

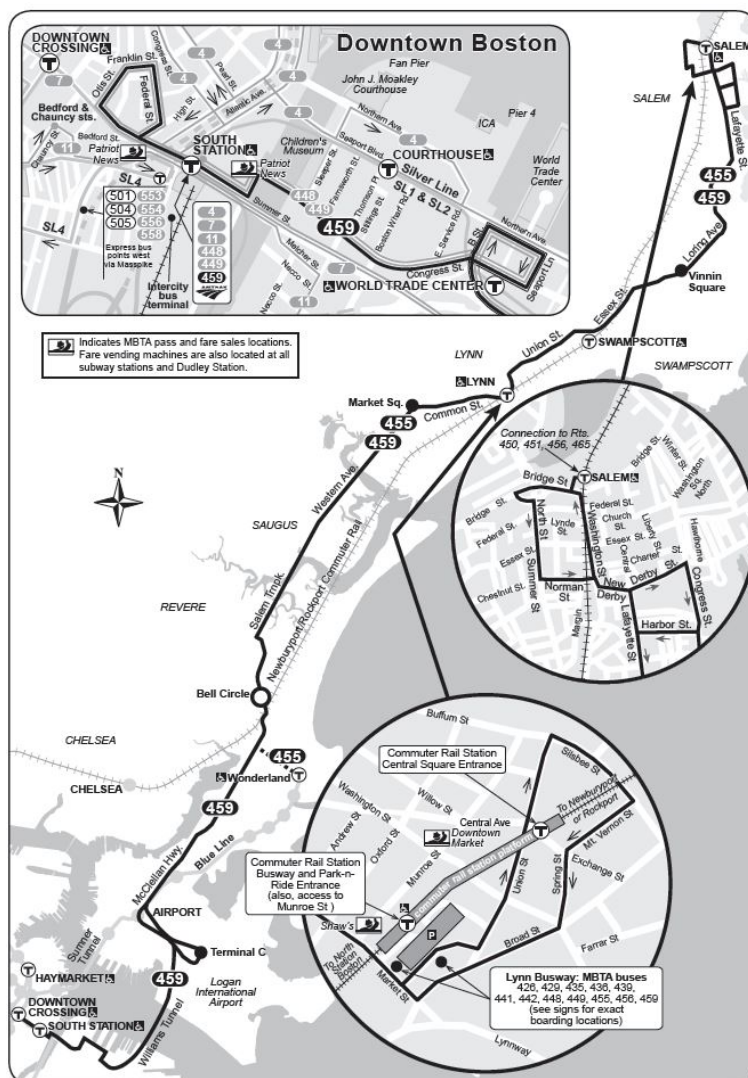
Routes 455/459

455 Salem Depot – Downtown Boston
459 Salem Depot – Wonderland Station

Route Overview

Route 455 Salem Depot – Wonderland is a Local route that provides service between Salem Depot and Wonderland Station via Swampscott and Lynn, and Revere, largely along Lafayette Street, Loring Street, Essex Street, Western Avenue, and Salem Turnpike (see Figure 1).

Figure 1 | Service Map

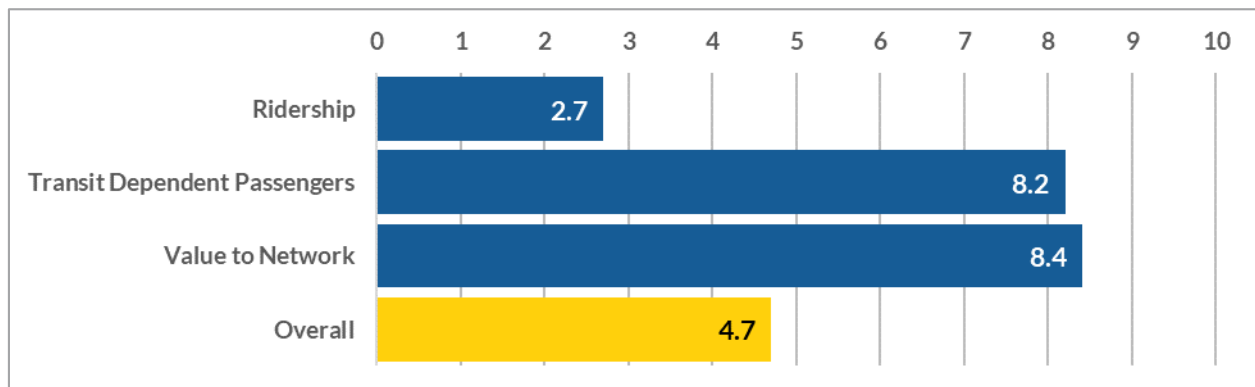


Route 459 Salem Depot – Downtown Boston operates between Salem Depot and downtown Boston via Logan Airport and the Seaport District. Route 459 and Route 455 serve the same corridor between Salem Depot and McClellan Highway where Route 455 turns to serve Wonderland Station. The two routes are intended to provide riders with a choice of direct service to downtown Boston or connecting service via the Blue Line.

Network Importance

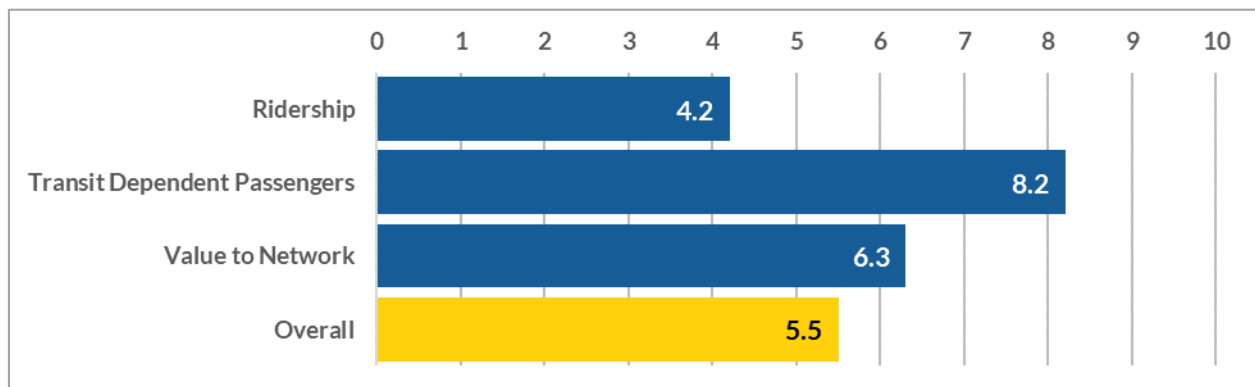
Route 455 and Route 459 have moderate importance within the MBTA bus network. On a relative scale of 0 to 10, Route 455 rates 2.7 in terms of ridership, 8.2 in terms of transit dependent ridership, and 8.4 in terms of its value to the network (which reflects the number of people who are uniquely served, the number of jobs and other important destinations, and the number of transferring passengers). Its overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 4.7 (see Figure 2).

Figure 2 | Relative Importance within MBTA Bus Network: Route 455



Route 459 rates 4.2 in terms of ridership, 8.2 in terms of transit dependent ridership, and 6.3 in terms of its value to the network. Its overall score is 5.5. (see Figure 3)

Figure 3 | Relative Importance within MBTA Bus Network: Route 459



Service Overview

Schedule

Route 455 and Route 459 operate on weekdays. Only Route 455 operates on weekends meaning that all weekend service operates to and from Wonderland Station. On weekdays, Route 455 has the longest span of service, and operates from 5:00 AM to 1:10 AM. Route 459 operates from 5:50 AM to 8:27 PM.

The schedule statistics for Route 455 and Route 459 are shown independently (see Table 1 and Table 2). However, between 7:00 AM and 6:30 PM much of the corridor benefits from the combined service and has more service than shown by a single route. The two routes operate as follows:

Inbound

- From the start of service through the end of the AM peak, service operates every 15 to 25 minutes, but most every 20 minutes. There are Route 459 trips at 5:50 AM and 7:10 AM, and all other trips are Route 455 trips. Route 455 and 459 schedules are coordinated, but since Route 459 trips bypass Wonderland Station, there are 40-minute gaps between service to Wonderland Station, which is the most important rider destination.
- From 8:30 AM until 6:00 PM, with the exception of one school trip, Route 455 and Route 459 alternate trips, generally every 35 minutes.
- After 6:00 PM, all service operates as Route 455 and generally operates every 60 minutes.

Outbound

- Service before 6:20 AM operates as Route 455, with trips spaced 36 to 39 minutes apart.
- Between 6:20 AM and 7:25 PM, Route 455 and 459 generally alternate. Most on both routes operate every 70 minutes.
- After 7:27 PM, all service operates as Route 455, generally every 60 minutes.

On Saturdays, all service is provided by Route 455. It operates from 5:15 AM to 12:32 AM. Service operates every 30 to 40 minutes between the start of service and 10:35 AM, but predominantly every 30 minutes. Service operates every 35 minutes between 10:35 AM and 5:35 PM, before returning to every 30 minutes between 5:35 PM and 7:35 PM. Service operates every 60 minutes between 7:35 PM and the end of service.

On Sundays, all service is also provided by Route 455. From the start of service at 6:30 AM until 11:05 PM, it operates every 50 to 60 minutes, but predominantly every 60 minutes.

Table 1 | Route 455 Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	5:00 AM to 1:10 PM			26/20
Sunrise	5:00 AM to 5:59 AM	10 - 40	22	4/2
Early AM	6:00 AM to 6:59 AM	20 - 50	37	3/1
AM Peak	7:00 AM to 8:59 AM	15 - 75	50	1/3
Midday Base	9:00 AM to 1:29 PM	70 - 75	71	3/3
Midday School	1:30 PM to 3:59 PM	15 - 70	58	3/3
PM Peak	4:00 PM to 6:29 PM	60 - 70	66	3/2
Evening	6:30 PM to 9:59 PM	60 - 75	66	3/3
Late Evening	10:00 PM to 11:59 PM	55 - 75	59	2/2
Night	12:00 AM to 1:10 AM	1 trip	-	1/1
Saturday	5:15 AM to 11:35 PM	10 - 60	35	32/31
Sunday	7:05 AM to 11:30 PM	25 - 60	55	18/18

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

Table 2 | Route 459 Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	5:50 AM to 8:27 PM			11/12
Sunrise	5:50 AM to 5:59 AM	1 trip	-	1/0
Early AM	6:00 AM to 6:59 AM	1 trip	-	0/1
AM Peak	7:00 AM to 8:59 AM	70 - 85	73	2/1
Midday Base	9:00 AM to 1:29 PM	70 - 75	71	4/4
Midday School	1:30 PM to 3:59 PM	70 - 70	70	2/2
PM Peak	4:00 PM to 6:29 PM	65 - 70	69	2/3
Evening	6:30 PM to 8:27 PM	1 trip	-	0/1
Late Evening	-	-	-	-
Night	-	-	-	-
Saturday	-	-	-	-
Sunday	-	-	-	-

Route 455 and Route 459 fail to meet service frequency standards, with service that operates as infrequently as every 85 minutes versus the off-peak minimum standard of 60 minutes.

Service Patterns

Route 455

Pattern 455.6 makes up most Route 455 weekday service, operating the full route from Salem Commuter Rail Station to Wonderland Station as shown in Figure 1.

However, there are a number of exceptions:

- Pattern 455.5 makes the first two inbound trips, which are short-turns that originate at Central Square, Lynn.
- Pattern 455.9 makes the first two outbound trips, originating at the Lynn Garage.
- Pattern 455.3 makes an inbound school trip that operates from Marshall Middle School at 2:35 PM and operates to West Lynn.

Pattern 455.7 makes up most weekend trips, operating the full route, but skipping the stop at Shetland Office Park (in Salem).

In addition:

- Pattern 455.5 makes the first two inbound trips on Saturdays, beginning service at Central Square, Lynn
- Pattern 455.8 makes one evening inbound trip on Saturdays from Salem to Central Square, Lynn, and then going out of service to the Lynn Garage in West Lynn.
- Pattern 455.4 makes one evening outbound trip on Saturdays from Central Square, Lynn to Salem.
- Pattern 455.8 makes the first three outbound trips on Sundays, going into service from the Lynn Garage in West Lynn and continuing along the regular route through Central Square, Lynn.

Route 459

All Route 459 service operates with the same inbound and outbound alignment shown in Figure 1.

Table 3 | Route 455 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
INBOUND				26	32	18
455.3	Marshall School	Western Avenue at Lynn Garage	PM school trip	1	-	-
455.5	Central Square, Lynn	Wonderland Station	First two AM trips	2	2	-
455.6	Salem Commuter Rail Station	Wonderland Station	Primary pattern	23	-	-
455.7	Salem Commuter Rail Station	Wonderland Station	Full Route – skips Shetland Office Park	-	29	17
455.8	Salem Commuter Rail Station	Western Avenue at Lynn Garage	Late trip that goes out of service at Lynn Garage	-	1	1
OUTBOUND				20	31	18
455.4	Central Square, Lynn	Salem Commuter Rail Station	Saturday evening trip	-	1	-
455.6	Wonderland Station	Salem Commuter Rail Station	Primary pattern	18	-	-
455.8	Lynn Garage	Salem Commuter Rail Station	First trips entering service from Lynn Garage	-	3	2
455.7	Wonderland Station	Salem Commuter Rail Station	Weekend service, skips Shetland Office Park	-	27	16
455.9	Lynn Garage	Salem Commuter Rail Station	First two AM trips	2	-	-

Table 4 | Route 459 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
INBOUND				11	-	-
459.0	Salem Commuter Rail Station	Otis Street at Summer Street	Primary pattern	11	-	-
OUTBOUND				12	-	-
459.0	Otis Street at Summer Street	Salem Commuter Rail Station	Primary pattern	12	-	-

Ridership

Route 455 carries 2,270 passengers on weekdays, 2,260 on Saturdays, and 1,410 on Sundays. Route 459 carries 910 passengers per weekday. Together, Route 455 and Route 459 carry 3,180 passengers per weekday.

Ridership by Stop

Most passengers largely travel to locations in Lynn or to Wonderland Station. On Route 455 weekday inbound trips (see Figure 4):

- 70 passengers board at Salem Commuter Rail Station.
- 110 passengers board at the five stops between Salem Commuter Rail Station and Lafayette Street.
- 230 passengers board and 60 alight at the 23 stops along Lafayette Street and Loring Avenue.
- 230 passengers board and 130 alight at the 21 stops between Loring Avenue and downtown Lynn. 12 of the boardings are on the school trip from Marshall School.
- 170 passengers board and 110 alight in downtown Lynn. 120 of the boardings and 70 of the alightings are at Central Square, Lynn.
- 400 passengers board and 230 alight between downtown Lynn and Bell Circle, which is where Route 455 and Route 459 diverge.
- 90 passengers board and 190 alight at the two stops before Wonderland Station.
- 510 passengers, or 41% of all inbound riders, alight at Wonderland Station.

On Route 459 weekday inbound trips (see Figure 5):

- 40 passengers board at Salem Commuter Rail Station.
- 60 passengers board at the five stops between Salem Commuter Rail Station and Lafayette Street.
- 120 passengers board and 30 alight at the 23 stops along Lafayette Street and Loring Avenue.
- 90 passengers board and 70 alight at the 21 stops between Loring Avenue and downtown Lynn. 12 of the boardings are on the school trip from Marshall School.
- 50 passengers board and 60 alight in downtown Lynn. 30 of the boardings and 40 of the alightings are at Central Square, Lynn.
- 120 passengers board and 120 alight between downtown Lynn and Bell Circle.
- A total of 210 passengers, or 43% of inbound riders, alight at stops uniquely served by Route 459:

- 10 alight at the five stops between Bell Circle and Logan Airport.
- 80 passengers, or 17%, alight at Logan Airport.
- 60 passengers, or 12%, alight in the Seaport District.
- 60 passengers, or 12%, alight in downtown Boston

In total, 510 inbound passengers use Route 455 to travel to Wonderland and 210 use Route 459 to travel to Logan Airport, the Seaport District, and downtown Boston.

Outbound Route 455 ridership by stop patterns are generally the reverse of inbound patterns, but with slightly lower volumes. Route 459 outbound patterns are also similar but with two differences:

- Ridership in Boston is lower on outbound trips with 40 passengers boarding at Otis Street and Summer Street (compared to the 60 passengers who alight at the same stop on inbound trips).
- Only half as many riders (40) board at Logan International Airport.

On weekends, when only Route 455 operates, ridership per stop patterns are similar to weekday patterns but with lower volumes.

Ridership by Trip

Weekdays

On weekdays, when Route 455 and Route 459 both operate, ridership per trip is much higher on Route 455 service to and from Wonderland than on Route 459 to and from downtown Boston. On inbound trips (see Figure 6 and Figure 7):

- From the start of service through 9:00 AM, most Route 455 trips carry 45 to over 60 passengers while Route 459 trips carry 30 to 35.
- From 9:00 AM to 4:00 PM, Route 455 trips carry 60 to over 80 passengers, while Route 459 trips carry around 50 passengers.
- From 5:00 PM to 7:00 PM, Route 455 trips carry 40 to 50 passengers and Route 459 trips carry 30 to 40.
- After 7:00 PM, when only Route 455 operates, ridership gradually declines from 50 passengers to fewer than 10 on the last trip at 12:30 AM.

On weekday outbound trips (see Figure 8 and Figure 9):

- The first two Route 455 outbound trips carry 14 and 21 passengers.
- From 6:00 AM to 12:30 PM, most Route 455 trips carry around 45 passengers and most Route 459 trips carry around 35 passengers.
- From 1:00 PM to 4:00 PM, Route 455 trips carry 70 to 80 passengers and Route 459 trips carry 40 to 45.

- From 4:00 PM to 7:25 PM, when Route 459 ends service, Route 455 ridership from 60 passengers per trip to 36, and Route 459 ridership per trips declines from 46 to 20.
- After 7:25 PM, when only Route 455 operates, ridership is close to or above 40 passengers per trip until 11:30 PM. It then declines to 18 on the last trip at 12:30 AM.

Saturdays

On Saturdays, inbound ridership is high from the beginning of service until 11:00 AM, when most trips carry 30 to 50 passengers (see Figure 10). Ridership increases to a peak of 73 on the 11:45 AM trip, and then declines to approximately 30 on later trips. However, some later trips carry as few as 10 passengers.

Outbound ridership increases from around 10 at the beginning of service to 30 by 6:30 AM (see Figure 11). Between 6:30 AM and 11:00, it generally ranges from 30 to 35 passengers per trip, but with a number of trips that carry more than 40 passengers. The last trip at 12:02 AM carries only six passengers.

Sundays

On Sundays, the first inbound trip at 7:05 AM carries 68 passengers, which indicates demand for earlier service (see Figure 12) (Earlier service was added in Spring, 2018). After the first trip until 4:30 PM, ridership per trip is generally between 40 and 50 passengers, which is very high considering that service is only provided hourly. Ridership per trip is then generally 30 to 40 passengers through the end of service. However, the 7:05 PM trip carries over 60 passengers, and the 11:05 PM short-turn that goes out of service in Central Square, Lynn carries only 12 passengers.

Outbound ridership starts low on the first two trips with fewer than 20 passengers (see Figure 13). It then ranges from 30 to 40 passengers per trip through 8:30 PM. After 8:30 PM, it gradually declines to 25 on the last trip at 10:58 PM.

Figure 4 | Weekday Inbound Ridership by Stop Map: Route 455 Inbound

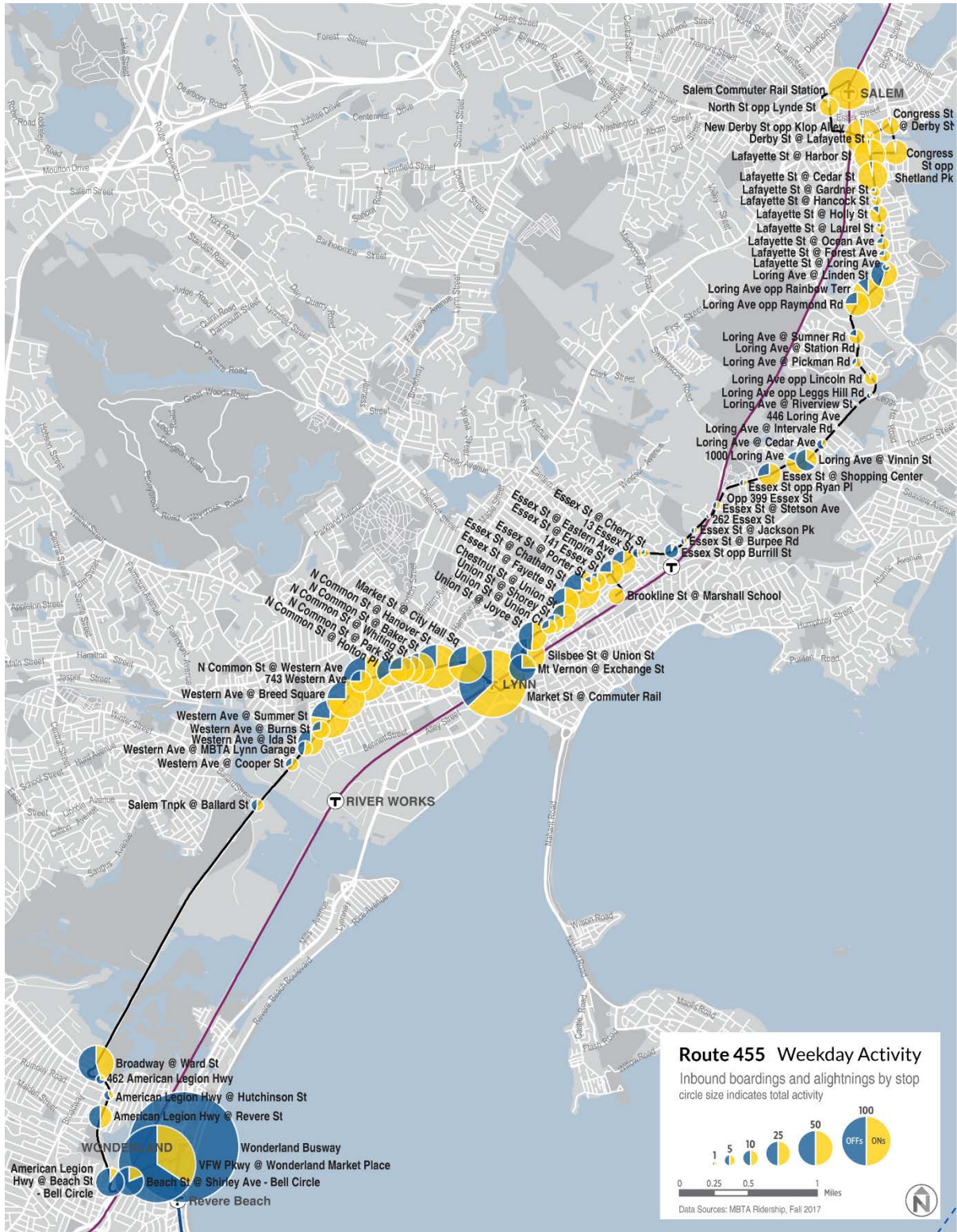


Figure 5 | Weekday Inbound Ridership by Stop Map: Route 459 Inbound

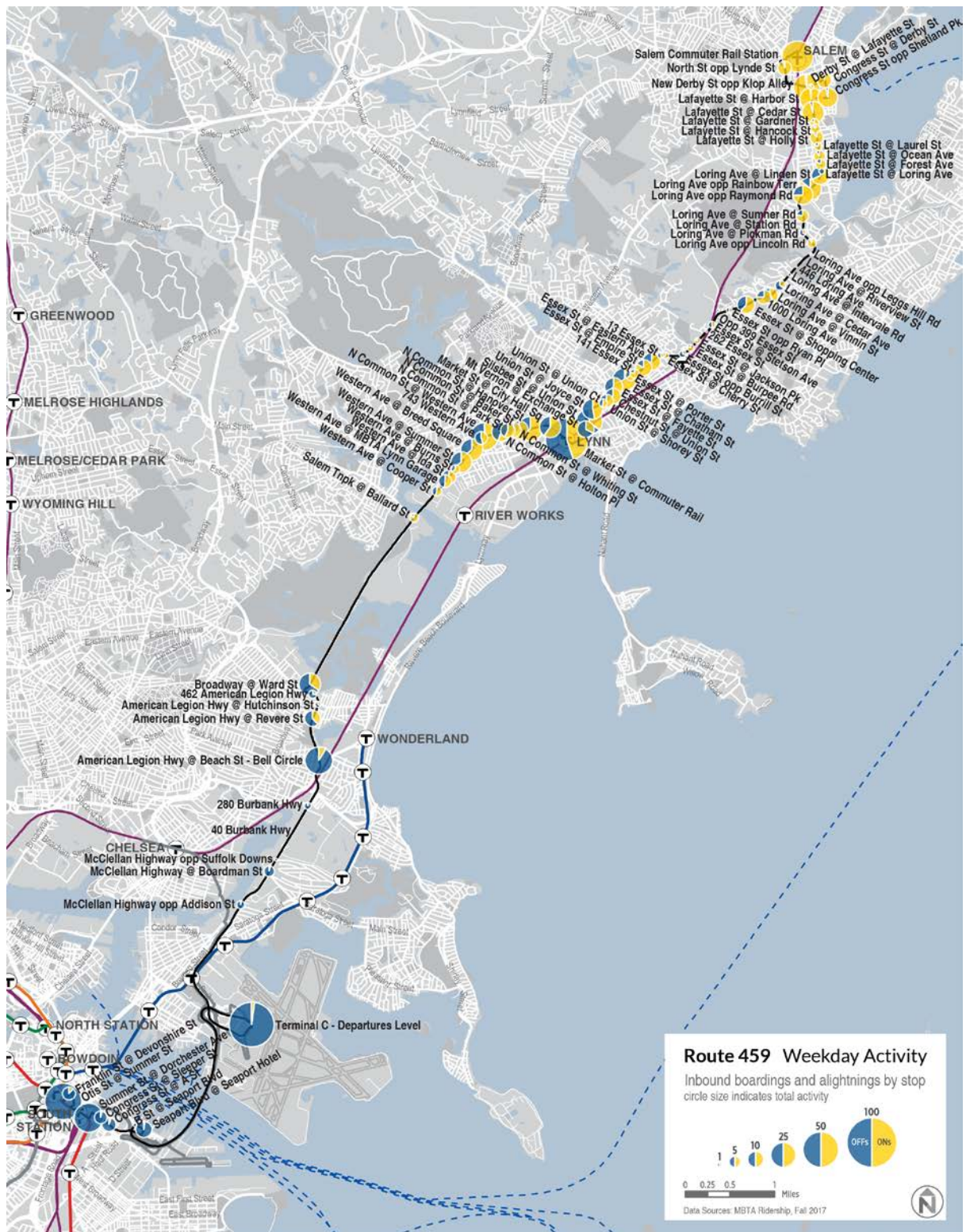


Figure 6 | Weekday Ridership by Trip: Route 455 Inbound

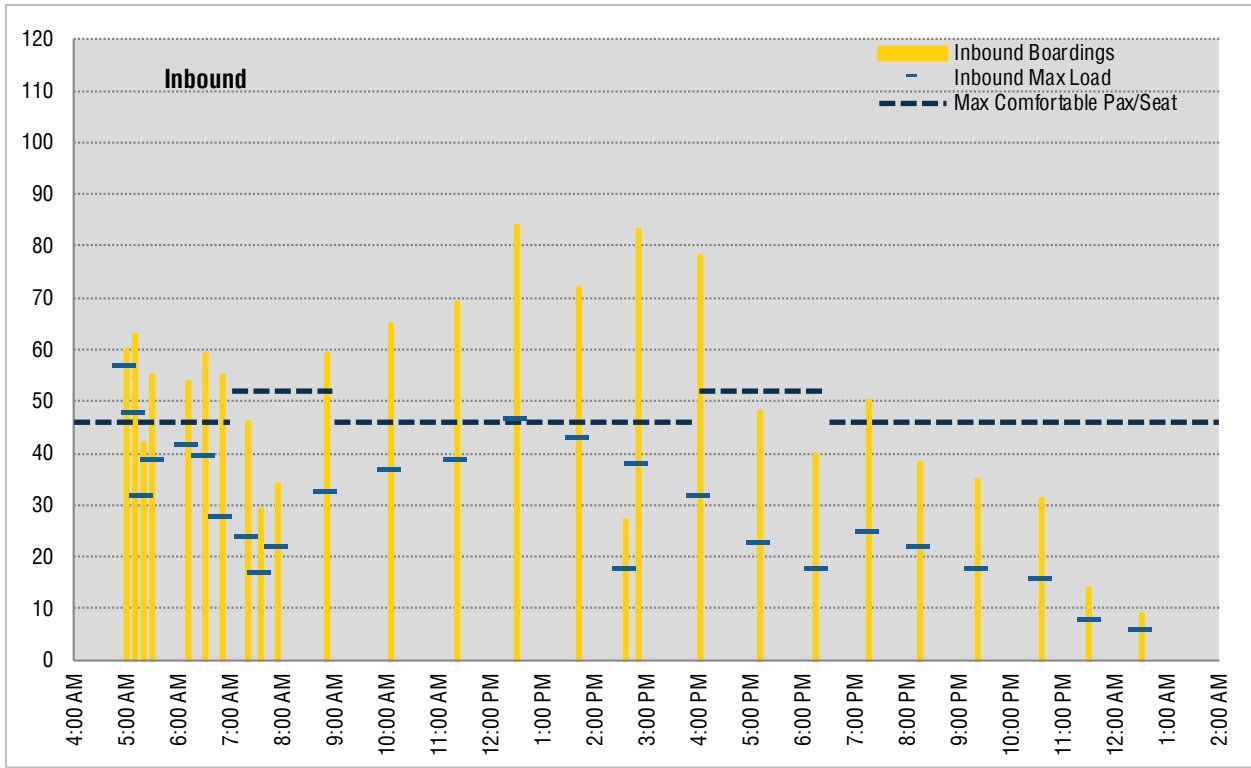


Figure 7 | Weekday Ridership by Trip: Route 459 Inbound

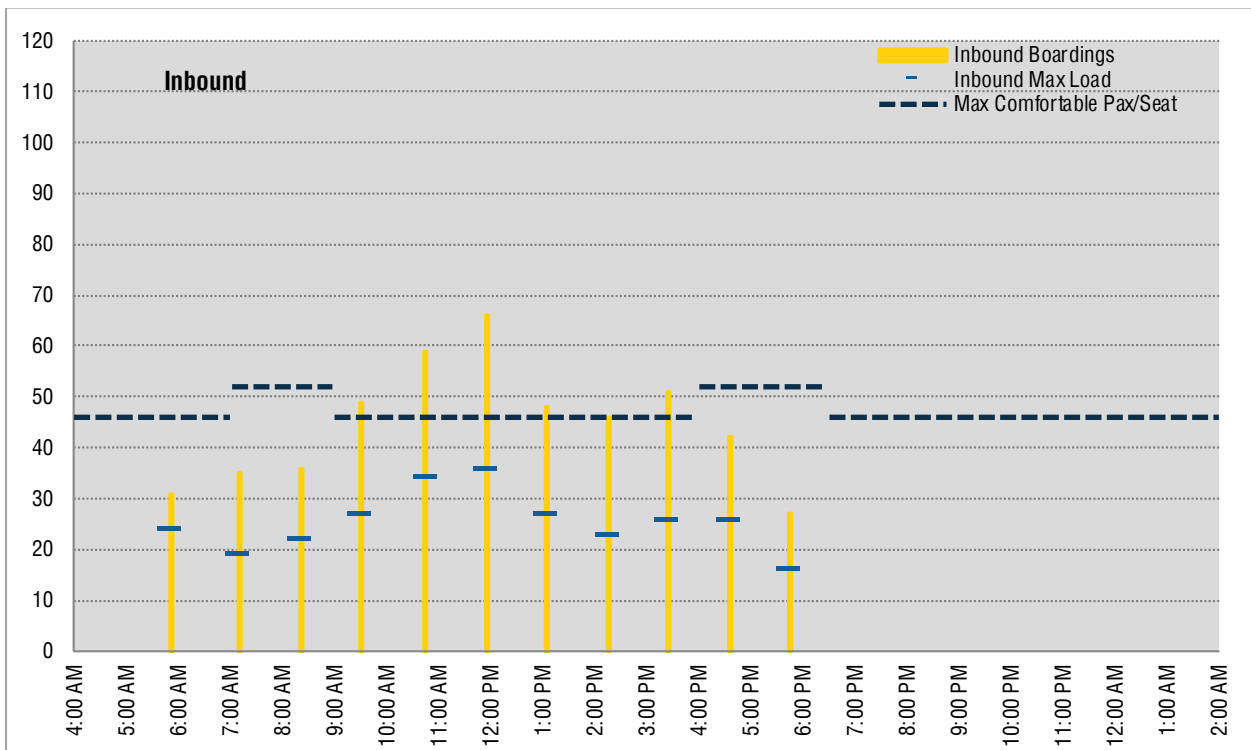


Figure 8 | Weekday Ridership by Trip: Route 455 Outbound

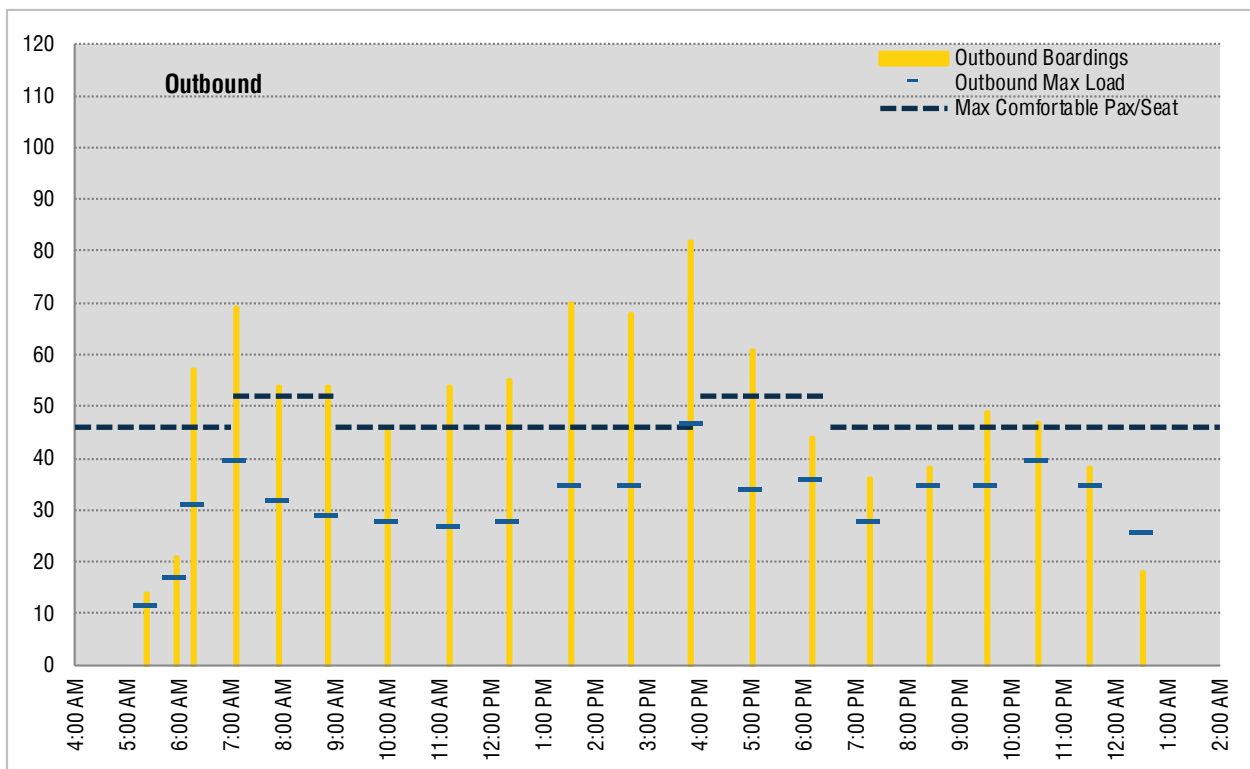


Figure 9 | Weekday Ridership by Trip: Route 459 Outbound

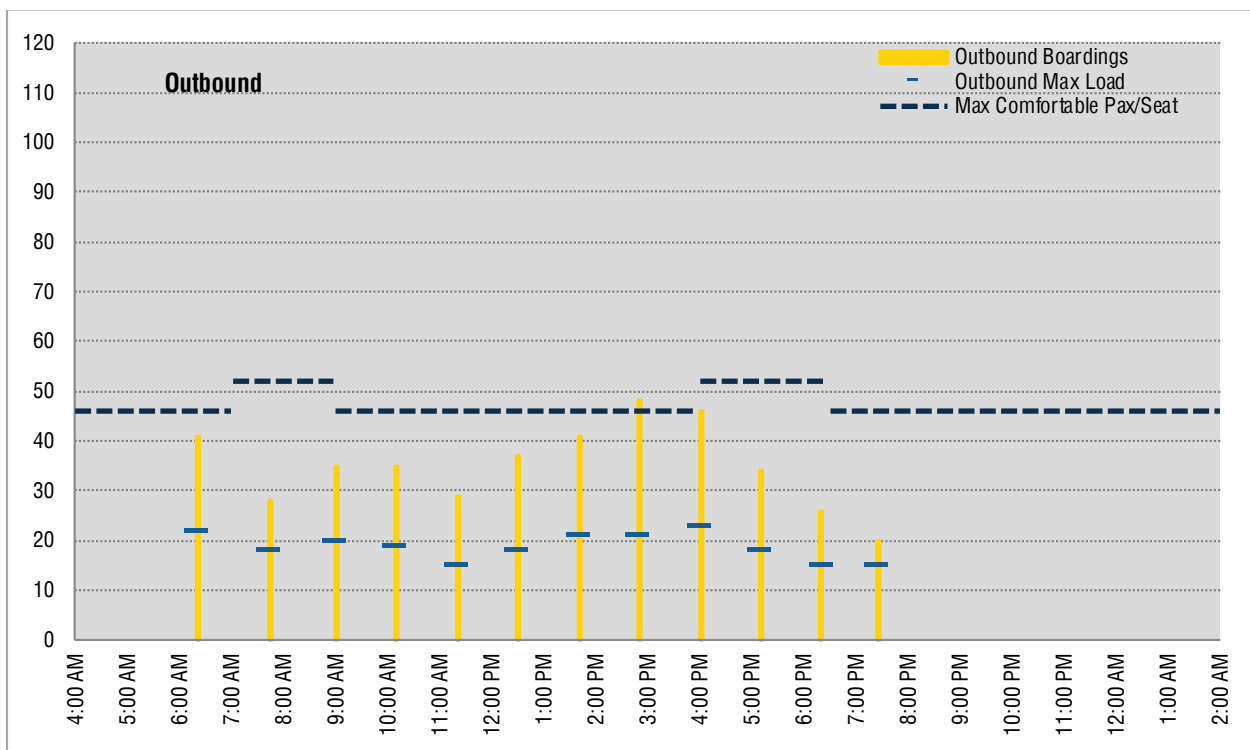


Figure 10 | Saturday Ridership by Trip: Route 455 Inbound

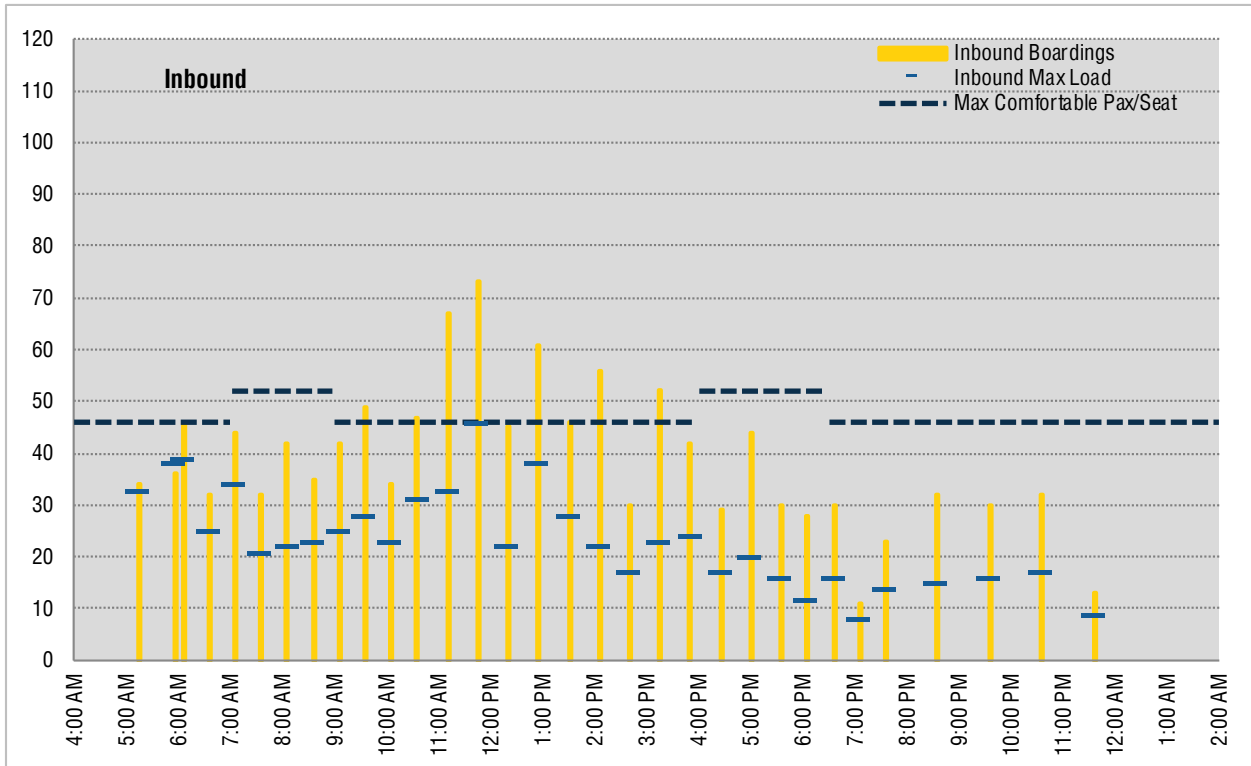


Figure 11 | Saturday Ridership by Trip: Route 455 Inbound

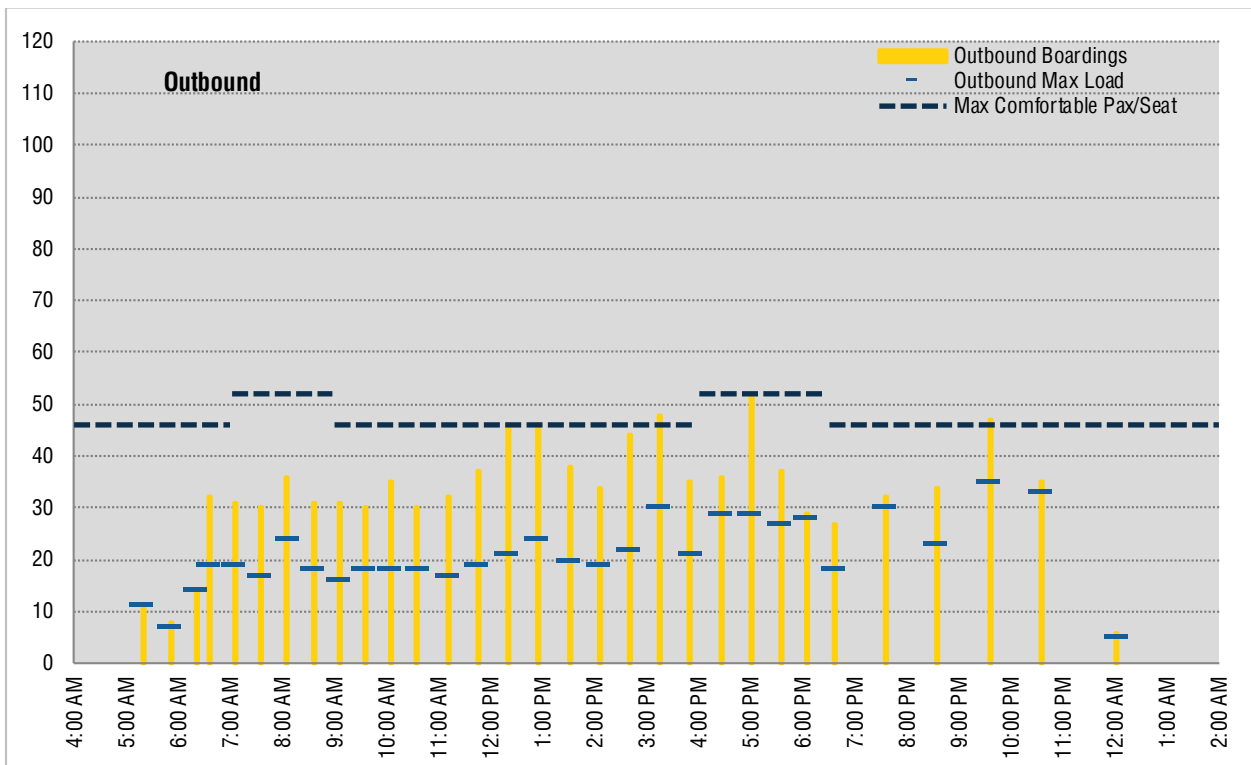


Figure 12 | Sunday Ridership by Trip: Route 455 Inbound

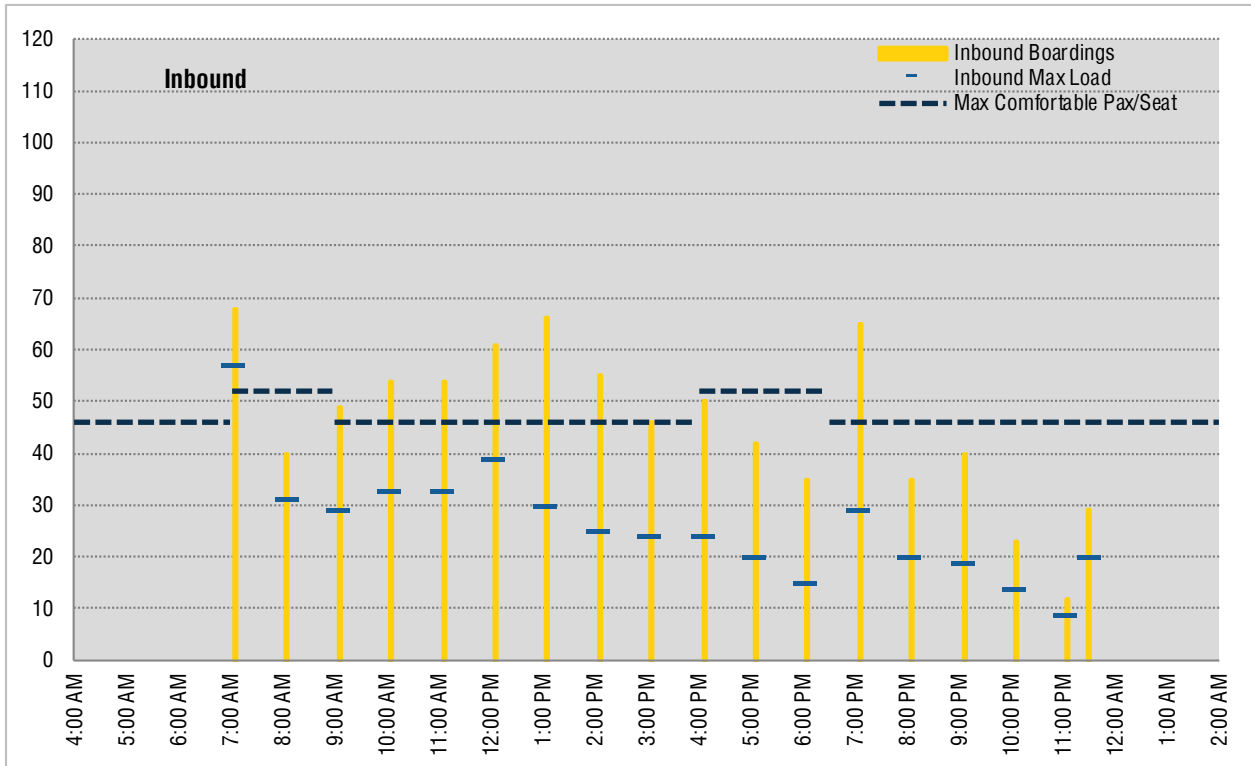
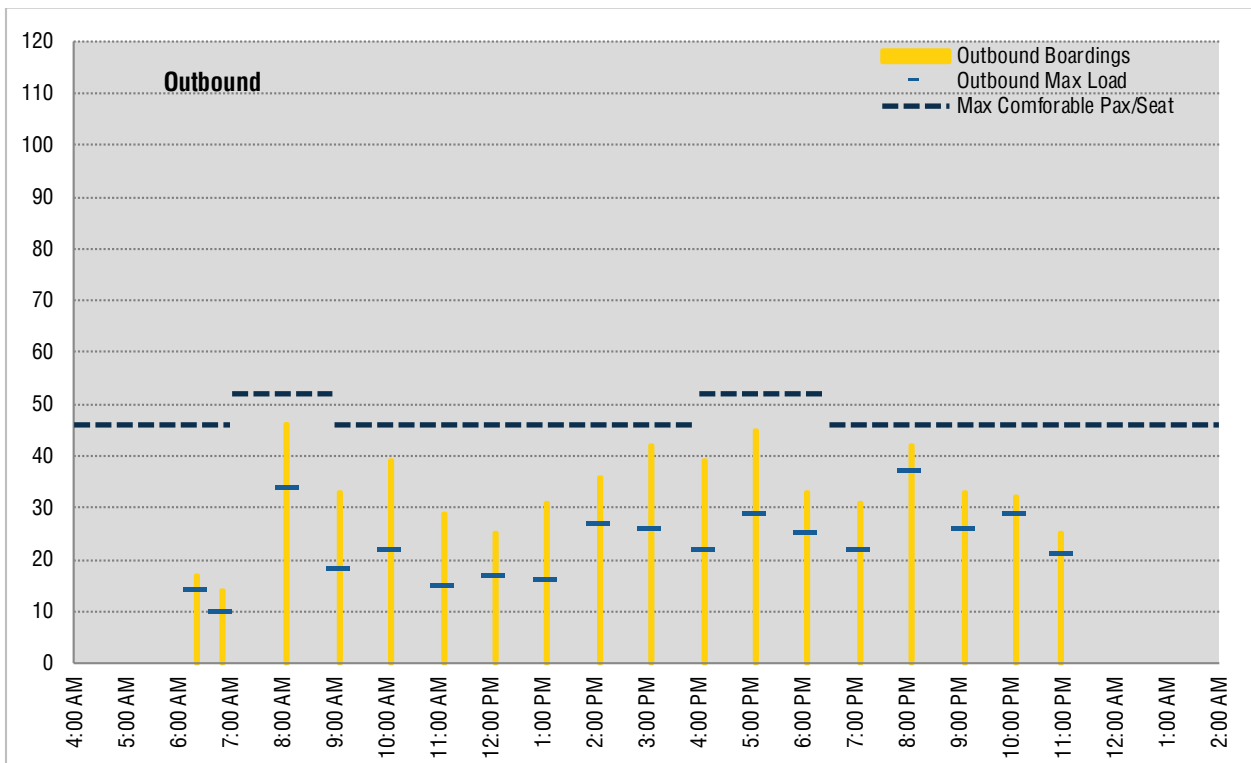


Figure 13 | Sunday Ridership by Trip: Route 455 | Outbound



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 455, 95% of passenger minutes are in comfortable conditions on weekdays and 98% on Saturdays and Sundays (see Table 5). The weekday comfort levels are above the minimum of 92% but below the target of 96%. Weekend comfort levels are above the target. On Route 459, which carries significantly lower loads, 99% of passenger minutes are in comfortable conditions.

Table 5 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
Minimum Standard	92%	92%	92%
Target	96%	96%	96%
Actual: Route 455	95%	98%	98%
Actual: Route 459	98.6%	-	-

Reliability and Speed

Reliability

Route 455's overall reliability is poor at 56% on weekday, 64% on Saturdays, and 58% on Sundays. (see Table 6) All of these figures are below the minimum standard of 70%. Route 459's overall reliability is even lower, at 43%. (see Table 7)

Table 6 | Route 455 Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	57%	44%	56%	0.1%
Saturday	65%	62%	64%	-
Sunday	57%	68%	58%	-

Table 7 | Route 459 Reliability

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	43%	37%	43%	0%
Saturday	-	-	-	-
Sunday	-	-	-	-

Running Times

Actual running times on both Route 455 and Route 459 exceed scheduled times throughout most of the day in both directions. On Route 455, inbound trips typically run six to 10 minutes behind schedule (see Figure 14) and Route 459 trips run up to 20 minutes behind schedule (see Figure 15). Outbound actual times also significantly exceed scheduled times.

Figure 14 | Scheduled & Median Travel Time by Trip - Route 455 Inbound

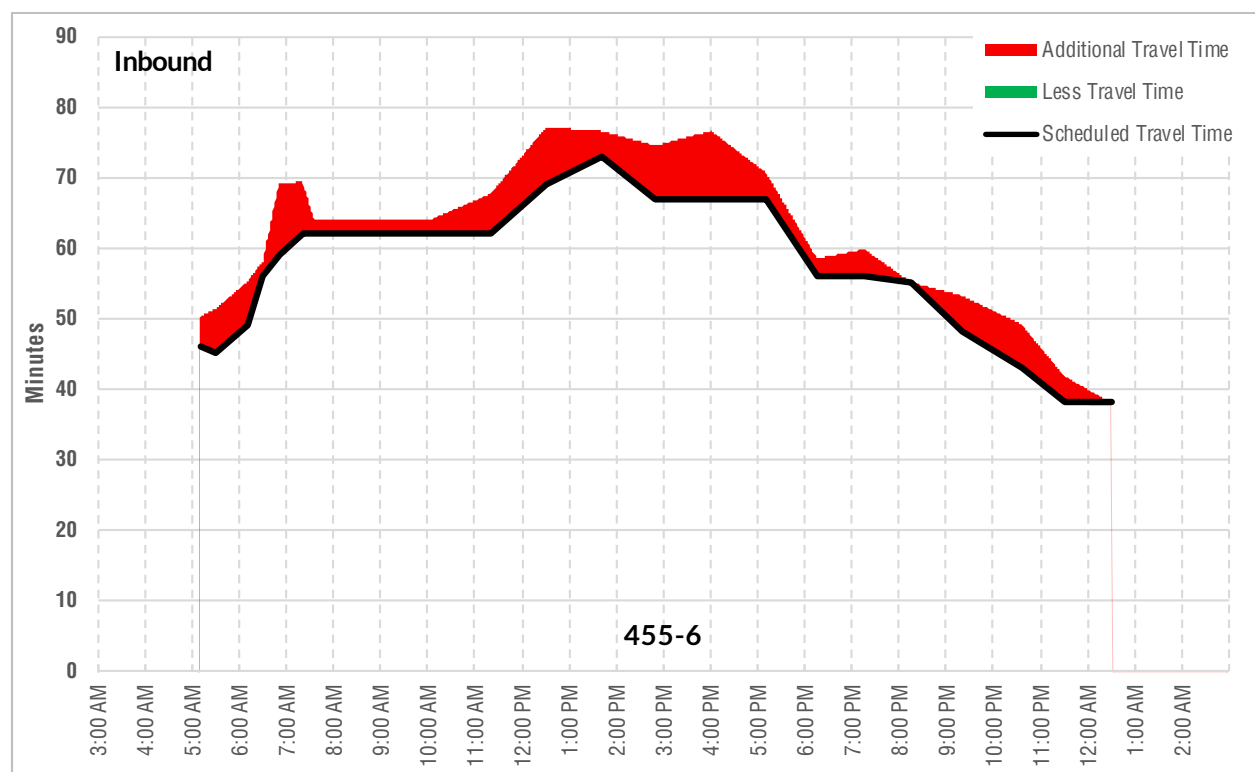
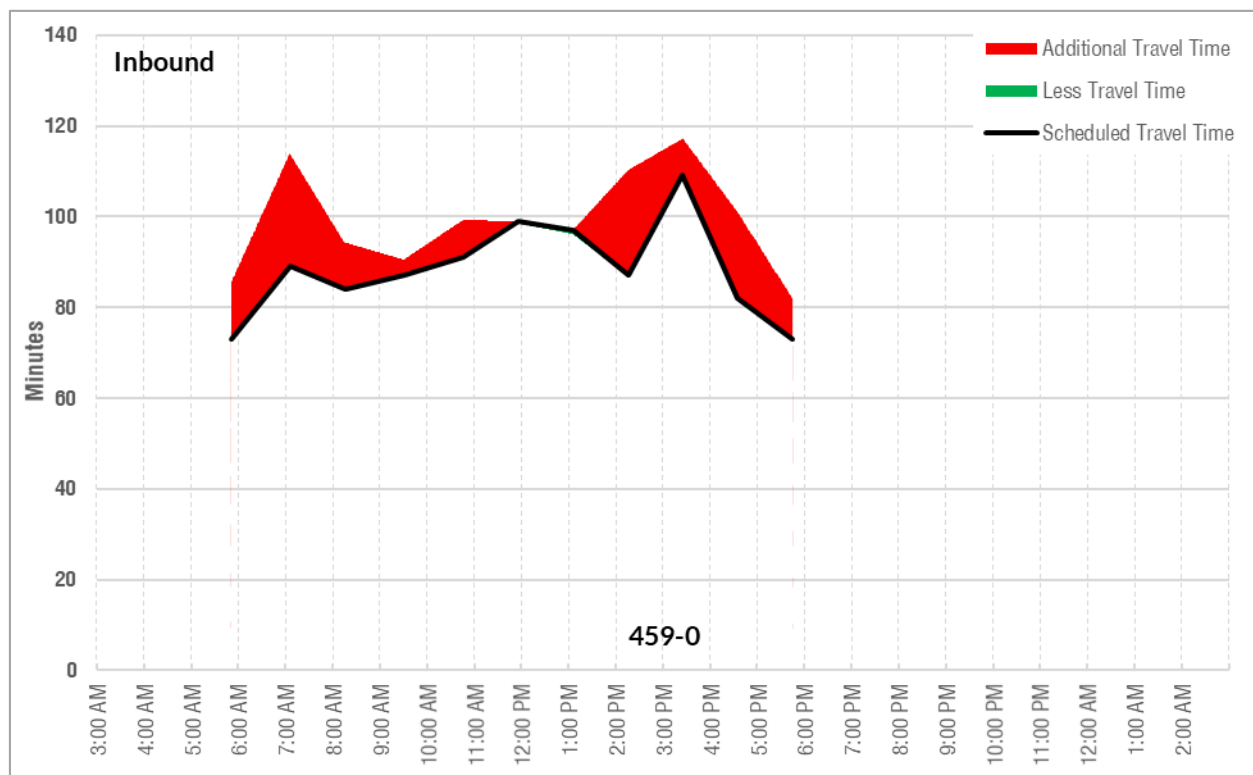


Figure 15 | Scheduled & Median Travel Time by Trip: Route 459 Inbound



Stop Spacing

Stop spacing varies along both routes from three stops per mile in some areas to over 10 in others. Areas where stops are very close together include:

- In Salem between Lafayette Street at Harbor Street and Loring Avenue at Linden Street, where there are nine stops in less than a mile
- In Lynn, between Market Street at City Hall Square and Western Avenue at Summer Street, where there are approximately nine stops per mile.
- In Lynn between Essex Street at Cherry Street and Mt. Vernon at Exchange Street, there are approximately nine stops per mile.

Stop consolidation in areas in these areas would make service faster.

Summary

Route 455 and Route 459 are designed to connect residents who live in the Lafayette Street/Loring Avenue and Essex Street corridor through Salem and Swampscott with Lynn, the Blue Line, and downtown Boston. Rather than serve the corridor with a single route to either the Blue Line or Boston, the operation of two routes is designed to provide

riders with a choice to travel to Boston; either directly or via the Blue Line. However, there are significant downsides to this approach:

- Rather than providing a single route with more frequent service to a single inner terminal, for most of the day, Route 455 and Route 459 provide very infrequent service to two different terminals. During the midday, service can be as infrequent as every 80 minutes.
- Demand to the two inner terminals is not equal, with two and half times as many passengers traveling to Wonderland on Route 455 than to Boston on Route 459. At all times of the day when both routes operate, including when they alternative trips, Route 455 carries significantly more, which indicates that the large majority of passengers prefer to travel via Wonderland.

There are also a number of other issues with the routes:

- The reliability of both routes is very poor, and is especially bad on Route 459 where the route is very delay prone between Revere and downtown Boston.
- Neither meets the SDP service frequency standards, with service that operates as infrequently as every 80 minutes versus the minimum standard of 60 minutes.
- Aside from the service standard non-compliance issue, ridership on the infrequent service is strong, which indicates demand for more frequent service.
- Stops are spaced too closely together in many areas.