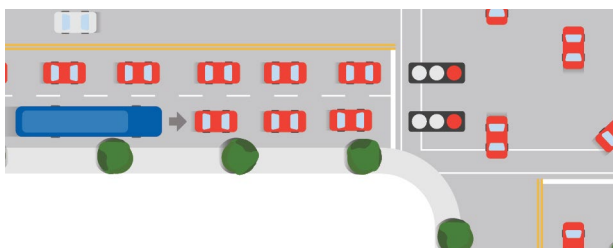


Part 3: Targeting Bus Speed & Reliability Projects

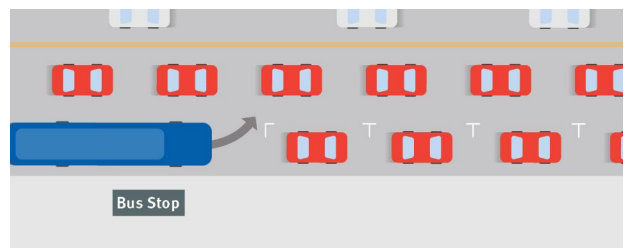
OUR APPROACH TO IDENTIFYING NEEDS

What causes delay?

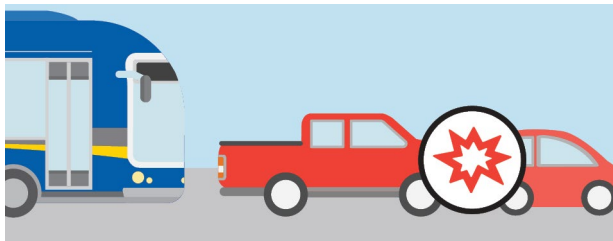
Traffic congestion delays all road users. Buses and cars alike are stuck in traffic. Some of this time is built into bus schedules.



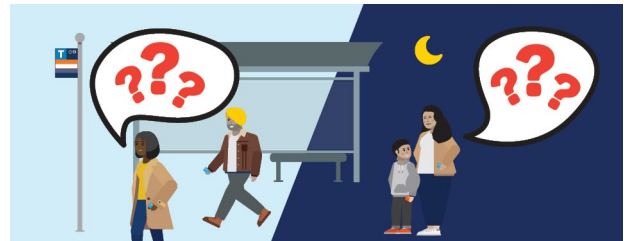
As traffic congestion increases, buses spend more time moving and waiting at red lights. It takes longer for people on the bus to get where they want to go.



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

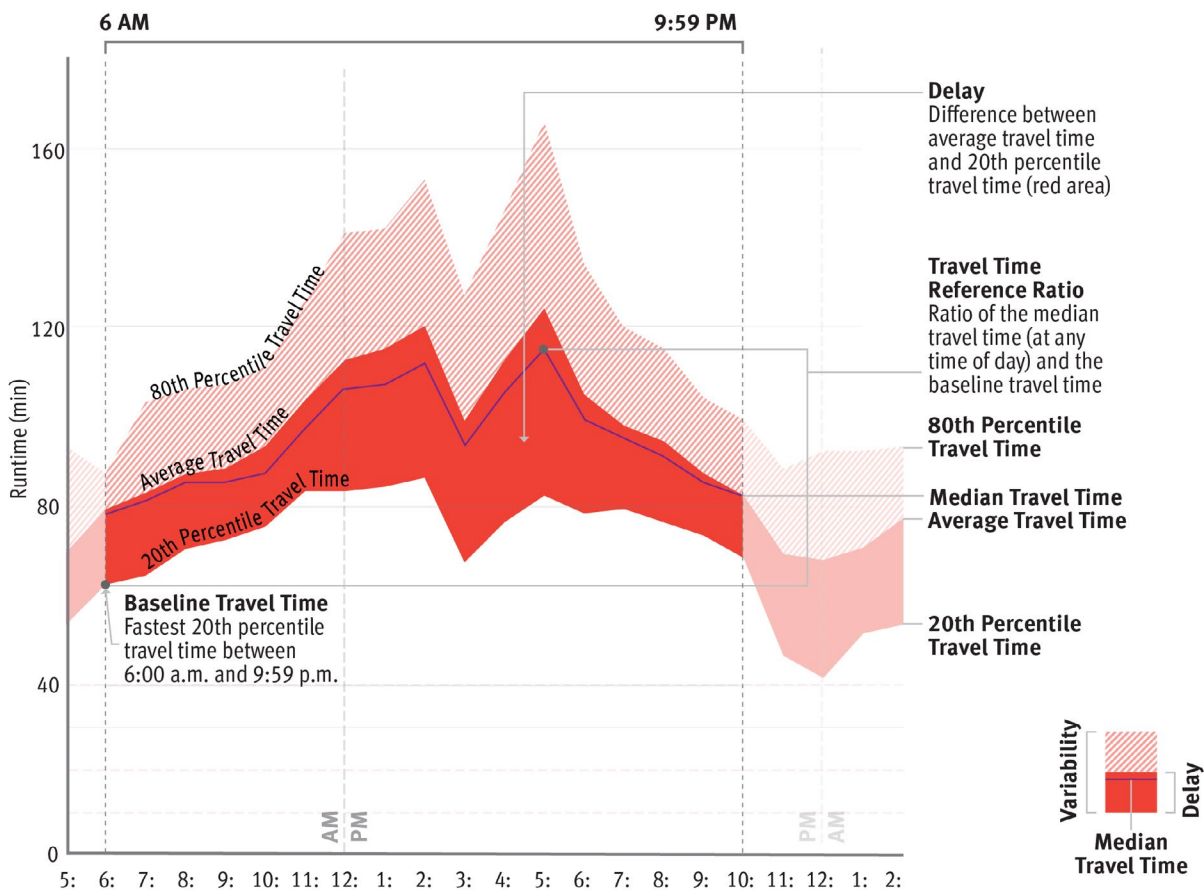
time spent picking up and dropping off passengers, which can be affected by ridership levels.

“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 (median) travel time during daytime hours (6 am–10 pm).

Conceptual Illustration of Delay and Variability

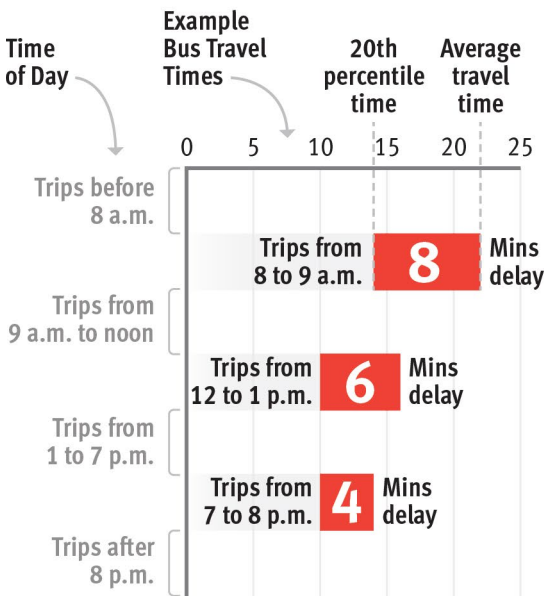


Customer-focused metrics like “person-hours of delay” identify areas of greatest need.

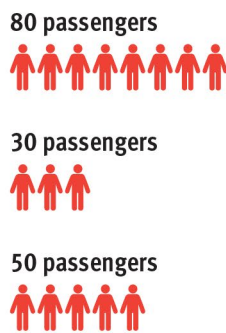
TransLink can calculate the amount of time our customers spend delayed by traffic. This highlights parts of the bus network where delay is impacting the most riders, helping to prioritize investments in bus priority where they will benefit the greatest number of people.

Calculation of Person-Hours of Delay

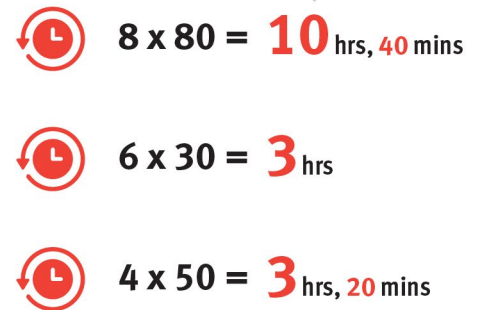
Delay varies by time of day



The number of people who take the bus changes by time of day



Person-hours of delay is the delay for the bus multiplied by the number of people who take the bus



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.

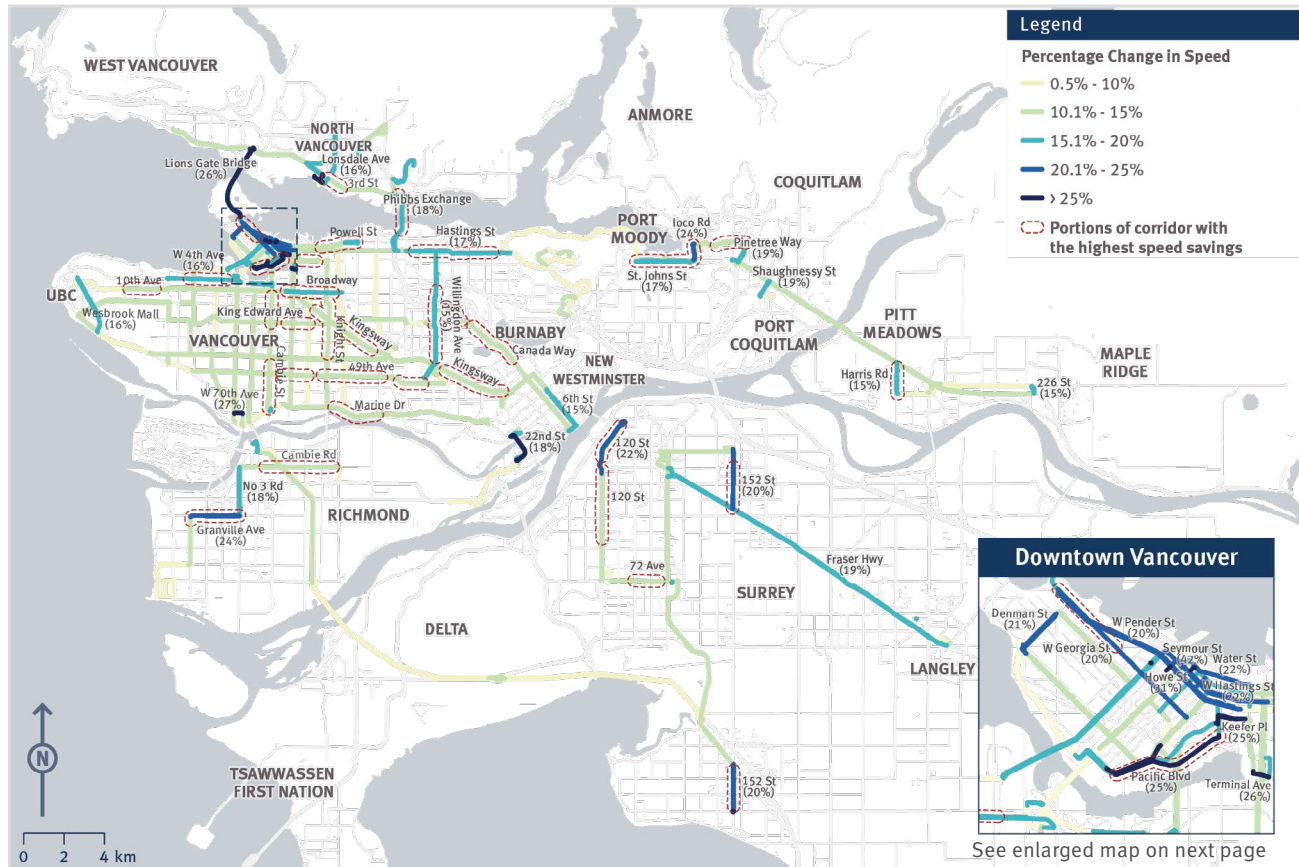
Between February 2020 and April 2020, bus performance improved as follows:

- 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.²² 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.²³ 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



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.

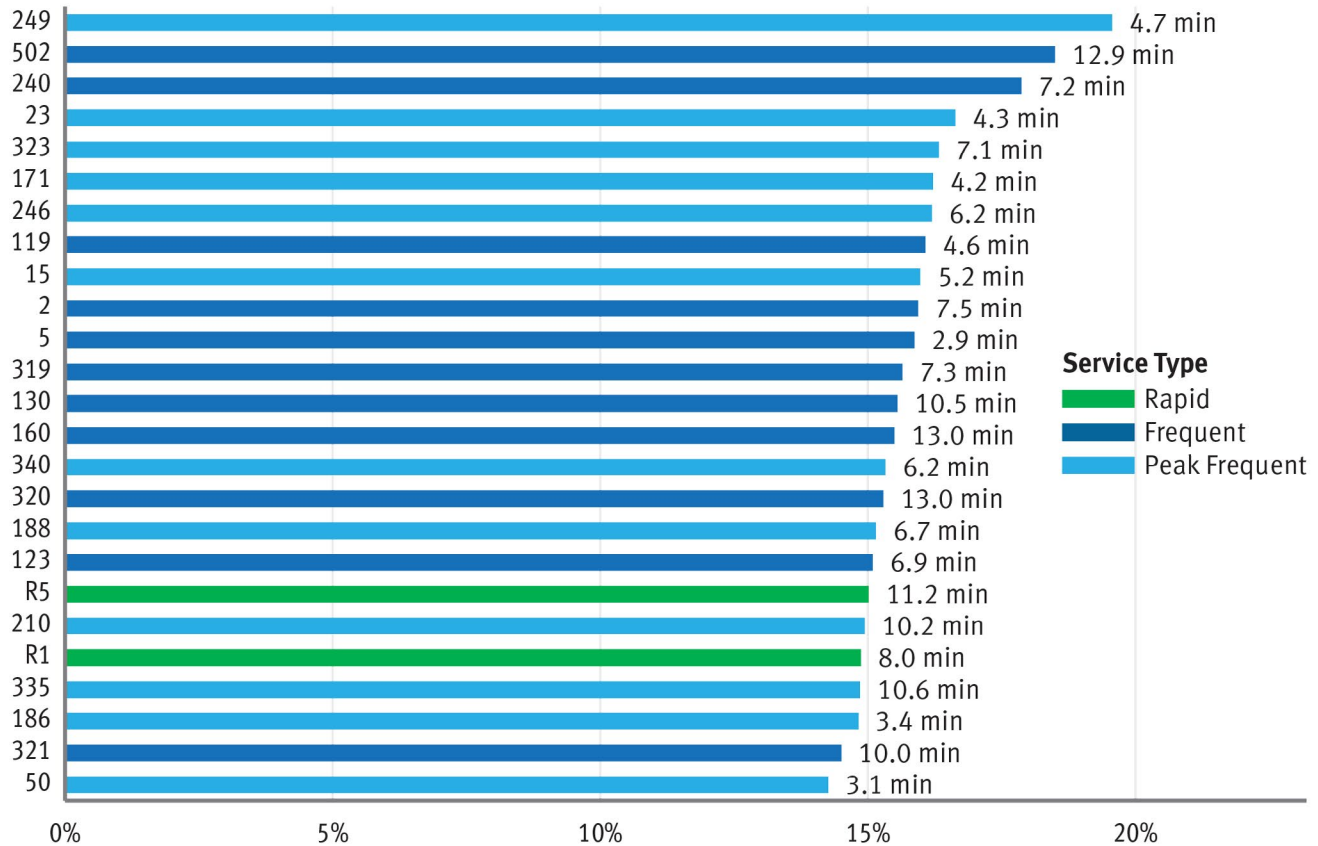
The chart below shows the savings for the routes that improved the most.

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 60.²⁴

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)

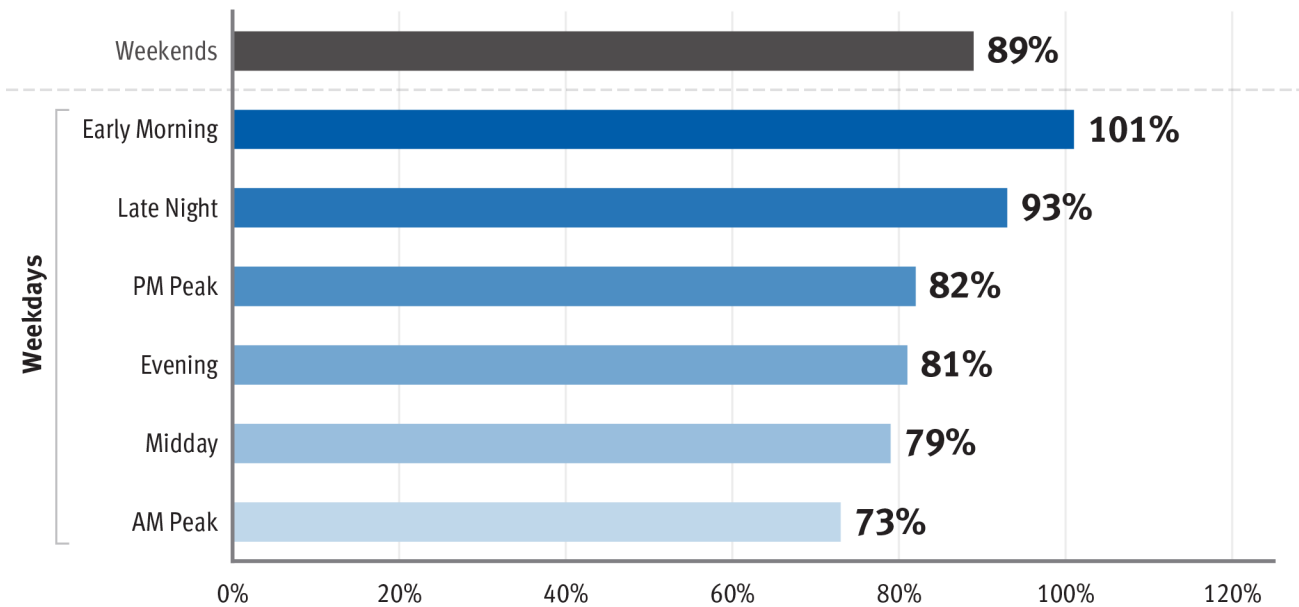


Off-peak person-delay has become relatively more important.

As ridership has returned from pandemic-lows, it is still highest at weekday rush hour peaks—a similar pattern as before.²⁵ 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

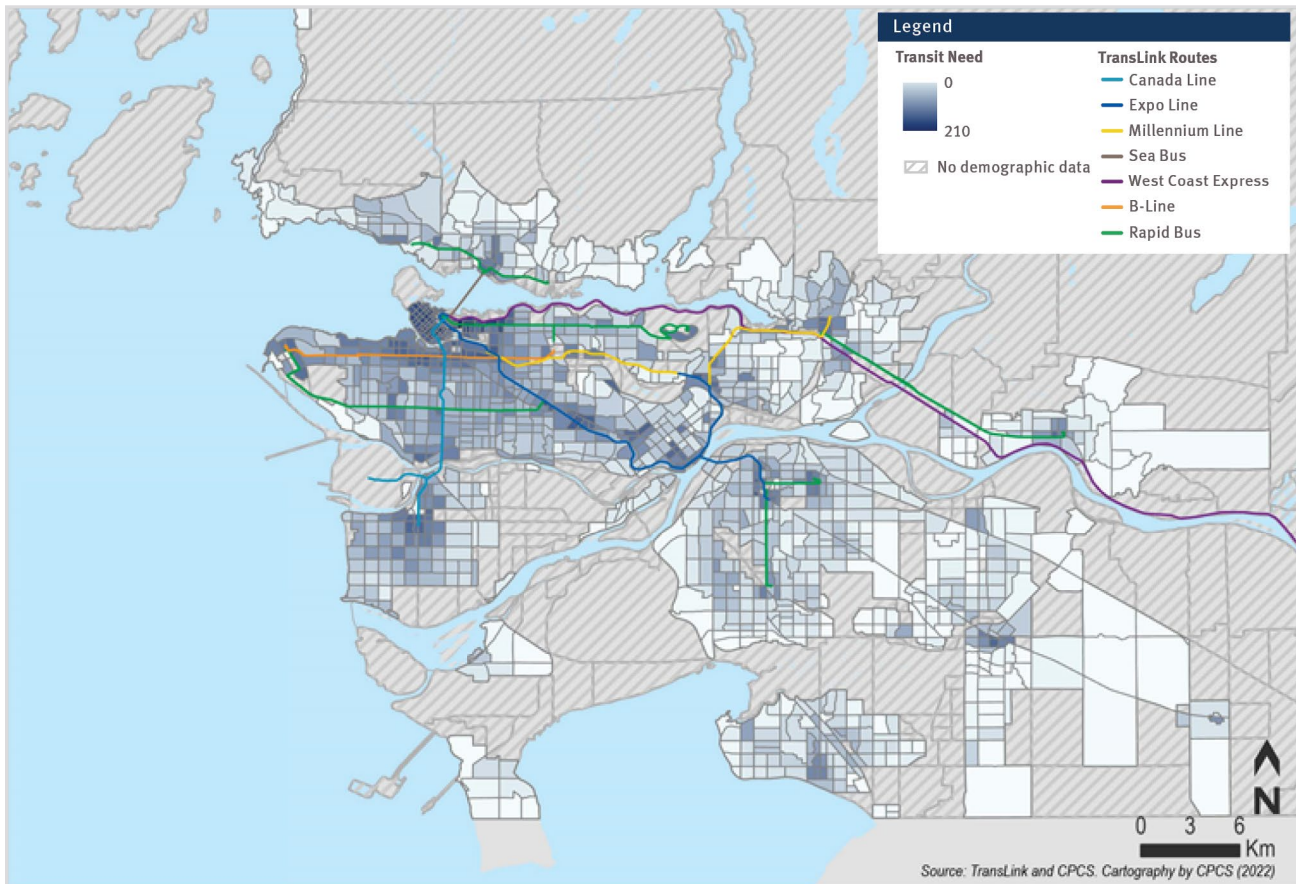
It is possible to identify areas where people are most likely to be reliant on transit. The map below illustrates “transit need” based on a combination of:

- 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

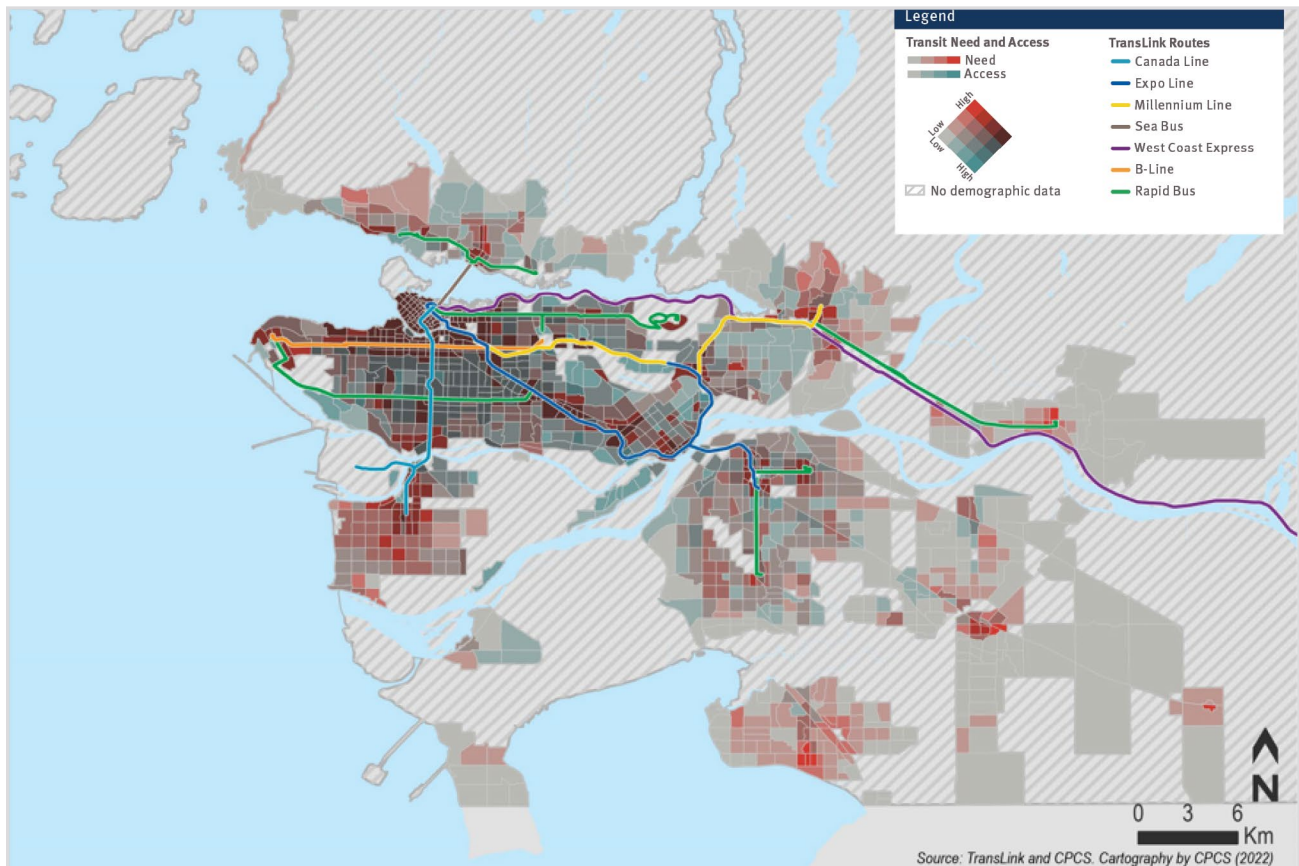
Transit Need and Access

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

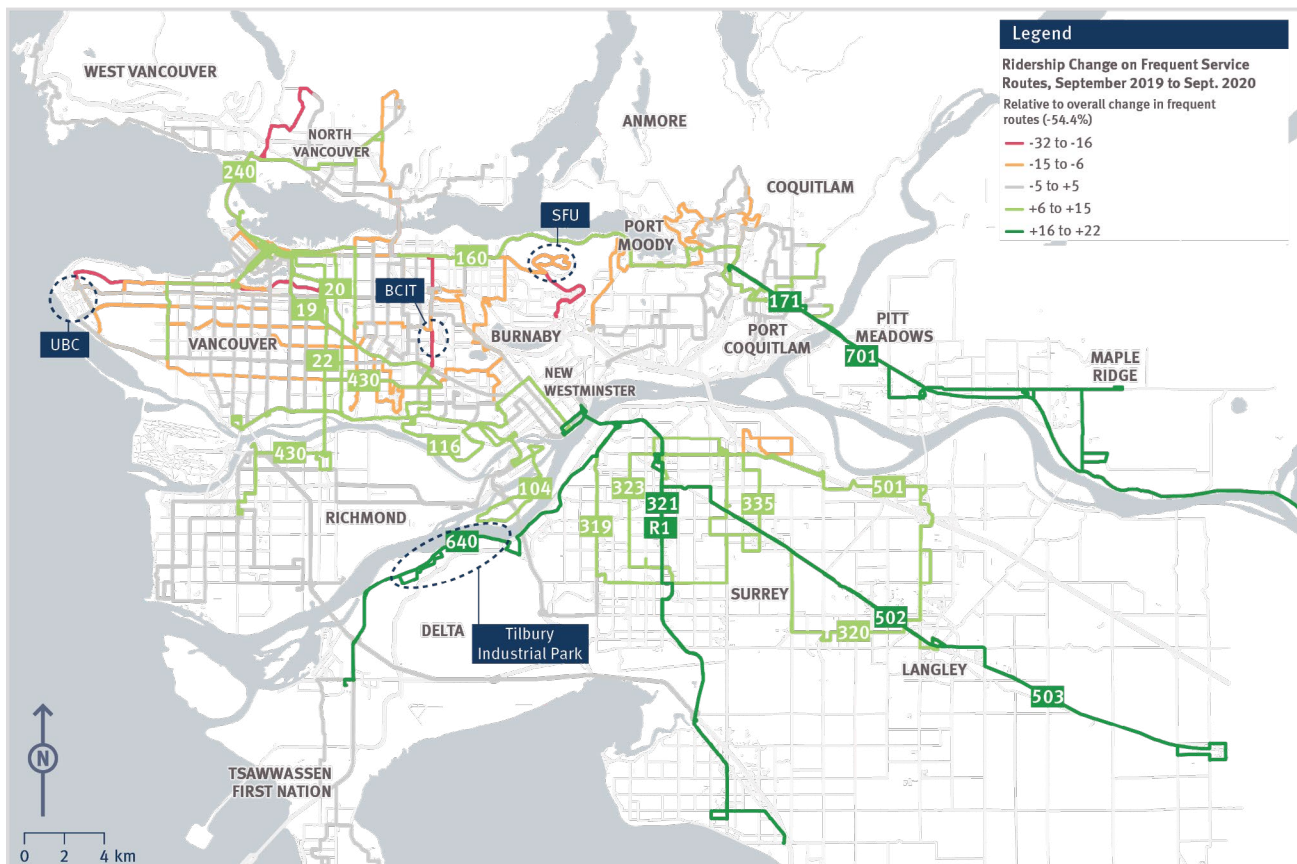
Essential Trips

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%.²⁶ 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.

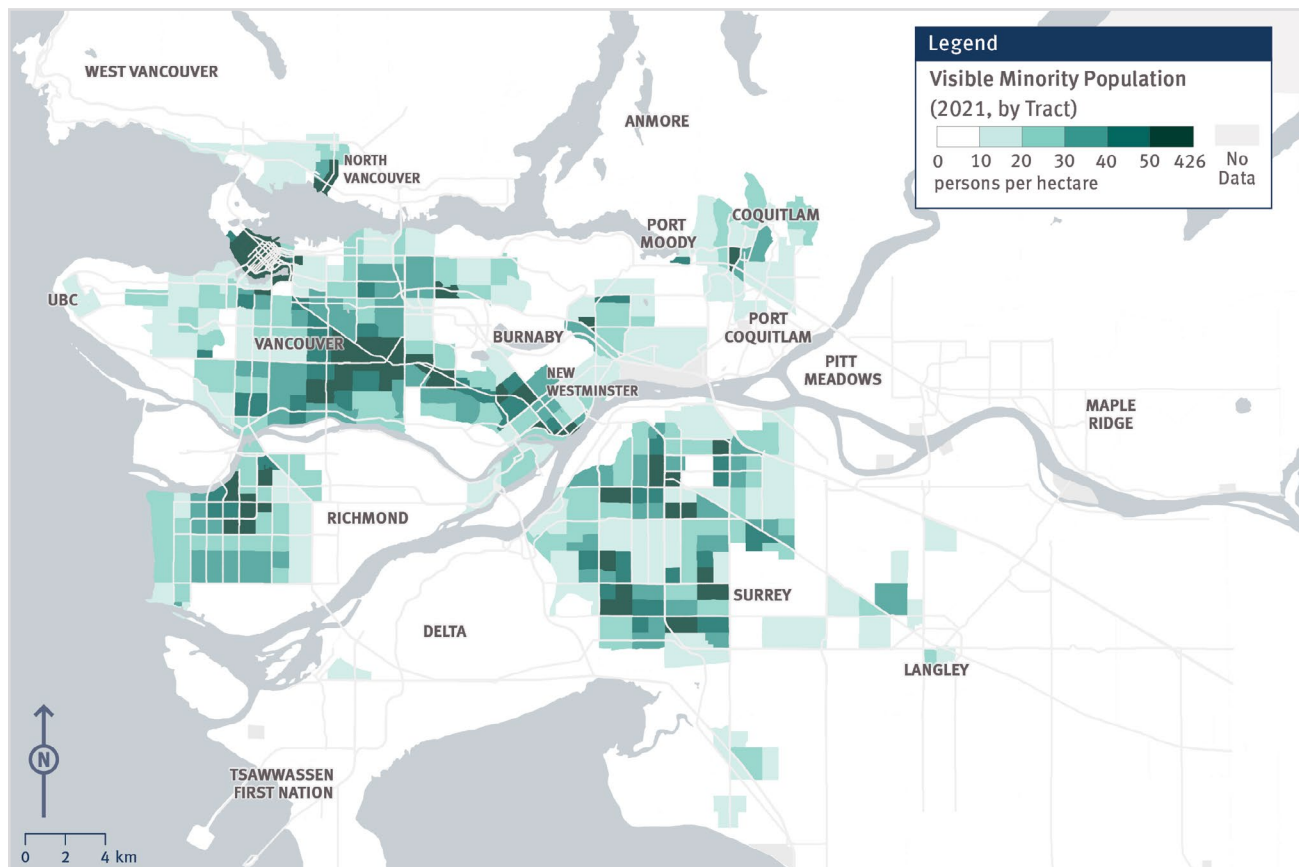
An “intersectional” approach tries to account for the exacerbated inequity faced by people in multiple disadvantaged groups. The following is a

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)

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RANKED PRIORITIES

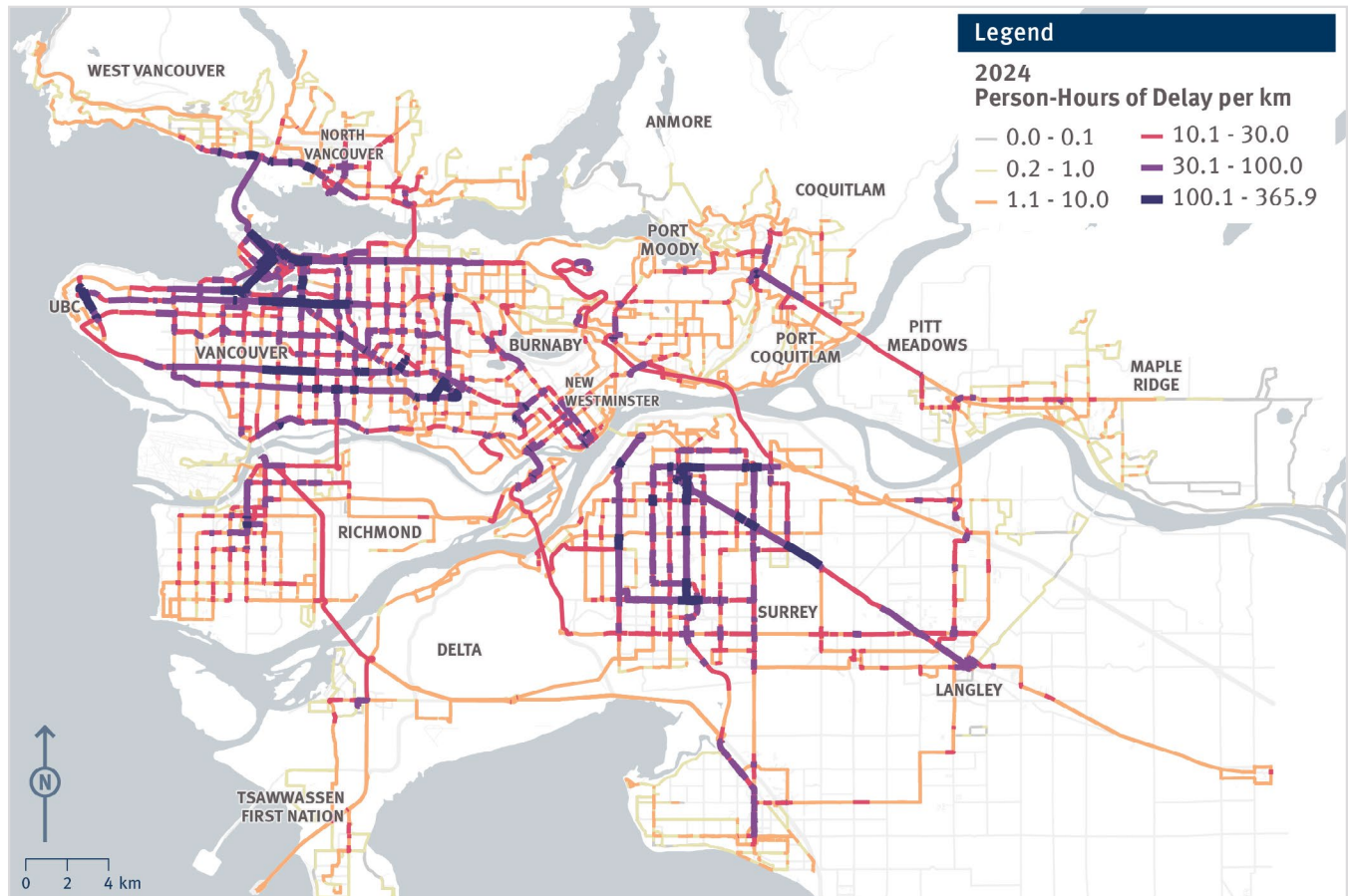
Delay exists across the region.

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 2,500 hours of delay each

weekday, nearly 10% more than pre-pandemic levels (2018). Collectively, people on those buses are delayed by over 44,000 hours. Person-hours of delay increased substantially to over 15% more than 2018.

The map below shows the distribution of delay.

Person-Hours of Delay in the Region, Fall 2024

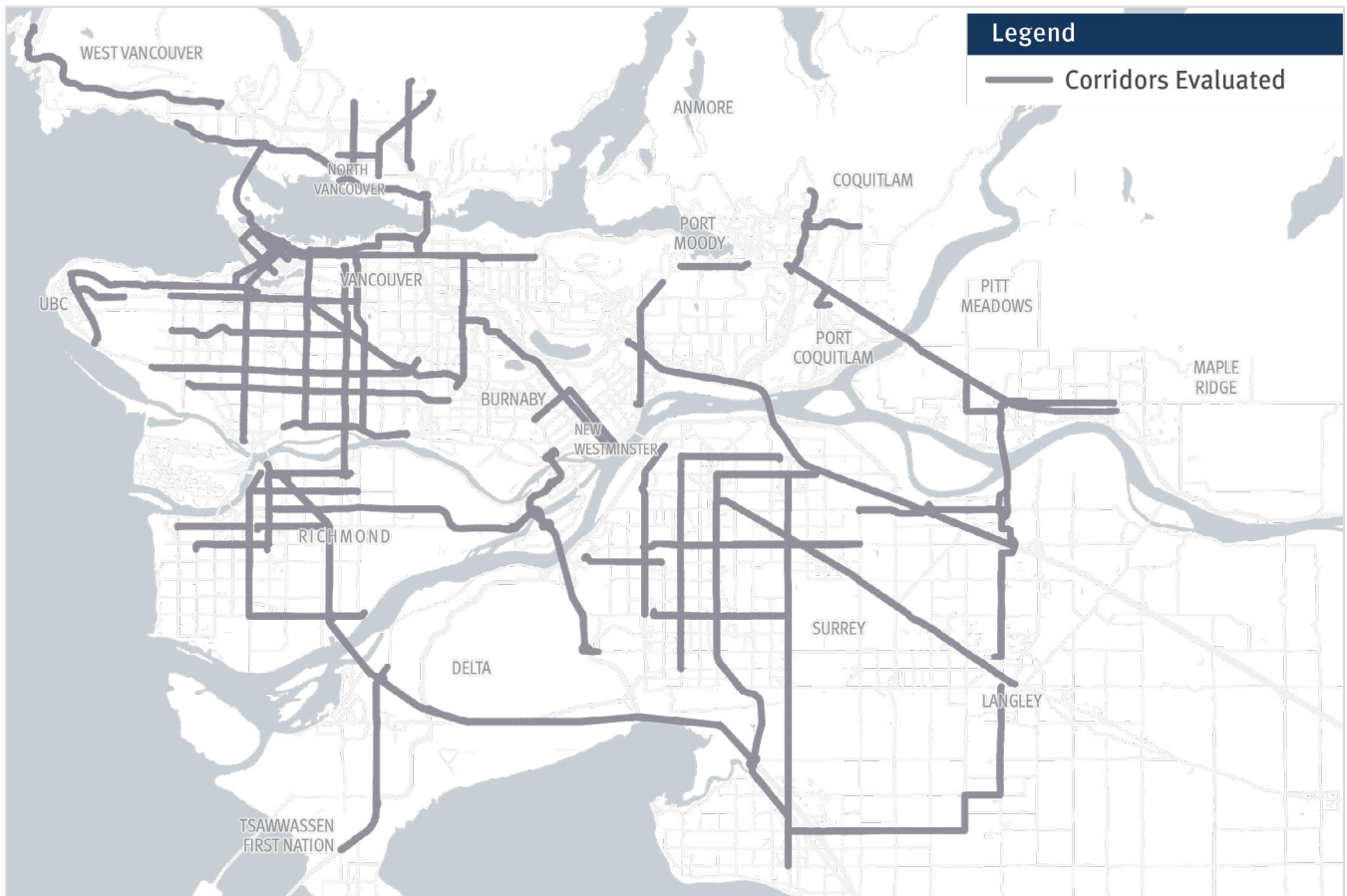


Delay is concentrated along the most congested and well-used transit corridors.

In 2021 TransLink identified just 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 ranking. These corridors and the statistics on the following pages have not been updated for the 2025 Report. See Appendix B for more detailed profiles of 20 corridors.

Map of Corridors Evaluated



The table below provides statistics for each of the corridors evaluated, which are ranked by person-delay per kilometre. Note that these statistics and rankings are the same as published in the 2023 Bus Speed & Reliability Report. Improvements are underway on some (Hastings St, 49 Ave, Granville St, Kingsway) and planned for others (Broadway, King Edward, SE Marine Dr).

Statistics for Corridors Ranked by Person Delay per Kilometre, 2021

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 Westminister	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 Westminister	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 Westminister	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	

	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 ?
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	
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: * Improvements are underway or planned on some corridors (as of 2026). 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.

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 2024, the Vancouver/UBC sub-region had the biggest share, with nearly 40% of the region’s person-

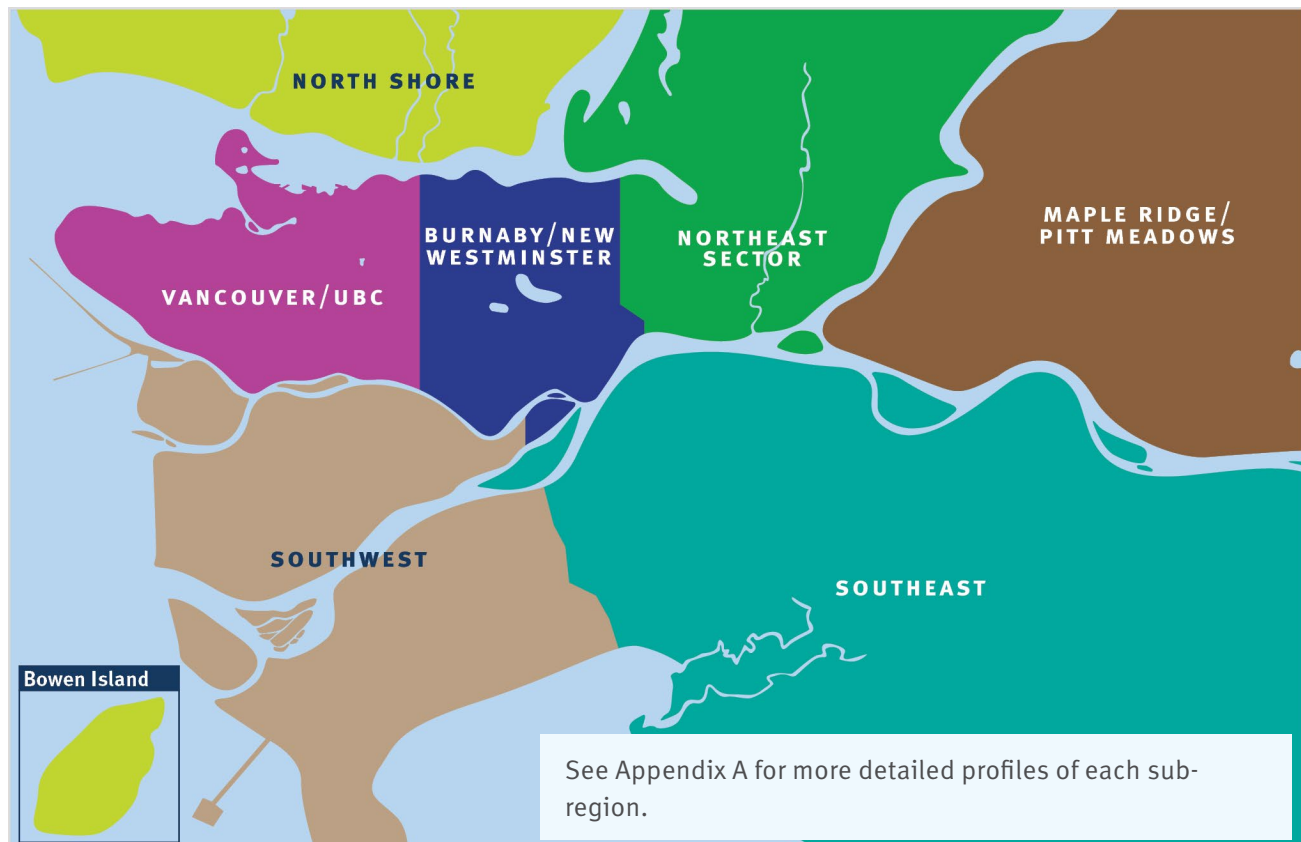
hours of delay and nearly 35% of the bus-delay. These proportions fell from 2018, in part because bus service was reallocated from Vancouver/UBC to other sub-regions with strong ridership growth, notably the Southeast and Maple Ridge/Pitt Meadows.

Share of Daily Passenger Delay and Bus Delay by Sub-region, 2018 and 2024 (ordered by total person-hours of delay)

Sub Region	Network (% of km)	Daily Bus Trip-KM (% of trip-km)			Daily Person Delay (% of person-hours)			Daily Bus Delay (% of hours)		
	2024	2018	2024	Chg*	2018	2024	Chg*	2018	2024	Chg*
Burnaby/New Westminster	12%	14%	13%	-1.1	13%	12%	-0.2	14%	14%	-0.3
Maple Ridge/Pitt Meadows	8%	3%	3%	0.7	1%	1%	0.2	2%	2%	0.7
North Shore	10%	8%	8%	0.0	6%	5%	-1.5	7%	7%	-0.6
Northeast	12%	10%	10%	0.2	4%	5%	1.0	8%	9%	1.4
Southeast	23%	18%	22%	4.1	18%	28%	9.7	17%	24%	7.0
Southwest	19%	15%	16%	0.7	10%	10%	0.4	10%	10%	0.0
Vancouver/UBC	16%	33%	29%	-4.6	49%	39%	-9.4	42%	34%	-8.1

Note: *Change values represent the change in percentage points from 2018 to 2024.

Map of Sub-Regions



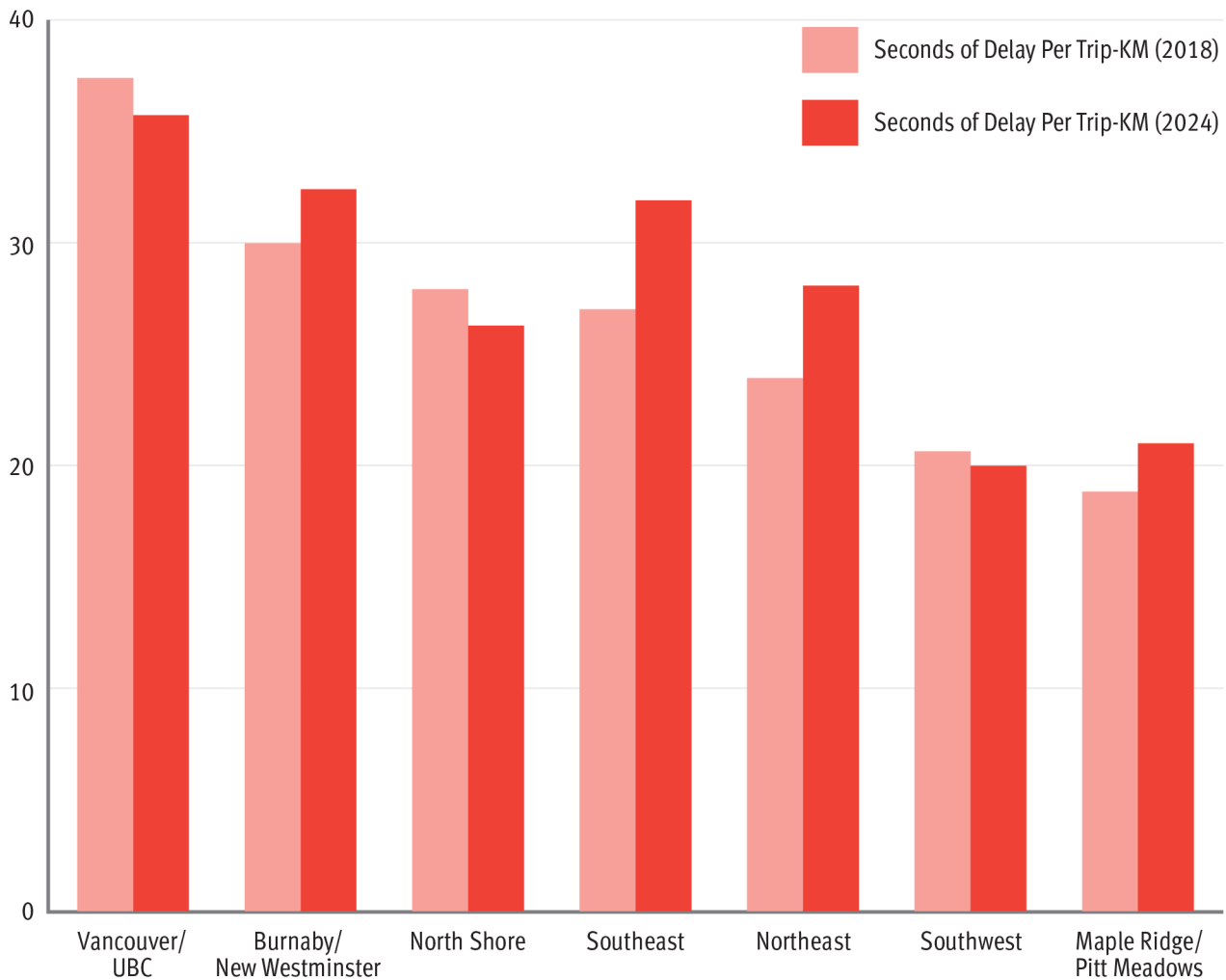
**The share of delay rose in Burnaby/
New Westminister, Southeast, Northeast,
and Maple Ridge/Pitt Meadows.**

Adjusting for changes in bus service, delay per bus kilometre traveled also remains highest in the Vancouver/UBC sub-region. But between 2018 and 2024, it fell slightly in Vancouver/UBC, the North Shore, and Southwest, while rising outside the Burrard peninsula, especially the Southeast and Northeast. The Southeast's share of the region's person-hours of delay increased by 10%, to nearly 30%.

**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 2024



Profile Areas

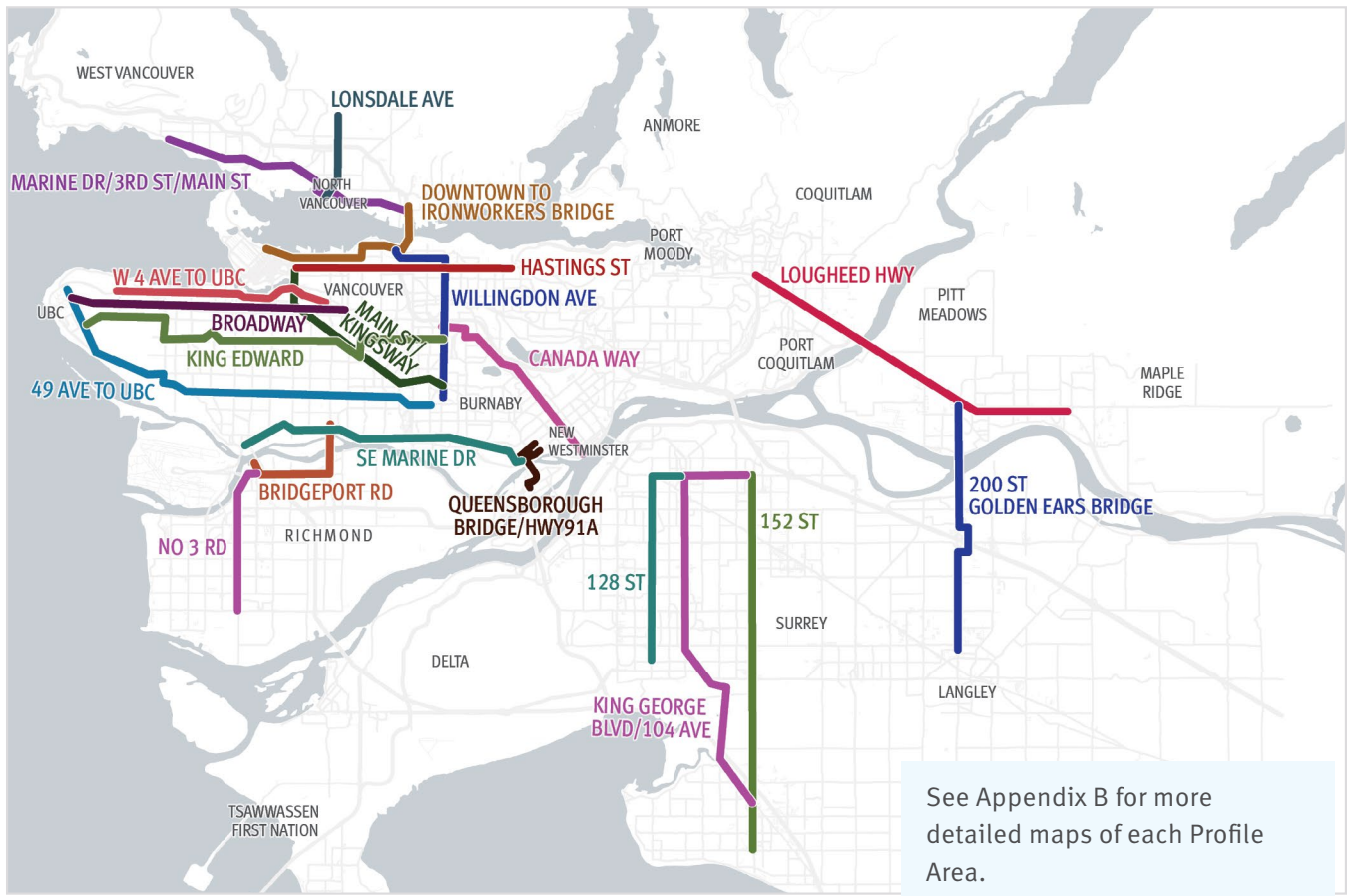
Bus speed and reliability investments are most impactful when focused where they can benefit the most people. Among the corridors evaluated, TransLink has identified 20 “Profile Areas” to analyze in more detail. These are primarily the corridors with the most person-hours of delay. However, the list 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 33. 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. Note: The Profile Area analysis was not updated for the 2025 Bus Speed & Reliability Report.

Map of Profile Areas



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