



Fixed-Route Service Analysis

Existing Conditions Report

March 2026



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Cover image: Nelson\Nygaard Consulting Associates, Inc.

EXECUTIVE SUMMARY

This Existing Conditions Report is the first step in the Lowell Regional Transit Authority's (LRTA's) 2025/2026 Fixed-Route Service Analysis, which is a project to analyze and improve LRTA's fixed-route service. The purpose of this report is to act as a resource and to guide subsequent recommendations for improvements to the system and individual routes. This requires a series of analyses to understand how the system currently functions within and beyond LRTA's 15 member communities.¹

This report includes a detailed assessment of LRTA current fixed-route service, in terms of operating characteristics (e.g., frequency and span of service) as well as descriptions of where routes operate, the markets they serve, and how they interact with other transit services. Service performance is then documented through an analysis of ridership, productivity, and on-time performance. This is followed by an analysis of current regional travel flows, which examines where LRTA service is provided today relative to where people are traveling to and from, along with emerging travel markets. Lastly, individual route profiles are included in an appendix to provide a thorough description of each route, its performance, and potential opportunities for improvement.

KEY FINDINGS

- The **top-performing routes** in LRTA's system—in terms of productivity and ridership—are routes 5 and 7.
- **School-tripper ridership** makes up 14% of all LRTA boardings. Because students also ride non-tripper trips, the percentage of high-school boardings on the system is likely considerably higher than 14%. This is an important market for LRTA.
- **Flag-stop boardings** are about 20% of LRTA's fixed-route boardings. To improve safety, speed, and reliability, LRTA should consider reducing the number of routes and/or places along routes where flag stops are allowed.
- **Route 11** operates limited service and has very low ridership and productivity. Eliminating Route 11 as it currently exists may be warranted.
- **On-time performance** is a major potential area of improvement for LRTA, as there are eight routes with 10% or more timepoint departures occurring more than three minutes early. LRTA should strongly consider implementing timepoint-based operations to improve the perceived and actual dependability of the service for riders.

¹ LRTA's member communities are Acton, Billerica, Chelmsford, Carlisle, Dunstable, Dracut, Groton, Lowell, Maynard, Pepperell, Tewksbury, Townsend, Tyngsborough, Westford, and Wilmington.

- **Average stop spacing** on at least seven LRTA routes differs considerably from standard practice. LRTA should consider assessing stop location on these routes, in addition to developing formal bus-stop guidelines.
- LRTA **shares stops** with other transit agencies. There are significant opportunities to improve the design of shared stops to make the system more comfortable and easier to use for riders.
- **Three downtown** circulator-type routes operate in Lowell, with mixed success. Consolidating and redesigning these alignments to better serve key destinations may save resources and improve ridership.
- The **Nashua-Lowell** travel market is untapped by LRTA on a year-round basis (LRTA operates a seasonal route making this connection) but could be a high-ridership service, especially if no transfers are required.

METHODS

In creating this Existing Conditions Report, the project team used an array of data sources and observations to develop a clear picture and full understanding of LRTA's fixed-route system. These sources included downloading datasets via online vendor portals, speaking with LRTA and operating company staff, traveling each route alignment, and riding buses.

Data Sources

Figure 1 Existing Conditions Data Sources, Sets, and Timespans

Source	Data Set(s)	Timespan
LRTA: Urban Transportation Associates' Automatic Passenger Counters	Ridership by Route by Trip by Stop by Day	March 2025
LRTA: Agency Website	Route Schedules	March 2025; Summer/Fall 2025
LRTA: NAVINEO Computer-Aided Dispatch/Automatic Vehicle Location	On-Time Performance; Speed by Route; Stop Spacing	June & July 2025
LRTA: General Transit Feed Specification	Route and Stop Locations, Speed by Route	June 2025
Replica	Overall (All Modes) Travel Volumes	Spring 2025
Direct Observations	Turning Movements; Stop Activity	July 2025
LRTA: Bus-Operator Observations	Turning Movements; Stop Activity	October 2025
LRTA	Key Destinations and Points of Interest; Driver Assignments; Route Interlining	August 2025
Northern Middlesex Council of Governments (NMCOG)	Bus Shelter Locations	2024

Assumptions and Limitations

March 2025 was used as the baseline month for ridership data, as March does not have federal or state holidays, school is in session for most students, and weather conditions are moderate. These attributes mean ridership is generally strong and helpful in illustrating broader patterns.

Some road detours were in place during March 2025, which may have had moderate effects on ridership, including construction at Dracut Village Square and Lowell High School.

Route 20 changed significantly between March 2025 and the time this report was drafted. In March, the route was known as Route 20 Warren St/Kennedy St and linked three destinations in downtown Lowell: the Kennedy Center, UMass Lowell (UML) Inn & Conference Center, and Market Basket on Broadway Street. In August 2025, the route was redesigned to serve UML students and the public as a weekday-morning campus shuttle called Route 20 Orange Line/UML North. This route now serves the Kennedy Center, Tsongas Center, UML East Campus, UML North Campus, and University Crossing. Ridership data from March 2025 are from the previous Warren St/Kennedy St alignment, while frequency, span, stop distance, and other narrative analyses reference the newer Orange Line/UML North alignment. Both versions of Route 20 served destinations in downtown Lowell.

1 EXISTING SERVICE

SERVICE AREA

LRTA provides transit service in northeastern Massachusetts, serving 15 member municipalities of around 370,000 residents², in communities ranging from urban to rural. LRTA has operated zero-fare service since December 1, 2024, supported largely by a state-funded pilot program. The pilot program has been extended through June 30, 2026.

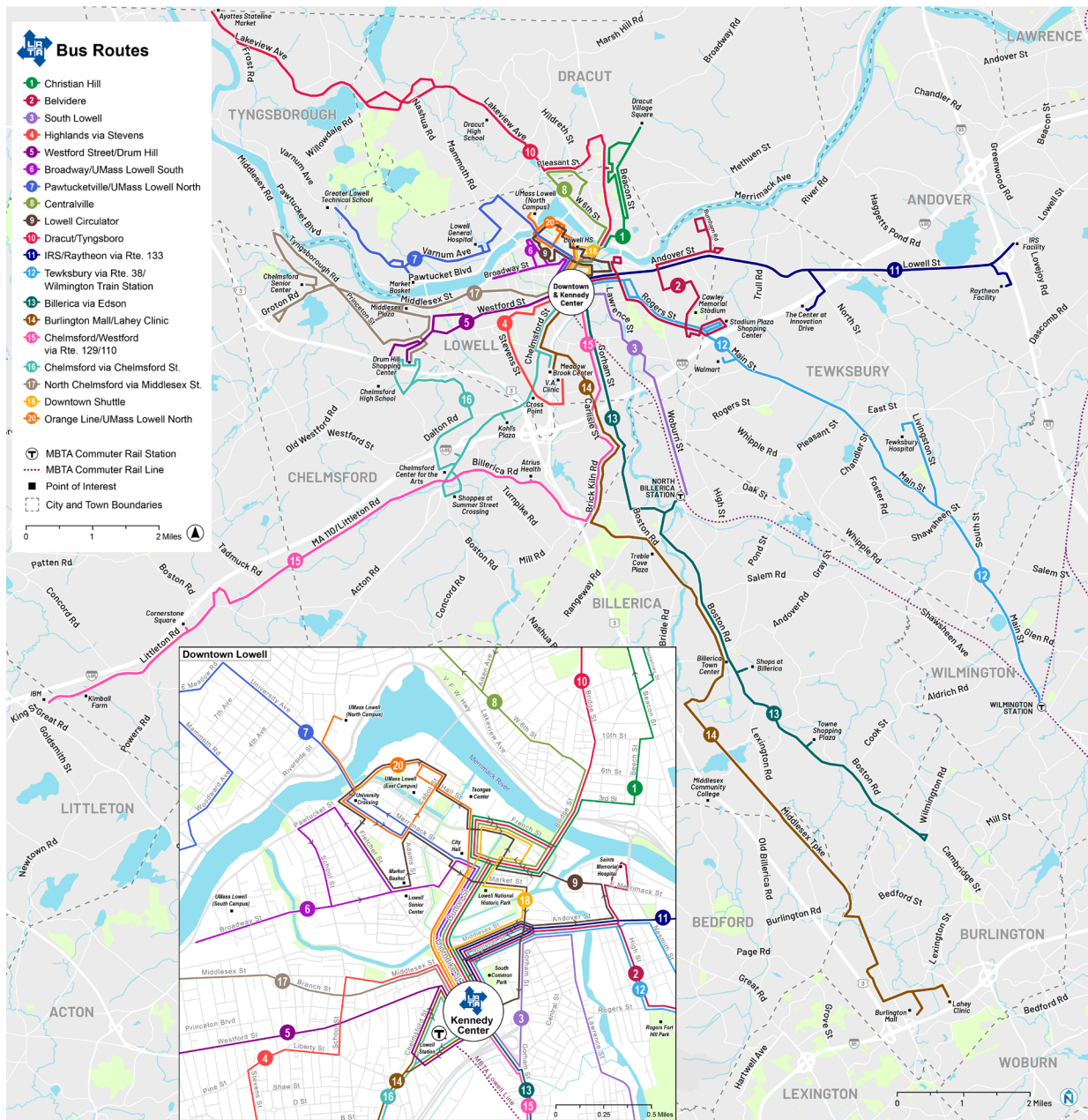
The service area, seen in Figure 2, is centered in the City of Lowell, where the bulk of LRTA's transit service is provided, but extends to serve Littleton in the west, Tyngsborough³ in the north, Andover in the east, and Burlington in the south. LRTA also provides some fixed-route service outside their 15 member communities in Andover, Burlington, and Littleton.

² National Transit Database. 2024. 2024 Annual Agency Profile.

<https://www.transit.dot.gov/sites/fta.dot.gov/files/transit_agency_profile_doc/2024/10005.pdf>

³ There is seasonal LRTA service on Route 19 connecting to Nashua, NH.

Figure 2 LRTA Regular Fixed-Route System Map



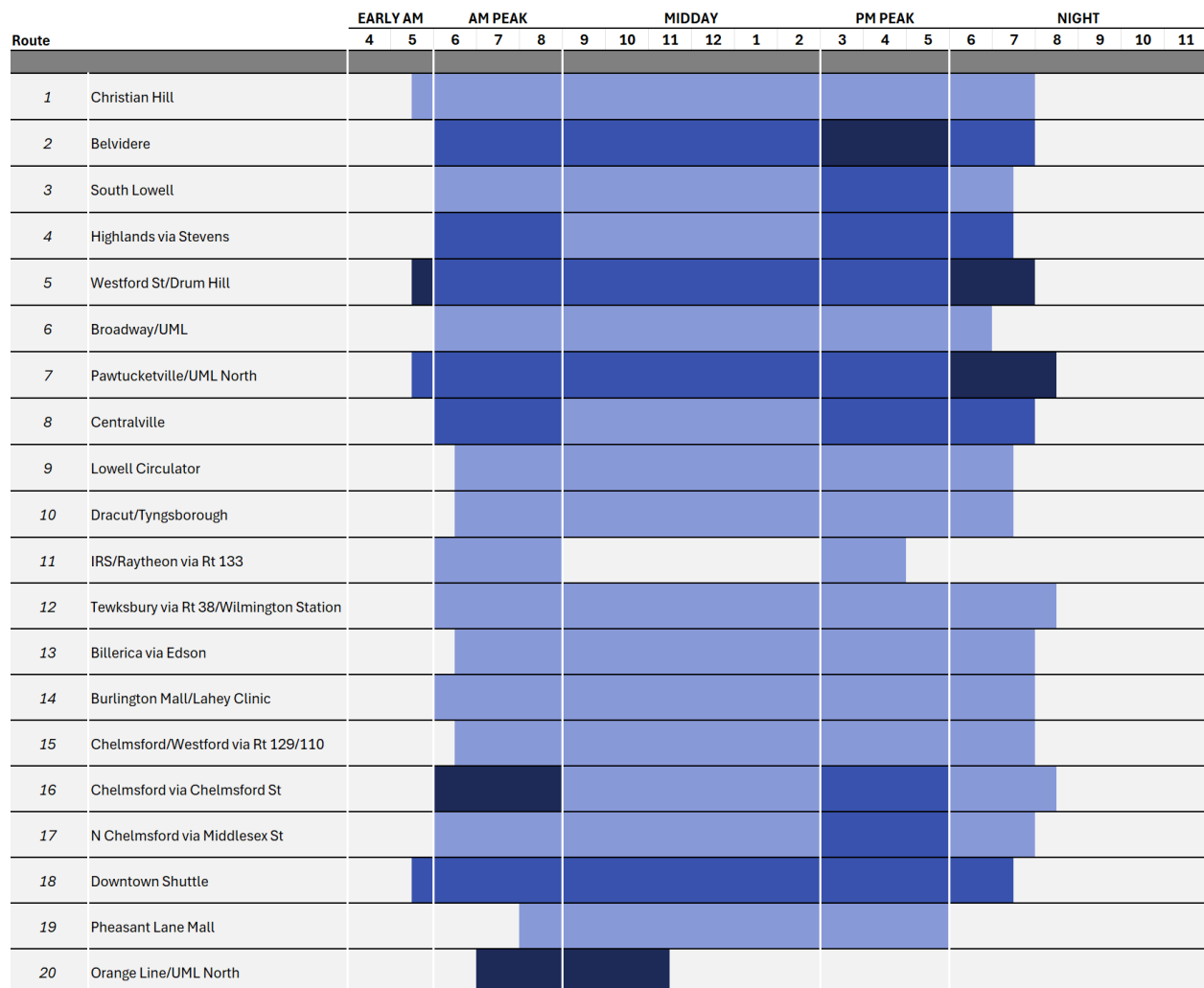
Note: This map excludes the seasonal Route 19.

HEADWAYS AND SPAN OF SERVICE

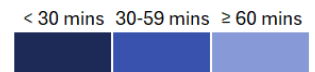
LRTA currently operates 19 regularly scheduled fixed routes and one seasonal fixed route. All regular routes operate on weekdays with all but two also operating on Saturdays. LRTA does not currently offer Sunday service. Headways and span of service by route are detailed in Figure 3 and Figure 4. Most of LRTA’s routes operate hourly, with four Lowell-based routes operating every 30 minutes for most of the day.

Most LRTA weekday routes operate from around 6:00 a.m. to 7:00 p.m., with the earliest routes beginning operation about 5:30 a.m., and the latest routes remaining in operation until around 8:00 p.m.

Figure 3 Fixed-Route Span and Frequency Chart, Weekdays

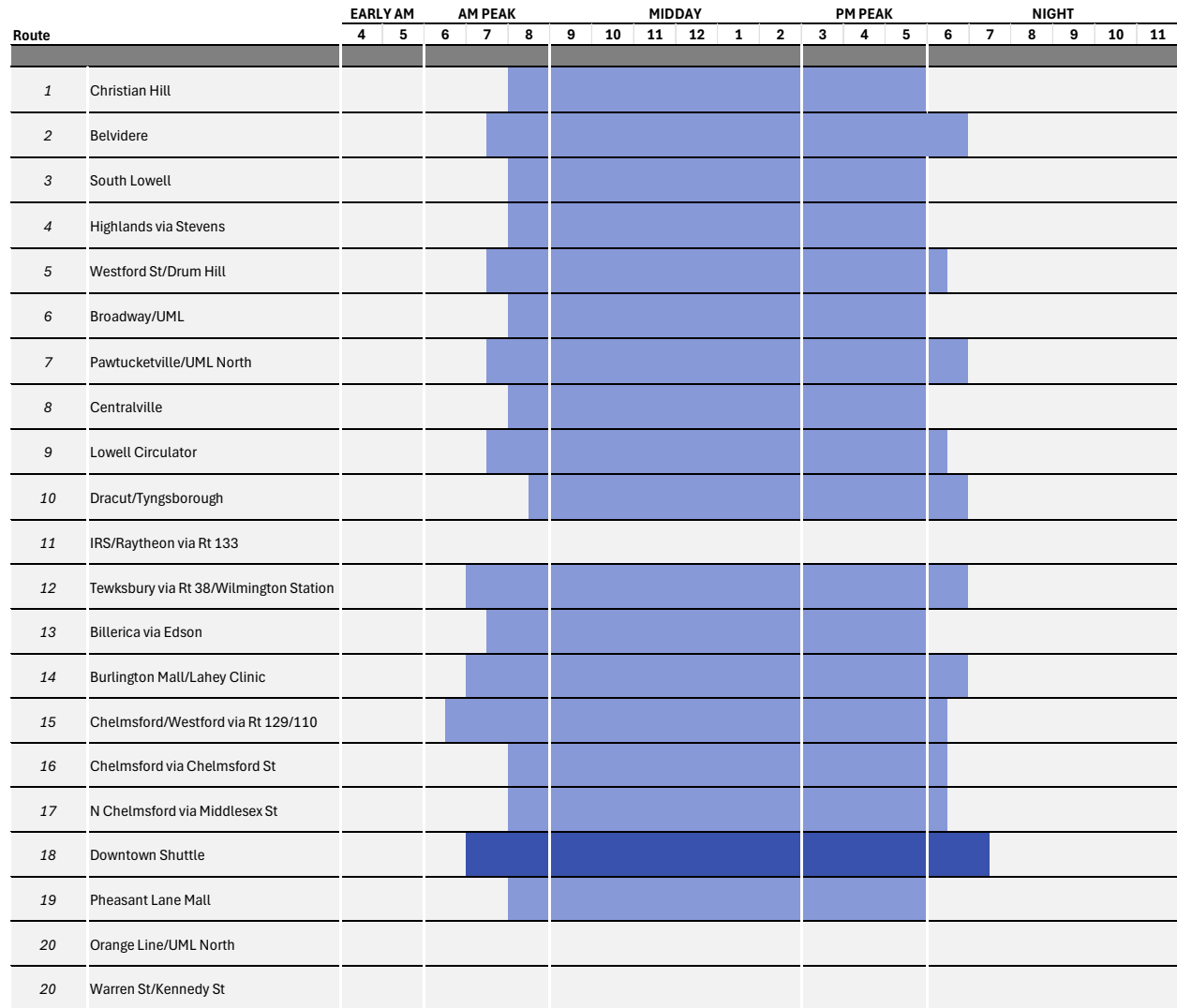


Note: Route 19 Pheasant Lane Mall is a seasonal route.

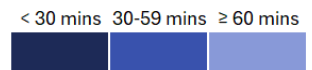


On Saturdays, only one route operates with a headway better than every 60 minutes (Route 18 operates every 30 minutes). The span of service is also reduced from weekdays, with service operating from about 8:00 a.m. to 6:30 p.m.

Figure 4 Fixed-Route Span and Frequency Chart, Saturdays



Note: Route 19 Pheasant Lane Mall is a seasonal route.



REGIONAL TRANSIT CONNECTIONS

This section describes existing connections between LRTA and other transit providers, as well as potential future connections. Connecting with other transit providers can significantly increase rider mobility. Both new and existing connections should be coordinated between agencies to reduce the chance of missed transfers or excessive wait times. Figure 5 and Figure 6 highlight existing points of connection with other transit services in the Greater Lowell Area.

Figure 5 Regional Transit Map

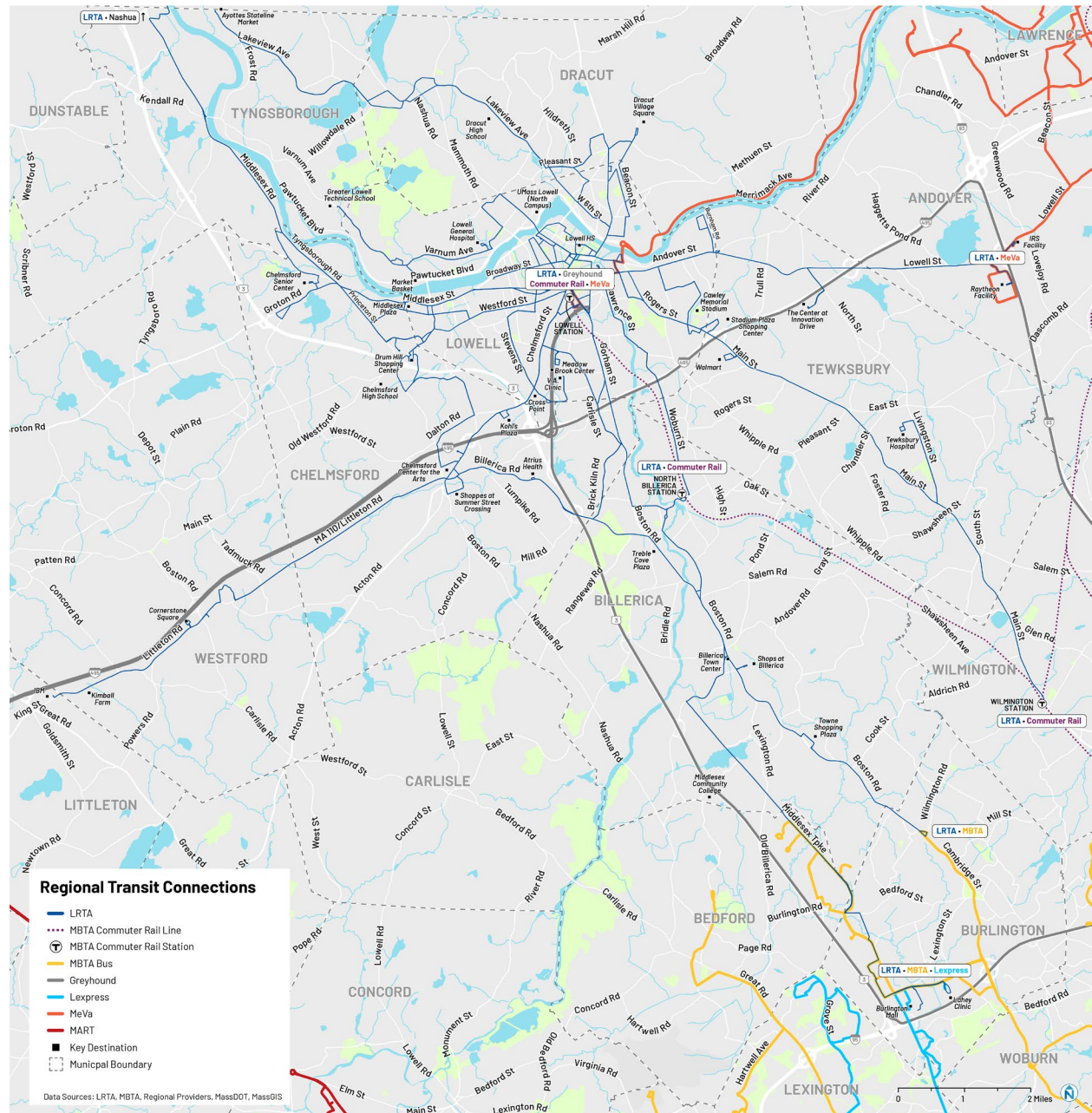


Figure 6 Regional Transit Connections

Regional Transit Service	Connections to LRTA Fixed-Route Bus
Greyhound	<p>All LRTA routes connect with Greyhound buses at the Kennedy Center.</p> <ul style="list-style-type: none"> ▪ Greyhound operates one daily evening trip to Boston from Thursday through Monday and one daily afternoon trip to Springfield from Friday through Tuesday.
Lexpress	<p>LRTA Route 14 connects to Lexpresss Route B near the Burlington Mall and at the Lahey Clinic.</p> <ul style="list-style-type: none"> ▪ Lexpress Route B operates every 60 minutes during weekdays.
MBTA Bus	<p>LRTA routes 13 and 14 connect to the MBTA bus network in Burlington. LRTA Route 13 connects to MBTA routes 350 and 354 and LRTA Route 14 connects to MBTA Route 351.</p> <ul style="list-style-type: none"> ▪ MBTA Route 350 operates every 20-60 minutes, 7 days per week. ▪ MBTA Route 351 operates every 60 minutes during weekday mornings and evenings. ▪ MBTA Route 354 operates every 20-40 minutes during weekday mornings and evenings.
MBTA Commuter Rail	<p>All LRTA routes connect with the MBTA Commuter Rail Lowell Line at the Kennedy Center/Lowell Station. Additionally, LRTA routes 3 and 13 connect to the Lowell Line at North Billerica Station and Route 12 connects to the Lowell Line at Wilmington Station.</p> <ul style="list-style-type: none"> ▪ The MBTA Lowell Line operates every 30-60 minutes during weekdays and every 120 minutes during weekends.
MeVa	<p>All LRTA routes connect with MeVa Route 24 at the Kennedy Center. LRTA Route 11 connects to MeVa Route 26 at the IRS and Raytheon facilities in Andover.</p> <ul style="list-style-type: none"> ▪ MeVa Route 24 operates every 20-60 minutes during weekdays and every hour during Saturdays. ▪ MeVa Route 26 operates one morning outbound trip and one afternoon inbound trip during weekdays.
Nashua Transit System	<p>LRTA Route 19 connects with Nashua Transit System (NTS) Routes 6, 6A, and the South Route at Pheasant Lane Mall. However, Route 19 only operates for one Friday and five Saturdays between Thanksgiving and Christmas.</p> <ul style="list-style-type: none"> ▪ NTS routes 6 and 6A operate every hour during weekdays and Saturdays. ▪ NTS South Route operates every hour during weekday evenings and one trip on Saturday evening.

While these connections are available to riders today, low frequencies of connecting routes mean anyone transferring is likely to wait a long time. LRTA should work with these transit agencies to coordinate service so that bus and train schedules align as best as possible. In cases where different agencies both have layovers at the end of routes, timed transfers should be considered.

In addition to these existing connections, the MBTA Littleton Commuter Rail station is around three miles west of the current Route 15 terminus. Connecting Route 15 to this station would connect LRTA riders to the MBTA Fitchburg Line, as well as MART's Boston Shuttle.

BUS STOPS

Riders have a significant amount of flexibility when boarding and alighting LRTA fixed-route service. They can board or alight at designated fixed stops, which feature varying levels of stop amenities (i.e., signage, benches, shelters) and are mostly located within Lowell city limits. Riders can also board using ‘flag stops’, where the rider requests to board or alight anywhere on the route if the operator is able to safely stop. The primary intent of permitting flag stops is to benefit riders who are traveling to or from lower-density areas where access-to-transit infrastructure may be limited and flagging the bus provides greater convenience than restricting riders to designated stops. A more in-depth discussion of flag-stop considerations is found later in this report.

Bus Shelters

The fixed stops within the LRTA system have varying levels of amenities. The 2024 NMCOG LRTA Bus Stop Inventory⁴ detailed the presence of seating and shelter at bus stops, along with lighting and maintenance issues.

In 2024, bus stops with shelter made up 6% of all LRTA stops (51 of 824 stops). The inventory indicated a shelter was present when there was either a dedicated transit structure or adjacent overhead coverage available to waiting riders. Shelters are spread across the system, with slightly higher concentrations in Downtown Lowell and along Route 7. Routes 12 and 13 also have notable distributions of sheltered stops along their alignments. Shelters are mostly found at shopping plazas and by large apartment complexes, which tend to be some of LRTA’s highest-ridership stops. Other high-ridership stop locations have no amenities, such as University Ave & 4th Ave in Lowell on Route 7, and at Princeton Blvd & Cornell St on Route 5.

Additionally, the NMCOG Inventory determined 9% of all LRTA bus stops have seating (74 of 824 stops), which included benches, chairs, or other adjacent options for waiting riders on both public and private property (private-property seating may not always be available).

Stop Spacing and Siting

Siting and spacing bus stops is important for making service fast, reliable, and easy to understand. It is also essential for optimizing access to transit.

Stop Spacing

Good bus-stop spacing is important. Too many stops which are spaced too close to one another will slow a bus down and introduce more potential points of conflict between the bus and other road users. Stops that are spaced too far apart will limit the number of people who ride by reducing

⁴ NMCOG. February 6, 2026. Lowell Regional Transit Authority Bus Stop Inventory 2024. <<https://storymaps.arcgis.com/stories/46205cdc704e46c0bf8673e5b64ffab4>>

access. Stop spacing is influenced by land use and density along a route, with local routes (i.e., urban routes) typically having lower average stop spacing than suburban routes.

According to the Transit Cooperative Research Program (TCRP), national bus-stop spacing for a local bus route ranges from 500 to 1,200 feet (typical is 750 feet), while the stop-spacing range for a suburban bus route is 600 to 2,500 feet (typical is 1,000 feet)⁵. The Southeastern Regional Transit Authority (SRTA), a peer agency operating primarily in Fall River and New Bedford, MA, finalized bus-stop design guidelines in 2022 which use 1,300 feet as the preferred stop spacing for the agency's 20 fixed routes.⁶ Stop spacing of approximately ¼-mile (~1,300 ft.) is likely appropriate for nearly all of LRTA's urban routes.

The average stop spacing for LRTA routes is shown in Figure 7. Five routes have an average stop spacing of 1,000 feet or fewer, all of which operate almost entirely within Lowell. All but two of LRTA's primarily urban routes fall between the TCRP typical urban stop spacing and SRTA's preferred stop spacing. These routes and any route with an average stop spacing below 1,200 feet for urban service may warrant separate analyses on stop location and consolidation to reduce travel delays and travel times, based on the assumption that pushing routes to a higher average stop spacing can produce considerable improvements to operational safety, speed, and reliability, with minimal impacts to rider access.

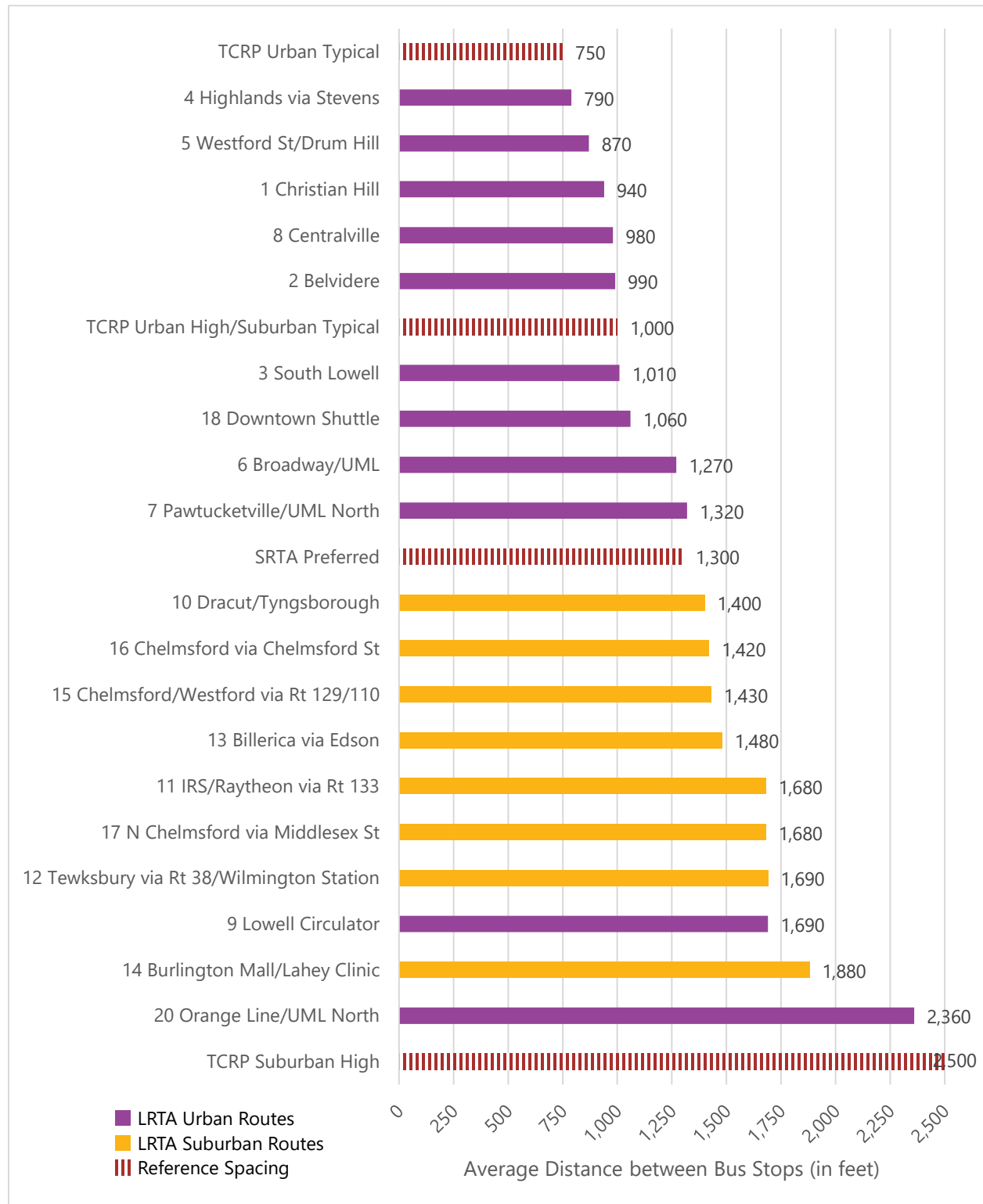
Conversely, LRTA's longer suburban routes, such as routes 10 through 15, all average greater than 1,400 feet between stops and fall within SRTA's preferred spacing and the TCRP high-bound suburban spacing. It is notable that the route with the longest spacing, Route 20, has a relatively short alignment in one of the densest parts of the service area. This is due to the route serving a fairly specialized market linking UML's North and East campuses and connecting them to downtown and the Kennedy Center.

While LRTA's fixed stops are generally well-spaced relative to their respective route type, riders can board and alight anywhere along the route by flagging. This means buses may stop much more often than the actual stop spacing, as riders flag down buses between stops.

⁵ TCRP. 1996. Report 19: Guidelines for the Location and Design of Bus Stops. p. 18. <https://nacto.org/wp-content/uploads/tcrp_report_19.pdf>

⁶ SRTA. November 2022. SRTA Bus Stop Design Guidelines. p. 1-2. <https://www.srtabus.com/wp-content/uploads/SRTA_BSDG_-Final-Draft-with-Appendices_20221121_reduced-size.pdf>

Figure 7 Average Distance Between Stops by Route for LRTA and Reference Spacing



Stop Siting

The location of stops on a route is also important. In some instances, stops are best located on the far side of an intersection, and in others they are best placed in a mid-block location. Stops should also typically be placed in 'stop pairs', where inbound and outbound stops are as close to each other on opposite sides of the street as possible. This makes the service easy for riders to understand and provides good access to transit, as people can board and alight the bus in essentially the same location.

One distinct area for stop improvement in LRTA's system is stop pairing. On many routes, inbound and outbound stops are not always paired or designated. In some cases, one direction of a route has a bus-stop sign and the other direction is unmarked and intended as a flag stop. This practice is largely due to challenges placing sign posts in municipal right-of-way. LRTA prefers to use existing sign posts, utility poles, and other infrastructure to place bus-stop signs. A comprehensive bus-stop analysis would help to address the logistics of siting stop infrastructure, including sign posts.

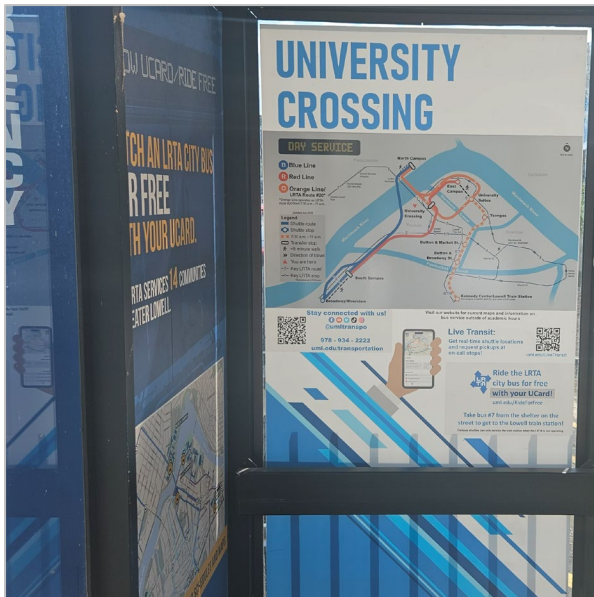
Shared Stops

LRTA fixed-route service connects with several other transit services in the Greater Lowell Area. As a result, some stops are shared with other transit systems. It is important for these shared stops to be properly designed, as they are a potential point of confusion for riders making two-seat-ride transit trips and serve as a 'gateway' to the LRTA system.

The best practice at shared stops is to include comprehensive information regarding all the routes—and potentially systems—that can be accessed from the stop. This could include system maps, fare information, and agency contact information. Signage should show each route that serves the stop, with branded information for each agency. These signs should be co-located if distinct and can also be combined into a single sign. These best practices are also applicable at stops shared among transit modes, such as the MBTA Commuter Rail stations served by LRTA.

through show select shared stops in the LRTA system and highlight best practices and areas for improvement.

Figure 8 University Crossing Transit Hub in Lowell



The University Crossing Transit Hub in Lowell serves as a main point of connection between UMass Lowell (UML) transportation and LRTA. A shelter at this stop has good information regarding the UML shuttle service and connections to LRTA.

Figure 9 MBTA and LRTA Shared Stop on 3rd Avenue in Burlington



The shared bus stop on 3rd Avenue in Burlington is heavily branded as an MBTA stop while lacking any LRTA signage, which may be confusing for riders using it to board a LRTA bus. Shared branding would improve system legibility at this stop.

Figure 10 MBTA North Billerica Station (east side) LRTA Stop



The place where LRTA buses board and alight passengers on the east side of the MBTA's North Billerica Station lacks stop amenities and information regarding LRTA service.

Source for three images: Nelson\Nygaard

Stop Guidelines

LRTA should consider creating bus-stop design guidelines as a service-planning tool. These guidelines could address siting and spacing stops; designing for accessibility and maneuverability; and choosing and maintaining amenities. Documenting the decision-making rationale around the variables needed to create good bus stops will aid LRTA staff now and in the future, if conflicts should arise in the planning and implementation process.

Bus-stop guidelines would provide guidance and best practices for locating bus stops at intersections and for spacing stops according to service type and land use. The guidelines would include specifications for placement of amenities including seating and waste receptacles, and would give LRTA actionable criteria for siting shelters, such as ridership thresholds. Procedures for navigating multi-party activities such as adding sign posts for bus-stop signs, removing snow, and marking stops shared by multiple transit operators could also be detailed.

DEMAND-RESPONSE SERVICE

In addition to a fixed-route bus network, LRTA also provides demand-response services:

- Road Runner is a comingled Americans with Disabilities Act paratransit and a senior dial-a-ride service. The paratransit service is for eligible disabled people and is available within three-quarters of a mile of all regularly scheduled LRTA fixed routes. The senior dial-a-ride service is for people 60 years and older and is available within three-quarters of a mile from LRTA fixed-routes in Lowell, Billerica, Chelmsford, Tewksbury, and Dracut.
- Council on Aging (CoA) or similar transportation is provided by local senior centers and CoAs in the following LRTA member municipalities: Acton, Billerica, Carlisle, Chelmsford, Dracut, Dunstable, Groton, Lowell, Maynard, Pepperell, Tewksbury, Townsend, Tyngsborough, Westford, and Wilmington. The Town of Acton also operates fixed-route and demand-response service.
 - Eligibility and availability depend on the municipality. LRTA supports these municipalities by providing vehicles and maintenance, while the municipalities operate service.

These demand-response services are alternatives to fixed-route service for eligible riders and increase access to areas beyond LRTA's bus routes. As LRTA already operates a large demand-response fleet and will soon be utilizing modern dispatching and routing software, the agency could consider implementing general public dial-a-ride or microtransit for low-demand sections of their service area. This new service could be designed to replace segments of existing fixed routes with poor productivity and ridership or to expand transit to areas not currently served.

2 RIDERSHIP AND PRODUCTIVITY

This section examines ridership and productivity, which are essential for evaluating a transit system's performance. Understanding the number of boardings alone is useful in assessing the overall importance of routes within the network, while productivity (boardings per revenue hour) examines how efficiently the service is operating; routes with higher productivity represent a more efficient use of resources.

RIDERSHIP

This section of the report explores ridership by route, by stop, and by time of day.

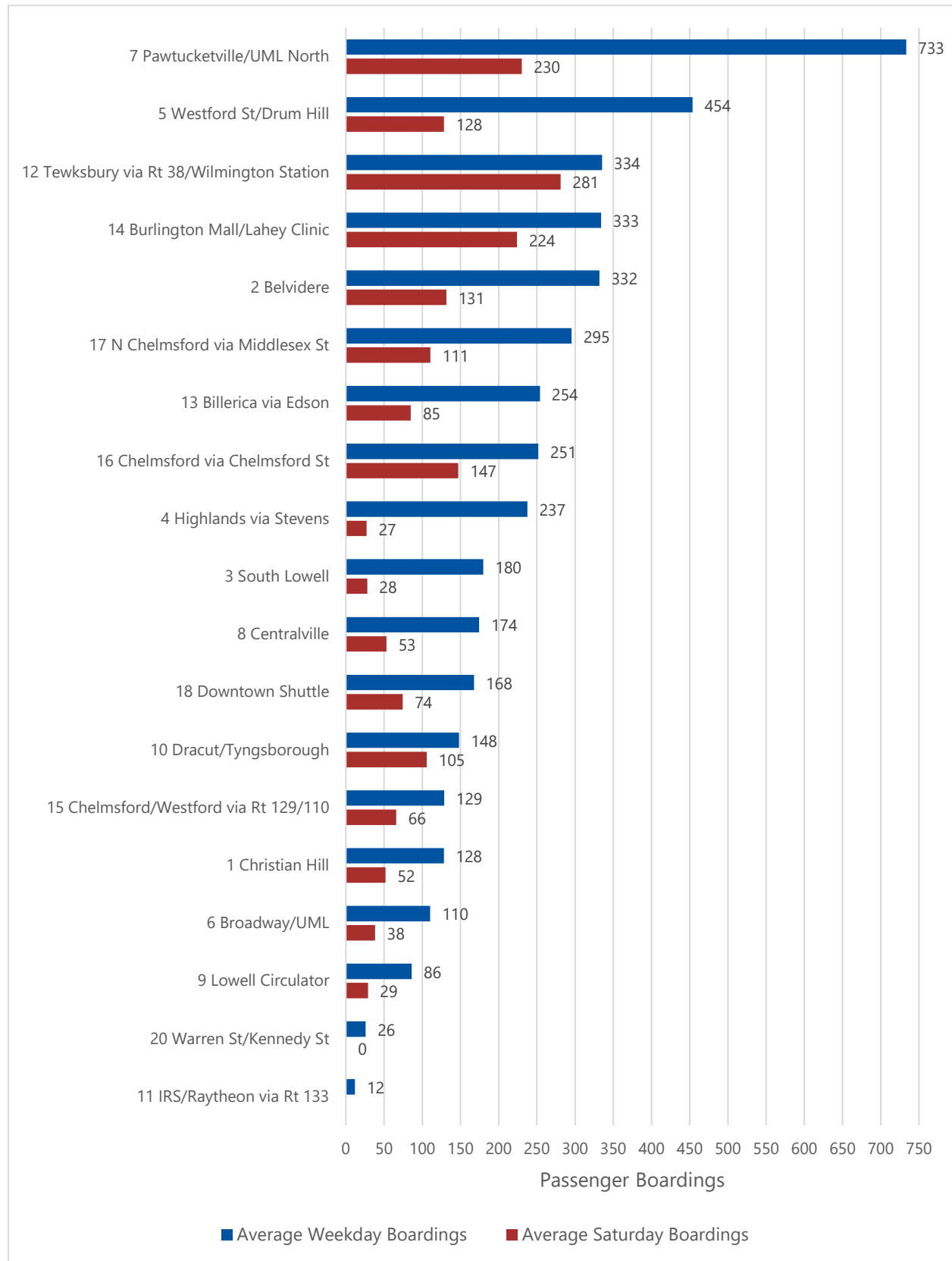
Ridership by Route

Average daily boardings by route and day type are shown in Figure 11. Route 7 sees by far the highest weekday ridership of any route in the system. The five routes exceeding 300 daily boardings are a mix of urban and suburban routes. Ridership reveals notable findings when comparing the performance of routes with suburban versus urban markets and hourly versus 30-minute headways. For example, suburban routes 12 and 14 operate hourly service yet slightly outperform urban Route 2, which operates every 30 minutes. In addition, suburban Route 16, which operates every 90 minutes, attracts more riders than urban Route 18, which operates every 30 minutes.

The three lowest-ridership routes are routes 9, 20, and 11. Route 11 is commuter-focused and operates only four round trips per weekday. Routes 9 and 20 are downtown circulator-type routes, and Route 20 only operates in the morning.

On Saturday, almost all routes operate with hourly headways (Route 16 operates every 90 minutes). Route 12 and Route 14 exhibit high ridership retention from weekday figures, whereas Route 7 and Route 5 show a significant decline in ridership from weekdays. Route 4 and Route 3 have the lowest Saturday ridership and among the steepest declines from weekday ridership. Routes 11 and 20 do not operate on Saturdays.

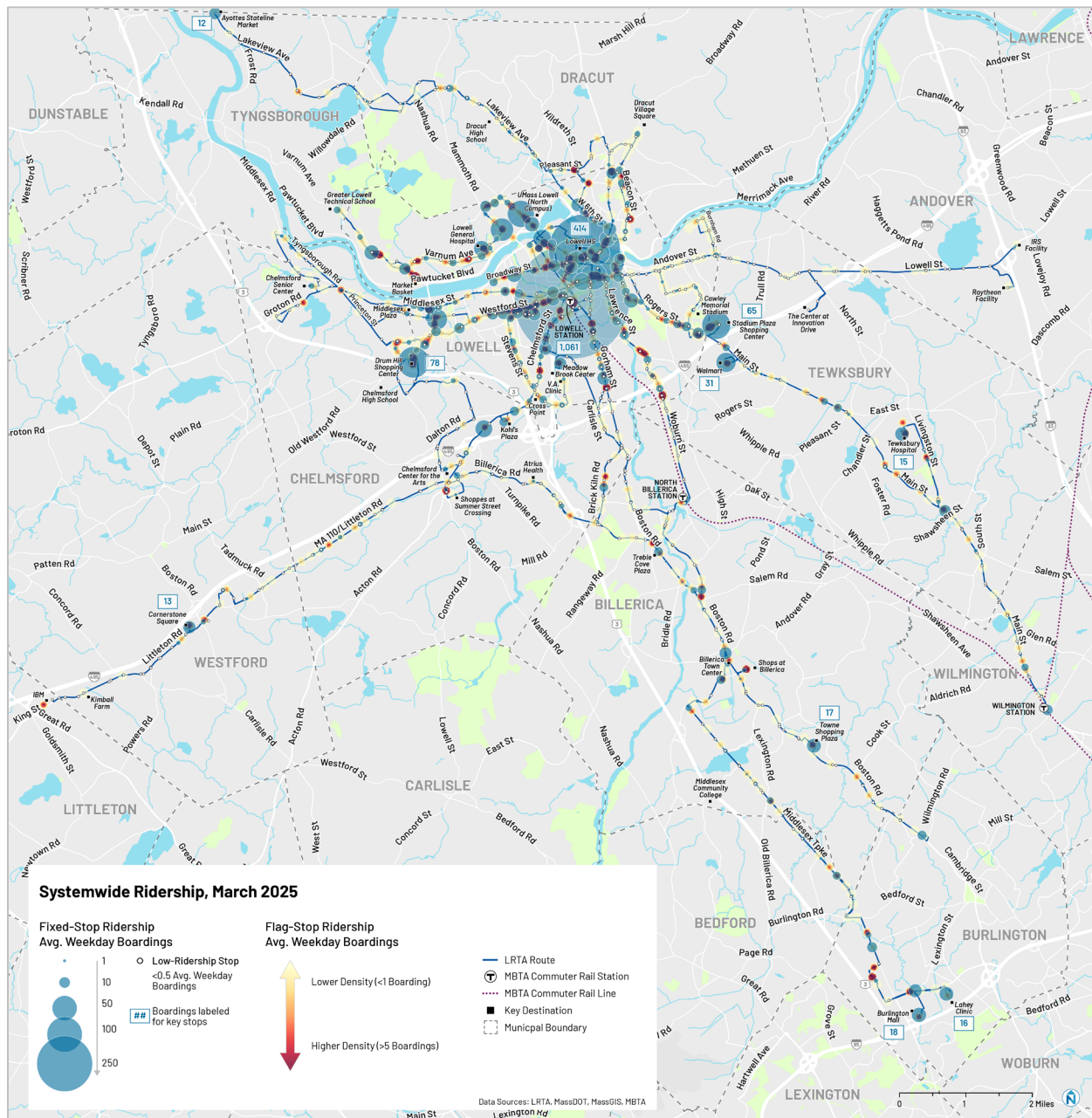
Figure 11 Average Daily Boardings by Route and Day Type, March 2025



Ridership by Stop

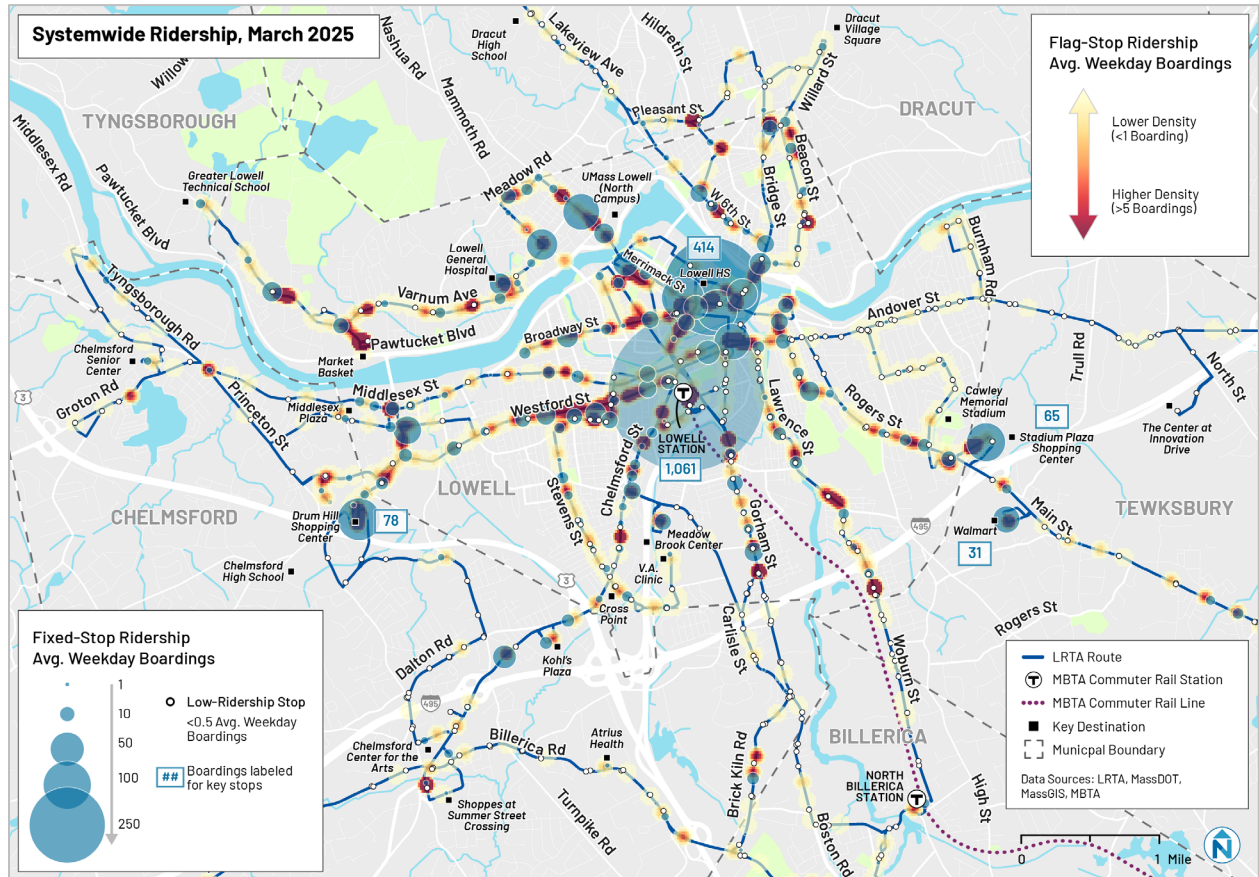
When examining ridership by stop across the entire service area, the map in Figure 12 shows a clear concentration of ridership in downtown Lowell with additional high-ridership hotspots just north of the Merrimack River and minimal ridership south of I-495. Outside the City of Lowell, major points of ridership include shopping centers, grocery stores, and hospitals. Among LRTA's suburban routes, routes 12 and 17 generally have more high ridership stops. Specifically, stops at Tewksbury Hospital (Route 12) and Drum Hill Plaza (routes 5, 16, and 17) have relatively more boardings. Stops on routes 15 and 16 have fewer boardings, even among suburban routes.

Figure 12 Ridership by Stop, March 2025



When examining ridership distribution within the City of Lowell (Figure 13), the Kennedy Center clearly stands out as the stop with the most boardings in the system, likely due to transfer activity. Stops in Lowell generally see more boardings than those in other municipalities, largely due to the higher population density in Lowell. Specifically, stops in Lowell’s downtown core have the most boardings. Lowell High School has the second-most boardings of any stop.

Figure 13 Ridership by Stop, Lowell, March 2025.



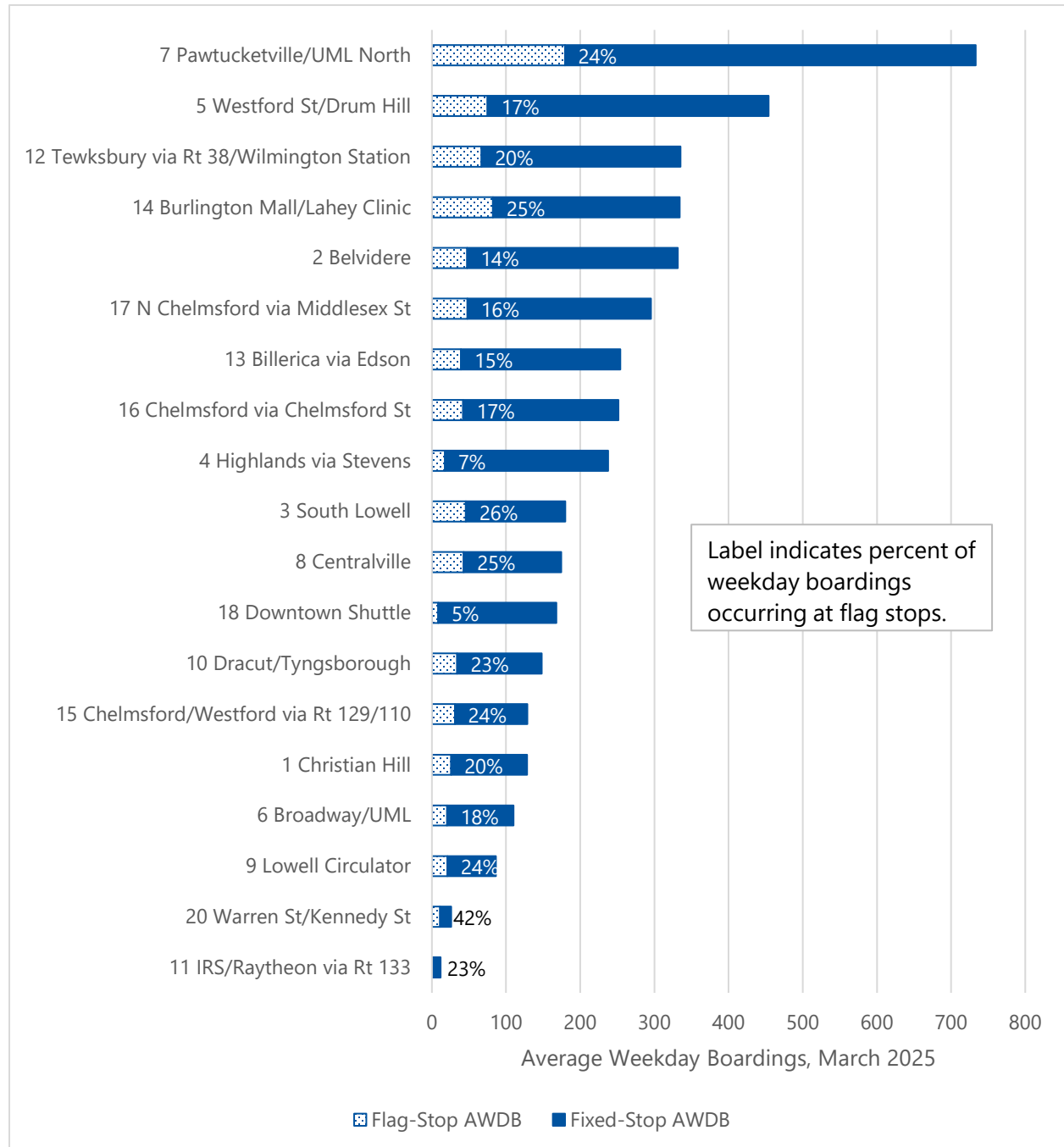
Ridership by Stop Type

Ridership, separated into fixed stops and flag stops, is shown by route in Figure 14. Route 20, which serves downtown Lowell, has the highest percentage of flag-stop boardings in the system with 42%, although this finding may be caused by inconsistencies in data collection on the route. The route with the second-highest percentage of flag-stop boardings is Route 3, which provides a more typical radial service. Conversely, Route 18 has the lowest percentage of flag stops in the system at 5% of average weekday boardings and operates entirely within downtown Lowell. Overall, 21% of passengers boarded buses by flagging on weekdays in March 2025. In general, about 10% to 25% of boardings on a given route occur as flag-stop boardings.

Flag-stops can cause operational difficulties for multiple reasons. Serving flag stops as well as designated stops means the bus will stop more often on each trip and spends less time moving,

which slows service for everyone onboard. Flag stops are intended to occur only in safe locations, but what counts as a 'safe' area may not be obvious to all riders. This can result in the bus needing to stop suddenly if a passenger comes into view, exposing the bus and/or rider to crash risks. Finally, flag stops do not offer the amenities present at designated stops, such as seating, shelter, or an accessible path of travel. LRTA should consider allowing flag stops only along some bus routes such as those traversing lower-density and suburban places, and prohibiting flag stops in the dense, congested parts of the service area where adequate access to transit infrastructure is present.

Figure 14 Percent of Boardings Occurring at Fixed Stops by Route

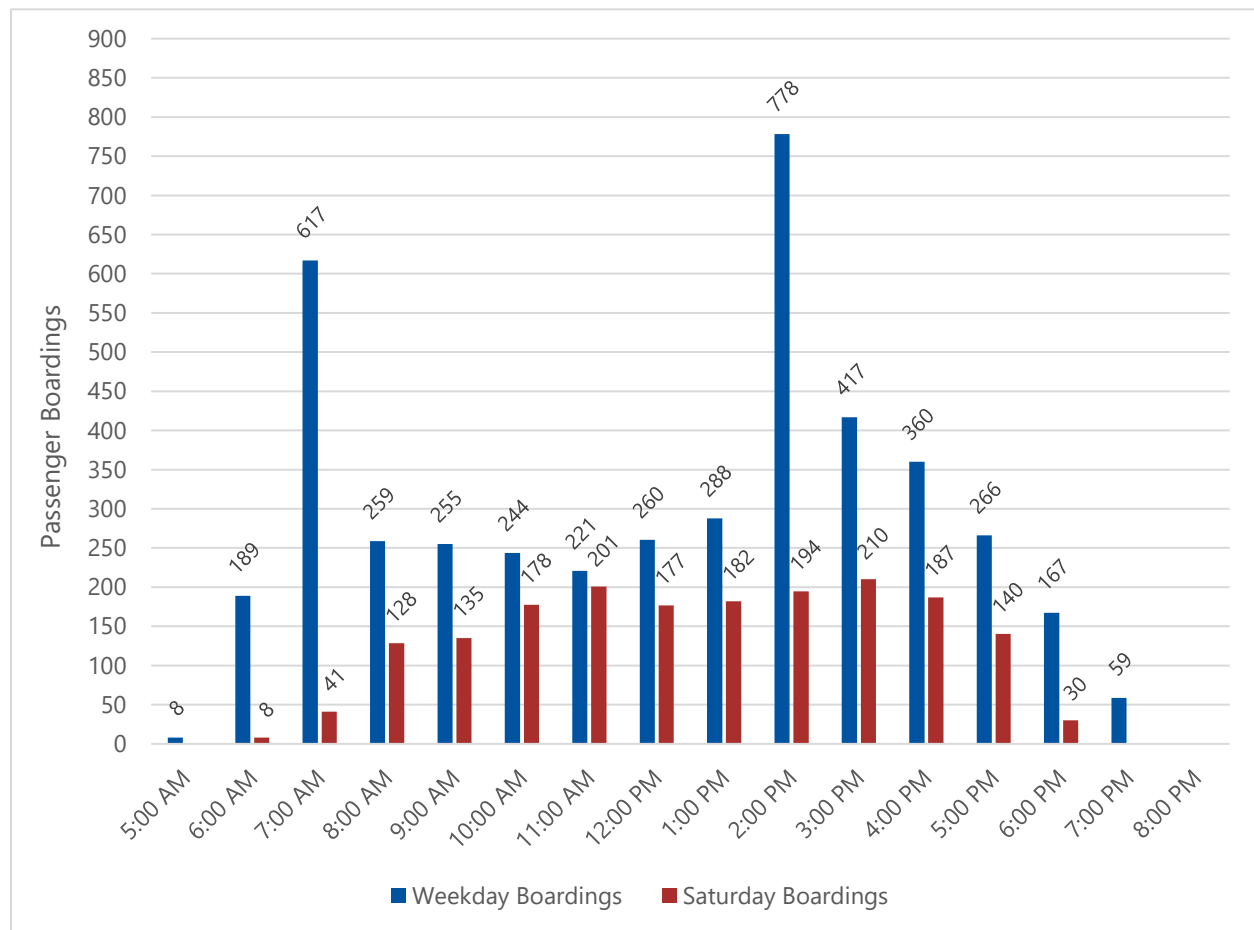


Ridership by Time of Day

The distribution of LRTA’s fixed-route boardings across a service day is shown in Figure 15. On weekdays, the hours by far with the highest ridership are 7:00 a.m. and 2:00 p.m. This is because of the many student boardings made on LRTA buses, including supplemental school trippers. Outside of these clear peaks, boardings are relatively consistent from mid-morning through mid-day. After the 2:00 p.m. peak, late afternoon sees higher demand than midday, with ridership tapering off in the evening after 6:00 p.m.

Ridership by hour on Saturdays follows a simpler pattern, with ridership largely growing from morning through midday, peaking from 2:00 to 5:00 p.m. Late afternoon sees the highest Saturday ridership, with about 210 riders boarding in the p.m. peak. Saturday ridership drops off thereafter.

Figure 15 Ridership by Hour by Day Type, March 2025



School Trippers

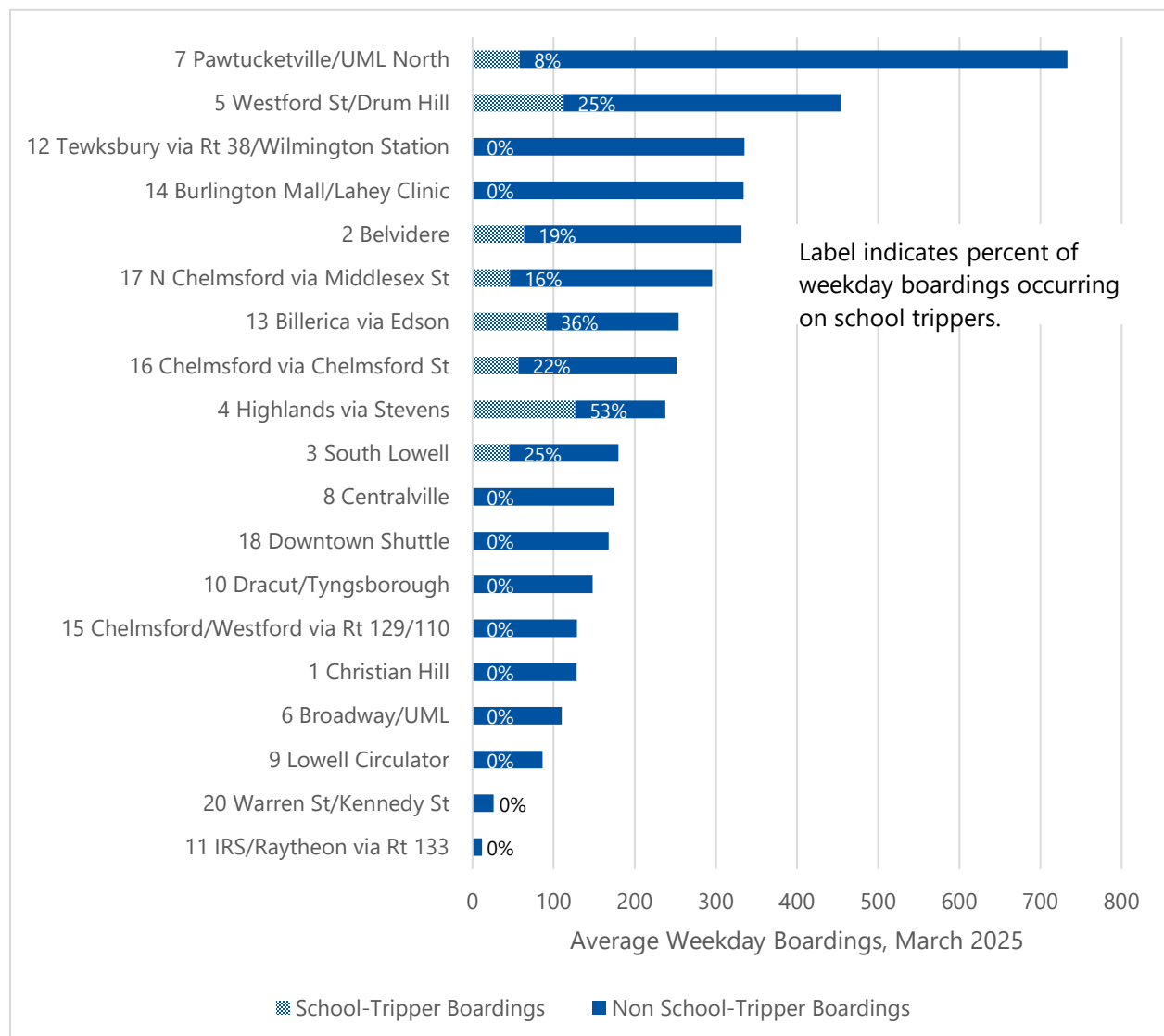
School trippers make up 14% of LRTA’s weekday ridership. School trippers are differentiated from other trips in each route’s schedule and act as supplemental service meeting demand for travel to and from Lowell High School. School-tripper departure times are tailored to the school schedule

rather than route headways, typically operating inbound trips at 7:00 a.m. and outbound trips at 2:40 p.m. Although focused on meeting peaked demand among high-school students, school trippers are open to—and used by—all.

Eight out of 18 regularly scheduled LRTA routes operate school trippers, and the share of boardings from school trippers on each route are shown in Figure 16. Route 4 has the highest percentage of boardings made on school trippers by far, at 53%. Routes 3, 5, and 13 also had at least 25% of their ridership on school trippers. Of routes with school trippers, Route 7 has the lowest percentage of riders boarding on school trippers, at 8%. Absolute school-tripper ridership is highest on Route 4, with 127 average daily boardings made on school trippers.

Most school-tripper ridership occurs on routes operating on the south side of the system, including routes 4, 5, and 13. Some inner-core routes, such as 1, 6, and 8, have no school trippers. These routes still see spikes in ridership during the morning and afternoon school times.

Figure 16 Average Daily Boardings on School Trippers, March 2025



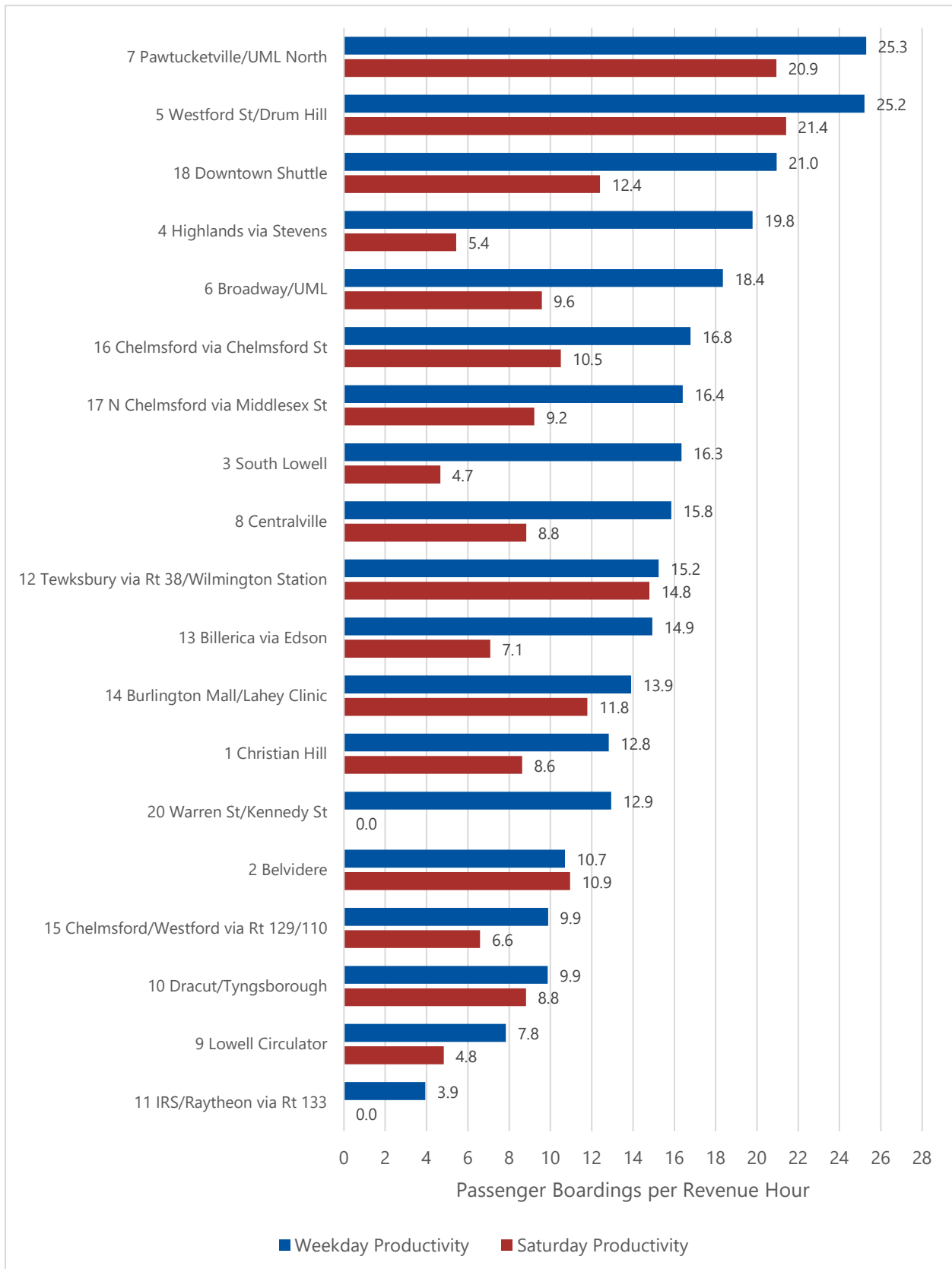
PRODUCTIVITY

Because LRTA operates in a fiscally constrained environment, it is important that the agency uses its resources (i.e., vehicles, operators, and operating budget) in the most cost-efficient manner possible. Efficiency is generally measured as 'productivity', which is the number of passengers boarding per revenue hour, which is closely related to the number of passengers moved per dollar spent. For this reason, it is important to evaluate route-level productivity. Ridership alone is insufficient to fully assess a route's performance, as the amount of service a route provides can significantly influence the ridership it receives.

Figure 17 shows route-level productivity on weekdays and Saturdays. Route 7 had the highest weekday productivity of any route in the system, with Route 5 carrying the most passengers per revenue hour on Saturdays. All the top five routes operate mostly within the City of Lowell, and three of these routes provide 30-minute service all day. This indicates that—at least in these markets—the additional resources used to provide 30-minute service are solid investments. Despite having relatively low absolute ridership, Route 18 is very efficient, with the third-highest productivity in the system.

The route with the lowest productivity was Route 11, a commuter-type service. This route had a productivity around half of the second-lowest performer, Route 9 (a downtown circulator). Route 9's low productivity may be due to several factors, including hourly headways and competition from overlapping services in downtown, such as Route 18. Route 11's productivity is low enough that eliminating the route entirely could be warranted.

Figure 17 Productivity by Route and Day Type, March 2025



3 ON-TIME PERFORMANCE

On-time performance (OTP) is an important measure of a transit system's reliability, as it indicates how much riders can depend on a service arriving when they expect it to. Late trips can delay riders headed to important (and not important!) destinations, and early trips can leave riders stranded at a bus stop even if they arrive at the scheduled departure time. This section examines OTP by route. Many factors can contribute to poor OTP, including operations and technology issues, traffic congestion, and inaccurate scheduling.

METHODS

Data in this section are from July 2025 and come with an important caveat: LRTA does not currently request that operators observe timepoints, and so the agency is not currently operating with OTP as a key service goal. The data used for this analysis are for departures from timepoints only; LRTA defines a departure as 'on-time' if it departs between three minutes early and five minutes late. Trips before and after that threshold are considered early or late, respectively.

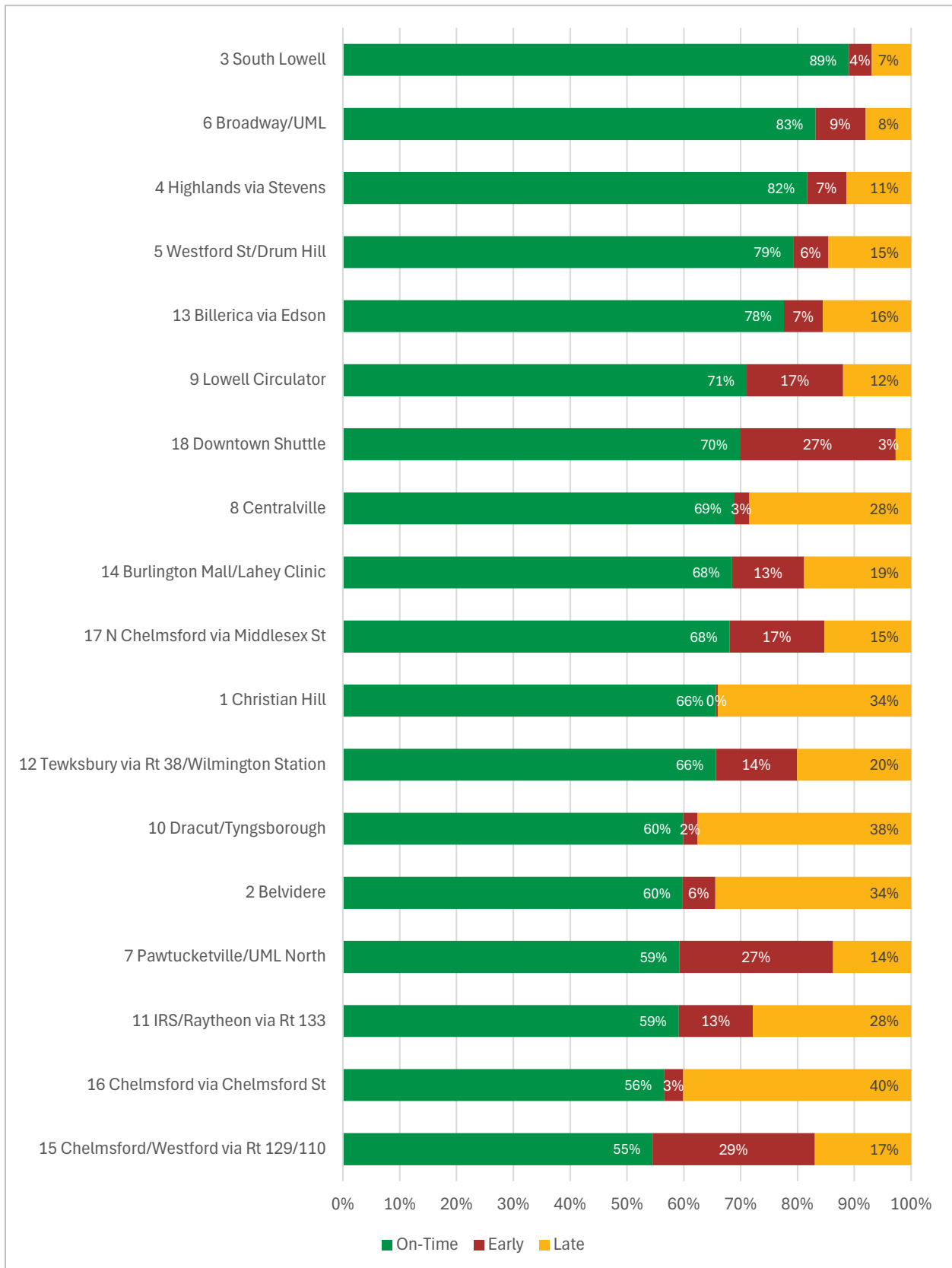
ON-TIME PERFORMANCE

Figure 18 shows route OTP. Overall, urban and shorter routes tend to have slightly better on-time performance than longer and more suburban routes, which is typical, given that a longer route has more opportunities to be delayed by traffic, passenger activity, or other issues. There does not appear to be a strong geographic pattern to OTP among LRTA routes.

Late departures are the most common OTP issue for LRTA, although early departures occur in significant volumes, with eight routes seeing more than 10% of all timepoint departures occurring more than three minutes early. Routes 7 and 15 each show more than one in four departures as early. Route 3 has the best on-time performance, with 89% of timepoint departures made on time.

Routes 15 and 16, serving Chelmsford, have the lowest on-time performance. It is also notable that Route 11 has the third-worst OTP despite having only four daily round trips.

Figure 18 On-Time Performance by Route, March 2025



4 TRAVEL-FLOW AND KEY-DESTINATION ANALYSIS

This section evaluates overall travel flows in the LRTA service area and beyond by examining the volume of trips—using all modes—between towns and major destinations within the City of Lowell and throughout the region. This analysis looks at travel in spring 2025 using Replica⁷, a travel-modeling service that aggregates and synthesizes location data with other datasets to estimate travel behavior.

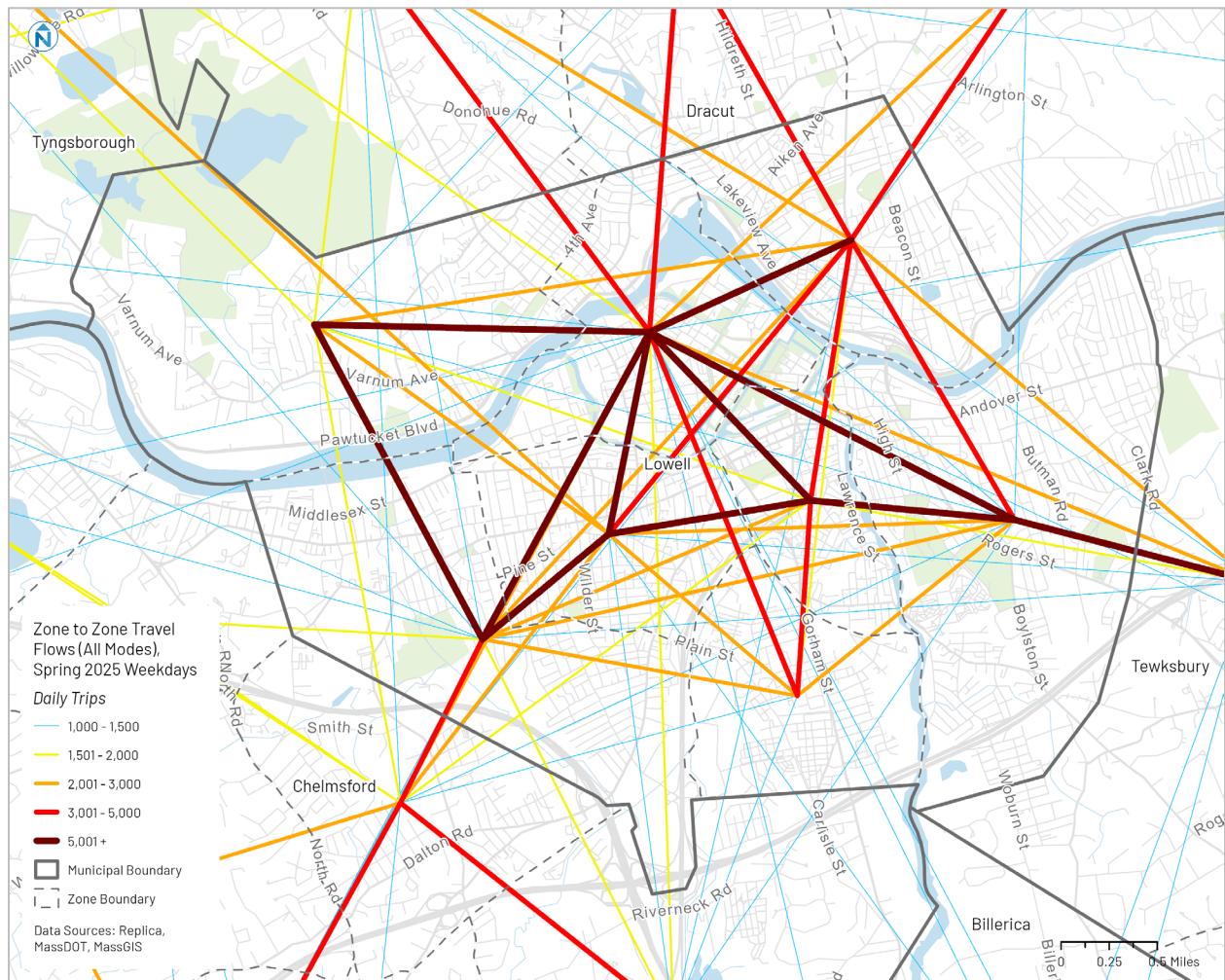
TRAVEL FLOWS

Regional travel flows should be regularly assessed, as factors such as real-estate development, changing demographics, and changing transportation options can alter the direction and intensity of travel among areas. Once major overall travel flows are understood, that information can be compared with LRTA service to assess if LRTA's fixed-route network adequately connects the places people are traveling to and from. It is worth noting that travel-flow maps show the general demand for travel among places, not the exact alignment people use to travel from one place to the other.

Most of the travel flows in the LRTA's service area, displayed in Figure 19, converge in downtown Lowell and are well-served by bus routes traveling through the city core, as LRTA operates a radial bus network centered in Lowell. The largest travel flows out of downtown Lowell are northwest toward Pawtucketville; southwest to the Highlands and toward Chelmsford; northeast to Centralville on toward Dracut; and east toward Tewksbury. The flows to the western parts of Lowell are well served by routes 5, 7, and 17; routes 5 and 7 are the top two highest-ridership routes in the LRTA system and operate weekday headways of 30 minutes. The flows to the northeastern part of the city and to Dracut are served by routes 1, 8, and 10, all of which operate hourly weekday service, with the combination of those routes along street corridors resulting in more frequent transit service (though schedules may not be well coordinated). There is also a strong travel flow to the southeastern part of the service area which is currently only served by Route 2—which runs every 30 minutes on weekdays—and Route 12—which runs every 60 minutes on weekdays.

⁷ Replica. 2025. <<https://www.replicahq.com>>

Figure 19 Map of Zone-to-Zone Travel Flows in the LRTA Service Area (all modes)



There are some significant travel flows that are not well-served by transit today. Within Lowell, there is some crosstown travel that is not served with a direct transit trip or convenient transfer. This includes travel between the Highlands and western Pawtucketville, which is only possible with a circuitous trip to transfer downtown. Similarly, travel between the Highlands and the Acre, and Belvidere and the Acre require transferring. Adding crosstown service may be an opportunity to capture some of this travel demand.

Beyond trips within Lowell itself, the largest regional travel flows (mapped in Figure 20 and in a table in Figure 21) are between Lowell and Chelmsford (served by routes 15 and 16), Lowell and Dracut (served by Route 1), and Lowell and Tewksbury (served by Route 12). There are also strong regional travel flows between Nashua and Tyngsborough and Nashua and Lowell. There is currently only LRTA seasonal service on Route 19 between Nashua, Tyngsborough, and Lowell. There is another major travel flow between Lowell, Billerica, and Burlington. That corridor is currently served by routes 13 and 14, both of which operate hourly. Westford has a significant north-south demand which is not served by the east-west Route 15.

Additionally, some LRTA communities and nearby towns show strong travel flow clusters that are not served by fixed routes. Acton has strong travel demand along with nearby Maynard and Concord. Additionally, Wilmington shows strong intra-town travel that is only partially served by Route 12.

Figure 20 Map of Zone-to-Zone Travel Flows in the Greater Lowell Area (all modes)

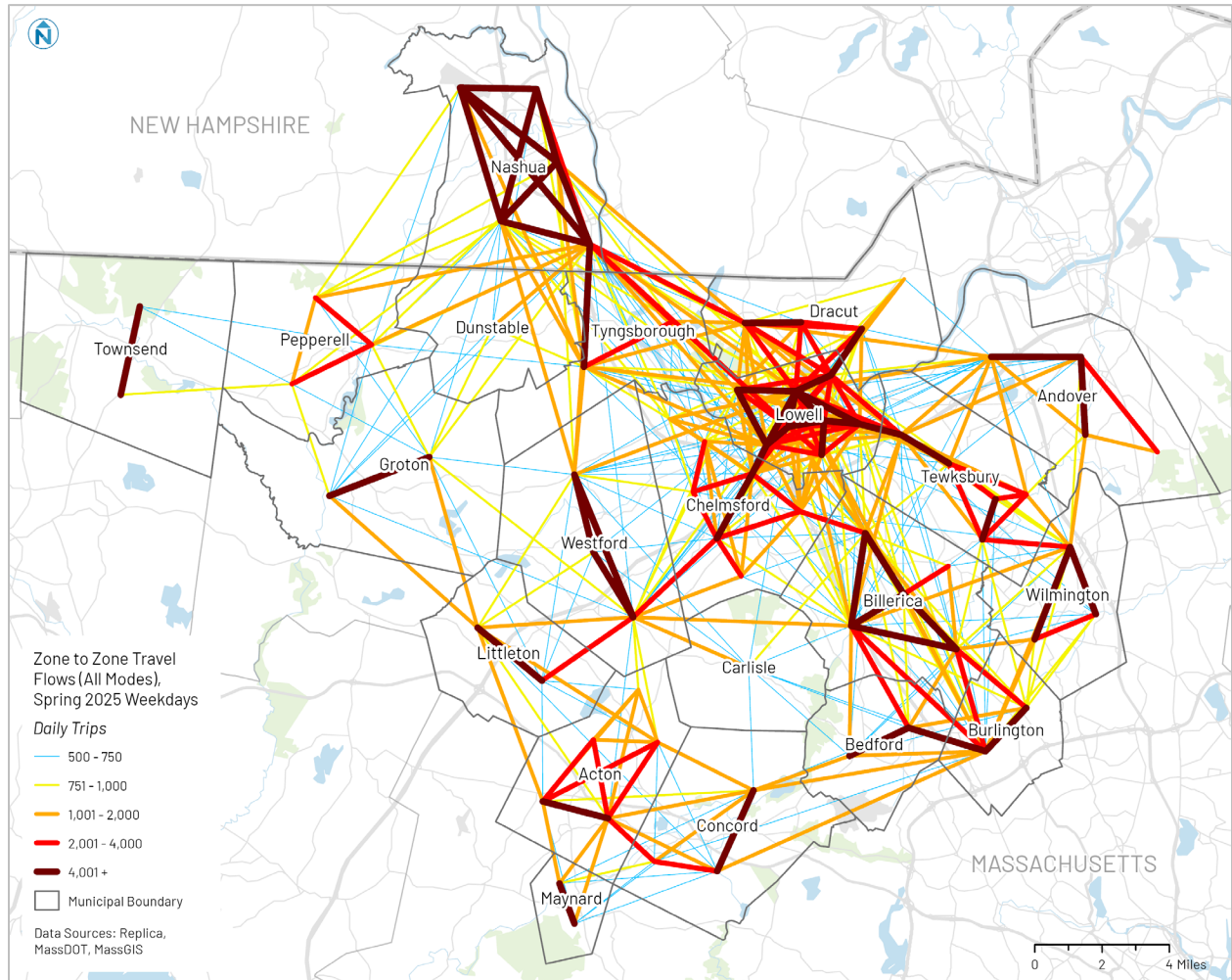


Figure 21 Table of Travel Flows Between Towns, All Modes

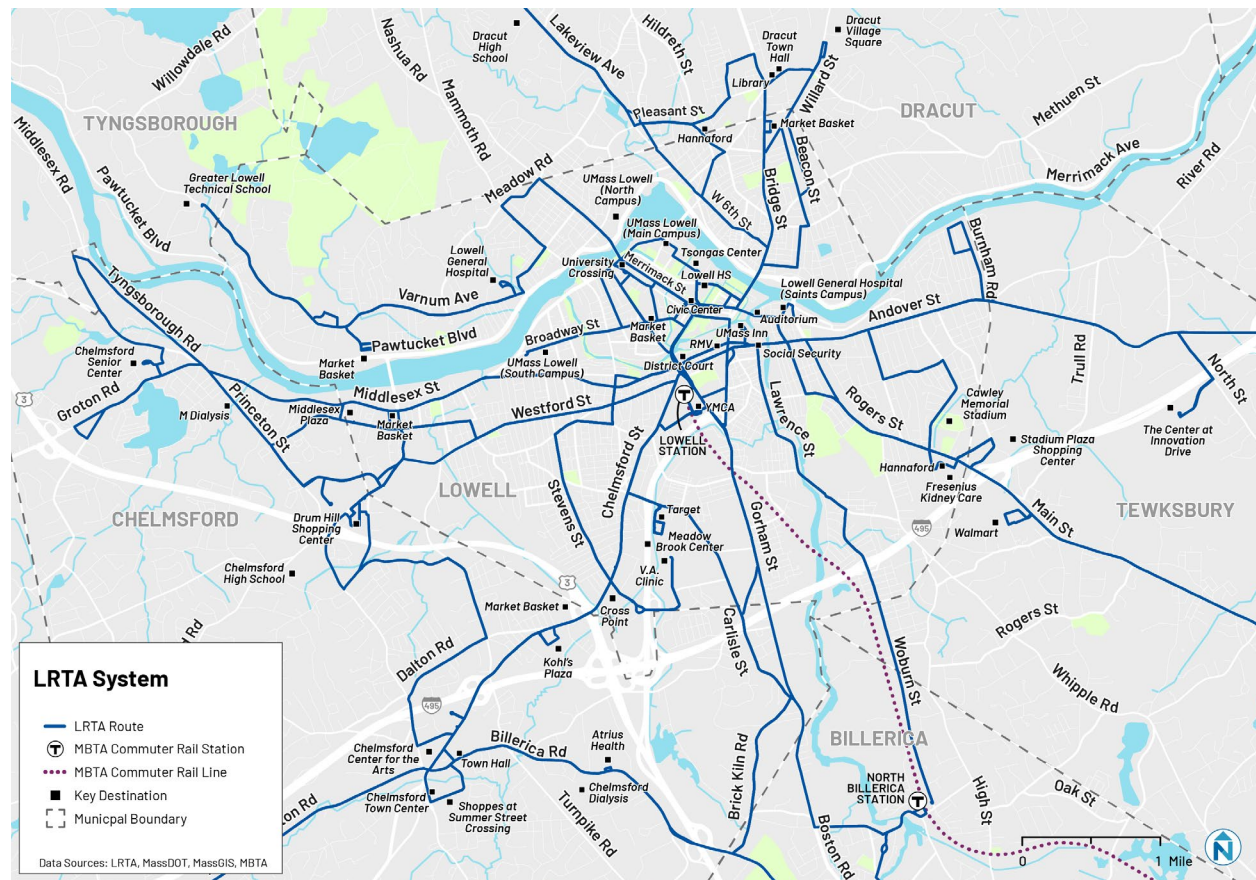
Town Travel Flow Matrix		DESTINATION																					
		Acton	Andover	Bedford	Billerica	Burlington	Carlisle	Chelmsford	Concord	Dracut	Dunstable	Groton	Littleton	Lowell	Maynard	Nashua, NH	Pepperell	Tewksbury	Townsend	Tyngsborough	Westford	Wilmington	TOTAL
ORIGIN	Acton		140	700	790	320	810	1,360	4,830	80	10	520	3,010	1,300	3,320	410	140	140	50	90	2,560	100	20,680
	Andover	140		210	1,350	720	80	1,320	60	2,350	90	60	140	5,090	30	640	50	5,500	50	230	330	2,780	21,220
	Bedford	580	230		4,850	4,940	540	1,000	980	330	30	80	220	1,410	230	410	100	800	50	90	450	920	18,240
	Billerica	760	1,540	5,020		7,010	990	6,000	680	1,260	70	150	640	10,130	100	1,300	190	5,910	160	510	1,310	3,640	47,370
	Burlington	320	900	3,890	6,930		350	1,400	2,570	570	60	100	230	3,020	200	770	60	2,200	60	350	420	2,730	27,130
	Carlisle	560	90	660	910	260		600	510	70	-	10	110	820	40	90	10	570	10	200	1,440	30	6,990
	Chelmsford	1,130	1,280	980	6,500	1,350	600		640	4,030	160	500	740	23,680	110	4,580	400	2,700	280	2,710	6,110	960	59,440
	Concord	5,250	70	1,370	630	1,620	430	820		130	20	130	690	620	2,080	210	110	150	80	120	670	150	15,350
	Dracut	60	2,140	340	1,320	650	80	3,360	150		50	90	130	19,760	10	3,790	120	2,440	70	2,600	790	450	38,400
	Dunstable	10	80	30	70	70	-	150	20	50		690	40	720	10	2,290	510	50	70	540	130	40	5,570
	Groton	500	50	90	130	110	10	590	120	80	780		1,820	670	30	2,120	2,120	90	530	370	1,590	50	11,850
	Littleton	3,540	140	200	580	260	130	1,100	1,060	120	50	1,580		1,160	240	390	470	220	170	300	3,470	100	15,280
	Lowell	1,110	4,900	1,560	9,230	3,150	630	24,250	590	18,550	960	740	1,050		170	9,210	610	14,510	180	5,090	4,900	2,750	104,140
	Maynard	3,210	20	230	100	210	30	100	1,870	10	10	50	220	160		80	40	190	40	-	170	50	6,790
	Nashua, NH	370	750	500	1,490	890	100	4,420	220	3,580	1,830	1,790	410	10,060	70		5,160	960	730	6,030	2,970	490	42,820
	Pepperell	110	50	100	170	60	10	390	100	120	540	1,880	580	540	40	5,280		160	1,760	540	650	80	13,160
	Tewksbury	140	4,980	970	5,940	2,020	720	2,190	140	2,700	40	100	200	13,430	190	790	140		80	710	720	4,810	41,010
	Townsend	30	50	50	160	60	10	270	100	50	50	490	200	130	50	800	1,590	60		50	220	70	4,490
	Tyngsborough	110	230	100	500	340	110	2,310	100	2,600	500	300	190	5,080	10	7,710	550	670	40		1,150	110	22,710
	Westford	2,270	400	420	2,070	460	1,210	6,090	580	870	180	1,670	3,270	5,730	170	3,350	520	650	220	1,240		260	31,630
Wilmington	80	2,310	1,180	3,790	3,000	30	840	130	460	30	50	50	2,700	40	380	70	4,120	90	90	250		19,690	
TOTAL	20,280	20,350	18,600	47,510	27,500	6,870	58,560	15,450	38,010	5,460	10,980	13,940	106,210	7,140	44,600	12,960	42,090	4,720	21,860	30,300	20,570		

KEY DESTINATIONS

The results of the travel-flow analysis should be complemented by a more granular examination of areas with larger trip volumes. Key destinations are usually major contributors to these large trip volumes and identifying their specific locations and activities can help inform LRTA service improvements.

Key destinations in the service area are densely located in downtown Lowell (Figure 22). Some key destinations include Lowell High School, Pollard Library and City Hall, the UML campuses, and Central Plaza. Farther away from downtown Lowell, the density of key destinations decreases. Lowell General Hospital is located within Lowell but outside the downtown core. Grocery stores, major employment sites, and large shopping centers are generally key destinations for all travelers, including transit riders. Middlesex and Drum Hill plazas in Lowell and Chelmsford, respectively, are major ridership generators, along with both Stadium Plaza Shopping Center and Walmart in Tewksbury. Some other key destinations outside Lowell include Tewksbury Hospital, Billerica’s Town Center and Towne Shopping Plaza, and the Burlington Mall and Lahey Clinic.

Figure 22 Map of Key Destinations in the Greater Lowell Area



Note: Not all destinations in downtown Lowell are shown, in order to preserve label legibility.

Figure 23 Map of Key Destinations in the LRTA Service Area



APPENDIX A – ROUTE PROFILES

The Route Profiles present a detailed examination of the existing conditions specific to each route. Using descriptive text, tables, charts, and maps, each profile provides a general overview of the existing service and how the route is performing in terms of ridership, productivity, and on-time performance. This information informs the last section of each route profile, which includes a list of potential ways to improve the service.