

ONLY  
BUS



ONLY  
BUS



# Get it Rolling

A brief guide to mobilize bus  
improvements in Greater Boston



ONLY  
BUS



ONLY  
BUS



## Authors

**Primary author:**

Marah Holland, Transportation Planner II

**Secondary authors:**

Sarah Kurpiel Lee, Assistant Director of Transportation

Eric Bourassa, Director of Transportation

Liana Banuelos,\* Transportation Planner

*\*Former staff member*

**Editor:**

Karen Adelman, Senior Communications Strategist

**Report Design:**

Kit Un, Visual Designer

## Thanks to contributors

We would like to thank the many partners that helped us create this document. At the start of this project, we conducted over 30 interviews to gather details about how these projects came to be. Throughout the writing of this document, we also had many partners review, edit, and provide comments on its content. We want to thank Wes Edwards, Eric Burkman, Andrew McFarland, Julia Wallerice, Jenny Raitt, Ali Carter, Daniel Amstutz, Stacy Thompson, Kristiana Lachiusa, Patrick Hoey, Matthew Moran, Tegin Teich, Andrew Reker, Laura Wiener, Jonathan Belcher, Scott Hamwey, Jay Monty, Tom Philbin, Matt Lawlor, Brad Rawson, Adam Polinski, Katherine Adam, Caroline Vanasse, Casey Waskiewicz, Aaron Clausen, Annette Demchur, Lisa Jacobson, Ralph DeNisco, Chris Dempsey, Travis Pollack, Julie DeMauro and Sandra Clarey for their contributions to this report.

## About This Guide

This guide lays out a recipe to help local staff members, leaders, and advocates identify the right ingredients to launch successful bus improvements in high ridership, high delay corridors in their communities. These projects can seem daunting in their complexity, but they are important tools in achieving climate, equity, and transit goals, as well as improving quality of life for the thousands of people in our region.

The guide identifies crucial stakeholders and project milestones. It offers examples of successful strategies, and it distills lessons learned. We identified six bus priority projects that started turning the wheels of change in the region. These projects were the first to involve quick, temporary, and easy to change elements in order to influence the permanent design.

The information this guide sets forth was drawn from over thirty in-depth interviews with stakeholders involved in the **six different projects** we identify below:

- **Everett's inbound bus lane on Broadway**
- **Boston's inbound bus lane on Washington Street in Roslindale**
- **Arlington's inbound bus lane on Massachusetts Avenue**
- **Cambridge and Watertown's inbound bus lane on Mount Auburn Street**
- **Boston's inbound bus lane on Brighton Avenue in Brighton**
- **Somerville's inbound and outbound bus lanes on Broadway**

These six projects are described in detail in the individual case studies found after the workbook. You'll find examples from these projects throughout this guide that illustrate the different strategies municipal staff and their partners have used to accomplish progressive bus improvements.

Every project's recipe will be different, and will require different ingredients, as well as different amounts of each. The projects showcased in this guide may not be directly applicable to your community, but they offer a framework for considering strategies to improve bus transit. With the ingredients presented in this document, we encourage you to innovate and experiment. Not all will apply to your situation, and not all will follow the same order as we have them listed here. This guide is not prescriptive, but instead offers direction based on the experience of people involved in the six local bus improvement projects that were studied.

---

*This guide was prepared by the Metropolitan Area Planning Council (MAPC) with funding from the Barr Foundation and help from many partners involved in bus improvements throughout Greater Boston. It began as part of an analysis of recent Metro Boston bus improvement projects to document successful strategies. We've summarized our notes to be a guide for those involved in bus improvements to consider as they effect change in their municipality.*

# Contents

- **Summary** **1**
- **Introduction** **4**
- **History of Greater Boston Bus Improvements** **6**
- **Workbook** **11**
- **Case Studies** **52**
- **Closing** **89**
- **Appendix** **90**
- **End Notes** **95**



## Terms and Acronyms

Bus priority encompasses a range of improvements that can enhance the bus rider's experience. These improvements can increase reliability, efficiency, and potentially frequency of bus service.

In the Boston region, the most visible bus priority improvements have been wide, red bus lanes with the words "Bus Only" or "Bus/Bike Only" adhered in large, white letters across the middle of the lane. In order to create these lanes, municipal staff have repurposed existing street space that may have previously been a parking lane or a general-purpose travel lane, rather than spending time and money to widen the streets. Widening streets, especially in Greater Boston, is not a feasible, or appropriate option for many reasons, including the historical lack of space, high cost, environmental impacts, and dangerous speeds that wide streets provoke. Adding lanes to existing streets won't decrease congestion, but instead encourage more people to drive along that route.

Bus improvements in the region have also included less noticeable infrastructure elements of Bus Rapid Transit (BRT), such as queue jumps, bus stop bulb outs, and level boarding platforms. BRT can also include non-material changes, such as transit signal priority (TSP), which detects a bus approaching and turns (or keeps) the signal green to allow a bus to continue moving through the intersection. This makes bus service more reliable and allows passengers to have a more consistent trip every day.

Bus priority can also be time specific. A bus lane, as well as some other BRT elements, can be implemented all day or exclusively during high traffic periods, known as "peak-only" bus lanes. For example, a peak-only lane may be implemented during the busiest morning commute times ("peak time") to help move more people on a corridor that experiences significant delays. Alternatively, bus improvements can be applied all day on a corridor that has enough space for a dedicated lane.

**BRT:** [Bus Rapid Transit](#)

**BTD:** [Boston Transportation Department](#)

**CTPS:** [Central Transportation Planning Staff](#)  
(to the MPO)

**DCR:** [Department of Conservation and Recreation](#)

**FHWA:** [Federal Highway Administration](#)

**FTA:** [Federal Transit Administration](#)

**LSA:** [LivableStreets Alliance](#)

**MAPC:** [Metropolitan Area Planning Council](#)

**MBTA:** [Massachusetts Bay Transportation Authority](#)

**MOU:** [Memorandum of Understanding](#)

**MPO:** [Metropolitan Planning Organization](#)

**RTA:** [Regional Transit Authority](#)

**TIP:** [Transportation Improvement Program](#)

**TNC:** [Transportation Network Company](#)  
(such as Uber or Lyft)

**TSP:** [Transit Signal Priority](#)

For a list of possible bus improvements to consider implementing in your municipality, as well as their descriptions, please **see Appendix**.

ONLY  
BUS



ONLY  
BUS



# Get it Rolling

## A brief summary to mobilize bus improvements in Greater Boston

**Don't have time to read the whole guide?** Here's a quick look at our suggested steps to implement bus priority projects in your area. These steps were drawn from thirty in-depth interviews with stakeholders involved in the six different projects, which you can read more about in our case studies.

Every project's recipe will be different, and will require different ingredients, as well different amounts of each. The steps below offer a framework for considering strategies to improve bus transit. Not all will apply to your situation, and not all will follow the same order as we have them listed here. These steps are not prescriptive, but instead offer direction based on the experience of people involved in the six local bus improvement projects that were studied.

## ● Define the problem and identify possible solutions

A good first step to a successful project is to define the problem you are trying to solve. If data is available, such as parking data or bus (or bus passenger) delay, use it to understand where there are opportunities for improvements and what those improvements might look like. *(Get it Rolling, Page 12)*

## ● Review current local, regional and state plans

Planning documents can help in identifying the right corridor and can also be a rich source of support for your project. Among the documents you should review are local, regional, and state plans. If your initiative is – or can be – connected, even tangentially, to an existing plan, that connection can enhance your proposal's credibility. *(Get it Rolling, Page 14)*

## ● Investigate available funding sources

Public entities, transit agencies, and private foundations all provided crucial funding. However, direct capital funding is not the only financial support – it can be highly advantageous to find funding for engagement, communications, and data collection via parking studies or bus rider surveys. *(Get it Rolling, Page 17)*

## ● Use data to tell your story

Data is as critical for building support and getting your project done as it is for defining your problem and identifying your solution. Quantitative data can detail metrics and qualitative data can tell the story of why bus improvements are needed from the perspective of everyday riders. Data can show how projects are centered in a community experience. *(Get it Rolling, Page 20)*

## ● Begin internal conversations with key stakeholders

Make an honest assessment of internal support for your project as early as possible. This will help you map out your path. Consider the talking points that may persuade these stakeholders. Focus on one striking data point that may be persuasive to many decision-makers. *(Get it Rolling, Page 26)*

## ● Create a list of partners

All bus projects should include collaboration with the MBTA or your local RTA, but there are many other groups – internal to a municipality and external – that may be helpful in getting a project done. *(Get it Rolling, Page 29)*

## ● Agree on and document project goals with partners

It can be helpful to draft and agree on a set of project goals and outcomes at the beginning of the project. This will help keep the project in line with its original intentions, especially if opposition or challenges arise. Determining a single point of contact to manage the process and the project partners can be helpful. *(Get it Rolling, Page 31)*



## GET IT ROLLING / SUMMARY

### ● **Use existing practices to make change feel easier**

Communicating that your project is consistent with current practices and priorities may make it more palatable for other municipal staff and partners. You may be able to achieve success by breaking a bus project down into its more familiar basic components. *(Get it Rolling, Page 33)*

### ● **Create a community engagement strategy**

Getting input from community members can improve your project and can itself build support. When thinking about asking for input, it's important to first determine what your goals are. Should outreach inform project decisions, evaluate decisions that have already been made, or both? *(Get it Rolling, Page 35)*

### ● **Create a communications strategy**

Any transportation communications strategy include making accurate, up-to-date project information available and easy to find, and to communicate regularly and effectively with the public and key stakeholders. *(Get it Rolling, Page 38)*

### ● **Consider incorporating public art and interactive materials into your project**

Public art at bus stops can enhance user experience and artistic communications materials have been influential in shaping positive public opinion and encouraging public engagement. *(Get it Rolling, Page 41)*

### ● **Determine design and engineering needs**

Plan for multi-modal changes, not just bus improvements. If a project can also improve the experience for people walking, biking, or using other modes, those elements should be incorporated to ensure the project has multiple benefits. *(Get it Rolling, Page 44)*

### ● **Create an implementation plan**

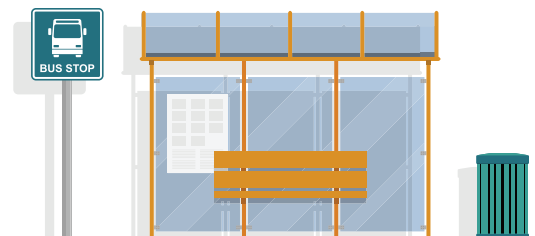
Who has the authority and responsibility to decide on the implementation of the project? Work with your partners to decide how the project should role out. *(Get it Rolling, Page 47)*

### ● **Create a list of implementation tasks and materials needed**

It is useful to create a list of tasks and materials that will be necessary for making the intervention a reality. *(Get it Rolling, Page 49)*

### ● **Determine operations and management of the new infrastructure**

There will be on-going management tasks and decisions. Decide ahead of time, in partnership with the MBTA or your local RTA, who (and what vehicles) will be able to use the lane – and how to manage usage on a day-to-day basis. *(Get it Rolling, Page 51)*





# Introduction

**Until recently**, bus service has not been a focus of innovation in Greater Boston. Buses are often the travel mainstay for people with lower incomes, as well as communities of color who financially or geographically are shut out from other transportation options. The mostly white middle class has historically called for improvements in car commuting – or in the more expensive-to-change commuter rail or subway, which has taken precedence over improving bus transit.

Even so, the bus has been integral to transportation systems locally and beyond for generations. Before COVID-19, a third of all ridership on the Massachusetts Bay Transportation Authority (MBTA) was on its buses. During the pandemic, the bus has supported the highest ridership of all MBTA modes and will continue to be a pillar of transit in the region.

---

Correcting transportation inequities and injustices of the past can start with better buses. Simple, low-cost, and quick bus improvements create better service for communities, neighborhoods, and riders who have been disproportionately impacted by inadequate transit service in the past. These projects can ease delays during peak commute hours, facilitate mobility throughout the region, contribute to local and regional climate goals, and increase safety on our streets. Implementing these projects, however, can be complex.

As we learned when we looked into the inception, implementation, and reception of recent bus improvement projects in Metro Boston by conducting over thirty interviews with key stakeholders, these interventions often require extensive coordination. Additionally, bus improvements depend on cooperation and support from multiple entities and stakeholders, each of whom can affect the outcome.

Most of the projects we studied began with a pilot, an innovative way to test how the changes would work before permanently altering the roadway. This method was popular when bus lanes were a new and unfamiliar strategy in the Boston region, but after extensive experimentation and a lot of learning, we hope that the information in this guide can help municipalities devote their limited resources to permanently installing future projects.

## GET IT ROLLING / INTRODUCTION

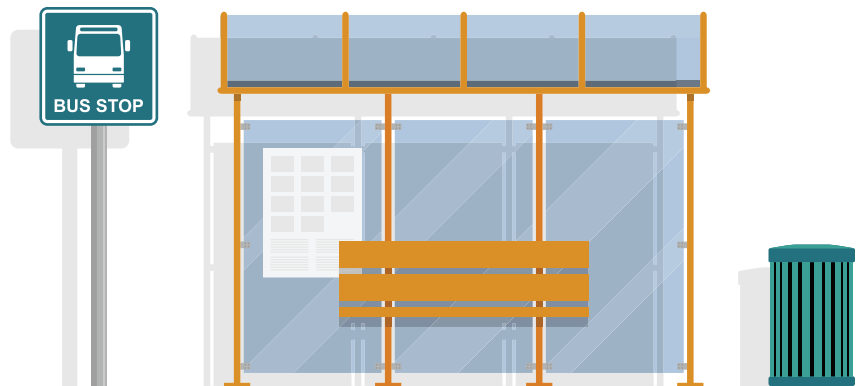
The projects that we studied, whether they have been a pilot, or permanent, have generally been low cost, quick to build, and innovative. Instead of widening roadways and moving curbs, these bus priority projects utilized existing street space by reallocating space from parking or general-purpose traffic to a dedicated bus lane. This reallocation of existing space requires tradeoffs and strategic thinking.

Champions of these improvements are oftentimes new to this type or scale of project – whether they’re municipal planning staff, public works staff, municipal leaders and committee members, or advocates. Regardless, they have the inspiration and drive to make a big new idea a reality.

That’s why we’ve written this guide. In our research, we’ve been able to identify some crucial steps and lessons, or “ingredients,” that make for successful projects. We hope that in sharing what we’ve learned, we can make the process less daunting for first timers and impart some useful tips to those who’ve already been working on these types of projects.

Every community is different, and each bus priority project is, too. This is also true in that not every Greater Boston municipality is served by the MBTA, but rather by other Regional Transit Authorities (RTAs). For this reason, we offer our findings less as a set of rigid formulae than as a loose guide to some ways these projects have been successfully implemented.

**Use these suggestions and examples to create your own recipe for improving bus transit – and share your strategy with us. Whether you succeed on the first try, or run into some bumps along the road, there is value in understanding how these projects can come to fruition in various types of municipalities.**



# The History of Greater Boston Bus Improvements

## **The first project intended to prioritize buses in the Boston region was the Silver Line dedicated bus lane in 2002.**

The Silver Line bus ran from Dudley (now Nubian) Square in Roxbury to Downtown, mostly following Washington Street.<sup>1</sup> The SL4 route from Dudley Square to South Station was introduced in 2009 and at that time, the original 2002 route that terminates at Downtown Crossing was designated as the SL5.<sup>2</sup> Two years later the second segment of the Silver Line, the SL1, opened, traveling from South Station to Logan Airport in East Boston.<sup>3</sup>

The Silver Line routes between Dudley (now Nubian) Square and Downtown were intended to replace the elevated Orange Line, which operated until 1987, when it was torn down and relocated underground approximately one mile to the west along the Southwest Corridor after a multi-decade planning effort. The Silver Line reflects some [Bus Rapid Transit \(BRT\) elements](#), like portions of dedicated bus lanes, longer vehicles, and higher end stations, but does not include all elements of BRT.

In 2009, the Massachusetts Department of Transportation (MassDOT) proposed “28X,” a project to replace the current 28 bus route on the Blue Hill Avenue route that connects the neighborhoods of Mattapan, Roxbury, and Dorchester.<sup>4</sup> The 28X was an ambitious bus priority project with BRT features, but it never moved forward.

The failure of the 28X was largely rooted in process - or lack thereof. The community felt the project was imposed upon them and that they'd lacked the chance to weigh in. Because \$170 million in Obama-era stimulus money had to be spent quickly, and on “shovel-ready” projects, the proposal was indeed rushed.<sup>5</sup> These circumstances didn't allow for the kind of robust community process that might have captured public support.



*Roxbury, Massachusetts//Chris Lovett*

The community also expressed significant concerns about transit equity. Mattapan, Roxbury, and Dorchester were at the time, and continue to be, disproportionately low-income and majority communities of color, adversely affected by historical and persisting racism. Residents expressed frustration that white, wealthier neighborhoods were getting trolleys and light rail, while Black and brown communities were getting buses, considered a less desirable transit option.<sup>6</sup> Residents were concerned, too, that the 28X bus priority lanes would displace parking and street trees, and would prevent people from double parking, an illegal yet common practice on Blue Hill Avenue. As State Rep. Russell Holmes of Mattapan said, “a big opportunity was lost to improve bus service along Blue Hill Avenue.”<sup>7</sup> What followed the 28X was several years of planning and regrouping through the MassDOT RDM (Roxbury-Dorchester-Mattapan) Study.

In 2013, the Barr Foundation, a major philanthropic organization in Boston, convened a working group of transportation advocates, community-based organizations, and planning professionals to explore the benefits of BRT, identify corridors for potential BRT service in Greater Boston, and to determine strategies to better engage municipalities and community organizations in the planning for these facilities. The Barr Foundation has played a prominent role in improving bus transit, including funding multiple aspects of recent bus priority projects.

These efforts formed the beginnings of BostonBRT, an initiative which began with the research and publication of the Institute for Transportation and Development Policy's (ITDP) 2015 report, "[Better Rapid Transit for Greater Boston: The Potential for Gold Standard Bus Rapid Transit Across the Metropolitan Area.](#)"

In June of 2016, the Central Transportation Planning Staff (CTPS) published its "[Prioritization of Dedicated Bus Lanes](#)" report, which set the stage for bus improvements throughout the region. It has been a valuable resource for communities working to improve and expedite bus service as it evaluated ridership and bus speed which enabled identification of corridors and segments that experienced varying degrees of delay. The report evaluated ridership and bus speed in order to identify corridors that could benefit most from bus interventions. Shortly after the CTPS report was released, MassDOT published a study in Everett identifying transit improvements, called the "[Everett Transit Action Plan.](#)" The plan recommended establishing a dedicated bus lane on Broadway in Everett and making other bus improvements that would enhance the quality and reliability of bus service.

A few weeks later, in December 2016, Everett, in partnership with the MBTA, piloted the first dedicated bus lane in the Greater Boston region since the Silver Line. The pilot took place along the city's main thoroughfare, Broadway, which has approximately 17 bus trips traveling along it during the morning peak hours and was plagued by constant congestion. The city chose to run the dedicated lane in the morning only, prohibiting on-street parking prior to 9:00 a.m. to create space for the bus. Few businesses were open during this time, so opposition was minimal.

This implementation strategy gained widespread recognition. It wasn't complicated or lengthy – Everett's staff used cones to block off the lane to test out an idea. It was simple, quick, and effective. The positive attention on Everett's elected officials, as well as the project, emboldened local decision-makers to rethink their own processes for implementing new bus projects. Articles were written about the pilot in national media sources such as [Transit Center](#) and [City Lab](#). It was so successful in the eyes of the public and in improving commute times and reliability that on day three of the pilot, Everett's mayor decided to extend it indefinitely from the originally planned one week pilot. The Everett bus lane officially became permanent in September of 2017, when the paint and pavement markings were installed.

**According to Julia Wallerce, Boston Program Manager for the Institute for Transportation and Development Policy, "Not only did the bus lane shave time from people's commutes and improve reliability of the bus, it gave people an overall better bus experience, which contributed to a perception of time savings that was often significantly higher than was actually saved."**

Almost overnight, people biking started using the new lane as well, which also included striping for bike lanes. The city continued to encourage this use by installing Bluebikes bike share stations at some bus stops and studying the bike and bus running speeds to ensure it would be safe for both vehicles to share the space.<sup>8</sup>

---

Everett's success was the first domino: there was suddenly momentum to do more around the region. Advocates started asking for more bus improvements as did elected officials, and the MBTA was willing to try more bus pilots. The Barr Foundation formally announced grant funding to support more local planning for BRT features, and the MBTA agreed to reimburse municipalities for some of the permanent implementation costs. Boston jumped on Everett's success by piloting a bus lane on Washington Street from Roslindale Square to Forest Hills. A year after Everett's pilot, in December 2017, Boston's two-day pilot was successful enough that a four-week pilot followed in May 2018. The improved service received strong support from Roslindale residents, bus riders, and cyclists including 94 percent of surveyed bus riders along the corridor expressing support for the bus lane. The Boston Transportation Department led the effort in partnership with the MBTA, and organizations such as LivableStreets Alliance and MAPC provided data collection and community engagement support.

Then, Arlington, Cambridge and Watertown, with funding from the MBTA and the Barr Foundation, began their own pilots for dedicated bus lanes and other elements of BRT. Somerville implemented a permanent bus priority project, skipping the pilot process all together. These processes followed similar, but unique, tracks. Each municipality needed to consider various potential best practices, approaches, and even designs to achieve their results. Each community was doing this for the first time and needed to create their own process.

**The sequence of steps for your municipality may be different – even wildly so – but we hope that sharing what these communities learned will ease the way for many more successes throughout the region. We offer these suggestions not as best practices, but as potential ingredients that have been successful in the six projects we reviewed for this study.**



## Timeline of Studied Projects

2016

**December 2016**

**Everett** pilots the first dedicated bus lane in the Boston region in over a decade. After three days of success, Everett decides to continue their pilot indefinitely.

**September 2017**

**Everett** launches a permanent bus lane with paint and pavement markings.

**December 2017**

**Boston** briefly pilots a bus lane in Roslindale on Washington Street from Roslindale Square to Forest Hills.

**May 2018**

**Boston** conducts a longer bus lane pilot in Roslindale, and soon after decides to make the peak-only shared bus/bike lane permanent.

**October 2018**

**Arlington** starts a month-long pilot for a bus priority lane, queue jumps, and signal changes on Massachusetts Avenue.

**July 2018**

**Everett** installs level boarding platforms at two major bus stops on Broadway.

**Cambridge and Watertown** pilot their bus improvements including a bus lane, and signal retiming along Mount Auburn Street and Belmont Street.

Bus priority projects continued to be implemented in Greater Boston throughout 2020 and 2021. Various funding sources, including the Massachusetts Department of Transportation's Shared Streets and Spaces Grant Program accelerated many projects in response to the COVID-19 pandemic.

**June 2019**

**Boston** launches a permanent shared bus/bike lane on Brighton Avenue inbound.

**August 2019**

**Somerville** launches a permanent bus lane on Broadway.

**Cambridge and Watertown** make their bus improvements permanent.

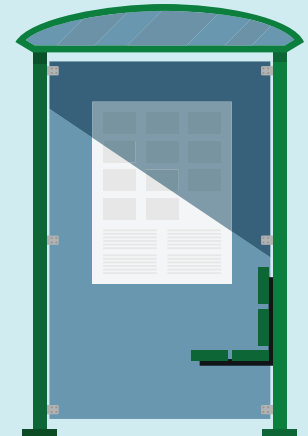
**October 2019**

**Arlington** makes their peak-only bus lane permanent.

**Boston** launches a permanent shared bus/bike lane on Brighton Avenue outbound.

# Workbook

- Define the problem and identify possible solutions
- Review current local, regional and state plans
- Investigate available funding sources
- Use data to tell your story
- Begin internal conversations with key stakeholders
- Create a list of partners
- Agree on and document project goals with partners
- Use existing practices to make change feel easier
- Create a community engagement strategy
- Create a communications strategy
- Consider incorporating public art and interactive materials into your project
- Determine design and engineering needs
- Create an implementation plan
- Create a list of implementation tasks and materials needed
- Determine operations and management of the new infrastructure





## Define the problem and identify possible solutions

### **Although it's impossible to assign an exact sequence to the steps that lead to a successful project,**

a good first step is always to define the problem you are trying to solve. Be specific. If you have data available, such as parking data or bus (or bus passenger) delay, use it to understand where there are opportunities for improvements, and what those improvements might entail. For example, if your bus delay data shows significant delays on a major bus route with high ridership, then your solution may be a dedicated bus lane to allow the bus to travel freely.

Once you've made the problem explicit, think through potential solutions. Not every problem can be solved by implementing bus priority, especially in areas where there is low transit demand. The MBTA, or your local Regional Transit Authority, could help guide you in determining if bus improvements are the most appropriate and effective decision to solve your problem. Again, use data, if possible, to understand where there are opportunities for improvements, and what those improvements might entail.

### **Quick tips**

Multi-modal changes can enhance the commuting experience for multiple road users at once. For example, cycling and pedestrian features can be added simultaneously with bus improvements.

Some projects allow other uses of the bus lane, as well, such as school buses and paratransit vehicles. Emergency services such as ambulances and fire trucks can use bus lanes to reach their destinations faster, which also helps the community as a whole and can help build political support among key decision-makers.



## Questions to consider

- Who's affected – both negatively and positively - by the problem and by the potential solutions? What data supports this?
- Is this problem affecting a specific geographic area (like a corridor, street, neighborhood)? Which agencies own those assets? Sometimes, for example, a road or a portion of it is owned by MassDOT or the Department of Conservation and Recreation (DCR) even if most of it is municipally controlled. The same goes for traffic signals.
- Are often-underserved groups disproportionately affected by the problem? Lower-income communities and communities of color tend to rely on MBTA bus service at significantly higher rates compared to other MBTA services or other commuting modes.
- What will be the consequences – both desirable and undesirable – of solving this problem?
- Is this a problem that needs a solution at specific times of the day, or does it need to be all day?
- What are you willing to compromise? What tradeoffs are you willing to make, what will you prioritize and why?
- What will success look like? How will you define success, and what story do you want to be able to tell?
- What challenges or objections do you anticipate with your solution? Get to the root of these problems early. Can something be done to address them?

## Review current local, regional and state plans

The selection of a good corridor for bus improvements is crucial. Factors in selecting a corridor can include data on bus ridership, reliability, delay, physical space, how people use the roadway, complications at intersections, and/or where there's political will. Upcoming reconstruction plans could also influence your decision, as combining bus improvements with other projects can decrease overall costs.

Planning documents can help you identify the right corridor and can also be a rich source of support for your project. Existing plans are the culmination of time, money, and effort spent to identify transportation improvements, which might include corridors that would work best or be highest priority for bus improvements. If your initiative is – or can be – connected, even tangentially, to an existing plan, that connection can enhance your proposal's credibility.

Among the documents you should review are local, regional, and state plans. Some examples of these can be prepared by your municipality, the MBTA or other RTAs, MassDOT, CTPS, or a local advocacy organization. One example of a local plan is the Boston Planning and Development Agency's (BPDA) [Allston-Brighton Mobility Study](#), which was finalized in May 2021.

If you can't find plans that recommend bus or corridor improvements in your focus area, collect necessary data or evidence to help tell the story of what needs fixing.

### Examples of plans to review:

[Prioritization of Dedicated Bus Lanes](#), released by CTPS

[Destination 2040](#), released by CTPS

[Focus40](#), released by MassDOT and the MBTA

[Better Rapid Transit for Greater Boston](#), released by the Barr Foundation

Additional local and regional plans can be found [here](#)

### Questions to consider

- Does your municipality have a master or comprehensive plan, transportation plan, complete streets plan, or sustainability plan?
- Do existing plans identify or prioritize the problem you want to solve?
- What do existing plans describe as potential solutions? Do the plans identify and provide support for the proposed solution(s)?

## Quick tips

A search on the websites of planning organizations such as MassDOT, MAPC, MBTA or other RTAs, CTPS, or even a general internet search, will usually find any relevant documents – but don't hesitate to contact the planning organizations directly, either. There are often staff on hand ready to help locate documents and answer your questions.

Review the public comments from previous plans and see if they point to the need and desire for bus improvements, and if they challenge or support bus priority.

Keep in mind that plans are helpful but not always necessary. Proponents should also look for ongoing or upcoming projects in which bus lanes could be incorporated, even if they are not part of a plan.

## Example projects

### Roslindale, Boston

The Go Boston 2030 plan, released by the city in 2017, identified bus priority improvements from Forest Hills to Roslindale Square as a top priority. The planning process included substantial public input, and this “rapid bus” project was one of the most highly demanded projects city-wide. This gave the City of Boston a running start on engagement and allowed it to move this project forward more quickly than would have been possible otherwise.

Local

## Forest Hills to Roslindale Square Rapid Bus

Bus priority treatments from Forest Hills to Roslindale Square

### Project Description

Using a reserved transit lane on Washington Street and bus signal priority, all existing bus service between Roslindale and Forest Hills would be able to operate clear of traffic congestion, greatly increasing transit speed, capacity, and reliability. The transit lane could be reversible, and flexible curb regulations would preserve vehicle capacity in the peak direction. With these bus service improvements, existing services could serve more riders in Roslindale and in points further south. In the long term, this route could utilize abandoned rail tracks that extend to Hyde Park, potentially bringing rapid bus to even more underserved residents.

### Benefits and Issues Addressed

*Go Boston 2030, page 79*

**Project Score**

○ Access 1	● Access 2
● Safety 1	○ Safety 2
● Reliability	● Affordability
● Sustainability/Resiliency 1	○ Sustainability/Resiliency 2
● Governance	

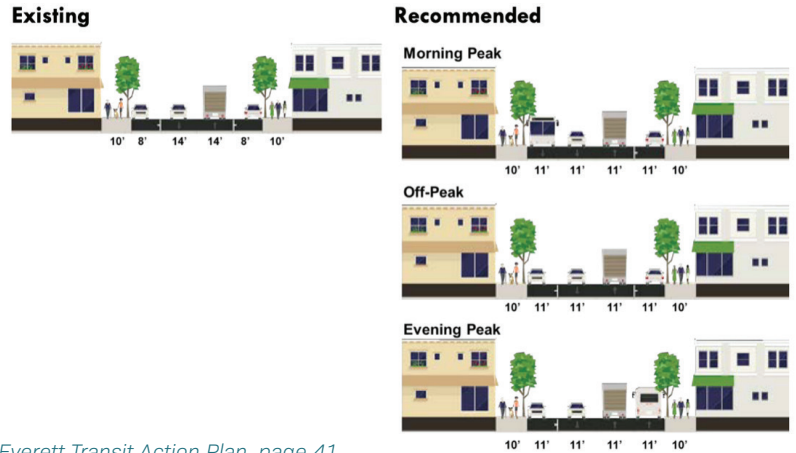
Identified on the ballot as an Early Action commitment



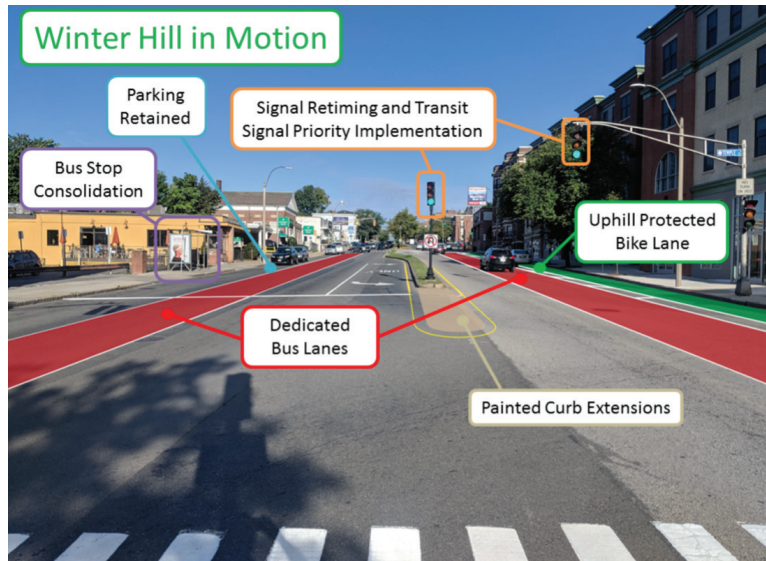
**Everett**

Bus-only lanes were identified in the Everett Transit Action Plan developed by MassDOT and released in November 2016. Thanks to Everett’s extensive public process for the plan, which highlighted the need for improvements along the Broadway corridor, the city was able to go straight into a pilot project at the conclusion of the study.

**Upper Broadway Bus Only Lanes**



Everett Transit Action Plan, page 41



Winter Hill in Motion//<https://www.somervillema.gov/winterhillinmotion>

**Somerville**

As part of Somerville’s Winter Hill in Motion Plan, two dedicated bus lanes were identified as a solution to delay on the corridor. The plan was “a small to medium scale effort,” according to the plan’s website, to make transportation improvements on Broadway between Magoun Square and McGrath Highway. This plan evolved from a survey that had over 1,000 responses from residents. The results showed that the current conditions were serving drivers well, but conditions for other modes were insufficient. Somerville staff looked at MBTA data, which supported the results from the survey that bus congestion was a problem during peak times. Multiple improvements were identified for implementation, including paint, signage, and changes to traffic signal timing.

## Investigate available funding sources

The six projects for which we collected data used a variety of funding sources. Public entities, transit agencies, and private foundations all provided crucial funding to make these projects possible.

- The MBTA works in partnership with municipalities to help fund and implement bus priority improvements, especially in high ridership and high-delay areas. Projects in Roslindale, Everett (its dedicated lane), Arlington, Somerville, and Brighton Avenue in Allston all received funding from the MBTA. As a subset of its [2020-2040 capital investment plan](#), the MBTA has identified funding for bus improvements in its [5-year capital investment program](#) to enhance bus service and the system as a whole.
- Private foundations can be a source of funding and support. The Barr Foundation, through its BostonBRT program, has funded communication and technical assistance, as well as outreach and data collection support on a number of bus improvement projects, including Arlington, Cambridge/Watertown, and Everett's level-boarding platform, which was installed in 2019.
- MassDOT has grant programs, such as the Complete Streets Funding Program that can be used for bus improvements. In 2020, MassDOT launched the Shared Streets and Spaces program that funded various bus improvements in Lynn, Malden, Northampton, Somerville, Dalton, and Medford. This program supports planning efforts and most implementation costs.
- MAPC has provided parking studies and staff support for engagement and surveying of bus riders for bus improvement projects. This work was funded by The Barr Foundation and offered at no cost to the municipalities.
- CTPS, through the MPO at no cost, produces important documents that highlight bus delay throughout the region, and in-depth corridor planning assistance. It is worth reaching out to determine whether your local planning agencies can support your work, or help you identify issues and possible solutions.
- The Boston MPO's Transportation Improvement Program (TIP) can fund larger and longer-term infrastructure projects. Funding from the TIP can also be accessed through the [MPO's Community Connections program](#), and bus priority improvements can be incorporated into the MPO's Complete Streets funding program.
- Funding for other bus priority projects may be possible through Federal Transit Administration (FTA) and Federal Highway Administration (FHWA) grant programs.
  - Ex: [FTA Small Starts Program and Core Capacity Program](#)

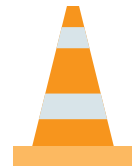
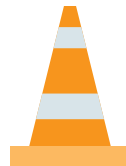
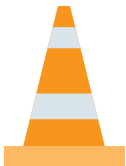
## Quick tips

Direct capital funding is not the only financial support you should seek. It can be highly advantageous to find funding for engagement, communications, and data collection via parking studies or bus rider surveys. We encourage you to explore all opportunities.

MAPC worked with the MBTA, MassDOT, Massport and 13 metropolitan area municipalities on a collective purchasing effort that allows state and local agencies to purchase red, green, and white striping materials used in bus, bicycle, and pedestrian safety treatments on roadways at lower, more reliable costs. [Find out more here.](#)

## Questions to consider

- What is the scope of the project? Will it involve a quick approach such as repainting the street, or a large construction process that may involve moving curbs?
- How much will the project cost?
- What can be funded with existing department budgets and what is a new expense?
- What public funds are available? What private funds are available?
- Does the Regional Transit Authority in your area have funding available for such a project, and would the project meet their funding qualifications?



## Example projects

### Arlington

The Barr Foundation played a huge role in Arlington, both in funding and in the network that they provided to make the project a success: the BostonBRT grant program helped Arlington through the initial barrier of funding its pilot. And when it was time to implement a permanent lane, the town had planned to put down red glass bead aggregate, a material used for bus lanes throughout the region, on only portions of the lane, due to the high cost of the material. After learning this, the MBTA supplemented funding to lay down the red aggregate on the full length of the bus lane. The town used funds that they receive from Transportation Network Company (TNC) fees (distributed by the state) to pay for the rest of the permanent implementation.

### Roslindale

The Boston Transportation Department (BTD) took the lead on implementing the Roslindale project. The MBTA agreed to reimburse the city for the costs associated with the bus priority features. The Barr Foundation funded outreach and engagement efforts by LivableStreets Alliance (LSA) as well as MAPC's collection of parking data, which showed that converting the parking lane to a shared bus/bike lane at peak times was feasible.

### Somerville

In 2014, Somerville initiated a public process for reconstruction of the Broadway corridor. As the project approached final design in late 2016, the City ran into a funding challenge - they were required to contribute \$50 million to MassDOT to prevent the MBTA Green Line Extension light-rail project from being cancelled. The new financial pressure caused the City to defer the Broadway reconstruction and begin investigating "quick-build" strategies for the corridor. The City, with their previous experience implementing a bus lane on Prospect Street in 2017, skipped the pilot project stage and went straight to a permanent, all-day bus priority lane. The initial funding for the project came from a community block grant. When the design progressed, the decision to use red glass bead aggregate (rather than paint) tripled the cost of the project. In addition to the block grant funding and the City's budgeted funds, the MBTA agreed to reimburse the city for the red aggregate. Somerville used their Transportation Network Company (TNC) funding to cover the remaining balance.



*Arlington Bus Stop // Ad Hoc Industries*



## Use Data to Tell Your Story

Data is as critical for building support and getting your project done as it is for defining your problem and identifying your solution. Quantitative data can detail metrics such as bus delay and ridership. Qualitative data, such as comments from riders collected through intercept surveys, can tell the story of why bus improvements are needed from the perspective of everyday riders and how projects are centered in a community experience.

Think about the most useful timeframe for your data. For example, if this is a problem that has significantly worsened over a series of years, it would be beneficial to share current data as well as historical data to show how the problem has progressed.

Frequency of collection is critical, as well. User experience data, for example, should be collected consistently and regularly. One of the best ways to collect this data is to ask people at bus stops or on buses how they perceive the project. This is also a good opportunity to answer questions that bus riders and other users may have about the process, or hand out information.

Post-project data are as important as pre-project data. If the project is not working as expected, the information you gather can help you make the necessary tweaks. Of course, it can show stakeholders and the public how the changes you made are improving performance and experience – and may make the difference in similar projects being prioritized by your municipality in the future.

As important as data is, there is such a thing as too much. Data takes time to collect and analyze – the process requires resources and staffing. Partnering with organizations like LivableStreets Alliance, MAPC, MassDOT, the MBTA or other RTAs can help reduce the workload on a municipality. However, acquiring more and more data can also needlessly delay implementation. If the political will already exists, for example, you may need less data than if you're building support from scratch. Bottom line: it's important to define the appropriate amount of data and analysis for this project and your own community.

Once you have the data, you can translate it into its effect on people. On an efficient bus corridor, total time saved by riders can add up to hours when a single bus becomes more reliable over days or weeks. Saving the equivalent in person hours would take many more single-occupancy vehicles moving more quickly. For example, the Roslindale project reported “The average bus rider saved **at least an hour** each week on the a.m. bus lane on Washington Street.”<sup>9</sup> This reframing allows you to point to delay per road user, and how that might be more equally distributed.

**“On the best days the bus takes 10 minutes, but on the worst days it takes 30. I had to plan for 30 minutes before, but now with the bus lane I can plan for 10. I saved 20 minutes!”**

After gathering this information, circle back to defining the problem with the new data and/or resources you have.

Timing for Data Collection	Type of Data	Purpose of Data	Potential Sources of Data
Before project	Congestion points/times	Understand what bus improvements are necessary, and if funding from the MBTA (or RTA) is possible	MBTA, CTPS
Before project	Bus ridership	Understand the impact of bus improvements, and if funding from the MBTA is possible	MBTA
Before project	Person delay on the corridor	Communicate to the public and stakeholders	Municipal staff can convert from MBTA data
Before project	How reliable trips are on the corridor (bus delay and reliability for all modes)	Communicate to the public and stakeholders	MBTA
Before project	Equity impacts	Understand who is being affected by these changes and work to correct historical and current injustices	MBTA, CTPS, Municipal data, planning documents
Before project	Bus crowding levels	Understand how bus improvements could improve the bus riding experience	MBTA
Before project	Proportion of people using different modes (mode share on the corridor)	Communicate with the public (and stakeholders) about the importance of this project	CTPS, planning documents, consultants

Timing for Data Collection	Type of Data	Purpose of Data	Potential Sources of Data
Before project	Parking analysis	Determine how and by whom parking is being utilized	MAPC
Before project	Business concerns	Decide if the project will have local pushback, and if there can/should be space accommodations	Municipal staff outreach, local advocacy organizations, local business alliance
Before project	User experience	Understand what various aspects to consider for improvements	Local advocacy organizations, municipal staff, community organizations
Before project	Curbside management needs	Understand how the lane should be designed to accommodate current uses	Municipal staff data collection, local advocacy organizations
After project	User experience	Understand how your project has improved experience	Local advocacy organizations, municipal staff, community organizations
After project	Time savings for users	Understand how the project has improved bus trip times and passenger travel times	MBTA
After project	Perceived time savings	Understand how the project has improved user experience	Local advocacy organizations, municipal staff, community organizations
After project	Mode shift	Understand how the project has contributed to increasing non-car modes	Consultants

## Quick tips

If you have limited capacity, you might want to focus on a few key data points, such as mode share on the corridor which shows how many people are using each mode of transportation on the corridor. Other key data points include parking capacity and utilization, curb management needs, and average bus delay and passenger delay.

If you need a significant amount of data, consider partnering with others. This can enhance your ability to build a persuasive case for your project and ultimately speed up implementation.

When collecting data, keep in mind that people commute in different ways on different days. On a sunny day, more people may bike to their destinations, but on a rainy day, more people may choose to take the bus.



## Questions to consider

- What are the most important types of data for your project?
- What do the key stakeholders, decision makers, and the public in your municipality care about? This can differ from place to place.
- What data do you currently have and what data do you still need? Who might already have the data you're looking for, and how can you access it?
- How will you collect new data for your project?
- What data do you need to show that this will be successful? And in the future, to show that it has or has not been successful?
- What time frame do you need data for?
- How often will you collect different types of data?

## Example projects

### Roslindale

Recognizing that data would be key to making informed decisions, the Boston Transportation Department commissioned MAPC, funded by the Barr Foundation, to conduct a parking study along the corridor in 2016. After analyzing the data, MAPC concluded that during the day, a large number of the parking spaces on Washington Street between Roslindale Square and Forest Hills were being used not by local residents, but instead by commuters using the corridor for free all-day parking before heading to downtown Boston via the Orange Line train. In addition, only half of the parking spaces in the study area were occupied at 6:00 a.m., and peak demand wasn't until 11:00 a.m., well after the morning pilot would end. After referencing the data, the city decided to restrict 146 parking spots during the morning peak period, spaces largely used by non-residents, to move forward with a pilot to make the morning commute more reliable for thousands of people.

During the pilot, LivableStreets Alliance (LSA), supported by MAPC, collected a significant amount of qualitative and quantitative data from both bus and bike riders. The MBTA, using these surveys, discovered that 94 percent of people riding the bus along Washington Street supported the permanent shared bus lane, and 89 percent of people biking reported feeling safer in the shared lane. This data convinced the City of Boston to make the bus lane permanent.<sup>10</sup>

To learn more about MAPC's data collection for this project, visit our [website](#).



*Roslindale Bus Pilot // LivableStreets Alliance*

### Brighton Avenue, Boston

The data collection effort that helped shape the success of Brighton Avenue was led by LivableStreets Alliance (LSA) in partnership with multiple local entities. Business engagement was extremely important. LSA surveyed people walking to and from businesses to ask about their travel mode. Approximately 75 percent of customers were walking, biking, or taking transit to and from local shops, not driving. This became a key talking point with businesses: bus priority would be helping their customers. LSA also documented curbside management needs, by asking businesses about deliveries and inquiring about employee parking patterns. This allowed LSA to determine how and when parking and loading space was used and most needed on the corridor. In collaboration with Allston Village Main Streets (AVMS) and Allston Brighton Health Collaborative, LSA also surveyed bus riders about their user experience. This work revealed the extent to which unreliable bus service was spurring users to switch to ride share services like Uber and Lyft – at high cost. As a whole, the data collection helped show that a bus lane would benefit, not hinder, business activity and transportation along the corridor.



*Brighton Bus/Bike Lane //  
City of Boston*

### Arlington

The MBTA's existing data revealed a great deal about the town's bus delays, including how long it took the bus to get through each traffic signal. Arlington also observed significant traffic congestion at multiple intersections. This helped the project team understand the source of the problem and develop a compelling solution. Thinking through whether interventions would be effective was very important. From the beginning, bus riders were vocal in support, but some local businesses, worried about potentially losing on-street parking, were in opposition. MAPC was able to ease those concerns with data from a parking study. The town also surveyed roadway users before, during, and after the pilot, while ITDP, through the BostonBRT initiative, conducted surveys at bus stops and online. After extensive surveying of users, Arlington was able to report that of the 382 responses they received, 73% wanted the bus lane to become permanent. All of the data helped to tell the story that the bus lane was beneficial.

### Resources:

[MBTA transit dashboard](#)

## Begin internal conversations with key stakeholders

Making an honest assessment of internal support for your project, and doing it as early as possible, will help you map out your path.

Before talking to municipal transportation staff and DPW staff, the MBTA or your local RTA, elected officials, and municipal leaders about the possibility of bus improvements, consider the talking points that may persuade these stakeholders. You can open conversations by referencing any available current transportation plans and data about potential impactful or previously-identified projects. Focus on one striking data point that may be persuasive to many decision-makers, such as mode share data to highlight how many people on the corridor are taking the bus versus driving (and using other modes).

As you talk to your colleagues, listen carefully to their thoughts, even – perhaps especially – if they object. It's extremely important to understand the pervasive challenges you face. Once you understand the most likely pushback, you can begin to address it. You can identify who needs to be on board and how to best win those players over. In addition, you can consider if the project should be modified to address the concerns you've heard. You can make a plan for approaching potentially resistant staff members or key stakeholders, and fashion different arguments in support of the project. What do they care about and how can this project help address those issues?

It can be useful to identify a project "champion," someone who is excited about the project's potential, wants to see it happen, and has the organizational capacity to see the project through. It's often effective, too, to get influential peers to speak out about the need for action.



Brighton Bus/Bike Lane // City of Boston

### Quick tips

If the municipality is willing to engage the general public, talk to key abutters – especially institutional or large business abutters.

Keep in mind that a road is a public facility, and it's important to include people who are adjacent to a project but also to help them understand how critical public space is to an entire municipality, and how it's a bigger picture issue than a single abutter's concern. Highlighting non-abutter's perspectives can give abutters a broader perspective of local needs.



Roslindale Street Signage // LSA

### Questions to consider

- Who do you know will immediately be supportive?
- What information can you present to create a persuasive case for supporting bus priority? What do your stakeholders care about?
- Who may need convincing? Who may be opposed?
- For people who may not be immediately supportive, what are their priorities, and how can this project address those?
- What challenges or objections do you anticipate? Get to the root of these problems early. Can something else be done to address them?



## Example projects:

### Everett

Transportation challenges were plaguing Everett, and city officials knew something had to change. Originally, the mayor wanted to explore extending the Orange Line or the commuter rail. But after MassDOT completed the Everett Transit Action Plan, it was clear that bus transit would be a faster way to make improvements. The mayor supported the plan that was developed and provided the political will for change. Convincing other city leadership that this was a good idea, however, took some time. The city council was not initially on board, but once it was clear how many residents (and voters) rode the bus, the council became supportive. Mode share data showed that 50% of people on the corridor were on the bus. This fact was the single biggest element in convincing political leaders that bus riders were not a minority and should be prioritized for street space.

### Somerville

There was both an internal and external focus in Somerville on improving Broadway, especially due to its expansive width. The street was a blank canvas with a lot of possibilities for change. The original plans for the street included a protected bike lane and maintained parking, but the transportation staff wanted to focus on a quick build project, which led to the conversation about bus improvements. Somerville's mayor wanted to make the bus a more reliable form of transportation. The mayor was extremely supportive of improvements, and prioritized bus transit even despite hiccups and public push back during the roll out of the project. In the face of very vocal opposition, the mayor pointed to Somerville's established goals for walking, biking, bus, and rail transit. He acknowledged that reallocating roadway space was going to be a difficult change for some residents, but it was what the city was going to do – and he supported the staff members who implemented the changes. Somerville staff, along with the mayor, rode the 101 and the 89 bus to engage with riders and see for themselves how the project was going.

### Brighton Avenue, Boston

After the success of the Roslindale project, the City of Boston was ready and eager to implement additional bus improvement corridors. Initially, project rollout was delayed because the city wanted to ensure neighborhood support. LSA sent letters to the city councilor of that district as well as to at-large councilors, the mayor, and the MBTA general manager, to highlight the significant community engagement work that had been done to date. Many internal stakeholders helped ease the process, however. Now that the BTD had seen a project in action, the department was on board with improvements elsewhere in the city. DPW staff, too, were supportive and crucial to the success of this project. After implementation, the mayor rode the bus on the corridor. He got to see and feel how the project was working, and to talk to local business owners that raved about how much they liked the project.

## Create a list of partners

All bus projects should include collaboration with the MBTA or your local RTA, but there are many other groups – internal to a municipality and external – that may be helpful in getting a project done. Some partners are an essential part of the process, such as those who have jurisdiction over the corridor or the traffic signals. Other partners are important to the process or outcome, depending on your goals for your project.

For each partner listed, decide what you hope to gain from the partnership, and how you hope the partner will engage, and how often. Where appropriate, identify extensions into neighboring municipalities that could enhance the project and reach out to the neighboring city/town planner, or appropriate municipal staff, to discuss collaboration across municipal boundaries. Partners you may want to consider include the following:

- Internal partners such as DPW staff, elected officials, and planning staff
- State agencies such as MassDOT, DCR, CTPS and MAPC
- Advocacy organizations like ITDP, LSA, and MassBike
- Stakeholders such as local businesses, main streets associations, schools, universities, coalitions, residents who can influence the project and show public support
- Consultants to help as necessary with communications, engineering
- Other municipalities with experience implementing bus improvements
- Funders to bolster projects with additional funds and support

### Quick tip

Sometimes a road or a portion of it is owned by MassDOT or DCR, even if most of it is municipally controlled. The same goes for traffic signals.

## Questions to consider

- Who needs to be part of the process? How will this need be determined?
- Who has jurisdiction over the corridor and/or the traffic signals?
- What local individuals, groups, or organizations might have an interest in this project? (negative or positive)
- What individuals, groups, or organizations will be concerned about (and potentially oppose) this project?

## Example projects:

### Cambridge/Watertown

One of the three 2018 BostonBRT local pilots funded by the Barr Foundation, this multi-jurisdictional project included not just the two municipalities the project would connect, but also DCR, MBTA, and MassDOT as well as private and non-profit partners. The Mount Auburn Street project took thorough coordination among stakeholders – and a lot of championing – to keep it moving. City officials instituted biweekly calls to facilitate the coordination. Cambridge and Watertown hosted joint public meetings. The MBTA participated in meetings and the cities worked closely with municipal staff. Because the projects were inherently linked, DCR held a number of public meetings about this project and a corresponding one on Fresh Pond Parkway. The Barr Foundation provided financial support, as well as engineering and marketing support, through its BostonBRT initiative: ITDP managed a street team, trained by LSA, to assist with data collection. The street team captured feedback from the most likely chief beneficiaries of the improvements, namely people boarding the bus in the morning. As a whole, this group effort, which involved many agencies, helped create new relationships between Cambridge, Watertown, and the MBTA.

### Arlington

Arlington's Massachusetts Avenue bus pilot was one of the three 2018 local pilots funded by the Barr Foundation. Through that entity, the Barr Foundation provided Arlington with a \$100,000 grant to help with technical, communications, coordination, and marketing support. In addition to a team of consultants, the Town coordinated with the MBTA, City of Cambridge, and the MA Department of Conservation and Recreation. The MBTA helped to identify important safety issues and stepped in when the project encountered community pushback. Cambridge staff and DCR were closely involved because the end point of the dedicated bus lane abutted the Cambridge line, a Cambridge-operated traffic light, and a state-owned parkway. In addition, the Town's economic development coordinator organized businesses in Capitol Square for meetings and to ask for input at project milestones for nearly a year before the pilot.

## Agree on and document project goals with partners

Multiple parties are involved in every bus improvement project, which can, at times, cause confusion throughout the process. It can be helpful to draft and agree on a set of project goals and outcomes at the beginning of the project to ensure that as the project progresses, it continues to meet these expectations. For example, a memorandum of understanding (MOU) can be a formal way of documenting project goals, tasks, division of labor, and outcomes. Less formal documentation, such as an email between partners, a project scope, or simply notes from a meeting can all be ways to stay true to your original goals. This will help keep the project in line with its original intentions, especially if opposition or challenges arise.

In the MOU, or separate project management document, you may want to create an organizational structure that sets forth the responsibilities and reporting procedure for every stakeholder and partner. Make sure everyone knows what their role will be for various parts of the project, such as community engagement, data collection, design, implementation, funding, maintenance, and giving public statements. Determining a single point of contact to manage the process and the project partners can be helpful.

### Quick tip

Partnering agencies such as the MBTA often require MOUs if the project is receiving their funding. Other organizations, such as ITDP and the Barr Foundation may also require a written agreement.

### Questions to consider

- What are your goals for the project (link this back to your original problem statement)?
- What do you expect from your partners?
- Who is responsible for tasks and funding those tasks? Who is overseeing the work, and who holds the contract for the work? It's often the roadway owner who contracts, permits, and oversees the project.
- What do you expect to happen before, during, and after implementation?
- If the project is successful and decreases bus travel time, what are the benefits?
- Who is responsible for ongoing maintenance and what does that maintenance include?

## Example projects:

### Roslindale

Early on, City staff had support for the Washington Street bus lane from the mayor and other decision makers. BTD staff worked to identify who needed to be included in the internal conversations about a bus lane pilot, such as public works, utilities, neighborhood services, etc. The city created a task force with those people they identified and met regularly with them to think through, and make decisions, about how the pilot would work. This led to new and enhanced cooperation among staff, largely thanks to strong support from the mayor and Chief of Streets. There was also cross departmental support and inter-agency support with the MBTA providing engineering resources. Although this project did not have a formal MOU, the regular task force meetings kept expectations aligned with project goals.

### Cambridge/Watertown

Initially, Cambridge and Watertown submitted a joint proposal to the Barr Foundation for their BostonBRT grant. This written proposal laid out the project goals, existing conditions, major design elements, community engagement plans, data collection strategy, and more. This proposal set the stage for the formal MOU between Cambridge, Watertown, and the MBTA. The non-binding MOU established how the different agencies would cooperate, and what roles each would play in the process. It also described the major elements of the project to ensure that the end result reflected the original project goals.

## Resources:

Reach out to MAPC to see examples of project MOUs and agreements.

## Use existing practices to make change feel easier

Communicating that your project is consistent with current practices and priorities may make it more palatable for other municipal staff and partners. For example, repurposing a lane of parking to function as a peak-only bus lane during morning commute hours could be framed as a drastic and bold policy move, or as an extension of existing parking restrictions during street sweeping. Everett, in using the latter explanation, made the change seem less jarring. You may be able to achieve success by breaking a bus project down into its more familiar basic components.

### Quick tips

Look at your municipality's repaving plan and see if there is an opportunity to incorporate bus priority changes as the same time as a repaving or reconstruction project.

If there is an upcoming street closure on a bus route for an event or activity, could you extend that closure for a few extra hours to test out a bus priority change?



*Everett Bus Lane Pilot*

### Questions to consider

- If a municipality is re-paving a road it may be useful to consider the question: how and by whom (transit users, peds, people biking, people driving) do you want this street to be used in the future?
- If parking is being removed to improve bus service, are you already restricting parking along the corridor for street sweeping or other purposes?
- Is your DPW familiar with setting up traffic management areas? (Areas that dynamically manage congestion based on current and predicted traffic patterns.)
- Can your design operate successfully without enforcement, or do you have parking enforcement staff that can be deployed to ticket vehicles blocking the lane?

## Example projects:

### Everett

There was already a system in Everett for DPW staff to restrict parking for street sweeping along Broadway. The city decided to use this practice to start their bus lane pilot. During the morning peak, the city restricted street parking on the inbound side of the same stretch routinely restricted during street sweeping days. Because it was a routine operation for the department, the pilot was made easier for both staff, and the public, to understand.

### Roslindale

Using street sweeping day for an operational pilot also smoothed the process in Roslindale's December 2017 pilot on Washington Street. Since cars were already restricted on the inbound side of the street for street cleaning, it was easier to schedule the pilot at the same time. Meaning, the lane wouldn't have any parked cars at that time, therefore not requiring any additional regulation or enforcement action. In addition, other regular practices like tree trimming and trash collection were incorporated into the process to ensure that the pilot went smoothly.

### Cambridge/Watertown

In Cambridge, staff members had previously implemented a quick build project that included cycling facilities on Cambridge Street. This project gave them experience with rapid and low-cost interventions. It also primed internal staff and the public to think beyond current use, as did Watertown's then-recent Mount Auburn Street redesign.



Cambridge/Watertown Bus Lane //  
Ad Hoc Industries

## Create a community engagement strategy

Getting input from community members can improve your project and can itself build support.

When thinking about asking for input, it's important to first determine what your goals are. Should outreach **inform** project decisions, **evaluate** decisions that have already been made, or both?

Consider who you need input from. Make a list of groups of stakeholders in the community. Such a list could include, for example, bus riders, small business owners, families with children who attend a school on the route, members of faith institutions, transit-dependent members of the disability rights community, or people who visit a senior center near the route.

---

When you're considering stakeholder groups, reach out to involve populations affected by systemic racism and others who are often underrepresented in civic processes. These groups are likely to have been disproportionately affected by the problem you're trying to solve, and it's therefore essential to listen and work collaboratively in order to ensure that your project mends inequities, rather than further exacerbates them.

Go where the stakeholder groups you're trying to reach already are, rather than expecting them to come to meetings. That means asking for feedback at bus stops, on social media outlets, doing the same on municipal websites and creating a strategy to drive traffic to the site, attending existing community events and meetings, and visiting other popular locations such as the local grocery store. Contact organizations representing various communities and work with them to influence the project and spread the word. If you are asking for outreach assistance from an organization in an under-resourced community, the organization is likely under-resourced, too. Compensate them for their time and effort, if possible. In addition, consider providing food and childcare at public meetings.

Determine whether a demonstration project might be the most convincing outreach. Pilots are time and resource intensive – and if paint is put down, the temporary projects can be indistinguishable to the public from permanent projects. “The pilot is the process,” however, is a strategy that's worked well in many local bus projects, such as Broadway in Everett. It can be used to underscore the value of simply trying something new and evaluating it along the way.

As part of your outreach strategy, use your data-driven story of why this project should happen, and how it will be beneficial. Demystify the percentage and number of people who ride the bus versus drive on the corridor and share parking and mode share data in an easy and clear way.

If your project stems from a prior engagement effort, make sure to highlight that process and showcase the relevant goals and vision.



## Quick tips

“Community” can mean a lot of things such as municipal government, neighborhood, social affinity group, or all of the above. It’s important to acknowledge the different multifaceted community dimensions that each of these projects reached – neighborhood leaders, municipal leaders, advocates, etc. – specifically identifying who you’re considering “community” to be in the context of these projects can better set up the subsequent audience.

Don’t forget to review past projects in the area to understand what data already exists, and how the community responded, what their concerns were, and anticipate how they may respond to the proposed project.

If your project is listed in a recent, existing action plan that had extensive community engagement, sufficient public engagement may already have been done. You do not need to re-engage in a lengthy public process when the public has already told you what they want.

---

## Questions to consider

- What are your outreach goals?
- Which stakeholders should be informed and consulted?
- How should the project team engage with different groups, and in what formats?
- What are the tasks – such as creating social media posts, updating websites, posting signs on sidewalks and bus stops, distributing flyers, contacting stakeholder organizations – that will help you achieve your outreach goals?
- What materials – such as signs, flyers, and social media posts – will you need for each task?
- What resources are available to facilitate successful community engagement?
- How will you demonstrate to community members that their feedback has been heard and how it has influenced the plan?
- How has engagement in this area been successful or faltered in the past?

## Example projects:

### Roslindale

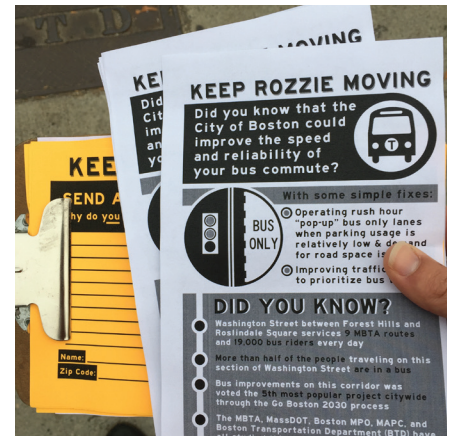
The inbound Washington Street bus lane was cited as a priority in the Go Boston 2030 plan, a multi-year planning effort by the City of Boston that included extensive and varied community engagement strategies. Less formal outreach was deemed necessary for this project, as the community had recently identified it as high priority, but many less-formal methods were employed. The city partnered with MAPC to conduct a parking study, and local groups WalkUp Roslindale, Rozzie Bikes, and Roslindale Village Main Streets were involved, as well. LivableStreets Alliance (LSA) played a major role in talking to bus- and bike-riders along the corridor. All the on-the-ground efforts by LSA, local groups, and volunteers, including outreach with business owners and large housing complexes, and extensive surveying of roadway users, together led to one of the biggest talking points about the project – that 94 percent of people riding the bus along Washington Street supported the bus lane.

### Arlington

Arlington followed a more traditional – and lengthy – process. The town was committed to setting definitive start and end dates for their pilot in order assure the public that the pilot was in fact a test; and that there would be a public process before, during, and after the pilot before any changes were made permanent. Over the course of a year and a half, the town conducted approximately 25 meetings, three big public forums, and many small meetings with residents, business owners, and the like. There was initial pushback, which slowed the process at the beginning, and resulted in one section of the project changing to accommodate a local business. A year after the pilot, the bus lane and queue-jump lane returned to Massachusetts Avenue as permanent fixtures. This was less about community engagement, however, than it was about the town's technical capacity to design and install the bus lane. Arlington wanted it completed during the summer of 2019, but funding, design, and product sourcing issues led to multiple delays.



Roslindale Outreach // LivableStreets Alliance



Roslindale Outreach // LivableStreets Alliance

## Resources:

ITDP's US BRT Implementation Guide: <https://www.itdp.org/event/brt-implementation-guide-us-cities/>

## Create a communications strategy

The overarching goal for any transportation communications strategy is to make accurate, up-to-date project information available and easy to find, and to communicate regularly and effectively with the public and key stakeholders.

An easily accessible source of up-to-date information about the project is indispensable. This can take many forms, such as a project website, a social media platform, signage, flyers, videos, or regular public announcements from staff. Highlight positives, progress, benefits, and any changes or challenges that people may need to know about. Be open and honest about the process.

Once you have a plan, think about your strategy for how you'll gain public interest in the project and let people know where to find more information.

---

Think again about your different stakeholder/audience groups and where they get their information. Social media is one popular answer to that question, so be sure to post with regularity, and link back to the main source of information, which may be your website. Emails, newsletter articles, and local news outlets all have their place. And don't forget about posters and signs, especially at bus stops, and flyers.

You may have already accumulated data, both qualitative and quantitative, to support your project. Communications materials are the place to put those persuasive facts. Think about which communications piece is for which audience, and tailor the material for the group you're trying to reach (including translation as necessary) while always staying truthful and open. The way you present the facts can change, but the facts cannot.

If you're including press in your strategy, build relationships with journalists, news organizations, and other media, and highlight the benefits of the project.

## Quick tips

As noted earlier in the guide, you should identify an official spokesperson (aka your project champion), but it's still essential that your entire project team be able to speak about the project concisely, accurately, and on message.

Always be clear that you are the source of any communications material you distribute, no matter how small, and include contact information. Include your logo and a way to find more information about the project.

## Questions to consider

- What do you need in your communications toolkit?
- Have there been similar projects nearby, or will this be completely new to community members? Who are the people that need to know about the project, and what's the best way to reach them?
- What action do you want your audience to take?
- What languages do people in your community speak and how do they receive information?
- How will this integrate with your community engagement strategy?

## Example projects:

### Arlington

The town employed a part-time public information officer but didn't have a press team on staff. Through its BostonBRT initiative, the Barr Foundation provided financial support and a grant that funded professional coordination, public relations, graphic design, and technical support from ITDP, as well as consultants from Stantec, Denterlein, and Adhoc Industries. The BostonBRT team also initiated a partnership with the Arlington Arts Association to implement a series of art installations at bus stops along the corridor. This brought beauty and a sense of place and comfort to the bus experience during the pilot.

**Cambridge/Watertown**

Also a part of the Barr Foundation’s BostonBRT 2018 local pilots, the Cambridge/Watertown joint municipal pilot was characterized by creative graphics and branding. At bus stops, purple and yellow banners with taglines such as “Dedicated bus lanes; dedicated to you,” brought a human element to BRT. Communications materials and strategy were created by people who routinely think about translating transportation lingo into regular language. They focused on issues people were most concerned about – for instance, reducing travel time and improved commute reliability – and used plain language. A bedrock of resolving issues and garnering support is focusing on what people are concerned about and using easily accessible language.

**Resources:**

To view more graphics from the BostonBRT pilots, visit: [Bostonbrt.org/localpilots](http://Bostonbrt.org/localpilots)



Cambridge Watertown BRT // Ad Hoc Industries



Cambridge Watertown Bus Stop // Ad Hoc Industries

## Consider incorporating public art and interactive materials into your project

Public art at bus stops and artistic communications materials have been influential in shaping positive public opinion and encouraging public engagement about new bus improvements in a variety of projects. In Everett, bus stops were decorated with huge displays of colorful flowers to enhance the visual and social experience of waiting for the bus, and local high school students added place making elements. Arlington worked with a group of artists to install beautiful designs reflecting local history and identity at six bus stops along its pilot corridor. Cambridge and Watertown included eye catching graphics at bus stops and on a highly visible fence along its pilot corridor. All of the BostonBRT local pilots included creative branding and postcards that staff and stakeholders handed out at community events and during the public launch ceremonies for the pilots. Signage, markings on the ground, as well as the lanes themselves can incorporate color and art to enhance the user experience.

### Quick tips

The MBTA, or your local RTA, should participate in the planning process for art installations and other placemaking projects at bus stops to review for safety, accessibility, and operational concerns.

It's important to determine if art is part of the community's identity. For example, art is an integral part of Arlington's identity, and the town had just embarked on a public art process, so it fit in well. If art isn't a priority for the community, it may not be as impactful, although huge flower displays are beautiful anywhere.

If working with professional artists is outside of your budget, or otherwise challenging, consider partnering with a local school to create a student art project, which can be temporary or permanent. Connect with municipal arts staff or a local cultural council to generate ideas about other possible partners and projects.



*Arlington Bus Stop//Ad Hoc Industries*

## Questions to consider

- What do you want to accomplish through your use of public art?
- Do you have local partners and/or funding to help develop public art displays?
- Is art part of your community's identity? If so, what types of art would resonate most with your residents? What message or story do you want to tell through art?
- Where (and when) would public art (or artistic materials) most benefit the project?
- Will the art installation or placemaking project maintain safety and accessibility at the bus stop?

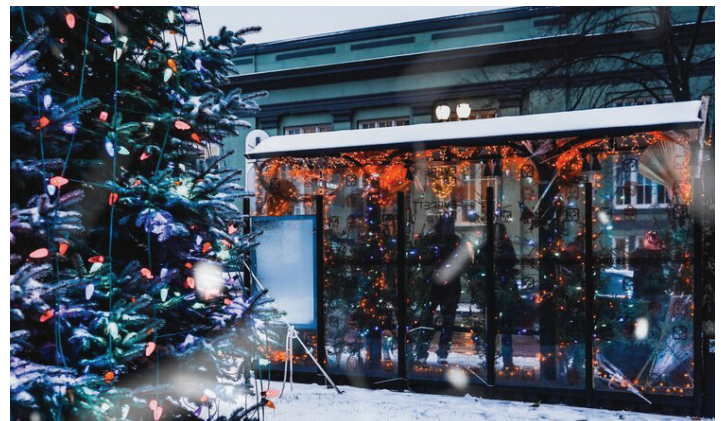
## Example projects:

### Everett

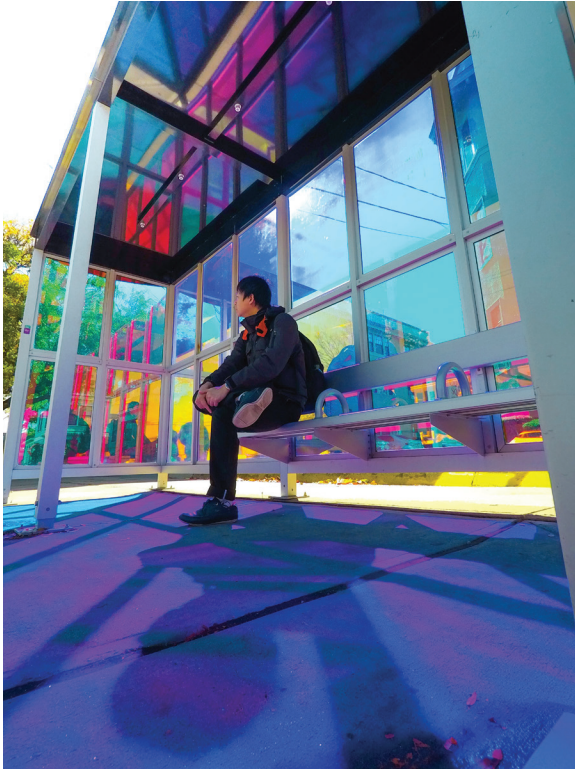
After several bus improvements, Everett decided to experiment with public art to bring attention to the bus changes and encourage mode shift. The artist, Krissy Price of Boston Pollen, created an art display she called a “flower bomb.” The display was meant for local riders, but also for potential ones. The idea was to decrease the stigma of riding the bus and acted as a visual cue along Broadway to bring attention to the bus as an improved transit mode. The flower bomb received a lot of press, which further promoted positive feelings towards the bus improvements as well as enhancing the waiting experience for bus-riders. In December 2019, another “flower bomb” was installed utilizing winter foliage and twinkly lights to create a magical, winter scene at the bus stop.



*Everett Flowerbomb // Ad Hoc Industries*



*Everett Winter Flowerbomb // Ad Hoc Industries*



*Arlington Bus Stop//Ad Hoc Industries*

### **Arlington**

In Arlington, too, art was used to reduce the stigma of bus-riding and to show that it can be a beautiful experience. The project entailed painting bus stops with vibrant colors and nature scenes. It was created by local artists, which provided an additional sense of community connection. The art and outreach spoke to the themes of movement along Mass Ave, a major corridor in Arlington, and emphasized the town's Cultural District. Fans of the art installations included bus- and bike-riders, and even non-riders. No one reported disliking it: even people who weren't supportive of the bus improvements enjoyed and appreciated the new public art during their commutes. This element of the pilot took on its own brand called "ArtBRT," which complemented the one that had been created by BostonBRT for the pilot, "ArIBRT." Various elements from the #ArtBRT project remain in place today.

### **Resources:**

Everett Flower Bomb: <http://www.bostonbrt.org/flowerbomb>

Arlington Bus Stop Public Art Project: <http://www.bostonbrt.org/arlingtonbrt>

MBTA Bus Stop Planning and Design Guide (to check for accessibility standards): <https://www.mbta.com/engineering/design-standards-and-guidelines>



## Determine design and engineering needs

From the beginning of the project, plan for multi-modal changes, not just bus improvements. If a project can also improve the experience for people walking, biking, or using other modes, those elements should be incorporated to ensure the project has multiple benefits. Curbside management for needs such as pick up/drop off or business deliveries should also be addressed in the final design if these occur frequently on the corridor.

For bus priority projects, where appropriate, the MBTA, or your local RTA, can work with municipalities and other jurisdictions to develop designs that include multimodal enhancements in addition to transit improvements. All projects should use materials consistent with local regulations.

Consider the following:

- Include clear, bright signage letting roadway users know how to use the new space
- Consider using variable message signs (VMS) that can be changed when the project launches
- Use distinct and durable paint
- Plan for adjusting signal timing early in the process and be aware of possible daylight savings changes during your initial implementation
- Work with MBTA Service Planning to see if bus stops should be moved to the far side of the intersection to improve operations and traffic safety
- Add curb extensions, where appropriate, to expand the bus stop area and the pedestrian realm, and to allow for in-lane bus stops
- Be aware of curb management needs of businesses and other abutters
- Evaluate if this project could be combined with a planned resurfacing or restriping project, as new pavement markings adhere best to fresh pavement
- Decide which vehicles and users will be authorized to use the new infrastructure and make that clear with signage

## Quick tips

It's ok if your project isn't the "perfect" BRT or bus priority design. Don't let perfect be the enemy of the good. For example, bus bulb-outs or curb extensions that allow in-lane bus stops might be ideal, but the added costs of design and construction might risk eliminating other project elements that provide more benefits, such as bus lanes.

If you're considering a peak-only bus lane, knowing who rides the bus along that route is important. Peak time (morning or afternoon commute) bus lanes typically cater to traditional nine to five workers. There may, however, be many bus riders who are college students or people working non-traditional schedules, and therefore utilizing the transit system throughout the day.

## Questions to consider

- How will your bus improvement be designed? How will aspects of the design address the community concerns you've identified, and how will those design choices be communicated back to stakeholders?
- Do you have internal staff with engineering expertise? If not, consider working with an experienced consultant who has bus lane experience.
- How can this project accommodate or benefit people who bike, walk, use wheelchairs, or drive?

## Example projects:

### Brighton Ave, Boston

The City of Boston thought a lot about curb management for the Brighton Avenue bus lane project, and specifically how to address double parking, tour buses, and deliveries. Some bus stops were relocated and curb space reprogrammed for additional loading, and short-term pick up and drop off, ridesharing, and food delivery. The community expressed concern over the potential loss of on-street parking, which helped the city decide against Option A, which would have utilized the parking lane for the bus lane; and in favor of Option B, which utilized one of the two inbound travel lanes for the bus lane. Recognizing that the congestion on this corridor lasted all day, partially because of students traveling to the nearby universities, the city made the Brighton Ave bus lane all day, rather than just for the morning peak time, as was the case in Roslindale.

### Arlington

Working with a \$100,000 grant from the Barr Foundation through their BostonBRT initiative and a team of consultants, and in coordination with the MBTA, City of Cambridge, and the MA Department of Conservation and Recreation, Arlington settled on four BRT elements – transit signal priority (TSP), queue jump, dedicated lane, and consolidated bus stops. (See **appendix** for definitions.) A complete reconstruction of Massachusetts Avenue in East Arlington recently occurred so the Town had to adapt to incorporate these BRT elements that were not contemplated when the reconstruction was originally conceived. The changes in bus stop location mean that bus riders can no longer shelter in inclement weather under a theater marquee. However, the far-side boarding experience has improved travel times significantly. The bus now has a dedicated space that doesn't compete with parked or double-parked cars or delivery vehicles. Overall, the changes have improved the bus rider experience along Massachusetts Avenue.

### Somerville

Unlike many other communities in the region that first piloted bus improvements before moving to implementation, Somerville was able to utilize lessons learned from other projects to go straight to a permanent installation. The final design featured a half-mile long, bi-directional, all-day bus lane between McGrath Highway (State Route 28) and Main Street at the top of Winter Hill. However, project implementation was exceptionally challenging. The City's proposed implementation sequence assumed that traffic signal equipment would be upgraded and retimed prior to operation of the new bus lanes. Scheduling challenges with contractors forced the City to reverse this sequence, opening the bus lanes and eliminating the general-purpose lanes without the benefit of signal retiming. Traffic queues were also exacerbated by major regional detours associated with the Green Line construction. Once the traffic signals were updated, the feedback for the project became overwhelmingly positive. An evaluation of the project a few months after it was finalized showed that weekday ridership on MBTA Route 89 was 36% higher than the equivalent period twelve months earlier.

### Resources:

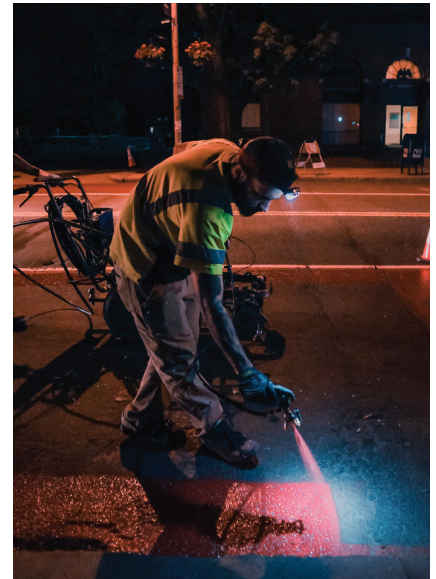
FHWA recently set clearer guidelines for what kinds of materials are acceptable for bus lanes:  
[https://mutcd.fhwa.dot.gov/resources/interim\\_approval/ia22/index.htm](https://mutcd.fhwa.dot.gov/resources/interim_approval/ia22/index.htm)

## Create an implementation plan

Look back at your MOU, or other agreement, to review who has the authority and responsibility to decide on the implementation of the project. If this wasn't agreed upon early in the process, work with your partners to decide how the project should roll out. This is not always the same between jurisdictions or municipalities, and it's not always clear. Is it the mayor? The planning office? The DPW chief? Does the select board or city council need to sign off on the project? What is the information that the decision-maker will expect to receive prior to making the decision?

Decide, too, who will do the installation. Staff capacity, both in terms of skill sets and available time must be among the deciding factors, as your budget allows.

In creating a timeline, keep in mind that certain work is weather and season dependent. Pavement markings, for example, are significantly impacted by temperature. Other considerations are important, too. Nearby projects and their impact, traffic, detouring, and otherwise, are important to be aware of. Even large public events and social timelines, like the school year, can make the difference between a successful implementation and a challenging one.



*Cambridge/Watertown Red Paint // Ad Hoc Industries*

### Questions to consider

- Think about the timeframe for installation – will it be during the school year? The winter? During street cleaning time? What activities do you need to consider?
- Are there other major projects happening at the same time that may impact the area? Be sure to coordinate with your permitting office.

## Example projects:

### Cambridge/Watertown

This multi-jurisdictional endeavor was intended to be a demonstration project that would become permanent after a testing period. At the end of 2018, the project went live with inexpensive paint that was meant to last a year or two, while the project team evaluated traffic and received community feedback in order to make any necessary changes. At the end of 2019, the municipalities repainted the lane to make it permanent. The municipalities had initial challenges in coordinating with DCR to update the signal timing, as the agency owned the traffic signals at Fresh Pond Parkway. Coordinating the signals was as important as the bus lane design for improving travel time and predictability, and helped gain needed support.

### Somerville

When Somerville was poised to roll out their permanent bus lane, a number of other construction projects were taking place at the same time. With so much happening, the community was frustrated by multiple changes in traffic patterns, which caused additional traffic delays. The city learned just how crucial it is to coordinate with other projects and with other elements of a community's calendar such as the school year.



Cambridge/Watertown Cards // Ad Hoc Industries

## Create a list of implementation tasks and materials needed

If you yourself are implementing the bus intervention, it's useful to create a list of tasks and materials that will be necessary for making the intervention a reality. Helpful materials might include electronic (VMS) and static signage, paint, cones, and more. It may also be necessary to think about activities on the corridor, such as trash collection and planned construction projects and permits that have been issued for development along the corridor. Curbside trees may also need to be trimmed so the bus can get by if a parking lane is being repurposed to create a lane for buses.

### Questions to consider

- What materials do you currently have or have access to? What materials will you need to purchase or borrow to implement your project?
- Are there activities happening on the corridor that might complicate the project or implementation, for example, trash collection, business deliveries, or school activity?
- What materials and tasks are needed for the permanent installation?
- Is special permitting or other public agency participation required in order to implement your project?

### Example projects:

#### Roslindale

The Boston Transportation Department (BTD) created a list of tasks and materials during the initial stages of the Washington Street project. The list included all the things the city felt were necessary to make a bus lane happen, including trash collection, making sure they had enough cones in stock, trimming trees, connecting with abutters, etc. Before the project began, BTD also worked with MAPC to conduct a parking study so they would be equipped with data about parking need and utilization, if push-back should occur.



Mack Terrapro//Jason Lawrence, Flickr CC 2.0

**Everett**

Cones were the main item Everett utilized during their pilot. They coordinated with their public works department to create a plan for putting the cones down every morning and picking them back up at the end of the peak morning commute. Placing cones along the route, with appropriate distancing from one another, proved to be a grueling and time-consuming task. After a few days, DPW staff used spray paint to identify where the cones should be placed. This saved DPW staff considerable time every morning.

In addition, MBTA Bus Operations, as well as the MBTA Service Planner for the routes in Everett and Malden made sure that the bus operators were informed and trained about the adjustments they would need to make for the pilot. Simultaneously while planning the physical changes, Everett also coordinated with multiple local media outlets to ensure that residents and commuters were aware of the pilot and to tell the story of how a simple re-allocation of street space could have incredible benefits to users. The local media stories ultimately swayed public opinion, and that of key decision makers, to ensure the decision to make this project permanent would come days after the pilot began.



*Everett Pilot, 2016//Josh Reynolds, Boston Globe*

## Determine operations and management of the new infrastructure

Regardless of what elements you choose to include in your bus priority project, there will be on-going management tasks and decisions. Project budgets should include capital costs, as well as costs for ongoing operations, maintenance, and management.

Enforcement is one management task that has been a challenge in many bus priority projects. Keep in mind that there may be a greater need for enforcement shortly after implementation, when the changes are new to roadway users. While there are many places in our region and beyond where the police may be called upon to provide enforcement, we encourage more creative and equitable strategies for managing the new infrastructure.

In addition, or alternatively to hiring enforcement agents to help manage usage of the lane, you can also consider elements like signage, paint, and cameras to reduce the need for ongoing people presence at the project site.

### Quick tips

Decide ahead of time, in partnership with the MBTA or your local RTA, who (and what vehicles) will be able to use the lane – and how to manage usage on a day-to-day basis. Emergency vehicles such as fire trucks and ambulances could be allowed to use the bus priority lane during emergencies.

Enforcement has proven to be an important aspect of project implementation, especially when the changes are new to the public. Consider working with municipal parking enforcement staff or MBTA police to supplement enforcement at the beginning of the project.

Enforcement of the bus lane can be challenging and expensive. A short term, intense enforcement strategy by parking enforcement staff and extensive signage can encourage desired driver behavior from the onset of the project and set the tone for future success.



# Case Studies

- Arlington's inbound bus lane on Massachusetts Avenue
- Boston's inbound bus lane on Brighton Avenue in Brighton
- Cambridge and Watertown's inbound bus lane on Mount Auburn Street
- Everett's inbound bus lane on Broadway
- Boston's inbound bus lane on Washington Street in Roslindale
- Somerville's bi-directional bus lane on Broadway



## Transit Signal Priority (TSP)

TSP can be a powerful tool to improve both reliability and travel time, especially on corridor streets with long signal cycles and distances between signals.



## Queue Jumps

Queue jump lanes combine short, dedicated transit facilities to allow buses to easily enter traffic flow in a priority position. Queue jump treatments can reduce delay considerably for in run-time savings and increased reliability.



## Dedicated Bus Lane

Dedicated bus lanes are typically used on major routes with frequent headways or traffic congestion that may significantly affect service and reliability.



## Consolidated Bus Stops

Consolidated bus stops are centralized stops that are designed to reduce ride time and improve the flow of traffic. Determining where to place a bus stop will depend on multiple factors, such as street width, intersection features, traffic volume, and more.

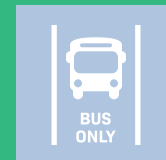
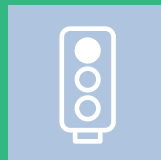
# ARLINGTON

## **Repurposing** Parking to create a Morning Bus Lane

Morning Peak Hour Dedicated Bus Lane

Pilot: October to November 2018 (30 days)

Permanent: October 2019



As bus priority projects began popping up around the Boston region, Arlington staff were observing significant traffic congestion at multiple intersections, especially on Massachusetts Avenue, the main corridor through the Town.

When Arlington first began considering bus interventions, Town staff used the MBTA's boarding data, including how long it took the bus to get through each traffic signal, to understand where bus delays were happening. This was helpful for the team to understand the source of the problem and develop a compelling solution. Arlington saw that Massachusetts Avenue (also known as US Route 3/ State route 2A) was a severe bottleneck for bus traffic. Massachusetts Avenue is a major north-south connector and key route into Cambridge and Boston, which meant that bus improvements would have a substantial impact on reducing commute times for many people.

Town staff decided to pilot bus improvements along this corridor on the inbound direction. Arlington announced that the project was going to have multiple Bus Rapid Transit (BRT) elements. Working with a \$100,000 grant through the Barr Foundation and a team of consultants, and in coordination with the MBTA, City of Cambridge, and the MA Department of Conservation and Recreation, four BRT elements were incorporated into the pilot – transit signal priority (TSP), queue jumps, a dedicated lane, and consolidated bus stops. The BRT proposals were vetted at several community-wide and East Arlington neighborhood meetings.

Like other bus priority projects in the region, Arlington's lane had to work with existing infrastructure. A complete reconstruction of Massachusetts Avenue in East Arlington recently occurred so the Town had to adapt the completed reconstruction to incorporate these BRT elements that were not contemplated when the reconstruction was originally conceived.



*Arlington Bus Stop // Ad Hoc Industries*



ARLINGTON  
BRT

Arlington initiated their month-long pilot on Massachusetts Avenue in the fall of 2018 from the beginning of October to the beginning of November. The bus lane was piloted in the morning peak commuting time from 6:00 a.m. to 9:00 a.m. in the parking lane on the eastbound section of the road between Varnum Street and Alewife Brook Parkway, benefiting MBTA bus routes 77, 79, and 350. The BostonBRT team, led by ITDP, initiated a partnership with the Arlington Commission for Arts and Culture to implement a series of art installations at bus stops along the corridor which brought beauty and a sense of place and comfort to the bus experience during the pilot, which they called ARTBRT.

Throughout the pilot, Arlington led extensive, regular meetings with the business community, neighborhood associations, and elected and volunteer committees. As the project progressed, one local business along the corridor voiced opposition due to the loss of on-street parking. MAPC conducted a parking study that was crucial to dispel assumptions that the reduction of parking spaces would hinder their business. In addition, the Town and ITDP collected survey data from both bus and bike riders using the new infrastructure. The data showed that bus riders were in strong support. After extensive surveying of users, Arlington was able to report that of the 382 responses they received, 73% wanted the bus lane to become permanent.

Due to this strong showing of public support and data showing the success of the project in improving bus travel times and reliability, Arlington's Select Board approved making the pilot permanent in February 2019. However, the project was not implemented until October 2019, a year after the initial pilot project, due to challenges with technical capacity and available funding to design and install the bus lane. The Town worked with the MBTA over the spring and summer of 2019 to address issues related to funding, design, and product sourcing.

Arlington originally considered improvements and a bus lane that would stretch over a mile along Massachusetts Avenue, but the final lane ended up being only about one quarter of a mile. Although this seems short, in the context of the corridor and the severe congestion experienced at the Mass Ave and Alewife Brook Parkway intersection, the bus lane helped address a critical bottleneck for buses they faced on this corridor every morning.

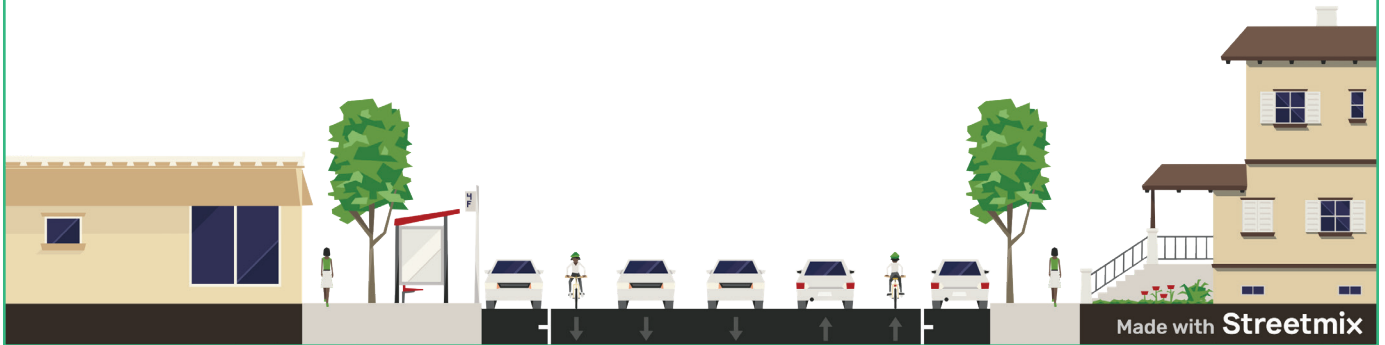
The Town had planned to lay down red glass bead aggregate on only portions of the lane, due to the high cost of the material. After working with the MBTA on the design and discussing the funding issues faced by the Town, the MBTA provided supplemental funding to the red glass bead aggregate the entire bus lane. The permanent installation of the bus lane, primarily the cost of the red glass bead aggregate, initial police details, and signs, was funded by the MBTA and the Town's Transportation Network Company (TNC) funds (payments from the state that disburse fees collected for every TNC ride) for about \$95,000.



*Arlington Public Art // Arlington BRT*

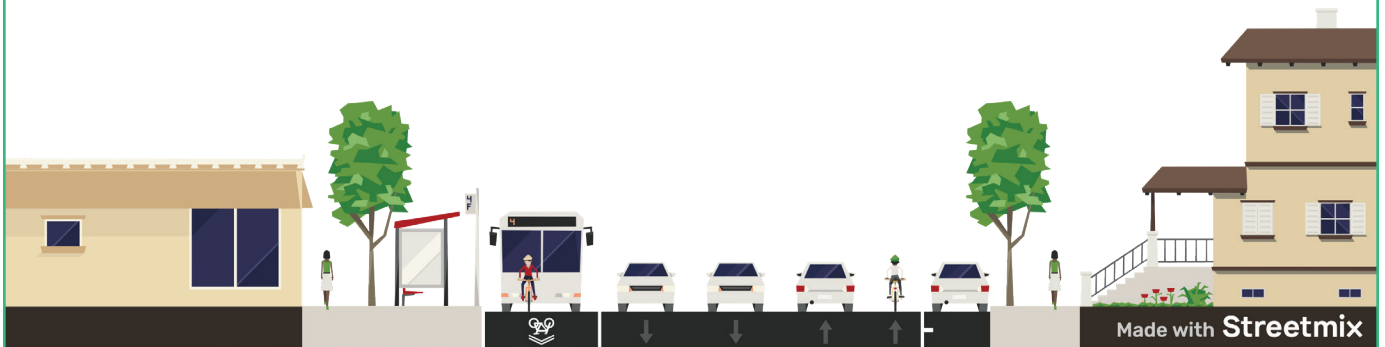
**BEFORE**

Massachusetts Avenue



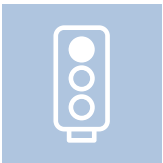
**AFTER**

Massachusetts Avenue



**DATA**

<b>Type of Improvement:</b> AM Peak bus lane (6am-9am)	<b>Land Uses Along Corridor:</b> Commercial and residential
<b>Length of Improvement:</b> 0.22 Miles	<b>Pilot or Direct to Implementation:</b> Pilot first, then permanent
<b>Exact Location:</b> In the parking lane on the eastbound section of the road between Varnum Street and Alewife Brook Parkway on Mass Ave.	<b>Dates of Pilot:</b> October to November 2018 – 30 days
<b>Starting Intersection/Point:</b> Massachusetts Avenue at Varnum Street	<b>Dates of Permanent Implementation:</b> October 2019
<b>Ending Intersection/Point:</b> Massachusetts Avenue at Boulevard Road	<b>Parking Study:</b> Yes (by MAPC)
<b>Weekday Ridership:</b> 10,000 people	<b>Planning Study:</b> None
<b>Vehicles Allowed to Use Bus Lane:</b> MBTA buses, bikes	<b>Average bus rider time saved:</b> 10 minutes
<b>Multimodal Improvements:</b> Bus and bike improvements	<b>Post-implementation Survey Satisfaction:</b> Bus Riders – 81% positive; Bike Riders – 94% positive



# BRIGHTON AVE (BOSTON)

**Transforming** a General-Purpose  
Travel Lane into a  
Shared Bus/Bike Lane

All Day Shared Bus and Bike Lane

Direct to Permanent

Permanent: June 2019





After the success of the Roslindale project, the City of Boston was ready and eager to implement additional bus improvement corridors. The Brighton Avenue bus lane was a natural next project, as it was identified in both [The Prioritization of Dedicated Bus Lanes](#), published in 2016 by CTPS, and [Go Boston 2030](#), published by the City of Boston in 2017. The CTPS report showed that in the morning peak time, approximately 40% of motorized roadway users were on the bus, providing evidence for prioritizing bus riders on this corridor.

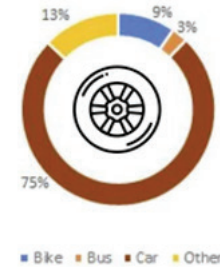
The City considered two design options for the bus lane: “**Option A**,” which would have utilized the parking lane, and “**Option B**,” which utilized one of the two travel lanes. The community’s concern over potential parking loss in the business district led the project team to ultimately choose “Option B,” avoiding any loss of parking along the corridor.

The City and the MBTA made the decision to have Brighton Ave’s bus lane be all day, rather than just for the morning peak time, as was the case for Washington Street in Roslindale. The corridor was wide enough to accommodate parking, a bus lane, and a general-purpose travel lane, so there was no need to restrict the bus lane to peak-only times. Consistent congestion throughout day, partially due to students traveling to the nearby universities, also helped make the case for a dedicated lane. Similar to Roslindale’s bus lane, people on bikes were allowed to share the lane with buses.

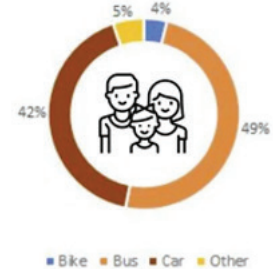
The data collection effort that helped shape the success of Brighton Avenue was led by LivableStreets Alliance (LSA) in partnership with multiple local entities. Business engagement was extremely important. LSA surveyed people walking to and from businesses to ask about their travel mode. Approximately 75 percent of customers were walking, biking, or taking transit to and from local shops, not driving. This became a key talking point with businesses: bus priority would be helping their customers.

The City of Boston and the MBTA thought a lot about curb management for this project, specifically to address double parking, tour buses, and deliveries, all of which were frequent on Brighton Avenue. LSA helped to document curbside management needs, by asking businesses about deliveries and inquiring about employee parking patterns. This allowed LSA, the City, and the MBTA to determine how and when parking and loading space was used and most

AM Peak Vehicles



AM Peak Passengers



The City of Boston’s roadway utilization analysis shows that buses carry more people than private cars on Brighton Avenue during the morning peak hours. Courtesy of the City of Boston Transportation Department.

## CASE STUDY / BRIGHTON AVE



*Brighton Ave Bus and Bike Lane (Before) // BostonBTD*



*Brighton Ave Bus and Bike Lane // City of Boston*

needed on the corridor. To address these challenges, the City decided to relocate a few bus stops and reprogram curb space for additional loading, short-term pick up and drop off, ridesharing, and food delivery.

In collaboration with Allston Village Main Streets (AVMS) and Allston Brighton Health Collaborative, LSA also surveyed bus riders about their user experience. This work revealed the extent to which unreliable bus service was spurring users to switch to ride share services like Uber and Lyft – at high cost. As a whole, the data collection helped show that a bus lane would benefit, not hinder, business activity and transportation along the corridor.

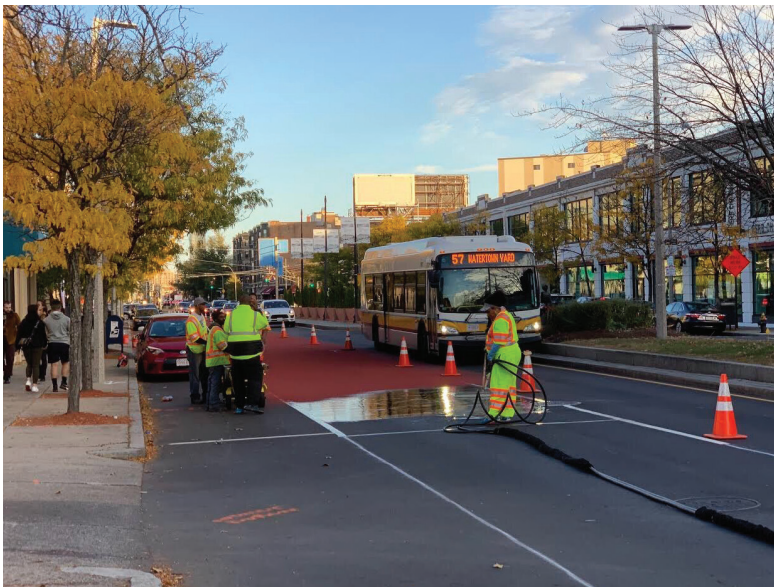
Initially, project roll out was delayed because the City wanted to ensure that the neighborhood was in favor of the project. LivableStreets Alliance sent letters to the district city councilor and at large councilors, the Mayor, and MBTA General Manager, to highlight the significant amount of community engagement work that had been done to date, and the support garnered through those efforts. Due to this widespread support and BTD's previous experience implementing bus improvements in Roslindale, the City made the decision to move straight to permanent implementation, skipping a pilot entirely.

Multiple internal stakeholders helped to make this project possible. Now that Boston's Transportation Department had seen a project in action, they were on board with additional improvements elsewhere in the City. Implementing an all-day bus lane could have been difficult but DPW staff were supportive and crucial to the success of this project. At the time, there was a new process in the City, with a project review committee and project review team. Brighton Avenue was one of the first projects to use this process.

After the project was implemented, an informative experience in shaping the opinion of leadership was Mayor Walsh's bus ride on the corridor. He got to see and feel how the project was working, as well as talk to local business owners that raved about how much they liked the project. Overall, survey data showed that 94% of bus riders ranged between neutral and very satisfied with the lane and 93% of bike riders viewed this project positively. The bus lane resulted in up to a 15% increase in bus ridership and 13% decrease in traffic volumes on Brighton Avenue. ([Reference](#))

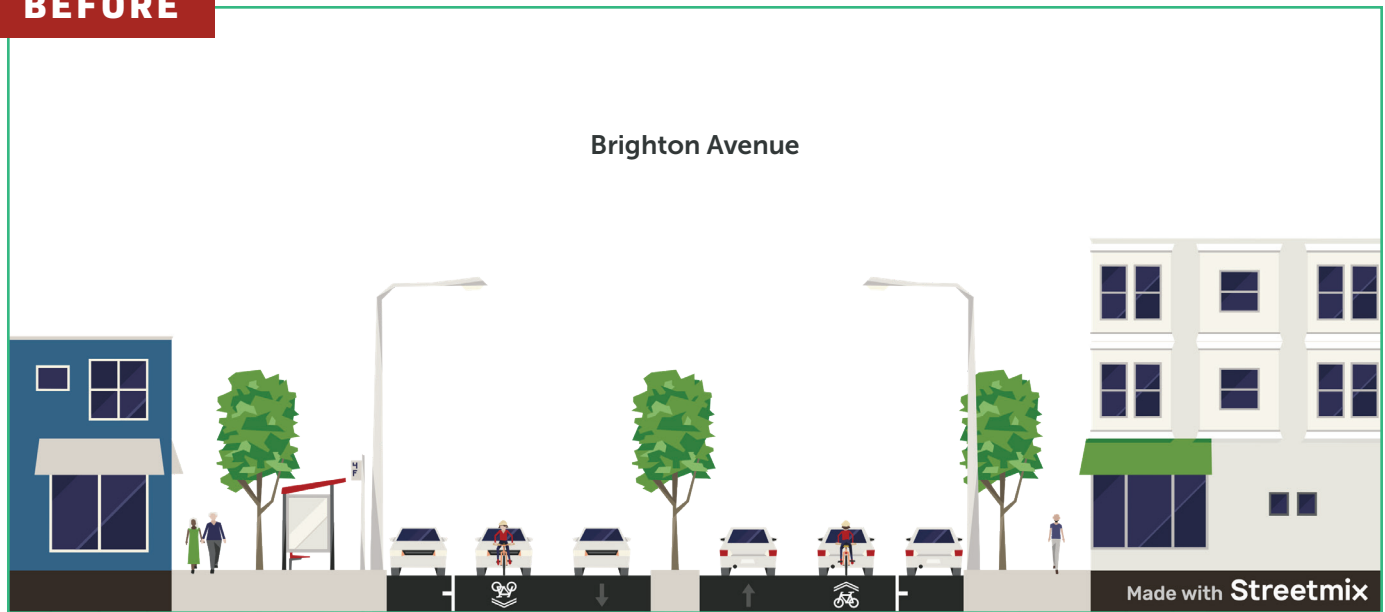
## What happened next?

In the fall of 2019, an outbound bus lane was installed on Brighton Avenue between Union Square and Packards Corner. After evaluating the lane's effectiveness, the City is planning to add curb extensions to the corridor in the spring of 2021, which will improve the reliability of the bus as well as pedestrian safety along Brighton Avenue. With this project, the City is also considering other public realm improvements to reallocate space to enhance the pedestrian and cycling experiences in Allston.

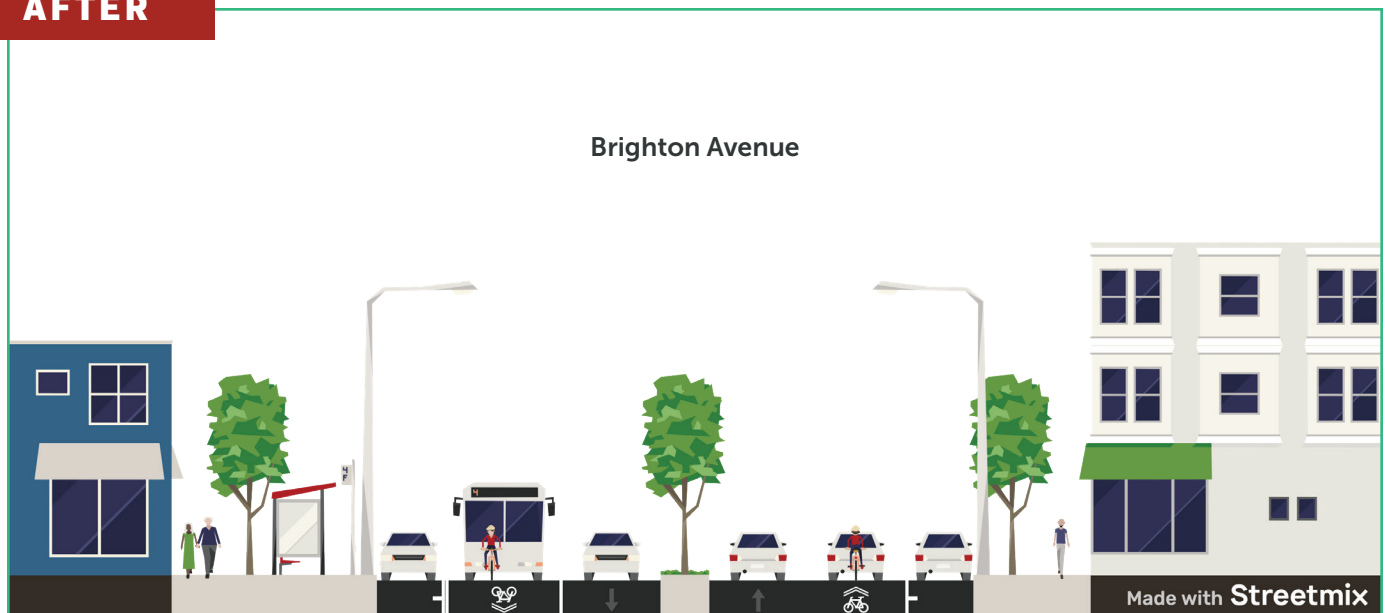


*Brighton Ave Bus and Bike Lane (Before) // BostonBTD*

**BEFORE**



**AFTER**



**DATA**

<b>Type of Improvement:</b> All-day bus lane	<b>Land Uses Along Corridor:</b> Commercial and residential
<b>Length of Improvement:</b> 0.6 Miles	<b>Pilot or Direct to Implementation:</b> Direct to permanent
<b>Bus Routes Along Corridor:</b> 51, 57, 57A, 66	<b>Dates of Pilot:</b> No pilot
<b>Exact Location:</b> Brighton Ave, between Cambridge St and Commonwealth Ave, and between Packard's Corner and Union Square, in Allston	<b>Dates of Implementation:</b> June 2019 (Inbound lane)
<b>Starting Intersection/Point:</b> Brighton Avenue at Islington Street	<b>Parking Study:</b> Yes (by MAPC)
<b>Ending Intersection/Point:</b> Brighton Avenue at Commonwealth Avenue	<b>Planning Study:</b> CTPS (2016) and Go Boston 2030 (2017)
<b>Weekday Ridership:</b> 14,000 bus riders, 1,300 bike riders	<b>Bus Ridership Change:</b> 5.3% increase (morning peak) 8.1% increase (evening peak)
<b>Vehicles Allowed to Use Bus Lane:</b> MBTA buses, bikes	<b>Post-implementation Survey Satisfaction:</b> Bus Riders – 94% neutral to very satisfied Bike Riders – 93% somewhat satisfied to very satisfied
<b>Multimodal Improvements:</b> Bus, bike, and pedestrian improvements	



# CAMBRIDGE/ WATERTOWN

## **Implementing** Bus Improvements Across Municipal Boundaries

All Day Shared Bus/Bike Lane

Pilot: October 2018

Permanent: Fall 2019



One of the three 2018 BostonBRT local pilots funded by the Barr Foundation, this multi-municipal project included not just the two municipalities the project would connect, but also the Department of Conservation and Recreation (DCR), the Massachusetts Bay Transportation Authority (MBTA), and the Massachusetts Department of Transportation (MassDOT) as well as private and non-profit partners.

From 2016-2018, DCR conducted the Mount Auburn Street Corridor Study to develop short- and long-term recommendations for Mount Auburn Street and portions of the adjoining roadways. This study identified bus improvements as one of the short-term recommendations to improve mobility on the corridor. In addition, a Cambridge funded study to identify corridors with the highest levels of delay and unreliability also found that Mount Auburn Street would benefit from bus priority. One of the most influential points that came out of these studies was that over half of the people traveling along this corridor during the morning rush hour were riding the bus, a point prominently featured in the project's communications materials.

Both municipalities were prepared for a project like this one. In Cambridge, staff had previously implemented a quick build project on Cambridge Street with cycling facilities, which gave them experience with rapid and low-cost interventions. It also served to prime internal staff and the general public to think about things differently. Watertown was in the process of redesigning Mt Auburn Street, which prepared them to think big and beyond what is currently there today.



Cambridge-Watertown BRT Banner // Ad Hoc Industries



Cambridge-Watertown Bus Stop // Ad Hoc Industries

## CASE STUDY / CAMBRIDGE-WATERTOWN

The multi-municipal project was intended to be a demonstration project that would become permanent after a testing period. It was driven by a non-binding MOU between the municipalities and the MBTA, signed by both the MBTA General Manager and the MassDOT Secretary of Transportation. The project went live on Mt. Auburn Street in October 2018 with inexpensive paint that was expected to last one to two years. The bus priority lane pilot started from Cottage Street in Watertown and extended to Fresh Pond Parkway in Cambridge, a corridor in which the 71 and 73 MBTA buses traveled.

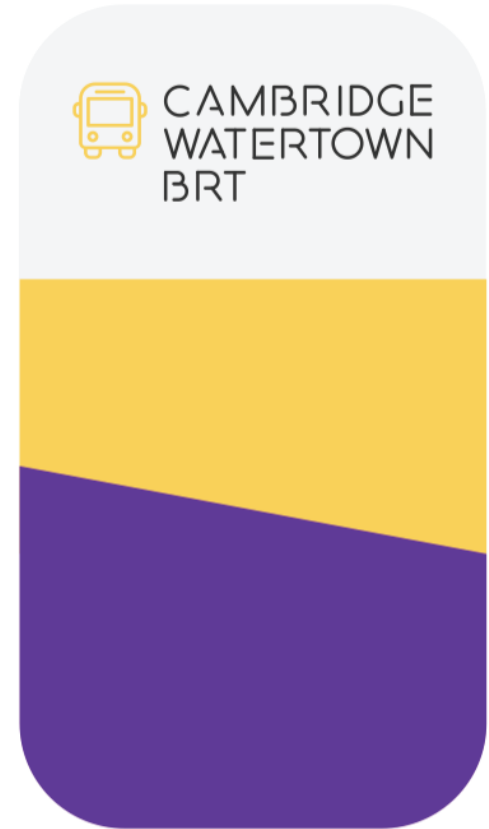
To make the project even more appealing to the public, the cities decided to couple this project with other improvements, like pedestrian and bicyclist safety features, leading to many multi-modal benefits. The pilot repeated practices from other similar projects such as extensive public and neighborhood engagement, multi-stakeholder collaboration, messaging, and more.

The Barr Foundation provided financial support, as well as engineering and marketing support through its BostonBRT initiative. The Cambridge/Watertown pilot was characterized by creative graphics and branding that brought a particularly human element to the notion of BRT and bus lanes through large scale banners and bus stop installations with taglines such as “Dedicated bus lanes; dedicated to you”. The graphic component, purple and yellow, was big, and very people-oriented. They used images showing that although the majority of vehicles were cars, the majority of people were riding the buses, which helped show how inefficiently the street space was being used.

Communications materials were designed to translate transportation lingo into regular language. They focused on words people already knew. Communicating to the public was key to the project’s success – it helped Cambridge and Watertown focus on what is important today, like reducing travel time and gaining predictability in a commute.



*Cambridge-Watertown Branding // Ad Hoc Industries*



*Cambridge-Watertown Branding // Ad Hoc Industries*





Cambridge-Watertown Bike // Ad Hoc Industries

*“It’s important to note how valuable it was to talk to individuals in person. At a public meeting, one person who claimed to represent a medical building on the corridor said that the people in the building were against the project because “no one [in the building] rides the bus”. Because we had talked to people in the building, we were able to share that many people in the building had talked to staff about how excited they were to have the bus lane to help them get to work on time.”*

*– Tegin Teich, Executive Director of CTPS, and former Senior Transportation Planner at the City of Cambridge*

The project team responded to needed changes by focusing their time, money and effort on quick, inexpensive interventions. Some strategies they used included installing flexposts, putting down temporary paint, changing signals, putting up signs, enforcing the lanes, and educating the public on how to use them instead of going through a major reconstruction process. This shift in focus allowed the pilot to happen quickly and be flexible to changes in design, process, and operation.

The project took a lot of constant championing to keep it moving, as well as thorough coordination among all the stakeholders. City staff and elected officials instituted biweekly calls to facilitate coordination with all parties. Cambridge and Watertown hosted joint public meetings, with support from the MBTA. It also built on the public engagement process that was carried out before by DCR as part of the Mount Auburn Street Corridor Study, which was a crucial foundation for the project.

As the pilot took place, the project team evaluated traffic flow and worked with partners to get community feedback. Thanks to funding from the Barr Foundation, the project team was able to receive assistance from the Institute for Transportation and Development Policy (ITDP) both prior to and during the pilot. Before the pilot, ITDP helped gather survey data from bus riders about how bus priority would help their commutes. During the pilot, ITDP managed a street team, trained by LivableStreets Alliance (LSA), to assist with data collection, which included capturing feedback from people who board the bus in the morning and therefore may get the most benefit from the improvements.

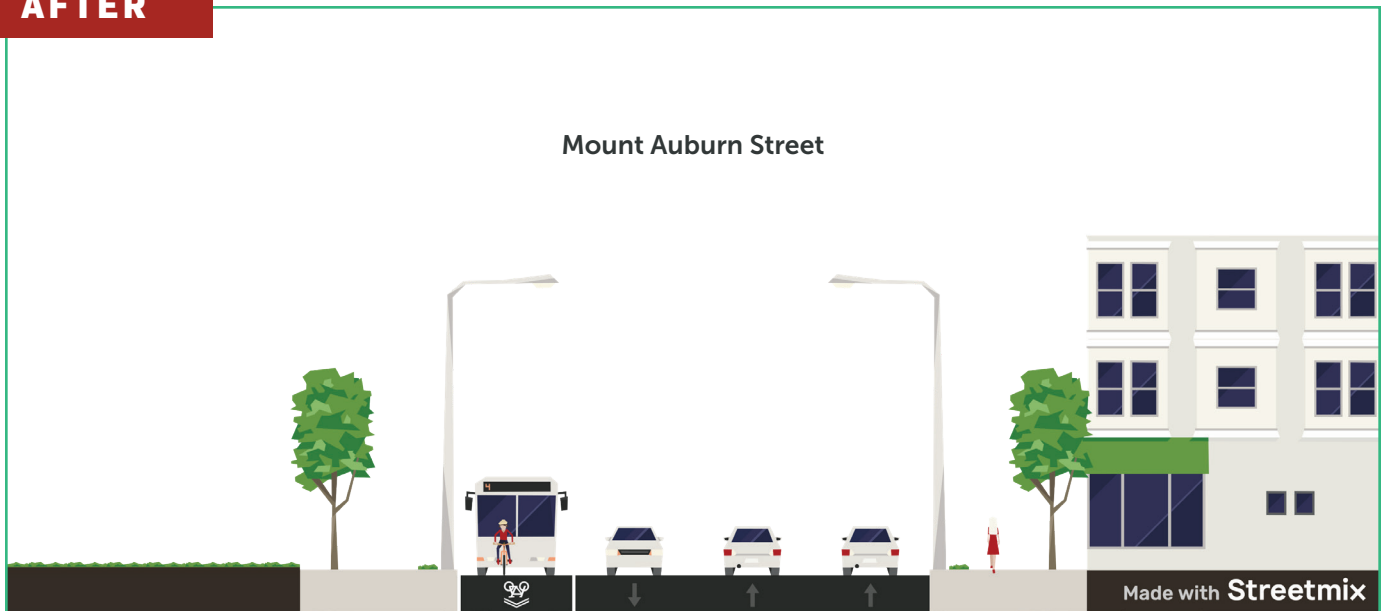
The municipalities repainted the lane at the end of 2019 to make it permanent. There were initial challenges coordinating with DCR to update the signal timing, as they were the owners of the traffic signals at Fresh Pond Parkway. Coordinating the signals was as important as the bus lane design for improving travel time and predictability.

This was a group effort that involved many agencies and helped create new relationships between Cambridge, Watertown and the MBTA to get this project done and formed a basis for working together in the future.

**BEFORE**

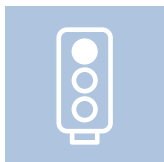


**AFTER**



**DATA**

<b>Type of Improvement:</b> All-day shared bus/bike lane	<b>Multimodal Improvements:</b> Walking, biking, and transit
<b>Length of Improvement:</b> 0.75 miles	<b>Land Uses Along Corridor:</b> Residential, commercial, and open space
<b>Bus Routes Along Corridor:</b> 71, 73	<b>Pilot or Direct to Implementation:</b> Pilot first, then permanent
<b>Exact Location:</b> Mt Auburn St and Belmont St (multiple segments)	<b>Dates of Pilot:</b> October 2018
<b>Starting Intersection/Point:</b> Segment 1: Eastbound on Mount Auburn Street from Belmont Street to Aberdeen Avenue	<b>Dates of Implementation:</b> Fall 2019
<b>Ending Intersection/Point:</b> Segment 2: Eastbound on Belmont Street from Sullivan Road to Mount Auburn Street	<b>Parking Study:</b> No parking was removed for the bus lane
<b>Weekday Ridership:</b> 12,000 bus riders	<b>Planning Study:</b> Mount Auburn Street Corridor Study
<b>Vehicles Allowed to Use Bus Lane:</b> MBTA buses, bikes, shuttles, emergency vehicles	<b>Average bus rider time saved:</b> 4-5 minutes per day
	<b>Post-implementation Survey Satisfaction:</b> Bus Riders – 80% positive



# EVERETT

## **Transforming** a Parking Lane into a Shared Bus/Bike Lane for the Morning commute

Morning Peak Time Dedicated Bus Lane

Pilot: December 2016 to September 2017

Permanent: September 2017



Fast, reliable, and accessible transportation was lacking in Everett, and city officials knew something had to change. A city just north of Boston, Everett saw that its lack of quality transportation options for residents and those passing through were insufficient. Originally the Mayor wanted to explore extending the Orange Line or the commuter rail, both of which would be costly and lengthy projects. However, after MassDOT completed the Everett Transit Action Plan in November 2016, it was clear that bus improvements would be a faster, and cheaper, way to prioritize transit in the City.

Everett's Mayor was a strong believer in the Transit Action Plan and provided the political will for changes to be made. Mode share data showing that 50% of people on the corridor were on the bus was the single biggest thing that convinced the Mayor and his administration that bus riders were not a minority and should be prioritized for street space.

The Everett Transit Action Plan, which included extensive public process, helped set the stage for the City to begin a pilot for bus improvements shortly after the conclusion of the study. Most new planning projects go through a lengthy and typical process of holding nighttime meetings with residents, gathering feedback, and then spending months working with consultants to reach a final design, but this project was different. With the foundation of the Transit Action Plan, the City of Everett made a decision to try a new project implementation process.

In December 2016, immediately after the completion of the Everett Transit Action Plan, the City of Everett piloted the first shared bus/bike lane in the greater Boston region since the Silver Line in Boston. The pilot took place on Broadway, the main thoroughfare through the city which has approximately seventeen bus trips traveling along it during the morning peak period. With the mantra "the pilot is the process," Everett gave one week's notice to residents before restricting parking on one side of the street and putting down cones to designate the space for buses and bikes. A previous MAPC parking study along Broadway gave the City crucial data showing that parking spaces were lightly utilized



*Everett Public Art // BRTBoston*



Everett Postcards // Ad Hoc Industries



Everett Bus Stop // Ad Hoc Industries

prior to 9:00am, which gave City officials the knowledge that parking displacement would not be significant during the pilot.

Using cones was intended to mimic a construction zone, something that drivers would be familiar with and know not to park or drive in. The City used this practice to pilot their bus lane on Broadway's inbound parking lane during the morning peak commute time. Every morning during the pilot the City's public works department would repurpose 200 parking spaces into a shared bus/bike lane with the help of 300 orange cones. By using temporary materials that could easily be moved, removed, or changed, the city had time to understand how the pilot was working and hear about people's experiences before investing a large amount of money into permanently changing the street.

Coordination with external agencies was key. The MBTA ensured that bus drivers for the routes in Everett were informed and trained about the adjustments they would need to make for the pilot. Simultaneously while planning the physical changes, Everett also coordinated with multiple local media outlets to ensure that residents and commuters were aware of the pilot and to tell the story of how a simple re-allocation of street space could have incredible benefits to users.

Results from the pilot showed that the one-mile bus lane cut trip times by 20-30%, which prompted the city to start working on the next steps of bus stop consolidation, transit signal priority, and planning for more bus/bike lanes.

In addition to bus lanes, Everett provided shared, dedicated space for both buses and bikes, where this street previously had no bike infrastructure. The bike community, almost overnight, started to utilize the shared bus and bike lane. The city continued to encourage use by installing Bluebikes bikeshare stations at some bus stops and studying the running speeds of both kinds of vehicles to ensure it would be safe for people riding bikes.

Everett's strategy for implementation gained wide-spread recognition. It was so successful in the eyes of the public and in improving commute times that on day three of the pilot, Everett's Mayor decided to continue the bus/bike lane indefinitely.

According to Julia Wallerice, Boston Program Manager for the Institute for Transportation and Development Policy, “Not only did the bus lane shave time from people’s commutes and improve reliability of the bus, it gave people an overall better bus experience, which contributed to a perception of time savings that was often significantly higher than was actually saved.”

## What happened next?

Everett’s transformative bus lane led to a domino effect in Greater Boston, with numerous other municipalities piloting and laying down permanent fixtures for bus lanes throughout the region. Everett continued their work to prioritize bus service within the city as well. In 2020, a new outbound bus lane was installed on Broadway during the evening peak hours, and new 24-hour bus lanes were painted along the outer edge of Sweetser Circle. To compliment the bus improvements, the city also installed level-boarding platforms, partnered with a local artist to transform a bus stop into a “flower bomb,” and added Bluebikes bikeshare stations near bus stops. All of these improvements worked together to enhance the experience of waiting for and riding the bus, as well as connecting to and from the Broadway corridor.

See **Everett’s Transit Action Plan** for additional information: <https://www.mass.gov/files/documents/2018/07/02/EverettTransitPlan-FinalReport.pdf>

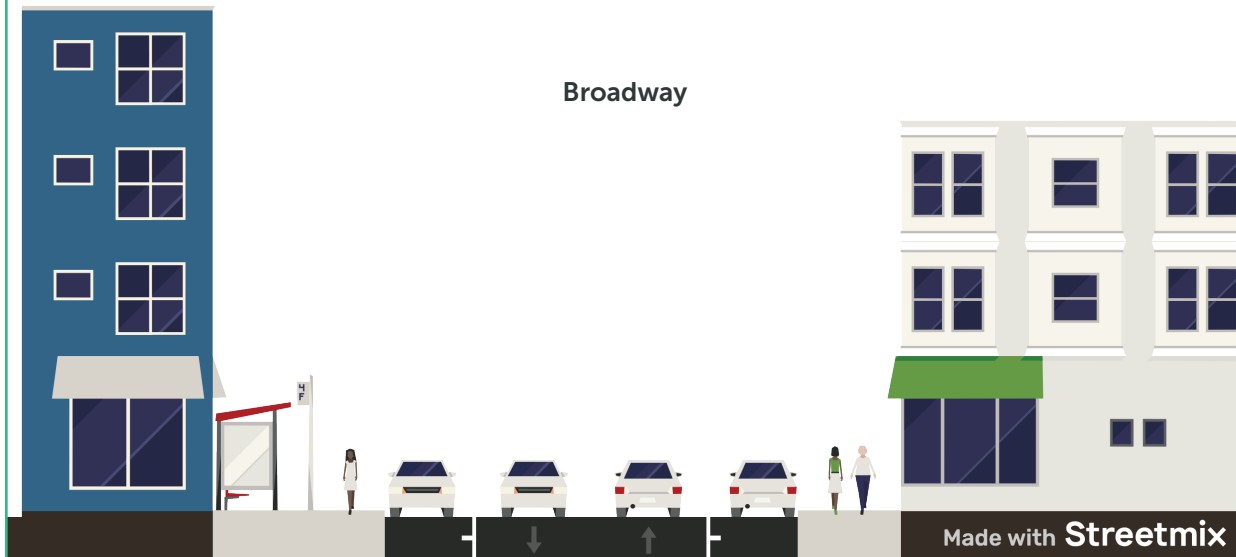


Everett Bus Lane on Broadway // City of Everett

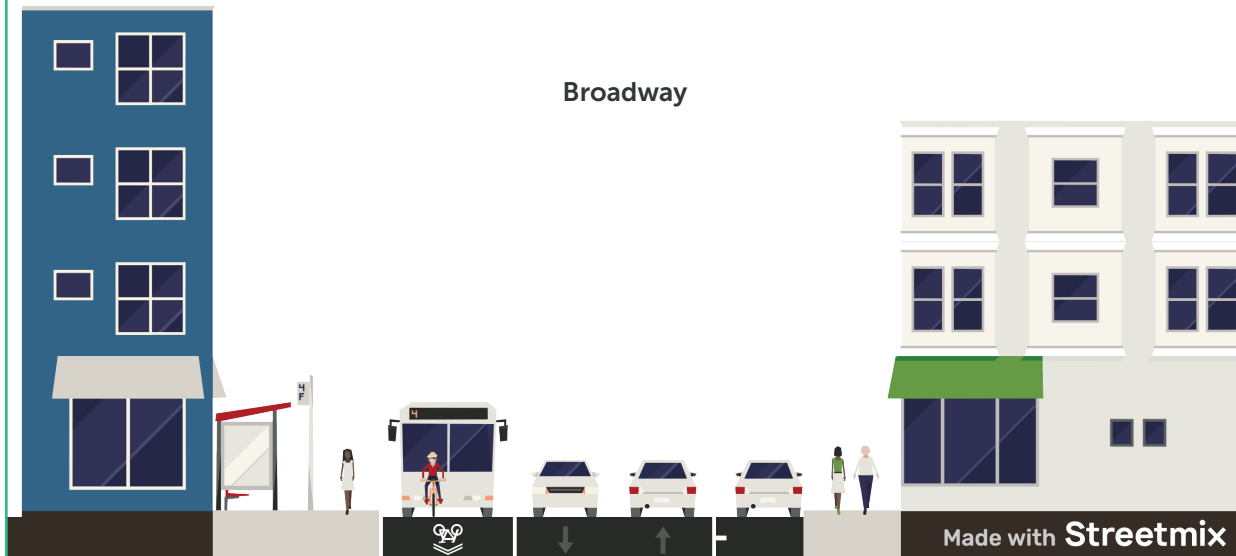


Everett Bus Lane in Sweetser Circle // City of Everett

**BEFORE**



**AFTER**





## DATA

<b>Type of Improvement:</b> AM Peak bus lane (4am-9am)	<b>Land Uses Along Corridor:</b> Commercial
<b>Length of Improvement:</b> 1.14 miles	<b>Pilot or Direct to Implementation:</b> Pilot first, then permanent
<b>Bus Routes Along Corridor:</b> 97, 104, 109, 110, 112	<b>Dates of Pilot:</b> December 2016 – September 2017
<b>Exact Location:</b> Broadway between Ferry St and Route 16	<b>Dates of Implementation:</b> September 2017
<b>Starting Intersection/Point:</b> Broadway at Ferry Street	<b>Parking Study:</b> Yes (by MAPC)
<b>Ending Intersection/Point:</b> Broadway at Sweetser Circle (Route 16)	<b>Planning Study:</b> Everett Transit Action Plan (2016)
<b>Weekday Ridership:</b> 7,500 people	<b>Average bus rider time saved:</b> Up to 8 minutes
<b>Vehicles Allowed to Use Bus Lane:</b> MBTA buses, bikes	<b>Post-implementation Survey Satisfaction:</b> 74% of survey respondents listed "satisfied" or "somewhat satisfied"
<b>Multimodal Improvements:</b> Only bus infrastructure, but bikes allowed to use lane	



# ROSLINDALE (BOSTON)

**Transforming** a Parking Lane  
into a Shared Bus/Bike Lane for  
the morning commute

Morning Peak Hour Shared Bus/Bike Lane

Pilot: December 2017 and May 2018

Permanent: June 2018



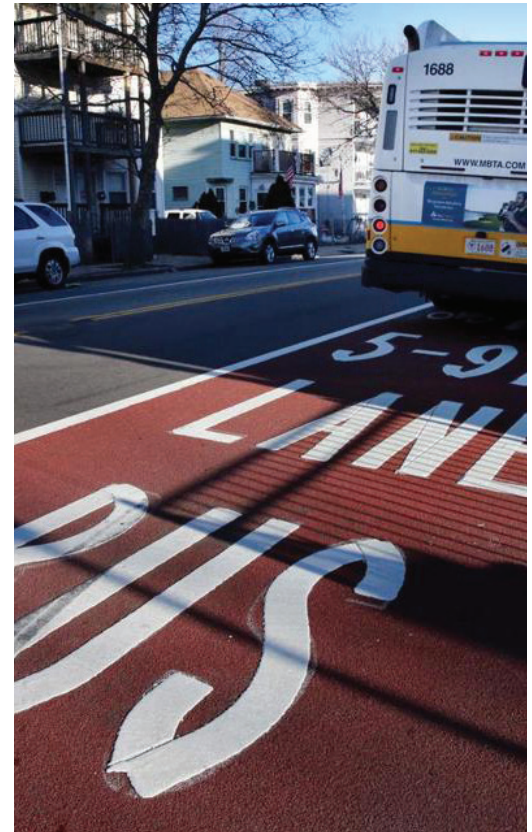
Following on the heels of Everett's success, bus pilot implementation became something like a domino effect in the region. In March 2017, a mere three months after Everett's pilot, the City of Boston released their [Go Boston 2030 plan](#), a multi-year planning effort designed to guide the city's transportation plans and policies for the following decade. One of the top projects identified in this plan was the inbound Washington Street bus lane in Roslindale.

Listed as an "early action project" in Go Boston 2030, the Washington Street bus project was identified as one that would significantly improve bus reliability and speed on a bottleneck corridor with a high number of buses and a large number of bus riders during peak times. The plan proposed to implement bus priority improvements inbound on Washington Street from Roslindale Square to Forest Hills.

In addition to Go Boston 2030, this corridor was identified as a candidate for a bus lane in the Central Transportation Planning Staff's (CTPS) 2016 [Prioritization of Dedicated Bus Lanes](#) report, which examined corridors in the Boston region where ridership is high and buses are routinely delayed in traffic.

With the support from two major planning documents, the Boston Transportation Department (BTD) decided to try out a bus lane on Washington Street. The pilot was designed to utilize the inbound parking lane during the morning peak time, meaning that all those parking spaces needed to be vacated prior to the 5:00 a.m. start time. In 2016, before the pilot began, BTD worked with MAPC to collect parking data and better understand the impacts if parking were to be removed. This also equipped the city with data about parking need and utilization they could show if push-back about parking removal should occur.

After analyzing the data, MAPC concluded that a large number of the parking spaces on Washington Street between Roslindale Square and the Forest Hills MBTA stop were being utilized during the day not by local residents, but instead by commuters using



*Roslindale bus lane // City of Boston*

## CASE STUDY / ROSLINDALE

the corridor for free all-day parking before heading to downtown Boston via the Orange Line train. In addition, only half of the parking spaces in the study area were occupied at 6:00 a.m., and peak demand wasn't until 11:00 a.m., well after the morning pilot would end. After referencing the data, the City decided to restrict all 146 inbound parking spots during the morning peak time, largely used by non-residents, to move forward with a pilot to see if a bus lane would make the morning commute more reliable for thousands of people.

The city created a task force to think through how the pilot would work, which led to new and enhanced cooperation among staff. The Boston Transportation Department (BTD) created a list of tasks and materials during the initial stages of the project. The list included all the things they felt were necessary to make a bus lane happen, including coordination with trash collection, making sure they had enough cones in stock, trimming curbside trees, connecting with abutters, etc.

Street sweeping day was leveraged as the day for the initial "operational pilot" in December 2017. Since cars were already restricted on the inbound side of the street, it was easier to schedule the pilot at the same time. The pilot ran inbound on weekdays during rush hour from 5:00 a.m. to 9:00 a.m. People riding bikes were welcomed to use the lane as well as school buses. Early on, enforcement of the lane was necessary. The City partnered with the MBTA and Boston Police Department to ensure that only buses and bikes were using the dedicated space.

The Go Boston 2030 plan had included extensive and varied community engagement strategies, which gave the city a running start on engagement. All the feedback gained from the multi-year planning process allowed the city to move this project forward LSA more quickly than would have been possible otherwise.



Roslindale Community Engagement // LSA



Roslindale Implementation // LSA

Although a traditional engagement process wasn't planned for this project, many less formal methods were employed to engage with the local community. The city received on the ground support from MAPC and LivableStreets Alliance (LSA), supported by the Barr Foundation. LSA played a huge role in talking to bus and bike riders along the corridor. From these conversations, LSA and MAPC collected a significant amount of qualitative and quantitative data from both bus and bike riders. They also partnered with local groups WalkUp Roslindale, Rozzie Bikes, and Roslindale Village Main Streets. Outreach for this project involved business owners, and large housing complexes. The City did extensive flyering in the area and used variable message boards both before, during, and after implementation to keep everyone informed about the use of the lane, and any upcoming alerts.

All the on-the-ground efforts by LSA, local groups, and volunteers, including extensive surveying of roadway users, ultimately led to one of the biggest talking points about the project – that 94 percent of people riding the bus along Washington Street supported the bus lane. In addition, 92 percent of bus riders perceived that the lane decreased their travel time, and 89 percent of cyclists reported feeling safer in the shared lane. This data convinced the City of Boston to make the bus lane permanent.

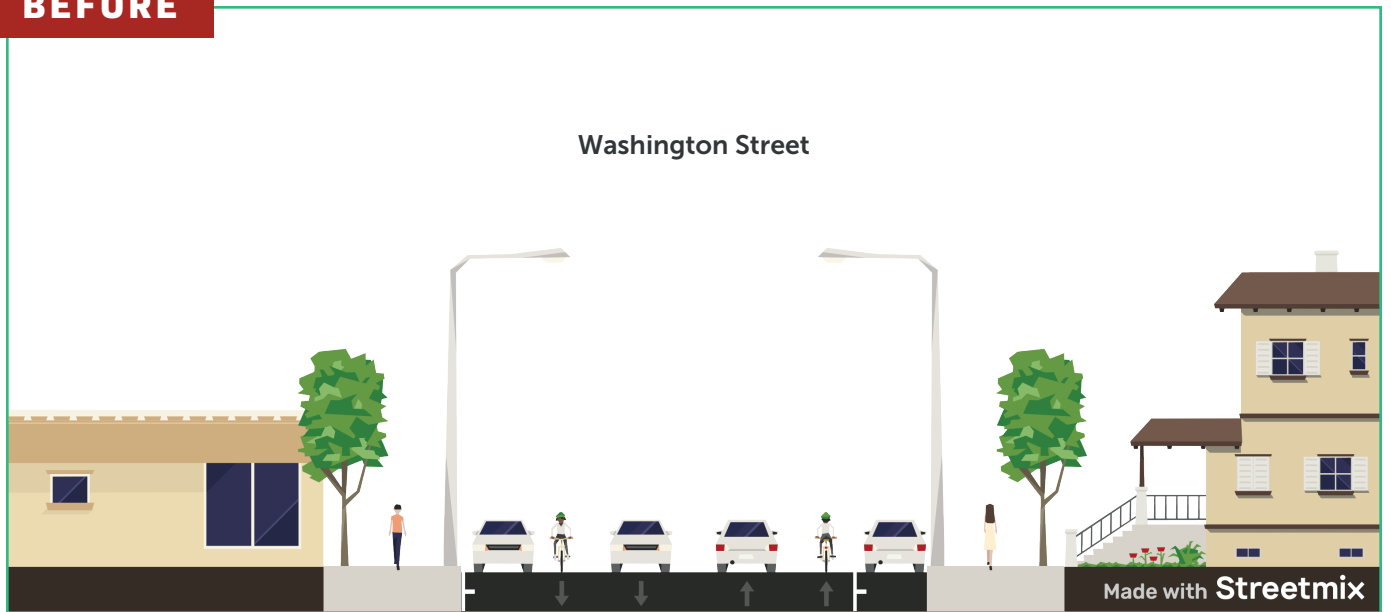
On June 7, following a continuous four-week spring pilot, the City of Boston announced the permanent installation of the inbound Washington Street bus lane in Roslindale.

**“Washington Street was the perfect candidate for the bus lane pilot and had already been identified in our Go Boston 2030 transportation plan. The corridor was experiencing some pretty significant delays for transit riders stuck in mixed traffic trying to make their way to Forest Hills and data showed the majority of roadway users were actually bus riders, not motorists. Converting the parking lane to use as a bus lane seemed as much of an issue of fairness as anything else and it turned out the intervention ended up saving bus riders at least an hour of commuting time in the mornings over the course of a week. When we saw that 94% of bus riders supported the lane, we knew this was an intervention we should replicate around the City.” – Patrick Hoey, Boston Transportation Department**

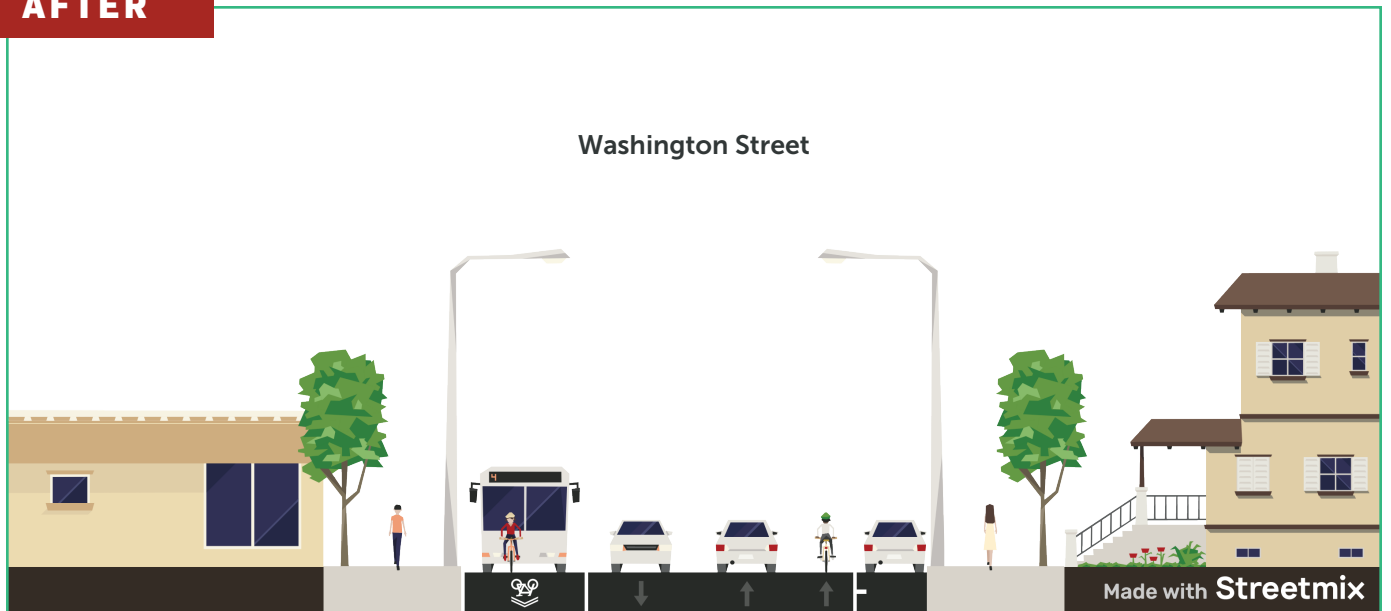
## What happened next?

After the success of the inbound bus lane, the Boston Transportation Department, in partnership with the MBTA, implemented an outbound afternoon peak bus lane on Washington Street from Forest Hills to Roslindale Square. This lane operates from 2:00 p.m. to 7:00 p.m, allowing a faster trip home for thousands of commuters. This lane was identified a priority project in the [City's Healthy Streets initiative](#) in response to the COVID-19 pandemic. The lane is expected to be painted in spring 2021, in conjunction with more improvements on the corridor.

**BEFORE**



**AFTER**



## DATA

**Type of Improvement:**

AM Peak bus lane (5am-9am)

**Land Uses Along Corridor:**

Commercial and residential

**Length of Improvement:**

1.03 miles

**Pilot or Direct to Implementation:**

Pilots first (2 1-day pilots in December, followed by a 4 week pilot in May), then permanent

**Bus Routes Along Corridor:**

14, 30, 34, 34E, 35, 36, 37, 40, 50, 51

**Dates of Pilot:**

December 2017 and May 2018

**Exact Location:**

Washington Street, inbound from Roslindale Village (Cummins Highway) to Forest Hills Station (Ukraine Way)

**Dates of Implementation:**

June 2018

**Starting Intersection/Point:**

Washington Street at Cummins Highway

**Parking Study:**

Yes (by MAPC)

**Ending Intersection/Point:**

Washington Street at Ukraine Way

**Planning Study:**

Go Boston 2030

**Weekday Ridership:**

19,000 people

**Average bus rider time saved:**

1 hour per week

**Vehicles Allowed to Use Bus Lane:**

MBTA buses, bikes, BPS school buses

**Post-implementation Survey Satisfaction:**

Bus Riders – 94% positive

Bike Riders – 92% positive

**Multimodal Improvements:**

Only bus infrastructure, but bikes allowed to use lane



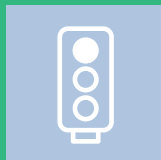
# SOMERVILLE

## **Redesigning** a wide boulevard to serve multiple travel modes

All Day Dedicated Bus Lane

Direct to Permanent

Permanent: August 2019



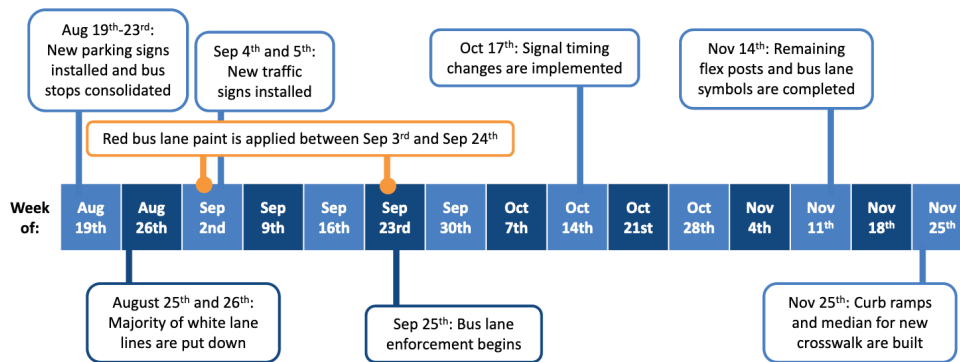


While many bus priority projects were starting to kick off in neighboring municipalities through the BostonBRT program, the City of Somerville built on the momentum of its first bus lane project in late 2017 on Prospect Street and began implementing its second in 2019 on Broadway in the Winter Hill neighborhood. The City coordinated closely with BostonBRT partners, and leveraged lessons learned from participating municipalities to deliver meaningful transit solutions.

The Broadway project followed an interesting trajectory. In 2014, the City initiated community engagement and design development for reconstruction of the project corridor. As the construction project was approaching final design in late 2016, the City was notified that they were required to contribute \$50 million to MassDOT to prevent the MBTA Green Line Extension light-rail project from being cancelled. The new financial pressure caused the City to defer the Broadway reconstruction. City staff began investigating “quick-build” strategies to deliver safety and mobility improvements on a severely constrained budget.

Knowing that this corridor could benefit from a range of improvements, the City sent out a survey to residents asking what they wanted improved along Broadway. The survey generated more than 1,000 responses, which suggested that the road was serving motorists well, but that the experiences for people traveling in other ways were subpar. Somerville staff compared their survey data to MBTA data which supported the results from the survey that bus congestion was a problem during peak times.

## Central Broadway Project Timeline



Central Broadway Project Timeline // City of Somerville

## CASE STUDY / SOMERVILLE

From their survey results, the City developed a new project, branded “[Winter Hill in Motion](#).” The initial concept proposed bus queue jump lanes at high-delay intersections, along with segments of protected bike lanes. As public review of the design concept proceeded, stakeholders encouraged the City to pursue more aggressive bus and bike treatments. City staff began exploring an offset bus lane configuration, replacing a general purpose travel lane rather than parking lanes. Traffic signal upgrades and retiming were identified as a key strategy to maximize the benefit of the bus lanes and simultaneously mitigate potential queuing in the general-purpose lanes. Bus stop consolidation was used to reduce dwell times and create stop frequencies meeting MBTA standards.

The final design featured a half-mile long, bi-directional, all-day bus lane between McGrath Highway (State Route 28) and Main Street at the top of Winter Hill. Unlike many other communities in the region that piloted projects before implementing, Somerville was able to utilize lessons learned from previous projects in neighboring municipalities and go straight to a permanent installation. They did, however, replicate the non-traditional engagement approach modeled by many other local projects.

The City reached out to neighborhood associations, community-based organizations, bicycle advocates, business owners, city councilors, and the MBTA. LivableStreets Alliance was contracted to train volunteers to flyer the neighborhood, interview people biking and riding the bus, and perform merchant interviews in multiple languages. A traditional project webpage was created to host important project information. Despite this mixture of traditional and non-traditional approaches, some community stakeholders reported feelings of being caught by surprise when the project was implemented in late 2019.

Project implementation was exceptionally challenging. The City’s proposed implementation sequence assumed that traffic signal equipment would be upgraded and retimed prior to operation of the new bus lanes. Scheduling challenges with contractors forced the City to reverse this sequence, opening the bus lanes and eliminating the general purpose lanes without the benefit of signal retiming. Traffic queues were exacerbated by major regional detours associated with the Green Line construction. Public opposition was severe, and a major controversy erupted in the weeks leading up to Somerville’s municipal elections.



*Broadway Bus Lane // MBTA*

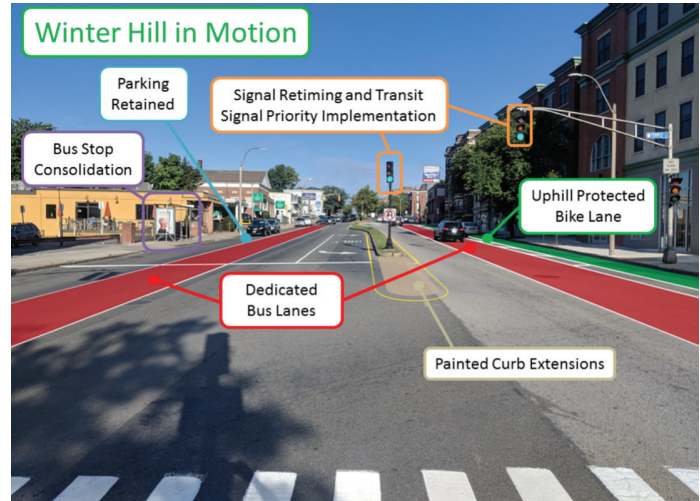
Somerville's Mayor stood firm throughout the turbulent fall season, assuring stakeholders that traffic patterns would adjust and that the City's commitments to transit equity and climate action required projects of this scale and ambition. The Mayor visited bus stops and rode on Broadway's two bus routes to engage with constituents. He attended a town hall meeting hosted by City staff, facing aggressive and emotional advocacy to eliminate the bus lane and return to the status quo. In early November, the Mayor won reelection.

During the month of November, the City prioritized a quantitative evaluation of the "Winter Hill in Motion" project to date. City staff and consultants analyzed safety data, travel time data, bus ridership, motor vehicle volumes and motor vehicle speeds. The results were presented in a formal City Council public hearing in December. Although project opponents remained organized and vocal, project supporters mobilized effectively and helped create a positive framing.

One of the most compelling data points for the project emerged in February 2020. MBTA ridership data compared the representative four-week period of January 2019 against January 2020. Post-bus lane weekday ridership on MBTA Route 89 was documented to be 36% higher than the equivalent period twelve months earlier. In absolute terms, the data showed that approximately 1,000 more weekday customers chose to use the bus after the new bus lanes were created. Saturday ridership was up 58% and Sunday ridership was 69% higher in 2020 compared with 2019.

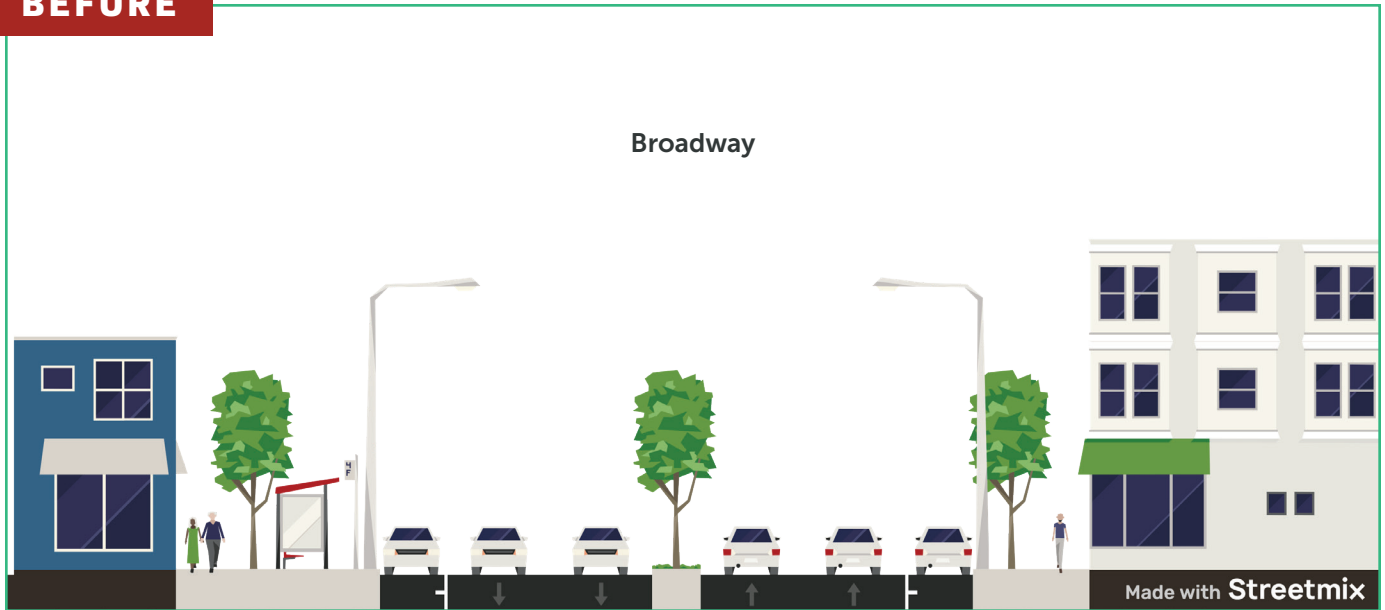
## What happened next?

The City of Somerville worked in 2020 to document lessons learned from the Broadway bus lane project and apply them citywide to quickly scale its bus priority program. The City implemented three dedicated bus lane projects as part of its COVID-19 public health response in 2020. In 2021 the City plans to implement three more bus lane projects, including a bus facility pilot on a major state highway facility (Route 38 / Mystic Avenue).

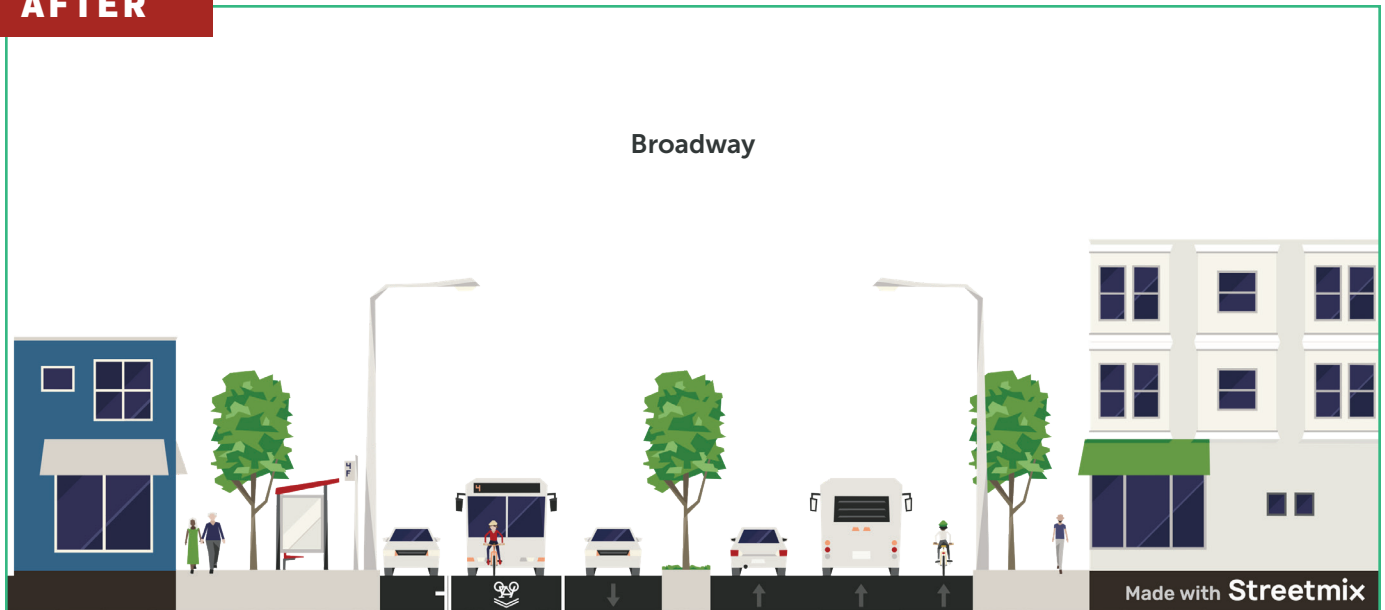


*Winter in Motion // City of Somerville*

**BEFORE**

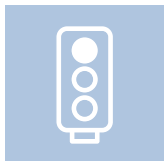


**AFTER**



**DATA**

<b>Type of Improvement:</b> All day bus lane	<b>Land Uses Along Corridor:</b> Commercial and residential
<b>Length of Improvement:</b> 0.59 Miles	<b>Pilot or Direct to Implementation:</b> Direct to permanent
<b>Bus Routes Along Corridor:</b> 89, 101	<b>Dates of Pilot:</b> None
<b>Exact Location:</b> Broadway between Magoun Square and McGrath Highway	<b>Dates of Implementation:</b> August 2019
<b>Starting Intersection/Point:</b> Broadway at Magoun Square	<b>Parking Study:</b> No
<b>Ending Intersection/Point:</b> Broadway at McGrath Highway	<b>Planning Study:</b> Winter in Motion
<b>Weekday Ridership:</b> 8,000 people	<b>Average bus rider time saved:</b> One minute
<b>Vehicles Allowed to Use Bus Lane:</b> MBTA buses	<b>Post-implementation Survey Satisfaction:</b> Bus Riders – 80% positive
<b>Multimodal Improvements:</b> Bus, bike, and pedestrian improvements	



# Closing

**As you've seen,** bus priority in the Boston region has taken on multiple different forms, strategies, and tactics. Rarely has any other major transportation improvement made such a strong impact on dense, urban mobility, and received such strong community support.

These projects have changed the assumption that successful transportation projects are impossible without months, even years, of pre-construction planning and public meetings. It is possible to do a project quickly, efficiently, and at low-cost, using existing materials and street space, and build public support while doing it.

These projects brought tactical urbanism into the mainstream planning process. Now, the door is open for experimentation and innovation.

## **Now it's your turn.**

Improving bus transit in your community is a step towards achieving climate benchmarks, equity goals, safer streets, and a more mobile community. Not only that, it works.

# Appendix

## Descriptions of Bus Improvement Options

### Bus Rapid Transit

Bus Rapid Transit (BRT) is a high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations. BRT has advanced throughout the U.S. in the last decade as congestion has increased and community leaders have sought affordable transit alternatives. BRT systems operate in big cities like Los Angeles and Pittsburgh, and is growing in popularity among mid-sized metropolitan areas like Eugene, Oregon, and Cleveland.

Because BRT contains features similar to a light rail or subway system, it is often considered more reliable, convenient and faster than regular bus services. With the right features, BRT is able to avoid the delays that can slow regular bus services, like being stuck in traffic and queuing to pay on board.<sup>11</sup> See a list of [BRT reports and resources](#).

For more information, visit the Federal Transit Administration's website here: <https://www.transit.dot.gov/research-innovation/bus-rapid-transit>

### Dedicated bus lanes

Dedicated bus lanes are typically used on major routes with frequent headways (10 minutes or less at peak) or where traffic congestion may significantly affect service and reliability. As on-time performance degrades, consider more aggressive treatments to speed transit service such as all door boarding, transit-signal priority, and center-running bus lanes, which remove bus lane conflicts with right turning vehicles, although left turn movements across the center-running lane will need to be managed through signal phasing. Agencies may set ridership or service standard benchmarks for transitioning bus service to a transit-only facility. Lanes may be located immediately at the curb or in an offset configuration, replacing the rightmost travel lane on a street.<sup>12</sup>

For more information, visit NACTO's website: <https://nacto.org/publication/urban-street-design-guide/street-design-elements/transit-streets/dedicated-curb-side-offset-bus-lanes/>

### Shared bus/bike lanes

The shared bus-bike lane is not a high-comfort bike facility, nor is it appropriate at very high bus volumes. However, buses and bicycles often compete for the same space near the curb. On streets without dedicated bicycle infrastructure, curbside or offset bus lanes frequently attract bicycle traffic, prompting some cities to permit bicycles in bus lanes.

Shared bus-bike lanes can accommodate both modes at low speeds and moderate bus headways where buses are discouraged from passing, and bicyclists pass buses only at stops. In appropriate conditions, bus-bike lanes are an option on streets where dedicated bus and separate high-comfort bicycle facilities cannot be provided.<sup>13</sup>

For more information, visit NACTO's website: <https://nacto.org/publication/transit-street-design-guide/transit-lanes-transitways/transit-lanes/shared-bus-bike-lane/>

### Queue jumps

Queue jump lanes combine short, dedicated transit facilities with either a leading bus interval or active signal priority to allow buses to easily enter traffic flow in a priority position. Applied thoughtfully, queue jump treatments can reduce delay considerably, resulting in run-time savings and increased reliability.<sup>14</sup>

For more information, visit NACTO's website here: <https://nacto.org/publication/transit-street-design-guide/intersections/intersection-design/queue-jump-lanes/>



*Everett Bus/Bike Lane*



## Transit Signal priority

Transit Signal Priority (TSP) tools modify traffic signal timing or phasing when transit vehicles are present either conditionally for late runs or unconditionally for all arriving transit. TSP can be a powerful tool to improve both reliability and travel time, especially on corridor streets with long signal cycles and distances between signals. In urban contexts, TSP benefits are significantly amplified when implemented alongside other strategies like dedicated transit lanes.<sup>15</sup>

For more information, visit NACTO's website here: <https://nacto.org/publication/transit-street-design-guide/intersections/signals-operations/active-transit-signal-priority/>

## All-Door Boarding and Off-Board Fare Collection

The time required for on-board fare collection can slow bus operations significantly. The more successful the service is, the greater the problem, as additional passengers create delays at every stop. Moving all fare collection off the bus offers the greatest potential for reducing dwell time. Not only is fare payment time reduced to zero, but all doors of the bus can be used for both loading and unloading.<sup>16</sup>

For more information, visit the Federal Transit Administration's website here: <https://www.transit.dot.gov/research-innovation/fare-collection>

## Bus Stop Placement

Where the bus stop is placed, whether it be before the intersection, after the intersection, in-lane, or in line with parking, is important to the flow of traffic through the intersection. Determining where to place a bus stop will depend on multiple factors, such as street width, intersection features, traffic volume, and more.

For more information, visit NACTO's website here: <https://nacto.org/publication/transit-street-design-guide/stations-stops/stop-design-factors/stop-placement-intersection-configuration/>

## Curb Extensions

Curb extensions visually and physically narrow the roadway, creating safer and shorter crossings for pedestrians while increasing the available space for street furniture, benches, plantings, and street trees. They may be implemented on downtown, neighborhood, and residential streets, large and small.

Curb extensions have multiple applications and may be segmented into various sub-categories, ranging from traffic calming to [bus bulbs](#) and [midblock crossings](#).<sup>17</sup>

For more information, visit NACTO's website here: <https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/>

### **Bus Bulb-Outs**

Bus bulbs are curb extensions that align the bus stop with the parking lane, allowing buses to stop and board passengers without ever leaving the travel lane.

Bus bulbs help buses move faster and more reliably by decreasing the amount of time lost when merging in and out of traffic.<sup>18</sup>

For more information, visit NACTO's website here: <https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/bus-bulbs/>

### **Supporting infrastructure improvements:**

#### **Intersection improvements**

There are multiple guides that offer ideas and suggestions for intersection improvements, which can be incorporated into bus improvement projects. Here are a few to consider:

- [NACTO's Transit Street Design Guide, Intersection Design for Transit](#)
- [NACTO's Urban Street Design Guide, Intersection Design Elements](#)
- [NACTO's Don't Give Up at the Intersection](#)
- [NACTO's Urban Street Stormwater Guide, Reclaimed Intersections](#)

#### **Bike and Pedestrian Improvements**

There are multiple guides that offer ideas and suggestions for bike and pedestrian improvements, which can be incorporated into bus improvement projects. Here are a few to consider:

- [NACTO's Urban Bikeway Design Guide](#)
- [NACTO's Designing for Pedestrians](#)
- [FTA's Bikeway Selection Guide](#)
- [MassDOT's Separated Bike Lane Planning and Design Guide](#)

## Links to resources

### Data Sources:

- [MBTA's Bus Transit Priority Evaluation Dashboard](#)
- [CTPS's Prioritization of Dedicated Bus Lanes](#)
- [ITDP's Progress of Bus Lanes in the Boston Area](#)
- [ITDP's Tracking Bus Lanes](#)

### US examples of BRT:

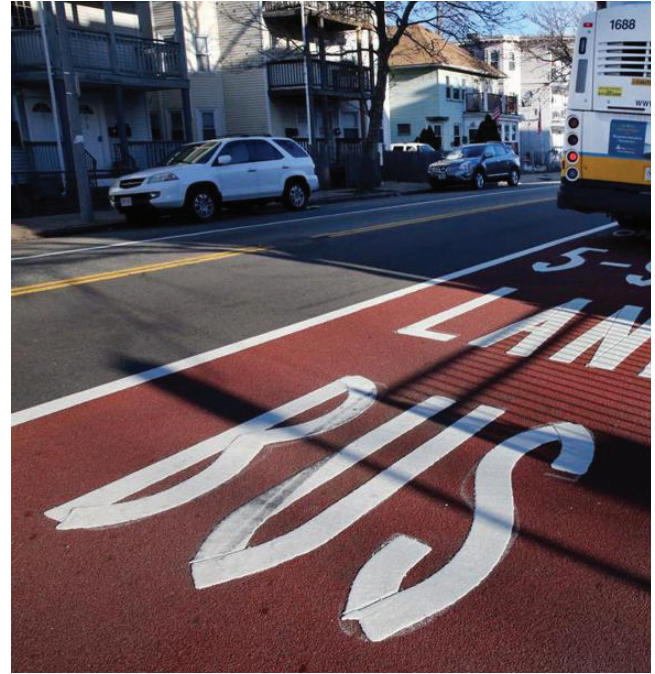
- [ITDP's Getting to BRT: An Implementation Guide for U.S. Cities](#)
- [ITDP's Everett BRT Playbook](#)

### Local examples of municipal plans:

- [Everett Transit Action Plan](#)
- [Allston-Brighton Mobility Plan](#)
- [Go Boston 2030](#)

### Other:

- [LivableStreets Alliance's Tight Spot: Determining When Buses + Bikes Should Share Spaces, and How to Make it Work](#)
- [LivableStreets Alliance's 64 Hours: Closing the Bus Equity Gap](#)



Roslindale Bus Lane // City of Boston

# End Notes

- 1 <https://www.transit.dot.gov/sites/fta.dot.gov/files/FINALBOSTONBRTREPORT062507.pdf>
- 2 <https://www.boston.com/uncategorized/noprimarytagmatch/2012/08/03/silver-line-10-years-of-history-changes>
- 3 <https://www.boston.com/uncategorized/noprimarytagmatch/2012/08/03/silver-line-10-years-of-history-changes>
- 4 <https://www.wgbh.org/news/local-news/2019/07/18/why-bostons-first-designated-bus-lane-project-failed>
- 5 <https://www.wgbh.org/news/local-news/2019/07/18/why-bostons-first-designated-bus-lane-project-failed>
- 6 <https://www.wgbh.org/news/local-news/2019/07/18/why-bostons-first-designated-bus-lane-project-failed>
- 7 <https://www.wgbh.org/news/local-news/2019/07/18/why-bostons-first-designated-bus-lane-project-failed>
- 8 <https://www.itdp.org/event/boston-bus-pilots-to-permanent-impacts/>
- 9 <https://www.boston.gov/departments/transportation/roslindale-bus-lanes>
- 10 <https://www.boston.gov/departments/transportation/roslindale-bus-lanes>
- 11 FTA's Bus Rapid Transit <https://www.transit.dot.gov/research-innovation/bus-rapid-transit>
- 12 NACTO Urban Street Design Guide <https://nacto.org/publication/urban-street-design-guide/street-design-elements/transit-streets/dedicated-curbside-offset-bus-lanes/>
- 13 NACTO Urban Street Design Guide <https://nacto.org/publication/transit-street-design-guide/transit-lanes-transitways/transit-lanes/shared-bus-bike-lane/>
- 14 NACTO's Transit Street Design Guide <https://nacto.org/publication/transit-street-design-guide/intersections/intersection-design/queue-jump-lanes/>
- 15 NACTO's Transit Street Design Guide <https://nacto.org/publication/transit-street-design-guide/intersections/signals-operations/active-transit-signal-priority/>
- 16 FTA's Fare Collection <https://www.transit.dot.gov/research-innovation/fare-collection>
- 17 NACTO's Urban Street Design Guide <https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/>
- 18 NACTO's Urban Street Design Guide <https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/bus-bulbs/>