

# Route 441/442

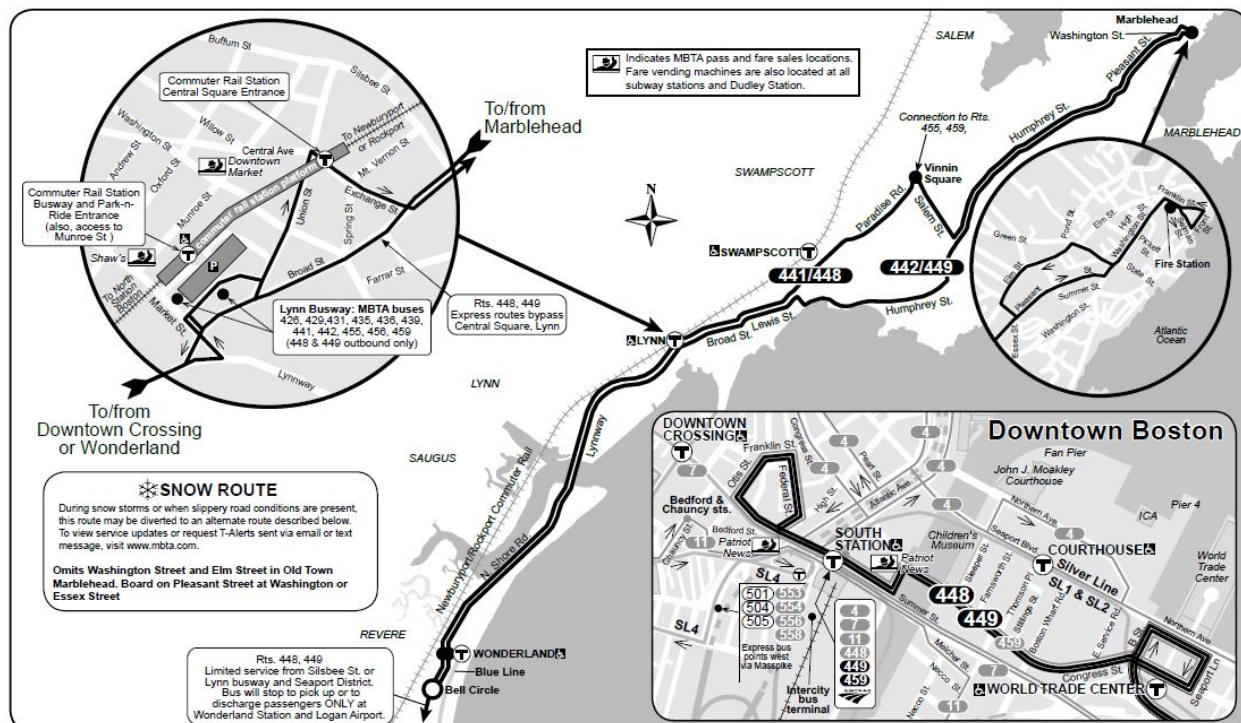
## Marblehead - Wonderland

### Route Overview

Routes 441 and 442 Marblehead - Wonderland are Local routes that operate between Marblehead and Wonderland Station (see Figure 1). Both routes serve the same alignment except in Swampscott, where Route 441 operates via Salem Street and Paradise Road and Route 442 operates via Humphrey Street.

Routes 441 and 442 are closely related to Routes 448 and 449 Marblehead-Downtown Crossing. Those two routes provide peak period service between Marblehead and Downtown Crossing. Between Marblehead and Wonderland Station, Route 448 operates along the same alignment as Route 441 and Route 449 operates along the same alignment as Route 442. They then operate between Wonderland and Downtown Crossing via Logan Airport and the Seaport District.

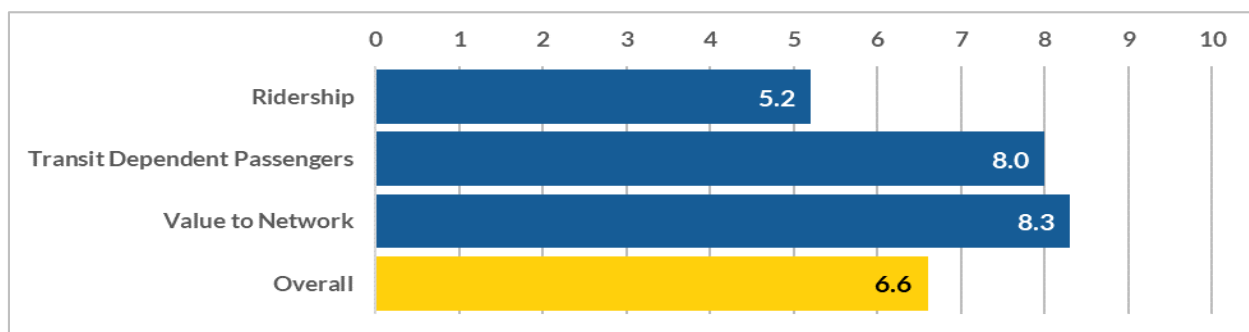
Figure 1 | Service Map



## Network Importance

Routes 441 and 442 are moderately important routes within the MBTA bus network (see Figure 2). On a relative scale of 0 to 10, the routes rate 5.2 in terms of ridership, 8.0 in terms of transit dependent ridership, and 8.3 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 routes' overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 6.6.

Figure 2 | Route 441 & 442 | Relative Importance within MBTABus Network (on a scale of 0 to 10)



## Service Overview

### Schedule

On weekdays, Routes 441 and 442 together operate from 5:13 AM to 1:22 AM (see Table 1 and Table 2):

#### Inbound

- There are two sunrise trips. The first departs Lynn Central Square at 5:45 AM, while the second departs at 5:40 AM and operates the full length of Route 442.
- In the early AM period, there are two Route 441 trips and three Route 442 trips. There is also one Route 448 trip and one Route 449 trip. In total, there are eight trips to or via Wonderland, three of which operate via Paradise Road and five of which operate via Humphrey Street. There are no regular patterns to service, but combined headways on the four routes average 20 minutes. When short-turns are considered, service from Marblehead operates approximately every 30 minutes.
- In the AM peak period, there are five Route 441 trips and two Route 442 trips. There is also one Route 448 trip and one Route 449 trip. In total, there are nine trips to or via Wonderland, six of which operate via Paradise Road and three of which operate via Humphrey Street. There are no regular patterns to service, but combined headways on the four routes average nine minutes.

- In the midday base period, there are six Route 441 trips and seven Route 442 trips. The two routes alternate trips and combined service operates every 30 minutes.
- In the midday school period, there are two Route 441 trips and two Route 442 trips. As in the midday base period, the two routes alternate trips and combined service operates every 30 minutes.
- In the PM peak period, there are three Route 441 trips and three Route 442 trips. The two routes alternate trips but service is irregular with combined headways that vary from 15 to 40 minutes.
- In the evening period, there are three Route 441 trips and two Route 442 trips. The two routes alternate trips until 8:00 PM but service is very irregular with combined headways that vary from one to 29 minutes. Only Route 442 operates after 8:00 PM with service every 60 minutes.
- In the late evening and night periods, there are three Route 442 trips that operate 60 minutes apart, except for the last trip, which is 55 minutes after the second to last trip.

#### Outbound

- In the sunrise period, the first trip departing at 5:13 AM operates as Route 442, serving Humphrey Street.
- In the early AM period, there are two Route 441 trips and four Route 442 trips. Service is irregular with combined headways vary from one to 52 minutes.
- In the AM peak period, there are two Route 441 trips and three Route 442 trips. There is also one Route 448 trip and one Route 449 trip. In total, there are seven trips from or via Wonderland, three of which operate via Paradise Road and four of which operate via Humphrey Street. There are no regular patterns to service, but headways on the four routes average 13 minutes.
- In the midday base period, there are six Route 441 trips and five Route 442 trips. The two routes alternate trips and combined service operates every 25 to 40 minutes.
- In the midday school period, there are two Route 441 trips and two Route 442 trips. As in the midday base period, the two routes alternate trips and service operates every 20 to 35 minutes.
- In the PM peak period, there are four Route 441 trips and four Route 442 trips. There are also two Route 448 trip and two Route 449 trip. In total, there are 12 trips from or via Wonderland, six of which operate via Paradise Road and six of which operate via Humphrey Street. There are no regular patterns to service, but headways on the four routes average 12 minutes. When short-turns are considered, average headways to Marblehead average 13 minutes, or nearly twice as much service as inbound in the early AM and AM peak periods.

- In the evening period, there is one Route 441 trip and three Route 442 trips. The Route 441 trip departs at 6:35 AM and all service after that time operates as Route 442. The Route 441 trip operates 10 minutes after the last PM peak trip, and the three Route 442 trips operate 40 to 60 minutes apart.
- In the late evening and night periods, there are three Route 442 trips that operate 60 minutes apart.

On Saturdays, Route 441/442 service operates from 6:05 AM to 12:58 AM. From the start of service until approximately 6:00 PM, Routes 441 and 442 alternate trips every 25 to 35 minutes. After 6:00 PM, all service operates as Route 442. Service operates every 25 to 35 minutes until approximately 8:30 PM, and then every 50 to 60 minutes.

On Sundays, Route 441/442 service operates from 7:30 AM to 1:00 AM. From the start of service until approximately 8:00 PM, Routes 441 and 442 alternate trips every 25 to 35 minutes. After 6:00 PM, all service operates as Route 442. Service operates every 25 to 35 minutes until approximately 8:30 PM, and then every 60 minutes.

When considered together, Route 441/442 meets the MBTA’s service span and frequency guidelines for all days.

It should be noted that since the development of this document weekday evening Route 442 frequencies were improved and a 2:35 AM trip was added to Route 442.

**Table 1 | Route 441 Schedule Statistics**

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
<b>Monday-Friday</b>	<b>6:10 AM to 8:06 PM</b>			<b>21/17</b>
Sunrise	-	-	-	-
Early AM	6:10 AM to 6:59 AM	28 – 35	31	2/2
AM Peak	7:00 AM to 8:59 AM	2 – 30	19	6/3
Midday Base	9:00 AM to 1:29 PM	25 – 60	60	5/4
Midday School	1:30 PM to 3:59 PM	60	60	2/3
PM Peak	4:00 PM to 6:29 PM	30 – 70	48	3/4
Evening	6:30 PM to 8:06 PM	32 – 44	33	3/1
Late Evening	-	-	-	-
Night	-	-	-	-
<b>Saturday</b>	<b>6:05 AM to 7:23 PM</b>	<b>55 – 60</b>	<b>52</b>	<b>14/14</b>
<b>Sunday</b>	<b>8:45 AM to 7:36 PM</b>	<b>55 – 75</b>	<b>52</b>	<b>11/11</b>

Table 2 | Route 442 Schedule Statistics

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
<b>Monday-Friday</b>	<b>5:13 AM to 1:22 AM</b>			<b>30/36</b>
Sunrise	5:13 AM to 5:59 AM	5 – 15	10	2/1
Early AM	6:00 AM to 6:59 AM	13 – 30	20	3/4
AM Peak	7:00 AM to 8:59 AM	13 – 50	32	5/4
Midday Base	9:00 AM to 1:29 PM	50 – 60	60	4/5
Midday School	1:30 PM to 3:59 PM	1 – 60	45	4/4
PM Peak	4:00 PM to 6:29 PM	10 – 59	23	5/9
Evening	6:30 PM to 9:59 PM	30 – 60	55	4/5
Late Evening	10:00 PM to 11:59 PM	55 – 60	57	2/2
Night	12:00 AM to 1:22 AM	1 trip	1 trip	1/2
<b>Saturday</b>	<b>6:30 AM to 12:58 AM</b>	<b>25 – 64</b>	<b>49</b>	<b>21/21</b>
<b>Sunday</b>	<b>7:30 AM to 1:00 AM</b>	<b>55 – 65</b>	<b>55</b>	<b>18/18</b>

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

## Service Patterns

Routes 441 and 442 operate in a very complex manner (see Table 3 and Table 4). On weekdays:

### Inbound

- From the beginning of service through the end of the AM peak:
  - The first inbound trip only operates between Central Square, Lynn and Wonderland Station.
  - 10 trips operate between Marblehead and Wonderland as shown in Figure 1. Three are Route 441 trips and three are Route 442 trips.
  - Nine trips only operate between Swampscott and Wonderland. Four are Route 441 trips and five are Route 442 trips.
- In the afternoon and PM peak, three trips only operate between Central Square, Lynn and Wonderland Station. These trips are designed to address overcrowding issues.
- In the evening, four trips that are going out of service only operate between Marblehead and Central Square in Lynn. Three are Route 441 trips and one is a Route 442 trip.

### Outbound

- Three early morning trips that use buses just entering service operate between Central Square, Lynn and Marblehead. One is a Route 441 trip and two are Route 442 trips.

- Beginning at 8:45 AM and scattered throughout the rest of the day, nine trips only operate between Wonderland Station and Central Square, Lynn. These trips are designed to address overcrowding issues.

Weekend service patterns are more regular. On both Saturdays and Sundays, the first two outbound trips only operate between Central Square, Lynn and Marblehead. These trips are run by buses coming into service from the Lynn Garage. On Saturdays, the first trip is run as Route 441 and the second as Route 442. On Sundays, both run as Route 442. In addition, on Sundays, two PM trips only operate between Marblehead and Central Square, Lynn. One of these trips operates as Route 411 and one operates as Route 442. Both trips are operated by buses going out of service to the Lynn Garage.

Table 3 | Route 441 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
<b>INBOUND</b>				<b>21</b>	<b>14</b>	<b>11</b>
441.6	Swampscott	Wonderland Station	Short turns	5	-	-
441.7	Marblehead	Wonderland Station	Primary pattern	13	14	10
441.9	Marblehead	Central Square, Lynn	Short turn	3	-	1
<b>OUTBOUND</b>				<b>17</b>	<b>14</b>	<b>11</b>
441.6	Wonderland Station	Swampscott	Short turn	1	-	-
441.7	Wonderland Station	Marblehead	Primary pattern	14	13	11
441.9	Central Square, Lynn	Marblehead	Short turn	2	1	-

Table 4 | Route 442 Service Patterns

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
<b>INBOUND</b>				<b>30</b>	<b>21</b>	<b>18</b>
442.1	Central Square, Lynn	Wonderland Station	Short turn	4	-	-
442.6	Swampscott	Wonderland Station	Short turn	5	-	-
442.7	7 Franklin Street at Fire House	Wonderland Station	Primary pattern	20	21	17
442.9	Mugford Street at Washington Street	Central Square in Lynn	Short turn	1	-	1
<b>OUTBOUND</b>				<b>36</b>	<b>21</b>	<b>18</b>

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS PER WKD	TRIPS PER SAT	TRIPS PER SUN
442.1	Wonderland Station	Central Square, Lynn	Short turn	11	-	-
442.6	Wonderland Station	Swampscott	Short turn	4	-	-
442.7	Wonderland Station	Marblehead	Primary pattern	20	20	16
442.9	Central Square, Lynn	Marblehead	Short turn	1	1	2

## Ridership

Together, Routes 441 and 442 serve 3,480 passengers on weekdays, 2,150 on Saturdays, and 1,680 on Sundays. Individually:

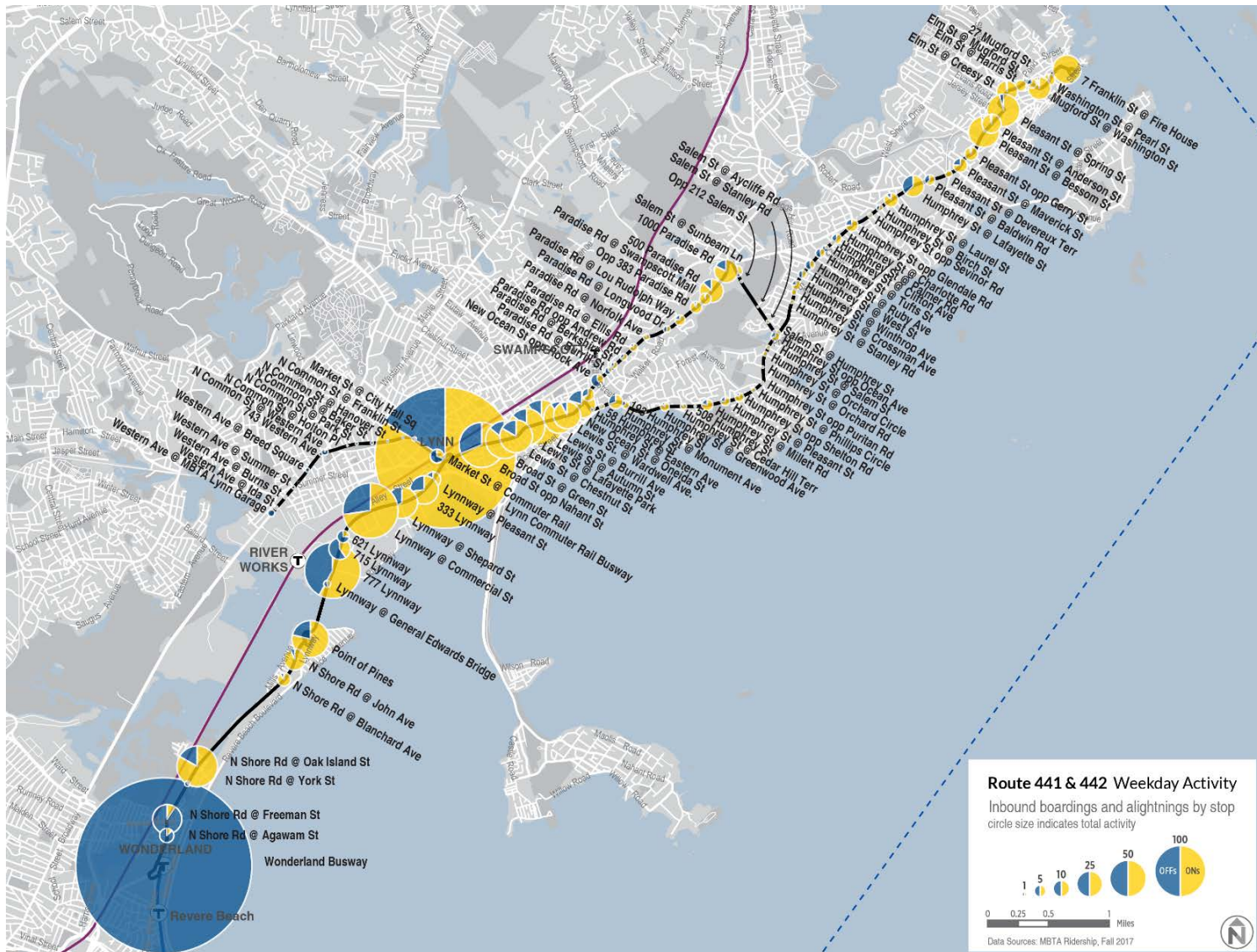
- Route 441 serves 1,340 passengers on weekdays, 920 on Saturdays, and 720 on Sundays.
- Route 442 serves 2,140 passengers on weekdays, 1,230 on Saturdays, and 960 on Sunday.

### Ridership by Stop

There are two “halves” to Route 441/442 ridership. The first half is ridership in Marblehead and Swampscott, which is low; and the second half is ridership in Lynn and Revere, which is high. On weekday inbound trips (see Figure 3):

- From the Marblehead end of the line to Pleasant Street at Bessom Street, there are 170 boardings and less than 10 alightings at nine stops.
- From Bessom Street to the intersection of Salem Street where Routes 441 and 442 diverge, 50 passengers board and 20 alight.
- Between Humphrey Street and Salem Street where Routes 441 and 442 diverge to the where they rejoin near the Swampscott/Lynn line:
  - 60 passengers board and 20 alight at the 17 stops along Route 441’s alignment on Salem Street and Paradise Road.

Figure 3 | Weekday Inbound Ridership by Stop





- Only 20 passengers board and less than 10 alight at the 16 stops along Route 442's alignment on Humphrey Street.
- In total, 300 passengers board in Marblehead and Swampscott, which is less than 20% of all inbound passengers.
- After the two routes rejoin and enter Lynn, ridership increases, with 360 boardings and 80 alightings at stops before Central Square, Lynn. This one-mile segment in Lynn has 20% of the combined routes' weekday boardings.
- Central Square, Lynn is the second-highest ridership stop, with a total of 650 boardings and 130 alightings. The boardings represent nearly 40% of inbound boardings.
- 350 passengers board and 190 alight between Central Square, Lynn and Wonderland Station.
- 1,210 passengers, or 70% of all inbound passengers, alight at Wonderland Station.

## Ridership by Trip

### Weekdays

On inbound service (see Figure 4 and Figure 5):

- The first inbound trip at 5:40 AM (Route 442 from Central Square, Lynn) carries 47 passengers. This high ridership indicates demand for earlier service.
- The first Route 441 inbound trip at 6:10 AM has 57 passengers and has a maximum passenger load of 49 passengers, which exceeds the maximum comfort standard.
- Ridership per trip is moderate during the AM peak. No trips carry more than 40 total passengers and maximum loads are low, which indicates that more service is provided than warranted by demand.
- Ridership per trip is highest in the midday when many trips carry more than 50 passengers and have loads that are close to the maximum loading standards.
- In the PM peak, ridership declines from over 40 passengers close to 4:00 PM and then declines to less than 20 by 6:00 PM. Low ridership per trip generally reflects the high amount of service that is provided as buses cycle to serve outbound riders.

Ridership is very low (between three and seven riders) on the three Route 441 inbound trips after 6:00 PM that terminate at the Lynn Garage and do not serve the southern part of Lynn, Revere, or Wonderland. However, ridership per trip on Route 442 trips steadily increases to over 40 passengers at 9:15 PM.

- It then steadily declines to fewer than five passengers on the last trip at 1:10 AM.

Figure 4 | Route 441 Weekday Ridership by Trip: Inbound

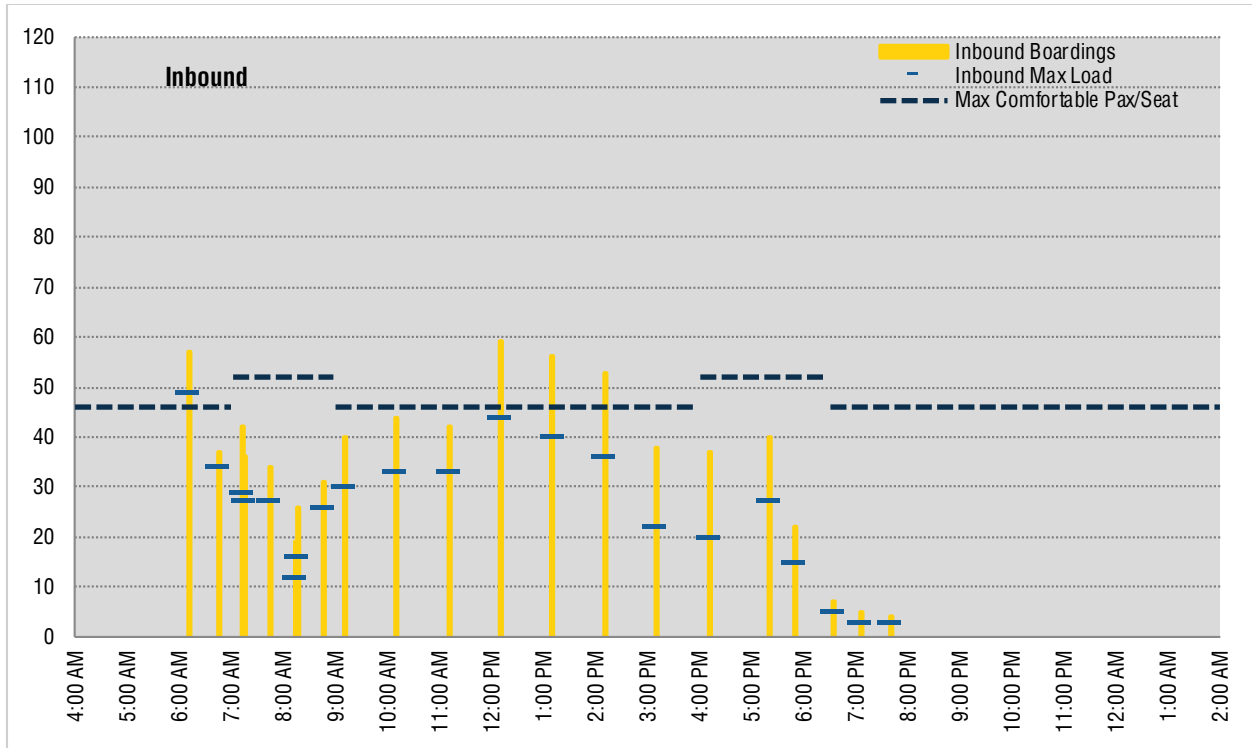
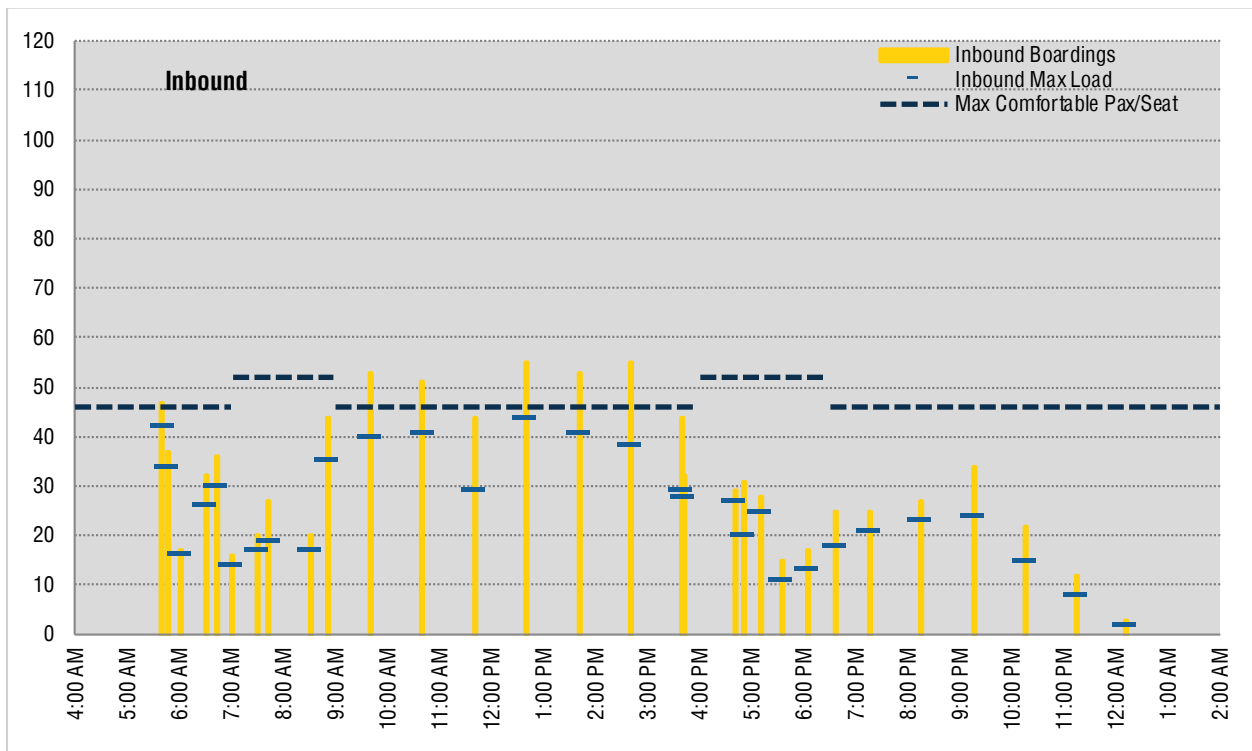


Figure 5 | Route 442 Weekday Ridership by Trip: Inbound



On outbound service (see Figure 6 and Figure 7):

- From 2:00 PM to 11:30 PM, ridership per trip generally ranges from 40 to over 50 passengers. Most trips are very full and one (at 9:15 PM) has loads that exceed maximum standards.
- After 11:30 ridership declines to 18 passengers on the last trip.

### Saturdays

Route 441 and 442 ridership is generally consistent throughout the day, with most trips carrying from 30 to over 50 riders. Inbound ridership is highest during the midday between 11:00 AM and 3:00 PM, when ridership exceeds 40 riders per trip (see Figure 8 and Figure 9). After 5:00 PM, most trips (which are all run as Route 442) carry 20 or fewer riders, except for two evening trips that have 21 and 28 passengers per trip.

Outbound ridership is highest in the late morning and during the midday when, as is the case inbound, most trips carry from 30 to over 40 riders (see Figure 10 and Figure 11). The highest ridership trips are at 10:55 AM and 1:40 PM, which both have 44 passengers per trip. After 6:00 PM, trips carry between 15 and 30 riders.

### Sundays

Sunday ridership varies across the day, but is generally between 20 and 45 riders per trip in both directions. On inbound trips, ridership starts very high at 40 passengers on the first Route 442 trip at 7:55 AM, which indicates demand for earlier service (see Figure 12 and Figure 13). It then ranges from 25 to over 40 passengers per trip through 4:00 PM. After 4:00 PM, it gradually declines to only two passengers on the last inbound trip at 12:25 AM.

Outbound ridership is 14 and 15 passengers on the first trips at 7:30 AM and 8:30 AM that begin in Central Square (see Figure 14 and Figure 15). It then jumps to 30 to over 40 on nearly all trips until close to 9:00 PM. It then stays relatively high at 20 to nearly 30 passengers on the last three trips. The last outbound trip, at 11:45 PM, has 27 boardings.

### 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.

Figure 6 | Route 441 Weekday Ridership by Trip: Outbound

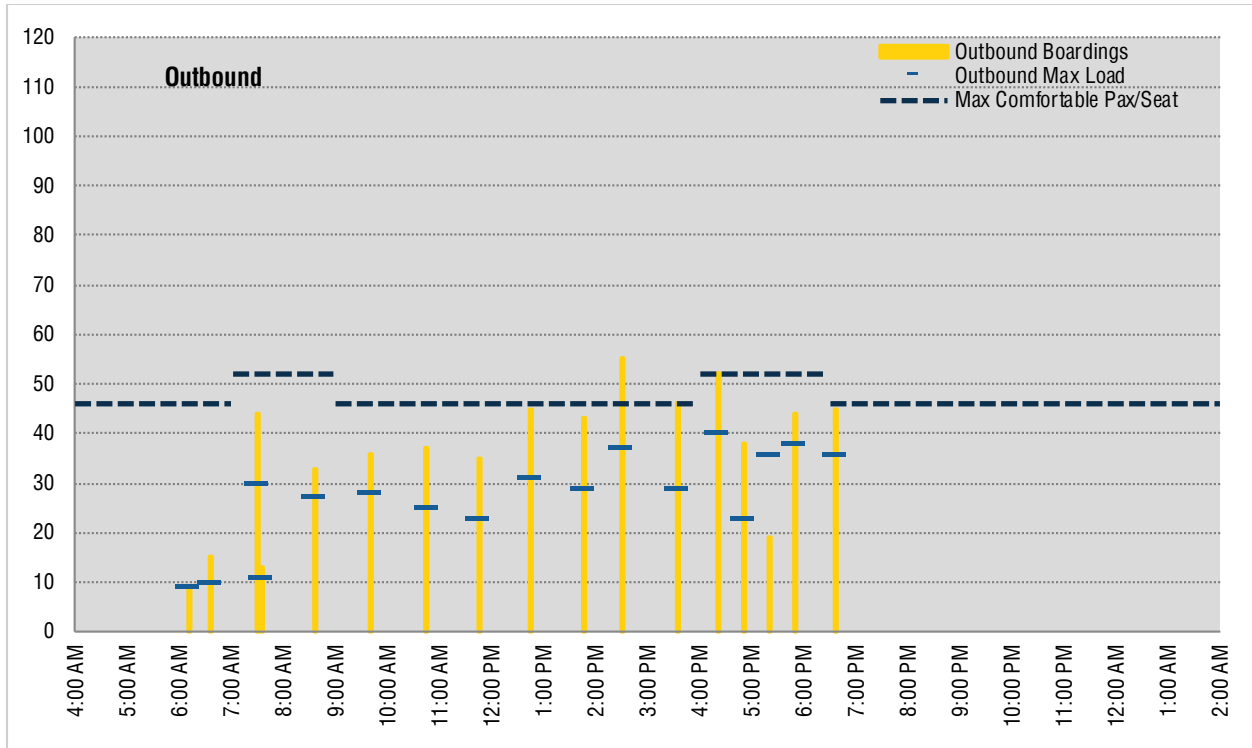


Figure 7 | Route 442 Weekday Ridership by Trip: Outbound

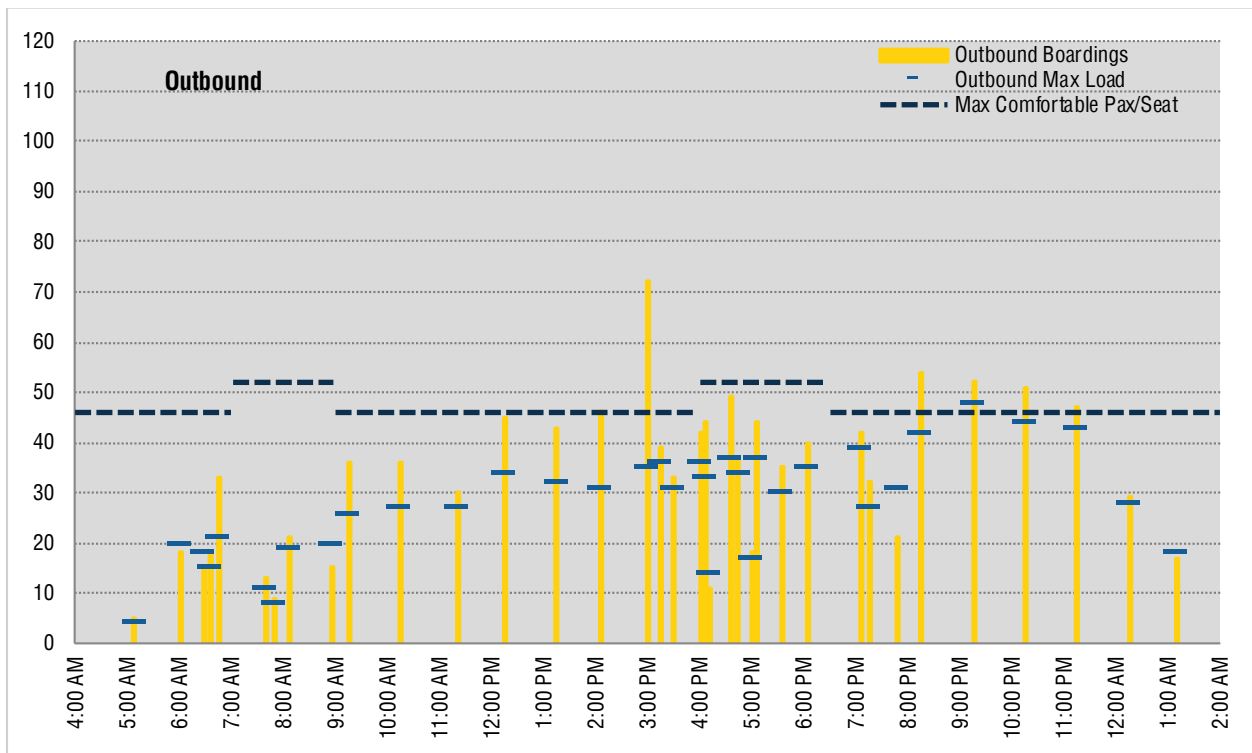


Figure 8 | Route 441 Saturday Ridership by Trip: Inbound

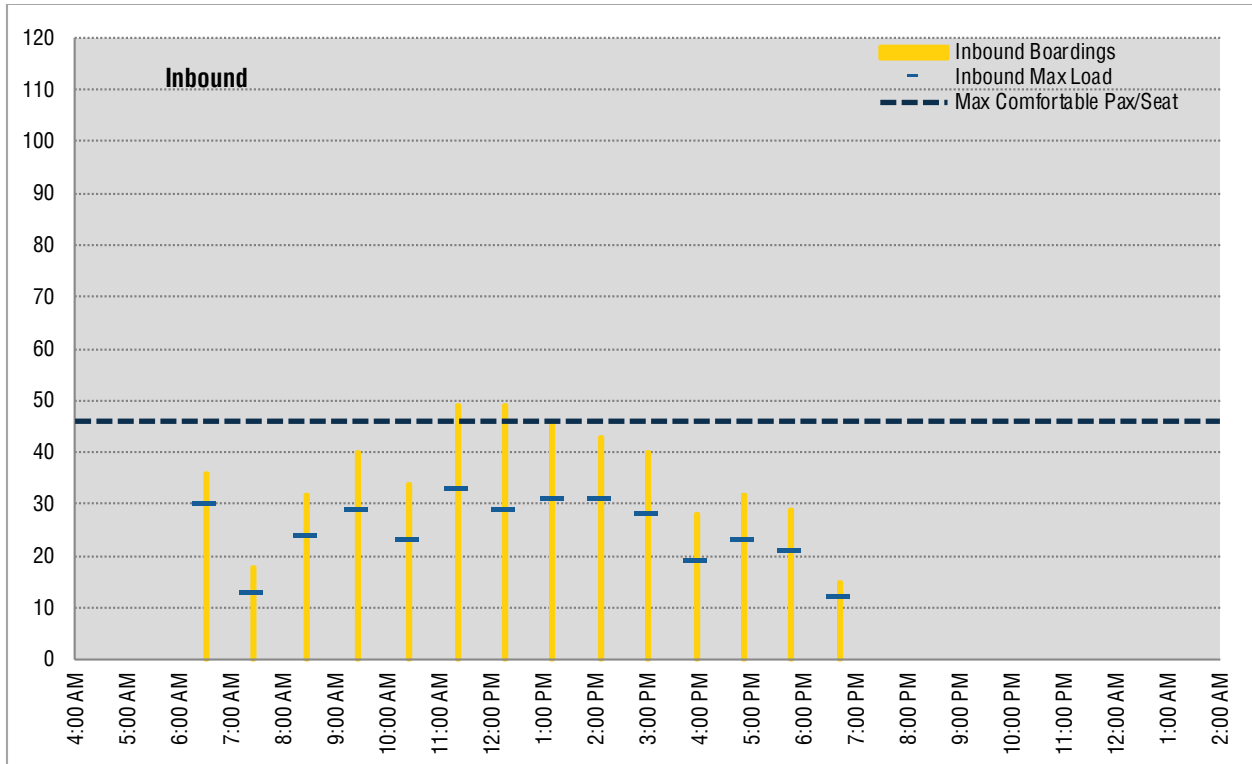


Figure 9 | Route 442 Saturday Ridership by Trip: Inbound

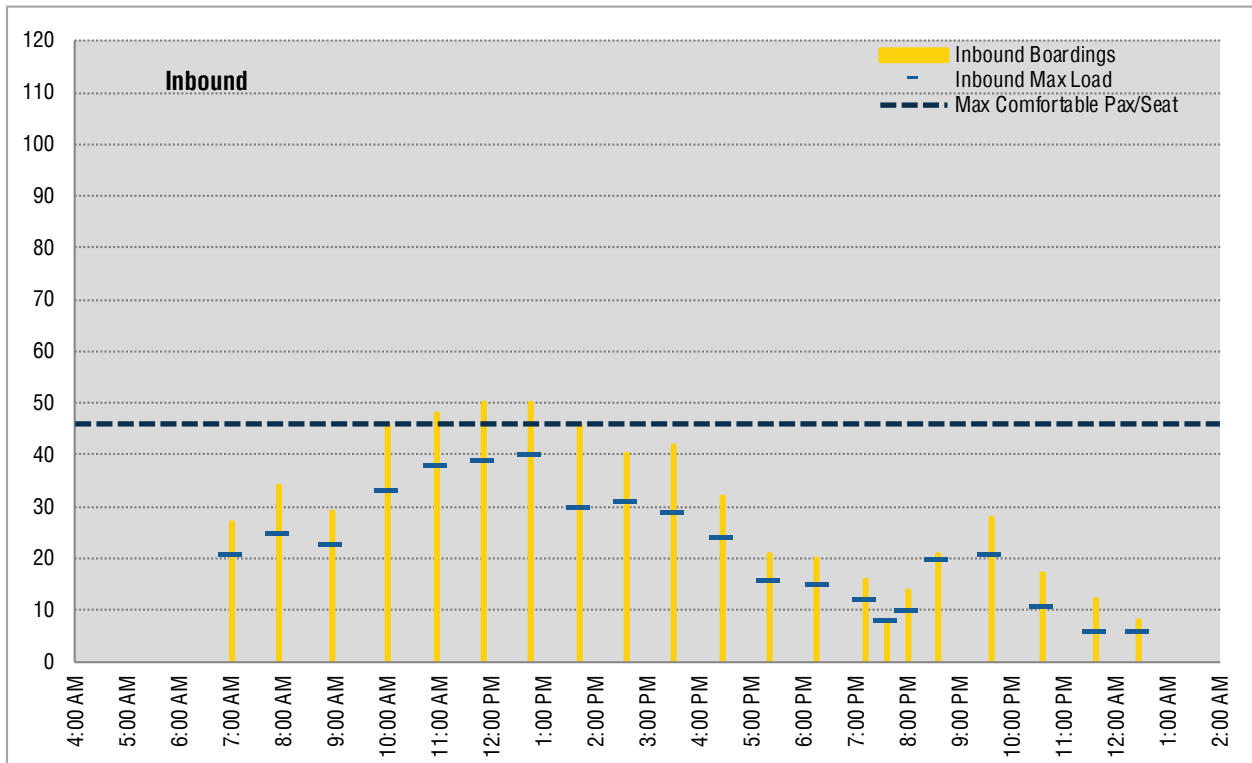


Figure 10 | Route 441 Saturday Ridership by Trip: Outbound

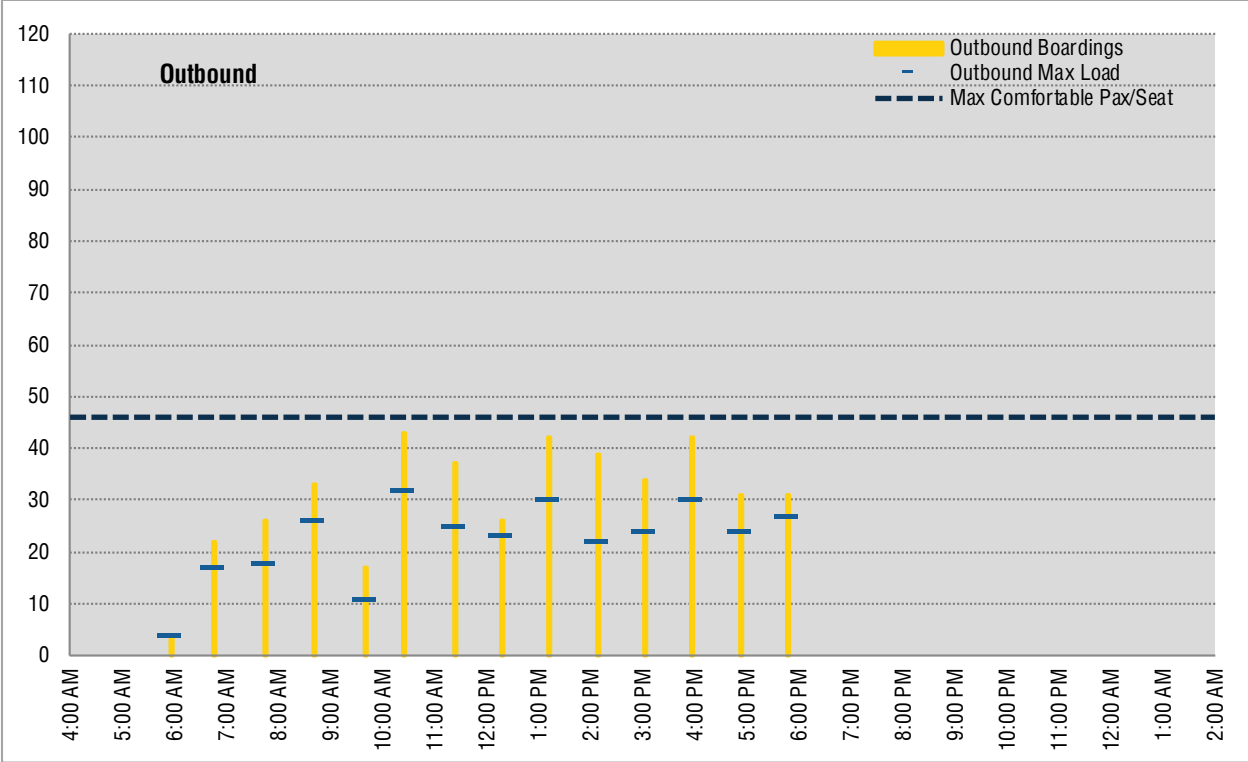


Figure 11 | Route 442 Saturday Ridership by Trip: Outbound

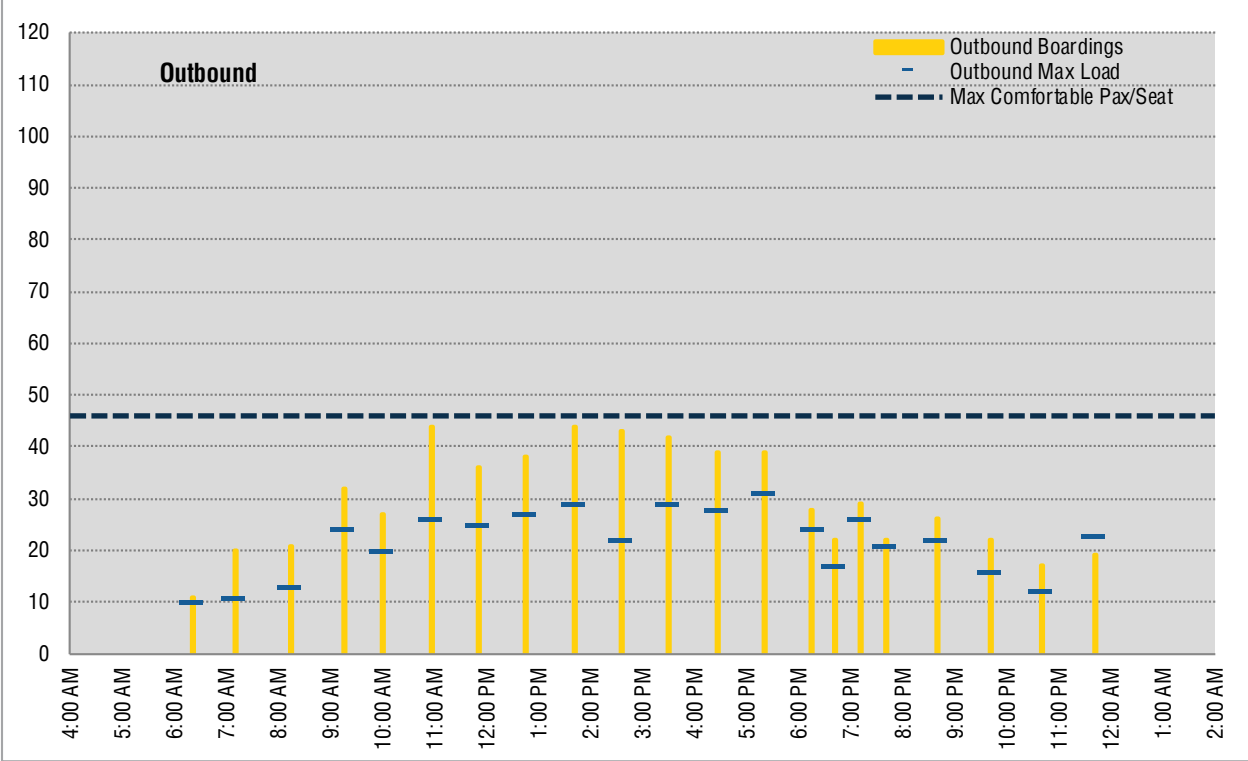


Figure 12 | Route 441 Sunday Ridership by Trip: Inbound

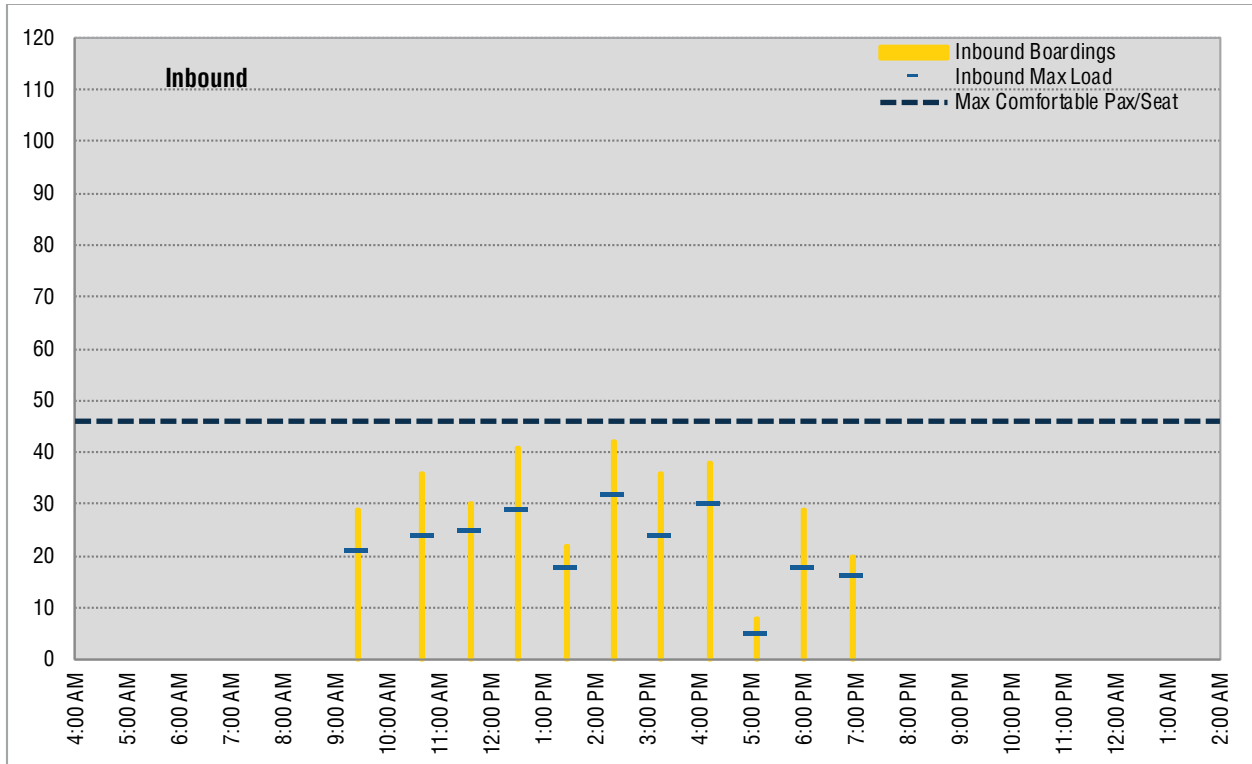


Figure 13 | Route 442 Sunday Ridership by Trip: Inbound

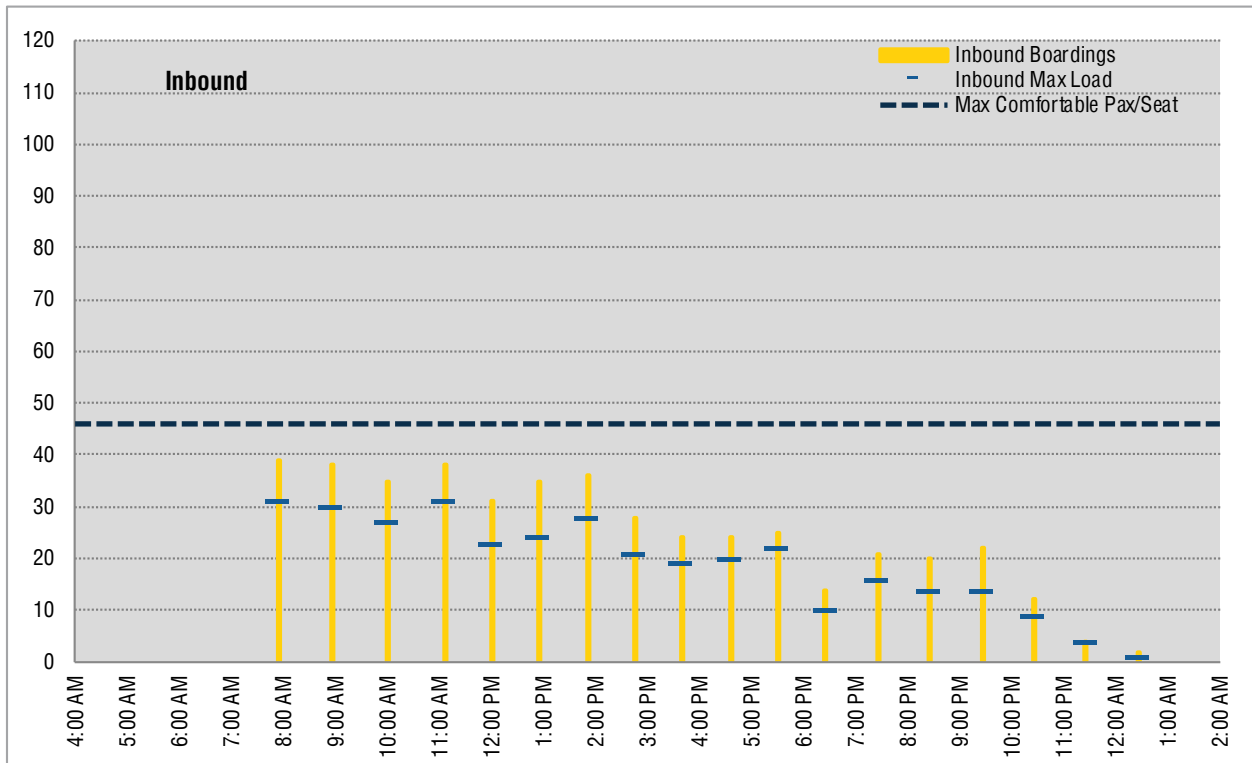


Figure 14 | Route 441 Sunday Ridership by Trip: Outbound

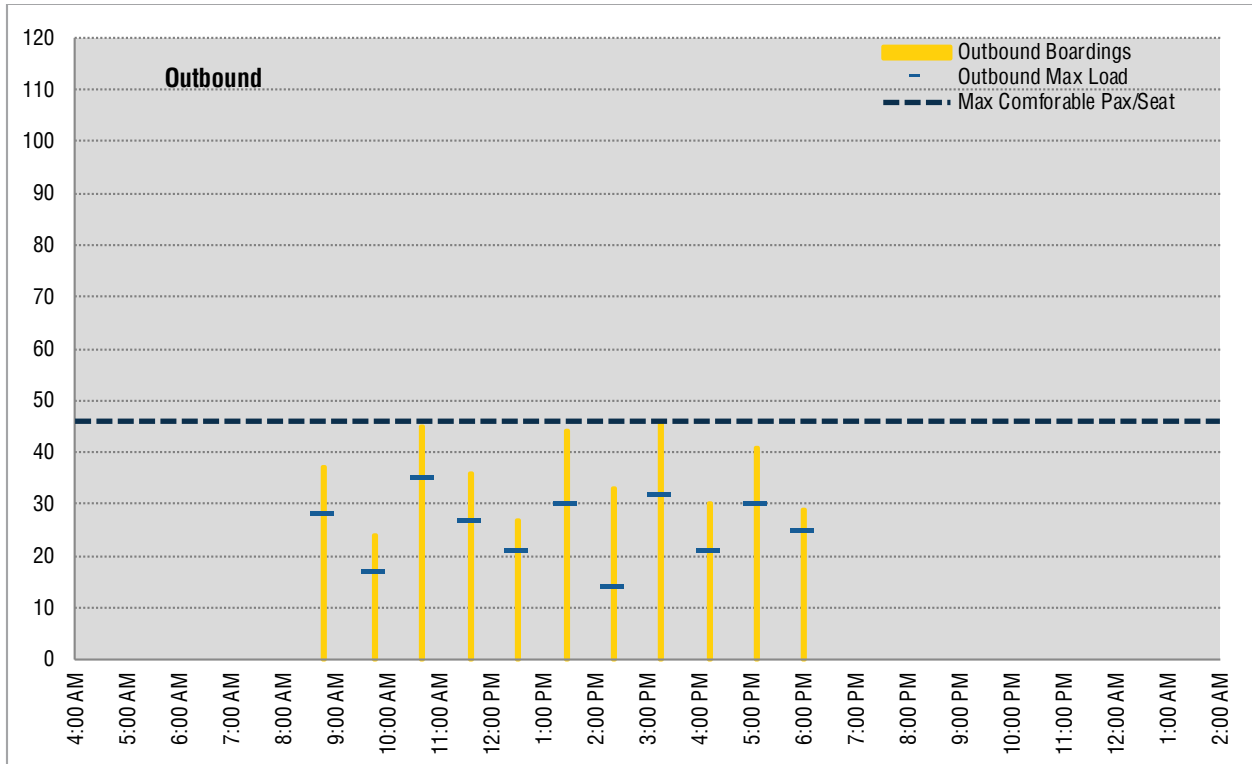
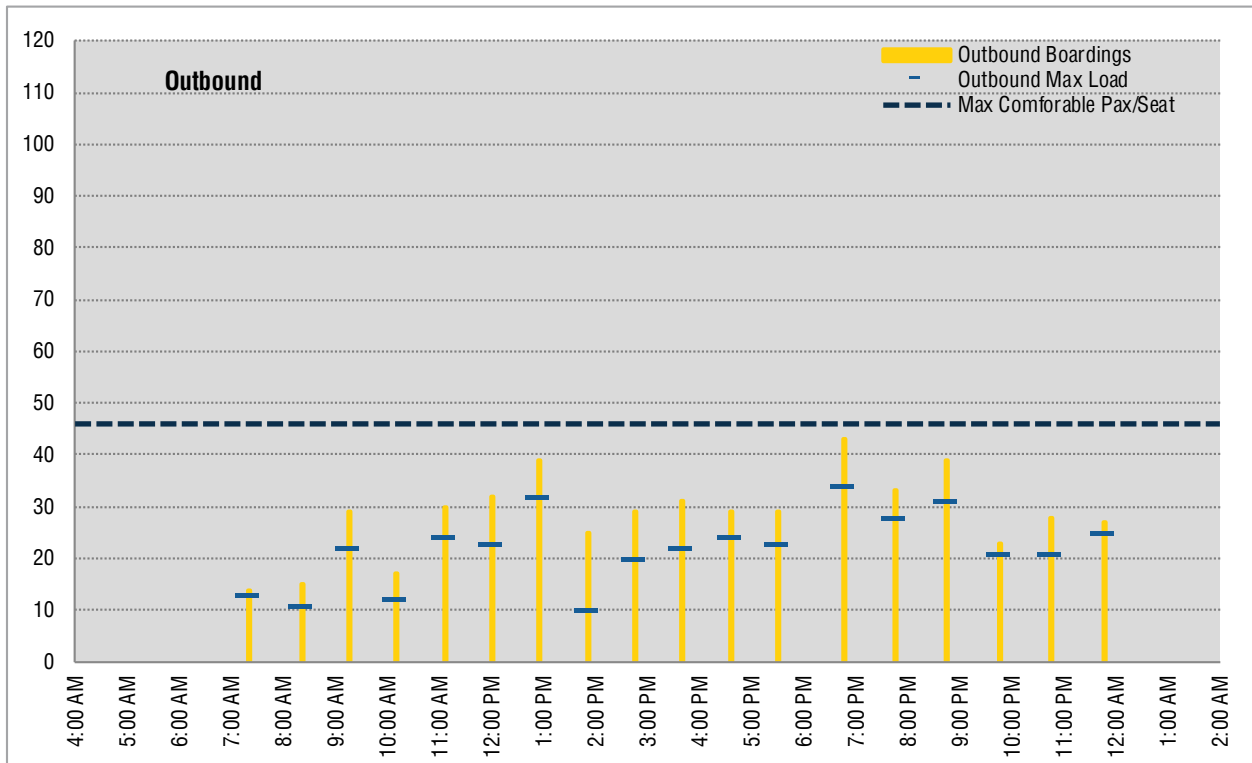


Figure 15 | Route 442 Sunday Ridership by Trip: Outbound





On Routes 441 and 442, 97% of passenger minutes or more are in comfortable conditions on weekdays. This is above the minimum standard of 92% and target of 96% (see Table 5).

**Table 5 | Passenger Time Spent Traveling in Comfortable Conditions**

	WEEKDAYS	SATURDAYS	SUNDAYS
<b>Minimum Standard</b>	92%	92%	92%
<b>Target</b>	96%	96%	96%
<b>Actual: Route 441</b>	97.1%	96.5%	98.1%
<b>Actual: Route 442</b>	97.4%	98.4%	98.8%

## Reliability and Speed

### Reliability

The reliability of both routes is poor (see Table 6 and Table 7). Overall reliability on Routes 441 and 442 on weekdays is 65% and 68%, respectively, 66% on both routes on Saturdays, and 46% and 57% on Sundays. All of these figures are below the minimum standard of 70% for local routes.

**Table 6 | Route 441 Reliability**

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
<b>Monday-Friday</b>	63%	76%	65%	0.3%
<b>Saturday</b>	65%	73%	66%	-
<b>Sunday</b>	45%	52%	46%	-

**Table 7 | Route 442 Reliability**

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
<b>Monday-Friday</b>	68%	72%	68%	0.3%
<b>Saturday</b>	65%	69%	66%	-
<b>Sunday</b>	53%	75%	57%	-

### Running Times

On Route 441, actual running times on inbound trips are generally close to scheduled times, except during the AM peak period, when median travel time is up to 10 minutes less than scheduled (see Figure 16). Outbound, actual times on trips between noon and 2:00 PM are generally two to five minutes longer than scheduled (see Figure 17).

Figure 16 | Scheduled & Median Travel Time by Trip: Route 441 Inbound

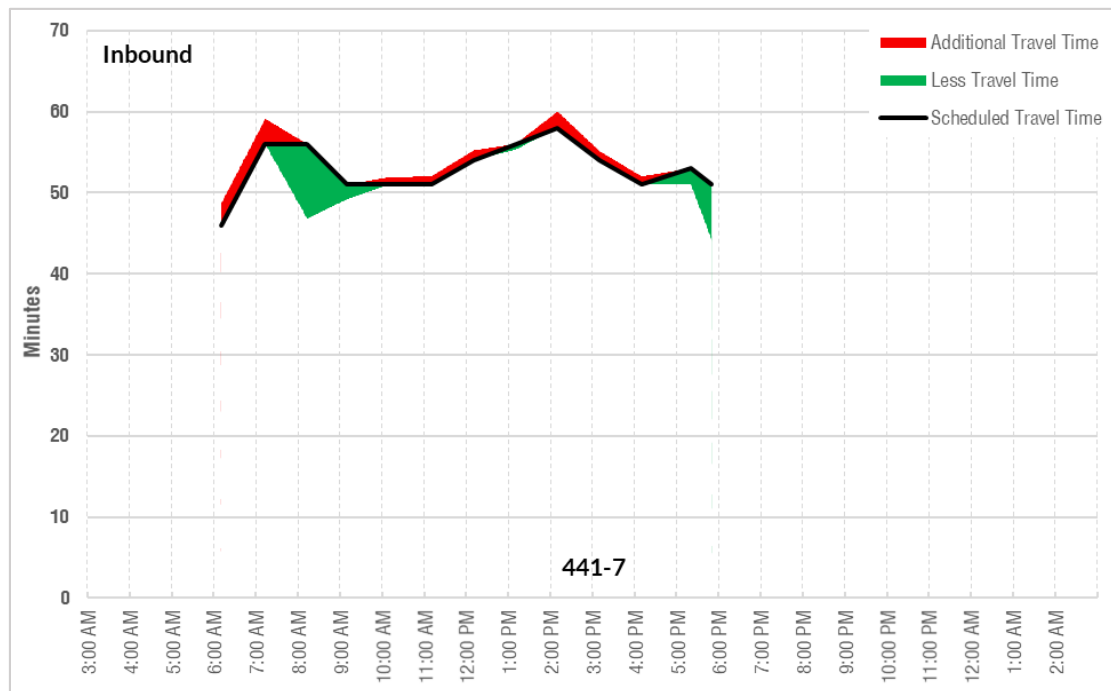
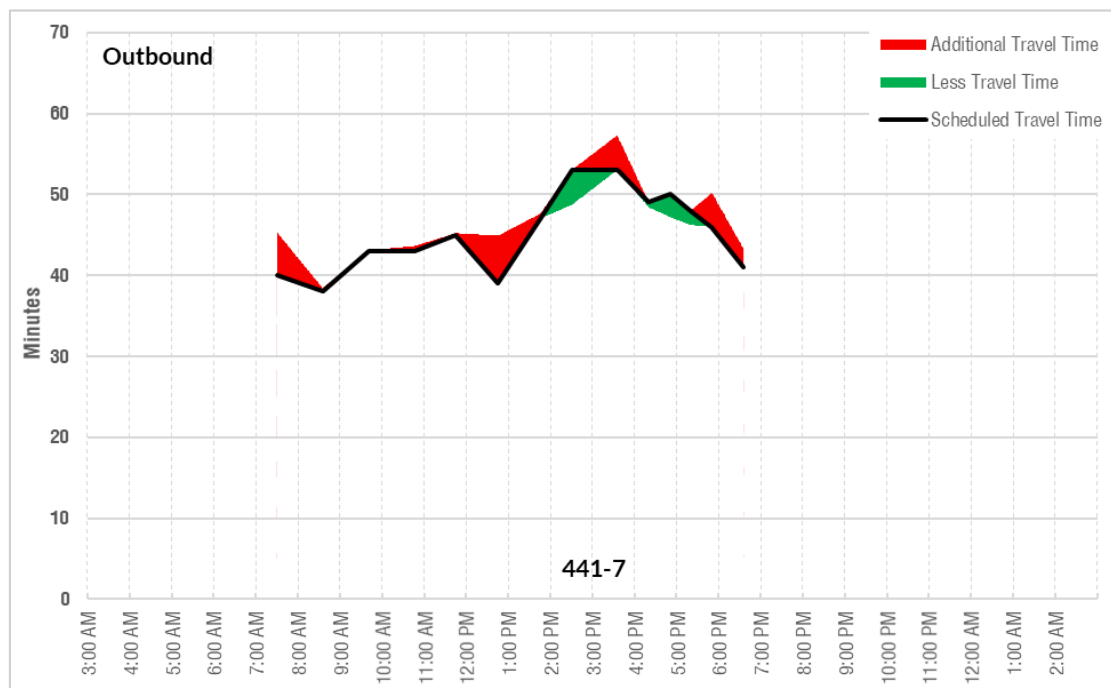


Figure 17 | Scheduled & Median Travel Time by Trip: Route 441 Outbound



Differences in scheduled and actual travel time are more pronounced on Route 442. Actual times on inbound trips up to five minutes longer than scheduled times (see Figure 18). On outbound trips, differences are much higher (see Figure 19):

- Before 8:00 AM, actual times are nearly 15 minutes longer.
- Between 1:00 PM and 4:00 PM, actual times are consistently three to six minutes longer.

Since the development of this document the MBTA has adjusted scheduled running times.

Figure 18 | Scheduled & Median Travel Time by Trip: Route 442 Inbound

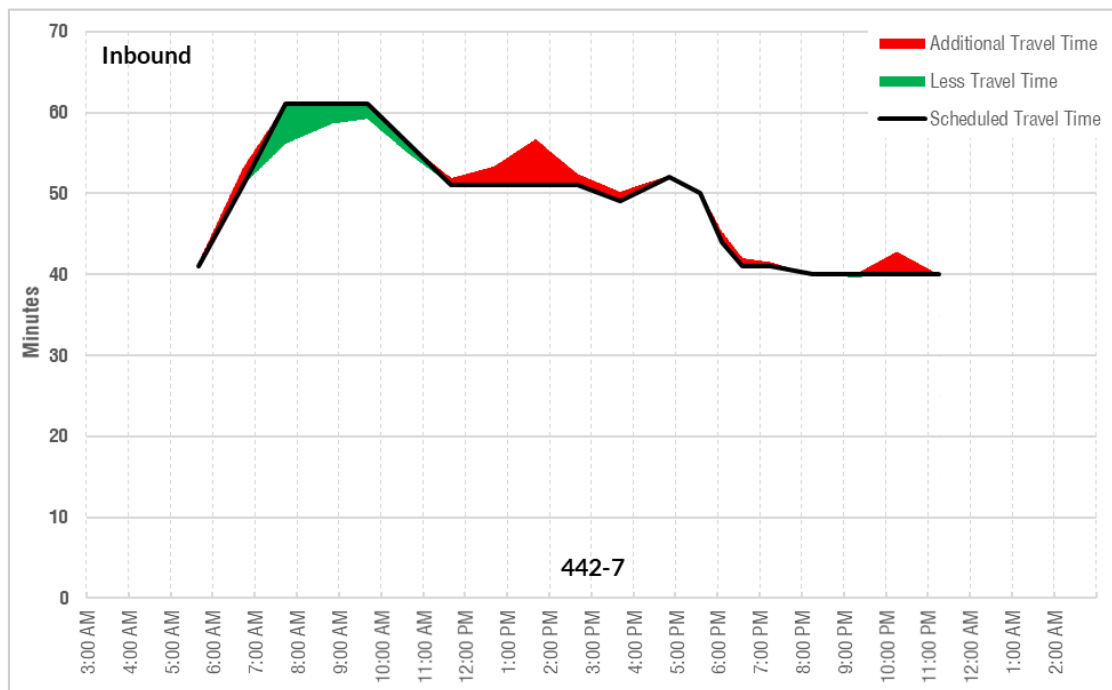
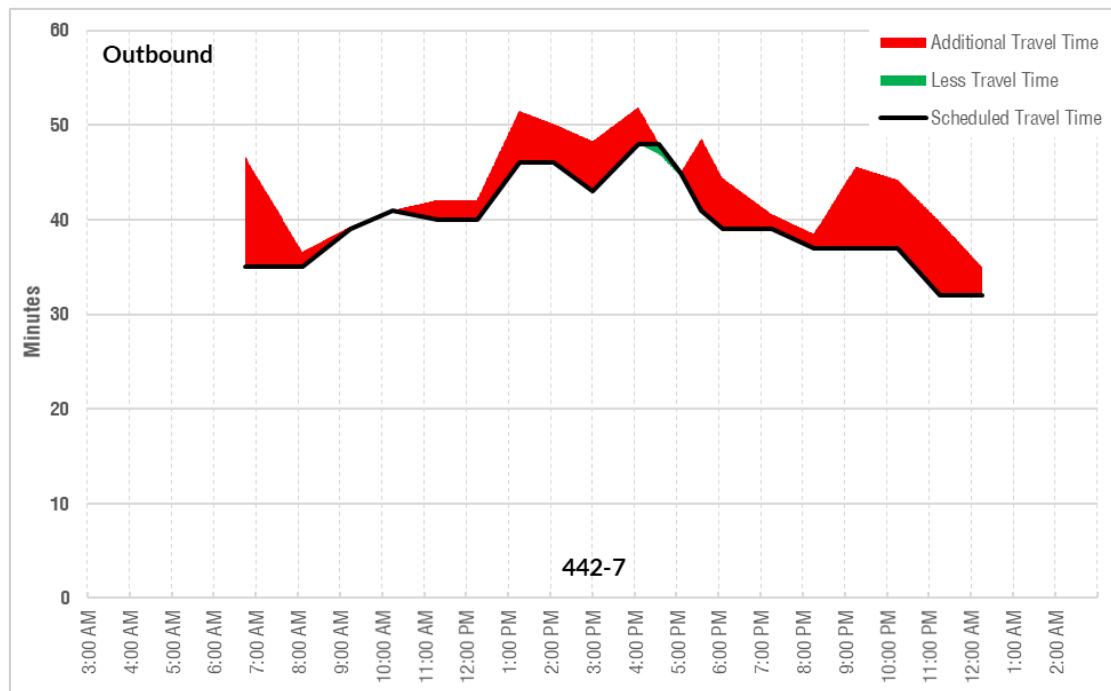


Figure 19 | Scheduled & Median Travel Time by Trip: Route 442 Outbound



- In the evening, actual times are up to 10 minutes longer.

### Stop Spacing

There are up to eight stops per mile along many sections of Routes 441 and 442. Between the route terminus in Marblehead and the southern boundary of Lynn at Western Channel, there are 7.7 stops per mile along the 8.2 mile alignment. Along Humphrey Street (3.6 miles, from Lafayette Street in Marblehead to Eastern Avenue in Swampscott), there is an average of 8.6 stops per mile (and with an average of two boardings per stop on inbound trips).

This stop spacing is greater than the MBTA guidelines of four to seven stops per mile in urban areas (Revere and Lynn) and four to five in suburban areas (Swampscott and Marblehead). Stop consolidation would make service faster and improve reliability.

### Summary

Routes 441 and 442 provide the primary connection between Marblehead, Swampscott, and Lynn and the Blue Line. Total ridership on the two routes is high, at 3,480 passengers on weekdays, 2,150 on Saturdays, and 1,680 on Sundays. However, ridership is very unbalanced along the route, with only 20% of boards and alightings in Marblehead and Swampscott, and 80% in Lynn and Revere. Buses run with light loads in Marblehead and Swampscott and very full in Lynn and Revere.

The two routes are essentially a single route that operates with two alternative alignments through Swampscott: one along Salem Street and Paradise Road and another via Humphrey Street. Ridership along both of these alignment is very low. With the different route names, other service patterns, and irregular schedules, service is very complex. On-time performance is also poor, in large part because actual running times exceed scheduled times.