

Route 502 and Route 504

Route 502: Express Bus—Watertown/Newton Corner – Copley Square

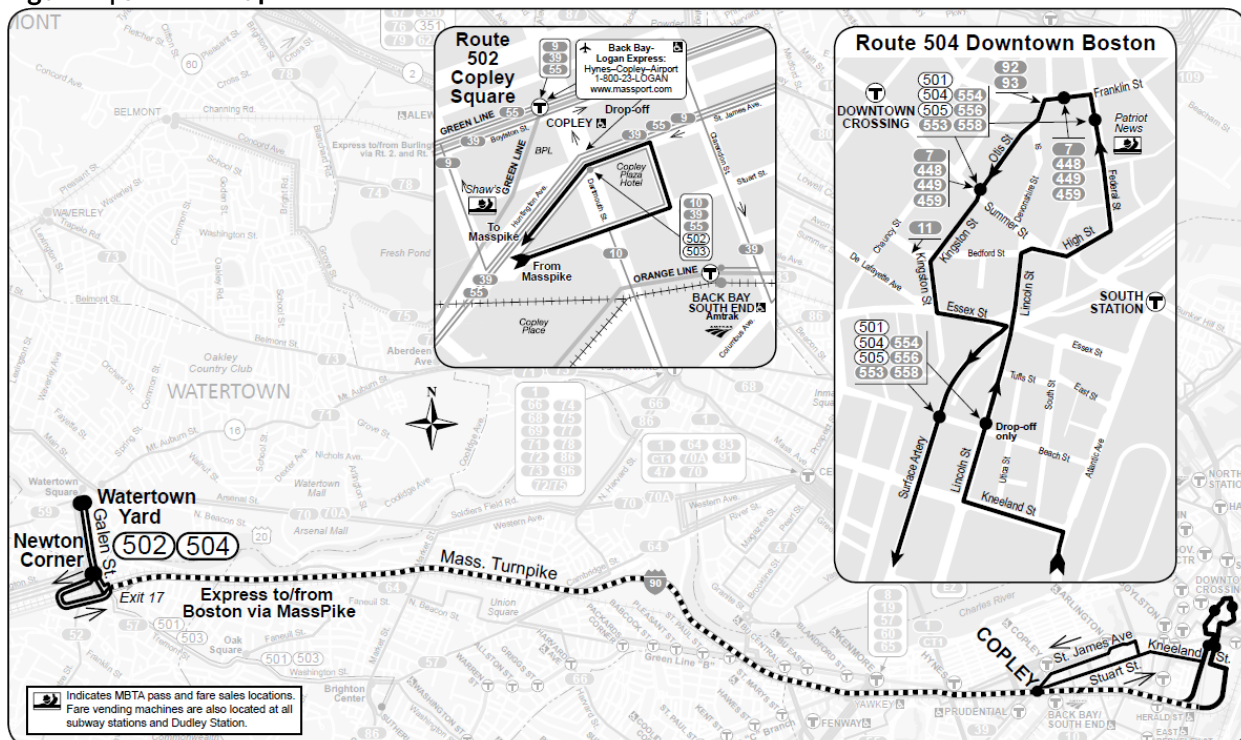
Route 504: Express Bus—Watertown/Newton Corner – Downtown Boston

Route Overview

Route 502 Watertown/Newton Corner – Copley Square is a Commuter route that operates between Watertown Yard and Copley Square via Newton Corner and the Massachusetts Turnpike during weekday peak periods.

Route 504 Watertown/Newton Corner – Downtown Boston is a Commuter route that operates weekdays and Saturdays between Watertown Yard and Downtown Boston. Route 504 operates directly to Downtown Boston during weekday peak periods but travels via Copley Square during weekday off-peak periods and Saturdays.

Figure 1 | Service Map



Network Importance

Route 502 is a route of low importance (see Figure 2). Its chief function may be to relieve other, two-seat routings connecting Watertown to downtown Boston. On a relative scale of 0 to 10, the route rates 2.9 in terms of ridership, 1.5 in terms of transit dependent ridership, and 4.3 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). Its overall score, which gives a 70% weighting to overall ridership and a 15% weight to both other measures, is 3.1.

Compared to Route 502, Route 504 is a slightly more important route (see Figure 3). It carries more passengers and has a higher value to the network due to its more expansive schedule. On a relative scale of 0 to 10, the route rates 3.4 in terms of ridership, 1.6 in terms of transit dependent ridership, and 6.1 in terms of 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 is 3.8.

Figure 2 | Route 502 Relative Importance within MBTA Bus Network (on a scale of 0 to 10)

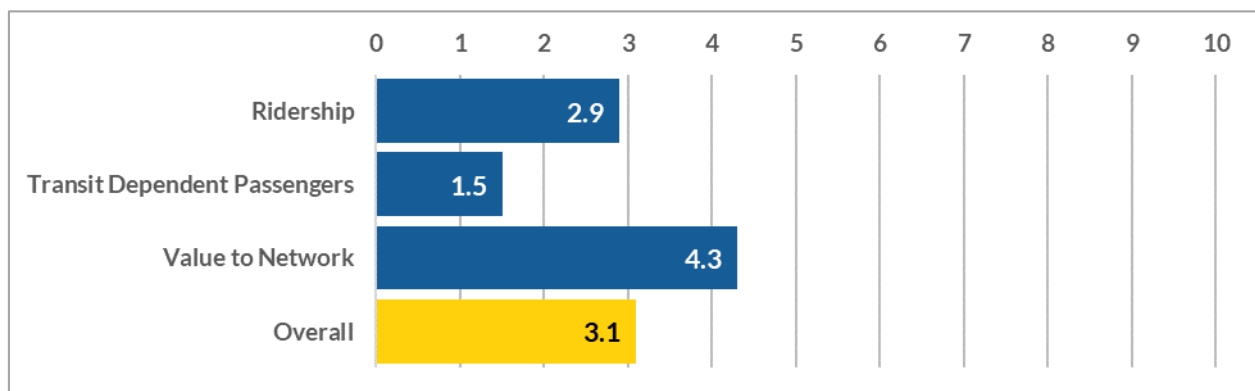
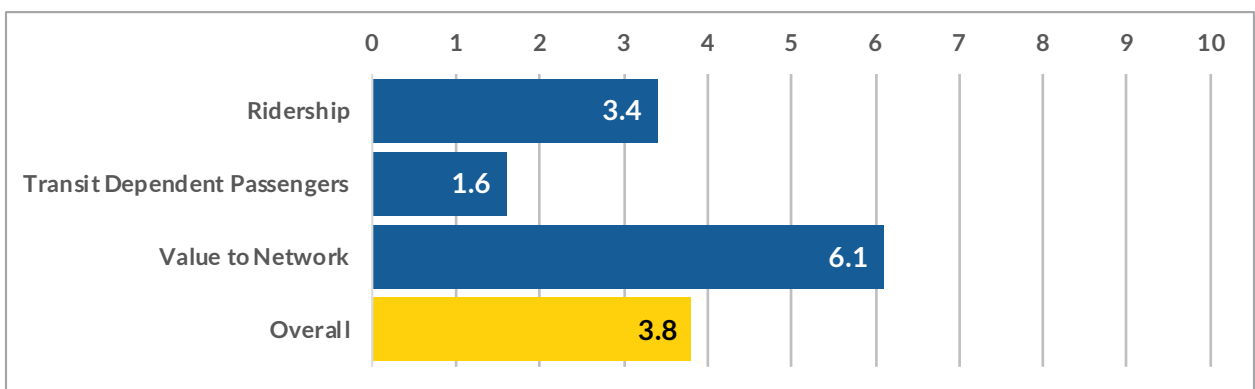


Figure 3 | Route 504 Relative Importance within MBTA Bus Network (on a scale of 0 to 10)



Service Patterns

Schedule

Route 502 and Route 504 provide frequent peak hour weekday service.

- From the beginning of service at 6:45 AM until 8:45 AM, Route 502 and Route 504 both operate on average every 8-13 minutes.
- Midday, when only Route 504 operates, the average headway is between 24-25 minutes.
- Route 502 service begins again at 4:14 PM (inbound reverse peak service), when it and Route 504 begin operating at 13-15 minute frequencies until the end of Route 502 service at 6:41 PM.
- Route 504 operates every 17 minutes between 6:30 PM and 7:50 PM, when weekday service ends.

Saturday service on Route 504 operates every 35 minutes on average from 7:30 AM to 7:40 PM. There is no Saturday service on Route 502. Neither route operates on Sundays. Route 502 and Route 504 exceed the MBTA Span of Service and Frequency Standards for Commuter routes.

Table 1 | Schedule Statistics for Route 502

SERVICEDAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:45 AM to 8:57 PM 4:14 PM to 6:41 PM			28/26
Sunrise	-	-	-	-
Early AM	6:45 AM to 6:59 AM	8 - 14	11	2/0
AM Peak	7:00 AM to 8:57 AM	6 - 12	8	15/11
Midday Base	-	-	-	-
Midday School	-	-	-	-
PM Peak	4:14 PM to 6:29 PM	12 - 25	15	10/12
Evening	6:30 PM to 6:41 PM	14	14	1/3
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.

Table 2 | Schedule Statistics for Route 504

SERVICE DAY	SPAN OF SERVICE	FREQUENCY (RANGE)	FREQUENCY (AVERAGE)	DAILY TRIPS (INBOUND/OUTBOUND)
Monday-Friday	6:20 AM to 7:50 PM			47/46
Sunrise	-	-	-	-
Early AM	6:20 AM to 6:59 AM	10-15	13	3/2
AM Peak	7:00 AM to 8:59 AM	1-12	9	14/10
Midday Base	9:00 AM to 1:29 PM	10-30	24	11/9
Midday School	1:30 PM to 3:59 PM	13-30	25	6/8
PM Peak	4:00 PM to 6:29 PM	6-22	13	12/13
Evening	6:30 PM to 7:50 PM	17	17	1/4
Late Evening	-	-	-	-
Night	-	-	-	-
Saturday	7:30 AM to 7:40 PM	35-40	35	20/20
Sunday	-	-	-	-

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

Service Patterns

Route 502 has a single service pattern, which originates at Watertown Yard, travels through Newton Corner via Galen Street and Washington Street, before heading to Copley via the Massachusetts Turnpike (Table 3).

Route 504 has two service patterns:

- Pattern 504.0 is the primary service pattern, and originates at Watertown Yard, travels through Newton Corner via Galen Street and Washington Street, before heading to Downtown Boston via the Massachusetts Turnpike.
- Pattern 504.2 serves Copley Square before continuing to Downtown Boston via Stuart Street and Kneeland Street. Pattern 504.2 makes up all trips between 9:20 AM and 3:46 PM and all trips on Saturday (Table 4):

Table 3 | Service Patterns for Route 502

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS per WKD	TRIPS per SAT	TRIPS per SUN
INBOUND				28	-	-
502.0	Watertown Yard	Copley Square	Via Newton Corner	28	-	-
OUTBOUND				26	-	-
502.0	Copley Square	Watertown Yard	Via Newton Corner	26	-	-

Table 4 | Service Patterns for Route 504

PATTERN	ORIGIN	DESTINATION	UNIQUE FEATURE	TRIPS per WKD	TRIPS per SAT	TRIPS per SUN
INBOUND				47	20	-
504.0	Watertown Yard	Downtown Boston	Direct to Downtown Boston	30	-	-
504.2	Watertown Yard	Downtown Boston	Via Copley Square	17	20	-
OUTBOUND				46	20	-
504.0	Downtown Boston	Watertown Yard	Direct from Downtown Boston	33	-	-
504.2	Downtown Boston	Watertown Yard	Via Copley Square	13	20	-

Ridership

Route 502 carries 956 passengers on a typical service day. It is the third-highest performing Commuter route in terms of ridership.

Route 504 carries 1,482 passengers on the average weekday, which is the second highest ridership of any Commuter route. On Saturdays, Route 504 carries 445 passengers.

Ridership by Stop

The highest boarding activity along Route 502 and 504’s alignments occurs at Watertown Yard, Newton Corner, and in Copley Square and downtown Boston.

- 730 passengers board at Route 502 and Route 504’s western terminus at Watertown Yard
- 160 passengers board at the two stops along Route 502 and Route 504’s Galen/Centre Street alignment
- In Newton Corner, 230 passengers board at the Washington Street at Bacon Street stop and 210 passengers board at 400 Centre Street.
- About 650 passengers use Route 502 to travel between Newton Corner and Copley Square, where they alight. About 135 passengers use Route 504 midday to travel between Newton Corner and Copley Square.
- About 670 passengers use Route 504 to travel between Newton Corner and Downtown Boston, where they alight.

Ridership by Trip

Route 502 operates at high frequencies during its peak and shoulder service times, resulting in comfortable passenger loads.

- Its first and last AM trips have relatively high ridership, indicating that the market for express service to Copley extends earlier and later into the shoulders than Route 502 currently operates.

Route 504 also carries comfortable passenger loads.

- The first trip of the day carries 22 passengers, indicating that there exists unmet demand for service beginning earlier in the day.
- The last trip of the day carries 15 passengers, indicating that there may also exist a modest unmet demand for service ending later in the day.
- Most weekday midday trips have low ridership; trips in the core of “base” midday (between 11 AM and 2 PM) average 10 riders each. Saturday ridership peaks inbound at 11:30 AM and outbound at 5:30 PM, and passenger loads remain comfortable throughout the day.

Figure 4 | Weekday Inbound Ridership by Stop Map for Route 502

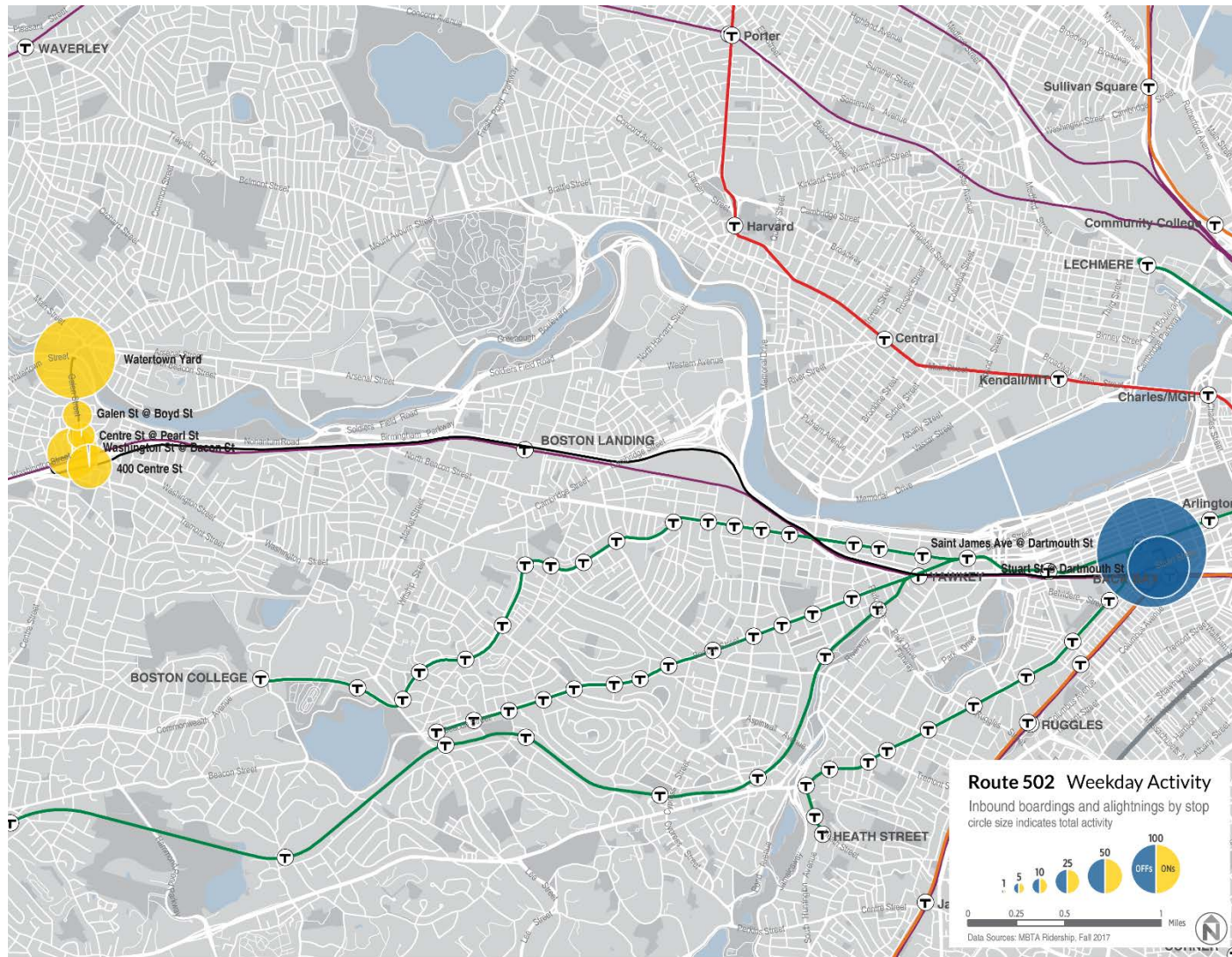


Figure 5 | Weekday Inbound Ridership by Stop Map for Route 504

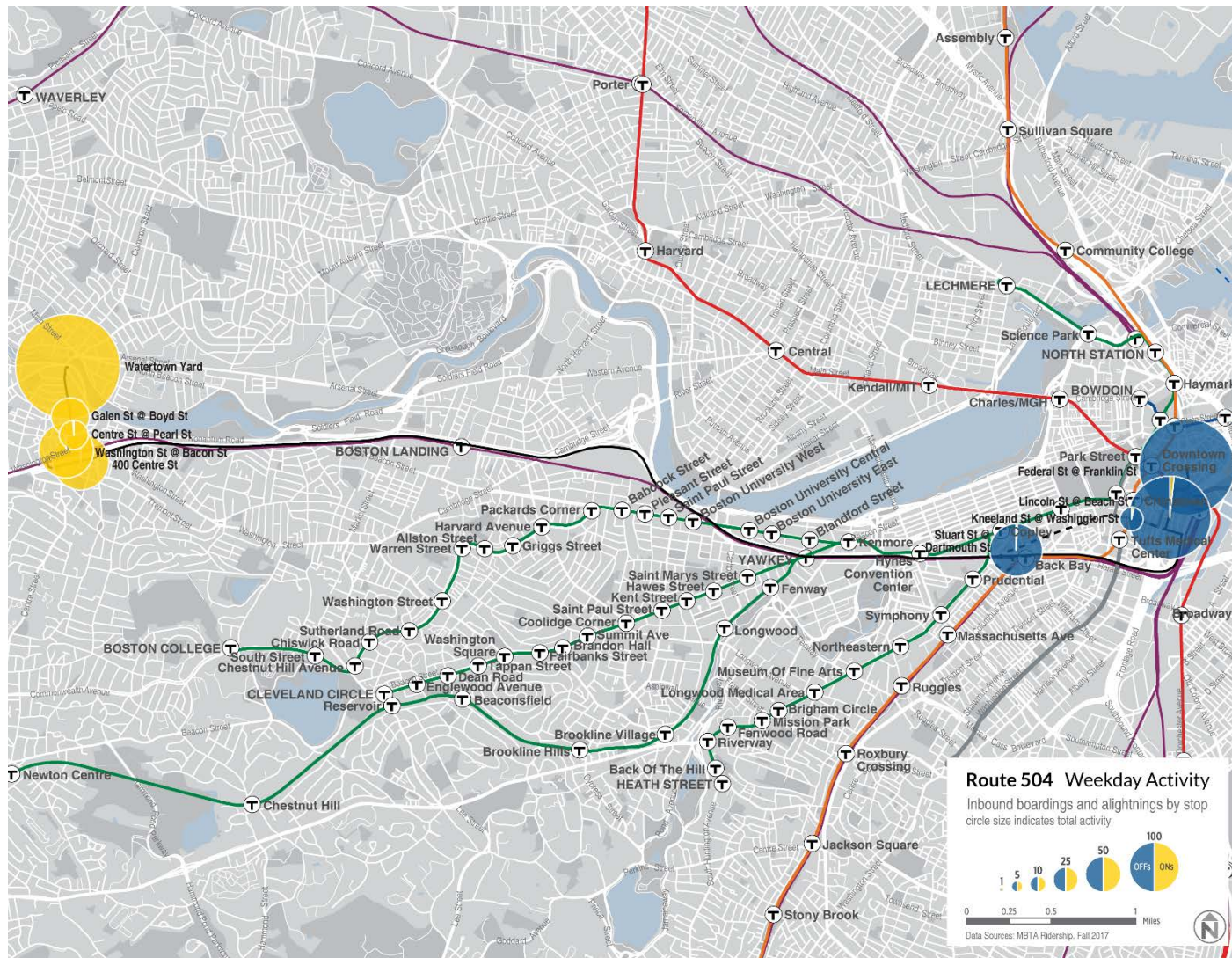


Figure 6 | Weekday Ridership by Trip for Route 502: Inbound

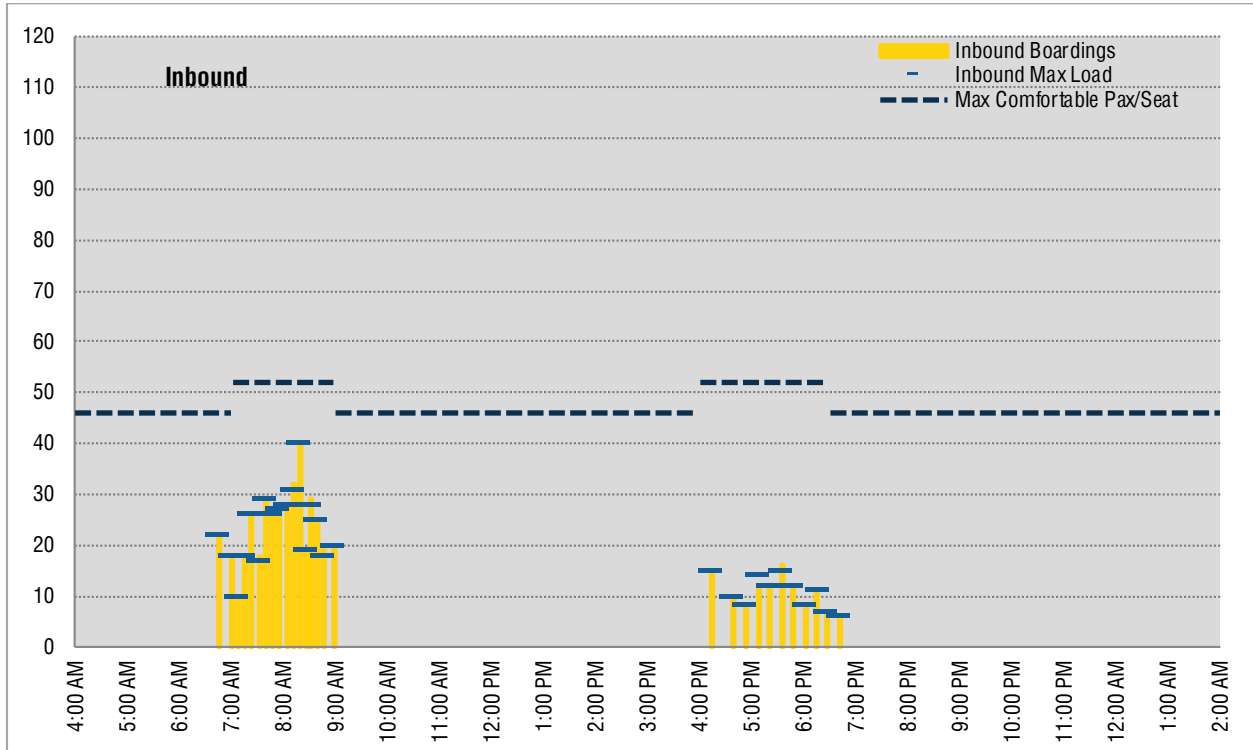


Figure 7 | Weekday Ridership by Trip for Route 502: Outbound

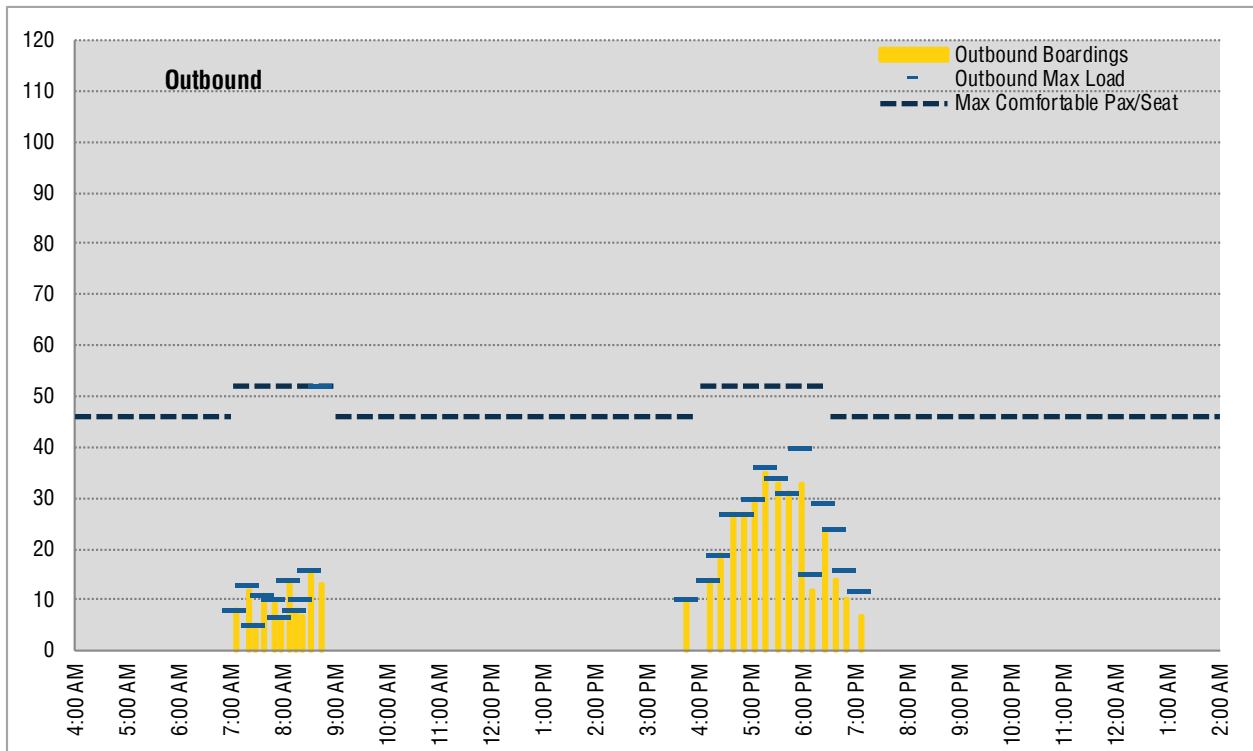


Figure 8 | Weekday Ridership by Trip for Route 504: Inbound

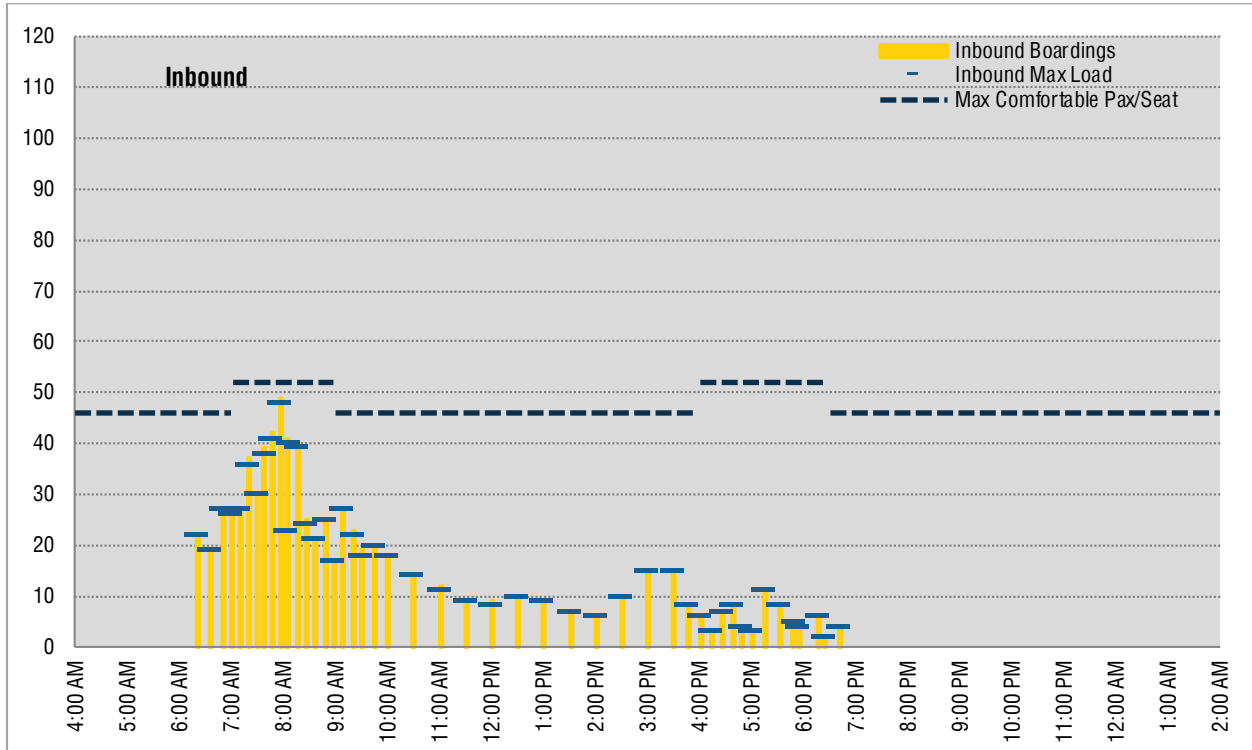


Figure 9 | Weekday Ridership by Trip for Route 504: Outbound

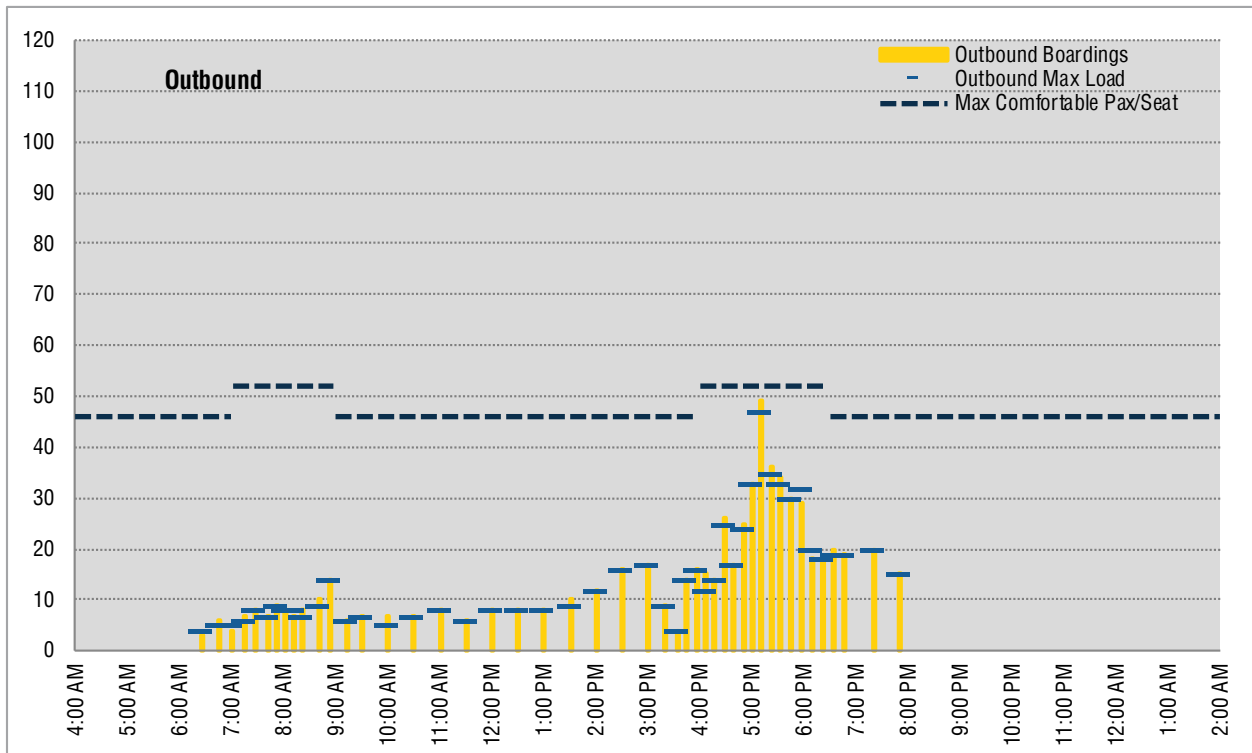


Figure 10 | Saturday Ridership by Trip for Route 504: Inbound

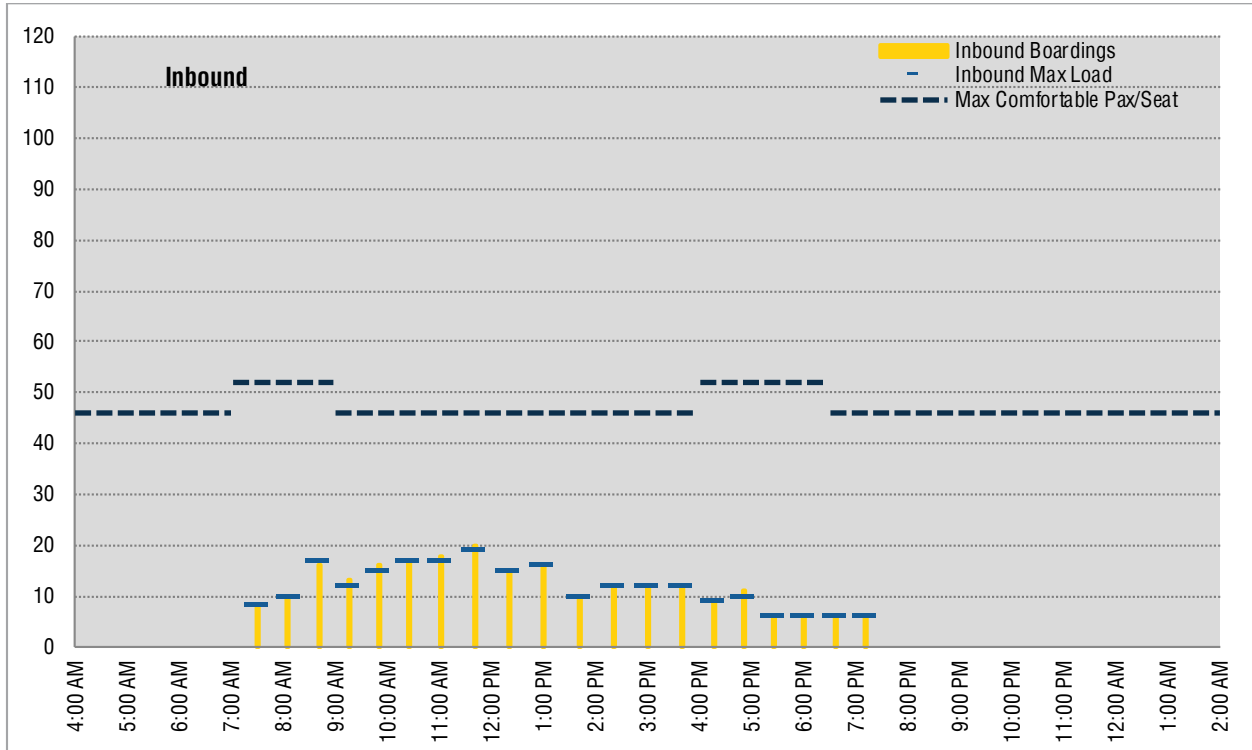
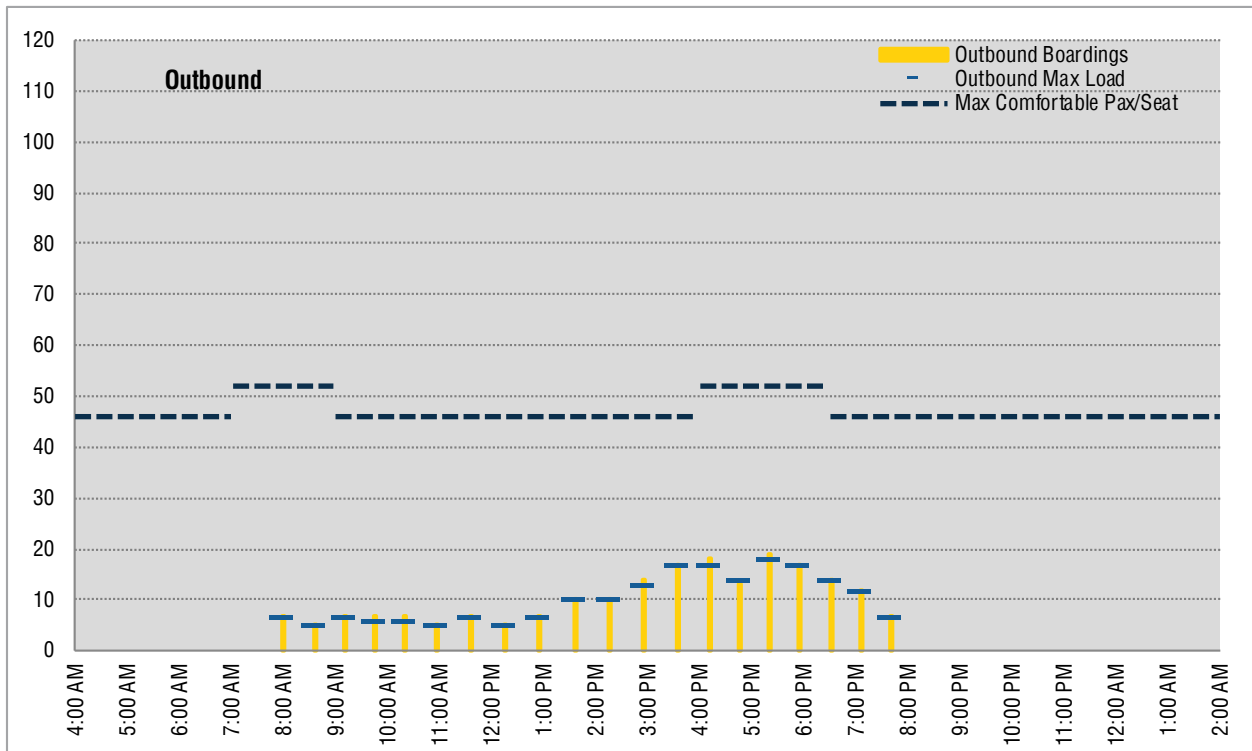


Figure 11 | Saturday Ridership by Trip for Route 504: Outbound



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 502, 97.1% of passenger minutes are in comfortable conditions, which is above the minimum standard and the target standard. On Route 504, 94.2% of passenger minutes are in comfortable conditions, which is above the minimum standard but below the target standard (see Table 5).

Table 5 | Passenger Time Spent Traveling in Comfortable Conditions

	WEEKDAYS	SATURDAYS	SUNDAYS
Minimum Standard	92%	92%	92%
Target	96%	96%	96%
Actual: Route 502	97.1%	-	-
Actual: Route 504	94.2%	100%	-

Reliability and Speed

Reliability

Route 502 is the second most reliable Commuter route and the eighth most reliable bus route operated by the MBTA, with an overall reliability of 81% (see Table 6). However, dropped trips are a significant issue, with 2.2% of trips dropped.

Reliability on Route 504 is notably worse than 502, likely due to the route’s alignment through congested streets between Copley Square and downtown Boston (see Table 7). Its overall reliability on weekdays and Saturdays is 66%. Dropped trips are also a significant issue on Route 502,

Table 6 | Reliability on Route 502

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	79%	86%	81%	2.2%
Saturday	-	-	-	-
Sunday	-	-	-	-

Table 7 | Reliability on Route 504

SERVICE DAY	ORIGIN/MID-ROUTE ON-TIME PERFORMANCE	DESTINATION ON-TIME PERFORMANCE	OVERALL RELIABILITY	DROPPED TRIPS
Monday-Friday	66%	67%	66%	1.4%
Saturday	54%	67%	66%	-
Sunday	-	-	-	-

Running Time

Massachusetts Turnpike traffic results in significantly variable trip times. Most of Route 502’s AM trips are 2-7 minutes shorter than scheduled, while Route 504 trips arrive on schedule during the morning. In the afternoon, outbound trips take 2 minutes longer than scheduled and inbound trips take up to 10 minutes longer than scheduled. Route 504 outbound PM trips take 5-7 minutes longer than scheduled.

Stop Spacing

The stop spacing in Newton Corner is close, but necessary due to the poor pedestrian conditions in the area. The stop at Centre Street and Pearl Street is about 500 feet from the stop at Galen Street and Boyd Street and about 400 feet from the stop at Washington Street at Bacon Street, and is a potential candidate for elimination, especially inbound.

Figure 12 | Scheduled & Median Travel Time by Trip: Inbound

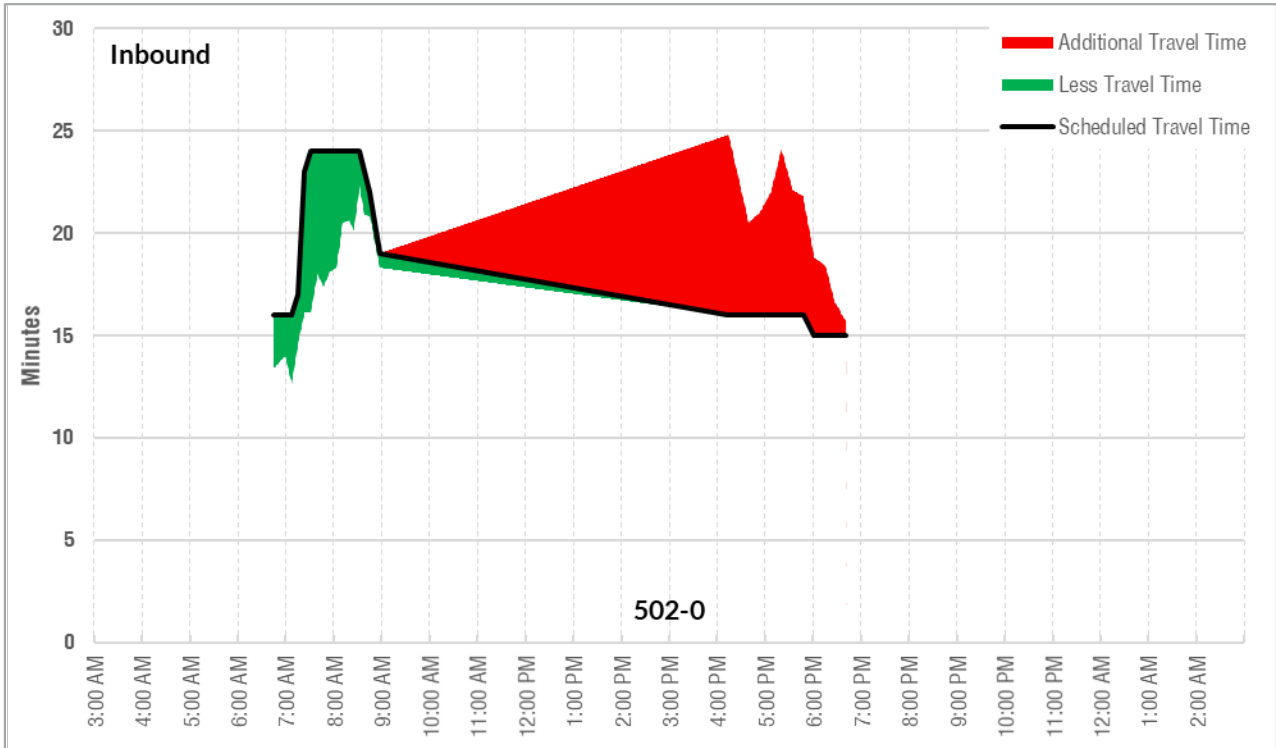


Figure 13 | Scheduled & Median Travel Time by Trip: Outbound

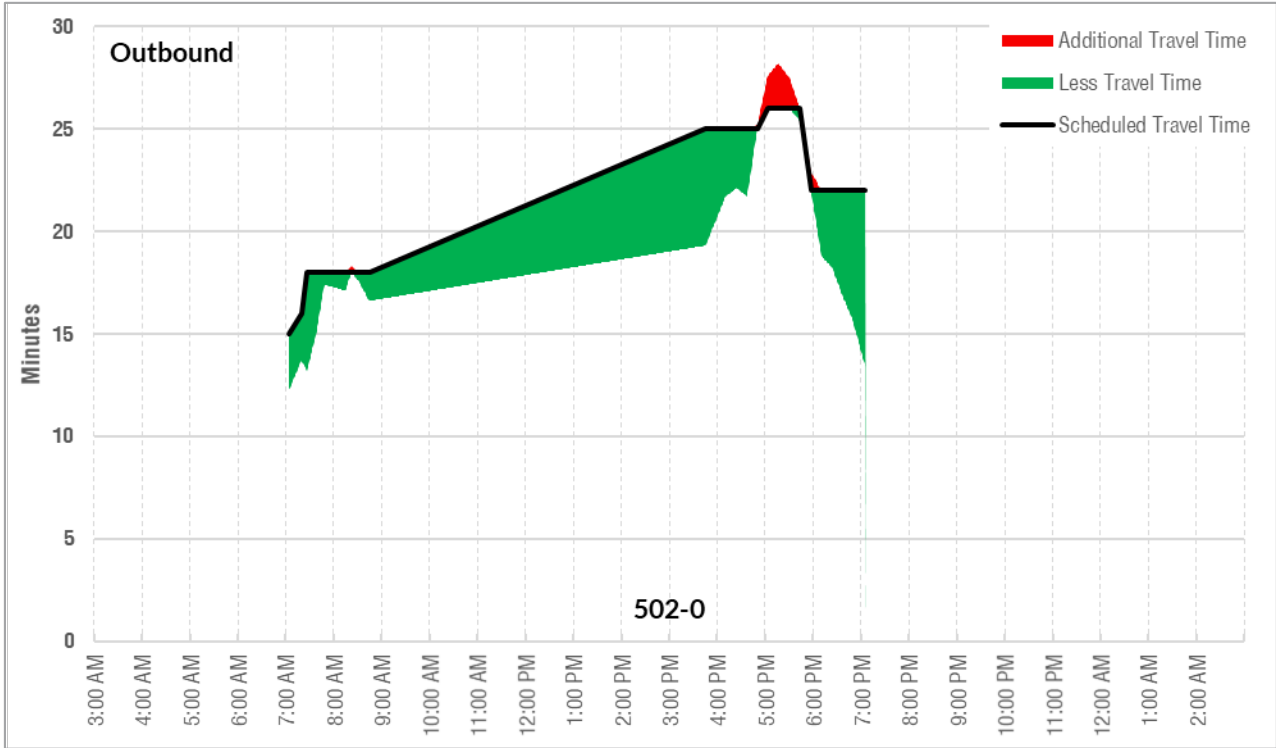


Figure 14 | Scheduled & Median Travel Time by Trip: Inbound

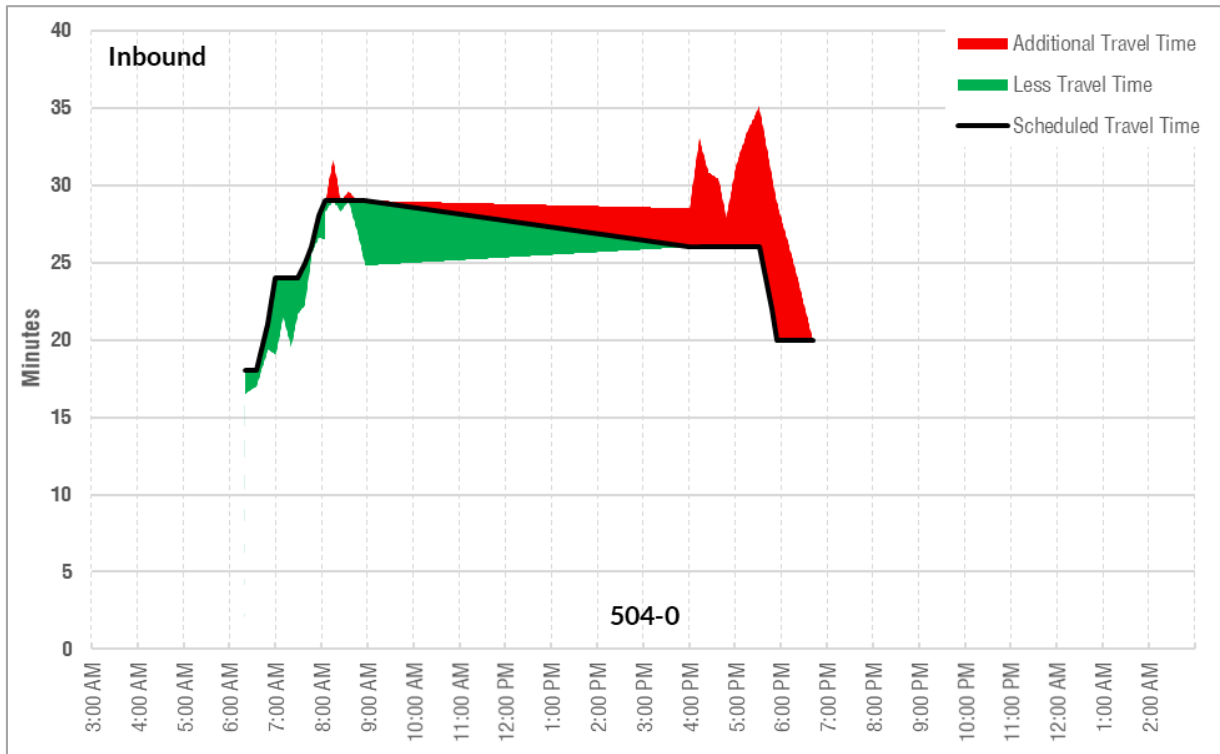
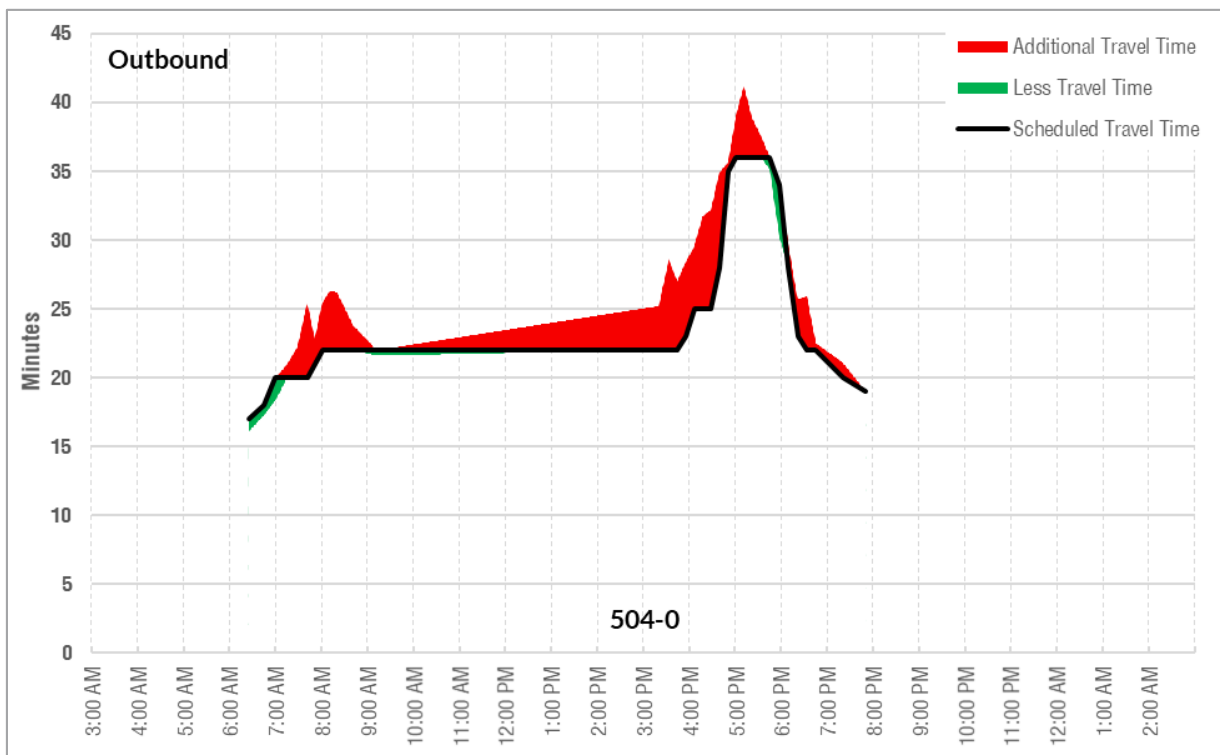


Figure 15 | Scheduled & Median Travel Time by Trip: Outbound



Summary

Route 502 and Route 504 provide high-frequency peak hour connections between Watertown Yard, Newton Corner, and either Copley Square or Downtown Boston. By providing near point-to-point service, it relieves other, two-seat routings between Watertown/ Newton Corner and Boston.