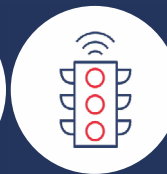




# Bus Priority Program Toolbox

MARCH 2021



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GOVERNMENT OF THE  
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DC MURIEL BOWSER, MAYOR

# Table of Contents

Treatment	Page
Introduction	3
Objectives Addressed by Bus Priority Treatments	5
<b>1.0 Bus Operations Strategies</b>	<b>6</b>
1.1 Stop Relocation	7
1.2 Stop Rebalancing	8
1.3 Route Design & Alignment	9
1.4 Fare Payment Changes & All-Door Boarding	10
<b>2.0 Traffic Control Strategies</b>	<b>11</b>
2.1 Bus Movement Exemptions	12
2.2 Transit Signal Priority (TSP)	13
2.3 Queue Jumps	17
<b>3.0 Bus Stop Infrastructure Strategies</b>	<b>15</b>
3.1 Bus Stop Cross Hatching	16
3.2 Bus Stop Lengthening	17
3.3 Bus Bulb-Outs	18

Treatment	Page
<b>4.0 Bus Lane Strategies</b>	<b>19</b>
4.1 Curbside Bus Lanes	20
4.2 Offset Bus Lanes	21
4.3 Contraflow Bus Lanes	22
4.4 Busways	23
4.5 Red-Colored Pavement	24
4.6 Automated Bus Lane Enforcement	25
<b>5.0 Bike and Bus Strategies</b>	<b>26</b>
5.1 Separated Bike-Bus Lanes	27
5.2 Left Side Bike Lanes	28
5.3 Bike-Pedestrian Mixing Platform	29
5.4 Narrow Floating Bus Islands	30
5.5 Wide Floating Bus Island	31



# Introduction

The District Department of Transportation (DDOT) Bus Priority Program (BPP) is working to streamline delivery of projects that improve bus service in the District of Columbia (“the District”), with a goal of faster delivery timelines and improved coordination. To support those efforts, DDOT developed a Toolbox of potential bus priority treatments that can be consistently applied to future efforts to improve the speed and reliability of bus service or create safer interactions with other modes.

The Toolbox will be used to identify bus priority treatments to address particular bus speed or reliability issues, informed by industry best practices and past DDOT project experience. Additionally, the Toolbox will serve as a resource for DDOT and transit agency staff, the public, and stakeholders.

## Toolbox Organization

For the purposes of this Toolbox, there are five categories of treatments:



**Bus Operations:** Treatments pertaining to the operation of the transit service, primarily led by the transit agency.



**Traffic Control:** Treatments that primarily make adjustments to traffic signals to help favor bus operations and reduce bus delay at traffic signals.



**Bus Stop Infrastructure:** Treatments that primarily involve enhancing bus stops.



**Bus Lane:** Treatments pertaining to the creation and enforcement of dedicated lanes for buses.



**Bike and Bus:** Treatments that create safer, more predictable interactions between bicyclists and buses.

# Introduction

The following information is generally provided for each treatment:

- **Description and Objective:** Provides a brief overview and describes treatment objectives.
- **Typical Applications/Thresholds:** Describes the operating context and provides ranges and thresholds for treatment implementation where applicable.
- **Potential Benefits:** Provides potential benefits based on the literature review and peer-city research. Wherever possible, quantification of anticipated benefits is also included.
- **Implementation Examples:** Provides implementation examples from the District when available.

## Overview of Treatments

The Toolbox contains 24 bus preferential treatments organized into five major categories. The following table introduces the 24 treatments and the objectives they are intended to address. The primary objectives of each treatment are displayed using filled circles, while hollow circles are used for the secondary objectives.

## Using the Toolbox

The Toolbox is expected to be utilized as part of the larger project development process for the Bus Priority Program, rather than a standalone solution. Before using the Toolbox for a project, DDOT and the transit agency will first assess the performance of bus service to identify the needs and issues. Then, potential treatments that are appropriate for the context will be identified using the Toolbox. It is important to note that not all treatments are possible for every street context. After the treatments are selected, they will be appropriately designed to safely fit within the project location.

# Objectives Addressed by Bus Priority Treatments

	Signal Delay	Congestion Delay	Time Spent at the Bus Stop	Delay While Entering Bus Stop	Delay While Re-entering Traffic	Inefficient Route Design	Bus/Bike Interactions	Compliance
● Indicates Primary Objective ○ Indicates Secondary Objective								
<b>1.0 Bus Operations Strategies</b>								
1.1 Stop Relocation	●						○	
1.2 Stop Rebalancing			●					
1.3 Route Design & Alignment						●		
1.4 Fare Payment Changes & All-Door Boarding			●					
<b>2.0 Traffic Control Strategies</b>								
2.1 Bus Movement Exemptions	○	○				●		
2.2 Transit Signal Priority (TSP)	●	○						
2.3 Queue Jumps		●			○			
<b>3.0 Bus Stop Infrastructure Strategies</b>								
3.1 Bus Stop Cross Hatching			○	○				●
3.2 Bus Stop Lengthening			○	●				
3.3 Bus Bulb-Outs				○	●			
<b>4.0 Bus Lane Strategies</b>								
4.1 Curbside Bus Lanes		●						
4.2 Offset Bus Lanes		●						○
4.3 Contraflow Bus Lanes		●						○
4.4 Busways		●				○		
4.5 Red-Colored Pavement		○						●
4.6 Automated Bus Lane Enforcement		○						●
<b>5.0 Bike and Bus Strategies</b>								
5.1 Separated Bike-Bus Lanes		○					●	
5.2 Left Side Bike Lanes							●	
5.3 Bike-Pedestrian Mixing Platform					○		●	
5.4 Narrow Floating Bus Islands					○		●	
5.5 Wide Floating Bus Island					○		●	



## 1.0 Bus Operations Strategies

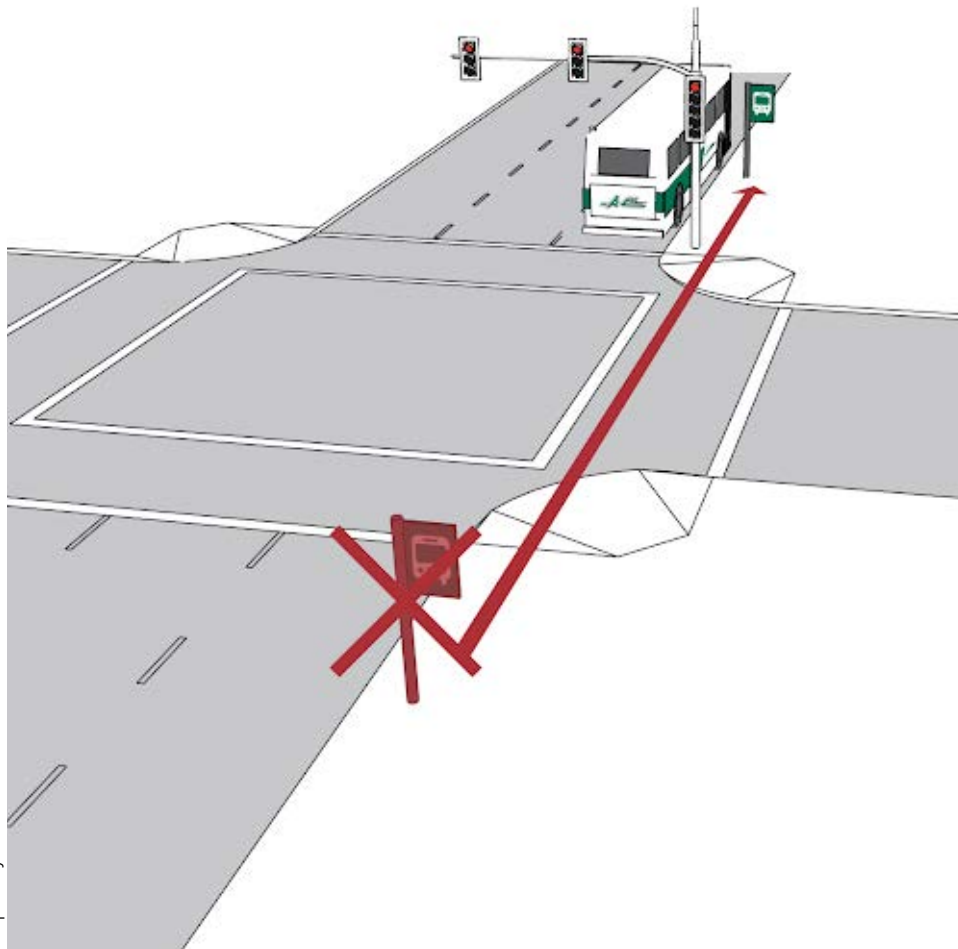
This section describes bus preferential treatments that are included under the Bus Operations Strategies category. These strategies are primarily led by the transit service provider, although they may sometimes be a joint effort between the transit service provider and DDOT. The following four treatments are included under this strategy.

Treatment Name	Section
Stop Relocation	1.1
Stop Rebalancing	1.2
Route Design and Alignment	1.3
Fare Payment Changes and All-Door Boarding	1.4



## 1.1 Stop Relocation

An existing bus stop is moved from the near side, or before the intersection, to the far side, or past the intersection, to reduce delays from traffic signals or improve safety.



Graphic by AC Transit

Figure 1: Bus Stop Relocation Example from Near Side to Far Side

### Typical Application/Thresholds

Near side to far side relocation is generally appropriate under the following:

- When there is queueing at an intersection, which often blocks buses from reaching a near side stop.
- When the green time for the direction the bus is travelling is short, so buses often miss the green light while stopped at the bus stop.
- When there is transit signal priority (TSP), since TSP is most effective with far side stops.
- When implementing bike-pedestrian mixing platforms, narrow floating bus islands, or wide floating bus islands to improve visibility of bicyclists by turning vehicles.

### Potential Benefits

- Near-side to far-side relocation can save 4 to 9 seconds per stop on average.

### Local Implementation Example

- [Rhode Island Avenue and 14th Street NE](#)

Travel Time Benefits



Reliability Benefits





## 1.2 Stop Rebalancing

Bus stop locations are rebalanced by increasing stop spacing so that buses make fewer stops along the route, which in turn reduces delay associated with entering the bus stop and re-entering traffic.

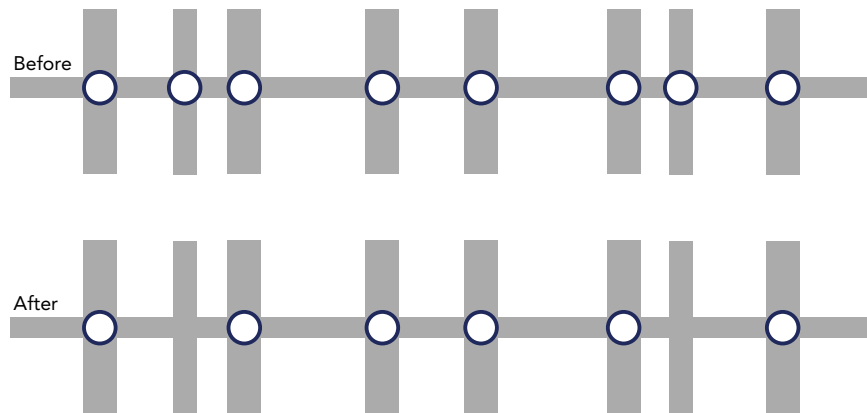


Figure 2: Bus Stop Rebalancing Example

### Typical Application/Thresholds

- The standard of 5 or fewer stops per mile for local service and 3 or less stops per mile for limited stop service seeks to balance customer access with improved speed and reliability along the entire route.

### Potential Benefits

- Eliminating one stop can typically save 10 to 15 seconds (assuming the bus does not usually skip the stop).
- In Portland, an increase in stop spacing of 6 to 8 percent resulted in a 5.7 percent reduction in travel time.
- A study conducted for a heavily used bus route in Massachusetts showed that stop rebalancing reduced average vehicle running times by 4 minutes while increasing bus riders' average walking time by only 0.6 min.

### Local Implementation Examples

- The current bus stop spacing along 16th Street NW is approximately 7 bus stops per mile in the northbound direction and 6 bus stops per mile in the southbound direction. With the proposed bus stop consolidation on 16th Street as part of the bus lanes project, the spacing will be close to meeting the standard of 5 bus stops per mile.

Travel Time Benefits	
Reliability Benefits	



## 1.3 Route Design and Alignment

A route's alignment is adjusted to provide a faster and more direct trip from origin to destination for the majority of passengers. The objective is to improve reliability, including reducing bus bunching from multiple service patterns, and to reduce the number of buses required to serve a route.



Figure 3: Route Design and Alignment Example

### Typical Application/Thresholds

- Route re-alignment often involves removing unnecessary turns.
- Routes with a high number of service patterns or a large number of turns in the route are good candidates for realignment.

### Potential Benefits

- A 2013 survey of 41 transit agencies found that route design changes were the second most successful action taken to improve bus speeds.
- Bus route redesign in Staten Island, NY for the express buses resulted in a 12 percent increase in bus speeds.

### Regional Implementation Example

- Maryland Transit Administration (MTA) – BaltimoreLink

Travel Time Benefits



Reliability Benefits





## 1.4 Fare Payment Changes and All-Door Boarding

Changes to fare payment, such as allowing payment via smart phones, and allowing passengers to board through the rear door can result in less time spent at bus stops (dwell time).



Photo by StreetsBlog LA

Figure 4: LA County Metropolitan Transportation Authority's Pilot All-Door Boarding

### Typical Application/Thresholds

- Fare payment and boarding upgrades are usually implemented on high-ridership routes or on routes with large variations in the time spent at bus stops, which can cause bus service unreliability.

### Potential Benefits

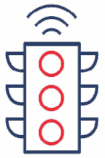
- Several agencies reported that off-board fare collection in conjunction with all-door boarding can result in 5 to 15 percent bus running time savings.
- A study conducted by San Francisco Municipal Transportation Agency (SFMTA) found that all-door boarding resulted in average reductions of 1.5 seconds per customer entry or exit (a 38 percent savings).
- The all-door boarding pilot in Los Angeles reduced the amount of time a bus spent at a stop per passenger by 32 percent compared to the boarding through the front door.

Travel Time Benefits



Reliability Benefits





## 2.0 Traffic Control Strategies

This section describes bus preferential treatments that are included under the Traffic Control Strategies category. These strategies are typically under the control of DDOT and aim to alter signal timing to favor bus operations and improve bus service. The following three treatments are included under this strategy.

Treatment Name	Section
Bus Movement Exemptions	2.1
Transit Signal Priority (TSP)	2.2
Queue Jumps	2.3



## 2.1 Bus Movement Exemptions

Bus movement exemptions allow buses to make movements, such as turns, that are restricted for general traffic. This provides more direct bus routing to save travel time.



Figure 5: Bus Movement Exemption Example, New York City

### Typical Application/Thresholds

- This treatment is appropriate where turn restrictions for general traffic have been implemented to reduce congestion. However, this treatment may not be appropriate for locations where turn restrictions have been implemented to improve safety.

### Potential Benefits

- The magnitude of the benefit is highly site specific but can be estimated with a traffic model.

### Local Implementation Examples

- [19th Street and K Street NW](#)
- [14th Street and I Street NW](#)

Travel Time Benefits



Reliability Benefits





## 2.2 Transit Signal Priority (TSP)

Traffic signal timing is altered (typically green time is extended or red time is truncated) dynamically in response to a request from a bus to reduce bus delay at intersections. This can increase bus travel speeds and decrease travel time variability. TSP can be “absolute,” providing TSP for all buses, or “conditional” based on a pre-defined set of criteria such as lateness, passenger load, and travel direction.

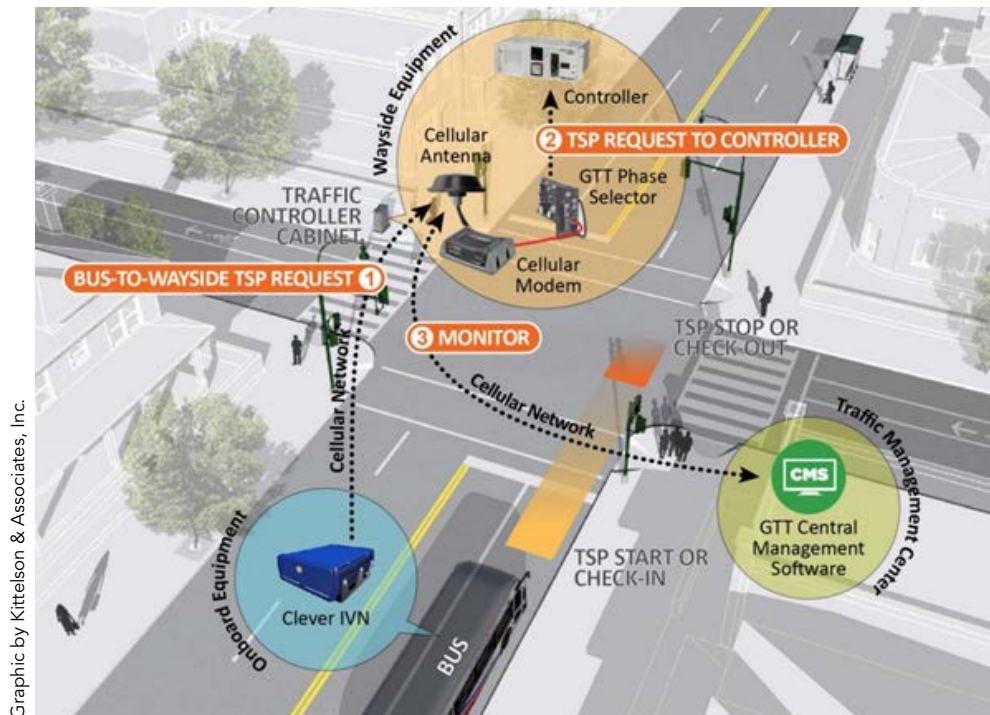


Figure 6: Transit Signal Priority System Architecture in the District

### Typical Application/Thresholds

- TSP is most effective at intersections where buses experience high signal delay.
- TSP is most effective at intersections with far side stops.
- TSP is not effective in highly congested areas.

### Potential Benefits

- Travel time savings of 5 to 15 seconds per intersection are possible at TSP intersections, but effectiveness is variable and dependent on intersection characteristics.
- The District has seen corridor-level travel time savings of up to 5 percent on 16th Street NW and higher benefits were observed (10 to 15 percent) on certain shorter segments.
- Travel time savings of 2 to 18 percent were observed for peer cities.

### Local Implementation Examples

- Georgia Avenue NW
- 16th Street NW
- Massachusetts Avenue NW

Travel Time Benefits



Reliability Benefits





## 2.3 Queue Jumps

Queue jumps provide the opportunity for buses to move ahead of queued vehicles at a traffic signal. The buses are given an early green light using a special bus-only signal in order to proceed through the intersection ahead of the queue. This can result in bus travel time savings by reducing delay due to traffic congestion.

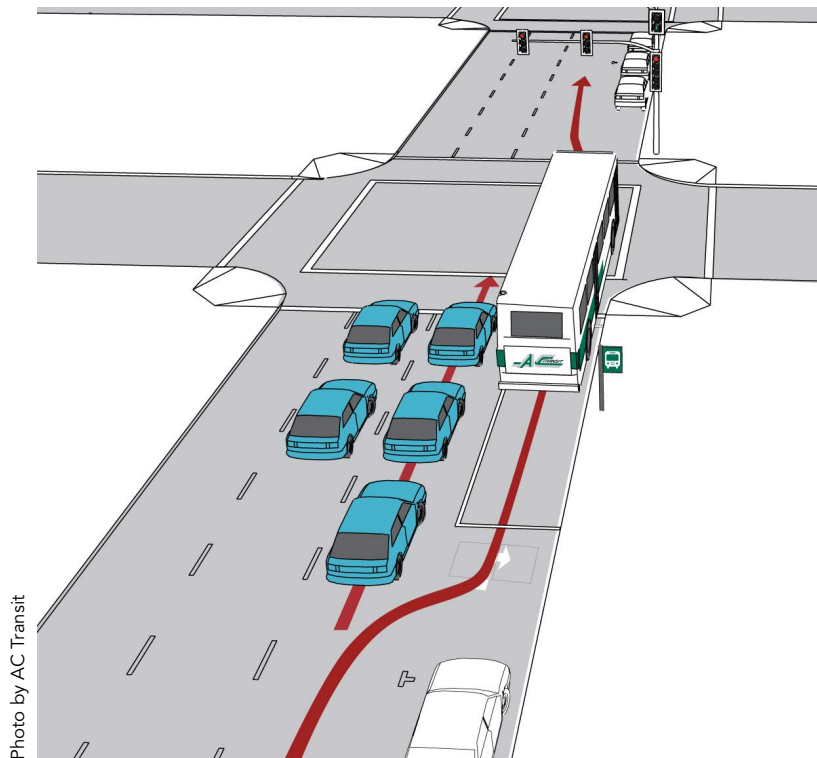


Photo by AC Transit

Figure 7: Queue Jump Example to Help Buses Move Ahead of Queued Vehicles

### Typical Application/Thresholds

- Vehicles turning right are typically allowed to turn from the queue jump lane in the District. Therefore, higher right turn volumes can diminish the benefit of queue jumps. Queue jumps should be considered where the right turn volume is less than 1 to 2 vehicles per signal cycle.

### Potential Benefits

- Level of benefit depends on queue lengths, but delay reductions of 2 to 7 seconds are possible.
- Implementation of queue jumps with TSP at 13 intersections in West Valley City, UT found 13 to 22 percent reduction in bus travel times.

### Local Implementation Examples

- [Georgia Avenue and Irving Street NW](#)
- [Florida Avenue and 12th Street NE](#)
- [16th Street and U Street NW](#)

Travel Time Benefits



Reliability Benefits





## 3.0 Bus Stop Infrastructure Strategies

This section describes bus preferential treatments that are included under the Bus Stop Infrastructure Strategies category. This strategy primarily involves constructing physical improvements at bus stops to ensure buses are not blocked from entering a stop (either by other buses or general traffic) or not delayed while exiting a stop and re-entering traffic. The following three treatments are considered in this category.

Treatment Name	Section
Bus Stop Cross Hatching	3.1
Bus Stop Lengthening	3.2
Bus Bulb-Outs	3.3



### 3.1 Bus Stop Cross Hatching

Installing cross hatching at bus stops helps to minimize illegal parking and loading in bus stops by increasing visibility of the bus stop zone.



Figure 8: Bus Stop Hatching at 7th Street and H Street NW

#### Typical Application/Thresholds

- This treatment should be prioritized at locations with known parking regulation compliance issues (e.g. commercial districts).

#### Potential Benefits

- Improving compliance through installing cross hatching allows buses to reliably pull into stops, which reduces delay is necessary to deploy the ramp that passengers with mobility devices use to board.
- Bus stop cross hatching allows buses to pull more closely to the curb and makes it easier for passengers to board and alight, which reduces the time spent at the bus stop.

#### Local Implementation Examples

- [7th Street and H Street NW](#)

Travel Time Benefits



Reliability Benefits





### 3.2 Bus Stop Lengthening

Longer bus stops can serve more buses simultaneously and allow buses to pull more closely to the curb, which can reduce delay resulting from buses waiting to enter occupied stops.

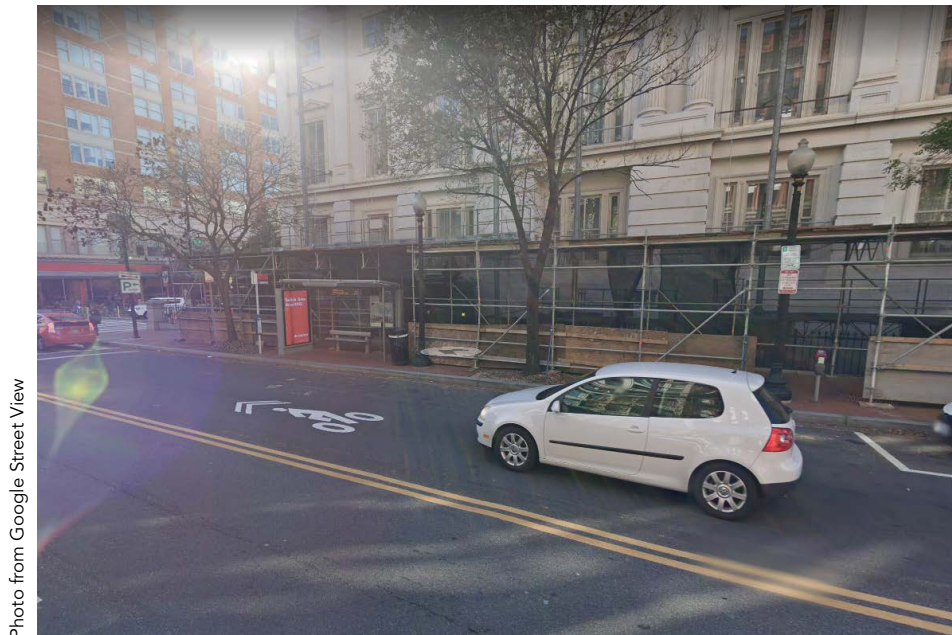


Photo from Google Street View

Figure 9: Elongated Bus Stop on 7th Street NW north of E Street NW

#### Typical Application/Thresholds

- Bus stops may need to be lengthened when they serve multiple routes, resulting in more than one bus needing to use the stop at the same time.
- Many existing bus stops in the District have short bus stop lengths, which causes congestion by preventing buses from being able to pull completely out of the travel lane. Extending bus stop length at these locations could improve traffic congestion.

#### Potential Benefits

- Bus stop lengthening allows buses to pull more closely to the curb and makes it easier for passengers to board and alight, which reduces the time spent at the bus stop.
- Bus stop lengthening can allow multiple buses simultaneously, improving bus travel times and reliability.
- Bus stop lengthening can eliminate spillback of buses onto the general traffic lane at bus stops, reducing general traffic delay.

#### Local Implementation Examples

- [H Street NW](#)
- [7th Street NW](#)

Travel Time Benefits	
Reliability Benefits	



### 3.3 Bus Bulb-Outs

Bus bulb-outs allow buses to board and alight passengers while remaining in the travel lane, thereby eliminating delay when re-entering traffic. In addition, they provide additional space for waiting bus riders and alleviate sidewalk congestion on sidewalks with high pedestrian activity.



Photo by Zicla

Figure 10: Curb Extension on Liberty Avenue in Pittsburgh

Travel Time Benefits	
Reliability Benefits	

#### Typical Application/Thresholds

- Bus bulb-outs are useful at stops with delay from re-entering traffic, which are typically locations with traffic congestion and on streets where there is full-time parking.
- This treatment is appropriate in areas with high pedestrian traffic and narrow sidewalks where additional waiting space is needed.
- The treatment may also increase safety at locations with a history of collisions resulting from buses pulling into and out of the travel lane from the curbside bus stop.

#### Potential Benefits

- This strategy eliminates bus delay when re-entering traffic and improves bus speeds.
- Bus bulb-outs can reduce pedestrian crossing distances.
- Bus bulb-outs also tend to marginally increase traffic speeds as they make bus movements more predictable. In San Francisco, bus bulb-outs increased both bus speeds and non-bus vehicle speeds.

#### Local Implementation Examples

- [8th Street and H Street NE](#)



## 4.0 Bus Lane Strategies

This section describes bus preferential treatments that are included under the Bus Lane Strategies category. This strategy includes different types of bus lanes along with treatments that can help improve bus lane compliance. In the District, bicyclists are allowed to use all bus lanes, as are emergency and paratransit vehicles. The following six treatments are considered in this category.

Treatment Name	Section
Curbside Bus Lanes	4.1
Offset Bus Lanes	4.2
Contraflow Bus Lanes	4.3
Busways	4.4
Red-Colored Pavement	4.5
Automated Bus Lane Enforcement	4.6



## 4.1 Curbside Bus Lanes

Curbside bus lanes are located in the right curb lane and help to improve bus speeds and reliability by reducing congestion delay. Right turning vehicles are also typically permitted in curbside bus lanes. The hours of operation of curbside bus lanes can be 24 hours, daytime only, or peak period only.



Photo by Curbed Washington DC

Figure 11: Curbside Bus Lane on I Street NW

### Typical Application/Thresholds

- Curbside bus lanes are usually installed on corridors with frequent bus service and traffic congestion that causes slow bus speeds and reliability issues.
- Implementation of curbside bus lanes requires adequate roadway width to accommodate a bus lane as well as a general-purpose travel lane.

### Potential Benefits

- Travel time savings of 10 to 15 percent are possible in areas with high levels of congestion and savings of 5 percent are possible in areas with low congestion. Travel time benefits depend on the degree of motorist compliance with bus lane regulations.
- Bus lanes can reduce travel time variability by 15 to 50 percent, as seen in Los Angeles and New York.

### Local Implementation Examples

- [Georgia Avenue NW](#)
- H Street NW and I Street NW
- M Street SE
- Martin Luther King, Jr. Avenue SE

Travel Time Benefits



Reliability Benefits



## 4.2 Offset Bus Lanes

Offset bus lanes are typically located in the lane to the left of the curb lane. Offset bus lanes allow for dedicated space for buses while providing access to the curb for loading or parking. Additionally, offset bus lanes reduce delay from right turning vehicles at signalized intersections. Offset bus lanes operate 24 hours a day, unlike curbside bus lanes, which may have variable hours.



Photo by Kittelson and Associates, Inc.

Figure 12: Peak Period Offset Bus Lane on First Avenue in New York City

### Typical Application/Thresholds

- Offset bus lanes are typically applicable when there is high demand for curbside access or when there are high right turn volumes.
- Usually applied on corridors with frequent service and traffic congestion.
- Implementation of offset bus lanes requires adequate roadway width to accommodate a bus lane, a general purpose travel lane, and a parking or right turn lane.

### Potential Benefits

- Travel time savings of 15 to 25 percent are possible in areas with high levels of congestion and savings of 5 percent are possible in areas with low congestion.
- A study conducted in New York City showed that offset bus lanes were less likely to be obstructed.

Travel Time Benefits



Reliability Benefits





### 4.3 Contraflow Bus Lanes

Contraflow bus lanes operate in the opposite direction of traffic to provide more direct routing or decrease bus lane violations.



Figure 13: Contraflow Bus Lane on Haight Street, San Francisco

#### Typical Application/Thresholds

- Along one-way streets, contraflow lanes are typically applied on the side of the street with lower curbside access needs.
- One block sections of contraflow bus lanes can allow buses to reverse direction at the end of routes. Longer segments can provide more direct routings or simplify bus routes.

#### Potential Benefits

- Contraflow bus lanes are typically self-enforcing and free of traffic, and thus particularly beneficial to bus travel.
- In Chicago, contraflow bus lanes installed downtown resulted in a major increase in average bus speeds.

Travel Time Benefits



Reliability Benefits



## 4.4 Busways

Busways prioritize moving people on transit by restricting general through traffic. Busways may maintain local access or operate only at certain times of day. In addition to buses, bicyclists, paratransit vehicles, and emergency vehicles are allowed to use busways. Trucks may also be allowed depending on the freight and loading needs along the corridor. Busways improve bus speeds and reliability through reduction of congestion from general traffic, while also providing a calmer street environment for pedestrians and bicyclists.



Photo by Marc A. Hermann, MTA

Figure 14: 14th Street in New York City is a Busway

### Typical Application/Thresholds

- Busways are typically applied along corridors with frequent service and low bus speeds where there may not be sufficient roadway width to install curbside or offset bus lanes.
- Busways are usually applied at locations with high commercial activity and high curbside demand. In these locations, curbside bus lanes may not be as beneficial due to potential compliance issues.
- Loading and pick up drop off zones are typically added to the cross streets.

### Potential Benefits

- In New York City, along the 14th Street Busway, weekday travel times were decreased by nearly half while ridership increased by a quarter.
- Pedestrians, bicyclists, and other non-auto users benefit from a calmer street environment.

Travel Time Benefits



Reliability Benefits





## 4.5 Red-Colored Pavement

Red-colored pavement is installed in the bus lane, in addition to typical bus lane signs and striping, to increase visibility and improve compliance.



Photo by Greater Greater Washington

Figure 15: Red-Colored Pavement for Bus Lanes on I Street NW

### Typical Application/Thresholds

- Red coloring may be applied to bus lanes to help deter vehicles from illegally driving and parking in the bus lanes.

### Potential Benefits

- Installation of red-colored pavement on Georgia Ave NW reduced unauthorized use of the bus lanes.
- In San Francisco, after red paint was implemented, violations per hour decreased by approximately half compared to bus lanes without the red paint.

### Local Implementation Examples

- [Georgia Avenue NW](#)
- H Street NW and I Street NW
- M Street SE
- Martin Luther King, Jr. Avenue SE
- 14th Street NW

Travel Time Benefits



Reliability Benefits





## 4.6 Automated Bus Lane Enforcement

Automated bus lane enforcement uses cameras to ticket vehicles illegally parking or driving in bus lanes to improve the effectiveness and safety of bus lanes. Cameras can be stationary and mounted on poles along the corridor or mounted on the front of the bus.



Figure 16: Automated Bus Lane Enforcement Using On-Bus Cameras in San Francisco

### Typical Application/Thresholds

- Stationary cameras are best suited for moving violations, such as driving in the bus lane, and on-bus cameras are best suited for non-moving violations, such as parking in the bus lane.
- Cameras can also be used to enforce illegal parking in bus stop zones.

### Potential Benefits

- Automated enforcement on First and Second Avenues in New York City have approximately halved the bus lane violations.
- A study led by SFMTA showed that automated enforcement increased bus reliability substantially, as well as slightly increasing bus travel speeds. The same study also found that more than 90 percent of the tickets issued were for new violators, indicating that automated enforcement helped to prevent repeat violations.

### Local Implementation Examples

- Georgia Avenue NW (stationary camera pilot)

Travel Time Benefits



Reliability Benefits





## 5.0 Bike and Bus Strategies

This section describes treatments that are included under the Bike and Bus Strategies category. These treatments offer techniques to help safely accommodate both modes on the same corridor. The following five treatments are considered in this category.

Treatment Name	Section
Separated Bike-Bus Lane	5.1
Left Side Bike Lanes	5.2
Bike-Pedestrian Mixing Platform	5.3
Narrow Floating Bus Island	5.4
Wide Floating Bus Island	5.5



## 5.1 Separated Bike-Bus Lanes

Separated bike-bus lanes provide a shared lane for bikes and buses that is physically separated from general purpose traffic. Temporary or permanent curbing, flexible posts, or other traffic control devices may be used for physical separation. The separated bike-bus lane may be wider than a typical bus lane and may provide additional space for bicyclists to pass buses at stops.



Photo by J. Maus/Bike Portland

Figure 17: Separated Bike-Bus Mixing Zone in Portland, Oregon

### Typical Application/Thresholds

- This treatment is typically applied where there is a need for both a protected bike lane and a bus lane, but due to space constraints a separate lane for each mode is not feasible.

### Potential Benefits

- This treatment reduces bike-bus conflicts in constrained corridors where there is not space to separate buses and bicyclists from each other or wrap the bike lane behind the bus stops, like a wide floating bus island.

### Local Implementation Examples

- 14th Street NW

Travel Time Benefits



Reliability Benefits





## 5.2 Left Side Bike Lanes

This treatment installs bike lanes on the left side of one-way or median-divided streets in order to eliminate conflicts at bus stops, which are on the right side of the street.



Photo by NYC DOT

Figure 18: Left Side Bike Lane on Second Avenue, New York City

### Typical Application/Thresholds

- This treatment is typically applied on one-way streets with high bicycle and bus volumes where bike-bus conflicts cannot be addressed by other treatments.
- This treatment avoids conflicts with bus stop and layover zones.

### Potential Benefits

- This treatment eliminates bike-bus conflicts at bus stops and throughout the corridor.

### Local Implementation Examples

- [L Street NW](#) has a left side bike lane that prevents conflicts with turning vehicles, although there is currently no bus service on this segment

Travel Time Benefits



Reliability Benefits





## 5.3 Bike-Pedestrian Mixing Platform

A bike-pedestrian mixing platform is a bulb-out area that raises the bike lane up to sidewalk height at the bus stop. The bus shelter and rider waiting area remain on the sidewalk. Bus riders move across the bike lane as they board and alight the bus. This approach provides protection for bicyclists by preventing buses from having to cross the bike lane at bus stops.



Photo by DDOT

Figure 19: Bike-Pedestrian Mixing Platform, Florida Avenue NE

### Typical Application/Thresholds

- It is generally appropriate to implement this treatment when bike/scooter volumes are moderate and bus volumes are low or when bike/scooter volumes are low and bus volumes are moderate.
- The bike-pedestrian mixing zone can be designed by using temporary or permanent materials.

### Potential Benefits

- Reduces bike-bus conflicts, which has speed and safety benefits for both buses and bicyclists.
- Allows buses to board and alight passengers while remaining in the travel lane, which can help reduce delay from re-entering traffic.

### Local Implementation Examples

- [Florida Avenue NE](#)

Travel Time Benefits



Reliability Benefits





## 5.4 Narrow Floating Bus Island

A narrow floating bus island is a bulb-out area that raises the bike lane up to sidewalk height and provides a narrow island for bus riders to board and alight. The bus shelter and rider waiting area remain on the sidewalk. Bus riders move across the bike lane and board and alight from the narrow island.

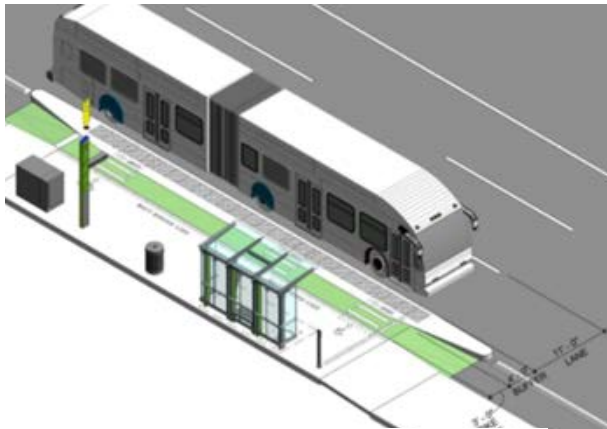


Photo by TriMet

Figure 20: Narrow Floating Bus Island

### Typical Application/Thresholds

- It is generally appropriate to implement this treatment when both bike/scooter volumes and bus volumes are moderate.
- The narrow floating bus island can be designed by using temporary or permanent materials.
- The treatment is typically used in locations where bus, bike, and scooter activity is moderate, space is limited, and bikes cannot be routed behind the bus stop using the wide floating bus island.

### Potential Benefits

- Reduces bike-bus conflicts, which has speed and safety benefits for both buses and bikes.
- Provides a moderate level of separation between bus riders and bicyclists.
- Allows buses to board and alight passengers while remaining in the travel lane, which can help reduce delay from re-entering traffic.

### Local Implementation Examples

- [M Street and 24th Street NW](#)

Travel Time Benefits



Reliability Benefits





## 5.5 Wide Floating Bus Island

A wide floating bus island is a bulb-out bus stop that allows the bicycle lane to wrap behind the bus stop. The bus shelter and rider waiting area are on the bus island. Generally, bus riders can access the bus island at one or two points across the bike lane. This approach provides protection for bicyclists by preventing buses from having to cross the bike lane at bus stops. It also clarifies interaction between all modes.

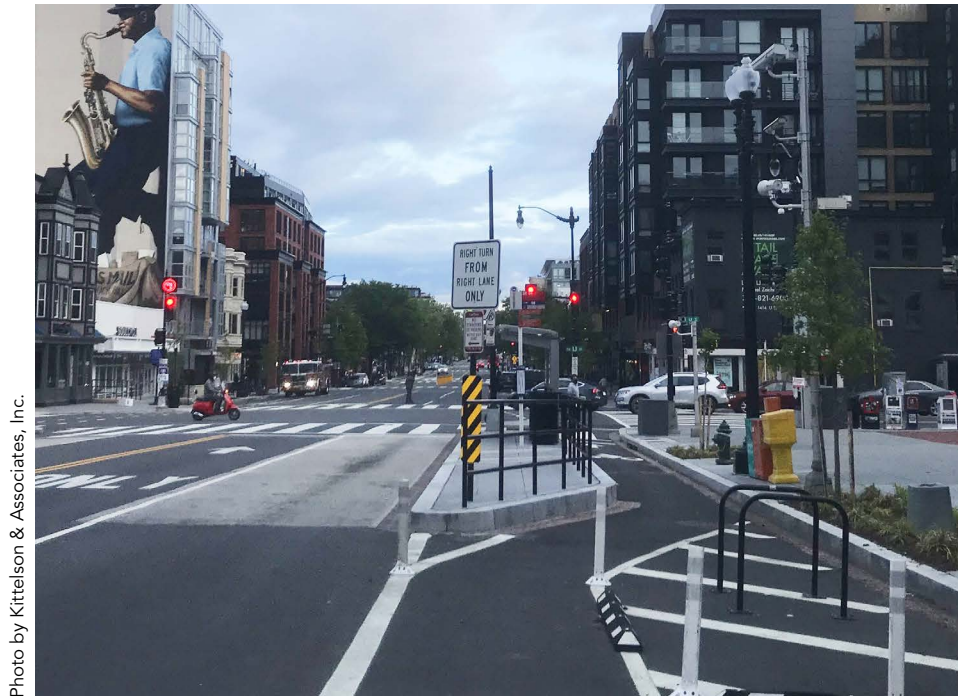


Photo by Kittelson & Associates, Inc.

Figure 21: Floating Bus Island on 14th Street NW

### Typical Application/Thresholds

- Wide floating bus islands are typically applied when both bike/scooter volumes and bus volumes are high.
- Floating bus islands can be designed by using temporary or permanent materials.
- The treatment is typically used in locations with wider roadway widths.

### Potential Benefits

- Reduces bike-bus conflicts, which has speed and safety benefits for both buses and bikes.
- Provides a high level of separation between bus riders and bicyclists.
- Allows buses to board and alight passengers while remaining in the travel lane, which can help reduce delay from re-entering traffic.

### Local Implementation Examples

- [14th Street NW](#)
- [2nd Street and R Street SW](#)

Travel Time Benefits



Reliability Benefits

