

# BUS PRIORITY TREATMENTS TOOLKIT



In collaboration with RTD, DOTI developed this toolkit of treatments that aim to help buses run more efficiently by improving transit travel times and reliability. The toolkit is based on best practices from peer cities as well as the National Association of City Transportation Officials ([NACTO](#)).





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Location: Park Ave & Clarkson St, Denver, CO

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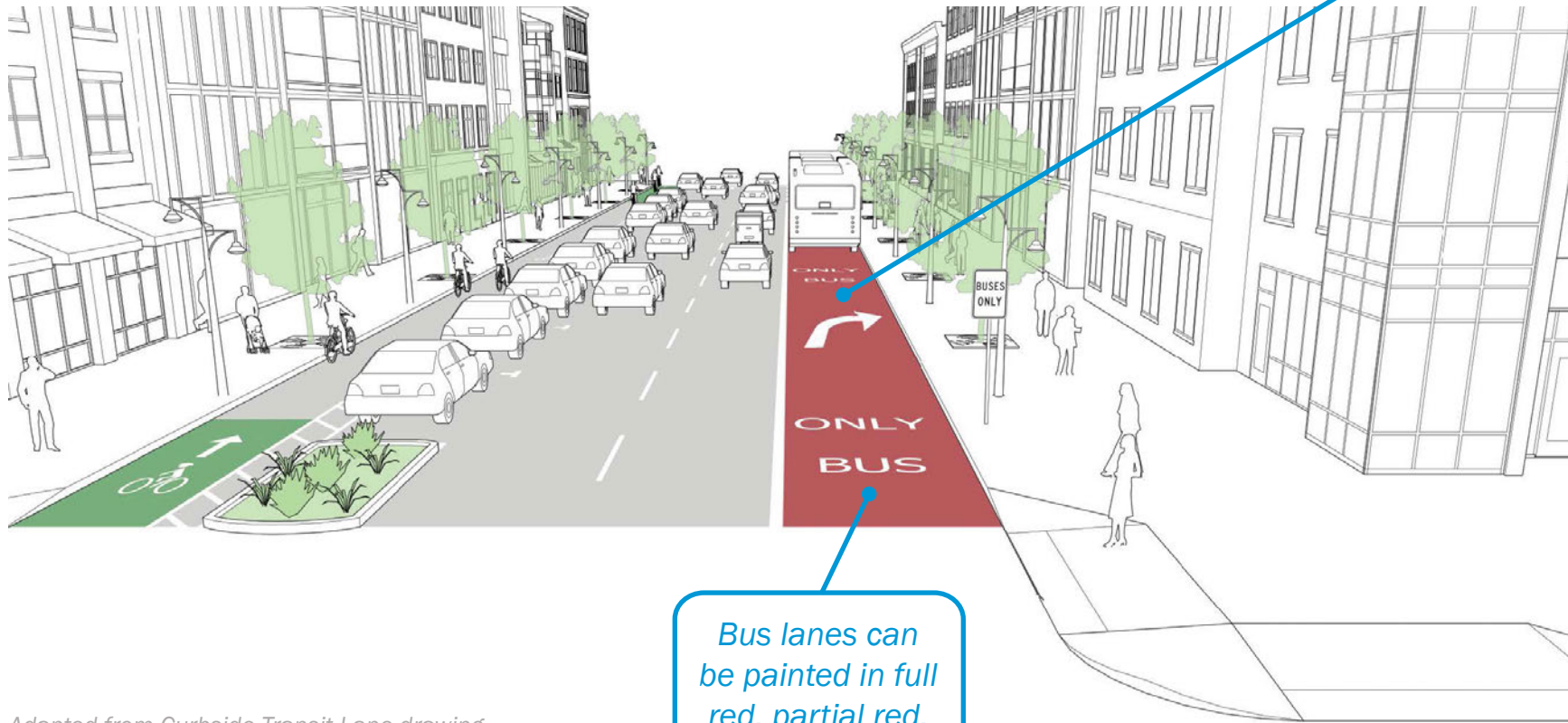
# 1. Roadway Treatments



# Curbside Bus Lane

A Curbside Bus Lane is a type of bus lane that runs along the edge of the curb and may permit right-turning vehicles in the lane.

*Right-turns may be permitted from a curbside bus lane.*



*Bus lanes can be painted in full red, partial red, or white striping.*

*Adapted from Curbside Transit Lane drawing in NACTO's Transit Street Design Guide*

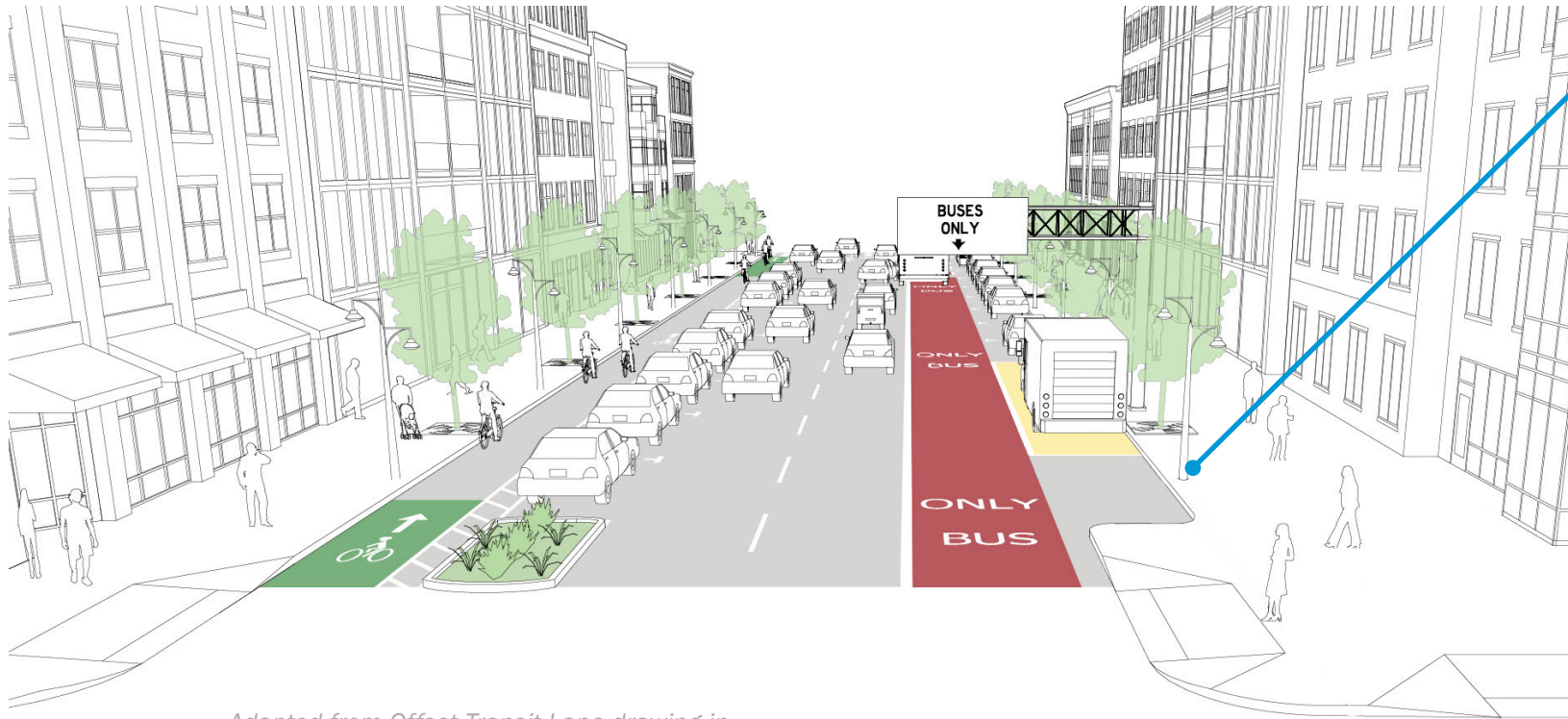




# Parking-Adjacent Bus Lane

A Parking-Adjacent Bus Lane is a type of bus lane that runs next to a parking lane or other curbside use. Vehicles may cross the bus lane to access on-street parking, as well make right turns at driveways and intersections.

*Alternate curbside uses include cycle tracks, parklets, loading, and bus bulbs.*



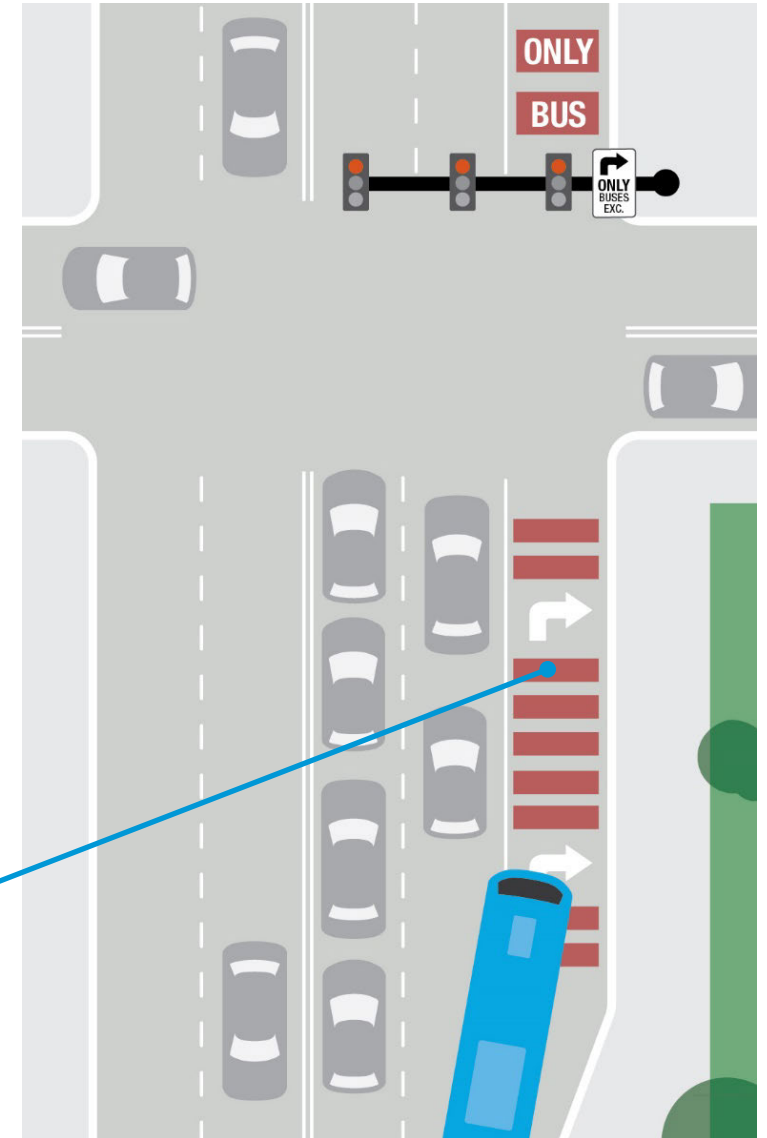
*Adapted from Offset Transit Lane drawing in NACTO's Transit Street Design Guide*



# Bus Bypass Lane

A Bus Bypass Lane is a short segment of bus lane that provides space for buses to get ahead of traffic, often (but not always) near intersections. Bypass Lanes can permit right-turning vehicles. They are often coupled with a bus priority signal called a Queue Jump to give buses an advanced green signal to move through an intersection before general traffic.

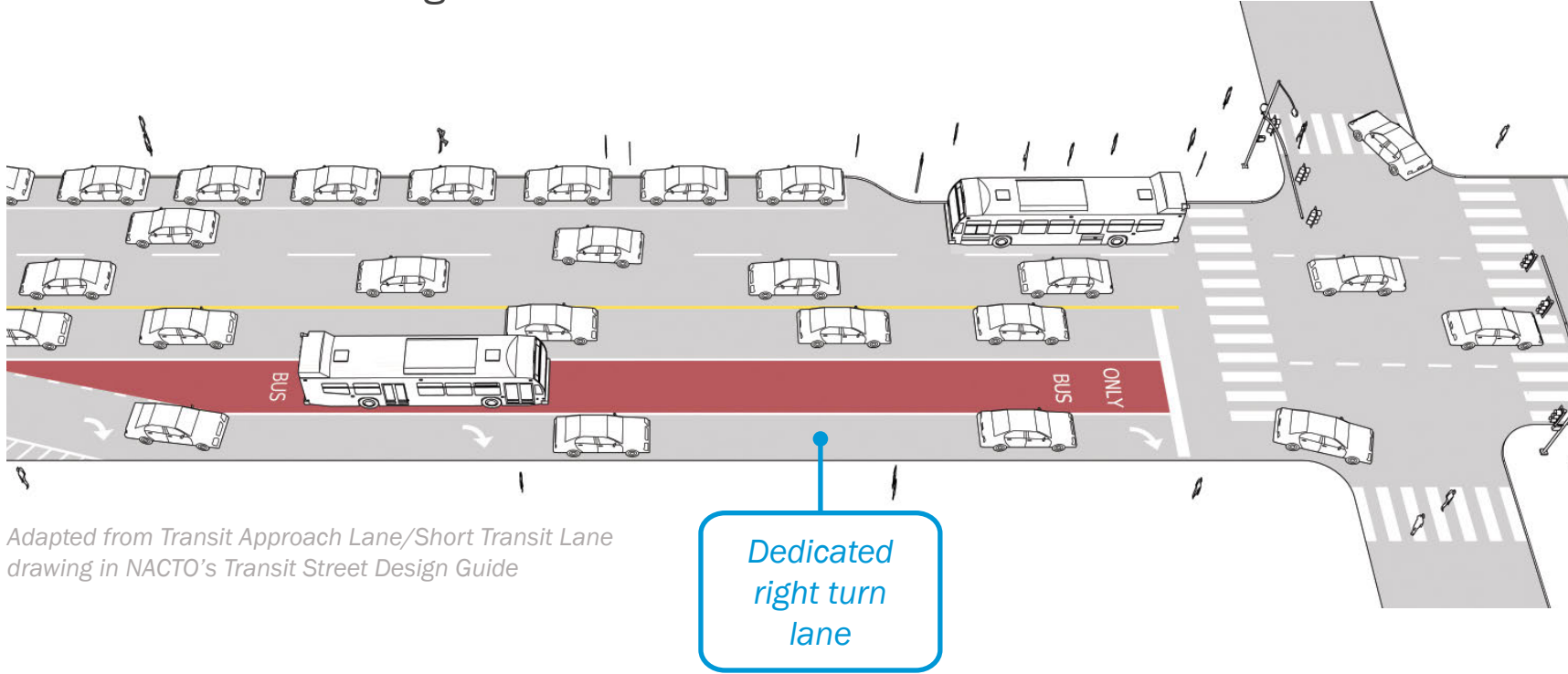
*A Bus Bypass Lane at an intersection that permits right-turning vehicles.*





# Transit Approach Lane

A Transit Approach Lane is a type of bus lane that provides space for buses to get ahead of traffic near intersections. Right-turning vehicles are not permitted in Transit Approach Lanes because they use an adjacent dedicated right-turn lane. Like Bypass Lanes, Transit Approach Lanes are often coupled with a designated bus priority signal called a Queue Jump to give buses an advanced green signal to move through an intersection before general traffic.



Adapted from Transit Approach Lane/Short Transit Lane drawing in NACTO's Transit Street Design Guide

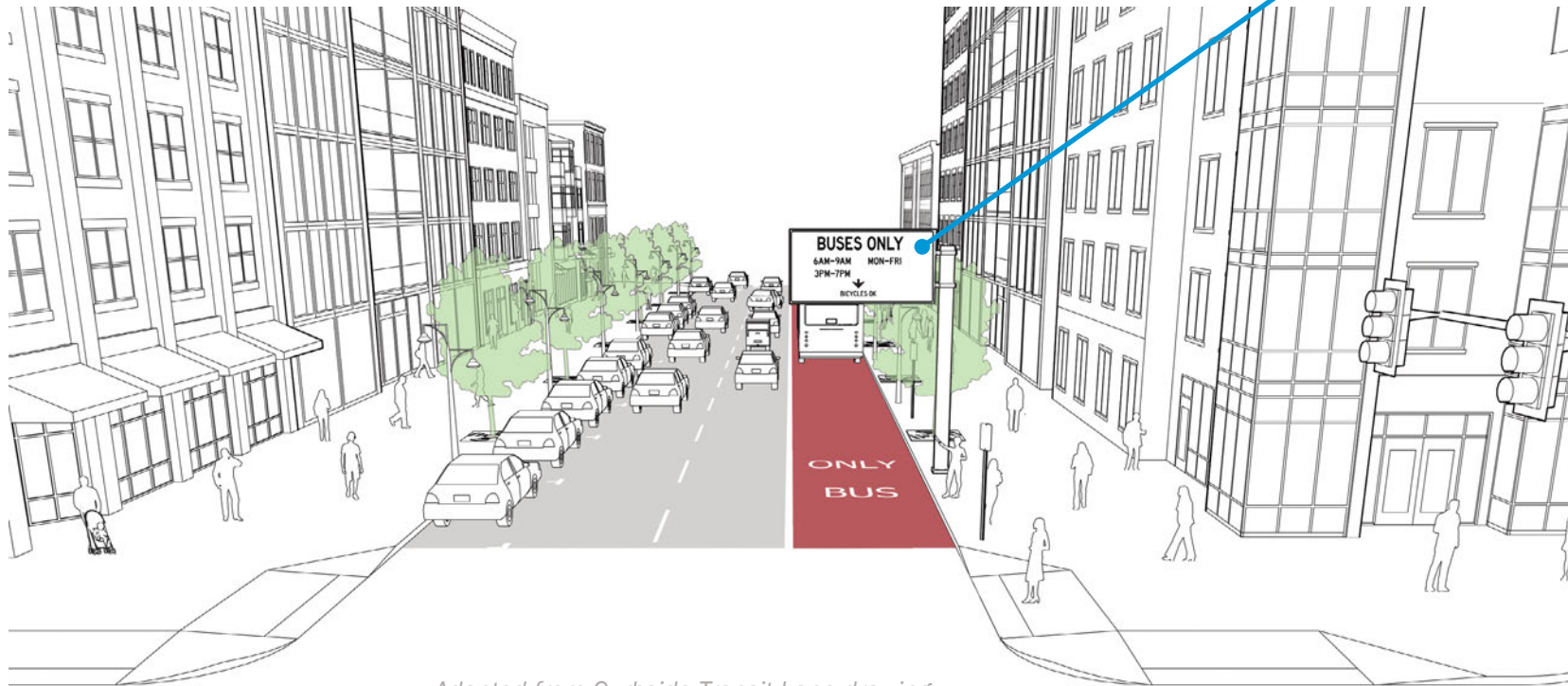




# Peak Hour Bus Lane

A Peak Hour Bus Lane operates as a dedicated bus lane during the morning and/or evening peak hours. The lane may operate as a regular travel lane or parking lane during the off-peak hours.

Overhead signage explains the lane restrictions.



*Adapted from Curbside Transit Lane drawing in NACTO's Transit Street Design Guide*



# Contraflow Bus Lane

A Contraflow Bus Lane is a type of bus lane that operates in the opposite direction of the traffic on the other side of the street. Contraflow Bus Lanes can be strategically implemented to create efficient connections along a bus route.

*Signage, pavement markings, red paint, or medians can be used to deter encroaching vehicles.*



*In this example, bikes are also allowed in the contraflow lane.*

Location: Park Ave & Clarkson St, Denver, CO





# Shared Bus-Bike Lane

A Shared Bus-Bike Lane is a type of bus lane that also allows people biking. Buses and bicyclists should operate at slow speeds and low volumes in Shared Bus-Bike Lanes. Buses are discouraged from passing bicyclists and bicyclists should only pass buses at stops.

*Sharrows can be placed with Bus Only markings to indicate that bicyclists may use the lane.*



Location: 15th St & Larimer St, Denver, CO



# Transit Only Street

A Transit Only Street is a roadway that only allows transit vehicles like buses or streetcars, such as Denver's 16th Street Mall. Maintenance and emergency vehicles may utilize Transit Only Streets when necessary.



Location: 16th St Mall & Court St, Denver, CO



# 2. Intersection Treatments

Location: 17th St & Lawrence St, Denver, CO

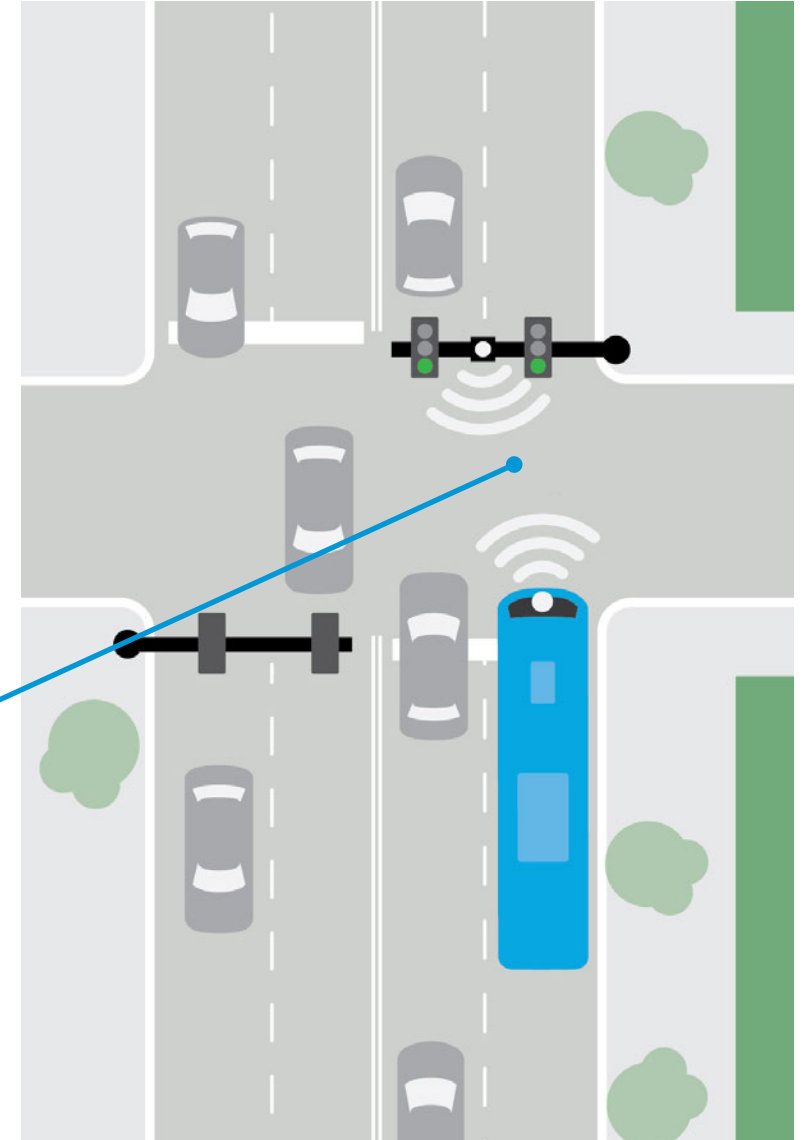


# Transit Signal Priority (TSP)

Transit Signal Priority (TSP) prioritizes transit by adjusting signal phasing to allow a bus to move through an intersection without stopping. Emergency vehicles and first responders may also benefit from TSP.

- Active TSP detects the presence of a bus and sends a message to the signal to either extend the green light or activate the green light early for the bus to pass through the intersection.
- Passive TSP times signals accordingly so that buses can pass through more than one intersection without stopping, also known as a green wave.

*Bus and signal communicate to allow bus to pass through intersection without stopping.*





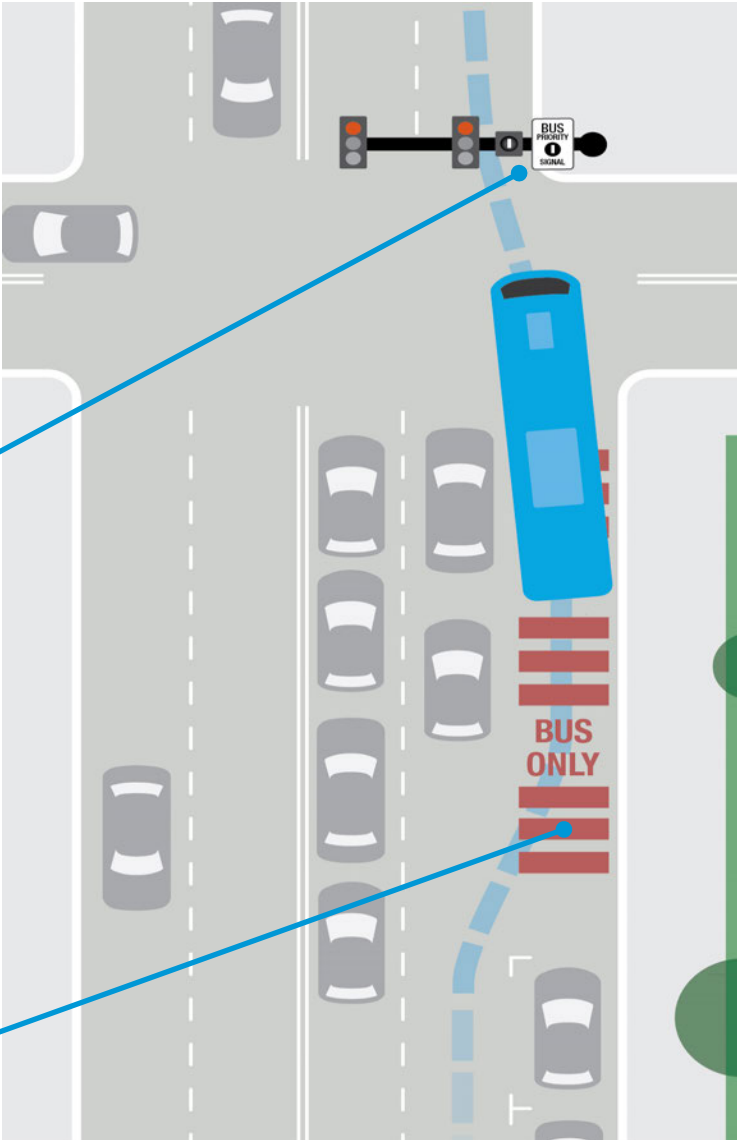


# Queue Jump

Queue Jumps give buses an advanced signal to move through an intersection before general traffic. They are typically coupled with a bus lane on the approach to an intersection.

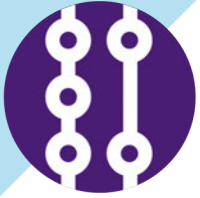
*This signal illuminates before the green phase to allow bus traffic to proceed ahead.*

*Bus Bypass Lane allows bus to circumvent stopped vehicles.*



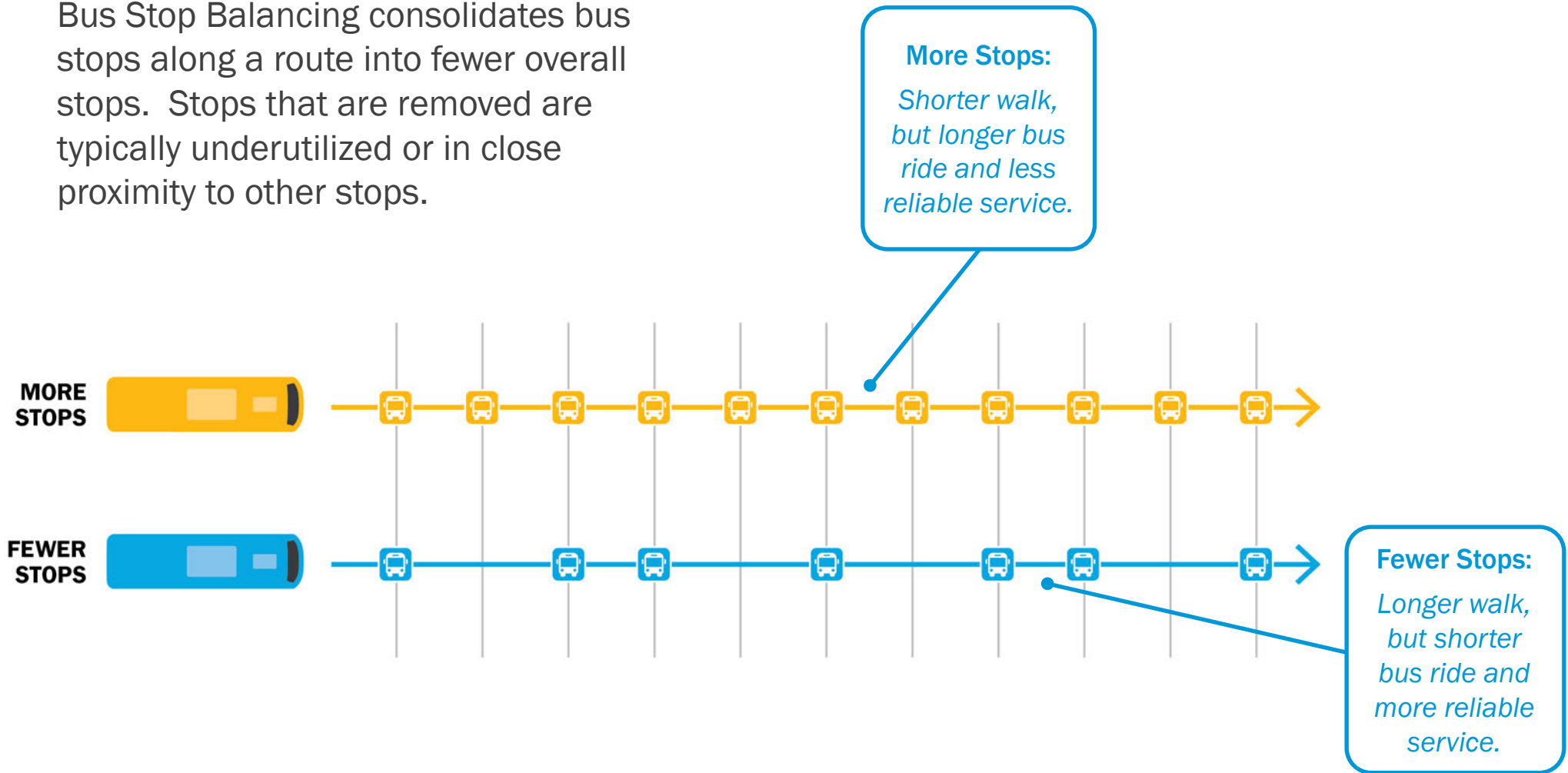
# 3. Stop Treatments





# Bus Stop Balancing

Bus Stop Balancing consolidates bus stops along a route into fewer overall stops. Stops that are removed are typically underutilized or in close proximity to other stops.

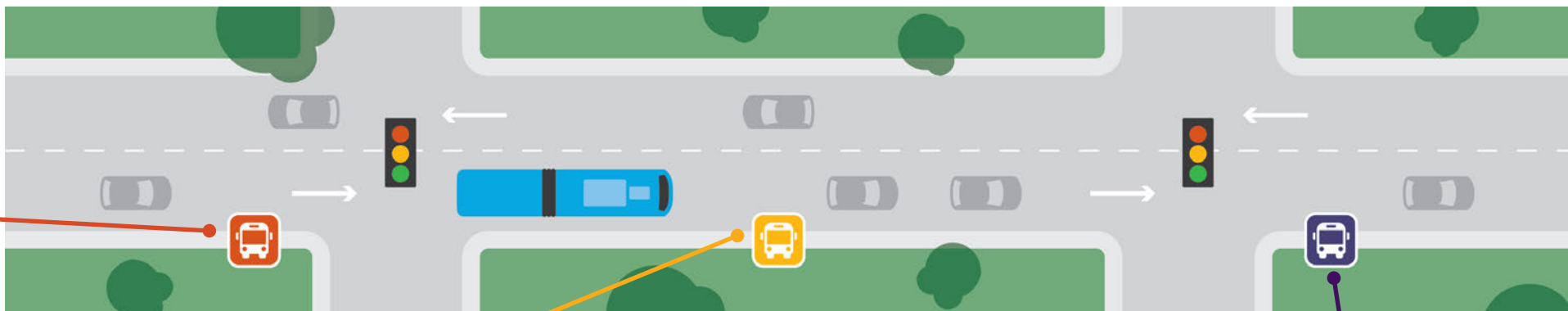




# Bus Stop Relocation

Bus Stop Relocation involves moving a bus stop to a more strategic location that allows a bus to stop more easily. For example, when applied with TSP, far-side stops can allow a bus to get through the intersection and then stop to let passengers on and off.

Near-Side Stops are recommended when Far-Side Stops are not feasible, or to avoid “double stopping” at intersections with stop-control or queue jumps.



Mid-Block Stops are recommended where major mid-block destinations generate high volumes of passenger trips or where traffic conditions at intersections may create safety challenges for pedestrians or stopped buses, particularly when multiple buses may be serving the stop simultaneously.

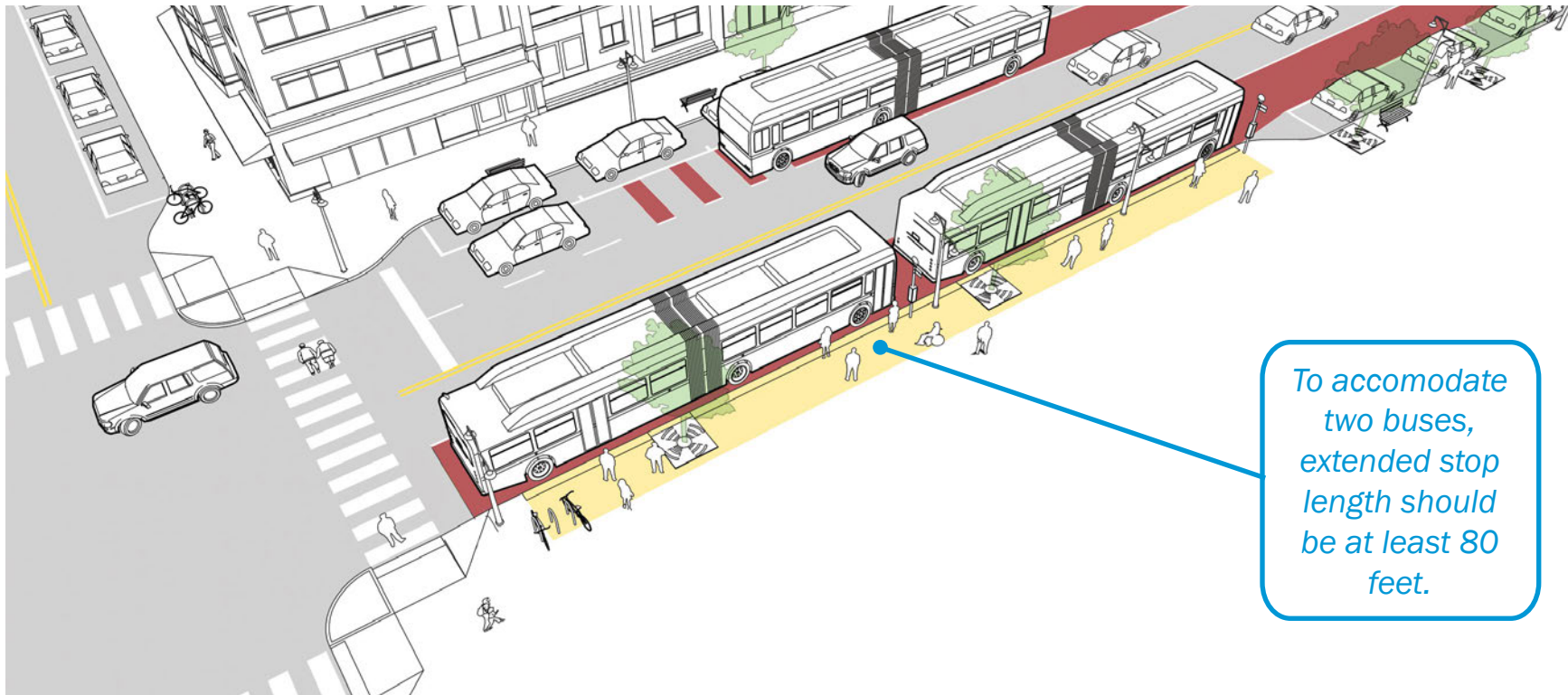
Far-Side Stops are preferred most often for both transit operations and pedestrian safety. Far-side stops also support the use of TSP, allowing buses to get through an intersection and then stop to let passengers on and off.





# Bus Stop Lengthening

Bus Stop Lengthening facilitates smoother bus operations at stops that often serve more than one bus at a time or articulated 60-foot buses.



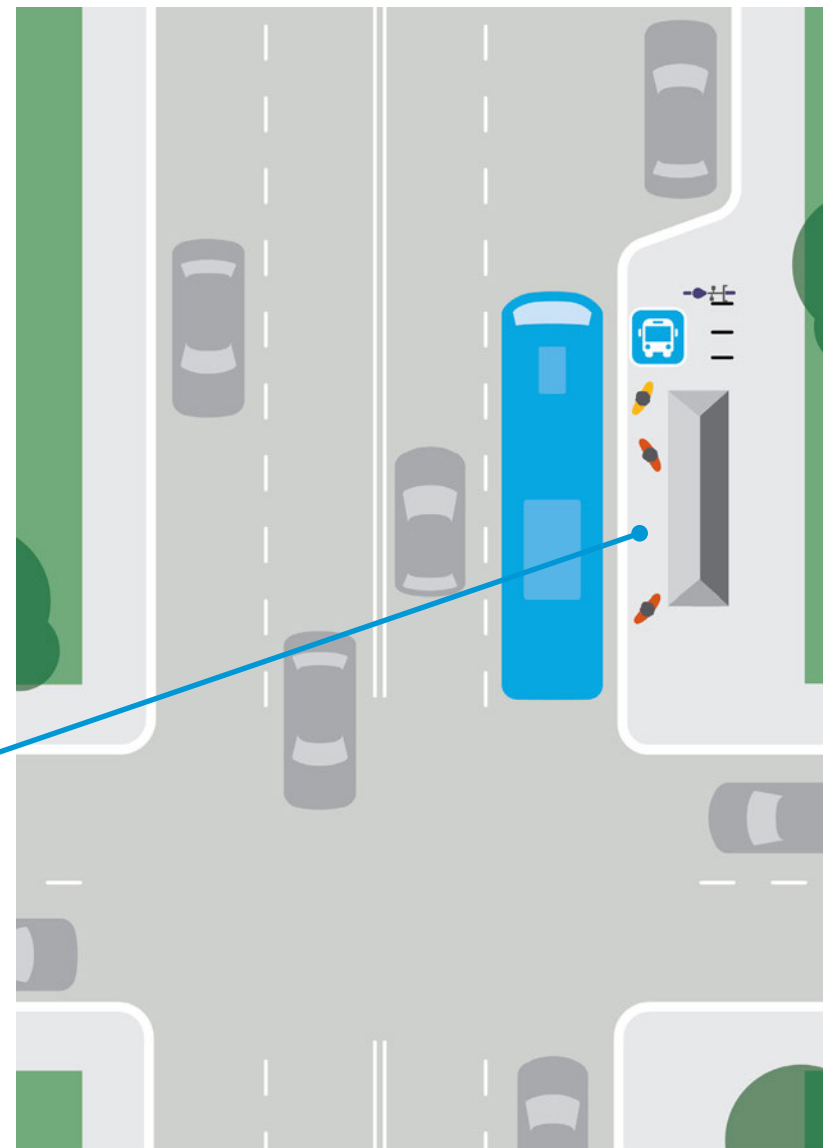
*Adapted from Platform Length Drawings in NACTO's Transit Street Design Guide*



# Bus Bulb

Bus Bulbs are curb extensions at bus stops that allow the bus to pick up and drop off riders without pulling in and out of traffic. Bus bulbs provide more space for riders waiting for their bus and help to improve travel times.

*Expanded space within bus bulb allows for more amenities such as shelters and benches.*







# Bus Island

Bus Islands are curb extensions at bus stops with space between the sidewalk and boarding area dedicated for people biking. Bus islands improve travel times by allowing the bus to pick up and drop off riders without pulling in and out of traffic and reduce potential conflicts between people on bikes and buses making stops.



*Separated bicycle facility reduces conflicts between people walking, boarding transit, and riding bicycles.*

Location: 18th St & Lawrence St, Denver, CO



# Passenger Loading Zone

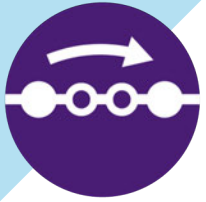
Passenger Loading Zones are designated paved spaces for riders to wait for buses. They allow passengers to board more efficiently and without barriers, especially where there are obstacles such as landscaping or snow.

*Passenger Loading Zones with sufficient space can make stops more efficient by allowing for all-door alighting.*



Location: Irving St & Regis Blvd, Denver, CO





# Limited Stop Service

Limited Stop Service is a type of bus service that skips some stops along a local route. Typically, Limited Stop Service utilizes higher-capacity vehicles on long, direct, high-demand corridors such as those connecting urban centers or downtowns to dense neighborhoods.

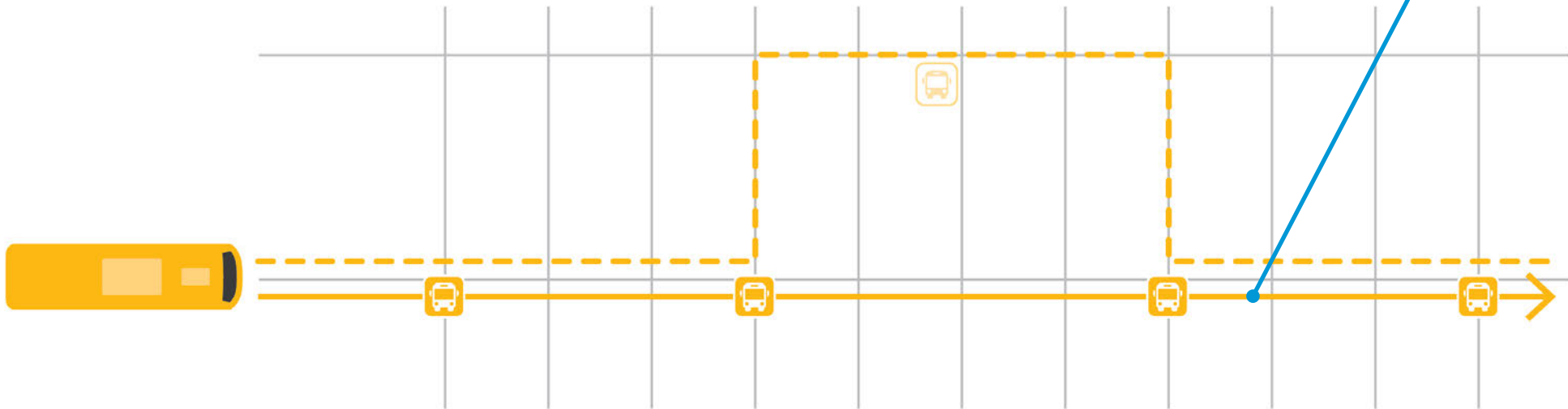




# Route Simplifying

Route Simplifying can improve transit travel times and reliability by reducing turns or avoiding complicated or congested intersections.

*New path considers multiple factors to provide a more efficient route.*



# 4. Citywide Treatments/Policy

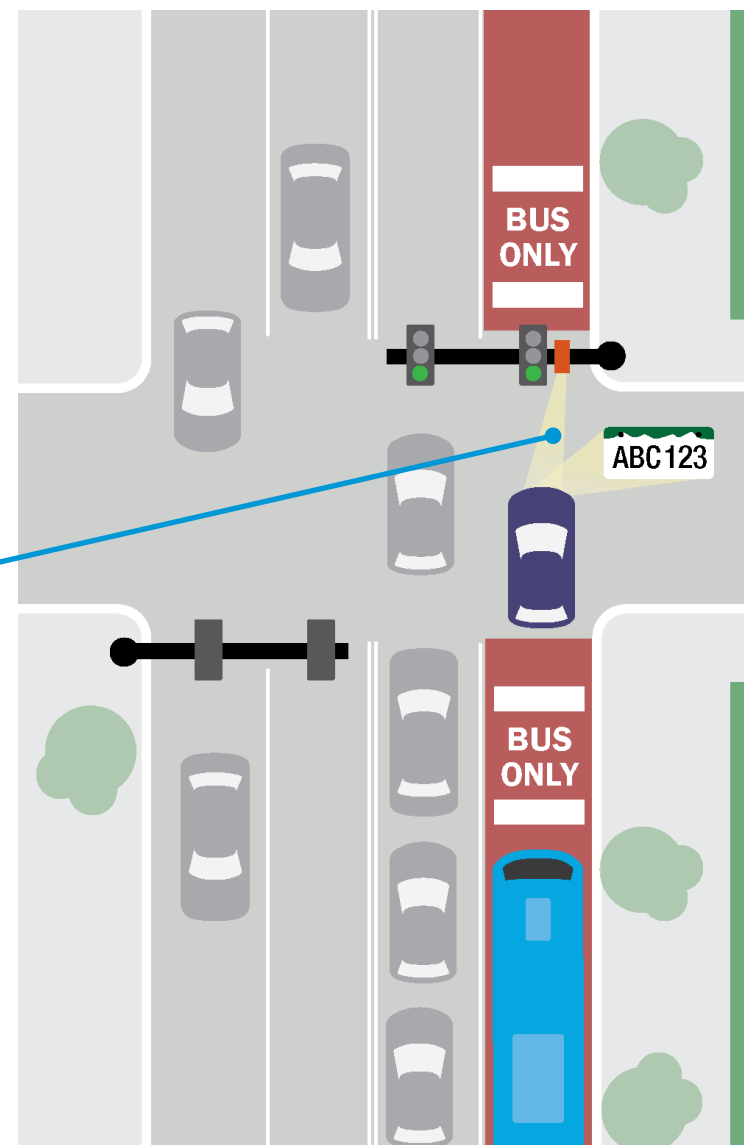




# Bus Stop & Lane Enforcement

Bus Lane & Stop Enforcement involves removing vehicles that are improperly using a bus lane or blocking stops. Enforcement can take many forms, such as signage or cross-hatching to discourage stopping or parking near bus stops.

*Traffic signal camera enforces restricted access in bus lane.*





# Cashless On-board Fare

Cashless On-board Fare is a form of paying for a transit trip via a reusable card with a stored balance, a credit/debit card, or mobile app. Similar to Off-board Fare Payment, Cashless On-board Fares improve efficiency by expediting on-board payment and allowing passengers to make a one-time purchase for multiple trips.



*Ticket machine is located on the bus near the front door where passengers board.*

Location: 16th St Mall & California St, Denver, CO



# Off-board Fare Payment

Off-board Fare Payment improves efficiency by allowing riders to purchase and/or validate tickets before boarding (via a ticket machine or mobile app) rather than on the transit vehicle from the driver.



Location: 116th St Mall & California St, Denver, CO





# Level Boarding

Level Boarding aligns the curb height of the boarding area as closely as possible to the floor of the transit vehicles, which provides better ADA access and improves efficiency by allowing riders to get on and off the bus more quickly.



*Location: Union Station A-Line, Denver, CO*



# All-Door Boarding

All-Door Boarding allows multiple riders to board simultaneously through any door of a transit vehicle rather than one-by-one through the front door. All-Door Boarding is typically combined with Off-Board Fare Payment or fare-free transit, such as the 16th Street Free MallRide.



Location: 16th St Mall & Court Pl, Denver, CO



# Headway Management

Headway Management is the practice of controlling the pace of bus trips along a corridor, particularly for higher frequency routes where bus bunching (when several buses approach a stop at once, causing delay) needs to be avoided. Strategies may include dispatch adjustments and infrastructure improvements like TSP and bus lanes in key locations.



*Bus bunching (shown here) can lead to conflicts at bus stops and inefficient service.*

Location: 17th St & Arapahoe St, Denver, CO



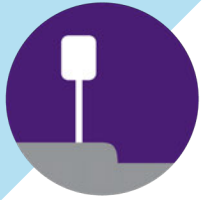


# High-Capacity Bus

High-Capacity Buses are usually 60-foot articulated buses and can hold more passengers than a typical 40-foot bus. High-Capacity Buses can reduce stop dwell time by decreasing the amount of time needed for passengers to board when the bus is very full.



Location: 17th St & Lawrence St, Denver, CO

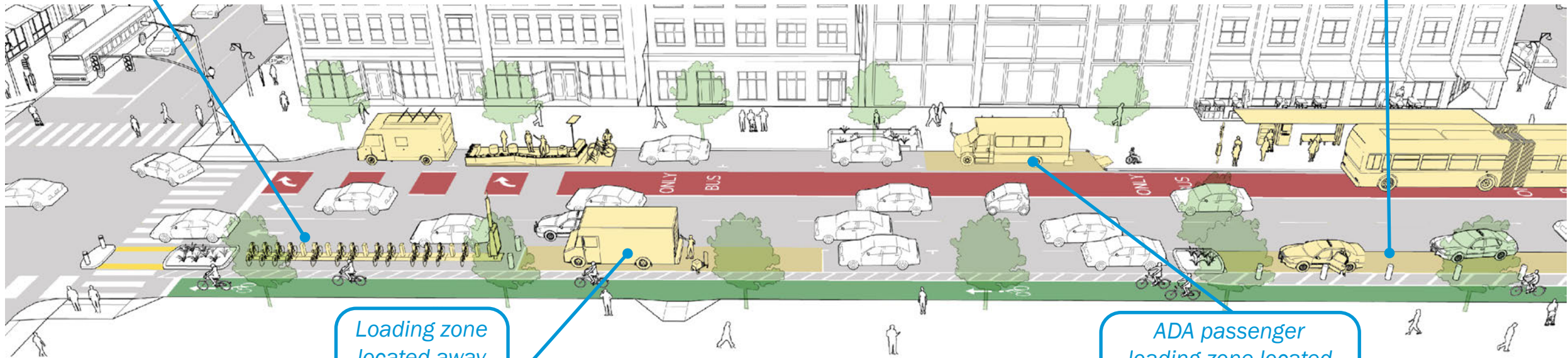


# Curb Management

*Micromobility parking supports transit and businesses by increasing connectivity.*

Curb Management describes any type of tool, policy, or program aiming to control the use of space along the curb. Curb Management can help keep travel lanes used by buses clear of obstructions. Examples of Curb Management that may benefit bus operations include establishing designated Loading Zones away from bus stops or installing No Parking signage near bus stops.

*Designated passenger pick-up and drop-off zone provides an alternative to blocking bus or travel lanes.*



*Loading zone located away from transit stops reduces conflicts.*

*ADA passenger loading zone located adjacent to transit stops increases accessibility for paratransit.*

Adapted from Curb Appeal drawing in NACTO's Transit Street Design Guide