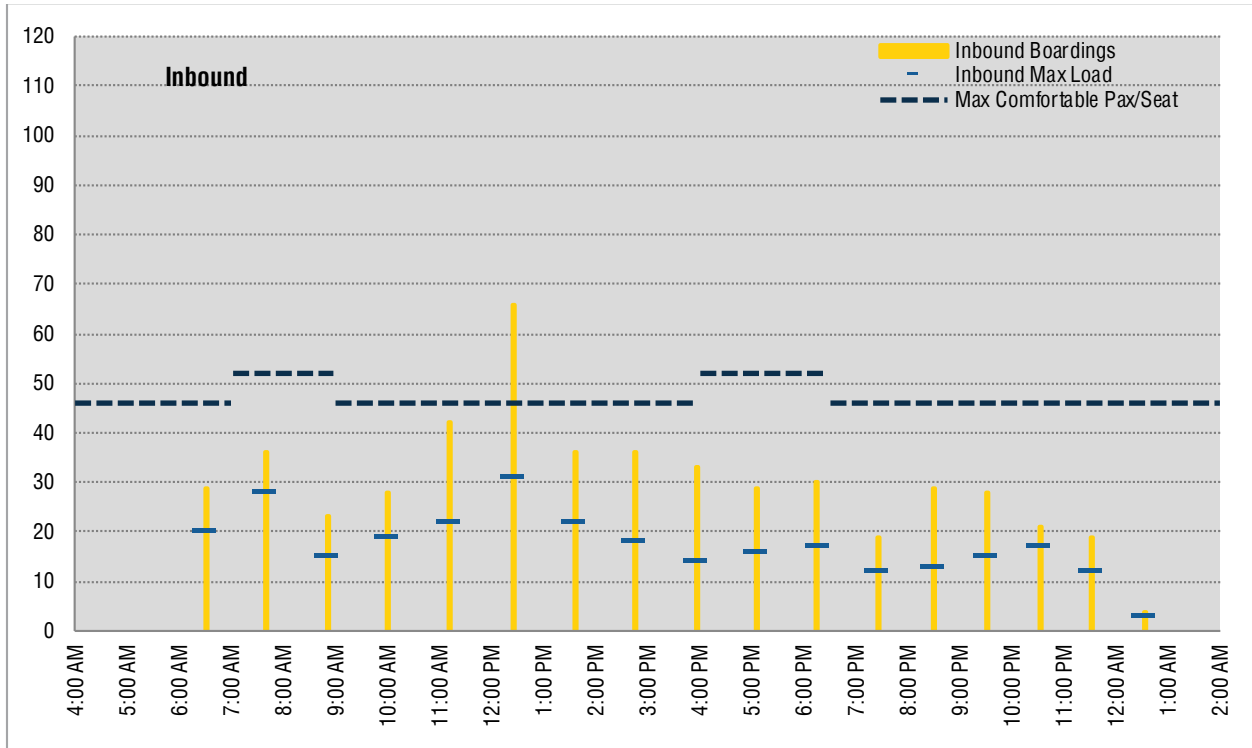


Figure 7 | Saturday Ridership by Trip: Outbound

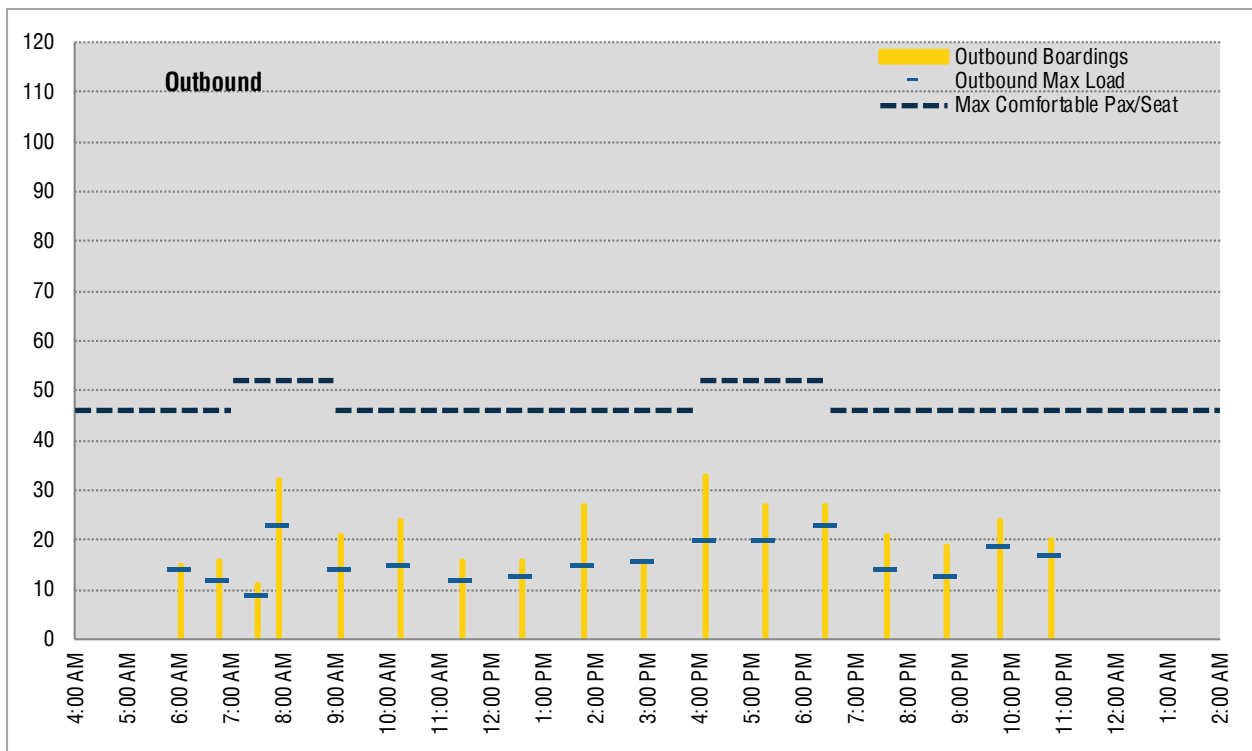


Figure 8 | Sunday Ridership by Trip: Inbound

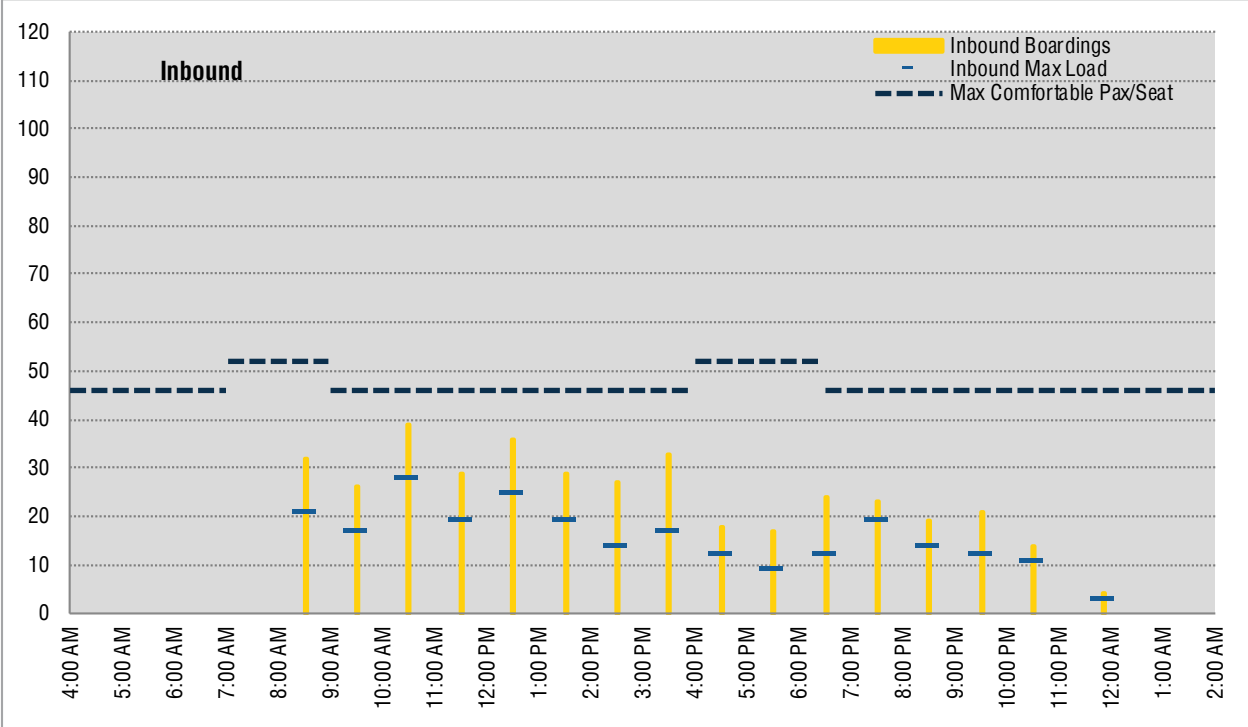
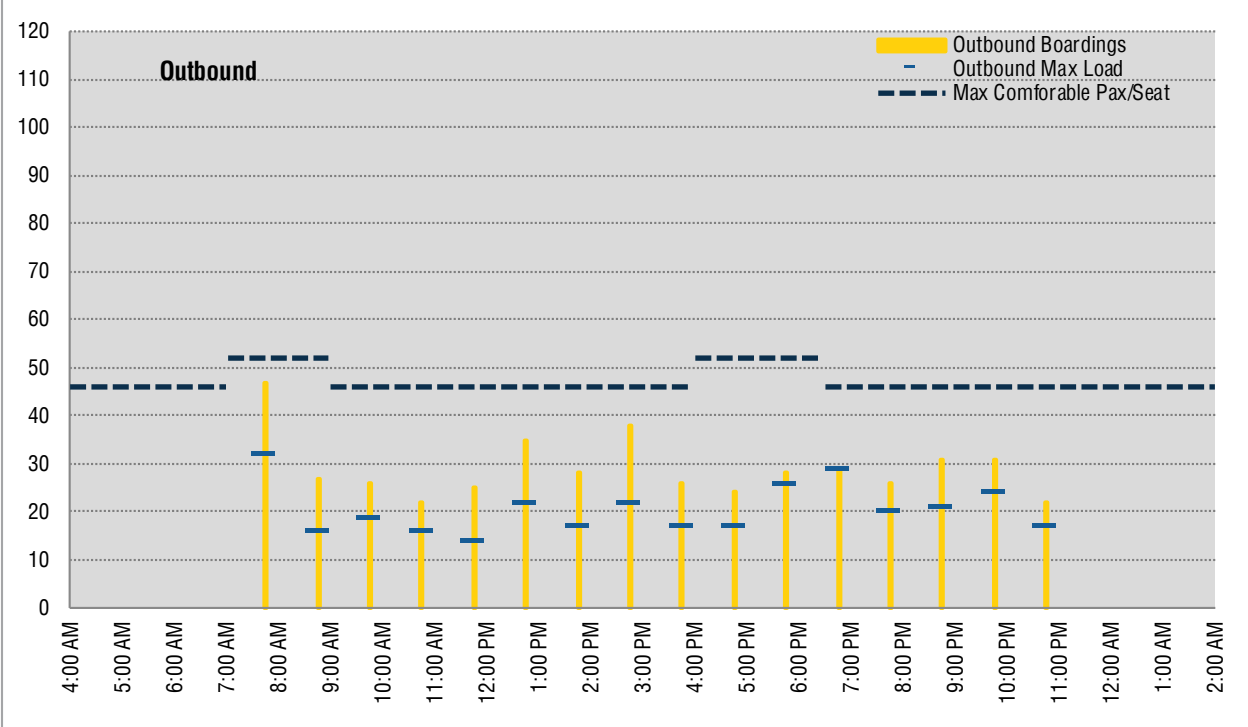


Figure 9 | Sunday Ridership by Trip: Outbound



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 Route 450/450W, 99.9% of passenger minutes are in comfortable conditions (see Table 3).

Table 3 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
Minimum Standard	92%	92%	92%
Target	96%	96%	96%
Actual	99.9%	100%	100%

Reliability and Speed

Reliability

Route 450's overall reliability is very poor, at 49% on weekdays, 68% on Saturdays, and 52% on Sundays (see Table 4). This performance is well below the minimum standard of 70% on weekdays and Sundays, and slightly below it on Saturdays. As described in the next section, this is due, in large part, to peak period running times that are longer than scheduled running times.

Table 4 | Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	49%	51%	49%	0.1%
Saturday	68%	64%	68%	-
Sunday	52%	50%	52%	-

Running Times

Route 450's running times are longer than scheduled by over 10 minutes in the AM peak inbound and by similar amounts in the PM peak outbound (see Figure 10 and Figure 11). During other times, differences are much smaller and in both directions.

Figure 10 | Scheduled & Median Travel Time by Trip: Route 450 Inbound

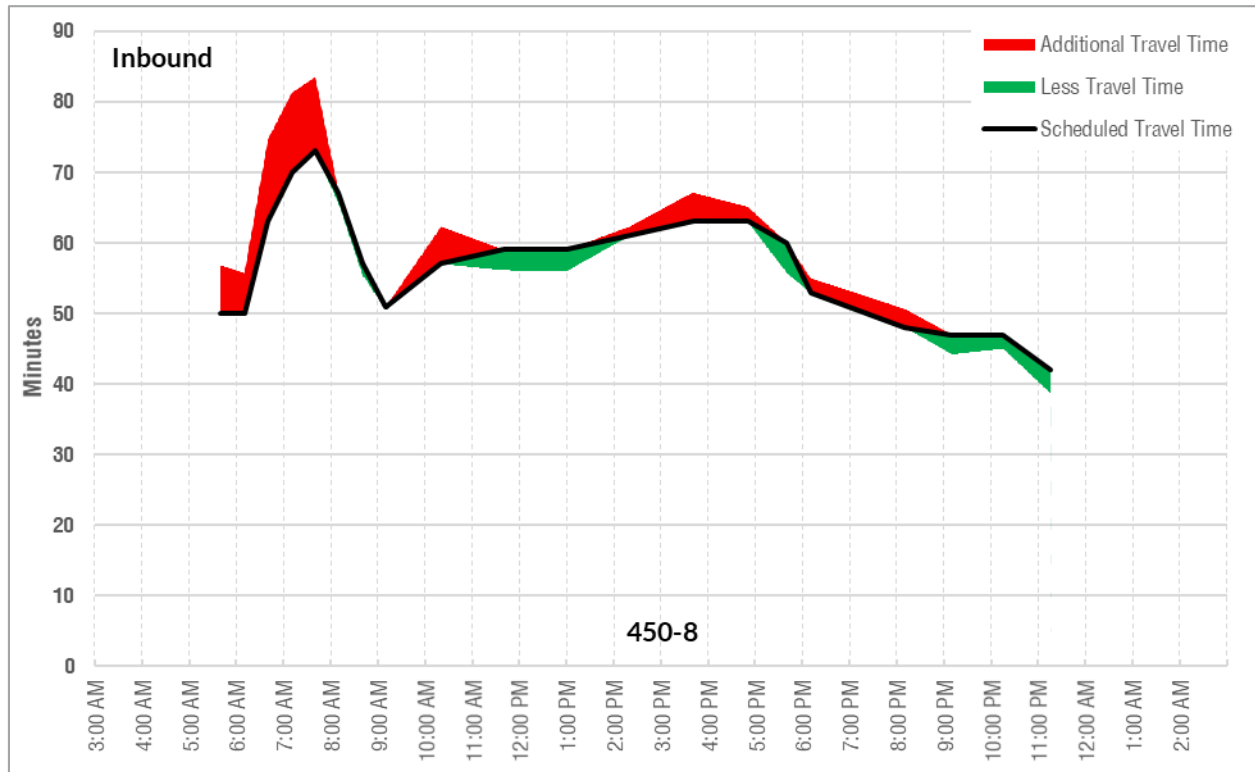
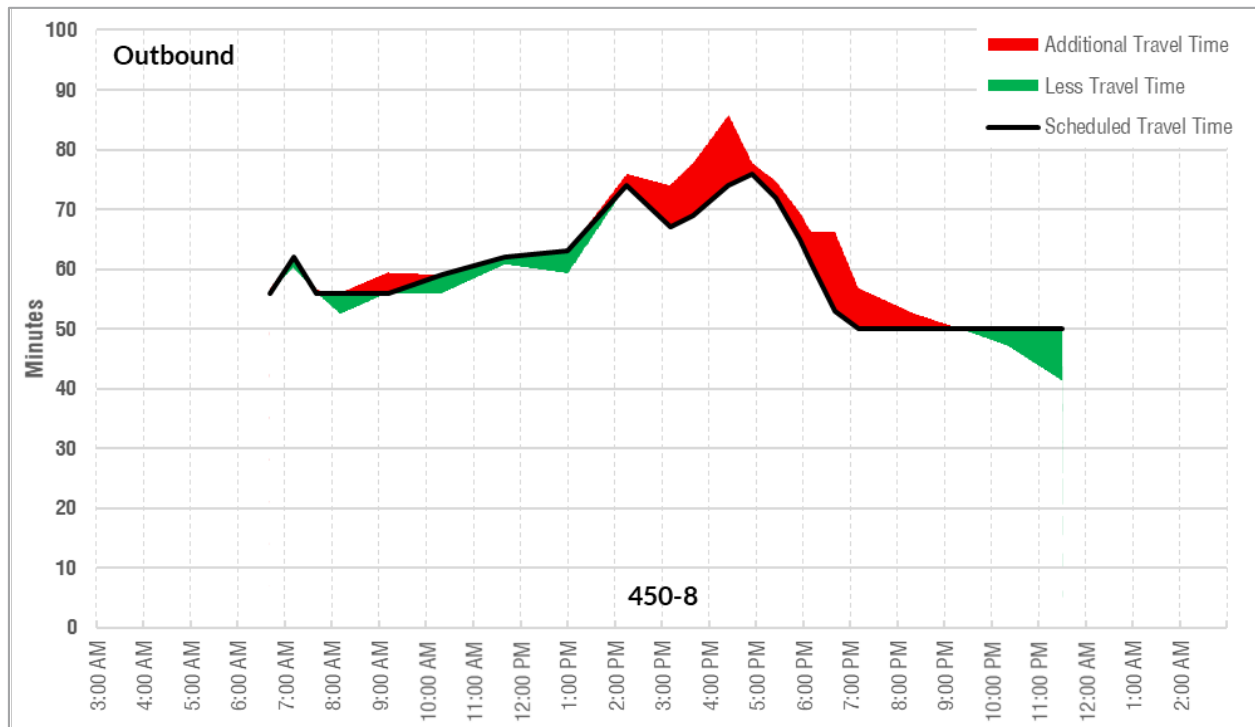


Figure 11 | Scheduled & Median Travel Time by Trip: Route 450 Outbound



Stop Spacing

Route 450/450W serves an average of approximately six bus stops per mile. However, the number of stops per mile varies along the route, and ranges from 3.3 to nine. Stops are particularly close together between Western Avenue opposite Buchanan Circle and Western Avenue at Cooper Street with nearly nine stops per mile, which is well above the MBTA guideline of four to seven stops per mile. Stop consolidation could reduce travel times.

Summary

Route 450/450W provides infrequent service but still has good ridership which indicates the strength of the market. Major issues with Route 450 are the infrequent service, which does not meet SDP standards, and very poor reliability. The very poor reliability is due to peak period, peak direction running times that are much longer than scheduled times.