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*massDOT*

**AECOM**

# Comprehensive Regional Transit Plan Update 2020

Lowell Regional Transit Authority



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## Acronyms

ACS	American Community Survey
ADA	Americans with Disabilities Act
APC	Automatic Passenger Counter
APTA	American Public Transportation Association
AVL	Automatic Vehicle Locator
CARES	Coronavirus Aid, Relief, and Economic Security
CFR	Code of Federal Regulations
COA	Council on Aging
COVID-19	Novel Coronavirus of 2019
CRTP	Comprehensive Regional Transit Plan
EEO	Equal Employment Opportunity
FTA	Federal Transit Administration
FY	Fiscal Year
GHG	Greenhouse Gas
GWSA	Global Warming Solutions Act
LEED	Leadership in Energy and Environmental Design
LEP	Limited English Proficiency
LRTA	Lowell Regional Transit Authority
MassDOT	Massachusetts Department of Transportation
MBTA	Massachusetts Bay Transportation Authority
MOU	Memorandum of Understanding
MVRTA	Merrimack Valley Regional Transit Authority
NSP	National Public Transportation Safety Plan
NTD	National Transit Database
OTP	On-Time Performance
PTASP	Public Transportation Agency Safety Plan
RTA	Regional Transit Authority
TAM	Transit Asset Management
TCI	Transportation and Climate Initiative
TERM	Transit Economic Requirements Model
ULB	Useful Life Benchmark



## Glossary

**Access:** The opportunity to reach a given destination within a certain timeframe or without significant physical, social, or economic barriers.

**Accessible Vehicle:** A public transportation vehicle that does not restrict access, is usable, and provides allocated space and/or priority seating for individuals who use mobility devices.

**Americans with Disabilities Act (ADA):** The Americans with Disabilities Act, passed in July 1991, gave direction to local transit agencies to ensure full access to transportation for persons with disabilities.

**Boardings:** The total number of passengers getting on a transit vehicle during a specified period of time. See also Ridership and Passenger Trip.

**Capital Cost:** The cost of equipment and facilities required to support transportation systems, including vehicles, radios, shelters, software, etc.

**Central Transfer Point:** A central meeting place where routes or zonal demand response buses intersect so that passengers may transfer. Routes are often timed to facilitate transferring and depart once passengers have had time to transfer. When all routes arrive and depart at the same time, the system is called a pulse system. The central transfer point simplifies transfers when there are many routes (particularly radial routes), several different modes, and/or paratransit zones. A downtown retail area is often an appropriate site for a central transfer point, as it is likely to be a popular destination, a place of traffic congestion and limited parking, and a place where riders are likely to feel safe waiting for the next bus. Strategic placement of the transfer point can attract riders to the system and may provide an opportunity for joint marketing promotions with local merchants.

**Circulator:** A bus that makes frequent trips around a small geographic area with numerous stops around the route. It is typically operated in a downtown area or area attracting tourists, where parking is limited, roads are congested, and trip generators are spread around the area. It may be operated all-day or only at times of peak demand, such as rush hour or lunchtime.

**Commuter Bus Service:** Transportation designed for daily, round-trip service, which accommodates a typical 8-hour, daytime work shift (e.g., an outbound trip arriving at an employment center by 8 AM, with the return trip departing after 5 PM).

**Coordination:** Coordination means pooling the transportation resources and activities of several agencies. The owners of transportation assets talk to each other to find ways to mutually benefit their agencies and their customers. Coordination models can range in scope from sharing information, to sharing equipment and facilities, to integrated scheduling and dispatching of services, to the provision of services by only one transportation provider (with other former providers now purchasing services). Coordination may involve human service agencies working with each other or with public transit operations.

**Cost per Boarding:** The total operating expenditures of a route or service divided by the number of total boardings.

**Cost per Revenue Mile or Hour:** The total operating expenditures of a route or service divided by the number of revenue miles or revenue hours.

**Demand Response Service:** Service to individuals that is activated based on passenger requests. Usually passengers call the scheduler or dispatcher and request rides for dates and times. A trip is scheduled for that passenger, which may be canceled by the passenger. Usually involves curb-to-curb or door-to-door service. Trips may be scheduled on an advanced reservation basis or in “real-time.” Usually smaller vehicles are used to provide demand

response service. This type of service usually provides the highest level of service to the passenger but is the most expensive for the transit system to operate in terms of cost per trip. In rural areas with relatively high populations of elderly persons and persons with disabilities, demand response service is sometimes the most appropriate type of service. Sub-options within this service type are discussed in order of least structured to most structured, in terms of routing and scheduling.

- **Pure Demand Response Service:** Drivers pick up and drop off passengers at any point in the service area, based on instructions from the dispatcher. In pure demand response systems, the dispatcher combines immediate requests, reservations, and subscription service for the most efficient use of each driver's time.
- **Zonal Demand Response Service:** The service area is divided into zones. Buses pick up and drop off passengers only within the assigned zone. When the drop off is in another zone, the dispatcher chooses a meeting point at the zone boundary for passenger transfer or a central transfer is used. This system ensures that a vehicle will always be within each zone when rides are requested.
- **Flexibly Routed and Scheduled Services:** Flexibly routed and scheduled services have some characteristics of both fixed route and demand response services. In areas where demand for travel follows certain patterns routinely, but the demand for these patterns is not high enough to warrant a fixed route, service options such as checkpoint service, point deviation, route deviation, service routes, or subscription service might be the answer. These are all examples of flexible routing and schedules, and each may help the transit system make its demand response services more efficient while still maintaining much of the flexibility of demand responsiveness.
- **Microtransit:** A form of demand response service, open to the general public, that requires some type of "reservation," typically made via an app-based system. Typically, microtransit uses software algorithms to completely automate the scheduling of the trip, the fare collection (if any), and the route the driver will utilize (communicating with the driver via some type of mobile data terminals).

**Deviated Fixed Route Service:** Transit buses travel along a predetermined alignment or path with scheduled time points at each terminal point and in some instances at key intermediate locations. Route deviation service is different than conventional fixed route bus service in that the vehicle may leave the route upon requests of passengers to be picked up or returned to destinations near the route. Following an off-route deviation, the vehicle typically returns to the point at which it left the route. Passengers may call in advance for route deviation or may access the system at predetermined route stops. The limited geographic area within which the vehicle may travel off the route is known as the route deviation corridor.

**Dial-A-Ride Service:** A name that is commonly used for demand response service. It is helpful in marketing the service to the community, as the meaning of "dial-a-ride" may be more self-explanatory than "demand response" to someone unfamiliar with transportation terms.

**Environmental Justice:** Executive Order 12898, issued in 1994, requires agencies receiving federal funds to determine whether their programs, policies, and activities will have disproportionately high and adverse human health or environmental effects on minority or low-income populations.

**Express Bus Service:** Express bus service characteristics include direct service from a limited number of origins to a limited number of destinations with no intermediate stops. Typically, express bus service is fixed route/fixed schedule and is used for longer distance commuter trips. The term may also refer to a bus that makes a limited number of stops, while a local bus makes many stops along the same route but as a result takes much longer.

**Farebox Recovery Ratio:** The percentage of operating costs covered by revenue from fares and contract revenue (total fare revenue and total contract revenue divided by the total operating cost).

**Fares:** Revenue from cash, tickets, and pass receipts given by passengers as payment for public transit rides.

**Federal Transit Administration (FTA):** An operating administration within the United States Department of Transportation that administers federal programs and provides financial assistance to public transit.

**Feeder Service:** Local transportation service that provides passengers with connections to a longer-distance transportation service. Like connector service, feeder service is service in which a transfer to or from another transit system, such as an intercity bus route, is the focal point or primary destination.

**Fixed Route:** Transportation service operated over a set route or network of routes on a regular time schedule.

**Headway:** The length of time between vehicles moving in the same direction on a route. Headways are called short if the time between vehicles is short and long if the time between them is long. When headways are short, the service is said to be operating at a high frequency; if headways are long, service is operating at a low frequency.

**Intercity Bus Service:** Regularly scheduled bus service for the public that operates with limited stops over fixed routes connecting two or more urban areas not near, that has the capacity for transporting baggage carried by passengers, and that makes meaningful connections with scheduled intercity bus service to more distant points, if such service is available. Intercity bus service may include local and regional feeder services, if those services are designed expressly to connect to the broader intercity bus network.

**Interlined Routes:** When fixed routes are routed through a transfer center or some other terminal location and become another route, with passengers typically allowed to ride through from one route to another without an additional fare and/or transfer fee. The “interline” is typically identified on public materials.

**Operating Expenditures:** The recurring costs of providing transit service (wages, salaries, fuel, oil, taxes, maintenance, insurance, marketing, etc.).

**Operating Revenue:** The total revenue earned by a transit agency through its transit operations. It includes passenger fares, advertising, and other revenues.

**Paratransit Service:** "Paratransit" means the transportation of passengers by motor vehicle or other means of conveyance by persons operating on a regular and continuing basis and the transportation or delivery of packages in conjunction with an operation having the transportation of passengers as its primary and predominant purpose and activity but excluding regular route transit. "Paratransit" includes transportation by carpool and commuter van, point deviation and route deviation services, shared-ride taxi service, dial-a-ride service, and other similar services.

**Boardings per Mile or Hour:** Productivity measure that takes the total boardings and divides by the miles and/or hours operated. The hours and/or miles may be presented as either total vehicle miles or hours or as revenue miles or hours.

**Passenger Trip (Unlinked):** Typically, one passenger trip is recorded any time a passenger boards a transportation vehicle or other conveyance used to provide transportation. “Unlinked” means that one trip is recorded each time a passenger boards a vehicle, no matter how many vehicles that passenger uses to travel from their origin to their destination.



**Performance Indicator:** An indicator is a metric that provides meaningful information about the condition or performance of the transportation system but is neither managed nor used to evaluate the effectiveness of policies, strategies, or investments.

**Performance Measure:** A performance measure is a metric that measures progress toward a goal, outcome, or objective. This definition covers metrics used to make decisions or evaluate the effectiveness or adequacy of a policy, strategy, or investment.

**Performance Target:** A target is a specific performance level representing the achievement of a goal, outcome, or objective.

**Point Deviation Service:** A type of flexible route transit service in which fixed scheduled stops (points) are established but the vehicle may follow any route needed to pick up individuals along the way if the vehicle can make it to the fixed points on schedule. This type of service usually provides access to a broader geographic area than does fixed route service but is not as flexible in scheduling options as demand response service. It is appropriate when riders change from day to day, but the same few destinations are consistently in demand. Also sometimes called checkpoint service.

**Public Transportation:** Transportation service that is available to any person upon payment of the fare either directly, subsidized by public policy, or through some contractual arrangement, and that cannot be reserved for the private or exclusive use of one individual or group. "Public" in this sense refers to the access to the service, not to the ownership of the system that provides the service.

**Revenue Hours:** The number of transit vehicle hours when passengers are being transported. Calculated by taking the total time when a vehicle is available to the public with the expectation of carrying passengers. Excludes deadhead hours, when buses are positioning but not carrying passengers, but includes recovery/layover time.

**Revenue Miles:** The number of transit vehicle miles when passengers are being transported. Calculated by taking the total mileage operated when a vehicle is available to the public with the expectation of carrying passengers. Excludes deadhead mileage, when buses are moving but not carrying passengers.

**Ridership:** The total of all unlinked passenger trips, including transfers. One trip that includes a transfer would be counted as two unlinked passenger trips.

**Ridesharing:** A form of transportation, other than public transit, in which more than one person shares the use of a vehicle, such as a van or car, to make a trip. Variations include carpooling or vanpooling.

**Section 5304 (State Transportation and Planning Program):** The section of the Federal Transit Act of 1991, as amended, that provides financial assistance to the states for purposes of planning, technical studies and assistance, demonstrations, management training, and cooperative research activities.

**Section 5307 (Urbanized Area Formula Program):** The section of the Federal Transit Act of 1991, as amended, that authorizes grants to public transit systems in urban areas with populations of more than 50,000 for both capital and operating projects. Based on population and density figures, these funds are distributed directly to the transit agency from the FTA.

**Section 5310 (Enhanced Mobility for Seniors and Persons with Disability):** The section of the Federal Transit Act of 1991, as amended, that provides grant funds for the purchase of accessible vehicles and related support equipment for private non-profit organizations to serve elderly and/or people with disabilities, public bodies that coordinate services for elderly and

people with disabilities, or any public body that certifies to the state that non-profits in the area are not readily available to carry out the services.

**Section 5311 (Non-urbanized Area Formula Program):** The section of the Federal Transit Act of 1991, as amended, that authorizes grants to public transit systems in non-urbanized areas (fewer than 50,000 population). The funds initially go to the governor of each state.

**Section 5339 (Bus and Bus Facilities):** The section of the Federal Transit Act of 1991, as amended, that makes federal resources available to states and designated recipients to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities, including technological changes or innovations to modify low or no emission vehicles or facilities. Funding is provided through formula allocations and competitive grants. A sub-program provides competitive grants for bus and bus facility projects that support low and zero-emission vehicles.

**Service Area:** The geographic area that coincides with a transit system's legal operating limits (city limits, county boundary, etc.).

**Service Gaps:** When certain geographic segments cannot be covered by transportation services. This term can also refer to instances where service delivery is not available to a certain group of riders, or at a specific time.

**Service Span:** The duration of time that service is made available or operated during the service day (e.g., 6 AM to 10 PM on weekdays).

**Spare Ratio:** The percentage/number of vehicles that an operator purchases in excess of the number of vehicles required to provide the maximum level of service. The spares are required so that some vehicles may cycle through a preventive maintenance regimen while the full level of planned service can still be provided.

**Standard:** A recommendation that leads or directs a course of action to achieve a certain goal. A standard is the expected outcome for the measure that will allow a service to be evaluated. There are two sets of transit standards.

- **Service design and operating standards:** Guidelines for the design of new and improved services and the operation of the transit system.
- **Service performance standards:** The evaluation of the performance of the existing transit system and of alternative service improvements using performance measures.

**State Contract Assistance:** The program through which the RTAs receive state operating funding for transit at the discretion of the Massachusetts Legislature via the state budget process annually. The total amount of state contract assistance funding provided in the state budget is allocated to the RTAs via a formula developed with RTA input.

**Through Routes:** When fixed routes are routed through a transfer center or some other terminal location and become another route, but – unlike interlining – passengers are not typically allowed to ride through from one route to another, as a “through-route” is typically only visible/presented on the operating schedule for bus operators and is not identified on public materials.

**Title VI:** Title VI of the Civil Rights Act of 1964 requires that “No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.”

**Transportation Network Companies:** Private sector companies that provide software routing, scheduling, and payment services to independent contractor drivers for a fee; these drivers then

utilize their own vehicles to provide a (typically) curb-to-curb transportation service, sometimes to sole riders and sometimes to pooled groups.

**Total Operating Cost:** The total of all operating costs incurred during the transit system calendar year, excluding expenses associated with capital grants.

**Transfer:** Passengers arrive on one bus and leave on another (totally separate) bus to continue their trip. The boarding of the second vehicle is counted as an unlinked passenger trip.

**Transit Dependent:** A description for a population or person who does not have immediate access to a private vehicle, or because of age or health reasons cannot drive and must rely on others for transportation.

**Transit Subsidy:** The operating costs not covered by revenue from fares or contracts.

**Trip Denial:** Occurs when a trip is requested by a passenger, but the transportation provider cannot provide the service. Trip denial may happen because capacity is not available at the requested time. For ADA paratransit, a capacity denial is specifically defined as occurring if a trip cannot be accommodated within the negotiated pick-up window. Even if a trip is provided, if it is scheduled outside the +60/-60-minute window, it is considered a denial. If the passenger refused to accept a trip offered within the +60/-60-minute pick-up window, it is considered a refusal, not a capacity denial.

**Volunteers:** Persons who offer services to others but do not accept monetary or material compensation for the services that they provide. In some volunteer programs, the volunteers are reimbursed for their out-of-pocket expenses; for example, volunteers who drive their own cars may receive reimbursement based on miles driven for the expenses that they are assumed to have incurred, such as gasoline, repair, and insurance expenses.

# 1. Executive Summary

This 5-year Comprehensive Regional Transit Plan (CRTP) Update builds on the work of the Lowell Regional Transit Authority (LRTA) 2015 Regional Transit Plan (RTP). This update was recommended by the Task Force on Regional Transit Authority Performance and Funding in its final report issued in April 2019. The report included 24 recommendations in 5 categories:

- Investment and Performance
- Accountability
- Service Decisions
- Quality of Service
- Environmental Sustainability

The CRTP update recommendation (No. 7) was included in the service decisions grouping. Specifically, recommendation 7 advised that RTAs will continue to succeed by understanding their markets and by aiming to have their service networks meet the current and future mobility needs of their region as well as support connectivity to other regions where possible. This effort will be guided by (1) the completion or updating of Comprehensive Regional Transit Plans (CRTPs) every five years...”


Following publication of the Task Force Report, a commitment to complete the CRTP was included in LRTA's 2-Year Memorandum of Understanding (MOU) with the Massachusetts Department of Transportation (MassDOT) executed on August 14, 2019.

The primary goals of this CRTP are to (1) provide an agency and service overview including fare structure; (2) identify essential markets, gaps in service, and ridership growth opportunities given demographic, socioeconomic, and employment data and the impacts of the novel coronavirus (COVID-19) pandemic; (3) evaluate the results of performance indicators and assess performance monitoring systems; and (4) provide recommendations for a strategic 5-year vision that will prioritize the development and implementation of a decision-making framework driven by data analysis and focused on performance.

The LRTA CRTP update process started in December 2019 but took a profound and unexpected turn mid-way through the project. Following the kick-off meeting in January 2020, the process proceeded with data collection, goal development, and planning for community and rider engagement. However, by the middle of March 2020, when the engagement activities were scheduled to commence, the world experienced a historic pause due to the COVID-19 pandemic.

In response to the pandemic, on March 10, 2020, Governor Baker declared a state of emergency and subsequently issued a stay-at-home order on March 23, 2020, closing all non-essential businesses. These safety measures, issued in the face of an unprecedented threat to public health, had serious, sweeping impacts, including on the development of this plan and transit operations writ large. LRTA, along with the other regional transit authorities (RTA), reduced service levels, encouraging non-essential riders to temporarily discontinue travel.

While LRTA continues its return to normal service in accordance with public health guidelines,



*“As of Saturday, March 21, 2020, the Lowell Regional Transit Authority (LRTA) has made systemwide service changes to protect our frontline employees and those members of the public who must travel as essential workers, i.e., hospital staff, emergency responders and safety personnel.”  
– LRTA website, March 21, 2020*

ridership is still depressed due to distance learning, business closures, telework, furloughs, layoffs, and reluctance to use public transportation. In response to this continued ridership volatility, LRTA acknowledges the unpredictability over the coming months and years and used this CRTP update to develop recommendations on methods to adapt quickly to a changing transit market.

## 1.1 Overview of LRTA Services

LRTA is headquartered in Lowell, Massachusetts, and is one of the 15 RTAs that, along with the Massachusetts Bay Transportation Authority (MBTA), operates public transportation in the Commonwealth. LRTA provides fixed route and Americans with Disabilities Act (ADA) demand response (Road Runner) services to Lowell and its surrounding communities. LRTA is a hub and spoke system, with the intermodal Gallagher Terminal serving as the terminus for every route in the system. The Terminal, which is located just west of Lowell's central business district, also serves as the final stop for MBTA's Lowell Line Commuter Rail service to North Station in Boston. According to 2018 data from MBTA, Lowell is one of the top 10 busiest stations in the commuter rail system (excluding South Station, Back Bay, and North Station).

In addition to operating fixed route and Road Runner service, LRTA provides Councils on Aging (COA) in the service area with vans and operating funds to provide Dial-A-Ride Senior Service and ADA demand response service to towns without fixed route service.

LRTA operates 19 fixed routes that, along with Road Runner demand response, have regular weekday service and some Saturday service, including three combo routes created from six routes with lower ridership. After temporarily pausing service due to the COVID-19 pandemic, LRTA has resumed a Sunday service pilot for some routes, including frequent service on a shuttle that serves downtown Lowell.

LRTA has implemented a variety of service improvements over the last 5 years that support efforts to improve the customer experience and inform service improvements by better tracking system performance. Improvements include:

- Automatic passenger counters (APC) on six buses with plans to expand as funding becomes available
- A user-friendly redesigned website and enhanced social media presence
- Implementing pilot Sunday service

## 1.2 Planning Process

The impacts and limitations imposed by the COVID-19 pandemic required flexibility in the approach for developing this 5-year plan. While some elements of the original process developed pre-pandemic remained viable, many had to be adapted to respond to the new realities of COVID-19. From public outreach to the structure of the recommendations, this planning process incorporates considerations relating to uncertainty around how the future might unfold.

### 1.2.1 Review of Transit Services and Market Conditions

A review of service from the last 5 years and market demand analysis were conducted to identify gaps and needs in LRTA's service area. LRTA service coverage includes areas where demographic data show the highest potential demand. However, safety measures like remote learning and teleworking, along with furloughs and layoffs, greatly disrupted LRTA's ridership patterns, making it difficult to infer future transit demand from past performance. This planning

process brought to light the importance of harnessing new technology to conduct ongoing analysis of real-time data rather than focusing primarily on historical trends.

### 1.2.2 Scenario Planning

The project team used scenario planning exercises to imagine what the next 5 years might hold in terms of ridership and market demand. Two months after the state of emergency was issued, LRTA leadership participated in an hour-long workshop with the consultant team centered around establishing key uncertainties in the face of the COVID-19 pandemic. Subsequent to that workshop, a high-ridership scenario (a return to 86 percent of pre-pandemic ridership), medium-ridership scenario (between 60 and 85 percent of pre-pandemic ridership), and low-ridership scenario (below 60 percent of pre-pandemic ridership) were developed to inform the development of needs and recommendations. These scenarios formed the framework for the recommendations in this plan.

### 1.2.3 Public Outreach

Due to social distancing guidelines and other safety protocols resulting from the COVID-19 pandemic, no in-person outreach could be conducted. The bulk of the outreach for this CRTP update was undertaken through an online stakeholder outreach survey that was open to the public between March 4 and July 31, 2020. Additionally, the project team met with key regional stakeholders, including UMass-Lowell.

Three hundred and thirteen survey responses were collected using the online survey, though it should be noted that the findings are not a statistically valid sample of LRTA riders or the region's residents. They should be used as a guide in the context of prior public outreach and study findings. Nonetheless, key takeaways that correlate with other planning efforts include:

- Expanded service was a top priority for riders, and permanent Sunday service in particular. Later evening service and more connections outside of Lowell were also common requests.
- While 28 percent of riders who only used fixed route service rode LRTA daily, only 13 percent of this group had a monthly pass. This may be due to the cost of a monthly pass being financially prohibitive.
- Many riders, both fixed route and demand response, wanted LRTA to offer more service to New Hampshire, both Nashua generally and the Pheasant Lane and Nashua Malls in particular.
- Riders wanted the rider-facing bus tracking technology to improve, as many have issues with the RouteShout app that is currently used by LRTA and were either unaware of service changes or unable to tell when a bus is delayed (*note that the RouteShout app was suspended at the time of the survey due to COVID-related service changes*).

*"Thank you for the partnership that you have built with UML [UMass-Lowell] in these past few years. Even in the face of this pandemic, students may be required to go back to campus - potentially in a hybrid setting - and may rely on the buses." – 2020 Rider Survey Comment*

## 1.3 Core Needs and Recommendations

LRTA identified 35 recommendations that respond to the needs and requests articulated by the public, key stakeholders, and those identified through data analysis and review of prior planning

efforts. Table 1 lists core recommendations that LRTA will pursue in the next 5 years, regardless of ridership levels. The full list can be found in Chapter 9.

**Table 1. Core Recommendations**

**Recommendation**

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Closely monitor funding sources to anticipate revenue disruptions and compensate as needed, such as the Gallagher Terminal Parking Garage.

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Continue assessing bus stops and other transit facilities for ADA improvements.

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Continue building out improved communications infrastructure through an improved website, integration with social media, dynamic screens at the terminal and on buses, the mobile bus tracker, and other industry best practices.

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Continue implementing the enhanced cleaning measures and protective equipment at least as extensive as state and federal guidance requires.

---

Continue implementing the environmental goals of the Commonwealth, pending availability of capital funding.

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Continue LRTA efforts to ensure a high-quality, clean, safe, and aesthetically appealing experience.

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Continue monitoring and coordinating changes with MBTA services to optimize connections between LRTA and MBTA services.

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Continue providing training to drivers on safe operation of vehicles around vulnerable road users.

---

Continue supporting training for all front-line staff that emphasizes customer service. Incorporate customer satisfaction into the ongoing performance analysis framework.

---

Continue working with the technology vendor and service operators to fine-tune the bus tracker and automatic vehicle locator (AVL) systems.

---

Coordinate construction activities in downtown Lowell closely with the City of Lowell and MassDOT to fully account for service disruptions and mitigate, to the greatest extent possible, negative impacts to the customer experience.

---

Engage in discussions with Scheidt and Bachmann regarding automated monthly payments for monthly passes.

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Explore opportunities for continued collaboration with the Merrimack Valley Regional Transit Authority (MVRTA) on fare media, particularly if MBTA moves away from the CharlieCard.

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Explore opportunities for implementing no-touch ticketing, such as through use of the GrantsPlus mobile ticketing app.

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Explore opportunities for joint procurement with other RTAs, including clean vehicles and other technology.

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Implement a Mystery Rider Program to ensure bus driver adherence to timepoint stops and safety policies.

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Implement a performance-driven decision framework for evaluating and adjusting appropriate levels of service for the routes in the service area on regular intervals.

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**Recommendation**

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Maintain LRTA's commitment to a diverse and inclusive workforce and implementation of its Equal Employment Opportunity (EEO) policy.

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Periodically review fare levels to ensure LRTA is maintaining the most equitable system possible through its fare policy.

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Publish detailed LRTA performance data on the website, including route-level performance data.

---

Pursue opportunities for procurement of APC units for implementation across the full LRTA fleet to facilitate more comprehensive data collection and analysis.

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Review fixed route deviations into parking lots or short spurs along side streets to improve travel time and adjust as necessary.

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Ensure state of good repair consistent with the Transit Asset Management (TAM) Plan and pending availability of capital funding.

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## 2. Background and 2020 Context

The 15 RTAs<sup>1</sup> provide vital mobility options and lifeline services to the millions of people across the Commonwealth outside of the Greater Boston region. The 2020 CRTP update process for the RTAs, funded by MassDOT, came out of Commonwealth-wide initiatives in 2018 and 2019, which prompted this plan update, most of which were last developed in 2015. The CRTP updates are both a result of and a contributor to the ongoing discussions on regional transportation. Recent and ongoing initiatives include the following:

- Governor's Commission on the Future of Transportation<sup>2</sup>
- A Vision for the Future of Massachusetts' Regional Transit Authorities<sup>3</sup> (RTA Task Force)
- Transportation & Climate Initiative<sup>4</sup>
- MBTA Fare Transformation<sup>5</sup>

The RTA Task Force Final Report<sup>6</sup> Recommendation No. 7 was a primary driver for the development of this CRTP update. The CRTP update is carried out as a commitment to LRTA's 2-year MOU with MassDOT signed in August 2019. In addition to the CRTP, the MOU also contained commitments on performance metrics and targets, maintaining an up-to-date asset inventory, submitting a fare policy by December 2020, submitting a balanced budget annually, and reporting timelines. The LRTA MOU is discussed in more detail in Chapter 6.

The LRTA CRTP update process started in December 2019 but took a profound and unexpected turn mid-way through the project. Following the kick-off meeting in January 2020, the process proceeded with data collection, goal development, and planning for community and rider engagement. However, by the middle of March 2020, when the engagement activities were scheduled to commence, the world experienced a historic pause due to the COVID-19 pandemic.

In response to the pandemic, on March 10, 2020, Governor Baker declared a state of emergency and subsequently issued a stay-at-home order on March 23. The stay-at-home order, originally intended for 2 weeks, ended up lasting until May 18, 2020. As of the finalization of this plan in early 2021, the pandemic continues to disrupt services and negatively impact transit ridership. Given the unprecedented nature of this disruption and unknown long-term economic, social, and public health implications, the next few years will likely see continued widespread societal change. Therefore, transit agencies especially will need to continue to build a data-driven and performance-focused decision-making framework to respond to these uncertain demographic and industry trends.

This chapter provides background and current context around the CRTP update process for all RTAs. LRTA-specific contextual information is included in Sections 2.2 and 2.3.

### 2.1 Background

Commonwealth-wide initiatives, organized generally around the themes of climate change, new technology, and providing affordable and convenient transportation options for all people, set

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<sup>1</sup> Commonwealth of Massachusetts, "General Laws Chapter 161B: Transportation Facilities, Highway Systems, and Urban Development Plans," <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleXXII/Chapter161B>.

<sup>2</sup> Commission on the Future of Transportation, *Choices for Stewardship: Recommendations to Meet the Transportation Future*, 2018, <https://www.mass.gov/orgs/commission-on-the-future-of-transportation>.

<sup>3</sup> Task Force on Regional Transit Authority Performance and Funding, *A Vision for the Future of Massachusetts' Regional Transit Authorities*, April 2019, [https://malegislature.gov/Reports/7917/SD2385\\_RTAtaskforceReport.pdf](https://malegislature.gov/Reports/7917/SD2385_RTAtaskforceReport.pdf).

<sup>4</sup> Transportation and Climate Initiative, accessed 2020, <https://www.transportationandclimate.org/>.

<sup>5</sup> Massachusetts Bay Transportation Authority, accessed 2020, <https://www.mbtta.com/projects/fare-transformation>.

<sup>6</sup> Task Force on Regional Transit Authority Performance and Funding, *A Vision for the Future of Massachusetts' Regional Transit Authorities*, April 2019, [https://malegislature.gov/Reports/7917/SD2385\\_RTAtaskforceReport.pdf](https://malegislature.gov/Reports/7917/SD2385_RTAtaskforceReport.pdf).

the stage for the CRTP update process. The RTAs play an important role in getting people across the diverse regions of the Commonwealth to work, to school, and to essential services. Because of this role, the RTAs are pivotal in improving the public's mobility options as explored through the Commonwealth-wide initiatives described in this section.

### 2.1.1 Governor's Commission on the Future of Transportation

Established by Executive Order in January 2018, the Governor's Commission on the Future of Transportation (the Commission) was convened to explore the following topics across the Commonwealth and their impact on transportation between 2020 and 2040:

- Climate and Resiliency
- Transportation Electrification
- Autonomous and Connected Vehicles
- Transit and Mobility Services
- Land Use and Demographics

The Commission completed its work and released findings in December 2018 in a report entitled *Choices for Stewardship: Recommendations to Meet the Transportation Future*.<sup>7</sup> Findings from the report included:

- The Commonwealth is expected to grow by 600,000 residents by 2040 and job growth is also expected to continue.
- Commonwealth residents are on average older than in many other US states, and older adults are expected to comprise a larger portion of the population in the future.
- As with the national trend, transit ridership has been declining in recent years.
- Use of transportation network companies has increased dramatically in recent years.
- Connected and autonomous vehicles are expected to radically change transportation and mobility in the future.
- The impacts of climate change are happening sooner and more intensely than originally projected with significant implications by 2040.
- Transportation in the Commonwealth accounts for 40 percent of all greenhouse gas (GHG) emissions.
- Electric vehicles could be part of the solution to reducing transportation emissions but would require significant infrastructure to implement.

The Commission used a scenario planning approach to itemize recommendations to prepare the Commonwealth's transportation system for the future. While many trends were evaluated for use in the scenario planning exercise, technology adoption as well as jobs and housing distribution were chosen as the two major trends that will most likely shape people's mobility options and needs. Based on the scenario planning trend analysis, the Commission then identified key challenges facing the Commonwealth's transportation system and developed recommendations across five categories to prioritize improvements over the next 20 years:

- Modernize existing state and municipal transit and transportation assets to more effectively and sustainably move more people throughout a growing Commonwealth.

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<sup>7</sup> Commission on the Future of Transportation, *Choices for Stewardship: Recommendations to Meet the Transportation Future*, 2018, <https://www.mass.gov/orgs/commission-on-the-future-of-transportation>.

- Create a 21st century “mobility infrastructure” that will prepare the Commonwealth and its municipalities to capitalize on emerging changes in transportation technology and behavior.
- Substantially reduce GHG emissions from the transportation sector in order to meet the Commonwealth’s Global Warming Solutions Act (GWSA) commitments, while also accelerating efforts to make transportation infrastructure resilient to a changing climate.
- Coordinate and modernize land use, economic development, housing, and transportation policies and investment in order to support resilient and dynamic regions and communities throughout the Commonwealth.
- Make changes to current transportation governance and financial structures in order to better position Massachusetts for the transportation system that it needs in the coming years and decades.

Within these 5 categories are a total of 18 recommendations on how to best prepare the Commonwealth’s transportation network for challenges and opportunities through 2040. The recommendations will guide Commonwealth-wide systems, specific solutions, and transportation investments and will have a profound impact on the RTAs over the next 20 years.

### 2.1.2 A Vision for the Future of Massachusetts’ Regional Transit Authorities

Resulting from the Governor’s Commission on the Future of Transportation initiative and directed by Outside Section 72 of the FY 2019 Massachusetts State Budget,<sup>8</sup> a Task Force on Regional Transit Authority Performance and Funding was established in the fall of 2018. The Task Force issued a final report entitled *A Vision for the Future of Massachusetts’ Regional Transit Authorities: Report of the Task Force on Regional Transit Authority Performance and Funding* in April 2019.<sup>9</sup>

The report built on the first recommendation from the Commission, “Prioritize investment in public transit as the foundation of a robust, reliable, clean, and efficient transportation system.” It set forth a path to stabilize, modernize, and improve the RTAs through 5 categories of action: Investment and Performance, Accountability, Service Decisions, Quality of Service, and Environmental Sustainability.

From those five categories, several goals related to the CRTF emerged:

- Sign a mutually negotiated MOU with MassDOT on a plan for performance monitoring and development of performance targets.
- Complete the CRTF and update every 5 years.
- Identify and evaluate demonstrated community need for evening and 7-day service.
- Identify and evaluate appropriate transit services and potential partnerships based on level of demand and efficiency.
- Develop pilot programs for innovative delivery models.
- Increase regional collaboration, including cross-RTA services.
- Collaborate with municipalities to provide safe walking and bicycle access to transit and comfortable, safe bus stops.
- Conduct a fare equity analysis every 3 years.

<sup>8</sup> Commonwealth of Massachusetts, “Budget Summary FY2019,” [https://budget.digital.mass.gov/bb/gaa/fy2019/os\\_19/houtexp.htm](https://budget.digital.mass.gov/bb/gaa/fy2019/os_19/houtexp.htm).

<sup>9</sup> Task Force on Regional Transit Authority Performance and Funding, *A Vision for the Future of Massachusetts’ Regional Transit Authorities*, April 2019, [https://malegislature.gov/Reports/7917/SD2385\\_RTAtaskforceReport.pdf](https://malegislature.gov/Reports/7917/SD2385_RTAtaskforceReport.pdf).

- Collaborate with the MBTA Fare Transformation process and adopt the proposed system.
- Participate in the Massachusetts Environmental Policy Act process.
- Maximize multimodal connectivity.
- Maintain an easily accessible website and robust social media presence.
- Collaborate with MassDOT and MBTA to integrate information services.
- Employ intentional outreach strategies.
- Purchase all zero-emission public buses by 2035.

Many of these goals are addressed and/or discussed as part of this CRTP update.

### 2.1.3 Transportation & Climate Initiative

Massachusetts is a participating state in the Transportation & Climate Initiative of the Northeast and Mid-Atlantic States:

The Transportation and Climate Initiative (TCI) is a regional collaboration of Northeastern states and Mid-Atlantic states and the District of Columbia that seeks to improve transportation, develop the clean energy economy, and reduce carbon emissions from the transportation sector. The participating states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia, as well as the District of Columbia.

The initiative builds on the region's strong leadership and commitment to energy efficiency and clean energy issues, and its programs to reduce carbon emissions in the power sector, which have resulted in the region becoming one of the most energy efficient areas in the nation. At the same time, the effort underscores the sense of urgency shared by all 12 jurisdictions, and their collective aspirations to become the leading region for sustainability and clean energy deployment in the country.

While the COVID-19 pandemic temporarily reduced congestion and associated pollution in the short-term, it has likely altered commuting patterns and housing choice in the long-term, which has environmental and sustainability implications. As such, the need to reduce carbon emissions from the transportation sector is just as important as it was before the COVID-19 pandemic. Additionally, the COVID-19 pandemic highlighted racial disparities in exposure to air pollution and disproportionate impacts of threats to public health. To that end, the TCI jurisdictions are collaborating to develop a low-carbon transportation program that advances equity.

The TCI jurisdictions are collaborating to develop a regional agreement to cap pollution from transportation fuels and invest in solutions that result in reduced emissions, cleaner transportation, healthier communities, and more resilient infrastructure. Massachusetts TCI participation will likely impact the RTAs in several ways, including vehicles, infrastructure, technology, and funding.

In December 2020, Massachusetts joined with Connecticut, Rhode Island, and the District of Columbia to be the first jurisdictions to launch a multi-state program to reduce pollution and invest \$300 million per year in cleaner transportation choices and healthier communities.<sup>10</sup>

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<sup>10</sup> Transportation and Climate Initiative, "Massachusetts, Connecticut, Rhode Island, D.C. are First to Launch Groundbreaking Program to Cut Transportation Pollution, Invest in Communities," December 2020, <https://www.transportationandclimate.org/final-mou-122020>.

### 2.1.4 MBTA Fare Transformation

LRTA's hub is situated next to the terminus of the MBTA Lowell Commuter Rail line and LRTA uses MBTA's Scheidt & Bachmann CharlieCard/CharlieTicket fare media. LRTA will be directly impacted by MBTA's efforts to modernize their fare payment system ("Fare Transformation") using mobile fare payment platforms and other new technologies. One of the key goals of fare transformation is reducing the use of cash on-board transit vehicles (which is also an interest of LRTA, as discussed in Section 4.6.2).

## 2.2 2020 Context

The year 2020 unfolded in a radically different manner than was anticipated. Because of the COVID-19 pandemic and the as-yet-unknown ways that the pandemic and its aftermath will permanently alter how, when, and where people travel, the CRTP update process had to be flexible and RTAs will need to be nimble, data-driven, and performance-focused in responding to an uncertain future. To that end, it will be critical for LRTA to continue building a data-driven and performance-focused decision-making and management framework to lean into and respond to the rapid changes that are expected to continue to impact the future of the transit industry. This data-driven and performance-focused approach will position LRTA for continued success.

### 2.2.1 COVID-19 Pandemic

Impacts to the transit industry from the COVID-19 pandemic included the following:

- Reduction of service due to diminished driver availability, social distancing requirements and associated capacity constraints on transit vehicles, and reduced demand
- Loss of ridership due to business closures/disruptions, remote working and learning, increased popularity of online shopping and telemedicine due to safety concerns, and stay-at-home orders and advisories that have depressed demand for discretionary student and work trips
- Temporary suspension of fare collection or fare collection enforcement along with rear-door boarding
- Implementation of employee protection measures, such as plexiglass shields and distribution of personal protective equipment
- New rigorous public space cleaning protocols and the removal of seats and tables from transit facilities to discourage congregation

As a result of these impacts, ridership on systems across the country initially declined by up to 80 percent and has been rebounding slowly (Figure 1).

**Figure 1. Change in Transit Demand (April 15, 2020–October 12, 2020)**

In the early months of the pandemic LRTA, like transit agencies nationwide, experienced a dramatic drop in ridership – LRTA’s April 2020 ridership saw a decline of 81 percent from the previous year. LRTA reduced service in response, making the following modifications:

- Routes ran on a modified Saturday schedule.
- LRTA suspended their Sunday pilot service.

On top of working quickly to adjust service levels, LRTA also implemented the following safety measures as a result of the COVID-19 pandemic:

- Drivers were supplied with personal protective equipment.
- Riders were required to wear masks if using LRTA service.
- All vehicles and the Intermodal Center and Gallagher Terminal were cleaned and disinfected daily.
- LRTA suspended fare enforcement and mandated rear door boarding.

By the fall of 2020, LRTA’s ridership had rebounded slightly, with a 59 percent decline in August 2020 ridership compared to August 2019. LRTA has restored all service to pre-pandemic levels, including the Sunday pilot service. In keeping with state guidelines and to maintain a safe environment for customers and drivers, LRTA has enacted the following policies:

- Riders are required to wear masks if using LRTA service.
- LRTA has been promoting CharlieCard usage to limit cash fares.
- Barriers have been installed in all LRTA vehicles to reduce contact with drivers.
- LRTA has added signage to vehicles to remind passengers of social distancing protocols.
- Vehicles are disinfected daily.
- The Intermodal Center and Gallagher Terminal receive a deep clean twice a week.

### 2.2.2 Federal Coronavirus Aid, Relief, and Economic Security (CARES) Act

LRTA has been able to continue to mitigate the financial impacts of the pandemic through funding from the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act. The



CARES Act has provided operating and capital funds for public transportation to mitigate lost revenue due to severe ridership decline, the suspension of fare collection, the implementation of cleaning and protection protocols, etc. The funding has been provided through the Federal Transit Administration (FTA) Section 5307 (urbanized area) and Section 5311 (rural areas) programs. For the RTAs, a total of \$213.4 million was apportioned through the CARES Act with \$11,556,540 provided to LRTA.

## 2.3 Plan Considerations

Given all the previous work that led to the development of the CRTP update and the unprecedented, transformational conditions during which the CRTP was developed, the CRTP update process necessarily evolved through 2020. Considerations included the following:

- The 5-year period prior to the 2020 pandemic year, fiscal year (FY) 2015 to FY 2019, was considered for recent historical trend analysis to understand how the systems were operating prior to the pandemic and to provide a baseline for understanding the market for transit service in each community.
- Rider, community, public, and stakeholder outreach was primarily conducted online. As with all transit planning processes, outreach is one component of many that go into the identification of needs, solutions, and recommendations.

### 2.3.1 Transit Demand and Economic Uncertainties

Notwithstanding COVID-19 pandemic-related disruptions, for many years, transit ridership has been stagnant or declining nationally (Figure 2).<sup>11</sup> This trend has accelerated in the past few years, with most systems – and bus transit in particular – experiencing steady declines in ridership, despite a historically good economy. The American Public Transportation Association (APTA) attributes the decline to four broad categories: erosion of time competitiveness, reduced affinity, erosion of cost competitiveness, and external factors.<sup>12</sup>

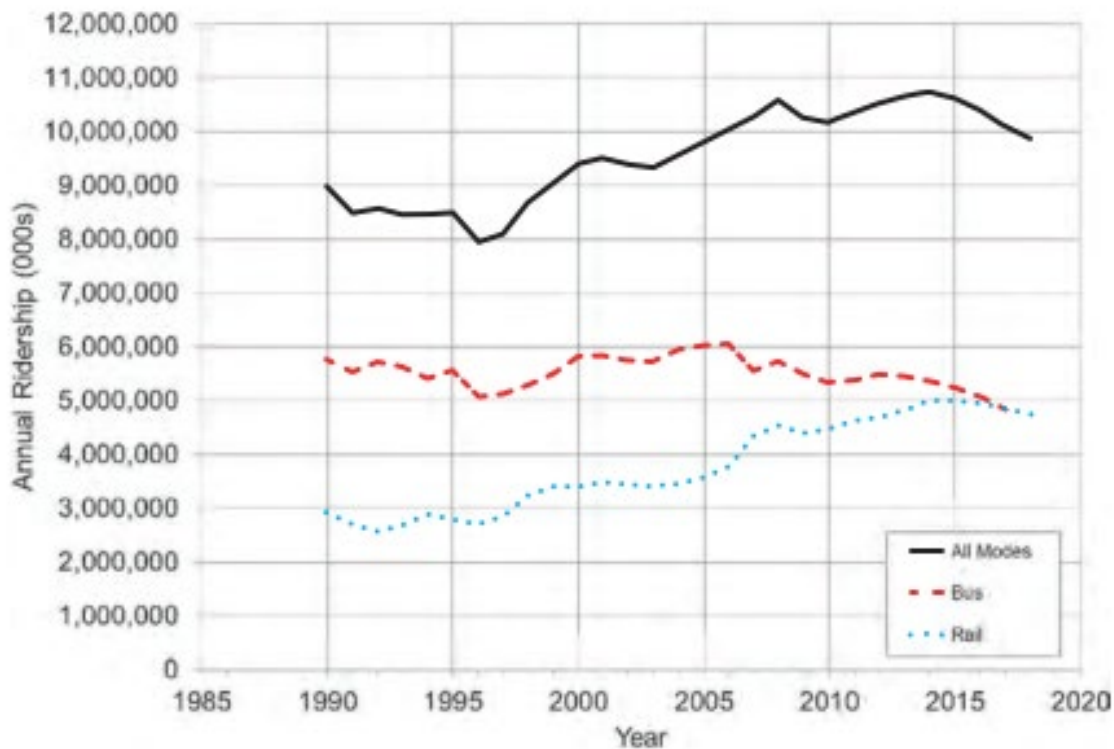
The erosion of time competitiveness is related to increasing traffic congestion and competing uses of street and curb space. Reduction in affinity refers to more competition for customer loyalty, and the erosion of cost competitiveness has to do with increasing costs without corresponding increase in demand for the service. And, finally, external factors are both the most challenging to define and to mitigate and include such things as policy changes that could improve transit usage but are too far-reaching for a transit agency alone to tackle.

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<sup>11</sup> National Academy of Science, Transportation Research Board, Transportation Cooperative Research Program, "TCRP Research Report 209: Analysis of Recent Public Transit Ridership Trends," <http://www.trb.org/TCRP/Blurbs/179912.aspx>.

<sup>12</sup> American Public Transportation Association (APTA), "Understanding Recent Ridership Changes," <https://www.apta.com/research-technical-resources/research-reports/understanding-recent-ridership-changes/>.

**Figure 2. National Change in Annual Ridership by Year for Bus, Rail, and All Modes (1990–2020)**



Source: TCRP Research Report 209, Analysis of Recent Public Transit Ridership Trends

It is uncertain whether the pre-pandemic downward trends in transit ridership in recent years combined with the pandemic's negative impact on transit ridership will become a longer-term pattern that will continue to depress transit usage. Pandemic trends potentially most impactful to LRTA include the increase in remote work and distance learning. Those trends could significantly impact the workforce and student ridership markets for commuter and express services as well as local routes that serve colleges and universities.

For all transit systems, including LRTA, public concern about the health impacts of shared-ride services will remain a challenge. While LRTA has instituted facial covering requirements, cleaning protocols, social distancing, and other mitigation measures, systems will also have to continue to reassure riders about the public health and safety of their services.

To monitor and lean into these trends and position the Authority for success, it will be critical for LRTA to use data tools to routinely analyze key system performance metrics and make service and financial decisions within the context of a performance-focused framework.



### 3. Agency Overview

Each of the Commonwealth's 15 RTAs operates in a unique context serving different geographic regions and mixes of urban, suburban, and rural communities, providing service tailored to the needs of their riders. This chapter provides an overview of LRTA that establishes the context for findings contained in this CRTP update.

#### 3.1 Transit Agency Background

LRTA was established in 1976 by the Massachusetts State Legislature to provide service to communities in the metropolitan Lowell region. Today, LRTA provides connections within Lowell and to surrounding communities, including Andover, Burlington, Billerica, Chelmsford, Dracut, Littleton, Tewksbury, Tyngsborough, Westford, and Wilmington. On an annual basis LRTA carries nearly 1.5 million passengers, traveling approximately 1.9 million miles and operating 135,000 revenue hours, with an operating budget of nearly \$12.4 million (Table 2).

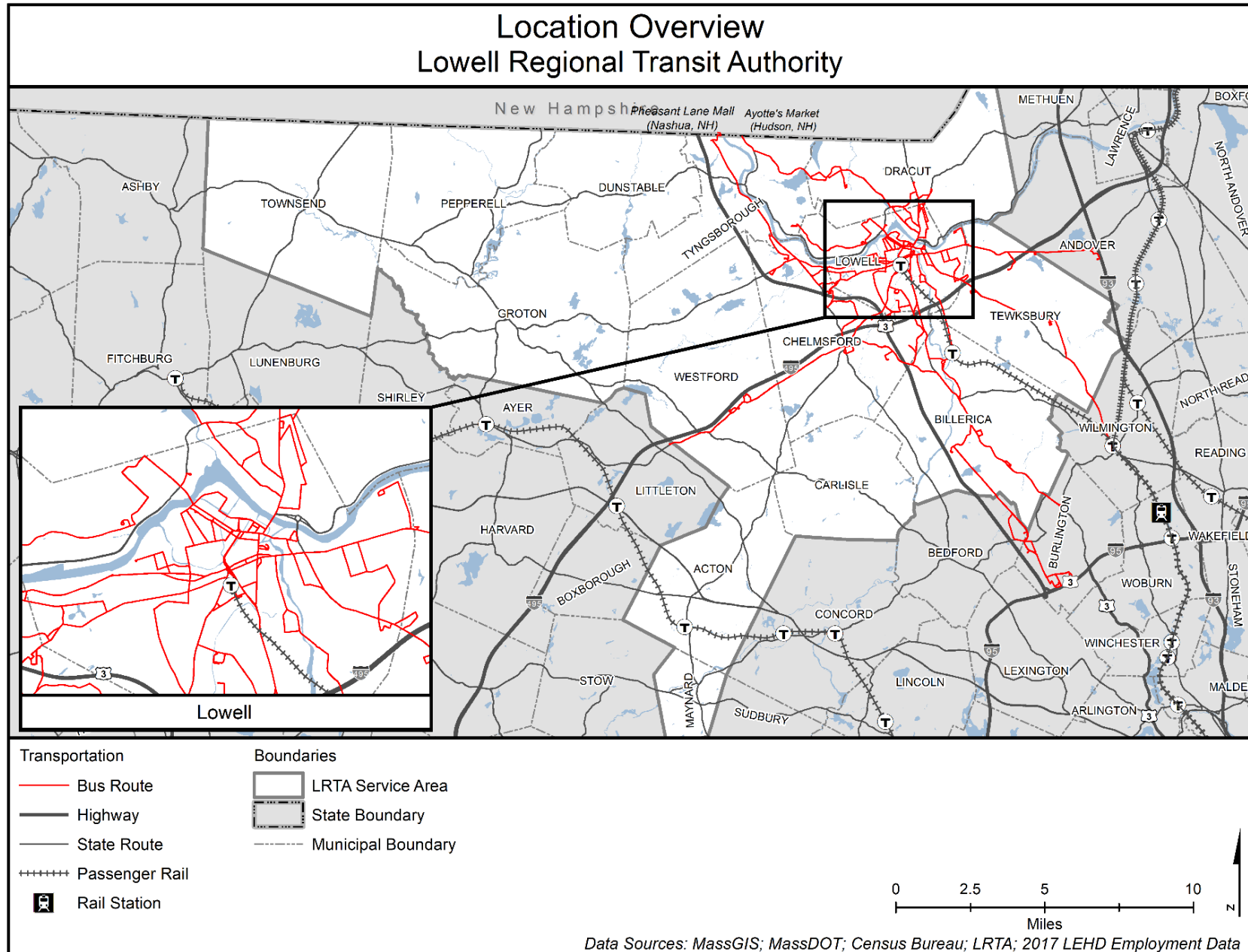
LRTA runs a hub-and-spoke system, with the intermodal Gallagher Terminal in Lowell serving as the terminus for all 19 routes (Figure 3). Fixed route service operates in an approximately 13.5-mile radius from the Gallagher Terminal. Additionally, LRTA ADA runs demand response service (called "Road Runner"). LRTA also supports some COAs by providing vans and funding for their Dial-A-Ride Senior Service and ADA demand response service outside of LRTA's fixed route service area.

With the exception of one seasonal route, all fixed route and demand response services operate every weekday. On weekends, LRTA runs a reduced schedule. Sunday service has been operated on a pilot basis using grant funding from the state but was interrupted as of the writing of this report by the COVID-19 pandemic. Headways vary depending on the route with some downtown routes operating every 15 minutes and suburban routes having 90-minute frequencies. Most routes run on an approximate 30- to 60-minute schedule. COA Dial-A-Ride service is available on weekdays only.

**Table 2. Statistics by Service (FY 2019)**

<b>FY 2019 Data</b>	<b>Fixed Route</b>	<b>% of Total</b>	<b>ADA Paratransit</b>	<b>% of Total</b>	<b>Demand Response (non-ADA)</b>	<b>% of Total</b>	<b>Total</b>
Ridership	1,370,690	92.6%	51,291	3.5%	58,598	3.9%	1,480,579
Revenue Miles	1,303,685	69.7%	332,482	17.8%	234,446	12.5%	1,870,613
Revenue Hours	89,341	66.4%	21,423	15.9%	23,807	17.7%	134,571

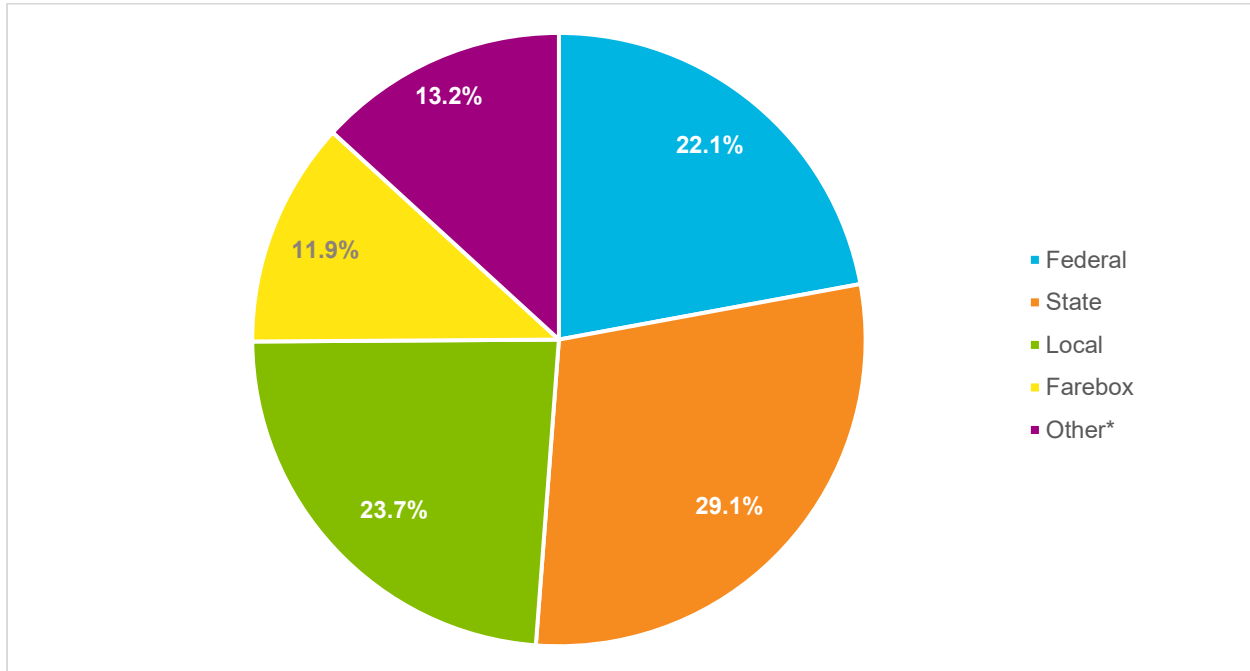
Figure 3. System Map



Source: LRTA

The largest source of LRTA's operating subsidy is provided by the Commonwealth of Massachusetts (29.1 percent), towns in the LRTA service area (23.7 percent), and the federal government (22.1 percent) (Figure 4). While fares are a significant source of operating revenue (11.9 percent), LRTA generates more operating revenue from the parking garage in the Gallagher Terminal, which is mainly used by MBTA Commuter Rail passengers.

**Figure 4. Operating Funding Sources (FY 2019)**



Source: 2019 LRTA Financial Statement

\*Includes revenue from Gallagher Terminal Parking Garage, advertising, rent, and other sources.

LRTA has a multilayered organizational structure (Table 5). It is governed by an Advisory Board comprised of members from the 14 communities in its service area. The Advisory Board is responsible for hiring the Administrator, passing the annual budget, and performing other duties as outlined in state law and Advisory Board bylaws. The Administrator is responsible for LRTA's day-to-day operations, including managing LRTA staff and its service providers. Massachusetts General Law prohibits LRTA from directly operating transit service; therefore, LRTA contracts out its fixed route operations to First Transit and First Transit Management of Lowell, Inc. Demand response service is contracted to MV Transportation and the Lowell Transit Management Corporation.

Figure 5. LRTA Organization Structure

# ***LRTA ORGANIZATION CHART***

## **LOWELL REGIONAL TRANSIT AUTHORITY --ADVISORY BOARD--**

**CHAIRMAN:** Thomas Bomil - Dracut**VICE CHAIRMAN:** P. Shea - Lowell**TREASURER:** M. Gowing - Acton**CLERK:** S. McCarthy - Pepperell**ACTON:** M. Gowing**GROTON:** J. Rider**TOWNSEND:** - D. Howard**BILLERICA:** A. Jennings**LOWELL:** P. Shea**TYNGSBOROUGH:** K. O'Connor**CHELMSFORD:** G. Dixon**MAYNARD:** G. Johnson**PEPPERELL:** S. McCarthy**DRACUT:** T. Bomil**DUNSTABLE:** D. Tully**TEWKSBURY:** M. Kratman**TOWNSEND:** T. Goddard**WESTFORD:** T. Ryan

**ADMINISTRATOR**  
**TAM ACCOUNTABLE EXECUTIVE**  
 David Bradley

**ASSISTANT**  
**ADMINISTRATOR**  
 Alexandria Bent

**ADMIN. ASSISTANT**  
 Patricia Gasper

**TRANSPORTATION**  
**COORDINATOR**  
 Kevin Drislane

**TRANSPORTATION**  
**COORDINATOR**  
 Graham Reich

**FINANCE:****FACILITIES:****MPO:****OPERATIONS:****CAPITAL:****LEGAL:**

Deputy  
 Kopelman & Paige  
 Int. Acctng  
 Roland Lambalot, P.C.  
 UniBank

LRTA  
 First Transit of Lowell

NMCOG

First Transit of Lowell  
 Lowell Transit Corp.  
 Councils

Admin.  
 Staff  
 Operations  
 FTA  
 MA Dot

## 3.2 Mission

LRTA recognizes its role in improving the lives of the people who live and work in the greater Lowell region. The LRTA website states that its mission is to provide convenient, comfortable, safe, reliable, cost-effective mobility services contributing to the economic vitality of the region.

## 3.3 Goals and Objectives

This 5-year CRTP is an opportunity for LRTA to position itself for the future. Goal setting is an iterative process wherein LRTA takes stock of the completed and outstanding goals from previous plans and creates new goals that respond to the needs of the coming 5 years. In consultation with members of the community, local and state leaders, past plans, and other stakeholders, LRTA identified the following goals and objectives for the coming 5 years:

- Mitigate impacts of the Thorndike Street Reconstruction project on LRTA service.
- Continue to work with University of Massachusetts-Lowell and other universities in the service area to align LRTA service with universities' needs.
- Form partnerships with large employers to provide transit service to employees working off-peak hours or when there is currently no service (perhaps through demand response service).
- Look into the feasibility of additional LRTA hubs in the service area (e.g., Burlington, Bedford).
- Increase transit service along the Route 3 corridor.
- Expand service hours if warranted.
- Investigate expanding service coverage in areas with new multi-family residential development.
- Continue progress in expanding data-driven decision making.

## 4. Transit Service Overview (FY 2015–FY 2019)

LRTA provides service to Lowell and its surrounding suburbs. LRTA is a hub and spoke system, with the Gallagher Terminal serving as the terminus for every route in the system. The Terminal, which is located just west of Lowell's central business district, also serves as the final stop for MBTA's Lowell Line Commuter Rail service to North Station in Boston (Figure 6 and Figure 7).

LRTA's fixed route service area extends roughly 15 miles to the north and south of the Terminal and 12 miles to the east and west, and includes the following towns: Billerica, Burlington, Chelmsford, Dracut, Lowell, Tewksbury, Tyngsborough, and Westford. LRTA provides ADA demand response service, called Road Runner, for eligible individuals within a  $\frac{3}{4}$  mile buffer of fixed routes. LRTA also provides COAs in the service area with vans and operating funds to provide Dial-A-Ride Senior Service and ADA demand response service to towns without fixed route service. The following COAs have partnerships with LRTA: Acton, Billerica, Carlisle, Chelmsford, Dracut, Groton, Lowell, Maynard, Pepperell, Tewksbury, Townsend, Tyngsborough, and Westford.

This section focuses on service provided by LRTA between FY 2015 and FY 2019 and does not include information for FY 2020. As with all transit providers across the country, and as detailed in Chapter 2, the pandemic has had significant impacts on LRTA ridership. Service statistics from FY 2020 can be found in Chapter 6.

### 4.1 Description of Existing Services

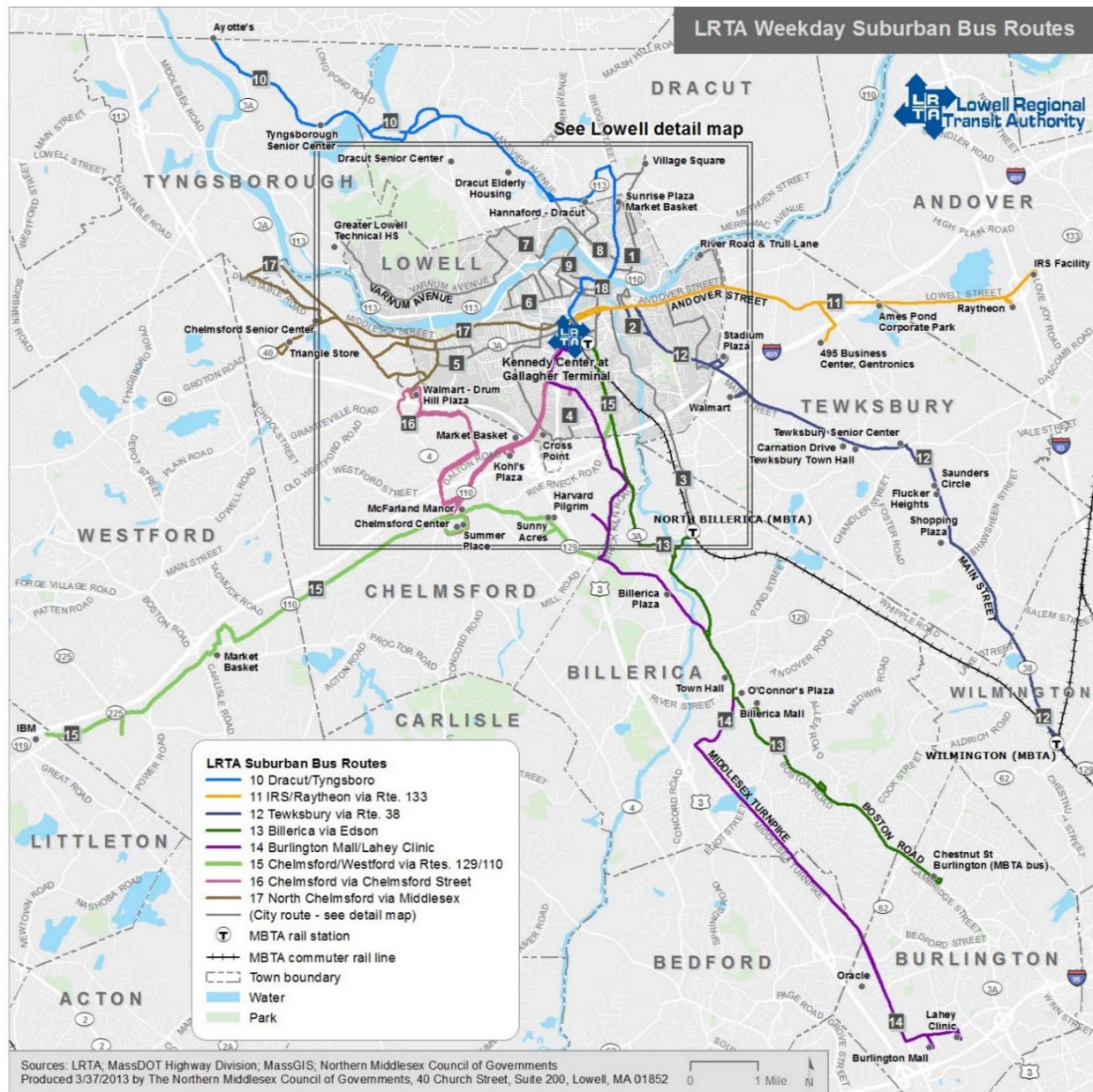
LRTA operates 19 routes with regular weekday service and some Saturday service, including three combo routes created from six city routes with lower ridership (Table 3). LRTA is piloting Sunday service for some routes, including frequent service on a shuttle that serves downtown Lowell. Sunday service was offered on 10 routes for 9 months effective June 2019 using a discretionary grant from MassDOT. Due to the COVID-19 pandemic, Sunday service was paused between April and August 2020, severely impacting ridership. LRTA is planning on extending the pilot through the end of FY 2021 with a discretionary grant, at which time LRTA will evaluate the service.

#### 4.1.1 LRTA Route Descriptions

LRTA uses two classifications to describe its fixed route service: Suburban Routes and City Routes. With a few exceptions, City Routes serve Lowell exclusively. LRTA's Suburban Routes serve a variety of trip generators, including MBTA Commuter Rail stations, senior living facilities, hospitals, shopping centers, and large employers (including IBM, the Internal Revenue Service, and Raytheon).

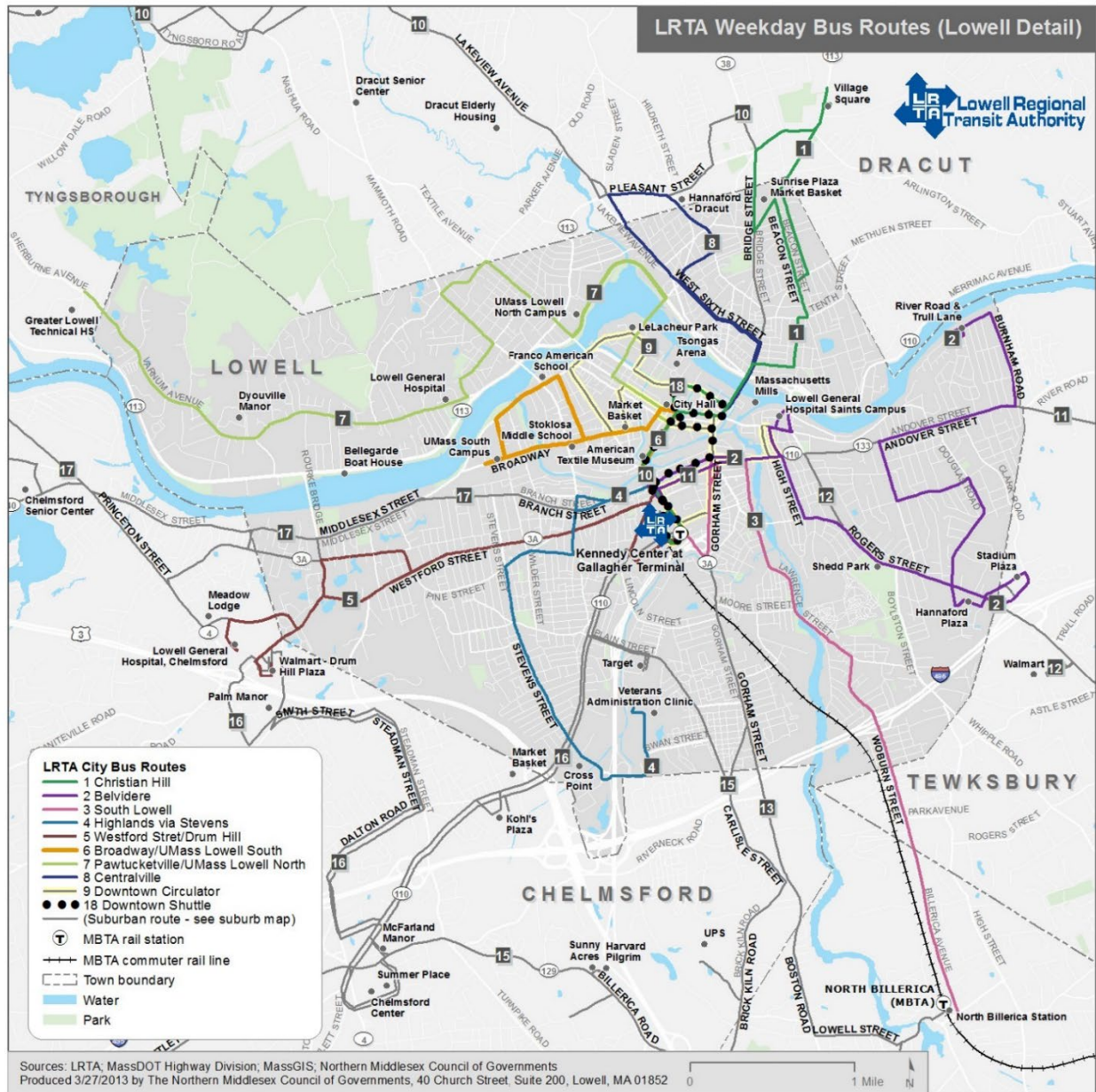


Figure 6. System Map



Source: LRTA

Figure 7. System Map (Lowell Detail)



Source: LRTA

Table 3. Service Overview

Route	Service Type	Description
Route 1 - Christian Hill	City Route	North-south route between Gallagher Terminal to Village Square in Dracut
Route 2 - Belvidere	City Route	East-west route between Gallagher Terminal and Belvidere via Stadium Plaza in Tewksbury
Route 3 - South Lowell	City Route	North-south route between Gallagher Terminal and North Billerica MBTA commuter rail station



Route	Service Type	Description
Route 4 - Highlands via Stevens	City Route	North-south route between Gallagher Terminal and the Lowell VA Clinic via Stevens Street
Route 5 - Westford Street	City Route	East-west route between Gallagher Terminal and Drum Hill Shopping Center via Lowell General Hospital Chelmsford
Route 6 - Broadway - UML South	City Route	Connects Gallagher Terminal to UMass-Lowell South Campus via Lord Manor
Route 7 - Pawtucketville	City Route	Connects Gallagher Terminal to Greater Lowell Technical High School via UMass-Lowell North Campus
Route 8 - Centralville	City Route	North-south route between Gallagher Terminal and the Dracut Hannaford via downtown Lowell
Route 9 - Circulator	City Route	Circulator serving downtown Lowell
Route 10 - Dracut / Tyngsborough	Suburban	Service between Gallagher Terminal and the New Hampshire border with Tyngsborough via Dracut High School
Route 11 - IRS / Rte 133	Suburban	East-west commuter shuttle between Gallagher Terminal and IRS/Raytheon
Route 12 - Tewksbury / Rte 38	Suburban	Service between Gallagher Terminal and the Wilmington MBTA Station via Tewksbury State Hospital
Route 13 - Billerica via Rte 3A	Suburban	North-south service between Gallagher Terminal and Chestnut Avenue, Burlington
Route 14 - Burlington / Lahey	Suburban	North-south service between Gallagher Terminal and Lahey Hospital and Burlington Mall
Route 15 - Westford via Rte 129	Suburban	East-west service between Gallagher Terminal and IBM Littleton
Route 16 - Chelmsford Center	Suburban	Connects Gallagher Terminal and Drum Hill Shopping Center via Chelmsford Town Center Plaza
Route 17 - North Chelmsford	Suburban	East-west service between Gallagher Terminal and Chelmsford Senior Center via Mission Road and Lowell General Hospital Chelmsford
Route 18 - Downtown Shuttle	City Route	Short circulator route connecting Gallagher Terminal and Lowell High School
Route 19 - Pheasant Lane	Suburban Seasonal	Seasonal route connecting Gallagher Terminal and Pheasant Lane Mall during winter holidays
Route 20 - Downtown/UMass Lowell North	City Route	Connects UMass Inn and Conference Center and UMass-Lowell North Campus

Route	Service Type	Description
Route 03/04 Combo	City Route	Combined route providing Saturday service to Routes 3 and 4
Route 06/09 Combo	City Route	Combined route providing Saturday service to Routes 6 and 9
Route 01/08 Combo	City Route	Combined route providing Saturday service to Routes 1 and 8
Road Runner	Demand Response	Paratransit service that includes some (4 percent or 5 percent of rides) elderly service for medical transport only.
Council on Aging	Demand Response	Senior transit in towns without fixed route service provided through the Councils of Aging

Source: LRTA

#### 4.1.2 Service Hours

Fixed route and ADA demand response service is operated between 5:30 AM and 9:24 PM on weekdays, 7:00 AM and 7:00 PM on Saturdays, and 10:00 AM and 5:45 PM on Sundays (Table 4). Dial-A-Ride service provided by the COA is available between 8:00 AM and 3:00 PM on weekdays only. With the exception of the Pheasant Lane Mall shuttle (operated during winter holidays only), all routes have weekday service.

Saturday service is available on all but two routes, which have limited service generally, only operating during AM/PM peaks on the weekdays; six routes that operate independently on weekdays are consolidated into three combo routes on Saturdays.

All the service offered on Sundays is through the 9-month pilot service that began in mid-June 2019 and was slated to extend another 9 months pre-COVID-19. After pausing the pilot during the early months of the pandemic, Sunday service was reinstated in August 2020.

**Table 4. Span of Service Hours**

Route	Service Type	Weekday	Saturday	Sunday*
Route 1 - Christian Hill	City Route	6:00 AM–7:31 PM	Becomes Combo Route (see Route 01/08)	No service
Route 2 - Belvidere	City Route	6:15 AM–9:20 PM	7:45 AM–6:55 PM	10:00 AM–5:30 PM
Route 3 - South Lowell	City Route	5:55 AM–7:21 PM	Becomes Combo Route (see Route 03/04)	No service
Route 4 - Highlands via Stevens	City Route	5:55 AM–7:00 PM	Becomes Combo Route (see Route 03/04)	No service
Route 5 - Westford Street	City Route	6:00 AM–8:48 PM	7:45 AM–6:27 PM	10:00 AM–5:20 PM

Route	Service Type	Weekday	Saturday	Sunday*
Route 6 - Broadway - UML South	City Route	6:05 AM–6:16 PM	8:00 AM–5:39 PM (see Route 06/09)	No service
Route 7 - Pawtucketville	City Route	5:50 AM–9:24 PM	7:45 AM–6:49 PM	10 AM–5:30 PM
Route 8 - Centralville	City Route	6:10 AM–8:14 PM	Becomes Combo Route (see Route 01/08)	No service
Route 9 - Circulator	City Route	6:10 AM–8:58 PM	Becomes Combo Route (see Route 06/09)	No service
Route 10 - Dracut / Tyngsborough	Suburban	6:10 AM–8:10 PM	8:30 AM–6:56 PM	10:00 AM–4:40 PM
Route 11 - IRS / Rte 133	Suburban	AM/PM peak only	No service	No service
Route 12 - Tewksbury / Rte 38	Suburban	6:45 AM–8:39 PM	7:00 AM–6:24 PM	10:00 AM–4:45 PM
Route 13 - Billerica via Rte 3A	Suburban	6:30 AM–7:48 PM	7:30 AM–5:48 PM	10:00 AM–4:45 PM
Route 14 - Burlington / Lahey	Suburban	6:00 AM–8:45 PM	8:00 AM–6:40 PM	10:00 AM–5:00 PM
Route 15 - Westford via Rte 129	Suburban	6:00 AM–8:45 PM	8:00 AM–6:30 PM	10:00 AM–4:45 PM
Route 16 - Chelmsford Center	Suburban	6:15 AM–8:58 PM	8:00 AM–6 PM	10:00 AM–4:45 PM
Route 17 - North Chelmsford	Suburban	6:00 AM–7:46 PM	7:55 AM–6:40 PM	No service
Route 18 - Downtown Shuttle	City Route	5:30 AM–9:30 PM	7:15 AM–7:00 PM	10:00 AM–5:45 PM
Route 19 - Pheasant Lane	Suburban Seasonal	No service	9:30 AM - 5:55 PM	No service
Route 20 - Downtown/ UMass Lowell North	City Route	7:00 AM–11:00 AM	No service	No service
Route 03/04 Combo	City Route	6:15 AM–9:20 PM	8:00 AM–5:49 PM	No service

Route	Service Type	Weekday	Saturday	Sunday*
Route 06/09 Combo	City Route	5:55 AM–7:21 PM	8:00 AM–5:39 PM	No service
Route 01/08 Combo	City Route	5:55 AM–7:00 PM	8:00 AM–5:32 PM	No service
Road Runner Demand Response	Demand Response	5:30 AM–9:24 PM	7:00 AM–7:00 PM	10:00 AM–5:45 PM
COA Demand Response	Demand Response	8:00 AM–2:30 PM	No service	No service

Source: LRTA

\*Pilot service suspended April 2020 and reinstated August 2020 due to COVID-19.

### 4.1.3 Service Frequency

Of the 19 routes with weekday service, two do not have regular headways (Route 8 - Centralville and Route 16 - Chelmsford Center) and two only run during the morning and evening peaks (Route 11 - IRS / Rte 133 and Route 20 - Downtown/ UMass Lowell North). The other 15 routes operate all day with varying frequencies (Table 5).

The Downtown Shuttle has 15-minute headways, which decrease to 30-minute headways after 7:30 PM. The remaining routes are split between 30- and 60-minute frequencies (28.5 percent and 57 percent, respectively) aside from two outliers with 40- and 90-minute frequencies.

The Suburban Routes all have 60-minute headways. Saturday and Sunday service runs less frequently, with nearly all routes (82 percent) having 60-minute headways. The Downtown Shuttle switches to all-day 30-minute headways on the weekends.

**Table 5. Frequency of Service (Minutes)**

Route	Service Type	Weekday	Saturday	Sunday
Route 1 - Christian Hill	City Route	60	Becomes Combo Route (see bottom of chart)	No service
Route 2 - Belvidere	City Route	30	60	60
Route 3 - South Lowell	City Route	60	Becomes Combo Route (see bottom of chart)	No service
Route 4 - Highlands via Stevens	City Route	60	Becomes Combo Route (see bottom of chart)	No service
Route 5 - Westford Street	City Route	30	60	60
Route 6 - Broadway - UML South	City Route	30	Becomes Combo Route (see bottom of chart)	No service

Route	Service Type	Weekday	Saturday	Sunday
Route 7 - Pawtucketville	City Route	30	60	60
Route 8 - Centralville	City Route	No regular headways	Becomes Combo Route (see bottom of chart)	No service
Route 9 - Circulator	City Route	40	Becomes Combo Route (see bottom of chart)	No service
Route 10 - Dracut / Tyngsborough	Suburban	60	60	60
Route 11 - IRS / Rte 133	Suburban	60	No service	No service
Route 12 - Tewksbury / Rte 38	Suburban	60	60	60
Route 13 - Billerica via Rte 3A	Suburban	60	60	90
Route 14 - Burlington / Lahey	Suburban	60	60	60
Route 15 - Westford via Rte 129	Suburban	90	90	90
Route 16 - Chelmsford Center	Suburban	No regular headways	60	90
Route 17 - North Chelmsford	Suburban	60	60	No service
Route 18 - Downtown Shuttle	City Route	15 (30 minutes after 7:30 PM)	30	30
Route 19 - Pheasant Lane	Suburban Seasonal	No Service	90	No service
Route 20 - Downtown/ UMass Lowell North	City Route	20	No service	No service
Route 03/04 Combo	City Route	No service	60	No service
Route 06/09 Combo	City Route	No service	60	No service
Route 01/08 Combo	City Route	No service	60	No service

Route	Service Type	Weekday	Saturday	Sunday
Road Runner Demand Response	Demand Response	NA	60	No service
COA Demand Response	Demand Response	NA	60	No service

Source: LRTA

#### 4.1.4 Operating Funding

LRTA's operating subsidy is provided through state contract assistance from the Commonwealth (29.1 percent), service assessments from towns in the LRTA service area (23.7 percent), and the federal government (22.1 percent) in the form of Section 5307 urbanized area formula grants (Table 6). LRTA generates over half of its non-subsidy operating revenue from parking garages that the Authority operates with 99-year leases from MBTA: Gallagher Terminal garage at the Lowell MBTA commuter rail station, which is adjacent to LRTA's hub, and the North Billerica garage at the North Billerica MBTA commuter rail station, both of which are mainly used by MBTA Commuter Rail passengers (Table 7).

**Table 6. Operating Funding Sources (FY 2017–FY 2019)**

Funding Source	FY 2017	%	FY 2018	%	FY 2019	%
Federal	\$2,441,536	21.0%	\$2,680,304	22.5%	\$2,738,871	22.1%
State	\$3,608,306	31.1%	\$3,537,901	29.7%	\$3,608,306	29.1%
Local	\$2,778,960	23.9%	\$2,860,434	24.0%	\$2,931,945	23.7%
Farebox	\$1,301,349	11.2%	\$1,326,599	11.1%	\$1,468,715	11.9%
Partnerships/ contracts	\$0	0.0%	\$0	0.0%	\$0	0.0%
Other*	\$1,478,612	12.7%	\$1,493,508	12.6%	\$1,631,232	13.2%
<b>TOTAL</b>	<b>\$11,608,763</b>	<b>100.0%</b>	<b>\$12,235,827</b>	<b>100.0%</b>	<b>\$12,379,069</b>	<b>100.0%</b>

Source: LRTA

\*Includes revenue from Gallagher Terminal Parking Garage, advertising, rent, and other sources.

**Table 7. Other Funding Sources (FY 2019)**

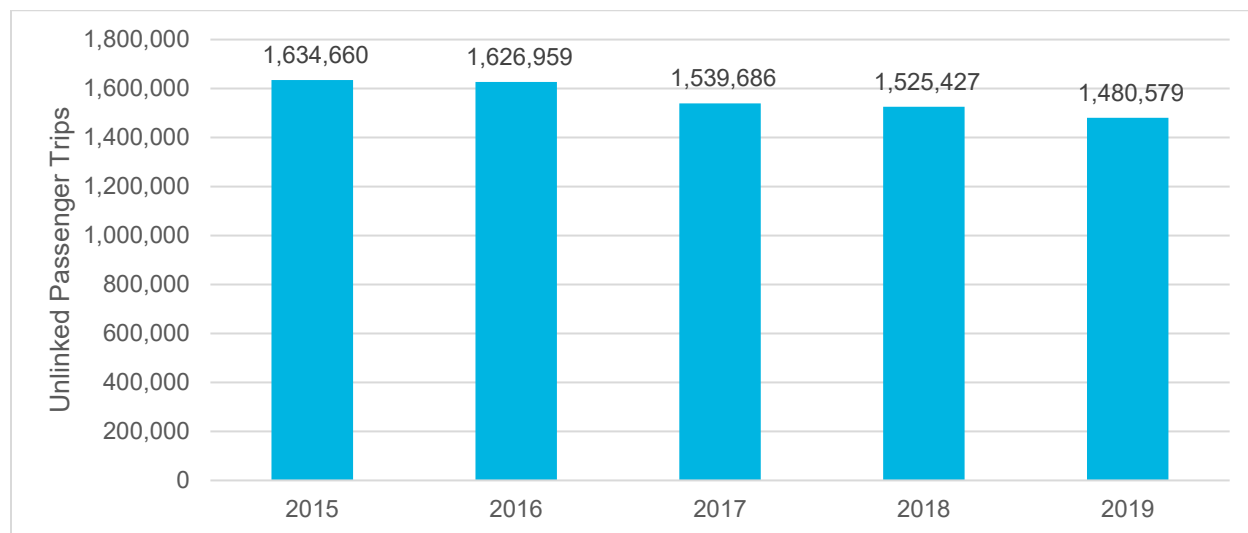
Funding Source	FY 2019	%
Gallagher Terminal Parking Garage	\$964,183	59.1%
North Billerica Parking Garage	\$399,376	24.5%
Sales Proceeds	\$25,276	1.5%
Advertising Revenue	\$77,015	4.7%
Administrative Revenue	\$112,276	6.9%

<b>Funding Source</b>	<b>FY 2019</b>	<b>%</b>
Other Income	\$53,106	3.3%
<b>TOTAL</b>	<b>\$1,631,232</b>	<b>100.0%</b>

## 4.2 Ridership and Service Operations

Like many other transit agencies, LRTA's system ridership has declined over the last 5 years (Figure 8).

**Figure 8. Annual System Ridership Trends (FY 2015–FY 2019)**

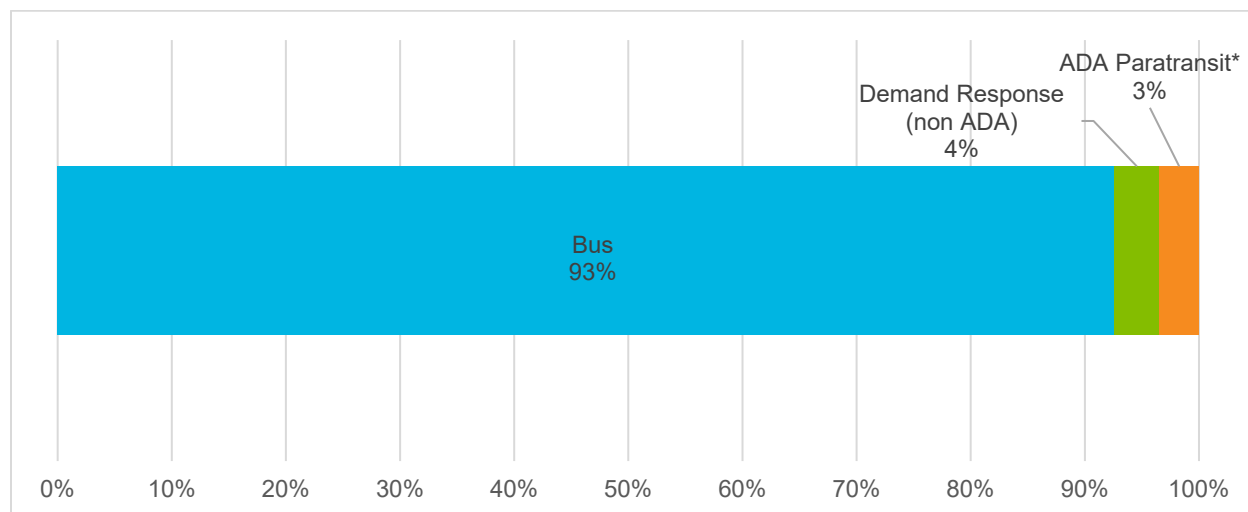


Source: LRTA, MassDOT

### 4.2.1 Fixed Route Service

The majority (93 percent) of trips taken in LRTA's system are on its fixed route service (Figure 9). This can often result in a more financially efficient service, as fixed route trips tend to be much less expensive to operate than door-to-door demand response service.

**Figure 9. Ridership Breakdown by Service Type (FY 2019)**

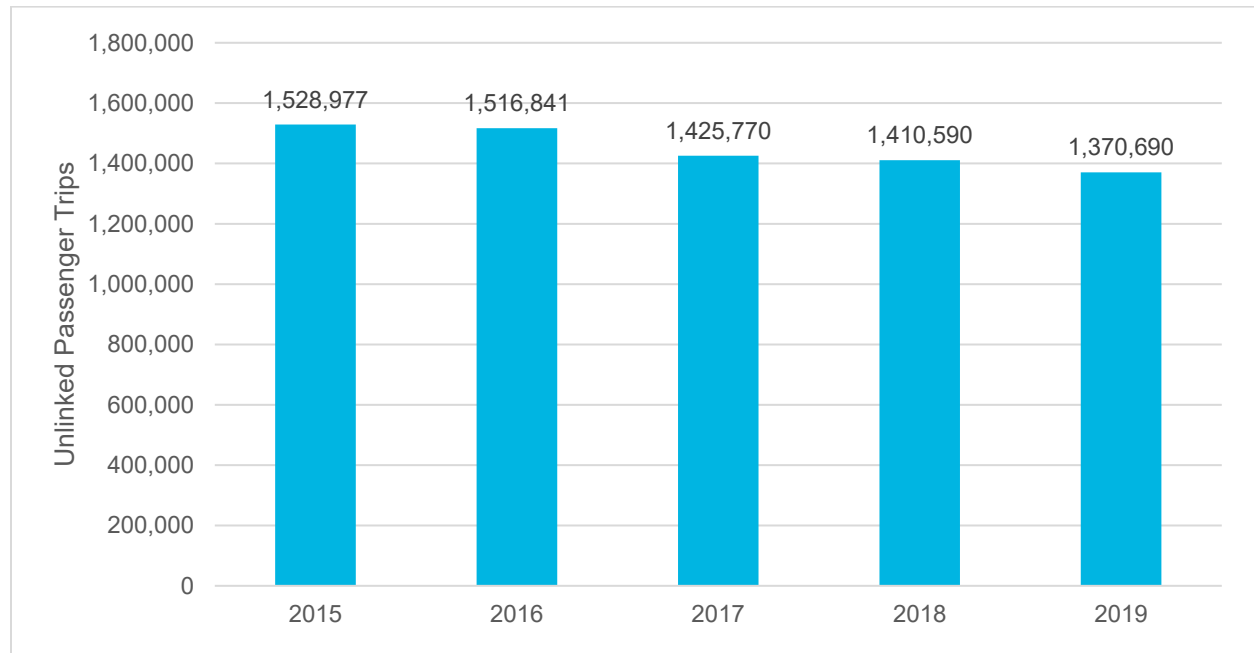


Source: LRTA

*\*4% - 5% of ADA trips are incidental trips of seniors traveling for medical purposes.*

As with many systems in the Commonwealth and the nation, and consistent with its overall ridership trend, LRTA has seen fixed route ridership declines during the 5-year period of this analysis (Figure 10).

**Figure 10. Annual Ridership Fixed Route (FY 2015–FY 2019)**



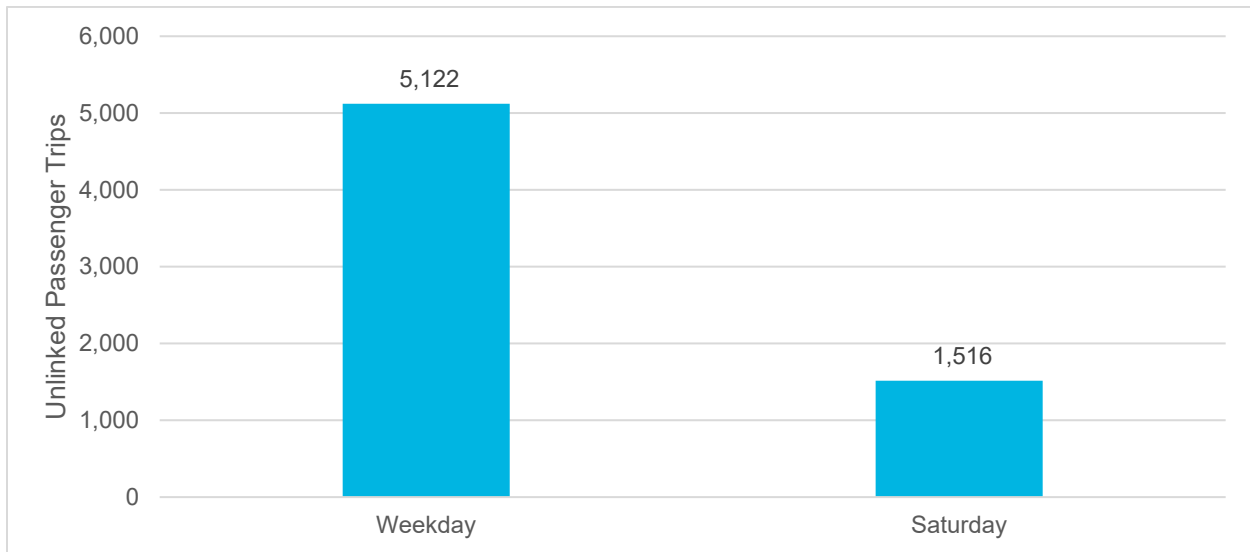
Source: LRTA, NTD, MassDOT

#### 4.2.1.1 Fixed Route Ridership Profile

System ridership consistently peaks in October, dipping in the summer months. The decline in summer ridership is likely due to most students being out of school. In 2019, student passes, including high school students and younger, as well as students at UMass-Lowell, made up 16.3 percent of all fares.

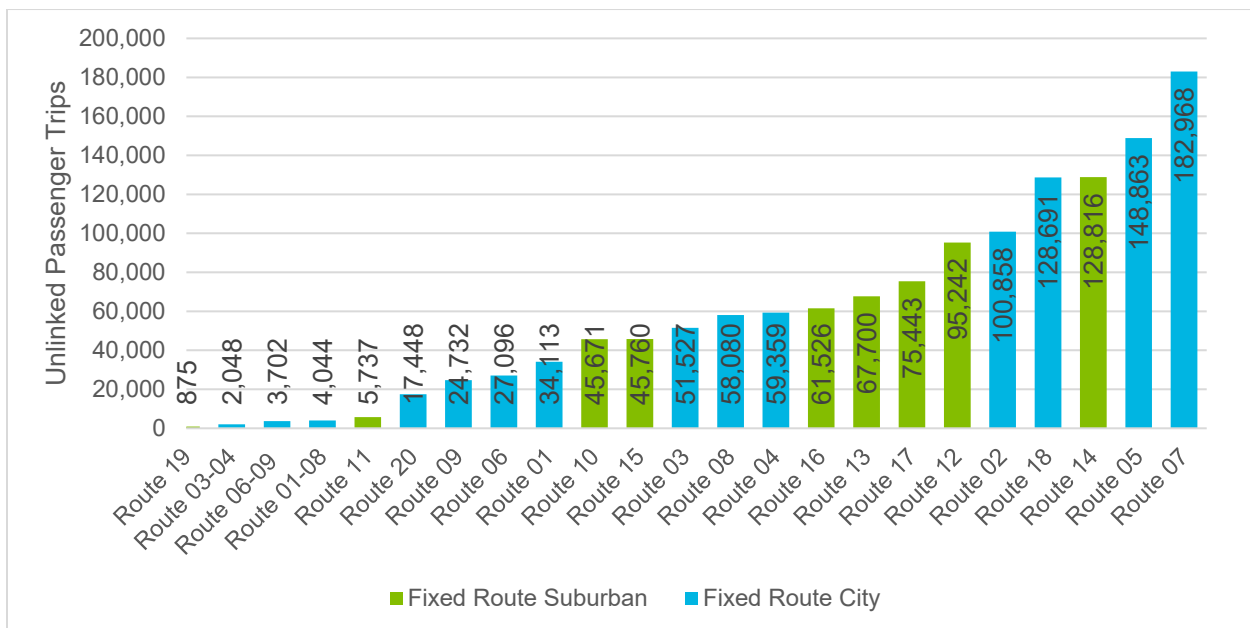
Saturday ridership is roughly one-third that of weekday ridership (Figure 11). Sunday service is a pilot service and is not included in this analysis.



**Figure 11. Fixed Route Average Daily Ridership (FY 2019)**

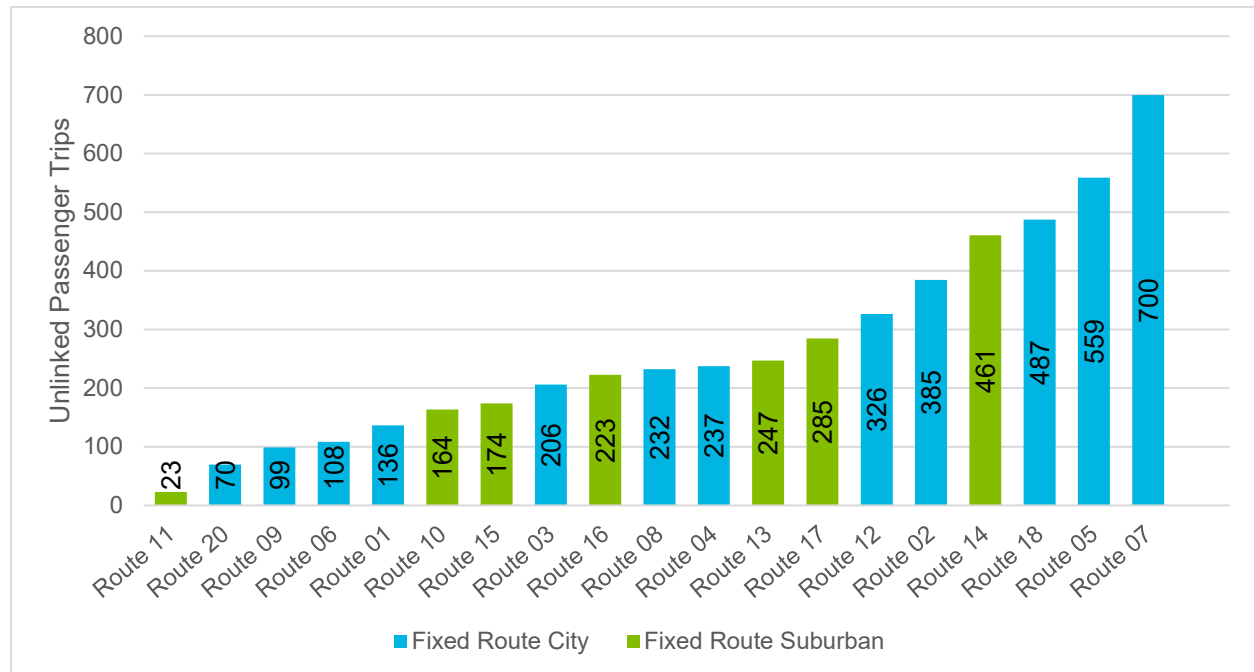
Source: LRTA

City Routes generally have higher ridership than Suburban Routes. Route 7, which serves UMass-Lowell's North Campus and Greater Lowell Technical High School, has the highest ridership of any route (Figure 12). However, excluding the combo routes (which are Saturday only), some City Routes also have relatively low ridership, such as Route 20, which, like most of the other routes with lower ridership, has limited service.

**Figure 12. Annual Ridership by Route (FY 2019)**

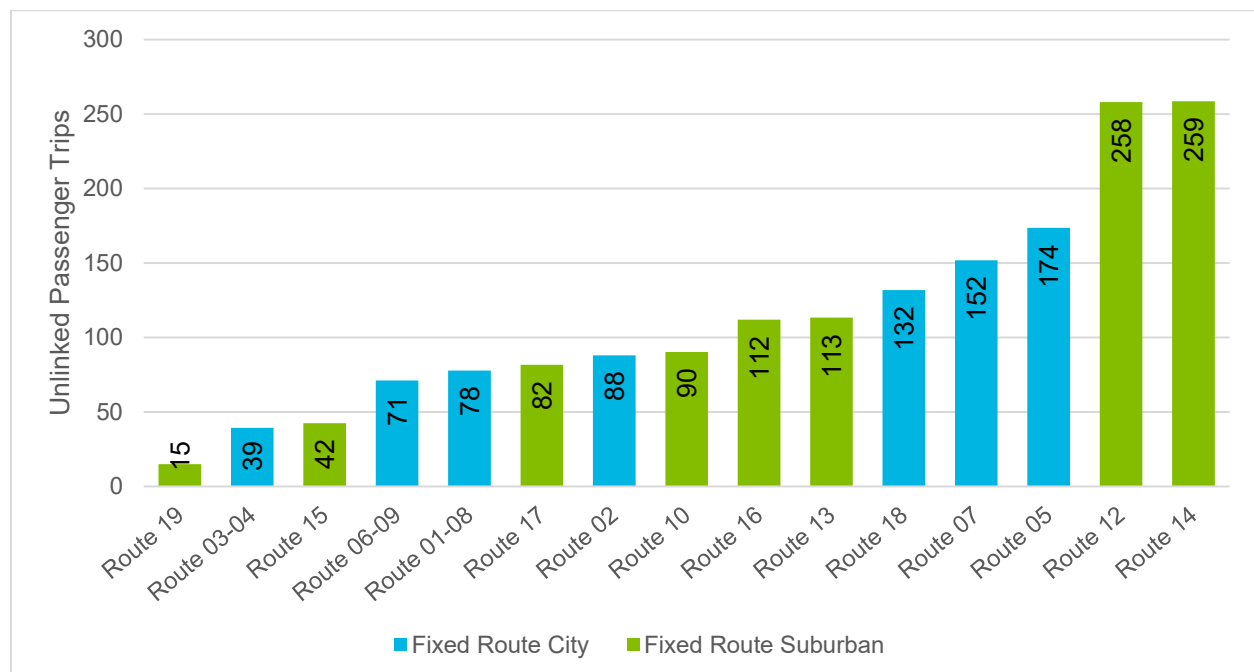
Source: LRTA

Weekday ridership is reflective of overall ridership trends, with Routes 7 and 5 being the highest performing routes (Figure 13). This likely is due to the majority of ridership across the system occurring Monday through Friday.

**Figure 13. Average Weekday Ridership by Route (FY 2019)**

Source: LRTA

On Saturdays, the Suburban Routes have better ridership performance (Figure 14). Routes 12 and 14 have the highest Saturday ridership, likely in part due to the students not using Route 7 during the weekend. The Combo Routes are among the lowest-performing routes on Saturdays, which combine service on weekday routes into longer Saturday-only routes. Route 03-04 is the worst performing combo route, despite Routes 3 and 4 performing relatively well individually on weekdays. Moving forward, LRTA will review Combo Route performance, along with other routes, more frequently and will explore options (e.g., microtransit) for how to continue to provide this historically challenging but important service.

**Figure 14. Average Saturday Ridership by Route (FY 2019)**

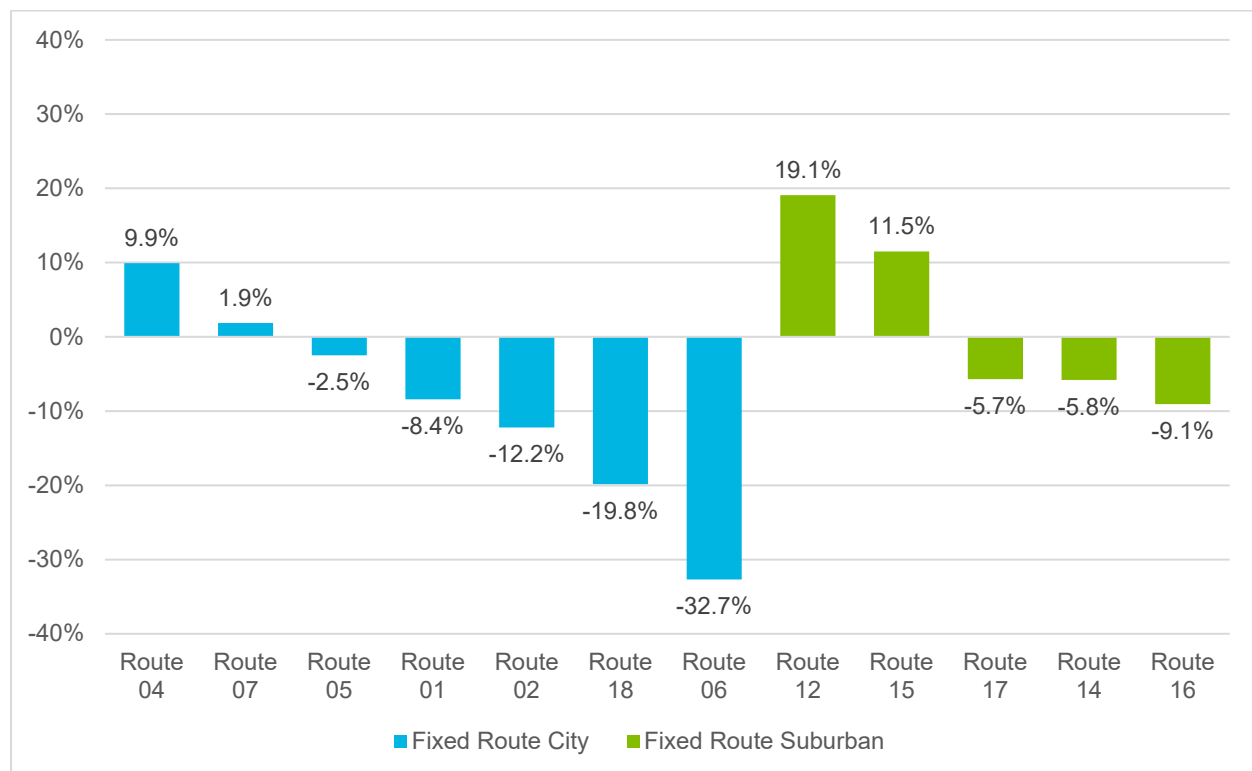
Source: LRTA

Some routes have ridership data available from the 2015 RTP, including Routes 18, 17, 16, 15, 14, 12, 7, 6, 5, 4, 2, and 1. Overall ridership has dropped 10.4 percent since 2015, which is reflected in ridership at the route level, with 66.6 percent of applicable routes experiencing declines (Figure 15). More City Routes have experienced ridership declines than Suburban Routes (71 percent and 60 percent, respectively). Route 6 (a City Route) has seen the steepest ridership decline of any route in the past 5 years with a 32.7 percent drop; construction on the Pawtucket and Broadway Street bridges have impacted operations and ridership on the route for three of the past 5 years. LRTA is optimistic the route will perform better moving forward.

Long-term construction in Lowell is not the only factor impacting City Routes—the population is also changing in some areas. For instance, the neighborhood of Belvidere has historically been home to many students, but the area has become more affluent in recent years, impacting ridership on Route 2. Moving forward, LRTA will monitor route performance on a more regular basis as described in Chapter 6 and adjust service as external factors like development, construction, and demographic changes affect ridership demand across the system.

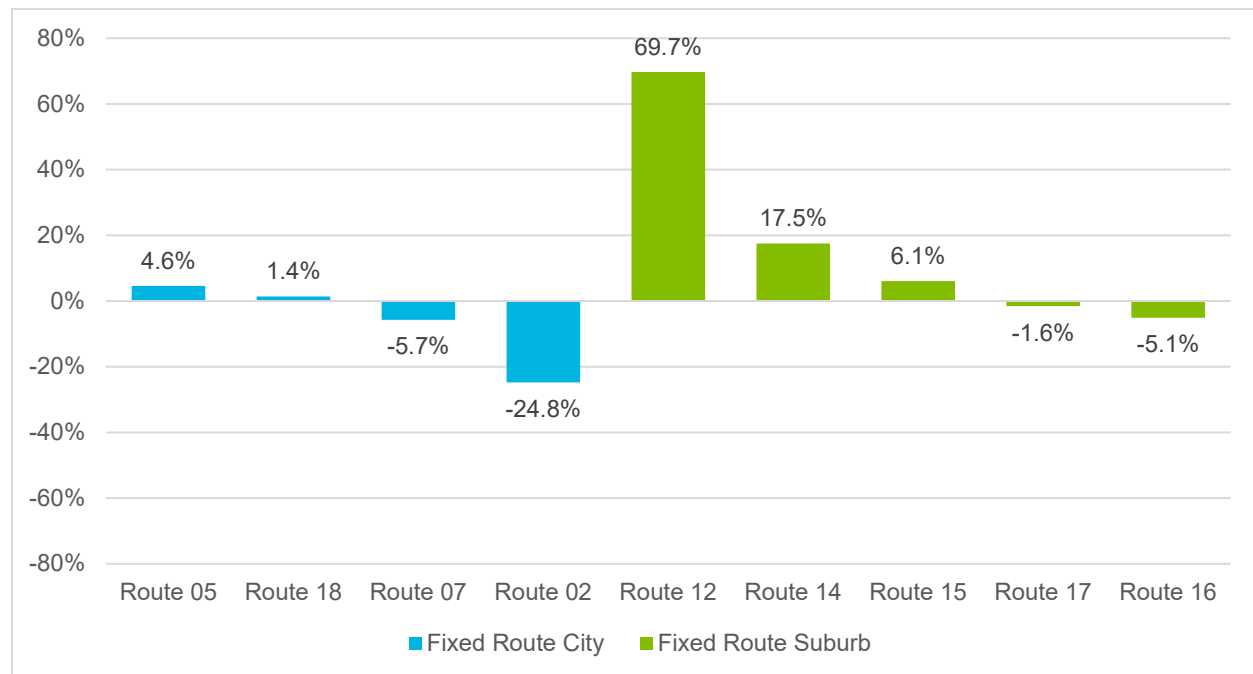
Routes 4, 7, 12, and 15 have demonstrated growth since 2015. Route 12 (a Suburban Route) has had the highest rate of ridership growth of any weekday route, increasing nearly 20 percent in the past 5 years. This is likely due to additional service on the route, including added frequency (headways have been reduced from 90 to 60 minutes) and extending service 1 hour in the evenings from 6:00 PM to 7:00 PM. Additional trip generators (commercial developments) along the Route 12 corridor (State Route 38) in Tewksbury have also boosted ridership.

**Figure 15. Weekday Average Ridership Change by Route (FY 2015–FY 2019)**



Source: LRTA

Route 12 also has the largest increase in ridership of any Saturday service (Figure 16). Ridership grew much more than any other route with a 69.7 percent increase. Route 2's ridership decreased the most dramatically on Saturdays (24.8 percent).

**Figure 16. Saturday Average Ridership Change by Route (FY 2015–FY 2019)**

Source: LRTA

#### 4.2.1.2 Fixed Route Ridership, Hours, Miles, and Operating Cost

Fixed route revenue hours and miles have remained relatively flat over the last 5 years, peaking in FY 2016 with slight declines in subsequent years (1.9 percent and 2.6 percent, respectively) while ridership has declined (Table 8). Despite a decrease in revenue hours and miles over the last 5 years, operating costs increased 11.3 percent over the same period with the largest increase occurring between FY 2018 and FY 2019 (7.6 percent).

**Table 8. Annual Fixed Route Operating Statistics (FY 2015–FY 2019)**

Operating Statistic	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	% Change 2015–2019
Ridership	1,528,977	1,516,841	1,425,770	1,410,590	1,370,690	-10.3%
Revenue Hours	89,799	91,091	91,063	89,981	89,341	-0.1%
Revenue Miles	1,306,807	1,338,395	1,336,862	1,312,648	1,303,685	-0.2%
Operating Cost	\$6,990,927	\$7,150,566	\$7,272,290	\$7,400,042	\$7,961,140	+13.9%

Source: NTD, LRTA

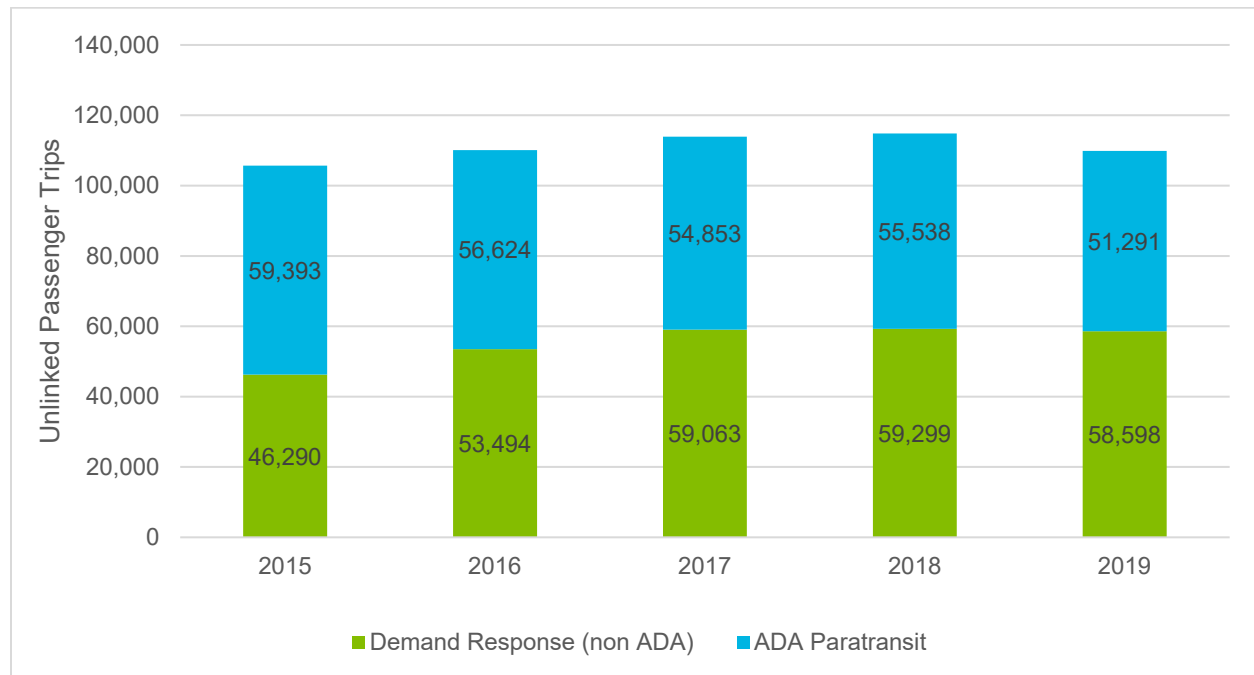
#### 4.2.2 Demand Response Service

There are two demand response services in the Lowell region, “Dial-A-Ride” Senior Van Service (operated by municipal COAs in LRTA’s service area) and federally required “Road Runner” complementary ADA paratransit (operated by LRTA). LRTA reports operating information from these separately.

#### 4.2.2.1 Demand Response Ridership Profile

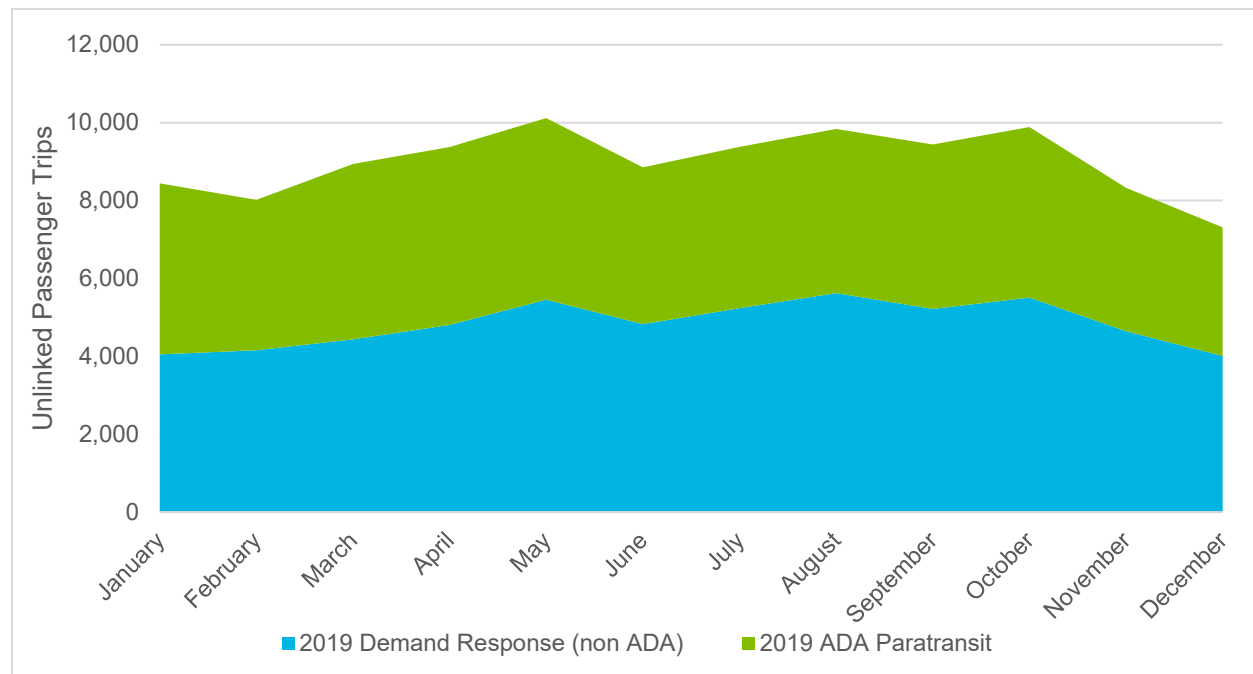
The COA non-ADA Dial-A-Ride services serve slightly more passengers than Road Runner ADA demand response. Given that the COAs provide service to seniors outside a  $\frac{3}{4}$  mile radius of LRTA fixed route service (including towns with no fixed route), the COA Dial-A-Ride service operates as a lifeline for many seniors. Combined, the services saw 109,889 trips in FY 2019 (Figure 17).

**Figure 17. Annual Ridership Demand Response (FY 2015–FY 2019)**



Source: LRTA, NTD, MassDOT

Monthly ridership patterns vary slightly between the COA and ADA Road Runner demand response services (Figure 18). Overall, there are greater fluctuations in ridership month to month for COA service. Both services mirror transit ridership patterns in other ways, with trips dipping around the winter holidays and peaking in the spring and fall.

**Figure 18. Monthly Demand Response Ridership Trends (FY 2019)**

Source: NTD

#### 4.2.2.2 Demand Response Ridership, Hours, Miles, and Operating Cost

LRTA's COA (non-ADA) and ADA Road Runner demand response services have diverged over the last 5 years, with ridership, hours, and miles increasing for the non-ADA service and decreasing for the ADA service. This is thanks to LRTA's ongoing collaboration with the municipal COAs, which have been providing increasing operating assistance to LRTA. ADA paratransit (Road Runner) ridership saw a 13.6 percent decrease between FY 2018 and FY 2019 (Table 9), while non-ADA ridership increased 26.6 percent.

**Table 9. Demand Response Annual Ridership (FY 2015–FY 2019)**

Service Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	% Change 2015–2019
Demand Response (non-ADA)	46,290	53,494	59,063	59,299	58,598	26.6%
ADA Paratransit	59,393	56,624	54,853	55,538	51,291	–13.6%

The Road Runner paratransit service's revenue miles and revenue hours have largely tracked with ridership decreases, as have the non-ADA COA revenue hours (Table 10) and miles (Table 11), which both steadily increased.

**Table 10. Demand Response Annual Revenue Hours (FY 2015–FY 2019)**

Service Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	% Change 2015–2019
Demand Response (non-ADA)	20,504	21,740	22,743	22,574	23,807	+16.1%
ADA Paratransit	30,757	32,533	34,527	25,031	21,423	–30.3%

Source: NTD, LRTA

**Table 11. Demand Response Annual Revenue Miles (FY 2015–FY 2019)**

Service Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	% Change 2015–2019
Demand Response (non-ADA)	193,381	210,858	225,993	228,906	234,446	+21.2%
ADA Paratransit	367,435	425,211	436,722	387,685	332,482	–9.5%

Source: NTD, LRTA

Non-ADA COA demand response operating costs fell between FY 2018 and FY 2019 (despite miles and hours increasing), after rising steadily from FY 2015 to FY 2018 (Table 12).

**Table 12. Demand Response Annual Operating Cost (FY 2015–FY 2019)**

Service Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	% Change 2015–2019
Demand Response (non-ADA)	\$693,902	\$817,489	\$883,879	\$908,597	\$904,875	+30.4%
ADA Paratransit	\$1,146,434	\$1,147,801	\$1,197,498	\$1,126,058	\$1,202,149	+4.9%

Source: NTD, LRTA

### 4.3 Policies and Procedures

LRTA's expectations for Road Runner passengers is posted on the Authority's website. The rules emphasize safety (all passengers are required to wear a seatbelt), hygiene, and respect for other passengers (no loud music, drinking, smoking, or speaking loudly).

Stated policies include:

- **Bag Policy:** Road Runner has a three-bag limit to ensure space for all customers on the bus. Customers must be respectful of fellow passengers and abide by this rule. In addition, Road Runner drivers will not load a grocery store's shopping cart onto the bus. Customers are allowed to bring a personal grocery cart to transport their bags and are allowed to use the lift to board their personal cart onto the bus.

- **Tip Policy:** Road Runner drivers are not allowed to accept tips. Road Runner is a public service.
- **Specific Requests:** Road Runner dispatchers and schedulers cannot place a customer on a specific driver's route nor can they guarantee that a customer will not have a specific driver.
- **Seat Belt Policy:** All customers are required by law to wear their seatbelt while on the Road Runner vehicles.
- **Car Seats:** Customers are responsible for providing and securing car seats if required for any children traveling on the vehicle.

## 4.4 Regional Connections and Other Transit Providers

LRTA connects to MBTA Commuter Rail services and carries passengers into neighboring New Hampshire on two fixed routes (Routes 10 and 19). Other than the Lowell Commuter Rail station located in the Gallagher Terminal that is connected to the LRTA Kennedy Bus Terminal, LRTA routes connect to the North Billerica and Wilmington MBTA commuter rail stations (both on the Lowell Line).

## 4.5 Sustainable Practices

LRTA and the Commonwealth of Massachusetts have prioritized sustainability and environmental stewardship in public transportation policy and operations. LRTA's 2015 RTP measured progress made in accomplishing MassDOT's sustainability initiative, GreenDOT, and found that LRTA was working continuously to achieve the initiative's goals, accomplishing many of them ahead of schedule. Subsequent to GreenDOT, the Commonwealth convened a Commission on the Future of Transportation, which released a report in 2018 that examined, among other topics, climate, and resiliency. The report stated the following as one of the chief transportation goals of the Commonwealth:

"Substantially reduce greenhouse gas (GHG) emissions from [the] transportation sector in order to meet the Commonwealth's Global Warming Solutions Act (GWSA) commitments, while also accelerating efforts to make transportation infrastructure resilient to a changing climate." (page 8)

The Commission recommended the Commonwealth pursue the following sustainable efforts that directly affect LRTA's operations:

- Prioritize investment in public transit as the foundation for a robust, reliable, clean, and efficient transportation system.
- Establish a goal that all new cars, light duty trucks, and buses sold in Massachusetts will be electric by 2040.
- Make transportation infrastructure resilient to a changing climate by providing RTAs with resources to assess the vulnerability of their infrastructure and provide design standards to construct resilient infrastructure moving forward, with a mandate that all construction meet statewide LEED Plus green building standards. As of September 2020, 92 public buildings have been LEED Certified since the first certification in 2006.
- Reduce overall energy consumption by 35 percent at state-owned and -leased buildings by 2020, using FY 2004 as the baseline. As of FY 2018, overall energy usage decreased by 14 percent.

The Commission on the Future of Transportation led to the convening of the RTA Task Force, consisting of representatives from the Commonwealth, RTA Administrators, and other public



transportation stakeholders. Among numerous recommendations, the final RTA Task Force report noted that:

“A top concern for the [Commission on the Future of Transportation] was increased public transit ridership as part of a broader effort to reduce greenhouse gas emissions and combat climate change . . . The RTAs will require additional investment, both in operations and capital funds, to achieve these goals.” (page 33)

This section outlines LRTA's efforts around sustainability and environmental stewardship undertaken to date, describes planned implementations of future sustainability efforts, and lists needs related to climate change and the environment.

#### 4.5.1 Current Practices

LRTA has made numerous adjustments or investments to make its operations more sustainable. These practices support Commonwealth initiatives, take advantage of federal funding opportunities, provide environmental benefits, enhance cost efficiency, and improve resiliency.

##### 4.5.1.1 Clean Vehicles

In the past two decades, there has been growing interest in transitioning transit fleets from diesel to hybrid-electric and all-electric (“clean”) vehicles. There have been significant advancements in hybrid and electric bus technology in recent years and the vehicles have become cheaper as batteries have become less expensive.

LRTA maintains the following equipment and policies relating to clean vehicles:

- Owns and operates five diesel/electric hybrid 35-foot buses, accounting for 11 percent of its fleet.
- Has anti-idling policy that exceeds the state law.

##### 4.5.1.2 Education

Public transit usage plays an important role in the reduction of GHG emissions. According to FTA's 2010 report *Public Transportation's Role in Responding to Climate Change*<sup>13</sup>, public transit produces 51 percent less CO<sub>2</sub> emissions per passenger mile than single-occupancy vehicles. The majority of Massachusetts residents (68.5 percent) indicated they used an automobile as their primary mode of travel in the 2010-2011 Massachusetts Travel Survey, while 7.6 percent indicated they used transit.

Transit authorities play an important role in encouraging mode shift, and one of the tools available to them is promoting use of their service through education. Education comes in many forms, including providing wayfinding, regional partnerships with large trip generators, and generating instructional materials that make transit services less intimidating to use.

LRTA employs the following educational strategies in efforts to boost ridership:

- Collaborates with the Commonwealth and municipalities to install navigational signage to transit stations along local roads and highways.
- Maintains a partnership with UMass-Lowell that allows students and faculty to pay for LRTA service with the U-Card.

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<sup>13</sup> Federal Transit Administration, *Public Transportation's Role in Responding to Climate Change*, January 2010, <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/PublicTransportationsRoleInRespondingToClimateChange2010.pdf>

- Coordinates with the UMass-Lowell transportation team on social media and other outreach methods to raise service awareness.
- Produces travel training videos to make its system more accessible to members of the public.

#### 4.5.1.3 Multimodal Integration

Transit authorities can also strengthen multimodal connections in efforts to boost ridership, which is a priority for the Commonwealth. Safe and convenient access to transit facilities via different modes increases the catchment area for transit service. Integrating transit with alternative modes boosts ridership, encourages active transportation, and reduces GHG emissions by offering alternatives to driving. LRTA has implemented the following measures to support multimodal integration:

- All LRTA buses are equipped with bike racks.
- The Gallagher Terminal and park and rides in the service area have public bike racks.
- LRTA's hub, the Kennedy Bus Transfer Center, shares facilities with the MBTA Commuter Rail Station, the Gallagher Terminal.

#### 4.5.1.4 Efficient Facilities

Building green facilities (e.g., LEED certified) or retrofitting existing facilities with green infrastructure is an opportunity for transit authorities to reduce both environmental impacts and operational costs. The Commonwealth has committed that state-funded infrastructure must follow green construction guidelines from 2020 on, stating in the 2018 report *Choices for Stewardship: Recommendations to Meet the Transportation Future*, that if infrastructure does not meet MassDOT-developed resiliency design standards it will not receive state funding.

This commitment is echoed in the Commonwealth's "Clean Energy and Climate Plan for 2020," which established the Leading by Example Program in 2007 to reduce energy use in public buildings across the state. The Leading by Example Program created a "Massachusetts LEED Plus" building standard for new construction and major renovations that requires all state government projects to perform 20 percent better than the Massachusetts energy code and be LEED-certified. LRTA has taken many steps to making its facilities more environmentally friendly, including initiating LEED certification for Existing Buildings Operations + Maintenance. It has also made the following improvements, replacing less efficient infrastructure and systems to minimize environmental impacts in its operations:

- LRTA installed motion sensor/occupancy lighting in some buildings.
- LRTA converted oil heating to natural gas or alternative energy where feasible.
- Fifty percent of their facilities' inefficient/electric water heaters have been replaced with high-efficiency tanks or tankless systems.
- Hale Street Bus Maintenance Facility is largely powered by a 1900 panel solar installation on its rooftop (Figure 19).
- One-quarter of LRTA's electricity needs are met through internally generated solar power or green energy purchases.
- Permeable paving or other infiltration installations have been included in parking lot resurfacing projects.
- The gasoline fueling pumps in LRTA's maintenance yard are retrofitted with vapor recovery systems.

- LRTA has installed Big Belly solar trash compactors at the Kennedy Bus Transfer Center.

**Figure 19. LRTA Hale Street Bus Maintenance Facility Solar Array**



#### 4.5.1.5 Recycling

Recycling waste products has been commonplace across the nation for the past several decades. The Commonwealth has been at the forefront of recycling efforts with the plan *2010-2020 Solid Waste Master Plan: A Pathway to Zero Waste*<sup>14</sup>, which outlines actions the Commonwealth could take to reduce solid waste production. The plan stated that public institutions should “lead by example and implement innovative materials management strategies that improve purchasing efficiencies, reduce waste, maximize the percent of waste that is recycled or composted and minimize disposal.”

In addition to recycling solid waste, recycling water used for washing vehicles is also increasingly commonplace in the transit industry. Recycling water used in bus washes and capturing rainwater for use reduces water consumption and contamination and saves money. LRTA has modified its operations in the following ways to reduce waste:

- LRTA is working toward purchasing 100 percent recycled paper products.
- All new vehicle/bus washing facilities are designed and built with recycled water technologies and evaluated for recycled or recaptured rainwater alternatives.
- All paper and cardboard waste generated in any LRTA facility is recycled.

<sup>14</sup> Massachusetts Department of Environmental Protection, *Massachusetts 2010-2020 Solid Waste Master Plan*, April 2013, <https://www.mass.gov/doc/2010-2020-solid-waste-master-plan-a-pathway-to-zero-waste/download>

### 4.5.2 Improvements Underway

LRTA continues to expand the sustainable practices used in its operations. LRTA has either already secured funding for projects listed below or are key stakeholders in projects being carried out by other entities that will improve LRTA's service and make the Authority more resilient:

- LRTA has received flex funds from the Federal Highway Administration to support a wayfinding/signage project at the Gallagher Terminal.
- LRTA is working on launching a redesigned website as of the drafting of this plan, which will help raise awareness of service and improve customers' experiences.
- LRTA is a stakeholder in Lowell's GoLowell (<https://www.lowellma.gov/1340/GoLowell>) Downtown Lowell Multimodal Complete Streets project that aims to bring the following improvements to the City:
  - Easy, safe, and predictable bus service
  - Transit stop and transit line enhancements
  - Safe bicycling routes and biking facilities
  - Safe, accessible, and enjoyable pedestrian routes
  - Car-share and taxi accommodations

### 4.5.3 Documented Needs

LRTA hopes to continue working to make its operations more sustainable. However, LRTA acknowledges that the ability to make any capital improvements is contingent on securing funding, which may be challenging given the uncertainty surrounding impacts on federal, state, and local funding from the COVID-19 pandemic.

LRTA has identified the need to collaborate in a joint procurement with other RTAs for up to six hybrid-diesel and electric vehicles over the next 5 years. Additional needs and opportunities will continue to be identified in future planning studies.

## 4.6 Fare Rates and Structure

A key responsibility of transit agencies is setting appropriate fare rates that balance maintaining an affordable transportation system with the financial needs of the organization. The RTA Task Force recommended that RTAs should periodically review fares to ensure that fare levels are appropriate, and this recommendation was subsequently included in the MOUs between the RTAs and MassDOT. The purpose of this section is to outline existing fare policies and collection methods and to describe future plans and needs of LRTA with regard to fares.

### 4.6.1 Collection Methods and Media

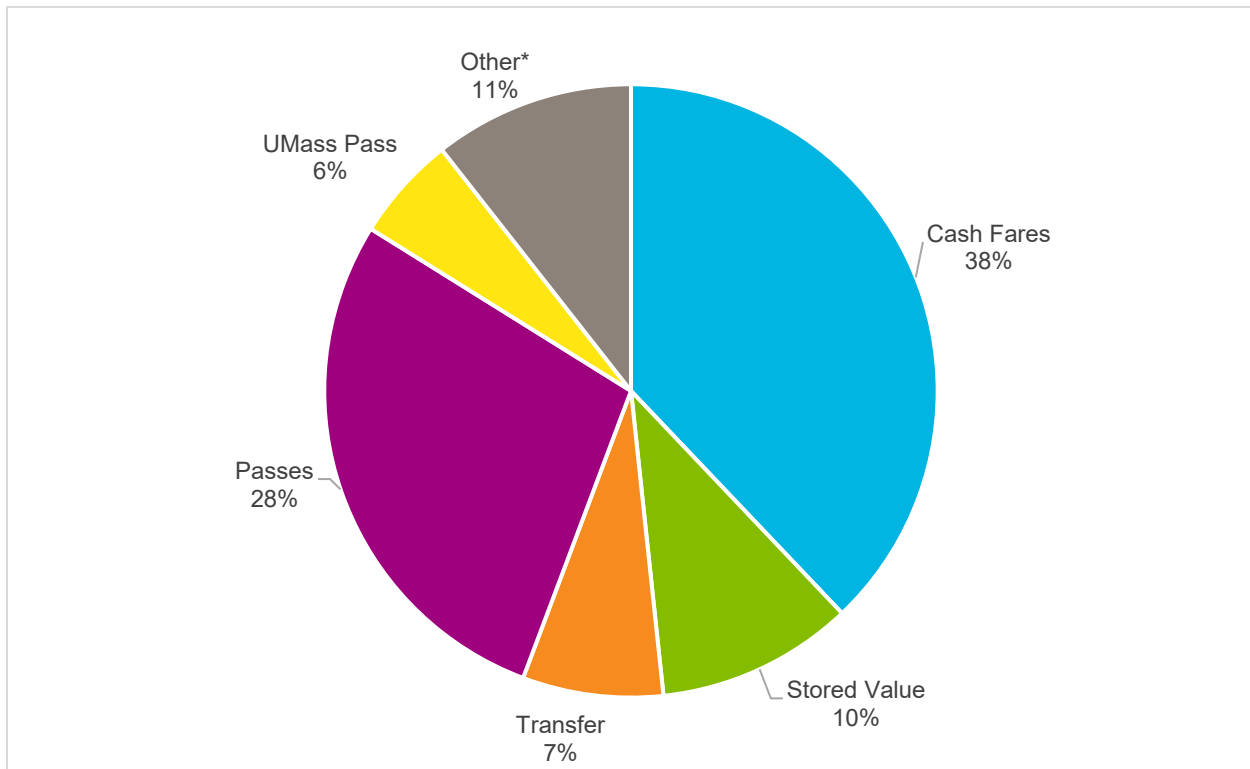
LRTA began using Scheidt & Bachmann fareboxes on its fixed route buses in November 2011. The Scheidt & Bachmann system accepts cash, transfers, and MBTA CharlieCards, a smartcard to which customers can add value, including all types of passes.

#### 4.6.1.1 Fare Technology and Media

Scheidt & Bachmann fareboxes are widely used across the state, including at MBTA. MBTA has been working on updating its fare payment system since 2018 and there is still uncertainty surrounding what the new fare technology will be. Ideally LRTA and other RTAs, especially those that connect to MBTA services (like LRTA), should share a fare payment system with MBTA to encourage multimodal trips.

LRTA has ticket vending machines at its terminal where customers can purchase new CharlieCards and load value onto already purchased CharlieCards. CharlieCards can also be purchased, along with passes, from ticket agents. Elementary, Middle, and High School students can purchase CharlieCards and passes at area schools. Customers using LRTA's ADA Road Runner demand response service must pay drivers exact fare at the time of boarding or pay with "Ticket to Ride" cards, which can be purchased at LRTA's Road Runner office.

The most popular fare medium among LRTA riders is cash. In FY 2019, the number of fares paid with cash equaled those paid with stored value and passes combined (Figure 20). LRTA does not provide a financial incentive for using CharlieCards such as discounted fares or free transfers, which differs from many other RTAs. Prior to the pandemic, LRTA was investigating incentivizing CharlieCard use through conversations with Scheidt & Bachmann. Moving forward, LRTA will be looking at providing an incentive with the implementation of their new fare policy. LRTA is currently promoting the use of CharlieCards as a COVID safety feature.

**Figure 20. Fare Media Usage (FY 2019)**

Source: LRTA

\*Other includes one ride, overpay ticket, pre-paid.

#### 4.6.1.2 Changes During COVID-19

In order to mitigate the public safety risks associated with collecting fares during the COVID-19 pandemic, LRTA suspended fare collection enforcement in March 2020. LRTA resumed front door boarding, rear door exit, and fare collection on August 31, 2020.

#### 4.6.2 Fare Structure

LRTA's fare policy adopted on October 29, 2020 to fulfill the requirement contained within its MOU with MassDOT stated:

"The Lowell Regional Transit Authority shall undertake a review of expected fare revenue, and the fare structure that generates it, as a component of the annual budget development process. If the Administration, in coordination with the Advisory Board, determines that the fare structure warrants adjustment, the agency shall undertake a public participation process in accordance with the *Public Participation Plan* and the *Language Assistance Plan*."

##### 4.6.2.1 Fixed Route Fares

LRTA has three fare zones: City/Local for routes that operate entirely within the City of Lowell or areas just outside the city; Suburban for routes that operate mostly outside of Lowell; and the Downtown Shuttle, which travels between the Kennedy Center at Gallagher Terminal and downtown Lowell. The different fare costs associated with the fare zones apply to full fares, reduced fares, and transfers. LRTA does not offer free transfers on any route except to the Downtown Shuttle and from the Downtown Shuttle inbound to City/Local routes. Transfers are issued on inbound routes and accepted on outbound routes.



Riders can purchase single rides with cash or use CharlieCards. Reduced fares are available to those who meet ADA requirements, qualify for the Statewide Access Plan, or meet LRTA eligibility requirements. LRTA offers reduced fare rides to children ages 6 to 12 and Medicare card holders.

**Table 13. Fare Structure**

<b>Fare Type</b>	<b>Fare (in dollars)</b>
<b>Single Ride</b>	
Full fare City/Local/Shuttle	\$1.25
Full fare Suburban	\$1.85
Reduced Fare for Seniors age 60 and older, Disabled and/or Medicare Card Holders, and Children 6-12 City/Local/Shuttle	\$0.60
Reduced Fare for Seniors age 60 and older, Disabled and/or Medicare Card Holders, and Children 6-12 Suburban	\$0.90
Transfer City/Local	\$0.25
Transfer Downtown Shuttle	Free
Transfer Suburban	\$0.50
Reduced Transfer for Seniors age 60 and older, Disabled and/or Medicare Card Holders, and Children 6-12 City/Local*	\$0.10
Reduced Transfer for Seniors age 60 and older, Disabled and/or Medicare Card Holders, and Children 6-12 Downtown Shuttle**	Free
Reduced Transfer for Seniors age 60 and older, Disabled and/or Medicare Card Holders, and Children 6-12 Suburban	\$0.25
<b>Monthly Pass</b>	
Full fare	\$44.00
Student Pass for Elementary, Middle, and High School Students	\$25.00
Reduced Pass for Seniors age 60 and older, Disabled and/or Medicare Card Holders	\$25.00
<b>ADA Road Runner Fare</b>	
Within same community	\$2.00
From one community to another	\$3.00
10 \$2.00 Ride Tickets	\$16.00
10 \$3.00 Ride Tickets	\$24.00
<b>Special Services (eligibility-based)</b>	
Boston Area Medical Facilities	\$25.00
Bedford Veterans Administration (VA) Facility	\$12.50

Source: *LRTA Fares & Passes*, <http://lrta.com/fare/>, August 2020.

*\*Issued on inbound routes only/accepted on outbound routes only.*

*\*\*To shuttle outbound and shuttle inbound to local routes.*

If a rider is disabled or over 60 years of age, they can obtain a Statewide Access Pass in order to qualify for half-fare discounts for fixed route service. Riders must complete an application available from LRTA. Eligible riders must either (1) verify their disability from a licensed professional to receive ADA Road Runner demand response services or (2) provide proof of date of birth to obtain a senior identification (ID) card. ID cards cost \$3.00 each. Those who qualify for ADA Road Runner demand response services are permitted to bring a personal care attendant on the bus who can ride for free.

LRTA offers an unlimited monthly pass that can be used systemwide. The monthly pass is also available at a discounted rate to those who qualify for reduced fares (registered disabled, Medicare card holders, seniors aged 60 or older, children ages 6 to 11, and elementary, middle, and high school students).

A partnership between UMass-Lowell and LRTA enables university students to ride LRTA's system at no additional out of pocket cost to the student with their UMass Pass. LRTA recoups \$1 per trip for fixed route and \$2 per trip for paratransit. This rate is reviewed each year and recently increased from \$0.75 per trip with the last agreement executed in August 2020. The partnership is mutually beneficial and generates ridership for LRTA, with the UMass pass constituting 6 percent of fare media used in FY 2019 (Figure 20). Students do not receive free transfers (like other fares); each transfer is \$1.00.

#### 4.6.2.2 Demand Response Fares

Like LRTA's fixed route service, ADA Road Runner demand response service has two fare levels. LRTA charges a base fare for trips taken within one town and an increased fare for trips that travel between towns. Riders can also purchase a 10-ride pass at a discounted rate. In order to qualify for ADA Road Runner demand response service, LRTA riders must fill out an application to prove eligibility.

Customers eligible for ADA Road Runner demand response service can also use LRTA's weekly Boston area medical facilities and Bedford VA shuttle services. Riders can either purchase tickets for this service in person at the Road Runner office or pay the exact fare the day of the ride; drivers do not provide change.

#### 4.6.2.3 Fare Adjustments

LRTA last adjusted fares in July 2018. The 2018 fare change was the first adjustment in 14 years and focused on across-the-board increases with the exception of transfers (Table 14). LRTA adopted a fare policy for more regular reviews of fare levels, consistent with the requirement outlined in the MOU with MassDOT.

**Table 14. Current and Previous Fare Structure**

Fare Type	Fare Prior to Increase	New Fare after Increase	Amount Increased or Decreased	Percent Change
<b>City/Local/Shuttle</b>				
Full Fare	\$1.00	\$1.25	\$0.25	25%
Reduced Fare	\$0.50	\$0.60	\$0.10	20%



<b>Fare Type</b>	<b>Fare Prior to Increase</b>	<b>New Fare after Increase</b>	<b>Amount Increased or Decreased</b>	<b>Percent Change</b>
One Transfer Full fare (City/Local)	\$0.25	No change	NA	NA
One Transfer Reduced Fare (City/Local)	\$0.10	No change	NA	NA
<b>Suburban</b>				
Full Fare	\$1.50	\$1.85	\$0.35	23%
Reduced Fare	\$0.75	\$0.90	\$0.15	20%
One Transfer Full fare (Suburban)	\$0.50	No change	NA	NA
One Transfer Reduced Fare (Suburban)	\$0.25	No change	NA	NA
<b>Monthly Passes</b>				
Adult	\$35.00	\$44.00	\$9.00	26%
Reduced Pass for Seniors age 60 and older, Disabled and/or Medicare Card Holders	\$20.00	\$25.00	\$5.00	25%
Student Pass for Elementary, Middle, and High School Students	\$20.00	\$25.00	\$5.00	25%
<b>ADA Road Runner Fare</b>				
Within same community	\$1.00	\$2.00	\$1.00	100%
From one community to another	\$1.50	\$3.00	\$1.50	100%

Source: LRTA

## 4.7 Considerations for the Next 5 Years

LRTA sees improving interoperability between its system and MVRTA and MBTA as a priority moving forward. Both providers border LRTA's service area, and MBTA provides service within LRTA's boundaries. LRTA anticipates more people who live outside LRTA service area will need to use the system with the opening of the Lowell Justice Center, wherein state and federal courthouses will be located. LRTA believes offering riders the option to pay one fare or the possibility to transfer between systems using the same fare media would greatly improve the customer experience.

LRTA is also considering updating its fare technology, having seen the benefits of a contactless system during the COVID-19 pandemic. LRTA will be consulting with the RTAs that currently are launching mobile ticketing systems. If LRTA does decide to update its fare technology in the next 5 years, LRTA is committed to continuing to collect cash but will likely take steps to encourage the use of alternative fare media.

## 5. Market Evaluation

### 5.1 Key Demographic and Geographic Factors

This section describes existing and projected socioeconomic characteristics of the area served by LRTA looking at the following key demographic and geographic measures for the region impacting transit demand:

- **Population Density:** Population density is particularly important when evaluating a transit market. Fixed route transit operates most efficiently in areas where people are in close proximity to one another. Population density gives a good general proxy for where fixed route service can be most effective, with more flexible forms of transportation in less dense areas.
- **Senior Population:** As people age, they are more likely to need public transportation due to health issues, lower incomes, or loss of ability to drive. Areas with a high proportion of seniors indicate current or future demand potential for public transportation services.
- **Income and Poverty:** Economic status is a strong factor in the propensity for using transit. Low-income households depend on public transportation to get to essential destinations such as work, school, medical appointments, and grocery shopping.
- **Vehicle Ownership:** Related to general economic status, households without access to an automobile are much more likely to use public transportation.
- **Race/Ethnicity:** As per agency goals and federal regulations, ensuring appropriate service to areas that are mostly minority is a priority for LRTA.
- **Job Density:** Census maps show where people live. However, major employment centers are also areas where investing in transit can provide an essential link between key destinations and communities predisposed to using transit.

In general, the LRTA service area shows multiple factors that indicate a strong transit market (Table 15). The median household income, the poverty rate, and the proportion of households without vehicles all suggest a propensity among LRTA residents to use the transit system.

**Table 15. Current Demographic and Socioeconomic Profile (2017)**

Area	Median Household Income	% People Living Below 150% the Poverty Level	% Households without Vehicles	% Seniors	% Minority	% People with Disabilities
LRTA Service Area	\$88,730	14.8%	7.5%	13.6%	26.3%	10.0%
Massachusetts	\$74,167	17.4%	12.4%	15.5%	27.1%	11.6%
United States	\$57,652	23.7%	8.8%	14.9%	38.5%	12.6%

Source: US Census Bureau 2017 ACS

Figure 21 through Figure 28 show the geographic distribution of these key demographic groups, which indicate a strong transit market. As the maps show, many of them are concentrated in Lowell with other hot spots scattered around the region, including Pepperell, Maynard, and Acton.

Figure 21. Population Density

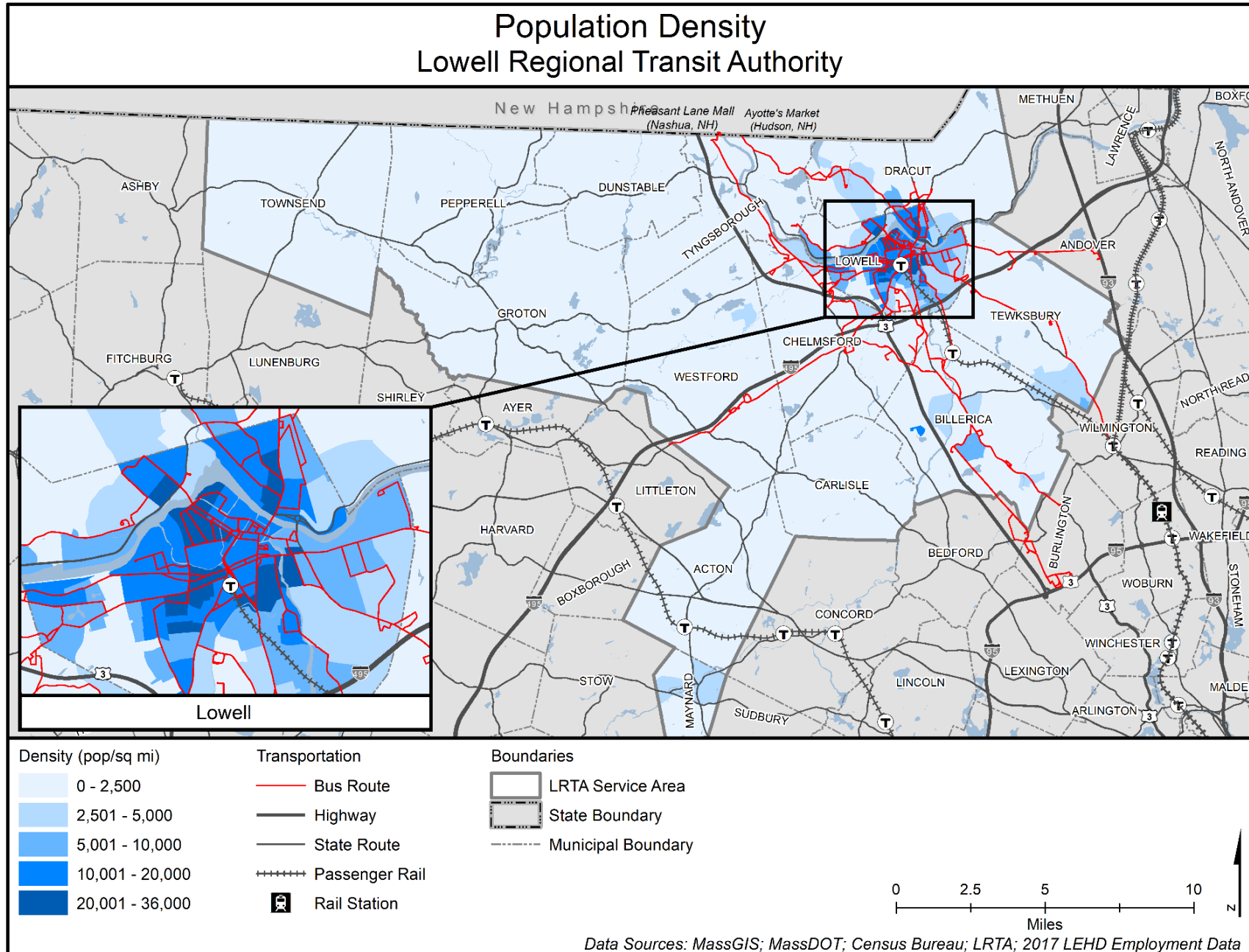
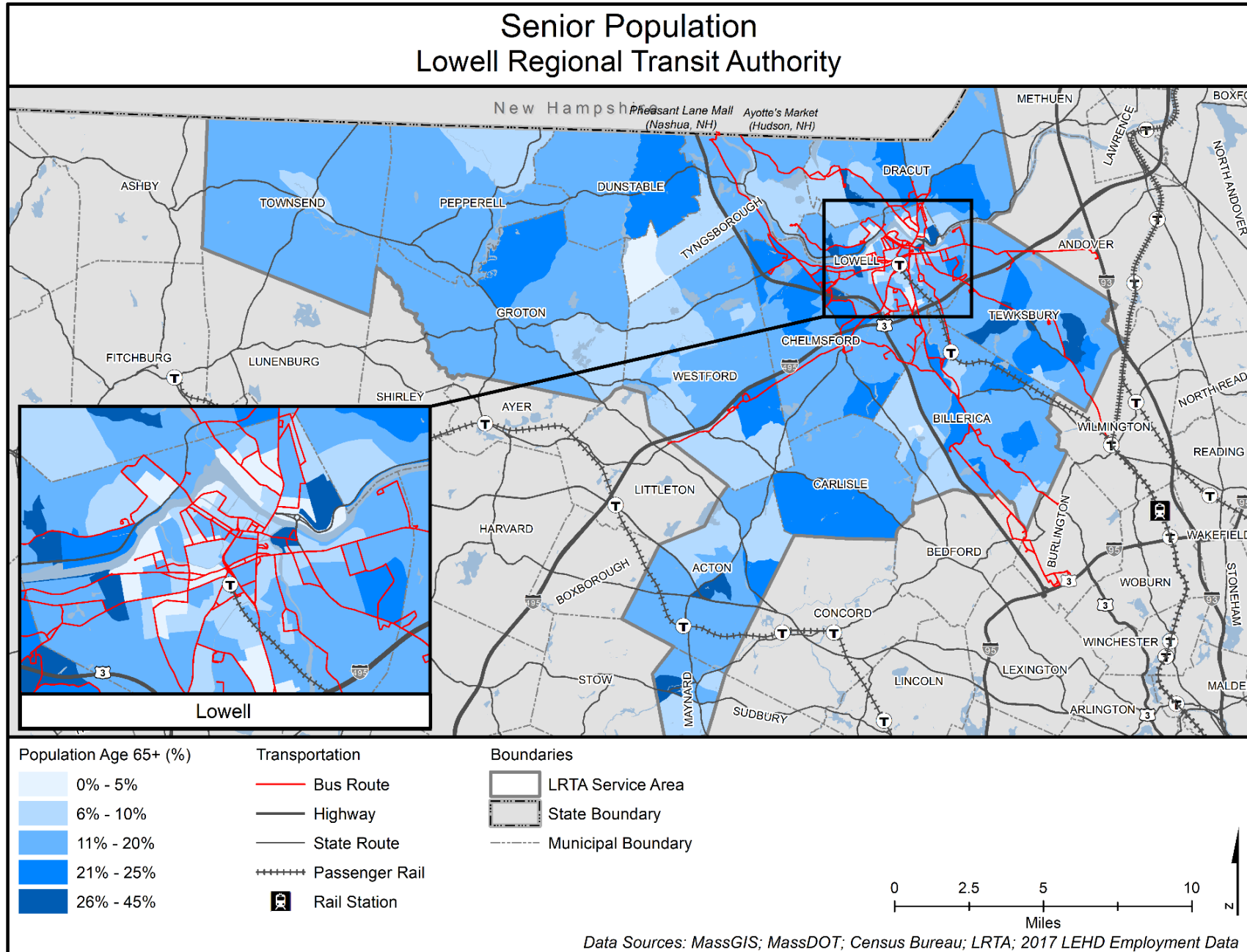
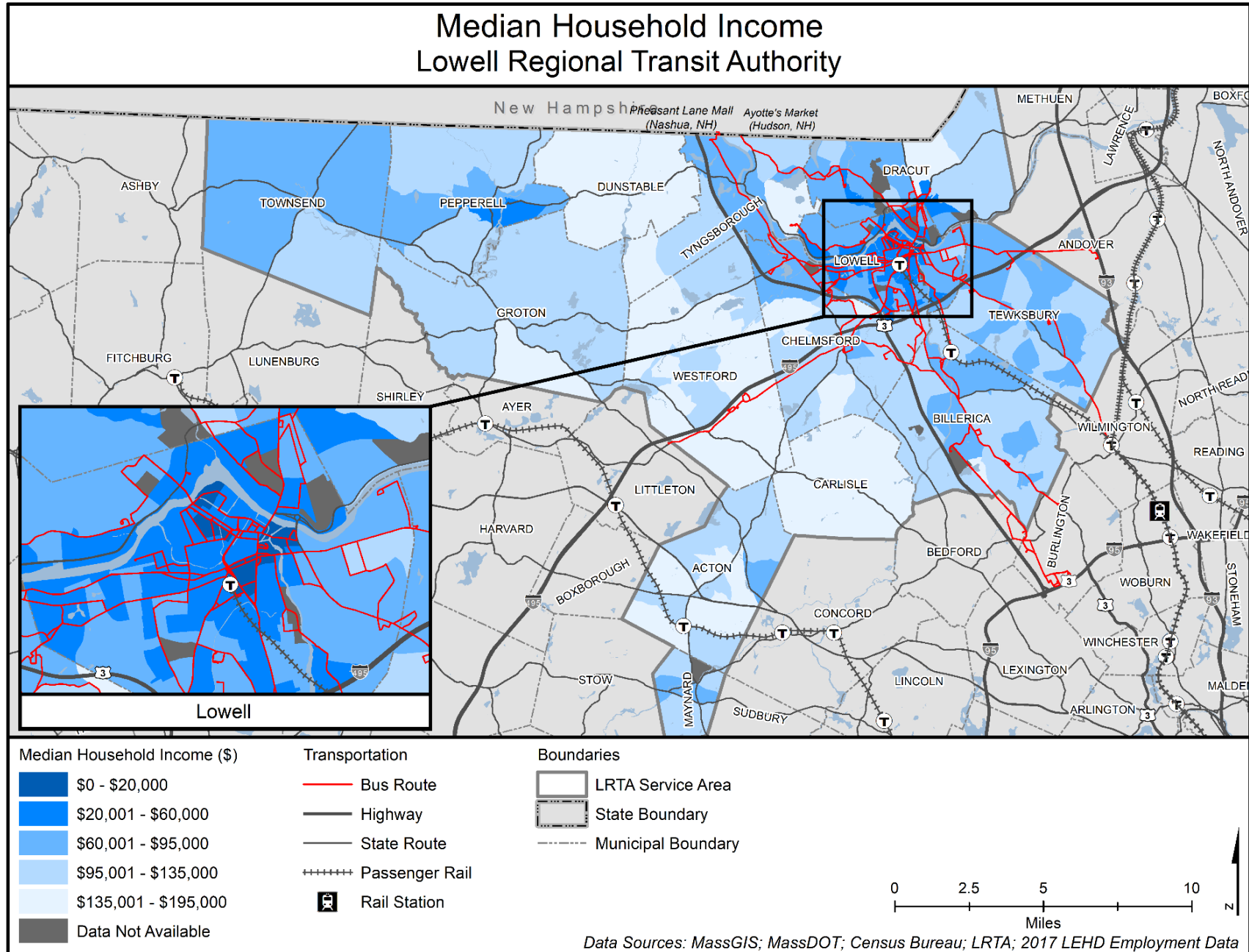


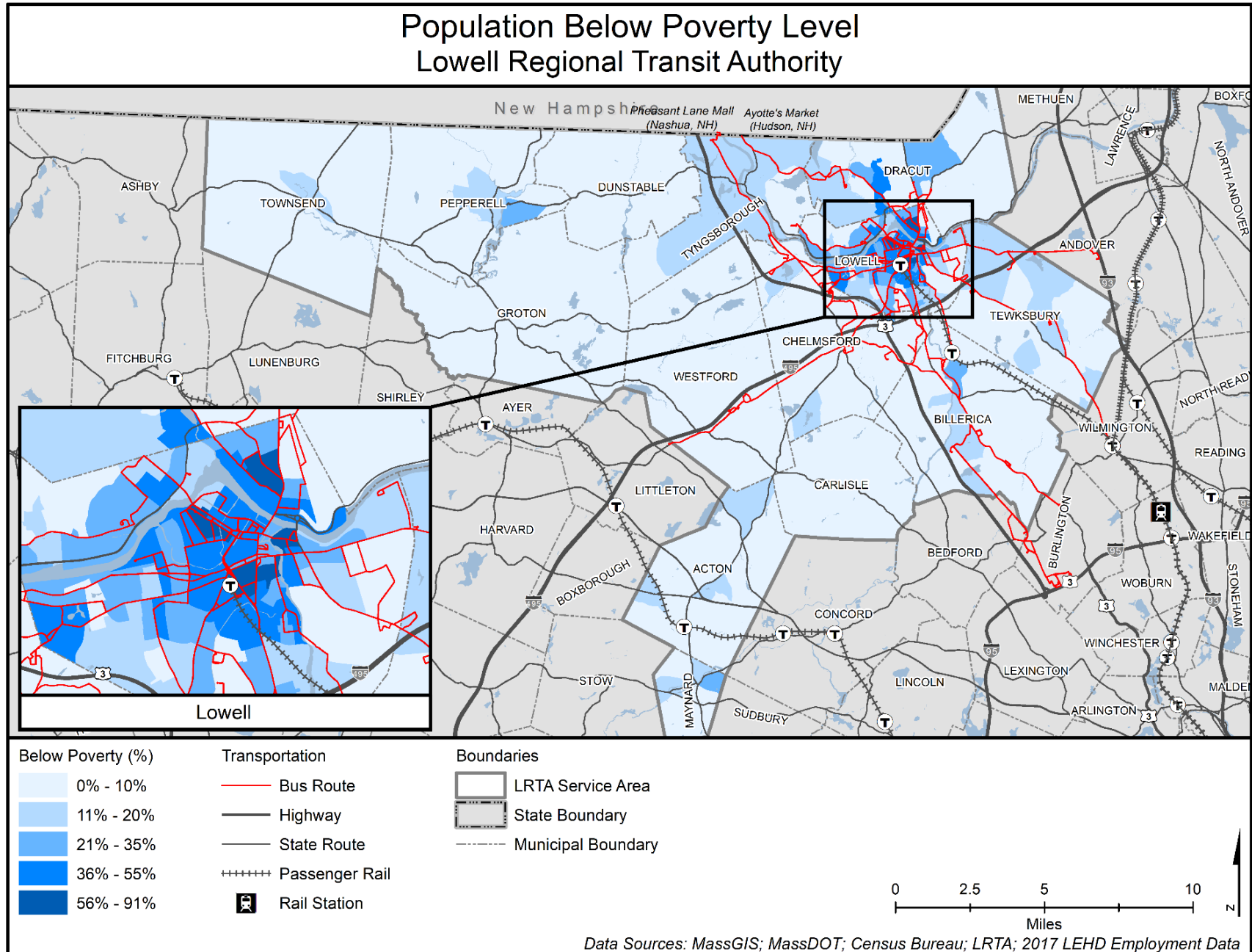
Figure 22. Senior Population





**Figure 23. Median Household Income**

**Figure 24. Population Below Poverty Level**



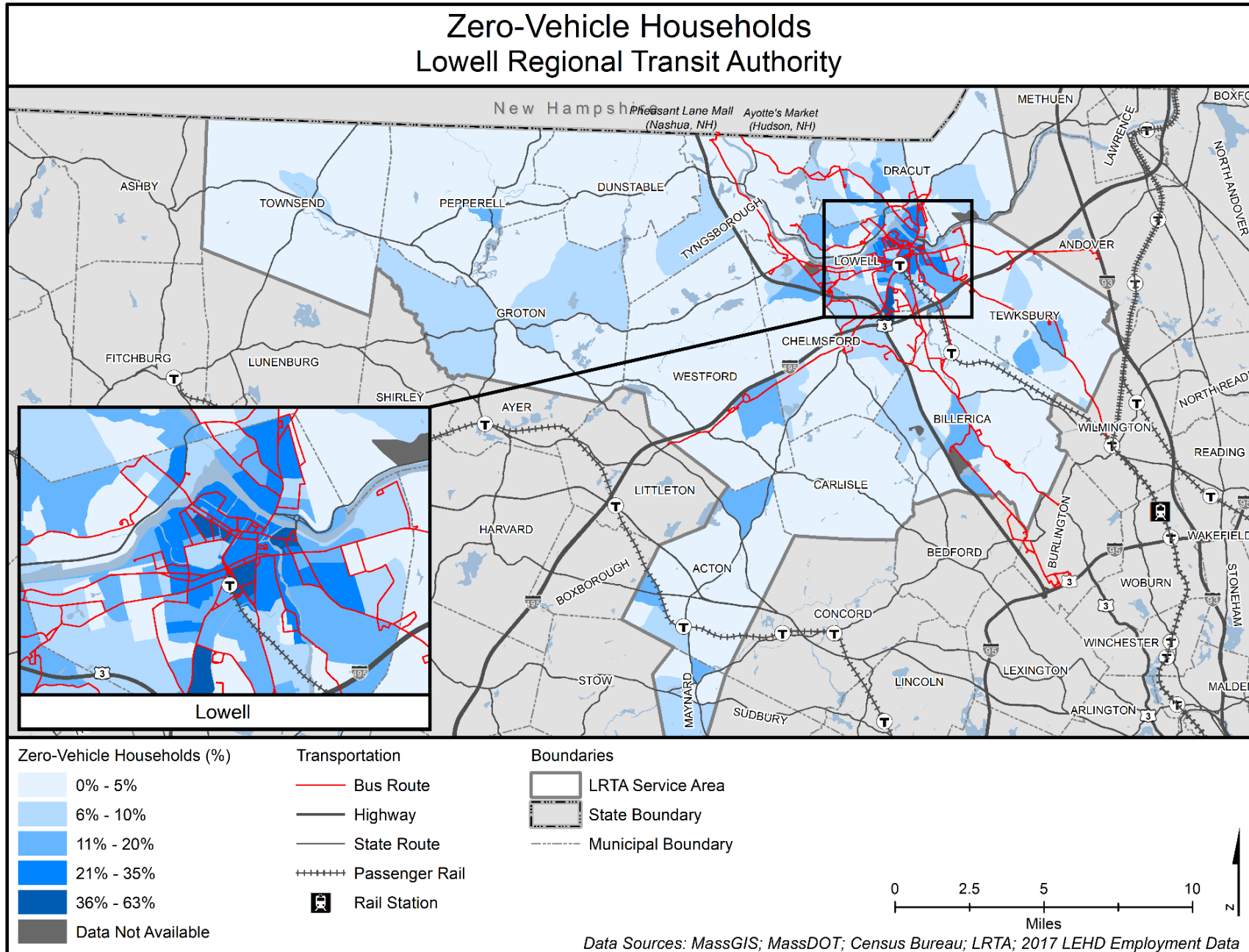
**Figure 25. Zero-Vehicle Households**



Figure 26. Minority Population

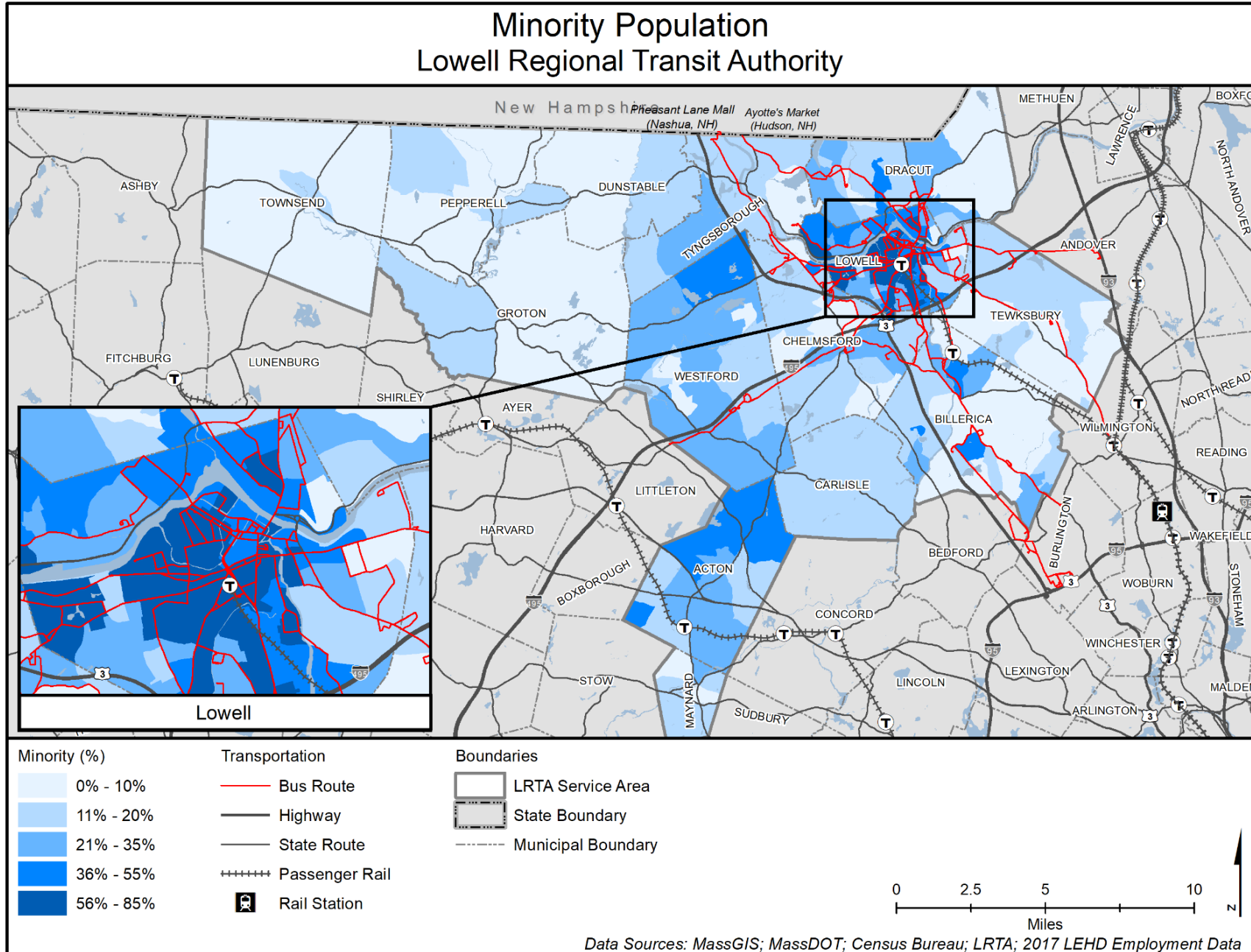




Figure 27. Job Density

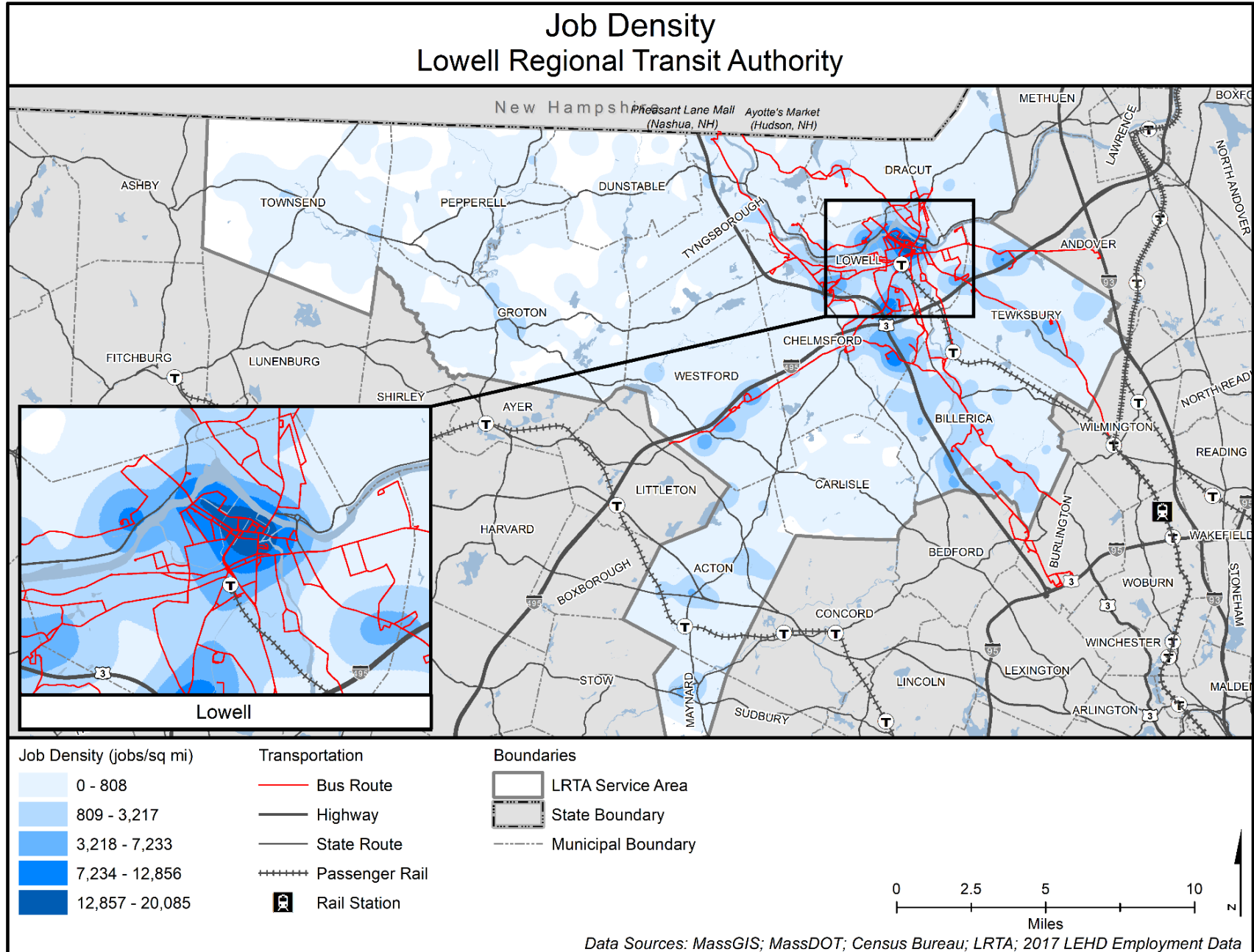
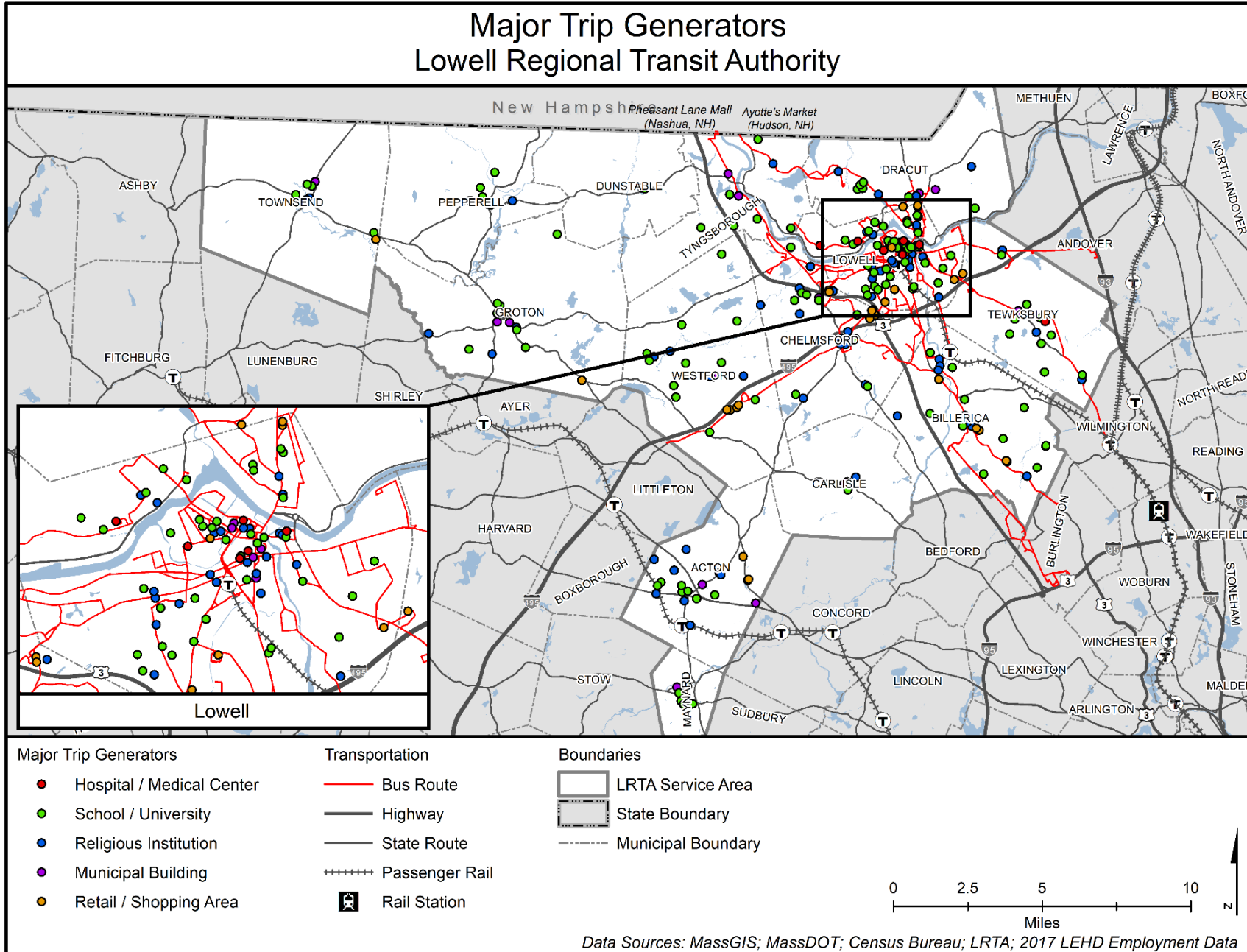


Figure 28. Major Trip Generators



## 5.2 Transit Score

The transit score map (Figure 29) shows composite scores for the area based on many of the factors discussed in the prior section. The transit score is a relative measure of how successful a fixed route transit system is expected to be in a particular region. Used in conjunction with a congruency analysis of major transit generators, the transit score can be used to evaluate existing service and to identify areas of potential demand.

Transit-oriented variables used for the analysis include:

- Overall Population Density
- Overall Job Density
- Density of the Population under the age of 18
- Density of the Population over the age of 65<sup>15</sup>
- Percentage of the Population Living Below the Poverty Level
- Percentage of Zero-Car Households

The composite transit score map is only suggestive of potential transit markets. Fixed route public transportation might not currently exist in areas the analysis identifies as opportunities for good reasons, including topography, roadway geometry, presence of overpasses, or other local context. However, this map does provide some insight on areas to consider for future transit expansion should the opportunity arise.

The areas identified in Figure 29 as being candidates for consideration of transit service expansion are parts of:

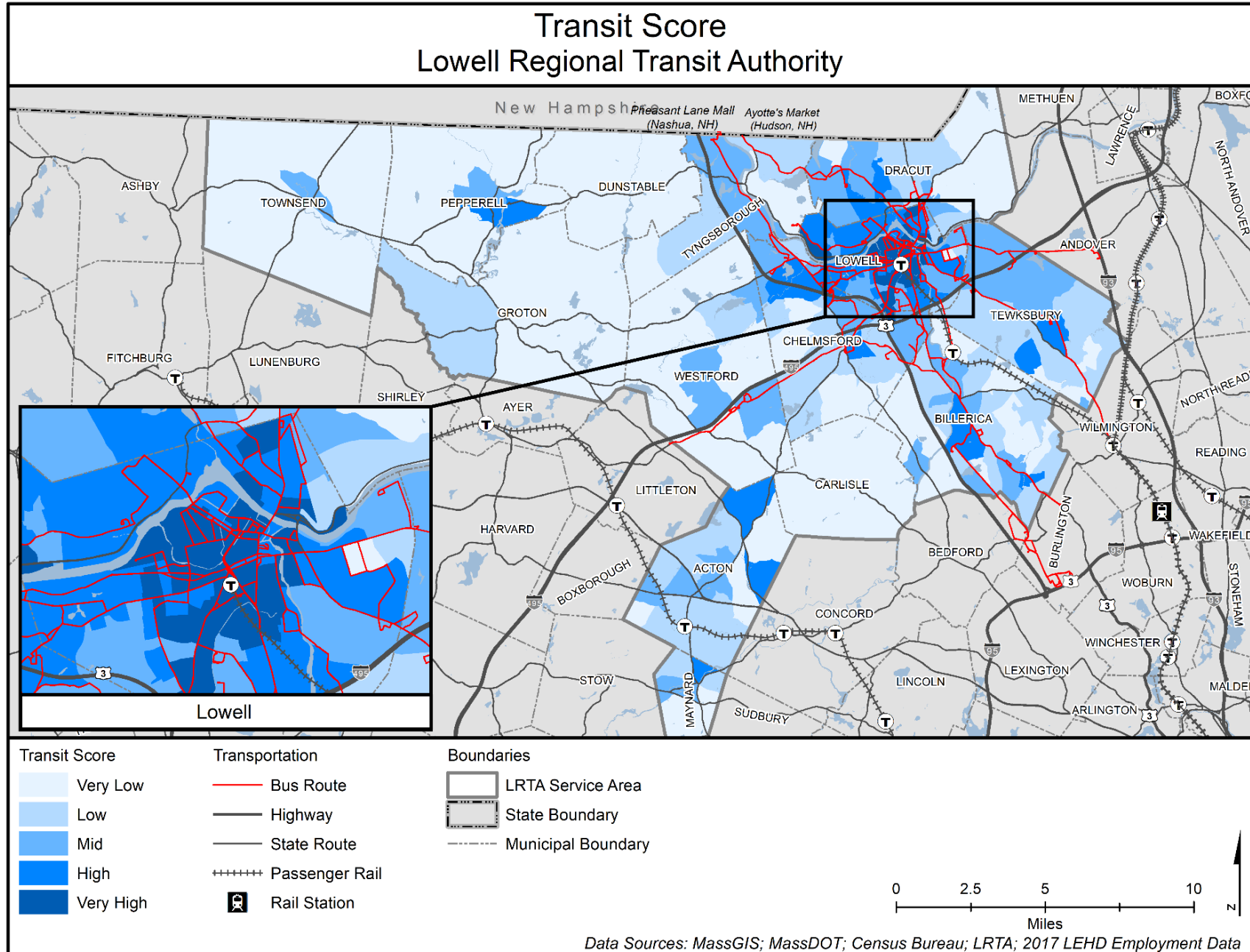
- Pepperell: Due to a lower median household income and high senior population
- Acton: Due to a high concentration of trip generators, diverse population, and high senior population
- Maynard: Due to a lower median household income, high senior population, and density of jobs
- Tewksbury border with Billerica: Due to a high senior population, diverse population, and a proportionally high number of households without vehicles,

All the areas listed above have a low population density, which makes it difficult to provide fixed route bus service. Demand response service or microtransit may be more appropriate.

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<sup>15</sup> Note that the federal definition of senior as aged 65 or over is used in this case, but age in relation to transportation need is more nuanced than a strict age cutoff implies. In 2017, Governor Baker signed Executive Order 576 establishing the Governor's Council to Address Aging in Massachusetts. As part of this effort, the Council looked at different methods and solutions to create an age-friendly Commonwealth and conducted research and listening sessions across the state, during which transportation was identified as a key challenge facing older adults. Additionally, research presented from this effort showed a trend toward people staying in the workforce longer than previous generations. This research shows that the topic of transportation for older adults is one that is evolving and will require more attention in transportation planning in the future.

Figure 29. Transit Score





## 6. Performance

Performance-focused management is a critical priority for LRTA and the Commonwealth. The federal government has also led the transportation industry to become more performance-driven in the last decade by mandating that federally funded agencies implement a performance-based approach to planning and programming. This broad emphasis on the importance of having a strong enterprise-wide, data-driven, and transparent performance management framework as the foundation for making decisions, particularly in the service planning and financial areas, is especially relevant to LRTA as it works to sustain success in the face of the challenges of COVID-19 and other market uncertainties.

The purpose of this chapter is to outline LRTA's current performance practices, track performance results for the LRTA/MassDOT Bilateral MOU (which the Authority monitors quarterly), and make recommendations to enhance LRTA's performance framework to support data-driven performance-focused decision-making. Historical performance information and a review of peer agencies are included in Appendix A.

As transit operations equipment has become more technologically sophisticated, vast amounts of operations data have become available to service providers. Providers should have data analysis strategies that ensure the data collected both informs operations planning and facilitates the RTA's reporting requirements. When evaluating existing practices and developing recommendations for new metrics, performance measures should:

- Be easily measurable with realistic, aspirational targets that will lead to successful outcomes
- Have a clear and intuitive meaning so that they are understandable to transit staff as well as non-transportation professionals
- Be acceptable and useful to transportation professionals
- Be comparable across time and between geographical areas
- Be performed on either a monthly, quarterly, or annual basis, depending on state and federal requirements and the nature of the data
- Have a strong functional relationship to actual system operations so that changes are reflected with minimal lag time in operating statistics
- Provide the most cost-effective means of data collection
- Be based on statistically sound measurement techniques
- Be consistent with measures identified for other systems
- Be readily available, when possible, to facilitate flexibility and agility in service planning
- Include actionable language, setting thresholds when additional analysis or service changes are warranted

These principles have informed the following analysis of performance recommendations and strategies, guiding the development of the recommendations at the end of this chapter.

### 6.1 Current Performance Measurement Practices

LRTA's performance monitoring practices are detailed in the following sections. The practices described fulfill state and federal oversight requirements and/or are part of internal performance monitoring protocols for service optimization.

### 6.1.1 Monthly and Annual Performance Monitoring

LRTA develops two performance reports, one annual internal ridership analysis spreadsheet and the other a dashboard posted on its website that is updated annually. It also submits data monthly, quarterly, and annually as required by MassDOT and FTA.

#### 6.1.1.1 State and Federal Monitoring Requirements

LRTA reports a variety of performance metrics to both FTA and the Commonwealth on a monthly, quarterly, and annual basis as part of their funding agreements. FTA requires transit providers to submit data (including service, financial, and asset inventory and condition) to be posted on the National Transit Database (NTD).

The Commonwealth also requires LRTA and other RTAs to report service and asset data through the state's GrantsPlus system. The Commonwealth has taken other steps in recent years to promote industry best practices, including a more data-driven approach to service planning. In 2019, MassDOT convened a stakeholder group, including RTA administrators, to develop a performance measurement strategy that could be tailored to each RTA's needs and challenges. The results of this effort were laid out in individual MOUs signed by MassDOT and the RTA administrators.

#### 6.1.1.2 Additional Monitoring Practices

In addition to reporting to meet federal and state requirements, LRTA organizes annual fixed route ridership data into a year-over-year spreadsheet for administrative staff to monitor performance. The report includes the following information:

- Annual total passenger trips by route
- Weekday, Saturday, and Sunday service annual total passenger trips by route
- Fare type used by route type (city/local and suburban)
- Fare type used by passenger type (adult, senior and disabled, student, UMass ID, other)

LRTA also posts performance reports for fixed route and ADA demand response services on its [website \(http://lrta.com/wrta-performance-report-card/\)](http://lrta.com/wrta-performance-report-card/) showing operating statistics broken down by mode, month, and calendar year; the following metrics are included in these updates:

- Fixed Route
  - Passenger trips
  - Passenger trips per revenue mile
  - Passenger trips per revenue hour
  - Preventable accidents per 100,000 miles
  - Mechanical failures per 100,000 miles
- Demand Response
  - Passenger trips
  - Passenger trips per revenue hour
  - On-time performance (OTP)
  - Preventable accidents per 100,000 miles
  - Valid customer complaints per 100,000 miles
  - Mechanical failures per 100,000 miles

**Figure 30. Monthly Fixed Route Performance Dashboard Posted on LRTA's Website**

**Lowell Regional Transit Authority  
Performance Dashboard  
Fixed Route**

<b>RIDERSHIP</b>	<b>Year</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>Average</b>
Total Unlinked Passenger Trips (UPT)	2019	111,943	103,054	117,554	113,770	118,216	96,732	97,412						108,383
Total Unlinked Passenger Trips (UPT)	2018	107,552	112,079	115,320	113,080	132,101	118,150	101,941	109,468	123,113	141,655	121,307	110,755	117,210
Total Unlinked Passenger Trips (UPT)	2017	113,482	100,483	122,625	110,039	125,470	121,785	98,705	110,938	130,952	134,290	126,440	111,069	117,190
Total Unlinked Passenger Trips (UPT)	2016	114,031	115,147	138,008	124,983	127,348	123,364	103,852	114,791	132,979	131,376	123,784	113,954	121,968
UPT Per Revenue Hour	2019	14.80	14.77	15.43	15.45	15.24	13.29	12.43						14.49
UPT Per Revenue Hour	2018	14.88	15.82	15.03	15.63	17.10	15.80	13.98	13.94	17.52	18.03	16.74	15.22	15.81
UPT Per Revenue Hour	2017	15.12	14.40	15.32	15.38	15.98	15.59	13.41	13.84	17.52	17.14	16.96	14.97	15.47
UPT Per Revenue Hour	2016	16.21	15.71	16.91	16.68	16.93	15.85	14.80	14.34	16.99	18.59	16.80	14.53	16.20
UPT Per Revenue Mile	2019	1.01	1.02	1.06	1.07	1.05	0.90	0.86						1.00
UPT Per Revenue Mile	2018	1.02	1.09	1.03	1.08	1.17	1.07	0.95	0.95	1.23	1.25	1.15	1.05	1.09
UPT Per Revenue Mile	2017	1.06	0.98	1.05	1.04	1.09	1.06	0.91	0.94	1.21	1.18	1.17	1.03	1.06
UPT Per Revenue Mile	2016	1.10	1.08	1.15	1.13	1.15	1.08	1.00	0.97	1.16	1.26	1.14	0.99	1.10

<b>SAFETY</b>	<b>Year</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>Average</b>
Preventable Accidents Per 100K Miles	2019	0.95	0.99	3.61	0.00	0.88	0.93	1.76						1.30
Preventable Accidents Per 100K Miles	2018	0.95	0.00	1.79	0.00	0.00	0.91	0.00	0.86	0.00	0.00	0.00	0.00	0.38
Preventable Accidents Per 100K Miles	2017	0.00	1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
Preventable Accidents Per 100K Miles	2016	0.00	0.00	0.84	0.91	0.00	0.00	0.00	0.85	0.00	0.90	0.00	0.00	0.29

<b>MAINTENANCE</b>	<b>Year</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>Average</b>
Mechanical Failures Per 100K Miles	2019	5.43	0.00	5.42	1.88	4.42	0.00	0.88						2.58
Mechanical Failures Per 100K Miles	2018	0.00	1.95	1.79	1.90	2.67	2.73	3.71	0.86	1.96	1.76	3.80	3.78	2.24
Mechanical Failures Per 100K Miles	2017	0.00	0.00	0.00	0.00	0.87	1.74	1.84	1.69	1.84	0.00	3.70	0.00	0.97
Mechanical Failures Per 100K Miles	2016	0.00	0.00	1.67	1.81	0.00	0.00	0.00	1.70	0.00	0.90	0.00	0.00	0.51

## 6.1.2 Performance Metrics and Targets from MassDOT Memorandum of Understanding

In August 2019, LRTA, along with the Commonwealth's 14 other RTAs, entered into 2-year MOUs with MassDOT. This agreement is based on performance metrics established by MassDOT and the RTAs, and includes performance targets in the categories of ridership, customer service and satisfaction, asset management, and financial performance. The MOU states that LRTA's performance is to be measured by comparing established baselines to FY 2020 and FY 2021 targets.

The performance measures included in the MOU, along with their baselines, targets, and LRTA's progress through the end of FY 2020, are included in Table 16 and Table 17. Given that the COVID-19 pandemic didn't significantly impact operations until the last two weeks of the third quarter, the data suggest that LRTA appeared to be on track to meet these goals before transit operations were interrupted.

When developing performance targets, it is typical to take into account external factors that are influencing performance, but it is not common practice to consider unforeseen disruptions that have the potential to greatly upset the status quo, like COVID-19. When LRTA and MassDOT developed the performance targets in the MOU, they developed baselines against which to measure LRTA's performance between FY 2019 and FY 2021. With few exceptions, these baselines are averages of data collected in FY 2016 to FY 2018. MOU targets reflected the reasonable expectation that LRTA could improve upon these baselines for the next 2 years. Since the outbreak of the pandemic, all parties acknowledge that meeting ridership and service efficiency goals will be challenging.

LRTA and MassDOT will continue to review MOU performance results through the term of the agreement and will mutually utilize this data to inform agreements for FY 2022 and beyond. LRTA will use FY 2021 as a time to reevaluate targets and performance metrics as transit demand stabilizes and LRTA and MassDOT continue to discuss how to best reflect the impact of the pandemic on ridership, operations, and efficiency. This is discussed in greater detail below.

### 6.1.2.1 Service Effectiveness Measures

The following performance measures contained in the MOU are calculated on a monthly and annual basis using farebox data, passes sold, bus driver tabulations, schedules, operations data recorded by drivers and dispatchers, and AVL technology installed on buses. As evident in Table 16 LRTA was on track to meet some of its targets before the pandemic struck toward the end of the third quarter. The fourth quarter saw greatly reduced ridership with the stay-at-home order and service cuts.

- **Total Ridership (Unlinked Passenger Trips):** This measures passenger trips taken on LRTA vehicles (transfers are counted as individual trips rather than one multi-segment trip). These data are based on farebox counts.
- **Unlinked Passenger Trips per Vehicle Revenue Hour:** This measures the number of total trips divided by the corresponding revenue hours. Revenue hours are calculated by using schedule data and operations data recorded by drivers and dispatchers.
- **On-Time Performance:** This measures the percentage of fixed route and ADA demand response trips that operate on-time, early, or late. LRTA currently reports fixed route vehicles that depart between one minute early and five minutes late (-1/+5) as being on-time; this is measured for both the outbound and the inbound trips. LRTA counts any ADA demand response trip performed within the scheduled window as on-time.



**Table 16. MOU Service Effectiveness Measures**

Operating Statistic	Baseline (FY 2016–FY 2018 Average)	Target FY 2020	FY 2020 (First Quarter–Third Quarter)	FY 2020 (Full Year)
<b>Total Ridership (Unlinked Passenger Trips)</b>				
Fixed Route	1,411,149	1,485,940	946,105	1,024,645
ADA demand response	111,166	111,722	76,210	82,097
Systemwide	1,522,315	1,597,662	1,022,315	1,106,742
<b>Unlinked Passenger Trips per Revenue Hour</b>				
Fixed Route	15.7	15.78	13.4	12.03
ADA demand response	2.30	2.31	2.32	2.26
<b>On-Time Performance</b>				
Fixed Route	83.00%	85.00%	81.75%	83.52%
ADA demand response	87.80%	90.00%	92.84%	94.31%

Source: LRTA and MassDOT MOU (2019), LRTA

### 6.1.2.2 Financial Efficiency Measures

These measures from the MOU are calculated on a monthly and/or annual basis using data from fare payment machines, fareboxes, pass sales, contracted service agreements, schedule data, and operations data recorded by drivers and dispatchers.

- **Farebox Recovery Ratio:** This metric is the percentage of operating costs covered by fares, calculated by the fares collected divided by the cost to operate the route. LRTA does not calculate revenue data by route, so this measure is only available by mode.
- **Operating Expenses per Revenue Mile:** This is the cost of service divided by revenue miles.
- **Operating Expenses per Revenue Hour:** This is cost of service divided by revenue hours.

**Table 17. MOU Financial Efficiency Measures**

Operating Statistic	Baseline (FY 2016–FY 2018 Average)	Target FY 2020	FY 2020 (First Quarter–Third Quarter)	FY 2020 (Full Year)
<b>Farebox Recovery Ratio</b>				
Systemwide	16.00%	16.40%	16.82%	13.25%
<b>Operating Expenses per Vehicle Revenue Hour</b>				
Systemwide	\$59.30	\$60.78	\$59.60	\$65.56

Operating Statistic	Baseline (FY 2016–FY 2018 Average)	Target FY 2020	FY 2020 (First Quarter–Third Quarter)	FY 2020 (Full Year)
<b>Increase Non-Fare Revenues (Excluding Advertising)</b>				
Systemwide	\$871,000	\$958,100	\$783,220	Not available

Source: LRTA and MassDOT MOU (2019), LRTA

### 6.1.2.3 Asset Measures

FTA has developed national standards for rating the condition of transit equipment and facilities. FTA categorizes vehicles, equipment, and facilities into asset classes and those classes have either a Useful Life Benchmark (ULB) or a condition rating on the Transit Economic Requirements Model (TERM) scale. While FTA has default ULBs for expected service years for vehicle classes, agencies are permitted to submit their own ULBs for approval from FTA if they choose. Although the MOU lists the following asset management metrics and targets, LRTA sets ULB goals for its rolling stock, equipment, and facilities in its TAM Plan, while the targets for the metrics in the sections above were set in the MOU. LRTA's vehicles and facilities are generally in good condition (Table 18).

- **FTA Reportable Revenue Vehicles Asset Class Meeting FTA TAM Plan ULB:** This metric is the percentage of vehicles within a particular asset class that have met or exceed their ULB.
- **FTA Reportable Equipment Asset Class Meeting FTA TAM Plan ULB:** This metric is the percentage of equipment within a particular asset class that has met or exceed their ULB.
- **FTA Reportable Facilities Asset Class Meeting FTA TAM Plan ULB:** This metric is the percentage of facilities with a condition rating below 3.0 on the FTA TERM scale.

**Table 18. Condition of LRTA's Vehicles and Facilities**

Asset Type	FTA Standard
<b>Vehicle</b>	<b>ULB</b>
30-foot Bus	0%
35-foot Bus	0%
Cutaway bus	6.25%
Minivan	0%
Automobiles/Sedans	33.33%
Truck	66.67%
<b>Facility</b>	<b>TERM Rating</b>
LRTA Main Office	4
Fixed Route Maintenance & Operations	4
Paratransit Maintenance & Operations	4
Gallagher I Parking Garage	4

Asset Type	FTA Standard
Gallagher II Parking Garage	4
Rourke Parking Garage	4
Gallagher Terminal	4
Kennedy Center (Bus Hub)	3

## 6.2 Considerations for the Next 5 Years

Given current practices, additional improvements and measures that LRTA should consider implementing over the next 5 years are described below. These changes will both aid its navigation of the uncertainties brought on by COVID-19 and further its efforts to adopt industry best practices.

### 6.2.1 How LRTA's Market Has Been Affected by COVID-19

Months into the pandemic, Americans are still trying to understand what the “new normal” will look like. Transit providers are uncertain how many former customers will return (ridership has dropped as much as 80 percent in some systems) and what that timeline looks like. They are also grappling with how to ensure a safe workplace and retain employees as the risk associated with transit operations (and driving a vehicle in particular) has increased significantly since March 2020.

Since the outbreak became widespread in Massachusetts in mid-March, many institutions and industries that fuel the region's economy, and therefore LRTA's ridership, have been severely altered for the foreseeable future. Some of the most significant include:

- Virtual classes at UMass-Lowell, Middlesex Community College Lowell, and the region's public schools
- Decline in customers and workforce at retail locations, restaurants, and bars

These institutions and events are not only major trip generators, but they also contribute significantly to area employment and the local budgets that comprise a significant portion of LRTA's funding. As the timeline for eradicating the virus is extremely uncertain (social distancing may continue into 2021), LRTA will need to be flexible in its ability to adjust service according to demand and funding availability. Access to ridership data that are detailed and readily available is imperative to LRTA's ability to both maintain lifeline service and transport essential workers.

### 6.2.2 Enhancing Data-Driven Evaluation

While the ability to access reliable up-to-date data was important prior to the pandemic, it is now essential that LRTA has the tools needed to make informed service changes in a nimble way and that it uses them promptly and consistently. These tools include technology like APCs and AVLs, which, when combined, allow agencies to analyze ridership at the bus stop level, identifying new ridership patterns and adjusting service accordingly. Because these data are rich with information about a system's travel patterns and are readily available, they are invaluable when considering service changes—particularly when those changes need to respond to a transit market in flux.

LRTA has AVL technology installed on all its buses and APCs on six of its buses. A real-time bus tracker is available on LRTA's website. LRTA is committed to installing APCs on its entire fleet and is planning to use CARES Act funding for their procurement. LRTA currently runs stop-level

reports on a case-by-case basis for special projects, using the buses that have APCs. Once APCs are acquired for its entire fleet, LRTA plans to conduct stop-level analysis on a regular basis along with the rest of its performance reporting.

LRTA currently measures OTP from the routes' departure points. Ideally, OTP is measured throughout a trip by using established time points along a route, resulting in a more nuanced result that provides instructive data (i.e., what segments of the route are causing delays) that can be used to remedy the issues causing delays. LRTA acknowledges that, given the high volume of construction activity occurring in LRTA's service area, a more detailed analysis of OTP is warranted.

In addition to organizing the data associated with its APC and AVL technology, LRTA should create actionable guidelines for the performance metrics it regularly reports, as ridership stabilizes post-pandemic. Thresholds for the following route-level metrics were recommended in LRTA's 2015 RTP (key metrics are in bold):

- **Passenger per hour**
- **Subsidy per passenger**
- **Farebox recovery ratio**
- Cost per hour
- Late trips
- Service/road calls
- Accidents per 100,000 miles

The 2015 RTP recommended that routes that failed to meet thresholds for at least two out of the three main indicators (passengers per hour, subsidy per passenger, or farebox recovery), or fall below the minimum suggested values, should be evaluated for possible modification. As post-pandemic ridership stabilizes, implementing thresholds for when actions like more extended analysis or service changes are warranted would simplify service planning and boost transparency if LRTA shared the guidelines with the public.

Currently, LRTA performs service analysis as needed for MassDOT and NTD on a monthly, quarterly, and annual basis and internally on an annual basis and as needed for special projects. LRTA plans on increasing the frequency of internal route-level analysis to a quarterly basis.

### 6.2.3 Expand Public Transparency

LRTA's website includes a "Performance Report Card" page, which includes a year-over-year performance dashboard (organized by month) for fixed route and ADA demand response services. The availability of this report boosts public trust in LRTA and allows the public to better understand the service. The website does not include route-level performance data, which LRTA includes in its internal annual service performance report for its fixed route service. LRTA should consider the following options for presenting key route-level operating statistics on the LRTA website:

- **Static PDF:** Key operating statistics can be formatted in Microsoft Word or a similar word processing tool and then saved as a static PDF file.
- **Tableau:** One platform for providing key service statistics that should be considered is Tableau. This is an easy-to-use data visualization platform that allows the public to interactively explore operational data.

If feasible, LRTA should also include the option to download raw data from the website, making the data easy to access so that analysis can be included in efforts to educate the public, academic studies, or planning studies.

#### 6.2.4 Additional Measures to Consider Including in Performance Reports

LRTA has annual performance dashboards for both fixed route and ADA demand response service posted on their website. These dashboards include ridership data, data that measure service productivity, and some safety and reliability data. In addition to these dashboards, LRTA develops an annual ridership report in Microsoft Excel format, breaking down the passengers by route and fare used (Adult, Student, Senior and Disabled, and UMass). LRTA also breaks down route by geography type (City/Local and Suburban).

As LRTA continues efforts to improve the accuracy of their AVL system and acquires fleetwide APC technology, LRTA should consider adding the additional performance analyses listed below. Most of the metrics can be looked at on a quarterly and annual basis, but LRTA will only analyze metrics involving financial performance annually to ensure that the data matches its annual audit.

- **Mode-Level Performance**

- **Cost per Passenger:** This is the overall cost to operate a route divided by the number of passengers. This is recommended for annual reports.
- **Subsidy per Passenger:** This is the total expenses minus fare revenue divided by ridership. This is recommended for annual reports.
- **On-Time Performance by Route:** This measures the percentage of fixed route and ADA demand response trips that operate on-time, early, or late. LRTA currently counts fixed route vehicles that depart between one minute early and five minutes late (-1/+5) as being on-time; this is measured for both the outbound and the inbound trips. LRTA counts any ADA demand response trip performed within the scheduled window as on-time.
- **Ridership by Stop:** This measures passengers boarding and disembarking by stop. The technology associated with this data collection (APCs and AVLs) and supporting software can generate reports quickly for any time period requested and includes data that can assist in looking at the data spatially and by time of day. Stop-level ridership data are especially important in the context of a shifting transit market (due to the pandemic) to understand how ridership demand has changed where data are available. Once APC equipment is deployed to LRTA vehicles, this is recommended for annual reports, though in the near-term it may be more appropriate for monthly reports as ridership stabilizes (technology permitting).
- **Passengers per Hour:** This measures the number of total monthly and annual passengers divided by the corresponding revenue hours. It is recommended for quarterly and annual reports.
- **Passengers per Mile:** This measures the number of total monthly and annual passengers divided by the corresponding revenue miles. It is recommended for quarterly and annual reports.
- **ADA Demand Response No-Show:** This measures cancellations made less than 1 hour prior to the pickup time or not being present for the pick-up. This is recommended for quarterly and annual reports.
- **ADA Demand Response Cancellations:** This measures same-day cancellations made at least 1 hour prior to the start of the pick-up window. This is recommended for quarterly and annual reports.

- **Denied Trips:**
  - **Fixed Route:** This measures the percentage of passengers left behind due to vehicle overload. This is recommended for quarterly and annual reports.
  - **Demand-Response:** This measures the denial of trips requested at least a day prior that the agency cannot provide or is outside the 1-hour negotiation window. This is recommended for quarterly and annual reports.
- **Average Phone Hold Time:** This measures the average length of time a customer is on hold with customer service or with reservations for ADA and non-ADA service. This is recommended for quarterly and annual reports.

#### 6.2.4.1 Service Guidelines

One of the critical performance metrics that LRTA should utilize as ridership stabilizes in the wake of the pandemic is service guidelines. Service guidelines provide context for evaluating route-level performance. There are two approaches that LRTA can take to establish guidelines: creating goals based on route type or comparing route-level performance to the system or route category average. It is recommended that one method of guidelines be included in quarterly and annual reports:

- **Route Performance by Route Type:** LRTA uses two service categories, City and Suburban, when comparing route-level performance, as was recommended in their 2015 RTP. When establishing guidelines for these categories, LRTA should consider the geography and primary market served. For reference, the 2015 RTP recommended setting the following performance targets when evaluating passengers per hour by route:
  - City: 18 passengers per hour
  - Suburban: 13 passengers per hour

These thresholds should be reevaluated once ridership has stabilized post-pandemic.

- **Route Performance by System or Route Category Average:** In this approach routes are compared to the system average or route category average and placed into three tiers based on their performance. This approach is ideal in this period of destabilized ridership, as the system or route category average is fluid, reflecting the instability in the market. Recommended tiers for route performance include:
  - **Pass:** Productivity measure is greater than 50 percent of the systemwide or route category average and no corrective action is necessary.
  - **Monitor:** Productivity measure is less than 50 percent of the systemwide or route category average but greater than 35 percent of the average; performance should be monitored, and a corrective plan is developed.
  - **Fail:** Productivity is less than 35 percent of the systemwide or route category average; the corrective plan is implemented.

LRTA should also look at ridership year-to-year, using standard deviation to determine whether changes in a route's ridership is significant. External factors that may have affected ridership (i.e., reduced school enrollment if school is a trip generator) should also be considered. This analysis should be an integral part of LRTA's service planning.

## 7. Stakeholder Engagement

Engaging the public is an essential element of a successful 5-year plan. Planning efforts should be informed by the needs and preferences of transit customers, major regional employers, institutional partners (such as higher education), municipal officials, human service organizations, and other stakeholders. Public outreach for this project primarily took the form of two efforts: an online stakeholder survey and meetings with key stakeholder groups. This chapter outlines the results of these outreach efforts as part of this 5-year CRTP.

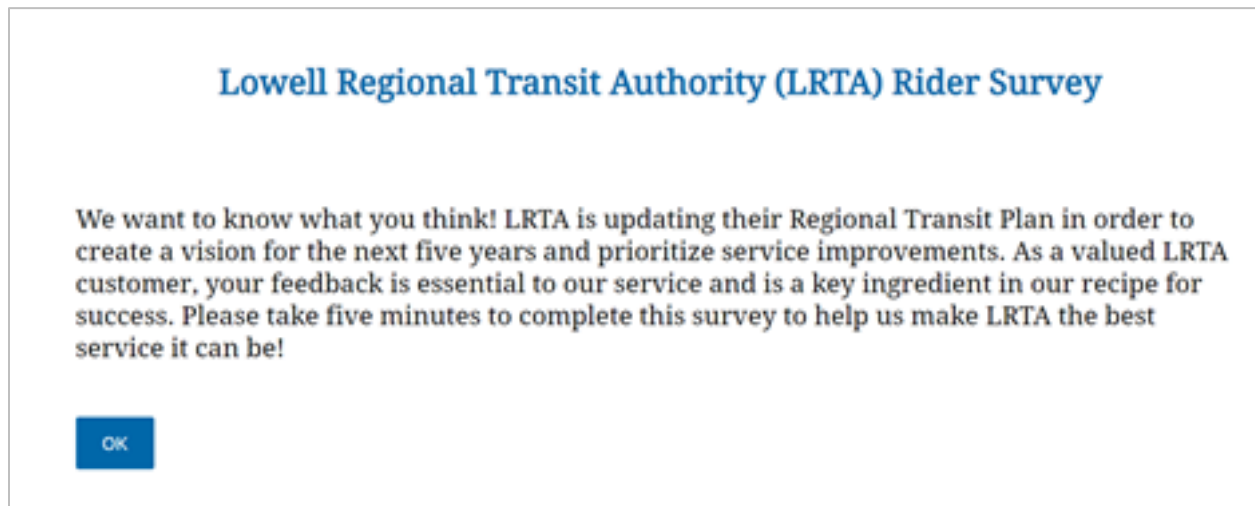
### 7.1 Stakeholder Survey

The foundational element of the outreach approach for this project was a stakeholder survey. The survey was launched online March 4, 2020, and then paused for several months due to the pandemic. It was reposted on the LRTA website and promoted through various communications outlets during the month of July, closing on July 31, 2020. To promote the survey to its riders, LRTA sent email blasts with survey information to stakeholder groups, posted links on its social media accounts, set up paid advertising to target residents within the LRTA service area, and posted a link on LRTA's website.

#### 7.1.1 Surveying Approach and Limitations

Due to social distancing guidelines and other safety protocols resulting from the COVID-19 pandemic, no in-person outreach could be conducted. Thus, the bulk of the outreach effort rested on an online stakeholder outreach survey conducted in the early summer of 2020. The project team developed an online survey using the SurveyMonkey platform (Figure 31).

**Figure 31. Survey Landing Page**



The project team worked to ensure that the broadest possible cross-section of LRTA's stakeholders was represented. Outreach efforts included sending a series of email blasts to stakeholder groups such as major employers, community partners, local chambers of commerce, and local municipalities to share with the public. LRTA posted a link to the survey on the website and a series of posts were shared on LRTA's Facebook page (Figure 32).

The survey was designed to be mobile-friendly and did not require computer access in order to complete. The survey link was accompanied by a QR code to enable a quick scan using a smartphone, which directed to the survey. Flyers were printed in six languages (Chinese, English, Khmer, Portuguese, Spanish, and Vietnamese) and were posted by LRTA throughout the bus terminal, bus shelters, and on LRTA vehicles. LRTA staff promoted the survey through



other local channels, including local cable access and interviews with local newspapers, to reach the largest audience possible.

**Figure 32. Social Media Post**



### 7.1.2 Limited English Proficiency Outreach

Special attention was paid to engaging with groups that serve populations with limited English proficiency (LEP), not only fulfilling Title VI obligations, but also ensuring that the full diversity of LRTA's ridership was represented in the survey results. The project team implemented a targeted outreach campaign where community groups working with LEP populations were reached via email. Additionally, the survey was available in six languages: Chinese, English, Khmer, Portuguese, Spanish, and Vietnamese. The partner organizations in Table 19 were contacted to raise awareness about the survey.

**Table 19. Partner Organizations Contacted for Survey Distribution**

Organization	Organization
Acton COA	Maynard Police Department
Acton Fire Department	Nashoba Valley Chamber of Commerce
Acton Police Department	Pepperell COA
Billerica COA	Pepperell Fire Department
Billerica Fire Department	Pepperell Police Department
Billerica Police Department	Tewksbury COA



Organization	Organization
Cambodia Town Lowell, Inc.*	Tewksbury Fire Department
Cambodian Mutual Assistance Association of Greater Lowell, Inc.*	Tewksbury Police Department
Carlisle COA	The Greater Lowell Chamber of Commerce
Carlisle Fire Department	The Greater Merrimack Valley Convention & Visitors Bureau
Carlisle Police Department	Town of Acton
Chelmsford COA	Town of Billerica
Chelmsford Fire Department	Town of Carlisle
Chelmsford Police Department	Town of Chelmsford
City of Lowell	Town of Dracut
Community Teamwork*	Town of Dunstable
Dracut COA	Town of Groton
Dracut Fire Department	Town of Maynard
Dracut Police Department	Town of Pepperell
Dunstable COA	Town of Tewksbury
Greater Lowell Community Foundation*	Town of Townsend
Groton COA/Senior Center	Town of Tyngsborough
Groton Fire Department	Town of Westford
Groton Police Department	Townsend COA
International Institute of New England – Lowell Site*	Townsend Fire Department
Lowell Alliance*	Townsend Police Department
Lowell Community Health Center*	Tyngsborough COA
Lowell Fire Department	Tyngsborough Police Department
Lowell Police Department	Tyngsborough Fire Department
Lowell Senior Center	UMass Lowell
Lowell TeleMedia Center	Westford COA (Cameron Senior Center)
Maynard COA	Westford Fire Department
Maynard Fire Department	Westford Police Department

*\*Indicates a community group that works with LEP populations.*

### 7.1.3 Survey Results

The survey captured 313 responses consisting of 201 completed surveys and 112 partial responses. Responses that were blank were likely the result of immediate abandonment of the survey due to a time constraint, technical problem, or user error. Note that this was not a statistically valid sampling plan due to the restrictions on methodology imposed by COVID-19; however, it still serves as a solid representation of the respondents' views toward LRTA.

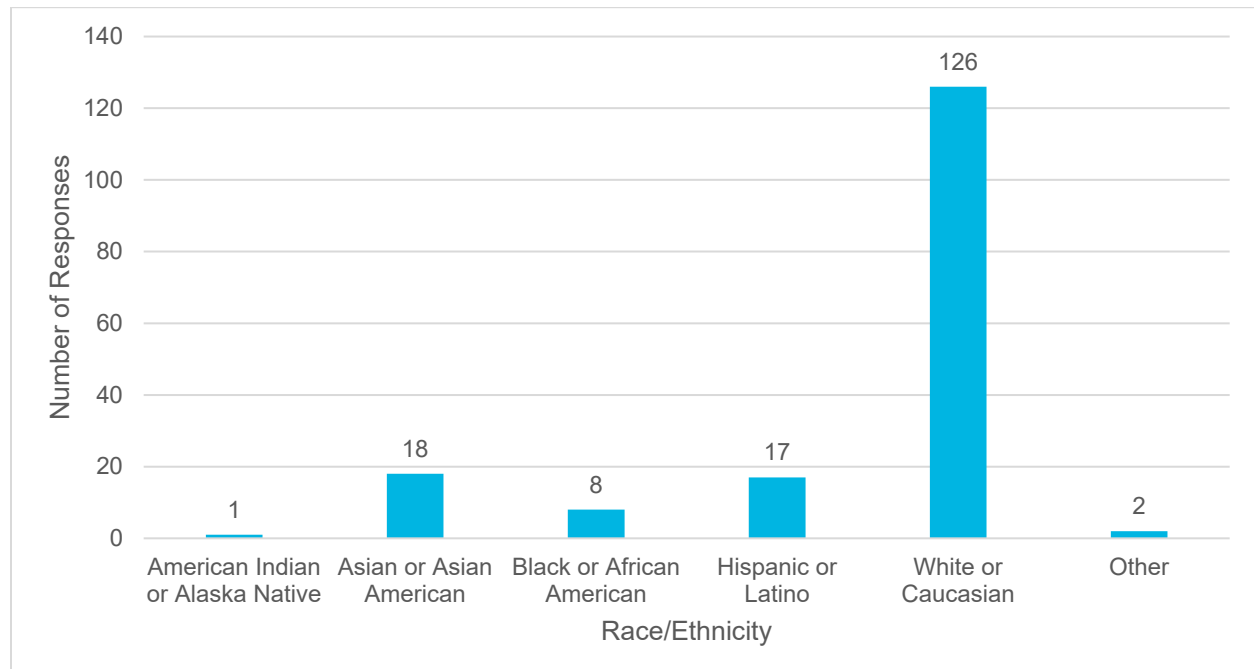
The majority of respondents elected to take the survey in English (86 percent), while 4 percent selected Spanish, 1 percent selected Vietnamese, and less than half a percent of respondents selected Chinese or Portuguese, both of which had one survey response. The survey was designed to determine the ridership status of respondents and had different tracks for riders and non-riders. The survey's respondents included:

- 150 fixed route only customers
- 37 fixed route and demand response customers
- 2 demand response only customers
- 7 non-riders

#### 7.1.3.1 Demographics

The majority of survey respondents identified as White or Caucasian (76 percent), with Asian or Asian American and Hispanic or Latino both comprising a little over 10 percent of the total responses (Figure 33).

**Figure 33. Race/Ethnicity of Survey Respondents**

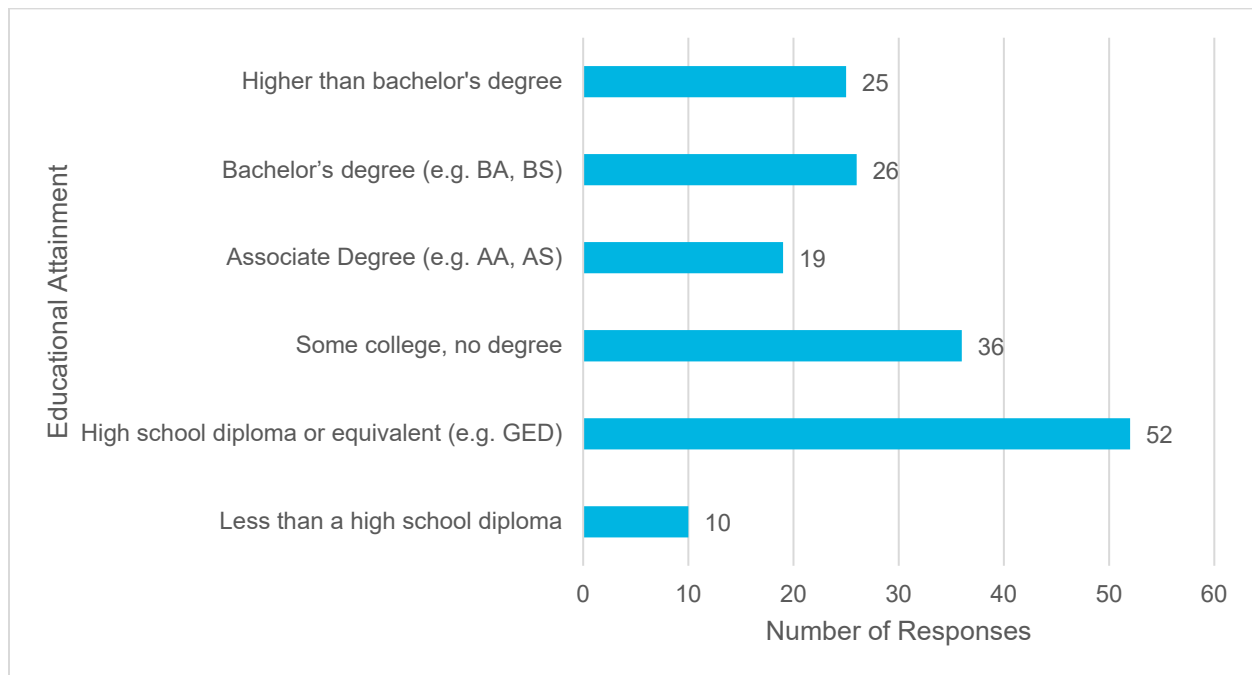


*n*=165

The average age of survey respondents was 44. Slightly more respondents identified as female than male, 52 percent versus 47 percent (respectively); 1 respondent identified as non-binary, and 1 as cis male.

The majority of respondents (58 percent) indicated they did not have a college degree, although 15 percent reported having advanced degrees (Figure 34).

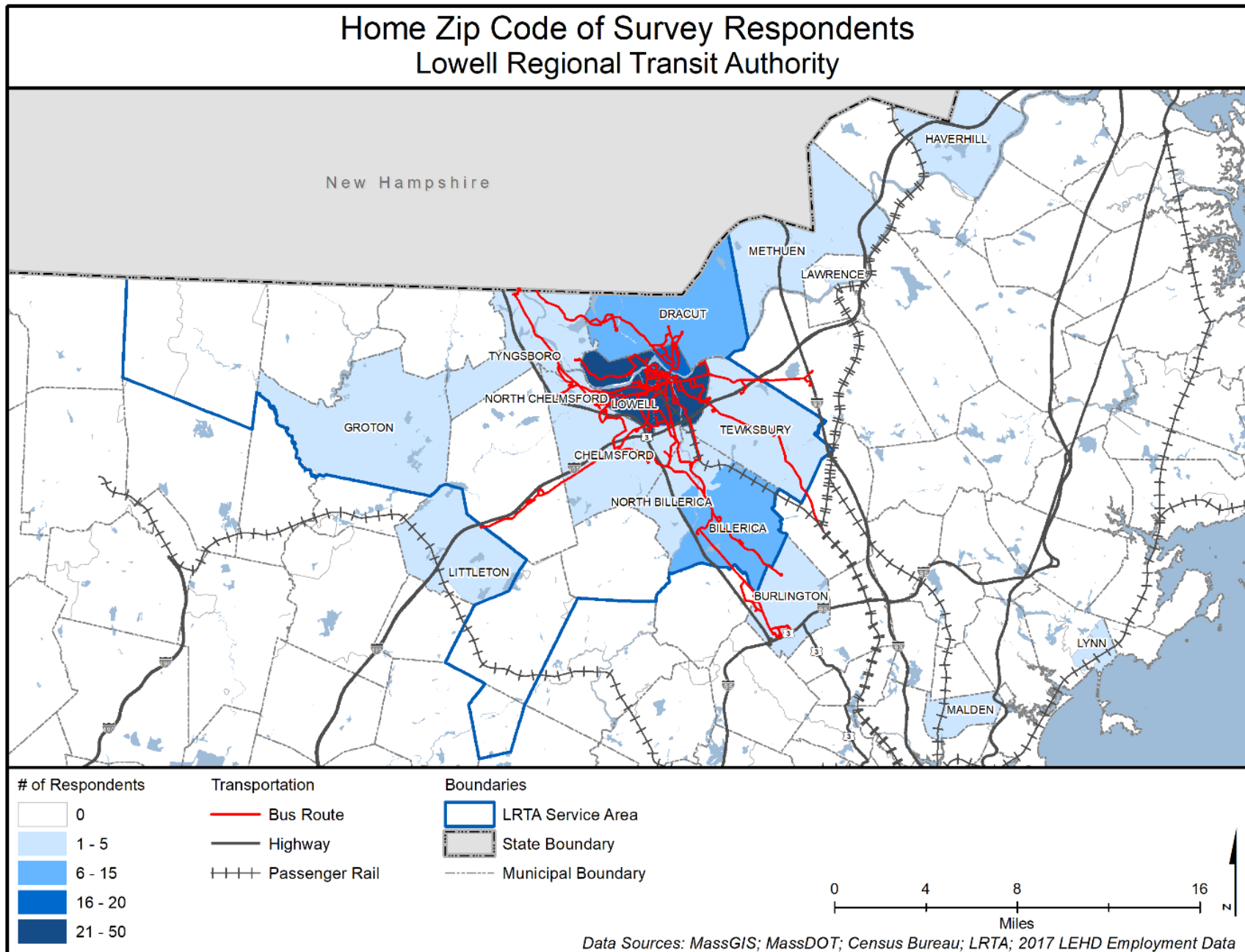
**Figure 34. Educational Attainment for Survey Respondents**



*n*=168

### 7.1.3.2 Current Service/Ridership Profiles

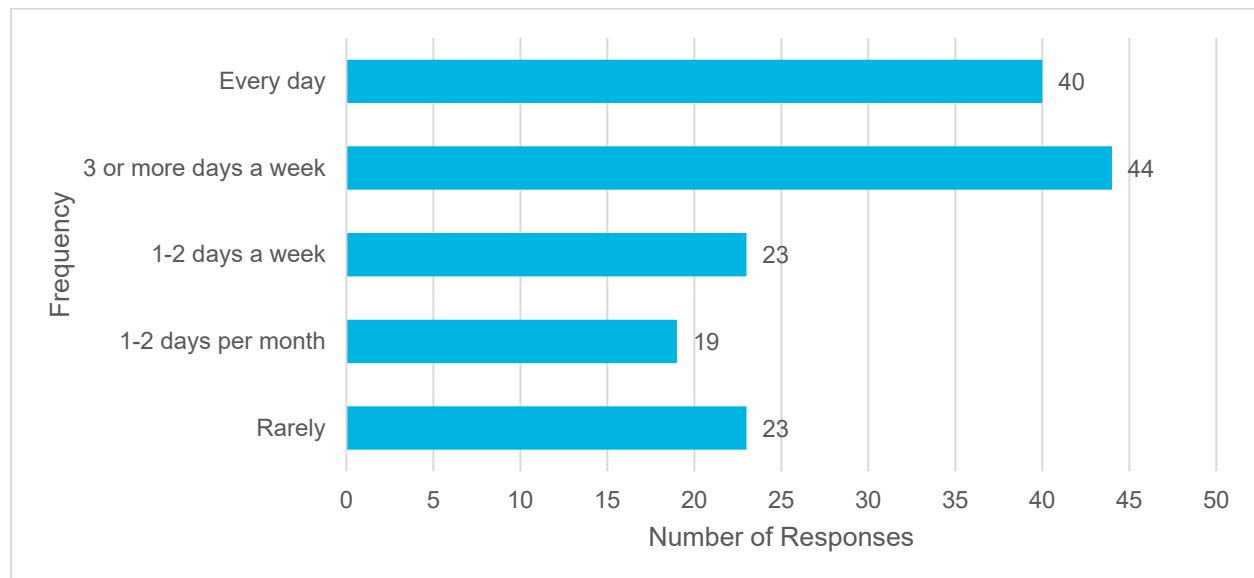
Most of the survey respondents were Lowell residents, with 75 percent of those who provided their zip code living in zip codes 01853, 01854, 01851, or 01850 (Figure 35).

**Figure 35. Home Zip Code of Survey Respondents**

### 7.1.3.3 Current Fixed Route Only Riders

The vast majority of rider respondents who only used LRTA's fixed route bus service used it at least once per week, and 27 percent of respondents answered they used LRTA every day (Figure 36). The majority of respondents who only used fixed route service indicated they were transit-dependent, either due to lack of car ownership (40 percent) or driver's license (21 percent).

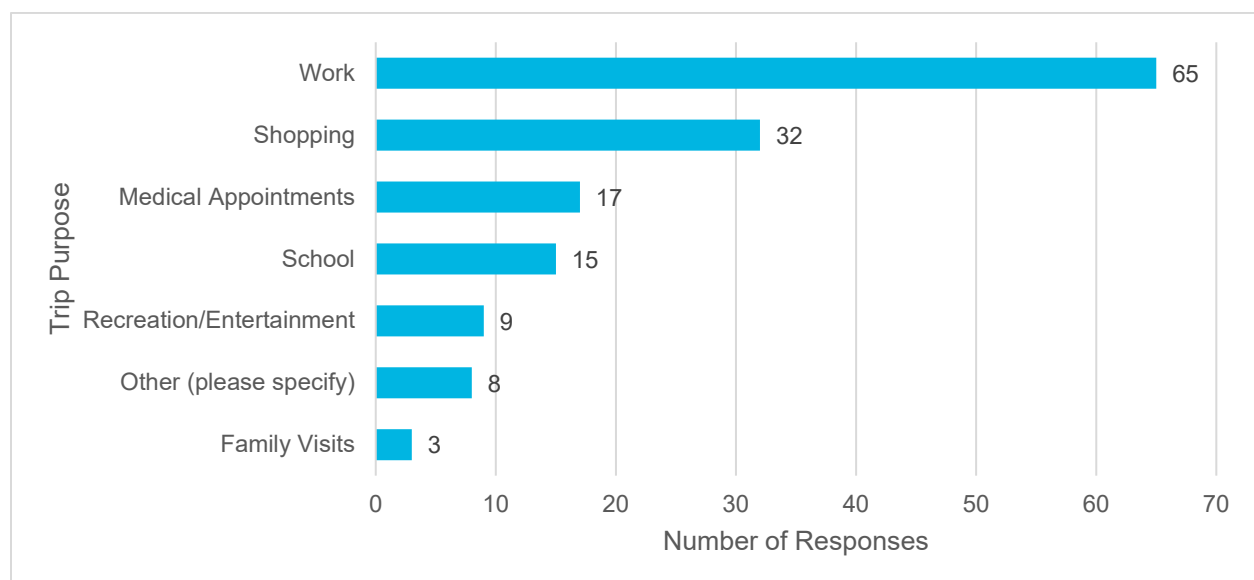
**Figure 36. Fixed Route Riders: Frequency of Fixed Route Service Use**



*n*=149

Forty-four percent of respondents who only used LRTA's fixed route services indicated that the primary trip purpose was work (Figure 37). Of those who responded "Other," the most common response was running various errands.

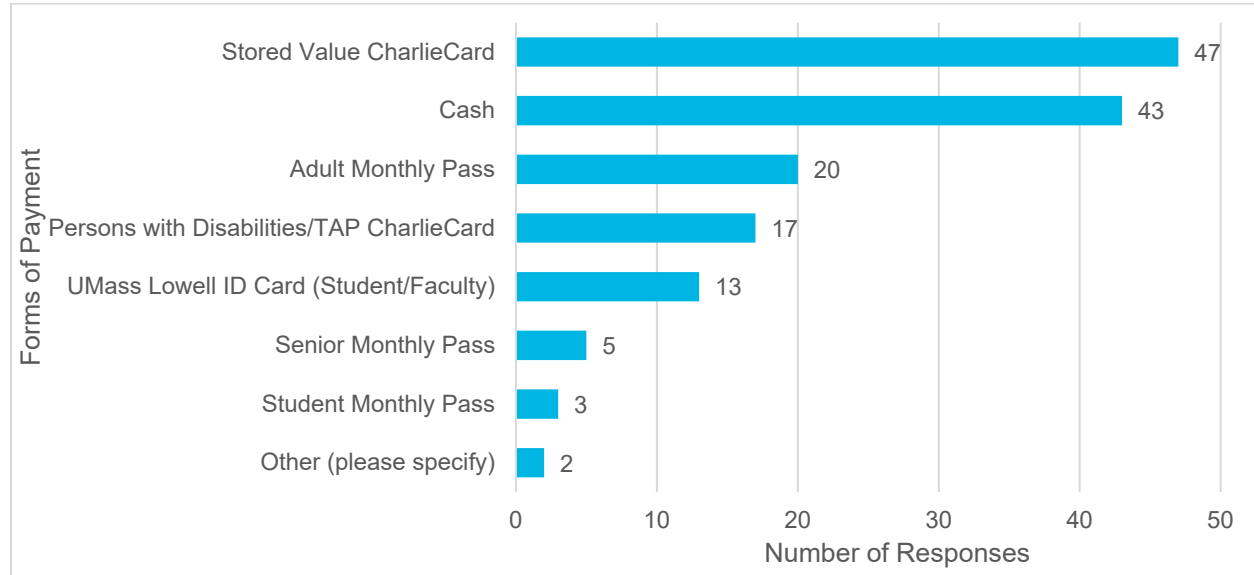
**Figure 37. Fixed Route Riders: Primary Trip Purpose**



*n*=149

The most popular fare medium for survey respondents was the CharlieCard, with 31 percent of respondents indicating they typically paid for LRTA service with a stored value CharlieCard. Cash was nearly as popular, with 29 percent of respondents using it as their primary fare medium. Despite many respondents (27 percent) answering they used LRTA daily, the monthly pass was not as popular, with 13 percent of respondents indicating use of a monthly pass.

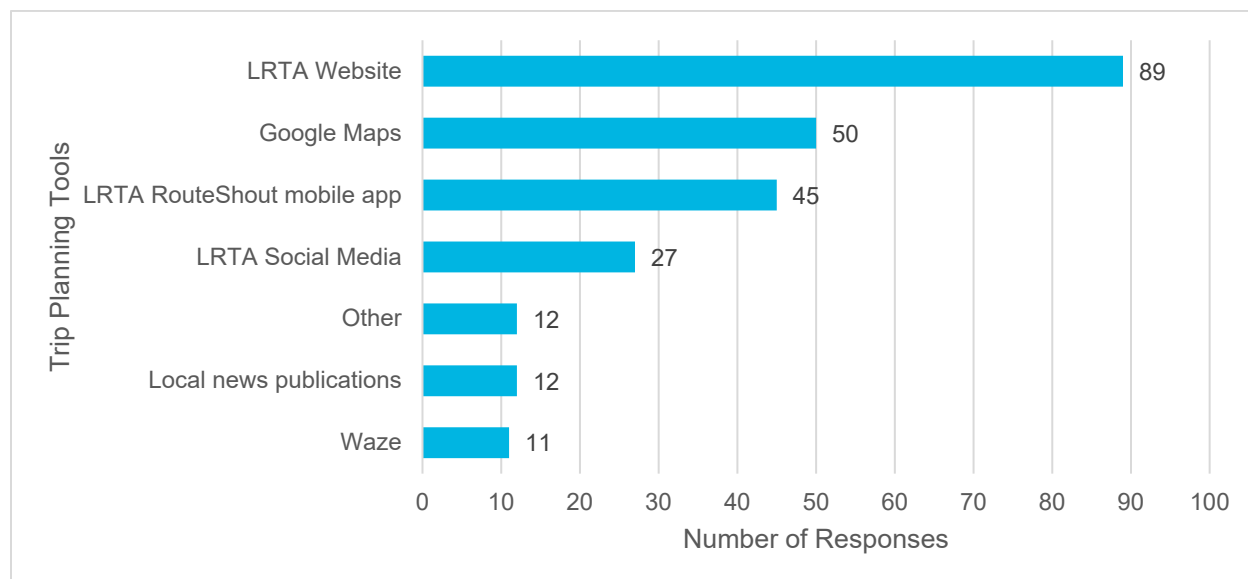
**Figure 38. Fixed Route Riders: Typical Fare Media Used**



*n*=150

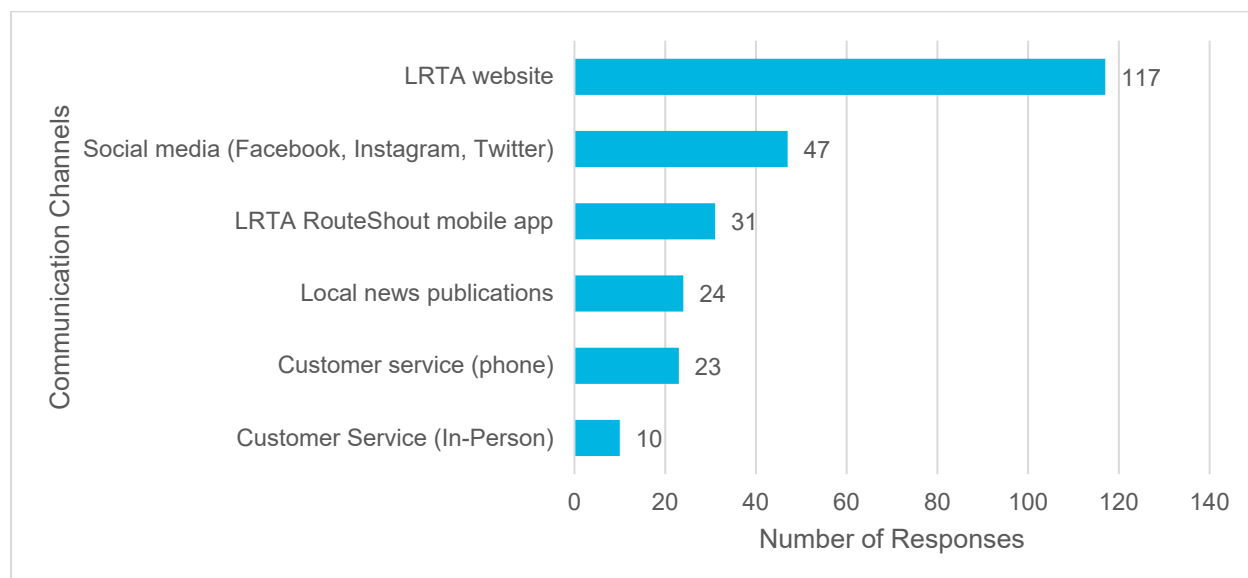
Survey responses indicate that riders made use of other modes of travel in addition to LRTA. When asked if they had used bikeshare, Uber or Lyft, or taxi service in the past year, 75 percent of respondents answered they had used Uber or Lyft and 39 percent answered they had used taxi service. Only 10 percent of respondents had used a bike share service in past year, which is not surprising given that there is no longer a bikeshare service in LRTA's member communities. There had been a pilot program in the City of Lowell, which included a station at LRTA's hub, but it was discontinued, in part due to vandalism.

Understanding how people plan their commute helps to bridge potential communication gaps with existing and potential future riders. A total of 137 current fixed route bus users responded to the question (Figure 39). Sixty-five percent of respondents used the LRTA website to plan their daily commute, 36 percent used Google Maps, and 33 percent used the LRTA RouteShout mobile app. Fifteen percent of respondents checked the LRTA social media accounts for alerts and updates about services while planning their daily commute.

**Figure 39. Fixed Route Riders: Trip Planning Tools Used to Plan Daily Commute**

*n*=137

In addition to trip planning, the LRTA website was also the medium most used by respondents to get updates from LRTA; 80 percent of respondents indicated they relied on the website for communications from LRTA (Figure 40). Respondents also used various social media outlets (32 percent of respondents) and LRTA RouteShout mobile app (21 percent)—with a smaller share of respondents relying on local news publications or customer service (in person or over the phone).

**Figure 40. Media Used to Receive LRTA Communications**

*n*=146

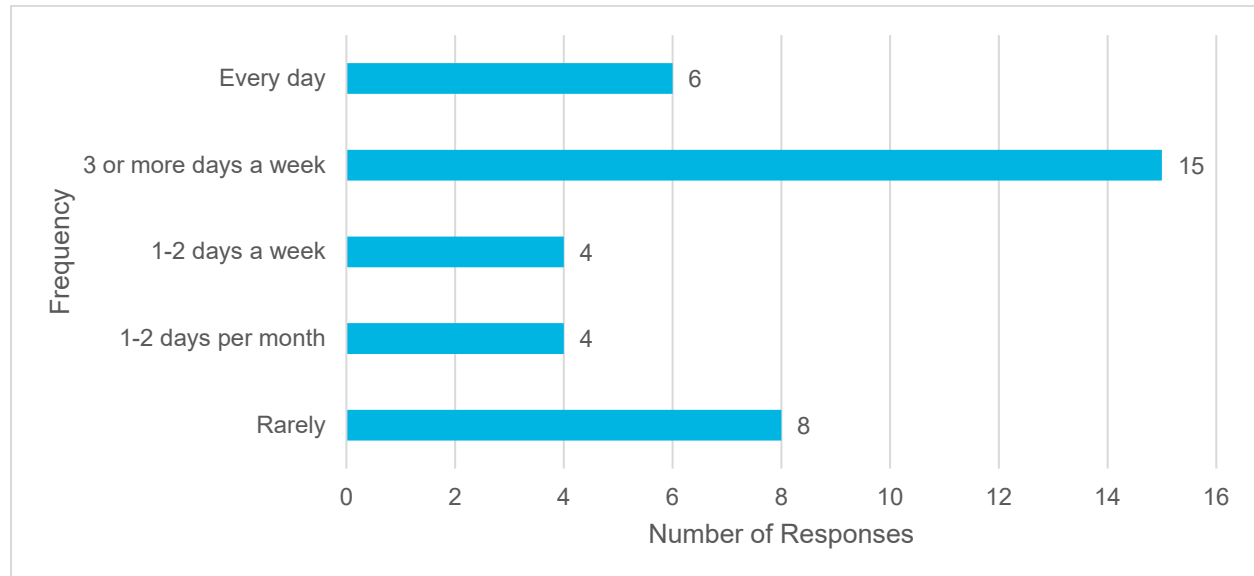
#### 7.1.3.4 Current Fixed Route and Demand Response Riders

Overall, riders who reported using both demand response and fixed route service ride as frequently as those who reported only using fixed route service, with 57 percent using the service at least 3 days per week (Figure 41). Respondents in this rider group did not use



demand response as frequently as fixed route service, with 11 percent of riders indicating they used demand response service 3 or more times a week. Twenty percent of respondents used demand response service 1 to 2 days a week, while 65 percent rarely used it.

**Figure 41. Fixed Route and Demand Response Riders: Frequency of Fixed Route Service Use**



*n*=37

Most of the respondents in this group of riders used LRTA services to go shopping (38 percent) or to go to work (32 percent). Nineteen percent of those using both demand response and fixed route used the services to get to and from medical appointments. Only 5 percent of respondents used these services to get to school.

#### 7.1.3.5 Current Demand Response Only Riders

Only two respondents indicated that they were solely demand response riders. Of those riders, one is transit-dependent, using the service because they did not have a driver's license. One respondent used the service 3 or more days a week to get to work while the other used the services infrequently to get to recreational or entertainment destinations. One respondent used Road Runner Cards and the other used CharlieCards to pay their fares.

#### 7.1.3.6 Needs or Opportunities for Future Improvements

The survey was designed to capture feedback on LRTA's service from two stakeholder groups: current riders and non-riders. LRTA received input on a variety of potential improvements including destinations where respondents would like to see LRTA serve, extended evening service, mobile ticketing, and increased or permanent Sunday service.

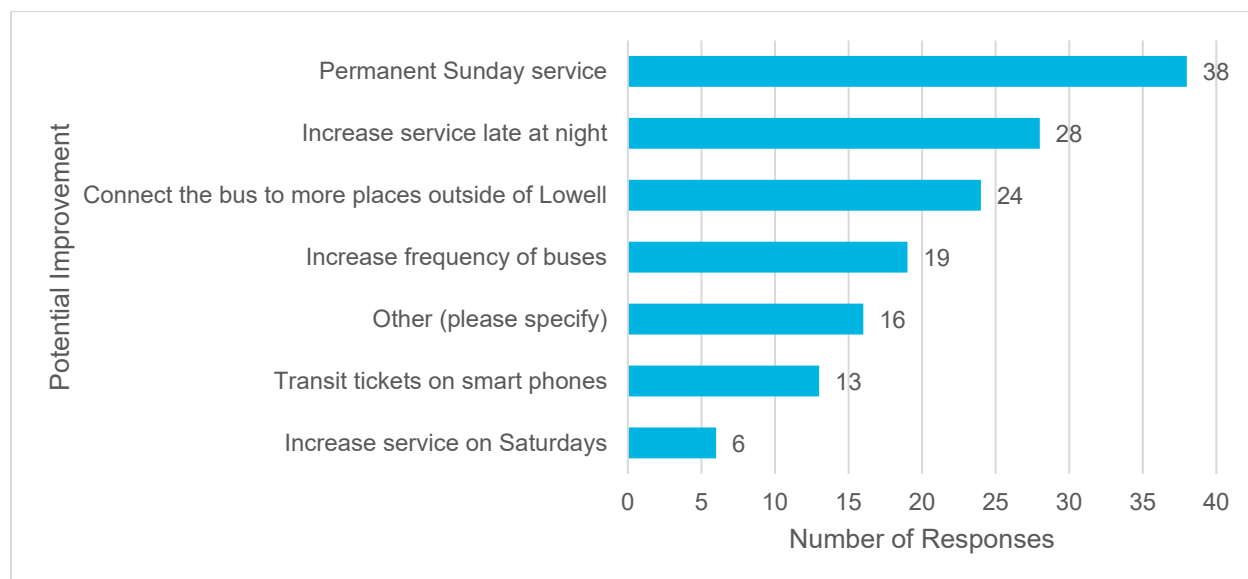
LRTA also used the survey to gauge respondents' comfort using service during the COVID-19 pandemic. LRTA was interested in gaining insight into what measures could be taken to make both riders and non-riders feel safer on its vehicles. A total of 143 people responded to the question, "What can LRTA do to make you feel more comfortable riding as a result of COVID-19?" Thirty-six percent of those who responded felt most comfortable if LRTA incorporated enhanced cleaning measures and required the use of protective equipment (both of which, as of the drafting of this report, it does require).

Thirty-five percent felt most comfortable if LRTA resumed normal service more rapidly, allowing life and travel to return to a sense of normal. Eleven percent felt that LRTA should improve its communications, and 8 percent would like to see expanded cash-free payment options. Ten percent of respondents selected other and provided the following responses:

- Cash-free payment options
- Enhanced communication through mobile apps
- Cleaning all touch points on the vehicles
- Requiring riders to wear masks covering nose and mouth
- Direct/faster routes with fewer stops
- Microtransit with advanced scheduling capability
- Transfers to neighboring transit authorities
- Keep reduced service for longer
- Friendly drivers

Some of these preferences were echoed in another question in the survey, “What is the biggest improvement LRTA can make in the next 5 years?” Respondents who only used fixed route service overwhelmingly selected expanding service hours, with most interested in permanent Sunday service (25 percent) followed by permanent evening service (19 percent) (Figure 42).

**Figure 42. Fixed Route Riders: Preferred Service Improvements for the Next 5 Years**



*n*=144

Respondents who used both fixed route and demand response service indicated a desire for increased connections to destinations outside of Lowell, which was selected by 24 percent of riders.

Respondents were also asked via open-ended questions where they would like to go using LRTA service but are currently unable:

- Twenty-six percent of the 88 fixed route only rider respondents answered the Pheasant Lane Mall in Nashua, New Hampshire, and 6 percent answered Nashua, New Hampshire generally. Other respondents mentioned a need for connections to beaches

or other outdoor recreation (9 percent), expanded service to Burlington (9 percent), Rockingham Mall (2 percent), among other destinations.

- Nearly half of the destinations that respondents who used both fixed route and demand response service would like LRTA to serve are in New Hampshire; 10 out of 21 comments mentioned either New Hampshire or Nashua generally, or the Pheasant Lane or Nashua Mall.

Respondents were also given the opportunity to express what they liked most and least about using the LRTA service:

- Overall respondents were happy with the cleanliness of LRTA's buses (5 percent).
- Three respondents mentioned that they were pleased with LRTA's partnership with UMass-Lowell.
- The biggest problem that respondents had with LRTA's service was unreliable service and the inability to get updates when buses were running late because the RouteShout app wasn't working (12 percent) (*note that the RouteShout app was suspended at the time of the survey due to COVID-related service changes*).
- Respondents also mentioned a need for more service either by:
  - Adding frequency (8 percent)
  - Weekend service (7 percent)
  - Later service (6 percent)
- Less frequently mentioned were the difficulty in traveling outside of the Lowell hub (5 percent), obtaining a CharlieCard (2 percent), and issues with LRTA's transfer policy (2 percent).

## 7.2 Other Outreach

In addition to the stakeholder survey, the project team undertook two additional outreach events with key stakeholders of LRTA:

- **Meeting with UMass-Lowell:** On January 29, 2020, the project team met with UMass-Lowell Administrators, including Tom Milano (Executive Director of Administrative Services); Nick Piscitello (Director of Administrative Services); and Karina Cruz (Parking & Transportation Director), to discuss the plan and gain any feedback on priorities of the university with regard to public transportation in the region. They noted that internal mobility is an issue, as UMass-Lowell has two campus centers that require creative solutions to ensure connectivity. They were also concerned with ease of access to the campus from the region's commuter rail stations, as 40 percent of students are commuters to the campus.
- **Meeting with the LRTA Advisory Board:** On June 25, 2020, the project team presented the plan to the LRTA Advisory Board for comment. Board members noted the importance of paying attention to transit demand in the outer suburbs, and in particular elderly residents and people with disabilities. They also noted the importance of the connection between Lowell and the Boston market.

## 7.3 Key Takeaways

While this effort yielded an array of valuable insights from riders and non-riders alike, a few key takeaways will be areas of focus as the plan's recommendations are developed:

- Expanded service was a top priority for riders, and permanent Sunday service in particular. Later evening service and more connections outside of Lowell were also common requests.
- While 28 percent of riders who only used fixed route service rode LRTA daily, only 13 percent of this group had a monthly pass.
- Many riders, both fixed route and demand response, wanted to see LRTA offer more service to New Hampshire, both Nashua generally and the Pheasant Lane and Nashua Malls in particular.
- Riders wanted the rider-facing bus tracking technology to improve, as many have issues with the RouteShout app that is currently used by LRTA and were either unaware of service changes or unable to tell when a bus is delayed (*note that the RouteShout app was suspended at the time of the survey due to COVID-related service changes*).

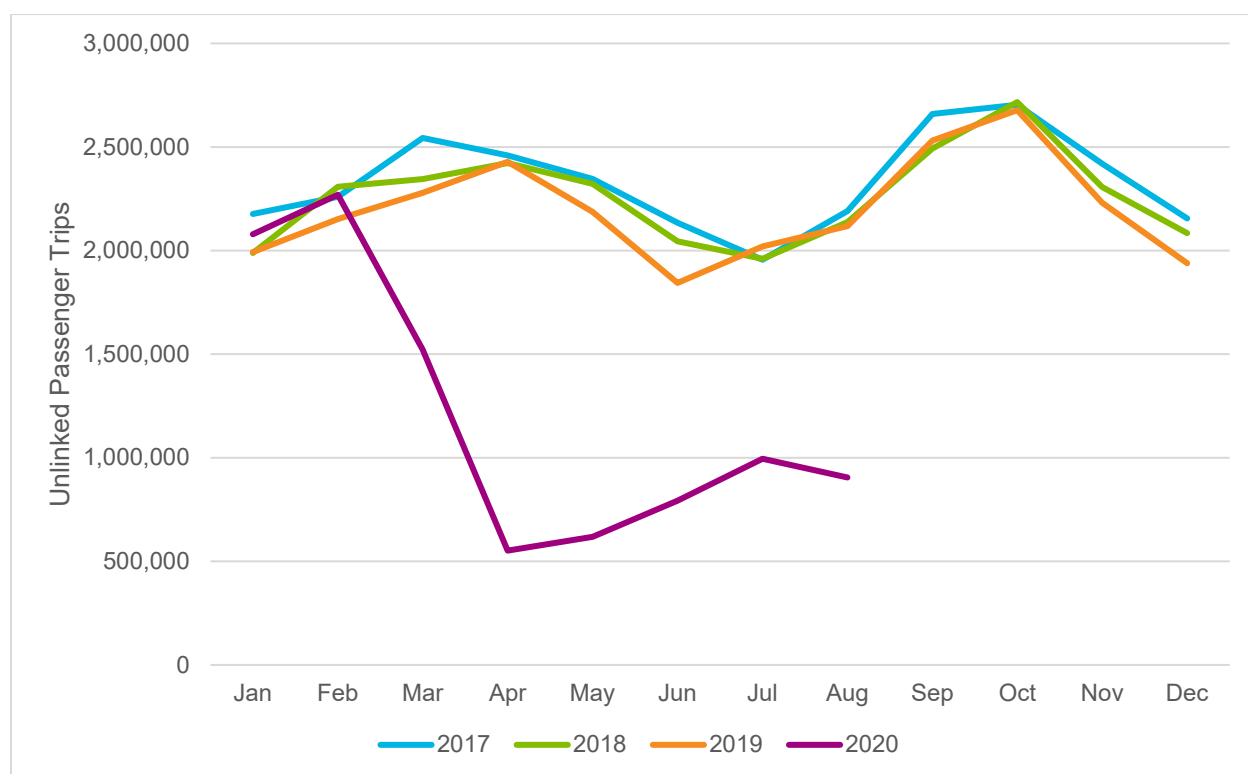
## 8. Transportation Service Needs

Transportation needs were identified for the LRTA service area through discussions with LRTA leadership, review of previous studies and relevant documents, analysis of the transit service operations from FY 2015 to FY 2019, and an outreach effort conducted as part of this plan development process. The needs identified in this chapter reflect this extensive analysis undertaken as a part of the overall planning process and directly inform the recommendations provided in Chapter 9.

### 8.1 FY 2020 Service

A central challenge in identifying needs for this plan has been the unprecedented context in which the plan was prepared. As described in Chapter 2, the COVID-19 pandemic has had sweeping impacts on all aspects of life, including major implications on the operation of public transportation. Between the stay-at-home order in the spring 2020 and ongoing distance learning, business closures, telework, furloughs, layoffs, and reluctance to use public transportation, LRTA has had to quickly adapt to a rapidly shifting landscape. LRTA has had to incorporate new state guidelines and ridership expectations regarding safety and operating a service with depressed ridership and transformed travel patterns (Figure 43).

**Figure 43. RTA Monthly Ridership (2017–2020)**



Of the pre-existing trends impacting the transit industry, the pandemic has served to accelerate some while disrupting others and leaving a few trends largely unaffected. Some issues, such as the demographic composition of a region, remain largely unchanged – for example, suburban and rural LRTA service area residents remain on average older than the rest of the Commonwealth regardless of the COVID-19 pandemic. Other industry trends, such as the adoption of new touch-free fare technology, may be accelerated due to public health concerns. Meanwhile, some practices are severely disrupted, such as higher education, which has pivoted heavily toward distance learning.

## 8.2 Needs Identification Process

The impacts and limitations imposed by the COVID-19 pandemic required flexibility in the approach for identifying the needs for this plan. While some elements of the original process developed pre-pandemic remained viable, many had to be adapted to respond to the new realities of COVID-19. From the inability to conduct public outreach in person to a newly volatile ridership market, the pandemic fundamentally shaped the identification of LRTA's needs for the next 5 years.

### 8.2.1 Review of Transit Services and Market Conditions

A review of service from the last 5 years and market demand analysis were conducted to identify performance trends as well as gaps and needs in LRTA's service area. The analysis included a review of transit routes and other services, frequency and span of service, assets, technology, and policies. This planning process brought to light the importance of harnessing new technology to conduct ongoing analysis of real-time data rather than focusing primarily on historical trends and introduced performance measures to guide data analyses.

### 8.2.2 Review of Previous Studies

In addition to the analysis of past operational data, the team reviewed previous studies and other relevant resources developed within the past 5 years, including the 2015 RTP, to identify transportation needs in the service area (Table 20).

**Table 20. Review of Previous Studies**

<b>Study Name</b>	<b>Author</b>	<b>Year Completed</b>
LRTA Regional Transit Plan (RTP)	URS/AECOM	2015
Middlesex 3 Community Compact Transportation Study (Route 3 Corridor Study)	Northern Middlesex Council of Governments, Metropolitan Area Planning Council, Central Transportation Staff	2018
Northern Middlesex Coordinated Human Service Transportation Plan	Northern Middlesex Council of Governments	2020
Northern Middlesex Regional Transportation Plan	Northern Middlesex Council of Governments	2020
GoLowell: Downtown Lowell Multimodal Complete Streets Plan	The City of Lowell	Ongoing

## 8.3 List of Identified Needs

Based on the information collected from public outreach, discussions with LRTA leadership, study of industry best practices, and prior plans, a list of identified needs has been developed. Needs are described in this section by category of need:

- Service
- Capital
- Performance
- Policy



- Coordination
- Studies
- Other

The needs directly inform the development of recommendations listed in Chapter 9 and include ID numbers to show a clear line between the source of the need to the recommendation responding to that need. Importantly, some needs may be more pressing than others depending on how the transit market recovers from the COVID-19 pandemic, which was considered as recommendations were developed.

### 8.3.1 Service Needs

Several specific service-related needs were identified through public outreach and prior plans (Table 21). These range from requests for service to specific regional destinations to more general needs such as improving customer service or extending hours. Some service needs are cross-listed in Chapter 6 as the route's performance would need to be evaluated in order to make decisions regarding additional service or route deviations.

**Table 21. Service Needs**

<b>ID</b>	<b>Need</b>	<b>Sources</b>	<b>Notes</b>
1	Run service to destinations in New Hampshire such as Hampton Beach and Pheasant Lane Mall in Nashua. Several survey respondents also listed Nashua in general.	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	Nashua is not in the LRTA service area, though LRTA does run a seasonal service to Pheasant Lane Mall, on Black Friday and then the 5 subsequent Saturdays.
2	Run a service connecting Alewife Station to the MBTA Red Line	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> </ul>	Unclear that this would be any faster access to Red Line than commuter rail and would be complicated to provide due to recurring traffic congestion into the urban core.
3	Increase service connections for UMass	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> </ul>	Currently unclear how ridership demand may rebound at UMass-Lowell.
4	Run service to the Point Plaza in Littleton	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	Littleton is not a member community, though this could be served via a route deviation on Route 15.
5	Improve service to the Showcase Cinema de Lux of Lowell	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	Service is currently provided on Route 4 from 40- to 60-minute headways.
6	Run service to Nashoba Valley Ski Area	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	Route 15 could deviate to the Nashoba Valley Ski Area, though it's unclear what the demand is there.
7	Run a service from Groton Center to the Ayer or Lowell Commuter Rail stations	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>Route 3 Corridor Study</li> </ul>	Unclear what the market demand is in Groton.

ID	Need	Sources	Notes
8	Expand bus service along the Route 3 corridor	<ul style="list-style-type: none"> <li>Route 3 Corridor Study</li> </ul>	The Route 3 Corridor Study specifically looks at the area around Burlington and Bedford. Unclear what the ridership demand is there. Micro-Mobility or a satellite LRTA hub are possibilities that take further study.
9	Run service to the Littleton/495 Commuter Rail Station	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>Route 3 Corridor Study</li> </ul>	Unclear what the demand to the Fitchburg Line is.
10	Improve customer service	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	
11	Run service to Pelham, New Hampshire	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	Unclear what the level of demand to Pelham is, as there are no major destinations in that community.
12	Increase service to Tyngsborough, including the Senior Center	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Coordinated Human Transportation Plan</li> <li>Route 3 Corridor Study</li> <li>LRTA Regional Transit Plan</li> </ul>	Tyngsborough is a town of just over 11,000 and very low density.
13	Run service to Concord, Massachusetts, including health care centers	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	Unclear what the level of demand is for service to Concord.
14	Run service to the Wilmington Target	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> </ul>	Unclear what the market demand is to Wilmington Target; Wilmington is not a member of LRTA.

### 8.3.2 Capital Needs

Several needs were identified related to new technology or other capital investments that LRTA should consider (Table 22). The continued expansion of APC technology and procurement of new electric vehicles are two priorities of LRTA's that are also supported in previous regional transportation plans.

**Table 22. Capital Needs**

ID	Need	Sources	Notes
15	Increase rolling stock carrying capacity	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	In the scenario that sees ongoing issues with the pandemic (Low-Ridership) this will be especially important.
16	Improve bus aesthetics (new buses, cleanliness, etc.)	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>Northern Middlesex Coordinated Human Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	This is especially important due to the pandemic. LRTA regularly meets with its communities to provide stop improvements and ADA accessible pads/shelters.
17	Develop more ways to communicate services to potential riders	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Coordinated Human Transportation Plan</li> </ul>	
18	Improve system accessibility	<ul style="list-style-type: none"> <li>Northern Middlesex Coordinated Human Transportation Plan</li> </ul>	Would entail updating bus stops with ADA landing pads, sidewalk connections, etc.
19	Continue to work towards achieving all goals in the Commonwealth's environmental policies	<ul style="list-style-type: none"> <li>LRTA Regional Transit Plan</li> </ul>	
20	Continue to expand clean vehicle fleet through joint procurements with other RTAs	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	
21	Consider implementing mobile ticketing	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Discussions with LRTA leadership</li> </ul>	
22	Continue efforts to expand APCs across fleet as funding becomes available	<ul style="list-style-type: none"> <li>Discussions with LRTA leadership</li> </ul>	

### 8.3.3 Performance Needs

As outlined more fully in Chapter 6, several needs were identified through workshops and discussions with LRTA leadership as well as industry best practices related to performance that were laid out by the RTA Task Force (Table 23). These include regular reviews of performance data and standards for making decisions on service based on performance. These performance monitoring strategies respond to the necessity for making data-driven decisions when adjusting to the effects of disruptive construction in Lowell, responding to the many suggestions that LRTA receives to expand service, and the volatile ridership market in the aftermath of the COVID-19 pandemic.

**Table 23. Performance Needs**

ID	Need	Sources	Notes
23	Increase frequency and hours of service on routes as warranted by demand and performance	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>Northern Middlesex Coordinated Human Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	
24	Enhance existing service to Dracut	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Route 3 Corridor Study</li> </ul>	Route 10 could have a deviation, but the market demand to Mammoth Road is unclear.
25	Increase service to Burlington Mall and other points in Burlington	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Route 3 Corridor Study</li> <li>Northern Middlesex Regional Transportation Plan</li> </ul>	Route 14 is the third-highest ridership route in the system, so this may be warranted if ridership rebounds and ridership on this route in particular remains strong.
26	Run service on Sundays, especially on the Route 3 bus	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Coordinated Human Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	Route 3 does not currently have Sunday service and is one of the lower-ridership routes on the system. However, there may be additional demand for service depending on the outcome of the Sunday service pilot.
27	Improve service along Chelmsford Street	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	Route 16 is a middle-performing route for ridership; unclear what the market demand is, though it does serve Walmart at Drum Hill Plaza, which could show strong resilience for ridership moving forward.

ID	Need	Sources	Notes
28	Consider running express routes that have limited numbers of stops	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Route 3 Corridor Study</li> </ul>	
29	Update Route 12 to better encourage regional development in Tewksbury	<ul style="list-style-type: none"> <li>Route 3 Corridor Study</li> </ul>	LRTA could study the opportunities and drawbacks of orienting Route 12 along Chandler Street in Tewksbury.
30	Eliminate some downtown Lowell routes	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>LRTA Regional Transit Plan</li> </ul>	Some routes may warrant service reductions depending on ridership performance, but it may be too early to tell - recommend re-evaluating in 2021 or whenever ridership has stabilized post-pandemic.
31	Display LRTA's performance analyses on the Authority's website in PDF format or interactive platform (through procurement of Tableau or similar technology). Consider publishing raw data on LRTA's website for use by the public.	<ul style="list-style-type: none"> <li>RTA Task Force</li> </ul>	
32	Monitor impacts of Lowell construction projects and adjust service as needed	<ul style="list-style-type: none"> <li>Discussions with LRTA leadership</li> </ul>	LRTA coordinates with the City of Lowell and MassDOT, but the layout of the city, key destinations, and access to bridges often make mitigations difficult.

### 8.3.4 Policy Needs

The policy need identified in this planning process focuses on fare policies, specifically the affordability of fares (Table 24).

**Table 24. Policy Needs**

<b>ID</b>	<b>Need</b>	<b>Sources</b>	<b>Notes</b>
33	Improve fare affordability	Public Outreach	Will also comply with the revised fare policy.



### 8.3.5 Coordination Needs

Because LRTA borders two separate transit providers, MBTA and MVRTA, several items related to better coordination (Table 25) were identified. Additionally, the need to coordinate with member municipalities and key institutional partners in the LRTA service area was also noted.

**Table 25. Coordination Needs**

ID	Need	Sources	Notes
34	Improve interoperability between LRTA's fare payment system and MVRTA's and MBTA's	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Discussions with LRTA leadership</li> <li>Route 3 Corridor Study</li> </ul>	LRTA could explore a revenue-sharing agreement for pass usage across systems.
35	Improve all services that currently connect to MBTA for more frequency and better timing	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Regional Transportation Plan</li> <li>LRTA Regional Transit Plan</li> </ul>	MBTA commuter rail and bus schedules are likely to shift due to ridership and funding changes resulting from the pandemic. LRTA should continue to ensure that bus connections at the Burlington Mall and along the Lowell commuter rail line are optimized to facilitate connections.
36	Run service to the Middlesex House of Corrections	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	
37	Improve the reliability of the bus tracker app	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	
38	Run service closer to Middlesex Community College in Lowell	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	Unclear what the market demand is or will be but this could be an opportunity for an enhanced partnership between LRTA and a large regional employer.

### 8.3.6 Study Needs

Some needs called out the importance of further study on a specific item. Previous studies referenced the need to explore microtransit services and revisit the design of the route network to provide for more connectivity between routes outside of LRTA's hub (Table 26).

**Table 26. Study Needs**

ID	Need	Sources	Notes
39	Bus routes should intersect more places than Gallagher Terminal	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	If telecommuting continues at high rates, there may be less of a pull to downtown Lowell, in particular office buildings and the commuter rail. There may be more need for connections between residential areas and service-sector employers/shopping (e.g., Walmart).
40	Shorten the time to complete a route	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>Northern Middlesex Coordinated Human Transportation Plan</li> </ul>	A review may uncover some opportunities for streamlining routes and reducing liability exposure by avoiding taking buses through active parking lots.
41	Offer an advanced scheduled (24 or 48 hours in advance) microtransit option that would be available to all riders	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	There may be some markets better served by microtransit as ridership remains depressed.
42	Run service health care centers and other destinations in Westford/Chelmsford	<ul style="list-style-type: none"> <li>Northern Middlesex Coordinated Human Transportation Plan</li> <li>Route 3 Corridor Study</li> </ul>	Unclear what the market demand is to Westford and Chelmsford.
43	Investigate the establishment of agreements with private ride-hailing services to fill gaps in transportation service during hours when public transit is unavailable	<ul style="list-style-type: none"> <li>Route 3 Corridor Study</li> </ul>	

### 8.3.7 Other Needs

A few needs did not fit into the categories above. These included safety needs, quality control issues, and fare payment needs (Table 27). The safety needs in particular are a pressing topic in the context of the COVID-19 pandemic, and LRTA is deeply committed to them through enforcement of mask policy, regular sanitation and cleaning protocols, and other activities as described in state and federal guidelines.

**Table 27. Other Needs**

ID	Need	Sources	Notes
44	Allow automatic monthly payments for passes	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	
45	Diversify drivers and hire more Spanish speaking drivers	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	
46	Continue to address COVID-19 through mandating masks, providing drivers adequate protection, and cleaning the buses	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	
47	Always include the Harvard Medical Center stop on Route 15	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	LRTA is unaware of any issues regarding service to that stop but will monitor service closely.
48	Improve perceptions of safety on and near bus stops	<ul style="list-style-type: none"> <li>Public Outreach</li> </ul>	This includes safety from crime and COVID-related concerns.
49	Provide drivers with additional trainings on how to share the road with other users such as bicyclists	<ul style="list-style-type: none"> <li>Public Outreach</li> <li>GoLowell Plan</li> </ul>	
50	Continue monitoring revenue sources (e.g., parking garage) and make adjustments to spending and costs as needed	<ul style="list-style-type: none"> <li>Discussions with LRTA leadership</li> </ul>	

## 9. Recommendations

The recommendations for this 5-year plan are based on a holistic process that takes into account historical operational data, stakeholder input, industry best practices, Commonwealth-wide goals, and LRTA's priorities. The strategy for generating these recommendations embraces the uncertainty introduced by the COVID-19 pandemic and considers a spectrum of recommendations depending on ridership demand in the region. These recommendations provide a decision-making framework for pursuing strategic service changes, capital enhancements, and policy approaches, and prioritize maximizing mobility options for residents of the LRTA service area.

### 9.1 Guiding Principles

As LRTA prepares for the next 5 years, several looming questions face operators across the country: When will ridership return? How might the transit market be permanently changed by the pandemic? How can new technology be used to accommodate these changes to the transit market? How might new housing preferences impact transit demand?

Despite the uncertainty facing the transit industry due to the COVID-19 pandemic, several guiding principles remain steadfast despite the shifting transit landscape. These guiding principles must be considered as LRTA's needs are analyzed and recommendations are made.

- **Safety:** The pandemic has underscored the importance of safety as the number one priority for LRTA. Before the pandemic, safety included considerations such as driver training, security systems, security guards at key locations, and enforcement of the Drug and Alcohol Program. In the context of the COVID-19 pandemic, safety considerations have been expanded to include issues such as routine cleaning, sanitizing, enforcement of mask and social-distancing mandates, and removal of benches and other amenities that may encourage congregation at transit facilities.
- **Top-Notch Customer Experience:** A primary guiding principle is the commitment to the best customer experience possible. The entire purpose of a transit agency is to move people efficiently to their desired destinations, and the efficiency of the system depends on robust ridership. Ensuring a high-quality customer experience is the best way to acquire and retain a loyal ridership base, especially during times of uncertainty.
- **Equity Considerations/Title VI:** Equity is an organizational priority for LRTA in addition to being a requirement of state and federal regulations. Federal guidance requires that service supported by federal funding must not be provided in a way that places undue burdens on minority populations or those living in low-income households. Equity considerations are codified in LRTA's Public Participation Plan and Language Access Plan, both of which ensure that major service decisions are done in consultation with the public.
- **Fiscal Responsibility:** A key group that LRTA has responsibility to is the taxpayer, and as such LRTA pays close attention to the efficient use of public funding to meet local and statewide goals. While maximizing ridership is one metric for assessing efficient use of funding, numerous other goals are expected of public transportation operators (many of which are listed later in this section).
- **Environmental Stewardship:** LRTA and the Commonwealth of Massachusetts have both made a commitment to environmental stewardship, and this commitment should guide decisions even in an uncertain future. This ongoing commitment to reducing environmental impacts must be reflected in the priorities of LRTA, with a recognition that

one of the most meaningful environmental goals is shifting car trips to fixed route bus trips.

- **Regional Land Use and Economic Development Goals:** Numerous land use and economic development goals at the regional and local level should guide LRTA's decisions. This could be service to new 40R (Smart Growth) developments such as those in downtown Lowell or to business parks along Route 128.
- **Data-Driven Performance-Focused Decision-Making:** LRTA's service and fiscal decisions should be made within a data-driven and performance-focused framework that is the foundation for management of the Authority and provides accountability and transparency.

## 9.2 Performance Monitoring

As outlined in Chapter 6, performance monitoring is the key strategy to navigate the extreme uncertainty facing LRTA in the context of this 5-year plan. Since the pandemic began, ridership has declined sharply across the LRTA system, and it is unclear which routes and modes will bounce back more quickly and which will be compromised for a longer period.

Performance monitoring depends on three key ingredients, which underpin the entire approach of this plan:

- **Data Collection:** A transit agency must have the data collection systems in place from which to draw the information for making decisions. These systems can be automated, such as APCs, or drawn from manual observations or samples. Validation of the information collected is a crucial aspect of data-driven decision making.
- **Data Analysis:** More often than not, transit operators are overwhelmed with the data produced on a daily or even hourly basis from the systems used in delivering service. Information from AVLs, APCs, fareboxes, phone systems, and other technology can be voluminous, and having appropriate levels of data analysis capacity is essential for distilling the information into key decision-driving reports.
- **Decision-making Processes:** The final essential component of using data to drive decisions is developing and implementing the process by which key decision-making bodies, such as the Administrator, senior staff, and/or the oversight board, are presented with information for making choices and then making those choices. This can include regular reviews of summary reports and/or meetings to review key performance metrics with responsible staff.

Each step of the process for a data-driven decision-making framework is necessary but, in and of itself, insufficient to confront the volatility facing the transit industry. Taken together, they provide a powerful framework for navigating the uncertainty of the coming months and years. The recommendations provided in Chapter 6, and reiterated below, underscore this essential strategy LRTA is utilizing to ensure the best possible decisions are made in the context of the COVID-19 pandemic.

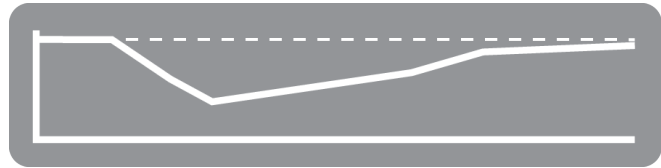
## 9.3 Ridership Scenarios

The recommendations in this plan are structured around the uncertainty of how ridership could rebound in the LRTA service area. While other considerations, such as funding availability, are important when understanding what the future might hold, this plan's approach focuses on ridership demand as the primary driving factor for these future scenarios.

In order to better understand how ridership might change in the coming months and years, LRTA used three qualitative ridership scenarios to sketch out the future of transit demand in potential futures through 2025. These include a high-ridership scenario (a return to 86 percent of pre-pandemic ridership), a medium-ridership scenario (between 60 and 85 percent of pre-pandemic ridership), and a low-ridership scenario (below 60 percent of pre-pandemic ridership). These are explored more below.

### 9.3.1 High-Ridership Scenario

In the high-ridership scenario, this plan imagines what the world will look like when LRTA's ridership reaches 86 percent of the levels it saw pre-pandemic (roughly February 2020). Even though system ridership has returned to roughly 2019 levels, some specific markets might continue to be impacted. The conditions expected to have occurred in a high-ridership scenario are:



- There is an effective vaccine developed and widely available around the country. Vaccination rates exceed 80 percent of the population, achieving “herd immunity.”
- There is continued federal support for small businesses and state and local governments to reduce layoffs resulting from the pandemic and prevent further workforce reductions due to lagging consumer spending and tax receipts.
- Major regional events restart with strong attendance, and local businesses are able to reopen with minimal permanent closures resulting from the pandemic.

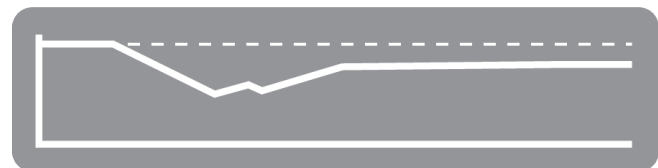
As a result of a successful vaccination development and distribution effort, and ongoing federal support, ridership would be expected to return to levels close to those seen in 2019. Specific aspects of this return of ridership demand include the following:

- Restaurants open with strong sales as people return in record numbers after months of social distancing and deferred travel plans.
- Post-secondary institutions like UMass-Lowell resume with primarily in-person classes, though it is likely that distance learning comprises a larger share of course offerings than pre-pandemic.
- Unemployment drops to levels seen pre-pandemic, with people traveling to work on transit, in particular service-sector workers who depend on public transportation for mobility.

Importantly, the high-ridership scenario does not envision ridership rising above where it was pre-pandemic, but rather envisions a return to ridership at roughly the same levels seen in 2019.

### 9.3.2 Medium-Ridership Scenario

The medium-ridership scenario imagines a future in which ridership recovers to 60 to 85 percent of its lowest level in 2020. This scenario would envision the following conditions:



- The COVID-19 vaccine is slow to be developed, has limited effectiveness, has distribution problems, or has low-uptake due to public skepticism about its safety. While

many people would be vaccinated, this lack of widespread immunization means that many are still reluctant to be in public spaces for fear of infection.

- Federal support for small businesses and laid off workers is modest, and state and local governments are forced to reduce services and lay off staff due to significant funding shortfalls.
- Some economic activity returns as portions of the population are vaccinated and return to pre-pandemic activities, though unemployment still remains substantially higher than in 2019.

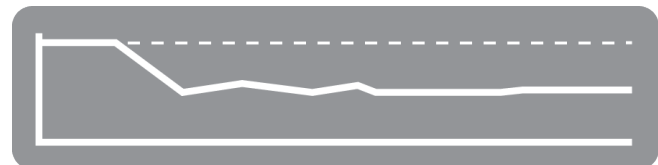
As a result of this middling performance on vaccination and economic support, the transit market remains depressed. Some specific transit market impacts are:

- Higher education sees some return of in-person instruction for those courses which benefit most from hands-on experience, such as trade schools and the sciences. Remote learning still dominates most departments.
- Those riders most sensitive to the risks of the pandemic (seniors, people with pre-existing conditions) tend to use demand response transit more often, which has higher fares than fixed route transit. The perceived risk of riding and prohibitive cost of fares reduce overall demand.
- Lowell-area and Boston restaurants fully reopen in winter FY 2021 but many diners are reluctant to return to indoor dining as the majority of the population has yet to be vaccinated.
- Unemployment remains somewhat high and travel to service-sector places of work is depressed, reducing overall ridership.

These factors produce a scenario where there is some rebound from the lows of spring 2020 but keep overall system ridership below pre-pandemic numbers.

### 9.3.3 Low-Ridership Scenario

The low-ridership scenario imagines a future where the transit market is permanently compromised and transit demand has been structurally impacted, resulting in an indefinite plateau at or near ridership levels seen during the worst of the pandemic. There are some seasonal fluctuations but overall ridership remains below 60 percent of the level seen in 2019. This scenario envisions the following conditions:



- The vaccine development effort proves to be more challenging than anyone thought, with vaccine trials showing limited or no effectiveness, or the need for annual vaccinations similar to flu shots.
- There is a strong shift in housing demand from urban areas (e.g., Boston) to auto-oriented suburban housing in the LRTA region as well as a move toward part- or full-time telework for computer-based professions.
- Higher education institutions explore all options for continued social distancing and remote learning, and the economic impacts result in fewer students with the financial means to pursue degrees.
- The national economy enters a period of extreme volatility, with unemployment rates spiking due to disruptions from recurring lockdown and social distancing orders.



- The federal government is stuck in gridlock and is unable to intervene effectively in addressing the ongoing economic crisis. Plummeting state and local revenues force layoffs, which exacerbate the economic turbulence.

This poor outcome on both the economic and public health fronts could impact the transit market in the following ways:

- Local business closures due to poor economic conditions and the ongoing cancellation or underattended public events severely depress ridership demand.
- Demand from higher education institutions, including students, faculty, and staff, is minimal due to the severe impacts of the pandemic.
- Many students attending Lowell Public Schools choose to continue remote learning over in-person learning.
- The severity of infection rates of the disease results in an ongoing hesitation to be in any public space, including transit vehicles, which diverts people to alternatives such as carpooling, active transportation, or lower-capacity shared rides (e.g., Uber/Lyft).
- The movement of people from more transit-oriented pre-war development into auto-oriented suburbs further erodes the market for fixed route transit and expands the need for demand response service.



The ongoing presence of high infection rates and the inability of the federal government to address the economic fallout result in volatility in the transit market, with ridership on average staying below 60 percent of pre-pandemic levels.

## 9.4 Key Recommendations

The needs outlined in Chapter 8 drove the development of recommendations presented in the following sections. The recommendations are broken down by service, capital, policy, performance, coordination, planning, and other needs. If a recommendation spans two or more categories, it is denoted with an icon to indicate that it is cross-listed (Table 28).

**Table 28. Recommendation Categories**

Category	Icon	Description
Service		Service recommendations deal with specific routing or other operational considerations of day-to-day provision of service.
Capital		Capital recommendations deal with the purchase or management of equipment, rolling stock, facilities, or other assets.
Performance		Performance recommendations deal with the systems and protocols for monitoring agency operations.
Policy		Policy recommendations deal with practices and standards adopted by the transit agency to guide how the organization functions.
Coordination		Coordination recommendations deal with communications between the transit agency and other regional and statewide partners.

Category	Icon	Description
Studies		Studies recommendations deal with needs that require further examination in order to make an informed decision.
Other		Other recommendations deal with issues not handled by the other categories.

This breakdown of recommendations can be used to help inform funding priorities, with LRTA using it as a reference document for assembling future grant applications. It also serves to outline the approach that LRTA will be taking depending on the level of transit demand (described in the three ridership scenarios above), as well as listing core needs for the Authority.






Importantly, some recommendations respond to “Core Needs,” which exist independent of the level of ridership. These recommendations tend to relate to pre-existing industry trends, such as no-touch mobile ticketing, that should be pursued regardless of whether ridership is at 50 percent of pre-pandemic levels or 100 percent.







### 9.4.1 Service Recommendations








Service recommendations for LRTA center on adding destinations to existing routes or adding the geographic reach of LRTA's service (Table 29). Existing routes' performance should be monitored to determine whether additional service is warranted. Before adding service via new fixed routes or demand response service, LRTA should assess market demand by looking at existing ridership data, census data, and stakeholder outreach. LRTA is also considering other modes like microtransit in lower density areas.







**Table 29. Service Recommendations**

	<b>Recommendation</b>	<b>Need ID</b>	<b>Core Need</b>	<b>Low-Ridership Scenario</b>	<b>Medium-Ridership Scenario</b>	<b>High-Ridership Scenario</b>	<b>Complexity of Implementation (Low, Mid-Level, High)</b>	<b>Impact (Low, Mid-Level, High)</b>
	Explore opportunities for implementing pilot service to the Pheasant Lane Mall in Nashua.	1			X		Mid-Level	Mid-Level
	Continue monitoring and coordinating changes with MBTA services to optimize connections between LRTA and MBTA services.	2, 9, 35				X	High	Low
	Review market demand at UMass-Lowell as ridership rebounds and classes in person resume.	3				X	Low	Mid-Level
								
	Develop and implement a performance-based decision-making framework for evaluating routes for additional service.	4, 6, 24, 25, 26, 27, 29	X			X	Mid-Level	High
	Better assess market demand to the commercial area at Route 3 and I-495 for enhanced transit service.	5				X	Mid-Level	Low

Recommendation		Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Explore the opportunities of microtransit in the LRTA service area and potential partnerships with ride-hailing services such as Uber or Lyft where appropriate.	7, 41, 42, 43				X	Mid-Level	Low
	Continue assessing the possibility of improving service along the Route 3 corridor as ridership improves post-pandemic.	8				X	Mid-Level	Mid-Level
	Continue supporting training for all front-line staff that emphasizes customer service. Incorporate customer satisfaction into ongoing performance analysis framework.	10	X				Mid-Level	High
	Use technology to expand data-driven decision making, acquiring new assets when needed.	11, 12, 13, 14,	X				Mid-Level	High
								
	Continue LRTA efforts to ensure a high-quality, clean, safe, and aesthetically appealing experience.	16	X				High	High

Recommendation		Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Continue building out improved communications infrastructure through an improved website, integration with social media, dynamic screens at the terminal and on buses, the mobile bus tracker, and other industry best practices.	17	X				Mid-Level	High
	Continue assessing bus stops and other transit facilities for ADA improvements.	18	X				Mid-Level	High
	Assess market demand for express routes on key long-distance routes.	28				X	Mid-Level	Low
	Implement a performance-driven decision framework for evaluating appropriate levels of service for the routes in the service area on regular intervals.	23, 30	X				Mid-Level	High
 	Coordinate construction activities in downtown Lowell closely with the City of Lowell and MassDOT to fully account for service disruptions and mitigate, to the greatest extent possible, negative impacts to the customer experience.	32	X				Mid-Level	High
	Explore a potential partnership with the Middlesex County Sheriff to provide service to the House of Corrections.	36		X			Low	Low





	Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Continue working with the vendor and operators to fine-tune the bus tracker and AVL systems with a goal to see improvements by September 2021.	37	X				Mid-Level	High
	Explore the possibility of a closer partnership with Middlesex Community College depending on the return of students to in-person classes. Extend the Downtown Shuttle potentially along East Merrimack Street to serve a stop closer to the Middlesex Community College building.	38				X	Low	Low
	Explore opportunities for radial/suburban connections between key origins and destinations.	39		X			Mid-Level	High
	Review fixed route deviations into parking lots or short spurs along side streets to improve travel time.	40	X				Low	Mid-Level

## 9.4.2 Capital Recommendations





Much of LRTA's capital recommendations are related to expanding the Authority's data analysis capacity (Table 30). LRTA has AVL technology that it is working with its supplier to fine-tune but the Authority only has APCs on six of its vehicles. Procuring additional APC technology is one of LRTA's priorities and will aid data-driven decision making. Additionally, implementing an updated fare payment system, increasing LRTA's capacity for communicating with customers, and funding the improvement of bus stop infrastructure are priorities for LRTA in the next 5 years.



**Table 30. Capital Recommendations**

Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
 Consider ongoing social distancing needs when purchasing rolling stock.	15		X			Low	High
 Continue LRTA efforts to ensure a high-quality, clean, safe, and aesthetically appealing experience.	16	X				Low	High
 Continue building out improved communications infrastructure through an improved website, integration with social media, dynamic screens at the terminal and on buses, the mobile bus tracker, and other industry best practices.	17	X				Mid-Level	High
 Continue assessing bus stops and other transit facilities for ADA improvements.	18	X				Low	High
Continue implementing the environmental goals of the Commonwealth, pending availability of capital funding.	19	X				Mid-Level	High









	Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Explore opportunities for joint procurement with other RTAs, including clean vehicles and other technology.	20	X				Mid-Level	High
	Explore opportunities for implementing no-touch ticketing, such as through use of the GrantsPlus mobile ticketing app.	21	X				High	High
	Pursue opportunities for procurement of APC units for implementation across the full LRTA fleet to facilitate more comprehensive data collection and analysis.	22	X				Mid-Level	High
 	Use technology to expand data-driven decision making, acquiring new assets when needed.	11, 12, 13, 14,	X				Mid-Level	High
	Ensure state of good repair consistent with the TAM Plan and pending availability of capital funding.	15, 19, 20	X				High	High








### 9.4.3 Performance Recommendations







LRTA plans to prioritize expanding its data analysis practices in the next 5 years. In addition to aiding in service planning in a volatile transit market and facilitating transparency in planning practices, LRTA will use performance monitoring to improve the customer experience through implementation of a Mystery Rider program (Table 31).



**Table 31. Performance Recommendations**

	Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Assess market demand for express routes on key long-distance routes.	28				X	Mid-Level	Low
	Implement a performance-driven decision framework for evaluating appropriate levels of service for the routes in the service area on regular intervals.	23, 30	X				Mid-Level	High
	Publish detailed LRTA performance data on the website, including route-level performance data.	31	X				Low	Mid-Level
 	Coordinate construction activities in downtown Lowell closely with the City of Lowell and MassDOT to fully account for service disruptions and mitigate, to the greatest extent possible, negative impacts to the customer experience.	32	X				Mid-Level	High
 	Review market demand at UMass-Lowell as ridership rebounds and classes in person resume.	3				X	Low	Mid-Level

	Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Develop and implement a performance-based decision-making framework for evaluating routes for additional service.	4, 6, 24, 25, 26, 27, 29	X			X	Mid-Level	High
	Better assess market demand to the commercial area at Route 3 and I-495 for enhanced transit service.	5				X	Low	Low
	Continue assessing the possibility of improving service along the Route 3 corridor as ridership improves post-pandemic.	8				X	Mid-Level	Mid-Level
	Continue supporting training for all front-line staff that emphasizes customer service. Incorporate customer satisfaction into ongoing performance analysis framework.	10	X				Low	High
	Use technology to expand data-driven decision making, acquiring new assets when needed.	11, 12, 13, 14,	X				Mid-Level	High
								
	Consider ongoing social distancing needs when purchasing rolling stock.	15		X			Mid-Level	High

Recommendation		Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Pursue opportunities for procurement of APC units for implementation across the full LRTA fleet to facilitate more comprehensive data collection and analysis.	22	X				Mid-Level	High
	Continue working with the vendor and operators to fine-tune the bus tracker and AVL systems.	37	X				Mid-Level	High
								
	Implement a Mystery Rider Program to ensure bus driver adherence to timepoint stops and safety policies.	47, 48	X				Low	High
	Review fixed route deviations into parking lots or short spurs along side streets to improve travel time.	40	X				Low	Mid-Level
								

#### 9.4.4 Policy Recommendation

LRTA adopted a new fare policy in October 2020 and is committed to periodically reviewing fare levels to ensure that its system is equitable (Table 32).



**Table 32. Policy Recommendations**





Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
Periodically review fare levels to ensure LRTA is maintaining the most equitable and financially sustainable system possible through its fare policy.	33	X				Mid-Level	High







### 9.4.5 Coordination Recommendations

Several of the recommendations in this plan deal with coordination with MBTA and MVRTA, as well as ongoing coordination with member communities and institutions within the LRTA service area (Table 33). This coordination can lead to streamlined procurement opportunities, partnerships for expanded service, and a more seamless customer experience. While the complexity is relatively low, the potential impact of this coordination is substantial.



**Table 33. Coordination Recommendations**

Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
Explore opportunities for continued collaboration with MVRTA on fare media, in particular if MBTA moves away from the CharlieCard.	34	X				High	High
 Explore a potential partnership with the Middlesex County Sheriff to provide service to the House of Corrections.	36		X			Low	Low
  Continue working with the vendor and operators to fine-tune the bus tracker and AVL systems.	37	X				Mid-Level	High
 Explore the possibility of a closer partnership with Middlesex Community College depending on the return of students to in-person classes. Extend the Downtown Shuttle potentially along East Merrimack Street to serve a stop closer to the Middlesex Community College building.	38				X	Low	Low

Recommendation		Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Continue monitoring and coordinating changes with MBTA services to optimize connections between LRTA and MBTA services.	2, 9, 35				X	High	Low
	Review market demand at UMass-Lowell as ridership rebounds and classes in person resume.	3				X	Low	Mid-Level
								
	Explore opportunities for joint procurement with other RTAs, including clean vehicles and other technology.	20	X				High	High
	Coordinate construction activities in downtown Lowell closely with the City of Lowell and MassDOT to fully account for service disruptions and mitigate, to the greatest extent possible, negative impacts to the customer experience.	32	X				Mid-Level	High
								







### 9.4.6 Recommendations for Additional Studies

Several exciting opportunities for additional studies were identified as part of this planning process (Table 34). All three have the potential to improve the efficiency of LRTA's operations, either through realigning route geometry or expanding microtransit as an alternative to fixed route service in lower density areas.



**Table 34. Recommendations for Additional Studies**


Recommendation		Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
	Explore opportunities for radial/suburban connections between key origins and destinations.	39		X			Mid-Level	High
	Review fixed route deviations into parking lots or short spurs along side streets to improve travel time.	40	X				Low	Mid-Level
								
	Explore the opportunities of micro-transit in the LRTA service area and potential partnerships with ride-hailing services such as Uber or Lyft where appropriate.	7, 41, 42, 43				X	Mid-Level	Low

### 9.4.7 Other Recommendations

Several recommendations related to LRTA's workforce, such as a maintained commitment to supporting a diverse and inclusive workforce and additional training for drivers to ensure a safe operating environment (Table 35). LRTA will also closely monitor additional funding sources that the Authority relies on that have been affected by the COVID-19 pandemic.



**Table 35. Other Recommendations**

Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
Engage in discussions with Scheidt and Bachmann regarding automated monthly payments for monthly passes.	44	X				Mid-Level	Mid-Level
Maintain LRTA's commitment to a diverse and inclusive workforce and implementation of its EEO policy.	45	X				Low	High
Continue implementing the enhanced cleaning measures and protective equipment at least as rigorously as state and federal guidance requires.	46	X				Low	High
 Implement a Mystery Rider Program to ensure bus driver adherence to timepoint stops and safety policies.	47, 48	X				Low	High
Continue providing training to drivers on safe operation of vehicles around vulnerable road users.	49	X				Low	High

Recommendation	Need ID	Core Need	Low-Ridership Scenario	Medium-Ridership Scenario	High-Ridership Scenario	Complexity of Implementation (Low, Mid-Level, High)	Impact (Low, Mid-Level, High)
Closely monitor funding sources to anticipate revenue disruptions and compensate as needed, such as the Gallagher Parking Garage.	50	X				Low	High

## Appendix A Illustrative FY 2015-FY 2019 Performance Results and Peer Review

### Performance Evaluation

To provide historical context for LRTA's performance since the 2015 RTP, this appendix provides information on LRTA's systemwide performance for fixed route and demand response modes for FY 2015 through FY 2019 (FY 2020 results are covered under the Bilateral LRTA/MassDOT MOU discussed in Chapter 6). A brief performance comparison with peer transit systems is also included in this appendix.

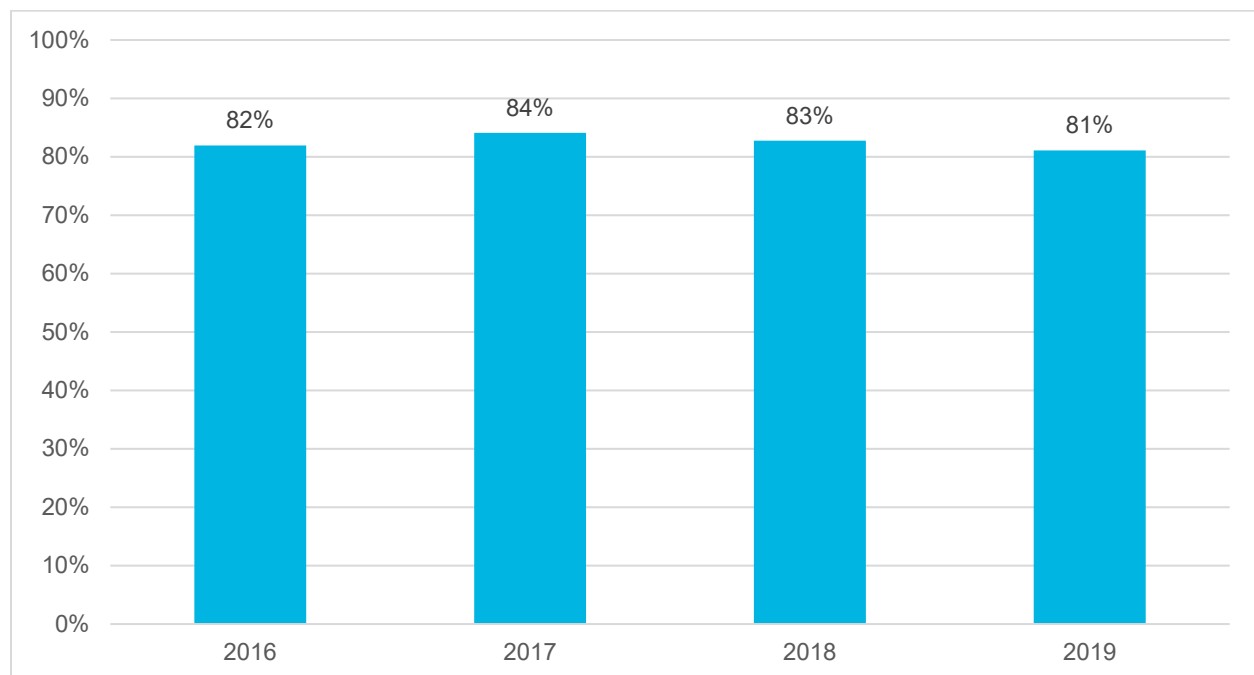
### Fixed Route Service Performance

LRTA, like many transit agencies, is currently not able to track revenue by route; with multiple pass options available at a variety of price points it is extremely challenging to calculate route revenue based on farebox data alone. Transit agencies often rely on complex models to estimate revenue by route, though LRTA expects revenue by route to track closely with ridership by route (data to which they have easy access).

### On-Time Performance

LRTA's average OTP for fixed routes has remained steady over the last 4 years (Figure 44). Maintaining historical OTP may become challenging in upcoming years due to several large construction projects near the Gallagher Terminal set to begin soon.

**Figure 44. Fixed Route On-Time Performance (FY 2016–FY 2019)**



Source: LRTA

\*2015 OTP data not available.

## Service Effectiveness

Service effectiveness describes the amount of service utilized per unit of transit service provided. Service effectiveness is measured based on two indicators: passengers per mile and passengers per hour. Passengers per mile is a measure of service efficiency based on the number of revenue miles operated. Large numbers indicate more riders boarding per mile traveled, which is typical in denser urban areas. Fewer trips per mile is typical for longer trips in rural areas, which is also generally indicative of less efficient routes.

Passengers per hour is a measure of service productivity. It is a function of the amount of service provided (number of vehicle revenue hours) and the number of unlinked passenger trips. Higher numbers indicate a more efficient system and are more typical in denser urban settings.

The operating statistics for LRTA reflect this overall dichotomy between the operating efficiency of higher-density urban areas compared to lower-density suburban and rural settings. City Routes like Route 5 and Route 7 are among the highest productivity, while Suburban Routes like Route 10 and Route 11 are among the lowest (Table 36).

**Table 36. Operating Statistics by Route (FY 2019)**

Route	Service Type	Ridership	Revenue Hours	Revenue Miles	Trips/ Mile	Trips/ Hour
Route 1 - Christian Hill	City Route	34,113	2,215	28,570	1.19	15.40
Route 2 - Belvidere	City Route	100,858	9,293	133,321	0.76	10.85
Route 3 - South Lowell	City Route	51,527	2,848	42,087	1.22	18.09
Route 4 - Highlands via Stevens	City Route	59,359	2,961	40,219	1.48	20.05
Route 5 - Westford Street	City Route	148,863	4,870	67,795	2.20	30.57
Route 6 - Broadway - UML South	City Route	27,096	2,951	30,727	0.88	9.18
Route 7 - Pawtucketville	City Route	182,968	8,351	118,698	1.54	21.91
Route 8 - Centralville	City Route	58,080	3,059	32,017	1.81	18.99
Route 9 - Circulator	City Route	24,732	3,707	38,954	0.63	6.67
Route 10 - Dracut / Tyngsborough	Suburban	45,671	6,253	108,057	0.42	7.30
Route 11 - IRS / Rte 133	Suburban	5,737	876	18,054	0.32	6.55
Route 12 - Tewksbury / Rte 38	Suburban	95,242	6,116	102,915	0.93	15.57
Route 13 - Billerica via Rte 3A	Suburban	67,700	5,254	94,866	0.71	12.89

Route	Service Type	Ridership	Revenue Hours	Revenue Miles	Trips/ Mile	Trips/ Hour
Route 14 - Burlington / Lahey	Suburban	128,816	8,676	154,533	0.83	14.85
Route 15 - Westford via Rte 129	Suburban	45,760	4,609	85,335	0.54	9.93
Route 16 - Chelmsford Center	Suburban	61,526	4,170	73,121	0.84	14.75
Route 17 - North Chelmsford	Suburban	75,443	5,950	80,420	0.94	12.68
Route 18 - Downtown Shuttle	City Route	128,691	6,645	47,907	2.69	19.37
Route 19 - Pheasant Lane	Suburban Seasonal	875	35	497	1.76	25.00
Route 20 - Downtown/UMass Lowell North	City Route	17,448	1,296	5,040	3.46	13.46
Route 03/04 Combo	City Route	2,048	418	6,840	0.30	4.90
Route 06/09 Combo	City Route	3,702	380	5,529	0.67	9.74
Route 01/08 Combo	City Route	4,044	466	5,016	0.81	8.68
<b>Total (Average)</b>		<b>1,370,299</b>	<b>91,399</b>	<b>1,320,518</b>	<b>(1.17)</b>	<b>(14.23)</b>

Source: LRTA

LRTA's trips per mile and hour totals for 2019 vary a great deal from route to route, with City Routes tending to be perform better than Suburban Routes. Overall, the system average is below the Massachusetts and national averages (Table 37).

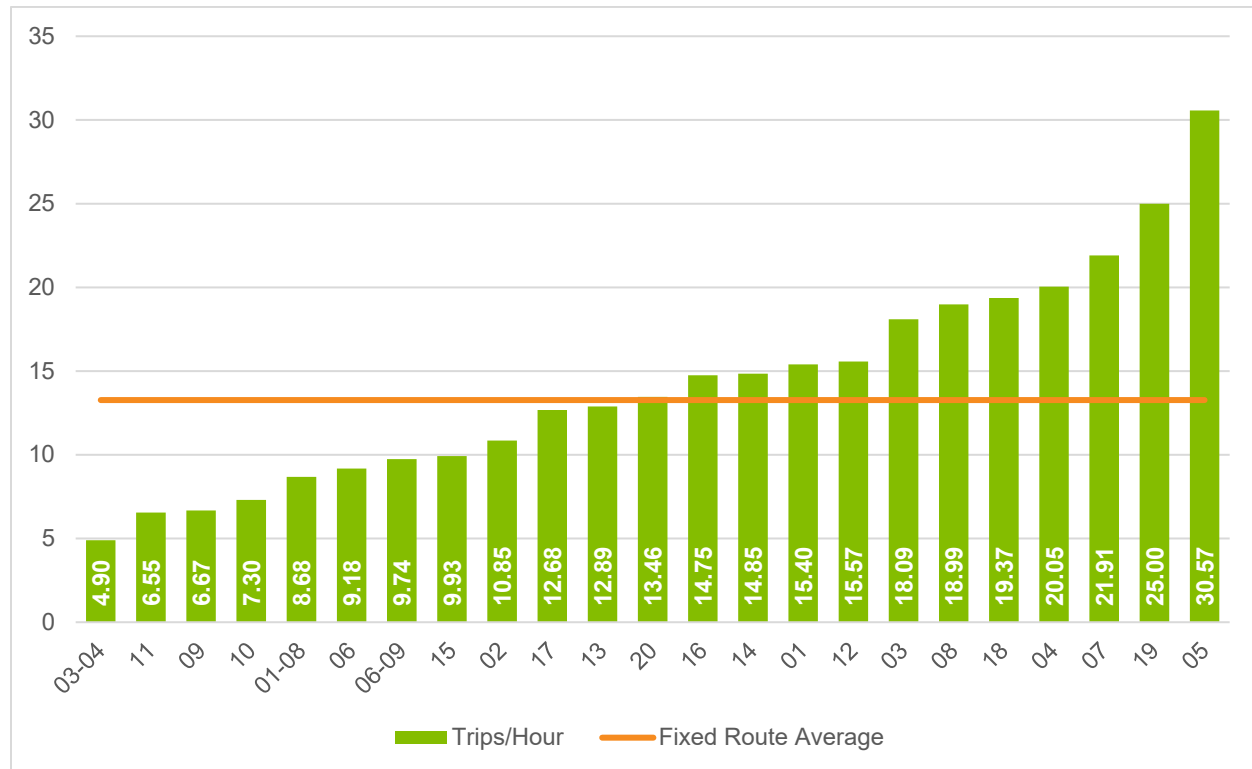
**Table 37. Fixed Route Productivity (FY 2019)**

Averages	Passengers/Mile	Passengers/Hour
Fixed Route Average	1.17	14.23
Massachusetts Average*	1.37	18.39
National Average	2.26	27.21

Source: LRTA, NTD

\*Does not include MBTA.

The worst performing route is the weekends-only combo Route 03/04, which is a relatively long route that has just over half the ridership of the two other combo routes (which also do not perform well). With the higher-performing City Routes balancing out the Suburban Routes, the system average is 14.23 passengers per hour (Figure 45).

**Figure 45. Fixed Route Trips per Revenue Hour by Route (FY 2019)**

Source: LRTA

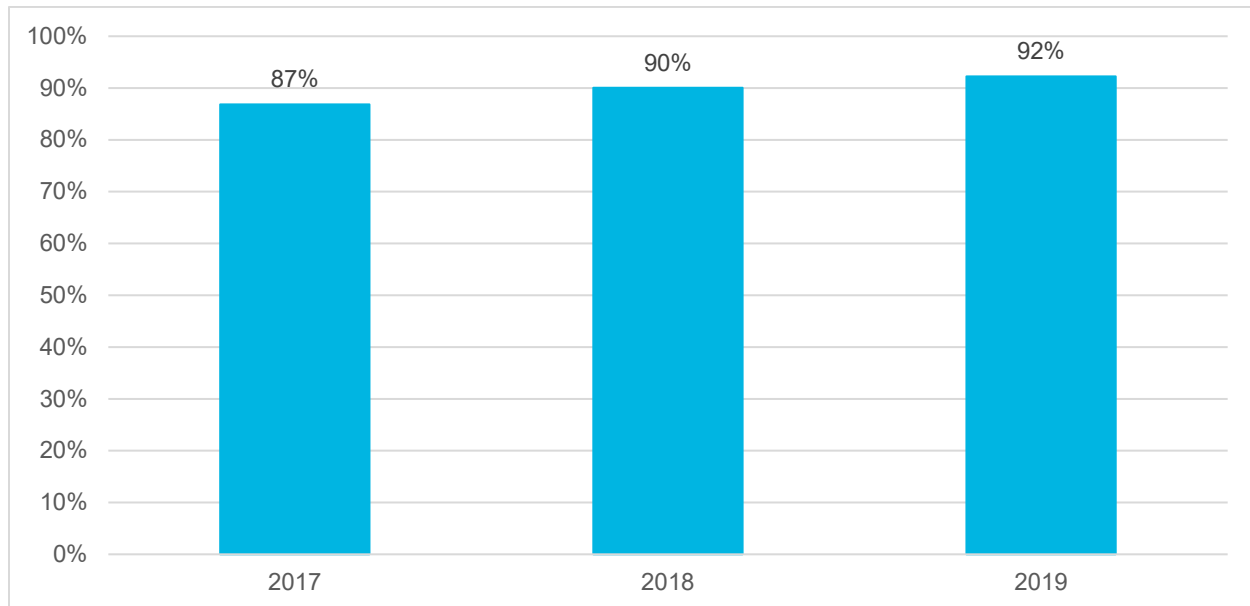
### Demand Response Service Performance

LRTA's demand response services perform better than the fixed routes when compared with Massachusetts and national averages.

### Road Runner On-Time Performance

LRTA's Road Runner ADA service OTP increased between FY 2017 and FY 2019 (Figure 46).

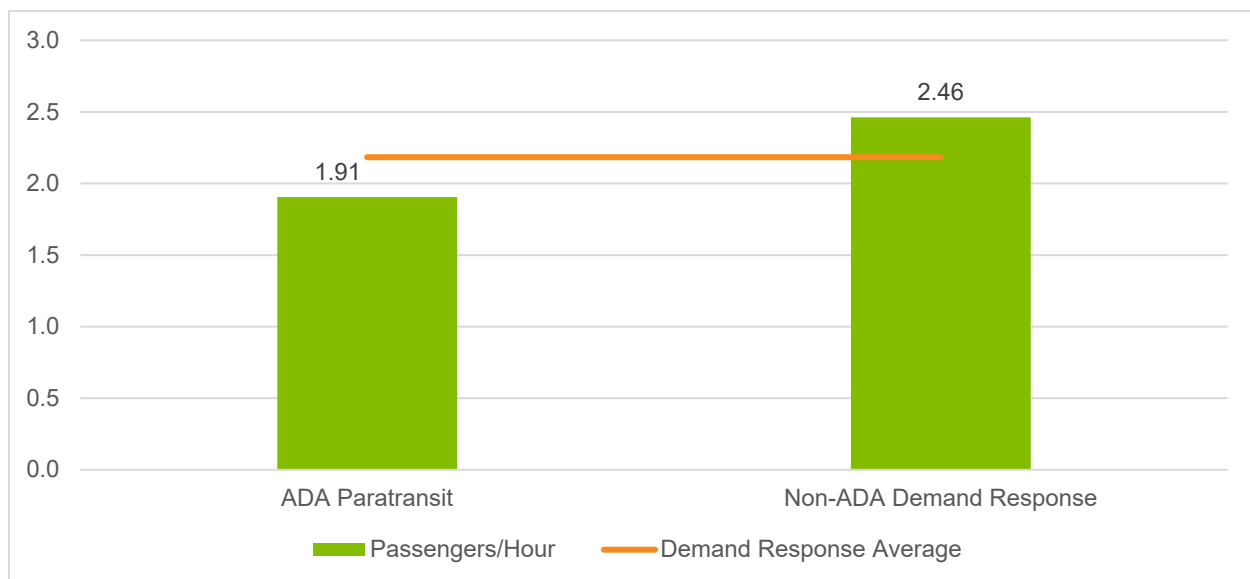


**Figure 46. Demand Response On-Time Performance (FY 2017–FY 2019)**

Source: LRTA

### Service Effectiveness

The COA service averages 2.46 passengers per revenue hour and the ADA Road Runner service averages 1.91 (Figure 47).

**Figure 47. Demand Response Trips per Revenue Hour (FY 2019)**

Source: LRTA, MassDOT

LRTA's COA demand response service is more productive than the Massachusetts state average and the national average. ADA Road Runner service does not perform as well but it is also close to state and national averages (Table 38).

**Table 38. Demand Response Productivity (FY 2019)**

<b>Route</b>	<b>Trips/Mile</b>	<b>Trips/Hour</b>
Demand Response (non-ADA)	0.25	2.46
ADA Paratransit	0.16	1.91
Demand Response Average	0.20	2.18
Massachusetts Demand Response Average (FY 2018) *	0.15	2.13
National Demand Response Average (FY 2018)	0.13	1.97

Source: LRTA, NTD

\*Does not include MBTA, CCRTA, or MART.

## Financial Performance

Cost effectiveness measures the effectiveness of the system from a financial standpoint – how efficiently the dollars put into the system are being used to produce passenger trips. The cost effectiveness indicators are cost per passenger, cost per mile, cost per hour, farebox recovery, and subsidy per passenger.

- **Cost per passenger** is the overall cost to operate a route divided by the number of passengers. A smaller number is preferred and typically correlates to higher ridership per hour or per mile. LRTA's demand response services cost far less per passenger than the state and national averages. LRTA's fixed route service does not perform as well as the state and national averages.
- **Cost per mile** measures financial efficiency of providing service and varies based on the average operating speed. A smaller number indicates more financially efficient routes and/or faster operating speeds. LRTA's cost per mile for both fixed route and demand response service perform better than state and national averages; the fixed route service operates at just half the cost per mile of the national average.
- **Cost per hour** measures the financial efficiency of providing service. A smaller cost per hour indicates more financially efficient routes and/or faster operating speeds. LRTA's fixed route service costs less per hour than the state average and just over half as much as the national average; the demand response services perform far better than state and national averages.
- **Farebox recovery** measures the percentage of operating cost covered by fares and is an outcome heavily influenced by the ridership productivity of a route against its total operating cost, as well as the fare policy of the system. It is calculated by dividing fare revenue by operating cost. LRTA's fixed route system is higher than the state average but lower than the national average.
- **Subsidy per passenger** measures how much it costs to operate a route on a "per passenger" basis. It is calculated by subtracting passenger revenue from operating cost and dividing by the total number of passengers. It is the cost to operate after taking into account fare revenue and represents the required operating subsidy to run the service. LRTA's fixed route system's subsidy per passenger is only slightly higher than the state and national averages. LRTA's ADA demand response service is very efficient, costing less than one-third of the state and national averages.

Overall, LRTA's fixed route system is close to or exceeding national and state averages in terms of cost effectiveness (Table 39). LRTA does not have reliable revenue data available by route, so it is not possible to evaluate cost effectiveness at the route level. LRTA's demand response services are very cost-effective, far exceeding national and state averages (Table 40).

**Table 39. Fixed Route Financial Efficiency (FY 2018 and FY 2019)**

Route	Cost/ Mile	Cost/ Hour	Cost/ Passenger	Subsidy/ Passenger	Farebox Recovery
Fixed Route Average	\$6.03	\$87.10	\$5.81	\$4.85	16.5%
Massachusetts Fixed Route Average (FY 2018)*	\$7.24	\$97.20	\$5.29	\$4.47	15.4%
National Fixed Route Average (FY 2018)	\$11.15	\$133.99	\$4.92	\$3.83	22.1%

Source: LRTA, NTD

\*Does not include MBTA.

**Table 40. Demand Response Financial Efficiency (FY 2018 and FY 2019)**

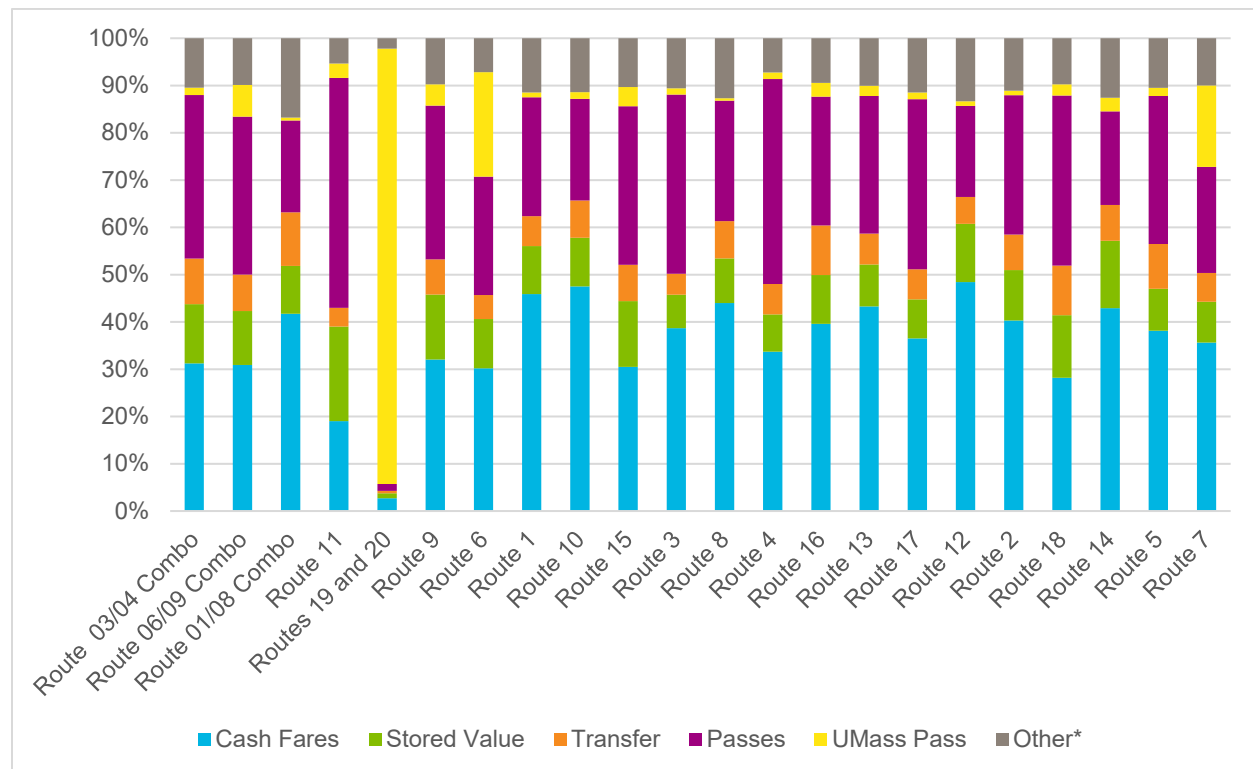
Route	Cost/ Mile	Cost/ Hour	Cost/ Passenger	Subsidy/ Passenger	Farebox Recovery
Demand Response (non-ADA)*	\$3.86	\$38.01	\$15.44	Not Available*	Not Available*
ADA Paratransit	\$3.27	\$39.09	\$10.26	\$9.66	5.8%
Demand Response Average	\$3.57	\$38.55	\$12.85	Not Applicable	Not Applicable
Massachusetts Demand Response Average (FY 2018)**	\$4.38	\$59.86	\$28.28	\$25.95	8.3%
National Demand Response Average (FY 2018)	\$4.33	\$64.93	\$32.92	\$30.46	7.5%

Source: LRTA, NTD

\*COA non-ADA demand response FY 2019 revenue data are not available. LRTA reimburses COAs for net cost of service and the COAs retain the revenues, so these are not reported as a funding source for LRTA.

\*\*Does not include MBTA, CCRTA, and MART.

While LRTA is not able to determine revenue by route, fare media usage by route is tracked (Figure 48). The most popular form of payment for LRTA customers is cash. Most routes have a similar proportion of fare media used with the exception of Routes 7 and 20, which have a much higher proportion of riders using UMass passes due to their serving UMass-Lowell campuses.

**Figure 48. Fare Media Usage by Route (FY 2019)**

Source: LRTA

\*Other includes one ride, overpay ticket, pre-paid.

## Capacity

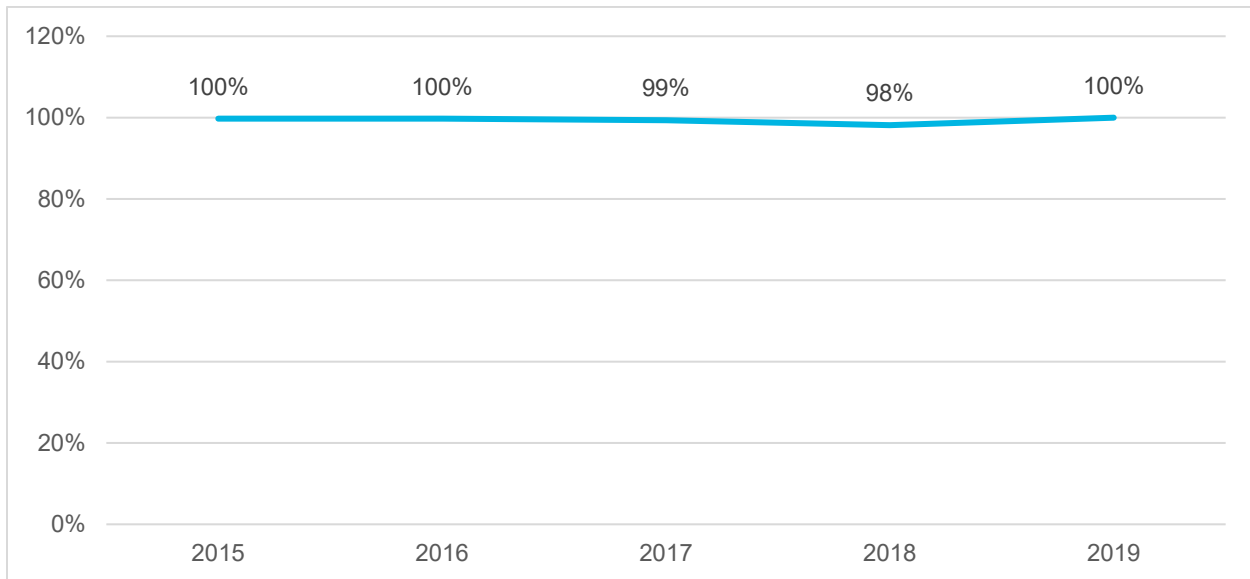
LRTA's demand response service has data back to FY 2017 for denied trips, missed trips, no-shows, late cancellations, and same day cancellations (which LRTA categorizes together); data were not available on the number of active passengers (Table 41).

**Table 41. ADA Demand Response Capacity (FY 2017–FY 2019)**

ADA Demand Response Capacity	FY 2017	FY 2018	FY 2019
% Denied Trips	0.00%	0.01%	0.00%
% Missed Trips	0.00%	0.02%	0.03%
% No-show	2.94%	3.37%	2.62%
% Late/Same Day Cancellation	27.49%	13.60%	15.52%

Source: LRTA

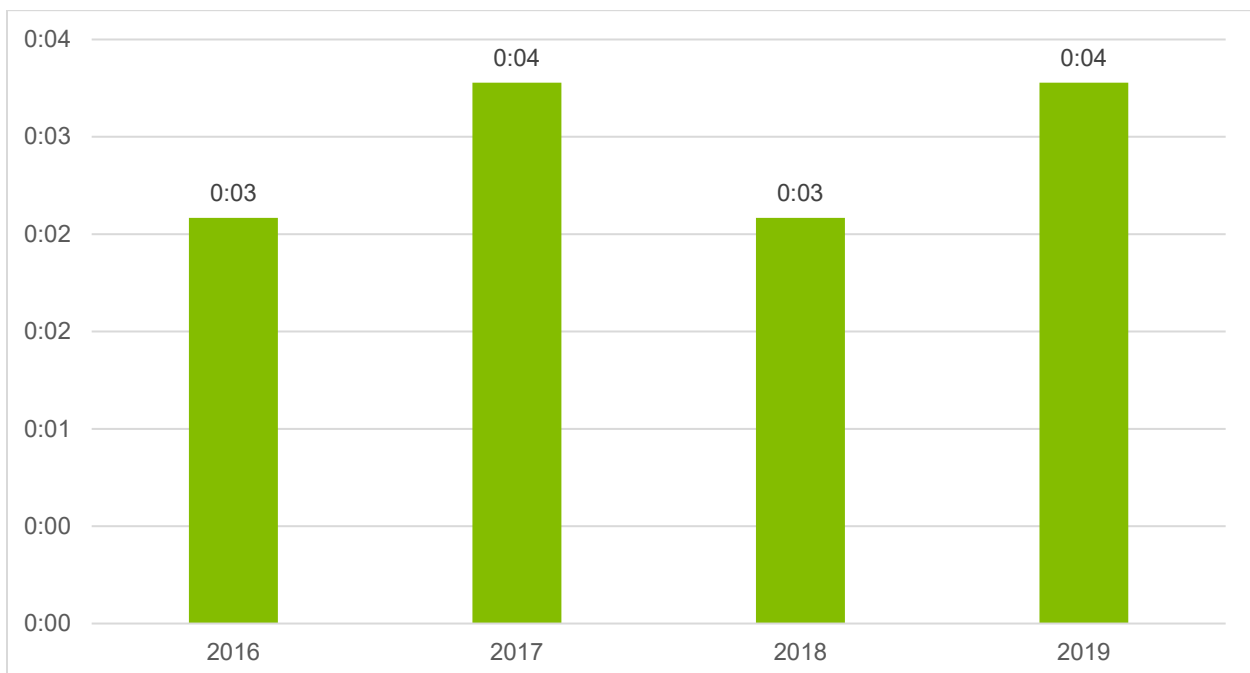
LRTA's data show there are no capacity issues with its demand response service. Systemwide trips operated were at or just below 100 percent all 5 years (Figure 49). No trips were denied between FY 2017 and FY 2019. The only values over 1 percent were no-shows and late/same day cancellations, the latter of which have declined significantly since 2017.

**Figure 49. Percent Scheduled Trips Operated Systemwide (FY 2015–FY 2019)**

Source: MassDOT

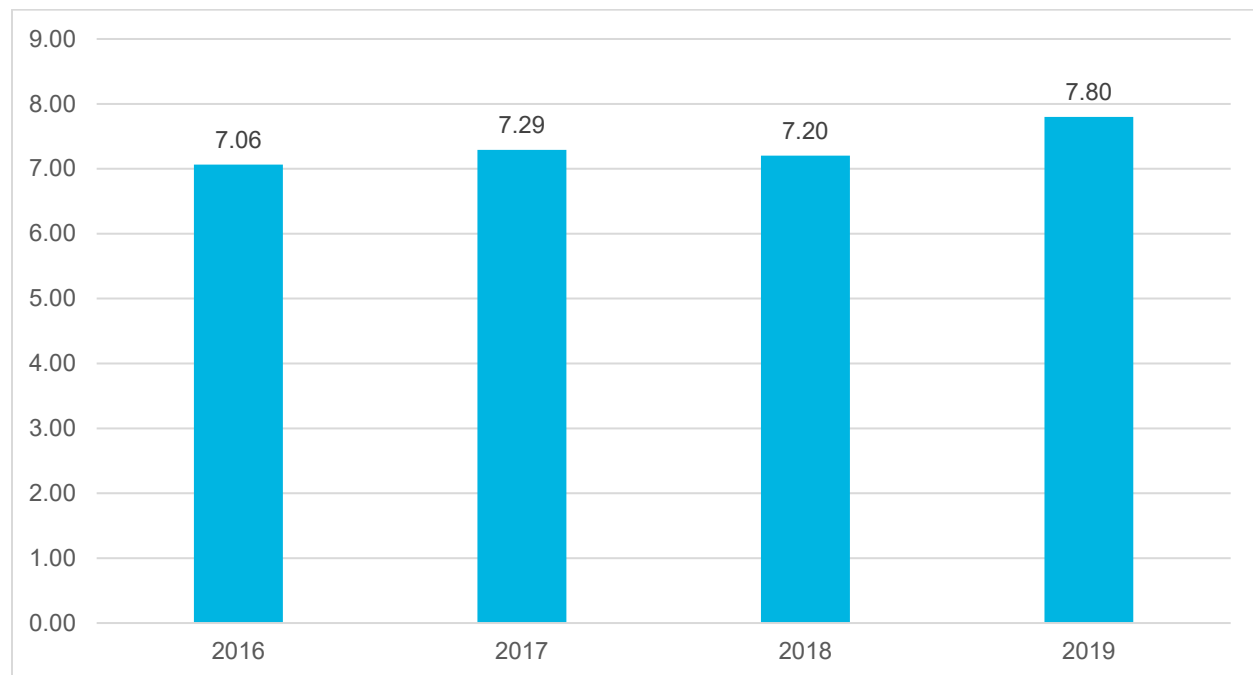
### Customer Service

LRTA's values for customer service metrics have remained steady since 2016. The average hold time for customers calling into the demand response operators was less than 4 seconds for the 4 years where data were available (Figure 50).

**Figure 50. Average Phone Hold Time (Min:Seconds) – ADA Demand Response (FY 2016–FY 2019)**

Source: LRTA

It is typical for transit providers to have a target set for complaints per 100,000 passenger trips to normalize complaints across fluctuating ridership. Complaints per 100,000 trips fluctuated between 7.0 and 8.0 for the 4-year period where data were available (Figure 51).

**Figure 51. Valid Complaints per 100,000 Passenger Trips – ADA Demand Response (FY 2016–FY 2019)**

Source: LRTA

## Safety and Security

FTA rule 49 CFR 673 requires transit operators who are recipients or sub-recipients of Section 5307 funding to develop safety plans (PTASP) that include the processes and procedures to implement safety management systems by December 31, 2020 (the original deadline of July 20, 2020, was delayed due to the COVID-19 pandemic). As part of the PTASP performance targets based on safety performance measures (fatalities, injuries, safety events, system reliability) established in FTA's National Public Transportation Safety Plan.

Systemwide, LRTA operates a safe system and has had very few safety events (Table 42).

**Table 42. Safety and Security Incidents (FY 2019)**

Mode of Service	Fatalities	Injuries	Safety Events	System Reliability
Bus Transit Actual	0	0	3	32
Bus Transit Target	NA	NA	NA	NA
ADA Paratransit	0	0	3	0
ADA Paratransit Target	NA	NA	NA	NA
Demand Response (non-ADA)	0	0	0	0
Demand Response (non-ADA) Target	NA	NA	NA	NA

Source: LRTA

## Asset Management

LRTA's administrative offices and Road Runner ADA demand response maintenance and operations facility are in the same cluster of buildings as the Gallagher Terminal (with MBTA commuter rail service), Kennedy Center Bus Hub, and Gallagher Terminal Parking Garage on Thorndike Street, just west of downtown Lowell. Fixed route maintenance and operations is located nearby on Hale Street.

LRTA owns several of its facilities and rents the others (the Gallagher Terminal and parking garages) from MBTA with 99-year leases. LRTA operates the parking garages, which generate a significant amount of revenue for LRTA.

All but one of the buildings (the Kennedy Center bus hub) have a TERM rating of 4, which means the buildings are in a state of good repair (Table 43). The Kennedy Center has a TERM rating of 3, which means it is in an adequate state of repair (maintenance needs are significant, but it is still within its useful life). This standard of reporting is required by FTA.

**Table 43. Facility Inventory Summary**

Facility Name	Type	Location	Direct Capital Responsibility	Operator	TERM Rating
LRTA Main Office	Administration	115 Thorndike Street, Floor 3b, Lowell, MA 01852	MBTA/LRTA	LRTA	4
Fixed Route Maintenance & Operations	Maintenance	100 Hale Street, Lowell, MA 01852	LRTA	LRTA	4
Paratransit Maintenance & Operations	Maintenance	113 Thorndike Street, Lowell, MA 01852	LRTA	LRTA	4
Gallagher I Parking Garage	Parking Structure	115 Thorndike Street, Lowell, MA 01852	MBTA/LRTA	LRTA	4
Gallagher II Parking Garage	Parking Structure	115 Thorndike Street, Lowell, MA 01852	MBTA/LRTA	LRTA	4
Rourke Parking Garage	Parking Structure	115 Thorndike Street, Lowell, MA 01852	MBTA/LRTA	LRTA	4
Gallagher Terminal	Passenger Facilities	115 Thorndike Street, Lowell, MA 01852	MBTA/LRTA	LRTA	4
Kennedy Center (Bus Hub)	Passenger Facilities	115 Thorndike Street, Lowell, MA 01852	MBTA/LRTA	LRTA	3

*Source: LRTA*

LRTA's vehicle fleet includes 26 buses (35 foot), 54 cutaway buses, 18 minibuses (30 foot), 2 minivans, 3 sedans, and 9 trucks (Table 44). The buses, minibuses, and 6 of the cutaway buses are used for fixed route service. LRTA does not break out 35 foot and 30-foot buses



separately when reporting to NTD but classifies them as “BU-BUSES.” None of the BU-BUS vehicles LRTA owns are at or exceed their ULB; in FY 2019, 11.36 percent of the BU-BUSES did meet or exceed their ULB but these vehicles were replaced in November and December 2019. LRTA has a purchase order in place to replace its oldest 35-foot bus in winter FY 2021 when it will be at its ULB.

The demand response service only uses cutaway buses and minivans. Six buses currently have APCs and all buses have bike racks.

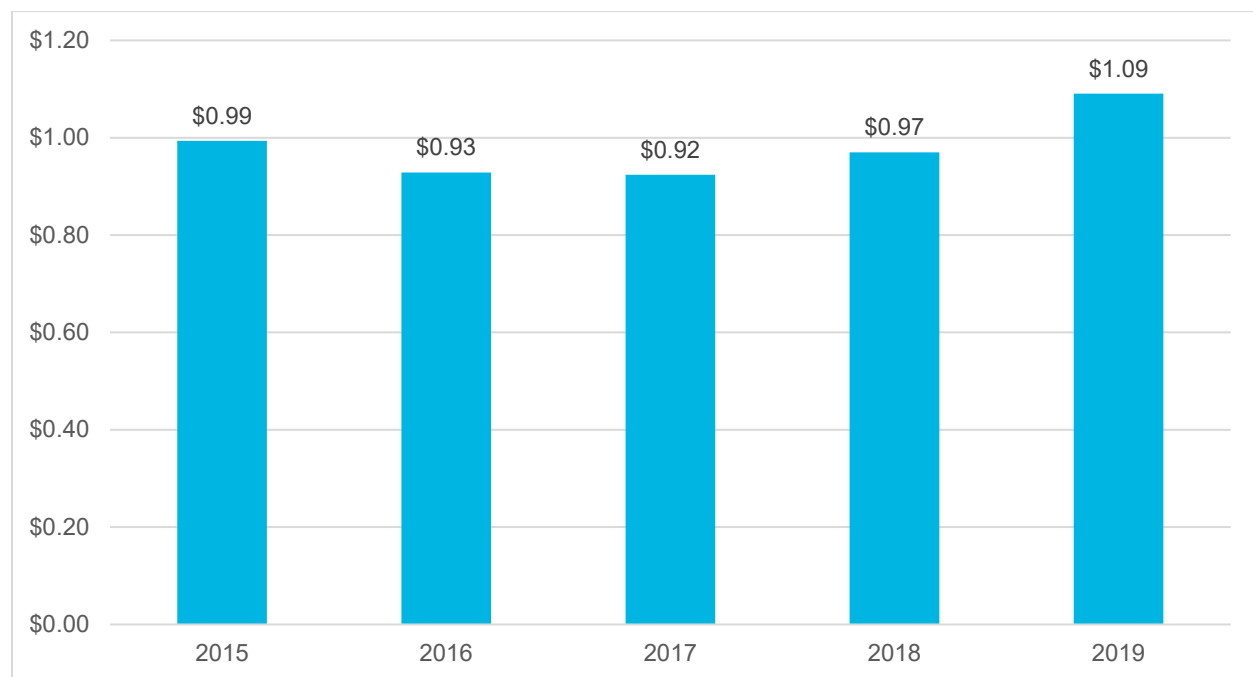
**Table 44. Equipment Inventory Summary**

Vehicle Type	Total Number	% at or past ULB
30-foot Bus	18	0%
35-foot Bus	26	0%
Cutaway bus	54	6.25%
Minivan	2	0%
Automobiles/Sedans	3	33.33%
Truck	9	66.67%

Source: LRTA

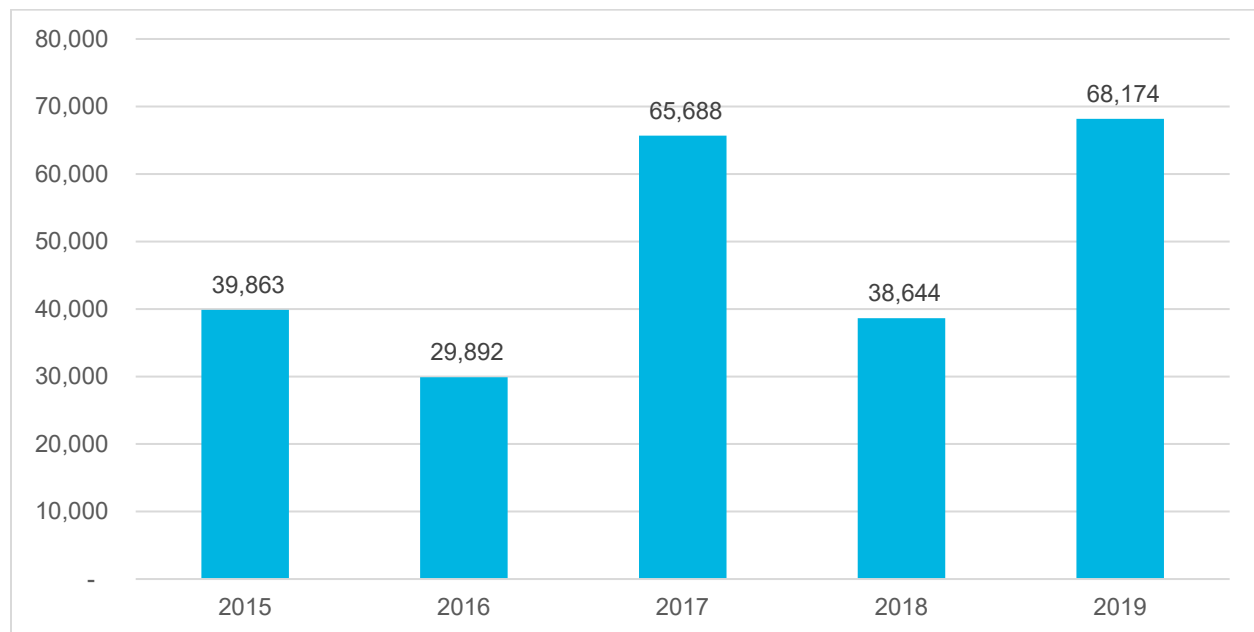
All LRTA's buses and paratransit vehicles are listed as being in service. The maintenance cost per revenue mile has increased slightly over the last 3 years (Figure 52) but the miles between road calls went up between this year and last (Figure 53), which is a positive development. Preventable accidents increased between FY 2016 and FY 2019 (Figure 54).

**Figure 52. Maintenance Cost per Revenue Mile (FY 2015–FY 2019)**



Source: LRTA

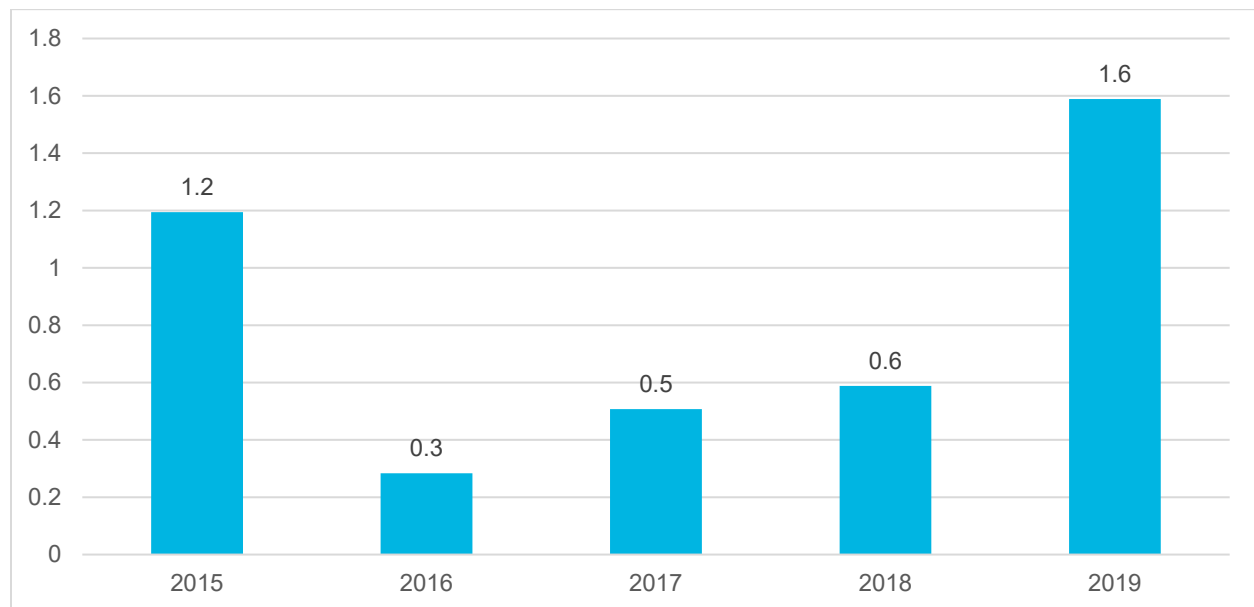
**Figure 53. Miles Between Road Calls – Fixed Route and ADA Paratransit Demand Response (FY 2015–FY 2019)**



Source: LRTA, NTD, MassDOT

\*COA demand response data not available.

**Figure 54. Preventable Accidents per 100,000 Miles – Fixed Route and ADA Paratransit Demand Response (FY 2015–FY 2019)**



Source: LRTA, NTD, MassDOT

\*COA demand response data not available.

## Peer Evaluation

As part of this plan, a peer review was prepared to gain an understanding of how similar systems operate transit service. This peer review explores five transit services that operate in similar conditions. Although each transit system and routes are unique, the similarities and

differences in these five peers provide useful insight into how transit service is provided and operated throughout the country.

Peers were chosen using iNTD,<sup>16</sup> which assigns transit agencies across the country and their service areas with likeness scores for metrics seen in the charts below. iNTD's overall likeness score was used to narrow down this list of peers to five (Table 45 and Table 46). All data are from FY 2017.

**Table 45. Peer Systems Census Data**

System	Town	State	Population	Population Density	Population Growth Rate*	Percent Poverty
Howard Transit	Ellicott City	MD	2,277,839	3,177	5%	11%
Arlington Transit - Arlington County	Arlington	VA	5,042,681	3,815	15%	8%
SouthWest Transit	Eden Prairie	MN	2,854,190	2,793	16%	9%
Prince George's County Transit	Largo	MD	5,042,681	3,815	15%	8%
Transport of Rockland	Pomona	NY	19,094,455	5,534	4%	13%
<b>Lowell Regional Transit Authority</b>	<b>Lowell</b>	<b>MA</b>	<b>4,433,253**</b>	<b>2,366</b>	<b>7%</b>	<b>10%</b>

Source: NTD

\*Percent change between 2010 and 2017 (Census and ACS data).

\*\*Boston UZA population.

**Table 46. Peer Systems Operating Data**

System	Ridership	% Demand Response *	Operating Budget	Revenue Miles Operated	Revenue Hours Operated	Farebox Revenue
Howard Transit	919,519	48%	\$8,815,039	2,020,216	142,472	\$901,390
Arlington Transit - Arlington County	3,507,219	16%	\$17,077,105	2,465,826	222,678	\$4,550,234
SouthWest Transit	1,148,833	15%	\$10,693,522	1,486,217	70,361	\$2,882,098
Prince George's County Transit	3,073,817	34%	\$30,318,137	3,354,752	253,380	\$1,647,145
Transport of Rockland	2,418,877	27%	\$18,760,035	2,858,883	154,462	\$3,577,713
<b>Lowell Regional Transit Authority</b>	<b>1,539,556</b>	<b>47%</b>	<b>\$11,550,038</b>	<b>2,001,263</b>	<b>148,614</b>	<b>\$1,301,349</b>

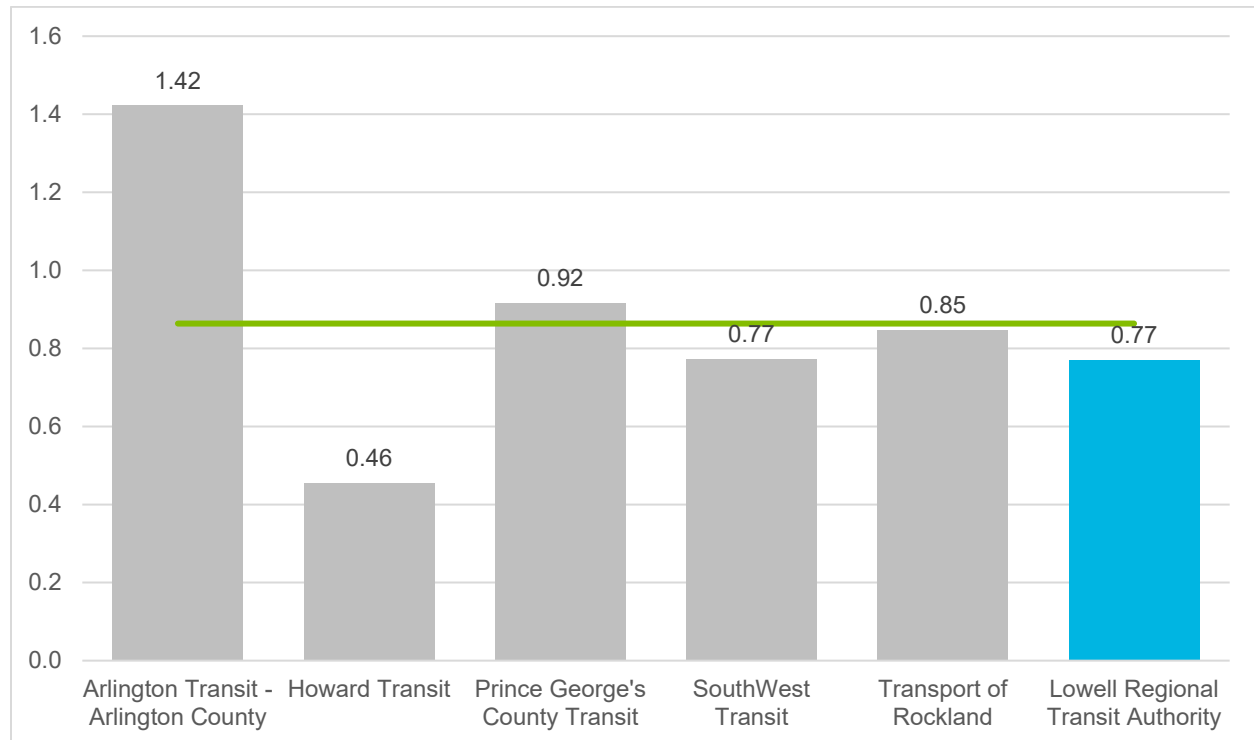
<sup>16</sup> For more information on the iNTD process, visit [https://www.ftis.org/urban\\_iNTD.aspx](https://www.ftis.org/urban_iNTD.aspx).

Source: NTD

\* Percentage of vehicles operated in maximum service that are demand response vehicles.

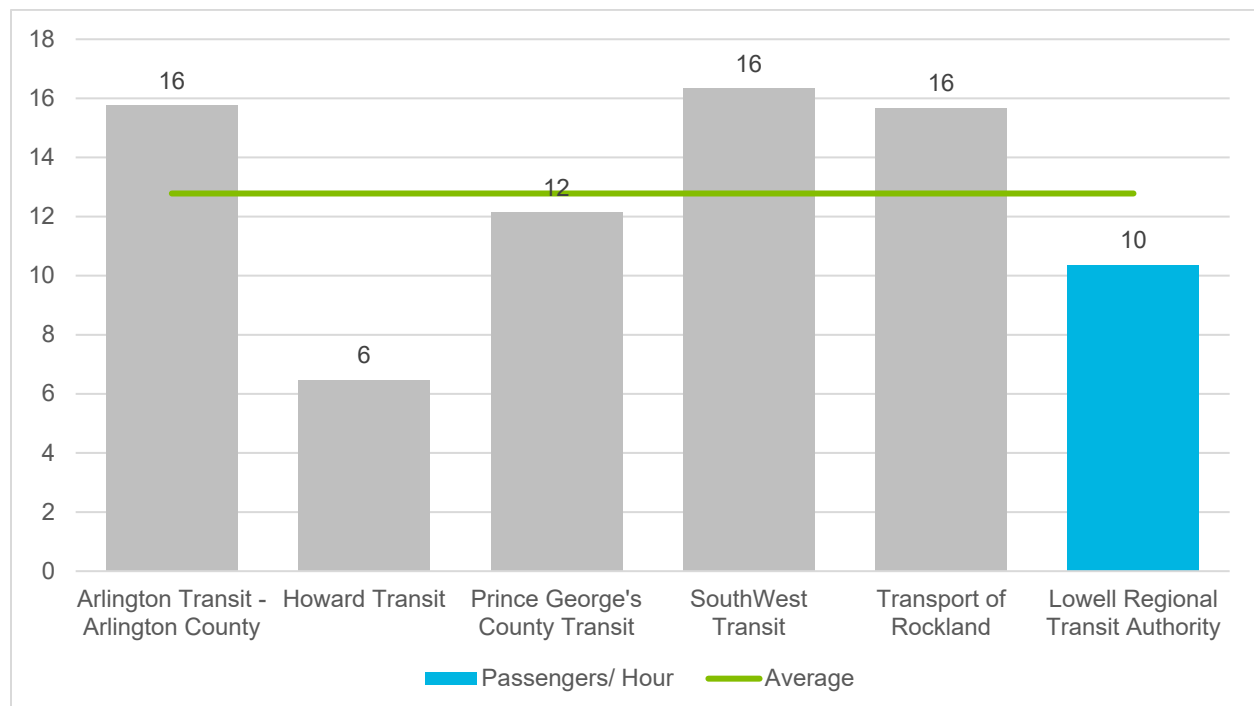
While generally outperforming peers in terms of financial efficiency, LRTA's peers report more efficient service when looking at ridership per mile (Figure 55) or per hour (Figure 56).

**Figure 55. LRTA Peer Comparison – Passengers per Mile (FY 2017)**



Source: NTD

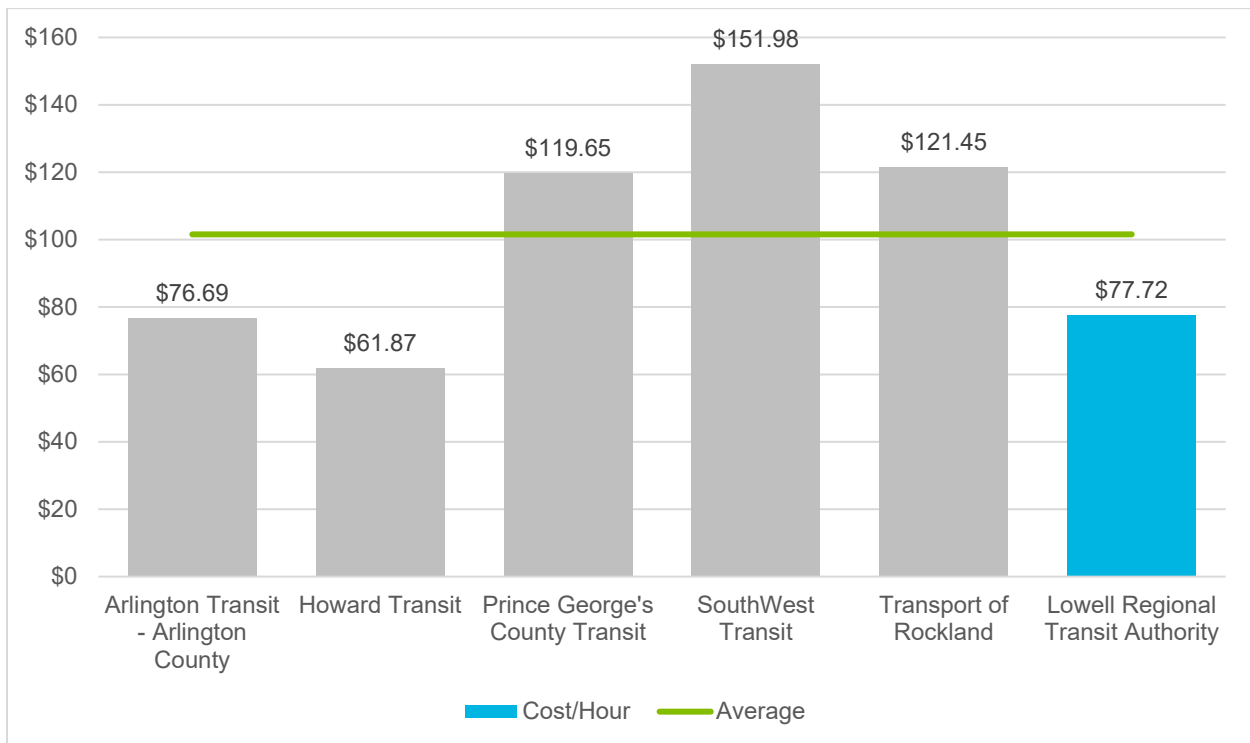
**Figure 56. LRTA Peer Comparison – Passengers per Hour (FY 2017)**



Source: NTD

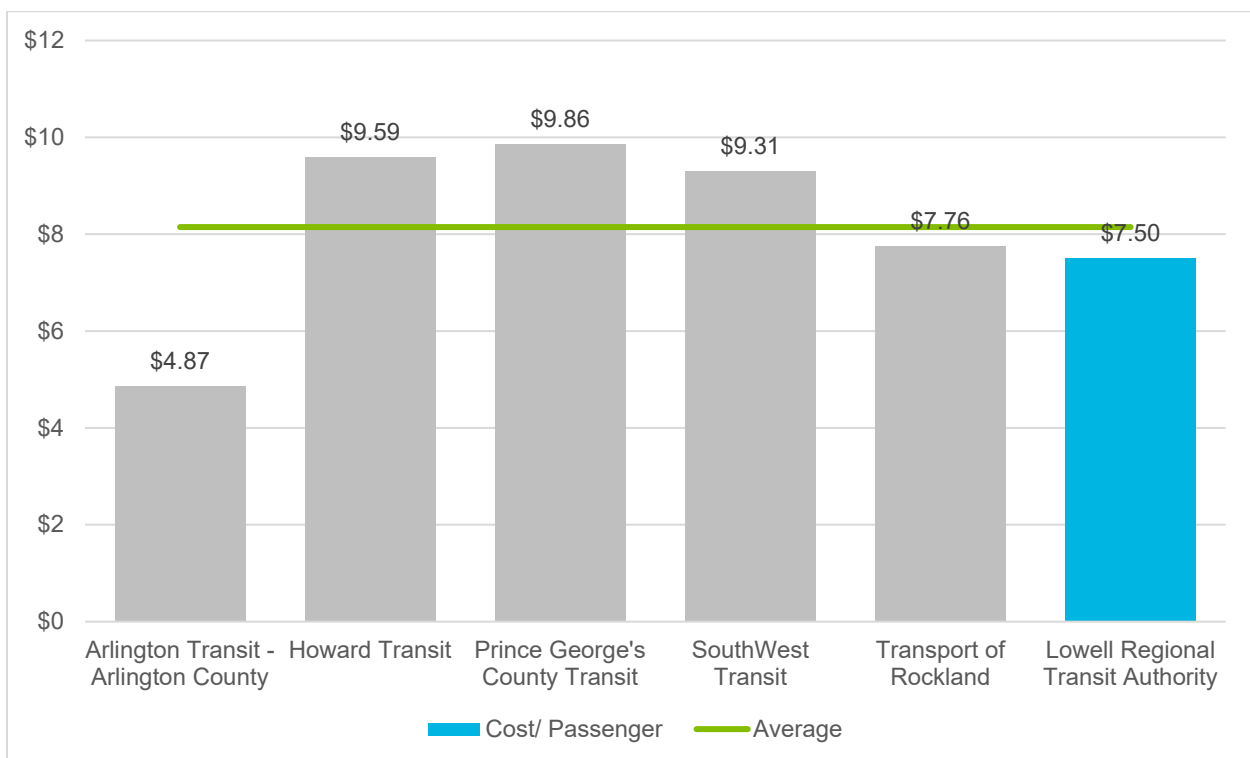
However, LRTA compares favorably in several financial categories, with a below-average cost per hour, cost per passenger, and subsidy per passenger (Figure 57 through Figure 59). However, its farebox recovery ratio is also below its peer average (Figure 60).

**Figure 57. LRTA Peer Comparison – Cost per Hour (FY 2017)**

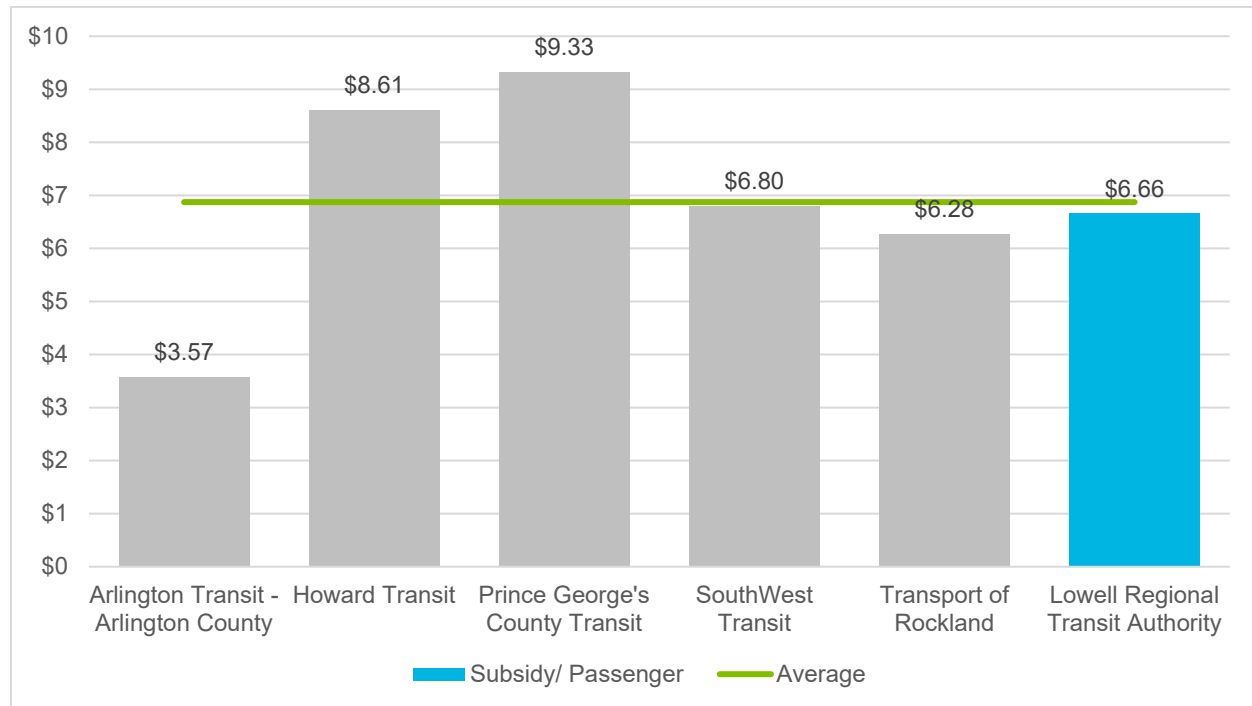


Source: NTD

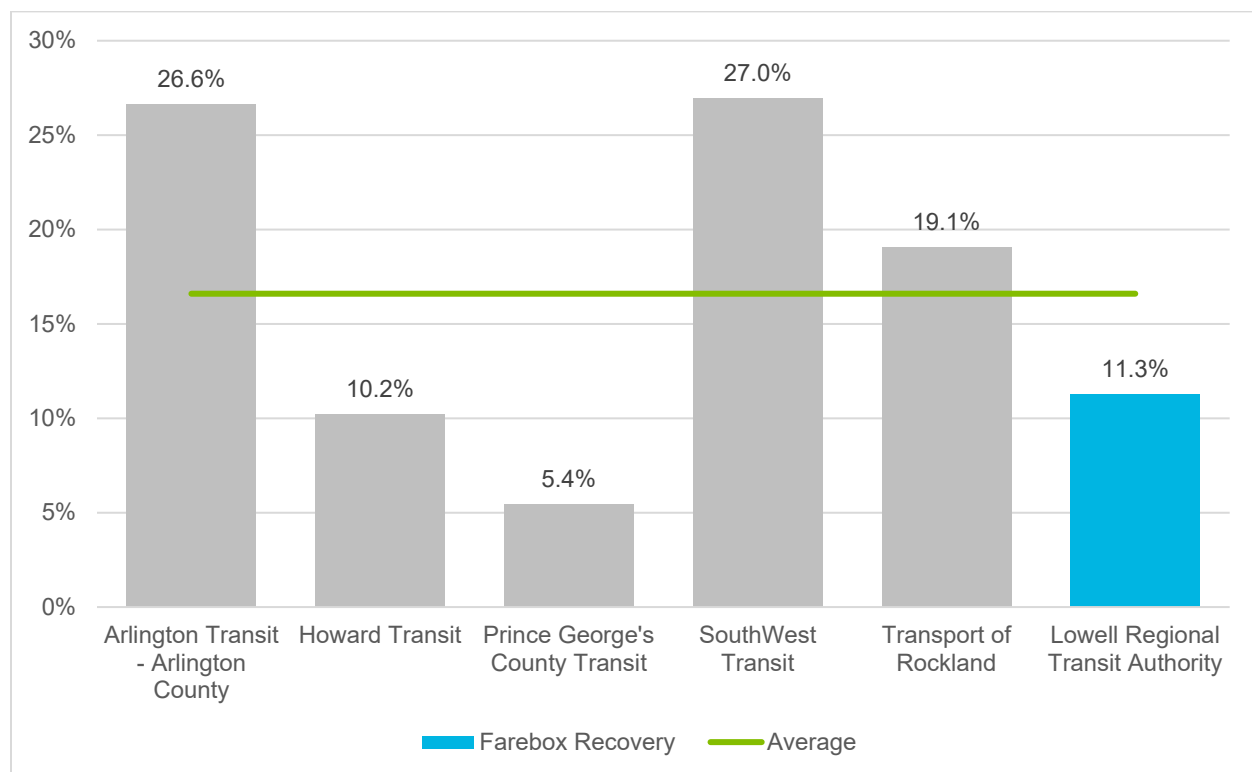
**Figure 58. LRTA Peer Comparison – Cost per Passenger (FY 2017)**



Source: NTD

**Figure 59. LRTA Peer Comparison – Subsidy per Passenger (FY 2017)**

Source: NTD

**Figure 60. LRTA Peer Comparison – Farebox Recovery Ratio (FY 2017)**

Source: NTD

Arlington Transit stands out among the peer agencies with generally good performance, which might be the result of a service area that is denser than LRTA's, with almost 1,000 more people per square mile. LRTA's service area has the lowest population density of all its peers and offers much less service than Arlington Transit, with one-third fewer revenue hours.

## Appendix B Commonwealth Environmental Policies

Transportation is a leading producer of greenhouse gas emissions (GHG) in the Commonwealth, and the only sector identified through the Global Warming Solutions Act of 2006 (GWSA) with a volumetric increase in GHG emissions; meaning that any effort to reduce emissions must significantly target the transportation system. In 2008, through the passage of the GWSA, Massachusetts committed to reduce its GHG emissions by 80 percent below 1990 baseline levels by 2050. Commonwealth policies and action on environmental sustainability in the transportation sector can be summarized by a series of executive orders, regulations, and recommendations to achieve the Commonwealth's goal of reducing transportation-related emissions by 40 percent over the next 20 years,<sup>17</sup> helping to meet the emissions reduction goals of the GWSA.

Massachusetts is establishing an integrated climate change strategy for the Commonwealth through the implementation of Executive Order 569, which was issued in 2017 and had major elements codified in 2018.<sup>18</sup> It aims to develop a roadmap for climate mitigation and adaptation for the Commonwealth.

Sustainability requirements for transportation are summarized in 310 CMR 60.05,<sup>19</sup> where the Climate Protection and Green Economy Advisory Committee advises the Executive Office of Energy and Environmental Affairs on measures to reduce GHG emissions in accordance with the GWSA. The purpose of 310 CMR 60.05 is to assist the Commonwealth in achieving the GHG emissions reduction goals, and to establish an annually declining aggregate GHG emissions limit for MassDOT, as well as general requirements for determining aggregate transportation GHG emissions in the transportation planning process.

To be in line with this regulation, RTAs in particular must conduct comprehensive service reviews; identify service enhancements to increase passenger ridership; identify vehicle technology and operational improvements that can reduce aggregate transportation GHG emissions; and work within the MPO process to prioritize and fund GHG reduction projects and investments.

In Executive Order 579: Establishing the Commission on the Future of Transportation in the Commonwealth, the goal is to determine “how to ensure that transportation planning, forecasting, operations, and investments for the period from 2020 through 2040 can best account for likely demographic, technological, climate, and other changes in future mobility and transportation behaviors, needs and options.”<sup>20</sup> This will be accomplished by further investigating topics such as climate and resiliency, transportation electrification, autonomous and connected vehicles, transit and mobility services, and land use and demographics.<sup>21</sup> In 2019, the Commission on the Future of Transportation released their report, *Choices for Stewardship: Recommendations to Meet the Transportation Future*.<sup>22</sup>

The report provides five recommendations with a planning horizon of year 2040. The recommendations include (1) modernizing existing transportation assets; (2) creating a 21st Century “mobility infrastructure” to prepare the Commonwealth for emerging changes in transportation technology and behavior; (3) substantially reducing GHG emissions from the transportation sector; (4) coordinating and modernizing land use, economic development, housing, and transportation policies and investment in order to support resilient and dynamic regions and communities throughout the Commonwealth; and (5) changing current

<sup>17</sup> <https://www.mass.gov/doc/a-vision-for-the-future-of-massachusetts-regional-transit-authorities/download>.

<sup>18</sup> <https://www.mass.gov/executive-orders/no-569-establishing-an-integrated-climate-change-strategy-for-the-commonwealth>.

<sup>19</sup> <https://www.mass.gov/doc/final-regulation-4/download>.

<sup>20</sup> <https://www.mass.gov/executive-orders/no-579-establishing-the-commission-on-the-future-of-transportation-in-the>.

<sup>21</sup> <https://www.mass.gov/executive-orders/no-579-establishing-the-commission-on-the-future-of-transportation-in-the>.

<sup>22</sup> <https://www.mass.gov/doc/choices-for-stewardship-recommendations-to-meet-the-transportation-future-volume-1/download>.

transportation governance and financial structures in order to better position Massachusetts for the transportation system that it needs in the next years and decades.

Current RTA-specific sustainable practices are described in Chapter 4 and recommendations for future sustainable practices are described in Chapter 9.



## Appendix C LRTA CRTP Update Public Outreach Summary

### Survey Instrument

Thank you for taking the time to fill out this short survey. LRTA is always striving to best serve each and every rider with the utmost care and we want to know how you feel. Please answer the following question to help us understand your level of comfort for riding with LRTA as the state begins to reopen.

- 1. In what ZIP code do you live?**
- 2. As the Greater Lowell areas begin to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?**
  - Enhanced cleaning measures and protective equipment
  - Improved communications
  - Expanded cash-free payment options
  - More rapid return to normal schedules/services
  - Other (please describe):
- 3. How often do you use the LRTA Road Runner/Paratransit Van?**
  - Every day
  - 3 or more days a week
  - 1-2 days a week
  - 1-2 days per month
  - Rarely
  - I don't use LRTA Road Runner/Paratransit Van
- 4. How often do you use LRTA fixed bus route service?**
  - Every day
  - 3 or more days a week
  - 1-2 days a week
  - 1-2 days per month
  - Rarely
  - I don't use LRTA fixed route bus service
- 5. What is your primary trip purpose when you use LRTA services?**
  - Work
  - School
  - Shopping
  - Recreation/Entertainment
  - Medical Appointments
  - Family Visits

- Other

**6. How do you typically pay to use LRTA service?**

- Day Pass
- Monthly Pass
- CharlieCard
- Senior CharlieCard
- Fare Free
- UMass Lowell ID Card (Student/Faculty)
- Cash
- Other

**7. Have you used the following service(s) in the past year?**

- Uber/Lyft
- VeoRide
- Bikeshare
- Taxi

**8. Why do you ride LRTA service?**

- I don't own a car
- I don't have a driver's license
- Low cost fares
- There is a bus stop near my house
- The bus schedule matches my schedule
- It is better for the environment

**9. What is the major advantage of using LRTA service?**

- Convenient service
- Good for the environment
- Low-cost of service
- Friendly drivers and staff
- Other

**10. Where would you like to go that you are currently not able to?**

**11. Are you aware of the upcoming construction projects on Thorndike Street/Lord Overpass and the Central Street bridge?**

- Yes
- No

**12. What is the biggest improvement that LRTA should make over the next 5 years? (Choose one)**

- Increase service late at night

- Increase service on weekends
- Increase frequency of buses
- Connect the bus to more places outside of Lowell
- Transit tickets on smart phones
- More benches, bus shelters, and other bus stop items

**13. Do you feel that LRTA public transportation services are valuable to the area?**

- Yes
- No

**14. How do you currently receive communications and information from LRTA?:**

- LRTA website
- LRTA mobile app
- Customer service (phone)
- Customer Service (In-Person)
- Social media (Facebook, Instagram, Twitter)

**15. What social media platforms do you currently use?**

- Twitter
- Facebook
- Instagram
- Other

**16. Do you use any of the following to plan your daily commute?**

- LRTA Social Media
- LRTA Website
- LRTA App
- Google Maps
- Waze
- Other (please specify)
- Local news

**17. Do have a cell phone?**

- Yes, I have a smartphone
- Yes, I have a flip phone/not a smartphone
- No

**18. What is your age?**

**19. What is your gender?**

**20. What is your race/ethnicity? (Choose all that apply)**

- White/Caucasian
- Black or African American

- Hispanic or Latino
- Asian or Asian American
- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander
- Other (please specify)

**21. What is the primary language spoken in your home?**

**22. What is your highest level of educational attainment?**

- Less than a high school diploma
- High school diploma or equivalent (e.g. GED)
- Some college, no degree
- Associate degree (e.g. AA, AS)
- Bachelor's degree (e.g. BA, BS)
- Higher than bachelor's degree

**23. What is your annual household income?**

- \$12,499 or less
- \$12,500 to \$16,999
- \$17,000 to \$21,499
- \$21,500 to \$25,999
- \$26,000 to \$30,499
- \$30,500 to \$34,999
- \$35,000 to \$39,499
- \$39,500 to 43,999
- \$44,000 or more

**24. How many people live in your household?**

- 1 (Just me)
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more

## Survey Comments

Table 47 provides the open ended responses received to questions.

**Table 47. Open Ended Survey Responses by Question**

<b>ID</b>	<b>Question</b>	<b>Comment</b>
1	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	The driver on the rt 15 inbound today from Littleton Saturday 4:15Pm was extremely rude and unprofessional. I arrived before the driver and a person was let off as it got to IBM. In the blazing heat I asked if I could board. He said it's out of service can't you see? I asked if he was going to the terminal. He said in 12 minutes and shut the door so I could not be in air conditioning. I don't want other seniors to be abused. God bless you
2	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Instead of trying to pick everyone up at once on your routes such as going to Burlington how about taking a faster route and getting people there faster people like myself would take the bus more often than once or twice a year
3	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Enhanced communication through the use of apps and app accessed routes and payment
4	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Offering An Advanced Scheduled (24 Hours In Advance or 48 Hours In Advance) Microtransit Option That Would Be Available To ALL Passengers/Riders  &  Fixed Route Bus Transfer Connections To Neighboring Transit Authorities Like ... MVRTA: Merrimack Valley Regional Transit Authority, MART: Montachusett Regional Transit Authority, & MBTA: Massachusetts Bay Transportation Authority.
5	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Remove the rude driver on the 7 route
6	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Enhanced measures AND cash free payment options

ID	Question	Comment
7	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Making sure riders have masks covering their mouth and nose I've noticed this is NOT being enforced which makes me feel completely unsafe I've had to ask riders to put masks on many times
8	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	A percentage of your drivers (20% - 40%) have horrible "attitudes" towards passengers and their jobs. They yell at people and pick and choose favorites, being so kind as to stop bus for one at the strangest place in the road (for example) while refusing another walking with a walker in the freezing cold for not being exactly at the "bus stop" (yes, really happens -- both -- more than once). Then too some drivers are very nice and get this: always on time to the minute too. Yet, the drivers who hate their jobs and half the people too, always, always have an excuse for being significantly late almost all the time. Almost all the drivers are amazing vehicle operators -- awesome -- but the customer service is on the average below standard.
9	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	place to park free @ a stop in Tyngsborough
10	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Keep things the same a bit longer
11	Q3. As the Greater Lowell area begins to reopen following the COVID-19 pandemic closures, what can LRTA do to make you feel more comfortable about riding with us?	Cleaning of surfaces that are touched by numbers of people is good practice. Also, riders and drivers should wear masks.
12	Q6. What is your primary trip purpose when you use LRTA services?	Replacing an iPhone at Apple
13	Q6. What is your primary trip purpose when you use LRTA services?	Only in a dire emergency if the car were being serviced.
14	Q6. What is your primary trip purpose when you use LRTA services?	GO TO BANK

ID	Question	Comment
15	Q6. What is your primary trip purpose when you use LRTA services?	For the train
16	Q6. What is your primary trip purpose when you use LRTA services?	I used to live in Lowell and just want to help.
17	Q6. What is your primary trip purpose when you use LRTA services?	shopping/ medical
18	Q6. What is your primary trip purpose when you use LRTA services?	all of the above
19	Q6. What is your primary trip purpose when you use LRTA services?	Various - don't have a car
20	Q6. What is your primary trip purpose when you use LRTA services?	Eating out downtown and getting back to Pawtucketville
21	Q6. What is your primary trip purpose when you use LRTA services?	Volunteering/ appointments food shopping
22	Q6. What is your primary trip purpose when you use LRTA services?	get to MBTA, Boston
23	Q7. How do you typically pay to use LRTA service?	Road runner cards
24	Q7. How do you typically pay to use LRTA service?	Charlie Card, Sr. pass
25	Q9. Why do you ride LRTA service?	My husband & I share 1 car.
26	Q9. Why do you ride LRTA service?	car is being repaired, occasionally connecting with train, but limited bus schedule makes that difficult
27	Q9. Why do you ride LRTA service?	This ride was too expensive in a taxi
28	Q9. Why do you ride LRTA service?	Bike got a flat
29	Q9. Why do you ride LRTA service?	When car not available
30	Q9. Why do you ride LRTA service?	why are you forced to choose one here? A few apply to me.

ID	Question	Comment
31	Q9. Why do you ride LRTA service?	Was accessible when my car was in the shop and needed access to transport to work
32	Q9. Why do you ride LRTA service?	I might do it once in a blue moon for the sake of nostalgia.
33	Q9. Why do you ride LRTA service?	When the route is covered by transit
34	Q9. Why do you ride LRTA service?	Free
35	Q9. Why do you ride LRTA service?	I am elderly bus is convenient
36	Q9. Why do you ride LRTA service?	Occasional when car not available
37	Q9. Why do you ride LRTA service?	when my car isn't working
38	Q9. Why do you ride LRTA service?	i am blind
39	Q9. Why do you ride LRTA service?	medical issue
40	Q9. Why do you ride LRTA service?	To relay from the Bus to the Commuter Rail to go into Boston
41	Q9. Why do you ride LRTA service?	Necessary connections
42	Q9. Why do you ride LRTA service?	AlornIII
43	Q9. Why do you ride LRTA service?	all of the above
44	Q9. Why do you ride LRTA service?	One car, shared with spouse
45	Q9. Why do you ride LRTA service?	Sometimes it's the most convenient way to get where I need to go
46	Q10. To where would you like to go that you are currently not able?	I think the routes cover all of the places I would want to go.
47	Q10. To where would you like to go that you are currently not able?	Not an issue
48	Q10. To where would you like to go that you are currently not able?	Nashua NH
49	Q10. To where would you like to go that you are currently not able?	I wish the run to Pheasant Lane mall would be a more permanent route instead of seasonal.
50	Q10. To where would you like to go that you are currently not able?	nashua mall
51	Q10. To where would you like to go that you are currently not able?	I can get to all of my places in lowell for school.



ID	Question	Comment
52	Q10. To where would you like to go that you are currently not able?	Kennedy Center
53	Q10. To where would you like to go that you are currently not able?	New Hampshire. If Lawrence can why cant Irta?
54	Q10. To where would you like to go that you are currently not able?	Dracut, MA/Pelham, NH State line aka Rte. 38
55	Q10. To where would you like to go that you are currently not able?	Hampton Beach?
56	Q10. To where would you like to go that you are currently not able?	Anywhere if it didn't take 45 minutes to go 10 miles
57	Q10. To where would you like to go that you are currently not able?	run my errands, take my kids and myself to our appointments or anywhere we want or need to go, mainly for important things.
58	Q10. To where would you like to go that you are currently not able?	School
59	Q10. To where would you like to go that you are currently not able?	There is no direct route to the new courthouse.  There is no route, at all, to Patriot Care.  Bus routes should intersect more places than gallagher, it is horribly slow and inefficient, and monthly commuter rail passes should be accepted on buses.
60	Q10. To where would you like to go that you are currently not able?	to get ice cream
61	Q10. To where would you like to go that you are currently not able?	I would just like the buses to stop leaving early.
62	Q10. To where would you like to go that you are currently not able?	Do they have a route to the Pheasant Lane Mall in Nashua, New Hampshire? That might be useful for some wanting to get out of Lowell for a day out.
63	Q10. To where would you like to go that you are currently not able?	Fixed Route Bus Transfer Connections To Both MART: Montachusett Regional Transit Authority & MVRTA: Merrimack Valley Regional Transit Authority.
64	Q10. To where would you like to go that you are currently not able?	More in to tyngsboro. Have family on cardinal lane.
65	Q10. To where would you like to go that you are currently not able?	BOSTON

ID	Question	Comment
66	Q10. To where would you like to go that you are currently not able?	A fixed route to Nashua
67	Q10. To where would you like to go that you are currently not able?	Andover
68	Q10. To where would you like to go that you are currently not able?	New hampshire
69	Q10. To where would you like to go that you are currently not able?	Middlesex House of Correction
70	Q10. To where would you like to go that you are currently not able?	14 Research place
71	Q10. To where would you like to go that you are currently not able?	Waltham MGH, Emerson Concord MA, Burlington mall
72	Q10. To where would you like to go that you are currently not able?	Grocery store, Target, doctors appointment, work
73	Q10. To where would you like to go that you are currently not able?	Alewife Station to connect with Red Line. (Route 13 and connections at the Burlington Line are poor.) I would like to connect to services in the Waltham area near Route 128. Frequently the connections to downtown Lowell do not work well, and they do not run late enough so I can get home after an MRT performance.
74	Q10. To where would you like to go that you are currently not able?	Food shopped
75	Q10. To where would you like to go that you are currently not able?	the pheasant lane mall and costco
76	Q10. To where would you like to go that you are currently not able?	Beach and mall
77	Q10. To where would you like to go that you are currently not able?	Salisbury
78	Q10. To where would you like to go that you are currently not able?	pheasant lane mall, and to the beach,
79	Q10. To where would you like to go that you are currently not able?	natural areas such as state parks and forests.
80	Q10. To where would you like to go that you are currently not able?	the Pheasant Lane Mall, Canobie Lake Park, the Point plaza in Littleton, Nashoba Valley Ski Area
81	Q10. To where would you like to go that you are currently not able?	pheasant lane mall

ID	Question	Comment
82	Q10. To where would you like to go that you are currently not able?	increase connections between UMass campuses
83	Q10. To where would you like to go that you are currently not able?	210 Ballardvale St, Wilmington, MA 01887 (Target Wilmington)
84	Q10. To where would you like to go that you are currently not able?	Lowell to Tyngsboro
85	Q10. To where would you like to go that you are currently not able?	Nashua nh
86	Q10. To where would you like to go that you are currently not able?	I need the 10 bus to get to the train station and the restricted Bus hours Prevents me from getting to my Woburn office
87	Q10. To where would you like to go that you are currently not able?	restaurants, stores
88	Q10. To where would you like to go that you are currently not able?	Direct connection/more frequent service from Route 4 to Eastgate Plaza (Market Basket)
89	Q10. To where would you like to go that you are currently not able?	Pleasant mall, Nashua
90	Q10. To where would you like to go that you are currently not able?	Pheasant lane mall , Rockingham mall
91	Q10. To where would you like to go that you are currently not able?	Showcase Cinema de Lux of Lowell, Closer to Middlesex Community College in Lowell, Merrimack River Trail, Chelmsford ST
92	Q10. To where would you like to go that you are currently not able?	The beach
93	Q10. To where would you like to go that you are currently not able?	Nashua, NH
94	Q10. To where would you like to go that you are currently not able?	Beaches
95	Q10. To where would you like to go that you are currently not able?	Downtown
96	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall all year round
97	Q10. To where would you like to go that you are currently not able?	To work, i work later than the last inbound burlington bus

ID	Question	Comment
98	Q10. To where would you like to go that you are currently not able?	Work I used to take the 6am bus to Burlington. Uber is too expensive and I cant afford it. So can you go back to normal schedule MBTA has already. Not to mention you guys need a bigger bus. Since everyone is moving up here
99	Q10. To where would you like to go that you are currently not able?	Mammoth Road in Dracut from Lowell to Lakeview Ave
100	Q10. To where would you like to go that you are currently not able?	To church on Sunday.
101	Q10. To where would you like to go that you are currently not able?	Lowell Memorial Auditorium
102	Q10. To where would you like to go that you are currently not able?	Not aware of LRTA routes leaving Tyngsborough. We like bus options to connect to Lowell, Logan Airport or Burlington. Unaware if such services exist.
103	Q10. To where would you like to go that you are currently not able?	Bedford center
104	Q10. To where would you like to go that you are currently not able?	pheasant lane mall
105	Q10. To where would you like to go that you are currently not able?	Burlington Mall (More buses), Morning 8:55am bus is difficult to catch, as I come from Alewife and buses are delayed to reach Lahey CLinic
106	Q10. To where would you like to go that you are currently not able?	From Groton Center to the Ayer commuter rail. Alternatively, from Groton Center to the Lowell commuter rail
107	Q10. To where would you like to go that you are currently not able?	Burlington Mall
108	Q10. To where would you like to go that you are currently not able?	New Hampshire other then Ayottes
109	Q10. To where would you like to go that you are currently not able?	I would like route 15 (or another route) to connect to mbta commuter rail at the Littleton/495 stop. This would allow seem less transition between services.
110	Q10. To where would you like to go that you are currently not able?	Any where on a Sunday. RT 3 does not run on Sunday so I can't get anywhere.
111	Q10. To where would you like to go that you are currently not able?	work

ID	Question	Comment
112	Q10. To where would you like to go that you are currently not able?	Pheasant lane mall
113	Q10. To where would you like to go that you are currently not able?	Malls more
114	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall in Tyngsboro
115	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall
116	Q10. To where would you like to go that you are currently not able?	Bedford/Lexington
117	Q10. To where would you like to go that you are currently not able?	Nashua, NH
118	Q10. To where would you like to go that you are currently not able?	nashua mall
119	Q10. To where would you like to go that you are currently not able?	Gift shop
120	Q10. To where would you like to go that you are currently not able?	Andover
121	Q10. To where would you like to go that you are currently not able?	Further places along all the out of town routes
122	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall
123	Q10. To where would you like to go that you are currently not able?	Nashua,NH
124	Q10. To where would you like to go that you are currently not able?	More locations outside of Lowell. Rockingham Mall, Pheasant Lane Mall
125	Q10. To where would you like to go that you are currently not able?	Pheasant lane mall
126	Q10. To where would you like to go that you are currently not able?	pheasant lane mall
127	Q10. To where would you like to go that you are currently not able?	The Pheasant Lane mall other then the holidays it doesn't have to be every hour on the hour but at least enough time to go back and forth throughout the day
128	Q10. To where would you like to go that you are currently not able?	Carlisle

ID	Question	Comment
129	Q10. To where would you like to go that you are currently not able?	Boston
130	Q10. To where would you like to go that you are currently not able?	The Showcase Cinema in Lowell, or The Luna Theater.
131	Q10. To where would you like to go that you are currently not able?	Nashua, as bus service to New Hampshire is very limited
132	Q10. To where would you like to go that you are currently not able?	More frequent service to Chelmsford and Burlington, Bedford area near The Exchange.
133	Q10. To where would you like to go that you are currently not able?	Bedford shopping plaza
134	Q10. To where would you like to go that you are currently not able?	pheasant lane mall
135	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall
136	Q10. To where would you like to go that you are currently not able?	South avenue across from the Burlington mall . I like to go to AMC 10 movie theater , but I dont always feel up to walking there from the current stops .
137	Q10. To where would you like to go that you are currently not able?	More places in southern Chelmsford more reliably
138	Q10. To where would you like to go that you are currently not able?	I would like it if there were cross-town routes that don't stop at the Gallagher Teeminal.
139	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall
140	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall
141	Q10. To where would you like to go that you are currently not able?	Late night events
142	Q10. To where would you like to go that you are currently not able?	Pheasant lane mall
143	Q10. To where would you like to go that you are currently not able?	I think it would be a good idea in the summer to have a bus that goes to canobie lake park
144	Q10. To where would you like to go that you are currently not able?	Pheasant lane mall.
145	Q10. To where would you like to go that you are currently not able?	Pheasant lane Mall

ID	Question	Comment
146	Q10. To where would you like to go that you are currently not able?	Modify Route 17 North Chelmsford trip times to line up with MBTA Commuter Rail departures. Even by taking the first IB trip to the Kennedy Center, it does not allow early morning connections to the 6:10 or 6:35 or 7:00am departures for Boston, which limits early risers who would like to get to Boston on one of the early trips. If the schedule was modified in order to use the LRTA to connect to the commuter rail, which I utilize to head to work in Boston, I would use the service daily
147	Q10. To where would you like to go that you are currently not able?	The pheasant lane mall in Nashua Nh
148	Q10. To where would you like to go that you are currently not able?	Market Basket warehouse, Andover
149	Q10. To where would you like to go that you are currently not able?	Pheasant Lane Mall outside of the holiday season
150	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Better routes should take 45 minutes to get to Burlington
151	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Cleanliness and social distancing
152	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Technology. your schedules and maps are incomprehensible and the smartphone app gps has literally never worked.
153	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Would have been great if your survey allowed multiple choices. Having driven ride share, folks on the weekends needed to be able to get to work and get home from work. Public transportation requires ALOT of planning for a worker, particularly a service worker. More routes on weekends would be beneficial to our workforce
154	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Some bus drivers leave the station early and it causes me to be late for work and pay for an uber.
155	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Electric bus
156	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Allowing transfers outside of Kennedy Center

ID	Question	Comment
157	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	no sat service
158	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Automatic monthly card refill
159	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Bigger bus and having buses run frequently than every hour. It should take a 30 min car ride home into a 2hr bus ride home because you run every hour
160	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	To be nice to passengers ALL the time.
161	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	lower price
162	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Increased frequency AND transit tickets on smart phones.
163	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Stop STOP all the passengers with large baby carriages and shopping carts that block the aisles. It is DANGEROUS.
164	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Make the service late night and also make it so that the tap pass can be bought for durations at time instead of monthly I would pay 60 to have the pass last longer then having to constantly renew
165	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	Improve punctuality
166	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	All the above
167	Q11. What is the biggest improvement that LRTA should make over the next 5 years?	All of the above
168	Q13. What social media platforms do you currently use? (Select all that apply)	google



ID	Question	Comment
169	Q13. What social media platforms do you currently use? (Select all that apply)	YouTube
170	Q13. What social media platforms do you currently use? (Select all that apply)	Occasionally Facebook, but not often enough so I would get LRTA information.
171	Q13. What social media platforms do you currently use? (Select all that apply)	Nextdoor
172	Q13. What social media platforms do you currently use? (Select all that apply)	Snapchat
173	Q13. What social media platforms do you currently use? (Select all that apply)	YouTube
174	Q13. What social media platforms do you currently use? (Select all that apply)	LinkedIn
175	Q13. What social media platforms do you currently use? (Select all that apply)	google
176	Q13. What social media platforms do you currently use? (Select all that apply)	google
177	Q13. What social media platforms do you currently use? (Select all that apply)	google
178	Q13. What social media platforms do you currently use? (Select all that apply)	google
179	Q13. What social media platforms do you currently use? (Select all that apply)	Snapchat
180	Q13. What social media platforms do you currently use? (Select all that apply)	google
181	Q13. What social media platforms do you currently use? (Select all that apply)	google

ID	Question	Comment
182	Q13. What social media platforms do you currently use? (Select all that apply)	Snapchat
183	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	Discussions With Both Immediate Family Members & Close Friends
184	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	Retired, no daily commute
185	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	Transit app
186	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	MBTA commuter rail
187	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	My mom
188	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	Apple Maps
189	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	Transit
190	Q14. Do you use any of the following to plan your daily commute? (Select all that apply)	Apple maps
191	Q20. What do you like most about LRTA service? What do you like least about it?	The convenience from UMass Lowell campuses. The program you have with UMass Lowell. The length of time it would take me to get to work from my house if I rode the bus the entire way because I would have to transfer at Gallagher terminal. It's faster to walk from my house over to Lowell then get on a Lowell bus.
192	Q20. What do you like most about LRTA service? What do you like least about it?	Most drivers are absolutely superb. We are blessed
193	Q20. What do you like most about LRTA service? What do you like least about it?	i used to like that it came to my building every hour now it shows up when it wants to with no warning so i could be sitting for hours waiting for the bus to come

ID	Question	Comment
194	Q20. What do you like most about LRTA service? What do you like least about it?	I am a huge fan of LRTA and am VERY happy with the services provided. I just wish the RouteShout app was working right now as it is difficult to determine if the bus will be showing up or not without it.
195	Q20. What do you like most about LRTA service? What do you like least about it?	i witnessed a driver being mean to a disabled passenger with one leg in a self rotary wheelchair.this afternoon coming back from belvidere . the driver talked to the man as if he was trash. iwas so sad. why is this happening? he told the man not to take the bus ever again! Why?ive heard this driver talk to seniors very badly,too. we are poor in lowell. and many of us have diabilities.do we desrve to be treated badly. i felt very badly for this man today. thank you .im sorry to complain.i do love the lrtA.
196	Q20. What do you like most about LRTA service? What do you like least about it?	The bus service is very convenient. The routes are designed in a way that work in an excellent way. I wish that the LRTA would create better schedules to make it easier to transfer buses. Also, the fare policy is confusing. I do not understand way there are 3 different tranfers. Some people get confused when they pay there fare and ask for a transfer. The driver has to ask them which route they are going to board.
197	Q20. What do you like most about LRTA service? What do you like least about it?	Everything
198	Q20. What do you like most about LRTA service? What do you like least about it?	<p>Some drivers are nice</p> <p>Others are racist, and it shows. Plenty drivers discriminate against passengers daily.</p> <p>They use border line loopholes to get out of hot water.</p> <p>The drivers mostly don't give a shit about us passengers.</p> <p>I hear drivers talking about people every day, regardless of race, sex gender, creed etc etc</p>
199	Q20. What do you like most about LRTA service? What do you like least about it?	<p>Service is good, friendly drivers.</p> <p>To many people asking for money and hanging out at station</p>

ID	Question	Comment
200	Q20. What do you like most about LRTA service? What do you like least about it?	<p>Most: The drivers are real friendly &amp; I can save money on expenses for a 2nd car.</p> <p>Least: It takes 2 to 4 times longer to get to where I need to go versus driving myself. Best scenario would be Sunday service &amp; later runs for people who are closers at stores beyond Lowell. Lyfts end up costing much more than the adult monthly pass.</p>
201	Q20. What do you like most about LRTA service? What do you like least about it?	Great drivers
202	Q20. What do you like most about LRTA service? What do you like least about it?	<p>I like that the drivers and personnel are friendly and helpful.</p> <p>I don't like that the stops are open to the elements, without even a roof.</p>
203	Q20. What do you like most about LRTA service? What do you like least about it?	<p>I use to use LRTA daily to commute to work when the Pawtucketville bus staged at CVS downtown. When the bus stop was moved to city hall, the commute time increased so much, it wasn't worth it to take the bus, and if it was inclement weather the increased time spent commuting on foot, wasn't worth it. Using the shuttle added 45 minutes on to my evening commute. Therefore I only use LRTA for the folk festival and when my car is unavailable.</p>
204	Q20. What do you like most about LRTA service? What do you like least about it?	<p>I love EVERYTHING about the LRTA! I used to work at Dunkin inside of the Gallagher train station and everything from the employees, to the building, to the people, the atmosphere, the energy, is just amazing. Customer service is always spot on and kind and always going out of their way to make sure our needs are met!</p>
205	Q20. What do you like most about LRTA service? What do you like least about it?	Drivers concern for passengers
206	Q20. What do you like most about LRTA service? What do you like least about it?	Reliability of service. The limited scope of service.
207	Q20. What do you like most about LRTA service? What do you like least about it?	potential. drivers who almost kill me while I'm on my bike.
208	Q20. What do you like most about LRTA service? What do you like least about it?	<p>Easy to use close to home. Tracker is good. Don't like that busses going to station rather than downtown.</p>

ID	Question	Comment
209	Q20. What do you like most about LRTA service? What do you like least about it?	Buses are clean. ED is very responsive to local concerns and needs
210	Q20. What do you like most about LRTA service? What do you like least about it?	Pre-covid I liked that I could bus from my apartment to the train station to Anderson RTC to catch the shuttle to the airport. I miss going places. Least...when you can see yourself miss the bus and the driver sees you running
211	Q20. What do you like most about LRTA service? What do you like least about it?	Most of the drivers are exceptionally friendly!
212	Q20. What do you like most about LRTA service? What do you like least about it?	I always enjoyed being able to look at the views of the areas visited. Having to drive has since become a chore.  Whilst the majority of the staff has always been professional, efficient, and polite, there had been the occasional staff member who seemed to misrepresent LRTA in a positive manner.
213	Q20. What do you like most about LRTA service? What do you like least about it?	All The Transit Drivers Are Really Awesome, And, Definitely, 100% True Heroes, Especially, Now, During This Particular Pandemic.
214	Q20. What do you like most about LRTA service? What do you like least about it?	Like: Good drivers & staff. Don't like: less frequent weekend buses
215	Q20. What do you like most about LRTA service? What do you like least about it?	it has great service sometimes, however, the bus drivers can be rude sometimes and the buses are dirty sometimes.
216	Q20. What do you like most about LRTA service? What do you like least about it?	It's accessible. N/a
217	Q20. What do you like most about LRTA service? What do you like least about it?	Nice new busses  Not super frequent outside of Lowell
218	Q20. What do you like most about LRTA service? What do you like least about it?	The partnership with UMass Lowell
219	Q20. What do you like most about LRTA service? What do you like least about it?	Busses are convenient to where I need to go . I have been treated quite rudely by more than a few drivers .!

ID	Question	Comment
220	Q20. What do you like most about LRTA service? What do you like least about it?	I love everything about the LRTA services
221	Q20. What do you like most about LRTA service? What do you like least about it?	I like the rude bus drivers, they're hard workers. The benches near the buses all need to have a roof. Your bath rooms are dirty. Have a better concession stand with all merchandise behind a glass so no one can steal. Happier workers
222	Q20. What do you like most about LRTA service? What do you like least about it?	clean. waiting
223	Q20. What do you like most about LRTA service? What do you like least about it?	Friendly drivers
224	Q20. What do you like most about LRTA service? What do you like least about it?	+friendly, convenient to senior center and Billerica center,  -evenings end early
225	Q20. What do you like most about LRTA service? What do you like least about it?	Low cost fares for seniors, good for environment, would like it closer to  My home
226	Q20. What do you like most about LRTA service? What do you like least about it?	I can get to where I need to go, drivers are nice
227	Q20. What do you like most about LRTA service? What do you like least about it?	The most irritating aspect of LRTA service is the failure of the bus tracker. A high percentage of the trips do not have a working system. The LRTA routes look too much like the routes that the Eastern Massachusetts Street Railway in the Lowell area, and they have not changed as much as they should have to meet changing transportation needs. The best thing about the LRTA is, despite all its issues is there and provides options for a one car, two adult household.
228	Q20. What do you like most about LRTA service? What do you like least about it?	GO BACK TO NORMAL SERVICE
229	Q20. What do you like most about LRTA service? What do you like least about it?	The transaction. Friendly service. Not running on Sundays

ID	Question	Comment
230	Q20. What do you like most about LRTA service? What do you like least about it?	like the most is comfortable and affordable the least the days and times
231	Q20. What do you like most about LRTA service? What do you like least about it?	Good prize nothing
232	Q20. What do you like most about LRTA service? What do you like least about it?	The most is that it goes to Burlington mall and the least is the different amount of fares it should be one amount and then a different amount of your going far away
233	Q20. What do you like most about LRTA service? What do you like least about it?	Rude bus drivers
234	Q20. What do you like most about LRTA service? What do you like least about it?	Wat i like least is some of the drivers be kinf lld of disrespectful without a reason if i speak my language it doesnt concern noone
235	Q20. What do you like most about LRTA service? What do you like least about it?	They print out paper schedule , nothing to dislick ,
236	Q20. What do you like most about LRTA service? What do you like least about it?	Convenient to home and work. Dislike that the bus hub is at the train station so for many that means longer or two bus rides.
237	Q20. What do you like most about LRTA service? What do you like least about it?	Like the friendly drivers on the road runner. What I like least is that messages left at night are often not listened to in the morning.
238	Q20. What do you like most about LRTA service? What do you like least about it?	Reliability. Limited coverage area.
239	Q20. What do you like most about LRTA service? What do you like least about it?	Most: Billerica route Least: lousy springs on buses I've been on; made trips painful

ID	Question	Comment
240	Q20. What do you like most about LRTA service? What do you like least about it?	<p>During my undergraduate years (2012 - 2016), I used the bus every day to commute from Burlington to Lowell for my education at UMass Lowell. Without the bus service, I would have been suffering the costs of living on campus or struggling to pay for car expenses (and polluting the environment). Thank you for the partnership that you have built with UML in these past few years. Even in the face of this pandemic, students may be required to go back to campus - potentially in a hybrid setting - and may rely on the buses.</p> <p>Sometimes, the bus schedule can run tight with the train schedule.</p>
241	Q20. What do you like most about LRTA service? What do you like least about it?	the large buses I love the small vans are a waste
242	Q20. What do you like most about LRTA service? What do you like least about it?	I like that it exists. I wish it were 1. Electric 2. More frequent 3. Ran at night.
243	Q20. What do you like most about LRTA service? What do you like least about it?	I like the low cost and dislike the long wait times
244	Q20. What do you like most about LRTA service? What do you like least about it?	Most is the fare. Least is some of my personal connections.
245	Q20. What do you like most about LRTA service? What do you like least about it?	I like it all.
246	Q20. What do you like most about LRTA service? What do you like least about it?	More late night and weekend bus service
247	Q20. What do you like most about LRTA service? What do you like least about it?	On time
248	Q20. What do you like most about LRTA service? What do you like least about it?	Price. Some of the bus drivers want us to follow the rules, but they don't, such as not wearing mask.
249	Q20. What do you like most about LRTA service? What do you like least about it?	<p>Most: Essential to my commute</p> <p>Least: reduced schedule</p>



ID	Question	Comment
250	Q20. What do you like most about LRTA service? What do you like least about it?	good amount of routes to multiple locations. service not frequent enough
251	Q20. What do you like most about LRTA service? What do you like least about it?	Good: The service is affordable and the buses are clean.  Bad: Frequency. Need more nights and weekends. Also, it's tough to get to certain locations from one part of the Highlands to another. I would like to see Route 4 circulate through the Highlands more like Rt 2 covers Belvidere.
252	Q20. What do you like most about LRTA service? What do you like least about it?	Friendly drivers , like least is that they are NOT ENFORCING USE OF MASKS
253	Q20. What do you like most about LRTA service? What do you like least about it?	I like most about it, is it is easy to use and to figure out. What I like least about it is that some of the stops are kinda random, and can get a bit expensive at times, hard to get a card.
254	Q20. What do you like most about LRTA service? What do you like least about it?	stop sat service and no sunday service just weekday service til 5
255	Q20. What do you like most about LRTA service? What do you like least about it?	All good services, but some drivers are so rude... Not all, just a few of them... One especially is very nice, her name is Connie....
256	Q20. What do you like most about LRTA service? What do you like least about it?	Convenience -- Nasty drivers
257	Q20. What do you like most about LRTA service? What do you like least about it?	Most: increased service on weekends  Least: evening service ends too early
258	Q20. What do you like most about LRTA service? What do you like least about it?	Nothing special. Everything the LRTA does for the community and its service is wonderful. I don't use the service much, but I know a lot of people that do and they love the service.
259	Q20. What do you like most about LRTA service? What do you like least about it?	I like that I can go anywhere in Lowell and the surrounding cities.  I dislike having to go to the service booth to renew my monthly card because it interferes with my work schedule and sometimes it's hard to make it in time before they close.

ID	Question	Comment
260	Q20. What do you like most about LRTA service? What do you like least about it?	Now the busses are cleaner.
261	Q20. What do you like most about LRTA service? What do you like least about it?	The busses are clean. The busses aren't always punctual and sometimes they don't even show up.
262	Q20. What do you like most about LRTA service? What do you like least about it?	There's nothing I like about LRTA. I already said what could be improved
263	Q20. What do you like most about LRTA service? What do you like least about it?	The frequency in Dracut is abysmal. It's like living in a backward hellhole with such infrequent service. You can't set your watch to when the bus will arrive and god help you if you're not there early because the bus isn't going to keep its schedule. Just like the bus at LGH that never stops. It just keeps going instead of making the stop for passengers.
264	Q20. What do you like most about LRTA service? What do you like least about it?	The drivers that are nice are really great. I dislike the bad ones who ruin my whole day. I used to ride two to three times more often but keep riding less because of the bad ones.
265	Q20. What do you like most about LRTA service? What do you like least about it?	Convenience n/a
266	Q20. What do you like most about LRTA service? What do you like least about it?	LRTA is better for environment. However, more should be done to make potential riders aware of services.
267	Q20. What do you like most about LRTA service? What do you like least about it?	The ease of getting to work Hoping to get back to Weekday service
268	Q20. What do you like most about LRTA service? What do you like least about it?	Very strange passengers and you really need to do a better job keeping everyone who uses it safe.
269	Q20. What do you like most about LRTA service? What do you like least about it?	The drivers are great, the buses are clean, they are really on time. Personally don't have problems with the routes offered, but running the buses until 8 or 9 PM would make a huge difference.
270	Q20. What do you like most about LRTA service? What do you like least about it?	Overall good. Sometimes experience discrimination

ID	Question	Comment
271	Q20. What do you like most about LRTA service? What do you like least about it?	lately the bus drivers have been rude, i guess they are stressed because of covid , but,gee ,we all are! please have some compassion for the passengers especially seniors , i do love the Lrta. please don't give up on the seniors.thank you for your service.
272	Q20. What do you like most about LRTA service? What do you like least about it?	The tracking app is not working, which makes it difficult to track bus, I leave Riverside tech park at 6pm and it is difficult to check where the bus is.
273	Q20. What do you like most about LRTA service? What do you like least about it?	I would really like it to return to regular service as the modified schedule no longer services where I live and I need it in the morning to get home from work.
274	Q20. What do you like most about LRTA service? What do you like least about it?	Some of the drivers are amazing, but some are assholes.
275	Q20. What do you like most about LRTA service? What do you like least about it?	convenience, and parking is not a problem
276	Q20. What do you like most about LRTA service? What do you like least about it?	I like it's price. I don't like how many of the farthest reaching routes still make lots of stops in interior lowell. This makes long distance commuting very slow with Lrta. I don't like infrequent busses. Thus makes commuting with time consuming and inconvenient.
277	Q20. What do you like most about LRTA service? What do you like least about it?	Some nice drivers. Rude/Anti-social drivers.
278	Q20. What do you like most about LRTA service? What do you like least about it?	Bus stop almost at my door step.  Can't always get to where I have to get to without walking a good distance.
279	Q20. What do you like most about LRTA service? What do you like least about it?	Everything
280	Q20. What do you like most about LRTA service? What do you like least about it?	when it runs on time and reliable. The Lrta bus location app doesn't function well
281	Q20. What do you like most about LRTA service? What do you like least about it?	The LRTA is reliable.  I'd like to see an expedient connection to Salisbury Beach and Hampton Beach.

ID	Question	Comment
282	Q20. What do you like most about LRTA service? What do you like least about it?	Inexpensive. Rte.# 15 buses aren't frequent enough. 1.5 hrs. Between buses is inconvenient.
283	Q20. What do you like most about LRTA service? What do you like least about it?	Most: Number of bus options Least: Frequency and Hours
284	Q20. What do you like most about LRTA service? What do you like least about it?	The bus drivers are great. Service is infrequent & connections are terrible
285	Q20. What do you like most about LRTA service? What do you like least about it?	The best service in a Merrimack Valley, best drivers 4 ★★★★★ Drivers
286	Q20. What do you like most about LRTA service? What do you like least about it?	I like that the drivers are helpful to customers that are unsure which bus to take to get to their destination. The least thing about the LRTA service is that I wish there were more Saturday service and to have a permeant Sunday service.
287	Q20. What do you like most about LRTA service? What do you like least about it?	Buses are safe and clean
288	Q20. What do you like most about LRTA service? What do you like least about it?	I like the fact that the buses have become much cleaner during the pandemic and I hope they remain clean
289	Q20. What do you like most about LRTA service? What do you like least about it?	I like the fact lowell has public transit & not that fact LRTA allows Rude behavior from drivers, no plastic barriers, some driver refusing to wear masks which is a threat the public safety of others. Routes that can't be tracked, drivers make up their own rules as they go, play loud music but say, passengers can't do the same.  If LRTA schedule is subject to change please allow passengers to be able to track the Bus locations For better results.
290	Q20. What do you like most about LRTA service? What do you like least about it?	It is convenient for me. A short walk to the bus stop from my home and work. I am able to get into Boston using the LRTA easily. I wish there was a way to load my charlie card with passes and money online or more kiosks in surrounding cities.

ID	Question	Comment
291	Q20. What do you like most about LRTA service? What do you like least about it?	I like how I can go out of town by the bus at varying plazas for shopping, medical appointments, errands, work, etc. What I least like is how late in the morning they start running and they end early afternoon. The bus drivers must also be more friendly and treat the customers with respect.
292	Q20. What do you like most about LRTA service? What do you like least about it?	For the most it's all good Couple of drivers with aditudes that are teribble and they suck.I am not sure why they are still driving.Poor.
293	Q20. What do you like most about LRTA service? What do you like least about it?	lately, the bus drivers have been yelling at seniors! very noticeable! usually they are patient,some are being very obnoxious.sorry, but it is true,thank you. hope it improves.
294	Q20. What do you like most about LRTA service? What do you like least about it?	the efficiency
295	Q20. What do you like most about LRTA service? What do you like least about it?	Its a nice way to get to places here in the city.
296	Q20. What do you like most about LRTA service? What do you like least about it?	I like most is how accurate the buses are on departure and arrival. Least about the service is the poor piss attitude of some of the driver's.
297	Q20. What do you like most about LRTA service? What do you like least about it?	The convenience is very good. I thoroughly dislike all the passengers who crowd the aisles with carriages of one kind or another, the rudeness/unhelpfulness of many of the bus drivers (worsened in the last 5 years) and the often inebriated or loud, foul-mouthed passengers, especially on the Tewksbury route.
298	Q20. What do you like most about LRTA service? What do you like least about it?	the very kind bus drivers
299	Q20. What do you like most about LRTA service? What do you like least about it?	Most the routes are accessible. Not enough routes
300	Q20. What do you like most about LRTA service? What do you like least about it?	Fares are great! Drivers are great!
301	Q20. What do you like most about LRTA service? What do you like least about it?	The online bus tracker

ID	Question	Comment
302	Q20. What do you like most about LRTA service? What do you like least about it?	the bus drivers are awesome especially Carl on shuttle he is very kind to seniors and Carolyn also.
303	Q20. What do you like most about LRTA service? What do you like least about it?	the kindness of the bus drivers
304	Q20. What do you like most about LRTA service? What do you like least about it?	they run every half hour weekdays on most routes . not enough weekend ones and that they only go to Nashua at Christmas.
305	Q20. What do you like most about LRTA service? What do you like least about it?	Cheapest way to get to most places I need to go. But, later evening and earlier Sunday schedule is lacking.
306	Q20. What do you like most about LRTA service? What do you like least about it?	I don't like how rude some of the drivers can be and some routes run very infrequently.
307	Q20. What do you like most about LRTA service? What do you like least about it?	Some driver need to be trained on better respect to people and not rude and take there problem out on people be more friendly and answer people questions
308	Q20. What do you like most about LRTA service? What do you like least about it?	i live next to library, so its convenient for me. like that alot
309	Q20. What do you like most about LRTA service? What do you like least about it?	I like that I'm able to get to most places I would go too. I would say some of the staff that helps with processing tickets can be rude at times or not open to helping when a customer needs assistance
310	Q20. What do you like most about LRTA service? What do you like least about it?	I like the variety of locations that I can access through the LRTA. I do not like the inconsistency of bus arrivals at different stops.
311	Q20. What do you like most about LRTA service? What do you like least about it?	Least like no hub in downtown
312	Q20. What do you like most about LRTA service? What do you like least about it?	What I most like about the LRTA service is just a reliable way of getting to school in the mid-afternoon and back home. What I least like about it is the frequency of routes, especially into the HighLands. Also, please update the bus stops on google maps and other services like that.
313	Q20. What do you like most about LRTA service? What do you like least about it?	Inexpensive fares, easy connection to the commuter rail & downtown Lowell

ID	Question	Comment
314	Q20. What do you like most about LRTA service? What do you like least about it?	Fairly direct route between Lowell and Chelmsford. Buses do not operate frequently enough, and some drivers skip the Harvard Medical Center stop on the inbound 15 route.
315	Q20. What do you like most about LRTA service? What do you like least about it?	Routes
316	Q20. What do you like most about LRTA service? What do you like least about it?	Easy way to get around town.
317	Q20. What do you like most about LRTA service? What do you like least about it?	The routeshout app needs to be redone. It's slow, and not easy to navigate.  Please make the busses run on time.
318	Q20. What do you like most about LRTA service? What do you like least about it?	What I like most about LRTA is that there's a couple of line that I can take to get to my house. And the line to my house runs late and I needed that so it is really convenient for me. What I dislike most is for Line 6, it never arrives to the bus station or departs on time. 2 days ago, I was waiting for the 5:10pm bus and I waited for 15 mins and it still did not show up so I had to spend \$10 on uber again just to get to my destination. It had happen twice already but the first time it showed up in 10mins so I was fine with that. I really hope buses do get here on time or depart on time and if they cannot at least inform/alert us through something. Maybe LRTA can come up with something that alerts us to know when the buses are late. Most of all, you guys are doing a good job! Keep up the good work!
319	Q20. What do you like most about LRTA service? What do you like least about it?	Gets me to most places I need or want to go. The no late buses , I have trouble planning for traffic and end times .
320	Q20. What do you like most about LRTA service? What do you like least about it?	It connects me to downtown  It isn't consistent enough and not frequent enough
321	Q20. What do you like most about LRTA service? What do you like least about it?	The drivers are phenomenal, friendly & helpful.  It is very difficult to get information about routes: snow routes, delays, detours, etc.



ID	Question	Comment
322	Q20. What do you like most about LRTA service? What do you like least about it?	The LRTA makes it a bit easier for me to be independent without a car. What I like least is that sometimes the app is not accurate or isn't working (lagging or not showing at all).
323	Q20. What do you like most about LRTA service? What do you like least about it?	Most is friendly drivers, least is scheduled times.
324	Q20. What do you like most about LRTA service? What do you like least about it?	Like where the buses go, wish there were more buses and they went longer into the evening
325	Q20. What do you like most about LRTA service? What do you like least about it?	Buses don't run early enough for me to get to church
326	Q20. What do you like most about LRTA service? What do you like least about it?	I enjoy taking the bus to get where I need to go. It's tough when you get a grumpy bus driver. If they can't handle working with the public then don't have that job. I have encountered a few mean bus drivers
327	Q20. What do you like most about LRTA service? What do you like least about it?	Like- Mostly on time and consistent even in inclement weather. Not like- route 15 to IBM needs more frequent buses, 1.5 hours between buses is inconvenient. Every 45 minutes would be effective.
328	Q20. What do you like most about LRTA service? What do you like least about it?	<p>I like it that drivers are helpful. What I dislike is that whoever is in charge of every driver's run schedule, some are literally impossible to do and barely make it on time. For example, a driver does a school tripper which I think starts at 7:05 or 7:15 am Route 13 inbound to LHS and then after that he or she does route 5 at 7:30 am. It is literally impossible for a driver to finish the school tripper on time and then be on time to start the next route which in this case is route 5.</p> <p>I think on time performance is essential to customers regardless what route.</p>
329	Q20. What do you like most about LRTA service? What do you like least about it?	The drivers can be rude and sometimes drive way to fast or they can see u at night time
330	Q20. What do you like most about LRTA service? What do you like least about it?	I like that it is convenient. I do not like how inconsistent it is.



ID	Question	Comment
331	Q20. What do you like most about LRTA service? What do you like least about it?	It's easy and convenient... usually.
332	Q20. What do you like most about LRTA service? What do you like least about it?	All in all your service is good
333	Q20. What do you like most about LRTA service? What do you like least about it?	Like the friendly drivers, affordable fares.
334	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	NewHapmhsire
335	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	Nashua mall
336	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	Boston
337	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	Casa
338	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	Mall
339	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	Playa
340	Q48. ¿A dónde te gustaría ir que actualmente no puedes viajar en el autobús?	Nazua
341	Q58. ¿Qué es lo que más le gusta de los servicios de la LRTA? ¿Qué es lo que menos te gusta de ellos?	Que los autobuses se ven nuevos, y lo que no me gusta es que aveces el manejador no son amables.
342	Q58. ¿Qué es lo que más le gusta de los servicios de la LRTA? ¿Qué es lo que menos te gusta de ellos?	Me gusta el trato y lo que no me gusta es la forma de muchos clientes de hablar
343	Q58. ¿Qué es lo que más le gusta de los servicios de la LRTA? ¿Qué es lo que menos te gusta de ellos?	Algunos conductores son repugnantes y no les gusta ayudar. Más conductores que hablen español

ID	Question	Comment
344	Q58. ¿Qué es lo que más le gusta de los servicios de la LRTA? ¿Qué es lo que menos te gusta de ellos?	Puntualidad y no me gusta que la espera es larga

