Chapter 5:

Bus Stop Treatments

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Bus Stops Overview

Bus stops serve as the gateway to the MBTA system. Everyday, thousands of trips start and end at a bus stop. Safe, accessible, and comfortable bus stops provide a more pleasant experience for riders and improve bus operations, making them a key pillar of the MBTA Better Bus Project. Bus stop treatments reduce bus dwell time, provide more space and separation from pedestrians and bicyclists, and enable in-lane stop access. These improvements help to make buses a more competitive and reliable mode of transportation, further supporting transit priority.

Sources of Delay

Bus priority benefits are lessened by excessive dwell time, when buses spend longer than necessary at bus stops, and frequent stop spacing. Delays at bus stops can occur in the following scenarios:

- **Pulling into a bus stop** Inaccessible boarding areas and insufficient stop lengths make it challenging for operators to reach the curb increasing the boarding time. In addition, if the stop is nearside the bus can experience signal delay if it misses it's green light while passengers are boarding.
- **Passengers boarding and alighting the bus** The volume of passengers at a stop can slow down bus service if there is high ridership and on-board, front-door fare-collection.
- **Exiting and reentering traffic** Buses may need to merge into the parking lane, bike lane, or shoulder to serve a stop and then, after passengers board, find a gap in traffic to reenter. Reentering traffic can be challenging when traffic volumes or traffic speeds are high.
- **Frequent stop spacing** Each bus stop has the potential for merge, signal, and boarding delays. These delays add up and can quickly cause a snowballing effect that results in service that is slow and unreliable. For more guidelines on preferred stop spacing see the MBTA Bus Stop Planning and Design Guide.
- **Stop Accessibility** Inaccessible boarding areas and insufficient stop length can also make it more difficult to board, increasing boarding time.

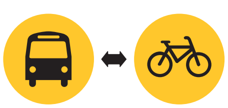
Implementation Considerations

To reduce dwell time and improve bus speed and reliability, municipalities should consider the following design treatments and approaches:

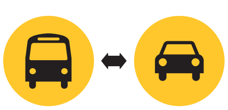
- **Farside stop placement** MBTA prefers farside stops to take advantage of transit signal priorirty (TSP), reduce signal delay, and allow riders to cross behind the bus.
- **All-door boarding** Can reduce dwell time significantly by eliminating the need for the operator to collect or verify fares. All-door boarding requires off-board fare collection.
- **Bus bulbs and floating bus stops** Allow for in-lane operations in cases where there are not curbside bus lanes. Bus bulbs and floating bus stops eliminate the need to exit and reenter traffic—reducing delays. In addition, they reduce crossing distances, improve visibility, and slow down turning vehicles improving corridor safety. See median boarding platforms (p. 94) for design and implementation considerations.

Bus stops are often modal mixing zones by design. It is important for planners to consider bus stop configurations, sidewalk widths, traffic queuing, curb space demands, and amenity placement when designing bus stops. Below are some design strategies to mitigate common modal conflicts at bus stops:

- **For bus-pedestrian interactions** All bus riders walk or roll to the bus stop at some point in their trip. Safe, accessible, and convenient crossings and sidewalks are key to high-quality transit service. At high-ridership or high pedestrian-traffic stops, it is important to provide adequate space for waiting, boarding, and alighting. Farside stop placement is also typically safer than nearside because people are crossing behind a stopped bus. Floating bus stops and center island bus stops and designs can reduce the risk of pedestrian/bicycle conflicts.



- **For bus-bike interactions** Floating bus stops and median bus platforms maintain a dedicated and protected bike lane at bus stops. On one-way streets, consider configuring the bike lane on the left side of the street, opposite bus stops.



- **For bus-vehicle interactions** In-lane stops and dedicated bus and turn lanes provide dedicated spaces for bus and vehicle operations that reduce lane weaving and conflicts between buses and vehicles. Along busy commercial corridors, consider dedicated loading zones and pick-up drop-off zones to prevent parking and loading in the bus stop.

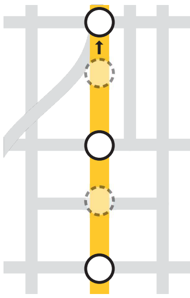
Prioritizing Bus Stop Improvements

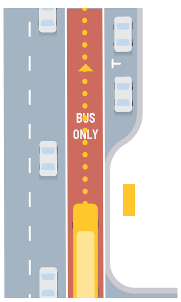
Bus stop improvements should be a core component of transit priority projects because of the benefits they provide to the customer experience. Municipalities should consider prioritizing bus stop amenities and bus priority treatments at:

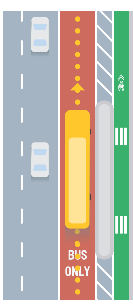
- **High ridership bus stops** with **high volumes of people** boarding or alighting the bus
- All bus stops serving passengers who need **additional time to board** because of mobility impairments, to load groceries, a stroller, or a bike, or at stops serving seniors or persons with disabilities
- **Bus stops with inadequate or inaccessible boarding areas and documented accessibility barriers**
- **Bus stops with insufficient stop length**
- **Along corridors with frequent bus service**
- **Along corridors with** high volumes of people biking
- **Along corridors where bus stops are being consolidated** or relocated
- **Along corridors with planned roadway or development projects**
- In neighborhoods where bus stop improvements **complement local planning goals** for transportation, urban design, and/or activating placemaking

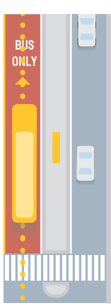
Bus Stop Treatments for Bus Priority

Table 8. Bus Stop Treatments for Bus Priority









Bus Stop Treatment	Level of Investment Needed	Right of Way Needed
Bus Stop Relocation and Consolidation Changes to stop location to reduce signal delay, and changes to stop spacing to increase bus speeds	●●○ Medium: Costs vary based on if a bus stop sign is being relocated or if multiple shelters are being relocated	●○○ Low: By relocating bus stops farside or removing them cities can regain parking spaces.
Bus Bulb Curb extension reducing crossing distances and allowing buses to stop in-lane	●●○ Medium: Requires capital construction and may require relocating passenger amenities	●●○ Medium: Extends the curb into the parking lane at stops for in-lane bus operations
Floating Bus Stop Relocates the boarding area to the other side of the bike lanes, allowing buses to stop in-lane and protecting the bike lane from conflicts with vehicles	●●○ Medium: Requires capital construction, relocating passenger amenities, and may impact utilities	●●○ Medium: Requires repurposing the parking or curbside lane for the bike lane and another travel lane for the new boarding area.
Median Bus Platform Relocate the boarding area and passenger amenities to new boarding platforms along the median; implemented with center-running bus lanes	●●● High: Requires capital construction, reconfiguring the median, relocating passenger amenities, is likely to impact utilities and signal infrastructure	●●○ Medium: Repurposes at least one lane of traffic at bus stops for the new boarding area

For more detailed guidelines see the MBTA Bus Stop Planning and Design Guide, which will be updated in 2023.

Bus Stop Relocation and Consolidation

Relocating bus stops can improve transit travel times and reliability by making it easier for buses to pull in and out of stops and travel through intersections. Depending on traffic conditions and the surrounding street design, municipalities can relocate stops at the farside or nearside of the intersection, or mid-block.

Benefits

- May reduce intersection wait time and bus stop dwell time
- May reduce amount of curb space needed at each stop
- May improve travel times, reliability and route efficiency
- May improve stop spacing and locate stops adjacent to land uses with highest ridership
- May enable opportunities to replace curbside "pull out" stops with bus bulbs and in-lane stops

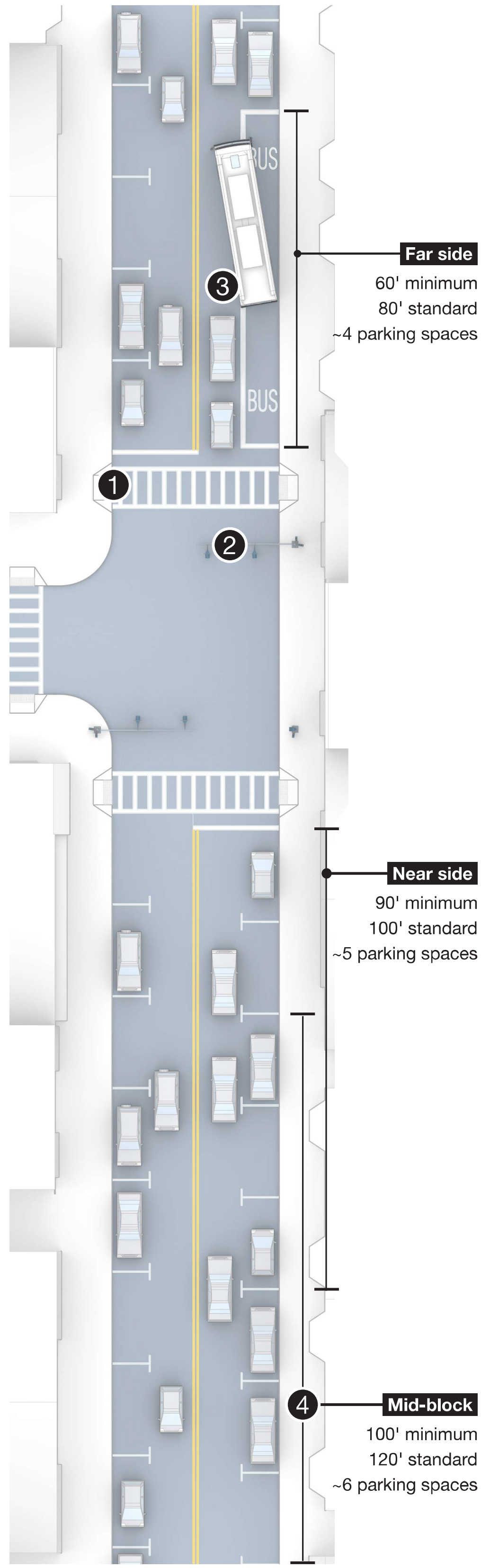
Challenges

- Relocation of stops with benches, shelters, or other amenities may require more capital investment
- Depending on the stop location and configuration there may be impacts to parking, loading, traffic, or pedestrian facilities.
- May face community / abutter resistance
- Increases walking distance between stops

Implementation Considerations

1. **Bus-Pedestrian Interaction** Generally, farside stops are preferred because crosswalks are located behind the bus stop, directing pedestrians to cross behind, rather than in front of a stopped bus.
2. **TSP Integration** Farside stops can typically be integrated with transit priority measures (i.e. queue jump lane and TSP) more easily and effectively.
3. **Traffic Impact** Farside in-lane stops may cause traffic to back up into an intersection. Nearside stops may enable through and right-turn bus movements.
4. **Curb Use Impact** Mid-block stops require the most curb clearance. Curb extensions at stops can be used to minimize parking loss.
5. **Transit Dependent Populations** At housing, social service organizations, and groceries are not recommended candidates.
6. **Stop Spacing and Location** Many riders may have difficulty with increased walking distances. Careful analysis must be conducted to understand and contain increases to required paths. Additionally, the path of travel between the relocated/consolidated stop and its alternate must be reviewed.
7. **Stop Accessibility** Relocated stops and stops adjacent to closed/consolidated stops must meet minimum accessibility standards and must not be less accessible than closed/consolidated stop.

For further detail on stop relocation considerations, consult the MBTA Bus Stop Planning and Design Guide.



Stop lengths assume 40' buses and 20' parking spaces.

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Bus Bulbs

Bus bulbs extend the curb of a bus stop to be in line with the bus travel lane, rather than the parking lane, which allows buses to stop in-lane to pick up riders. This treatment saves time and increases transit reliability because buses do not have to merge in and out of traffic when serving a bus stop.

Benefits

- Compatible with both general traffic and dedicated bus lanes
- Reduces dwell time at bus stops
- Taking more room for bus stop and multimodal amenities without taking away sidewalk space
- Shorter bus stop lengths, which preserves more parking because buses do not have to pull into the stop
- Preferred option from accessibility point of view as it separates riders from bicyclists, increases depth of landing pad, and reduces crossing distance

Challenges

- Requires moderate capital investments and potentially drainage modifications due to curb relocation
- Can cause traffic buildup behind buses if there is only a single travel lane
- Precludes implementation of curbside bus lanes
- Precludes implementation of protected bike lanes

Complementary Treatments

- Parking Offset Bus Lanes (p. 68)

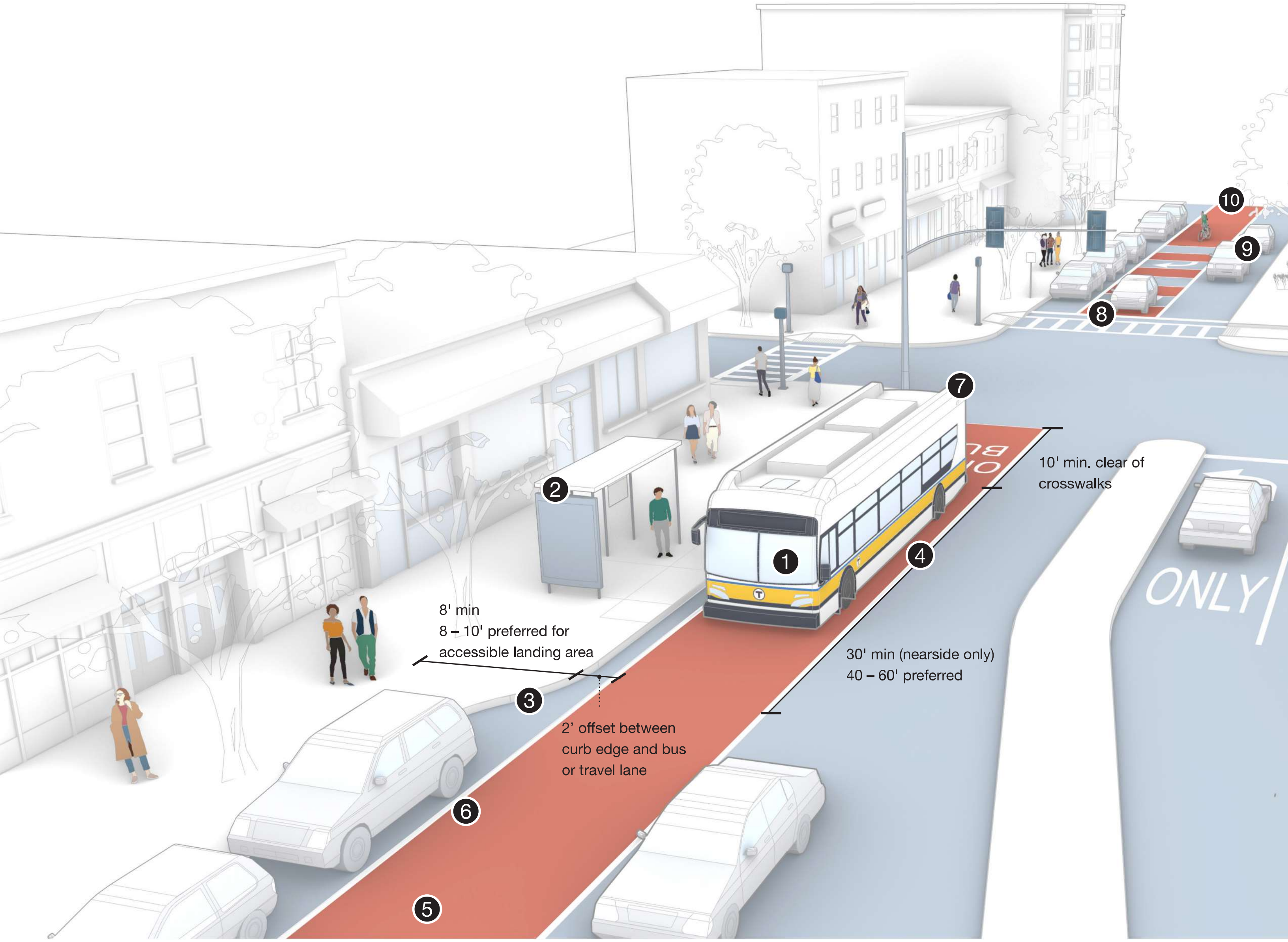

Before


After

See it in action

As part of the MassDOT Shared Winter Streets and Spaces Program, the MBTA and the City of Boston installed two bus bulb stops to complement the bus lanes in Roslindale Square.

1. **Curb Access** A typical 40' bus bulb replaces 2–3 standard parking spaces, retaining more parking than a curbside bus stop, which occupies 3–6 spaces depending on placement.
2. **Passenger Amenities** Provides additional space for waiting riders and bus stop amenities, particularly shelters, without encroaching on the original sidewalk area.
3. **Signage and Painting Treatment** Municipalities do not need to strip the roadway because buses are stopping.
4. **Bus Stops** Bus bulbs need to be at least 30’ in length for both doors to open on the sidewalk. To not obstruct parking bus bulbs should be 40’. Longer bus bulbs farside provide room for vehicles to queue behind a stopped bus.
5. **Enforcement** Likely unnecessary as buses will stop in the travel lane.
6. **Bus Lane Compatibility** Incompatible with a part time bus lane that is parking during off-peak hours.
7. **Intersections** Nearside and farside bus bulbs typically include the adjacent pedestrian curb ramp. This reduces the intersection crossing distance for pedestrians.
8. **Right Turn Volumes** Nearside bus bulbs may require right turn restrictions if there is a tight corner radius. The American Association of State Highway Transportation Officials (AASHTO) specifies a 50–55' radius to accommodate urban transit and intercity buses.
9. **Traffic Volumes + Queuing** Consider traffic and queuing impacts with farside bus bulbs, as traffic may back up behind the bus and into the intersection. Also consider traffic volumes and the number of travel lanes in relation to vehicles being able to pass stopped buses.



10 **Bus-Bike Interactions** Integrate protected bike lanes through "floating" bus stops (described on the next page), where the bike lane wraps behind the bus stop at either the street or sidewalk level. Best used where there is high bus frequency, high ridership, and high bicycle volumes. Signage and striping are required for the bike lane. At minimum there should be a bike symbol and yield marks for crossing pedestrians. The bike lane does not need to be painted.

11 **Stop Accessibility** Relocated stops and stops adjacent to closed/consolidated stops must meet minimum accessibility standards and must not be less accessible than closed/consolidated stop.

Floating Bus Stop

Floating bus stops are bus bulbs separated from the sidewalk by bike lanes. This treatment reduces conflicts between buses and cyclists while allowing buses to stop in-lane to pick up and drop off passengers, saving time and further increasing transit speed, reliability, and accessibility.

Benefits

- Enhances overall safety by reducing conflicts between buses and bikes
- Creates more room for passengers and amenities without using existing sidewalk space
- Improves bus speeds by making stops in-lane
- Buses do not have to pull into or out of the stop
- Reduces dwell time at bus stops
- Compatible with both mixed traffic and dedicated bus lanes
- Chicaning effect of bike lanes and raised crosswalks slows bicyclists down as they approach the bus stop

Challenges

- Requires moderate capital investments and may require drainage modifications
- At farside stops on single lane roads, vehicles cannot pass the bus and may queue into the intersection
- Uses more roadway space than a bus bulb because it requires space for the sidewalk, the bike lane, and the bus stop
- Potential conflicts between people crossing to reach the bus stop and cyclists.

Complementary Treatments

- Parking Offset Bus Lanes (p. 68)

See it in action

Floating bus stops were installed along Commonwealth Ave in Boston's Brighton neighborhood between the Commonwealth Ave Bridge and Packard's Corner.

1. **Curb Access** A typical 40' floating bus stop replaces 2-3 parking spaces, retaining more parking than a curbside bus stop, which occupies 3-6 spaces.
2. **Passenger Amenities** Provides additional space for waiting passengers and bus stop amenities, particularly shelters.
3. **Signs and Striping** Requires effective signage to slow bicyclists and indicate crossings over the bike lane. Does not require pavement marking because buses are stopping in-lane.
4. **Bus-Bike Interactions** Floating bus stops allow for the integration of bike lanes between the passenger waiting area and the sidewalk. Best used where there is high bus frequency and/or high bicycle volumes. Signage and striping are required for the bike lane—at minimum, a bike symbol and yield markings for crossing pedestrians. Bike lane can be at sidewalk or street level. At sidewalk level, paint the bike lane to delineate it from the sidewalk and yield markings (shark's teeth) on the bike lane approach to the crosswalk.
5. **Bus Stops** Floating bus stops must be at least 40'. Farside curb extensions may be longer to provide room for vehicles to queue behind a stopped bus.
6. **Accessibility** MBTA prefers crosswalks at each end of the floating bus stop. At stops with high volumes of pedestrians and bicyclists, fencing and seating should serve as a barrier between the waiting/boarding area and the bike lane.
7. **Intersections** Floating bus stops at intersections are typically extended to include the adjacent pedestrian curb ramp—nearside stops will connect to the ramp at the front of the stop, while farside stops will connect at the rear, reducing the pedestrian crossing distance.

❽ **Right Turn Volumes** Nearside floating bus stops may require right turn restrictions. AASHTO specifies a 50- to 55-foot radius to accommodate urban transit and intercity buses.

❾ **Traffic Volumes + Queuing** Consider traffic and queuing impacts impacts at farside floating bus stops, as traffic may back up behind the bus and into the intersection. Also consider traffic volumes and the number of travel lanes if vehicles need to be able to pass the bus.

❿ **Bus Priority** Compatible with both part-time and full-time parking offset bus lanes when there is an adjacent general purpose traffic lane. Nearside bus stop can serve as a queue jump lane.

⓫ **Bicyclist Target Speed** The curve of the bike lane around the floating bus stop can slow bicyclists down at pedestrian crossings.

Median Bus Platforms

Median bus platforms are bus stops located in the middle of the roadway, separate from the existing sidewalk. They provide dedicated space for riders to wait for, board, and alight buses operating in a center-running bus lane, or adjacent to a curbside bus lane where the platform physically separates the bus lane and general purpose traffic lanes, such as a right turn lane. Often, they provide near level boarding and enhanced amenities, such as more substantial shelters, wind screens, or other elements. They are typically implemented along corridors that have a wider cross-section, frequent curb-cuts, and/or there is support for bus rapid transit.

Benefits

- Eliminates the need to encroach on private ROW, coordinate with abutting property owners, or occupy curbside sidewalk space for a bus stop, leaving existing sidewalk available for other uses
- Creates a refuge space for pedestrians crossing major roadways at bus stops, improving visibility and safety and reducing the time and distance spent crossing general purpose traffic lanes
- Can provide at or near level boarding, improving accessibility, making boarding and alighting more efficient and pedestrian connections and crossings for emergency egress at each end
- Can provide an overall “traffic calming” effect for the corridor by redirecting general purpose traffic around the median platform; vertical elements placed at the back of the platform create a perceived narrowing of the roadway, elevating the traffic calming effect
- Provides more space for waiting passengers that is not crowded with other streetscape features

Challenges

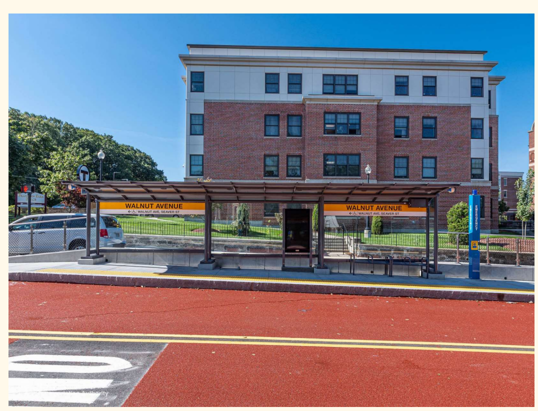
- Requires a wide roadway cross-section; and with a two-way bus facility, one platform in each direction is required to accommodate right-side only door access of the current and planned future bus fleet
- Necessitates wider platforms to accommodate projected ridership; desired elements and amenities may be challenging within the ROW to facilitate the preferred number of buses and width of travel lanes
- Requires longer platforms to accommodate higher frequency service, multiple routes serving the corridor, or articulated buses; it may be difficult to establish crosswalks at either end of the platform
- More complex to design and more costly to build than curbside bus stops, due to location in center of roadway
- Riders must cross traffic to reach bus stops, which may be unfamiliar and or unconventional when compared to typical curbside stops
- Installation will likely require tapered travel lane shifts or removal of existing turn lanes
- Construction may involve extensive utility relocations and drainage improvements to facilitate platforms and any existing median modifications

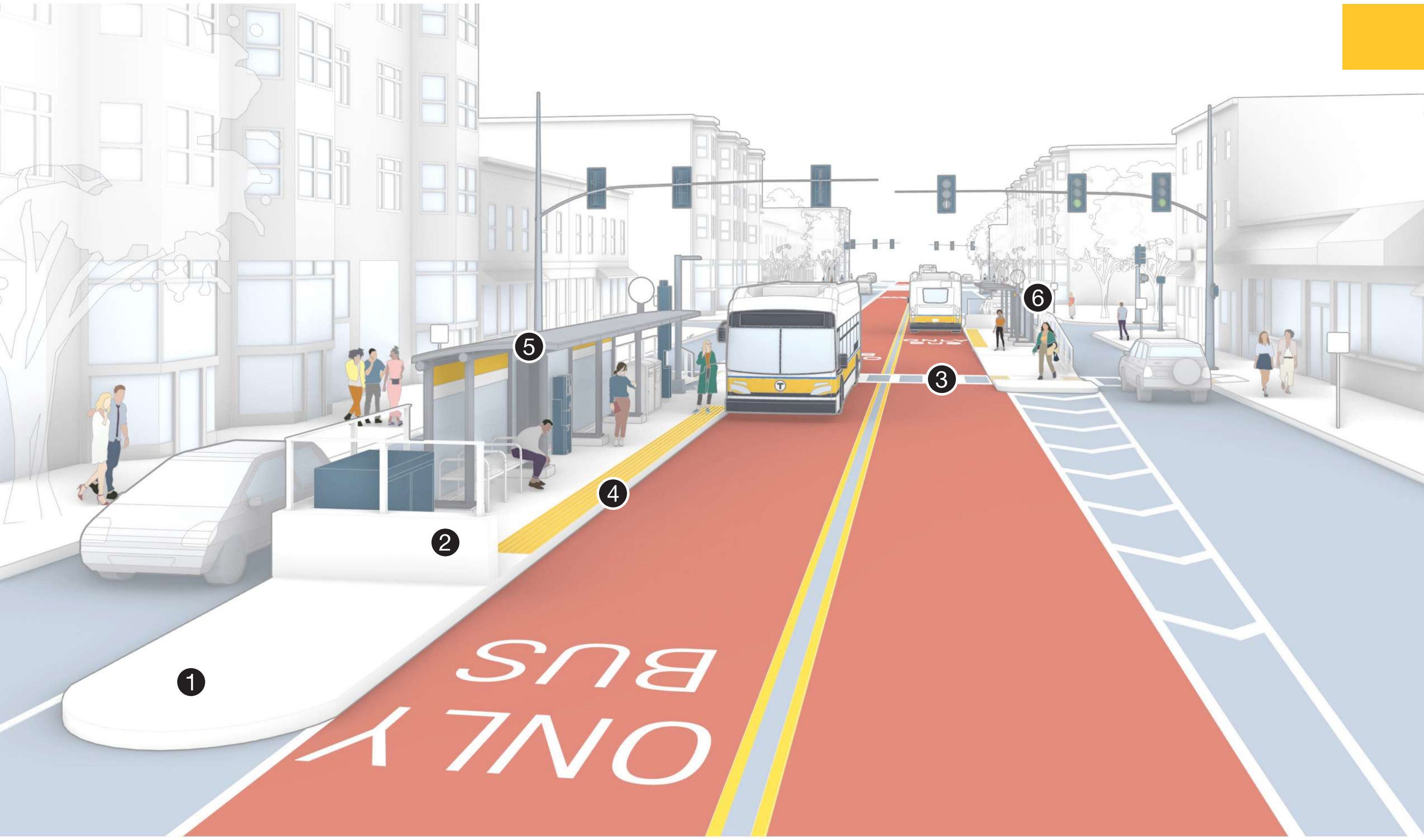
Complementary Treatments

- Center Running Bus Lane (p. 74)
- Bus Stop Relocation and Consolidation (p. 88)

See it in action

Boston’s center-running bus lanes on Columbus Ave include 8 median bus platforms with near-level boarding and enhanced amenities.





❶ **Platform Location** Determine where in a roadway's cross-section right-side boarding buses can accommodate a median bus platform. Platforms should only be located at signalized intersections, in a constrained ROW. In a constrained ROW, platforms can be off-set immediately before or after the traffic signal. If a corridor with center-running bus lanes cannot accommodate median bus platforms, consider ROW expansion, altering the configuration of the bus lanes. If platforms are located mid-block, as opposed to at an existing intersection, municipalities should evaluate signalizing crossings connecting the platform.

❷ **Platform Configuration** Determine the length of buses using the stop, as this will affect the design requirements.

❸ **Safety** Provide crosswalks at each end of longer or double berth platforms, as well as crash protection such as bollards, attenuators, walls or other barriers at the back of the platform to protect passengers from vehicles, and wrap around the tip of the platform if there is no access in that direction. Supplement low-profile barriers at the tip of the platform with a fence or railing to further discourage access. Consider a railing or barrier between the busway and sidewalk connecting the platform and pedestrian refuge area. Railings are required on both sides of the walkway if the sloped walkway or ramp has a grade steeper than 5%. Include a two-foot deep yellow detectable warning panel (federal yellow) along the length of the platform behind the curb on the bus lane side of the platform.

❹ **Platform Design** Pave the bus lane adjacent to the platform, where buses are accelerating/decelerating, with a heavy duty hot mix asphalt (airport mix) to extend the longevity of the roadway pavement. Platform widths should accommodate projected peak passenger volumes, especially when platforms have a single access point. The platform surface should be heated from and including the landing area of the first bus berth, to the end of and including the clear zone serving the last bus berth to prevent ice and snow accumulation.

5 **Passenger Amenities** Platforms may lack the weather protection offered by buildings and trees at curbside stops and therefore should include shelters with wind screens. Municipalities should consider more substantial shelters than those typically found at curbside stops, such as large-scale, custom-designed and or canopy-style shelters with integrated or standalone pedestrian scale lighting. Other amenities to consider include benches and/or lean rails, digital signage for real-time displays, maps and other information, T-logo lollipop signs, station ID signage with platform bus route direction and destination direction and or wayfinding, emergency call boxes, security cameras, fare vending machines, single standing bike racks, trash cans, bus stop signs etc. Additional platform space may be needed for mechanical/electrical/communications cabinets related to lighting, digital signage, transit signals etc. These shall be placed as far from the passenger waiting space as possible and not interfere with pedestrian paths of travel and passenger-bus operator visibility. The placement of amenities cannot interfere with the ability of a bus to fully deploy its access ramp in the landing area.

6 **Bus Stop Consolidation** Consider whether to consolidate stops when implementing platforms, particularly when used on high-frequency, high-ridership corridors that typically have longer stop spacing, and especially when platforms are designed to accommodate articulated buses, higher frequency service, or multiple routes. Consider the passenger boarding/alighting capacity of the median platform to avoid overcrowding.

7 **Accessibility** Municipalities must coordinate with the MBTA to upgrade intersections, sidewalks, curb ramps, and crossings to be fully accessible. Pedestrian refuges must have detectable warnings for people with low-vision or mobility impairments crossing the street. Platforms must have an 8' by 10' boarding area, clear of amenities, for passengers getting on and off the bus with mobility devices or strollers. Pedestrian signals should allow enough time for people to cross in one trip even if refuges are present. For more details on accessibility requirements, consult the MBTA Bus Stop Planning and Design Guide.

For additional details on passenger amenities, stop spacing, and accessibility requirements,consult the MBTA Bus Stop Planning and Design Guide.

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Better Bus Project