

Better Bus Transit Priority Toolkit

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About the Better Bus Toolkit

The Better Bus program focuses on improving high delay locations. The transit priority treatments in this toolkit prioritize capital and larger infrastructure treatments. Though not featured in the toolkit, the Better Bus program acknowledges additional programmatic tools and policies that support bus speed and reliability throughout the system, such as:

- Route design and alignment
- Rolling stock modification
- Enforcement
 - Automated enforcement
 - Parking and driver behavior enforcement
- System access
 - Bikes on board
 - Level boarding
 - All door boarding
 - Off-board payment
 - Payment technology and fare media



Better Bus Toolkit

Treatment Theme	Treatment Type and Subtypes	
	Core	Supportive
Transit Lanes	Bus Lane <ul style="list-style-type: none"> • Dedicated Bus Lane • Business Access and Transit (BAT) Lane • Peak Hour or Pro-Time Lane • Curbside Lane • Offset Lane • Left Side Lane • Shared Bike-Bus Lane • Shared Bus-Freight Lane • Red Pavement 	Contraflow Lane Median Bus Lane Reversible Bus Lane Bidirectional Bus Lane
Bus Stops and Operations	Stop Balancing Curb Extensions Transit Islands	Level Boarding Bus Stop Lengthening Bus Stop Improvements
Street Infrastructure	Street Design and Modifications Bus On Shoulder	Modifying Speed Humps Bus Only Links
Traffic Control	Bus Movement Exemptions <ul style="list-style-type: none"> • Right Turn Except Bus • Left Turn Except Bus • Transit-Only Access Transit Signal Priority (TSP) Traffic Signal Phase Modification and Timing Bus Signal Phase and Signal Head Queue Jump Signal	Restricting Automotive Movement Reverse Queue Jump Dedicated Bike Signal Curb Management



Transit Lanes

Transit lanes describe the roadway space, or right-of-way, that is allocated for the primary or exclusive use by public transit vehicles to travel with minimal interference and conflict with other motor vehicles and modes. Additional modes may be permitted to use transit lanes, but public transit vehicle travel is prioritized.

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

Offset Lane

Left Side Lane

Shared Bike-Bus Lane

Shared Bus-Freight Lane

Red Pavement

Supportive Strategies

Core	Supportive
Bus Lane <ul style="list-style-type: none"> • Dedicated Bus Lane • Business Access and Transit (BAT) Lane • Peak Hour or Pro-Time Lane • Curbside Lane • Offset Lane • Left Side Lane • Shared Bike-Bus Lane • Shared Bus-Freight Lane • Red Pavement 	Contraflow Lane Median Bus Lane Reversible Bus Lane Bidirectional Bus Lane



Bus Lane

Bus lanes are roadway lanes dedicated exclusively or primarily to the use of buses.

There are many types of bus lanes, each with their own accompanying treatments, benefits, and considerations. The implementation of bus lanes should consider location within the roadway, such as curbside, offset (from the curb), or on the left side (of a one-way street). Implementation should also consider the timing of when the bus lane is in effect, such as peak-hour, and direction of travel based on traffic volumes. Application of bus lanes typically include signage communicating whether other vehicles or modes are permitted on the lane, and solid white lines to denote a separate travel lane from general travel lanes. Bus lanes separate buses from general traffic and improve safety and travel time by increasing bus speeds and reducing conflict with other vehicles.

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

Offset Lane

Left Side Lane

Shared Bike-Bus Lane

Shared Bus-Freight Lane

Red Pavement

Supportive Strategies



Dedicated Bus Lane



Business Access and Transit (BAT) Lane



Peak Hour or Pro-Time Lane



Curbside Lane



Offset Lane



Left Side Lane



Shared Bike-Bus Lane



Shared Bus-Freight Lane



Transit Lanes

Dedicated Bus Lane



A roadway lane dedicated exclusively to the use of buses.

Dedicated bus lanes are exclusively for bus travel. Bus lanes should be dedicated for bus use on frequent bus service corridors that experience heavy congestion and high delay. They are often implemented by repurposing an existing travel lane or an on-street parking lane. A turning lane approaching an intersection can also be dedicated to buses only to separate turning buses from general through traffic. For example, this can help buses turn left into a transit center.

Treatment

- Bus only pavement marking and overhead and/or curbside signage communicating exclusive use of lane by buses

Benefit

- Improves bus speeds and travel time because buses are separated from mixed through traffic and not stuck in congestion
- Reduce conflict between buses and other vehicles, improving safety

Consideration

- Allocating an existing travel or on-street parking lane requires engagement with businesses and other uses adjacent to the bus lane



NE 11th Ave & E Burnside St

Source: TriMet

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

Offset Lane

Left Side Lane

Shared Bike-Bus Lane

Shared Bus-Freight Lane

Red Pavement

Supportive Strategies



Transit Lanes

Business Access and Transit (BAT) Lane



A roadway lane dedicated primarily to the use of buses.

Business Access and Transit (BAT) lanes are primarily dedicated for transit use, but allow some general traffic circulation for turning into driveways or onto intersecting streets. Even limited separation from mixed traffic allows for more efficient transit movement through otherwise congested conditions.



SW Capitol Hwy & SW Sunset Blvd

Source: TriMet

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

Offset Lane

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Shared Bike-Bus Lane

Shared Bus-Freight Lane

Red Pavement

Supportive Strategies

Treatment

- Bus only marking and overhead and/or signage communicating primary use of lane by buses
- Signage permitting right-turns and business/driveway access
- Dashed pavement markings to allow vehicle access for turns and business access

Benefit

- Maintains business and residence access
- Allowing turns minimizes restrictions to general traffic flow

Consideration

- Buses may experience delay waiting behind vehicles queued to turn right or to access businesses and/or driveways



Transit Lanes

Peak Hour or Pro-Time Lane



A roadway lane dedicated exclusively or primarily to the use of buses during specified hours.

Peak hour or pro-time lanes use parking lanes or general-purpose travel lanes for exclusive bus operations for select hours of the day, usually times of the highest demand. These lanes may be in effect for limited hours (7-9 am and/or 4-6 pm) or operate throughout the core of the day (7 am to 7 pm). They may be restricted to a peak commute direction, with the off-peak direction remaining as a parking lane or travel lane.

Treatment

- Bus only marking and overhead and/or curbside signage communicating exclusive or primary use of lane by buses
- Signage indicating hours of operation and permitting parking

Benefit

- Buses take precedence over parking and curbside access during hours when it most benefits bus operations

Consideration

- Implementation in residential areas requires communication with neighborhoods as residents are accustomed to placing garbage cans or parking in the pro-time lane space
- Compliance may require additional enforcement to ensure posted times are respected



Parking lane along SE Morrison St converts into bus-only lane during morning peak hours.

Source: Google Street View

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

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Red Pavement

Supportive Strategies



Transit Lanes

Curbside Lane



A bus lane located in the rightmost lane of the roadway and adjacent to the right curb.

A curbside bus lane describes a bus lane that is in the rightmost lane of a roadway (along the curb). Curbside lanes are often implemented as BAT lanes, but dedicated curbside bus lanes may be implemented where intersection movements and driveway access are limited or restricted. Curbside lanes may also allow other modes to share the lane with buses, such as bikes or freight vehicles.

Treatment

- Bus only marking and overhead and/or curbside signage communicating exclusive or primary use of lane by buses
- Signage indicating hours of operation and use of lane by other modes

Benefit

- Improves travel time because buses travel on a dedicated, unobstructed lane

Consideration

- Implementation will require communication with neighborhoods and businesses as parking in front of businesses or homes may be reallocated for bus travel
- Consider the placement of poles and street trees adjacent to the curbside lane



SE 82nd Avenue, northbound at Causey Avenue

Source: Nelson\Nygaard

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Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

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Red Pavement

Supportive Strategies



Transit Lanes

Offset Lane



A bus lane in the interior of the roadway that is typically located to the left of the curb (parking) lane but can also be in another non-curb lane.

Offset lanes provides a transit lane while maintaining on-street parking, loading/unloading, or other curb access functions in the space adjacent to the curb. This lane is typically located directly to the left of the parking lane. Parking lanes may become right-turn lanes on the approach to intersections, and these bus lanes often allow vehicles to transition through the bus lane to access the turn lane. In other instances, the offset lane may be shared with right-turning vehicles.

Treatment

- Bus only marking and overhead and/or curbside signage communicating exclusive or primary use of lane by buses
- Signage indicating locations where other vehicles or modes may enter the lane to park or turn

Benefit

- Improves travel time because buses travel on a transit lane with limited obstructions
- Maintains on-street parking and curb access functions

Consideration

- Offset travel lanes will be shared with vehicles for access to curb parking, loading, and right-turn movements



NW Everett Street, eastbound at 6th Avenue

Source: TriMet

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

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Offset Lane

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Red Pavement

Supportive Strategies



Transit Lanes

Left Side Lane



A bus lane on the left side of the roadway that is adjacent to the left curb on one-way streets or adjacent to the median on two-way streets.

A left side lane is a bus lane that is in the left-most lane of a roadway. Left side lanes may be the left curbside lane of a one-way right-of-way or the leftmost lane of a two-way right-of-way. Left side lanes may allow left-turning vehicles and bicycles to share the lane with buses. Bike lanes may be present along the left or right side of a left side lane.

Treatment

- Pavement markings and/or lane painting
- Signage permitting buses only and prohibiting other vehicles

Benefit

- Improves travel time because buses travel on a dedicated, unobstructed lane

Consideration

- May require a left-side transit island, consider the right-of-way for including transit island and left side lane
- Consider the placement of poles and street trees adjacent to the left side lane



SW Jefferson St & SW 17th Ave

Source: TriMet

Bus Lane

Dedicated Bus Lane

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Peak Hour or Pro-Time Lane

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Red Pavement

Supportive Strategies



Transit Lanes

Shared Bike-Bus Lane



A shared lane for bikes and buses that is separated by a physical barrier or buffered from general purpose traffic.

Shared bike-bus lanes allow full- or part-time use by buses and bicycles. Other users may be allowed to use the shared lane at specific times or locations. Shared bike-bus lanes are typically implemented where roadway space is not available to provide separate facilities for buses and bikes and where buses experience lower travel speeds and frequent stops, such as downtown cores with smaller block sizes.

Treatment

- Bus only and bicycle pavement markings
- Signage communicating exclusive use by bus and bike, and if applicable, hours of operation

Benefit

- Reduces impact and conflict on bus and bike movements by general purpose traffic
- Implementation on downhill segments allow bike speeds to match vehicle speeds

Consideration

- Implement bike-bus lanes to connect other bicycle facilities
- More effective on shorter segments and lower speeds



NE Couch St, westbound at NE 12th Ave

Source: TriMet

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

Offset Lane

Left Side Lane

Shared Bike-Bus Lane

Shared Bus-Freight Lane

Red Pavement

Supportive Strategies



Transit Lanes

Shared Bus-Freight Lane



A lane shared part- or full-time by buses and freight vehicles.

Shared bus and freight lanes allow full- or part-time use of buses and freight vehicles. Other users may also be allowed into the lane at specific times or locations. Shared bus-freight lanes are typically implemented where buses travel along major freight corridors or in a designated freight district. In Portland, these have been implemented as Transit, Truck, and Turn lanes that allow turns by personal vehicles.



SE Main St & SE Grand Ave

Source: Google Street View

Bus Lane

Dedicated Bus Lane

Business Access and Transit (BAT) Lane

Peak Hour or Pro-Time Lane

Curbside Lane

Offset Lane

Left Side Lane

Shared Bike-Bus Lane

Shared Bus-Freight Lane

Red Pavement

Supportive Strategies

Treatment

- White striping applied to full length/selected segments, always the full width of the lane, supplementing bus lane signage

Benefit

- Reduces delay on bus and freight travel by general purpose traffic

Consideration

- A freight vehicle should be clearly defined, and definition should be communicated such that personal or commercial trucks do not use shared bus-freight lanes



Transit Lanes

Red Pavement



All or selected segments of a bus lane are indicated with red-colored pavement to increase visibility and enhance compliance.

Red pavement increases visibility of bus lanes and deters illegal parking or use of bus lanes by general-purpose traffic. Red pavement may be applied along full lengths of a bus lane, or on segments where conflict from other modes is expected, such as on the far side of intersections where turning vehicles may enter the lane.

Treatment

- Red-colored pavement applied to full length/selected segments, always the full width of the lane, supplementing bus lane signage
- Standards for red pavement treatment found in Manual on Uniform Traffic Control Devices (11th Edition).

Benefit

- Clearly communicates to road users the lane is dedicated for bus travel
- Reduces violations and obstruction by other motor vehicles

Consideration

- Guidance for enforcement should be clearly communicated to road users
- Red pavement requires ongoing maintenance



E Burnside Street & Martin Luther King Jr Blvd

Source: TriMet

Bus Lane

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Supportive Strategies



Transit Lanes

Supportive Strategies

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Red Pavement

Supportive Strategies

Contraflow Lane	A bus lane provided in the opposite direction of normal traffic flow on a one-way or divided street.
Median Bus Lane	A bus lane in the middle of a roadway and often separated from other traffic by curbs or landscaped islands.
Reversible Bus Lane	A single bus lane that serves buses operating in both directions, where direction favors peak-time travel and is generally controlled by time of day.
Bidirectional Bus Lane	A single bus lane that serves buses operating in both directions at any time of day. Access is signal-controlled.



Bus Stops and Operations

Bus stops and operations describe the physical locations and infrastructure along a bus route where passengers board and alight the bus as well as supportive policies for effective operations of bus travel at bus stops.

- Stop Balancing
- Curb Extensions
- Transit Islands
- Supportive Strategies

Core	Supportive
Stop Balancing Curb Extensions Transit Islands	Level Boarding Bus Stop Lengthening Bus Stop Improvements



Bus Stops and Operations

Stop Balancing



Bus stop balancing is the relocating or consolidation of bus stops and optimizing the spacing between bus stops.

Stop balancing incorporates stop relocation, consolidation, and/or removal at the corridor level. Consolidations and relocation typically achieves wider stop spacing with fewer stops. Passengers experience a faster ride due to less frequent stops. Balancing stops maintains convenient access to essential destinations while providing faster service. Standards for stop spacing may be in miles or blocks, so long as it considers the needs of the riders and benefits to the corridor.

Treatment

- Removal and relocation of bus stop infrastructure
- Signage communicating future removal/relocation of bus stop customized to ridership demographic at stop

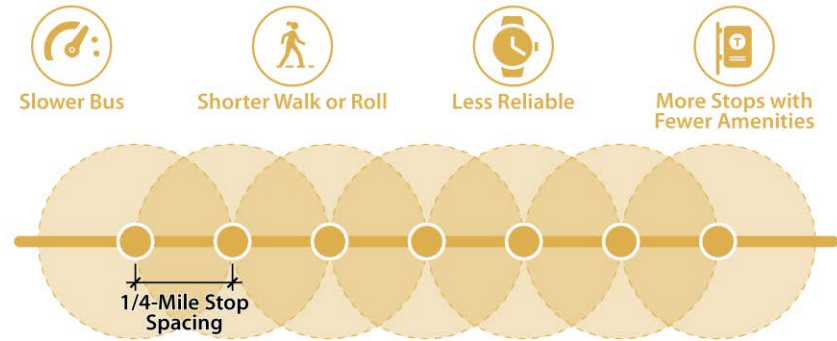
Benefit

- Reduces dwell time and more efficient use of limited bus stop infrastructure (shelters, benches)
- Reduces deceleration/acceleration time required to serve bus route

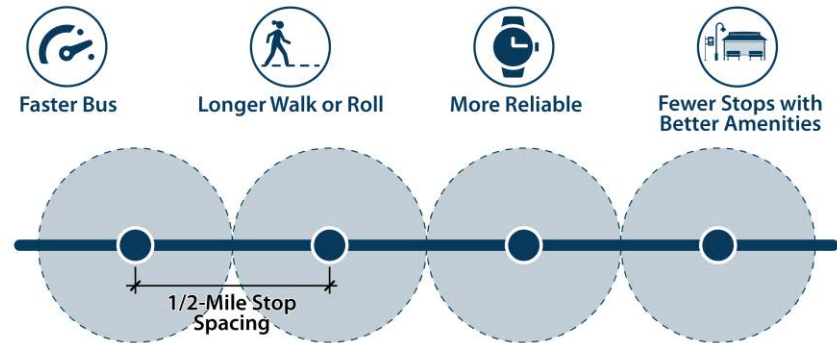
Consideration

- Consider maintaining stop locations that serve passengers with reduced mobility, provide access to specific destinations (healthcare, schools), and connect to safer pedestrian facilities

WHEN STOPS ARE CLOSER TOGETHER



WHEN STOPS ARE FARTHER APART



Benefits and tradeoffs of stop balancing should be considered based on access to destinations and facilities along the corridor.

Stop Balancing
Curb Extensions
Transit Islands
Supportive Strategies



Bus Stops and Operations

Curb Extensions



Curb extensions extend the curb and sidewalk out to the edge of the parking lane to create an in-lane stop.

Curb extensions are used to extend the edge of a bus stop up to the bus travel lane. This keeps the bus “in-lane” when stopping to pick up passengers. Curb extensions are also used to enlarge the bus stop loading/waiting areas to provide space for amenities, reduce conflicts between passengers and sidewalk flows in high pedestrian activity areas, and accommodate high passenger volumes at busy locations.

Treatment

- Temporary or permanent extension of sidewalk so the curb is adjacent to bus travel lane

Benefit

- Reduces delay from merging into travel lane
- Improves pedestrian visibility and safety

Consideration

- Presence of curbside bike lane may require installation of shared bike and pedestrian platform
- Length of curb extension is determined by the frequency and size of buses at stop
- Streets above a certain speed limit may not be suitable for curb extensions/in-lane stops and require further analysis



NW Pettygrove and NW 21st Ave

Source: Nelson\Nygaard

Stop Balancing
Curb Extensions
Transit Islands
Supportive Strategies



Bus Stops and Operations

Transit Islands



- Stop Balancing
- Curb Extensions
- Transit Islands
- Supportive Strategies

Transit islands feature a channelized bike “wrap-around” behind the station area while providing an in-lane stop.

Transit islands are also known as “bikes behind station”. Transit islands allow for separate of general traffic, bus lanes, and bike lanes to minimizing conflicts between buses, passengers, and bicycles at stops. Riders cross the bike lane to board and alight the bus. Transit islands can also provide left side boarding platforms for left side bus lanes Transit islands may be implemented as shared bike and pedestrian platforms at stops with high bicycle and pedestrian volumes.

Treatment

- Platform along roadway, typically in current parking area or travel lane
- Green pavement markings for separate bike lane and crosswalk treatments for pedestrian crossing

Benefit

- Reduces delay from merging into traffic lane
- Improves bicycling and pedestrian visibility and safety

Consideration

- Width of right-of-way to accommodate transit island and bike lane
- Bicycle and pedestrian volumes at stop



NE Halsey St and NE 111th Ave

Source: Nelson\Nygaard



Bus Stops and Operations

Supportive Strategies

Level Boarding	Level or near level boarding at stops or stations provides a platform height that minimizes the vertical gap between the pavement and the bus floor, making it easier and faster to board the bus.
Bus Stop Lengthening	A bus stop's length is increased to allow it to serve more (or longer) buses simultaneously.
Bus Stop Improvements	Enhancements to bus stops to improve functionality, accessibility, and passenger experience with buses. Bus stop improvements can also support bus stop spacing projects.

- Stop Balancing
- Curb Extensions
- Transit Islands
- Supportive Strategies**



Street Infrastructure

Street infrastructure refers to strategies that modify vehicle movements. These strategies describe physical treatments to roadways that prioritize bus movements and policies that facilitate bus movements on existing roadway infrastructure.

Core	Supportive
Street Design and Modifications Bus On Shoulder	Modifying Speed Humps Bus Only Links

Street Design and
Modifications
Bus On Shoulder
Supportive Strategies



Street Infrastructure

Street Design and Modifications



Modifications to street design or geometry where high vehicle volumes may interfere with transit operations but may not be prohibited.

Street design modifications should improve traffic flow such that vehicles do not block transit or general traffic.

Modifications may include:

- Adding right/left turn pockets
- Restricting left turns
- Adding two-way left turn lanes
- Driveway consolidation
- Adding raised medians/physical barriers to direct traffic

Treatment

- Signage, pavement markings, and/or raised traffic barriers to manage access

Benefit

- Improving flow of vehicle movements can reduce travel time, improve reliability, and increase safety by reducing conflict with other modes

Consideration

- Modifications should consider right-of-way, turn volumes, driveway access
- Large scale modifications may include roadway widening



Restriping to provide a left turn pocket at NE Prescott St & NE 82nd Ave

Source: TriMet

Street Design and Modifications

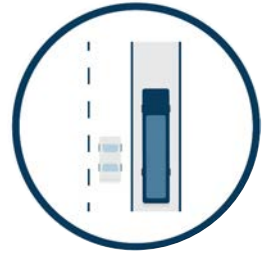
Bus On Shoulder

Supportive Strategies



Street Infrastructure

Bus On Shoulder



Buses are allowed to use roadway shoulders during peak periods or when slowing/congestion occurs.

Repurposing the shoulders of freeways and highways can provide a transit lane that improves bus travel during periods of congestion. The shoulder provides a separate transit lane that can increase travel speeds and improve bus reliability. For roadways that already have a wide shoulder (11-12 feet or more), this is a low cost and impact treatment. Bus on shoulder may be allowed at all times of the day or during specific times, such as during peak periods.

Treatment

- Signage communicating bus travel is permitted on shoulder
- Potential restriping to ensure sufficient width for bus travel

Benefit

- Improves bus travel speed as bus travels separately from general traffic

Consideration

- Only to be used when overall speed of traffic is lower than 35 mph
- Training of bus operators to use shoulders, education to public to expect buses on shoulders
- Emergency uses are prioritized so general motor vehicles may stall or stop on shoulder



C-TRAN Route 105 on I-5 between 99th St and Interstate Bridge, Vancouver

Source: C-TRAN

Street Design and
Modifications

Bus On Shoulder

Supportive Strategies



Street Infrastructure Supportive Strategies

Modifying Speed Humps

Speed bumps and humps along bus routes are replaced with bus-friendlier versions.

Bus Only Links

Bus-only links (bus gates, bus-only crossings) are short sections of roadway connecting public streets that can only be used by transit vehicles and other authorized vehicles (e.g., emergency vehicles) and often implement a physical barrier to prevent access by unauthorized vehicles.

Street Design and Modifications

Bus On Shoulder

Supportive Strategies



Traffic Control

Traffic control refer to strategies that manage and regulate the movement of vehicles to ensure efficiency and safety of specific vehicle movements. The strategies described in this section prioritize bus movements.

Bus Movement Exemptions

- Right Turn Except Bus
- Left Turn Except Bus
- Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies

Core	Supportive
Bus Movement Exemptions <ul style="list-style-type: none"> • Right Turn Except Bus • Left Turn Except Bus • Transit-Only Access Transit Signal Priority (TSP) Traffic Signal Phase Modification and Timing Bus Signal Phase and Signal Head Queue Jump Signal	Restricting Automotive Movement Reverse Queue Jump Dedicated Bike Signal Curb Management



Traffic Control

Bus Movement Exemptions

Buses are allowed to make movements that are prohibited for other motor vehicles.

In some locations, general-purpose traffic may be expected to make a turn or be subject to turn and other movement restrictions. To ensure buses take the most efficient and direct route, buses may be exempt from these restrictions. Often, these exceptions are made in coordination with traffic calming or are intended to reduce travel time. In other instances, these movement exceptions are applied in particular lanes. For example, a right turn only lane may allow buses to proceed through the intersection to access a far-side bus lane or bus stop.

Bus Movement Exemptions

- Right Turn Except Bus
- Left Turn Except Bus
- Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies



Right turn except bus



Left turn except bus



Transit-only access



Traffic Control

Right Turn Except Bus



Buses are allowed to make a through movement at an intersection from a lane where other vehicles are only permitted to make right turns.

Right turn except bus movements are applied to improve bus through movements at an intersection and allow buses to advance ahead of general traffic. These movements may be helpful when a street has insufficient space for a dedicated bus lane and a separate right-turn pocket. It may also allow buses to proceed through the intersection to access a far-side bus lane or bus stop.

Treatment

- Signage communicating buses are permitted to make through movements, right-turn and red paint pavement markings

Benefit

- Decrease travel time because buses can advance ahead of general traffic at an intersection

Consideration

- Implementation should consider right-of-way, right-turn volumes
- If there is no receiving lane, consider providing a queue jump signal



SE Hawthorne Blvd, eastbound at Cesar Chavez Blvd

Source: Nelson\Nygaard

Bus Movement Exemptions

Right Turn Except Bus

Left Turn Except Bus

Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies



Traffic Control

Left Turn Except Bus



Buses are allowed to make a through movement at an intersection from a lane where other vehicles are only permitted to make left turns.

Left turn except bus movements are applied to improve bus through movements at an intersection and allow buses to advance ahead of general traffic. These movements may be helpful when a street has insufficient space for a dedicated bus lane and a separate left-turn pocket.



SW Jefferson St & SW 17th Ave

Source: TriMet

Bus Movement Exemptions

Right Turn Except Bus

Left Turn Except Bus

Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies

Treatment

- Signage communicating buses are permitted to make through movements, left-turn and red paint pavement markings

Benefit

- Decrease travel time because buses can advance ahead of general traffic at an intersection

Consideration

- Consider right-of-way, left-turn volumes
- If there is no receiving lane, consider providing a queue jump signal
- Extra communication and signage may be required to familiarize road users with this bus movement



Traffic Control Transit-Only Access



Bus Movement Exemptions

Right Turn Except Bus

Left Turn Except Bus

Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies

Prohibiting or redirecting general traffic away from a transit route that continues through an intersection.

Transit-only access includes an exclusive lane at the far side of the intersection that permits transit and/or bicycle access only. This treatment is also known as “do not enter except bus” and reduces conflict between buses and general traffic, allowing for more efficient travel through congested and/or strategically located intersections.

Treatment

- Traffic diversion features (curbs, pavement markings and/or median islands) are accompanied by signage prohibiting general vehicle travel
- Operation can be enhanced with dedicated signal phasing
- May include contra-flow bus and/or bicycle lanes

Benefit

- Reduce travel time as bus travel is separated from general vehicle traffic and congestion

Consideration

- Can be applied to either through lanes or turning lanes



SE 28th Ave & SE Holgate Blvd

Source: Google Street View



Traffic Control Transit Signal Priority (TSP)



Interventions at signalized intersections that benefit bus movements when buses are detected.

TSP refers to signal technologies that give buses additional or dedicated time for moving through intersections. TSP enables communications between transit vehicles, traffic signals and/or the traffic control system. When buses are detected, the TSP algorithm can extend the green phase or shorten the red phase to reduce bus wait time. Previous TSP systems relied on line-of-sight detection of buses at individual signals. Newer systems (referred to as Next-Gen TSP) track buses in real time and use artificial intelligence and a cloud-based platform to provide bus arrival times to multiple signals along a corridor.

Treatment

- Updating infrastructure and technology in traffic signals and on buses to support TSP

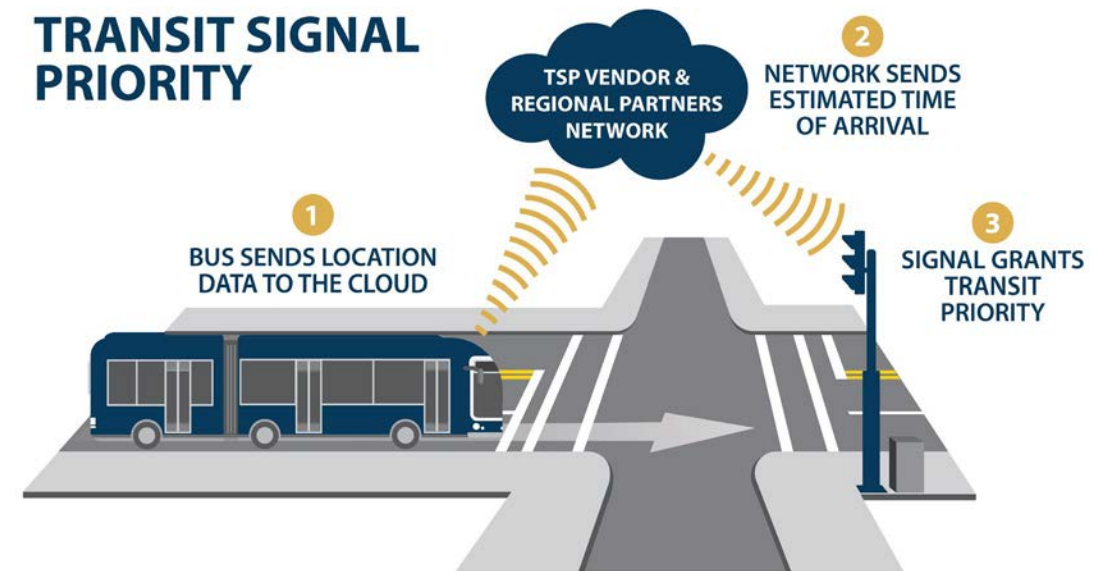
Benefit

- Reduces bus wait time at signals, improving travel time and travel time variability

Consideration

- Implementation requires technological support from signal infrastructure and transit vehicles

TRANSIT SIGNAL PRIORITY



Active Transit Signal Priority (TSP) utilizes a network to time signals with transit.

Bus Movement Exemptions

Right Turn Except Bus

Left Turn Except Bus

Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies



Traffic Control

Traffic Signal Phase Modification and Timing



Bus Movement Exemptions

- Right Turn Except Bus
- Left Turn Except Bus
- Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies

Optimizing signalized intersections to benefit bus movements even when buses are not detected.

Traffic signal phase modifications and timing are programmed signal cycles that operate continuously regardless of presence of a bus at an intersection (also called passive signal priority). Modifications help clear vehicle traffic at intersections to ease movement of transit vehicles and may include:

- Signal retiming to optimize green phases based on expected bus frequency and travel speed
- Serving a phase twice in a single traffic signal cycle to facilitate a bus movement
- Pre signals/signal shadowing to control general traffic, providing a temporal gap allowing the bus to move ahead of general traffic

Treatment

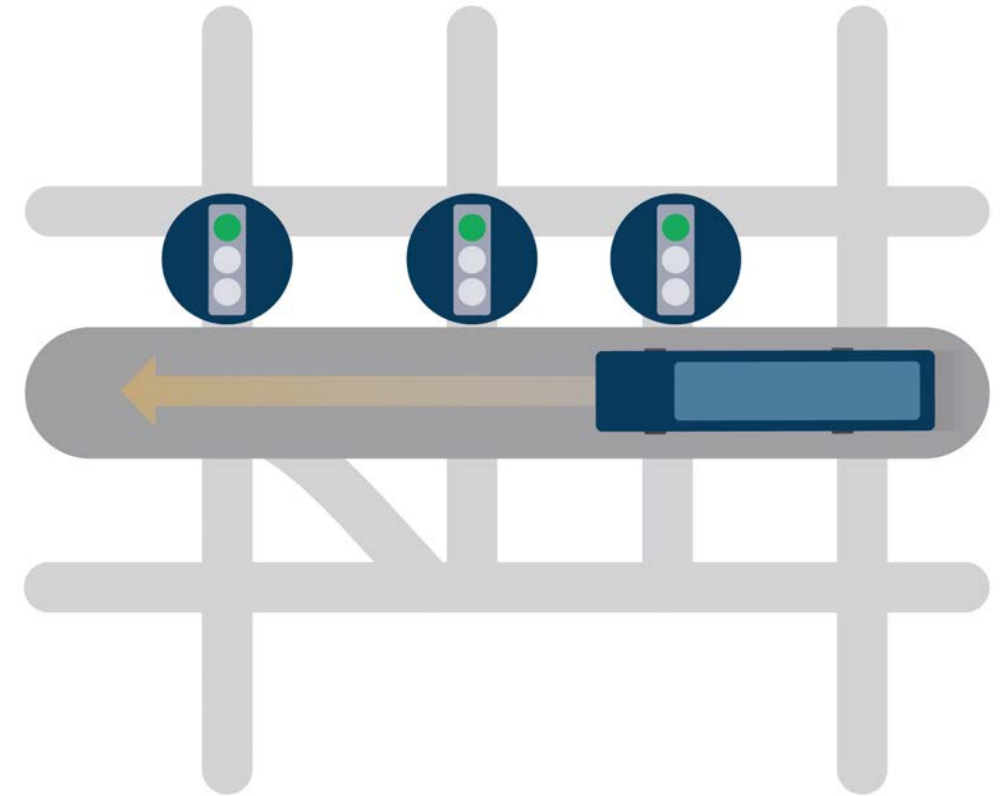
- Optimizing existing signal timing plans to prioritize bus movements at intersections

Benefit

- Reduce delay for all vehicles on the approach to an intersection used by transit
- Reduce wait time for buses at intersections

Consideration

- Implementation should consider traffic, turn, and pedestrian volumes at intersection



Signal green phases can be timed with bus frequency and travel speed along a corridor.



Traffic Control

Bus Signal Phase and Signal Head



Bus Movement Exemptions

- Right Turn Except Bus
- Left Turn Except Bus
- Transit-Only Access

Transit Signal Priority

Traffic Signal Phase Modification and Timing

Bus Signal Phase and Signal Head

Queue Jump Signal

Supportive Strategies

A bus-specific signal head and phase.

Bus signal phases and signal heads are typically applied to support other treatments such as queue jumps, bus movement exemptions, and transit signal priority. Bus-specific signals can also facilitate bus movements from nonstandard locations, such as a left turn from a right-side lane. Bus signal phases and signal heads can be used in coordination with bike-only signals.

Treatment

- Signal head with designated bus/transit signal

Benefit

- Reduce travel time by prioritizing bus movements at intersections

Consideration

- Length of existing/potential signal phases and intersection movement volumes
- Requires a bus lane to get the bus to the intersection



NE Martin Luther King Jr Blvd & E Burnside St

Source: TriMet



Traffic Control

Queue Jump Signal



Bus Movement Exemptions

- Right Turn Except Bus
- Left Turn Except Bus
- Transit-Only Access

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Supportive Strategies

Special signal phase to allow a bus to advance through an intersection without conflicts with through vehicle.

Queue jumps are used to advance buses through an intersection, particularly where there is no receiving lane. Often queue jumps are used in conjunction with Right Turn Except Bus lanes or a transit approach lane (sometimes known as queue jump lanes). A special phase is required to proceed through the intersection when no transit receiving lane is available. This is to avoid conflicts with general-purpose vehicles proceeding through the intersection into the same lane.

Treatment

- "Early green" signal phase OR exclusive transit signal phase
- Often paired with traditional bus loop detection or TSP to detect a bus at an intersection

Benefit

- Decrease travel time as buses advance ahead of general traffic at intersections

Consideration

- Requires a transit approach lane which should consider right-of-way, right-turn volumes



A queue jump signal is needed when there is no approach lane across the intersection.



Traffic Control Supportive Strategies

Bus Movement Exemptions

- Right Turn Except Bus
- Left Turn Except Bus
- Transit-Only Access

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Supportive Strategies

Restricting Automotive Movement	One or more existing general traffic turning movements at an intersection are prohibited.
Reverse Queue Jump	This tool includes communication between nearby traffic signals and the bus to create gaps in traffic to expedite a difficult movement. This strategy may include a bus signaling an upstream intersection to turn red, creating a gap in traffic for a bus merging from a far-side stop.
Dedicated Bike Signal	Dedicated bike signal phasing near a transit stop – or at intersections where the bus turns – can improve multi-modal integration and reduce conflicts by clarifying the interaction among bicycle riders, pedestrians, and transit vehicles.
Curb Management	The planning, allocation, and regulation of use of curbside space along roadways to balance competing demands. Effective curbside management can complement enforcement to ensure curbside uses such as loading, deliveries, and parking do not block the transit lane.