



The Research Bureau

The Implications of a Fare-Free WRTA

Report 19-04

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Research in the Public Interest

Worcester Regional Research Bureau, Inc.

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Introduction

Charging user fees for public services can have adverse effects. Police don't want to cut down on 911 calls by billing distressed citizens for law enforcement response. A cover charge to get into a public school would result in a less educated public. Residents can read to their hearts' content without worrying about paying off a tab at the library, and there is no need to purchase tickets to get into a city park.

Public transportation is treated differently. The Worcester Regional Transit Authority charges most adults \$1.75 per trip to board the bus, a disincentive to make use of what could be a cornerstone of the region's transportation network. Ridership is dropping, declining 23 percent between 2016—before the latest fare hike—and 2018. Last year had the fewest passenger trips since a driver strike in 2005, and the lowest in a non-strike year since tracking began in 1991.

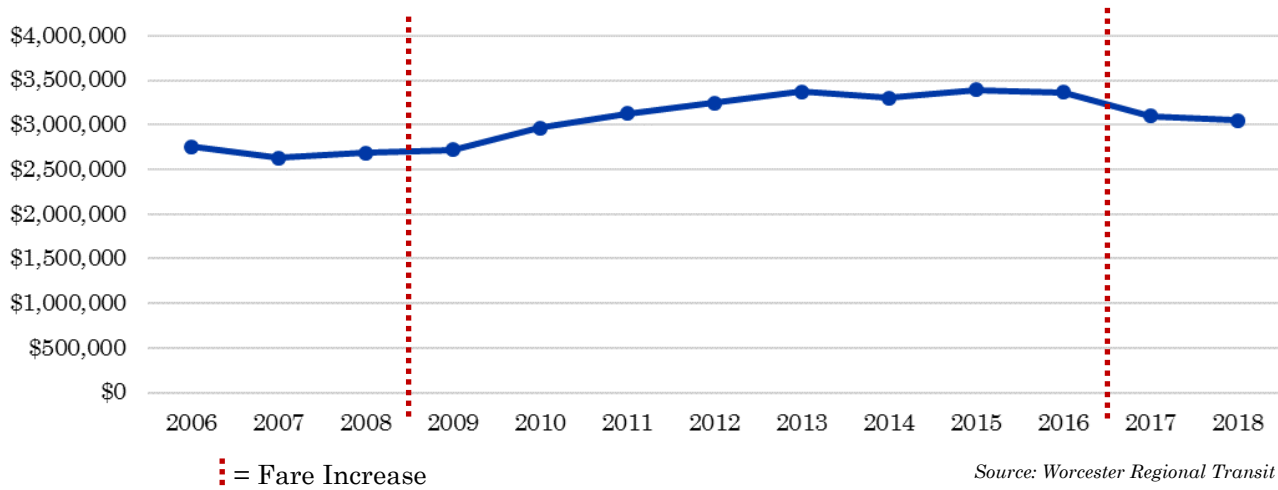
Fare hikes are sometimes presented as a way to raise revenue, despite evidence that charging more to ride the bus does not necessarily improve cash flow. Instead, the 2017 fare hike preceded two straight fiscal years of declining farebox revenue. Total fixed-route fare revenue in 2018 was around \$3 million, the lowest since 2010 (see Chart 1).

Low ridership is concerning because of the benefits of public transit. Buses are efficient, moving large numbers of people in one vehicle. Fewer cars on the road means less congestion on city streets, cutting down on traffic and greenhouse gases. Expanded transportation options are good for the economy, benefiting commuters and patrons of area businesses. Buses benefit mobility generally, as cost or age barriers restrict some residents' options. Cities with good public transit options score high in quality of life metrics, attracting new residents and investment.

The financial cost of a fare-free system may not be as steep as some believe. In 2018, farebox revenue made up 14 percent of the WRTA's total operating expenses, the lowest mark in 10 years. The action of collecting fares is not free, as infrastructure and staff time are needed to process incoming money. Collecting fares also creates operational inefficiencies, including delays during the boarding process. One common complaint about bus systems is tardiness or unreliability; eliminating fares may mitigate those concerns. The ridership boost from eliminating fares—which, according to research from systems that have done it, is substantial—reduces per-passenger costs, making systems more cost-efficient.

Making the WRTA fare-free is not charity. It is a way to increase the efficiency of a key government service in a creative and compassionate way. This report will explain the current conditions of the bus system as they relate to fares and lay out a possible path forward to a fare-free system.

Chart 1: WRTA Fixed-Route Farebox Revenue



Source: Worcester Regional Transit Authority



The State of the WRTA

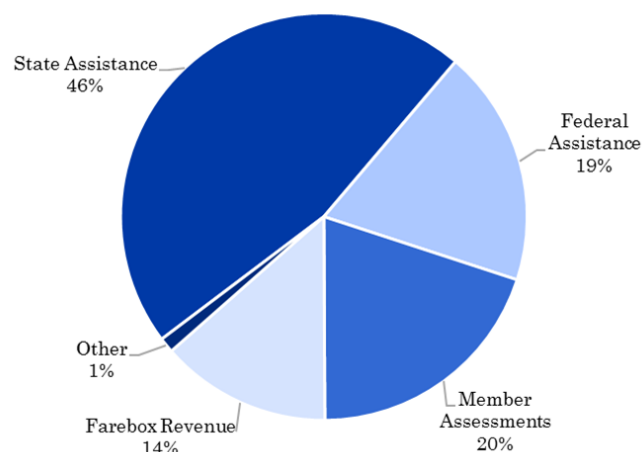
The Worcester Regional Transit Authority is the second-largest regional transit authority in Massachusetts by ridership, running 23 fixed routes to 13 communities and offering paratransit service to a total of 37 communities in its service area. It operates a fleet of 52 buses, which in 2018 drove 3 million miles, making approximately 3.3 million passenger trips system-wide. Its stated mission is “to provide convenient, comfortable, safe, reliable, cost-effective mobility services contributing to the economic vitality of the region.”

The WRTA was created in 1974, and is a political subdivision of the State of Massachusetts. It is managed by an advisory board consisting of representatives from communities in its service zone, usually town managers or elected officials. Votes are weighted by population, with the City of Worcester having the largest say in the direction of the agency. The advisory board hires an administrator to oversee the WRTA’s operations, and the administrator and a handful of employees work directly for the WRTA. To operate bus service, the WRTA contracts with Central Mass Transit Management Inc., which employs more than 150 bus drivers, mechanics, and other workers.

Funding for the WRTA comes from a variety of sources (see Chart 2). The largest is state assistance, which made up approximately 46 percent of the 2018 budget. Assessments levied on member cities and towns in the service area made up 20 percent, federal assistance made up around 19 percent, and farebox revenue was around 14 percent, with income from advertising and other sources contributing 1 percent.

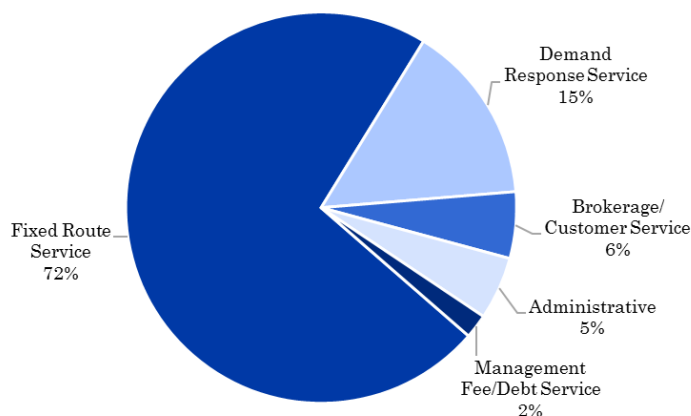
More than 90 percent of the WRTA’s operational expenses go toward bus operations (see Chart 3). In 2018, around 72 percent of expenses were directed to fixed route service, 15 percent to demand response service, and 5.5 percent to brokerage and customer service (paratransit), with administrative costs, a management fee, and debt service making up the remainder.

Chart 2: WRTA Revenues, 2018



Source: Worcester Regional Transit Authority

Chart 3: WRTA Expenses, 2018



Source: Worcester Regional Transit Authority

Fixed-route service operates on a hub-and-spoke model. All routes start at the WRTA Transportation Hub on Foster Street next to Union Station, which opened in 2013. Routes run from 5 a.m. to 10 p.m. on weekdays, with reduced hours on weekends. Bus frequency varies by route and time of day, but ranges from every 30 minutes on main lines to 1 hour and 15 minutes on others. Paratransit for residents eligible under the Americans with Disabilities Act is available by reservation.

Metrics to Measure Success

There are a number of factors officials should consider when deciding whether the bus system is succeeding in providing an efficient mobility service.

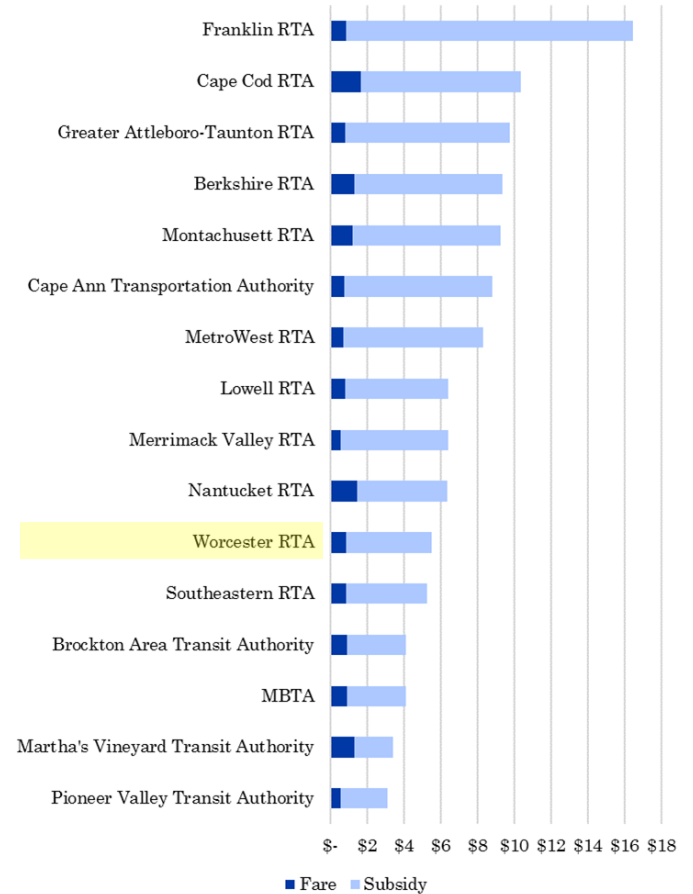
In a time of lean budgets, cost-efficiency is a top concern. According to self-reported data from the National Transit Database (NTD), the WRTA collected an average of \$0.85 per fixed-route passenger trip in 2017. This is from a variety of fare levels, with the standard full cash fare for adults costing \$1.75 and reduced cash fare for children and seniors costing \$0.85.

Because operating the bus system is more expensive than the approximately \$3 million the WRTA collects in fares, each passenger trip is effectively subsidized by state aid and other sources. The fixed-route cost per passenger trip in 2017 was \$5.49, according to NTD data, resulting in a subsidy of \$4.64 per passenger. This ranks Worcester’s subsidy as the 11th highest out of Massachusetts’ 15 regional transit authorities (see Chart 4—the MBTA is not an RTA, but is included for comparison).

Per-passenger cost is viewed as a good way to look at a transit system’s cost effectiveness because it takes ridership into account when calculating expenses. If a system sees an increase in ridership but spends the same amount of money on operational costs, that system is spending money more efficiently, even if the amount expended stays level. By the same logic, declining ridership leads to a more inefficient system, even with level spending.

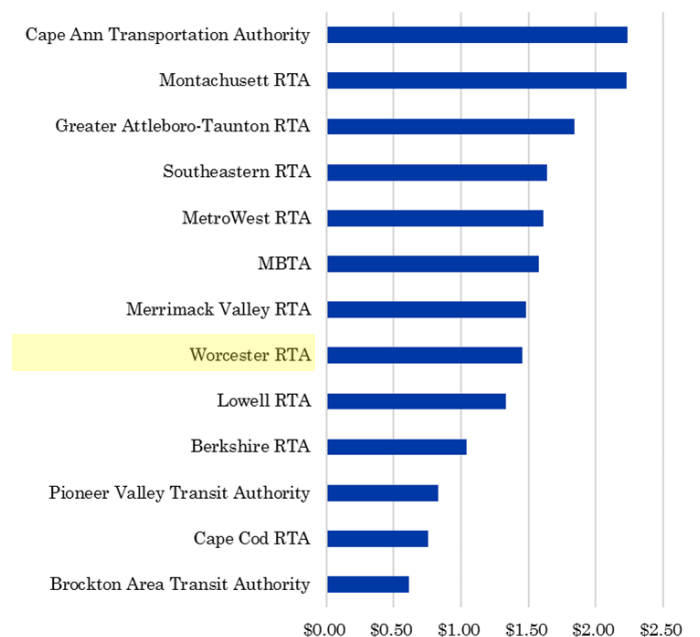
Another metric used in analysis of transit agencies is the cost per passenger mile, which is the average cost to transport one passenger one mile. This takes distance traveled into account, since bus systems in a dense urban core have different challenges than those in a spread-out, rural area. In 2017 the WRTA spent \$1.45 per passenger mile, the 7th highest rate among the 12 Massachusetts RTAs that provided data (see Chart 5).

Chart 4: Cost per Passenger, Massachusetts RTAs



Fixed-route service. Source: National Transit Database

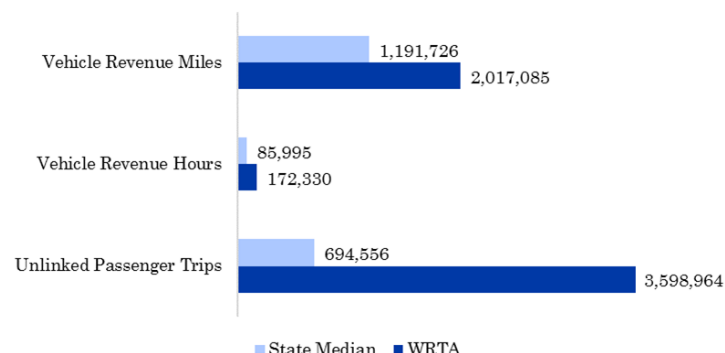
Chart 5: Cost per Passenger Mile, Massachusetts RTAs



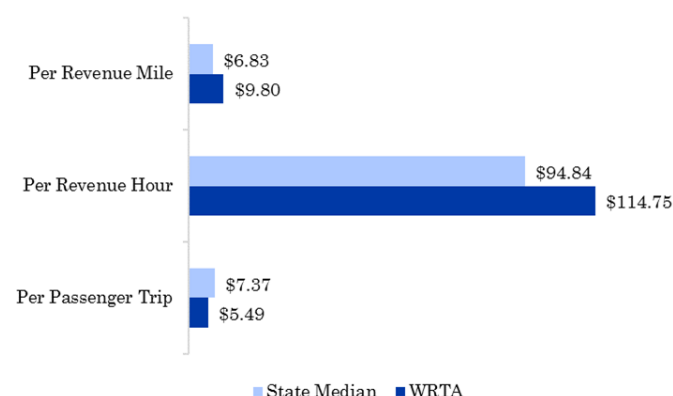
Non-rural reporters only.
Fixed-route service. Source: National Transit Database

Chart 6: RTA Task Force Recommended Metrics, FY 2017 Fixed-Route Service

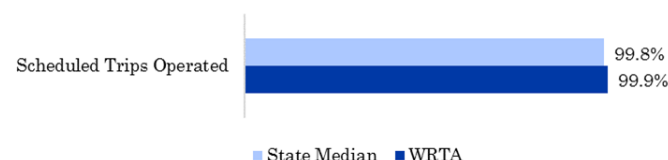
Coverage Data



Financial Performance—Expenses



Customer Service



Farebox Recovery Ratio



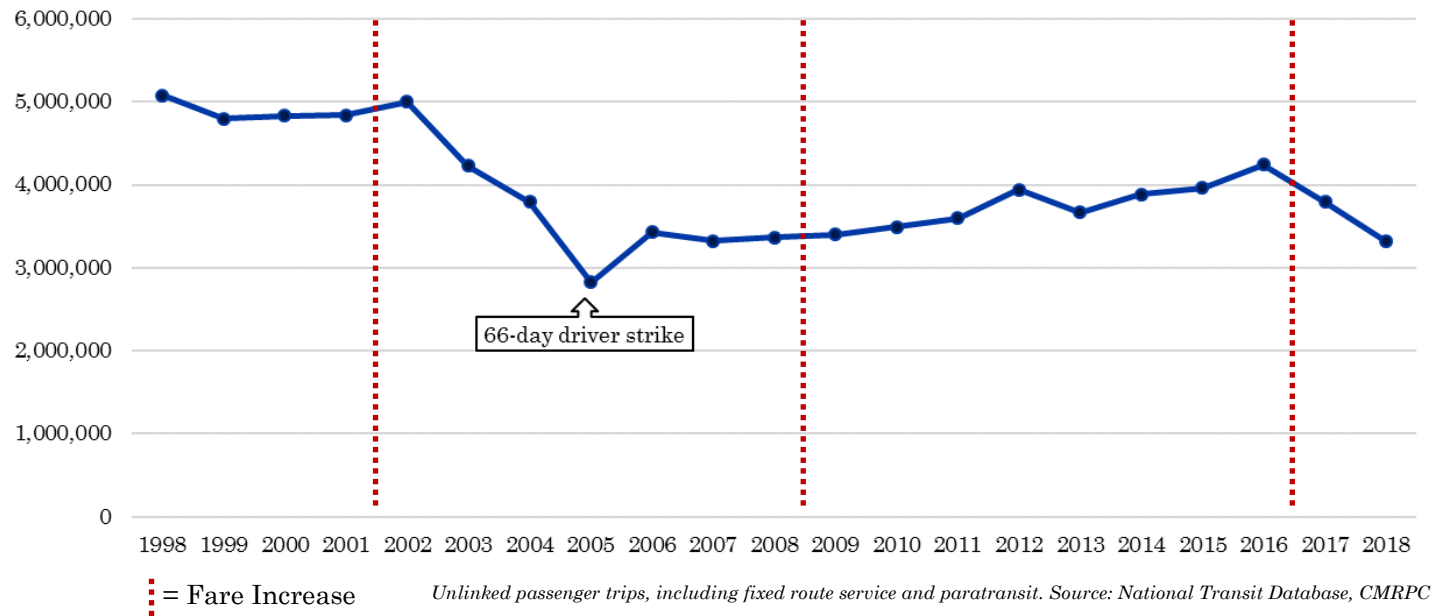
Sources: National Transit Database, MassDOT Tracker

The Task Force on Regional Transit Authority Performance and Funding, a group formed by the Massachusetts Department of Transportation (MassDOT) and MassDOT Rail and Transit, and made up of policy and transit experts, released a report this year laying out recommendations for the future of Massachusetts' RTAs. One key recommendation was the standardization of performance metrics for better collaboration between agencies and with the state. In addition to the metrics in Chart 6, the Task Force recommended tracking on-time performance and various asset management measures.

Standardizing performance metrics is important, as MassDOT plans on negotiating a memorandum of understanding with each RTA in which state contract assistance is connected to the chosen metrics, a recommendation made by the Task Force. The target for each metric will vary based on individual RTAs' circumstances. Failure to meet targets will result in a remedial plan, while doing well will result in eligibility for additional funding to pilot and expand successful services.

Of special interest to the Task Force and others is the "farebox recovery ratio," the fraction of operating expenses that is met by fares paid by passengers. A high farebox recovery ratio for a bus system signals high fares, many passengers, low operating costs, or a combination. A low recovery ratio is a sign of low fares, low ridership, high operating costs, or a combination. The WRTA's current goal is 20 percent, but it achieved a farebox recovery ratio of 15.6 percent in 2017. While farebox recovery ratios are a longstanding indicator used in transit research, the Task Force recommended that it be used carefully as a performance metric, pointing out that it can create an incentive to decrease service to certain populations, like senior citizens, who pay discounted fares. The Task Force called for the consideration of "alternative metrics that don't penalize agencies for the use of discounted fares," with the goal of avoiding "disincentivizing fare policies that increase access."

Chart 7: WRTA Ridership Over Time



Ridership

While other metrics are important for measuring efficiency, the key indicator for the success of any transit system will always be ridership. The WRTA reported approximately 3.3 million fixed route and paratransit passenger trips in 2018. A passenger trip is logged every time a passenger boards a bus, so an exact count of how many unique riders the bus system serves is difficult to estimate.

Studies from the WRTA and others have shown that residents who currently ride the bus tend to be those without another option—low-income residents, people without driver’s licenses, and students or senior citizens unable to drive because of age. A 2016 WRTA customer satisfaction survey of 440 riders found that nearly 70 percent had a total household income under \$25,000, with another 17 percent reporting an income below \$40,000. The median household income in Worcester in 2016 was around \$45,600, according to the U.S. Census Bureau. Around 70 percent of WRTA survey respondents also reported that their household had zero vehicles.

The demographic makeup of WRTA riders means fare increases represent a larger burden, as a

percent of income, than they would for a more affluent population. It also shows that the WRTA is mostly attracting riders without the option of taking a private vehicle, rather than those who could but choose to ride the bus. In the same customer satisfaction survey, nearly half of respondents said they would have walked if the WRTA was not available, while less than 5 percent said they would have driven.

The WRTA is primarily used by commuters getting to and from work. The customer satisfaction survey found that around 42 percent of respondents, at the time they were asked, were taking the bus for work. Approximately 16 percent were going shopping, nearly 15 percent were going to a medical appointment, nearly 11 percent were keeping a social appointment, and 6.5 percent were going to school. Most Worcester workers, however, find other ways to get to work. According to 2017 data from the U.S. Census Bureau, nearly 84 percent of Worcester residents take a car, truck, or van to work, while only 2.5 percent take the bus.

The impact changing fare prices has on ridership is called fare elasticity. An often-cited guideline is the Simpson-Curtin Rule, which estimates a 3 percent drop in ridership for every 10 percent



increase in fare prices. Other analysts have estimated different elasticities, varying by factors like urban or rural areas, or peak versus non-peak ridership, but the intuition that raising the cost of bus fare results in a decrease in ridership has been confirmed by many research studies.

A 2012 study by the Transit Cooperative Research Program (TCRP) found that ridership gains in systems that converted to a fare-free model outstripped what would be expected in standard elasticity models (a 100 percent reduction in fare prices would theoretically result in a 30 percent rise in ridership, according to the Simpson-Curtin Rule). Results from agencies surveyed saw results ranging from a 32 percent increase in ridership (Advance Transit, New Hampshire) to more than 200 percent (CityLink Edmond, Oklahoma; Hele-on-Transit, Hawaii).

Part of what the TCRP study and others have found is that there is a psychological barrier for many due to unfamiliarity with how to ride the bus. Agencies account for first-time riders—the WRTA has a “how to ride the bus” section on its website and a full-time Travel Trainer and

Table 2: WRTA Fare History

Time Period	Base Fare	Average Ridership	Average Farebox Revenue
1997—2001	\$1.00	4,927,807	N/A
2002—2009	\$1.25 (+25%)	3,855,697 (-22%)	\$2,807,976
2009—2016	\$1.50 (+20%)	3,773,485 (-2.1%)	\$3,509,402 (+20%)
2017—present	\$1.75 (+17%)	3,553,289 (-5.8%)	\$3,553,289 (+1.2%)

Source: National Transit Database, CMRPC

Outreach staff person—but the fear of looking foolish or doing something wrong while attempting an action as seemingly simple as boarding a bus is enough of a deterrent that researchers have suggested it as an explanation for why traditional fare elasticity theories don’t apply to fare-free bus systems. The effect of previously-wary residents boarding the bus can’t be replicated by simply lowering the cost of fares, only by eliminating it entirely.

The WRTA estimates that buses are currently running at around 45 percent of their capacity, meaning the system could theoretically withstand ridership doubling in volume without having to add more buses or increase frequency. However, fare changes often impact certain routes more than others, and all agencies, including the WRTA, should examine ridership and demand before and after making any fare adjustments.

Other Effects and Considerations

While going fare-free is not hypothetical—at least 39 transit agencies across the country do not charge fares, according to the TCRP report, which surveyed those and other agencies to compile data on fare-free systems—it is true that each region of the country is different, and each agency has different challenges. What works in one area might not translate effectively to others. However, there are similar factors that allow comparison across different cities and transportation service zones, allowing some level of prediction about how a fare-free system would impact central Massachusetts.

Table 1: WRTA Fare Information	
Full Cash Fare Riders 14 years old and up Children 9 years old and up (unaccompanied)	\$1.75
Reduced Cash Fare Children 5-13 years old (accompanied by an adult)	\$0.85
Free Fare Children under 5 years old (accompanied by an adult)	\$0
Paratransit Riders eligible under the Americans with Disabilities Act (fare varies by distance)	\$2.75- \$3.50
One Day Pass (Maximum Eight Rides)	\$4.50
Reduced One Day Pass (Maximum Eight Rides) Children Elderly/Disabled with ID	\$2.25
31 Day Pass	\$57
Reduced 31 Day Pass Children Elderly/Disabled with ID	\$28.50
College Semester Pass College Student with ID	\$125

Collection Expenses

There is a financial cost to collecting fares. A TCRP report on “Multipurpose Transit Payment Media” found that large bus systems spent an average of 4 percent of their fares on the collection of those fares, with smaller systems spending 3.4 percent. The range of expenses was between 0.5 percent and 22 percent, reflecting variation in individual systems’ circumstances.

Part of the cost of fare collection comes from physical infrastructure. The WRTA purchased new fareboxes in 2012 to synchronize with the MBTA’s Charlie Card system, and is exploring purchasing new fareboxes in the near future to keep up with a planned \$723 million overhaul of the MBTA fare collection system. Maintenance on the current WRTA fareboxes costs around \$500,000 per year, according to a WRTA estimate.

The other major fare collection expense for most transit systems is collection and processing, according to the TCRP. The WRTA’s cash fares are currently counted by two full-time employees, with salary and benefits—positions that exist only because of the cash fare charged by the bus system. The estimated cost for these positions is \$250,000 annually.

Other costs associated with fare collection, according to TCRP surveys and analysis, include security, services to pick up and deposit money, commissions to third-party vendors, and staff time involved with analyzing modifications to fares and the necessary public hearings.

Cash Fares

Customers who pay with cash pose a problem for transit agencies. When compared to swiping a bus pass or Charlie Card, depositing exact change, an amount that in the current fare structure includes at least three coins, adds time to the boarding process, slowing down the bus on the way to its next stop. Gloves and other cold-weather gear can further delay the process, as riders can struggle to quickly handle fares.

Table 3: The Financial Cost of Collecting Fares	
Fixed-Route Fare Revenue (2018)	\$3,047,573
Farebox maintenance	-\$500,000
Farebox purchase (\$1 million total cost over 10 years)	-\$100,000
Staff—processing revenue	-\$250,000

Estimated annual cost. Source: WRTA

Because of their adverse impact on operations, some transit agencies have devoted time and resources to figuring out how to ban cash fares. Washington D.C.’s Metropolitan Area Transit Authority found that cash payments are involved in 12 percent of systemwide transactions, but represent 24 percent of boarding time, and they and other analysts found that cash fares “disproportionately slow down boarding, increase travel times for all customers, and reduce reliability.” For every dollar of a cash fare payment, 10 cents goes to administrative costs, according to the analysis. Last year, the agency started a pilot program on selected routes to ban paying fares with cash, to see the effects of the idea and if it should be extended system-wide.

Currently, the WRTA estimates between 25 and 30 percent of fares are paid with cash. The 2016 customer satisfaction survey found that around 33 percent of respondents paid full or reduced cash fare.

A related problem is that the presence of a farebox restricts the number of doors available on the bus. While most WRTA buses have two doors, one by the driver and one further to the back, one of these doors needs to be kept sealed during the boarding process to ensure fares are collected. A fare-free system could theoretically use both doors during boarding because there is no need to check in with a driver or drop money in a farebox, further speeding up the boarding process.

“Problem Passengers”

Eliminating barriers to boarding the bus is not universally seen as a positive, even in systems where it could be done with minimal financial impact. Some fear that allowing populations who had previously been screened out of the service by cost barriers to ride the bus could increase the number of what they call “problem passengers,” decreasing satisfaction among other riders.

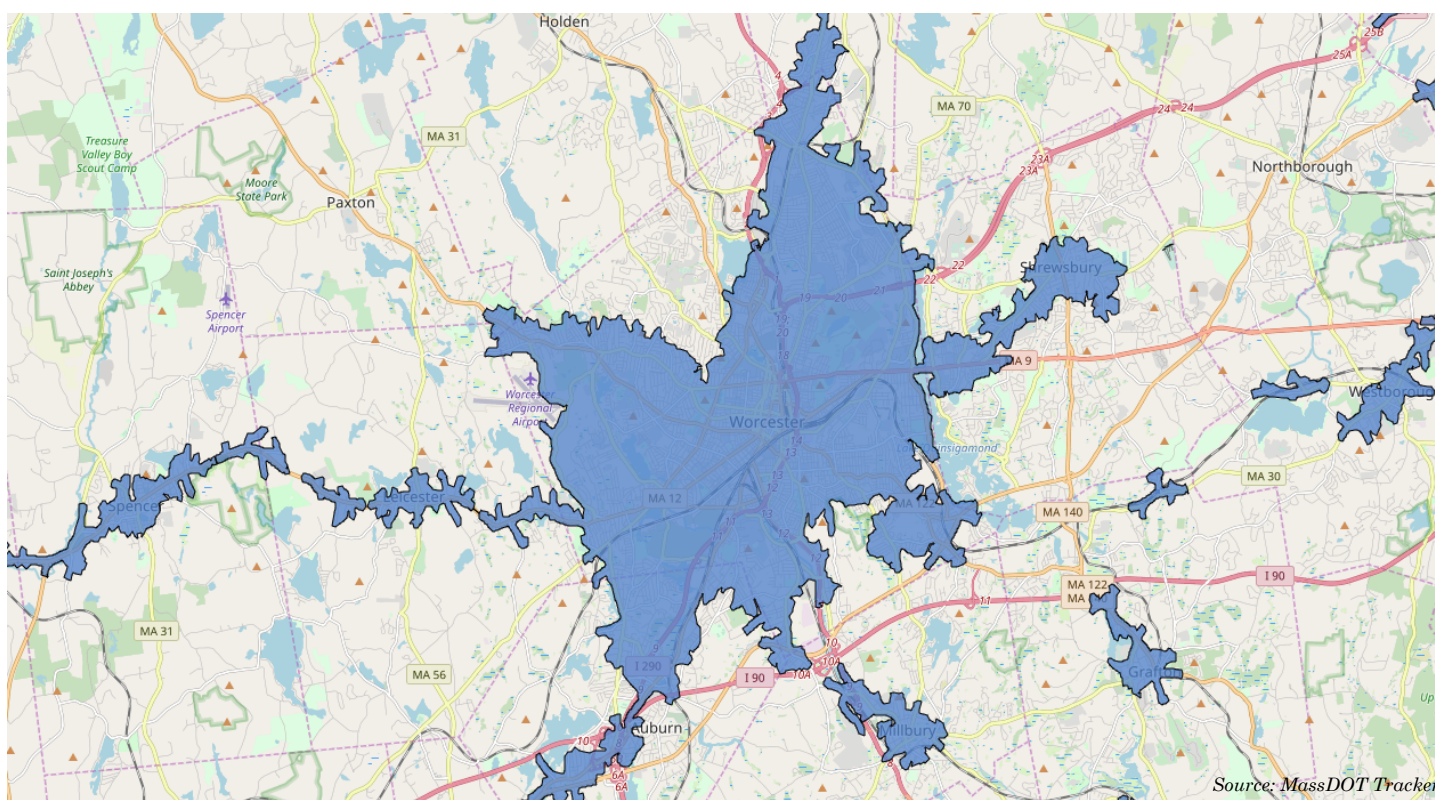
In the TCRP’s synthesis study, most agencies reported no problems with additional riders disrupting routes, or no problems that were not pre-existing. However, some agencies in large cities like Austin that have tried fare-free service on a trial basis found a significant uptick in incidents and violations. Specific populations identified by these and other agencies often include teenagers and the homeless.

According to TCRP survey responses, problems most often arise when first-time or infrequent riders board the bus without being familiar with the code of conduct. For that reason, some systems see an uptick in incidents at the

beginning of a fare-free implementation before education efforts, and sometimes a system of warnings followed by banning individuals from boarding, result in a decrease in problems. Another theory holds that if riders are not paying for the privilege of riding the bus, they might view the trip as having less value and treat drivers or the vehicle less respectfully. The majority of systems surveyed by TCRP said this was not an issue. Organizations have reported that complaints and incidents remained the same as a percentage, but large increases in ridership meant more overall problems to handle.

One of the largest factors in whether a system can deal with “problem passengers,” in a paid or fare-free system, is security. The bus systems that were able to handle “vagrants” and “rowdy passengers” the most smoothly often reported having video cameras aboard buses, something the WRTA also does. Fare-free bus systems must also decide if they will allow “round-tripping,” or riding the bus for an indeterminate amount of time, without getting out at any destinations. Some fare-free systems limit riders to one round trip, while others say they don’t mind riders staying on the bus, as long as they maintain good behavior.

Map 1: Area Within 0.5 Miles of an RTA Stop



Other RTAs

Low bus ridership is not only a Worcester problem. Between 2016 and 2017, 12 of the 15 Massachusetts RTAs saw a decline in ridership, and they “have struggled just to maintain a stable level of service,” according to the RTA Task Force.

One sticking point for many transit advocates and RTAs is funding. The total state RTA budget was between \$80 million and \$82 million each year from fiscal year 2015 to fiscal year 2018, despite an expectation from RTAs that funding would increase by \$2 million each year in order to reach \$88 million in 2019. RTAs have had to cut service to balance their budgets, and many have raised fares in an attempt to increase revenue. The RTA Task Force recommended \$90.5 million in fiscal year 2020, with scheduled annual increases.

RTAs do not raise fare rates regularly, but five RTAs have instituted fare increases since the beginning of 2018. Five RTAs still use a zone-based system that charges riders more for longer-distance travel, although most systems use a single-rate model, including the WRTA, which switched from a zone-based structure in 2009 (see Table 4).

While the WRTA shares similar features and challenges with other RTAs, comparing systems to each other can be difficult because of unique service area characteristics and management situations. One of the biggest divides in bus

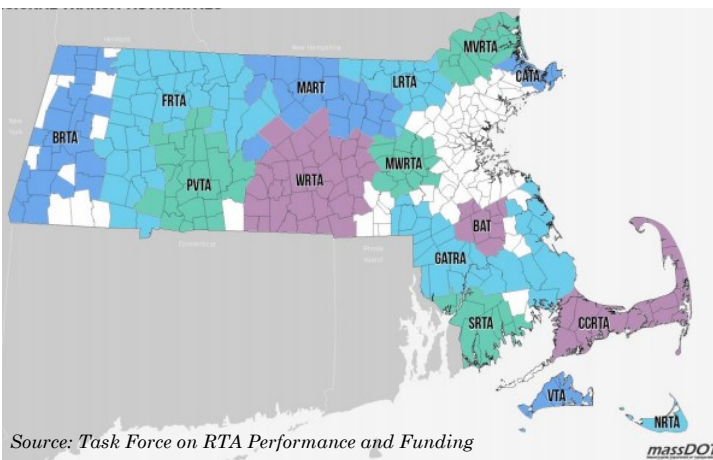
Table 4: Massachusetts RTA Fixed-Route Fares	
Cape Cod RTA	\$2.00
Worcester RTA	\$1.75
Berkshire RTA	\$1.75
Southeastern RTA	\$1.50
Pioneer Valley Transit Authority	\$1.50
Greater Attleboro-Taunton RTA	\$1.50
MetroWest RTA	\$1.50
Franklin RTA	\$1.50
Merrimack Valley RTA	\$1.25
Montachusett RTA	\$1.25
Nantucket RTA	\$2.00—\$3.00
Brockton Area Transit Authority	\$1.50—\$2.25
Martha’s Vineyard Transit Authority	\$1.25—\$6.25
Lowell RTA	\$1.25—\$1.85
Cape Ann Transportation Authority	\$1.00—\$1.25

Full cash fare. Ranges represent zone-based fares. Source: RTA websites

service is whether routes serve an urban or rural area. While most residents of Worcester live a short distance from a bus stop (see Map 1), residents of more rural areas face greater mobility challenges. The RTA Task Force recommended partnerships with other organizations, notably Transportation Network Companies such as Uber or Lyft and municipal shuttles, to better manage mobility in these areas. Other area-specific considerations include weekend and night service, and integration with pedestrian and bicycle options.

While no Massachusetts RTA is completely fare-free, the Pioneer Valley Transit Authority (PVTA) has what is effectively a fare-free zone. UMass Transit operates buses serving UMass Amherst and other members of the Five Colleges Consortium as part of the PVTA. Rides are free for students and college employees, while the general public is held to an “honor system.” A similar partnership exists at UMass Lowell, where students and employees can scan a college ID to board Lowell Regional Transit Authority buses, and one Merrimack Valley RTA line, for free. That service started in 2017 as a six-month pilot program, and its popularity led to an extension and expanded route options. Both programs are subsidized by the universities.

Map 2: Massachusetts RTA Service Areas



Recommendations

Research and evidence from other cities have shown going fare-free to be perhaps the most effective ridership-boosting plan available to bus systems, a priority for a system like the WRTA that is suffering from significant drops in ridership. **The loss of \$3 million in fares would be mitigated by the elimination of fare collection costs,** and the operational benefits could make that price a bargain.

Feasibility is key. The WRTA already has a low cost per passenger relative to sister agencies in Massachusetts, and **the public subsidy required to move each person is minor. It would, according to all available evidence, even decrease as the per-passenger subsidy is offset by a rise in the number of passengers.** Spending money on getting riders from place to place—the primary function of the bus system—rather than on fare collection and associated costs is a more efficient use of money.

Increasing the number of people who ride the bus is important for efficiency and cost-effectiveness, but it is perhaps even more important for city livability. More cars on the road lengthen car trips for work or pleasure, and clog up parking options. This is especially important as new development and demographic trends lead to population growth. Increasing the proportion of residents who ride the bus regularly can mitigate the growing pains of more people using the road network. It also helps with environmental goals, reducing greenhouse gases. Saying that “everyone is hurt when a passenger stops riding public transit,” the RTA Task Force recommended each RTA in the state conduct regular fare equity analyses to inform fare increases or changes in fare policy, writing that “there may be reasons to raise fares, but there also may be reasons not to raise fares—like incentivizing greater use.”

The **\$2 million to \$3 million** it would take to eliminate fares is small compared to other initiatives of similar scale, but is still a potential barrier to implementation. The TCRP study outlined **alternative revenue streams used by other fare-free systems, including philanthropy from large institutions like universities or medical centers, sales tax or gross receipts tax, city general fund money, and state aid.** There is also a belief in the transit community that grant programs are moving more toward valuing ridership as a factor in how much money a system receives. Some Federal Transit Administration grants are reduced by the amount of fares a system collects, and small urban and rural systems have received more federal funding as a result of going fare-free.

The WRTA is not an added route or a 25-cent fare tweak away from success. The problem of a steep and ongoing ridership drop is being compounded by the inherent inefficiencies of charging and collecting fares, and addressing these problems requires bold and impactful action. While the Task Force’s conclusion that there may sometimes be reasons to raise fares is true, **Worcester’s specific conditions—rider demographics, farebox recovery ratios, service zone characteristics, and lean operations—point to a perfect candidate for a fare-free system.**

The equity implications of allowing all residents to ride the bus without paying a fare may overshadow the implications for government efficiency, but both are important factors in whether to implement a fare-free model. **Decision makers in Worcester and the surrounding towns served by the bus system should give serious consideration to finding funding to eliminate fare collection as a function of the WRTA,** either through increased governmental aid or partnerships with the institutions that would benefit from a stronger public transit network.

Worcester Regional Research Bureau, Inc.

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