

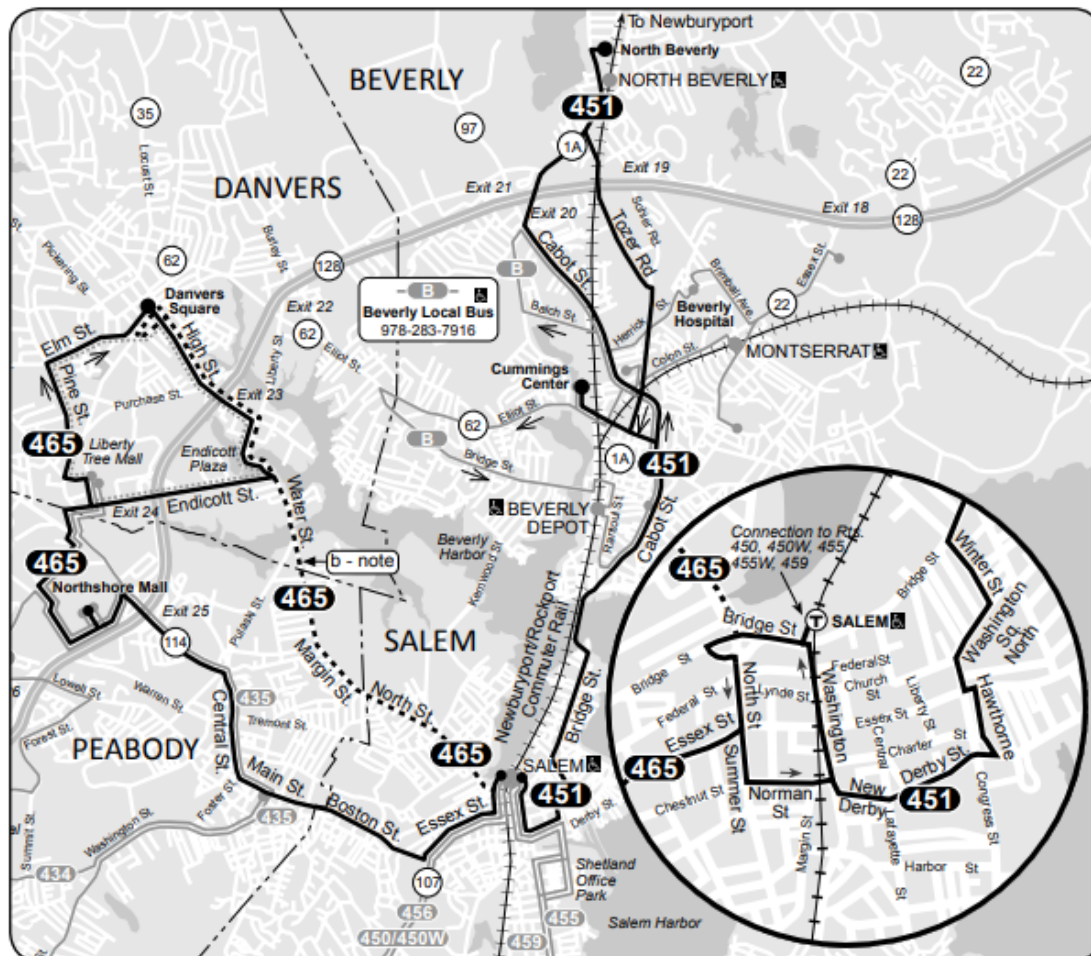
Route 451

North Beverly – Salem Depot

Route Overview

Route 451 North Beverly – Salem Depot is a Commuter route connecting northern Beverly to the Salem Commuter Rail Station (see Figure 1). In Beverly, Route 451 operates on Tozer Road and Cabot Street, crosses the Essex Bridge into Salem, and runs along Bridge Street to the Salem Commuter Rail Station. It serves several activity centers including North Beverly Plaza, Shore County Day School, Beverly High School, the Cummings Center, downtown Beverly, and downtown Salem.

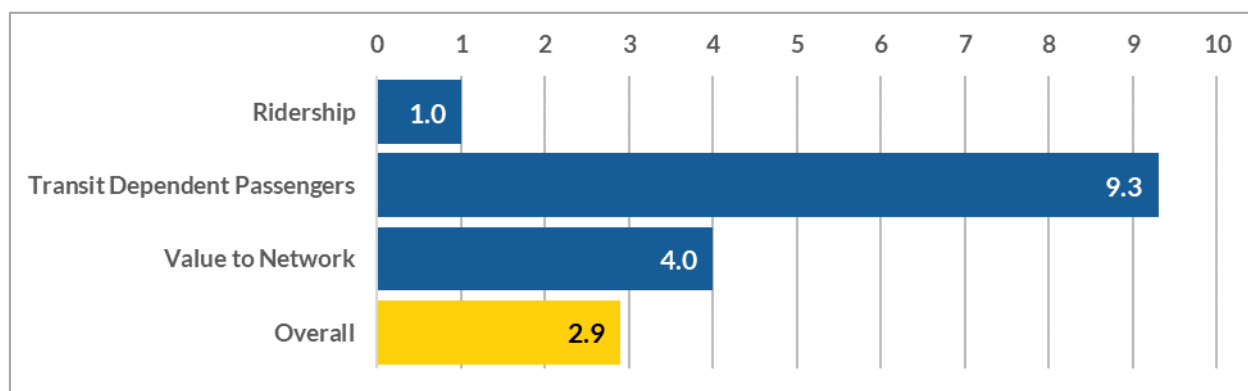
Figure 1 | Service Map



Route Importance

Route 451 is a relatively unimportant route within the MBTA network (see Figure 2). On a relative scale of 0 to 10, Route 451 rates 1 in terms of ridership, 9.3 in terms of transit dependent ridership, and 4 in terms of its value to the network. Its overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 2.9.

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



Service Patterns

Schedule

Route 451 operates only during commute hours on weekdays.

Table 1 | Schedule Statistics

SERVICEDAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:00 AM to 9:00 AM 2:30 PM to 7:10 PM			8/8
Sunrise	-	-	-	-
Early AM	6:00 AM to 6:59 AM	70	70	1/1
AM Peak	7:00 AM to 9:00 AM	60 - 70	65	2/2
Midday Base	-	-	-	-
Midday School	2:30 PM to 3:59 PM	70	70	1/2
PM Peak	4:00 PM to 6:29 PM	45 - 70	64	3/2
Evening	6:30 PM to 7:10 PM	55 - 65	58	1/1
Late Evening	-	-	-	-
Night	-	-	-	-
Saturday	-	-	-	-
Sunday	-	-	-	-

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

Service Patterns

All trips run between North Beverly and Salem Depot (see Table 2).

- Pattern 451.0 makes all peak-hour peak-direction trips via Cabot Street
- Pattern 451.0 makes all off-peak trips in the off-peak direction via Tozer Road.

Both streets run roughly parallel to one another in northern Beverly.

Table 2 | Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS per WKD	TRIPS per SAT	TRIPS per SUN
INBOUND				8	-	-
451.0	Enon Street at Lakeview Avenue	Salem Commuter Rail Station	Via Cabot Street	3	-	-
451.1	Enon Street at Lakeview Avenue	Salem Commuter Rail Station	Via Tozer Road	5	-	-
OUTBOUND				8	-	-
451.0	Salem Commuter Rail Station	Enon Street at Lakeview Avenue	Via Cabot Street	5	-	-
451.1	Salem Commuter Rail Station	Enon Street at Lakeview Avenue	Via Tozer Road	3	-	-

Ridership

Route 451 carries 134 riders per weekday. Route 451 carries 81 passengers in the outbound direction and 53 in the inbound direction. This makes Route 451 one of the lowest ridership routes in the MBTA network.

Ridership by Stop

Most of Route 451's limited ridership is concentrated in stops in southern Beverly and in Salem. Notably, central Salem generates more ridership activity than the Salem Commuter Rail Station, suggesting that the bus is used by residents commuting to Salem as well as passengers transferring from commuter rail.

On weekday inbound trips (to Salem Commuter Rail Station):

- Six passengers board and three alight at the 22 stops from Enon Street at Lakeview Avenue to Cummings Center at 101U South Drive on the Cabot Street branch of Route 451.

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- Four passengers board and one alight at the eight stops on the Tozer Road branch of Route 451.
 - 21 board and one alights at the Cummings Center.
 - 22 board and 38 alight at the 24 stops from the Cummings Center to Washington Street at Federal Street.
 - 15 alight at Salem Commuter Rail Station.

Outbound ridership is roughly the reverse of inbound ridership on weekdays, with one exception:

- 13 passengers board and 12 alight at Enon Street at Lakeview Avenue, the second to last stop on Route 451.

Ridership by Trip

On weekdays, Route 451 has low ridership during its service periods. On inbound trips:

- Three morning trips between 6:50 AM and 8:59 AM carry between six and eight passengers per trip.
- Five afternoon trips between 3:20 PM and 7:10 PM carry between four and 11 passengers per trip, with most carrying around seven passengers per trip.

On outbound trips:

- Three morning trips between 6:00 AM and 8:20 AM carry between 10 and 16 passengers per trip.
- Five afternoon trips between 2:30 PM and 6:30 PM carry between four and 11 passengers per trip.

Figure 3 | Weekday Inbound Ridership by Stop Map



Figure 4 | Weekday Ridership by Trip: Inbound

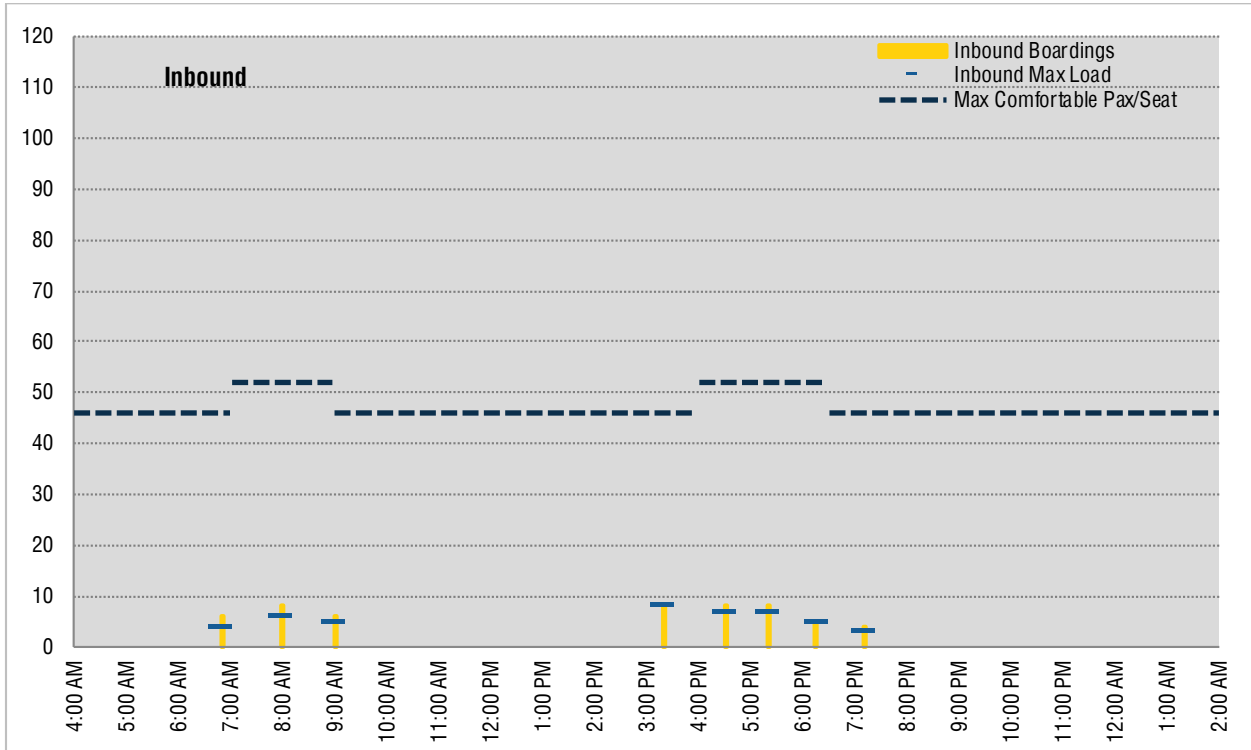
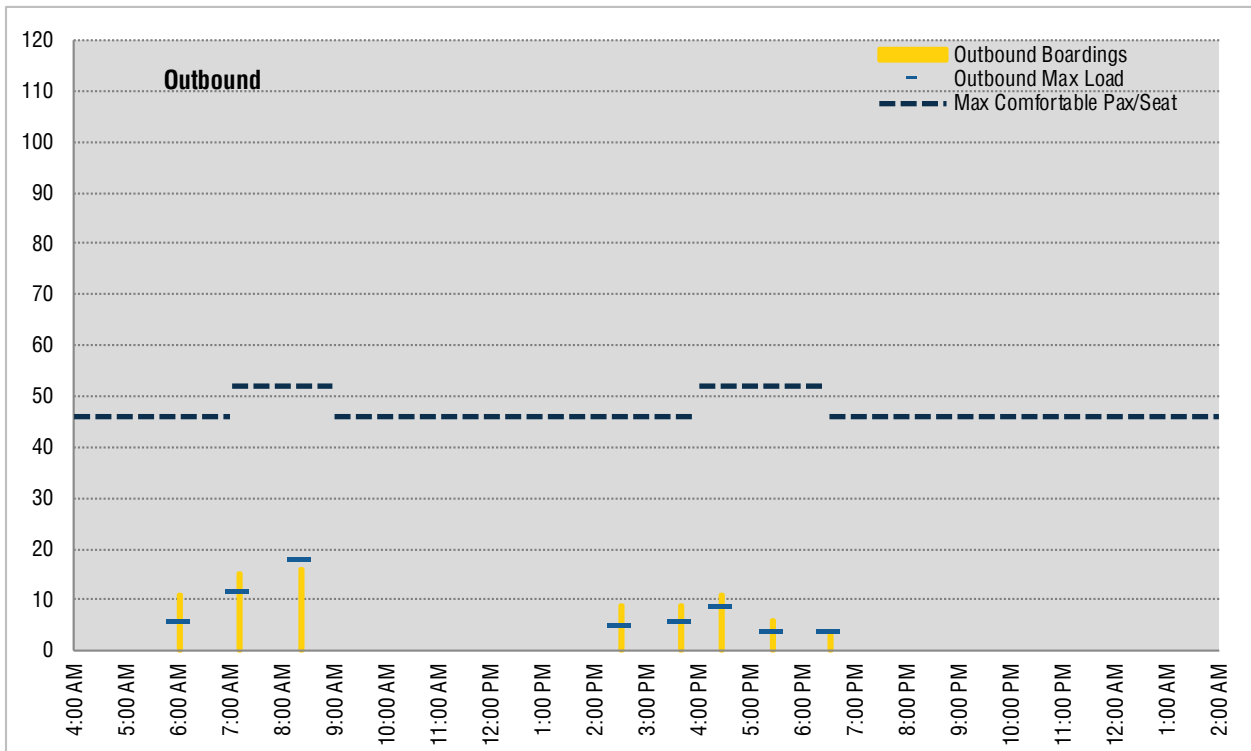


Figure 5 | Weekday Ridership by Trip: Outbound



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 451, 100% of passenger minutes are in comfortable conditions, which exceeds the minimum standard and target (see Table 4).

Table 3 | Passenger Time Spent Traveling in Comfortable Conditions

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

Reliability and Speed

Reliability

Route 451’s overall reliability is poor, at 65%, below the minimum standard of 70% for local bus routes. Dropped trips are not an issue on Route 451.

Table 4 | Reliability

SERVICEDAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	69%	46%	65%	0%
Saturday	-	-	-	-
Sunday	-	-	-	-

Running Times

Route 451 trips regularly exceed their scheduled running time, though only slightly. This is more of an issue during the afternoon and evening. Morning trips usually run around one minute behind schedule while afternoon and evening trips usually run around three minutes behind schedule.

Figure 6 | Scheduled & Median Travel Time by Trip: Route 451 Inbound

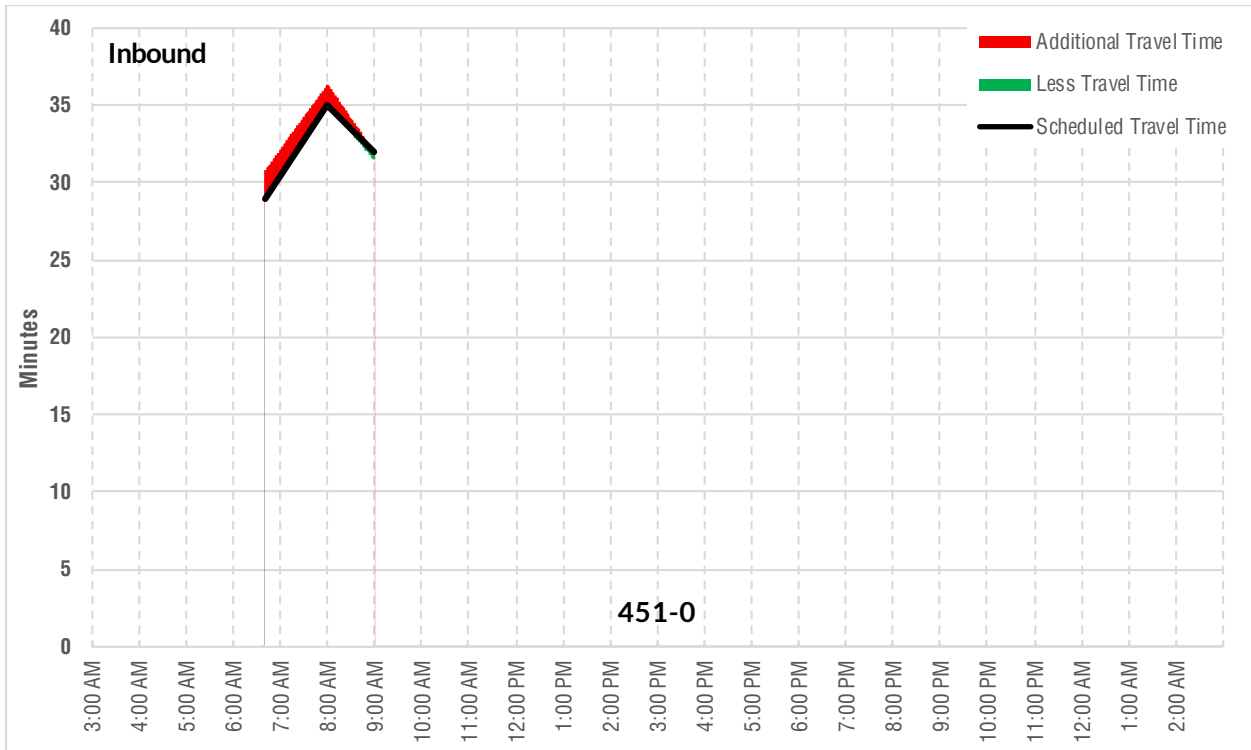
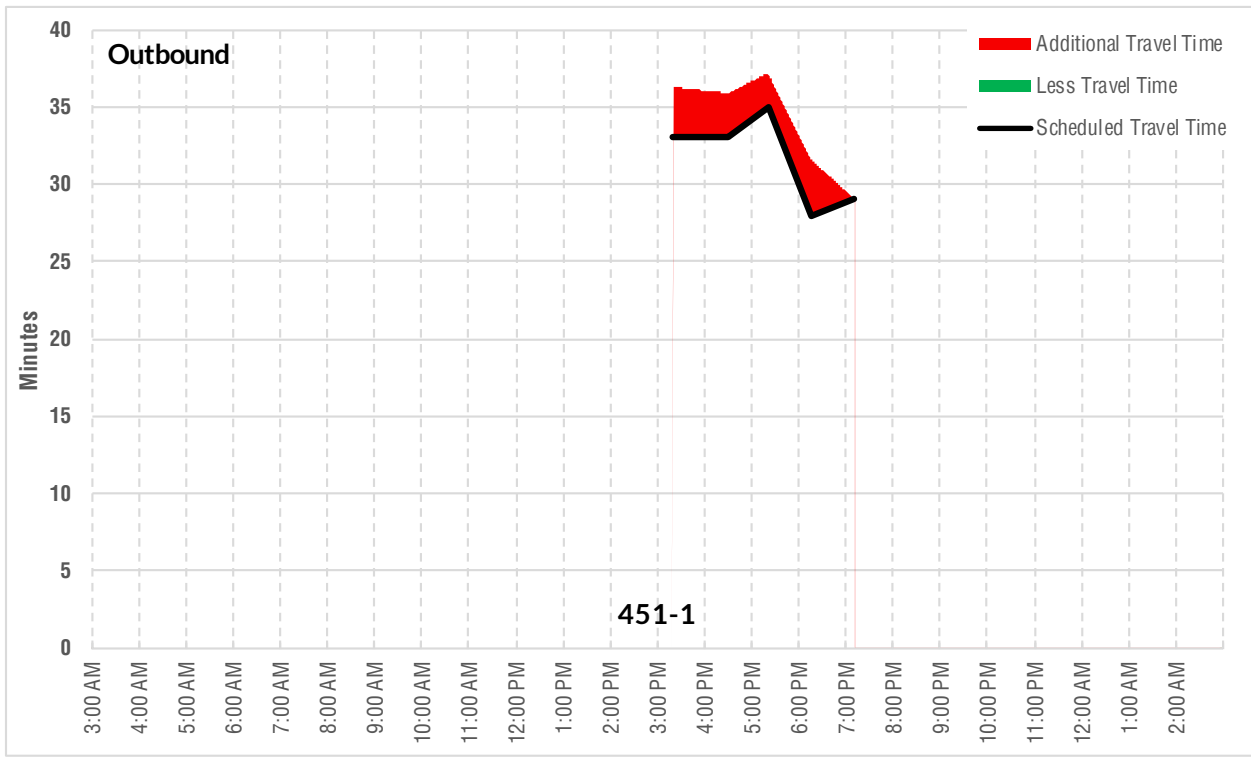


Figure 7 | Scheduled & Median Travel Time by Trip: Route 451 Outbound



Stop Spacing

Route 451 has an average of nine stops per mile, in excess of the four to seven stops per mile recommended for urban areas under MBTA guidelines. Stops are even closer together:

- Along all of Cabot Street in Beverly, where stop spacing in some stretches exceeds 10 per mile.
- At numerous stopcouplets along Route 451 such as at Cabot Street at Judson Street or New Derby Street at Klopp Alley.

Certain segments of Route 451 have more appropriate stop spacing. Route 451's segment in Salem has roughly 6.5 stops per mile, and the Tozer Road branch of Route 451 has roughly five stops per mile.

Summary

Route 451 is a Commuter route that provides service to a small group of commuters where no other MBTA bus service is present. It provides parallel service to MBTA commuter rail service in the area. Overall though, Route 451 performs poorly in terms of ridership and reliability. Also, the limited span of service, very close stop spacing, and large one-way loop alignment somewhat reduces Route 451's appeal to potential riders. Despite this, Route 451 does provide a lower-cost alternative to the commuter rail service and provides neighborhood circulation in an area only served by the Beverly Shuttle Bus.