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# **Evaluation of the Fare-Free Bus for Boston Pilot Proposal**

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As Boston faces the compounding crises of racial injustice, climate change, unaffordable housing and other economic inequities, access to public transportation is more essential than ever before. Reduced ridership during the COVID-19 pandemic has only raised the stakes, pushing commuters into cars and leading to disastrous--if short-lived<sup>1</sup>--service cuts. But long before the pandemic, recurring fare hikes and ongoing service and safety issues have resulted in an MBTA that has failed a generation of Bostonians.

Fare-free public transportation is one innovative, increasingly common approach to address concerns with transportation systems' access, service, and environmental impacts that has been implemented in at least 98 localities worldwide.<sup>2</sup> A fare-free bus pilot project is a logical first step toward a comprehensive, holistic vision for fare-free transit system-wide. This transition will take time. But a two-year pilot on select bus routes in Boston will lead to significant economic, environmental, and social benefits, particularly for low-income residents and communities of color. This research paper was developed in partnership with Boston City Councilor Michelle Wu, building on her legislative record and advocacy<sup>3</sup> around free T service by examining the potential impact of making the 28, 66 and 116 bus routes fare-free and suggesting next steps for implementation.

### **Which routes?**

The first step toward implementing fare-free transit is a pilot to test the proposal on the city's most congested and poorly served bus routes. This research paper considers the impacts of piloting fare-free buses for the 28, 66 and 116 routes. The 28 bus connects Mattapan and Ruggles along the Blue Hill Avenue corridor, simultaneously serving some of the most delayed bus corridors in the city,<sup>4</sup> as highlighted in a Boston Region Metropolitan Planning Organization report on priority bus routes for faster service,<sup>5</sup> and

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<sup>1</sup> DeCosta-Klipa, 2021. [MBTA officials are moving to restore pandemic-induced service cuts. But no one knows how long it will take.](#)

<sup>2</sup> Koblowski, 2019. [Why \(not\) abolish fares? Exploring the global geography of fare-free public transport.](#)

<sup>3</sup> Buell, 2019. [Michelle Wu Wants to Make the MBTA Free.](#)

<sup>4</sup> CMP, 2017. [Fall 2016 Monitoring of MBTA Bus Performance Measures.](#) 2019 congestion data for the 28 [available here.](#)

<sup>5</sup> Boston Region Metropolitan Planning Organization (MPO), 2016. [Prioritization of Dedicated Bus Lanes.](#)

environmental justice (EJ) populations<sup>6</sup> that have retained high ridership through the pandemic.<sup>7</sup>

The communities served by route 28—Mattapan, Dorchester, and Roxbury—have the highest rates of child asthma emergency department visits in Boston, an indicator of respiratory disease that is directly affected by environmental factors such as exposure to pollution.<sup>8</sup> The 66 bus connects residents of Allston and Mission Hill with commercial hubs in Harvard Square and the Longwood Medical Area, similarly facing some of the most congested space in the city<sup>9,10</sup> and longstanding environmental justice populations.<sup>11</sup> Finally, the 116 connects East Boston with Chelsea, serving Boston residents facing high rates of air and water pollution and toxic emission exposure due to the pollution from Logan Airport and the Massachusetts Turnpike—including storage of all of the airport’s jet fuel, heating fuel for over 70% of New England, and particulate matter from road salt for 350 New England communities.<sup>12</sup> The resulting low air quality is likely connected to East Boston and Chelsea’s high rates of COVID-19 infections.<sup>13,14</sup> All of Boston’s environmental justice communities are distinct, with a localized confluence of environmental, racial and economic injustices—but all would benefit from more accessible transit.<sup>15</sup>

In addition to saving money on fares, riders on fare-free 28, 66 and 116 buses would experience faster service, reduced local pollution, and social benefits such as greater economic activity and improved health that would positively impact the broader Boston community. The following sections provide data and analysis of the benefits of fare-free bus, the estimated costs of running a

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<sup>6</sup> Massachusetts defines Environmental Justice populations as census blocks that meet 1+ of the Income, Minority population, or English language isolation criteria: a) Income - households earn 65% or less of statewide median household income, b) Minority population - 25% or more of residents identify as a race other than white, c) English language isolation - 25% or more of households have no one over the age of 14 who speaks English only or very well. More information is available at the [Massachusetts Department of Environmental Protection website](#), and visible in [this map](#) using data from the 2010 census.

<sup>7</sup> Office of Boston City Councilor Michelle Wu, 2020. [Planning for a Boston Green New Deal & Just Recovery](#).

<sup>8</sup> Boston Public Health Commission, 2019. Health of Boston 2016-2017, [Chapter 8: Chronic Disease](#).

<sup>9</sup> Ibid.

<sup>10</sup> CMP, 2017. [Fall 2016 Monitoring of MBTA Bus Performance Measures](#). 2019 congestion data for the 66 [available here](#).

<sup>11</sup> MassDEP, 2012. [2010 Census Environmental Justice Populations in the Boston Area](#).

<sup>12</sup> WNPR, 2017. [How One Massachusetts City Came To Bear Environmental Burdens for the Region](#).

<sup>13</sup> Boston Globe, 2020. [Why East Boston’s coronavirus infection rate is higher than the rest of the city](#).

<sup>14</sup> Energy News Network, 2020. [Massachusetts city’s residents ‘need to be listened to’ on pollution concerns](#).

<sup>15</sup> Ibid.

two-year pilot project, and suggestions for next steps to move toward system-wide fare-free transit after completion of the pilot.

### **Economic Benefits**

The most direct benefit of a fare-free bus pilot is that passengers will be able to spend the money they no longer spend on bus fares on other goods and services, increasing their capacity to meet basic needs and pay essential bills<sup>16</sup> while providing direct economic benefits to local businesses.<sup>17</sup> These benefits will be incurred by passengers travelling through what the MBTA calls “unlinked rides”: those who pay to use the bus without linking into the T, which would still charge fares during this pilot.

The MBTA does not collect specific data on unlinked fare revenue at the route level, but based on available ridership and fare data,<sup>18</sup> eliminating fares from the three routes together would save passengers an estimated \$1,010,600 that can instead be spent in local businesses.<sup>19</sup> Clearly, these savings are most critical for low-income communities and can have community-wide impacts, especially during periods of economic contraction.<sup>20</sup> One survey of bus users in Lawrence, MA, which implemented a fare-free bus program in 2019, found that over half of passengers earned less than \$10,000 per year,<sup>21</sup> so eliminating bus fares leads to meaningful savings. About 10% of Boston households earn less than \$10,000 per year<sup>22</sup> and 20% of individuals in Boston experienced food insecurity prior to the pandemic.<sup>23</sup>

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<sup>16</sup> WGBH, 2021. [The Call for Making Public Transit Free Continues.](#)

<sup>17</sup> Massachusetts Budget and Policy Center (MBPC), 2021. [The Dollars and Sense of Free Buses.](#)

<sup>18</sup> MBTA, 2018. [MBTA 2015-17 Survey.](#)

<sup>19</sup> Bus 28 had 5,270 daily passengers in each direction on average through the week in fall 2019. We know that about 452 daily trips, or 13% of the 66% of riders who are monthly pass-holders for this route, have unlinked local bus passes that cost \$55, or \$1.83/day, for an average of about \$413/day round trip. About 20% of route 28 passengers pay per ride, of which 14% use reduced fare pay per ride passes (\$0.85 each), totaling about \$125.43. If roughly 1/4 of full-fare pay per ride passengers are unlinked (since of 438 million annual MBTA trips, there were 100.25 million unlinked bus trips), since bus fares cost \$1.70, in total a fare-free bus 28 will save Boston bus riders \$1132 daily, and over \$413,180 annually. Bus 66 had 5,900 daily passengers in each direction, generating annual fares over \$417,530, and Bus 116 had 2,785 daily passengers, annually generating about \$179,950.

<sup>20</sup> MBPC, 2021. [The Dollars and Sense of Free Buses.](#)

<sup>21</sup> Ibid.

<sup>22</sup> US Census Bureau, 2019. [Income in the Past 12 Months.](#)

<sup>23</sup> Boston Mayor’s Office of Food Access, 2019. [State of Food Security in the City of Boston.](#)

During the pandemic, food insecurity increased by 66% across Massachusetts, with even more dramatic increases among children,<sup>24</sup> and particularly among Black and Latinx households with children.<sup>25</sup> For these Bostonians, savings from a fare-free transit system will enable more stable access to food and other needed resources for survival. Recent analysis of spending among low-income families in Chelsea, Massachusetts, for example, found that 73.3% of cash benefits paid through a pilot program were spent at grocery stores and other establishments where food is the primary product.<sup>26</sup>

Beyond this direct impact, we can expect other indirect but equally vital benefits. Bus fares are a small percentage of the MBTA's overall operating budget: across local bus routes, fare revenue accounts for \$33,665,457, which is about 5% of the MBTA's \$662,564,539 total fare revenue and less than 2% of the MBTA's \$2.12 billion operating budget.<sup>27</sup> By eliminating bus fares, Boston can increase collection speeds and reduce "dwell time". Fare-free buses will save an average of 1-2 seconds per passenger—a major benefit since system-wide, reduced dwell time across the 180 MBTA bus routes add exponentially saving the MBTA the high costs of every second of delay.<sup>28</sup> A 2017 survey of the Silver Line in Boston found that all-door boarding enabled by fare elimination was a simple upgrade that improved reliability, reduced delays, helped buses run more frequently, and led 70% of respondents to say they were more likely to ride the line again.<sup>29</sup> There is a distinct improvement in boarding speed for buses with fare-free all-door boarding.<sup>30</sup> Reducing dwell time will increase the cost-efficiency of bus service through higher frequency and greater capacity per bus trip.

Speeding up service also reduces costs related to lost productivity, efficiency, and income for riders arriving late to their destination.<sup>31</sup> These effects would be meaningful for Boston-area employers: fare-free buses help employees

<sup>24</sup> Boston Herald, 2021. [Coronavirus pandemic has caused food insecurity in Massachusetts to soar.](#)

<sup>25</sup> Bottemiller Evich, 2020. [Stark racial disparities emerge as families struggle to get enough food.](#) *Politico*, July 6, 2020.

<sup>26</sup> Liebman et al., 2021. [Chelsea Eats Study: Card Spending Update.](#) *Harvard Kennedy School Rappaport Institute for Greater Boston*, May 2021.

<sup>27</sup> Livable Streets, 2020. [Free the Bus.](#)

<sup>28</sup> Ibid.

<sup>29</sup> Boston BRT, 2017. [Silver Line Demo.](#)

<sup>30</sup> Boston BRT, 2017. [All Door Boarding Demonstration.](#)

<sup>31</sup> APTA, 2018. [The Economic Cost of Failing to Modernize Public Transportation.](#)

access and maintain work through reliably prompt travel times.<sup>32</sup> Increased bus ridership<sup>33</sup> also creates job opportunities for public transit workers such as bus drivers, mechanics, and foreman, as well as for workers in businesses along fare-free bus routes, which receive more foot traffic.<sup>34</sup> By enabling greater access along bus routes, fare-free transit reduces friction that prevents passengers from going to groceries, pharmacies, retail stores, and anywhere else they need to go.<sup>35</sup> Greater travel along bus routes will incentivize business owners and developers to locate near this transit to capitalize on the greater traffic and increase their revenues.<sup>36</sup> Therefore, as customers see lower costs of maintaining,<sup>37</sup> fueling, and parking cars,<sup>38</sup> businesses may also grow their customer base.

Fare-free transit also supports sustainable tourism. A German fare-free bus pilot, for example, decreased the environmental impact of tourists who would otherwise use cars while increasing their freedom, mobility, and access to local stores.<sup>39</sup> Prior to the pandemic, tourism was the third largest industry in Massachusetts, earning the Commonwealth \$20.2 billion in direct spending.<sup>40</sup> The city of Boston received about 22.7 million visitors in 2019, supporting over 63,000 jobs<sup>41</sup> and generating billions of dollars in spending.<sup>42</sup> A fare-free bus system would strengthen Boston's tourism sector's ability to continue to grow, creating additional local union jobs, without increasing the industry's environmental impact.

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<sup>32</sup> APTA, 2018. [The Economic Cost of Failing to Modernize Public Transportation.](#)

<sup>33</sup> MBPC, 2021. [The Dollars and Sense of Free Buses.](#)

<sup>34</sup> MBPC, 2021. [Freeing the Climate: Environmental Benefits of Eliminating Transit Fares.](#)

<sup>35</sup> Whillans et al, 2020. [Nudging the Commute: Using Behaviorally-Informed Interventions to Promote Sustainable Transportation.](#)

<sup>36</sup> Ibid.

<sup>37</sup> Ibid.

<sup>38</sup> Litman, 2021. [Evaluating Public Transit Benefits and Costs.](#)

<sup>39</sup> Gronau, 2016. [Encouraging behavioural change towards sustainable tourism: A German approach to free public transportation for tourists.](#)

<sup>40</sup> Greater Boston Convention & Visitors Bureau, 2017. [Tourism Industry Celebrates its Economic Impact at Annual State Tourism Day.](#)

<sup>41</sup> City of Boston, 2021. [Boston's People and Economy.](#)

<sup>42</sup> City of Boston, 2015. [Boston's People and Economy.](#)

## Climate and Health Benefits

Transportation is the largest and fastest-growing source of greenhouse gas emissions in Massachusetts.<sup>43</sup> Over 300,000 cars were registered in Boston between 2014 and 2019,<sup>44</sup> leading to increasingly arduous commutes as 59,000 more people began driving to work alone over the same time period.<sup>45</sup> Using public transportation is one of the most effective ways for individuals to reduce their climate footprint: moving from a car to public transportation for a 20-mile, round-trip commute can save 4,800 pounds of carbon dioxide emissions annually.<sup>46</sup> Research on the climate benefits of increased access to public transit indicates that fare-free buses would significantly reduce Boston's greenhouse gas emissions and lead to related public health benefits including for air quality that are especially critical in the context of the ongoing COVID-19 pandemic.

Economic models of elasticity and prior research on a fare-free bus pilot in Lawrence, Massachusetts<sup>47</sup> suggest a 20% elasticity—that is, as fares are eliminated, ridership is expected to increase by 20%. Based on this benchmark, we expect to observe increases in passengers from a daily average in each direction (inbound and outbound) from about 5,270 on route 28 to 6,325, 5,900 on route 66 to 7,080, and 2,785 on route 116 to 3,340<sup>48</sup>. Research indicates that some of the new passengers, induced to start riding the bus once it becomes fare-free, will be people who were previously walking or biking to avoid the cost of bus fare.<sup>49</sup> Many others, however, will make the switch away from driving cars to benefit from newfound cost savings—switching from driving to taking a bus has been estimated to save passengers \$10,000 per year in maintenance, gas, city parking, and other related car ownership costs<sup>50</sup>—and the avoided stress of driving in traffic and finding parking.

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<sup>43</sup> MBPC, 2021. [Freeing the Climate: Environmental Benefits of Eliminating Transit Fares](#).

<sup>44</sup> Ryan, 2019. [Epic Traffic afflicts the region as our political leaders remain stuck in place](#).

<sup>45</sup> Boston Globe, 2019. [Five years, 300,000 cars: The numbers behind Boston's traffic battle](#).

<sup>46</sup> C2ES, 2021. [Reducing Your Transportation Footprint](#).

<sup>47</sup> MBPC, 2021. [The Dollars and Sense of Free Buses](#).

<sup>48</sup> These numbers were calculated using data on the MBTA's average daily ridership in fall 2019. Daily riders were averaged across in and outbound buses for weekdays and weekends for each route, so increases in weekday ridership would likely be higher than these averages and weekend ridership lower.

<sup>49</sup> Straub, 2020. [The Effects of Fare-Free Public Transport: A Lesson from Frydek-Mistek \(Czechia\)](#).

<sup>50</sup> WGBH, 2021. [The Call for Making Public Transit Free Continues](#).

Behavior changes among these “choice riders” will lead to multiple positive environmental impacts. First, individuals who switch from driving to taking the bus reduce the total number of cars on the road, therefore reducing the total emissions from cars. Buses have 1/3 lower greenhouse gas emissions per person than personal vehicles, reducing the emissions significantly for each individual’s trip.<sup>51</sup> Second, a reduction in traffic due to a lower total number of automobiles on the road contributes to reduced idling, which eliminates greenhouse gas emissions as well.<sup>52</sup> Finally, the dwell time reduction due to elimination of fare collection will further reduce greenhouse gas emissions and other pollution.<sup>53</sup> This is a critical public health consideration, since a June 2021 study found that ozone and fine particulate matter from vehicle emissions caused 620 premature deaths in Massachusetts (223 from vehicles in Massachusetts) and 134 premature deaths in neighboring states.<sup>54</sup> Recent research has directly connected elevated regional levels of fine particulate matter including from vehicles to more severe morbidity and mortality from COVID-19.<sup>55</sup>

Using the ridership figures above, we estimate that if one half of new riders on fare-free buses are transitioning from non-carpool driving to riding the bus, the three-bus pilot alone would eliminate nearly 2,800 daily car rides. If each now-replaced car ride was just 10 miles (including driving around to find parking), this would replace about 11280 kgs of CO<sub>2</sub> from cars<sup>56</sup> with about 7,445 kgs from buses<sup>57</sup>. Annually, just the reduced emissions from switching to the bus from driving totals 1,387 metric tons of CO<sub>2</sub>. Additionally, Boston drivers spend about 165 hours per year per person in congestion – the highest amount of time in the US in 2018.<sup>58</sup> For every 10 minutes an average car idles, it emits about .5 kg.<sup>59</sup> Setting aside the additional reduced congestion from having fewer total cars on the road, if passengers who switch from driving to

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<sup>51</sup> MBPC, 2021. [Freeing the Climate: Environmental Benefits of Eliminating Transit Fares.](#)

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

<sup>54</sup> Arter et al., 2021. [Mortality-based damages per ton due to the on-road mobile sector in the Northeastern and Mid-Atlantic U.S. by region, vehicle class and precursor.](#)

<sup>55</sup> Wu et al., 2020. [Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis.](#)

<sup>56</sup> EPA, 2018. [Greenhouse Gas Emissions from a Typical Passenger Vehicle.](#)

<sup>57</sup> MBPC, 2021. [Freeing the Climate: Environmental Benefits of Eliminating Transit Fares.](#)

<sup>58</sup> INRIX, 2018. [INRIX: Congestion Costs Each American 97 hours, \\$1,348 A Year.](#)

<sup>59</sup> EDF, 2009. [Attention drivers! Turn off your idling engines.](#)



riding one of the three fare-free buses are saved even just half of the total time they spend in congestion, a total of 344 additional tons of annual emissions. This number would be even greater as bus idling for passenger boarding would also decrease without fare collection.

**In total, the emissions reductions projected from this three-route pilot alone are estimated to total 1,730 annual metric tons CO<sub>2</sub>e, cutting .03% of the city's total carbon emissions.** If expanded to the rest of the MBTA buses, Boston would eliminate almost 2% of its total emissions – not including the additional benefits of the total traffic reduction and potential greater future benefits of electrifying buses. These emissions reductions will help Boston achieve its climate commitments under the 2019 Climate Action Plan: to reduce carbon emissions by 50% compared to 2005 levels by 2030 and 100% by 2050, and to improve the resilience of Boston's transportation system by 2030 under the Go Boston 2030 plan by enabling all residents to “have better and more equitable travel choices” while increasing ridership by a third compared to 2019.<sup>60</sup> Councilor Michelle Wu's proposed Planning for a Boston Green New Deal & Just Recovery takes these commitments even further, accelerating the net-zero carbon emissions goal to 2040.<sup>61</sup> This target is aligned with the IPCC's Special Report on Global Warming of 1.5°C, which shows that limiting global warming (and the costs associated with it) to 1.5°C and thereby maintaining a habitable climate will necessitate commitments to deep emissions reductions in all sectors as rapidly as possible prior to 2050.<sup>62</sup>

Total environmental benefits are likely to be even higher, as the above analysis does not include an estimate of the impact of space previously taken by parking spots or car lanes being used for more or improved space for bus, bike, and/or pedestrian lanes.<sup>63</sup> Additionally, a well-used bus system facilitates more compact and efficient urban development, which limits urban sprawl—lowering travel times, reduces the need for car ownership, and increases the likelihood that passengers will “chain” trips together therefore reducing total travel and emissions—for example, picking up

<sup>60</sup> City of Boston, 2019. [Climate Action Plan 2019 Update](#).

<sup>61</sup> Office of Boston City Councilor Michelle Wu, 2020. [Planning for a Boston Green New Deal & Just Recovery](#).

<sup>62</sup> IPCC, 2018. [Special Report: Global Warming of 1.5°C](#).

<sup>63</sup> MBPC, 2021. [Freeing the Climate: Environmental Benefits of Eliminating Transit Fares](#).

groceries on the way home from work instead of going out for a separate round trip.<sup>64</sup> One case study on a short-term free public transportation pilot in Sweden found that the intervention led to a long-term transformation in public opinion, motivating participants to reduce their total car use and take more advantage of public transport overall.<sup>65</sup>

## **Social Benefits**

Beyond climate change more broadly, these emissions reductions will directly improve the health of local Boston residents by reducing local pollutants and mitigating impacts on micro-climates.<sup>66</sup> Boston is the eighth most challenging city to live in with asthma in the US, a problem that is exacerbated for communities that experience health hazards due to environmental injustice.<sup>67</sup> Reducing the number of cars on the road and shortening idling, through less overall traffic and less dwell time, will improve local air quality and smog from hydrocarbons, carbon monoxide, and nitrogen oxides.<sup>68</sup> Limiting exposure to pollutants will have particular benefits for Boston's residents of color, who are disproportionately at risk for heart and lung problems like asthma, by both lowering rates of asthma and improving quality of life for asthmatics by reducing the frequency and severity of asthma symptoms.<sup>69</sup>

Replacing personal vehicles with buses will also reduce injury and death from vehicle crashes, particularly if a fare-free bus program is coupled with complementary transit interventions. Evidence on bus priority routes, including bus-only lanes and transit signal priority, suggests that these measures can also increase reliability and safety by reducing the total number and severity of crashes with buses, pedestrians, motorcycles, and

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<sup>64</sup> Ibid.

<sup>65</sup> Friman et al., 2019. [Applying a motivational stage-based approach in order to study a temporary free public transport intervention.](#)

<sup>66</sup> CDC, 2018. [Public Transportation System: Introduction or Expansion.](#)

<sup>67</sup> Asthma and Allergy Foundation of America, 2019. [Asthma Capitals: The Most Challenging Places to Live with Asthma.](#)

<sup>68</sup> MassDEP, 2021. [Transportation and Air Quality Guide.](#)

<sup>69</sup> Union of Concerned Scientists, 2019. [Inequitable Exposure to Air Pollution from Vehicles in Massachusetts.](#)

other vehicles.<sup>70</sup> The US Department of Transportation found that fewer than 1% of transportation-related fatalities occur on public transportation.<sup>72</sup>

Fare-free public transit provides an array of other social benefits for vulnerable groups including senior citizens, people living with disabilities, and low-income families by removing a barrier to transportation for these residents that will help to meet broader goals for equity. Low-income passengers that cannot afford to pay for weekly or monthly passes, which offer fare discounts, end up spending more money per trip than higher-income passengers—effectively subsidizing the travel of high-income riders.<sup>73</sup> One pilot program in Boston found that SNAP recipients who were provided subsidized CharlieCards took 30% more trips, increasing access to necessary but otherwise hard-to-reach healthcare and social services.<sup>74</sup> These individuals cited affordability and reliability—both issues that are addressed by fare-free transit, as discussed above—as some of their top concerns with Boston public transportation.<sup>75</sup>

A fare-free bus program for the elderly in the UK has been found to be associated with increased public transit use, lower obesity, increased social engagement, and reduced loneliness and depression among participants,<sup>76,77</sup> all improvements that are relevant to Boston seniors. Prior to the pandemic, 38% of Bostonians over the age of 60 lived alone, with the number increasing to about half for those over 80. Seniors living alone are at higher risk of social isolation and related negative health outcomes,<sup>78</sup> especially throughout the pandemic.<sup>79</sup> The consequences of isolation are widely understood by Boston seniors. For example, when the MBTA announced the elimination of 55 bus

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<sup>70</sup> Mendelsohn et al., 2021. [5 ways to make buses more reliable](#).

<sup>71</sup> Naznin et al., 2015. [An empirical bayes safety evaluation of tram/streetcar signal and lane priority measures in Melbourne](#).

<sup>72</sup> CDC, 2018. [Increasing access to safer and healthier modes of transport](#).

<sup>73</sup> Boston Globe, 2020. [Make Public Transit Free](#).

<sup>74</sup> JTL, 2020. [How Low-income Transit Riders in Boston Respond to Discounted Fares: A Randomized Controlled Evaluation](#).

<sup>75</sup> Ibid.

<sup>76</sup> Reinhard et al., 2018. [Public transport policy, social engagement and mental health in older age: a quasi-experimental evaluation of free bus passes in England](#).

<sup>77</sup> Jackson et al., 2019. [Social isolation and physical activity mediate associations between free bus travel and wellbeing among older adults in England](#).

<sup>78</sup> City of Boston's Commission on Affairs of the Elderly, 2014. [Aging in Boston](#).

<sup>79</sup> WGBH, 2020. [Seniors, Facing Isolation Worsened by COVID, Turn to Volunteers, Community Efforts to Ease Loneliness](#).

service in March 2021, community members successfully argued that the bus is essential for residents with mobility challenges who depend on city buses to access healthcare, services, and community gatherings,<sup>80</sup> leading the MBTA to reinstate 55 bus summer service. Eliminating fares will further increase access to healthcare and opportunities for social engagement, which can improve the health of isolated and elderly passengers.<sup>81</sup>

Evidence from a pilot in Germany suggests that fare-free transit led to substantial increase in use of public transit for the same groups who have experienced the worst economic impacts of the pandemic: women, low-income, and elderly people, as well as families with young children.<sup>82</sup>

Eliminating public transit fares has been shown to improve community relationships, encouraging rapport between bus drivers and riders, which can increase driver job satisfaction and therefore retention.<sup>83</sup> Fare-free buses also eliminate the potential for racially discriminatory fare evasion enforcement and lowers the risk of police violence, particularly for passengers of color,<sup>84</sup> which can also improve mental health outcomes, especially for Black passengers.<sup>85</sup> The stronger community relationships fostered by fare-free buses can encourage economic growth<sup>86</sup> and environmental responsibility,<sup>87</sup> improving outcomes for the environment and the economy.

### **The Costs of Fare-Free Bus**

Accessing the wide array of benefits discussed above will require investment—from the City of Boston as well as state and federal partners. The pilot program will incur the cost of lost fare revenue, as well as the cost of adding new trips to each bus route to accommodate increased bus ridership. In 2019, the MBTA reported about \$97 million in fare revenue from across all bus routes. However, some of these passengers' trips are linked trips,

<sup>80</sup> Boston Sun, 2021. [Bok, Fenwickians Protest the Suspension of the #55 Bus.](#)

<sup>81</sup> Jackson et al., 2019. [Social isolation and physical activity mediate associations between free bus travel and wellbeing among older adults in England.](#)

<sup>82</sup> Busch-Geertsema, 2021. [Making public transport irresistible? The introduction of a free public transport ticket for state employees and its effect on mode use.](#)

<sup>83</sup> MBPC, 2021. [The Dollars and Sense of Free Buses.](#)

<sup>84</sup> MBPC, 2021. [Free Buses Advance Equity.](#)

<sup>85</sup> McLeod et al., 2020. [Police Interactions and the Mental Health of Black Americans: a Systematic Review.](#)

<sup>86</sup> Whitely, 2000. [Economic Growth and Social Capital.](#)

<sup>87</sup> Selman, 2010. [Social Capital, Sustainability and Environmental Planning.](#)

including subway transfers or trips using an unlimited multi-modal travel pass, payments which would still be made in the absence of bus fares. Across the MBTA, unlinked local bus fares are estimated to be about \$60 million.<sup>88</sup> The MBTA will therefore continue to collect revenue from these linked trips through the proposed fare-free bus pilot and will directly cost only the estimated \$1.01 million in unlinked fares. The cost to run each bus, including all maintenance, fuel, parts, and employee costs, is \$2,199,580 for the 28 route, \$1,496,217 for the 66 route, and \$1,023,702 for the 116, totaling \$4,719,498 across the buses.<sup>89</sup>

Expected changes in ridership were calculated in the economic section above. Based on estimated fare elasticity, we expect to observe 20% increases in passengers from a daily average in each direction (inbound and outbound) from about 5,270 on route 28 to 6,325, 5,900 on route 66 to 7,080, and 2,785 on route 116 to 3,340. MBTA bus capacity is up to 55 passengers, so the additional 1,055, 1,180, and 555 passengers will require at least 20, 22, and 11 additional daily buses for each route, respectively. Using the same calculation as the current operation and maintenance costs, this would add annual costs of approximately \$293,366 for route 28, \$167,363 for route 66, and \$66,235 for route 116. In total bus and employee costs with additional riders, the pilot is estimated to cost \$5,246,462.27 to run.

Means-tested fares have been proposed as an alternative to eliminating fares that could save the city some of the lost fare revenue.<sup>90</sup> However, this approach would require substantial administrative effort to develop and implement the new system – requiring substantial resources to maintain and update the fare collection system. The process of updating the fare collection system, known as Automated Fare Collection (AFC) 2.0,<sup>91</sup> has already cost over \$600 million for installation with an estimated \$33 million annual maintenance for 10 years – totaling nearly a billion dollars<sup>92</sup> – and would yield fewer benefits for the community. Requiring passengers to apply and

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<sup>88</sup> Personal communication with MBTA. June 2021.

<sup>89</sup> Personal communication with MBTA. April 2021.

<sup>90</sup> Boston Globe, 2021. [Opinion: Free bus is tempting but low-income fares better address affordability.](#)

<sup>91</sup> US Department of Transportation Federal Highway Administration, 2021. [Massachusetts Automated Fare Collection System, Boston.](#)

<sup>92</sup> MBPC, 2021. [The Dollars and Sense of Free Buses.](#)

document eligibility for reduced fares will also prevent a significant number of low-income riders from accessing the program.

16% of MBTA users already have access to reduced fares:<sup>93</sup> people under 11 years old; people who are legally blind; military, police, and firefighter personnel; and some government officials can ride for free. People with disabilities and Medicare, people over 65 years old, some middle and high school students, and some people between 12 and 25 years old who have low income are all eligible for reduced fares.<sup>94</sup> Expanding a means-tested approach would not reduce dwell time and vehicle idling, thereby sacrificing reductions in greenhouse gas emissions and the resulting public health benefits. The economic benefits would be diminished as fewer passengers would have additional money to spend in the local economy or additional access to shop at local businesses. Continuing to require fares for some passengers also fails to address the racial equity concerns surrounding discriminatory fare evasion enforcement. Finally, deploying and maintaining a fare collection system is a high cost that would be sustained by continuing to require means-tested or full fares, but would be eliminated in a fare-free system.

To fund a completely fare-free bus pilot, the city has a range of options. Other than redirecting the nearly \$1 billion set aside for the delayed AFC 2.0 to instead offer fare-free transit, and before considering a transportation tax on corporations and universities, the City of Boston can apply to a number of existing grants that support green infrastructure and transportation for funding. Federal grants that support green infrastructure and modern urban planning,<sup>95</sup> include opportunities offered by the Department of Transportation,<sup>96,97,98</sup> Department of Energy,<sup>99</sup> and EPA.<sup>100</sup> State grants,<sup>101</sup>

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<sup>93</sup> Ibid.

<sup>94</sup> MBTA, 2021. [Reduced Fares](#).

<sup>95</sup> US EPA, 2021. [Green Infrastructure Funding Opportunities](#).

<sup>96</sup> US DOT, 2021. [RAISE Discretionary Grants](#).

<sup>97</sup> US DOT Federal Highway Administration, 2021. [Congestion Mitigation and Air Quality Improvement Program OR Advanced Transportation and Congestion Management Technologies Deployment](#).

<sup>98</sup> US DOT Federal Transit Administration, 2021. [Grant Programs](#). (e.g., [Public Transportation Innovation](#))

<sup>99</sup> US DOE Office of Energy Efficiency and Renewable Energy, 2021. [FFRE: Find Funding](#).

<sup>100</sup> US EPA, 2014. [Getting to Green: Paying for Green Infrastructure](#).

<sup>101</sup> Mass.gov, 2021. [Funding for community transportation](#).

including through the DOER Green Communities program,<sup>102</sup> MassDOT's Community Transit Grant Program for people with limited mobility,<sup>103</sup> and potentially even future Transportation & Climate Initiative funds<sup>104</sup> are all also possible sources of pilot and longer-term funds. Finally, grants from foundations that work on transportation, climate change, and social equity, such as Climateworks Foundation,<sup>105</sup> the Barr Foundation,<sup>106</sup> the National Aging and Disability Transportation Center (NADTC),<sup>107</sup> can be harnessed to support fare-free transit as in 2020 for Arkansas's Ozark Regional Transit system.<sup>108</sup>

Another relevant consideration for a fare-free public transit policy is the MBTA's service for people with disabilities: the Ride.<sup>109</sup> About 12% of Bostonians, over 75,000 residents of which over 48,000 are under age 65, have disabilities.<sup>110</sup> Fare-free public transit may support these passengers by increasing access to higher-cost paratransit services.<sup>111</sup> U.S. Department of Transportation regulation complies with the Americans with Disabilities Act (ADA) by requiring that paratransit trip fares be comparable to fares on regular fixed route transit, where comparable is "not more than twice the fare that would be charged to an individual paying full fare for a trip of similar length, at a similar time of day, on the entity's fixed route system, exclusive of discounts."<sup>112</sup> However, whether a fare-free MBTA would be required to eliminate paratransit (the Ride) fares is still a matter of debate. A fare-free pilot could receive a short-term waiver for the ADA requirement as a discounted ride, with the potential to negotiate the statute in the longer term.

In 2019, the Ride served an average of 5,900 riders each weekday<sup>113</sup> and saw about \$6 million in fare revenue.<sup>114</sup> With an operating subsidy of about \$46 per passenger trip and assuming an increased ridership of 20% due to fare

<sup>102</sup> MA DOER, 2021. [Green Communities Grants](#).

<sup>103</sup> Mass.gov, 2021. [Community Transit Grant Program](#).

<sup>104</sup> Mass.gov, 2021. [The Transportation & Climate Initiative \(TCI\)](#).

<sup>105</sup> Climateworks, 2021. [Grants Database](#).

<sup>106</sup> Barr Foundation, 2021. [Mobility](#).

<sup>107</sup> NADTC, 2021. [Grants and Funding](#).

<sup>108</sup> Arkansas Democrat Gazette, 2020. [Walton Family Foundation grant will allow ORT to continue free fares](#).

<sup>109</sup> Boston Globe, 2021. [Opinion: Free bus is tempting but low-income fares better address affordability](#).

<sup>110</sup> Boston Planning and Development Agency, 2017. [Disability Housing Task Force Report](#).

<sup>111</sup> MBPC, 2021. [The Dollars and Sense of Free Buses](#).

<sup>112</sup> DOT, 2015. [ADA Frequently Asked Questions](#).

<sup>113</sup> NBC Boston, 2020. [MBTA Sees More Riders, But Nowhere Near the Pre-Coronavirus Days](#).

<sup>114</sup> MBPC, 2021. [The Dollars and Sense of Free Buses](#).

elasticity, additional operating costs could total about \$54,300 per weekday and \$19.8 million per year<sup>115</sup> – \$13 million less per year than the annual maintenance cost of AFC 2.0. Fare-free transit has not eliminated paratransit fares in other US cities but eliminating fares could improve equity in access to transit and mobility for disability communities.<sup>116</sup> Still, the best approach to allocating funds to reduce transportation barriers and meet the needs of the disability communities will be best determined by a collaboration between these communities, the MBTA, and elected officials.

## Conclusion

A fare-free bus policy will leverage investment in public transportation to garner substantial economic and qualitative benefits for the entire City of Boston, starting with some of Boston's most underserved communities. Fare-free public transportation will economically benefit passengers, the overall sustainability of the MBTA, and the small business community. Alongside the economic benefits, the policy will enable greenhouse gas emissions reductions that accelerate progress towards the City's climate goals and lead to profound public health benefits. Less traffic and idling will improve local air quality, creating health benefits for communities experiencing higher rates of heart and lung problems due to environmental injustice. And as we plan and implement recovery from the COVID-19 pandemic, fare-free public transportation will support increased confidence in and return to public transit ridership while preventing widespread increases in personal automobile use.<sup>117</sup>

While this pilot will have costs from the elimination of fares and expected increases in ridership, the full range of benefits to the community from more safe, sustainable, and accessible transit are forecasted to ultimately create a net benefit—an assessment bolstered by experience with the fare-free segment of the Silver Line in Boston and other successful pilots in cities across the US.<sup>118</sup>

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<sup>115</sup> MBTA, 2017. [Strategic Plan](#).

<sup>116</sup> MBPC, 2021. [The Dollars and Sense of Free Buses](#).

<sup>117</sup> Dai et al., 2021. [Improving the subway attraction for the post-COVID-19 era: The role of fare-free public transport policy](#).

<sup>118</sup> MBPC, 2021. [Does it Make Sense to Collect Bus Fares?](#)



As the first three fare-free routes are implemented in the pilot phase, the City of Boston should partner with the MBTA and local transit advocacy and community groups to gather and assess more granular, localized data on costs and benefits. Data that would help to understand the impact of fare-free transit include the total fare revenue and cost to run each bus line, numbers of unlinked bus riders and the average amount of money passengers spend on fares, any changes in ridership levels for fare-free buses, air pollution levels along bus routes, rider survey responses on how bus services affect them, and the number and extent of route delays due to fare collection (on buses not in the pilot), traffic, and any other causes. This analysis will provide the foundation to expand the fare-free pilot across the MBTA's entire service area alongside a suite of parallel City-led reforms—including bus-only travel lanes, transit signal priority, and Complete Streets infrastructure to maximize the efficiency and effectiveness of the overall transportation system.

Implementing and sustaining fare-free bus service will build momentum for a broader paradigm shift toward treating public transit as a public good, creating an equitable and accessible system that makes Boston the benchmark for other forward-thinking cities around the world.

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