Part 3: Planning and Delivering Projects

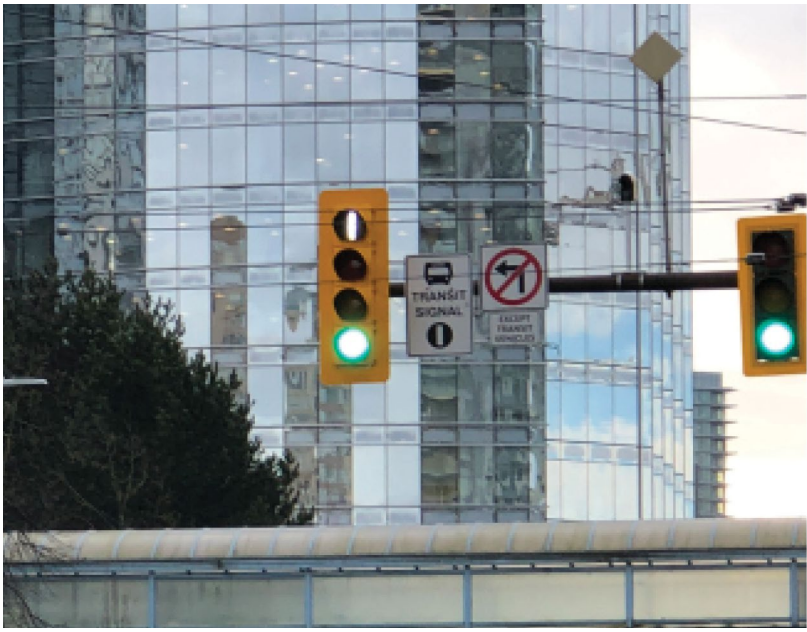
High quality transit takes a regional effort

There are many tools to improve the speed and reliability of bus service.

These interventions range from dedicated bus-only lanes that separate buses from congestion, to fare-payment policies that allow customers to board and alight more quickly. Transit approach lanes and queue jumps allow buses by bypass congested intersections. Turn pockets can move private vehicles out of the bus's path. Bus stops can be removed, or shifted out from the curb, in order to reduce the time buses spend merging; and traffic signals can be designed to recognize and prioritize bus movements. (See the "Bus Priority Infrastructure" portion of this report, starting on page 43, for more discussion about these bus priority measures.)

TransLink has developed a Transit Priority Toolkit (see next page) that provides examples of bus priority measures and the challenges they address. These tools vary in terms of cost, effectiveness, complexity, and visibility.

Bus lane on Georgia Street.



Bus-only signal at Metrotown.

TransLink Transit Priority Toolkit

	SPECIFIC CHALLENGES												
	INTERSECTION	ROADWAY	SIGNAL	RIGHT TURN	LEFT TURN	ACCESS TO BUS STOP	LEAVING BUS STOP	DWELL TIME	INSUFFICIENT RUNNING TIME	PEDESTRIANS	CYCLISTS	MOTORISTS	$ UNDER $50K $$ $50,000 - $100K $$$ $100,000 - $250K $$$$ OVER $250K
STRATEGY	**CONGESTION**		**DELAY**			**OPERATIONS**				**SAFETY**			**COST/COORDINATION**	
A. Bus Stop and Curb Management														
A1. Bus Stop Placement	★		★			★★★	★★	★	★	★★	★★		$–$$	Medium/ High
A2. Curb Management		★				★★	★	★		★	★	★	$–$$	Medium
B. Traffic Regulations														
B1. Movement Restrictions	★★★		★	★★★	★★★		★★		★★	★	★	★★	$–$$$$	Medium/ High
C. Street Design														
C1. Bus Stop Infrastucture						★★	★★	★★★		★★★	★★★		$–$$$	Low
C2. Turn Pockets	★		★★	★	★							★★	$–$$	Medium
C3. Vertical Control Devices		★★★				★★	★		★★	★★★	★★★	★	$	Medium
C4. Queue Jumps	★★★		★★★						★★				$–$$	Medium
C5. Transit Approach Lane	★★★		★★★						★★				$	Medium
C6. Peak-Hour Bus Lane	★★	★★		★★	★★	★★	★★	★★	★★★		★	★★	$$–$$$$	High
C7. Dedicated Bus Lane	★★★	★★★		★★★	★★★	★★★	★★★	★★★	★★★		★	★★	$$–$$$$	High
D. Signal Priority														
D1. Passive Signal Priority	★★	★	★★						★★	★	★	★★	$–$$	Medium
D2. Transit Signal Priority (Active)	★★★		★★★	★★★	★★★				★★★				$$–$$$$	High
E. TransLink Practices and Policy														
E1. All-Door Boarding								★★★	★★	★				Low
E2. Schedule/Operator Recovery									★★★					Low

Benefits: ★ LOW ★★ MEDIUM ★★★ HIGH

The tools for improving bus speed & reliability are controlled by different authorities.

In Metro Vancouver, no single entity controls all the interventions that improve bus performance. Making transit better therefore is a shared responsibility between TransLink, CMBC, municipalities, and the BC Ministry of Transportation and Infrastructure (BC MOTI).

TransLink has control or direct influence over operating considerations such boarding and fare payment policies, route design, and service frequency. Coast Mountain Bus Company (CMBC), a subsidiary of TransLink, operates the bus fleet and manages the schedules.

Municipalities and BC MOTI own the roadway and control traffic signals. This means they have ultimate authority over changes to the right of way, such as the addition of bus lanes, the management of parking, and the programming of traffic signals.

TransLink, the municipalities, and BC MOTI share responsibility for many interventions. For example, if TransLink wishes to move a bus stop—or modify its design—municipalities must approve the change, which occurs on their property.

Private property owners and municipalities also share control over parts of the roadway. These include street patios, the addition of which can impact bus operations.

The table below illustrates what TransLink has control over in the right-of-way and what is controlled by municipalities, MOTI, and private property owners—or is a shared responsibility.

TransLink Control	TransLink and Municipality Control	Municipality and MOTI Control		Municipality and Property Owner Control
Operations	**Bus Stops**	**Travel Lanes**	**Intersections**	**Public Realm**
Boarding policy (e.g., all-door boarding)	Stop relocation or consolidation	Bus lanes	Turn and movement restrictions	Street patios
Route design	Bus platform design	Transit approach lane	Transit signal priority	Connecting shuttles or bike share
Bus fleet size and type	Bus bulbs	Queue jump	Turn lanes and pockets	
Frequency and hours of service	Boarding islands	Roadway channelization		
		Parking restrictions		

Multi-agency partnerships are required for progress on bus priority.

Although bus priority improvement projects can be done cost-effectively and quickly, they are not always easy to accomplish, in part due to their multiagency nature. No agency can successfully deliver these projects alone. In additional to having different authorities over road-space, each offers unique skills, perspectives, and resources.

TransLink has staff with expertise in transit operations and design. They can identify causes of delay and propose potential solutions. TransLink also provides funding resources to municipalities to design and deliver projects.

Municipalities and BC MOTI have staff with expertise in transportation engineering and traffic signal operation and design. They can also identify causes of delay and potential solutions. But they also bring local knowledge of conditions, including previous and planned initiatives, and they have the ability to integrate bus priority elements into already-planned roadway maintenance and upgrade projects.

In recent years TransLink, BC MOTI, and some Metro Vancouver municipalities have ramped up their efforts to improve bus performance, in support of regional and provincial goals. That collaboration has been aided by the launch of the RapidBus brand of service, which focused new transit priority measures along some of the highest ridership corridors in the region. In parallel TransLink has also dedicated funding for the BSR Program—nearly $15 million between 2019 and 2022. (See "Regional Investments in Bus Priority" on page 33.) This has been supported by the development of new data analytics and visualizations that support analysis of existing bus delay.

A recent collaborative speed & reliability project on Edmonds at Kingsway in Burnaby.

The launch of new RapidBus routes requires close coordination between TransLink, municipalities, and BC MOTI.

OVERCOMING COMMON CHALLENGES TO FAST, RELIABLE BUS SERVICE

Most municipalities and BC MOTI face similar challenges to providing fast, reliable bus service.

Although each city has unique characteristics, they all must balance competing demands on public roadways and sidewalks. In addition to transit vehicles, roads must also accommodate personal cars, taxis, goods movement and delivery trucks, emergency services, bicycles, and pedestrians. Similarly regional authorities like BC MOTI must balance competing demands for the space on provincially managed highways.

Sometimes bus priority improvements have benefits to other users of the roadway, such as widening projects that add bus or HOV lanes. But, in general, the most impactful and inexpensive interventions are the most politically sensitive—because they require an explicit trade-off between users of the roadway. For example, converting general travel lanes or parking lanes into bus lanes is a fast, effective, and low-cost way to improve bus service. However, it can be challenging to reallocate space—or time in the traffic signal cycle—from one user to another, especially when changes are subject to public comment or approval from the City Council.

In particular, major corridors often serve many different modes of travel at once, notably buses, cycling, and goods movement. Along these, multiple goals must be balanced, and the impact on overall people-moving capacity of the road should be considered.

Many cities have been successful at providing fast, reliable bus service.

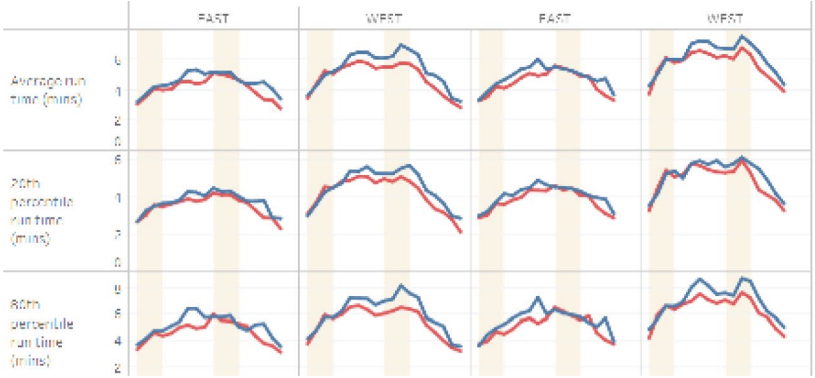
Fortunately many cities across the globe, including several in Metro Vancouver, have successfully reallocated road space. Many of these efforts were accelerated during the pandemic, when very low levels of traffic prompted a unique opportunity to rethink priorities.

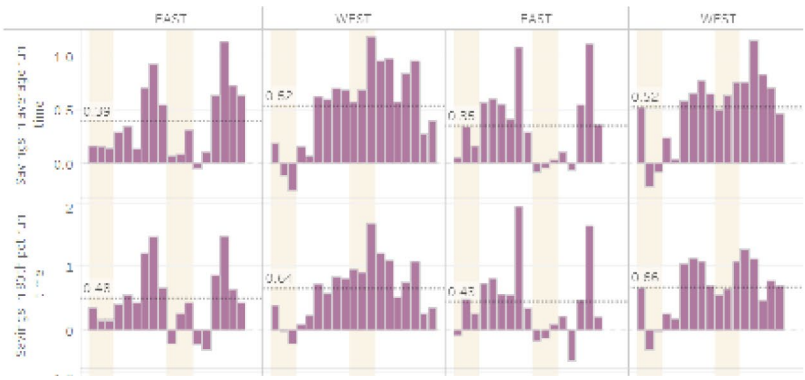
Road reallocations to support transit are often done in recognition of the fact that transit riders already make up a major share of the people moving through major corridors. But many cities have made changes to encourage mode shifts in the future. For example, most cities have some experience reallocating road space to provide safer facilities for cycling or walking. The same can be done to protect people on transit from congestion.

Data helps leaders make more informed decisions about trade-offs.

As the manager of Metro Vancouver's integrated regional transit network, TransLink has enormous amounts of data to identify where, when, and by how much buses are slowed down. In tandem, municipal and provincial agencies have information about traffic volumes, and other roadway activity such as parking usage. Using this data to develop analytics and visualizations on bus delays, traffic conditions, and parking have helped municipal and provincial leaders make informed decisions and balance competing needs.

Example of TransLink Data Used to Make Informed Decisions





It is possible to achieve shared goals with businesses.

Improving and promoting transit supports local businesses. Locations with convenient access to good public transport are more valuable,[23] and improving transit access to business districts increases the customer base.[24] Notably, employees who commute by transit are also interested in shopping without going home to get their car, and tourists and visitors often don't have one at all.

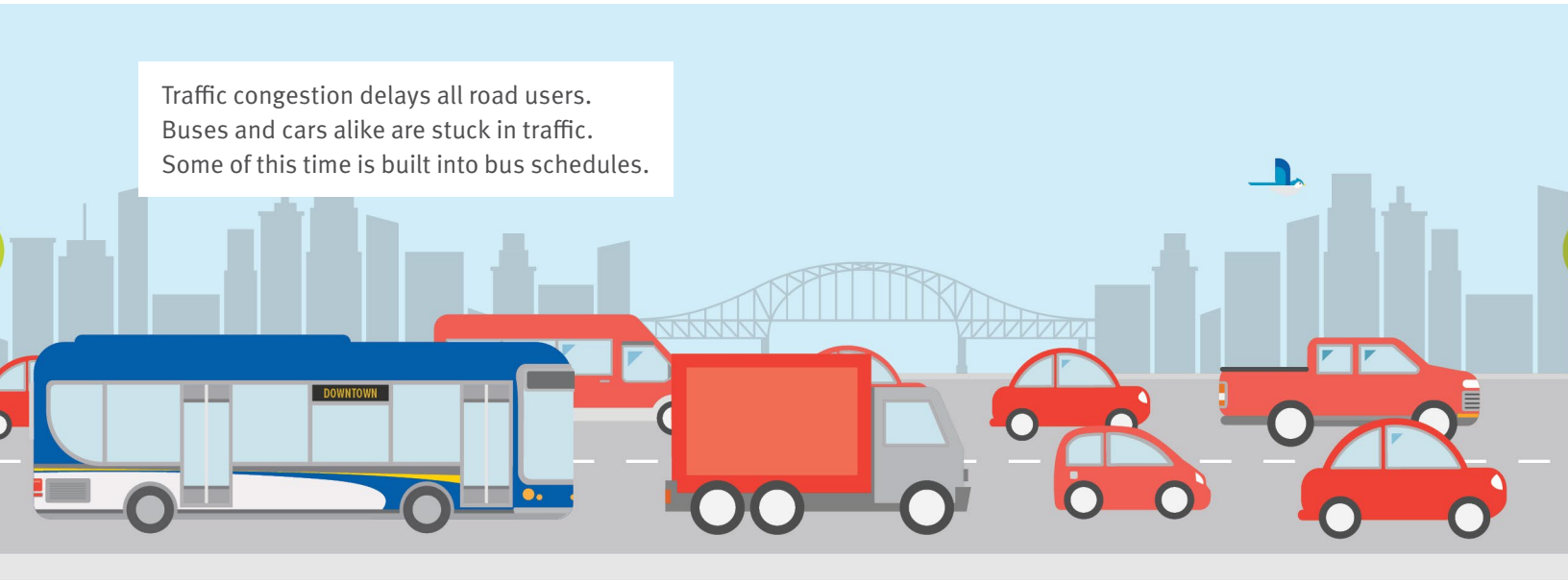
Examples from several Canadian and US cities found that transit brings new and existing customers, who then spend more time in shops and businesses.

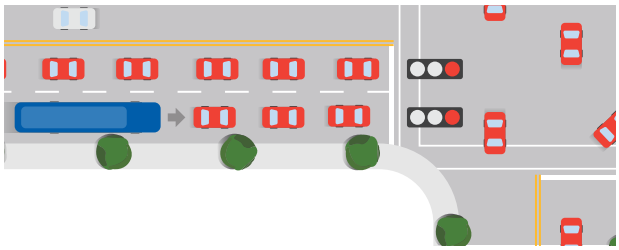
- **Toronto, ON:** 76% of people surveyed felt that "complete street" installations that supported bus access in Summer 2021 helped local businesses, and 31% of respondents visited the area more often.[25]
- **San Francisco, CA:** An intercept survey on Mission Street showed that 60% of people arrived by transit. Transit riders also spent more than those who arrived by other modes such as walking, cycling, driving, or ride share.[26]
- **Seattle, WA:** An intercept survey in downtown Seattle found that workers who take transit are also much more likely to spend more time in the neighbourhood to shop or eat, spending more than triple that of car commuters.[27]

OUR APPROACH TO IDENTIFYING NEEDS

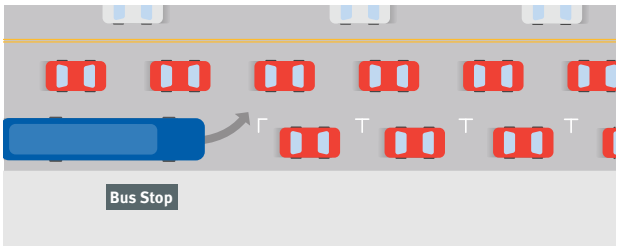
What causes delay?

Traffic congestion delays all road users. Buses and cars alike are stuck in traffic. Some of this time is built into bus schedules.

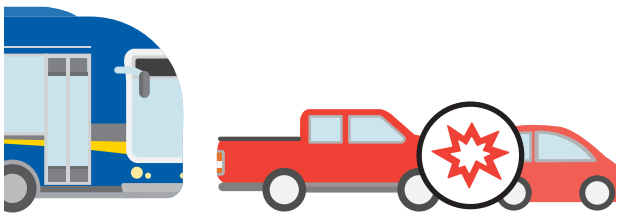




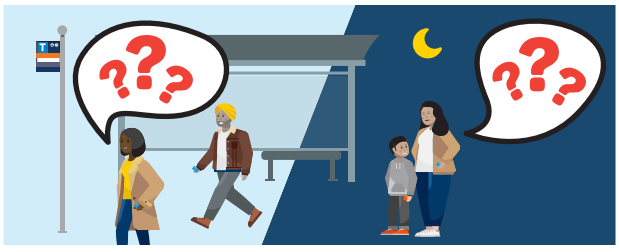
As traffic congestion increases, buses spend more time moving and waiting at red lights. It takes longer for people on the bus to get where they want to go.



Buses must slow down and speed up for each stop, and on some streets, merge back into traffic. Buses also take longer to accelerate and decelerate than cars. When bus stops are too close together, it makes the bus slower.



When traffic is heavy it can be more difficult for bus operators to find safe gaps to change lanes. Incidents like crashes or construction can also cause heavier than normal traffic but can be hard to plan for.



When congestion varies from day to day or from one time of day to another, it makes taking the bus unpredictable.

Data from TransLink buses are used to quantify delay across the region.

This report uses TransLink's bus performance and passenger delay data from across the region to aid the discussion within municipal and provincial agencies and with the public about where bus priority improvements may be most beneficial.

TransLink collects multiple sources of data from buses, from GPS units that track their movement to automated passenger counters (APCs) and Compass card readers that track passenger activity. From these data sources we calculate measures of bus performance due to road congestion.

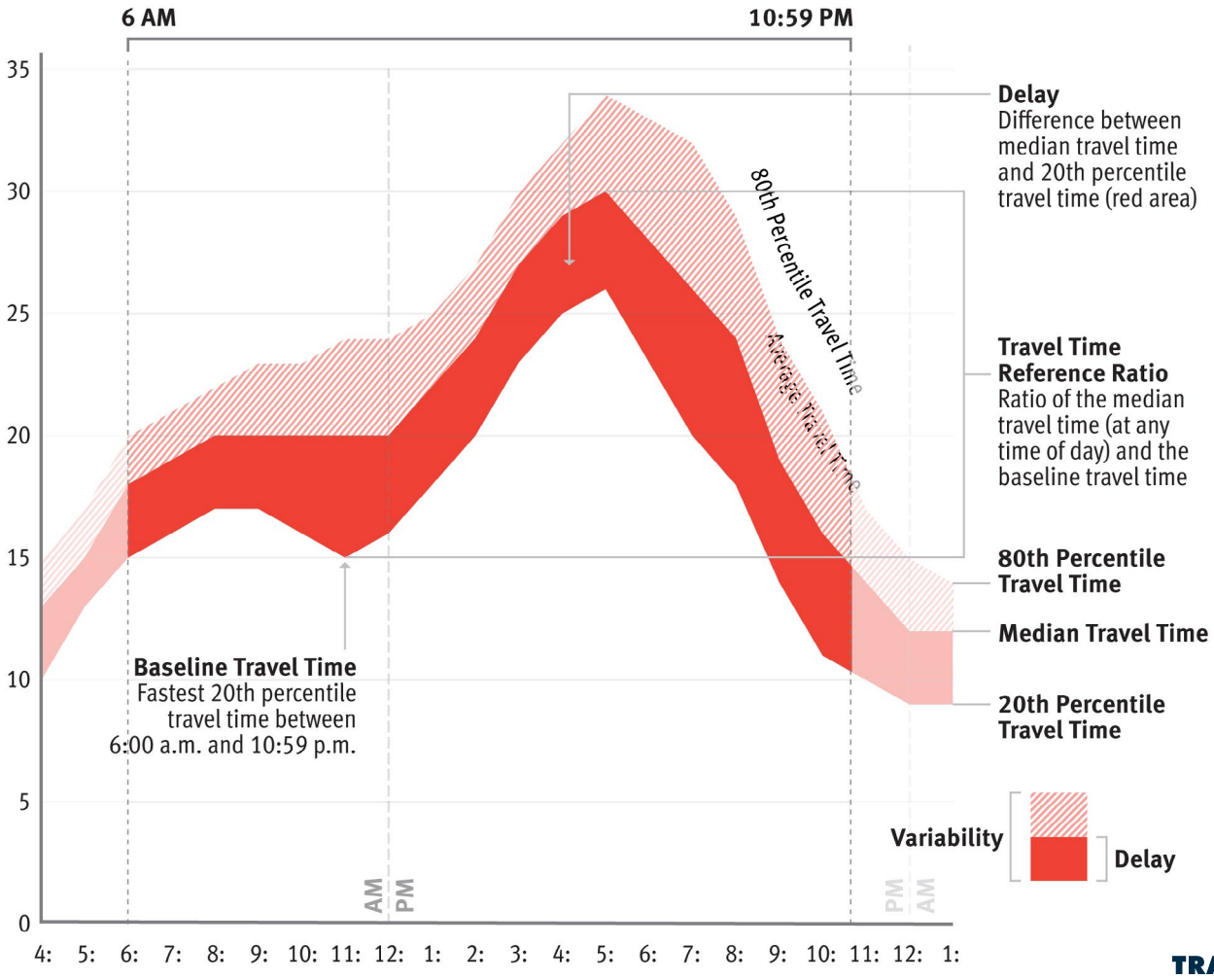
This report generally focuses on the time buses spend traveling between bus stops. This is approximately 80-85% of the time between the start and the end of a route. Importantly, it excludes the time spent picking up and dropping off passengers, which can be affected by ridership levels.

"Delay" is the key metric for this report. It's defined as the difference between an average and optimal (fastest 20%) trip on the bus. It can be seen as the additional time it takes the bus to make a trip on a typical day, compared to the best day of the week.

"Variability" is another useful metric, to evaluate the reliability of bus service. It's defined as the difference between the worst case (slowest 20%) and optimal (fastest 20%) trips. This can be seen as amount of additional travel time a transit customer must plan into their schedule, due to road congestion.

"Travel Time Reference Ratio" is another measure of reliability, comparing typical travel times in each hour to the best typical travel time during daytime hours (6 am – 10 pm (including between 10-11 pm).

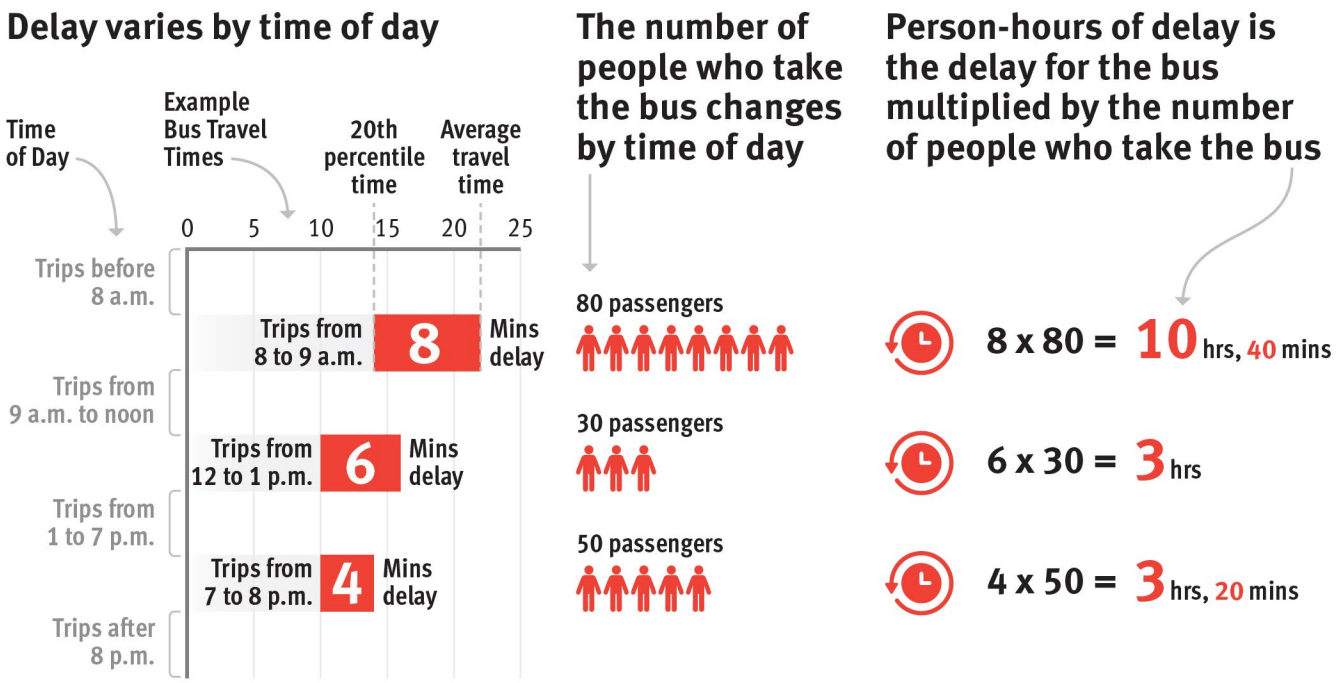
Conceptual Illustration of Delay and Variability



Customer-focused metrics like "person-hours of delay" identify areas of greatest need.

TransLink can calculate the amount of time our customers spend delayed by traffic. This highlights parts of the bus network where delay is impacting the most riders, helping to prioritize investments in bus priority where they will benefit the greatest number of people.

Calculation of Person-Hours of Delay



Note: Person-delay is calculated for each bus trip in a service period based on the number of people on board. Data are summarized by hour and totaled for the full day.

Measures of "bus delay" help to evaluate trends.

Measures of bus performance that are not weighted by passenger loads are still useful. These highlight areas where road congestion is incurring the greatest costs on TransLink's operations. They also help to reveal trends across the region and over time, independent of differences in ridership. This is particularly useful after the COVID-19 pandemic, which has had significant impacts on ridership.

Lessons from the Pandemic

Buses freed from congestion are faster and more reliable.

In the early days of the COVID-19 pandemic—when lockdown orders were most stringent—general purpose traffic fell significantly. This period provides a glimpse of how much faster and more reliable buses can be when they're not stuck in traffic.

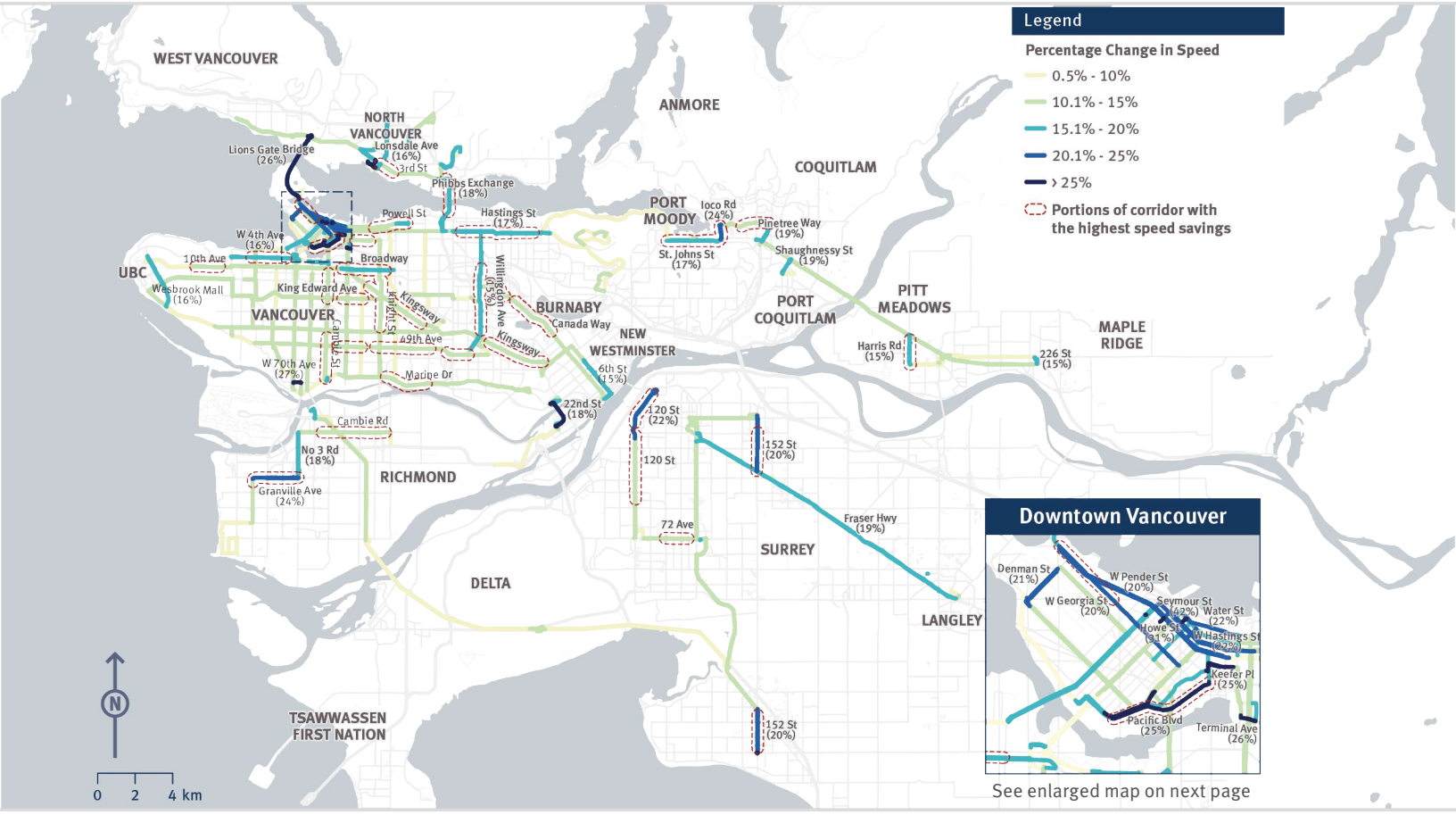
Between February 2020 and April 2020, bus performance improved as follows:

- 14% faster system-wide speed, on average. Some routes saw 15% to 20% increases in end-to-end speed, with some sections increasing more than 25%.
- 34% reduction in system-wide delay, with some routes experiencing 50% to 75% reductions.

For example, a trip from Metrotown Station to UBC using 49th Avenue was both faster and more reliable (less variable). A trip that had taken between 36 and 62 minutes during the PM peak, was taking 32 and 50 minutes when buses could move more freely.[28] An average trip increased from 25 km/hour to 30 km/hour, and weekday delay fell from 13 minutes to 9 minutes.

The following map highlights where bus service improved the most during the early months of the pandemic.[29] Over 90% of the Frequent Transit Network saw an increase in speed between the two months; 35% of the Frequent Transit Network saw an increase in 5 km/hour or more, much of it happening along major corridors.

Change in Bus Speed for Frequent Network, February to April, 2020



See enlarged map on next page

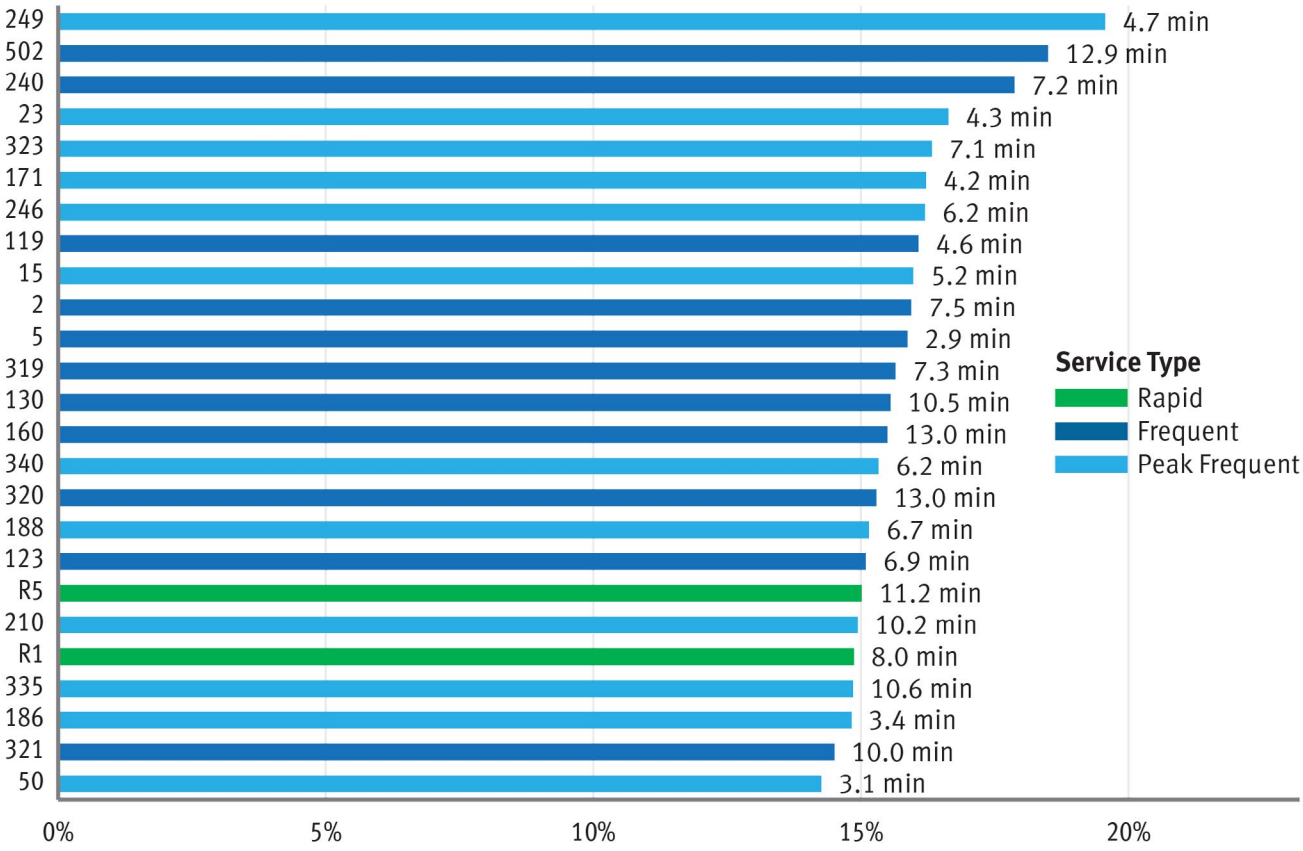
As a percentage, buses improved the most in downtown areas—especially downtown Vancouver—which are also destinations for the kind of work commutes and shopping trips that were most impacted by early pandemic restrictions. In absolute terms, sections of major arterials such as Lions Gate Bridge, Trans-Canada Hwy, Hwy 99, Fraser Hwy, and Lougheed Hwy and streets such as Hastings St., Kingsway, SE Marine Dr., Granville Ave., and Scott Rd., increased in speed by over 10 km/hour. Likewise, these are key corridors for work commutes and shopping trips.

The chart below shows the savings for the routes that improved the most.

If these temporary improvements were made permanent via bus priority measures, TransLink could save over 500 hours per weekday and reduce the number of buses needed to run frequent routes by more than 60.[30]

Change in Bus Speed in Downtown Vancouver, February to April, 2020

Travel Time Savings for the Routes that Saved the Most Time, April vs February 2020 (Top 25 based on Percent Savings)

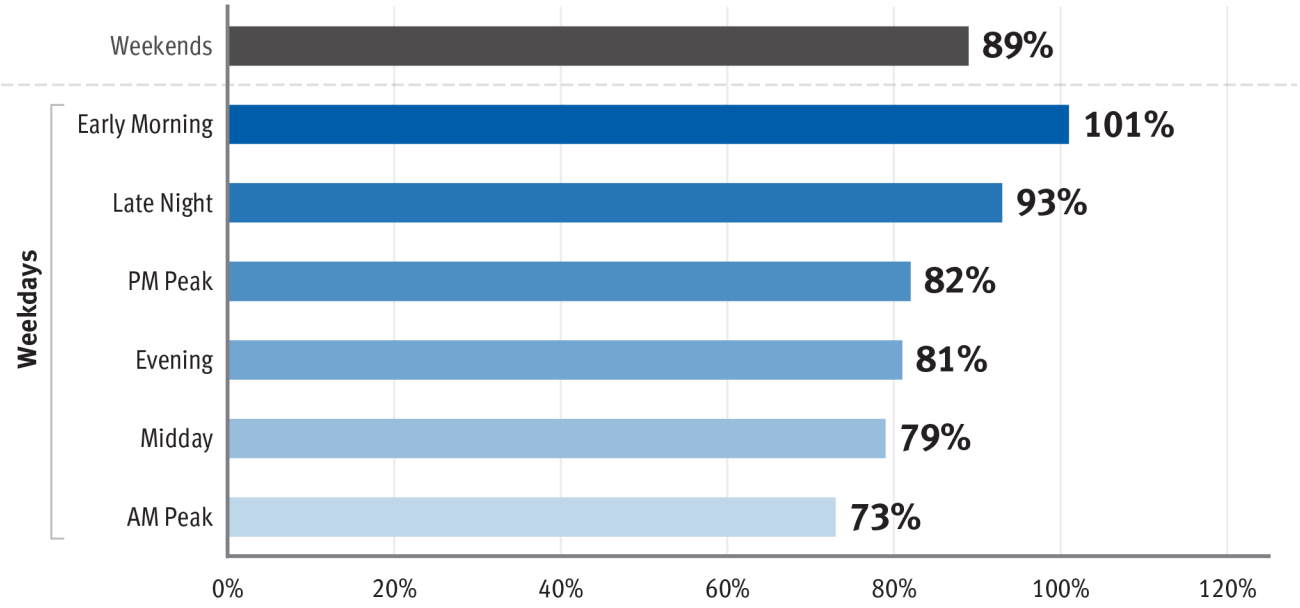


Off-peak person-delay has become relatively more important.

As ridership has returned from pandemic-lows, it is still highest at weekday rush hour peaks—a similar pattern as before.[31] However, ridership has not returned evenly throughout the week, increasing relatively more on the weekends, early mornings, and late nights. As a result person-delay is also relatively more important during these "off-peak" times.

This may be because work-from-home policies have reduced the number of traditional commute trips, while errands and off-peak commutes have still continued. Regardless, this trend suggests that peak-only transit priority measures (such as AM peak-hour bus lanes) have also become relatively less valuable than all-day or 24-7 measures.

Percent Recovery in Person-Hours of Delay, November 2022 vs November 2019



Addressing Social Equity

There are different frameworks for addressing social equity, an increasingly important consideration.

Unfortunately the pandemic worsened, and brought new attention to, many social inequities—due to both lingering historical injustices and rising economic inequality.

Public transportation has an important role to play in mitigating these inequities. It provides affordable access to all, including those who are unable to drive due to age, disability, or limited resources. And bus service in particular—which extends more broadly throughout the region than ferries or rail lines – can provide access for historically disadvantaged ethnic groups and neighbourhoods.

Improvements to bus speed and reliability can therefore bring improvements in access for equity-seeking groups. There are many different "equity lens" that could be adopted to prioritize projects, but three are discussed here:

- **"Transit need"**
- **"Essential trips"**
- **"Location-based demographics"** such as neighbourhoods with relatively higher low-income and visible-minority populations

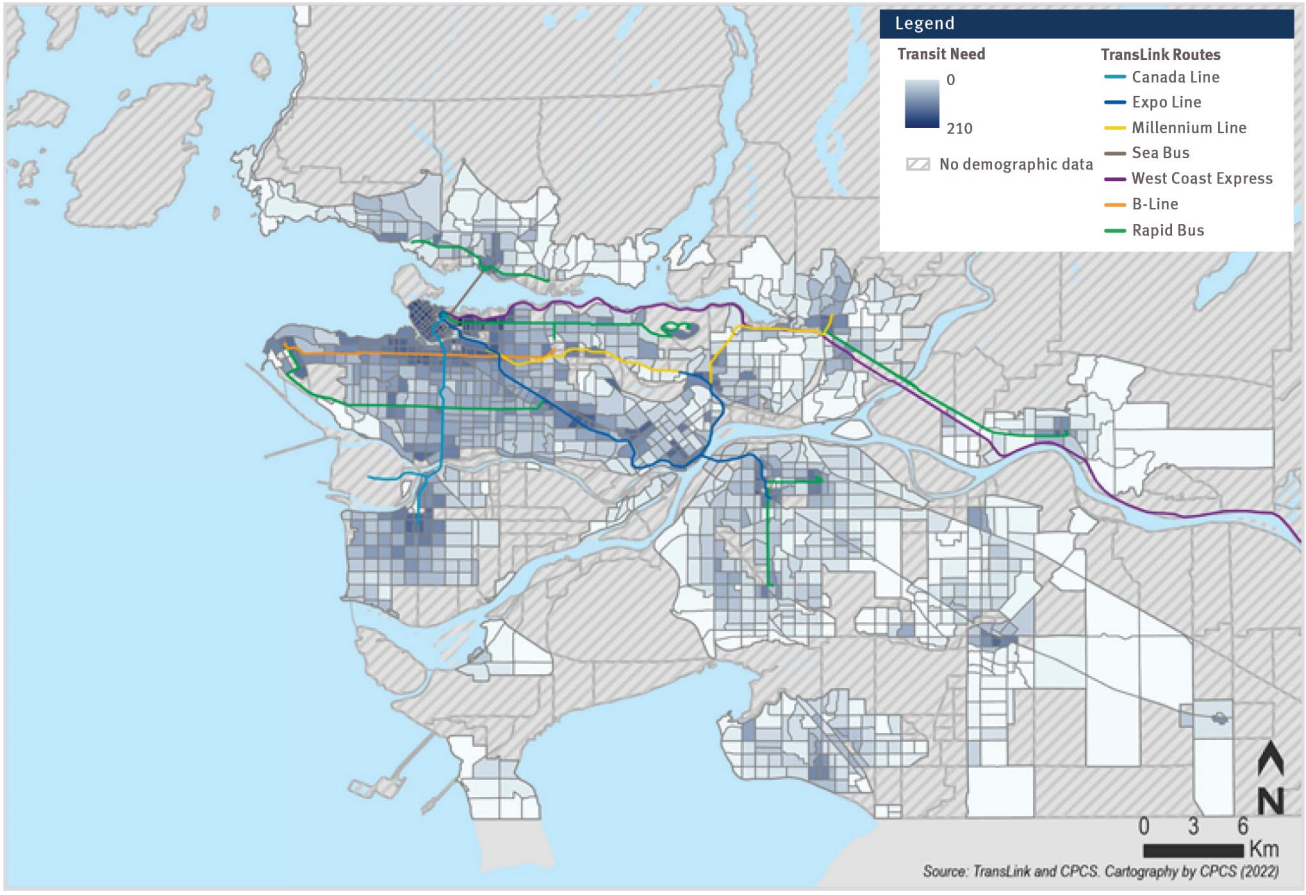
Transit Need

It is possible to identify areas where people are most likely to be reliant on transit. The map below illustrates "transit need" based on a combination of:

- Overall population density
- Percentage of the population that is low-income
- Percentage of households who do not own a car

Although this is not a precise indicator, places where a large number of people cannot afford a car are impacted more by bus delay.

Index of Transit Need by Traffic Analysis Zone (TAZ), 2017

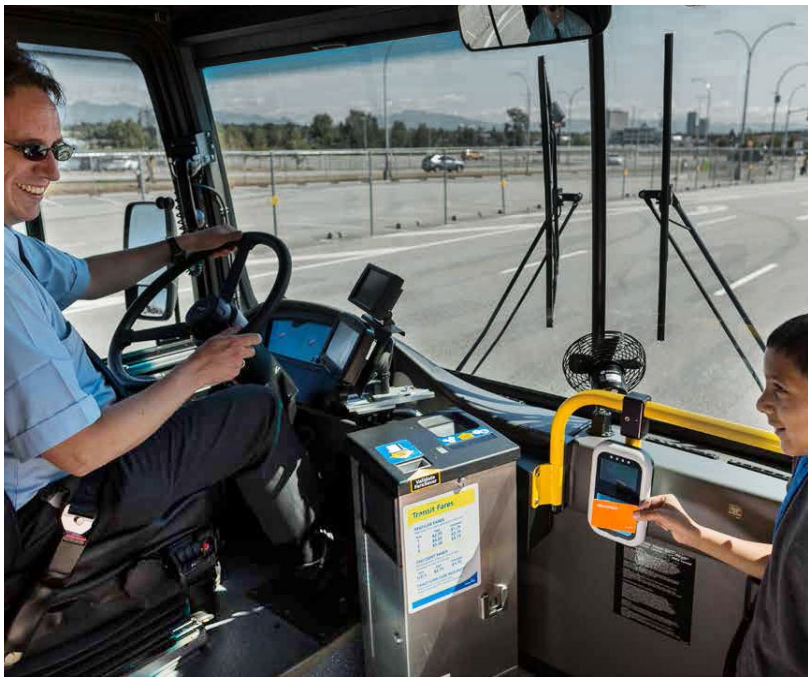


Source: TransLink and CPCS

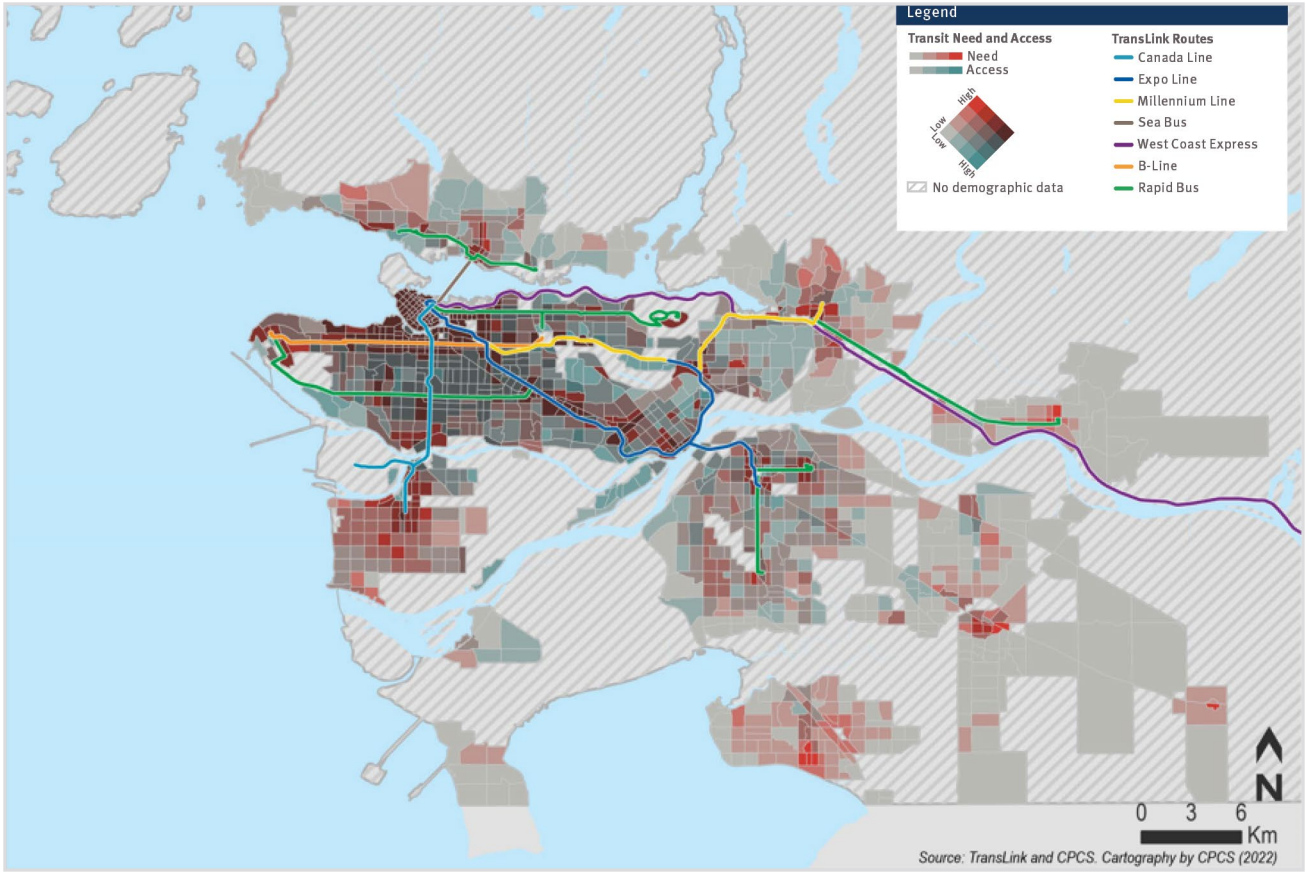
Transit Need and Access

Locations with high transit need—and where transit service is also limited—should be particularly important targets for new investments in transit. The map below overlays the data from the first map with an analysis of "transit access" to jobs and other destinations. This is based on the number of destinations people can reach in a given time, based on TransLink's regional transportation model. Areas with high need and low access (coloured bright red) are where people are more likely to both rely on transit, and to be poorly served by it.

These areas will most benefit from investments in new transit lines or increases in the frequency of existing service—to make transit more useful. However, improving the speed & reliability of bus routes can also play a role, by allowing customers to access more destinations in the same amount of time.



Index of Transit Need and Access by Traffic Analysis Zone (TAZ), 2017



Source: TransLink and CPCS

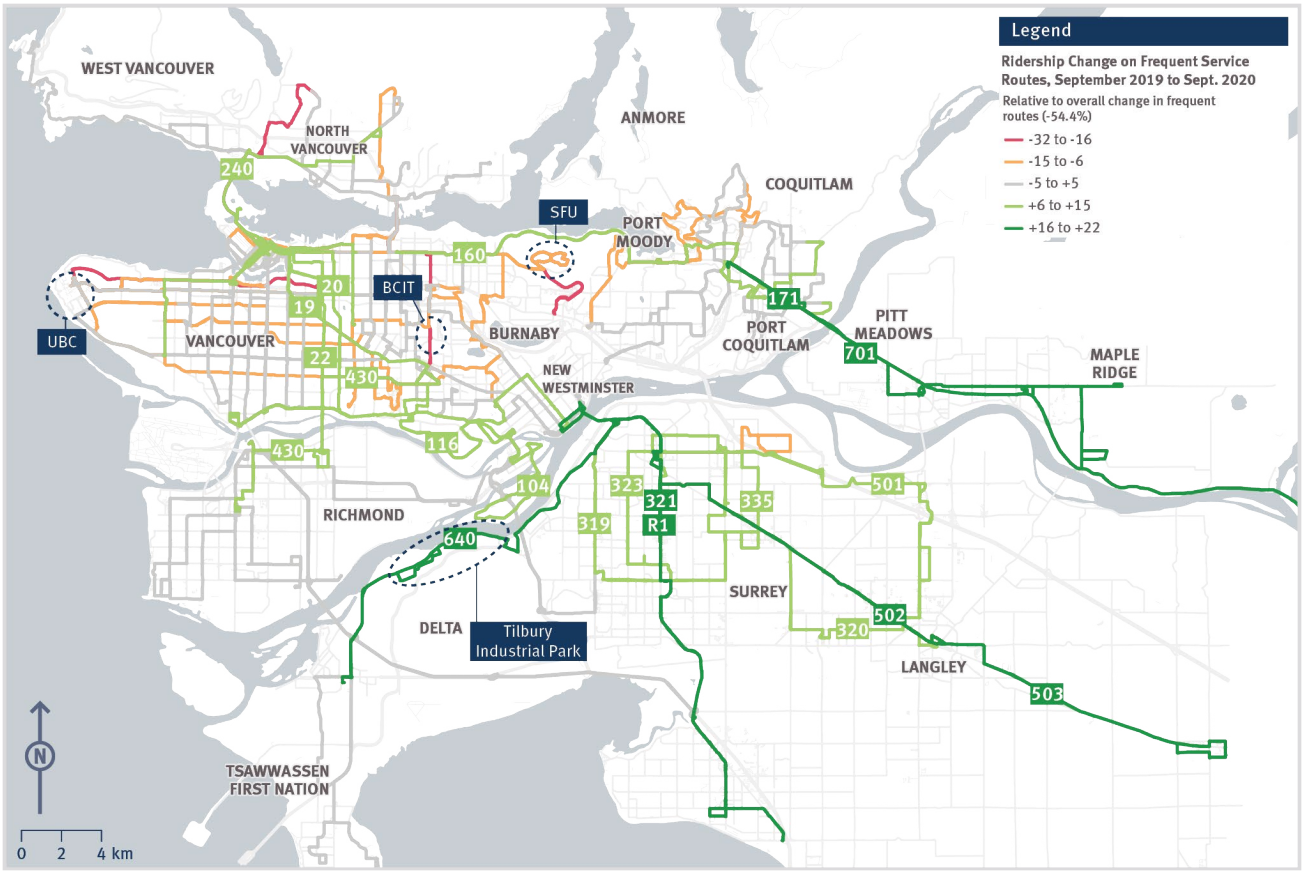
Essential Trips

The pandemic provided another way to identify where Metro Vancouver residents are most reliant on transit service. When stay-at-home orders were issued in the spring of 2020, ridership dropped sharply—by nearly 55%.[32] Those who continued to ride were largely making essential trips, to get to work, to take care of relatives, or to access healthcare and other services. Corridors where bus ridership fell the least can be seen as areas where investments in bus speed & reliability would improve access for people with the fewest alternatives, reducing transportation inequities.

Comparing September 2019—before the pandemic—with September 2020, ridership on TransLink's frequent routes dropped by approximately 54% on weekdays. The map below shows that all lines lost ridership, but the changes were not consistent.

- Ridership increased or stayed the same in areas outside the regional core of Vancouver and Burnaby, notably south of the Fraser River (in Surrey, Delta, and Langley), and east of Port Coquitlam. While some of this ridership retention can be attributed to the introduction of new service, it still reveals how many people relied on bus service during the pandemic.
- Industrial areas—important locations for warehousing and freight distribution—also saw relatively higher ridership. These jobs remained important during the pandemic, but they are less amenable to working-from-home. The southeast industrial, warehouse, and distribution sectors stand out relative to the region.

Change in Bus Ridership on Frequent Routes, September 2019 to September 2020



Demographics

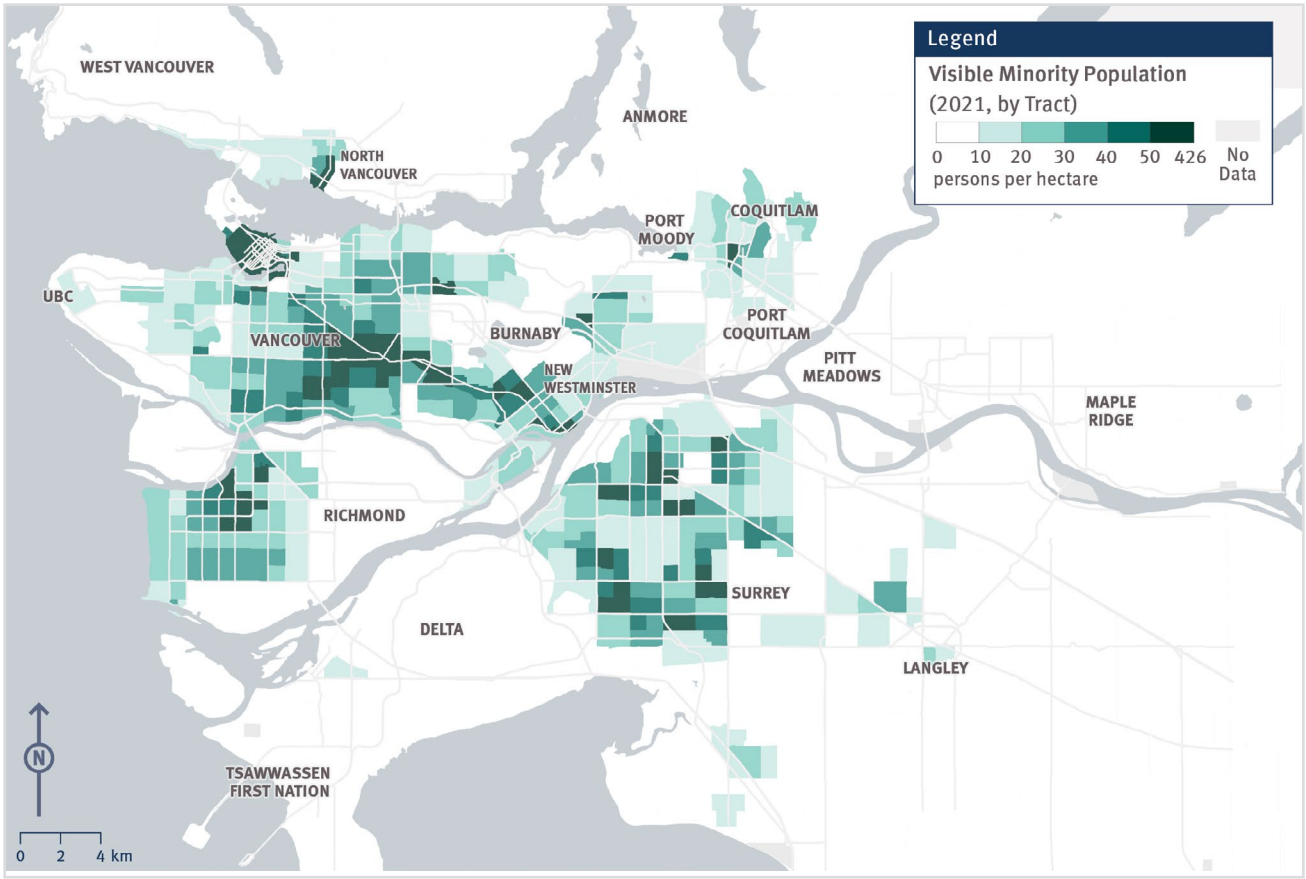
A range of other demographic characteristics can also be used to indicate where to target inequity-reducing transit investments. People who are too young or old to drive, for example, need transit to ensure their access to the region; and neighbourhoods with a high concentration of minority ethnicities may have historically received less public investment—either because of overt racial prejudice or because they have not been included in political processes. People who do not speak English, for example, may not be heard by decision makers. In the United States, Title VI of the Civil Rights Act requires transit agencies to demonstrate that any major changes in service do not discriminate based on race, colour, or national origin.

An "intersectional" approach tries to account for the exacerbated inequity faced by people in multiple disadvantaged groups. The following is a list of these groups, for which there is Canadian Census data available, and which the City of Vancouver has included in developing a metric for Disproportionately Impacted Communities:

- Seniors (people aged 65+)
- Indigenous people
- Visible minorities
- Single-parent households
- People with limited knowledge of English
- Rent-burdened households (30%+ of income)
- Median household income
- Recent immigrants
- Youth under 14

Unfortunately, there is complexity in ensuring that demographic data is intersected in a meaningful way, and that each factor is appropriately weighted. The following map shows just one of these demographic characteristics, which was not included in the "transit need" analysis above: the share of visible minorities by census tract.

Visible Minority Population (Census Tract), 2021



Data Source: Statistics Canada (via CensusMapper.ca)

REGIONAL INVESTMENTS IN BUS PRIORITY

Faster and more reliable bus service is a keystone of the region's growth.

Metro Vancouver's regional transportation strategy—Transport 2050—aims to put transit within a short walk of most homes and jobs. This goal is to be achieved by quadrupling the size of the rapid transit network from 100 to 400 kilometres—relying in large part on buses. Enhancements to the bus network can be quicker and more cost-effective than other approaches, and these investments will build on TransLink's previous efforts to provide high quality bus service across the region.

The RapidBus Program is a new brand of faster and more reliable service.

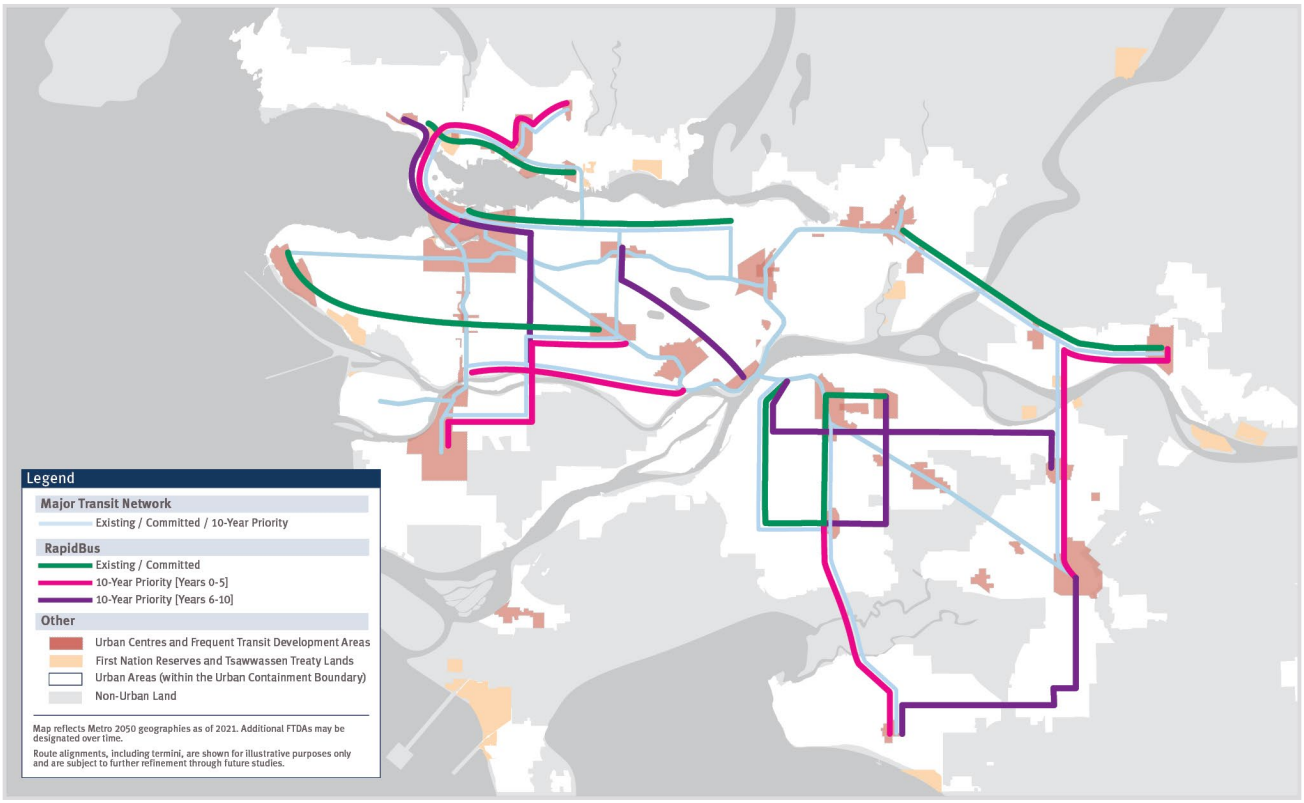
In 2020, TransLink launched a new brand of service—"RapidBus"—along five corridors. RapidBus aims to be 20% faster than local buses—via fewer stops, all-door boarding, and extensive bus priority. All five of the new RapidBus lines have achieved the program's goal of having bus priority measures such as bus lanes, transit approach lanes, and queue jumps on at least one-third of each corridor.

Expansions to RapidBus service are underway and ongoing:

- The **6th RapidBus line (R6 Scott Road)** launched January 2024, with bus priority measures on approximately 36% of the 72 Ave/Scott Road corridor.
- A **further 11 new RapidBus lines** are prioritized for the first 10 years of Transport 2050, with five lines proposed in the next five years.[33]

An additional **7 new Express bus routes** are prioritized as well. Also supported by extensive transit priority, these will provide connections over longer distances.

Existing (and Planned) RapidBus Routes



Source: Transport 2050: 10-Year Priorities (RapidBus)

Bus Rapid Transit corridors will become increasingly important.

Building on the success of RapidBus, Bus Rapid Transit corridors will provide even faster and more reliable service along key corridors. BRT runs along dedicated, fully traffic-separated lanes, with signal priority at intersections. While BRT requires reallocating traffic lanes to dedicated rapid transit running ways, its lower cost means that the region can bring fast, frequent, and reliable rapid transit service more quickly and affordably and to more areas than would otherwise be possible with a rail-only approach.

Up to **nine** new Bus Rapid Transit routes are prioritized for the first 10 years of Transport 2050, including several corridors also identified as future RapidBus routes. The phased implementation of these routes will be determined via a BRT Action Plan.

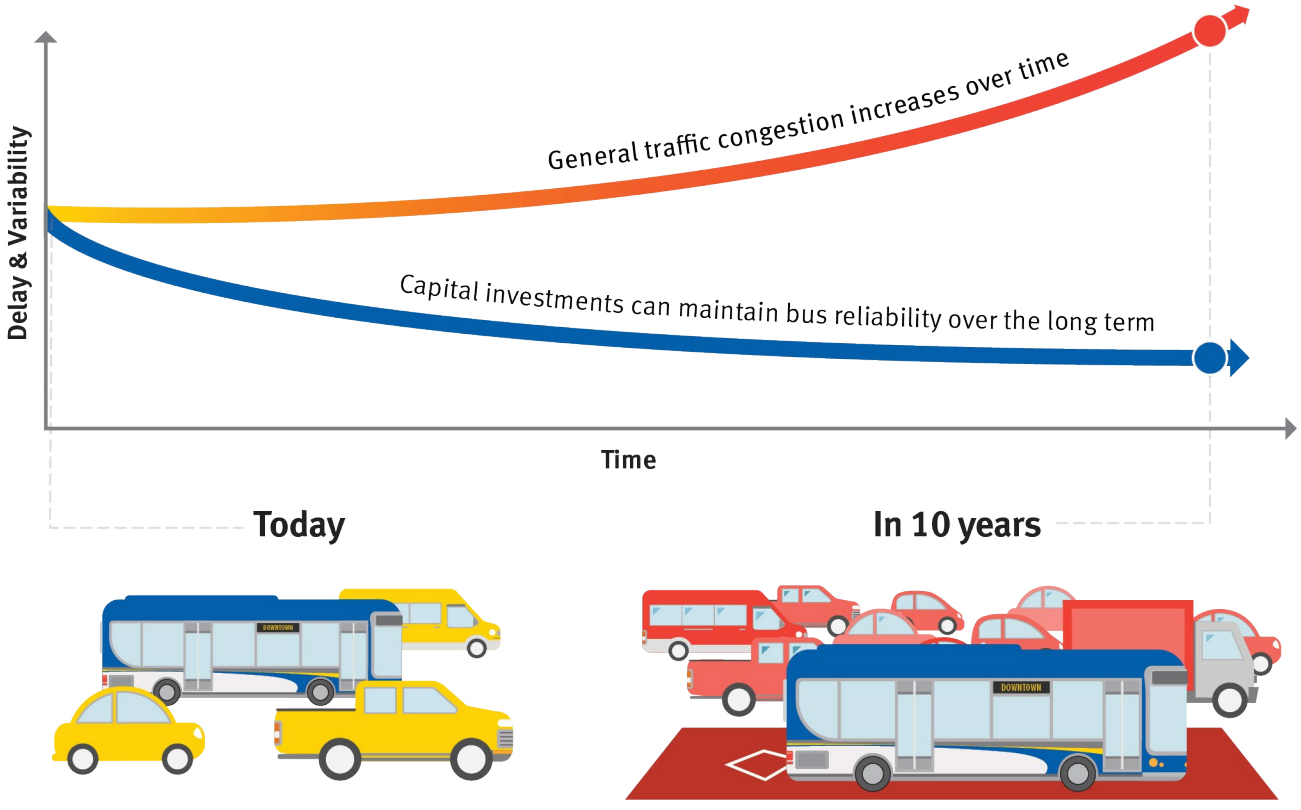
The Bus Speed & Reliability Program makes investments across the network.

TransLink's BSR Program helps improve bus performance along parts of the network that carry the most riders and experience the highest delay —regardless of whether they are future RapidBus or BRT corridors. Bus priority interventions at high delay locations can reduce travel times by 5% to 10%. These minutes add up and help improve the access available by transit.

Between 2019–2022, TransLink has worked with municipalities to identify and fund 103 bus priority projects, totaling almost $15 million. TransLink aims to expand bus priority measures to the entirety of the existing frequent bus network and up to 25% of an expanded frequent bus network.[34]

These projects will not only improve the speed and reliability of the buses running today. By investing now, we can ensure bus service remains reliable, even if traffic congestion increases in the future.

Conceptual Illustration of the Long-Term Impact of Speed and Reliability Improvements



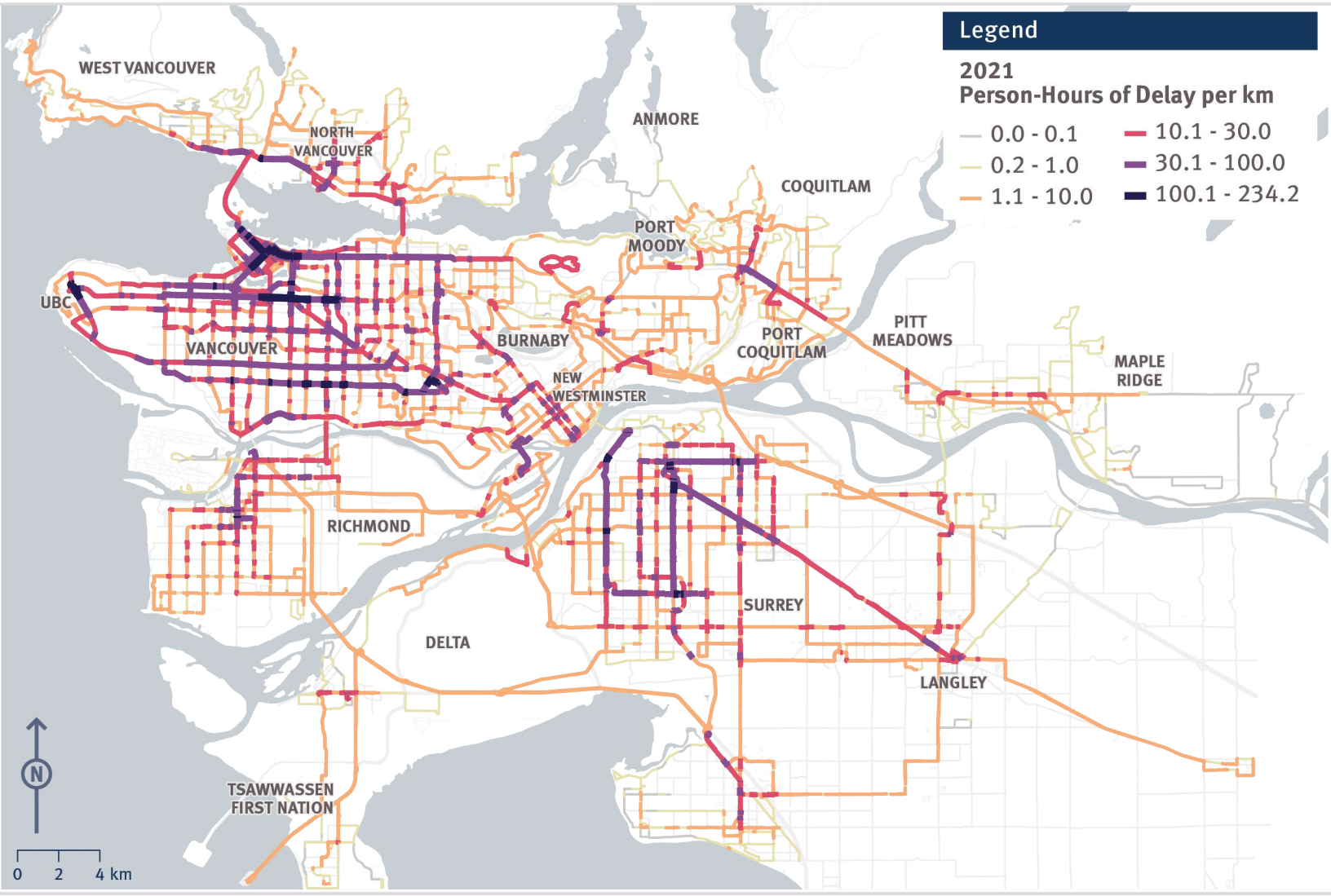
RANKED PRIORITIES

Delay exists across the region.

Despite active efforts to reduce delay for our buses, there are many locations throughout the network where bus priority solutions can be beneficial. The total amounts of delay are significant. Buses experience more than 2,400 hours of delay each weekday. Collectively, people on those buses are delayed by over 28,000 hours.

The map below shows the distribution of delay.

Person-Hours of Delay in the Region, Fall 2021

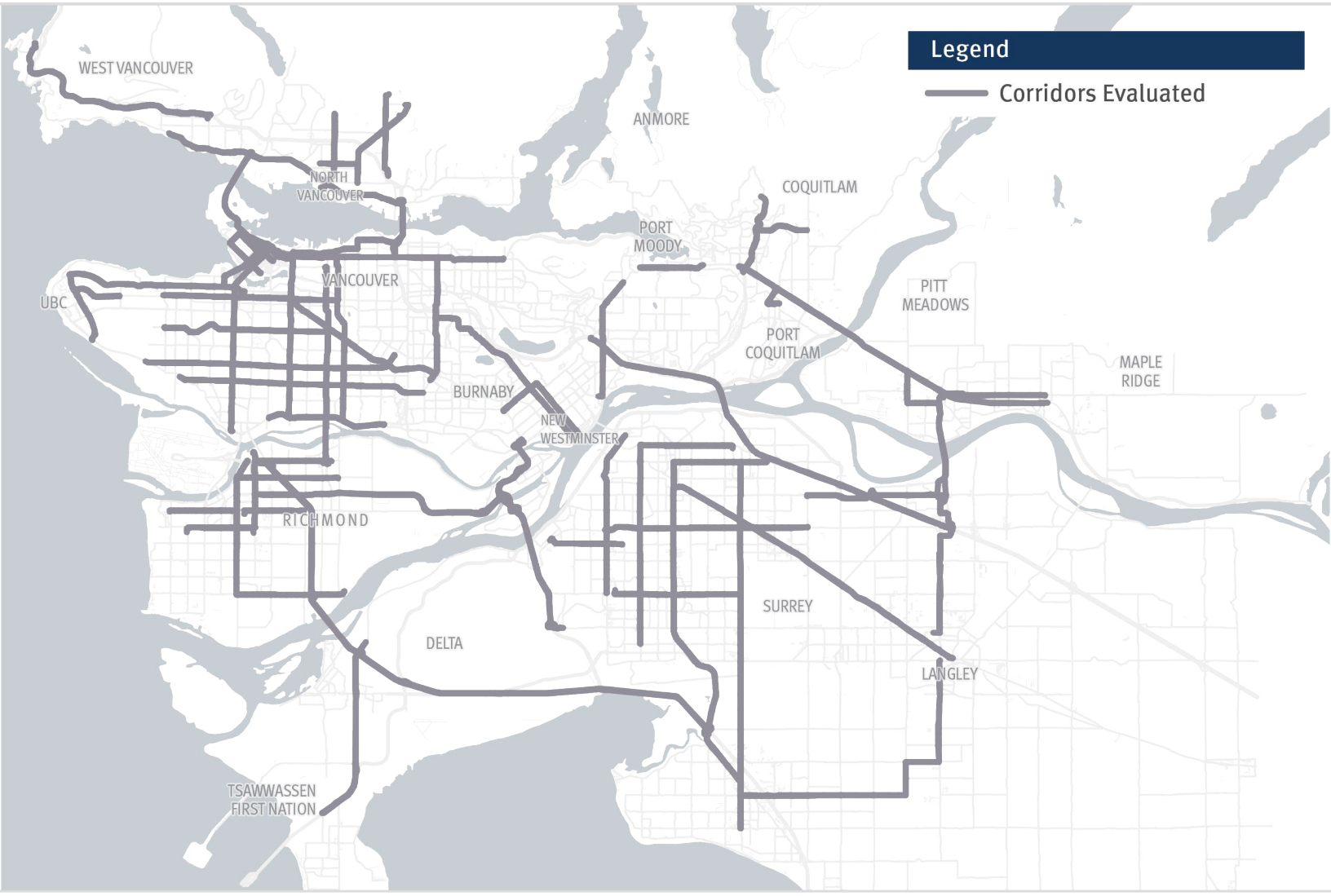


Delay is concentrated along the most congested and well-used transit corridors.

TransLink has identified over 60 corridors that are served by many of the most frequent and highest ridership routes. Nearly 60% of the person-delay in the system in fall 2021 was concentrated on these corridors, which make up only 30% of the transit network (by kilometres). Over 40% of the person-delay is concentrated on less than 10% of the network.

The map below shows the corridors identified by TransLink for further evaluation.

Map of Corridors Evaluated



The table below provides statistics for each of the corridors evaluated, which are ranked by person-delay per kilometre.

Statistics for Corridors Ranked by Person Delay per Kilometre

	Corridor	Sub-Region	Primary Route(s)	Max. Hourly Buses (One Direction) [1]	Daily Person Delay (hours per km)	Rank within Region	Rank within Sub-Region	Daily Person Delay (hours)	Daily Bus Delay (hours)	Daily Person Load (One Direction) [2]	Profile Area?
	System-Wide Total							**28.3K**	**2.4K**		
1	**Broadway**	**Vancouver/UBC**	**9, 99**	**40**	**89**	**1**	**1**	**1,500**	**75**	**11,700**	**Yes**
2	W Georgia St	Vancouver/UBC	240, 246, 250, 257	44	78	2	2	360	25	7,800	
3	**Wesbrook Mall**	**Vancouver/UBC**	**49**	**76**	**57**	**3**	**3**	**380**	**21**	**10,900–13,100**	**Yes**
4	**Hastings St**	**Vancouver/UBC**	**R5**	**47**	**51**	**4**	**4**	**1,200**	**96**	**8,000**	**Yes**
5	**49 Ave**	**Vancouver/UBC**	**49**	**22**	**48**	**5**	**5**	**1,140**	**45**	**5,600**	**Yes**
6	Scott Rd	Southeast	319	26	46	6	1	770	47	6,000	
7	41 Ave	Vancouver/UBC	41, R4	33	46	7	6	1,130	57	7,300	
8	**104 Ave**	**Southeast**	**R1, 320, 337**	**44**	**44**	**8**	**2**	**400**	**28**	**5,700–6,100**	**Yes**
9	Burrard St	Vancouver/UBC	2	38	41	9	7	250	16	5,600	
10	**Marine Dr**	**North Shore**	**R2**	**32**	**40**	**10**	**1**	**570**	**42**	**5,600**	**Yes**
11	Granville St	Vancouver/UBC	10	48	36	11	8	700	55	8,400	
12	**Willingdon Ave**	**Burnaby/ New Westminster**	**130**	**34**	**34**	**12**	**1**	**410**	**29**	**4,300–4,400**	**Yes**
13	72 Ave	Southeast	301, 319, 322, 335	31	30	13	3	430	29	6,000–7,500	
14	Robson/Denman/ Davie	Vancouver/UBC	5, 6	19	30	14	9	250	21	2,300	
15	**Pender/Powell/ Dundas/McGill**	**Vancouver/UBC**	**4, 7, 19, 22, 210**	**57**	**30**	**15**	**10**	**460**	**53**	**4,900**	**Yes**
16	**Main St**	**Vancouver/UBC**	**3**	**36**	**29**	**16**	**11**	**460**	**34**	**4,100–4,200**	**Yes**
17	**W 4 Ave**	**Vancouver/UBC**	**84**	**33**	**27**	**17**	**12**	**470**	**33**	**5,800–6,000**	**Yes**
18	**Kingsway**	**Vancouver/UBC**	**19**	**20**	**26**	**18**	**13**	**440**	**29**	**4,200**	**Yes**
19	Edmonds St	Burnaby/New Westminster	106	16	26	19	2	120	8	3,100	
20	Fraser Hwy	Southeast	502, 503	20	26	20	4	850	58	4,300–4,400	
21	University Boulevard	Vancouver/UBC	4, 9, 14, 99	37	25	21	14	120	8	7,300	
22	**No 3 Rd**	**Southwest**	**403**	**49**	**25**	**22**	**1**	**330**	**33**	**4,800–6,000**	**Yes**
23	**King George Blvd**	**Southeast**	**R1, 321**	**34**	**25**	**23**	**5**	**850**	**45**	**11,100**	**Yes**
24	**Lonsdale Ave**	**North Shore**	**229, 230, 232**	**20**	**23**	**24**	**2**	**180**	**18**	**2,300–2,700**	**Yes**
25	Lions Gate Bridge	North Shore	240, 246, 250, 257	43	22	25	3	210	10	7,000–7,300	
26	**SE Marine Dr**	**Vancouver/UBC**	**100**	**17**	**22**	**26**	**15**	**260**	**16**	**3,300**	**Yes**
27	**King Edward**	**Vancouver/UBC**	**25**	**17**	**22**	**27**	**16**	**370**	**20**	**3,000**	**Yes**
28	Commercial/Victoria	Vancouver/UBC	20	29	22	28	17	350	21	2,700–8,800	
29	6 St	Burnaby/ New Westminster	106	13	21	29	3	130	11	1,700	
30	Cambie Rd	Southwest	405, 410	13	19	30	2	190	14	2,300	
31	Garden City Way	Southwest	407, 408	57	18	31	3	140	12	6,200–6,700	
32	**Queensborough Bridge/Hwy 91A**	**Burnaby/ New Westminster**	**104, 340, 388, 410, 418**	**69**	**17**	**32**	**4**	**160**	**9**	**4,900–13,500**	**Yes**
33	Knight St	Vancouver/UBC	22	16	16	33	18	340	22	2,500	

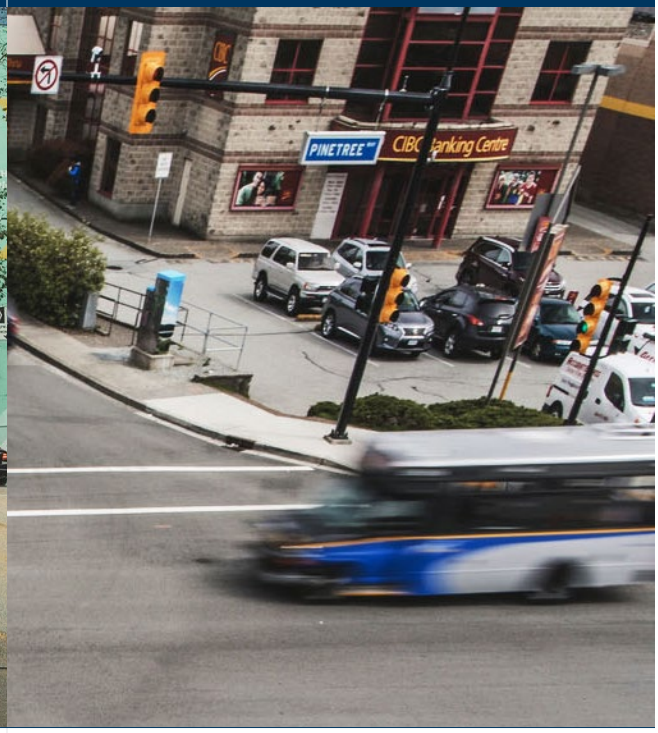
	Corridor	Sub-Region	Primary Route(s)	Max. Hourly Buses (One Direction) [1]	Daily Person Delay (hours per km)	Rank within Region	Rank within Sub-Region	Daily Person Delay (hours)	Daily Bus Delay (hours)	Daily Person Load (One Direction) [2]	Profile Area?
34	15 St	North Shore	240, 255	15	15	34	4	60	5	2,000	
35	108 Ave	Southeast	335	14	15	35	6	130	9	2,300	
36	3Rd/Main	North Shore	R2	43	14	36	5	140	13	2,500–3,700	
37	**Canada Way**	**Burnaby/ New Westminster**	**123**	**22**	**14**	**37**	**5**	**260**	**22**	**2,200–2,600**	**Yes**
38	Wilson/Shaugnessy	Northeast	159, 160, 173, 174	35	14	38	1	40	13	1,300	
39	Granville Ave	Southwest	404, 406	9	14	39	4	90	7	1,400–1,500	
40	**Bridgeport Rd**	**Southwest**	**407, 430, all hwy routes**	**39**	**13**	**40**	**5**	**90**	**6**	**4,900**	**Yes**
41	**152 St**	**Southeast**	**375**	**27**	**13**	**41**	**7**	**470**	**39**	**3,200**	**Yes**
42	**128 St**	**Southeast**	**322, 323**	**9**	**11**	**42**	**8**	**220**	**14**	**2,500**	**Yes**
43	Harris Rd	Maple Ridge/ Pitt Meadows	701	12	9	43	1	30	4	900	
44	**Lougheed Hwy**	**Maple Ridge/ Pitt Meadows**	**R3, 701**	**43**	**9**	**44**	**2**	**320**	**40**	**3,000–3,400**	Yes
45	Westminster Hwy	Southwest	401, 405	10	9	45	6	110	8	1,800	
46	Pinetree Way	Northeast	183, 186	20	9	46	2	70	15	1,400	
47	Dewdney Trunk Rd	Maple Ridge/ Pitt Meadows	701	15	8	47	3	90	12	900	
48	**Ironworkers Memorial Bridge**	**North Shore**	**28, 130, 210**	**30**	**8**	**48**	**6**	**70**	**6**	**2,700**	**Yes**
49	Saint Johns St	Northeast	160, 180, 183, 184	25	7	49	3	40	10	1,300–1,400	
50	84 Ave	Southeast	301	6	6	50	9	40	2	1,400	
51	Lynn Valley Rd	North Shore	240, 228, 255	18	6	51	7	50	9	1,100	
52	**200 St Golden Ears**	**Southeast**	**501, 595**	**20**	**6**	**52**	**10**	**150**	**12**	**1,500–2,800**	**Yes**
53	North Rd	Northeast	109, 180	19	5	53	4	60	13	1,100–1,900	
54	Hammond Rd	Maple Ridge/ Pitt Meadows	701	12	5	54	4	20	2	900	
55	David Ave	Northeast	191	11	5	55	5	30	4	1,000	
56	96 Ave	Southeast	501	9	4	56	11	60	4	1,400	
57	Hwy 99	Southwest	351, 601, 620	31	4	57	7	260	16	3,600	
58	Hwy 91	Southwest	301, 410	11	4	58	8	150	8	1,700–2,500	
59	24 Ave/200 St	Southeast	531	10	3	59	12	110	9	900	
60	Mountain Hwy	North Shore	210	20	3	60	8	30	4	600–1,000	
61	88 Ave	Southeast	326, 388	7	3	61	13	60	5	600	
62	Steveston Hwy	Southwest	403	10	3	62	9	30	10	600	
63	Hwy 1 To Carvolth	Southeast	509, 555	13	3	63	14	110	5	2,500	
64	Hwy 17A	Southwest	620	20	2	64	10	40	3	2,200	
65	Hwy 1 To Horseshoe Bay	North Shore	257	5	1	65	9	30	2	1,000	

Notes: 1. Highest number of bus trips per direction within the AM Peak, Midday, and PM Peak time periods. 2. Daily passenger load is reported for the location along the corridor in one direction with the highest number of cumulative passengers on-board the bus throughout the day. For corridors with a range of loads, the lower range represents the maximum daily load, accounting only for routes that have at least 1 km of their alignment along the corridor. The upper range reflects the maximum daily load for all routes, regardless of distance along the corridor.

The most-delayed corridors typically contain retail areas.

Of the most-delayed corridors, 14 of the top 15 have notable retail areas (all but 49 Ave)—which can impact bus operations. "Traditional" retail zones feature on-street parking, frequent deliveries, and rideshare pick-up/drop-off—each of which have potential to interfere with bus movements. Likewise "auto-focused" retail areas have access driveways, which bring turning cars into the buses' path, and many retail strips have few parallel roads for traffic to divert onto. Both types of retail development may have constrained or non-existent sidewalks, limiting the space available to optimize bus stop locations.

Comparison of Traditional and Auto-Oriented Retail Characteristics that Affect Bus Operations

Traditional Retail (e.g., on-street parking)	Auto-Focused Retail (e.g., off-street parking)
	
Examples • Hastings St • W 4th Ave • Lonsdale Ave • Robson St	**Examples** • Scott Rd • Lougheed Hwy • No. 3 Rd
Characteristics that affect bus operations • On-street parking • Deliveries • Rideshare pick-up/drop-off • Constrained sidewalks	**Characteristics that affect bus operations** • Driveways • Constrained sidewalks • Lack of parallel roads

Delay remains concentrated in the Vancouver/UBC subregion.

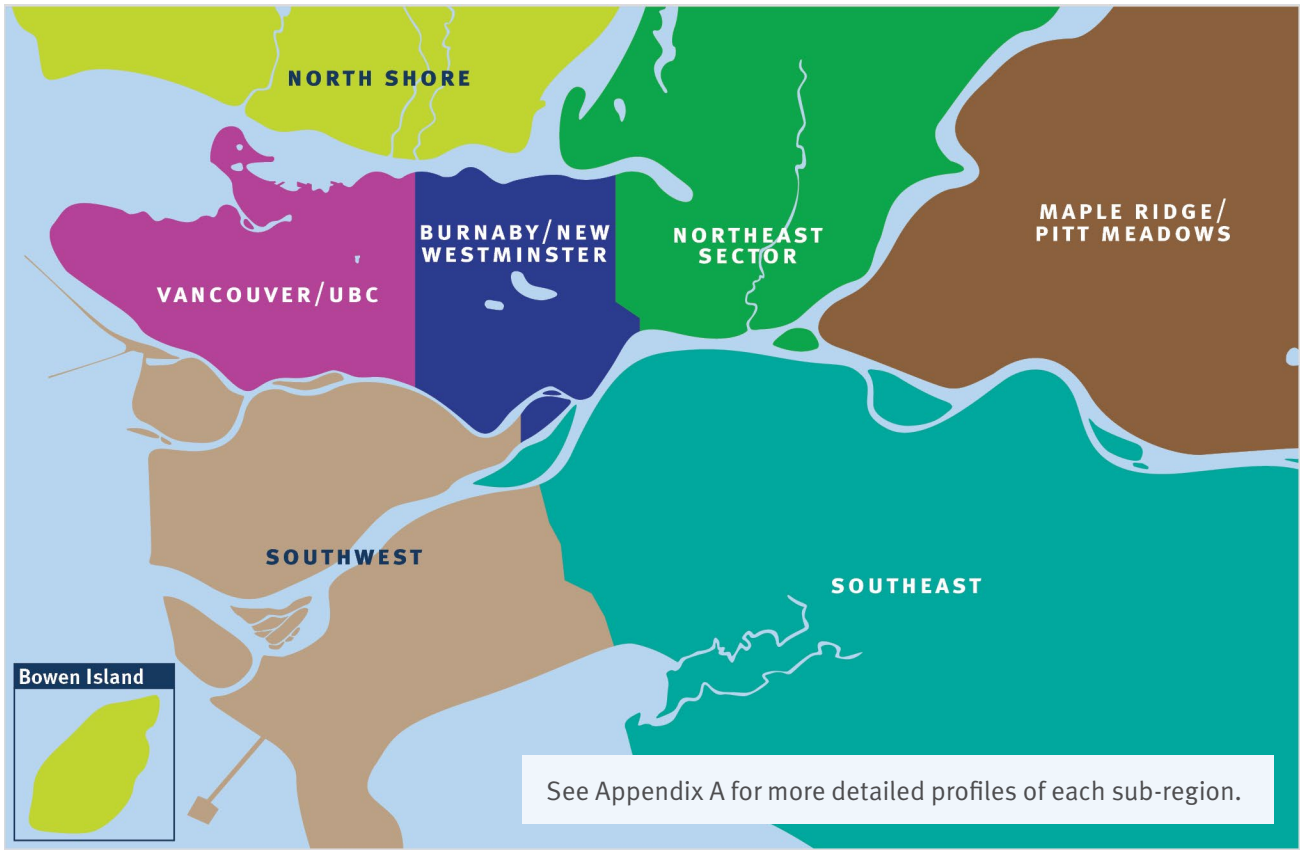
The table below shows total person-hours and bus-hours of delay each day, by sub-region. In 2021, the Vancouver/UBC sub-region had the biggest share, with 45% of the region's person-hours of delay and 37% of the bus-delay. This proportion fell slightly from 2018, in part because bus service was reallocated from Vancouver/UBC to other sub-regions with strong ridership growth, notably the Southeast and Maple Ridge/Pitt Meadows.

Share of Daily Passenger Delay and Bus Delay by Subregion, 2018 and 2021 (ordered by total person-hours of delay)

	Network (% of km)	Daily Bus Trip-KM (% of trip-km)			Daily Person Delay (% of person-hours)			Daily Bus Delay (% of hours)		
Sub Region	2021	2018	2021	Chg*	2018	2021	Chg*	2018	2021	Chg*
Burnaby/New Westminster	12%	14%	13%	-0.4	13%	12%	-0.3	14%	13%	-0.5
Maple Ridge/Pitt Meadows	8%	3%	3%	0.8	1%	1%	0.2	2%	2%	0.8
North Shore	10%	8%	8%	0.2	6%	6%	-0.7	7%	7%	-0.3
Northeast	12%	10%	10%	0.1	4%	4%	0.7	8%	9%	1.4
Southeast	24%	18%	21%	2.3	18%	22%	4.0	17%	20%	3.1
Southwest	18%	15%	15%	0.1	10%	10%	0.3	10%	11%	0.4
Vancouver/UBC	16%	33%	30%	-3.0	49%	45%	-4.2	42%	37%	-4.9

Note: *Change values represent the change in percentage points from 2018 to 2021.

Map of Sub-Regions



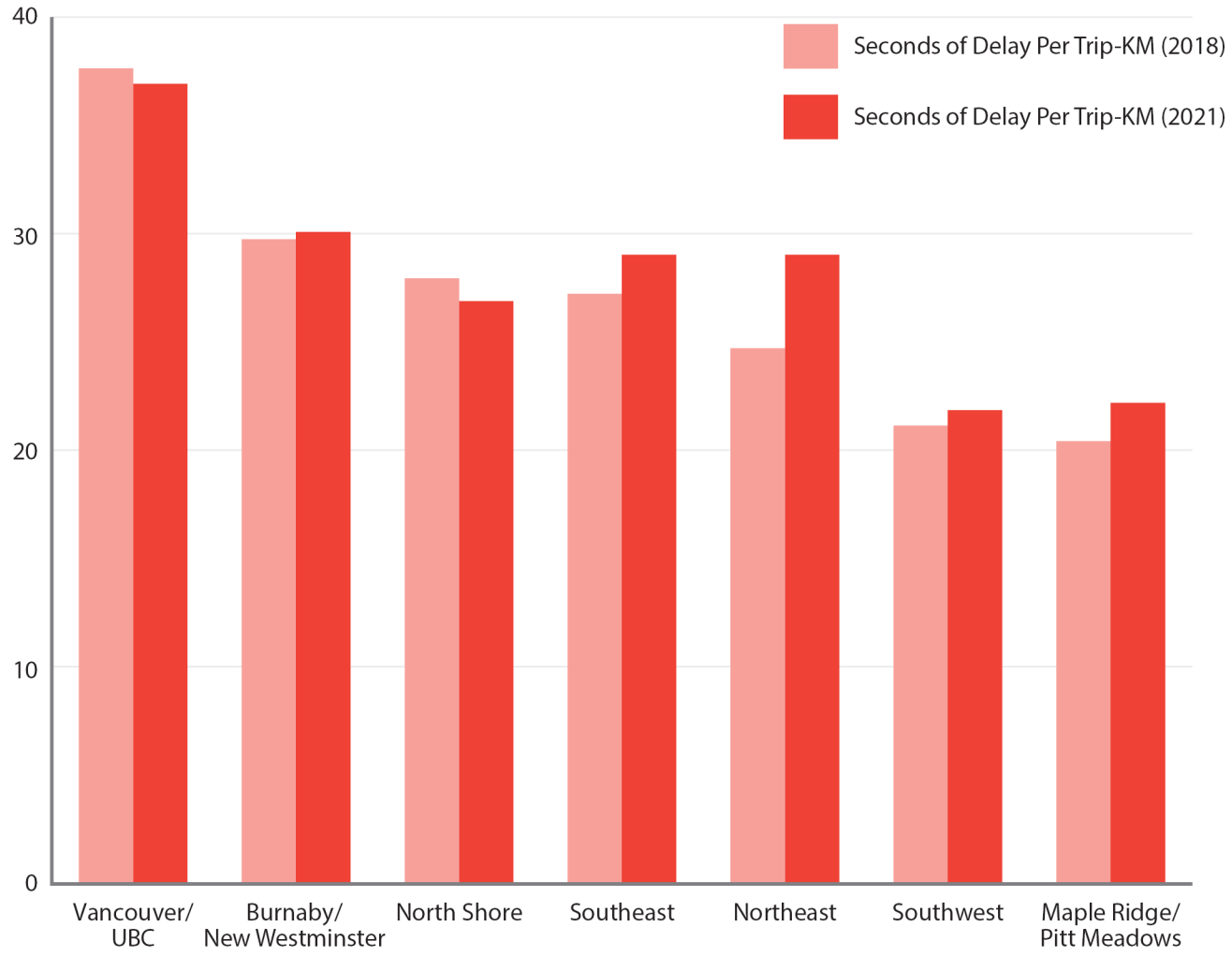
The share of delay outside Vancouver/UBC and Burnaby/New Westminster rose.

Adjusting for changes in bus service, delay per bus kilometre traveled also remains highest in the Vancouver/UBC sub-region. But between 2018 and 2021, it fell slightly in Vancouver/UBC and the North Shore, while rising outside the Burrard peninsula, especially the Southeast and Northeast.

Opportunities to reduce bus delay exist throughout our region.

Even though delay is not distributed evenly, there are corridors that warrant improvement in every sub-region. Profiles of each sub-region (see Appendix A) provide additional statistics and maps highlighting hotspot areas for attention.

Return of Bus Delay by Sub-region, 2018 to 2021



Profile Areas

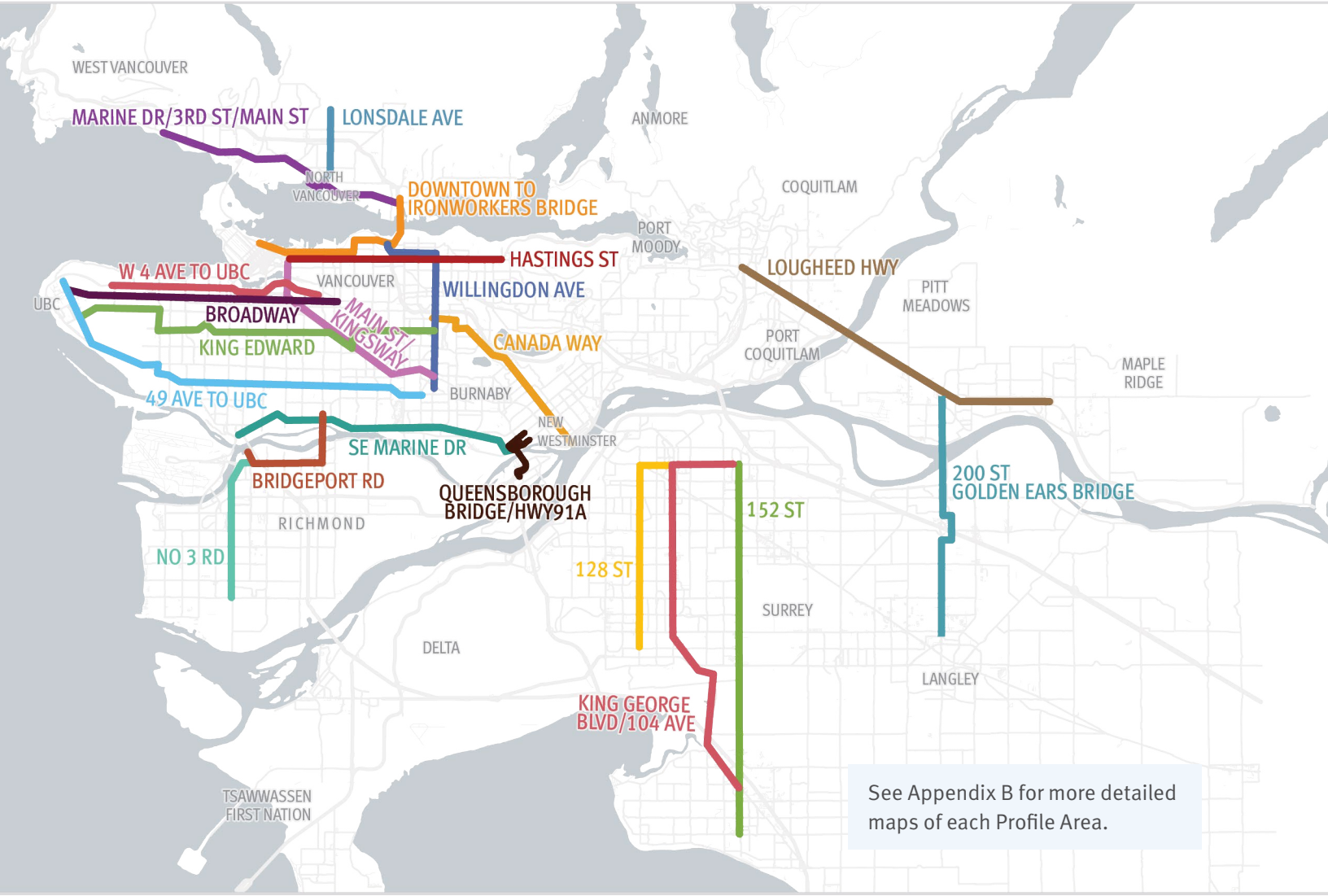
Bus speed and reliability investments are most impactful when focused where they can benefit the most people. Among the corridors evaluated, TransLink has identified 20 "Profile Areas" to analyze in more detail. These are primarily the corridors with the most person-hours of delay. However, the list excludes those with transit improvements already underway, while corridors identified as near-term RapidBus or Bus Rapid Transit lines are also included.

Maps of each are provided in Appendix B.

These Profile Areas differ slightly from the corridors shown on page 36. In order to better align with existing and planned bus routes, some overlap with parts of more than one corridor. Others have been adjusted to focus away from transit investments underway. (The table on page 37 identifies the corridors included in these Profile Areas.)

The 20 profile areas cover less than 15% of the transit network, but represent 35% of total bus-delay and 45% of total person-delay.

Map of Profile Areas



See Appendix B for more detailed maps of each Profile Area.