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REGIONAL TRANSPORTATION AND MOBILITY
CURRENT CONTEXT REPORT

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Regional Transportation and Mobility Current Context Report

Client: TransLink
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Content

Report at a Glance

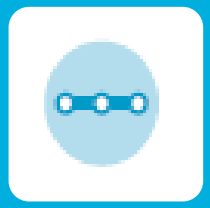
TransLink are currently working to update the Regional Transportation Strategy (RTS) – a long-range plan that explains how people will live, work, and move around in Metro Vancouver in the future. The RTS provides a single vision for the region, and is the source of information for regional transportation priorities.

To guide this process, research has been undertaken to explore the considerations facing transportation today. What problems do customers face? What existing issues must we try to resolve? Where has the region struggled to keep pace with demand or targets?

The key transportation considerations facing the region are presented under the following themes:

- How the region gets around;
- How the region builds, live and work; and
- How the region plans and invest.

The research and evidence supporting the challenge statements are detailed in the following chapters of this technical report.



How the region gets around

- Transit ridership and demand is at a all-time high, but is also leading to varying degrees of crowding on buses and SkyTrain
- Traffic is congested and travel times are unreliable with varying degrees of impact across the region on our economy and quality of life
- Transit, walking, and cycling are often not as competitive as driving

How the region builds, lives and works

- The location of housing influences housing and transportation costs, which represents a significant portion of living costs for many households
- There is high demand to live and work in this region, but growing population and employment is putting pressure on our transportation network
- While the region is becoming more walkable and dense around transit in some areas, many people live and work in locations where transit, walking, and cycling are not viable

How the region plans and invests

- TransLink can rely on diverse revenue sources, but future funding needs may not be met with current sources
- Uncoordinated planning and regulations between different levels of government in this region risks effective governance on existing and emerging transportation services and technology

2. How we get around

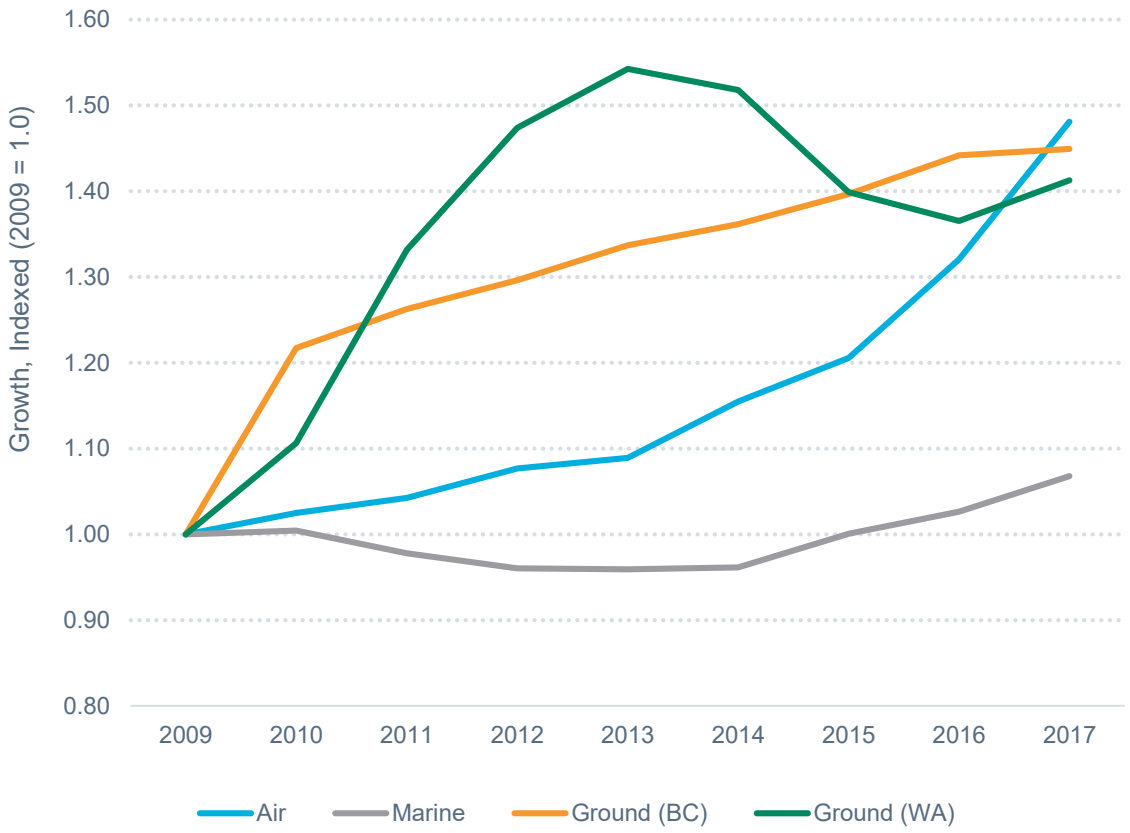
Travel to and from Metro Vancouver is steadily growing.

Due to our unique geography, travel to and from Metro Vancouver can only be accomplished through a few key points – by ferry, air, or ground on a few select highways (Highways 1, 7, or 99) and three key entry points from Washington State (Highways 99, 15 and 13).

More and more interregional travel has been occurring between our region and others in the Pacific Northwest and beyond. Since 2009, interregional travel has increased with a compound annual growth rate of about 2.6%.

As shown on the line graph, travel by ground and air into and out of Metro Vancouver has increased by 40% over 2009 levels, with ferry traffic also increasing, although more modestly.

Daily interregional travel growth, by mode



Data Sources:
Ground: MoTI Average Annual Daily Traffic (AADT) counts;
Air: YVR Airport annual passenger counts;
Marine: BC Ferries annual passenger counts

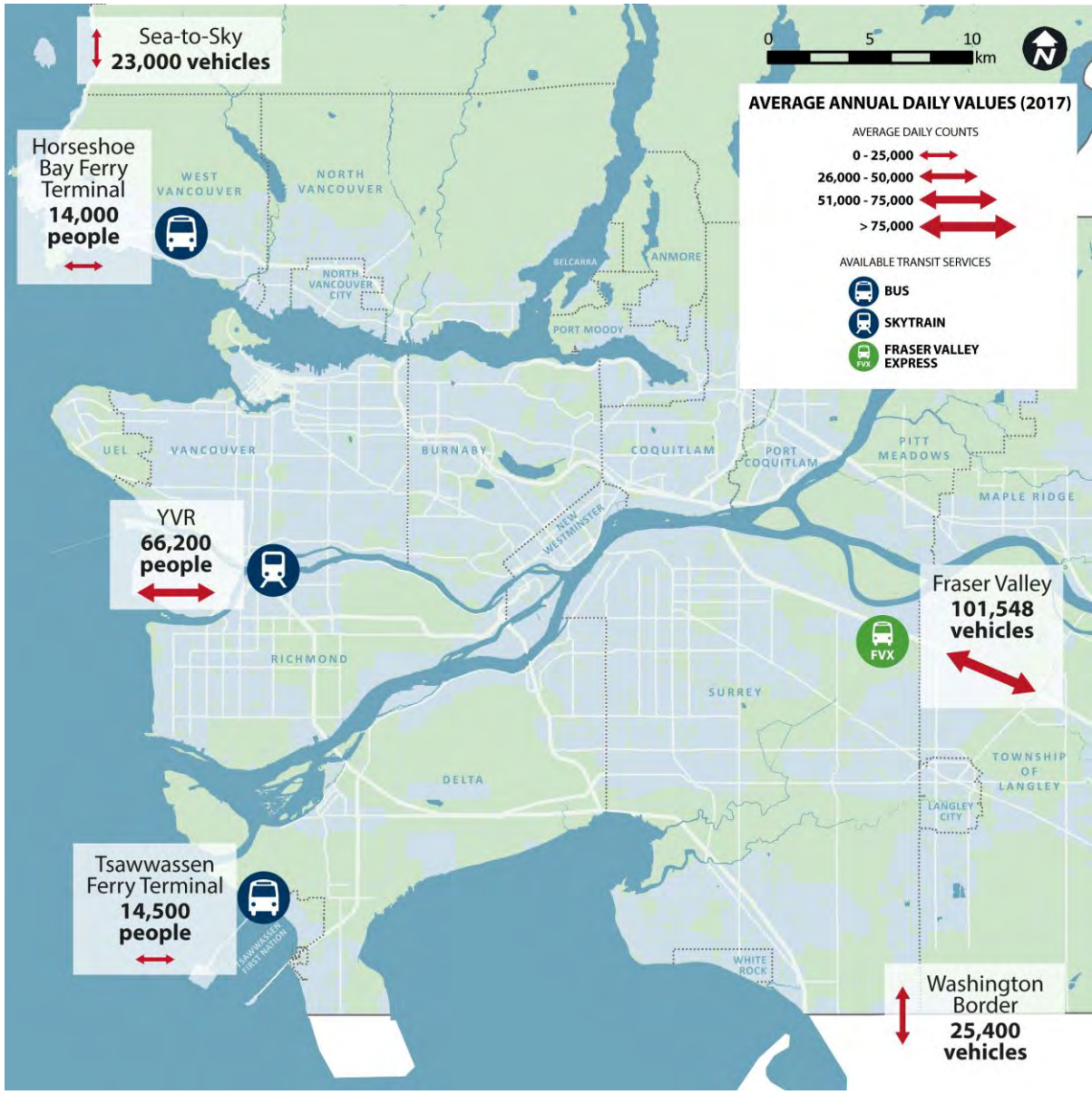
Travel to and from Metro Vancouver is steadily growing.

The map shows the average annual daily comings and goings into Metro Vancouver in 2017.

The busiest entry and exit points to our region are the highways connecting Metro Vancouver to the Fraser Valley and YVR airport which account for over two-thirds of the daily movements.

Travelers entering and exiting our region via YVR Airport or the two BC Ferries terminals are well-served by express buses and SkyTrain. However, travelers coming from the Fraser Valley, Washington State border, and Sea-to-Sky have fewer travel options, and mostly rely on private vehicles to travel to and from these regions.

Average annual daily trips into and out of Metro Vancouver (2017)



Data Sources:
Ground: MoTI Average Annual Daily Traffic (AADT) counts;
Air: YVR Airport, daily estimated from annual passenger counts;
Marine: BC Ferries, daily estimated from annual passenger counts

Transit use, especially rapid transit, is increasing much faster than population.

In 1997, there were just under 2 million people living in Metro Vancouver. That year, Metro Vancouverites boarded transit vehicles on average about 116 boardings per person. By 2017, with a population of around 2.5 million, we were making about 169 boardings per person. This is a huge increase – about 45%.

The top graph shows the regional population growth (blue dotted line) compared with growth in transit boarding's (dark green line) and annual service hours (dashed blue line).

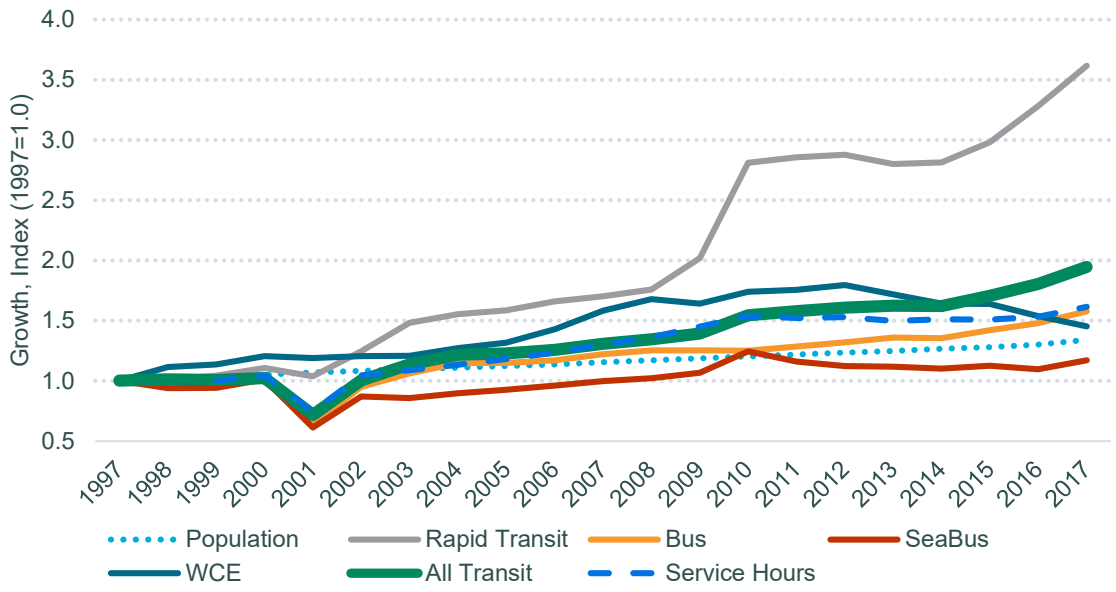
The majority of additional transit use has been on the rapid transit network. This growth is in part due to the significant increases to rapid transit options since 1997, such as the opening of the Millennium Line (2002), Canada Line (2010), and Evergreen Extension (2016).

While bus boarding's have also grown faster than population, There has not been a corresponding step-change in the supply of bus service.

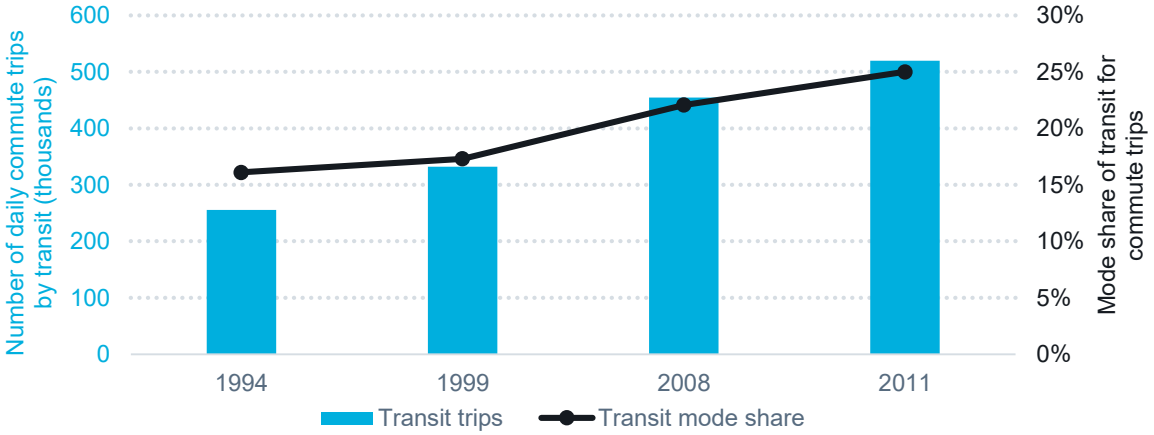
There is some correlation between the increase in transit boarding's (dark green line) and the increase in annual service hours (dashed blue line) in response to this. However from 2014 - 2016 service hours have not been growing at the same rate as transit boarding's.

Importantly as shown on the lower graph, commute trips (to work or post-secondary) by transit have been steadily growing since 1994, both in absolute terms and in transit mode share.

Annual transit ridership and service hours, 1997 - 2017



Daily transit trips by transit to work or post-secondary (1994 – 2011)



Data Sources:
Top: TransLink Ridership Data and Service Hours data and Transit Service Performance Reviews; Government of BC Population and Employment Statistics. Drop in 2001 boardings is due to CMBC strike.
Bottom: TransLink/GVRD/Province of BC Regional Trip Diary Results (1994, 1999, 2008, 2011)

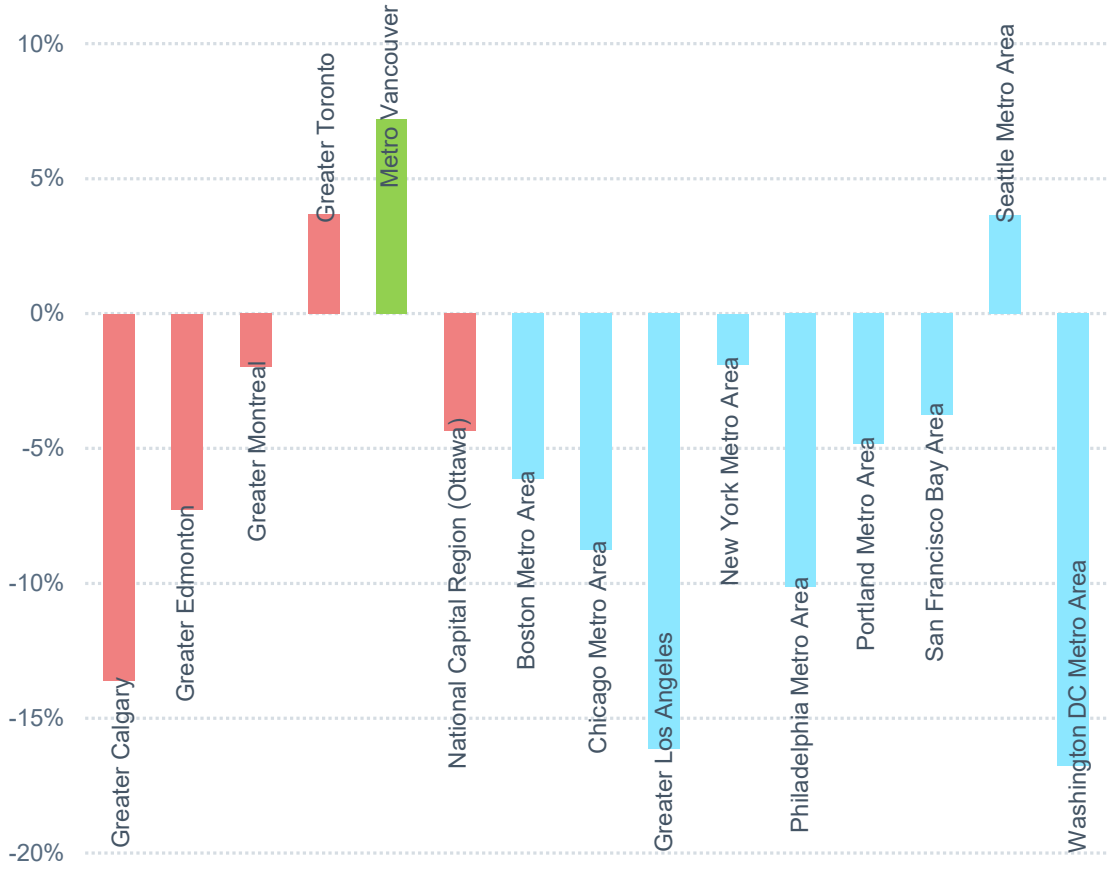
Why is transit ridership growing in Metro Vancouver?

In many other North American regions, transit ridership per capita has been declining over the last few years. This has not been the case in Metro Vancouver.

Between 2013 and 2017, Metro Vancouver led North American metropolitan areas in terms of transit ridership per capita, with a 7% increase.

The exceptional increases to ridership per capita in Metro Vancouver in recent years have been attributed to higher fuel prices, the opening of the Evergreen Extension, other increases to service for SkyTrain, SeaBus, and bus, high employment levels, and concentration of population and employment in urban centres and along frequent transit corridors. A potential differentiator for Metro Vancouver is that TNCs (Transportation Network Companies, also known as ridehailing) are not formally in operation.

5 Year Percentage Growth in Boardings per Capita (2013-2017)



Data sources:
US Metro Boardings: National Transit Database; US Metro Populations: US Census, American Community Survey
Metro Vancouver Boardings: TransLink
Canadian Metro Boardings, other than Metro Vancouver, and Canada Metro Populations, other than Greater Montreal: Canadian Urban Transit Association

Notes on Greater Montreal Boardings and Populations:
- Greater Montreal transit boardings reported by CUTA in 2017 were adjusted to exclude Exo metropolitan bus boardings (approx. 20 million) as this data was not included in previous years. This estimate includes metropolitan commuter train boardings which were included as Agence métropolitaine de transport (AMT) boardings prior to 2017.
- Greater Montreal population reflects Montreal Census Metropolitan Area (CMA) population from Statistics Canada Census data.

Parts of the SkyTrain network are crowded during peak periods.

The map shows transit ridership as a percentage of available capacity on the SkyTrain during the AM Peak (7:30 to 8:30 AM).

Sections of SkyTrain are close to or over capacity including the Canada Line from Richmond to Downtown Vancouver, and sections of the Expo and Millennium Lines into Downtown Vancouver.

The worst sections are inbound from Joyce-Collingwood, Rupert and Oakridge – 41st Avenue to Downtown.

There is however lots of capacity on all routes outbound from Downtown.

TransLink's Expo and Millennium Line Upgrade Program (EMUP), as well as the Mayors' Plan, will help to address the capacity issues that the SkyTrain network is currently experiencing, with new trains and additional capacity over the next few years.

SkyTrain Crowding during the AM Peak

Data source: TransLink Compass Data (2017)

Almost twice as many people ride the bus than SkyTrain.

While the three SkyTrain lines are by far the busiest routes on the Metro Vancouver transit network, overall, the bus network carries nearly twice the number of people than SkyTrain does in a day.

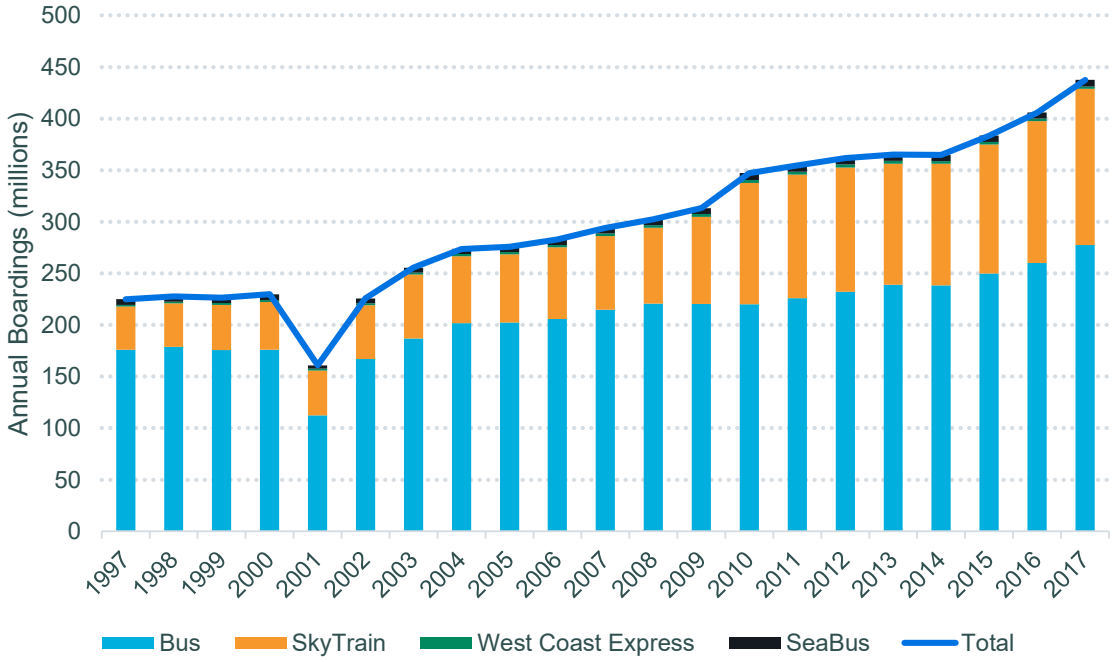
Of all boarded passengers in 2017, the bus network carried 63%, SkyTrain 35%, SeaBus ~1.5%, and the West Coast Express ~0.5%.

Buses are the workhorses of the transit system in Metro Vancouver. While rail-based mobility solutions like SkyTrain provide a lot of capacity and are very reliable, they are very expensive and cannot be built in all places.

Buses provide the flexibility to operate nearly everywhere where there are roads and can be a very fast and efficient way to move a lot of people.

Daily share – transit modes (2017)

Annual transit boardings by mode (1997-2017)



Data sources: TransLink Ridership Data and Transit Service Performance Reviews
Drop in 2001 boardings is due to CMBC strike.

Overcrowding on bus routes occurs in many areas in the region

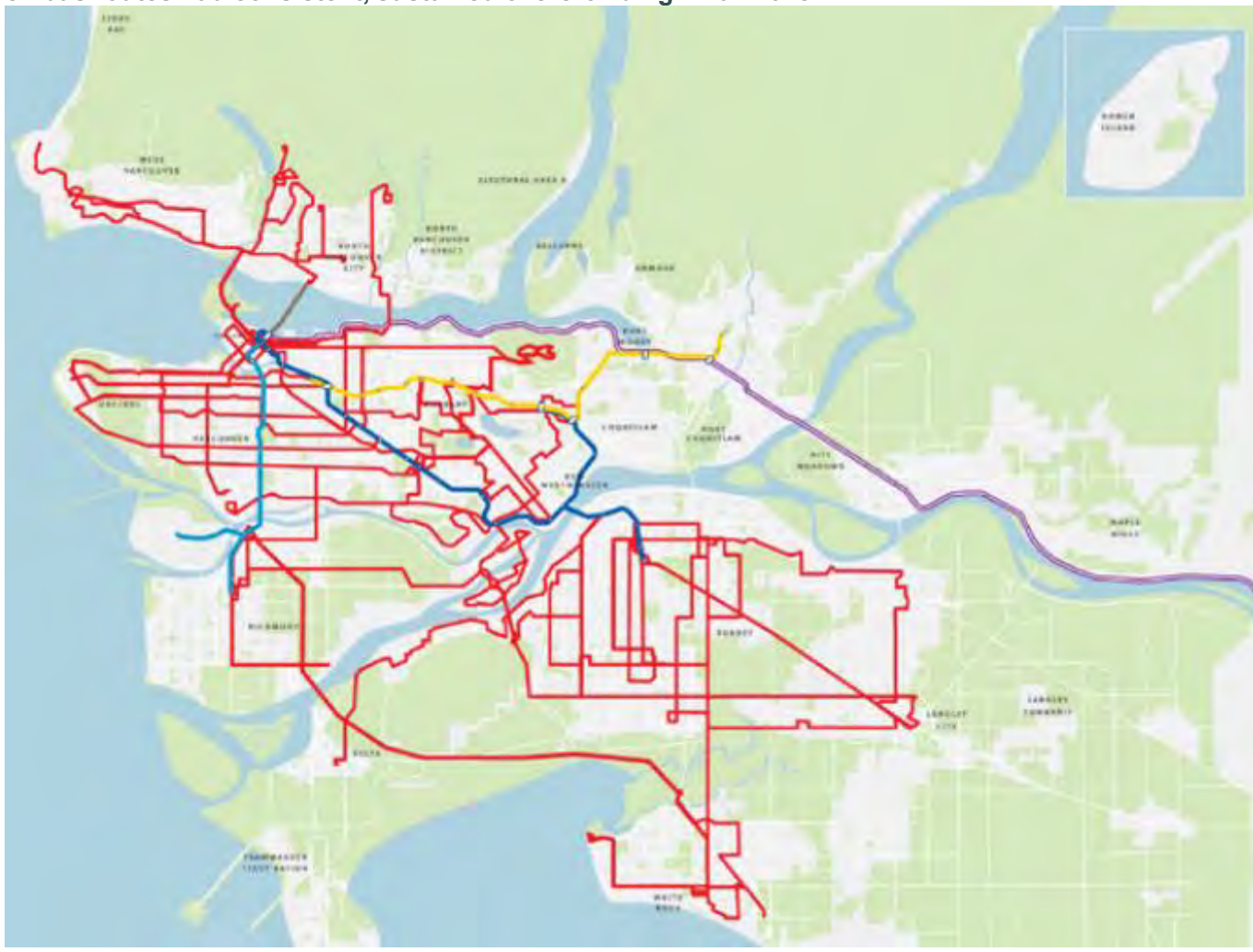
The map shows 52 bus services (one-quarter of all routes) in fall 2018 which experience consistent, sustained overcrowding[1] for one hour or more on any day of the week.

This is an increase from 38 routes in fall 2016 (one-sixth of all routes), before Phase One improvements began.

The map does not represent where on the route the crowding issues occur. It is likely only overcrowded along a segment of the service route.

[1] Consistent, sustained overcrowding occurs on a bus route when demand is high throughout an hour so that the average trip for that hour has overcrowding. Overcrowding occurs when there are more passengers on board than the vehicle's practical capacity, i.e. the bus is more than 100% full.

52 bus routes had consistent, sustained overcrowding in fall 2018



Note: Map shows routes that experience consistent, sustained overcrowding, but does not show where on the route such issues occur.
Data source: TransLink Transit Service Performance Review, 2018

Buses that operate with traffic priority measures are more reliable.

The grade-separated rapid transit network has consistently achieved exceptional reliability rates of more than 95%.[1]

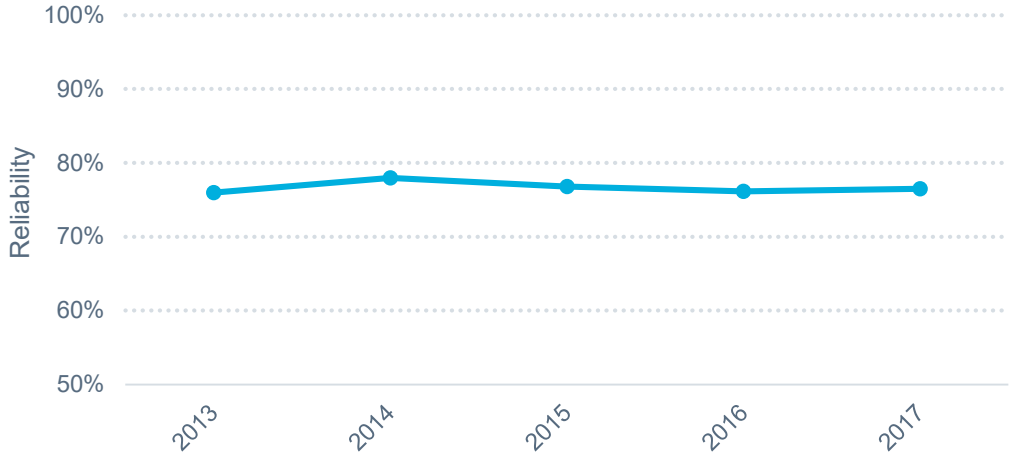
Buses, generally operating with car traffic, are significantly less reliable than transit modes with their own rights-of-way. In 2017, the weighted average reliability for all Metro Vancouver bus routes was around 77%, or in other words 77% of the time buses arrived within 2 minutes of the scheduled time. This reliability rate has been fairly consistent since at least 2013.

Among the busiest routes, the 99 B-Line, 96 B-Line, 9, and 95 B-Line have above-average reliability. Despite operating on some of the busiest and most congested corridors in the region, three of the top four most reliable routes are B-Lines (shown in green). These tend to be reliable in part due to the increased level of priority offered (like HOV/bus lanes, and queue jump lanes).

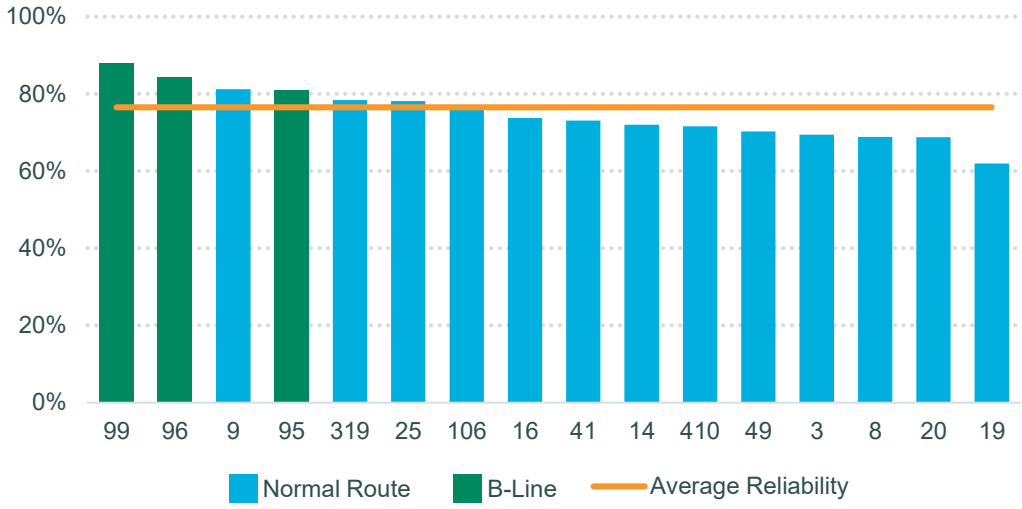
Recently, the region has invested $144 million in transit priority and enhanced passenger amenities on new B-Line corridors, and $16 million in new funding for transit priority on bus services across the region as part of the Phase One and Two Investment Plans.

[1] SkyTrain (95%), SeaBus (>99%), West Coast Express (98%).

Annual reliability, all bus routes (2013-2017)



Annual reliability for the busiest bus routes (2017)



Data sources: TransLink Transit Service Performance Review (TSPR) (2017)

HandyDART is primarily used for medical-related trips.

In 2017, there was a total of about 1.25 million trips taken by HandyDART. Approximately 67% of those trips were for medical reasons, including trips to the hospital, renal clinics, day programs, medical workshops, and for cancer treatment.

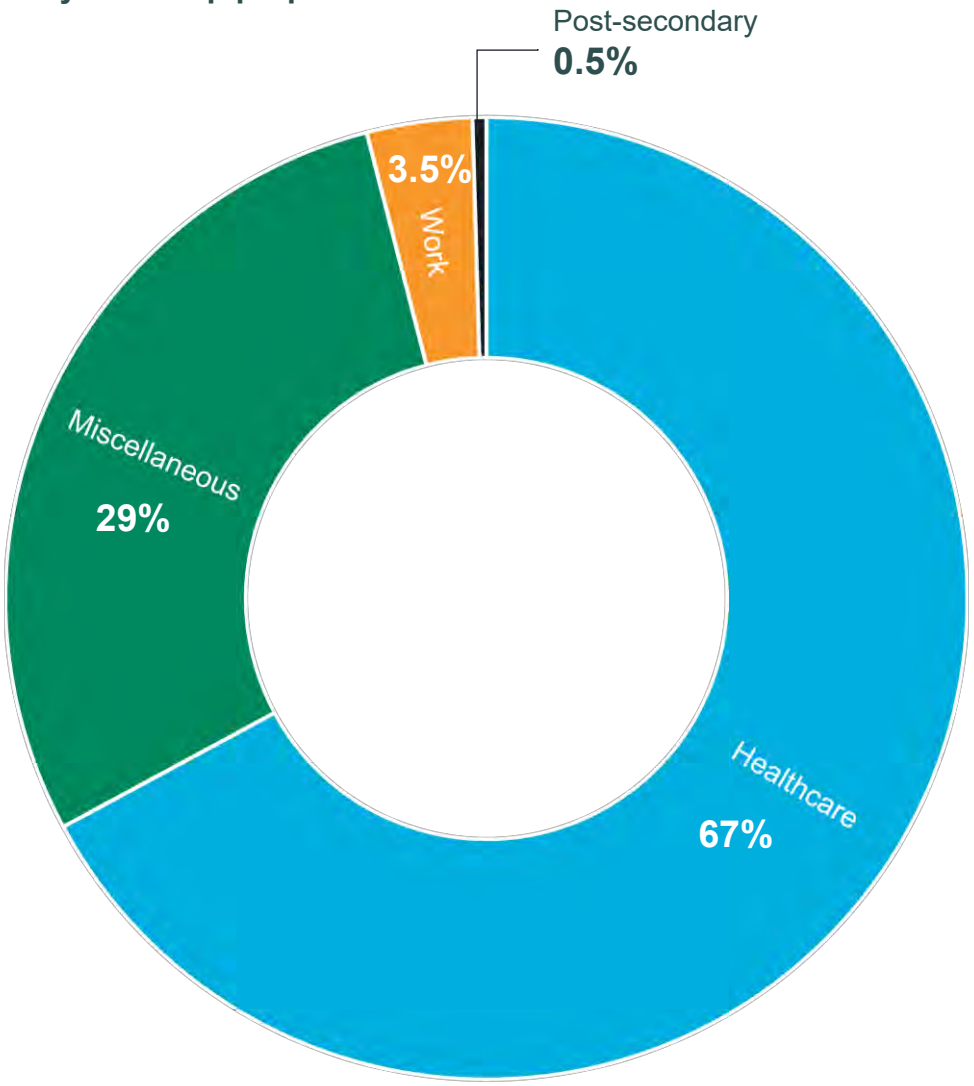
As the Metro Vancouver senior population (>65 years old) is expected to increase to 40% of the total population by 2041 (from about 19% in 2006) [1] demand for accessible transit services is likely to increase.

The Provincial government provides funding for HandyDART programs throughout the province, with the exception of Metro Vancouver. As well as HandyDART, TransLink also provides additional accessible transit services, including taxi-saver vouchers and the VIP service.

The service is currently an expensive operation to run, it is restrictive because it uses high floor vehicles and trips need to be booked in advance by phone call. Given the constraints to convenience and accessibility, current trips may not reflect actual mobility desires of potential HandyDART customers.

[1] Source: Metro Vancouver Regional Growth Strategy Projections Population, Housing and Employment 2006 - 2041

HandyDART trip purposes



Data source: TransLink HandyDART Data, 2017

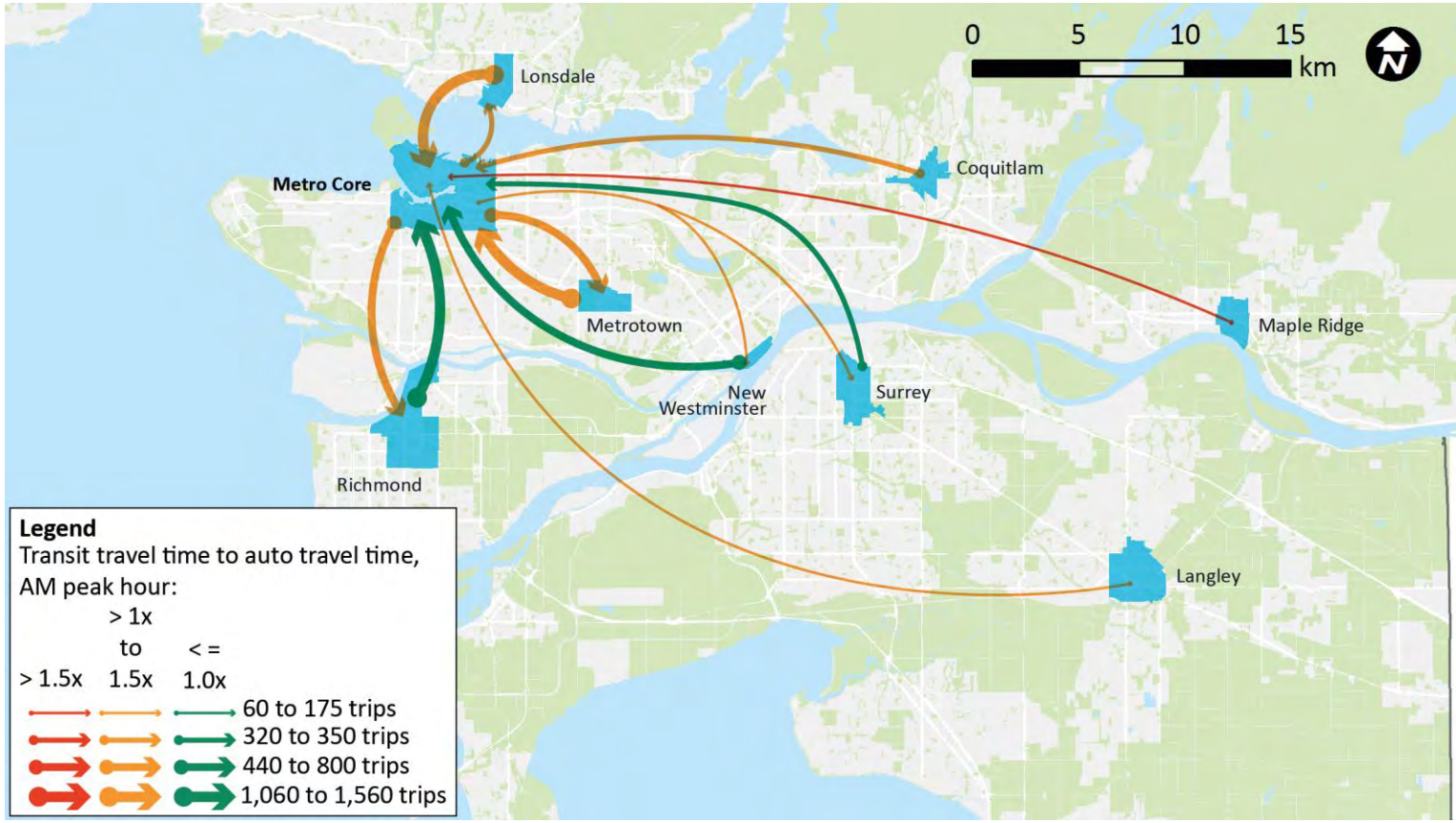
While most trips are faster by car than by transit, SkyTrain trips can be faster than car to the Metro Core in the morning peak.

The map shows a comparison of transit to auto travel times in the AM peak hour during a typical weekday, for inbound and outbound trips between representative points inside Urban Centres and a representative point in the Metro Core.

This analysis shows that only trips from Richmond, New Westminster and Surrey to the Metro Core are quicker by transit than by auto in the AM peak. This corresponds with their connectivity to the SkyTrain network.

Travel times from Lonsdale, Coquitlam, Langley, Maple Ridge and Metrotown to the Metro Core are quicker by car than by transit.

Transit vs. auto travel times to the Metro core (AM Peak)



Data sources:
Travel times: Google Maps (October 2018)
Origin-to-destination trip volumes: RTM 2016 Phase 3.2

Cars are faster than transit for all trips between Urban Centres in the morning peak.

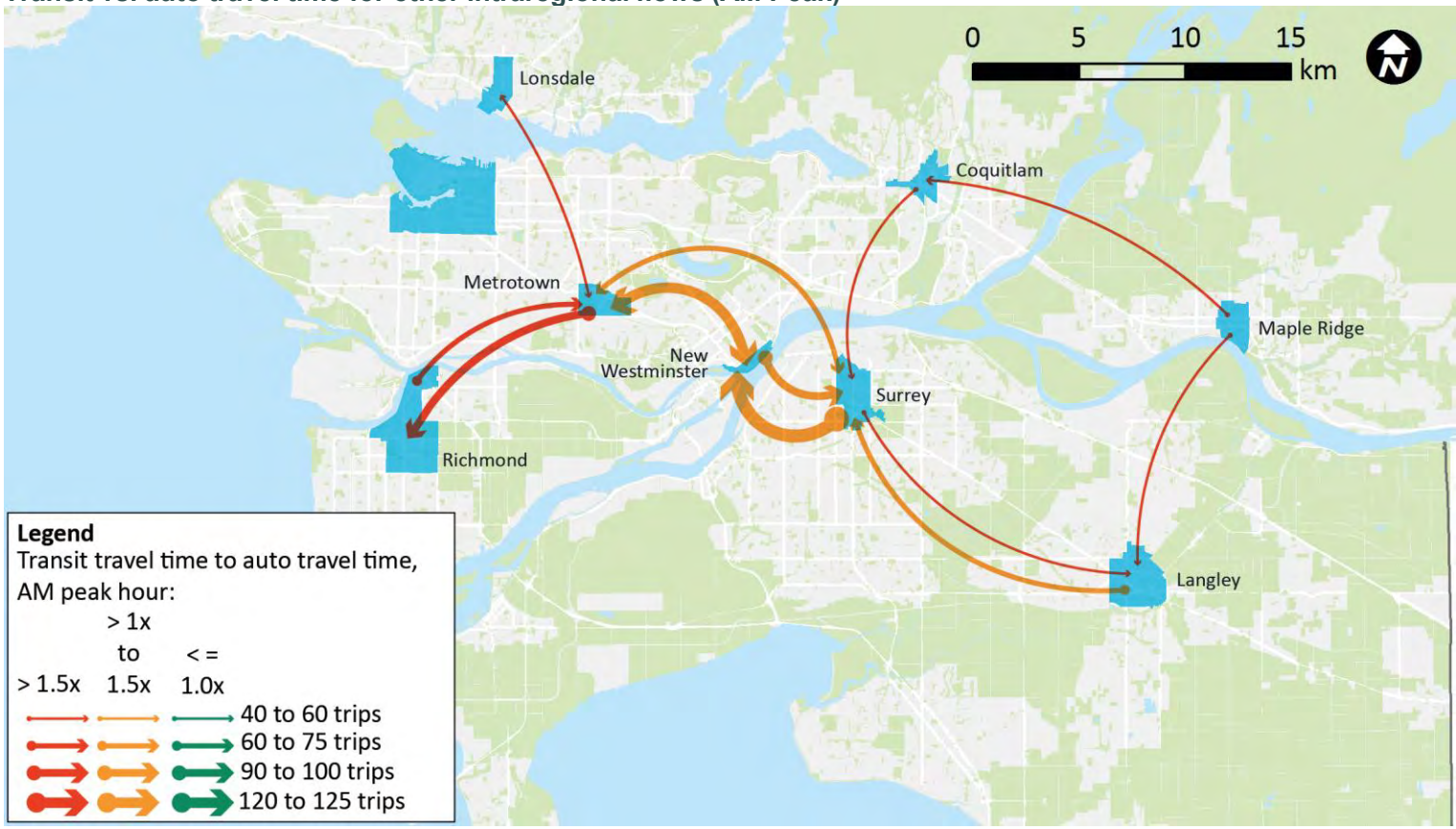
The map shows that trips between representative points inside Urban Centres across Metro Vancouver are generally slower on transit when compared to car in the AM Peak.

For those Urban Centres located on the Expo Line (such as between Metrotown and Surrey), travel time by transit is not much slower than car.

For those Urban Centres that are located either on different rapid transit lines, or do not have access to a rapid transit line, the travel time is significantly slower on transit.

Travel from Metrotown to Richmond, for example, is much slower by transit, despite these two locations having access to the rapid transit network. For this particular trip, the fastest way to travel is to transfer from Canada Line to Expo Line (or vice versa) in Downtown Vancouver.

Transit vs. auto travel time for other intraregional flows (AM Peak)



Data sources:
Travel times: Google Maps (October 2018)
Origin-to-destination trip volumes: RTM 2016 Phase 3.2

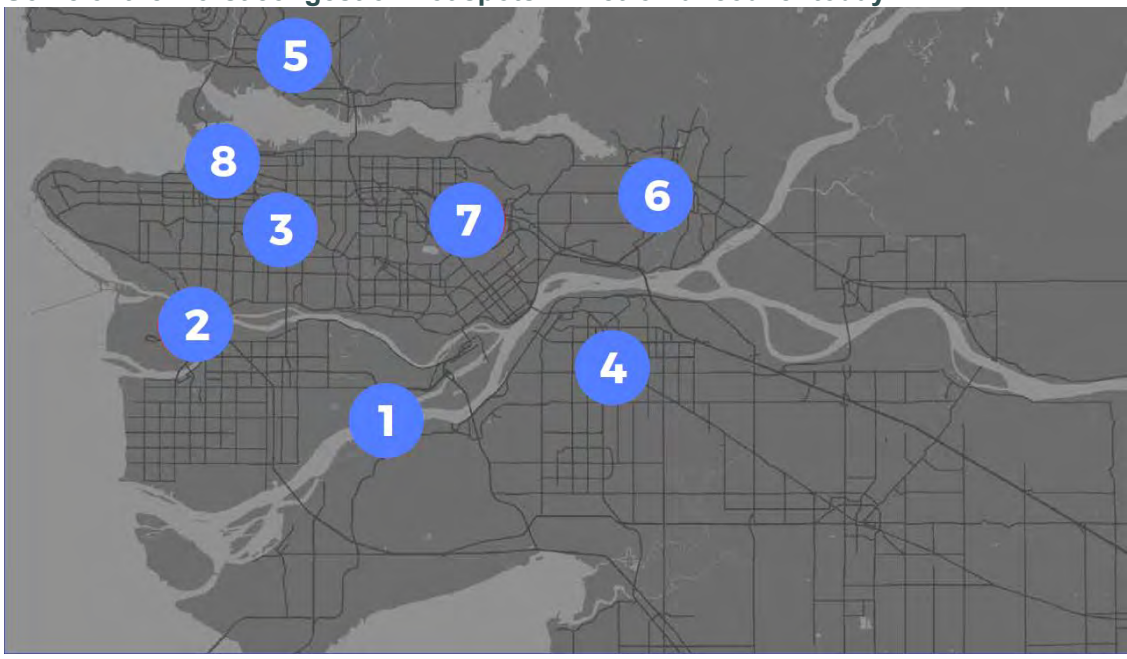
Traffic congestion is experienced across the region.

In simple terms, congestion on the road network occurs when the volume of traffic exceeds the capacity of a road, causing traffic speeds to drop.

The figure here and list below identifies in no particular order, some of the worst congestion 'hot spots' in and around Metro Vancouver. This is neither a definitive nor an exhaustive list and people are likely experiencing other congestion issues that are not included in this list.

1. On and around bridges and tunnels crossing the Fraser River – especially northbound in the morning and southbound in the evening.
2. On and around bridges between Richmond, the airport and Vancouver – bidirectional in the morning and evening.
3. Major arterials in Vancouver and western parts of Burnaby – having a particular impact on busy bus corridors.
4. Travel to, from and around Urban Centres – for example New Westminster, Metrotown, Surrey City Centre and Richmond.
5. Travel to, from and around the North Shore – in every direction.
6. Travel to and from the northeast part of the region – Coquitlam, Port Coquitlam, and Port Moody.
7. Travel on regional highways during peak periods – for example Highway 1 and Highway 91.
8. Travel to, from and around the Metropolitan Core of Downtown Vancouver.

Some of the worst congestion hot spots in Metro Vancouver today



Data sources: Moving around Metro Vancouver: Exploring New Approaches To Reducing Congestion, Mobility Pricing Independent Commission, October 2017. Hotspots generated from TransLink analysis of Google Maps API data (Fall, 2017) and from modelling the region's traffic system.

Travel times are unreliable across the region.

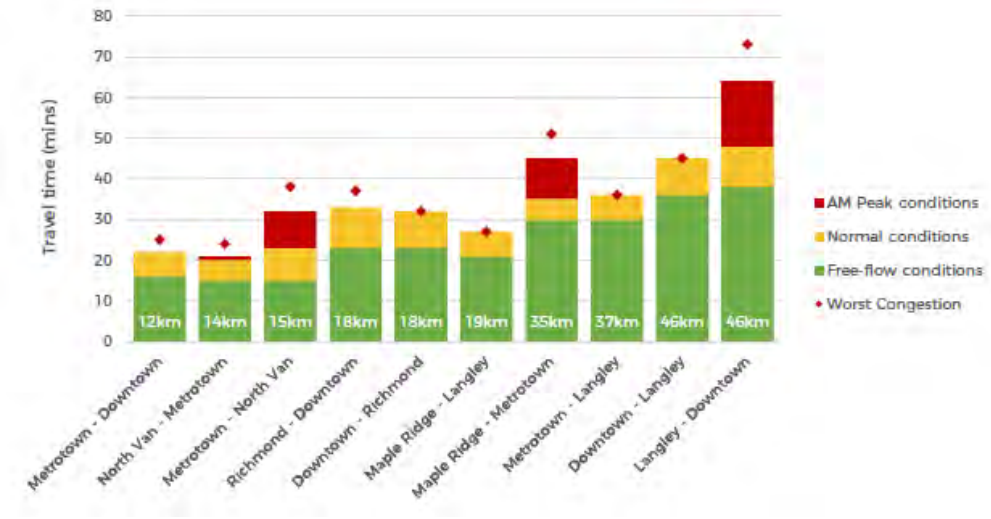
The figures here indicates that travel times between a number of locations around the region, during the AM and PM peaks, can be unreliable.

The bars indicate the difference between “free-flow” travel times (what you might expect to experience in the middle of the night), travel times in “normal” conditions (during the off-peak periods), and during the AM or PM peaks. They also reveal what some of the longest travel times can be as a result of the unpredictability of congestion. The dots in the figures represent the worst travel time that a person commuting daily could expect to experience once every two weeks.

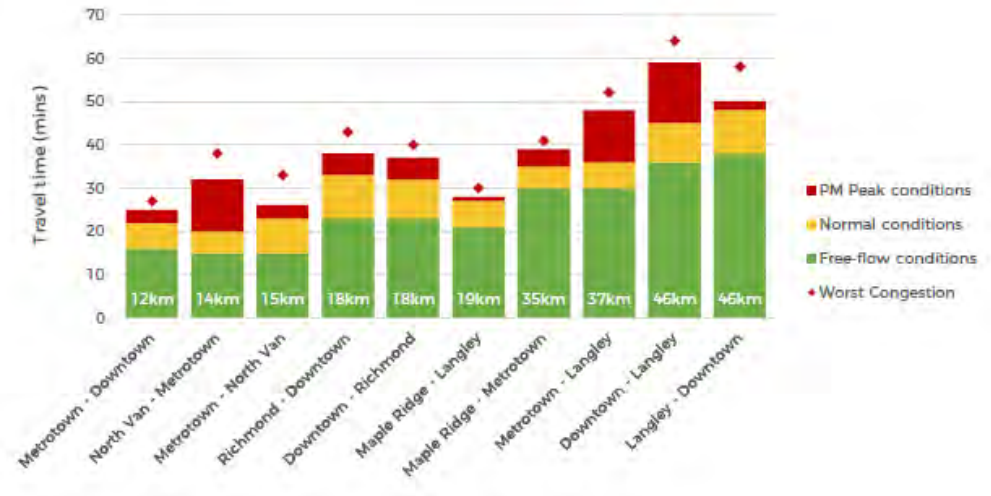
For example, travel from Langley to Downtown Vancouver in the AM peak can take between 49 and 62 minutes or over 70 minutes when congestion is worst.

There comes a point at which the length, and in particular the unreliability of travel times, becomes a major burden to individuals and businesses. Reducing the variance of travel times can have the effect of improving average journey times, with only small reductions in total journey times.

Travel times between key regional origins and destinations during the AM peak



Travel times between key regional origins and destinations during the PM peak



Data sources: TransLink analysis of Google Maps API data (Fall, 2017)

Some traffic congestion happens all day.

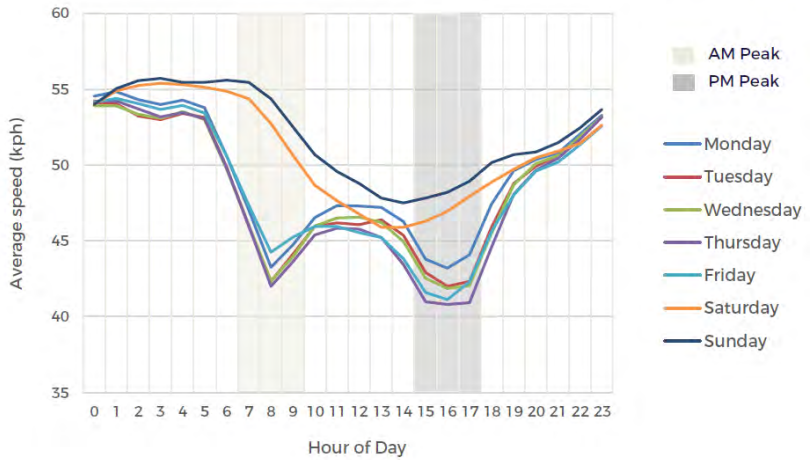
Traffic congestion can vary significantly throughout the day, week, and year. It is normally caused by traffic volumes on a given road link exceeding or approaching their design capacity, but other causes of congestion can include bottleneck or pinch points in the road network, road and other construction projects, crashes or breakdowns, events and weather related issues. When roads become congested, traffic speeds become slower.

While severely slow traffic is generally only limited to the PM peak, and to a lesser extent the AM peak, moderate traffic slow-downs do occur throughout the day.

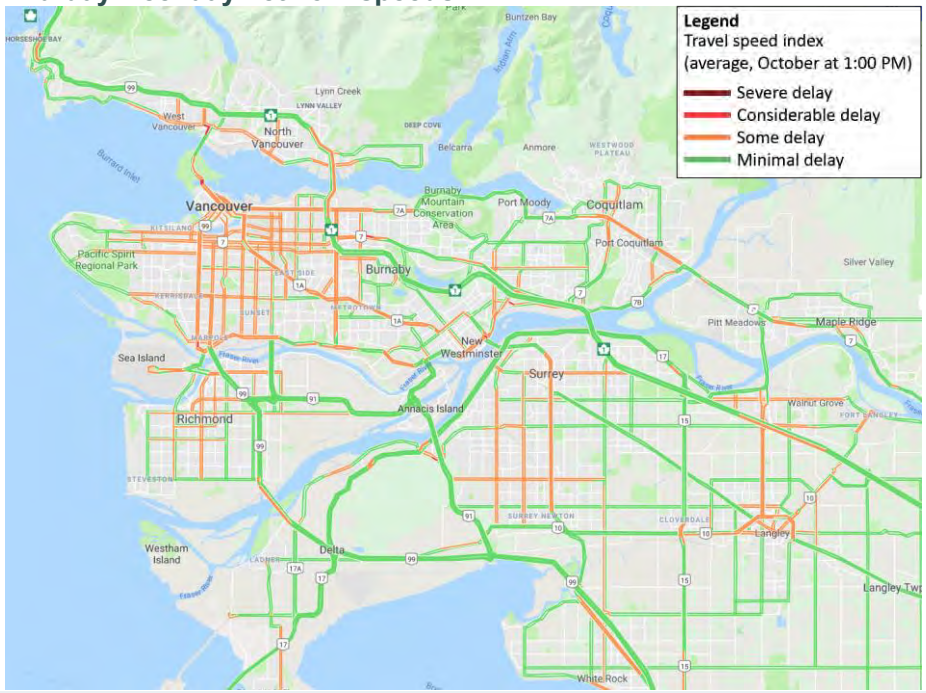
The top right figure indicates the average traffic speeds region-wide. The slowing down of traffic correlates to higher traffic volumes in peak times. We can also see that slower traffic speeds occur on weekends too, typically around 13:00 to 15:00.

The figure on the bottom right shows typical mid-day weekday traffic speeds taken from Google Maps traffic in Fall 2018. This image indicates moderately slow traffic speeds due to congestion on most major arterials.

Network-wide average speeds: mid-September to mid-October, 2017



Mid-day weekday network speeds



Data sources:
Top right: Exploring New Approaches to Reducing Congestion Report, Mobility Pricing Independent Commission, October 2017
Bottom right: Google Maps 2018

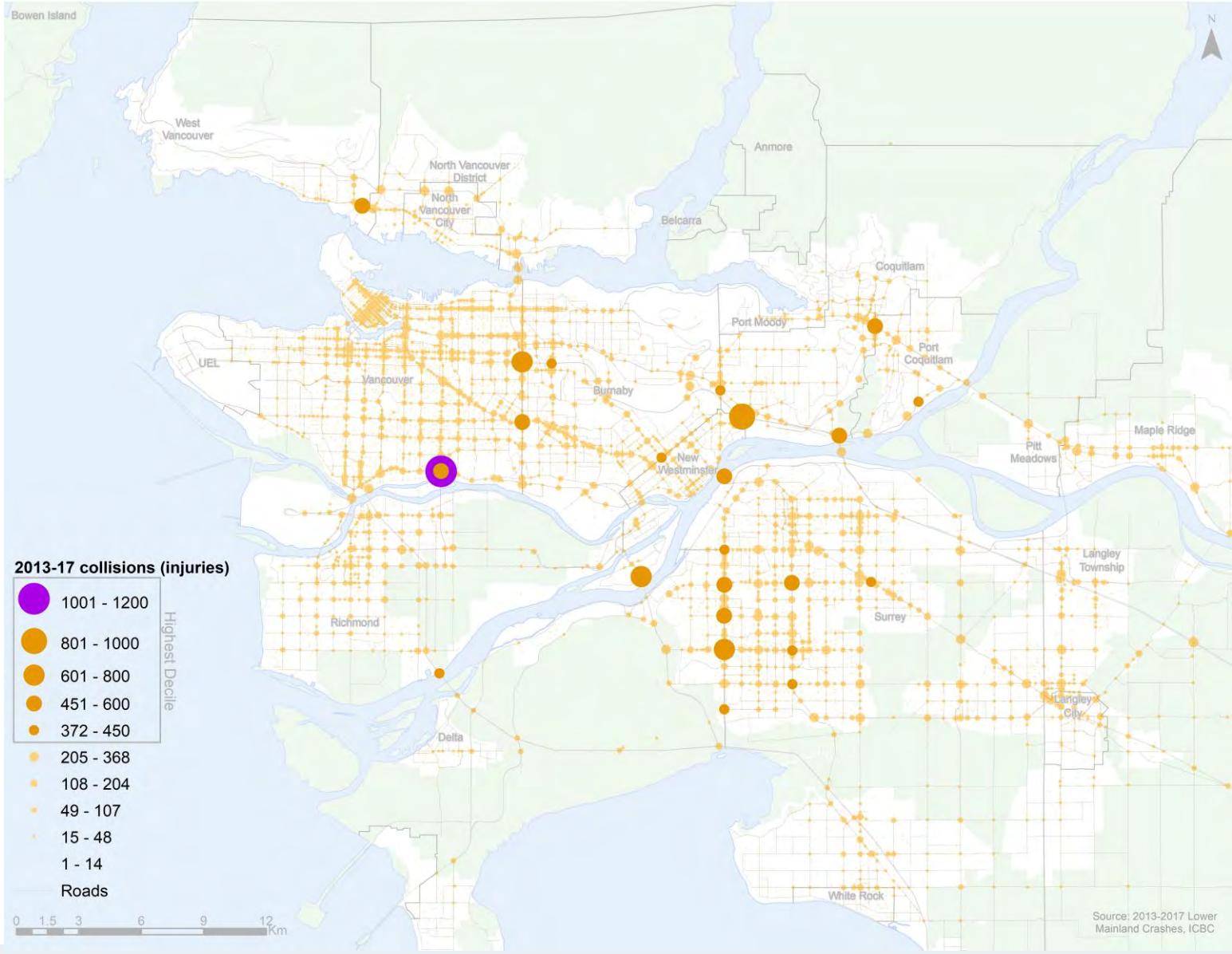
The majority of traffic collisions happen at a few key locations.

From 2013 to 2017, ICBC received some 430,300 collision claims in Metro Vancouver. These collisions happened at 37,250 locations across the region.

Of the total collision, 50% (some 215,150) were around 3% (1,264) of the reported locations. Approximately 10% of collisions (some 43,150) were at just 77 locations.

The intersection of Boundary Road and Grandview Highway reported 1,368 collisions, around 0.3% of the total in Metro Vancouver.

Common collision locations



Private vehicles, not heavy trucks, contribute most to traffic congestion and delays.

Traffic congestion is normally caused by traffic volumes on a given road link exceeding or approaching their design capacity. When roads become congested, traffic speeds become slower. Having a significant truck traffic on a particular road link can contribute to lower traffic speeds.

Trucks are limited to the goods movement road network, which is typically major highways and arterials. As such, those corridors experience higher truck traffic volumes.

The figure on the right shows those road links where significant volumes of trucks are present. Higher truck volumes can be noted on regional highways (like Highway 1 in Burnaby), the South Fraser Perimeter Road in Delta and Surrey, roads in mainly industrial areas close to the Fraser river industrial areas, and roads servicing other goods movements facilities.

Percentage of truck traffic in the AM Peak

Data Source: TransLink Regional Transportation Model (RTM) (2016 Phase 3.2)

3. How we build, live and work

Growth is successfully being focused in Metro Vancouver's Urban Centres.

Metro 2040, the regional growth strategy, identifies Urban Centres[1] as areas for targeted growth. The population within Urban Centres has grown by 124,000 additional residents between 2006 and 2016. The population inside Urban Centres has increased by 2.7% per year. Comparatively, population outside Urban Centres has only grown by 1.3% per year.

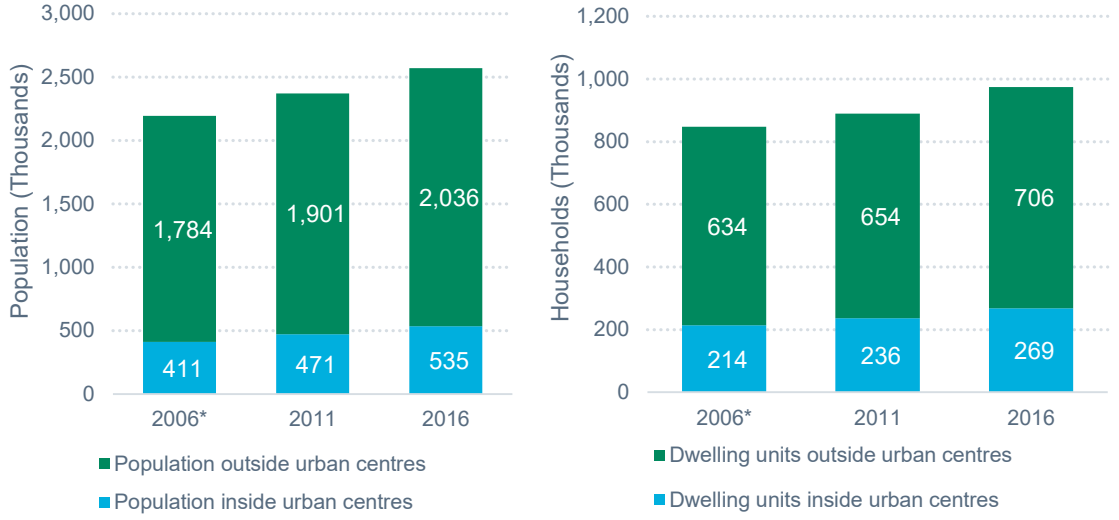
The number of dwelling units within Urban Centres has also grown by 54,700 units between 2006 and 2016. The number of dwelling units within Urban Centres has increased by 2.3% per year. Comparatively, the number of households outside Urban Centres has grown by 1.1% per year.

On track to achieve regional target for dwelling unit growth in Urban Centres

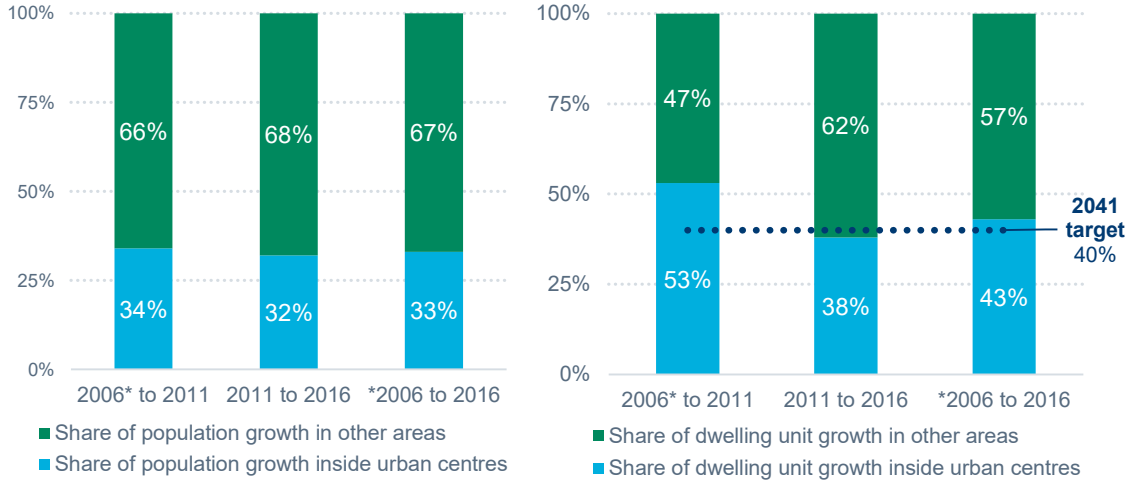
Metro 2040, the regional growth strategy, sets the target of focusing 40% of the dwelling unit growth in Urban Centres by 2041. Metro Vancouver has grown by 126,500 dwelling units between 2006 and 2016, and 43% of the dwelling unit growth was located in Urban Centres. Based on current trends, Metro Vancouver is on track to achieve the regional target of 40% dwelling unit growth in Urban Centres by 2041.

[1] Urban Centres includes Metropolitan Core, Surrey Metro Centre, Regional City Centres and Municipal Town Centres

Population and Dwelling Units inside and outside of Urban Centres



Share of Population and Dwelling Unit Growth within Urban Centres



* 2006 Urban Centres data is based on estimates from 2006 Census block data. The data will be refined as 2006 Census custom geography data becomes available.
Data sources: Metro Vancouver; Statistics Canada

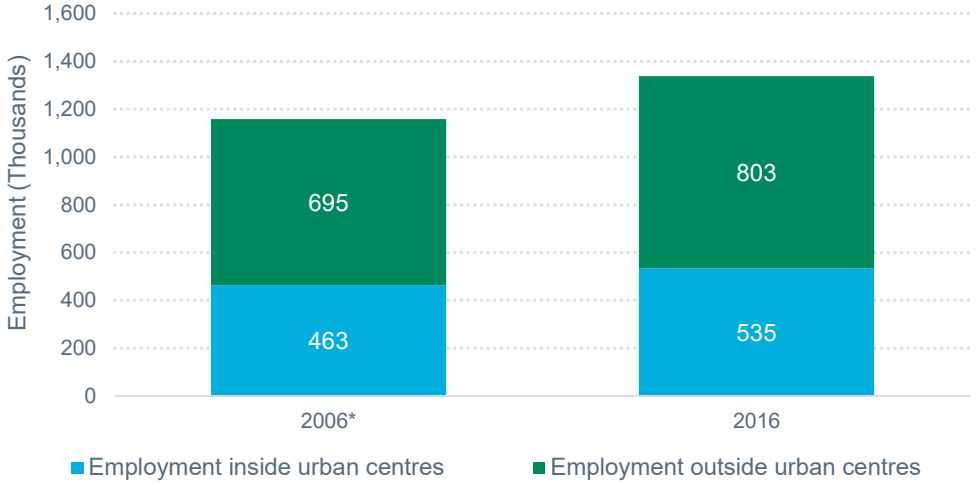
Job growth in Urban Centres remains steady.

The number of jobs in Urban Centres has grown from 463,200 to 535,000 (71,800 additional jobs) between 2006 and 2016. Jobs inside Urban Centres has increased by 1.5% per year.

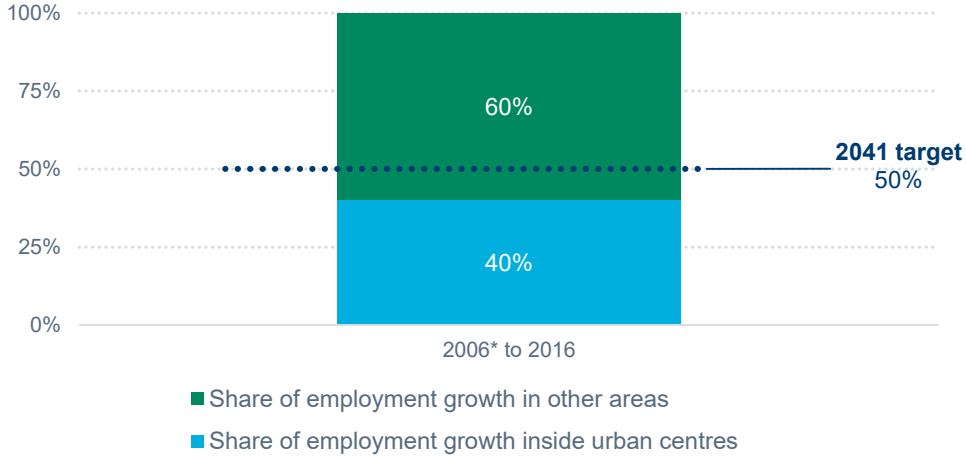
Comparatively, jobs outside Urban Centres are growing at the same rate.

Metro 2040, the regional growth strategy, sets the target of focusing 50% of the job growth in Urban Centres by 2041. Metro Vancouver has grown by 179,500 jobs between 2006 and 2016, and 40% of which have been located in Urban Centres. Based on current data, jobs are growing at the same rate inside and outside of Urban Centres.

Employment inside and outside of Urban Centres



Share of Employment Growth within Urban Centres



[1] Urban Centres includes Metropolitan Core, Surrey Metro Centre, Regional City Centres and Municipal Town Centres

* 2006 Urban Centres data is based on estimates from 2006 Census block data. The data will be refined as 2006 Census custom geography data becomes available.
Data sources: Metro Vancouver; Statistics Canada

There are significant gaps in the regional bikeway network.

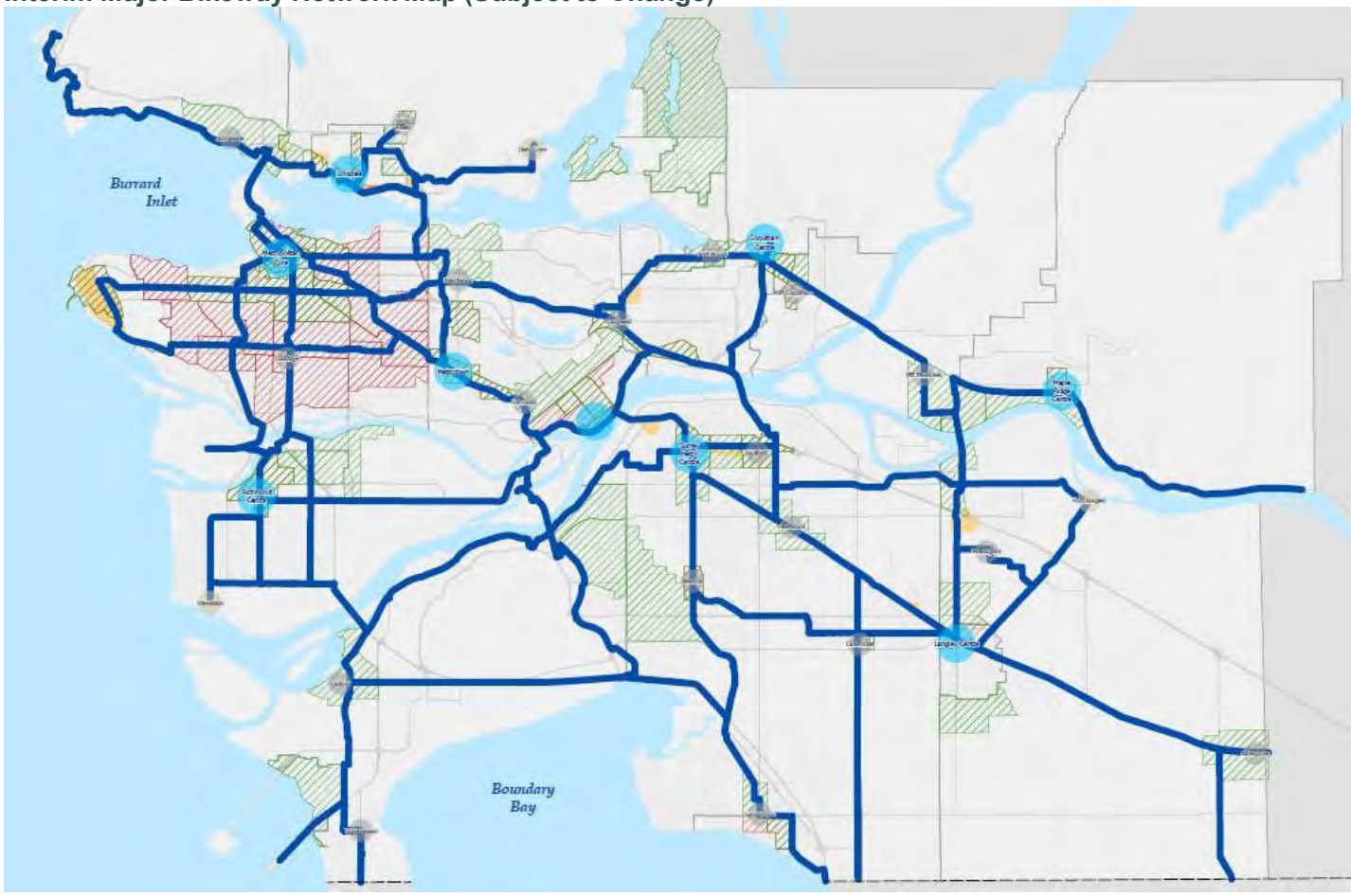
A Major Bikeway Network (MBN) Concept was developed for the 2011 Regional Cycling Strategy. The MBN will connect key regional destinations, including Urban Centres, rapid transit, and transportation gateways (e.g. bridges, regional/international boundaries).

The Mayors' 10-Year Vision expressed support for advancing the MBN and cycling in Urban Centres. Recently, the region has invested in $57.1 million in new funding for municipal cycling infrastructure projects, and $22.1 million in new funding for regional cycling infrastructure, as part of the Phase One and Two Investment Plans to implement the 10-Year Vision and advance the MBN.

In 2018, TransLink conducted preliminary analysis to understand the current state of the 2011 MBN Concept and also worked with local government staff to produce a somewhat expanded Interim MBN.

The map on the right shows the interim MBN.

Interim Major Bikeway Network Map (Subject to Change)



Data source: TransLink, 2018

Less than half of the population has access to 15-minutes or better transit service.

The Frequent Transit Network (FTN) (shown on the map) includes any corridor with a frequency of 15 minutes or better, throughout the day and evening, and includes SkyTrain, SeaBus, B-Lines, and other bus routes that meet this threshold.

Access to the FTN is defined as within:

- 800m of a SkyTrain or SeaBus station; or
- 400m of a B-Line or FTN bus route.

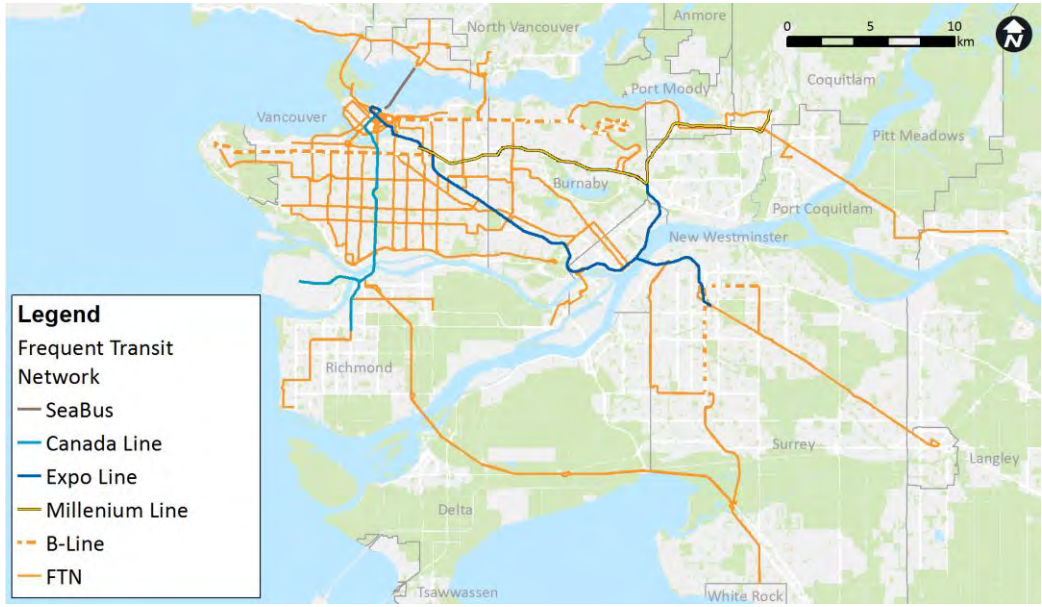
62% of jobs are accessible to the FTN, indicating that the majority of jobs are located in well-served transit areas.

53% of households are accessible to the FTN, while 47% of the population is accessible to the FTN.

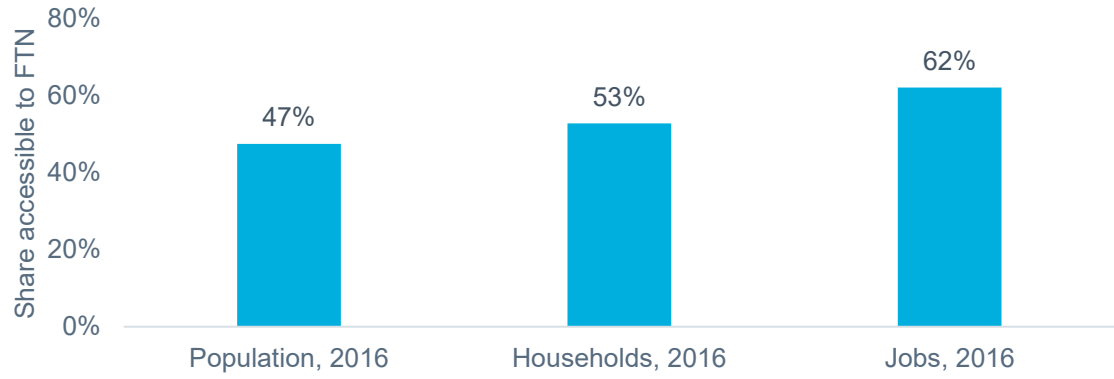
Transit services with FTN services levels occur where surrounding land use and development supports the operation of high frequency services. It therefore supports those who live in denser areas. This aligns with the vision of Metro 2040 which targets growth and development in transit rich areas, primarily served by the FTN.

Those who live in less dense areas are by their nature unable to generate enough transit demand to support FTN services and therefore have lower transit service levels.

The Frequent Transit Network (FTN)



Share of population, households, and jobs to FTN



Data sources:
Top: TransLink FTN November 2018
Bottom: Metro Vancouver (2016 TAZ-Level)

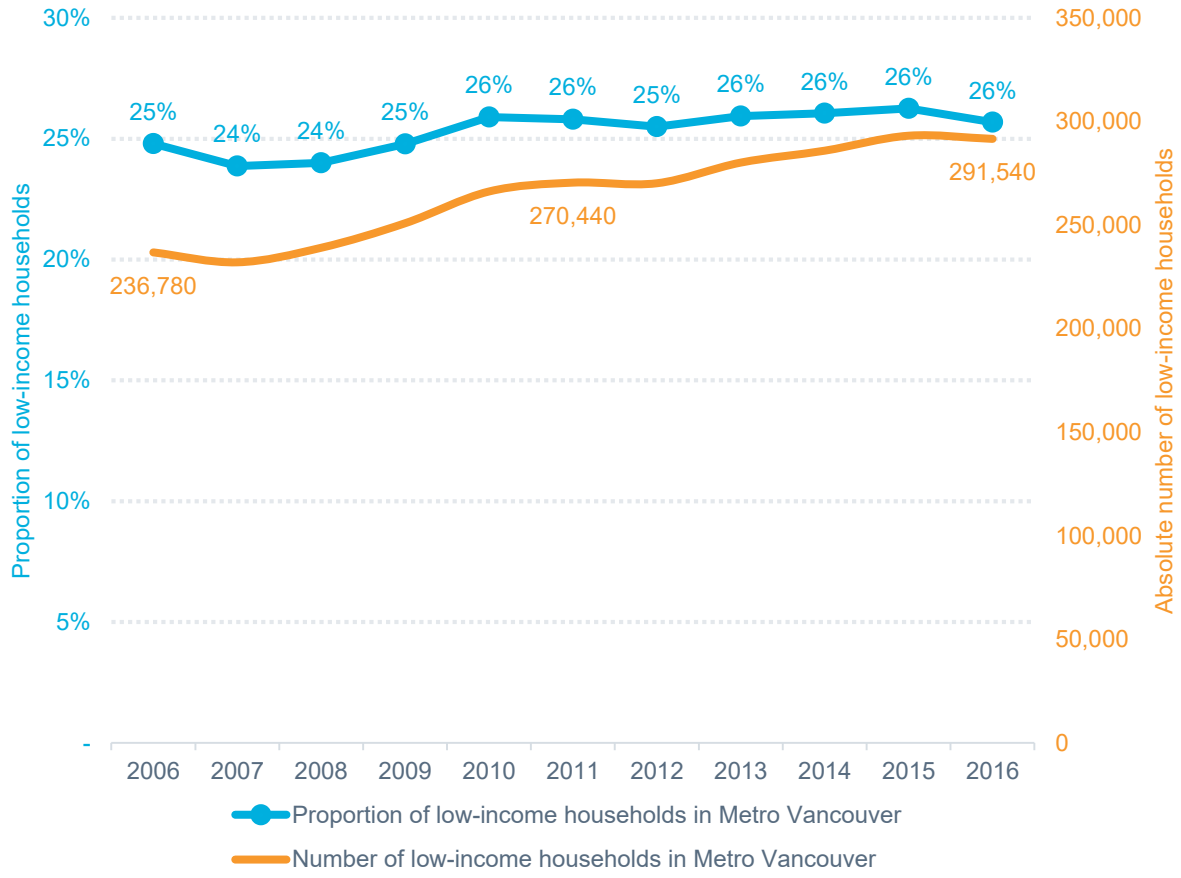
The number of low income households is growing, but remains steady in proportion to all households.

Between 2006 and 2016, the number of low income[1] households[2] in Metro Vancouver increased by 55,000, from 237,000 in 2006 to 292,000 in 2016. This is a 1.9% compound annual growth rate.

The proportion of low income households as a percentage of all households has also increased, from 24.8% in 2006 to 25.7% in 2016.

Although the number and percentage of low income households may be increasing slowly, the fact that they are still increasing illustrates that attention and support is needed to improve affordability.

Number and proportion of low-income households (2006 to 2016)



Data sources: Statistics Canada. Table 11-10-0020-01 After-tax low income status of census families based on Census Family Low Income Measure (CFLIM-AT), by family type and family composition & Table 11-10-0017-01 Census families by family type and family composition including before and after-tax median income of the family

[1] Low income households are defined as per the Statistics Canada definition, known as the "after-tax low income status of tax filers and dependents based on Census Family Low Income Measure" (CFLIM-AT). This indicator is defined as households whose adjusted income is less than half of the median income, but is also dependent on household size. Note that Metro Vancouver uses a similar but more simplified methodology to determine low-income status, therefore comparisons with Metro Vancouver reports may not be possible.

[2] Households for this analysis are defined as family units within a Census family (couples, couples with at least one child, and single parents with at least one child) and persons not in a census family (a single person household).

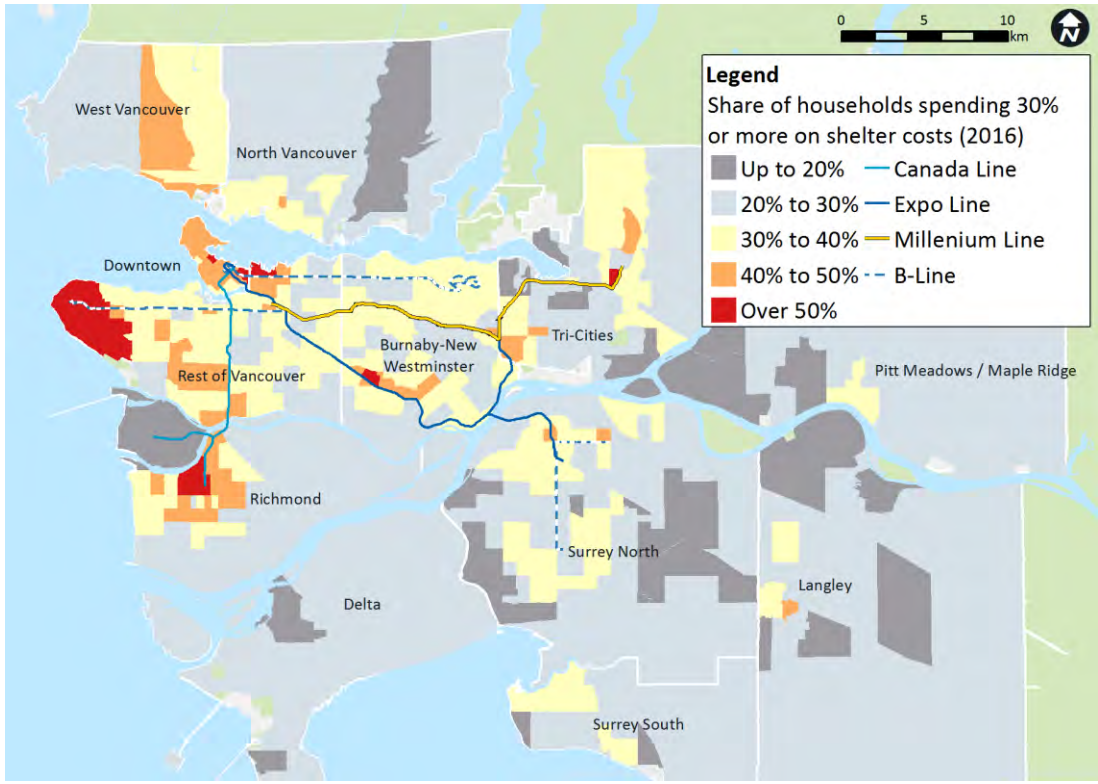
Housing affordability is a region-wide issue.

Households with housing affordability issues can be found throughout the region. Region-wide, 34% of households spent more than 30% of their before-tax income on shelter costs[1] in 2016. Housing cost issues are more prevalent in the region compared to the province: Half (50%) of all households in BC are in Metro Vancouver, but almost 2 in 3 (60%) households with housing affordability issues are in Metro Vancouver.

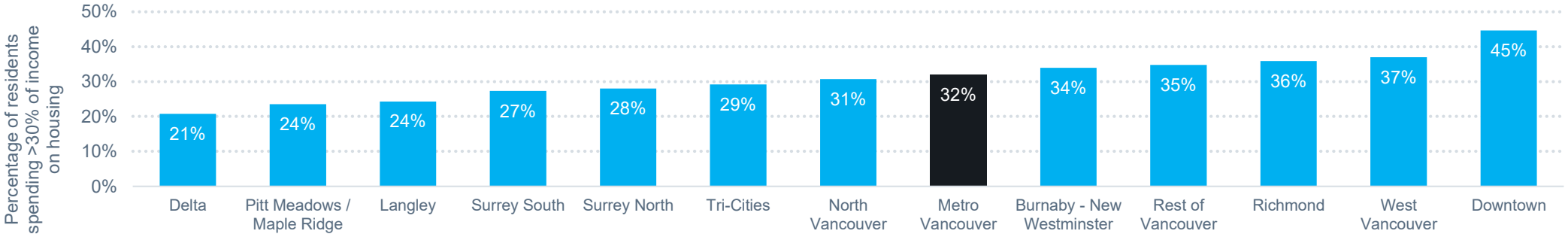
There are regional variations: 45% of households in Downtown Vancouver have affordability issues, compared to just 21% in Delta.

[1] This definition of unaffordability in terms of shelter costs is used by Statistics Canada and is based on the threshold defined by the Canadian Mortgage and Housing Corporation (CMHC).

Housing affordability in the Metro Vancouver region



Percentage of Residences Spending >30% of income on housing

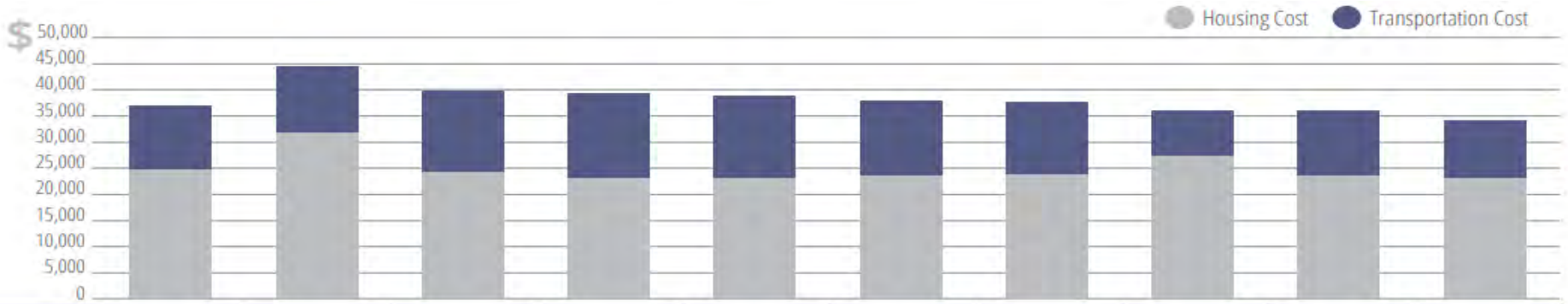


Data source: Top and Bottom: Statistics Canada, Census 2016

Affordability depends on location and transportation.

Housing and transportation costs are closely linked and represent the two largest expenditures for many working households. Region-wide, owners with mortgages spent 40% of their pre-tax income on housing and transportation costs. The chart below shows the housing and transportation costs for owners with mortgages in different sub regions.

Combined Housing and Transportation Cost Burden : Working Owner Households with Mortgages



	METRO VANCOUVER	NORTH SHORE	DELTA	LANGLEY CITY AND TOWNSHIP	PITT MEADOWS/ MAPLE RIDGE	SURREY/ WHITE ROCK	NORTHEAST SECTOR	VANCOUVER/ UEL	RICHMOND	BURNABY/ NEW WESTMINSTER
HOUSING COSTS*	$24,744	$31,500	$24,192	$23,088	$22,956	$23,292	$23,856	$27,228	$23,232	$23,016
TRANSPORTATION COSTS**	$12,301	$13,036	$15,769	$16,345	$15,974	$14,685	$13,827	$8,989	$12,823	$11,133
H+T COSTS	$37,045	$44,536	$39,961	$39,433	$38,930	$37,977	$37,683	$36,217	$36,055	$34,149
SUBREGIONAL MEDIAN INCOME	$92,281	$113,793	$104,435	$93,281	$93,585	$89,902	$95,660	$92,452	$80,460	$84,925
H+T AS % OF SUBREGIONAL MEDIAN INCOME	40%	39%	38%	42%	42%	42%	39%	39%	45%	40%

*Housing costs represent average payments for all homes owned by working households with mortgages.

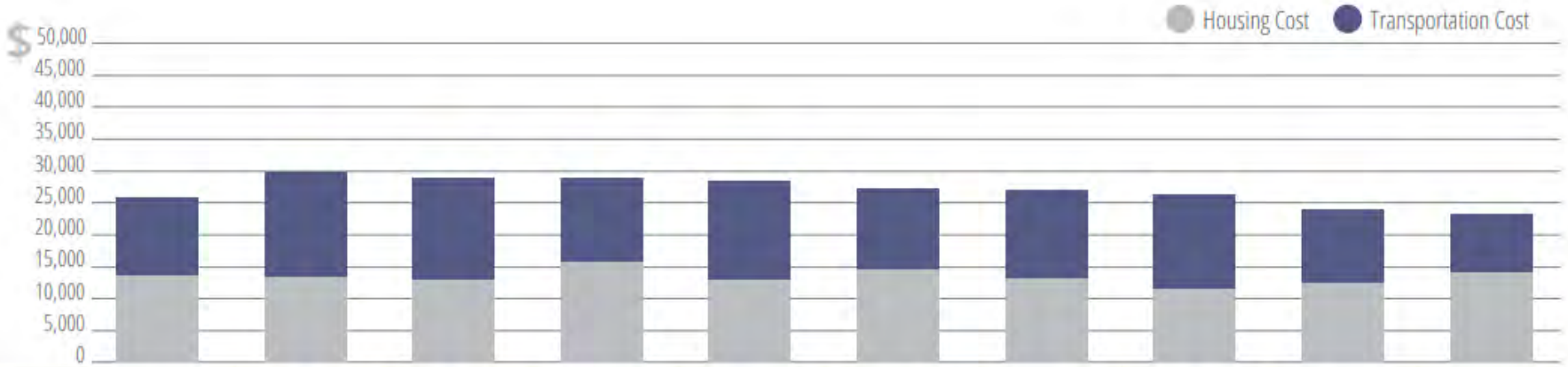
**Transportation cost estimates are representative for working households, regardless of tenure.

Data source: All of the above information has been sourced from The Metro Vancouver Housing and Transportation Cost Burden Study, Phase 1, 2017

Affordability depends on location and transportation (continued).

Region-wide, working renter households spent 49% of their pre-tax income on housing and transportation costs. The chart below shows the housing and transportation costs associated with working renter households in different sub regions.

Combined Housing and Transportation Cost Burden : Working Renter Households



	METRO VANCOUVER	LANGLEY CITY AND TOWNSHIP	PITT MEADOWS/ MAPLE RIDGE	NORTH SHORE	DELTA	RICHMOND	NORTHEAST SECTOR	SURREY/ WHITE ROCK	BURNABY/ NEW WESTMINSTER	VANCOUVER/ UEL
HOUSING COSTS	$13,440	$13,344	$12,912	$15,684	$12,804	$14,604	$13,236	$11,352	$12,516	$14,004
TRANSPORTATION COSTS*	$12,301	$16,345	$15,974	$13,036	$15,769	$12,823	$13,827	$14,685	$11,133	$8,989
H+T COSTS	$25,741	$29,689	$28,886	$28,720	$28,573	$27,427	$27,063	$26,037	$23,649	$22,993
SUBREGIONAL MEDIAN INCOME	$52,153	$55,549	$54,974	$57,178	$57,247	$54,377	$52,000	$52,149	$49,989	$51,405
H+T AS % OF SUBREGIONAL MEDIAN INCOME	49%	53%	53%	50%	50%	50%	52%	50%	47%	45%

*Transportation cost estimates are representative for working households, regardless of tenure.

Data source: All of the above information has been sourced from The Metro Vancouver Housing and Transportation Cost Burden Study, Phase 1, 2017

Affordability depends on location and transportation (continued).

The Metro Vancouver Housing and Transportation Cost Burden Study suggests that the total housing and transportation cost burden does not vary across sub regions as much as might be expected. Key findings were:

- Although ownership and rental costs in Vancouver/UEL are the second and third highest in the region, respectively, and higher than the regional average, its annual transportation costs are nearly $3,000 below the regional average of $12,301. Therefore the combined housing and transportation costs in Vancouver is below the respective regional average for owners and renters.
- While households living in the eastern or southern parts of the region with fewer transit options may have lower housing costs, the final cost burden is pulled up by higher transportation costs.
- Working households in the eastern parts of the region and south of the Fraser – Pitt Meadows/Maple Ridge, Delta, Surrey/White Rock, and Langley City and Township – face some of the highest combined costs on an absolute basis and relative to median income.

In terms of planning transportation to assist with the cost of living the report highlights that:

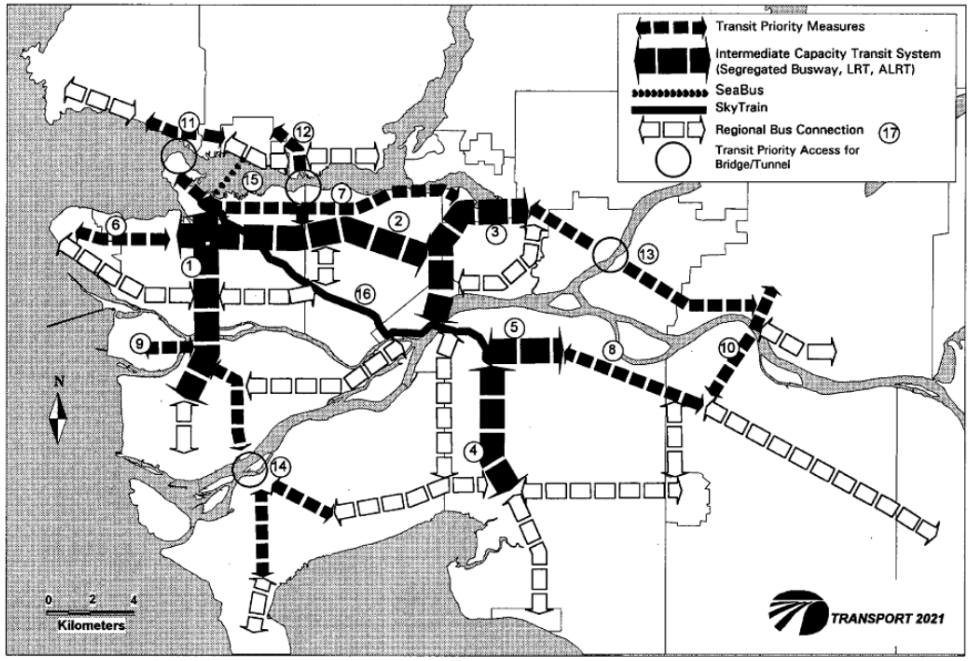
- Access to the Frequent Transit Network helps working households absorb high housing costs. Each new transit-oriented location provides the opportunity to make the transit and affordable housing connection.
- The challenge is to share the benefits of transit-oriented living with low and moderate income households. These households, especially renters, depend on transit to get to work and school.

Data source: All of the above information has been sourced from The Metro Vancouver Housing and Transportation Cost Burden Study, Phase 1, 2017

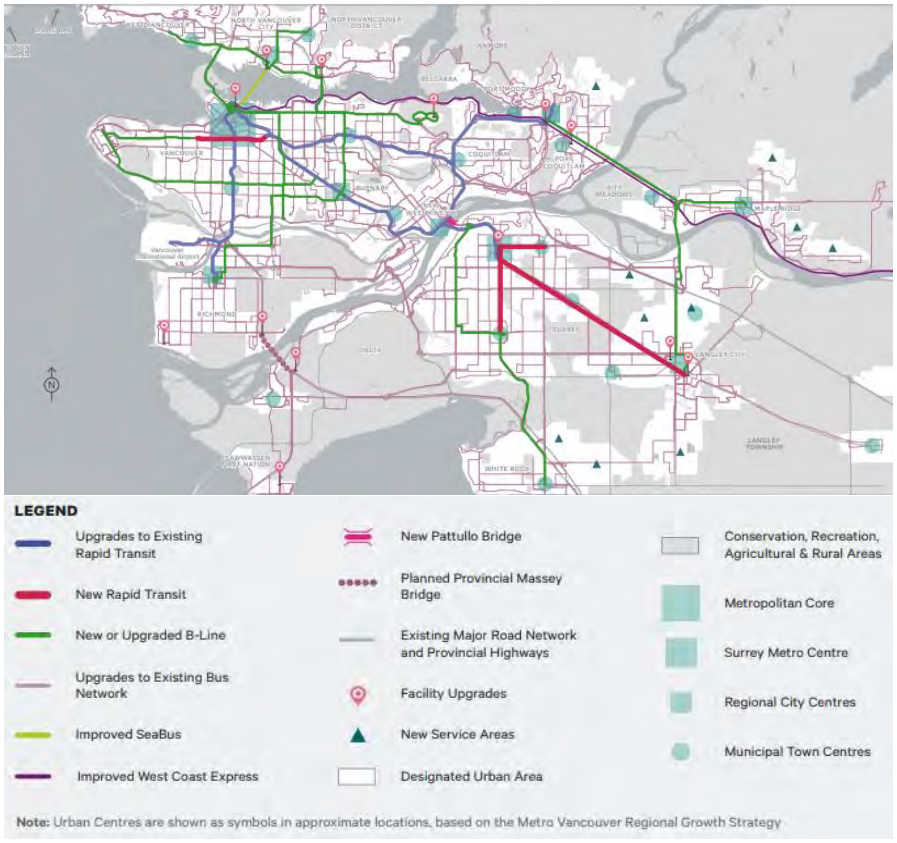
4. How we plan and invest

Though much progress has been made, some key policies and investments committed to in previous plans have not yet been implemented.

Transport 2021, Transit Vision (1993)



Mayors' Vision Transit Vision (2014)



In 1993, Metro Vancouver's first long-range regional transportation plan, Transport 2021, envisioned new corridors connected by fast and reliable rapid transit, restrictions on urban sprawl, and less reliance on the private car. This vision was to be accomplished by investing in infrastructure, managing transportation demand, and developing partnerships between agencies. However, critical demand management policies, such as pricing the road network, have not yet been implemented.

Both Transport 2021 and the Mayor's Vision (2014) supported investments in new rapid transit. These investments have been progressed, in addition to other improvements such as B-Lines, with the exception of the proposed Surrey Newton Guilford LRT, which was suspended in November 2018 following a resolution passed by the Mayors' Council. A revised South of Fraser Rapid Transit Strategy will be initiated in response.

Managing the transportation system is complex, involving multiple agencies.

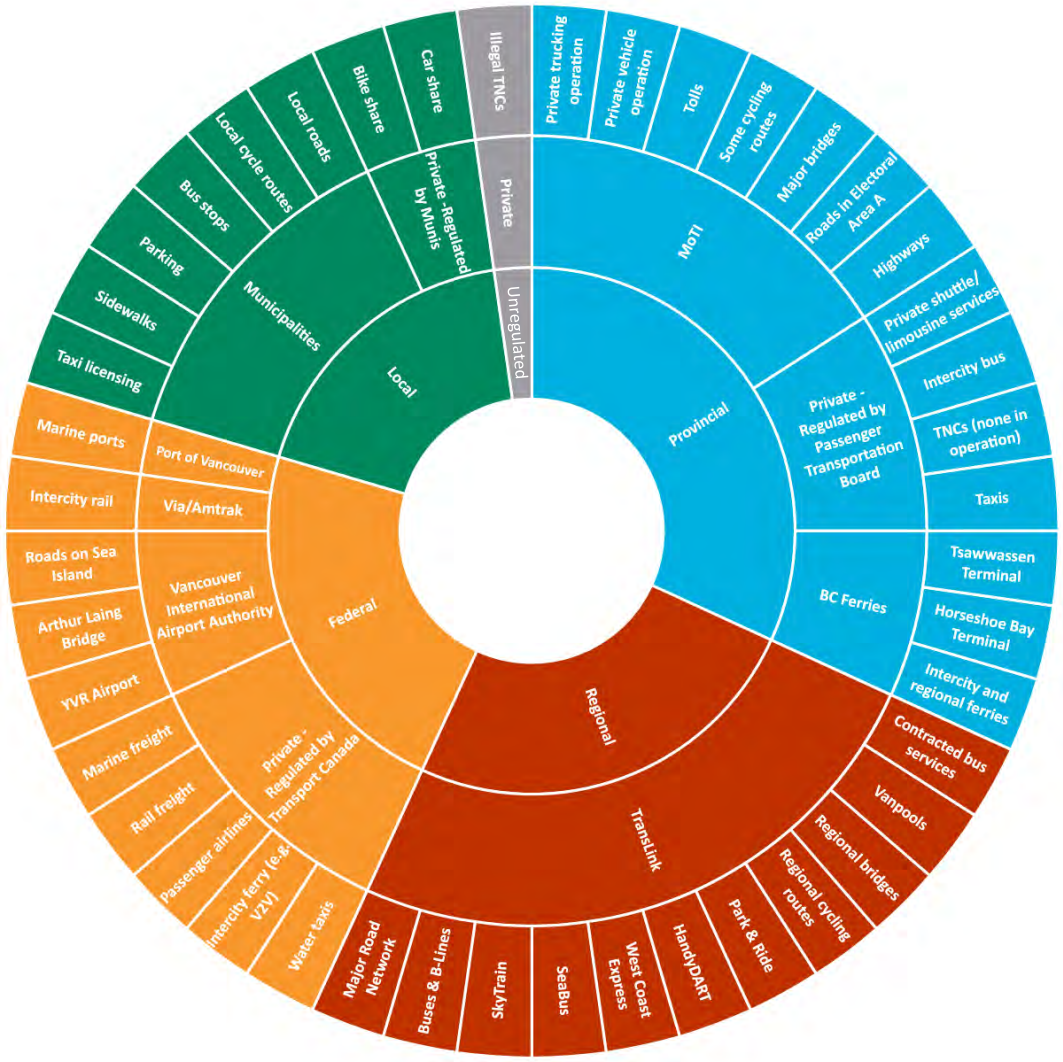
Transportation in Metro Vancouver is operated, governed, and influenced by multiple political and non-political agencies representing both the public and private sectors. With few exceptions, the transportation of all goods and passengers is regulated by some form of government policy. The diagram illustrates which aspects of the transport system are regulated by each of the three main levels of government: Federal, Provincial, and local.

At the regional level, Metro Vancouver benefits from having a regional transportation authority (TransLink). However, TransLink has little ability to control or influence services not currently under their mandate, i.e. new mobility technologies and services. TransLink must also react to political motivations which can cause the cancellation or suspension of major transport investment projects it is promoting or the construction and management of projects it had not intended to build.

As new and unanticipated transportation technologies and services have emerged, government policy has not always been able to keep pace, resulting in some aspects of the transportation network being unregulated, like illegal Transportation Network Companies (TNCs) (i.e. ride hailing).

The private sector, including companies like Uber, have already indicated their interest in owning and operating coordinated mobility services. This will require new forms of legislation, integration, and management to achieve regional goals.

Regional governance of transportation



There is no single coordinating authority for major projects throughout the region.

LIST OF PLANNED MAJOR PROJECTS

TRANSLINK

1. New B-Lines for 2020
2. Proposed Phase Two B-Lines

PROVINCE OF BRITISH COLUMBIA

3. Lower Lynn Improvements
4. Patullo Bridge Replacement
5. Alex Fraser Bridge Improvements
6. Massey Tunnel Replacement
7. Millenium Broadway Extension
8. Highway 1 and 216th Interchange

PORT OF VANCOUVER

9. Centerm Expansion Project
10. Roberts Bank Terminal 2

Greater Vancouver 2030 Projects receiving Federal Funding in 2018

11. Burrard Inlet Road and Rail Improvement Projects
12. North Shore Corridor Capacity Improvement Projects
13. Westwood Street and Kingsway Avenue Grade-Separations Project
14. Pitt River Road and Colony Farm Road Rail Overpasses Project
15. Harris Road Underpass and Kennedy Road Overpass Project

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE (MOTI)

16. Mountain Highway Underpass Project

YVR / TRANSPORT CANADA

17. YVR International Terminal Expansion

CITY OF RICHMOND

18. River Parkway Extension

CITY OF VANCOUVER

19. Georgia and Dunsmuir Viaduct Removal

- SKYTRAIN
- SEABUS
- WEST COAST EXPRESS
- RAILWAY LINES
- EXISTING B-LINES

More attention is needed to effectively regulate new technologies and services.

New services, new technologies, and business models in mobility are constantly evolving and by their nature are unpredictable. This makes it very difficult for transit agencies to prepare and be ready for their arrival.

British Columbia is currently behind the trend as established technologies and services such as Uber and Lyft are currently not available. A legislative committee is studying updates to the Passenger Transportation Board (which regulates ground passenger transportation in the province) legislation to allow their operation.

Current Projects

TransLink has been proactively planning and seek to harness the world of new mobility technologies and services in support of regional objectives to dramatically reduce distances driven, offer the ability for less dependence on private autos, and dramatically increase the number of trips made by active and shared-use modes.

For example in spring 2018, TransLink launched an Open Innovation Call to look for ideas to improve mobility in the region.

TransLink is undertaking pilot projects on artificial Intelligence bus prediction, electric battery buses, on-demand micro transit, dockless bike-sharing, and a Future of Driving project to set out policy directions for autonomous vehicles and new mobility services in Metro Vancouver.

Being Prepared

Before the region is ready for new technologies and services, it will need to:

- Gain experience and learn lessons from operating new mobility services;
- Study where new mobility services should go and progress more pilot projects;
- Review existing service contracts and the ability to change or replace existing services to make way for new mobility options;
- Review the adequacy of procurement processes;
- Review changes in legal requirements, e.g. insurance, human resources, data protection, new forms of legislation; and
- Review governance structures, e.g. when, how and who should regulate new mobility models.

Source: TransLink, 2018

TransLink's future funding needs may not be met with current revenue sources.

The bar chart shows TransLink revenue's (excluding 'other income') have been steadily growing. The Compound Annual Growth Rate (CAGR) is 4.5% from 2007 to 2017.

For Phase One and Two of the 10-Year Vision, the Federal government contributed $2.37 billion and the Provincial government contributed $2.75 billion in new capital funding, and the region has also enacted new regional funding sources.

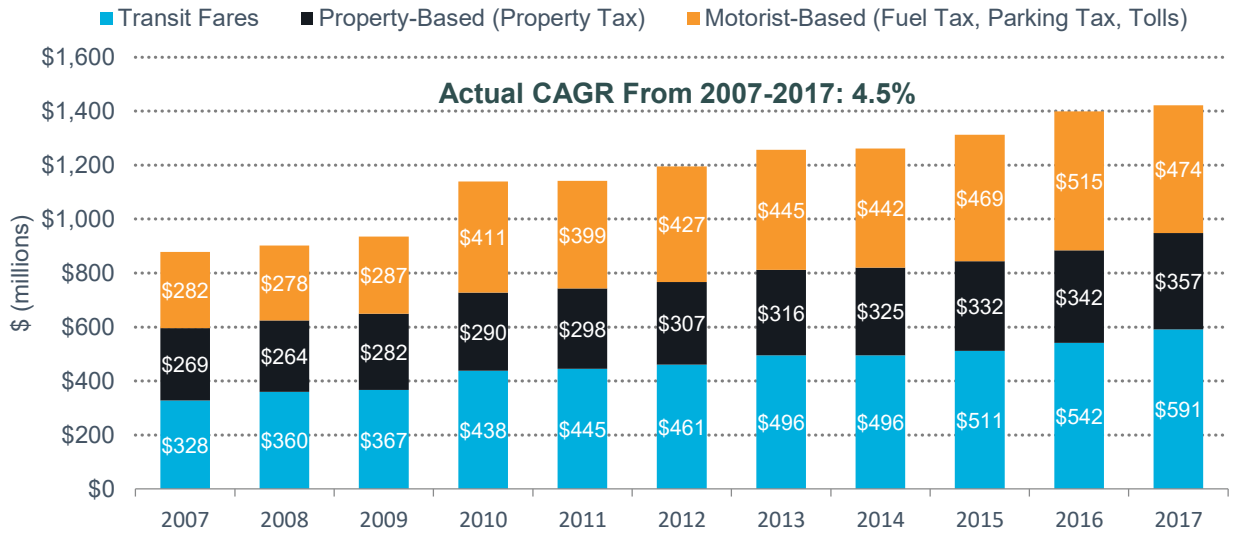
However, as shown in the lower graph, projections made in the Regional Transportation Funding Strategy suggest funding needs are likely to grow by 5-6% due to inflation, population growth and mode shift, leaving a 0.5-1.5% gap, every year.

As ridership grows, there will be a need for further funding to increase services and expand the transit network.

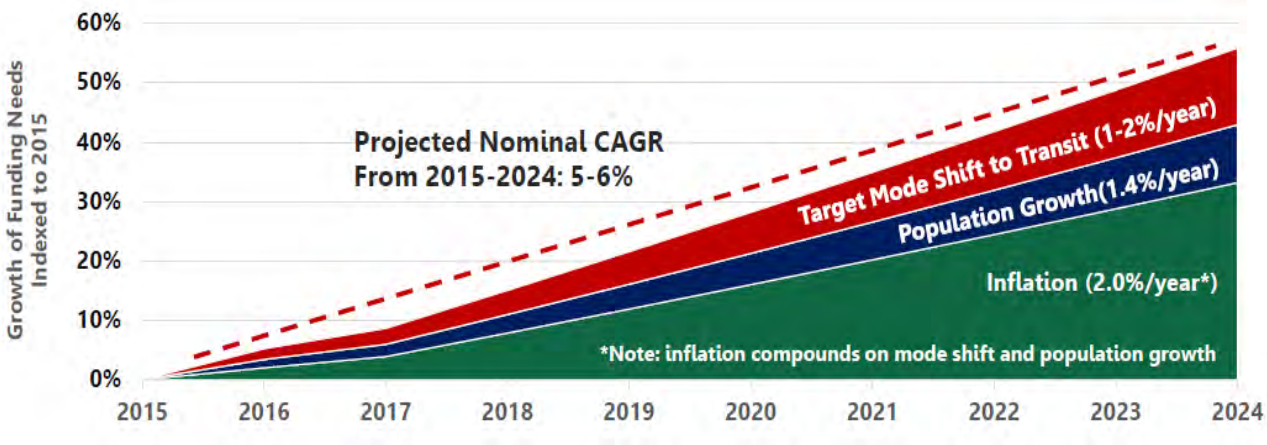
TransLink's revenue sources contribute to some of the funding required to deliver improvement projects on the network but are insufficient in themselves to support major investment and new infrastructure. New funding will be needed to support a growing population.

Data source:
Top right: TransLink Revenue Data 2018
Bottom right: Regional Transportation Funding Strategy – Status Update for Municipalities, November 20, 2015.

Total revenues (excluding other income)



Growth in operating and capital funding needs for Metro Vancouver



TransLink's gas tax revenues are unpredictable.

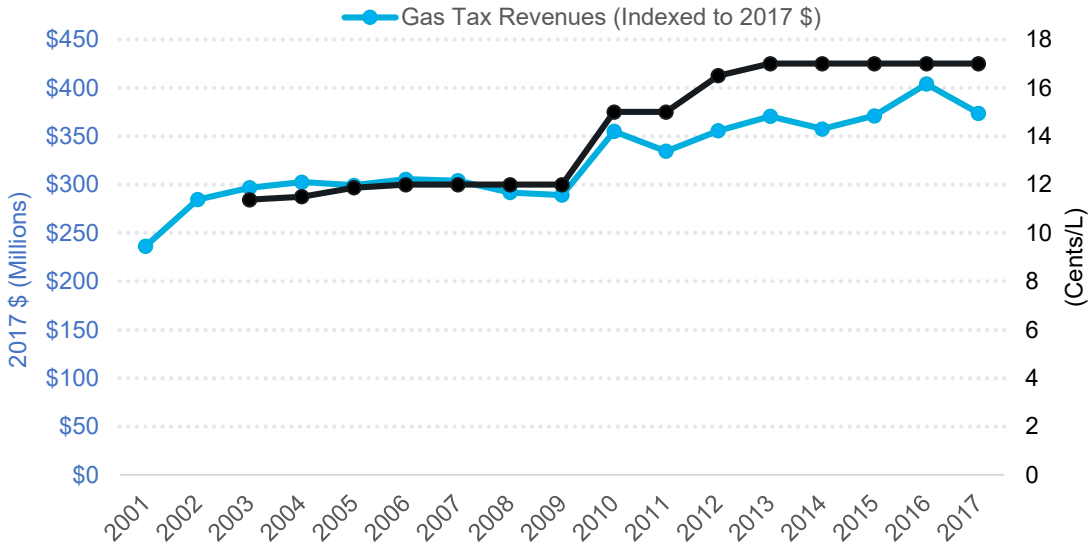
Regional gas tax (currently fixed at 17 cents per litre) was, for 2017, TransLink's second largest revenue source after transit fares.

As shown in the charts, gas tax revenues have been increasing. There is a correlation between gas tax revenues increasing as the gas tax rate has gone up. The rate of growth has been fluctuating (particularly since 2009 -2017). The amount of gas tax revenue year-to-year is difficult to estimate and plan for. Most recently, between 2016 and 2017 TransLink's gas tax revenue declined by $21.9 million

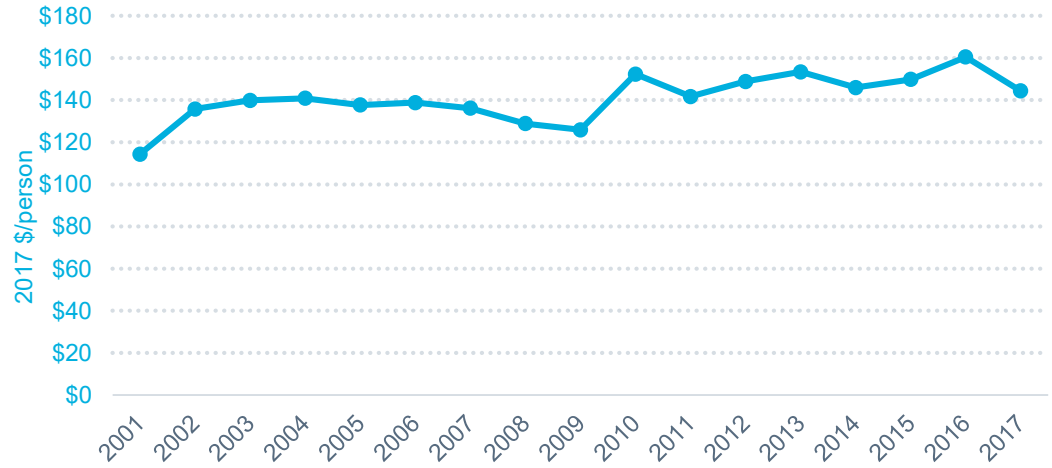
This is partly due to fuel sales being influenced by numerous factors, including automobile travel demand, exchange rates, and the global price of oil.

In the longer term, as vehicles become more fuel efficient and electric cars become more commonplace, this may continue. Other factors which could influence a decline in fuel tax revenue are decreased automobile travel demand, cost of fuel, and investments in alternative transportation choices.

Regional gas tax revenues



Regional gas tax revenues per person



Data source: TransLink Annual Fuel Tax Volumes and Rates, 2018

Property tax revenue is increasing, but is not keeping pace with population and housing growth.

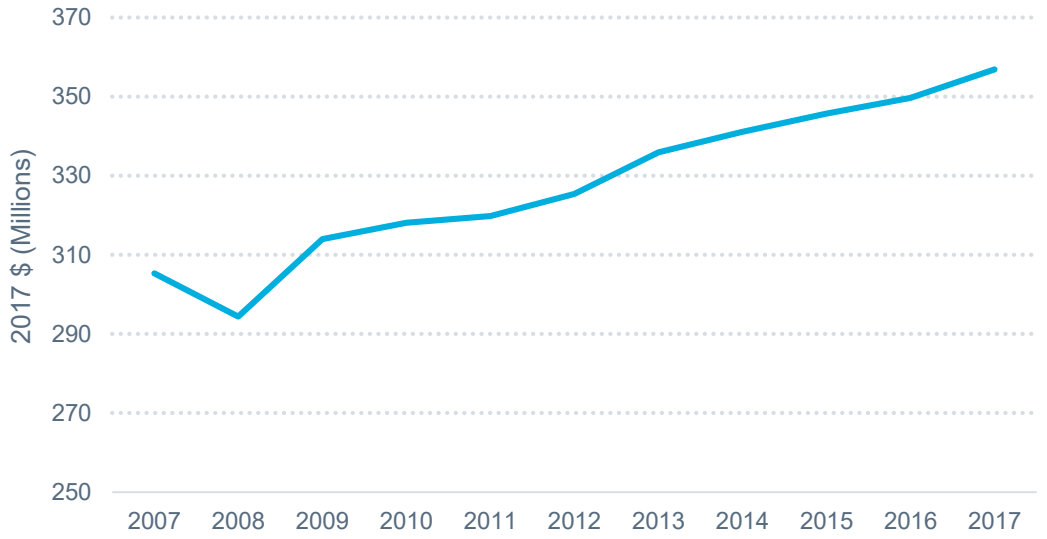
As shown on the top graph, between 2007 and 2017, TransLink's property tax revenue steadily grew. In 2017, property tax was TransLink's third largest revenue source.

However, as the bottom line graphs show, on a per dwelling basis, property taxes collected have been declined at a Compound Annual Growth Rate (CAGR) of -0.27% between 2007 and 2017 (using consistent dollars).

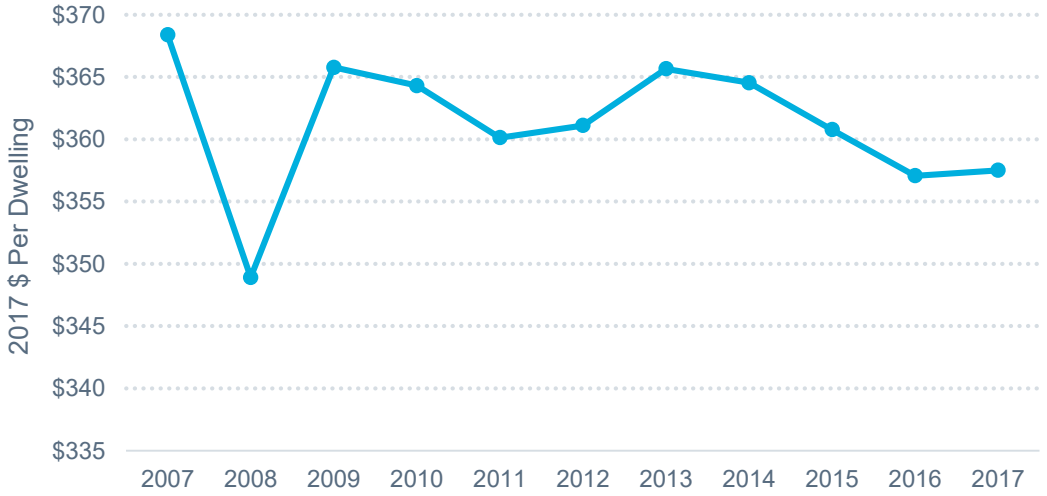
Thus, property tax revenue is increasing, but not quite keeping pace with growth in dwellings.

Further, while population has been growing by around 1% per year between 2007 and 2017, property tax collected per person has been somewhat variable, and overall has not grown (~0% change between 2007 and 2017).

Total Property tax revenue per year (2017 $)



Property tax revenue per dwelling (2017 $)



Data source: TransLink Revenue Data 2018

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