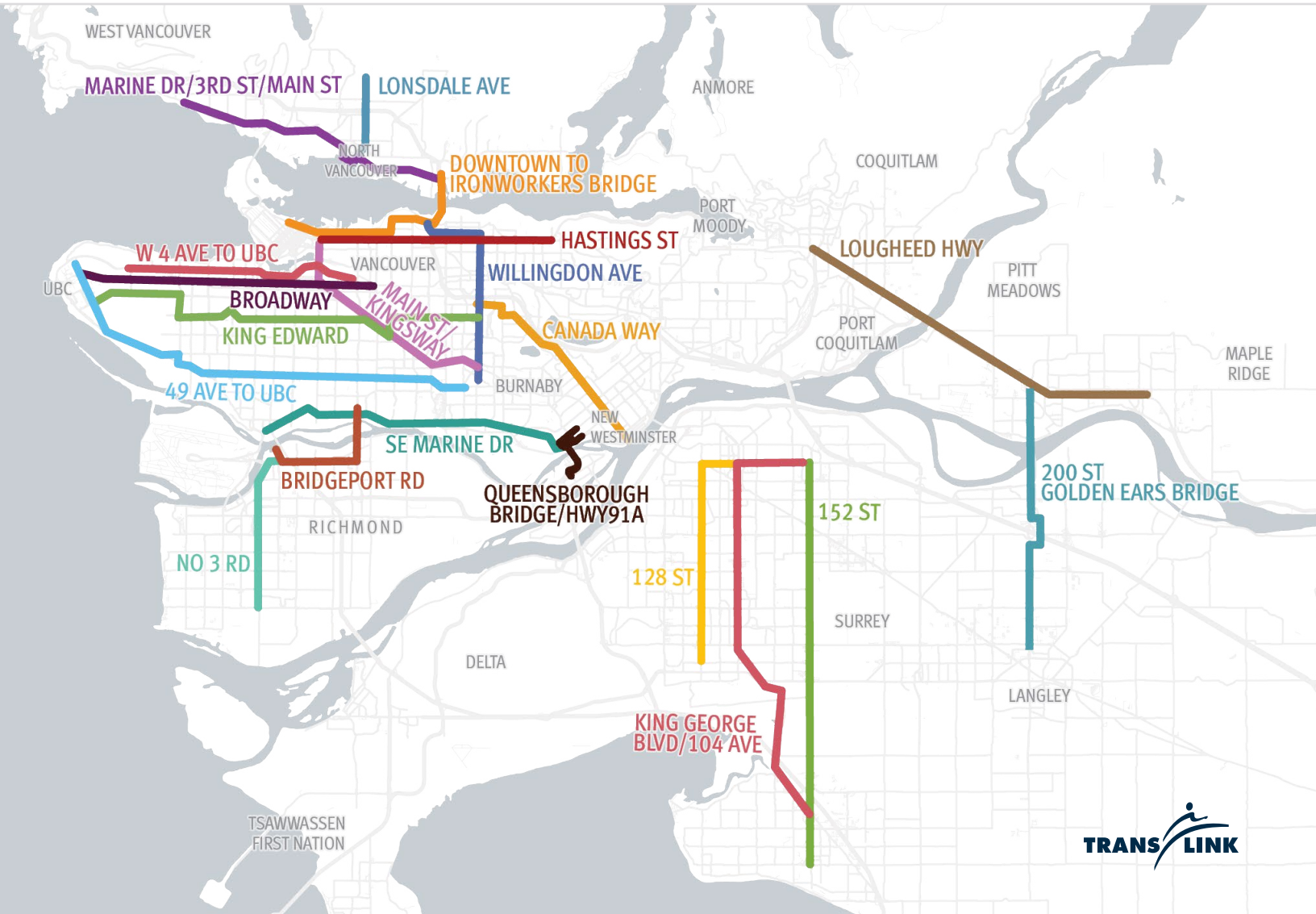
Appendix B: Profile Areas

In order to facilitate more focused conversations about opportunities to reduce delay across the region, 20 profile areas are analyzed in greater depth. These areas are not simply the top 20 most-delayed corridors, although they were primarily selected based on the amount of person-delay per kilometre. Routes prioritized in the near term as future RapidBus or Bus Rapid Transit lines in TransLink's 10 Year Priorities are also included, while corridors with work already underway are excluded. In order to better align with existing and planned bus routes, some profile areas overlap with parts of more than one corridor.

A map of the profile areas illustrates their extents, and the list at the right provides the page number.

Map of the 20 Profile Areas



TYPES OF SPEED AND RELIABILITY ISSUES IDENTIFIED

The table below describes the types of issues that have been identified for each profile area and their effect on bus speed and reliability.

Issue	What does it mean?
Motorists turning left (or other delay from left-turns)	Where left-turns are permitted at intersections without left-turn lanes, a single automobile can block a full travel lane and slow down all traffic. Where buses make left turns, lack of turn signals, short turn phases, or difficulty accessing turn lanes can require several traffic light cycles before a bus can make a left-turn.
Motorists turning right (or other delay from right-turns)	In most places, right-turning motorists must wait for pedestrians to cross the street before turning. Where pedestrian activity is high, a single right-turning motorist can block a full travel lane for an entire green phase.
Roadway congestion	Roadway congestion—or traffic—affects transit customers more acutely than other travelers on the roadway as buses are not able to select an alternative path of travel. Congestion also increases all other types of delay, e.g., left-turns, right-turns, and access/exit from bus stops.
Closely spaced driveways or other roadways	Driveways or other minor streets that are very close together slow down buses and all traffic as motorists make frequent right turns to enter and exit the roadway. Management of the roadway curb space can provide more capacity for all modes, including transit.
Re-entering traffic from bus stops	Bus stop design (along with location) can affect how quickly and easily buses are able to pull into and out of bus stops. This impacts travel time and reliability.
Location of bus stops	The location of bus stops can increase the likelihood of buses encountering delay reentering traffic or waiting at traffic lights.
Short spacing between bus stops	Stop spacing refers to the distance between bus stops along a route. Stops that are too closely spaced may reduce walking distance for individual riders, but slow buses down along a route and can lead to extra acceleration and deceleration time, additional delay reentering traffic, and less reliable service.
Pedestrian movements (including pedestrian signals)	When pedestrian crossings are unsignalized and/or uncoordinated with traffic signals, transit customers may get stopped at consecutive intersections. This greatly affects customer travel time and reliability of schedules. A bus may also be delayed making a right turn when pedestrian activity is high.
Uncoordinated traffic signals	When traffic signals are coordinated for transit, buses travel through intersections on a “green wave.” When traffic signals are uncoordinated, buses may get stopped at red lights at consecutive intersections. This greatly affects customer travel time and reliability of schedules.

Issue	What does it mean?
Schedules and/or timepoints	Timepoints are useful to let riders know when to expect buses to arrive and keep buses from running ahead of schedule, but optimizing schedules and timepoints can prevent passengers from unnecessary wait time on the bus while buses catch up to the schedule.
HOV or bus-only lane violations	Posted lane restrictions that are not observed by motorists or vehicles illegally stopping in the curb lane to drop off passengers can delay buses and make HOV or bus-only lanes less effective.
Overhead trolley wire-related delays/conflicts	On roads with multiple frequent trolley bus lines, buses can be delayed due to lack of overhead wires that allow them to pass other trolley buses at bus stops.
Pedestrian access and/or safety	Roads that lack safe crossings or accessible walking routes to bus stops affect peoples' ability to catch the bus and are part of a comfortable experience using transit. Safe and accessible crossing are important, but infrastructure such as pedestrian-activated signals and midblock crossings can cause unreliable bus service when not coordinated with traffic signals.
Bus/bicycle interactions	Bus-only lanes that are shared with bicycles may be suitable for slow-to moderate-speed roadways when separate bicycle facilities cannot be provided but may not be optimal when bus and/or bicycles volumes are very high. Bus and bicycle interactions may also occur when a bus must cross an unprotected bicycle facility to pull in and out of a bus stop.
Freight rail crossings	Frequent freight rail crossings can cause long and unpredictable delays that severely impact bus reliability.

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Solutions to Bus Speed and Reliability Issues

This report focuses on identifying conceptual solutions to key issues that affect speed and reliability for each profile area. Maps for each profile area illustrate where different solutions could be implemented. These maps are intended as a starting point identifying where potential solutions will help bus speed and reliability. More detailed analysis and municipal and stakeholder consultation will be needed for implementation.

Potential Solutions

Key Issues	Intersection Operations *Signal priority, phasing, coordination*	Left- and Right-Turn Solutions *Turn pockets, turn restrictions*	Queue Jumps and Approach Lanes	Bus Lanes *All-Day, Peak-Hour Lanes*	In-Lane Bus Stops	Bus Stop Balancing
Delay from left turns	●	●	●	●		
Delay from right turns	●	●	●	●		
Congestion	●	●	●	●		
Stop re-entry			●	●	●	
Short spacing between bus stops						●

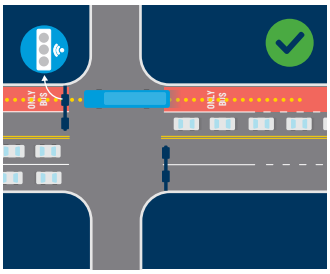
Considerations for Profile Area Solutions

This page briefly describes potential solutions identified for the profile areas. Selected key solutions accompany maps of potential solutions for each profile area. (See Part 4 of the BSR Report—pages 43 to 88—for an in-depth discussion potential solutions.

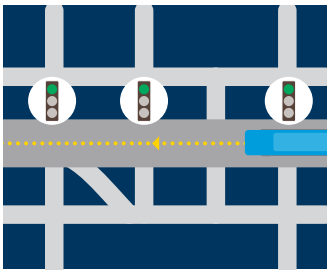
Opportunities at Intersections

INTERSECTION OPERATIONS

Intersection operations can include providing active signal priority, passive signal priority, or adding a new traffic signal or signal phase that benefits the directio n of bus travel, or coordinating signals along a corridor to prioritize bus travel and reduce delay.



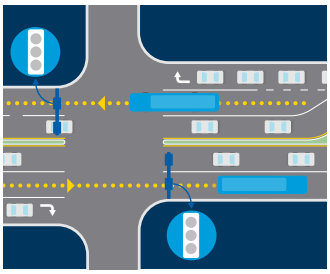
Active signal priority includes detecting an approaching bus in advance of an intersection and extending green times so the bus doesn't wait at the signal.



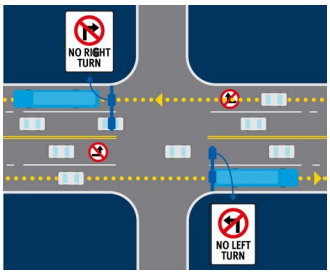
Passive signal priority includes coordinating/timing signals to create a "green wave" based on the expected speed of bus travel.

LEFT- AND RIGHT-TURN SOLUTIONS

Where right-of-way permits, turn solutions include dedicated turn pockets. Where right-of-way is limited, solutions include turn restrictions for general traffic but permitted for buses.



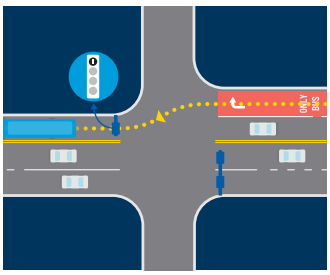
Turn pockets separate buses and motor vehicle traffic to reduce time spent by buses queueing behind general traffic. Consider turn pockets when turn volumes are high.



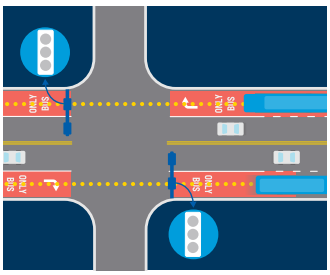
Turn restrictions limit left or right turns for general traffic to reduce delay for buses and other vehicles traveling along a corridor. Buses may be exempted from the restrictions.

QUEUE JUMPS AND APPROACH LANES

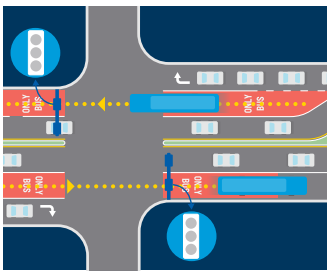
Queue jumps and approach lanes should be implemented strategically and in combination with intersection operations and turn solutions. They are typically implemented when the right-of-way is too limited to create a whole bus lane.



Queue jump in right-turn lane or BAT lane without a receiving lane. A specialized **transit signal** and / or phase is required to help the bus transition back into traffic.



Queue jumps can be implemented **in the right-turn lane or BAT Lane.** Signal priority is not required but may be complementary.

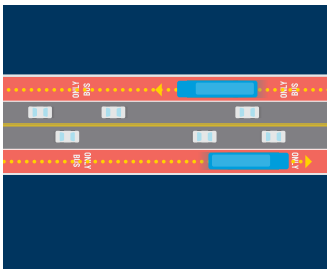


Approach lanes are dedicated to transit and do not share the turn lane. Signal priority is not required but may be complementary.

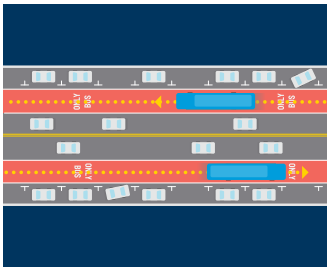
Opportunities Along Roadways

BUS LANES

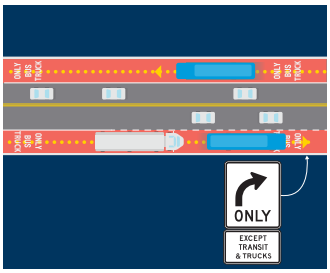
Bus lanes can be implemented in context-specific solutions that consider traffic conditions, on-street parking and access to business and destinations; and integration with facilities for bicyclists or goods movements.



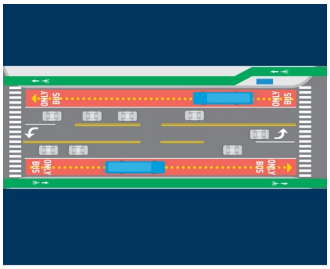
Curbside bus lanes can be full-time or part-time (peak hours). They are quick to implement but may have conflicts with right turning motor vehicle traffic and require enforcement and curb management to deter parking during operating hours.



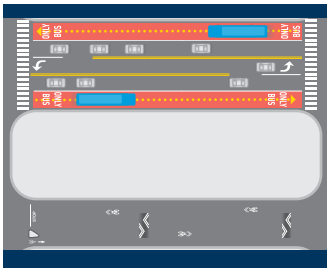
Offset bus lanes (in commercial areas) run between an on-street parking lane and a through-traffic lane and preserve parking and loading along the curb. Bus bulbs used with offset bus lanes can provide additional space for passengers at bus stops and shorten pedestrian crossing distances.



Bus lanes along freight routes can consider implementing such as freight and bus lanes or restrictions on turning movements that accommodate buses and trucks to improve freight mobility and reduce conflict with other modes of travel.



Bus lanes along bicycle routes can have floating bus stops so buses do not have to merge in and out of bike routes and pedestrians have a dedicated stop area.

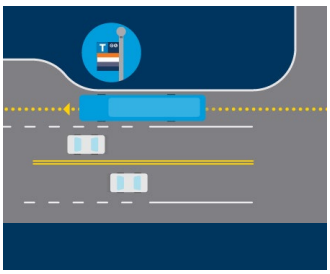


Bike facilities on parallel streets can be implemented when a street doesn't have enough right-of-way for appropriate cycling infrastructure and a nearby parallel street may be used to provide a safe and direct altnerative route.

Opportunities at Bus Stops

IN-LANE STOPS

In-lane stops (also called "bus bulb" or "floating bus stop") may be temporary platforms or paved extensions of the sidewalk. Both applications improve passenger visibility for the bus and reduce passenger conflicts with pedestrians on the sidewalks.



BUS STOP BALANCING

Bus stop balancing (also called "bus stop consolidation") includes thoughtful removal and/or relocation of bus stops along a corridor to achieve spacing consistent with design guidelines, maintain convenient access, and provide faster, more reliable service.