2020 REGIONAL ROAD PERFORMANCE MONITORING REPORT

JULY 2020

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TRANSLINK

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2020 REGIONAL ROAD PERFORMANCE MONITORING REPORT

INTRODUCTION

A strong Regional Road Network is essential to the personal and economic well-being of everyone living and working in Metro Vancouver.

Roads are the primary conduit for the movement of people and goods in the Metro Vancouver region.

Roads are a publicly owned asset with multiple uses, including the through movement of people and goods, access to property and gateways, and act as places to be, exercise, gather, or conduct other important public activities. In addition to accommodating the movement of people by bus, private vehicle, bicycle, and walking, roads contribute to a healthy economy by supporting the movement of goods and services.

There is no single authority for the region's regional roadways.

Although regional roads enable the economy and contribute to the health and quality of life of everyone in Metro Vancouver, there is no single authority for all the region's roadways; instead, different roadways fall under different jurisdictions. Because of this, the region's roadways have historically been planned as a series of discrete but connected networks.

The Regional Road Performance Monitoring Report is a way to document and illustrate how regional roads perform.

The Regional Road Performance Monitoring (RRPM) report is a review of the performance of regional roads throughout Metro Vancouver using consistent indicators. It includes a data collection and assessment program, and an online dashboard. The program is intended to create materials that can be used by the public, decision-makers, and provincial, regional, and municipal staff to inform the management of our integrated Regional Road Network (RRN).

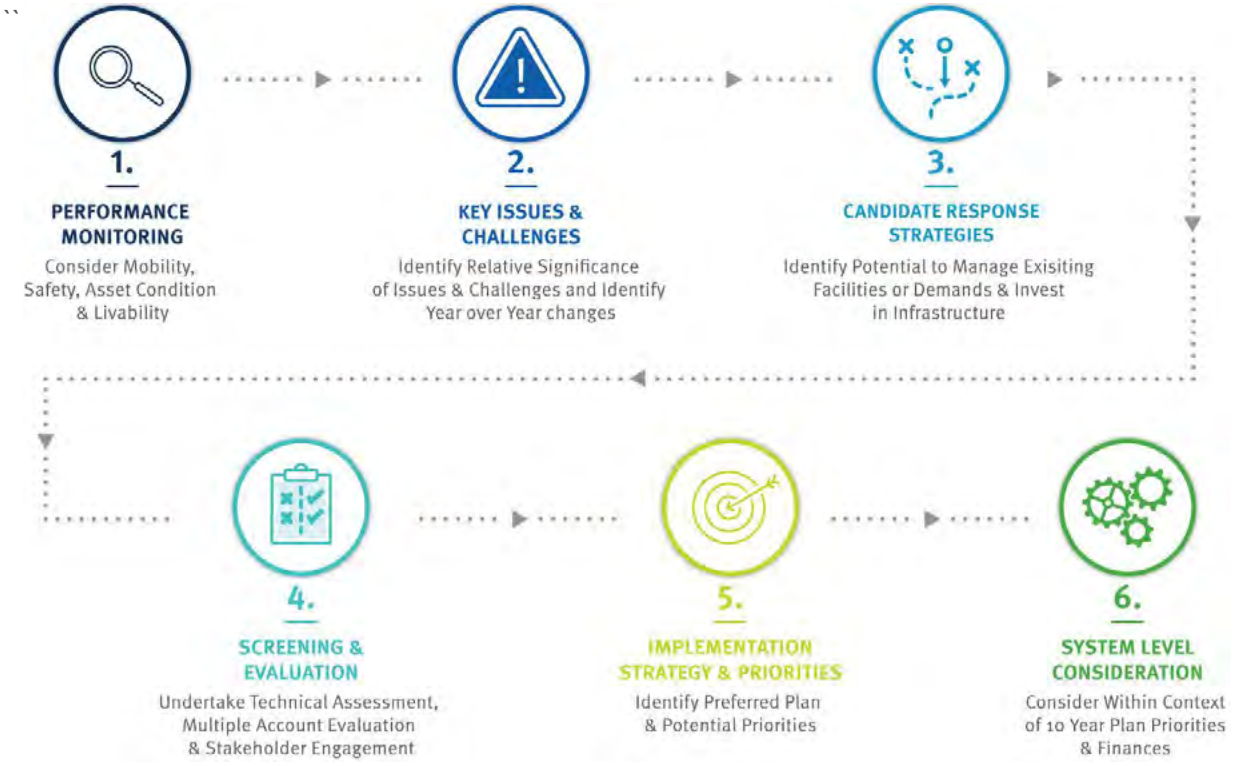
Having consistent data on a regional scale supports objective conversations about regional roads.

The RRPM report consolidates performance monitoring data on a regional scale to allow for quick and easy access. The key performance indicators summarized in this report have been endorsed by staff at road authorities throughout the region. This allows for consistent and objective conversations between different organizations. Sharing this information facilitates informed, performance-based decision making.

Monitoring the RRN is part of a broader approach to identifying, prioritizing, and addressing needs.

Performance monitoring builds an understanding of the location and scale of challenges. When performance monitoring is done consistently over time, it shows how changes – like population growth, new policies, new technology, road improvements, or other changes – can improve or worsen conditions. This leads to identification of issues and challenges. Once issues and challenges are understood, then agencies can work towards developing and evaluating responses. Across the region, performance monitoring can be expected to identify many challenges of different scales and complexities, with different solutions. Ultimately, different agencies must work together to create a package of policies, actions, and improvements that best serves the region within funding constraints.

The flow chart below illustrates the regional framework used for identifying and addressing road network challenges. The RRPM report focuses on the first two activities – monitoring performance and making observations that will support the identification of issues and challenges.



TransLink and other regional actors measure indicators that are important; however not everything that is important can be measured.

The focus of the RRPM report is on data that is consistently available at a regional level. These indicators tell us important information about how the roadways operate, how safe they are, and how well they are maintained. There are many other indicators that are important but are currently more difficult to measure consistently across the region.

This is the first Regional Road Performance Monitoring Report.

As this is the first time that this type of data has been collected and presented at a regional level, there is limited opportunity to compare to previous years to understand the direction or scale of change. The information in this report is a snapshot in time and these indicators are expected to change as transportation patterns and networks in the region evolve. The information summarized in this report will be a baseline that can be used for comparison in future years.

More data can be collected in the future to monitor progress towards the region's broader goals and objectives.

Data collection is a rapidly changing field. The number of indicators that can be measured consistently at a regional level is constantly increasing. Throughout the development of the 2020 RRPM report, the project team and stakeholders identified many other data and indicators that would be useful to understand regional roads, such as air quality, noise, and greenhouse gas emissions. Some of these indicators related to regional goals and objectives are currently being developed through the update to TransLink's Regional Transportation Strategy (Transport 2050). Future editions of the RRPM report are expected to use new and expanded data sets to track the region's progress towards the goals and targets identified in Transport 2050.

HOW TO USE THIS DOCUMENT

The Regional Road Performance Monitoring report informs the public and decision makers about conditions and challenges facing road authorities responsible for the health of regional roads.

This report is paired with the RRPM online dashboard, which is an interactive tool that allows viewers to explore all of the indicators included in this report at different levels of detail. The dashboard can be found on TransLink's website (***hyperlink to be added once permanent web address is known***).

This report will:

1. Describe how the RRN functions, including the role of road authorities across multiple jurisdictions
2. Outline the importance of the RRN for the efficiency and livability of the region.
3. Review existing demographic and transportation conditions in the region that impact the RRN.
4. Offer observations about the performance of the RRN.

Part 1 begins by establishing the Regional Context.

This section defines the Regional Road Network and explains the roles that different jurisdictions and road authorities – including TransLink – play in planning and operating regional roads. It summarizes the inter-jurisdictional nature of regional roads and emphasizes the importance of partnerships in creating a unified road network. This section also describes where people live and work in the region, both now and in the future. Finally, it outlines regional travel patterns, explaining how people move about the region.

Part 2 outlines Performance Highlights of the Regional Roads.

This section describes the safety, mobility, and asset condition of regional roads, all of which help us understand if the network is supporting our economy and quality of life. It outlines collision frequency and severity across the network, considering impacts on all modes of transportation. It also outlines mobility (i.e. congestion and reliability) and asset condition (i.e. pavement condition and roughness). Finally, this section introduces other livability indicators that can be explored in future work, such as transportation related noise exposure and local air contaminant emissions.

Part 3 provides Observations of the Regional Road Network.

This section describes common performance indicator patterns on the RRN. It also offers more in-depth observations of ten corridors in the region, providing commentary about of safety, mobility, and asset condition indicators along with information about land use, road geometry, jurisdiction, and other local context.

Part 4 offers Next Steps.

This section describes how monitoring the performance of the Regional Road Network will lead to more integrated, performance-based decision making and, ultimately, a more efficient and effective network. It also outlines several response strategies to street network challenges that focus on prioritizing demand management and management of existing facilities in advance of expansion. Finally, this section offers advice for continually improving monitoring performance of the Regional Road Network.

The Appendix of this report outlines the Approach and Methodology and outlines Sub-Regional Highlights.

The **Approach and Methodology** includes information about the data and method used to arrive at the indicators included in the RRPM report. The **Sub-regional Highlights** offer detailed maps and descriptions of trip patterns, mobility, safety, and asset condition.

GLOSSARY

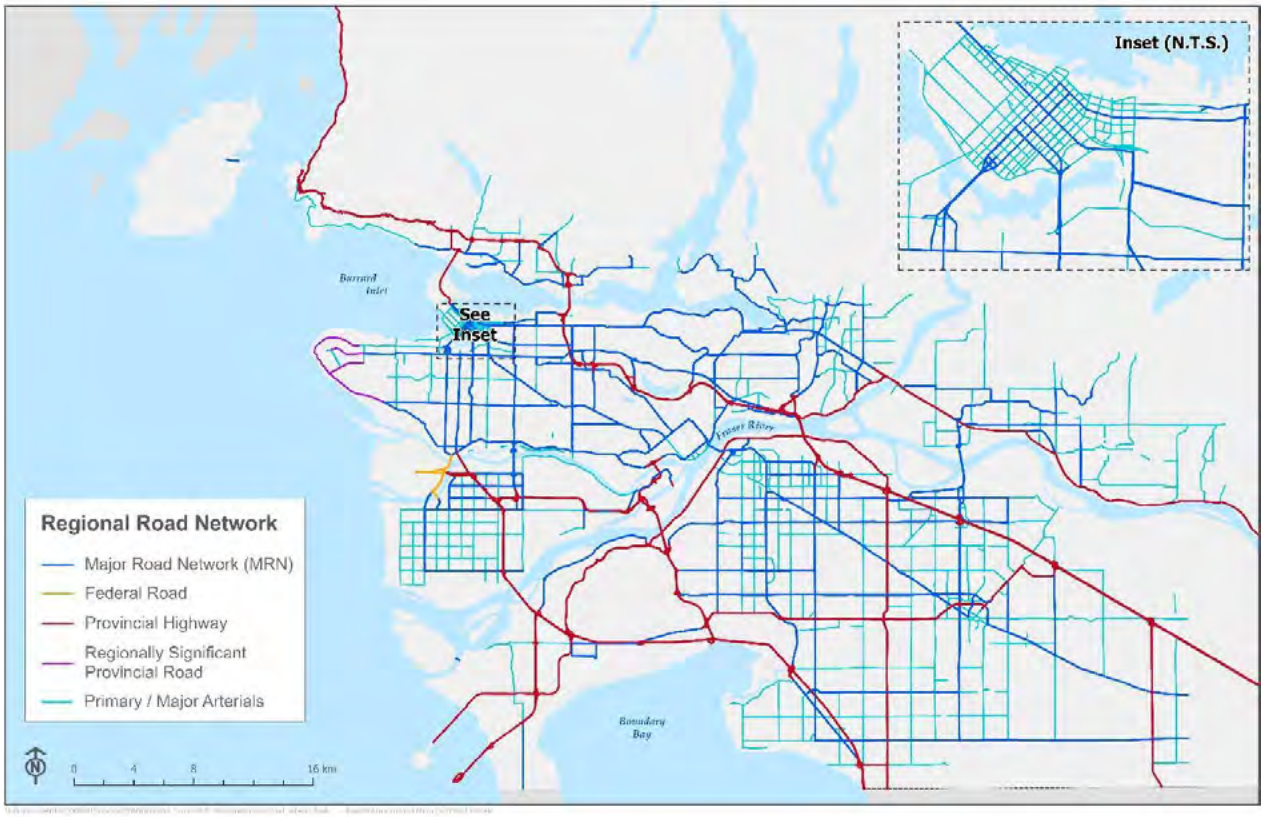
Term	Definition
Road Authority	The organization that has jurisdiction and control of a given road. There are many road authorities with jurisdiction within Metro Vancouver, including the British Columbia Ministry of Transportation and Infrastructure, the Vancouver Airport Authority, First Nations, and the region's 21 municipalities. Municipal governments are the road authorities for the majority of roads in Metro Vancouver. The provincial government has authority over provincial highways (e.g. Highway 1) and other roads outside of municipal jurisdiction, such as SW Marine Drive in the University Endowment Lands. Roads within the jurisdiction of the Vancouver Airport Authority (VAA) are operated by the VAA and are federally owned. First Nations also own and operate roads on their reserve lands within the region.
Regional Road	Regional roads connect regionally significant destinations and gateways throughout the Metro Vancouver region. This includes Regional City Centres, Municipal Town Centres, industrial areas, regional parks, and key gateways such as airports, ferry terminals, border crossings, and major highway routes. These regional destinations are where people gather to live, work, shop, and play. Providing safe and efficient connections between these destinations support the livability and economic success of the region. Road authorities typically classify their roadways, identifying which roadways are intended to serve which purposes within their jurisdictions. Road classifications in Canada typically include local, collector, arterial, expressway, and freeway. Roadways that serve to connect significant destinations and gateways typically have higher classifications than those that are focused on providing local access. Regional roads have been defined by using the classifications identified by each road authority and include Federal Roads, Provincial Highways and Roads, the Major Road Network (MRN), and municipal Major Arterial Roads.
Regional Road Network	The Regional Road Network (RRN) is a network of regional roads in Metro Vancouver that is made up of a complex set of overlapping jurisdictions and road authorities. The RRN includes Federal Roads, Provincial Highways and Roads, the Major Road Network (MRN), and municipal Major Arterial Roads.
Major Road Network	The Major Road Network (MRN) is a portion of the Regional Road Network. It includes 675 kilometres of major arterial roads that carry commuter, transit, and truck traffic, supporting the safe and efficient movement of people and goods across the region. The Major Road Network connects the provincial highway system with the local road network, and some corridors also serve cyclists and pedestrians. TransLink, in partnership with municipalities, plans the region's MRN. TransLink contributes funding for the on-going operation, maintenance, and rehabilitation of the MRN, but ownership and operational responsibility for the MRN remains with the respective municipalities. TransLink also shares the cost of road, cycling, and pedestrian improvement projects with municipal partners and other stakeholders, in order to expand options for driving, cycling, and walking across the region.

Term	Definition
Arterial Road	Arterial roads are roadways that function primarily to enable the through movement of traffic (as opposed to local roads which function primarily to provide land access). Arterial roads are designed to provide uninterrupted traffic flow except at signals and crosswalks. Arterial roads can be further classified into major or minor arterials based on function and roadway design. Some roadways are both arterial roads (as classified by the municipality) and MRN roadways. For the purposes of the RRPM report, roadways that are Arterial Roads and part of the MRN are illustrated as MRN.
Highway	Highways are higher-speed roadways designed to connect regional, provincial, national, and international destinations. Highways are expected to provide high overall travel speeds with minimal interference to traffic. They serve as important regional networks for the movement of people and goods. In the context of the RRPM report, the word Highway is used exclusively for certain roadways under Provincial jurisdiction. Because Highways are under provincial jurisdiction, they are excluded from the MRN. Note: In legislation such as the *B.C. Motor Vehicle Act*, the term "highway" is used to describe "every road, lane or right of way designed or intended for or used by the general public for the passage of vehicles."
Mobility	For this report, mobility refers to getting people and goods where they need to go in a predictable, and reasonable amount of time – whether they are travelling to work or school, to deliver goods, or other reasons. Mobility can be measured using indicators that monitor delay and reliability. Mobility is a primary function of the Regional Road Network.
Delay	Delay is the difference between the expected travel time and the average travel time within a defined time period.
Reliability	Reliability reflects how likely people and goods are to be able to accurately predict their travel time during a given hour of the day.
Safety	Safety is the is the condition of being protected from danger, risk, or injury and is fundamental to the function of the Regional Road Network. Regional roadways should be designed, operated, and maintained in a way that reduces the number of collisions (frequency) and the portion of collisions resulting in injuries and fatalities (severity) in order to protect human life and health and limit damage to property.
Asset Condition	A measure of the health of physical infrastructure. For the purposes of this report, asset condition refers to indicators that measure how road surfaces are changing over time. The RRPM report focuses on roughness (International Roughness Index) and pavement condition (Pavement Condition Index) on the Major Road Network.
Livability	Livability refers to all the factors that contribute to a person's or community's quality of life, including access to nature and recreation, equity, economic prosperity, and other factors. Regional roadways can have both positive and negative impacts on the livability of the region, communities, and neighbourhoods. Roads can act as pleasant destinations and conduits to community life and can facilitate economic benefits, but they can also increase exposure to noise and air pollution and act as barriers for local trips that must cross them. There is currently limited data available to measure the impact of regional roads on livability

PART 1: REGIONAL CONTEXT

WHAT IS A REGIONAL ROAD?

Regional roads connect destinations and gateways that are essential to the livability and economic success of the region.



The RRN includes Federal Roads, Provincial Highways and other regionally significant roads owned by the Province, the Major Road Network and municipal Major Arterial Roads.

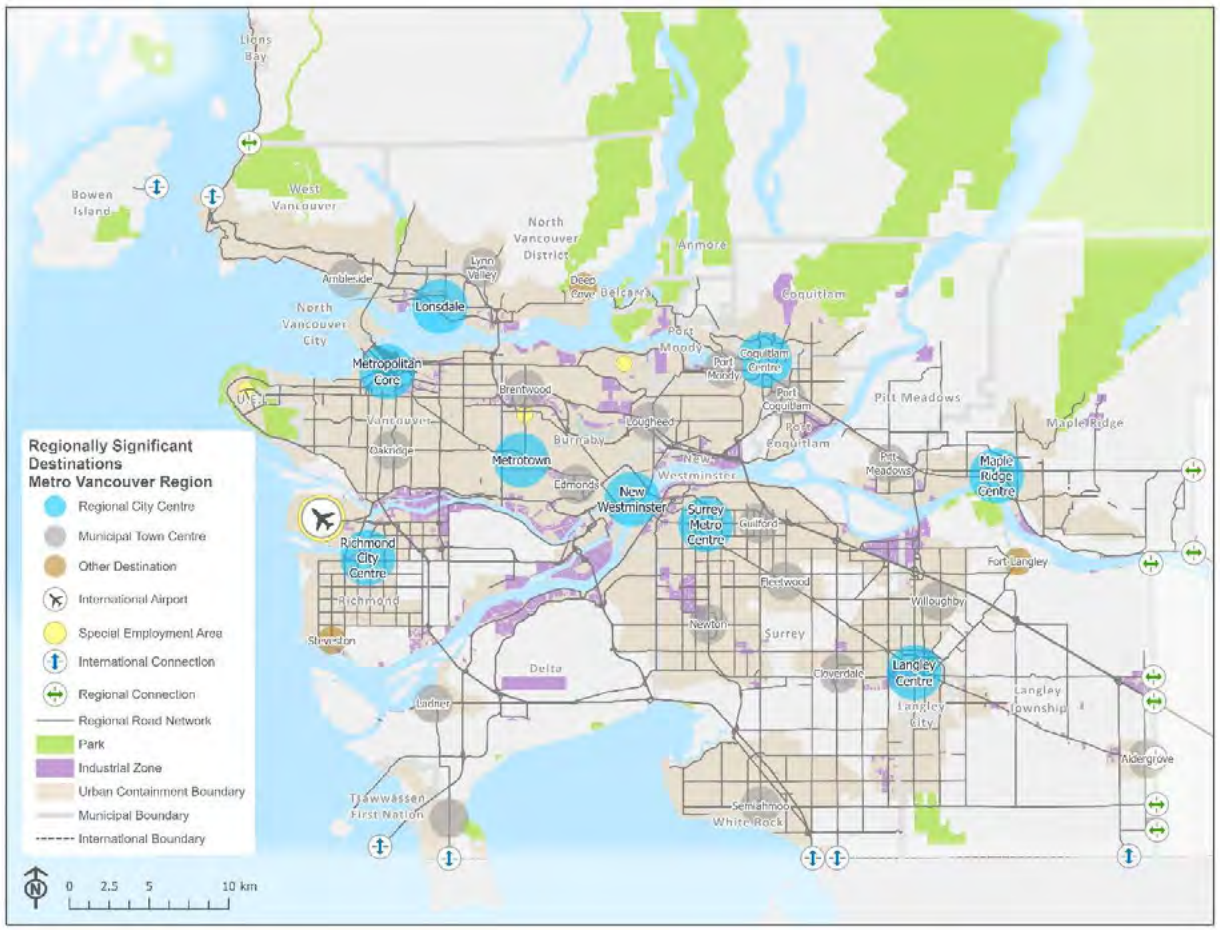
Road authorities typically classify their roadways, identifying which roadways are intended to serve which purposes within their jurisdictions. Roadways that serve to connect significant destinations and gateways typically have higher classifications than those that are focused on providing local access. Using the classifications identified by each road authority, the RRN includes Federal Roads, Provincial Highways and Roads, the Major Road Network (MRN), and municipal Major Arterial Roads. Practices around the classification of Major Arterial Roads vary by individual municipality and there is some variability in the use and function of Arterial Roads.

Regional roads serve regionally significant destinations.

Together, regional roads connect regionally significant destinations throughout Metro Vancouver. This includes Regional City Centres, Municipal Town Centres, industrial areas, regional parks, and key gateways such as airports, ferry terminals, border crossings, and major highway routes. These regional destinations are where people gather to live, work, shop, and play. Providing safe and efficient connections between these destinations supports the economy and livability of the region.

Metro Vancouver also plays a major role in the regional, national, and international movement of goods, and is part of the Asia-Pacific Gateway. The Port of Vancouver is Canada's largest ports and contains 27 major terminals, trading a diverse range of cargo with over 170 trading economies and contributing billions of dollars to the Canadian economy each year. The RRN connects trucks from across the region to these terminals.

Regionally significant destinations include gateways to the region, Regional City Centres, Municipal Town Centres, Industrial Zones, and other land uses that support the economy and livability of the region.



WORKING TOGETHER

Although the Regional Road Network exists under multiple jurisdictions, it operates as a unified network.

The dynamics of road ownership, authority, and responsibility in Metro Vancouver are complex. Different levels of government serve as road authorities over specific roads. Municipal governments are the road authorities for the majority of roads in Metro Vancouver. The provincial government has authority over provincial highways (e.g. Highway 1) and other roads outside of municipal jurisdiction, such as SW Marine Drive in the University Endowment Lands. Roads within the jurisdiction of the Vancouver Airport Authority (VAA) are operated by the VAA and are federally owned.

TransLink has limited direct authority over roads; however, TransLink owns and is responsible for four bridges in Metro Vancouver: Knight Street Bridge, Golden Ears Bridge, Westham Island Bridge, and the Canada Line bike and pedestrian bridge.

Despite this complicated web of road authorities and ownership, the entire road network must function as one unified system. Road users are not generally aware of which jurisdiction they are in; they simply need the road network to carry them seamlessly across the region. Road authorities across various jurisdictions must work together to create and maintain this seamless network.

Road authorities typically own, operate, and maintain the roads under their jurisdiction.

A road authority is responsible for all aspects of a functioning roadway, including planning, decision making, funding, operations, maintenance, and rehabilitation. For example, when a pothole needs to be repaired, the road authority in charge of that roadway is tasked with completing that repair. Along certain regionally significant roadways, the road authority may work in partnership with TransLink, as outlined below.

TransLink has responsibility for the regional movement of people and goods and limited authority over the road network.

TransLink serves as Metro Vancouver's regional multimodal transportation authority, working with partners across 23 local governments to provide a regional transportation system that moves people and goods. TransLink is responsible for planning the region's Major Road Network (MRN), a portion of the RRN that consists of 675 road kilometres (over 2,700 lane-kilometres) of major arterial roads spanning 20 municipalities. These roads are still owned and operated by municipalities, but TransLink has the authority to review any change that limits the people moving capacity of the MRN or restricts truck movements anywhere on the road network.

TransLink also shares the cost of road, cycling, and pedestrian improvements along the MRN with municipalities. Additionally, TransLink provides funding for the ongoing operations, maintenance, and rehabilitation (OMR) of the MRN. The actual road work, such as street cleaning, maintaining traffic signals, and repairing potholes, is planned and performed by the municipality. Between 2017 and 2019, TransLink provided municipal partners with more than $148 million in OMR funding. This helps the MRN remain in a good state of repair, ensuring that people and goods can move efficiently and safely across the region.

Successful operation and maintenance of the Regional Road Network relies on effective partnerships between agencies.

The RRN is made up of a complex set of overlapping jurisdictions and road authorities. When issues occur on the road network, they often spill into multiple areas of jurisdiction. Addressing these issues often requires cooperation from a number of agencies, including multiple road authorities, TransLink, the Port Authority, railways, and others. Likewise, planning and designing future road network improvements can involve multiple road authorities. As a result, strong interjurisdictional partnerships are critical to delivering a road network that works for the whole region. Complex dynamics such as this require clear metrics, shared goals, and a common vision for improving the regional movement of people and goods.

As the world grows more complex and more people and jobs come to Metro Vancouver, effective planning and partnership will be even more important.

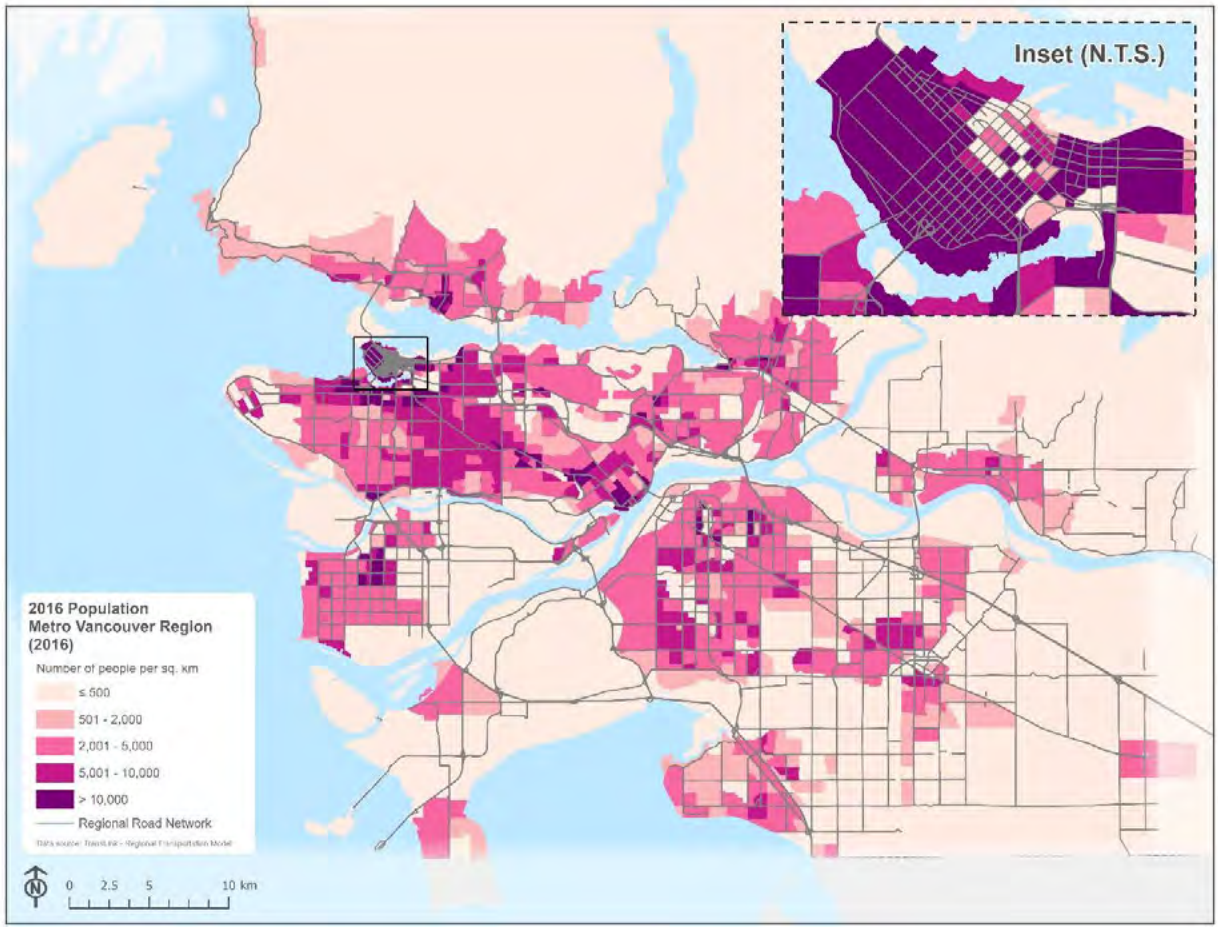
Strong partnerships are necessary in order to address the opportunities and challenges that exist in this growing and increasingly complex region. These challenges and opportunities include managing the impacts of climate change, planning for changing transportation patterns and technologies, and providing safe and effective travel for more and more people. All levels of government are being asked to do more with less, as there are significant funding challenges – even before the global economic recession brought on by COVID-19. Partnerships are crucial for ensuring that Metro Vancouver remains a dynamic region with a safe and effective road network.

WHERE PEOPLE LIVE AND WORK NOW AND IN THE FUTURE

In 2016 there were 2.46 million people and 1.28 million jobs in Metro Vancouver, concentrated in the metropolitan core, regional and municipal centres, and industrial areas.[1]

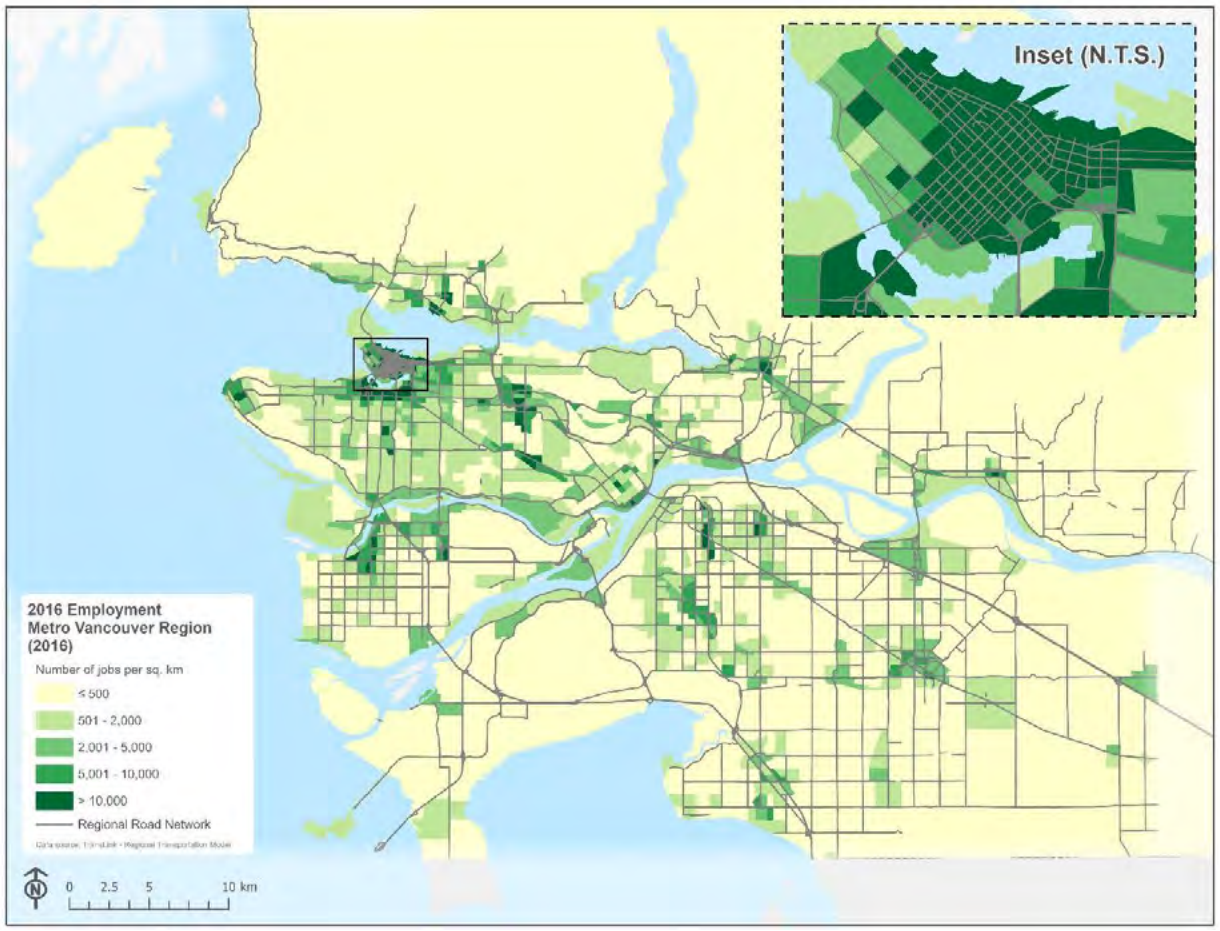
Metro Vancouver is a vibrant and growing region, both in terms of population and employment. This growth is directed towards designated areas throughout the region, as laid out in *Metro Vancouver 2040 and* the Regional Growth Strategy (RGS). The RGS focuses growth in Urban Centres, including the Metropolitan Core (Downtown Vancouver and Central Broadway), Surrey Metro Centre, Regional City Centres (e.g. Lonsdale, Maple Ridge, Metrotown, and others), and Municipal Town Centres (e.g. Aldergrove, Guilford, Lynn Valley, and others). This is where most people and jobs are already located. Directing future growth to these areas provides efficiencies and benefits, such as the creation of more walkable, bikeable, and transit-oriented communities.

Metro Vancouver's population is concentrated in key urban centres throughout the region.



[1] Metro Vancouver generates regional and municipal growth forecasts that are generally aligned with municipal Official Community Plans. Traffic zone forecasts are prepared by Metro Vancouver with growth guidance provided by member jurisdictions. Metro Vancouver is currently in the process of updating its Metro 2040 regional growth strategy which includes a review of long range regional and municipal forecasts.

Jobs in Metro Vancouver are concentrated across urban centres as well as key industrial areas, including the ports, airport, and intermodal terminals.

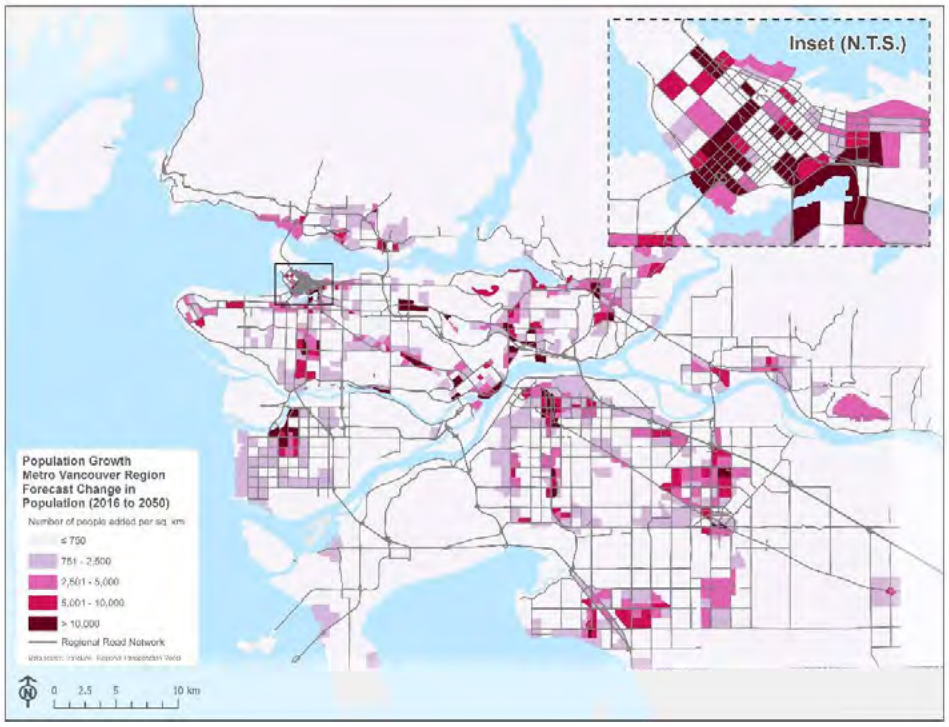


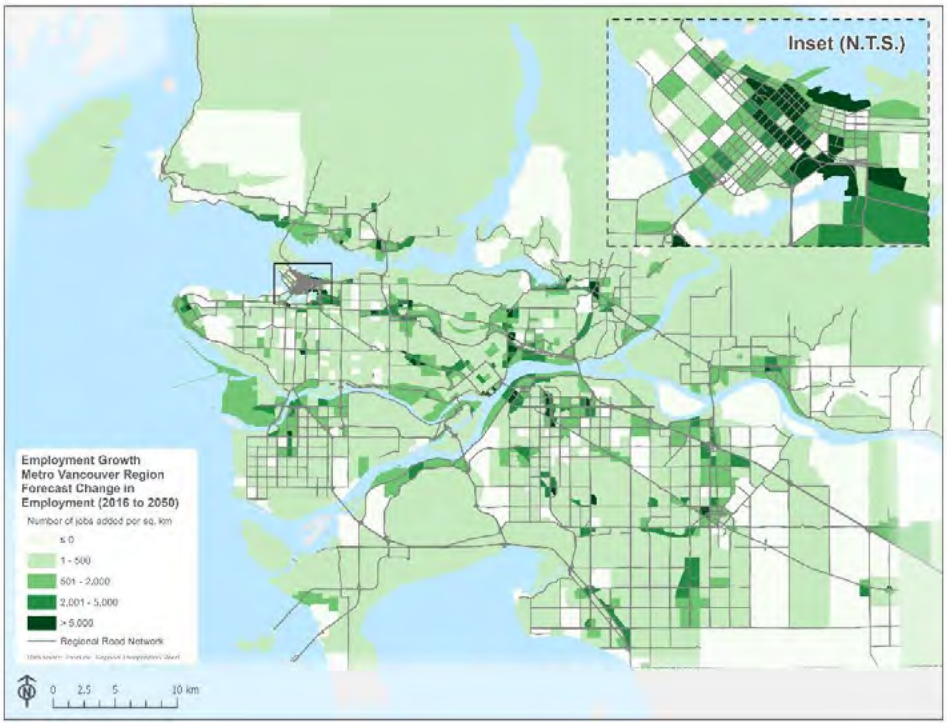
The Regional Road Network connects these population and employment centres to support the movement of people and goods.

The demand for travel and for goods movement is highest to and from the areas where people live and work, as well as regional gateways. It is crucial that multi-modal access is prioritized for these areas. This includes ensuring the efficient movement of trucks, transit vehicles, and personal motor vehicles, as well as active transportation modes.

By 2050, an additional 1.2 million people and 470,000 jobs are expected in Metro Vancouver.

A substantial number of new people and jobs are expected to be added to the region within the next 30 years. Population growth is expected in key areas of South of Fraser (50% of all Metro Vancouver population growth), Burrard Peninsula (29% of all Metro Vancouver population growth) and Northeast Sector (16% of all Metro Vancouver population growth). Job increases are projected for these same areas: South of Fraser (46% of all new jobs), Burrard Peninsula (32% of all new jobs) and Northeast Sector (16% of all new jobs). This growth will have a significant impact on transportation throughout the network, with an increasing number of trips taking place on the RRN.





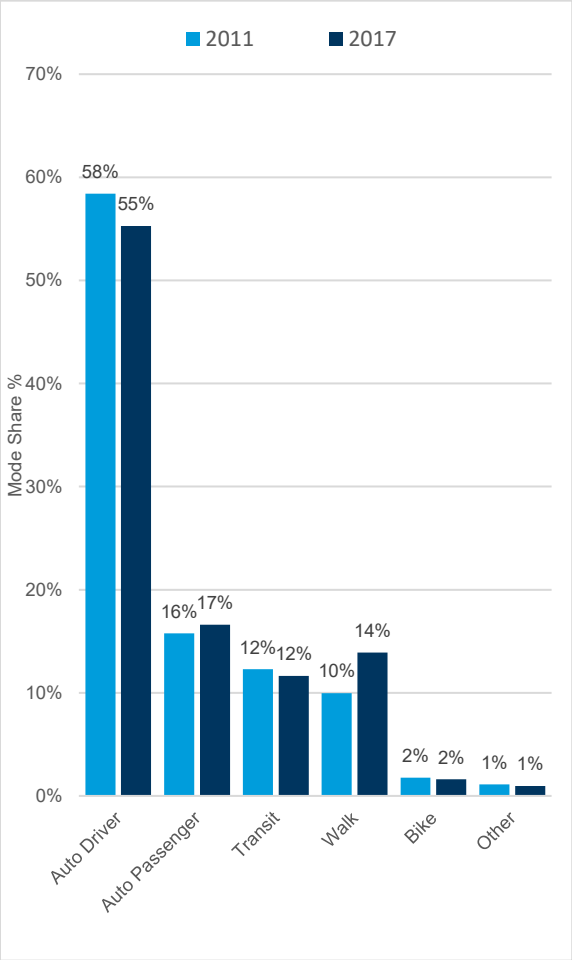
Population growth is expected for Regional City and Municipal Town Centres across the region, in addition to new suburban developments in Maple Ridge, West Vancouver, and Surrey. Employment growth is projected in regional industrial areas, in addition to key areas such as YVR Airport, Delta, and Langley Township.

HOW PEOPLE TRAVEL WITHIN THE REGION[2]

Most people rely on private vehicles to get around Metro Vancouver.

In 2017, approximately 72% of all trips[3] in Metro Vancouver were taken using a motor vehicle, either as a driver (55%) or a passenger (17%).

Mode Share, Metro Vancouver Region (2011, 2017)



Reliance on driving for trips is decreasing over time.

Most trips by Metro Vancouver residents are by private vehicle as a driver or a passenger; however, the share of trips by private vehicles has been decreasing over time. Compared to 2011, the share of automobile trips decreased from 74% to 72%. While overall automobile trips decreased, the share of automobile passenger trips increased slightly, indicating that the average number of people per vehicle increased and there were fewer single occupant vehicles travelling in 2017 than in 2011.

The overall demand on the region's roads is increasing across all modes.

Overall trips per household have grown by 9% over the past five years, from 2.96 in 2011 to 3.23 overall trips per household in 2017. The largest proportion of this growth is from shopping and personal business trips. There are also more people living in Metro Vancouver now than there were in 2011. This means that there is more demand for all modes of transportation, even if the mode share has decreased.

There is more demand on the region's roads because the total kilometres travelled by private vehicles has increased, even though mode share has decreased.

While the share of automobile trips has decreased, the total number of automobile trips grew 14% between 2011 and 2017, from 3.8 million to 4.38 million. Residents of Metro Vancouver travelled approximately 44.59 million kilometres by private vehicle each weekday in 2017, or about 18.2 km per person. This is an increase of about 5.19 million kilometres from 2011, when the total vehicle kilometres travelled was about 39.4 million (about 17.8 km per person).

[2] Travel pattern data comes from the TransLink Trip Diary, Metro Vancouver's comprehensive transportation census that gathers detailed data on weekday regional travel patterns. The two most recent Trip Diary surveys were conducted in 2011 and 2017, allowing a comparison of travel patterns over time. Data presented here from the Trip Diary represents daily trips. The term 'mode share' is used to describe the proportion of trips that are taken by different modes of transportation (e.g. driving an automobile, traveling in an automobile as a passenger, walking, cycling, taking transit, or some other mode).

[3] A trip is defined as an individual leaving one location (origin) and arriving at another (destination) for a specific purpose, such as travelling to work or returning home. Recreational trips with no set destination, such as going for a walk around the neighbourhood for exercise or to walk the dog, do not count as trips in the Trip Diary survey.

Most driving trips are less than 10 km.

The average trip length for driving trips is just under 10 km and this did not change between 2011 and 2017. As a result, most driving trips start and end within the same municipality or in a nearby municipality. For example, 5% of all automobile driver trips in 2017 began and ended in the Northeast Sector.

People are less likely to choose driving for very short trips.

The choice of transportation mode is often related to the length of the trip. People are more likely to use active modes such as walking and cycling for shorter trips and transit or driving for most longer trips. For trips under 2 km in length, the automobile mode share in Metro Vancouver decreased by 7% between 2011 and 2017 (from 54% to 47%), while walking mode share increased by 8% (from 40% to 48%). Bicycle mode share remained constant at around 2%.

For trips longer than 15 km, automobile mode share decreased by 3% from 81% to 78%, while transit mode share increased from 17% to 21%.

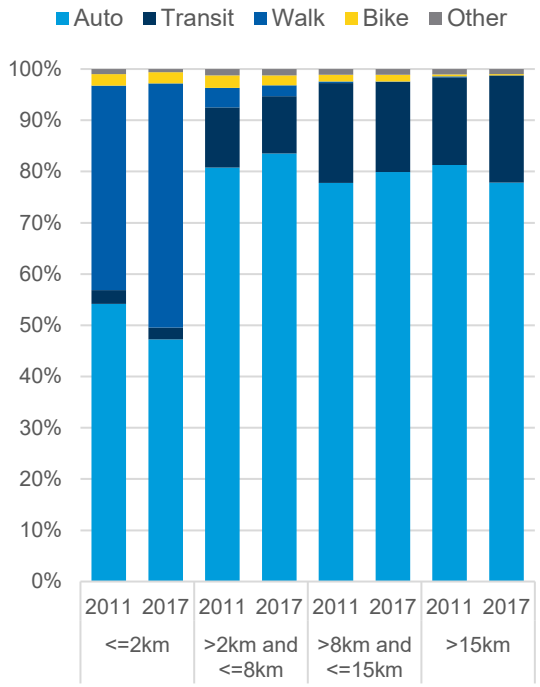
The growth in automobile trips is coming predominantly from people in older age brackets, while younger people are more likely to choose other modes of travel.

As discussed earlier, the overall number of automobile trips in the region increased between 2011 and 2017.

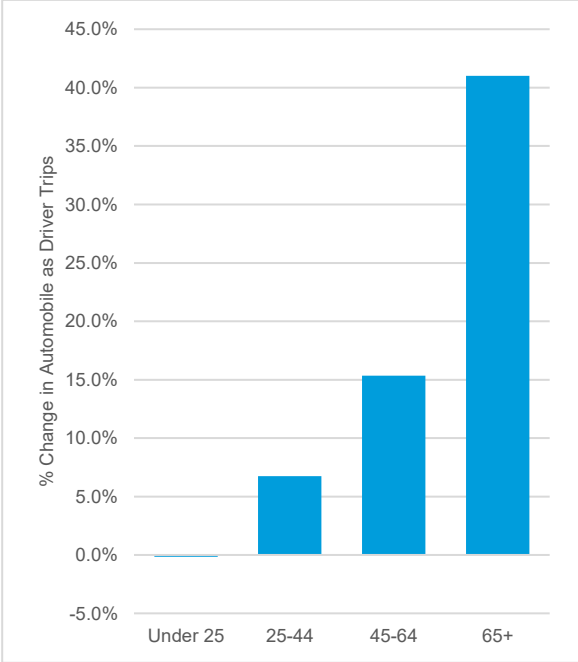
Both the number and proportion of trips made by older drivers have increased. The proportion of trips made by people 65 years and older in Metro Vancouver has increased from 13.1% in 2011 to 16.1% in 2017.

The total number of automobile driver trips made per day by people in the 65+ age bracket increased over 41% – from 501,000 trips in 2011 to over 700,000 trips in 2017. The growth in trips far outpaced the population growth in this age bracket, which was about 24% between 2011 and 2016.

Mode Share by Average Trip Distance, Metro Vancouver Region (2011, 2017)



Percent Change in Automobile as Driver Trips by Age Range, Metro Vancouver Region (2011 - 2017)

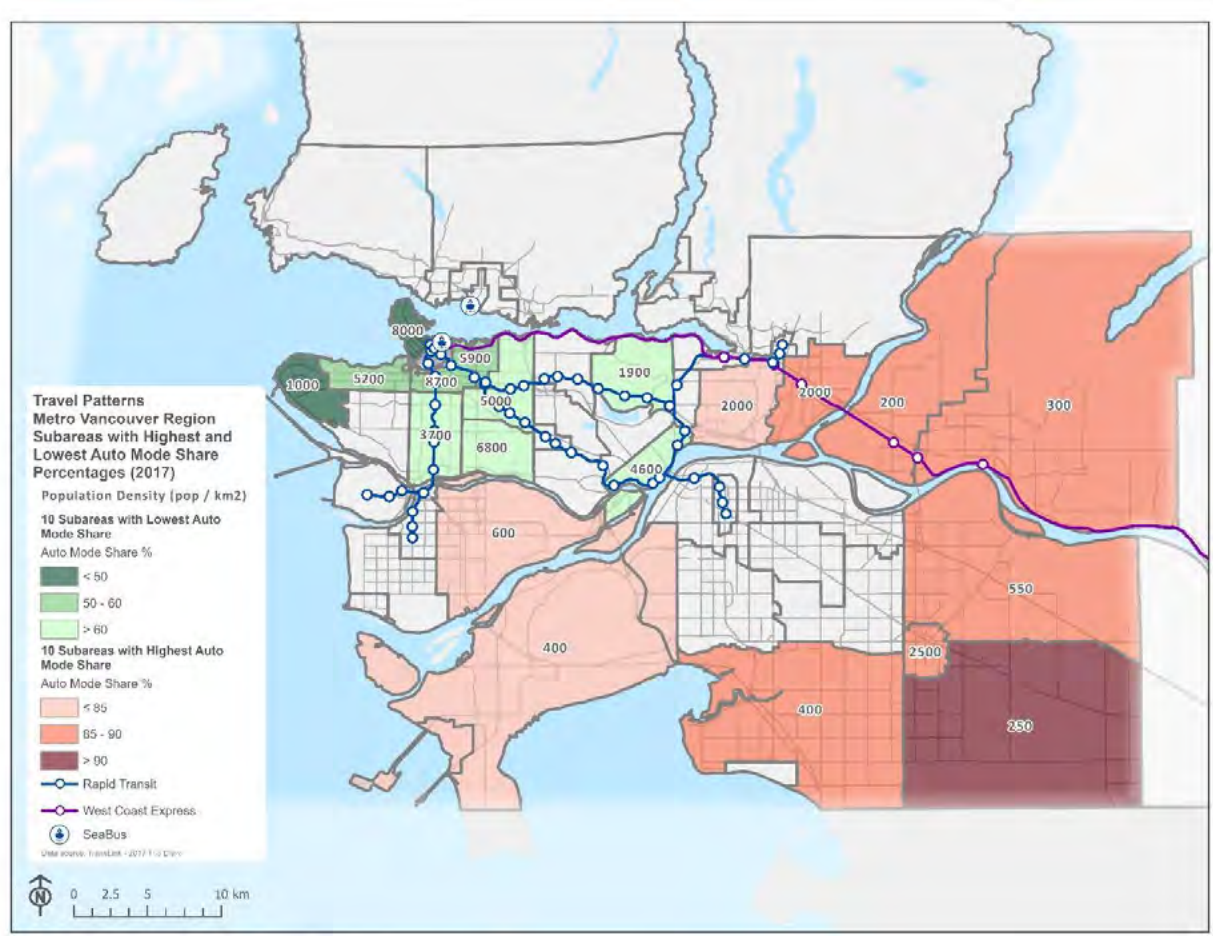


People rely on private vehicles for more trips in parts of the region with lower population densities, where destinations are further away, and where transit service is less frequent.

Looking at the ten areas of Metro Vancouver with the highest and lowest driving mode shares provides insights on why people choose to drive compared to using other modes of transportation. In areas that have a higher population density, there tends be a greater concentration of employment, goods, and services in the area, making everything closer together. As a result, population density can be an indicator of how easy it is to walk, bike, or use transit for your daily needs. In Metro Vancouver, people in areas with higher population density (1,000 to 9,000 people per square kilometre) tend to drive less than people in areas with lower population density (200 to 2,500 people per square kilometre).

Likewise, where average trip distance is longer, people tend to drive more. In areas with the highest driving mode share, the average trip distance is 10.4km, with trip distance typically ranging between 8.0 and 12.6km. By comparison, the average trip distance in areas with the lowest driving mode share is only 6.8km, with trip distance typically ranging between 5.0 and 9.6km. People also tend to drive more where transit service is less frequent. Vehicle ownership is higher in areas where people drive more.

Subareas with the ten highest and ten lowest auto mode share percentages in the Metro Vancouver region, labelled with their population densities.



PART 2: PERFORMANCE HIGHLIGHTS OF REGIONAL ROADS

Measuring the safety, mobility, and asset condition of regional roads helps us understand if the network is supporting our economy and quality of life.

The quality of life of Metro Vancouver residents and the health of the economy relies on the ability of regional roads to move people and goods safely and effectively. Roads are also a significant public asset and maintaining them in a state of good repair reduces the overall life cycle cost and preserves a high-quality experience for users.

This section presents performance highlights at a regional level using safety, mobility, and asset condition metrics. More information about how the data was collected and how indicators were calculated can be found in the Appendices, along with more detailed information at a sub-regional level.

SAFETY

Regional roadways should be designed, operated, and maintained in a way that reduces the number of collisions (frequency) and the portion of collisions resulting in injuries and fatalities (severity) in order to protect human life and health and limit damage to property.

People expect safe travel on regional roads; whether they are walking, cycling, driving, riding in an automobile, or transporting goods.

Measuring the safety of regional roadways allows us to understand the effects of road travel on our communities. Location-based safety data illustrates where people are most likely to be involved in crashes. Safety data collected over time allows us to understand whether changes in our communities, policies, road infrastructure, and way we travel have made our roads safer.

The number of collisions per year and the severity of those collisions are measures of safety.

Monitoring the number of collisions per year allows us to understand where collisions are occurring and how collision patterns are changing over time. By monitoring severity, we can understand where and why people are being injured or killed as a result of crashes.

Locations with higher volumes of traffic are likely to have more collisions.

Intersections can experience collisions for many reasons. That said, the number of collisions typically increases along with traffic volume.

At a regional level, this means that if no action is taken, the number of collisions can be expected to increase as the number of vehicle kilometers travelled increases.

As discussed in previous sections, the number of vehicle kilometres travelled in the region has increased along with the number of people and jobs. To understand how the safety of the RRN is changing over time, it is important to consider the number of collisions relative to both the number of people and the vehicle kilometres travelled.

Metro Vancouver Regional Safety Statistics for Intersections on the RRN

Total collisions per year:	**63,180**
Total crashes causing an injury or fatality:	**26,568**
Crashes per year causing injury or fatality per 100,000 residents:	**1,049**
Crashes causing injury or fatality per 100 million vehicle kilometres travelled:	**170**
TransLink Crash Severity Index for all Metro Vancouver	**4.8**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

Improving safety means reducing both the number and severity of collisions.

Safety objectives typically focus on fewer collisions – overall, per person, and per vehicle kilometres travelled. Reducing the severity of collisions is also a positive measure – it means that when there is a collision, people are less likely to be injured or killed.

Focusing on locations with the highest severity has the highest potential to reduce the negative impact of roads on people's wellbeing.

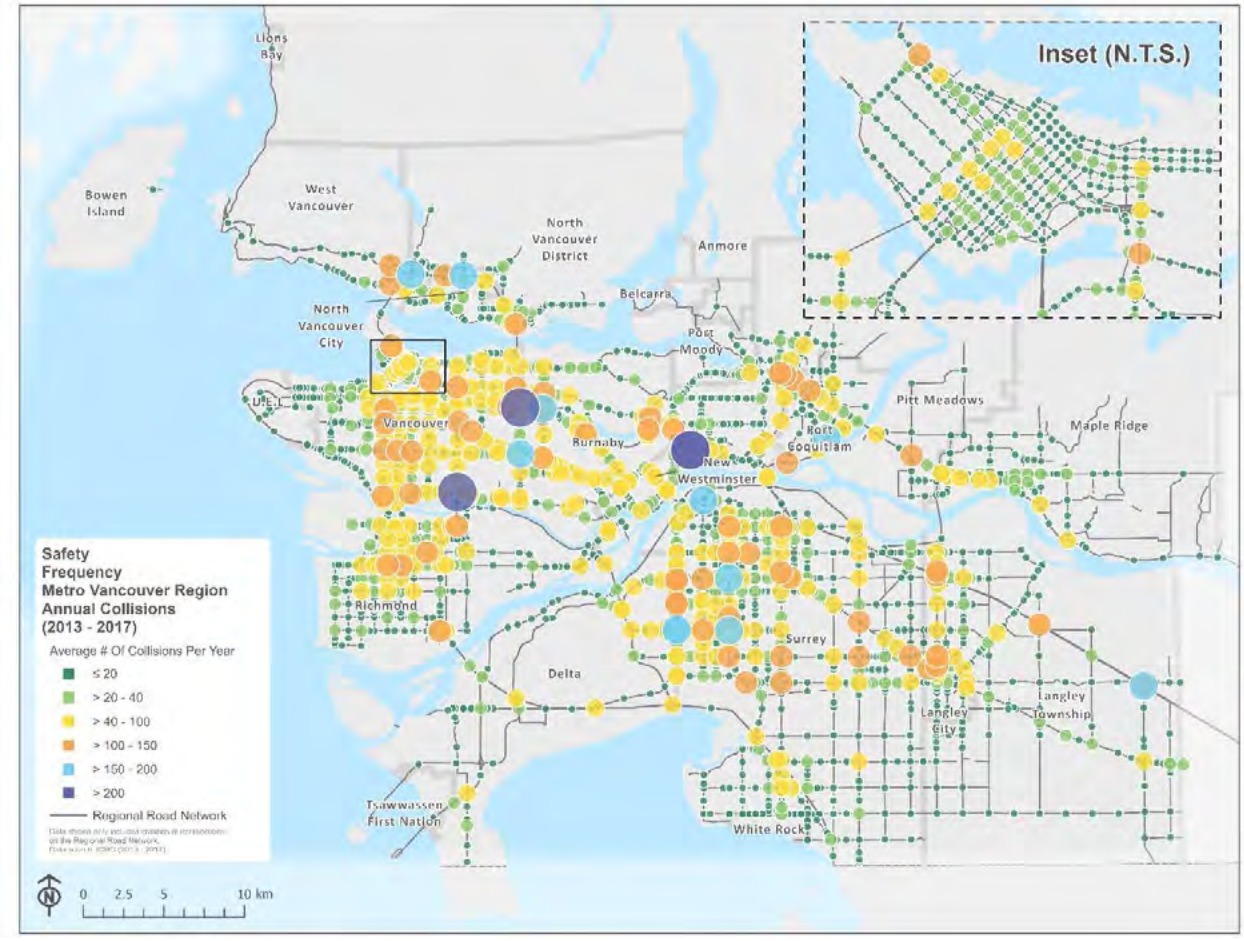
Because severity is a measure of the proportion of collisions that result in an injury or fatality, focusing on locations with a high severity has the highest potential for a positive impact.

Note: All safety data presented in this section is based on crash information from ICBC. Statistics include only collisions at intersections on the RRN. Collision data includes information about crashes involving motor vehicles that are reported to ICBC. This includes crashes involving a motor vehicle and a pedestrian or cyclist. It does not include collisions that do not involve motor vehicles. ICBC data and resulting indicators cannot be easily compared with data from other jurisdicitons.

Measures of safety included in the RRPM report includes frequency of collisions per year over a five-year period.

Collision frequency is the number of collisions per year over a five-year period. Data in this years' report includes collisions that happened between 2013 and 2017. Frequency can be measured over an area or at a specific location, like an intersection, or over a broader geography – like a corridor, neighbourhood, municipality, or for the whole region.

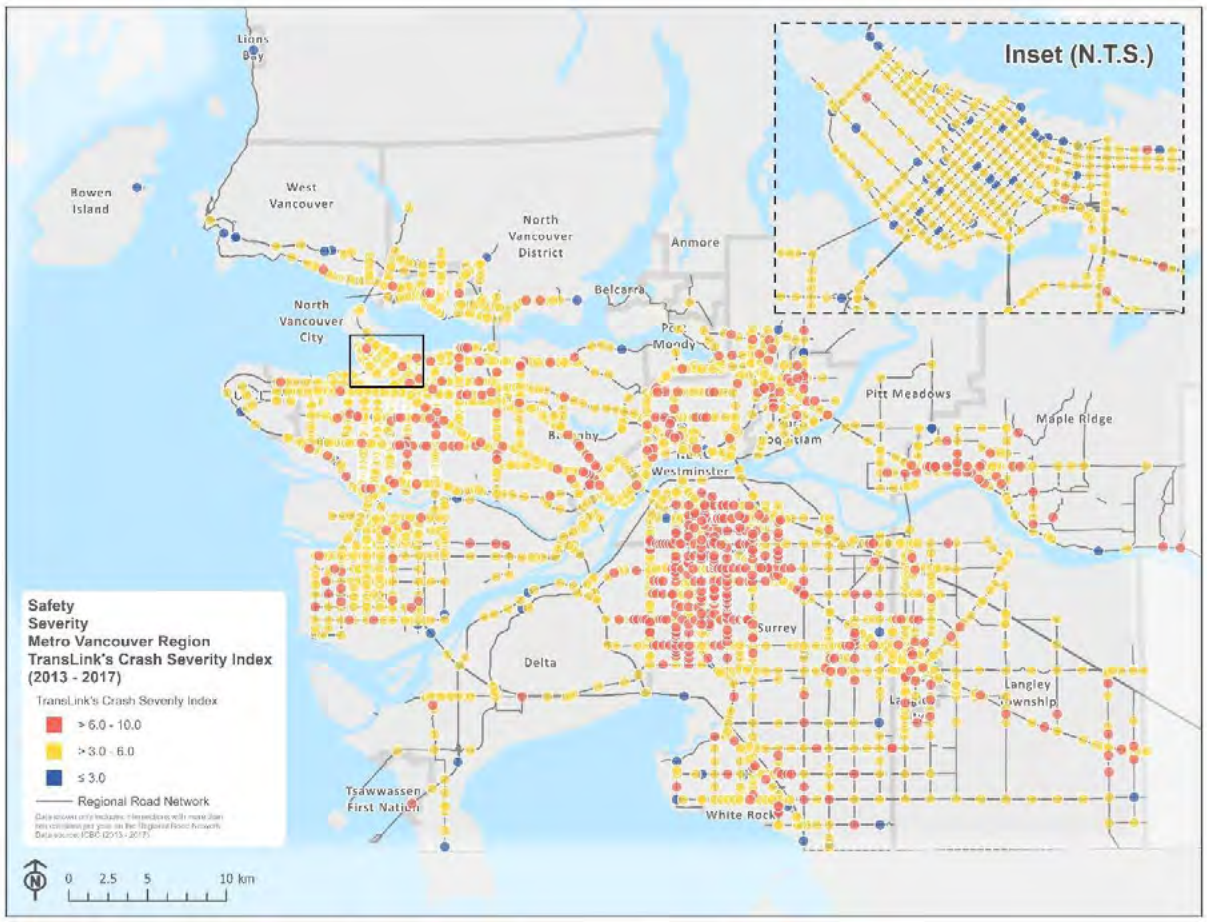
This map illustrates the number of collisions per year between 2013 and 2017 at intersections on the RRN. The size of the circle and colour indicate the number of collisions per year. The largest, purple circles indicate locations with more than 200 collisions per year. Small dark green circles have 20 collisions or less per year.



TransLink's Collision Severity Index (CSI) is a way of understanding the proportion of crashes that result in fatality or injury.

The CSI developed by TransLink for this work assigns a value of ten to each collision that results in an injury or fatality and a value of one to each collision that results in property damage only. The total value is then divided by the total number of collisions, resulting in an index. At intersection with a CSI of 10, all collisions have resulted in an injury or fatality. At an intersection with a CSI of 1, no collisions have resulted in an injury or fatality. The CSI information presented in this report reflects collisions between 2013 and 2017 at intersections on the RRN.

This map illustrates the severity of collisions at intersections on the RRN between 2013 and 2017 using TransLink's Severity Index. A high CSI (shown in red) indicates a higher proportion of crashes resulting in an injury or fatality. A low CSI (shown in blue) indicates more collisions that were property damage only.



MOBILITY

Regional roadways support movement by people and goods for personal and economic purposes. This category includes indicators that monitor delay and reliability for the movement of passenger vehicles and trucks on the RRN.

Mobility – getting people and things where they need to go – is a primary function of the RRN.

People depend on being able to get to their destination within a predictable and reasonable amount of time – whether they are travelling to work or school, to deliver goods, or other reasons.

Mobility is especially important for goods and services.

Industry depends on being able to move around on the road network in a predictable way to schedule the delivery of goods and services. Unexpected delays to commercial vehicles can result in interruptions to consumers, supply chains, manufacturing, and other important functions. When commercial vehicles face unreasonable delay on the road network, the cost of shipping increases, fuel use and emissions increase, and fleets are less productive.

Delay and reliability are measures of mobility.

Delay describes the time people and goods lose to congestion on the roadway. It helps us understand whether the average travel time during a given hour of the day is consistent with what is expected. Reliability reflects how likely people and goods are to be able to accurately predict their travel time during a given hour of the day. Both are important; however, a reliable road network is essential to people and goods to arrive at their destinations on time.

Improving mobility means reducing delay and increasing reliability.

For the purposes of the RRPM report, delay is measured using the Travel Time Index (TTI). Lower delay means that people and goods can travel faster – the lowest level of delay is when the average time is equivalent to the expected travel time. The expected travel time is based on a reference speed and includes some congestion.[4] Reliability is measured using the Planning Time Index (PTI). Higher reliability means that people and goods can get to their destination within the expected travel time, most of the time. The highest level of reliability occurs when 95 out of 100 trips can travel to their destination within the expected travel time.[5] Several elements can affect delay and reliability. The simplest is when a road's capacity (the number of vehicles that can move through a road section in a given time period) is overwhelmed by too many vehicles, such as during the peak periods in the morning and afternoon. Additionally, crashes and in and other incidents on the roadways, work zones, weather, and daily variations in vehicle volumes can have large impacts on the delay and reliability of a roadway.

Note: Mobility indicators were aggregated by TransLink based on data from Google Maps.

[4] The reference speed is the 90th percentile speed for highways and the 60th percentile speed for urban roads, for data collected during typical daytime weekdays (Tuesday to Thursday, 6:00 a.m. to 8:00 p.m.

[5] For the purposes of the RRPM report, the expected travel time is based on the travel time for the same journey at a reference speed that was set by TransLink in collaboration with technical representatives from the region's municipalities. More information about the reference speed is included in the Appendix.

Delay and reliability can be considered for small sections of roadway, for intersections, for corridors, or even between destinations.

For the RRPM report, delay and reliability were measured by direction on small segments of roadway. The travel time between key origins and destinations was also recorded to understand patterns at a larger, regional level. [6]

Reporting delay and reliability at a regional, sub-area, or corridor level requires consistent, regional information about the volume of vehicles and people.

To report an overall indicator – like TTI or PTI – for the whole region, we must first understand how many people are experiencing the delay or unreliability on each smaller segment in each hour. If one road segment is reliable, but few vehicles are experiencing that reliability and another road segment is more unreliable road segment and has more vehicles, averaging the two segments together omits vital information about what the average vehicle is actually experiencing. This information (vehicular volumes and occupancy) is not yet available.

Measures of mobility include information about the average travel time and speed between regional centres during the morning and afternoon peak periods.

Regional travel time and speed information is presented in map format to communicate how travel time and speed differ when travelling between different parts of the region. The information presented is based on typical weekday peak periods in the fall of 2018.[7]

[6] TransLink also publishes the Bus Speed and Reliability Report, which illustrates bus delay. Bus delay is developed based on a different data set and using a different methodology than road network delay. The two indicators are not directly comparable.
[7] The Appendix includes more information about the data shown in this section. More travel time and speed data for trips between regional destinations at different times of day can be explored on the online dashboard.

*These maps illustrate the average travel speed for a vehicle trip between two points during the **weekday morning peak period** as a coloured line.*

Red, thick lines have slower average speeds and lighter, yellow lines have faster speeds.

The top map shows the average speed between Downtown Vancouver and other regional destinations.

The bottom map shows the average speed between Surrey City Centre and other regional destinations.

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*These maps illustrate the average travel speed for a vehicle trip between two points for the **weekday afternoon peak period** as a coloured line.*

Red, thick lines have slower average speeds and lighter, yellow lines have faster speeds

The top map shows the average speed between Downtown Vancouver and other regional destinations.

The bottom map shows the average speed between Surrey City Centre and other regional destinations.

Delay changes over the day, with the highest level of delay on most roadways occurring in the morning between 8:00 a.m. and 9:00 a.m. and in the afternoon between 5:00 p.m. and 6:00 p.m.

Delay information is available for segments of the RRN between 6:00 a.m. and 8:00 p.m. on a typical weekday in fall of 2018. Most of the network has low delay at 6:00 a.m. Delay on most segments increases until 9:00 a.m., when it starts to decrease. Delay begins to increase again around 3:00 p.m. Most of the region experiences the highest level of delay on weekdays between 5:00 p.m. and 6:00 p.m.; however, some areas have different travel patterns during peak hours.

The following maps indicate delay on the RRN at different times of the day.

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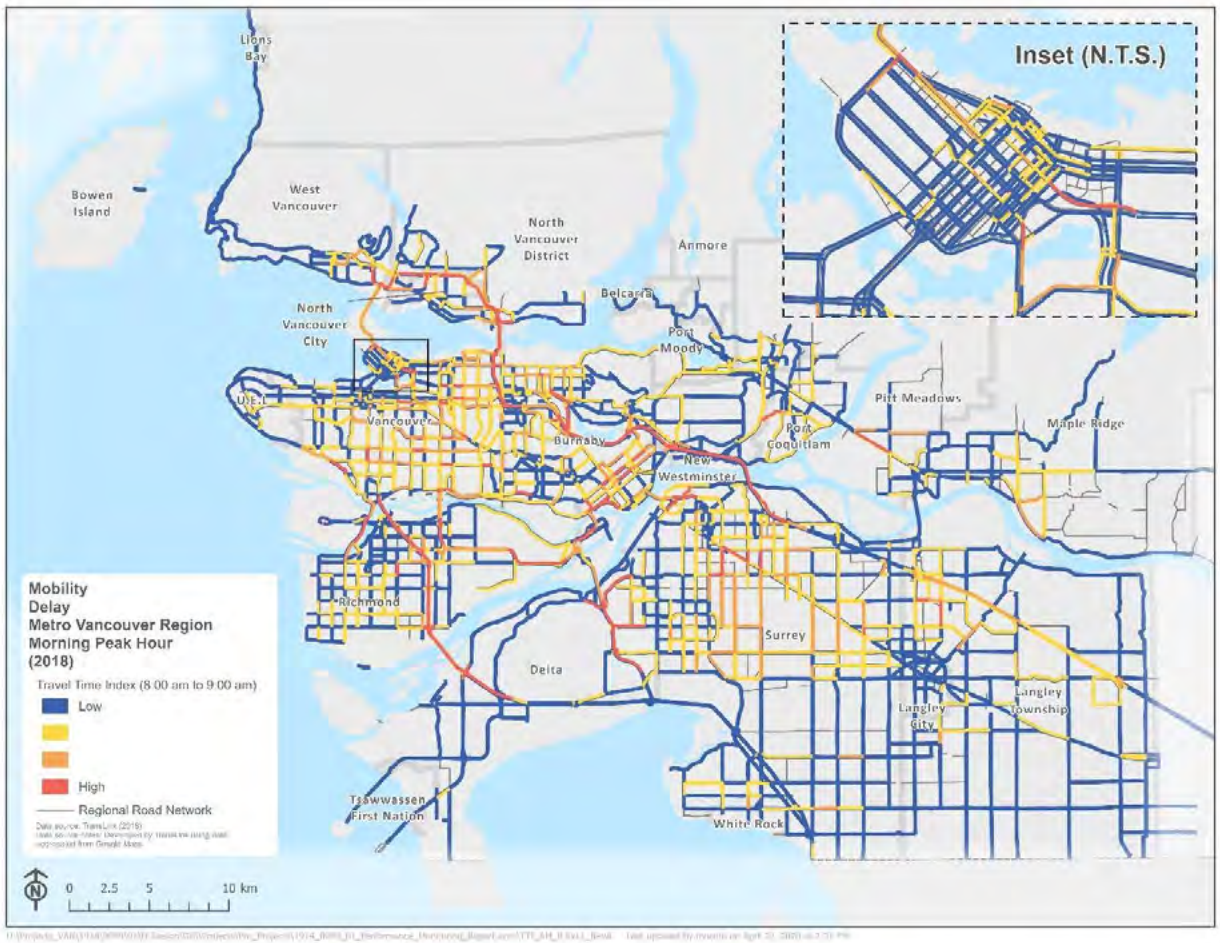
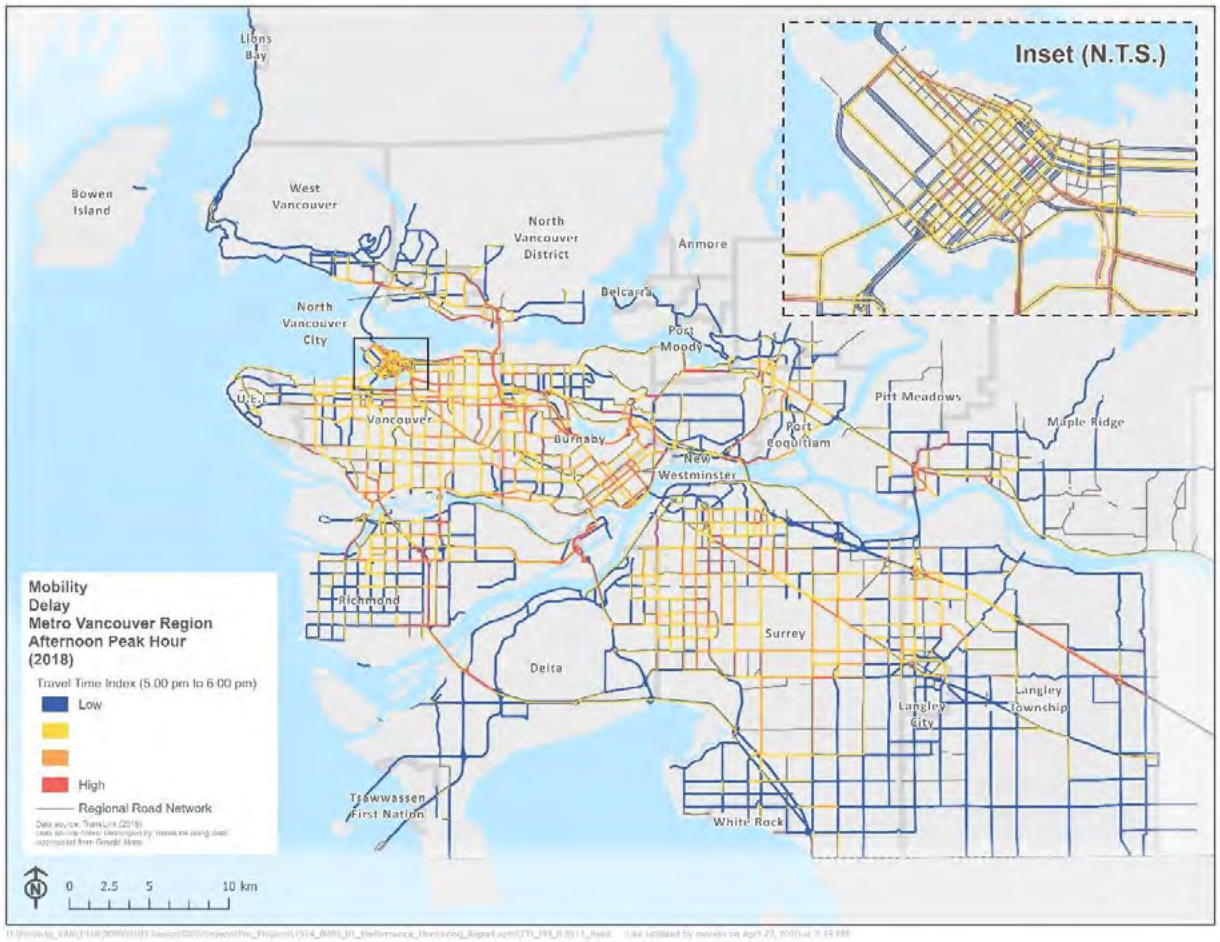
*Delay – as indicated by TTI – for **8:00 a.m. to 9:00 a.m.** for a typical weekday in the Fall of 2018. Blue indicates low delay and red indicates high delay. Each direction of travel is shown separately.*[8]



[8] Please refer to the online dashboard for higher resolution maps and additional time periods.

*Delay – as indicated by TTI – for **5:00 p.m. to 6:00 p.m.** for a typical weekday in the Fall of 2018. Blue indicates low delay and red indicates high delay. Each direction of travel is shown separately.*[9]



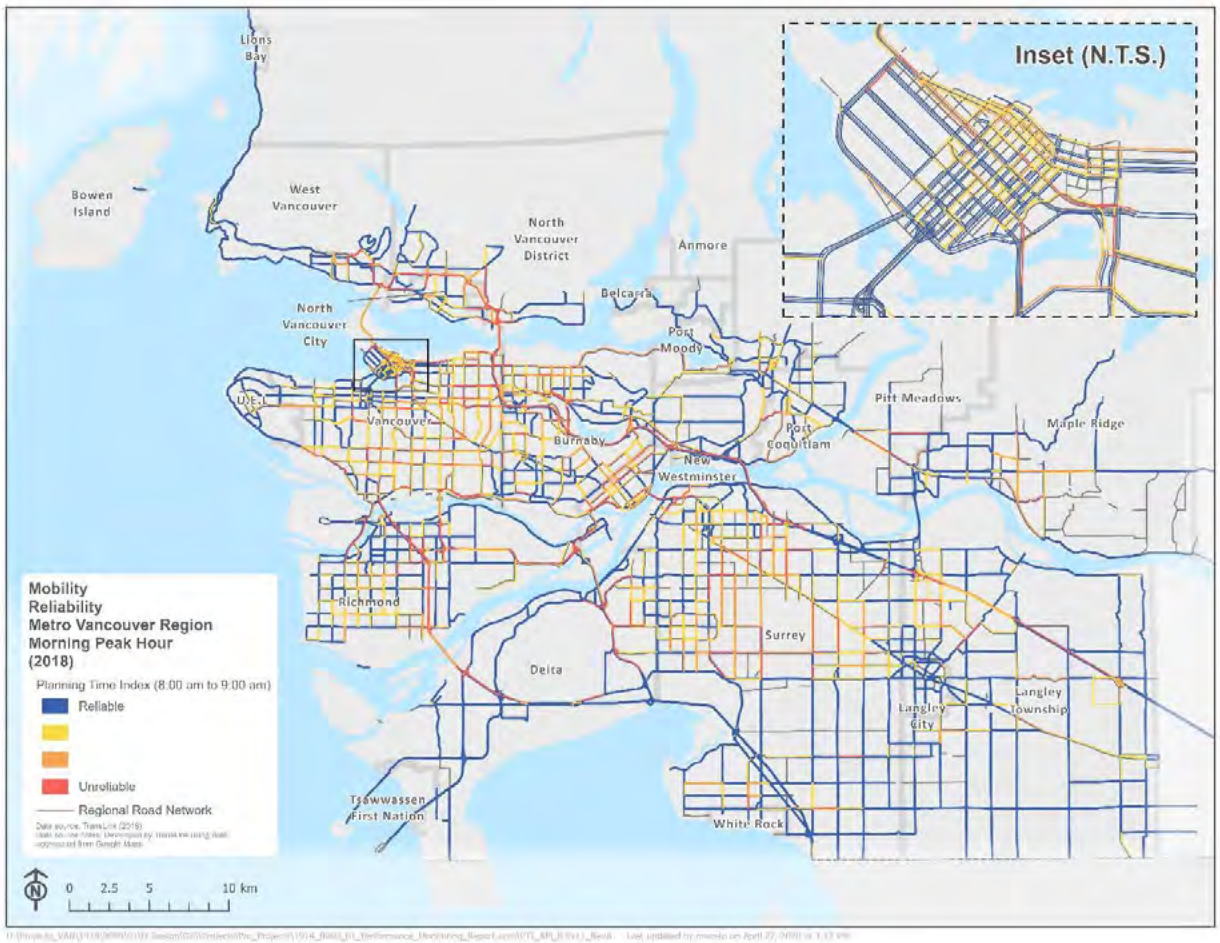
[9] Please refer to the online dashboard for higher resolution maps and additional time periods.

Reliability also changes over the day, with similar patterns to delay. The lowest levels of reliability on most roadways occur in the morning between 8:00 a.m. and 9:00 a.m. and in the afternoon between 5:00 p.m. and 6:00 p.m.

Like delay, reliability information is also available for segments of the RRN between 6:00 a.m. and 8:00 p.m. on a typical weekday in fall of 2018. High delay and low reliability happen on many of the same roadway segments.

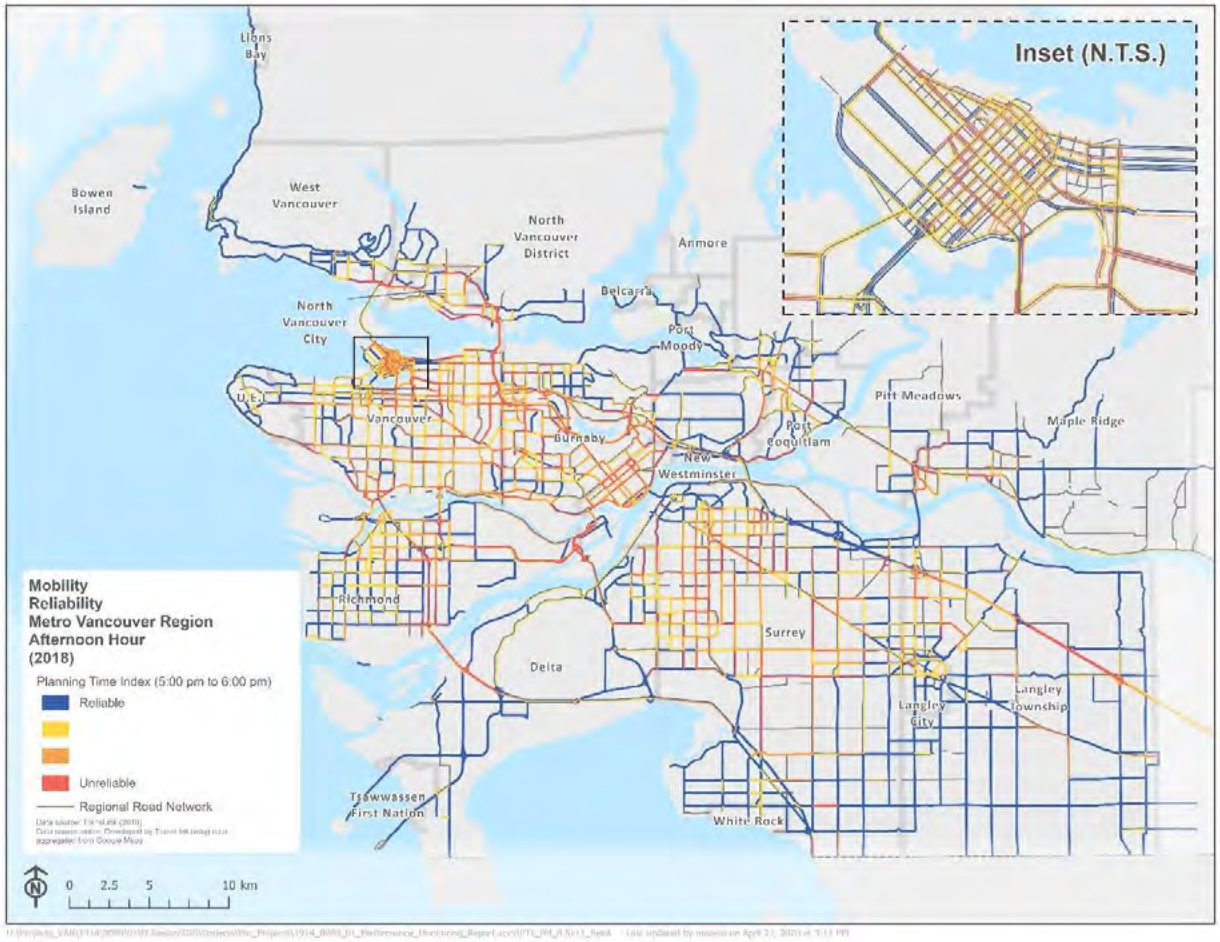
As illustrated for delay, the following maps indicate reliability on the RRN at different times of the day.

*This map illustrates the reliability of the RRN using PTI for **8:00 a.m. to 9:00 a.m.** for a typical weekday in the Fall of 2018. Blue indicates a reliable segment and red indicates un unreliable segment. Each direction of travel is shown separately.*[10]



[10] Please refer to the online dashboard for higher resolution maps and additional time periods.

*This map illustrates the reliability of the RRN using PTI for **5:00 p.m. to 6:00 p.m.** for a typical weekday in the Fall of 2018. Blue indicates a reliable segment and red indicates un unreliable segment. Each direction of travel is shown separately.*[11]



[11] Please refer to the online dashboard for higher resolution maps and additional time periods.

ASSET CONDITION

Roadways are public assets that require regular maintenance. Road condition information allows road authorities to understand how pavement conditions are changing over time and develop a strategy for preventative, immediate, and long-term maintenance and rehabilitation needs. The RRPM report focuses on roughness (International Roughness Index) and pavement condition (Pavement Condition Index) in order to understand asset condition.

Keeping the RRN in a state of good repair is an important function of road authorities.

Roads are an important and valuable public asset and road authorities are responsible for planning and delivering road maintenance on an ongoing basis. Timely maintenance can improve the user experience and reduce the overall life-cycle cost of roadways.

Maintenance of the MRN is done by municipalities, but costs are shared with TransLink.

TransLink provides funding for the ongoing operations, maintenance, and rehabilitation of the MRN. The maintenance of the MRN is done by municipalities and is part of their larger road maintenance programs. TransLink collects data about the condition of the MRN on a regular basis – typically once every three years.

Asset condition indicators provide information about how the roadway looks and feels.

The two measures used reflect how the driver or passenger feels the road (roughness) and what they see on the surface of the road (pavement condition).

Roughness is indicated by the International Roughness Index (IRI).

Changes to road roughness can be felt as users travel over the roadway, but they are not necessarily visible. Drivers and passengers experience higher IRI values as rougher or bumpier roads and lower IRI values as smoother roads. Most roadways have IRI values between 1 m/km and 5 m/km with lower values assigned to smoother roads and higher values assigned to bumpier roads.

Metro Vancouver Regional Asset Condition Statistics

Roughness (average weighted IRI value):	**2.66**
Pavement Condition (average weighted PCI value):	**77.55**

Data source: TransLink 2017. Includes the MRN and some other regional roads.

Pavement condition is indicated by the Pavement Condition Index (PCI).

PCI measures the type, extent, and severity of visible pavement surface distresses. Road surfaces in worse condition may have visible cracking and / or rutting. These conditions can be seen but may not be felt by drivers or passengers. PCI varies from 0 to 100, where 100 represents pavement without any visible distress.

When assessed together, IRI and PCI help road authorities choose a treatment strategy.

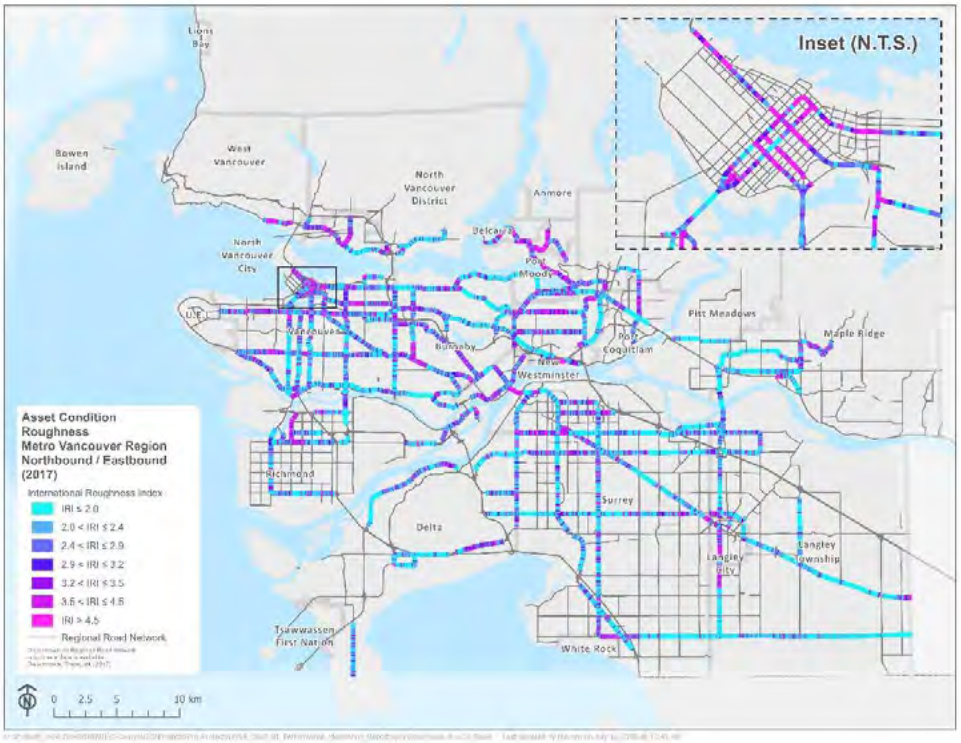
Regular, preventative maintenance and minor rehabilitation lengthen the life span and performance of roads and structures, reducing the need for major rehabilitation or reconstruction in the future.

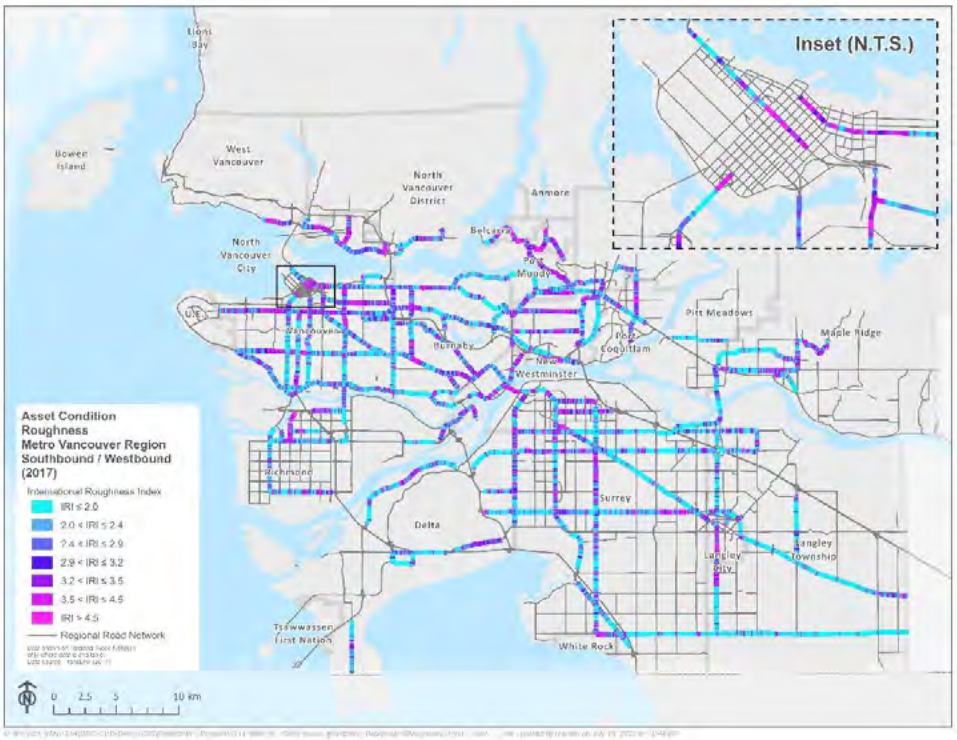
Both IRI and PCI can be aggregated over corridors or areas to understand the overall condition of the road network.

An average weighted IRI or PCI can be calculated for corridors, municipalities, sub-areas, or for the region, as shown in the blue box above.

Note: Asset condition data was provided by TransLink based on a pavement condition audit. The audit collects data using an automated sensor system mounted on a survey vehicle. The asset condition survey is repeated every three years. It was last conducted in 2017 and included all roads that were in the MRN at that time as well as some other regional roads.

Road roughness (IRI) is measured for small sections of road. The two sides of the road are typically measured and illustrated separately. These maps show the 2017 road roughness for select regional roadways across the Metro Vancouver region in 2017.



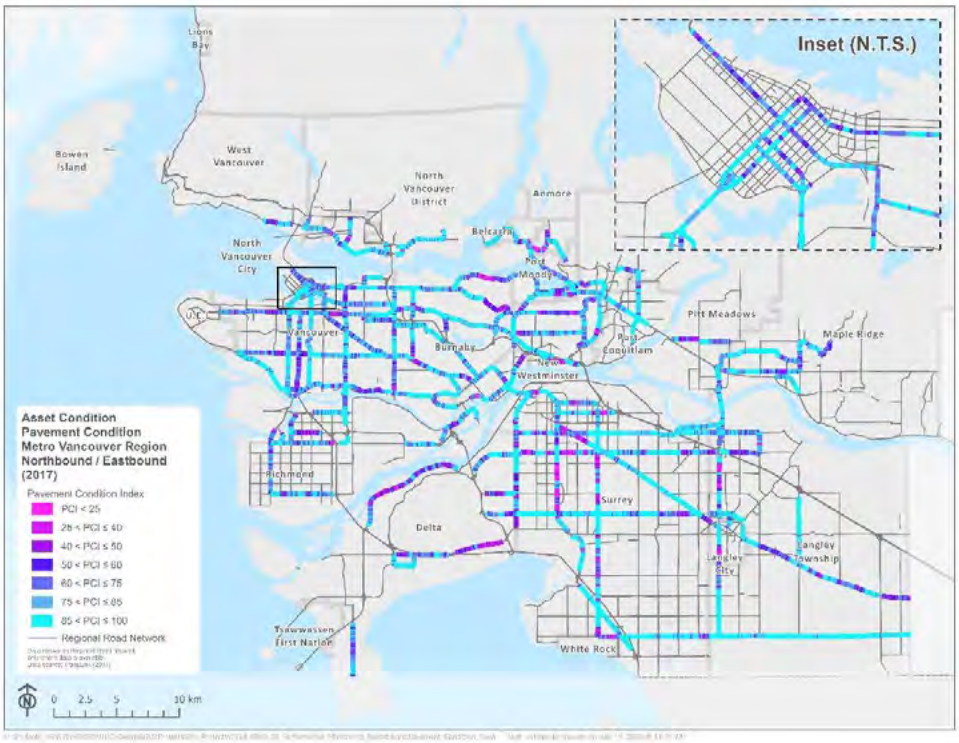


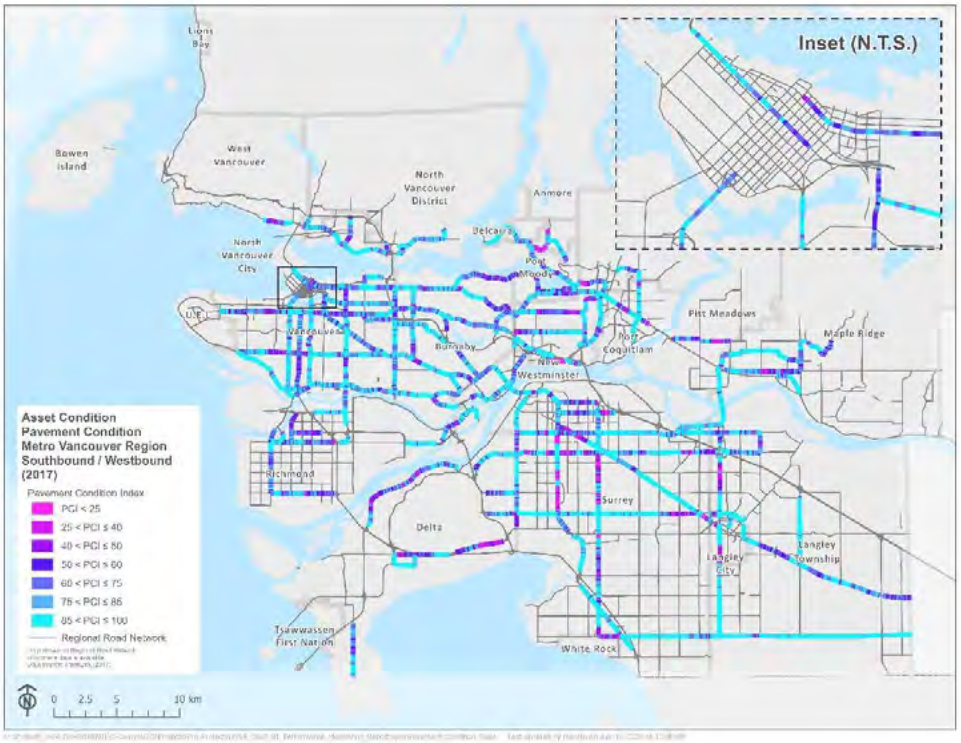
Lower IRI values reflect smoother conditions (shown in turquoise), while higher values indicate rougher conditions (shown in magenta).

The top map shows the roughness in lanes where the direction of travel is northbound or east bound.

The bottom map shows the roughness for lanes where the direction of travel is southbound or westbound are shown.

The pavement condition (PCI) is measured for small sections of road. The two sides of the road are typically measured and illustrated separately. These maps show the 2017 Pavement condition for select regional roadways across the Metro Vancouver region in 2017.





Higher PCI values reflect better conditions (shown in turquoise), while lower values indicate worse conditions (shown in magenta).

The top map shows the PCI in lanes where the direction of travel is northbound or eastbound.

The bottom map shows the PCI for lanes where the direction of travel is southbound or westbound.

LIVABILITY

Regional roadways can have both positive and negative impacts on the livability of the region, communities, and neighbourhoods.

Roads can act as pleasant destinations and conduits to community life, facilitate economic benefits, but they can also increase exposure to noise and air pollution. There is currently limited data available to measure the livability of regional roads. This category is being developed and data is expected to be added in future releases of the RRPM report.

Possible future indicators may include:

- Noise exposure
- Greenhouse gas emissions
- Criteria Air Contaminants emissions
- Sidewalk coverage and / or quality
- All Ages and Abilities Bicycle Facility coverage and / or quality
- Tree Canopy
- Presence of amenities (e.g. benches, water fountains, wayfinding, public art, weather protection)
- Other measures to be determined through consultation and data availability

PART 3: OBSERVATIONS OF THE REGIONAL ROAD NETWORK

The Regional Road Network is extensive and complex, but there are some common patterns and observations that can help us understand emerging issues and challenges.

The performance of the Regional Road Network is complex, and each indicator is driven by local conditions.

The RRN is large and each part of the network has its own distinct local context and patterns. Regional roads serve different roles, have different adjacent land uses, and serve different volumes and types of vehicles.

With further exploration, observations could lead to future identification of issues and challenges.

The information that is documented in this report and the dashboard includes some interesting patterns at different levels – from regional, to corridor, to intersections. Some observations indicate potential issues that can be considered for further exploration, while others may show lessons learned that can be applied to other contexts. In all cases, more data and analysis are needed to make conclusions.

COMMON PATTERNS ON REGIONAL ROADWAYS

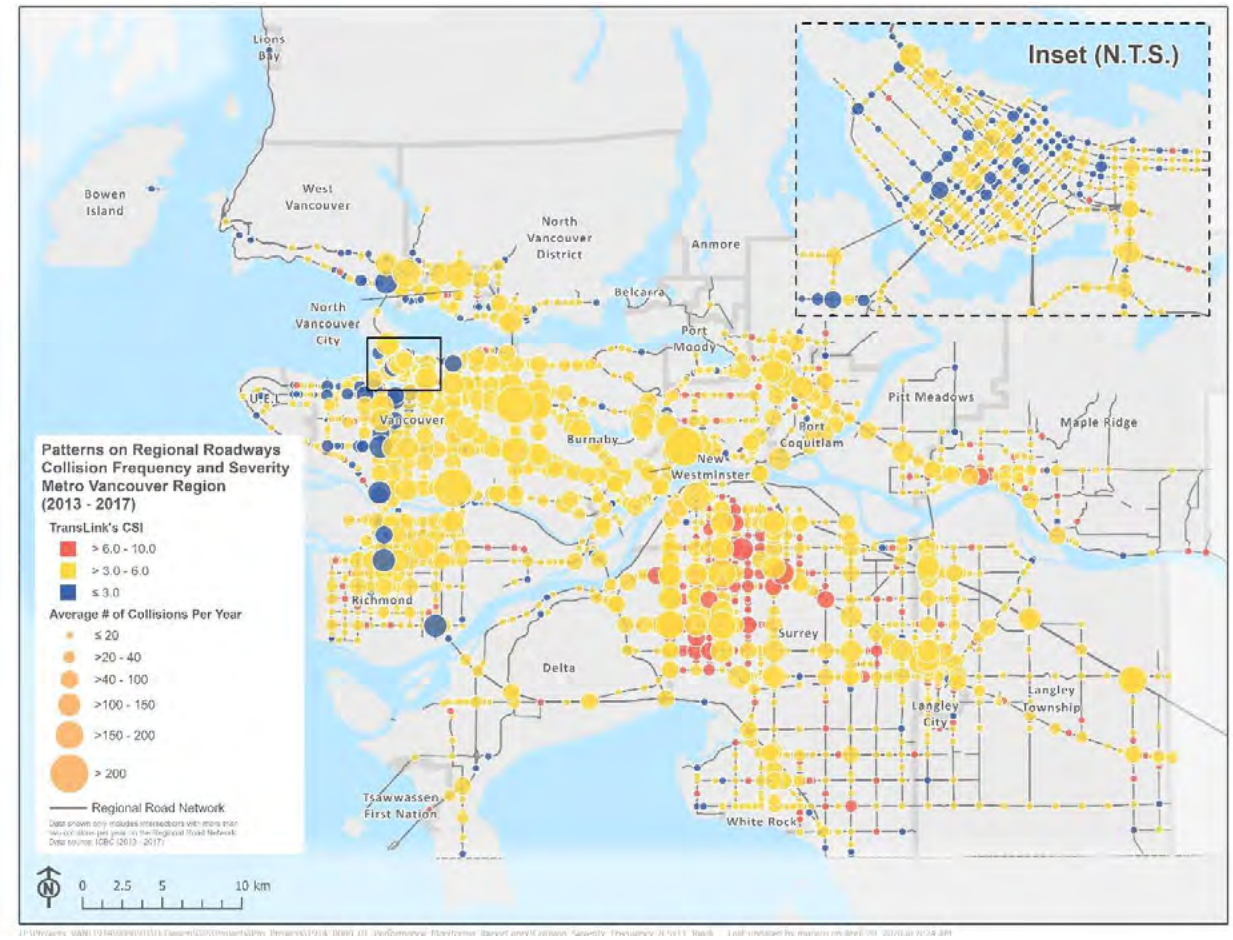
Some intersections have a high frequency of severe collisions.

Motor vehicle collisions occur throughout the Regional Road Network. While no collision is desirable, locations where there is a high to moderate frequency and / or severity have the greatest negative impact on people's wellbeing.

North Surrey has a high concentration of intersections with at least 40 collisions per year and a TransLink CSI of 6.0 or higher. Other parts of the region have a high number of annual collisions and a moderate TransLink CSI value (between 3.0 and 6.0). Although the severity at these locations is lower, the high overall number of collisions means the actual number of crashes resulting in injury or fatality may be higher than at other locations with very low collision frequency and high severity.

The core metro area east of Oak Street in Vancouver, through south Burnaby and New Westminster, has a high concentration of intersections with more than 100 collisions per year and a TransLink CSI value between 3.0 and 6.0. Throughout the region, most intersections with at least 150 collisions per year have TransLink CSI values between 3.0 and 6.0.

This map illustrates both the collision frequency and severity at intersections on the RRN. The size of the circle symbolizes the average number of collisions per year and the colour of the circle indicates the severity of collisions at the intersections. The largest, red circles are intersections with both a high number of collisions and a higher proportion of severe collisions.



Delays caused by collisions are a source of unreliability on the road network.

When collisions occur, they result in interruptions to traffic flow. Severe collisions typically require lane closures to allow emergency services time to treat injuries, clear the site, and investigate the collision (in some cases). Because collision frequency is often correlated with exposure – i.e. the number of vehicles on the road – some of the busiest intersections have the highest frequency of collisions. When roadways are near capacity, even small interruptions to normal traffic operations can have large impacts on travel speeds. These impacts can spread through the network, resulting in queuing and slow travel speeds.[12]

Most of the segments with the highest delay and lowest reliability are approaches to water crossings.

The geography of the Lower Mainland includes several water crossings that limit connectivity and route options. Bridges and tunnels, and the roadways that approach bridges and tunnels, have a discrete number of lanes that can impact the capacity of a corridor. These crossings are an important part of the RRN and support travel between communities, as well as regional, provincial, and national goods movement. As seen in the delay and reliability data included in Part 2, the RRN on the approaches to the crossings experience moderate to high delay and low to moderate reliability in one (or sometimes both) directions during peak periods. In some cases, the crossing itself has high delay and low reliability. In other cases, the crossing itself has no observed issues and it is the approaches to the crossing that experience challenging conditions.

CORRIDOR OBSERVATIONS

Ten unique regional roads located within Metro Vancouver were selected to explore in more detail. The intent was to select corridors that represent a cross section of the regional roads in Metro Vancouver. New corridors will be explored in future iterations of the RRPM report.

The following characteristics were considered when selecting the corridors:

- **Geography** – The corridors provide geographic representation of the region.
- **Classification, Characteristics and Role** – The classification, characteristics, and the role of the corridor within the RRN were considered as part of the corridor selection process. This includes whether it is a bus route, truck route, part of the bicycle network, or a corridor with pedestrian activity.
- **Land use** – The corridors were selected because they are located within a variety of land use contexts. In many cases, the land use context changes along the extent of the corridor.
- **Jurisdiction** – The corridors represent several different jurisdictions, whether municipal, provincial, or federal. In several cases the multi-jurisdictional nature of the corridor makes it unique.
- **Performance** – The safety, mobility, and asset condition of various corridors in the network were reviewed at a high level. These ten corridors were selected because they represent a cross section of the performance results.

[12] It is difficult to visualize the relationship between collisions and reliability because of the scales and time periods of available data.

The remainder of this section provides corridor profiles for each of the ten corridors listed below:

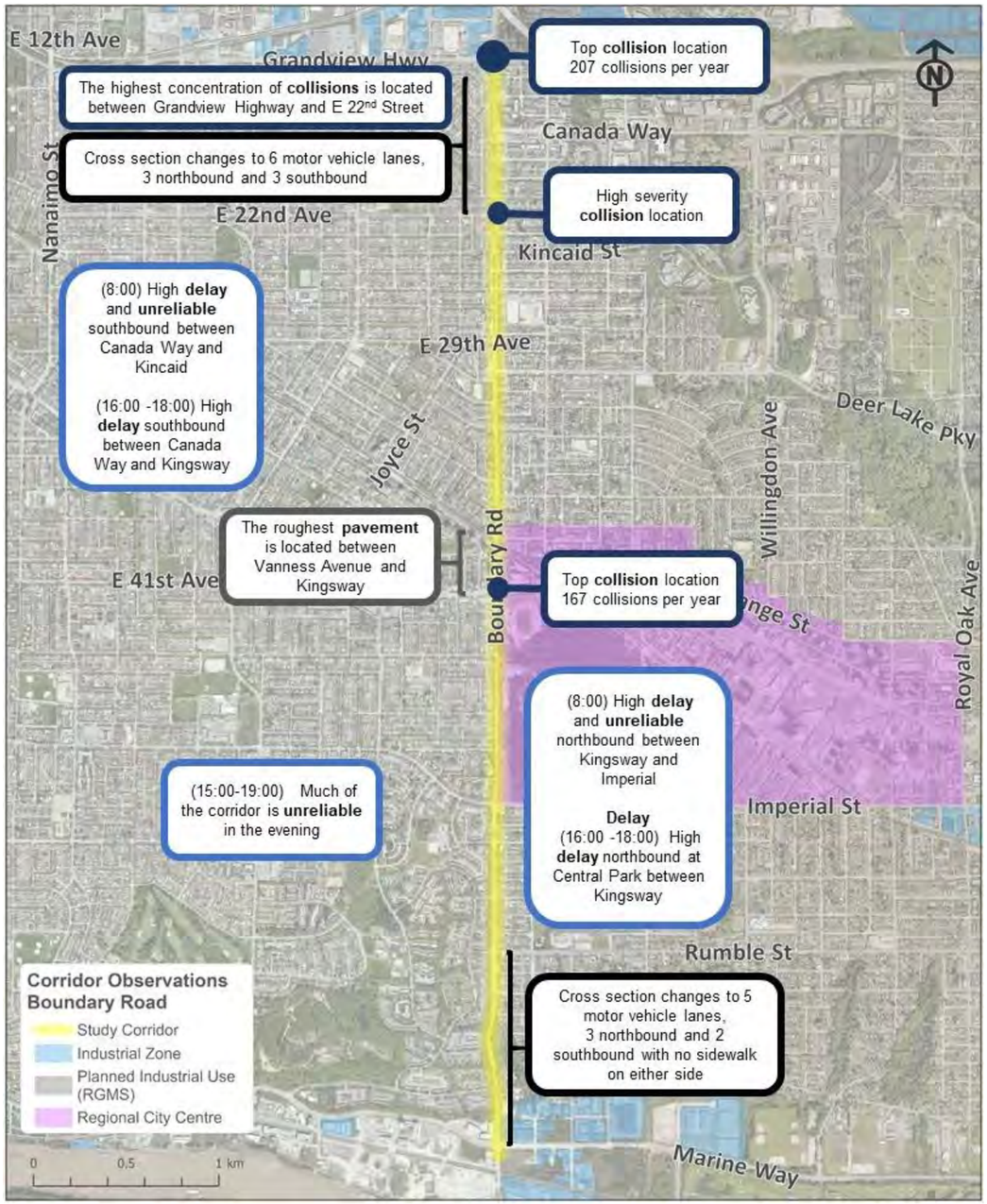
1. **Boundary Road from Grandview Highway to Marine Way** – Boundary Road is located on the border of the City of Vancouver and the City of Burnaby. It is a four-lane arterial road that experiences moderate to high delays and reliability issues during the AM and PM peak.
2. **Lonsdale Avenue from 23rd Street to Esplanade Avenue** - Lonsdale Avenue is located within the City of North Vancouver. It is a four-lane arterial road, it is part of the MRN, a truck route, and a frequent transit route. It intersects the North Shore Regional City Centre with medium to high population density and high pedestrian activity.
3. **Marine Drive from Taylor Way to W Keith Road / 3rd Street** – This section of Marine Drive travels through each of the North Shore municipalities and a portion of it is under provincial jurisdiction. It provides access to Lions Gate Bridge and experiences significant delays and reliability issues based on time of day and direction of travel. It is part of the Frequent Transit network and a RapidBus corridor. The RapidBus corridor had not yet been implemented when the data used for the RRPM report was collected.
4. **Clark Drive / Knight Street from Powell Street to SE Marine Drive** – Clark Drive and Knight Street are located within the City of Vancouver. The six-lane road is a major truck route and provides access to port and industrial lands.
5. **Trans-Canada Highway (Highway 1) from Sprott Street to Brunette Avenue** – This portion of the Provincial Highway is known for having significant delays and reliability issues depending on time of day and the direction of travel.
6. **Lougheed Highway from Pinetree Way to Mary Hill Bypass** – This section of Lougheed Highway is located in the City of Coquitlam and City of Port Coquitlam, a section of the corridor is under provincial jurisdiction. This four-lane roadway is adjacent to several different land use types, it connects several destinations, and functions as an important transit route.
7. **Dewdney Trunk Road from Lougheed Highway to 232 Street** – Dewdney Trunk is located in the City of Maple Ridge parallel to Lougheed Highway. It travels through a Regional City Centre where the character of the corridor changes.
8. **200 Street from 86 Avenue to 56 Avenue** – This section of 200 Street is in the Township of Langley and the City of Langley. The cross section varies along the length of the corridor and passes through several difference land use types.
9. **140 Street from 96 Avenue to 72 Avenue** – 140 Street is in the City of Surrey. It is an arterial road. While the cross section varies, it predominantly has one motor vehicle lane in each direction. The collision severity along this corridor is higher than the regional average.
10. **No. 2 Road/Russ Baker Way from Miller Road to Moncton Street** – No. 2 Road and Russ Baker Way (on Sea Island) are located in the City of Richmond. No. 2 Road is under municipal jurisdiction and Russ Baker Way is federal.

BOUNDARY ROAD FROM GRANDVIEW HIGHWAY TO MARINE WAY

- Delays and unreliability are an issue throughout the afternoon between 3:00 pm and 7:00 pm along most of the corridor.
- The section of the corridor adjacent to Central Park has delays and reliability issues and several high severity collisions were reported.
- Reliability is particularly an issue along much of the corridor except for south of Rumble Avenue, where delays and reliability do not appear to be an issue at any time.
- Multi-jurisdictional ownership can create challenges.
- Collision Frequency - 972 collisions per year / 374 collisions resulting in an injury or fatality, this equates 165 collisions per km/per year.
- Collision Severity Index (CSI)- Combined TransLink CSI for the intersections along the corridor is 4.7 which is similar to the regional average (4.8).
- The southern end of the corridor has fewer reported collisions, it also has fewer intersections or land use mix.
- The roughness of the corridor (IRI 2.25) is better than the regional average (2.66).
- The pavement condition along the corridor (PCI 80.12) is better than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 6 kilometers (5.9 km)
Location	Burnaby / Vancouver border
Jurisdiction	City of Burnaby / City of Vancouver
Classification	Major Road Network
Characteristics	Municipal Truck Route, Bus Route (#26 and #28)
Land Use	Land use on either side of Boundary Road is predominantly single family residential with some pockets of multi-family and some commercial/retail. Central Park is located on the east side of the corridor between Kingsway and Imperial Street. The corridor is adjacent to a Regional City Centre located in Burnaby.
Typical Cross Section	• 4 lanes (2 northbound, 2 southbound) with additional lanes at major intersections • Sidewalk or multi-use pathway on both sides of the street • No on-street cycling facilities • Parking is available in some locations, and with some time restrictions
Other Considerations	• All major intersections on Boundary Road are signalized with pedestrian activation. • BC Parkway intersects Boundary Road at Vanness Avenue.

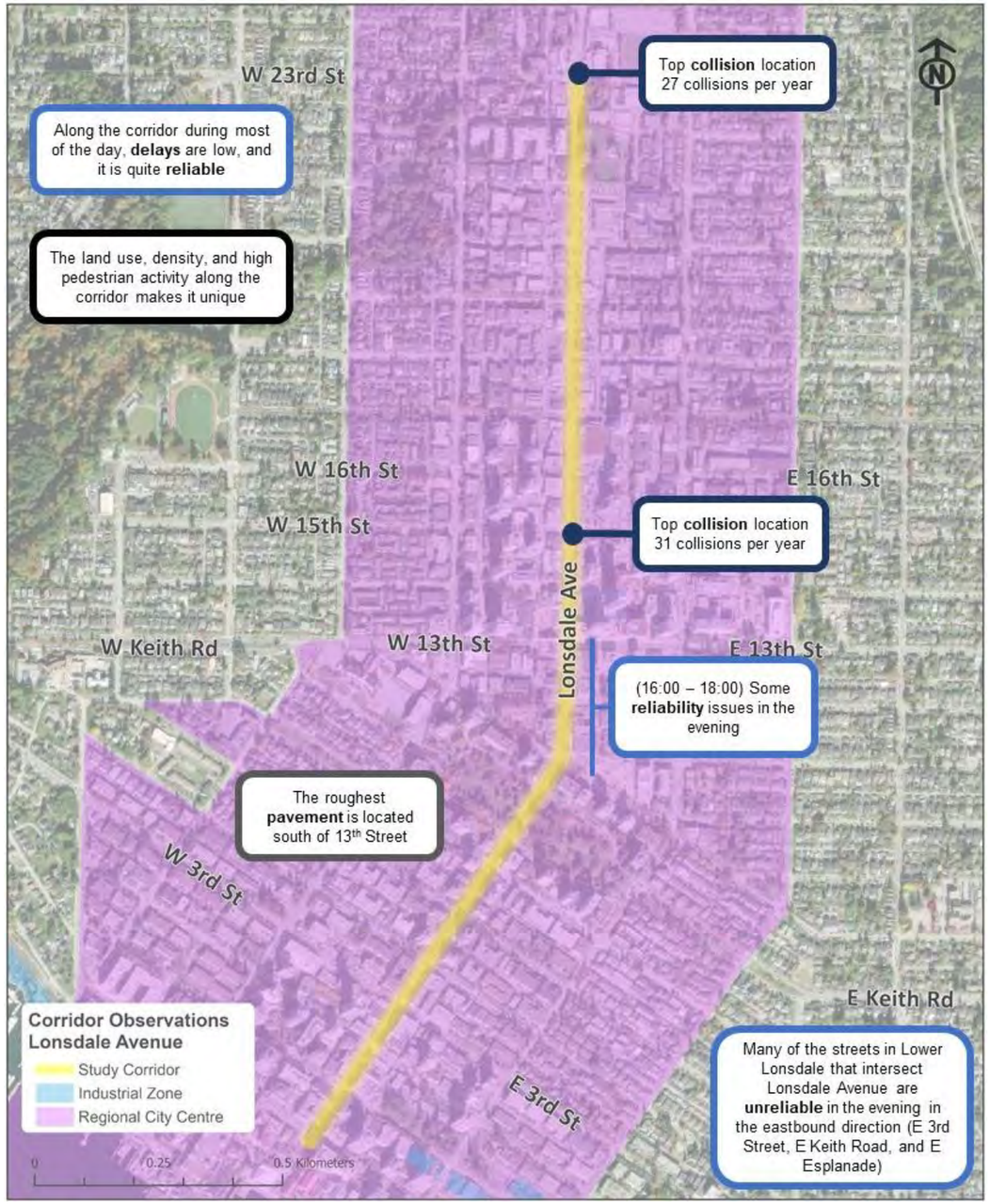


LONSDALE AVENUE FROM 23RD STREET TO ESPLANADE AVENUE

- Delays are low and it is quite reliable along the corridor during most of the day.
- Delays and reliability are a bigger issue on cross streets.
- Collision severity is low compared to the regional average. Combined TransLink CSI for the intersections along the corridor is 2.9 which is below the regional average (4.8).
- Collision Frequency - 237 collisions per year / 67 collisions resulting in an injury or fatality, this equates to 103 collisions per km/per year.
- The intersections with the highest number of collisions on this corridor have a relatively low frequency compared to other, similar corridors in the region.
- The land use, density, and high pedestrian activity along the corridor makes it unique.
- The roughness of the corridor (IRI 3.6) is worse than the regional average (2.66)
- The pavement condition along the corridor (PCI 72.56) is worse than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 2 kilometres (2.3 km)
Location	North Shore
Jurisdiction	City of North Vancouver
Classification	Major Road Network
Characteristics	Municipal Truck Route, Frequent Transit Network
Land Use	Land use along Lonsdale Avenue is high to medium density residential and commercial. Much of Lonsdale Avenue is within a Regional City Centre and is home to several significant destinations that serve the North Shore.
Typical Cross Section	• 4 lanes (2 northbound, 2 southbound) • Sidewalks on both sides of the street. • There are no cycling facilities along Lonsdale Avenue. • Parking is available on both sides of the street along most of the corridor.
Other Considerations	• The City recently installed signalization at previously unsignalized intersections in lower Lonsdale, there still are some intersections that are unsignalized. • Lonsdale is a high pedestrian activity corridor. • Several bus routes travel along Lonsdale Avenue.

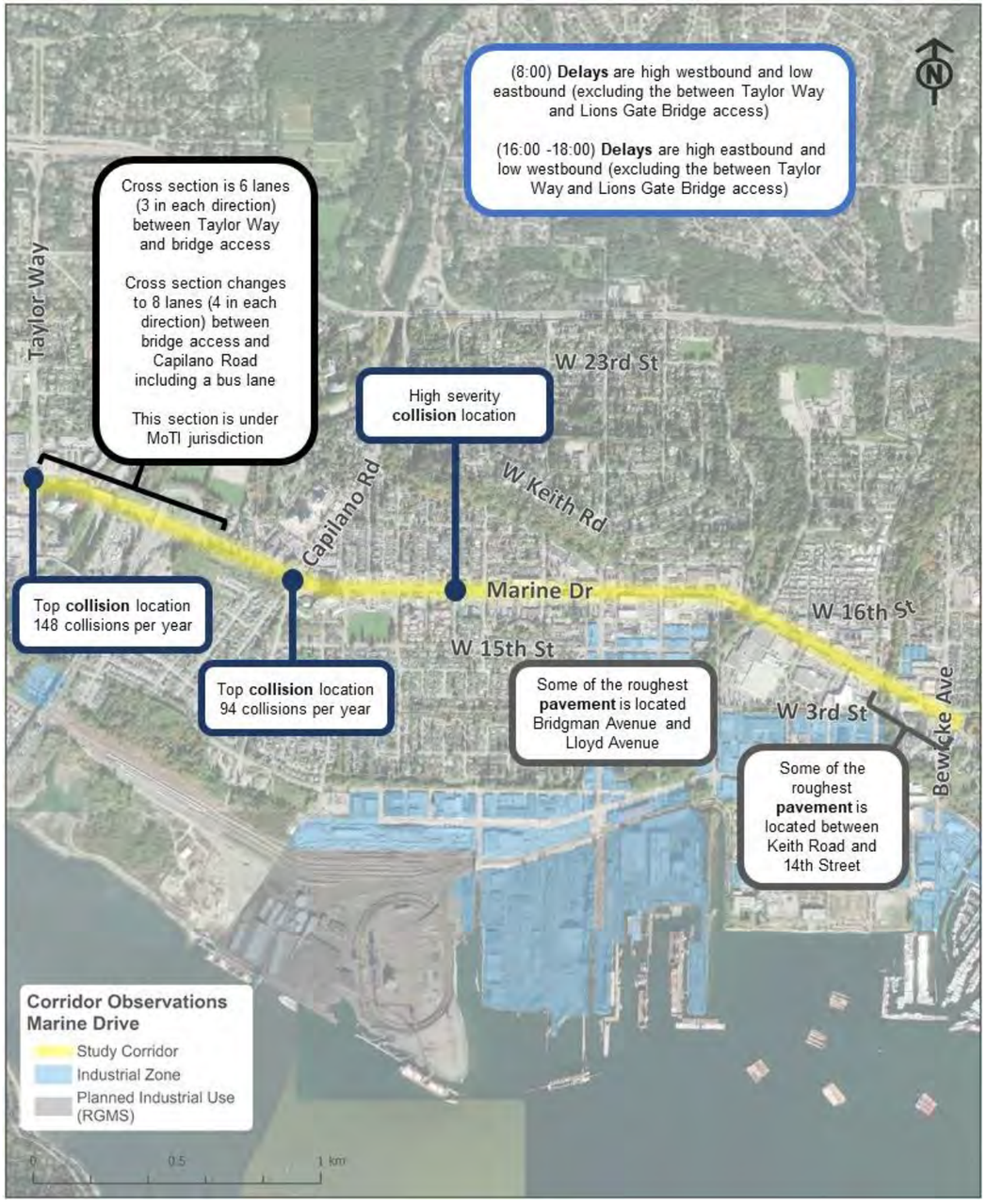


MARINE DRIVE FROM TAYLOR WAY TO W KEITH ROAD / 3RD STREET

- Delays along the corridor are heavily impacted by Lions Gate Bridge and travel direction.
- Segments of the corridor can be unreliable throughout the day (7:00 to 21:00).
- Delay and reliability issues are the most significant between Lions Gate Bridge access and 16th Street W (westbound direction) and between Taylor Way and the bridge access (eastbound direction).
- Multi-jurisdictional road ownership can create challenges.
- Transit priority measures are in place along the corridor to reduce delay and improve reliability for buses. This was implemented in 2020.[13]
- Collision severity is comparable to the regional average of 4.8.
- Collision Frequency - 604 collisions per year / 190 collisions resulting in an injury or fatality, this equates to 180 collisions per km/per year.
- The roughness of the corridor (IRI 3.4) is worse than the regional average (2.66)
- The pavement condition along the corridor (PCI 80.95) is better than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 3 kilometres (3.35 km)
Location	North Shore
Jurisdiction	Ministry of Transportation and Infrastructure (MoTI), District of North Vancouver, City of North Vancouver, District of West Vancouver
Classification	Major Road Network and Provincial Highway (portion)
Characteristics	Municipal Truck Route, Rapid Bus Route (R2)
Land Use	Land use varies and includes medium to lower density residential, commercial, and light industrial.
Typical Cross Section	• 4 lanes (2 westbound, 2 eastbound) • Sidewalks on both sides of the street. • Painted bicycle lanes westbound between Mackay Road and Keith Road. • Limited on-street parking is available.
Other Considerations	• The corridor is under construction (fall 2019 to spring 2020) as part of the Mosquito Creek Bridge replacement project.



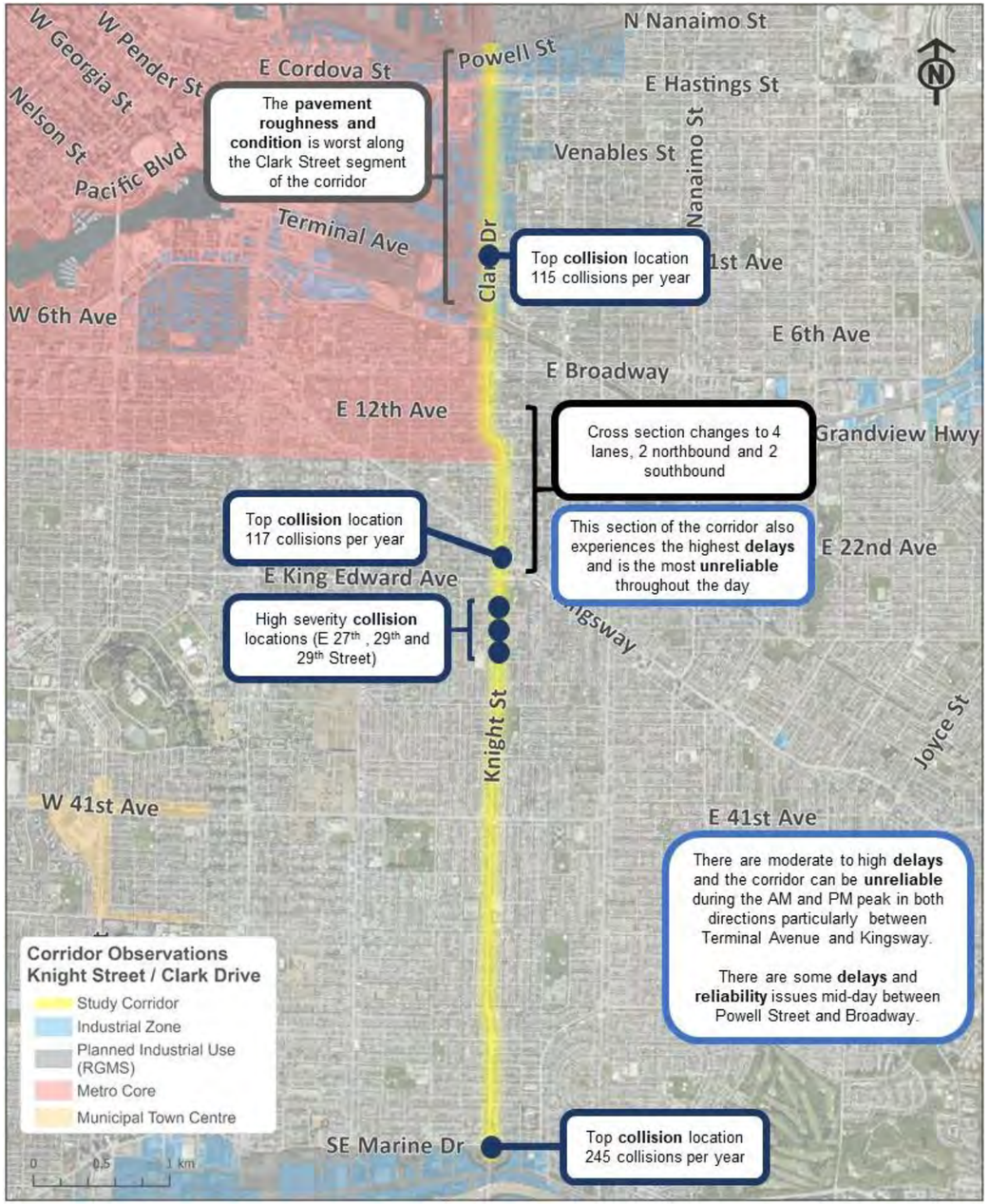
[13] The mobility data in this report represents Fall 2018 and does not include the transit priority measures.

CLARK DRIVE/KNIGHT STREET CORRIDOR FROM POWELL STREET TO SE MARINE DRIVE

- There are moderate to high delays and the corridor can be unreliable during the morning and afternoon peak periods in both directions between Terminal Avenue and Kingsway.
- Between 12th Avenue and Kingsway the corridor is two lanes in each direction. This is the location that experiences the highest delays and is the most unreliable throughout the day.
- Collision severity is comparable to the regional average.
- Collision Frequency - 1733 collisions per year / 661 collisions resulting in an injury or fatality, this equates to 217 collisions per km/per year.
- The roughness of the corridor (IRI 3.0) is worse than the regional average (2.66)
- The pavement condition along the corridor (PCI 73.92) is worse than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 8 kilometres (8 km)
Location	Vancouver
Jurisdiction	City of Vancouver
Classification	Major Road Network
Characteristics	Municipal Truck Route, Frequent Transit Network
Land Use	Predominantly single family residential between W 7th Avenue and SE Marine Drive with some high density residential at the northern and southern extent. Between Powell Street and W 7th Avenue the land use is predominantly industrial.
Typical Cross Section	• 6 lanes (2 northbound, 2 southbound), with additional turn lanes at major intersections. • Sidewalks on both sides of the street. • There are no designated cycling facilities along the corridor. There are several designated cycling routes intersect the corridor at Adanac Street, E 6th Avenue, E 10th Avenue, E 37th Avenue, E 47th Avenue, E 59th Avenue. • There are some locations along the corridor where on-street parking is permitted, most is time restricted.
Other Considerations	• This corridor provides access to the Port of Vancouver and an important industrial area.

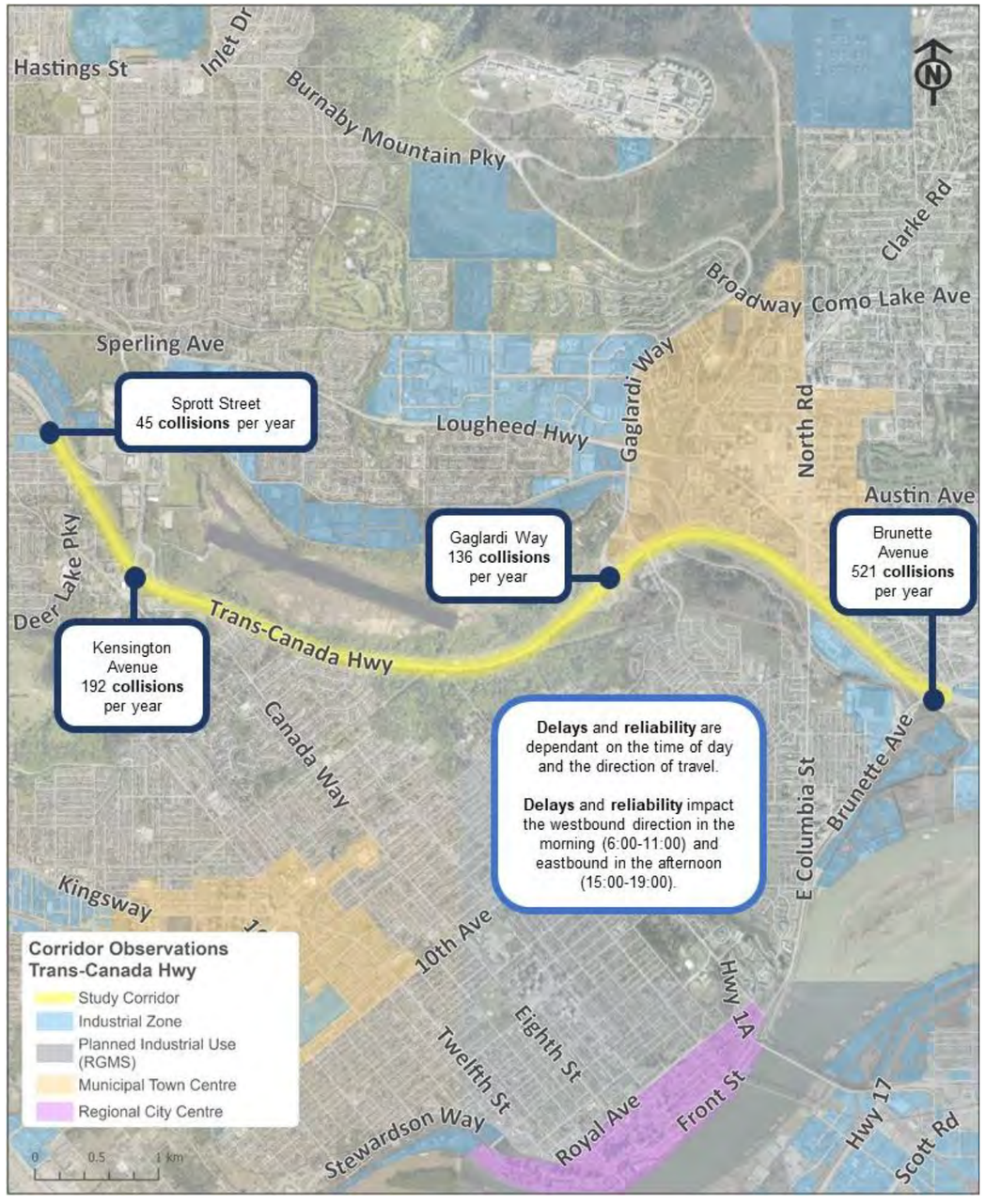


TRANS-CANADA HIGHWAY (HIGHWAY 1) FROM SPROTT STREET TO BURNETTE AVENUE

- Delays and reliability are an issue along this section of the TransCanada Highway throughout the day.
- Morning delays are high in the westbound direction between 6:00 and 10:00 along the length of the corridor.
- The corridor is unreliable in the westbound direction between 6:00 and 11:00.
- Afternoon delays are high in the eastbound direction between 15:00 and 19:00 along the length of the corridor.
- The corridor is unreliable in the eastbound direction between 14:00 and 19:00.
- Delays and reliability are less of an issue east of Burnette Avenue (outside of the study extent) in the afternoon peak period.
- Collisions are only presented at the interchange locations.
- Collision Frequency - 912 collisions per year / 419 collisions resulting in an injury or fatality.
- Collision severity is comparable to the regional average.
- Asset condition data is not available for this corridor.

CORRIDOR PROFILE

Length	Approximately 8 kilometres (8.7 km)
Location	Burnaby / Coquitlam
Jurisdiction	MoTI
Classification	Provincial Road
Characteristics	Provincial Road
Land Use	Highway corridor predominantly located through green space (Burnaby Lake).
Typical Cross Section	• 8 lanes (4 westbound, 4 eastbound) • One lane in each direction is a designated HOV lane.
Other Considerations	• This corridor extent includes 4 interchanges.

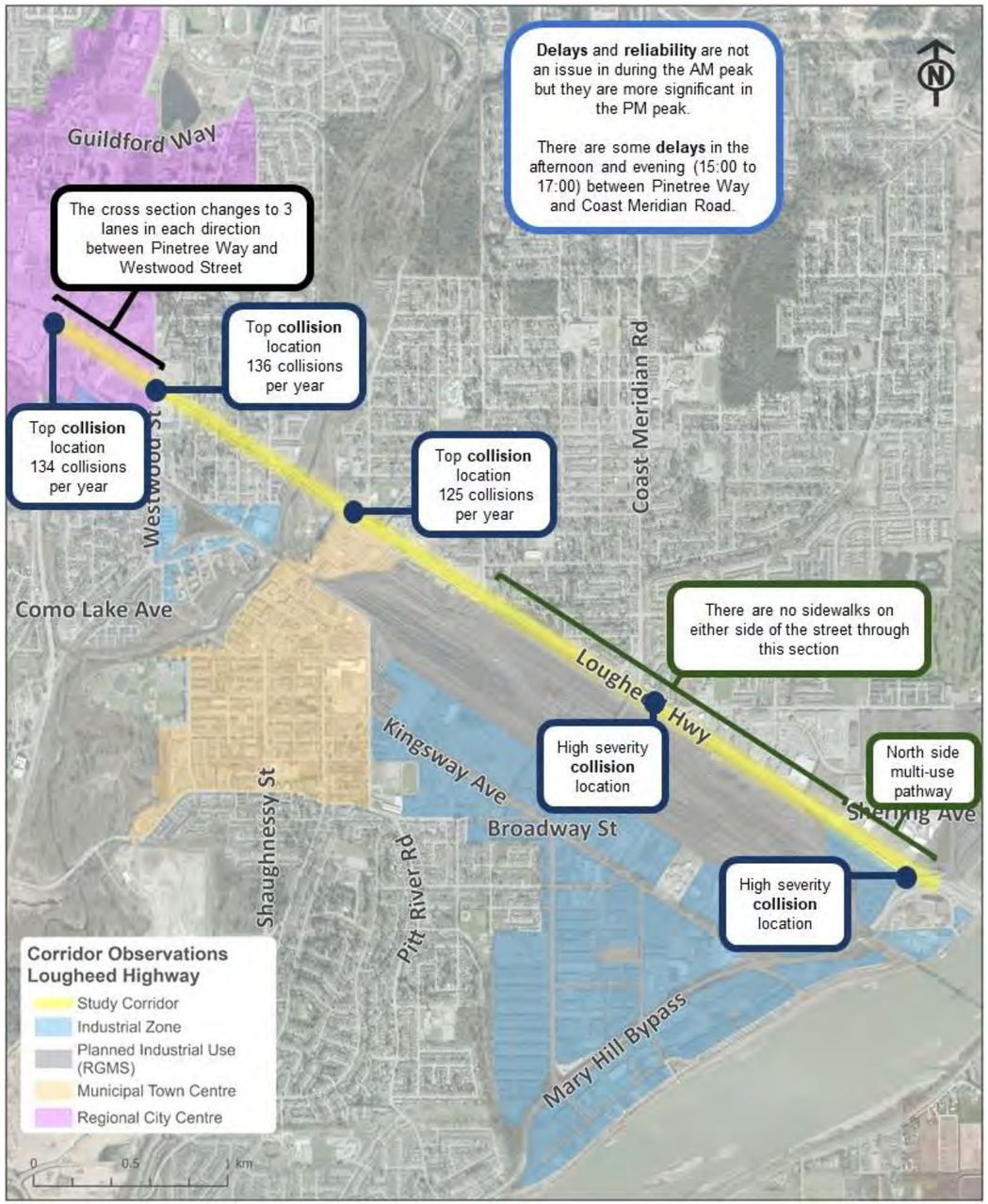


LOUGHEED HIGHWAY FROM PINETREE WAY TO MARY HILL BYPASS

- Delays and reliability are not an issue in the morning but they are more significant in the afternoon.
- There are some delays in the afternoon and evening (15:00 to 17:00) between Pinetree Way and Coast Meridian Road.
- During the afternoon peak period (16:00 to 18:00) the corridor is less reliable between Pinetree Way and Coast Meridian Road.
- Multi-jurisdictional ownership can create challenges.
- Combined TransLink CSI for the intersections along the corridor is 5.3 which is higher the regional average (4.8).
- Collision Frequency - 812 collisions per year / 349 collisions resulting in an injury or fatality, this equates to 155 collisions per km/per year.
- The roughness of the corridor (IRI 2.40) is better than the regional average (2.66).
- The pavement condition along the corridor (PCI 81.53) is better than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 5 kilometres (5.28 km)
Location	Tri-Cities
Jurisdiction	City of Coquitlam, City of Port Coquitlam, MoTI
Classification	Major Road Network, Provincial Road
Characteristics	Municipal Truck Route, Rapid Bus Route (R2), identified as part of the Major Bikeway Network
Land Use	Small and larger scale commercial, predominantly industrial with some single family residential.
Typical Cross Section	• 4 lanes (2 northbound, 2 southbound), with additional turn lanes at major intersections. • Sidewalks are not constant along the corridor, there are segments of the corridor where there are no sidewalks on either side of the street. • There is some shoulder space for cycling, but the facility is not consistent along the corridor. Parking is not permitted along most of the corridor.
Other Considerations	• The corridor provides access to Coquitlam Centre.

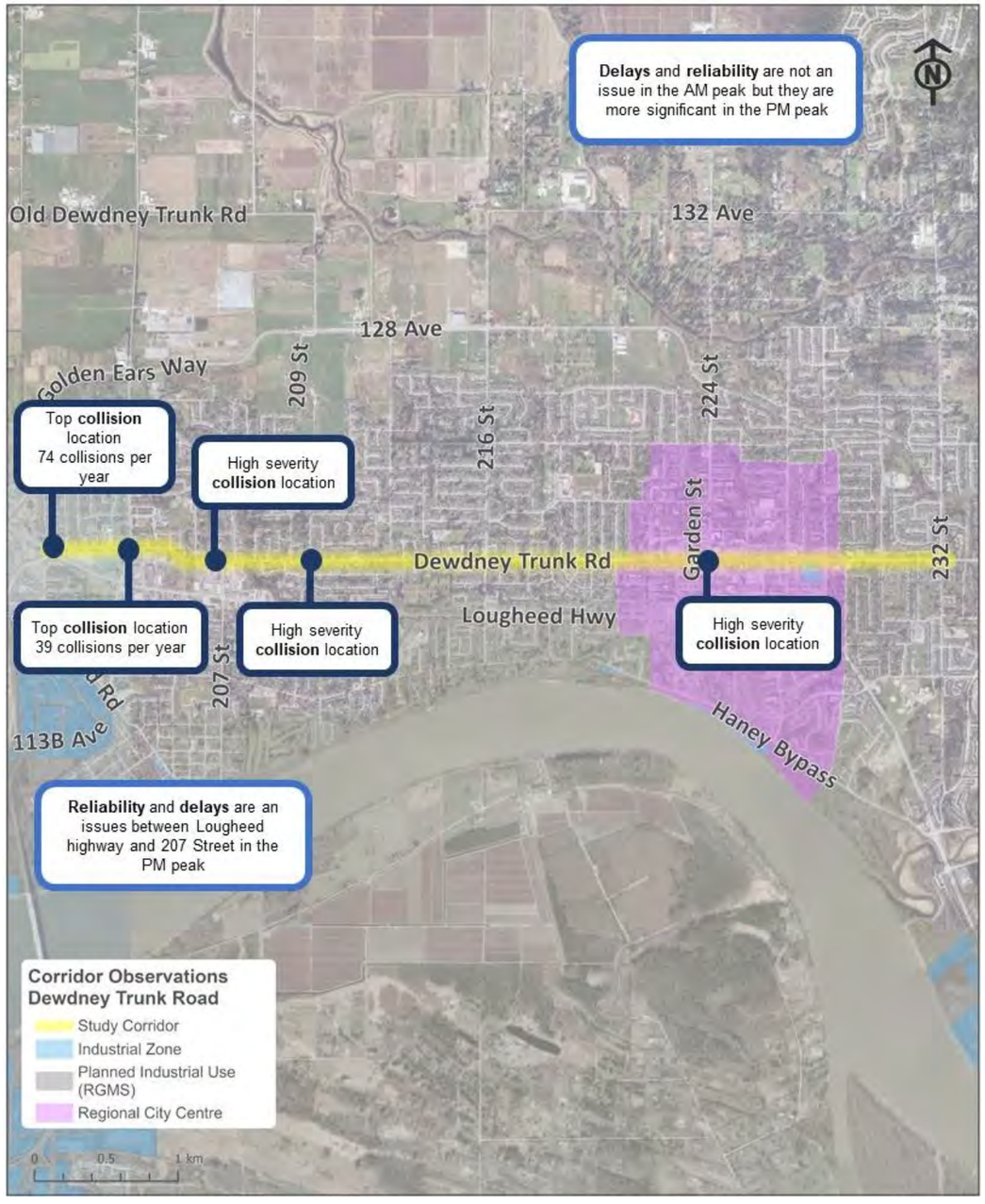


DEWDNEY TRUNK ROAD FROM LOUGHEED HIGHWAY TO 232 STREET

- Delays and reliability are not an issue in the morning, but they are more significant in the afternoon.
- There are some delays in the afternoon and evening (15:00 to 18:00) between Lougheed Highway and 207 Street eastbound.
- During the afternoon peak period (16:00 to 18:00) the corridor is less reliable particularly between Lougheed Highway and 207 Street and between 216 and 232 Street in the eastbound direction.
- Combined TransLink CSI for the intersections along the corridor is 5.5 which is higher than the regional average (4.8).
- Collision Frequency – 403 collisions per year / 182 collisions resulting in an injury or fatality, this equates to 65 collisions per km/per year.
- The roughness of the corridor (IRI 2.73) is comparable to the regional average (2.66).
- The pavement condition along the corridor (PCI 68.00) is worse than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 6 kilometres (6.2 km)
Location	Maple Ridge
Jurisdiction	City of Maple Ridge
Classification	Major Road Network
Characteristics	Regional Road, Frequent Transit Network
Land Use	The land use along the corridor is a mx of single family residential, with pockets of commercial and rental. A section of the corridor is located within a Regional City Centre.
Typical Cross Section	• 4 lanes (2 westbound, 2 eastbound), with additional turn lanes at major intersections. • Sidewalks are located on both sides of the corridor. • There are no designated cycling facilities along the corridor. • Parking is not permitted along the corridor except within the Regional City Centre.
Other Considerations	• Within the Regional City Centre there are three crosswalks with pedestrian overhead flashers. One of these locations (Dewdney Trunk Road and Garden Street) scored high on the Crash Severity Index (6.4).

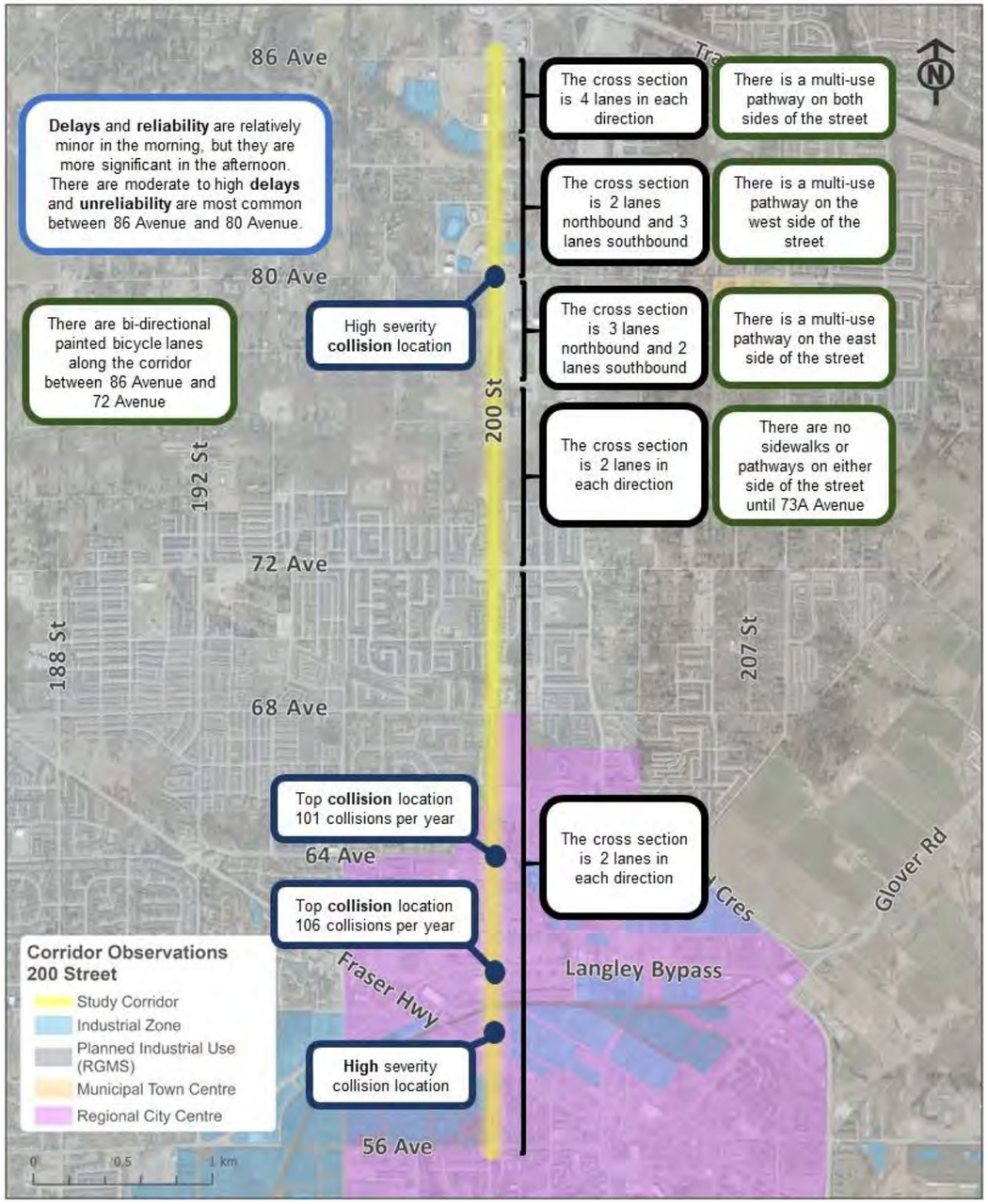


200 STREET FROM 86 AVENUE TO 56 AVENUE

- Delays and reliability are relatively minor in the morning, but they are more significant in the afternoon.
- Moderate to high delays and unreliability are most common between 86 Avenue and 80 Avenue.
- During the afternoon peak period (16:00 to 18:00) the corridor is less reliable, particularly between 64 Avenue and 56 Avenue in both directions.
- Combined TransLink CSI for the intersections along the corridor is 5.2 which is slightly higher than the regional average (4.8).
- Collision Frequency – 791 collisions per year / 334 collisions resulting in an injury or fatality, this equates to 129 collisions per km/per year.
- The roughness of the corridor (IRI 2.40) is comparable to the regional average (2.66).
- The pavement condition along the corridor (PCI 74.28) is worse than the regional average (77.16).

CORRIDOR PROFILE

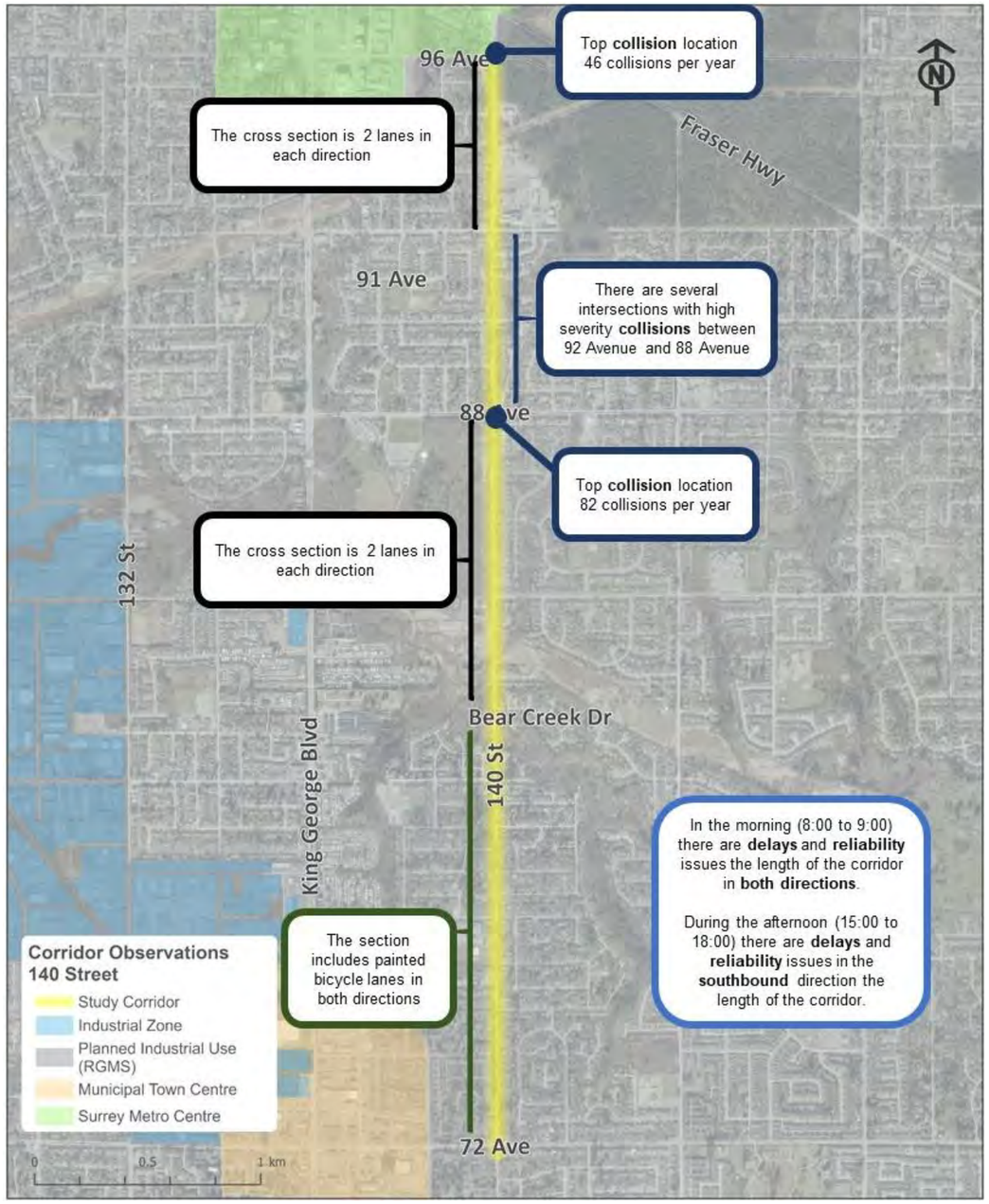
Length	Approximately 6 kilometres (6.1 km)
Location	Langley
Jurisdiction	Township of Langley and City of Langley
Classification	Major Road Network
Characteristics	Municipal Truck Route, Major Bikeway Network, Bus Route (320, 501, 590, 595)
Land Use	The land use along the corridor varies. At the northern extent it is more rural with larger scale commercial. It then transitions to single family residential. The southern section of the corridor is located within a Regional City Centre.
Typical Cross Section	• The cross section of the corridor varies. • Sidewalks or a multi-use pathway are located on at least one side of the street along most of the corridor. • There are painted bicycle lanes or a paved shoulder on both sides of the street between 86 Avenue and 72 Avenue.



140 STREET FROM 96 AVENUE TO 72 AVENUE

- During the morning peak hour (8:00 to 9:00) there are delays and reliability issues the length of the corridor in both directions.
- During the afternoon peak period (15:00 to 18:00) there are delays and reliability issues in the southbound direction the length of the corridor.
- There are several intersections along the corridor that score high on the Collision Severity Index (CSI). The Combined TransLink CSI for the intersections along the corridor is 6.4 which is higher than the regional average (4.8).
- Collision Frequency – 332 collisions per year / 194 collisions resulting in an injury or fatality, this equates to 69 collisions per km/per year.
- Asset condition data is not available for this corridor.

CORRIDOR PROFILE	
Length	Approximately 5 kilometres (4.8 km)
Location	Surrey
Jurisdiction	City of Surrey
Classification	Primary / Major Arterial
Characteristics	Regional Road, Bus Route (325, 326)
Land Use	The land use along the corridor is preliminary single family residential. Bear Creek Park and Simon Cunningham Elementary School are located adjacent to the corridor. The northern extent of the corridor is the southern extent of the Surrey Metro Centre.
Typical Cross Section	• The cross section of the corridor varies but typically has two motor vehicle lanes, one in each direction. • Sidewalks or a multi-use pathway are located on at least one side of the street along most of the corridor. • There is a multi-use pathway on the west side of the street between 88 Avenue and Bear Creek Drive. There are painted bicycle lanes on both sides of the street between Bear Creek Drive and 72 Avenue. • Parking is permitted on the corridor south of Bear Creek Drive.
Other Considerations	• Green Timbers Greenway crosses 140 Street between 94a Avenue and 93a Avenue. • There are several unsignalized pedestrian crossings along the corridor.

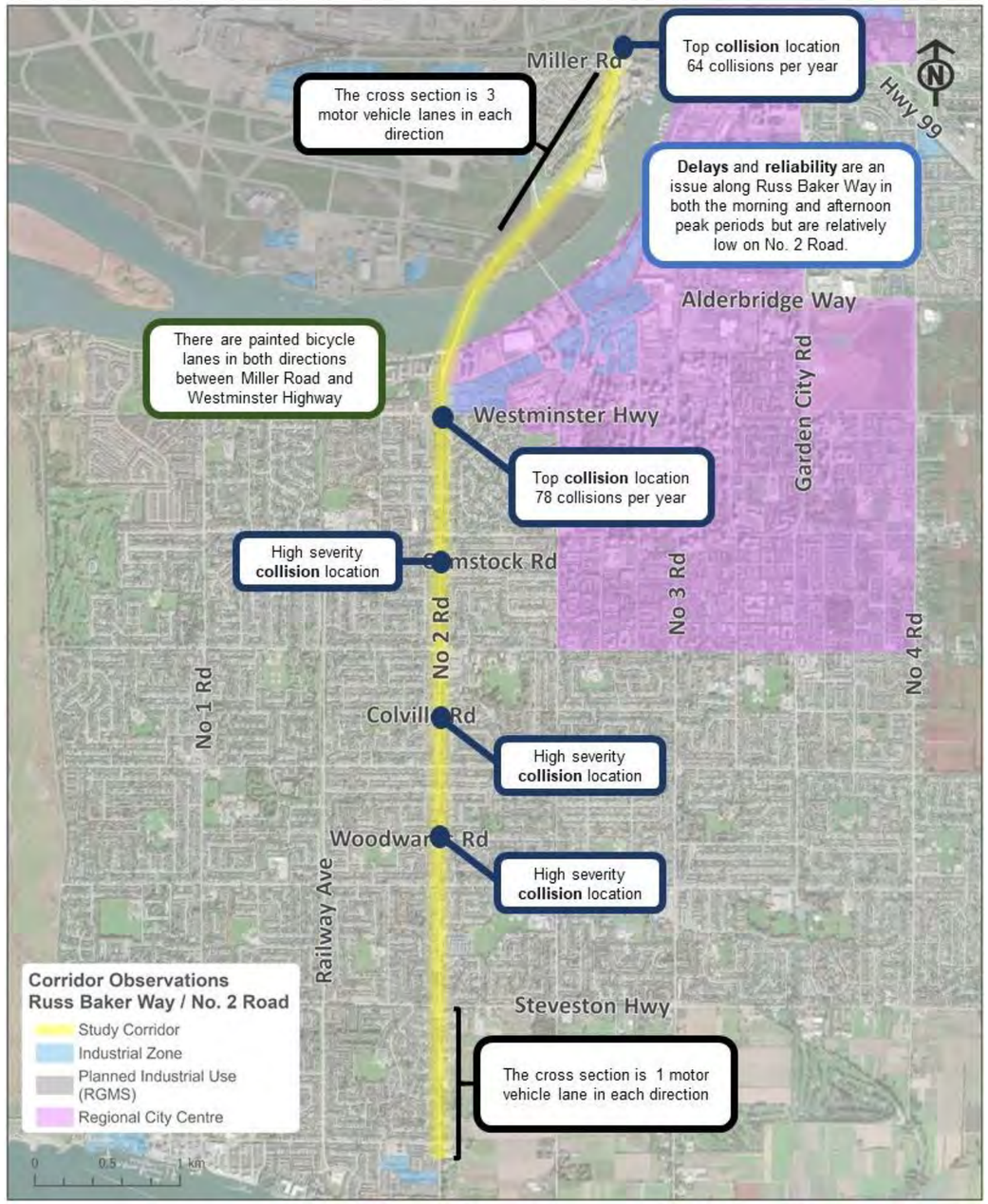


NO. 2 ROAD/RUSS BAKER WAY FROM MILLER ROAD TO MONCTON STREET

- Delays and reliability are an issue along Russ Baker Way in both the morning and afternoon peak periods but are relatively low on No. 2 Road.
- Delays and reliability on Russ Baker Way in the morning are in the northbound direction. During the afternoon, delays and reliability issues are in the southbound direction.
- Combined TransLink CSI for the intersections along the corridor is 4.6 which is slightly lower than the regional average (4.8). Though there are three intersections along the corridor that have a CSI that is higher than 6.0.
- Collision Frequency – 393 collisions per year / 162 collisions resulting in an injury or fatality, this equates to 50 collisions per km/per year.
- Asset Condition information is not available for Russ Baker Way.
- The roughness of No. 2 Road (IRI 2.32) is slightly lower than the regional average (2.66).
- The pavement condition along No. 2 Road (PCI 75.22) is worse than the regional average (77.16).

CORRIDOR PROFILE

Length	Approximately 8 kilometres (7.83 km)
Location	Richmond / YVR
Jurisdiction	City of Richmond / Federal (federal jurisdiction ends at Inglis Drive)
Classification	Major Road Network, Federal Road, Minor Arterial (south of Steveston Hwy)
Characteristics	Regional Road, Bus Route (402, 412)
Land Use	The land use along the corridor is predominantly single family residential. There are some pockets of commercial land use along the corridor. At the northern extent of No. 2 Road and along Russ Baker Way, the land use is industrial. The BCIT Aerospace Technology Campus is located adjacent to the corridor. There are also some park and agricultural land adjacent to the corridor.
Typical Cross Section	• The cross section of the corridor varies but typically has 4 motor vehicle lanes (2 northbound and 2 southbound). • Sidewalks are located on both sides of No.2 Road. • There are no sidewalks along Russ Baker Way but there is a multi-use pathway on the west side of most of the corridor. • There is a multi-use pathway on the east side of No. 2 Road south of Steveston Highway. • There are painted bicycle lanes along the corridor between Miller Road and Westminster Highway.



PART 4: NEXT STEPS

Measuring the performance of the Regional Road Network is the first step towards more integrated, performance-based decision making.

The 2020 RRPM report creates a base case that will allow us to monitor changes in the way the RRN performs over time. It will inform regional decision making regarding where and what type of changes to policy and infrastructure will best support regional goals. The RRPM report also identified other indicators and data that are needed for a complete picture of road network performance.

HIERARCHY OF RESPONSE STRATEGIES

A hierarchy of responses is a thoughtful approach to responding to road network performance issues.

The hierarchy of responses is a framework to organize responses to issues with safety, mobility, asset condition, or livability on and around the RRN. The framework suggests that each level in the hierarchy should be investigated – either by implementing and measuring the results or through a technical assessment – before considering the next level of response.

The first level of response is managing demands on the road network. This may include improving walking, cycling, and transit to make these modes more attractive, reliable, and comfortable, while applying travel demand management – such as mobility pricing – to reduce the demand from private vehicles, especially at peak congestion times.

The next level of response includes strategies to manage existing facilities. This is a financially sustainable approach that focuses on localized improvements to safety and operations. These improvements typically include changes to signal operations, reconfiguring existing pavement, or other small-scale corridor or intersection improvements.

Finally, larger scale infrastructure investments to improve capacity may include road widening within or beyond the right-of-way, adding lanes to bridges, or constructing new links to serve growing areas of the region.

This illustration shows a hierarchy of responses to address issues on the road network. The level of response that is expected to have a positive impact – based on technical evaluation of the issue and possible responses – should be chosen.

Responses must be at the same scale as issues, consistent with broader goals, and protect against unintended consequences.

Experience in every urban region in the world has shown that expansion of the road system alone cannot solve our transportation and congestion problems. New road connections and capacity will, at first, reduce congestion and shorten travel times for people and goods.

However, reducing the cost of driving in this way stimulates, or “induces” demand, and very soon there are more cars on the road, ensnaring commercial goods and commuters in congestion.

Road expansion is expensive and can have impacts on property and quality of life. Major infrastructure projects can address issues of safety and mobility, but they must be carefully considered, evaluated, designed, and constructed.

Responses can be scaled and adjusted over time.

As noted previously, performance monitoring is the first step of a larger process to identify and address issues at a regional level. Through analysis, planners, engineers, and decision-makers seek to understand the costs and benefits of different potential solutions. If level one – manage demands – is not expected to address the issues, then a level two solution may be more appropriate. If neither level one or level two responses are expected to result in a meaningful improvement, only then should level three responses (i.e. capacity expansion) be considered.

The response hierarchy can be applied to the same issue or location over time and the results monitored to determine if more intensive responses are needed.

Monitoring the performance of the Regional Road Network supports transparent and meaningful investments that will help achieve the region’s overarching goals.

Understanding the performance of the RRN at a regional level is key to making sure that changes to policy and infrastructure are targeted to the highest priority issues and locations and that they align with the goals being developed in Transport 2050. Monitoring the same indicators over time will also tell us if our responses are working as intended and to adjust over time.

CONTINUOUS IMPROVEMENT

The RRPMP is the result of long-term development of indicators and continual improvements to data collection.

Although the indicators shown in this report have been in development over many years, they are not exhaustive and are not expected to fully address the goals and objectives that are currently being developed for Transport 2050. Over time, data collection opportunities are expected to improve and organizations from across the region will continue to work together to collect and store consistent data across multiple indicators.

In particular, goals and objectives addressing the environmental and health impacts of transportation and the livability of our communities are expected to be included in Transport 2050 and that will be reflected in future updates of the RRPMP.

Tracking the magnitude of change at a regional, municipal, or corridor level requires information about the volume of travel.

Knowing the number of people and goods moving on all regional roads at different times of day will provide much more insight into the most significant issues and challenges. Complete and consistent regional travel volumes also allow for the development of rates and indices that measure change at a regional, sub-area, municipal, or corridor level.

The RRPMP is an ongoing program and will be updated on an annual basis with new data.

TransLink is planning to update and publish the information in this report on an ongoing basis.

APPENDIX

CONTENTS

APPENDIX A: METHODOLOGY & TECHNICAL DETAILS

Appendix A outlines the methodology used to calculate safety, mobility, and asset condition.

This appendix includes technical definitions for key terms, formulas, data sources, and any additional notes regarding data assumptions or limitations that should be considered when reviewing the transportation statistics.

Mobility

Regional roadways support movement by people and goods for personal and economic purposes. This category includes indicators that monitor delay and reliability for the movement of passenger vehicles and trucks on the RRN.

Delay

Delay is a common measure used to describe the time people and goods lose to congestion on the roadway. The RRMR uses Travel Time Index (TTI) to quantify delay – this index indicates how the average trip time at a given time of day during the monitoring period compares to travel time during normal conditions.

A TTI is calculated for each roadway segment, for each hour of the day.

$$TTI = \frac{\textit{Average Travel Time}}{\textit{Travel Time at Reference Speed}}$$

Reliability

Reliability reflects how likely a roadway user is to be able to accurately predict their travel time during a typical weekday. The RRMR uses Planning Time Index (PTI) to quantify reliability – this index indicates how much extra time is required during the most congested conditions in order to arrive at a destination 'on time'.

A PTI is calculated for each roadway segment, for each hour of the day.

$$PTI = \frac{\textit{95th Percentile Travel Time}}{\textit{Travel Time at Reference Speed}}$$

Regional Travel Time

Three maps that illustrate the average travel time and speed between regional centres during the morning peak period (7:00 a.m. to 9:00 a.m.) and afternoon peak period (3:00 p.m. to 6:00 p.m.) during a typical weekday (Tuesday to Thursday) in fall of 2018. The travel times and speeds are based on the best routes at the time the data was collected, as provided by Google Maps. The three maps are:

- *Travel Speed by Origin – an illustration of the average travel speed of a journey from the selected origin to all destinations.*
- *Travel Time Hourly Profile – the 5th percentile, average, and 95th percentile travel time between two selected activity centres.*
- *Travel Time & Travel Speed – the minimum, average, and maximum travel time and travel speed from the selected origin to all destinations.*

Data Sources Notes

Data source: Google Maps (Fall 2018)
The data was aggregated using the following definitions:

- *Typical weekday: Tuesday to Thursday*
- *Outliers were filtered out based on the Interquartile Range (IQR), where the outlier cut-off is calculated using the following formula:*

*75^{th} percentile + 1.5 * (75^{th} Percentile – 25th Percentile)*

What is a Reference Speed?

The reference speed was chosen to reflect the expected travel time during normal, weekday, daytime conditions. The reference speed is calculated for each link based on typical weekday daytime speeds and is different for different roadway types.

The reference speed is the:

- *90^{th} percentile speed (highways)*
- *60^{th} percentile speed (urban roads)*

of data collected during typical daytime weekdays (Tuesday to Thursday, 6:00 a.m. to 8:00 p.m.)

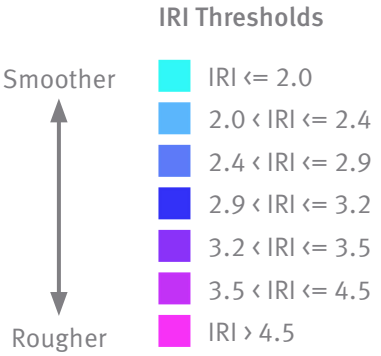
Asset Condition

Roadways are public assets that require regular maintenance. Road condition information allows road authorities to understand how pavement conditions are changing over time and develop a strategy for preventative, immediate, and long-term maintenance and rehabilitation needs. The dashboard presents information on roughness (International Roughness Index) and pavement condition (Pavement Condition Index). The two measures reflect how the a driver or passenger feels the road (roughness) and what they see on the surface of road (pavement condition).

Roughness

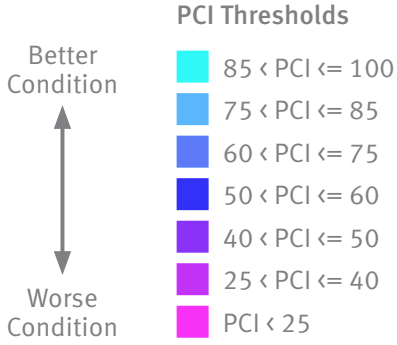
Changes to road roughness can be felt as users travel over the roadway, but they aren't necessarily visible. The International Roughness Index (IRI) is the relationship between the amount of bounce experienced over the distance travelled. Drivers and passengers experience higher IRI values as rougher or bumpier roads and lower IRI values as smoother roads. It is calculated by measuring the vertical profile surface of the paved road and determining how much 'bounce' a vehicle is expected to experience using the quarter-car model (Theoretical Quarter-Car Model). The scale varies from 0 for a perfectly smooth surface with no theoretical upper limit. Most roadways have IRI values between 1 m/km and 5 m/km.

$$IRI = \frac{\textit{Suspension Vertical Motion (m)}}{\textit{Distance Travelled by Vehicle (km)}}$$



Pavement Condition

Pavement Condition Index (PCI) measures the type, extent, and severity of visible pavement surface distresses. Road surfaces in worse condition may have visible cracking and/or rutting. These conditions can be seen, but may not be felt by drivers or passengers. PCI varies from 0 to 100, where 100 represents new pavement without any visible distresses. PCI can varies from 0 to 100, where 100 represents new pavement without any visible distress.



Data Sources Notes

Data source: TransLink (2017)

Every three years, TransLink undertakes a pavement condition audit on the Major Road Network. The audit collects data using an automated sensor system mounted on a survey vehicle. This sensor system collects information about asset condition as it travels along the roadway at the same speed as surrounding vehicles.

The last asset condition survey was collected in 2017 and includes all roads that were in the Major Road Network at that time, as well as some other regional roads. Asset condition information is not available for other roads in the RRN at this time.

Safety

Regional roadways should be designed, operated, and maintained in a way that reduces the number of collisions (frequency) and the portion of collisions resulting in injuries and fatalities (severity) in order to protect human life and health and limit damage to property.

Frequency

Frequency is the number of collisions per year over a five year period.

$$Frequency = \frac{(Number\ of\ Collisions\ Over\ 5\ Years)}{5}$$

# of Collisions Per Year

- › 200
- › 150-200
- › 100-150
- › 40-100
- › 20-40
- <= 20

TransLink's Crash Severity Index (CSI)

A methodology determined and calculated by TransLink to describe the relationship between casualty and PDO collisions, where one motor vehicle crash resulting in an injury or fatality is weighted as 10 times one PDO collision.

$$CSI = \frac{(Number\ of\ PDO * 1 + Number\ of\ Motor\ Vehicle\ Crashes\ resulting\ in\ an\ injury\ or\ fatality * 10)}{Total\ Number\ of\ Collisions}$$

Using this measure, an intersection that had only PDO collisions has a CSI of 1 and an intersection that has only crashes resulting in an injury or fatality collisions has a CSI of 10.

Collision CSI Classes

- › 6.0-10.0 (worse)
- › 3.0-6.0
- <= 3.0 (better)

Data Sources Notes

Data source: ICBC (2013 – 2017)

Collisions include all crashes involving motor vehicles that are reported to ICBC. This includes crashes involving a motor vehicle and a pedestrian or cyclist. It does not include collisions that do not involve motor vehicles. Collisions are classified into two types as follows:

- **Motor Vehicle Crashes Resulting in an Injury or Fatality.**
- **Property Damage Only (PDO) Collisions:** *motor vehicle crashes resulting in material damage and no injury or fatality.*

Please note that accurate and verifiable information is not always available and therefore, this data only includes collisions where sufficient location information was available to determine a latitude and longitude, as provided by ICBC.

The maps and statistics provided here include collisions that took place within 50 metres of an intersection on the Regional Road Network (RRN). Other collisions have been excluded. Because some collisions have been excluded, the total number of collisions shown for a community or portion of the region are not a true total – the total is limited to collisions at intersections on the RRN.

When applying filters, collisions on boundary roads (e.g. Boundary Road) will appear in both sub-regions (e.g. Vancouver / UBC and Burnaby / New Westminster). When comparing this data with other publications and datasets, collision information may differ due to rounding, late reporting, or corrections to the data.

APPENDIX B: SUB-REGIONAL HIGHLIGHTS

Appendix B summarizes key transportation statistics for each Metro Vancouver sub-region.

The sub-regions captured in this appendix are listed below:

- Burnaby / New Westminster
- Maple Ridge / Pitt Meadows
- Northeast Sector
- North Shore
- Southeast
- Southwest
- Vancouver / UBC

This appendix includes a section for each sub-region. The sections begin with a summary of sub-regional statistics. These include:

- Travel patterns (mode share and average trip distance)
- Safety (collision frequency, severity, and collision rates)
- Asset condition (roughness and pavement condition)

Aggregated sub-regional statistics are not available for mobility indicators.

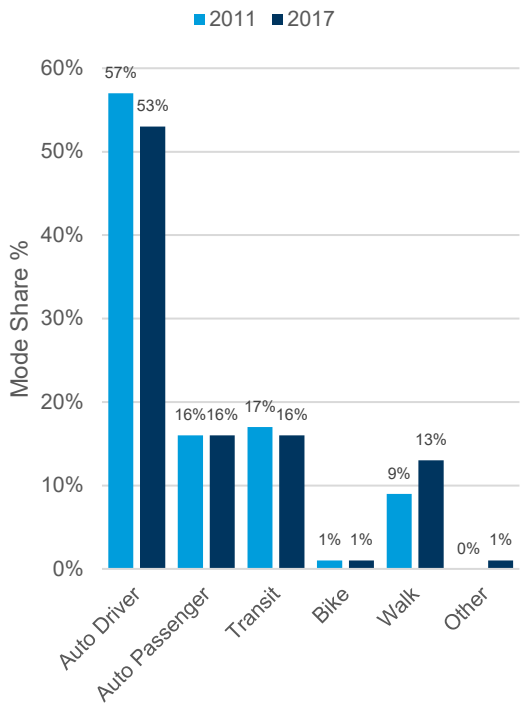
Following the overall summary is a series of maps. These include:

- Safety (collision frequency and severity)
- Mobility (delay, reliability, and regional travel time)
- Asset condition (roughness and pavement condition)

To explore this information in a dynamic format, visit the online **Regional Road Performance Monitoring Dashboard (2020)** at: **translink.ca/rrpm.**

BURNABY / NEW WESTMINSTER

MODE SHARE SUMMARY



SAFETY SUMMARY

Burnaby / New Westminster Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**8,406**
Total crashes causing an injury or fatality:	**3,464**
Crashes per year causing injury or fatality per 100,000 residents:	**1,102**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**218**
TransLink Crash Severity Index for sub-region:	**4.7**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

Burnaby / New Westminster Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**9 km**	**9 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

Burnaby / New Westminster Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**2.72**	**2.51**
Pavement Condition (average weighted PCI value):	**78.15**	**79.41**

Data source: TransLink 2017. Includes the MRN and some other regional roads.

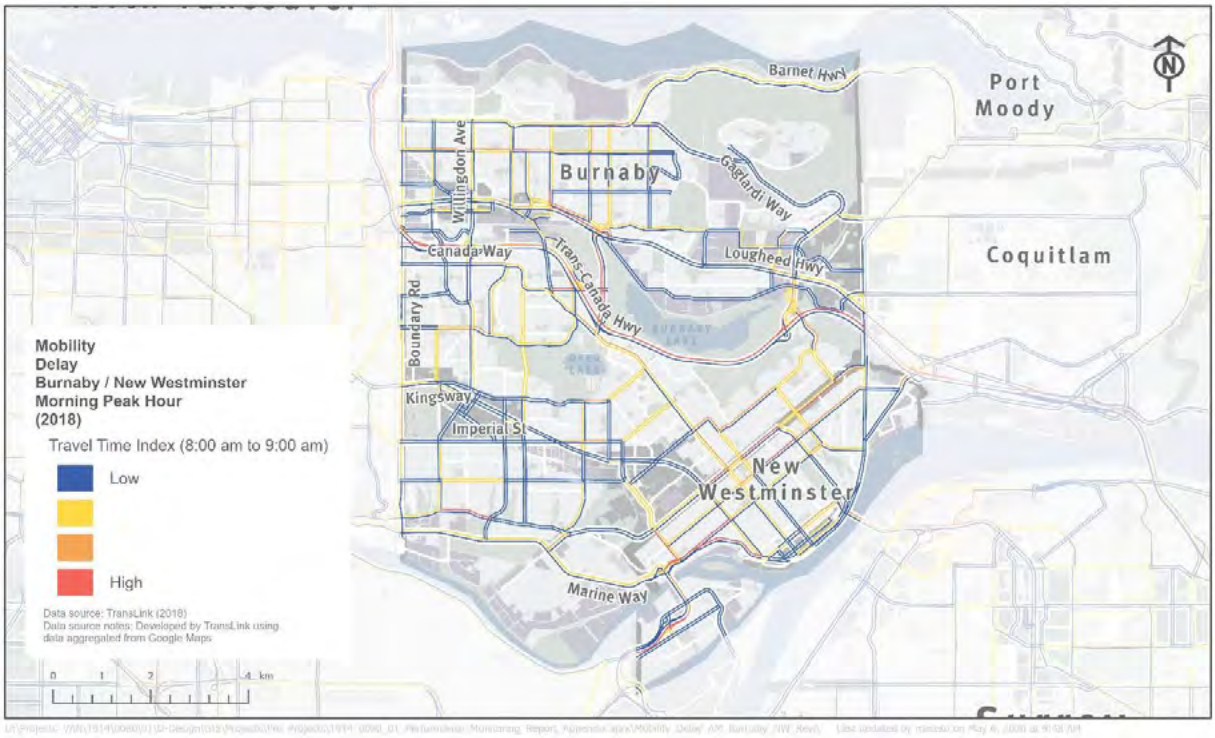
BURNABY / NEW WESTMINSTER – SAFETY

FREQUENCY

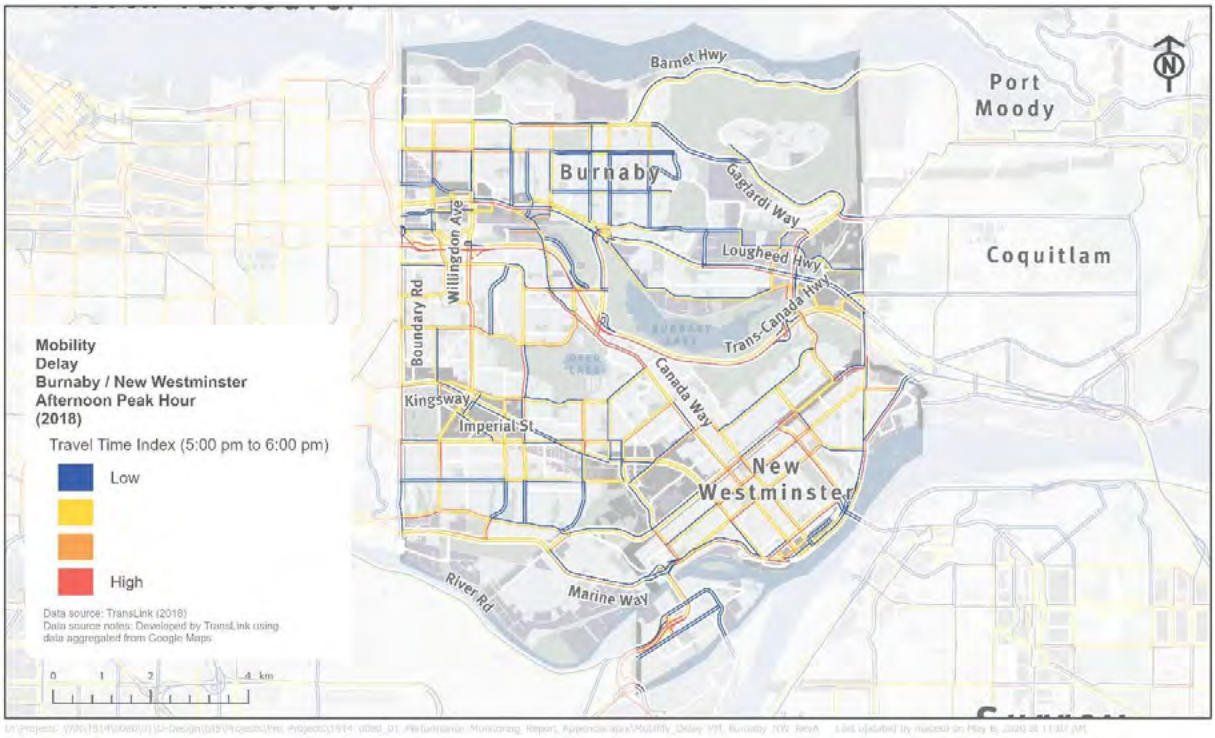
SEVERITY

BURNABY / NEW WESTMINSTER – MOBILITY

DELAY (AM)

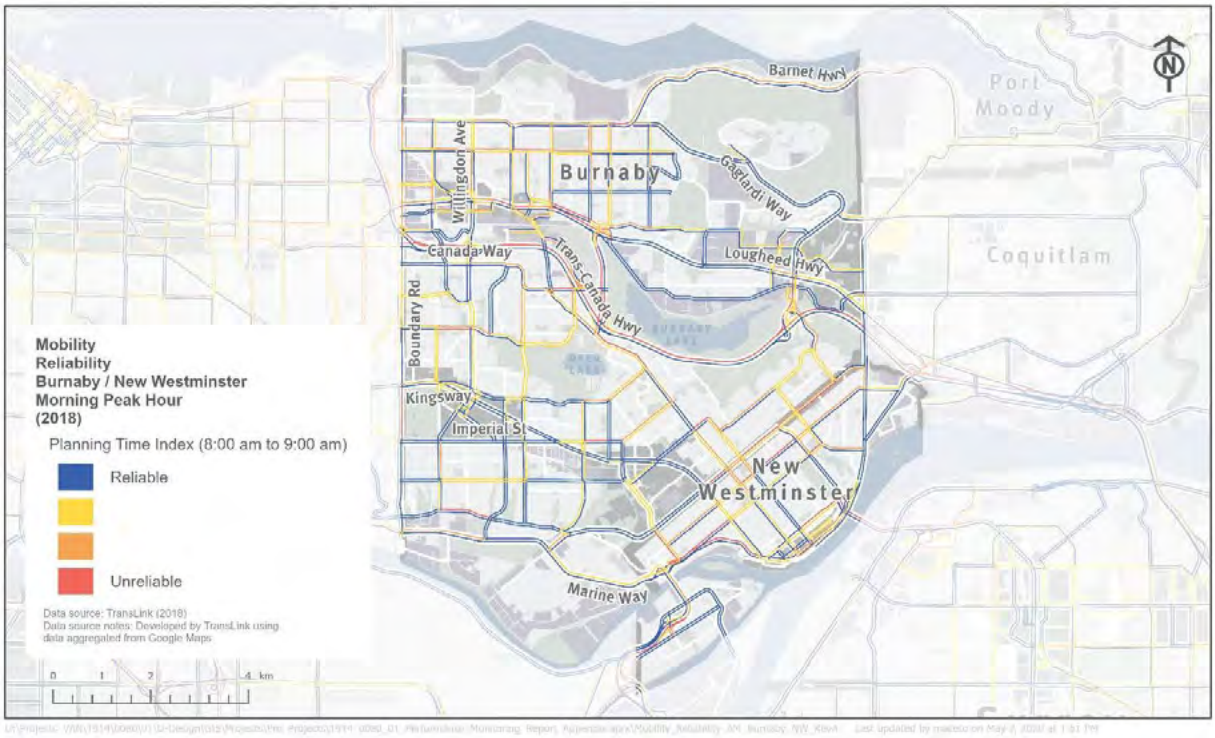


DELAY (PM)

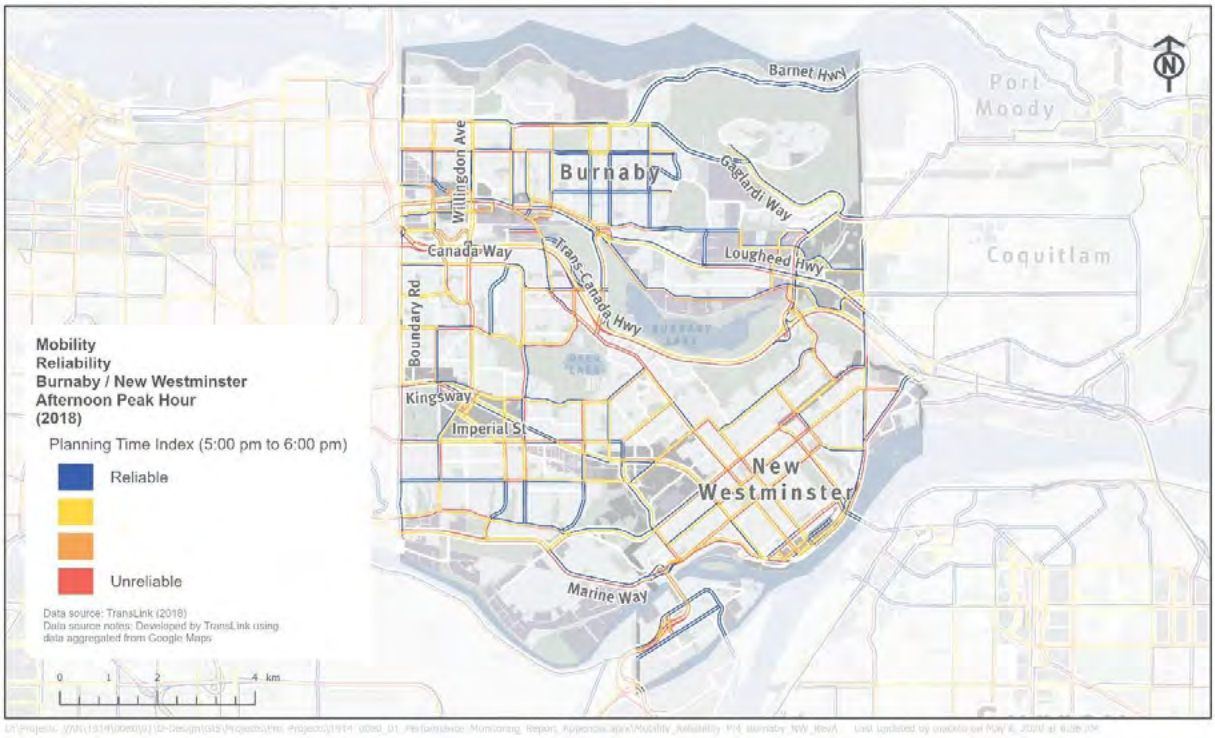


BURNABY / NEW WESTMINSTER – MOBILITY

RELIABILITY (AM)

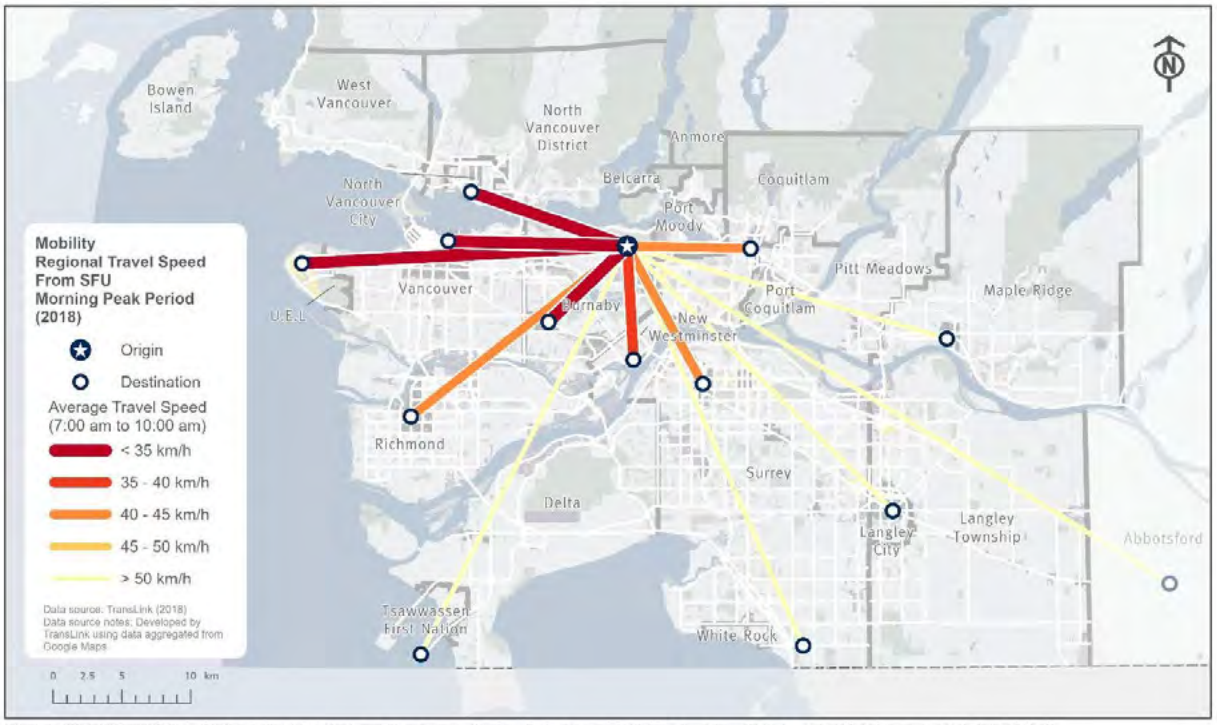


RELIABILITY (PM)

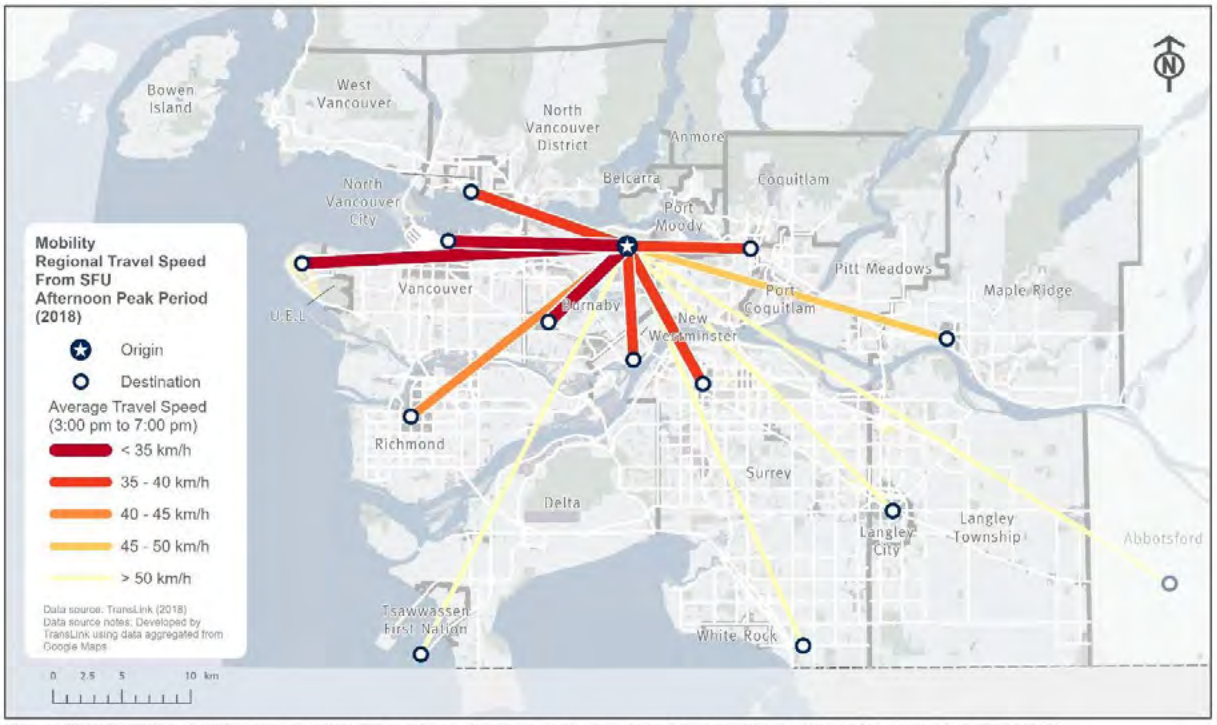


BURNABY / NEW WESTMINSTER – MOBILITY

REGIONAL TRAVEL TIME (AM): SFU

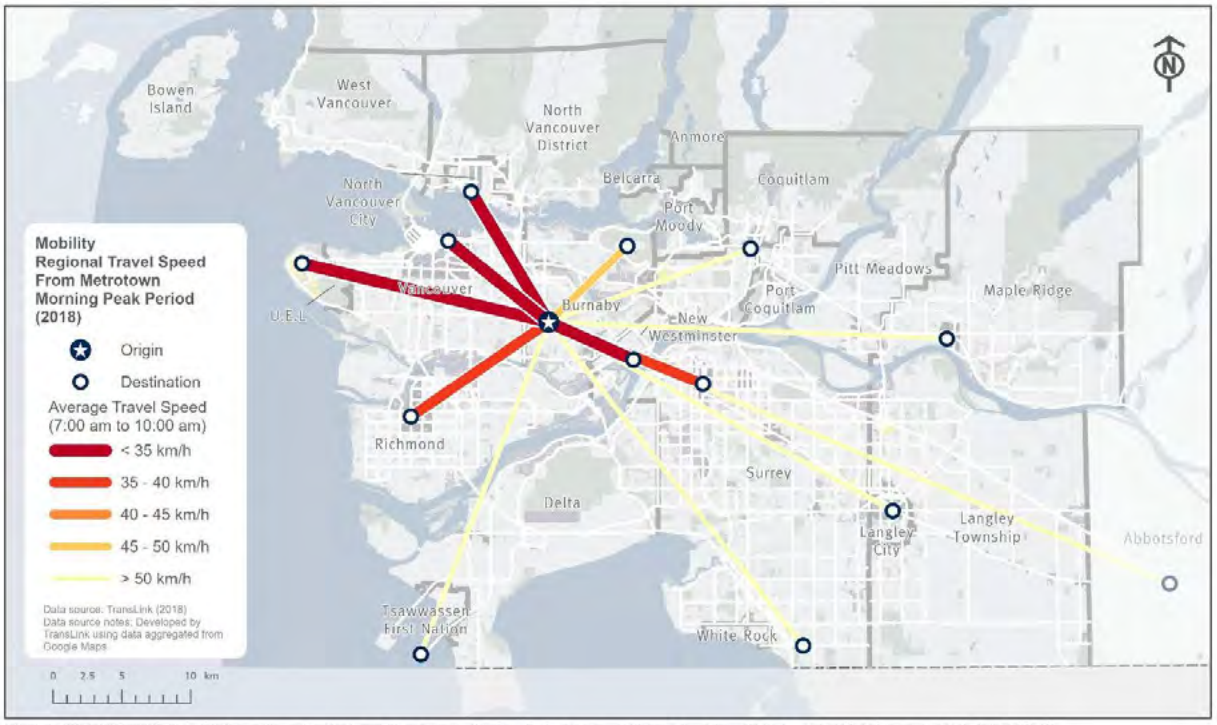


REGIONAL TRAVEL TIME (PM): SFU

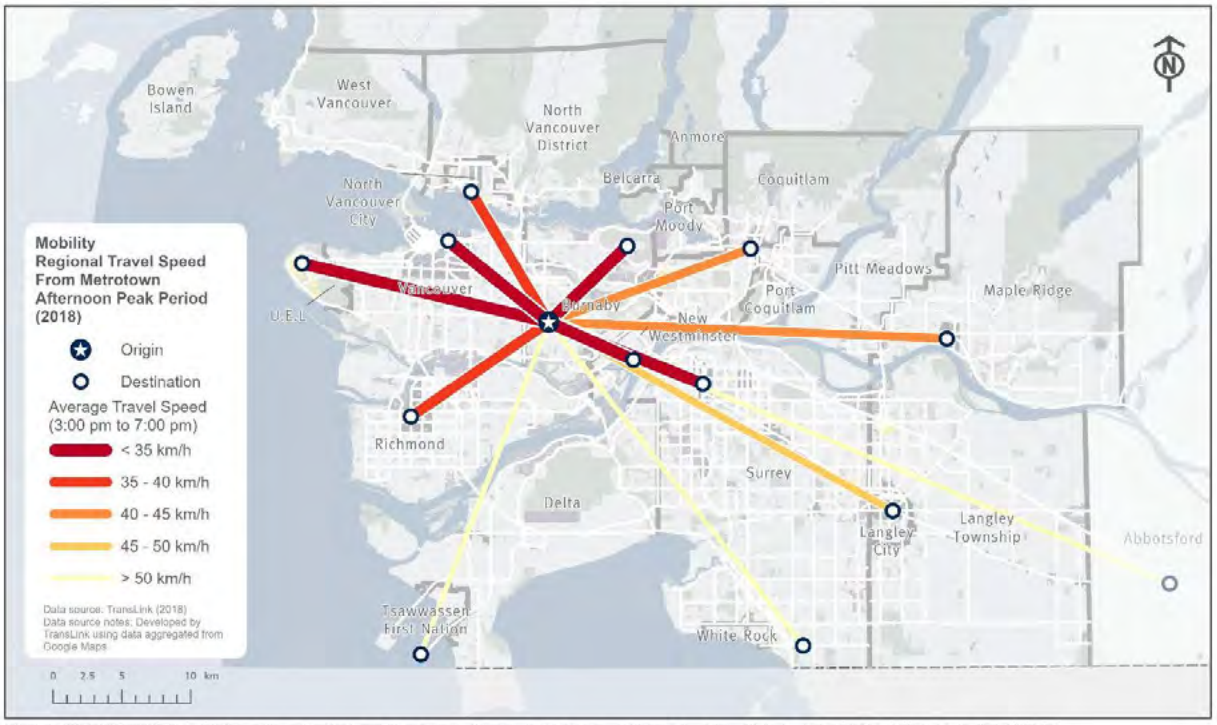


BURNABY / NEW WESTMINSTER – MOBILITY

REGIONAL TRAVEL TIME (AM): METROTOWN

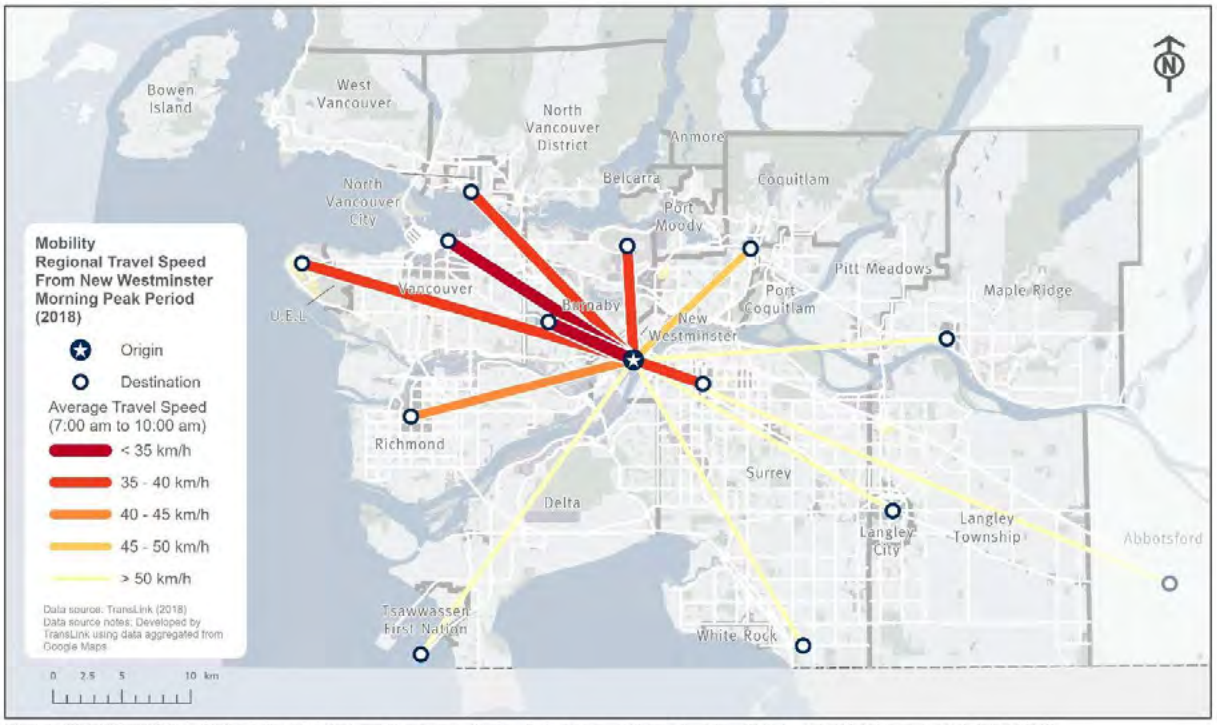


REGIONAL TRAVEL TIME (PM): METROTOWN

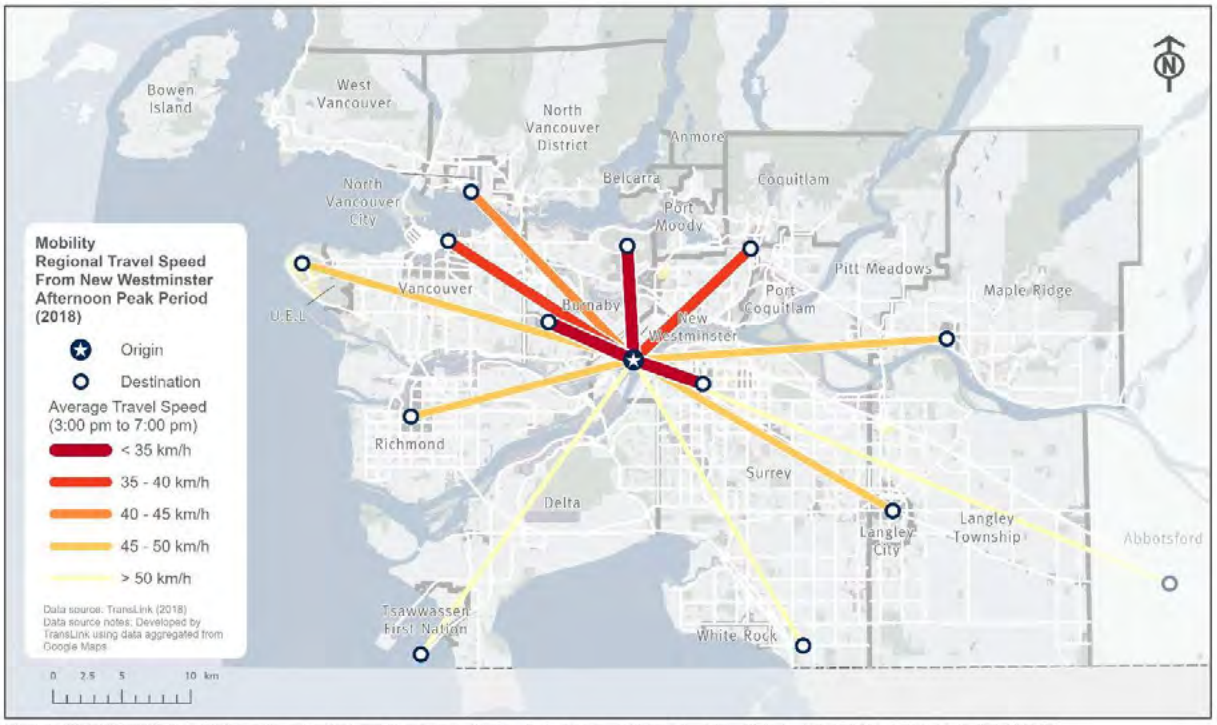


BURNABY / NEW WESTMINSTER – MOBILITY

REGIONAL TRAVEL TIME (AM): NEW WESTMINSTER

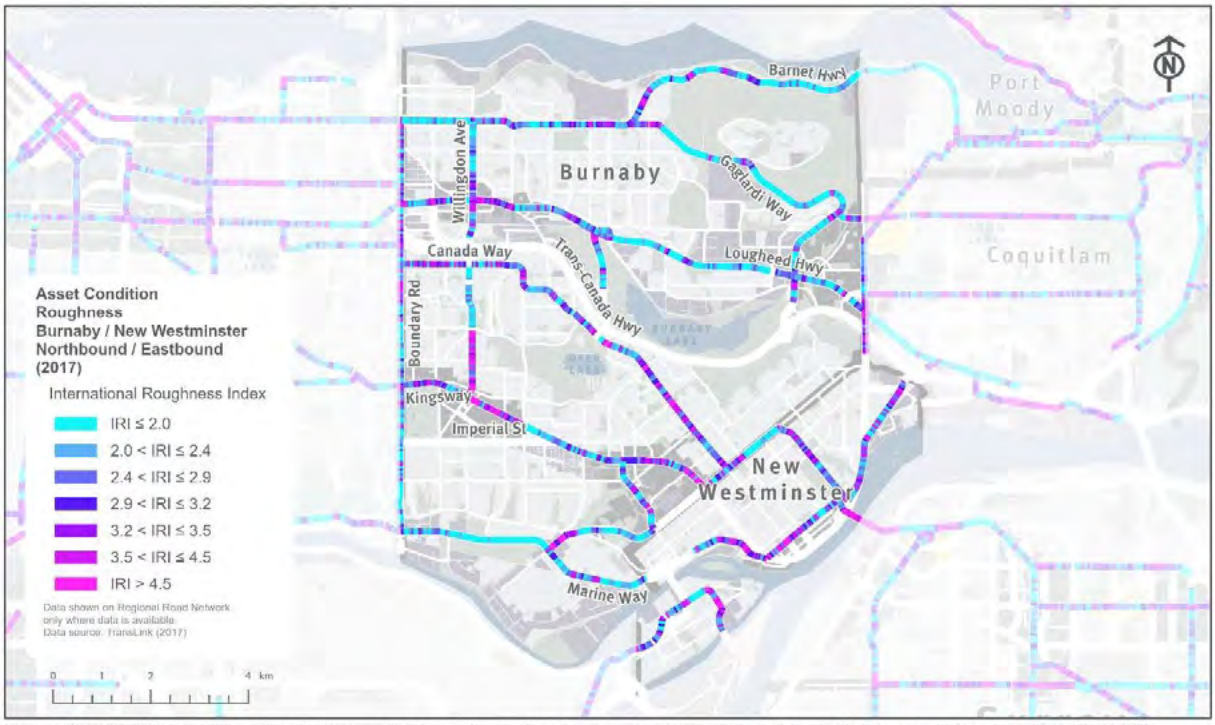


REGIONAL TRAVEL TIME (PM): NEW WESTMINSTER

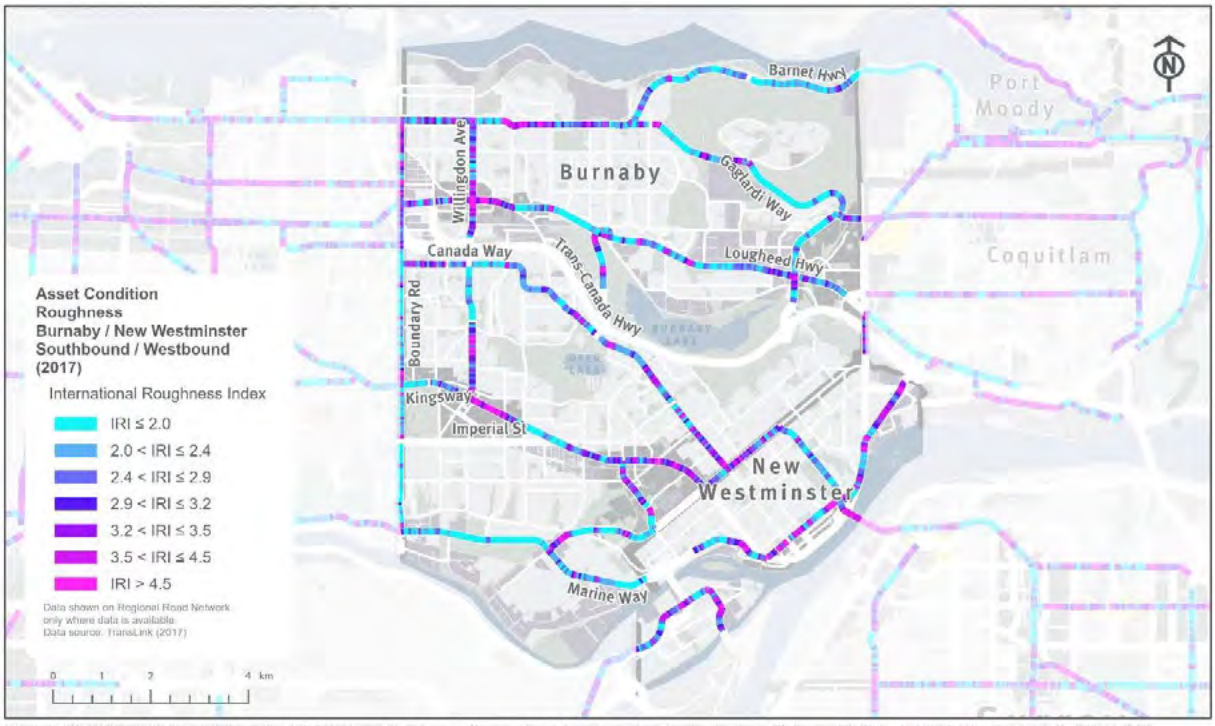


BURNABY / NEW WESTMINSTER – ASSET CONDITION

ROUGHNESS (NE)

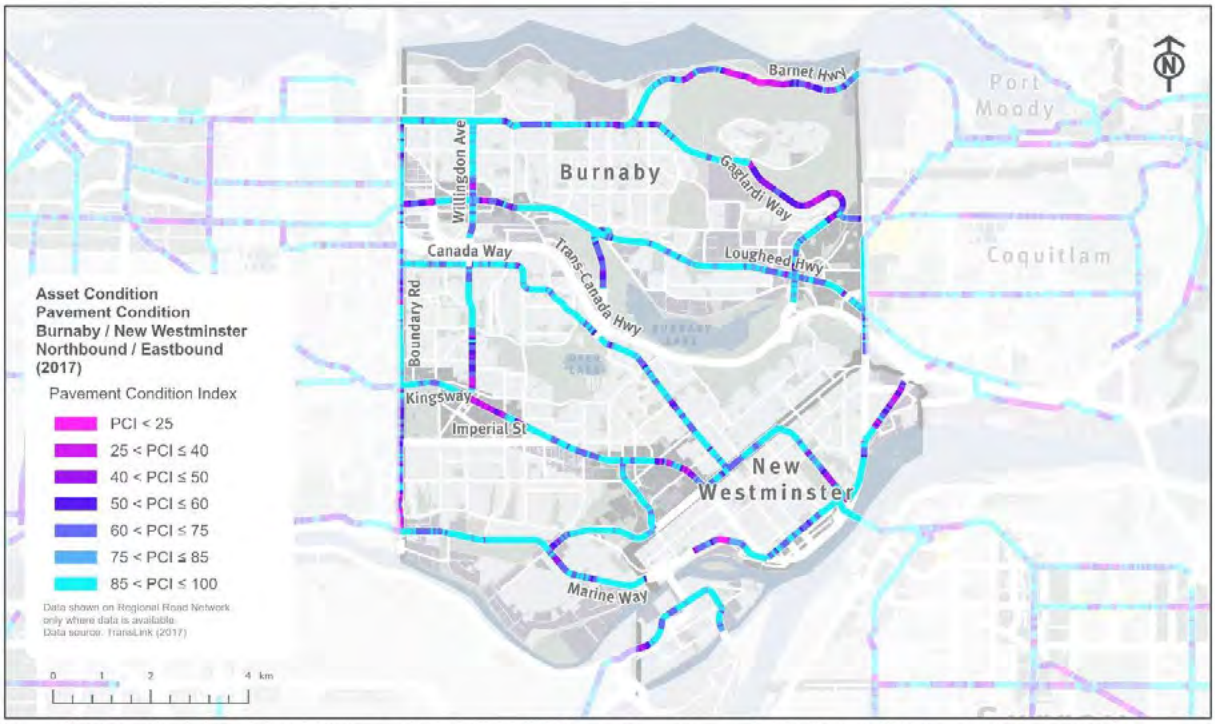


ROUGHNESS (SW)

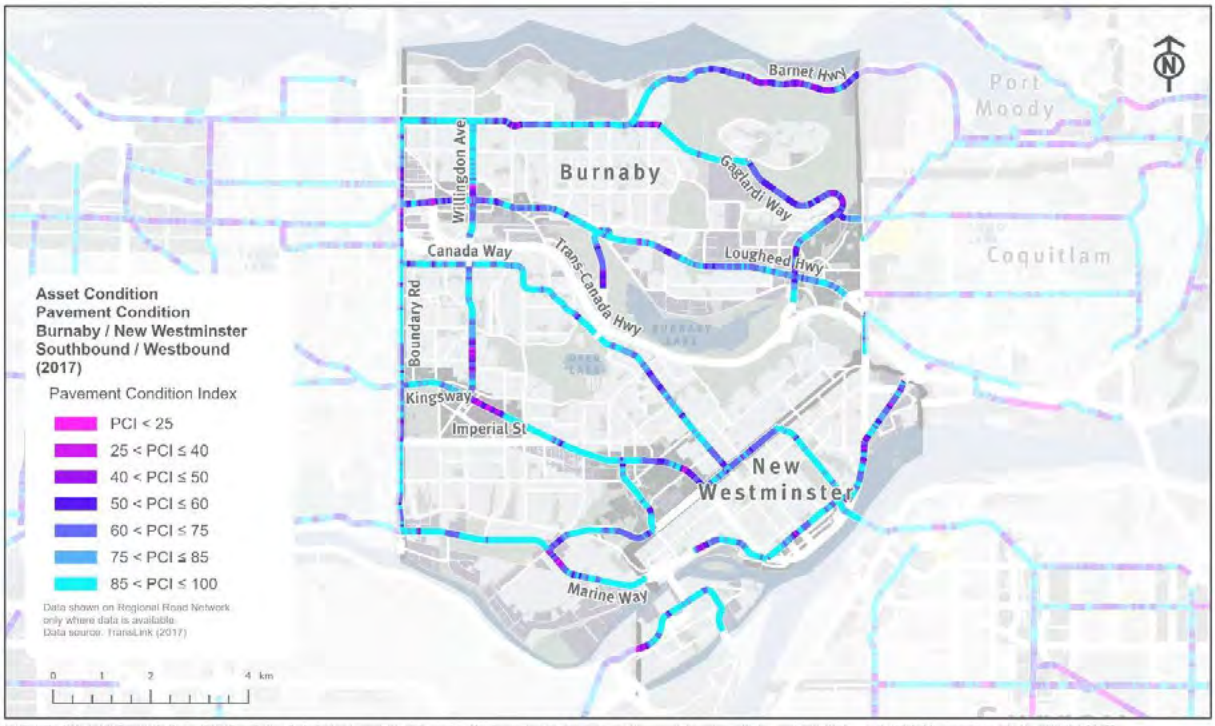


BURNABY / NEW WESTMINSTER – ASSET CONDITION

PAVEMENT CONDITION (NE)

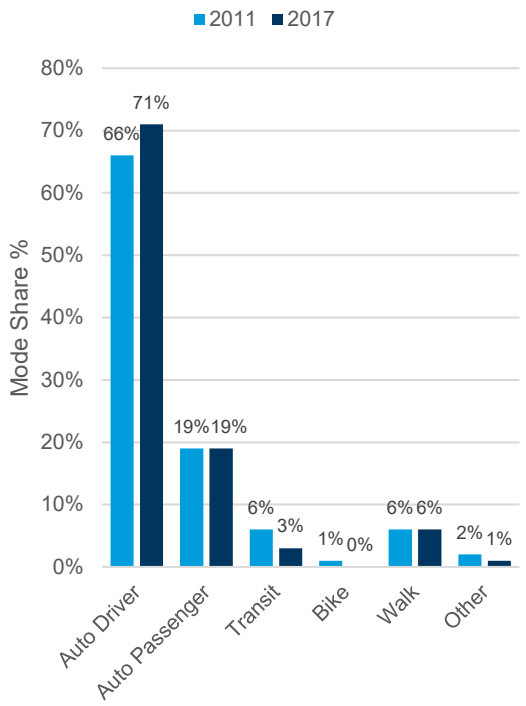


PAVEMENT CONDITION (SW)



MAPLE RIDGE / PITT MEADOWS

MODE SHARE SUMMARY



SAFETY SUMMARY

Maple Ridge / Pitt Meadows Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**1,905**
Total crashes causing an injury or fatality:	**896**
Crashes per year causing injury or fatality per 100,000 residents:	**870**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**83**
TransLink Crash Severity Index for sub-region:	**5.2**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

Maple Ridge / Pitt Meadows Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**14 km**	**13 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

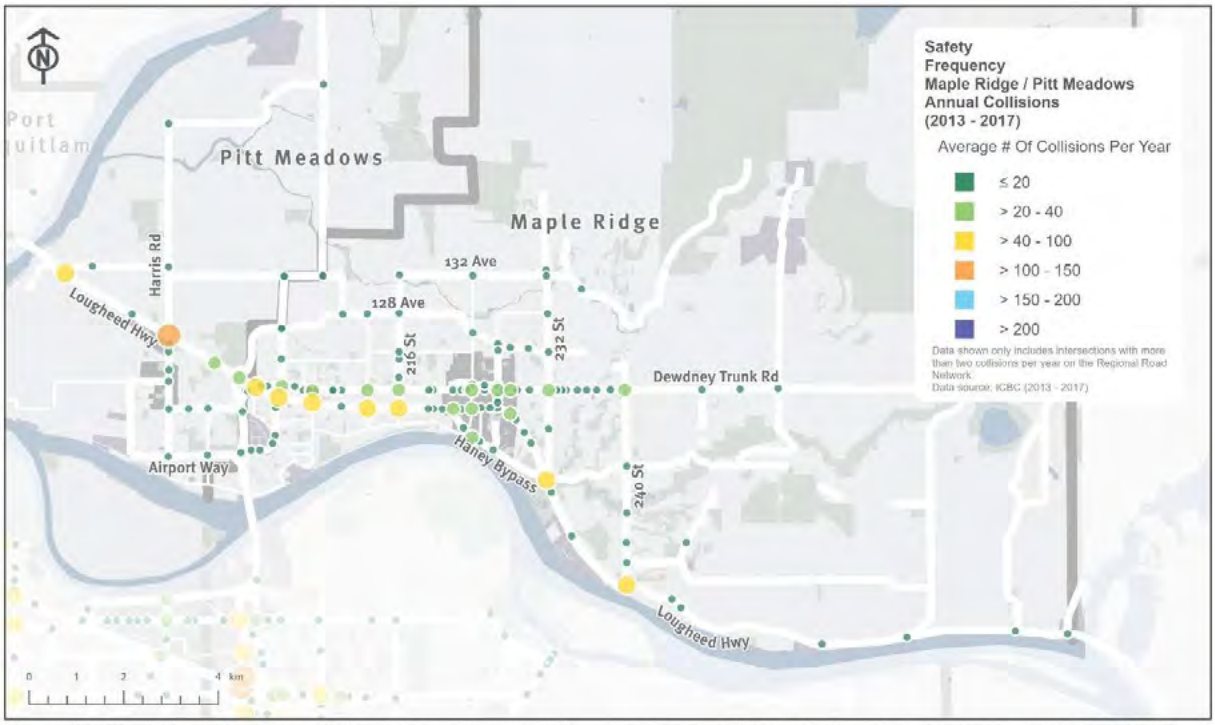
Maple Ridge / Pitt Meadows Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**2.25**	**2.38**
Pavement Condition (average weighted PCI value):	**80.41**	**79.94**

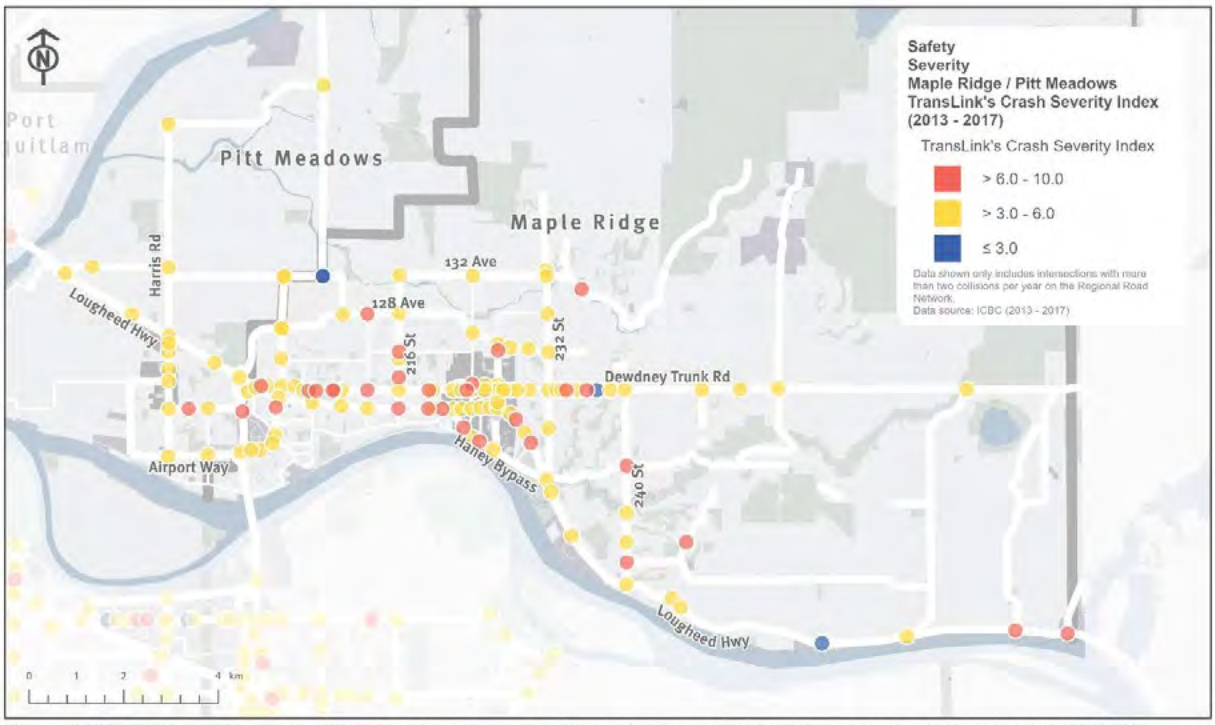
Data source: TransLink 2017. Includes the MRN and some other regional roads.

MAPLE RIDGE / PITT MEADOWS – SAFETY

FREQUENCY

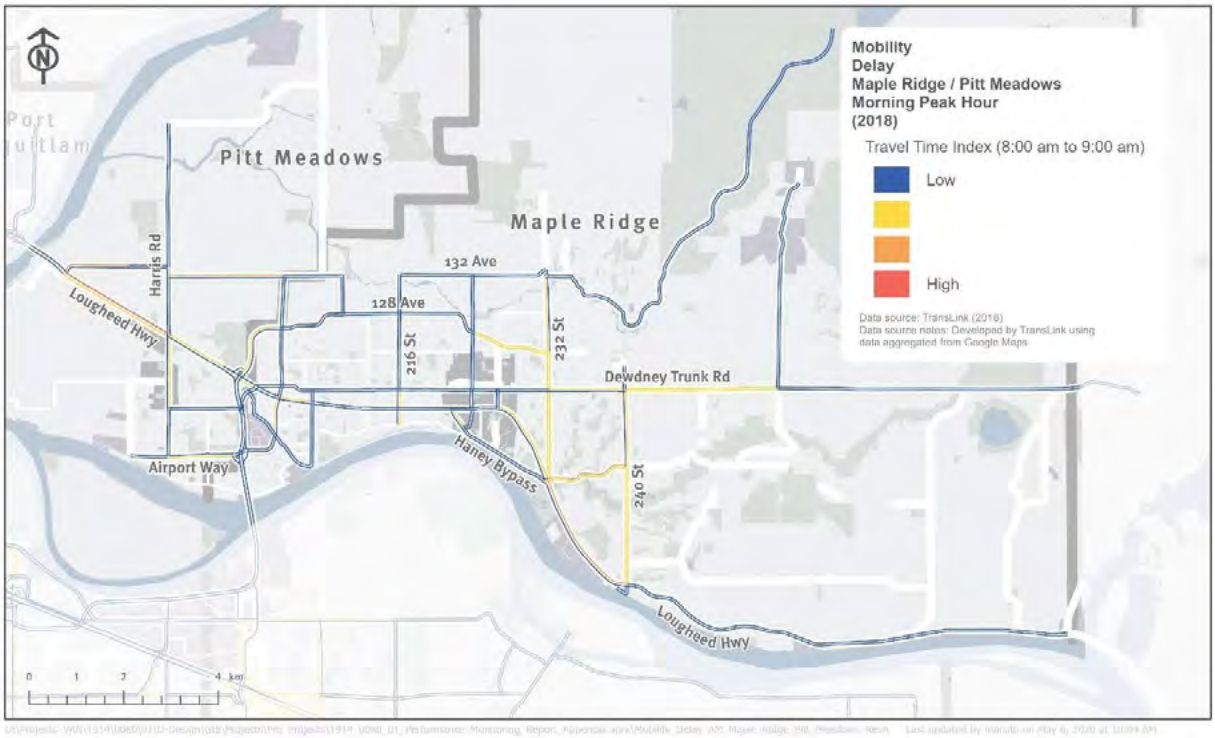


SEVERITY

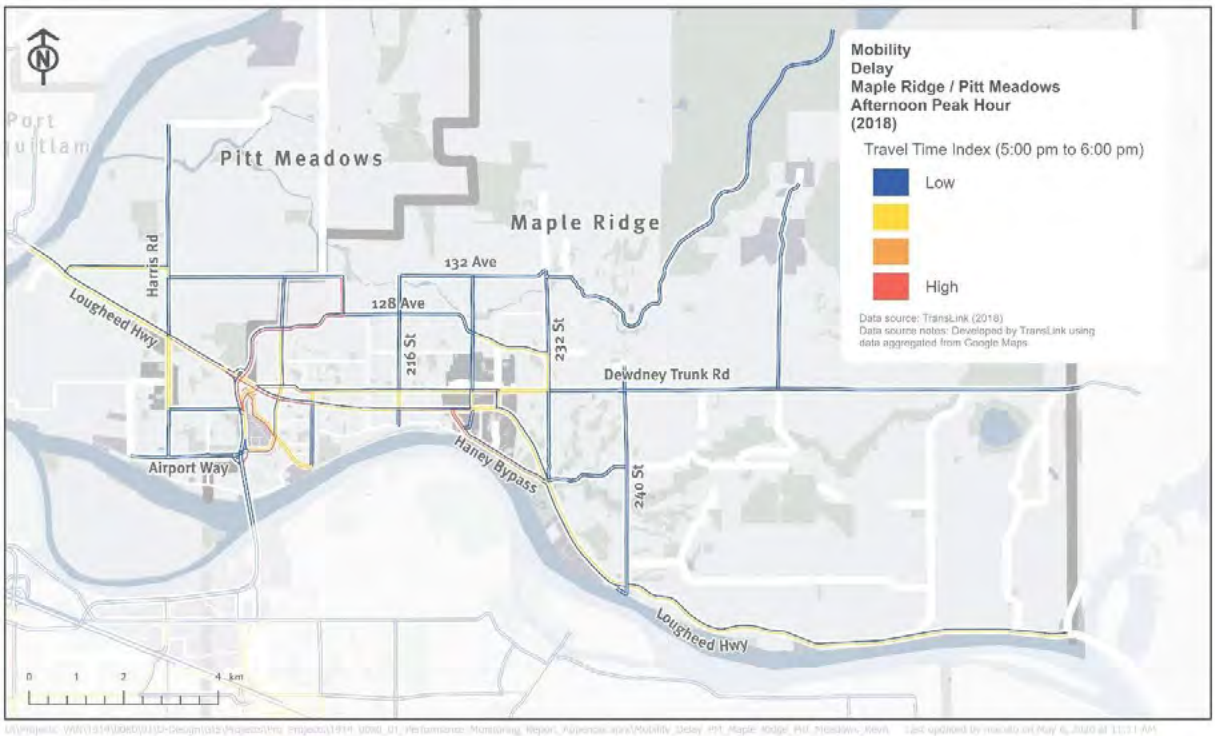


MAPLE RIDGE / PITT MEADOWS – MOBILITY

DELAY (AM)

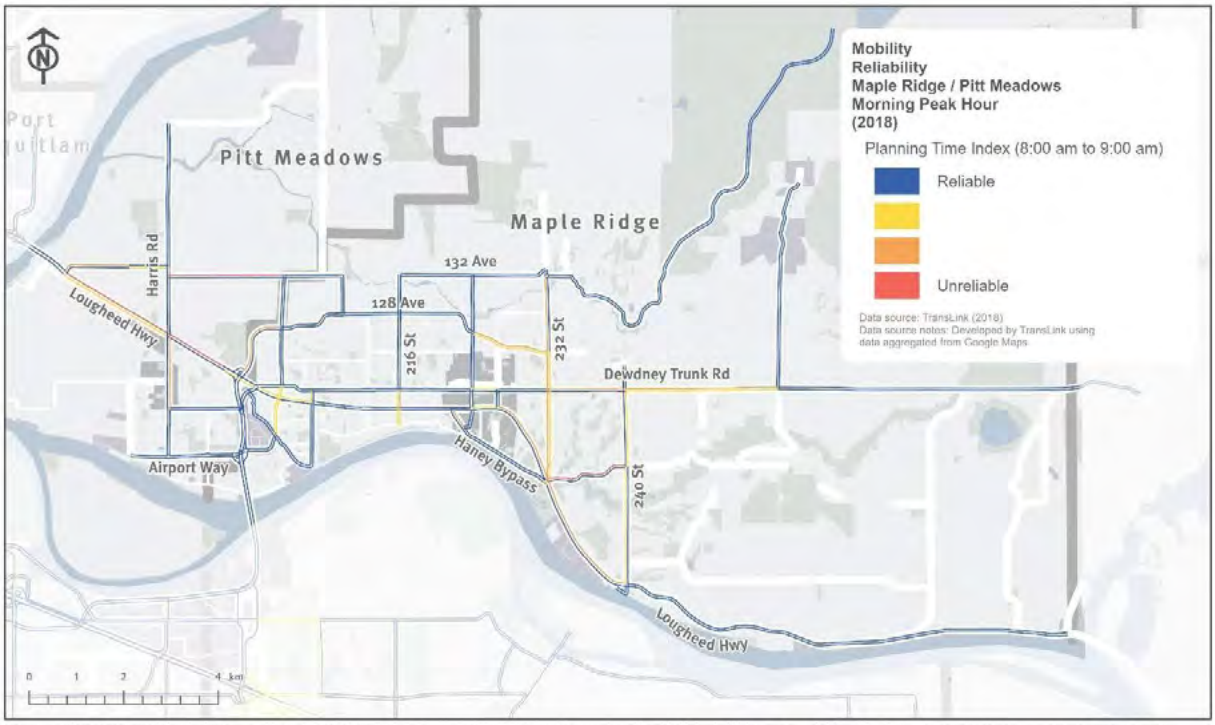


DELAY (PM)

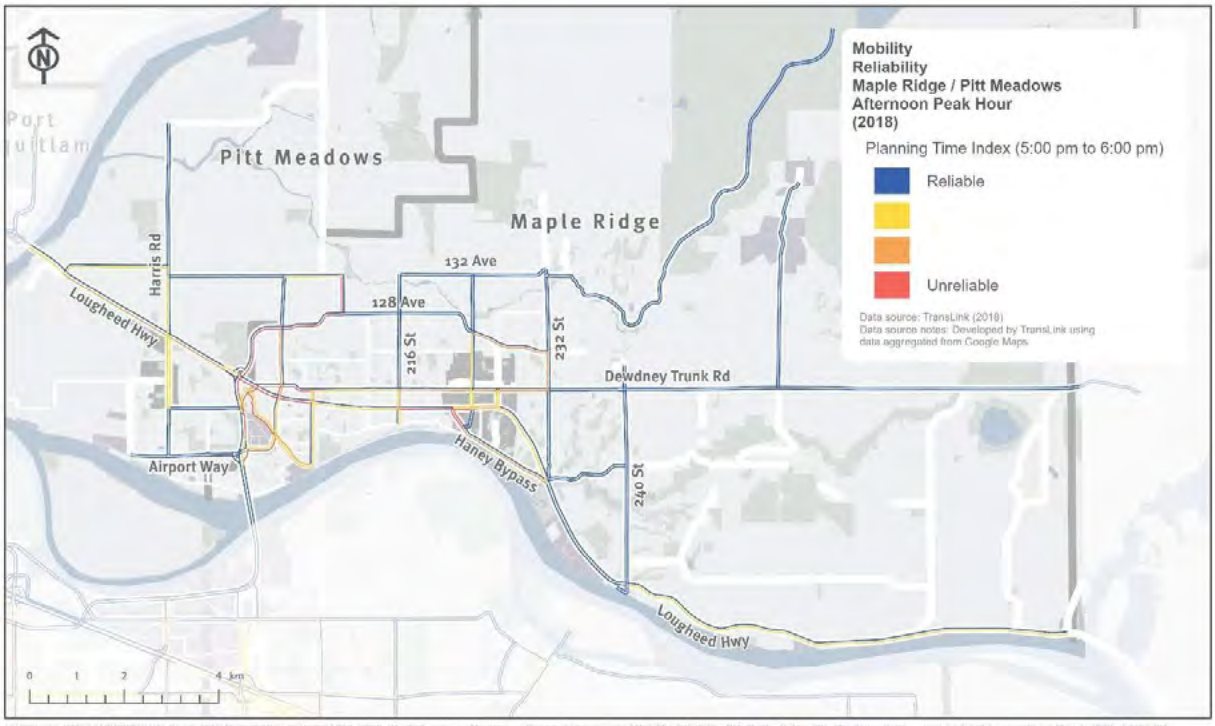


MAPLE RIDGE / PITT MEADOWS – MOBILITY

RELIABILITY (AM)

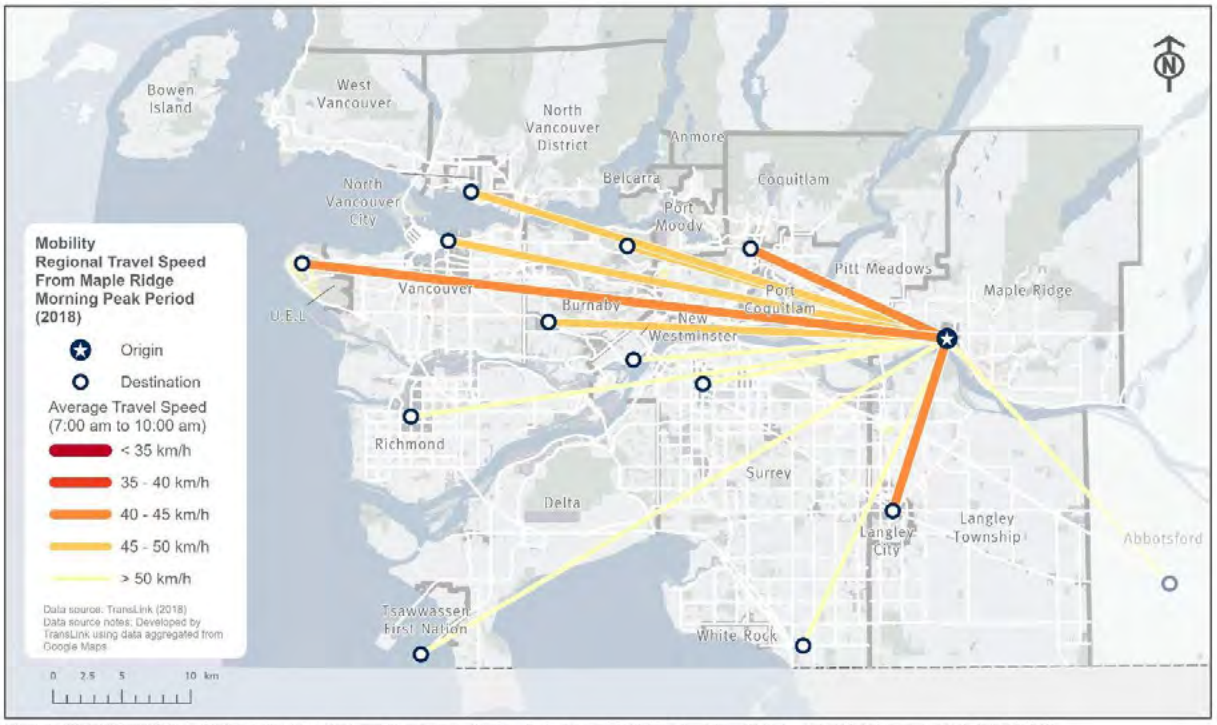


RELIABILITY (PM)

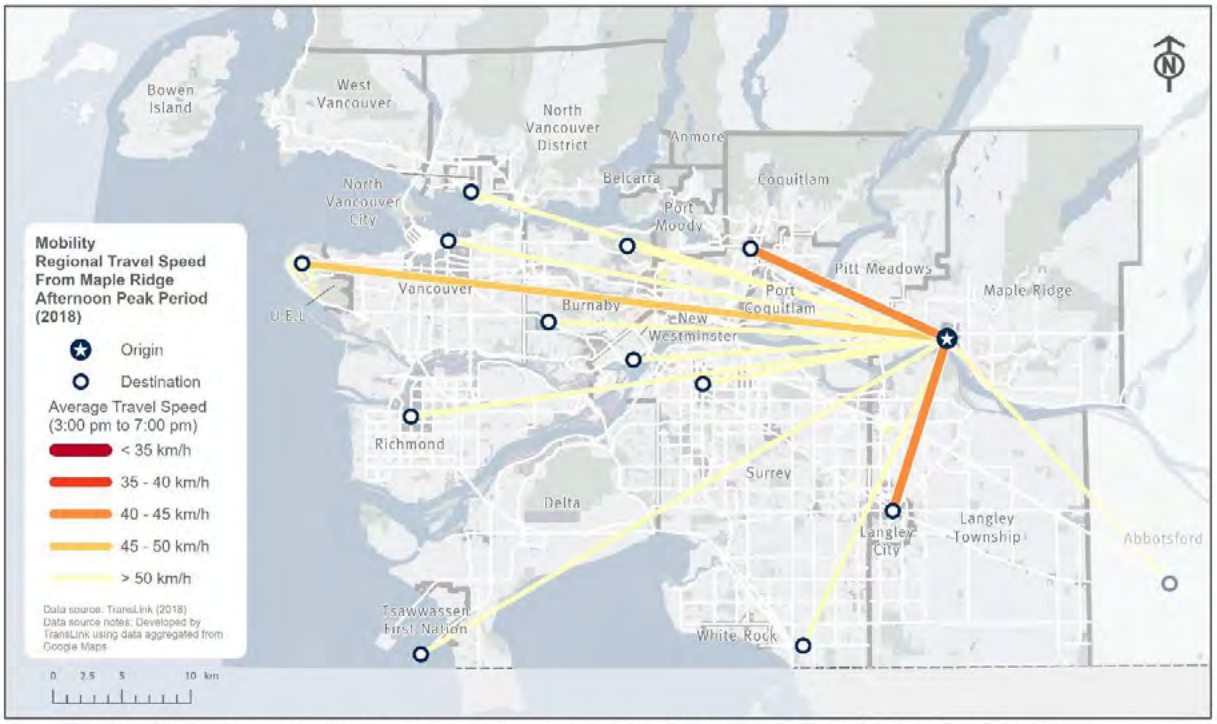


MAPLE RIDGE / PITT MEADOWS – MOBILITY

REGIONAL TRAVEL TIME (AM): MAPLE RIDGE

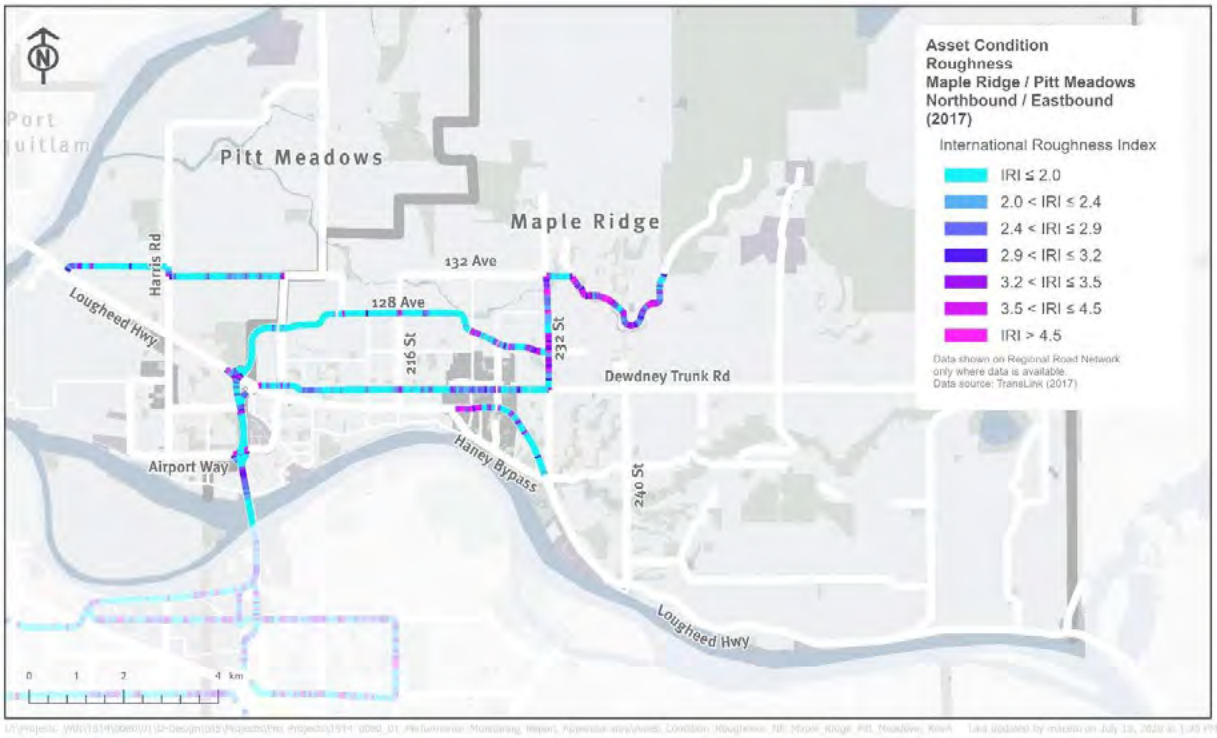


REGIONAL TRAVEL TIME (PM): MAPLE RIDGE

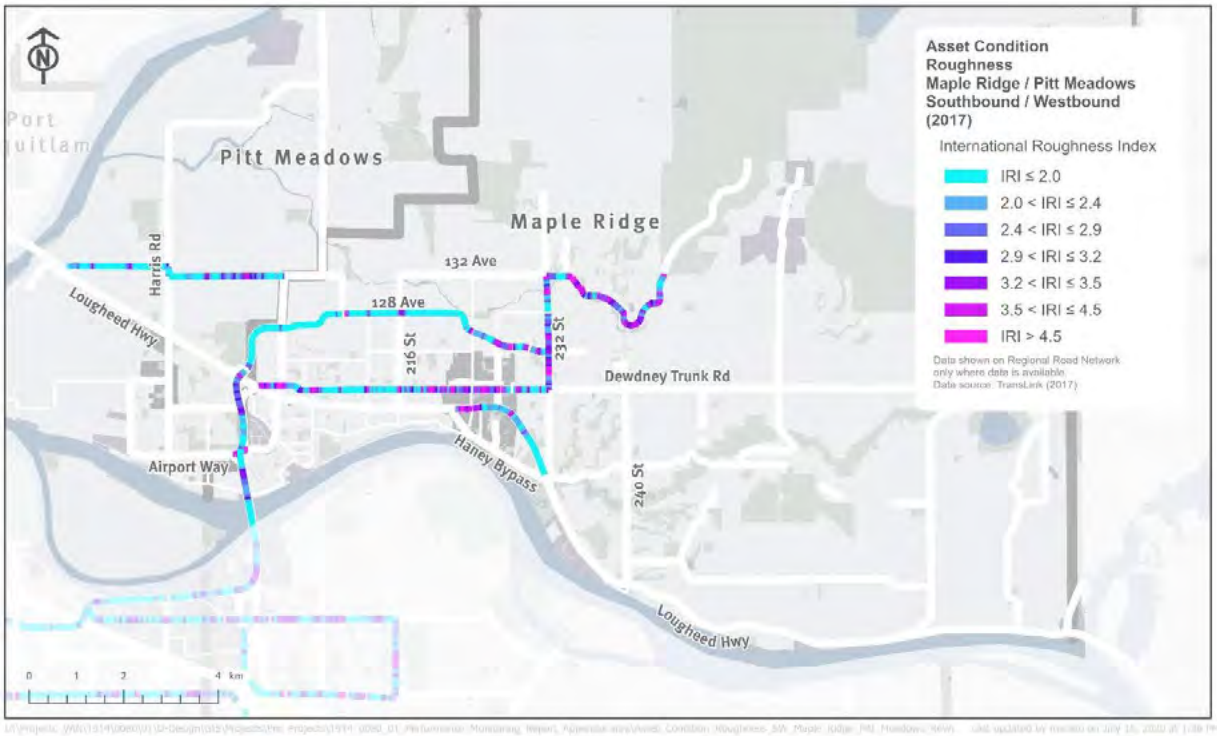


MAPLE RIDGE / PITT MEADOWS – ASSET CONDITION

ROUGHNESS (NE)

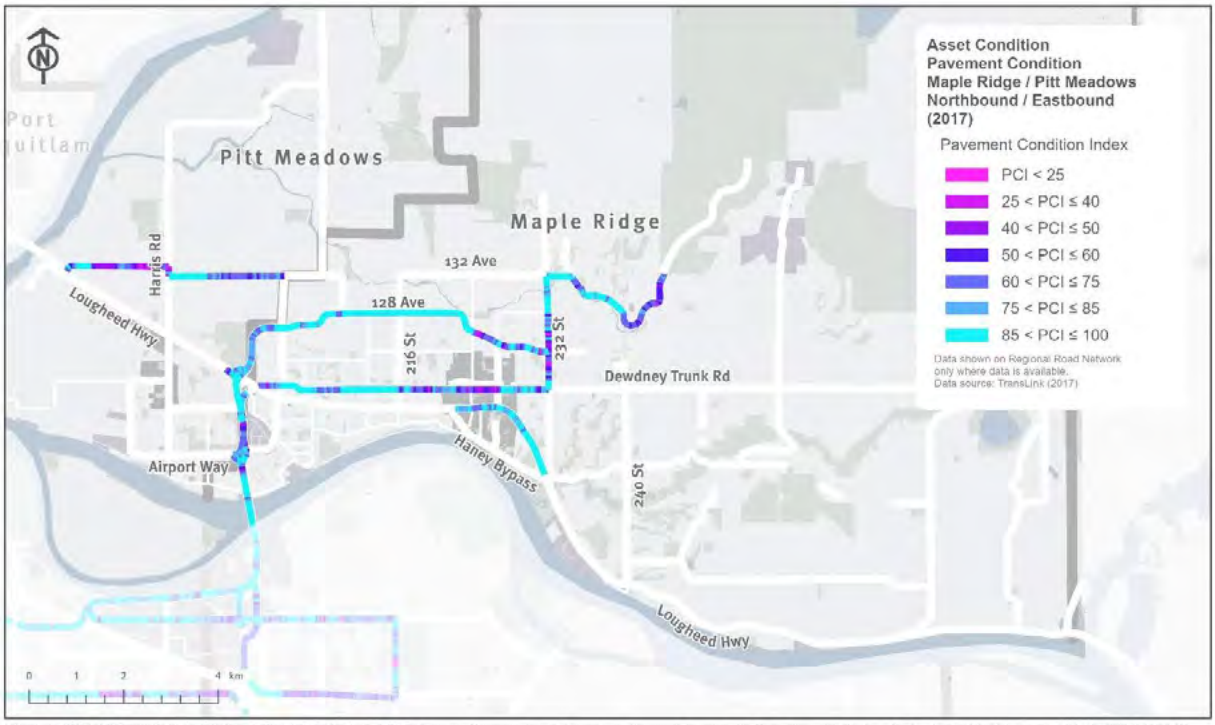


ROUGHNESS (SW)

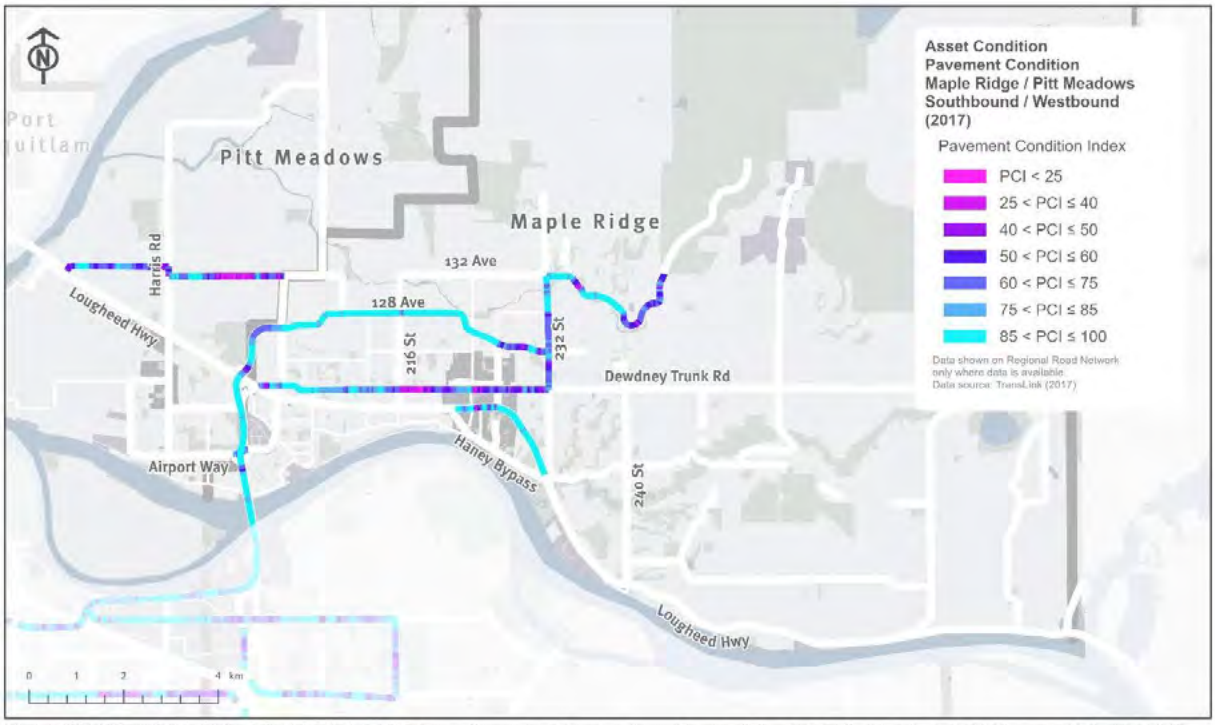


MAPLE RIDGE / PITT MEADOWS – ASSET CONDITION

PAVEMENT CONDITION (NE)

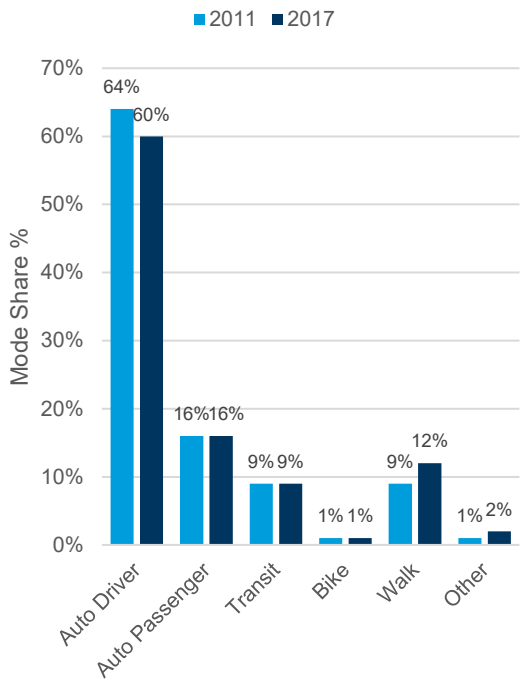


PAVEMENT CONDITION (SW)



NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN)

MODE SHARE SUMMARY



SAFETY SUMMARY

North Shore Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**3,035**
Total crashes causing an injury or fatality:	**1,080**
Crashes per year causing injury or fatality per 100,000 residents:	**564**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**88**
TransLink Crash Severity Index for sub-region:	**4.2**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

North Shore Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**10 km**	**9 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

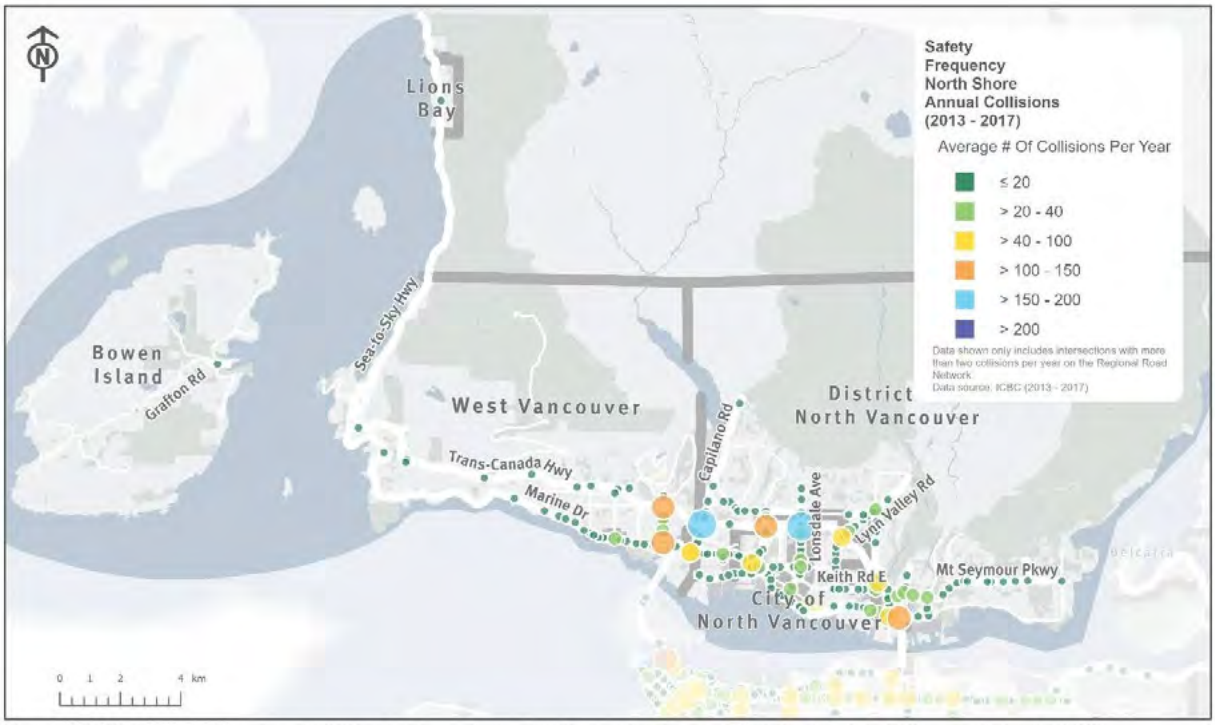
North Shore Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**3.02**	**2.84**
Pavement Condition (average weighted PCI value):	**80.25**	**81.25**

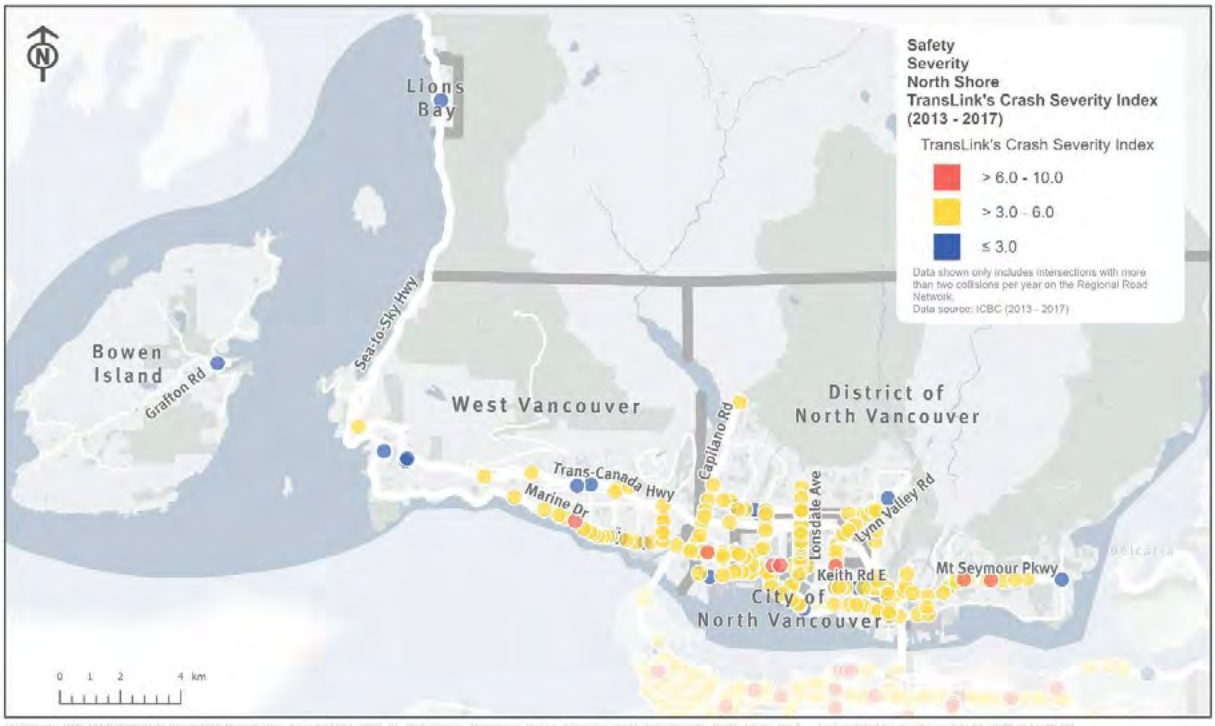
Data source: TransLink 2017. Includes the MRN and some other regional roads.

NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN) – SAFETY

FREQUENCY

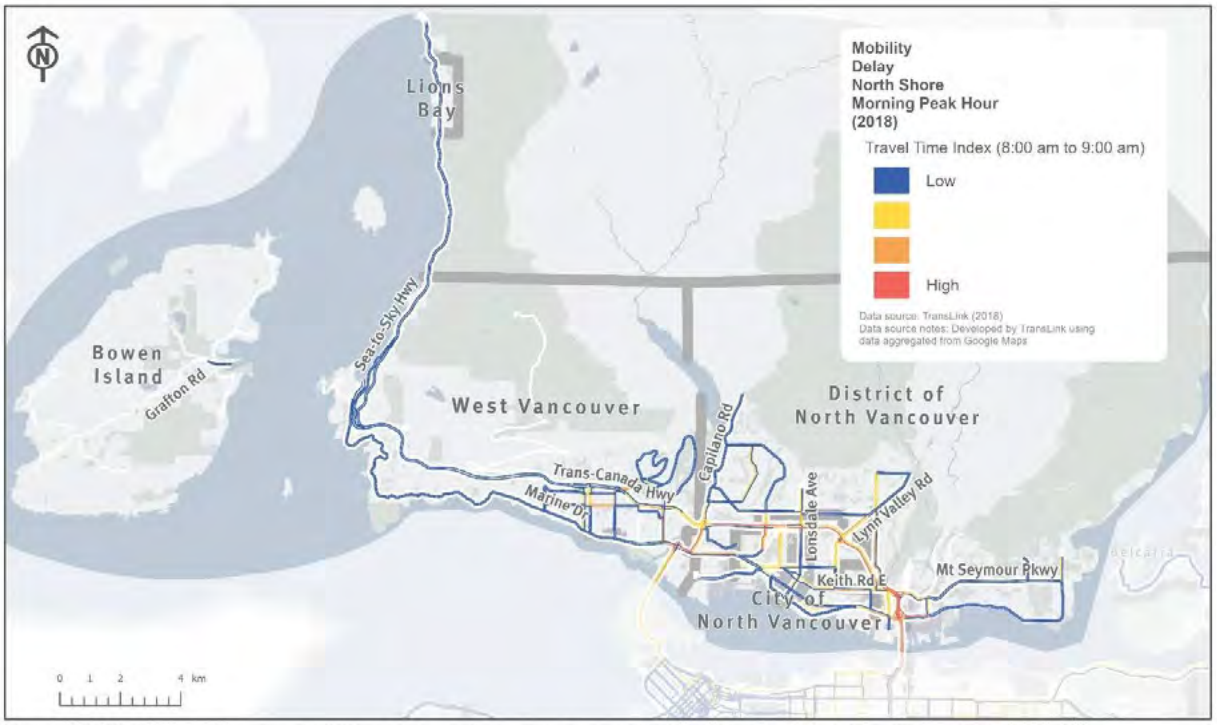


SEVERITY

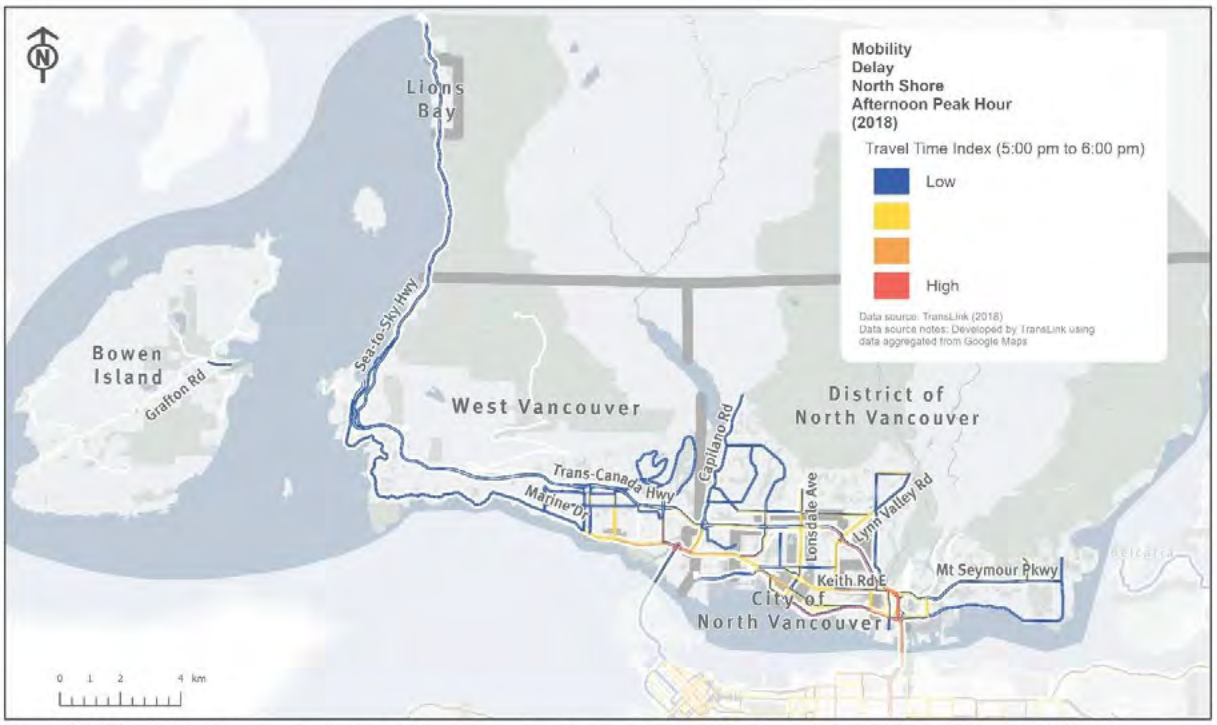


NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN) – MOBILITY

DELAY (AM)

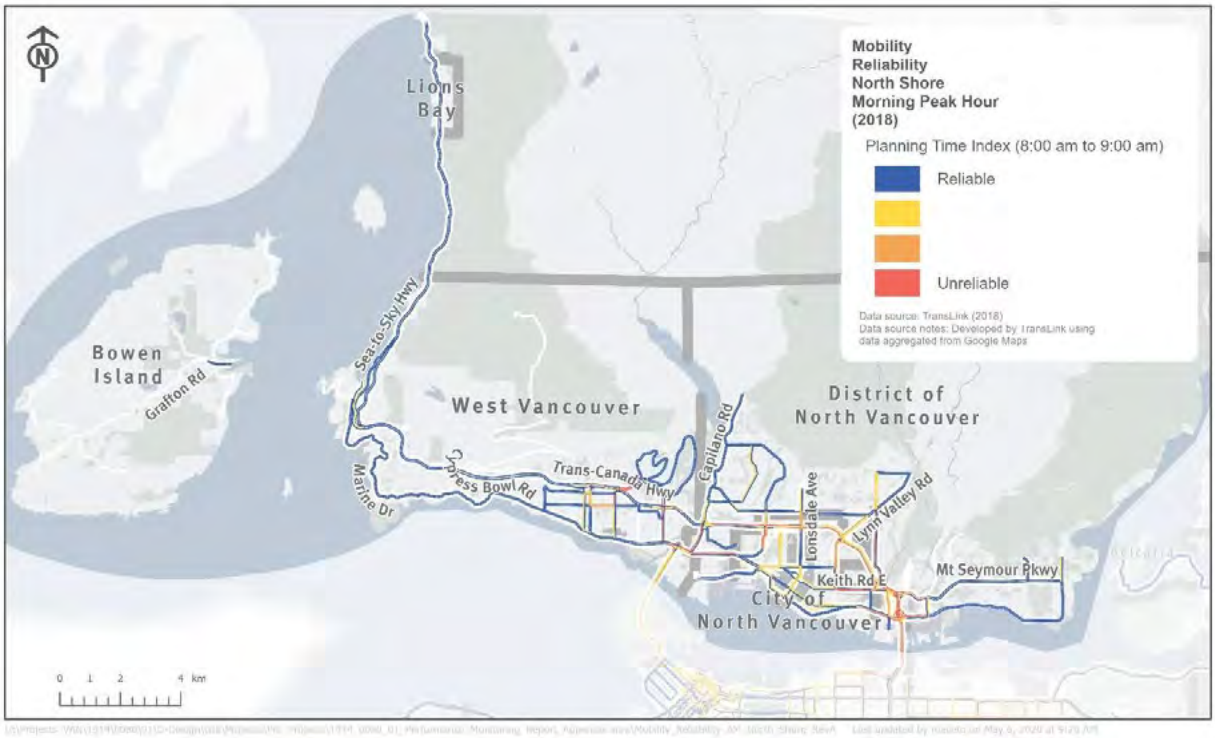


MOBILITY – DELAY (PM)

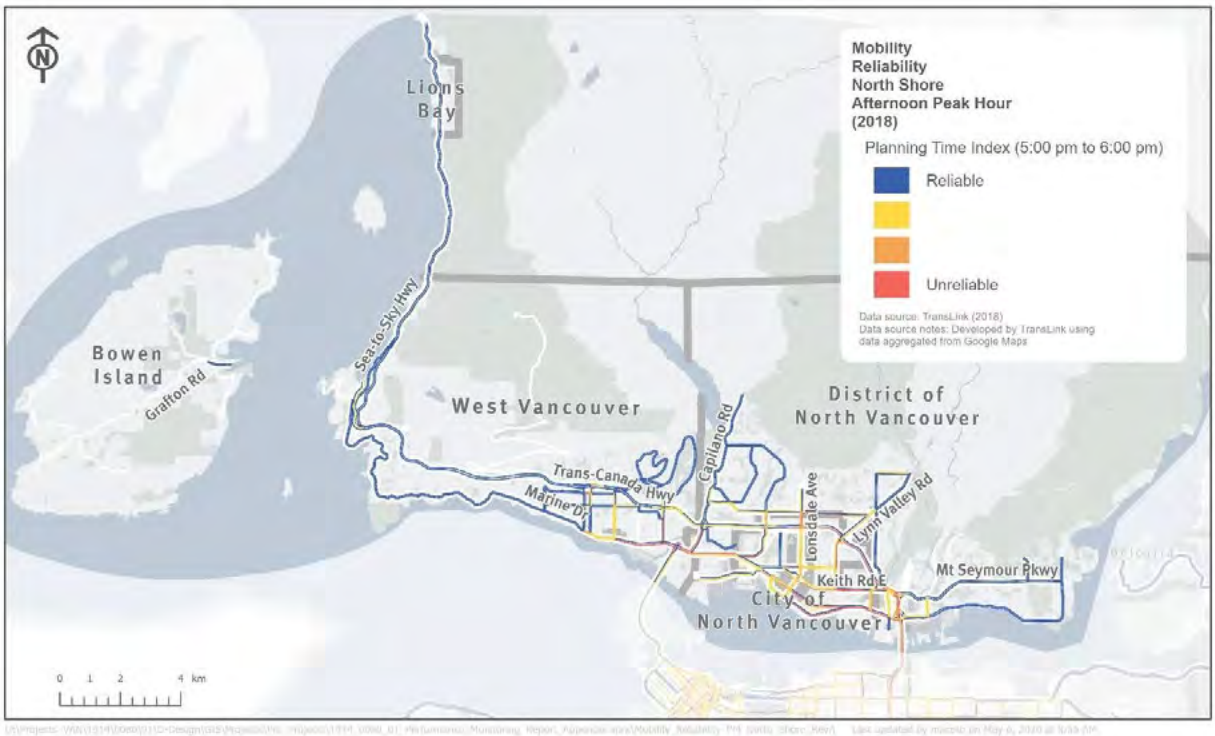


NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN) – MOBILITY

RELIABILITY (AM)

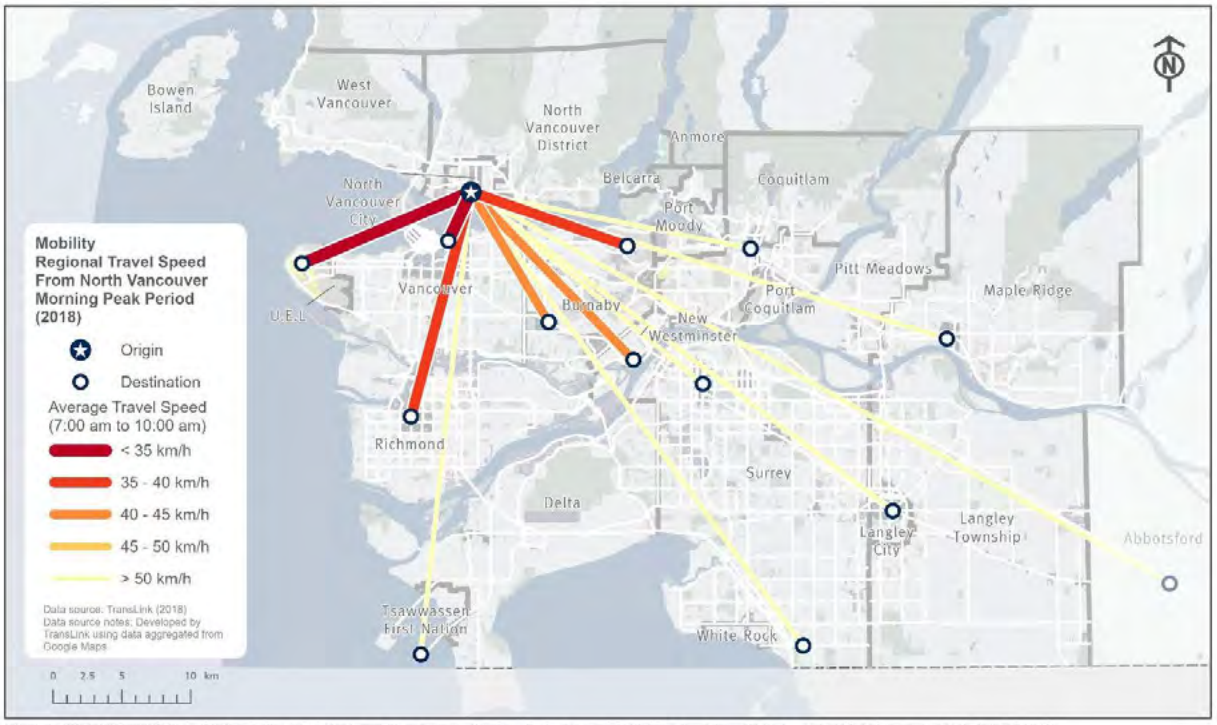


MOBILITY – RELIABILITY (PM)

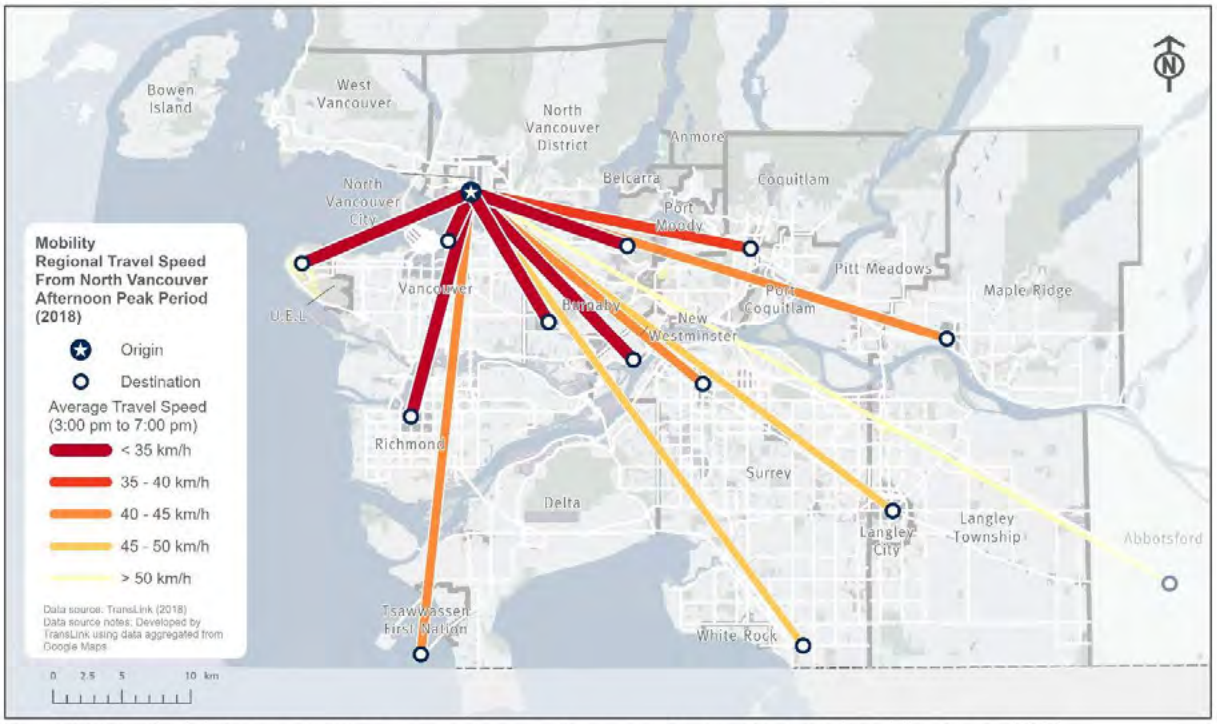


NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN) – MOBILITY

REGIONAL TRAVEL TIME (AM): NORTH VANCOUVER

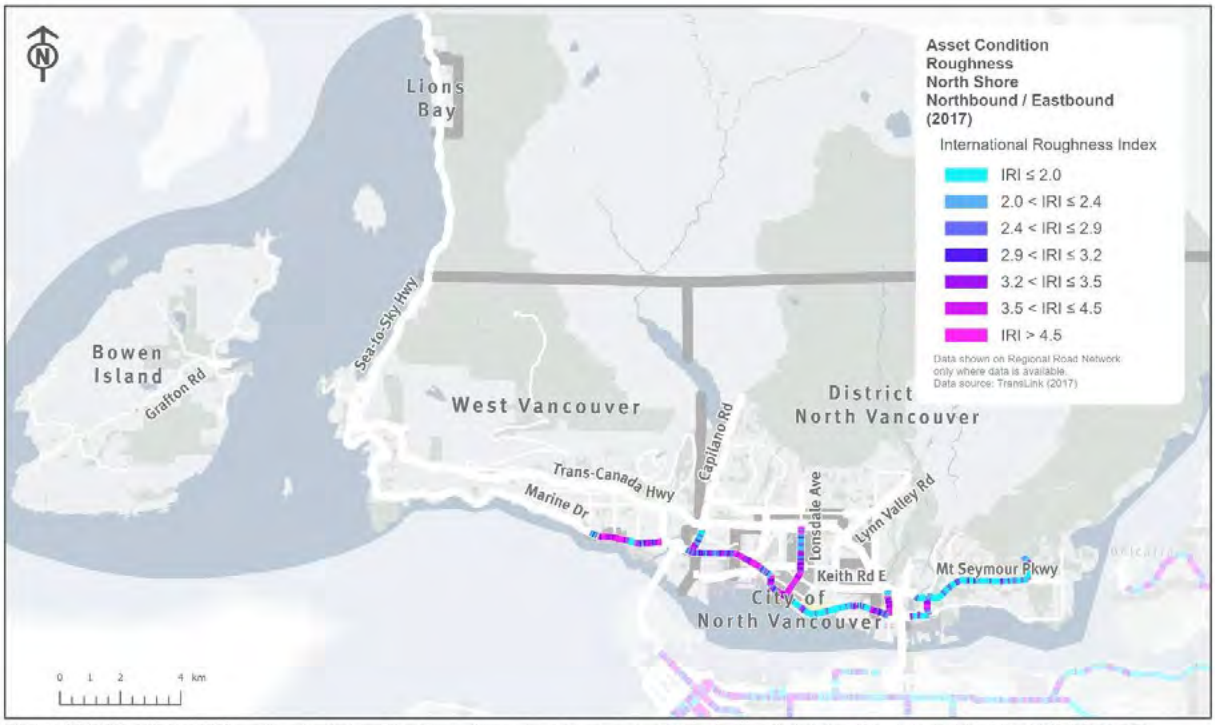


REGIONAL TRAVEL TIME (PM): NORTH VANCOUVER

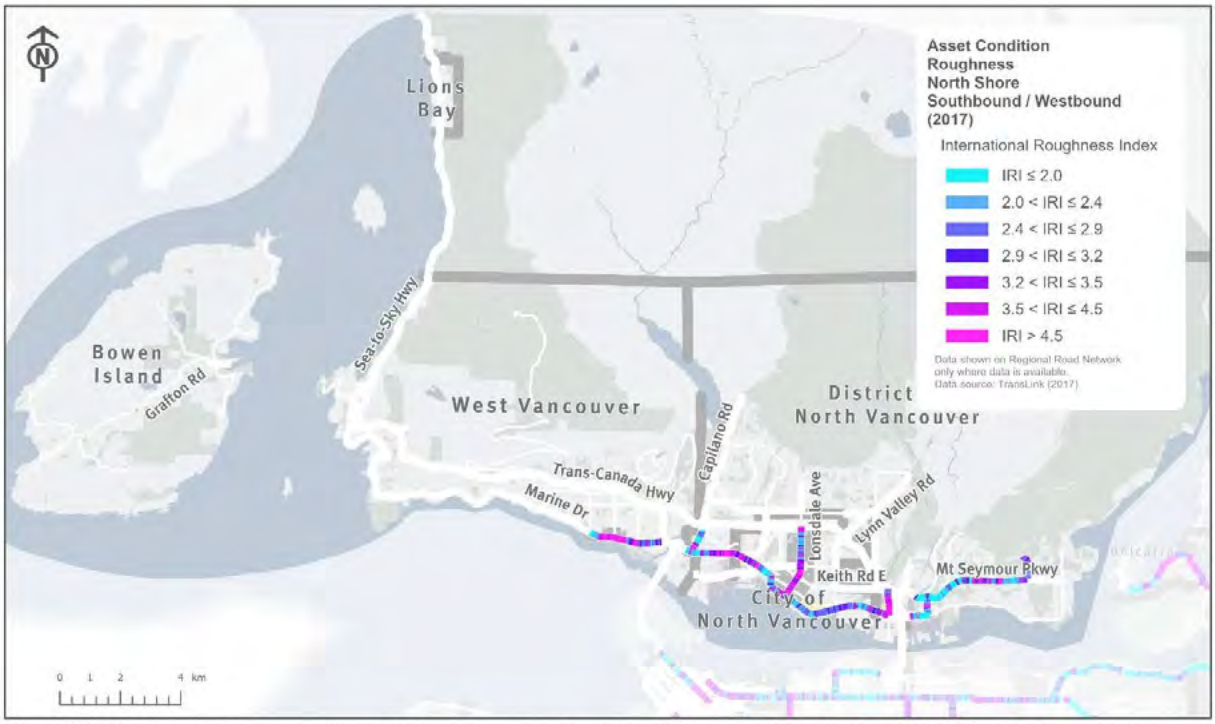


NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN) – ASSET CONDITION

ROUGHNESS (NE)

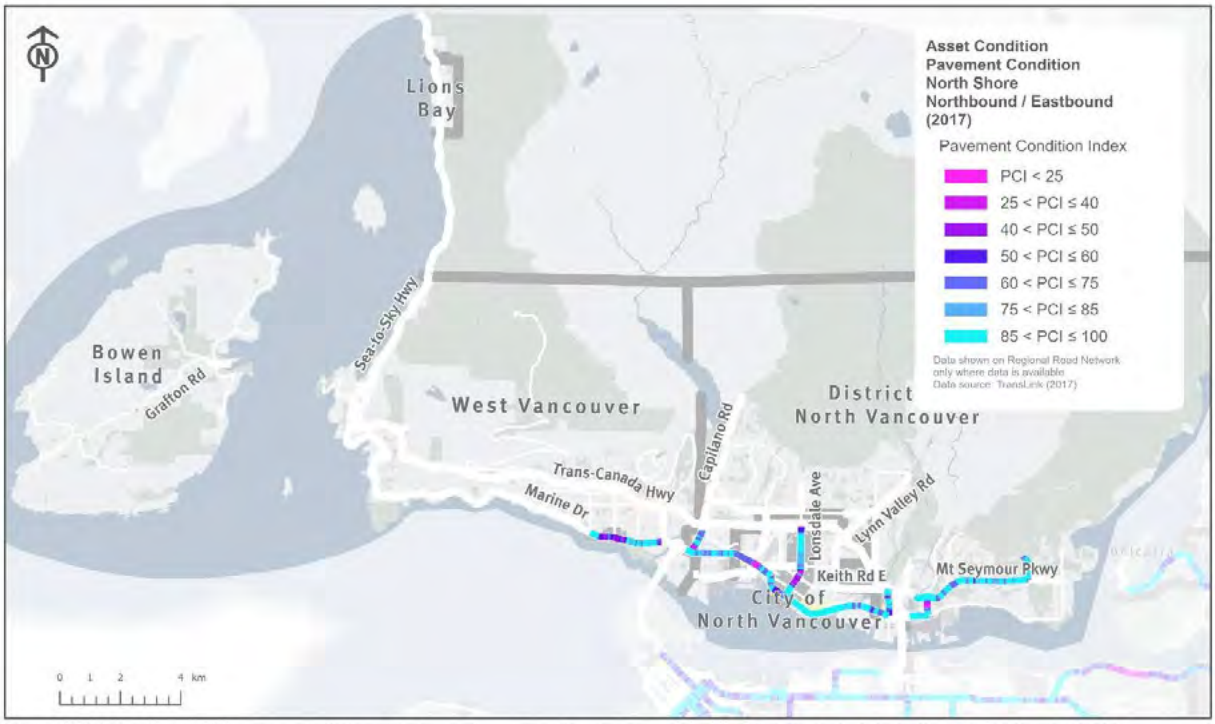


ROUGHNESS (SW)

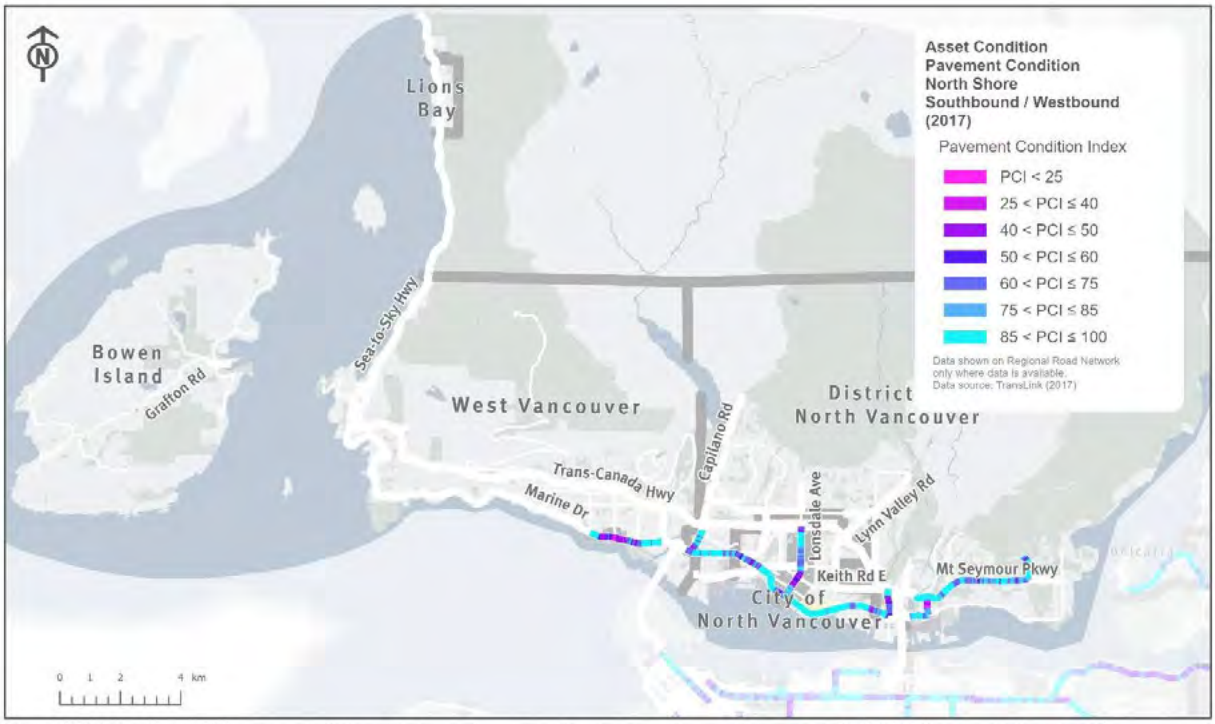


NORTH SHORE (NORTH VANCOUVER, WEST VANCOUVER, LIONS BAY / BOWEN) – ASSET CONDITION

PAVEMENT CONDITION (NE)

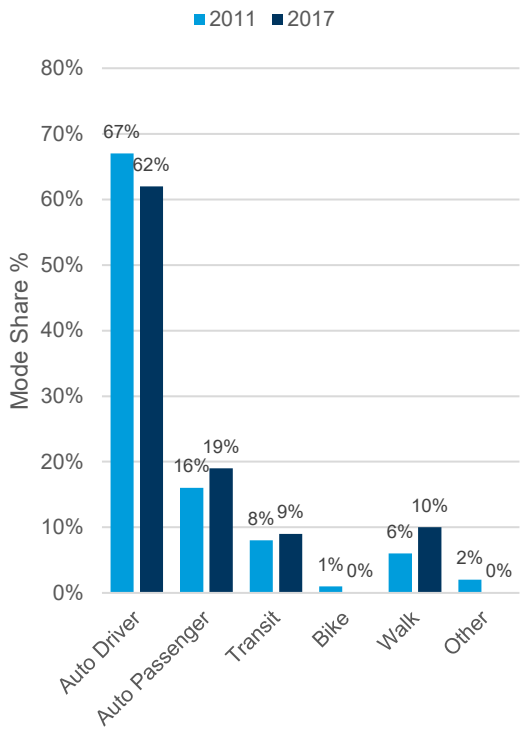


ASSET CONDITION – PAVEMENT CONDITION (SW)



NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA)

MODE SHARE SUMMARY



SAFETY SUMMARY

Northeast Sector Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**5,507**
Total crashes causing an injury or fatality:	**2,445**
Crashes per year causing injury or fatality per 100,000 residents:	**1,013**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**136**
TransLink Crash Severity Index for sub-region:	**5.0**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

Northeast Sector Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**11 km**	**11 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

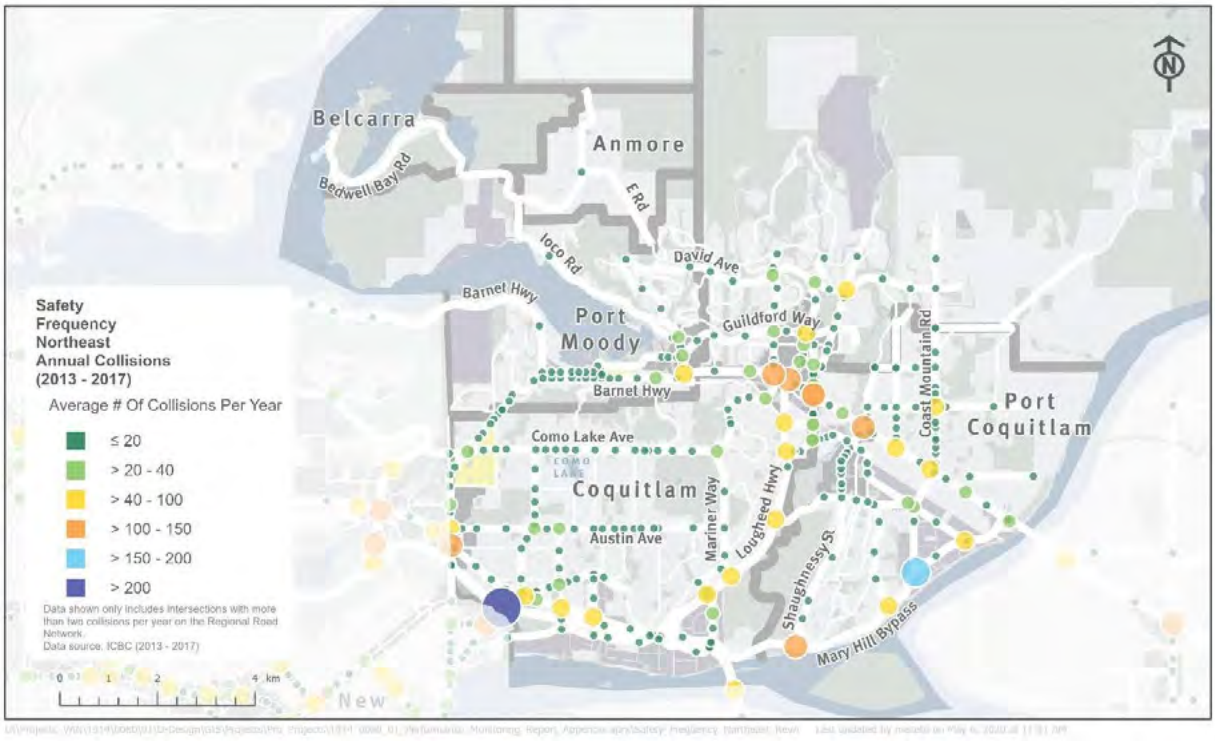
Northeast Sector Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**2.87**	**2.61**
Pavement Condition (average weighted PCI value):	**78.21**	**79.17**

Data source: TransLink 2017. Includes the MRN and some other regional roads.

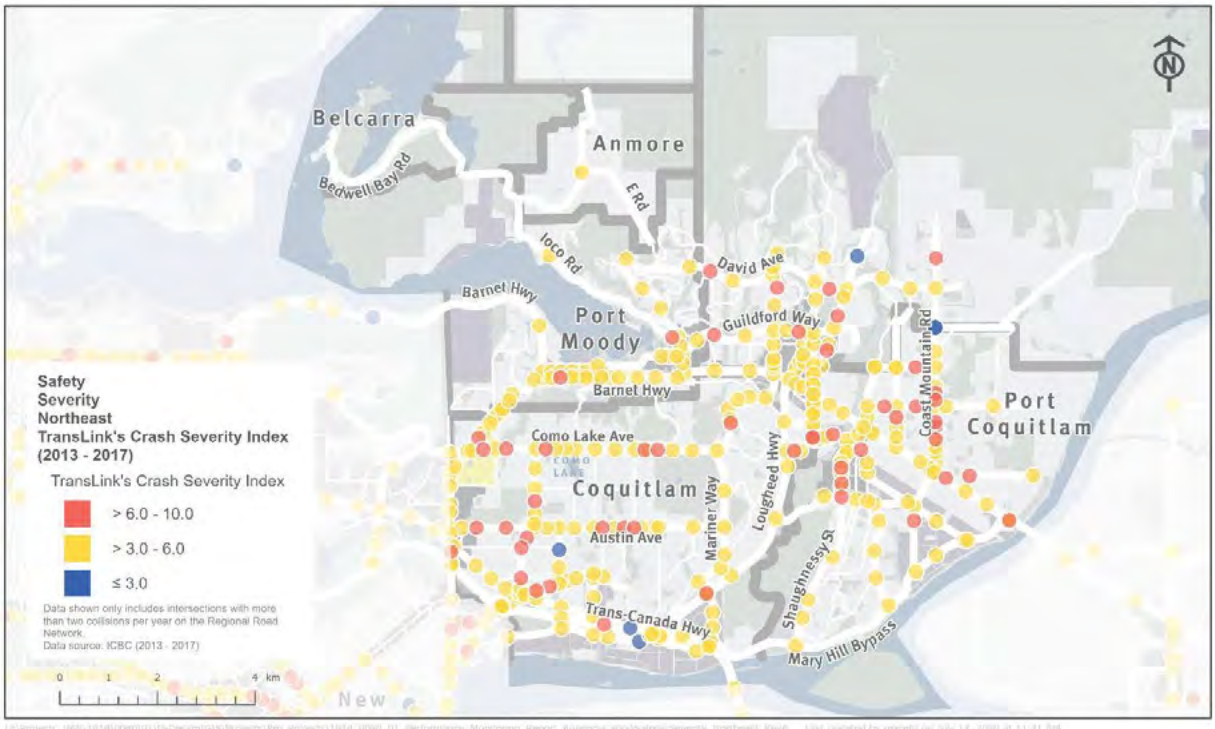
NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – SAFETY

FREQUENCY



NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – SAFETY

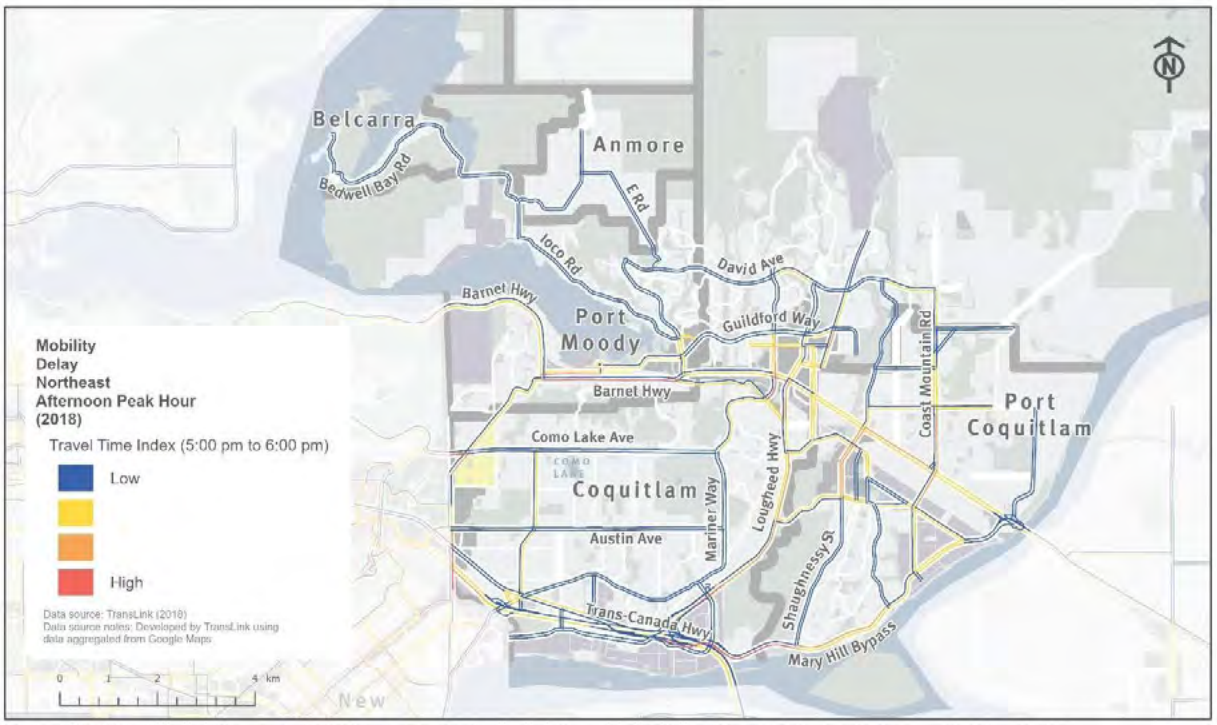
SEVERITY



NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – MOBILITY

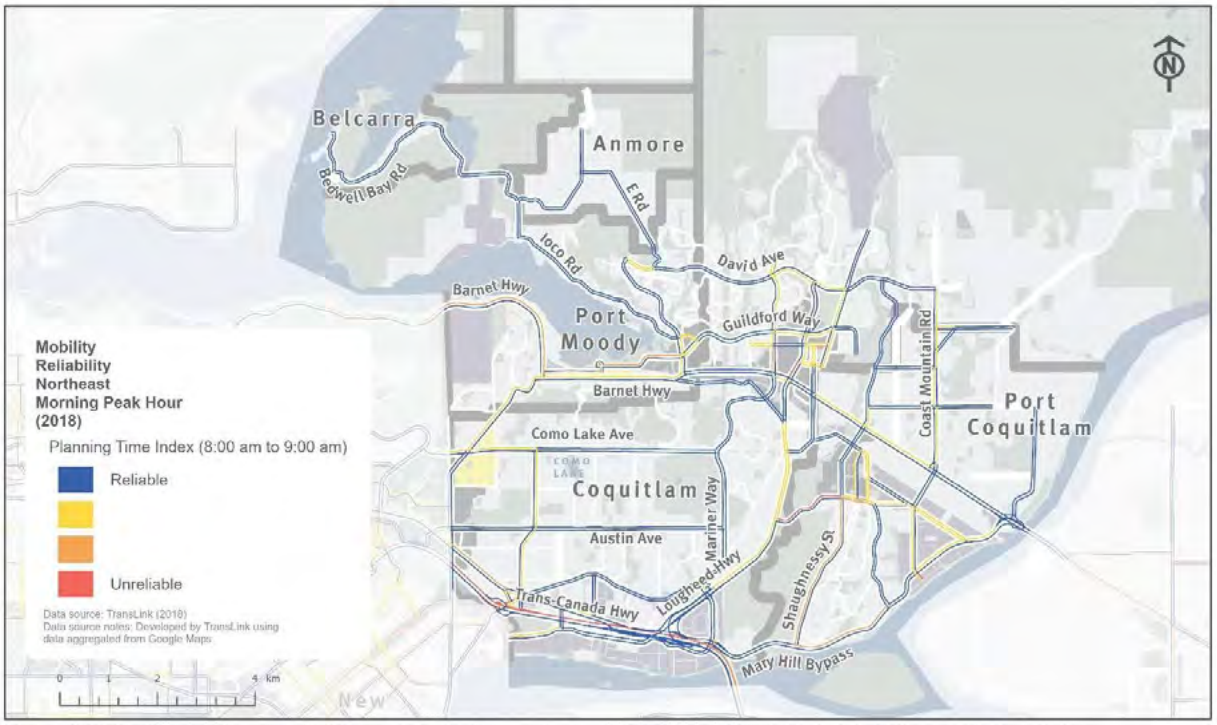
DELAY (AM)

DELAY (PM)

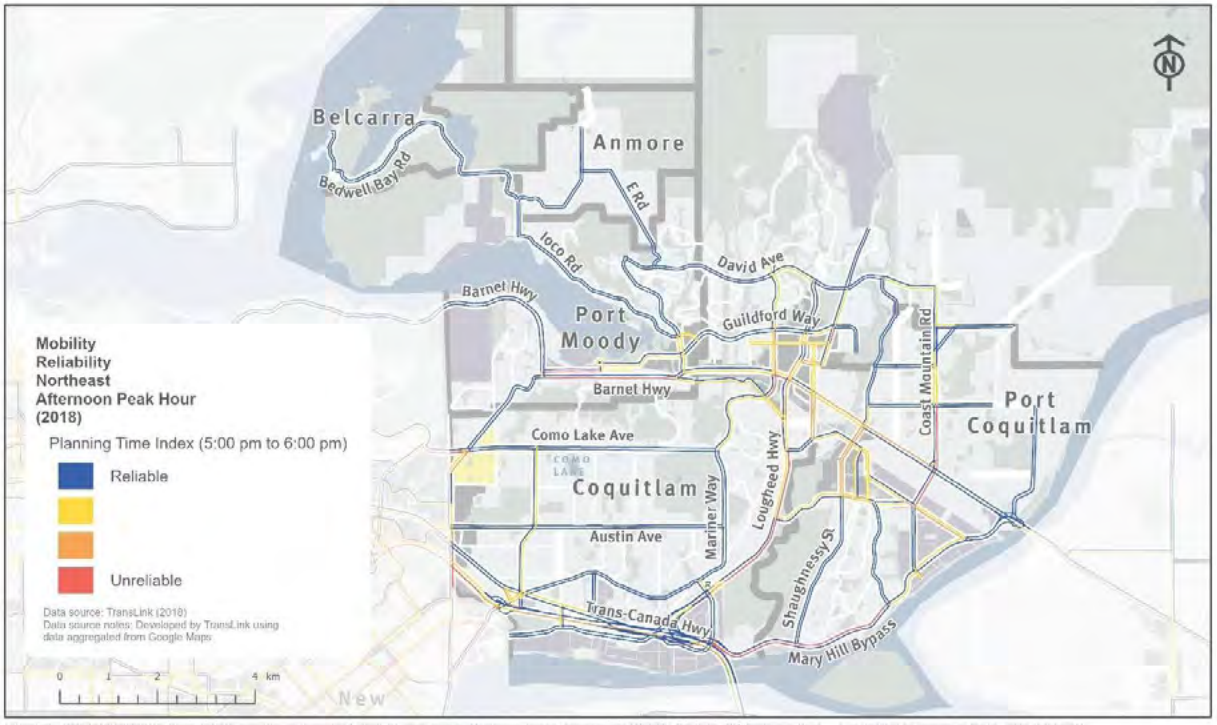


NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – MOBILITY

RELIABILITY (AM)

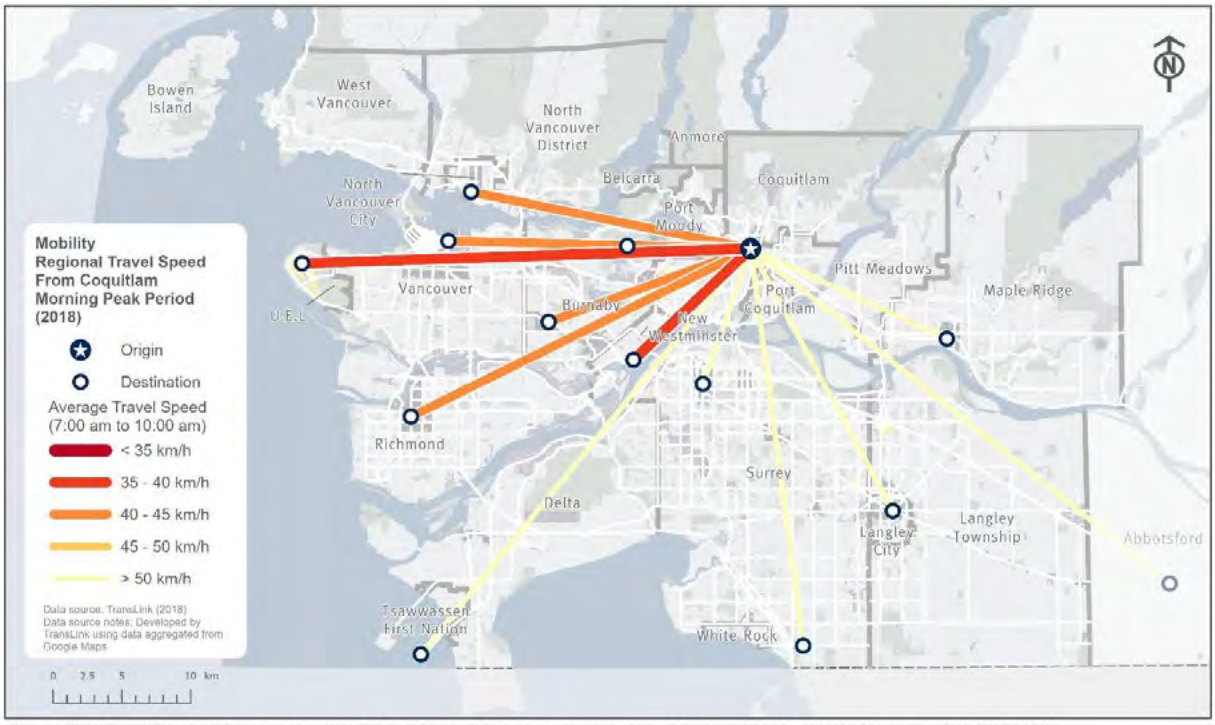


RELIABILITY (PM)

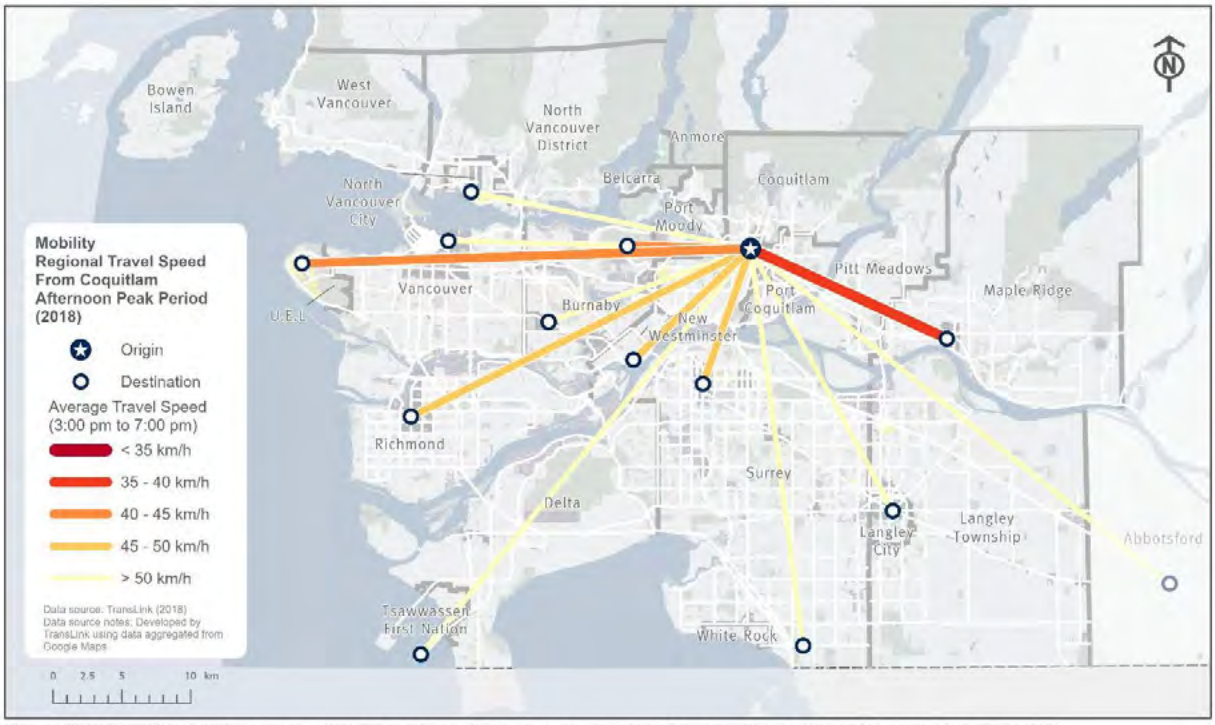


NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – MOBILITY

REGIONAL TRAVEL TIME (AM): COQUITLAM

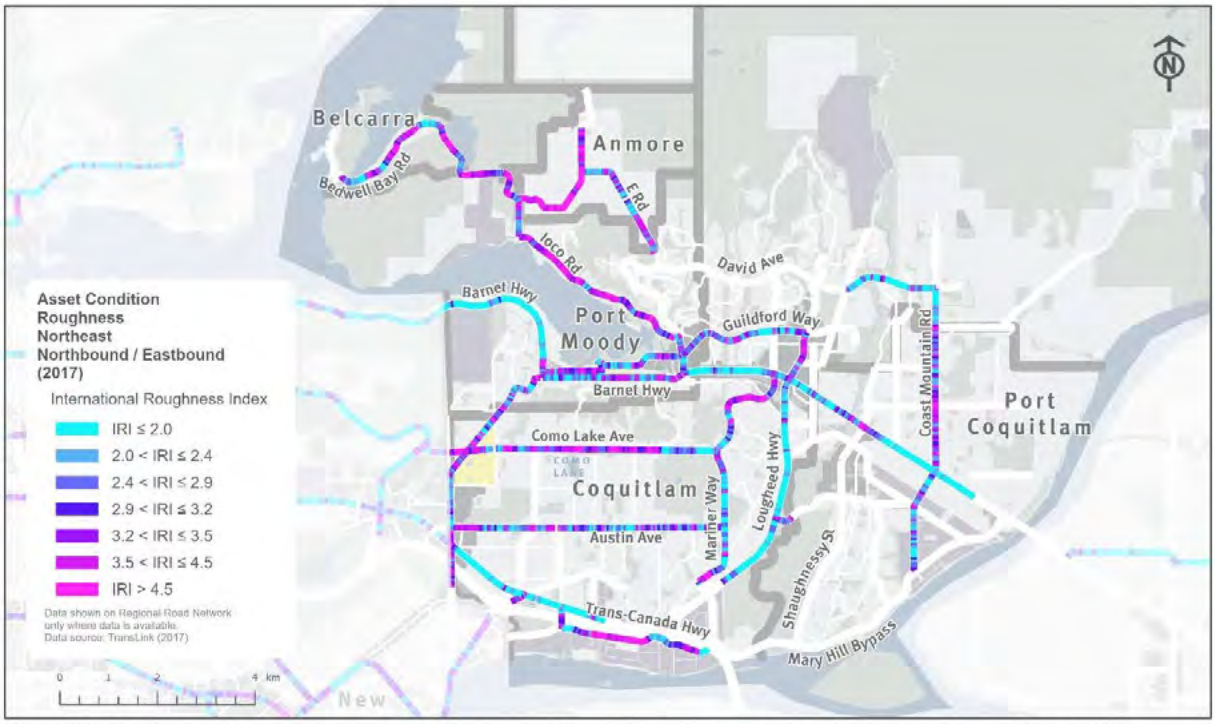


REGIONAL TRAVEL TIME (PM): COQUITLAM

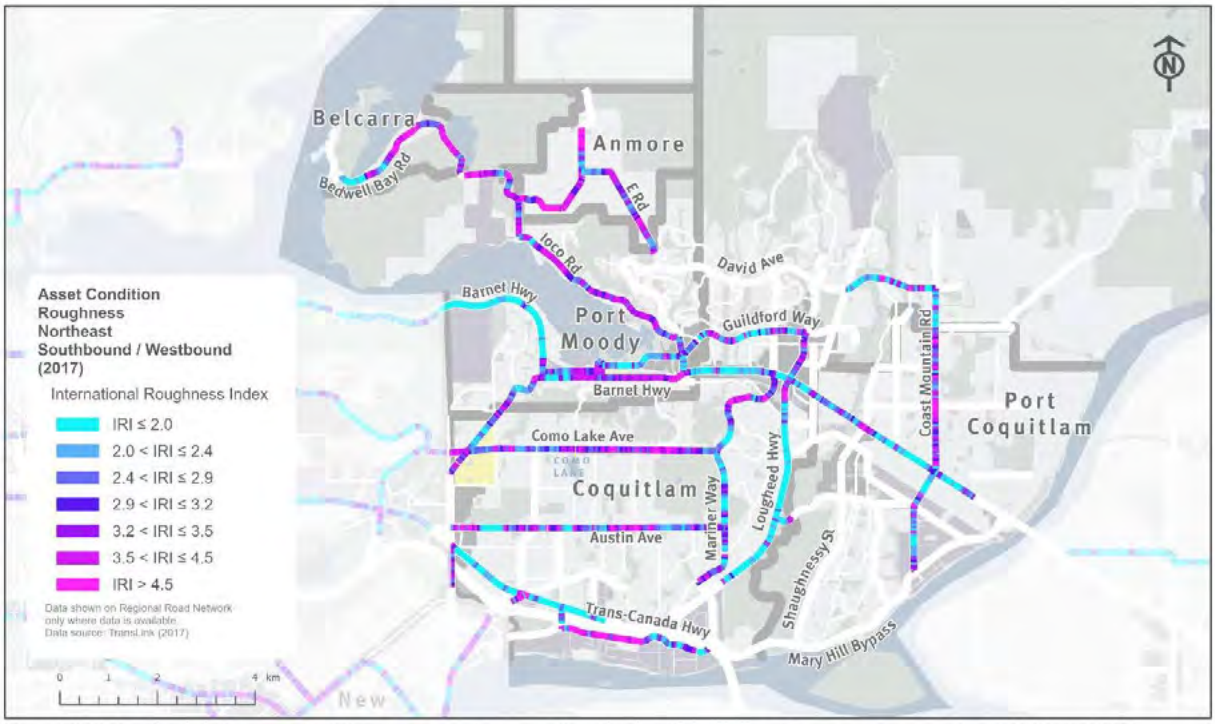


NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – ASSET CONDITION

ROUGHNESS (NE)



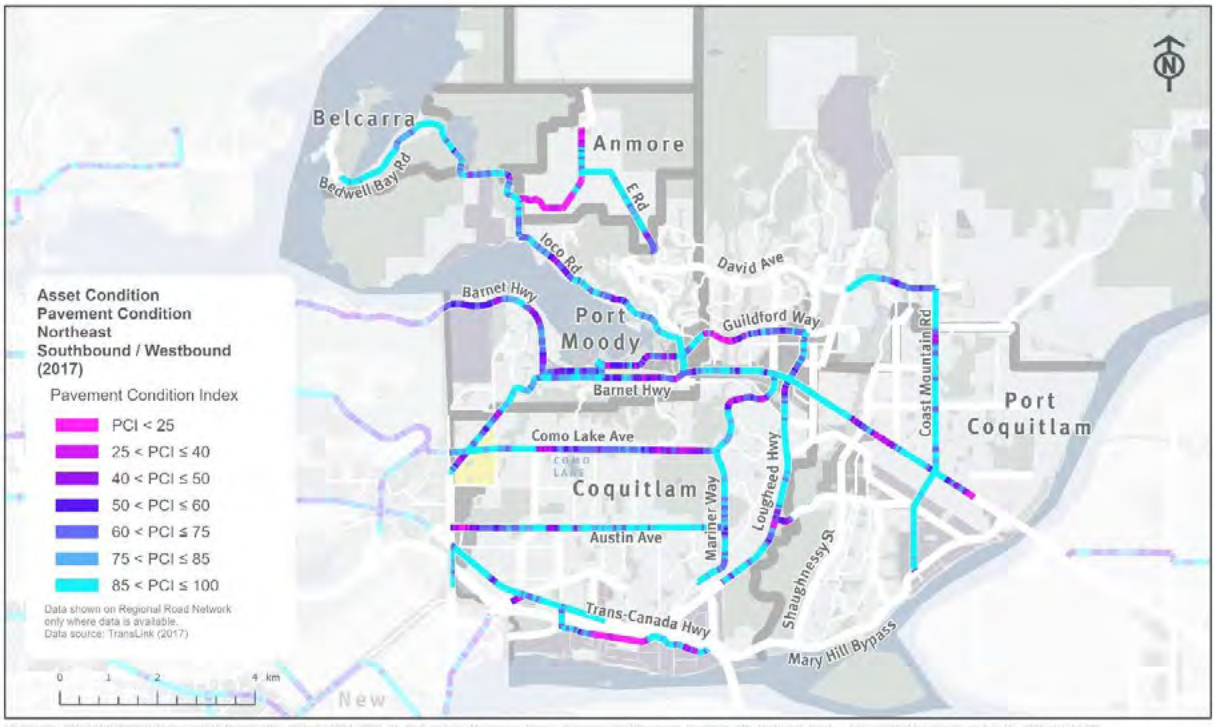
ROUGHNESS (SW)



NORTHEAST SECTOR (TRI-CITIES / ANMORE / BELCARRA) – ASSET CONDITION

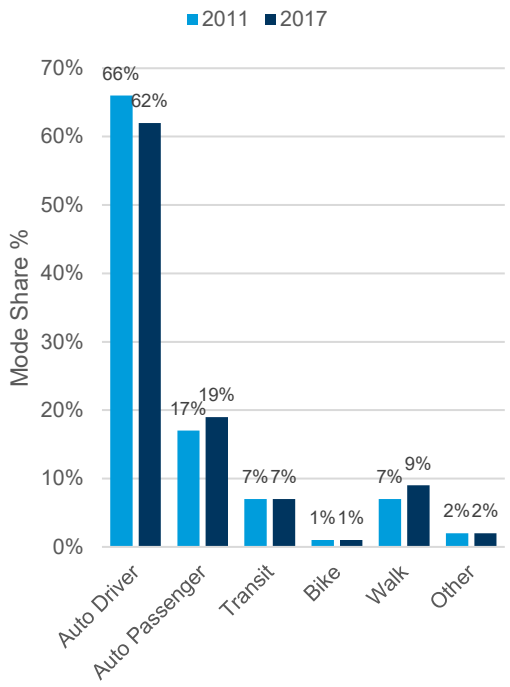
PAVEMENT CONDITION (NE)

ASSET CONDITION – PAVEMENT CONDITION (SW)



SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK)

MODE SHARE SUMMARY



SAFETY SUMMARY

Southeast Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**20,344**
Total crashes causing an injury or fatality:	**9,923**
Crashes per year causing injury or fatality per 100,000 residents:	**1,315**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**166**
TransLink Crash Severity Index for sub-region:	**5.4**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

Southeast Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**13 km**	**10 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

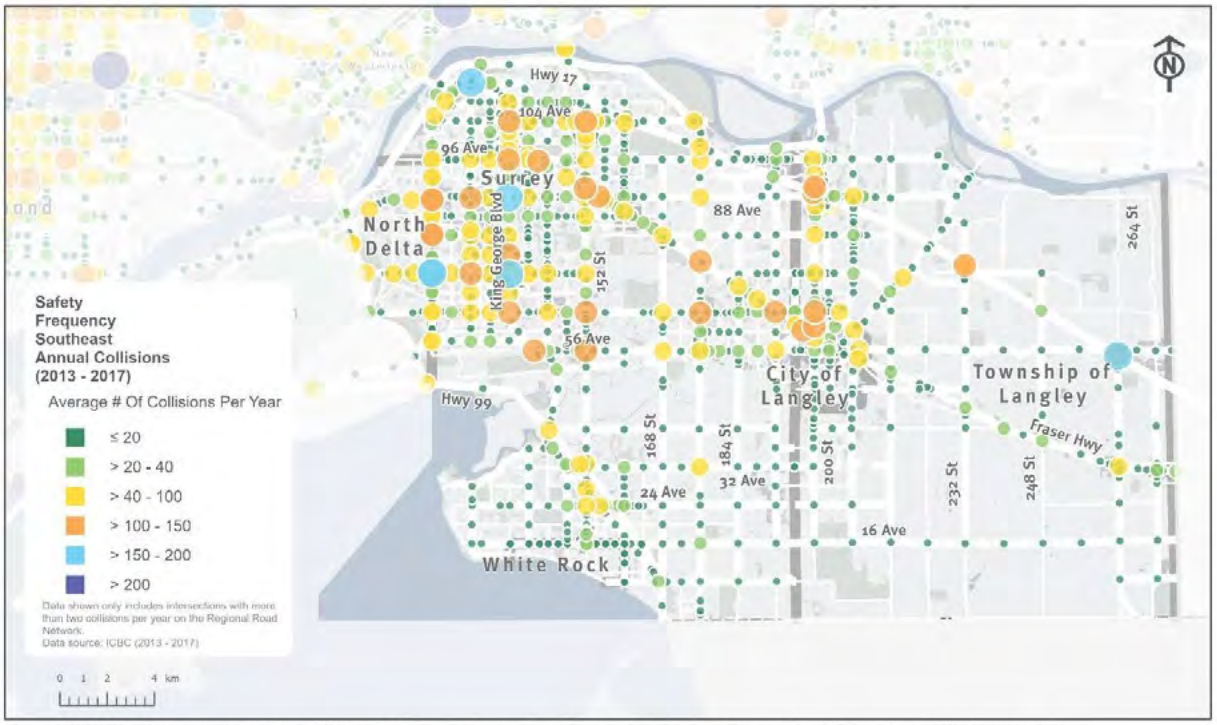
Southeast Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**2.53**	**2.35**
Pavement Condition (average weighted PCI value):	**78.33**	**82.29**

Data source: TransLink 2017. Includes the MRN and some other regional roads.

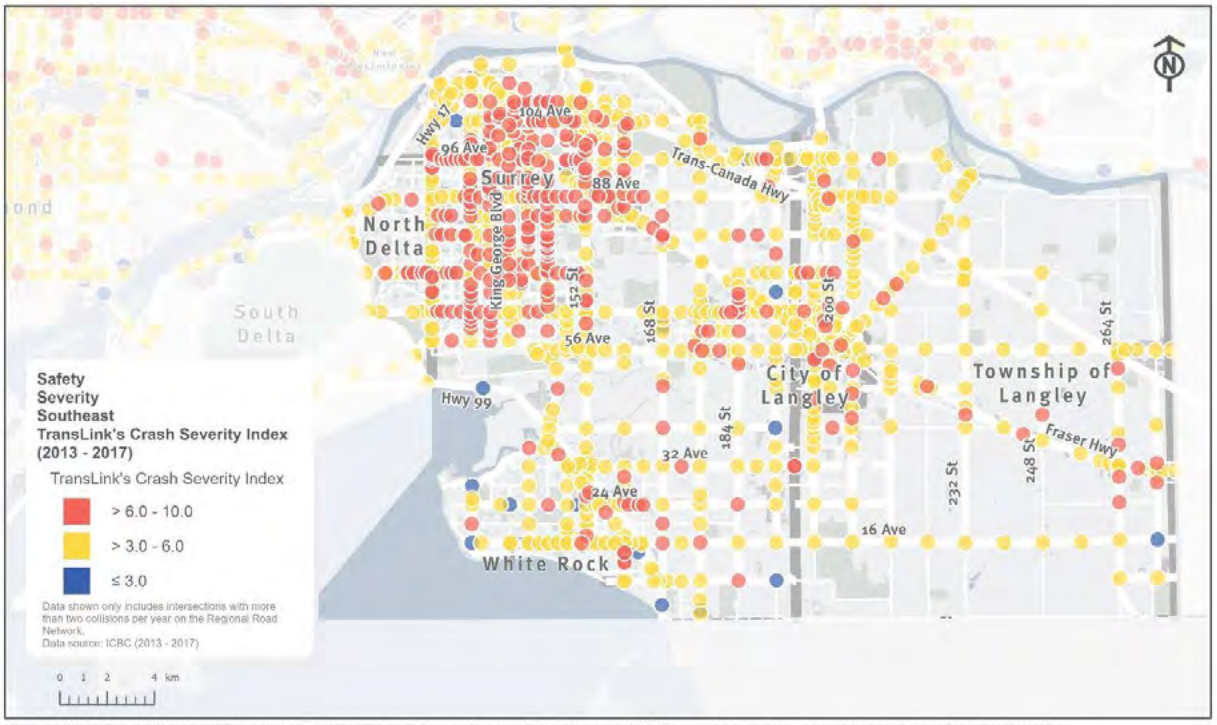
SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – SAFETY

FREQUENCY



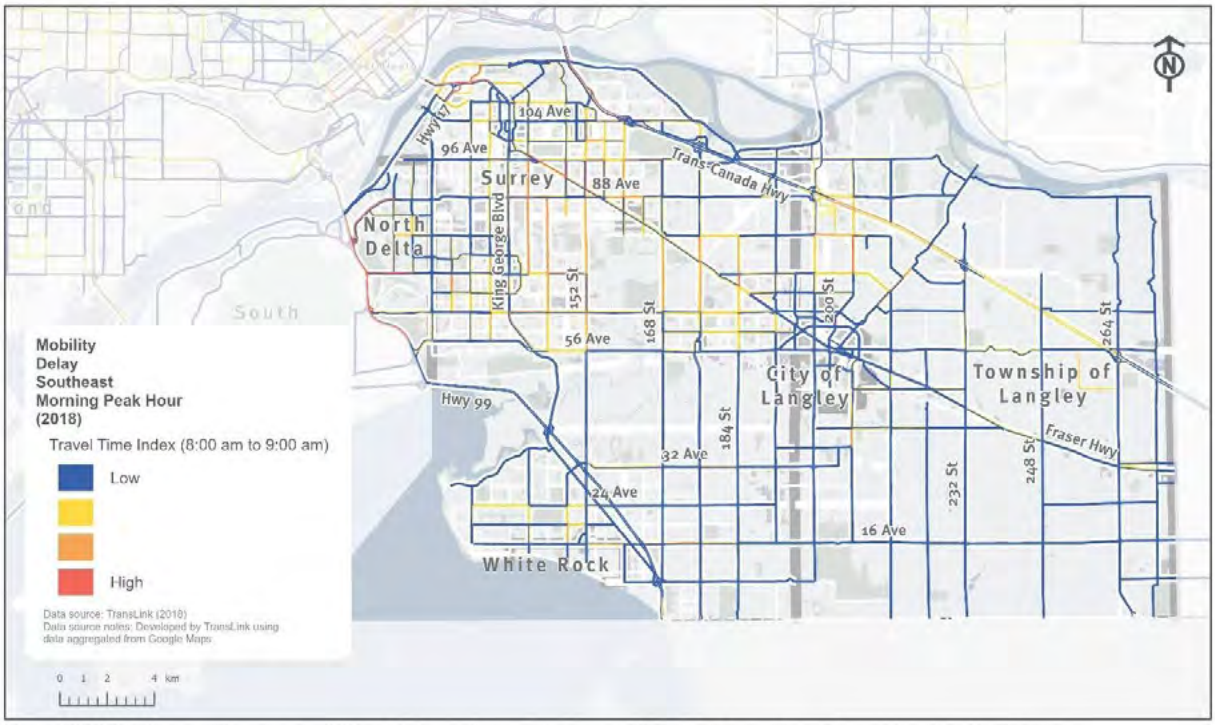
SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – SAFETY

SEVERITY

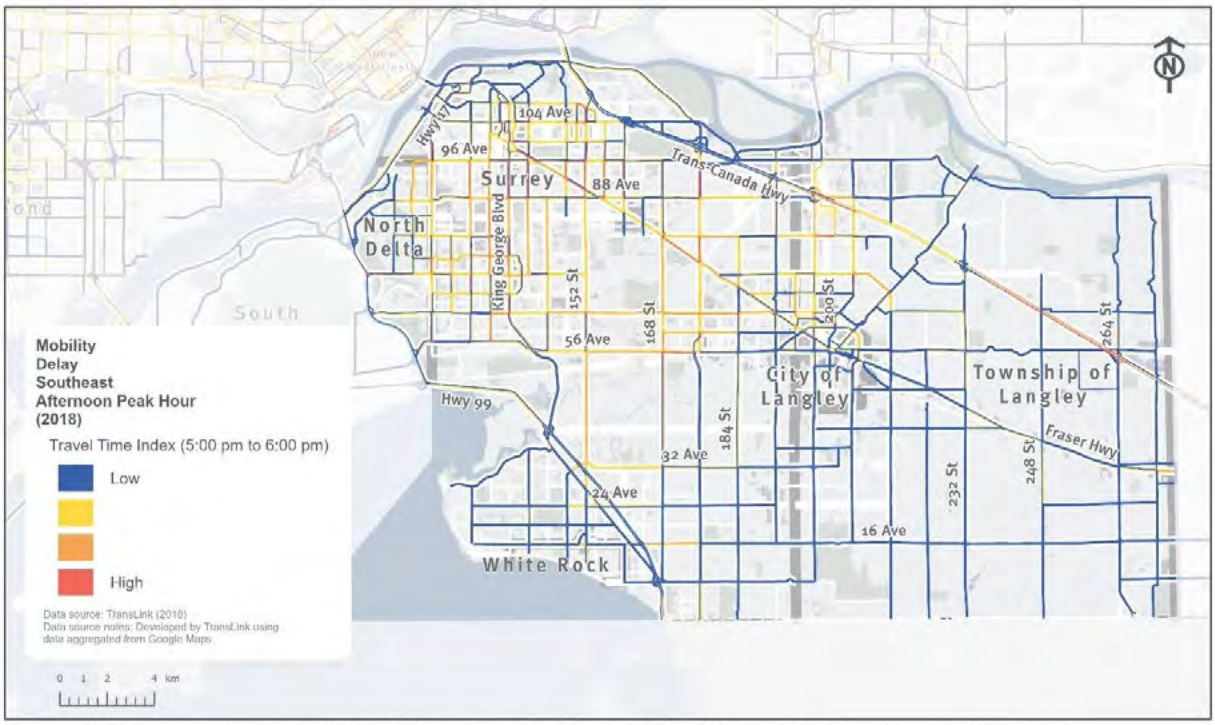


SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – MOBILITY

DELAY (AM)

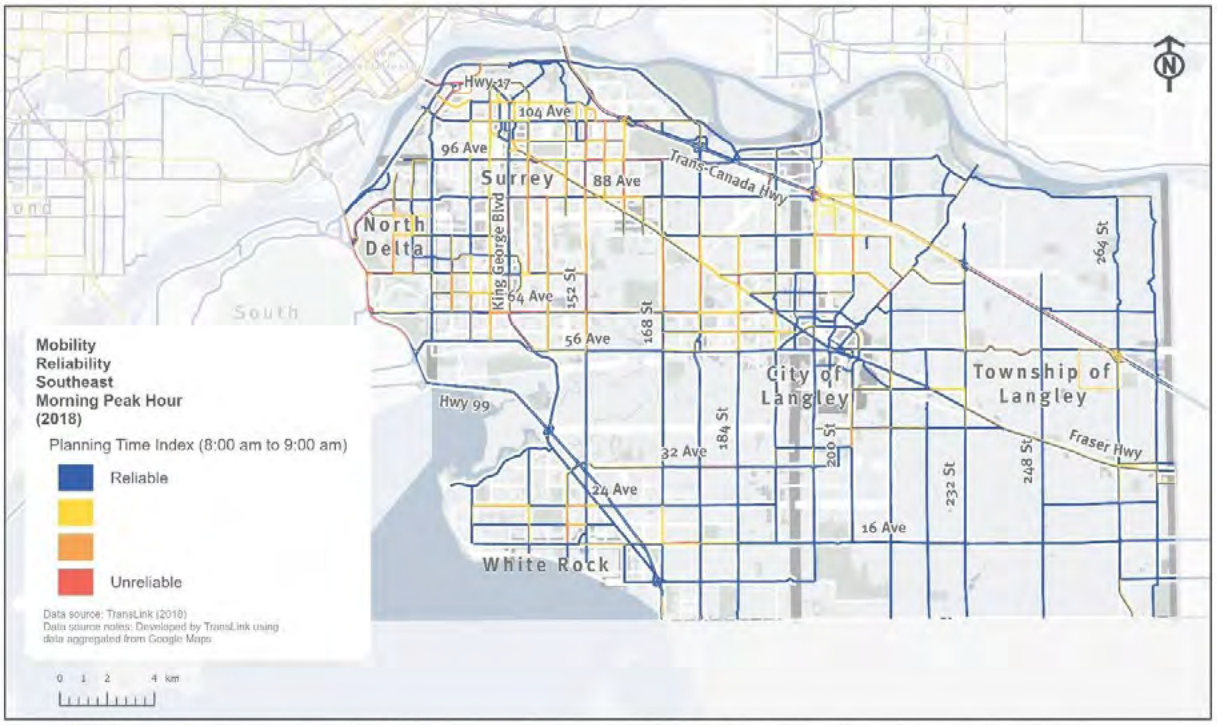


DELAY (PM)

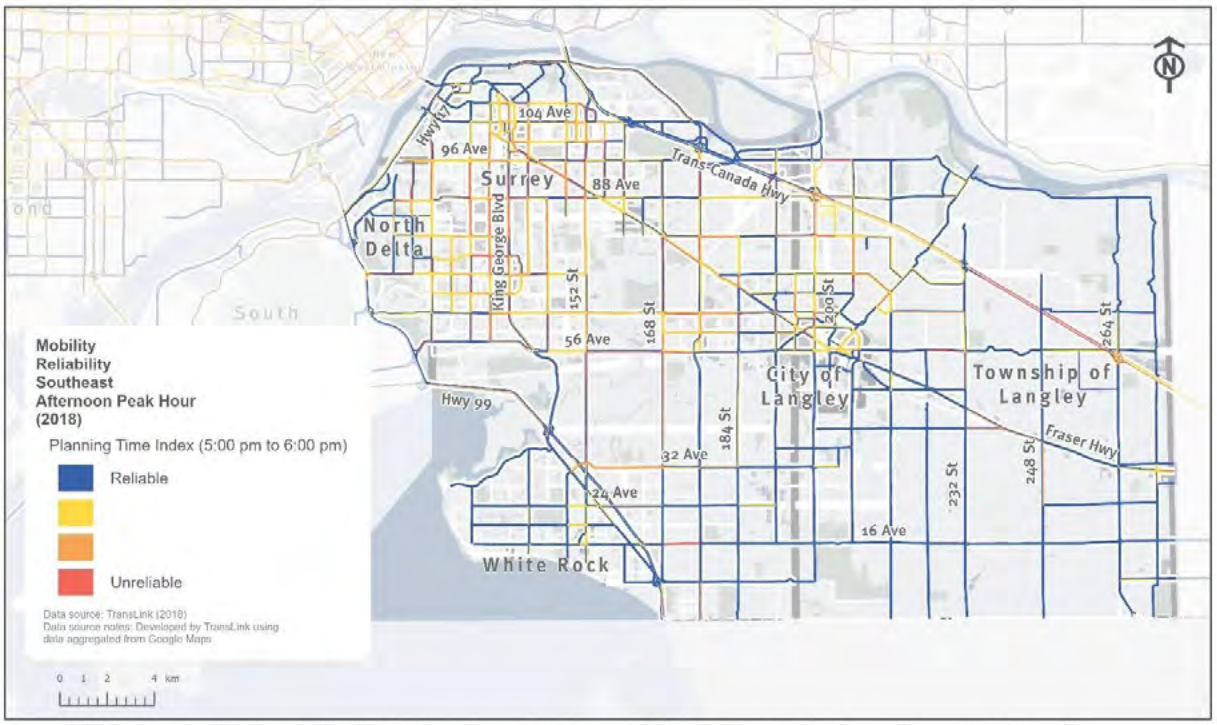


SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – MOBILITY

RELIABILITY (AM)

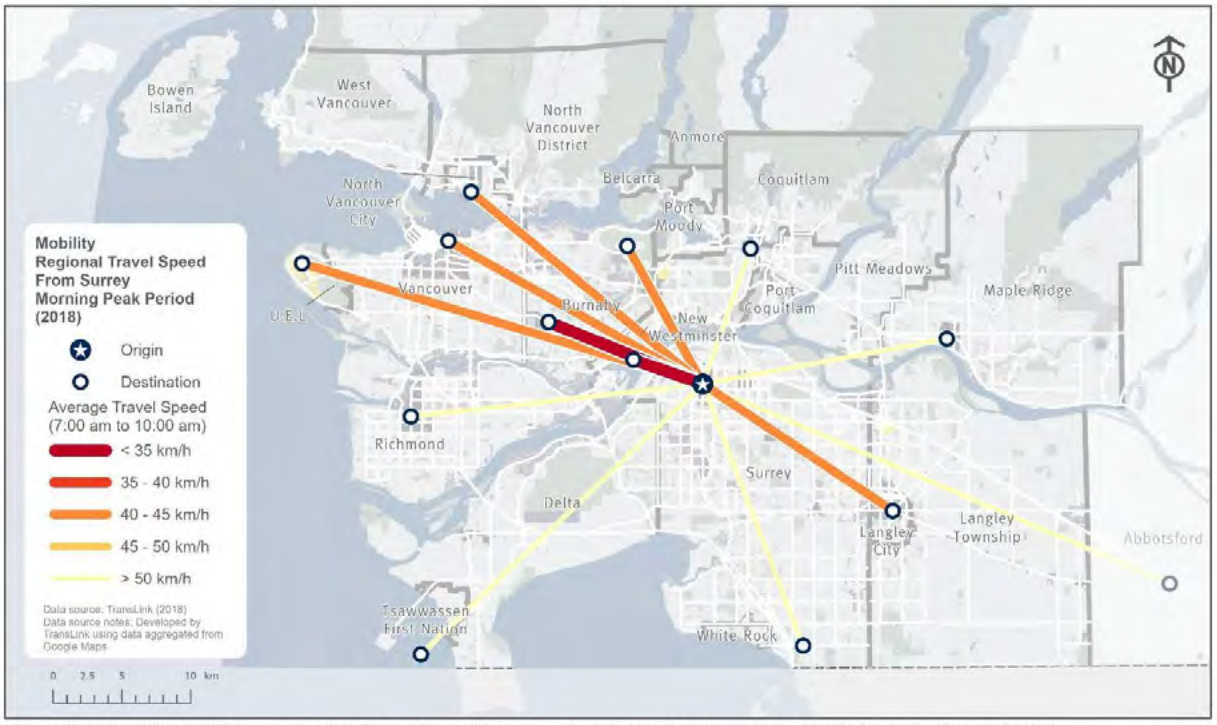


MOBILITY – RELIABILITY (PM)

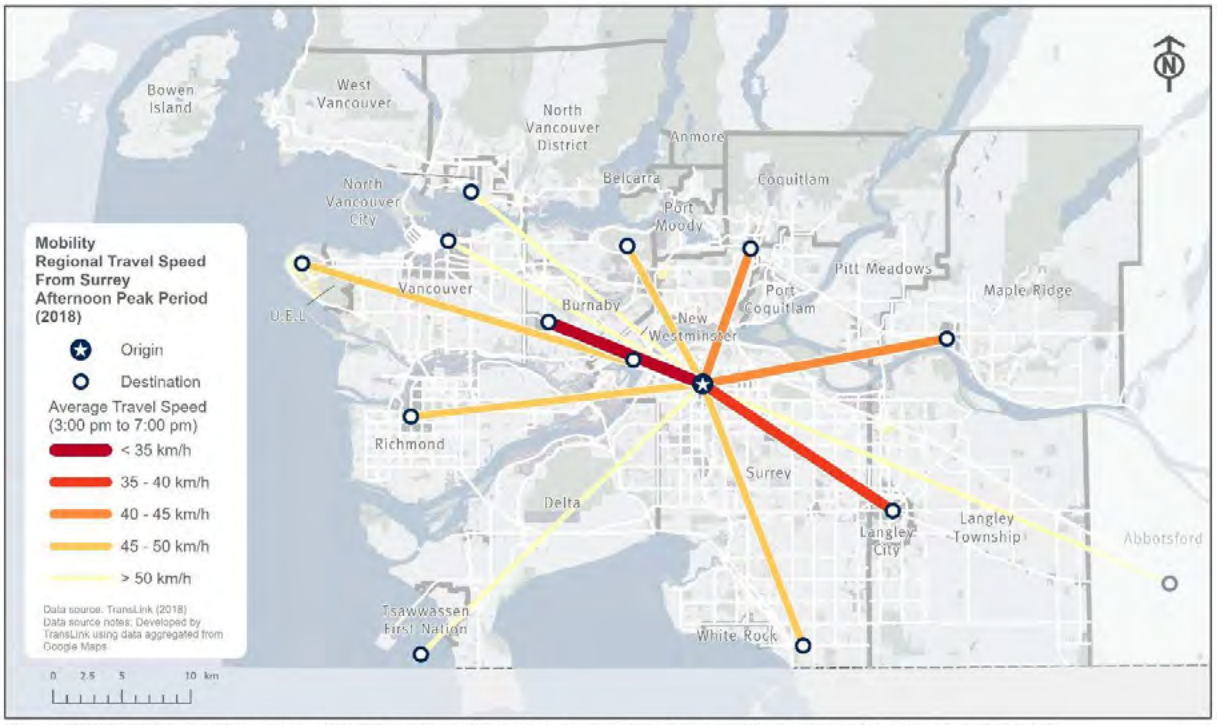


SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – MOBILITY

REGIONAL TRAVEL TIME (AM): SURREY

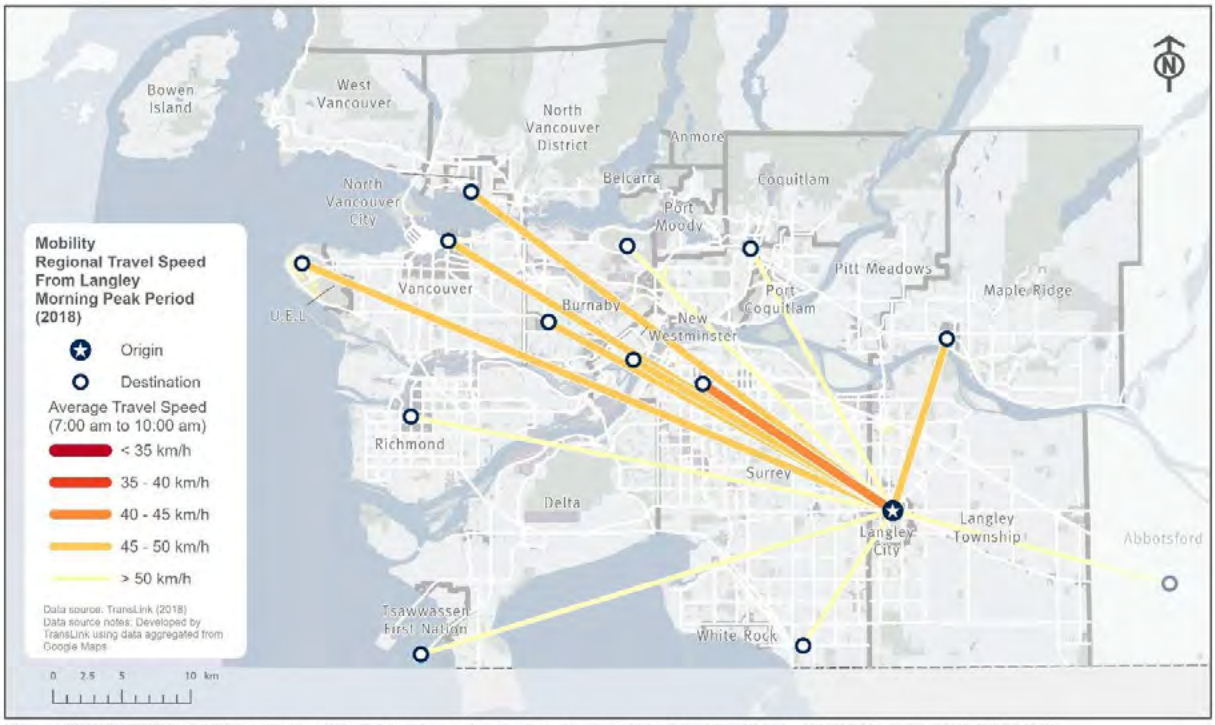


REGIONAL TRAVEL TIME (PM): SURREY

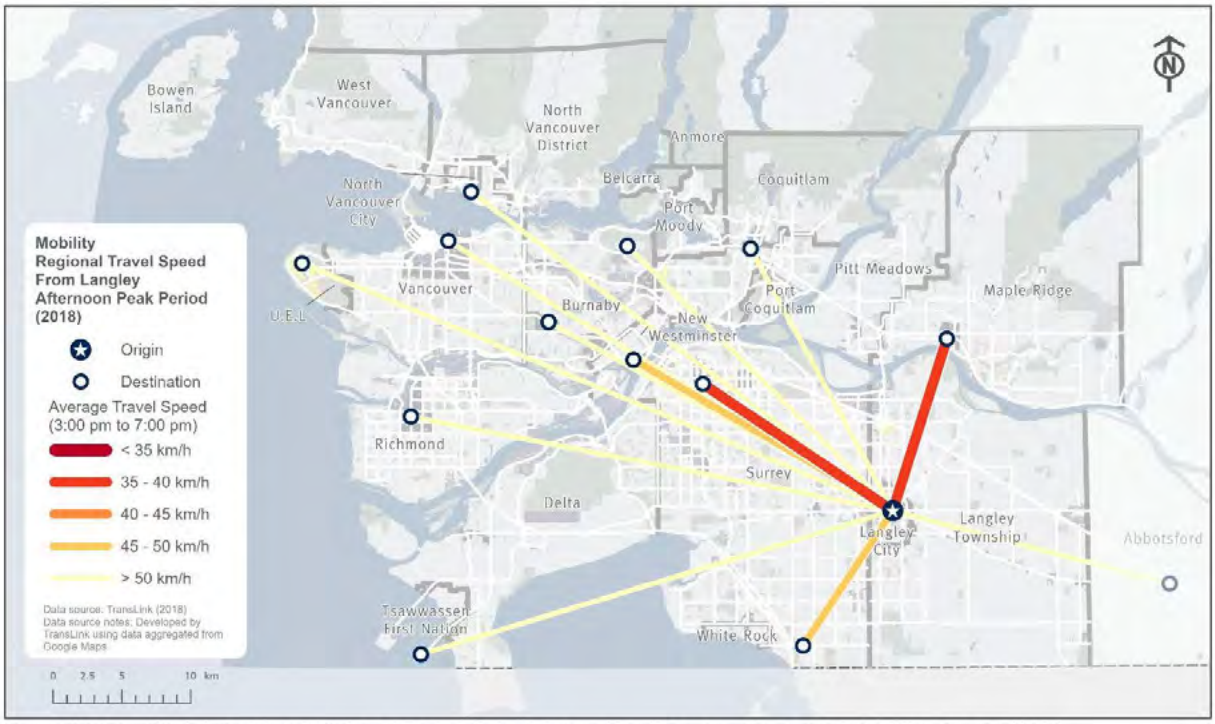


SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – MOBILITY

REGIONAL TRAVEL TIME (AM): LANGLEY

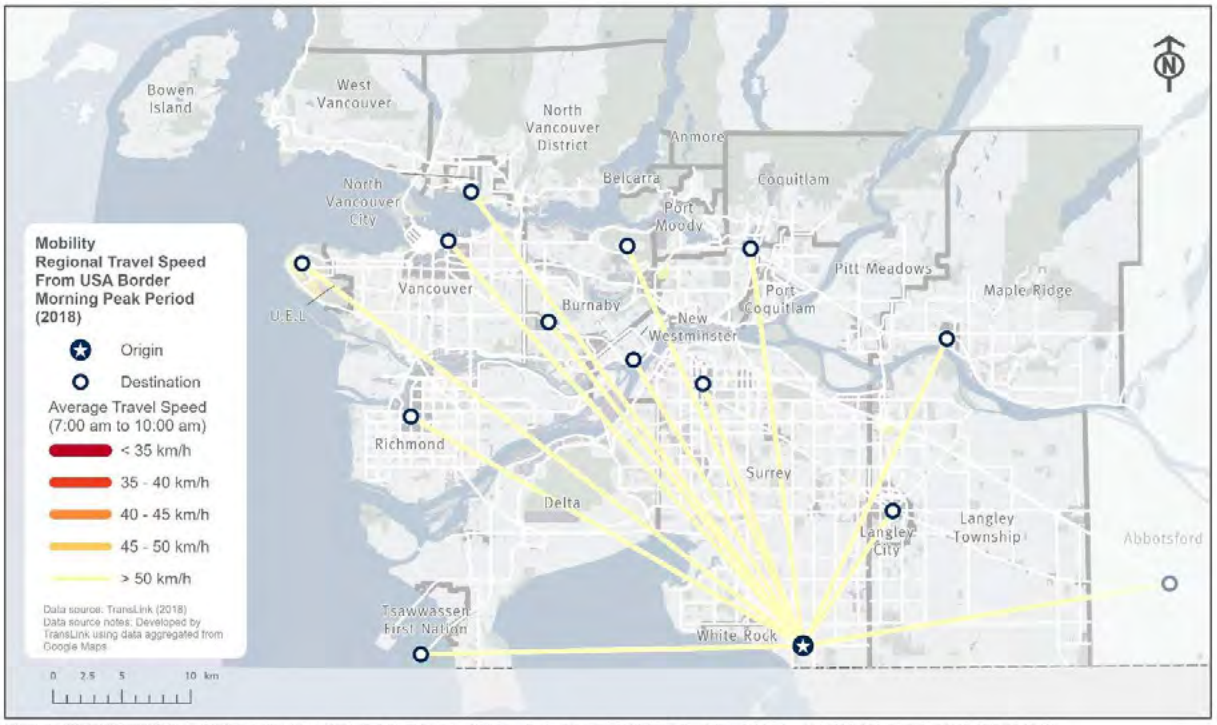


MOBILITY – REGIONAL TRAVEL TIME (PM): LANGLEY

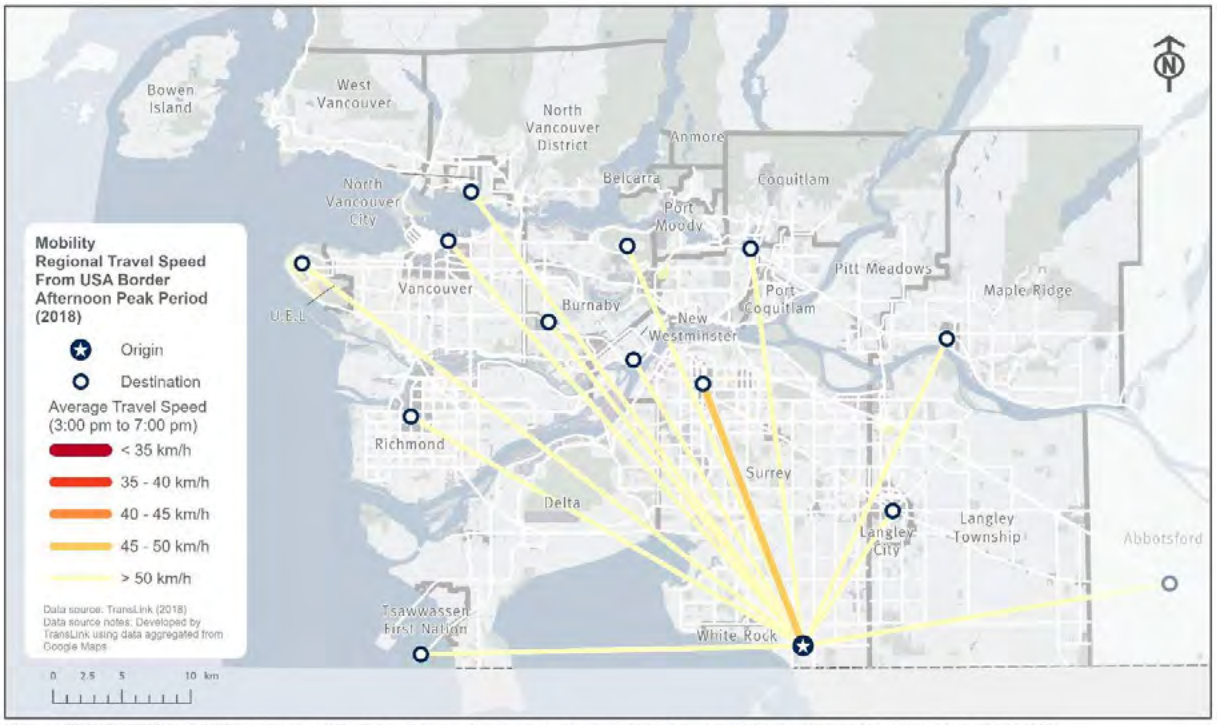


SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – MOBILITY

REGIONAL TRAVEL TIME (AM): USA BORDER



MOBILITY – REGIONAL TRAVEL TIME (PM): USA BORDER



SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – ASSET CONDITION

ROUGHNESS (NE)

ROUGHNESS (SW)

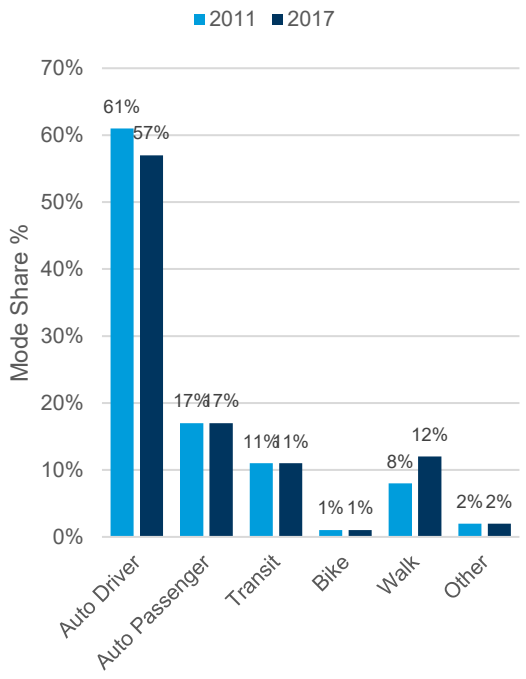
SOUTHEAST (NORTH DELTA / SURREY / LANGLEYS / WHITE ROCK) – ASSET CONDITION

PAVEMENT CONDITION (NE)

PAVEMENT CONDITION (SW)

SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION)

MODE SHARE SUMMARY



SAFETY SUMMARY

Southwest Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**6,200**
Total crashes causing an injury or fatality:	**2,429**
Crashes per year causing injury or fatality per 100,000 residents:	**960**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**161**
TransLink Crash Severity Index for sub-region:	**4.5**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

Southwest Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**11 km**	**7 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

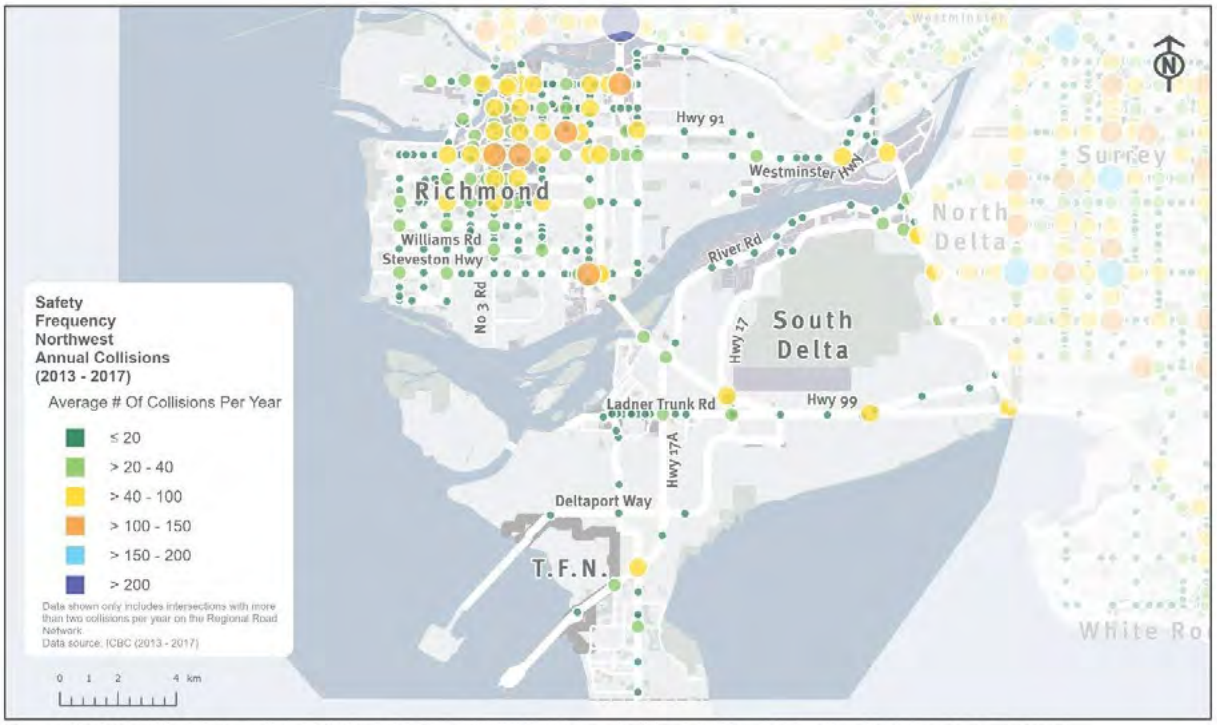
Southwest Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**2.50**	**2.32**
Pavement Condition (average weighted PCI value):	**73.48**	**77.06**

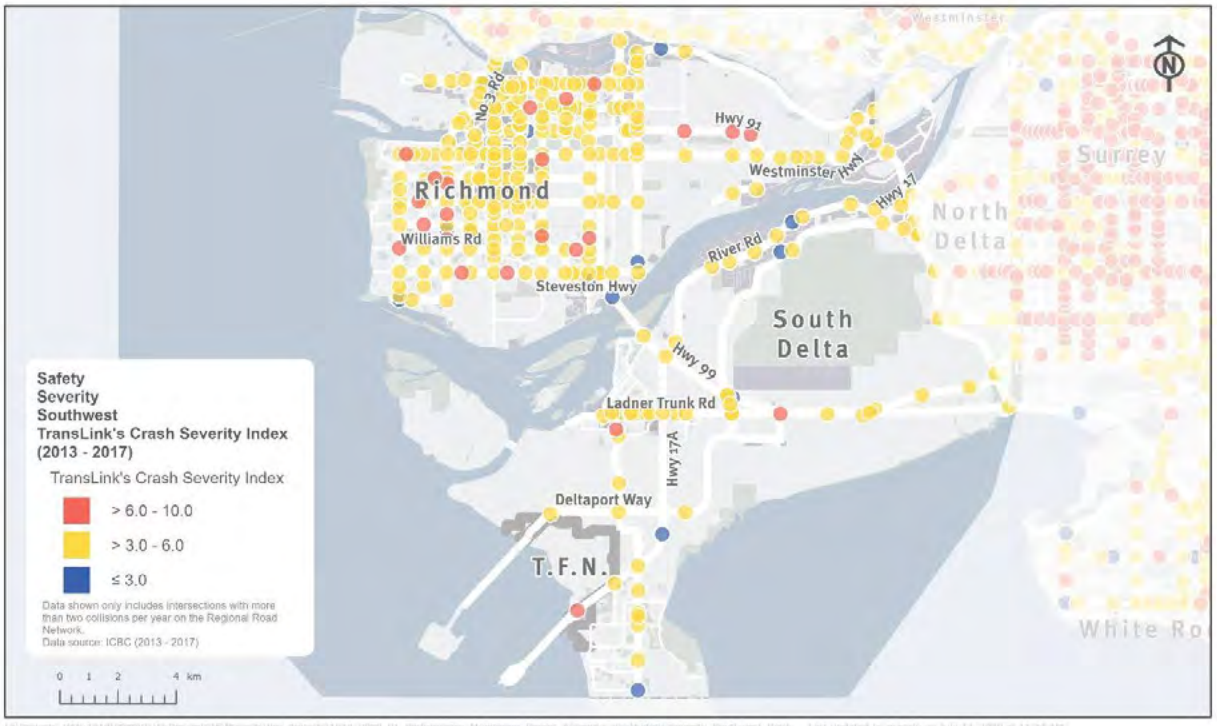
Data source: TransLink 2017. Includes the MRN and some other regional roads.

SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION) – SAFETY

FREQUENCY

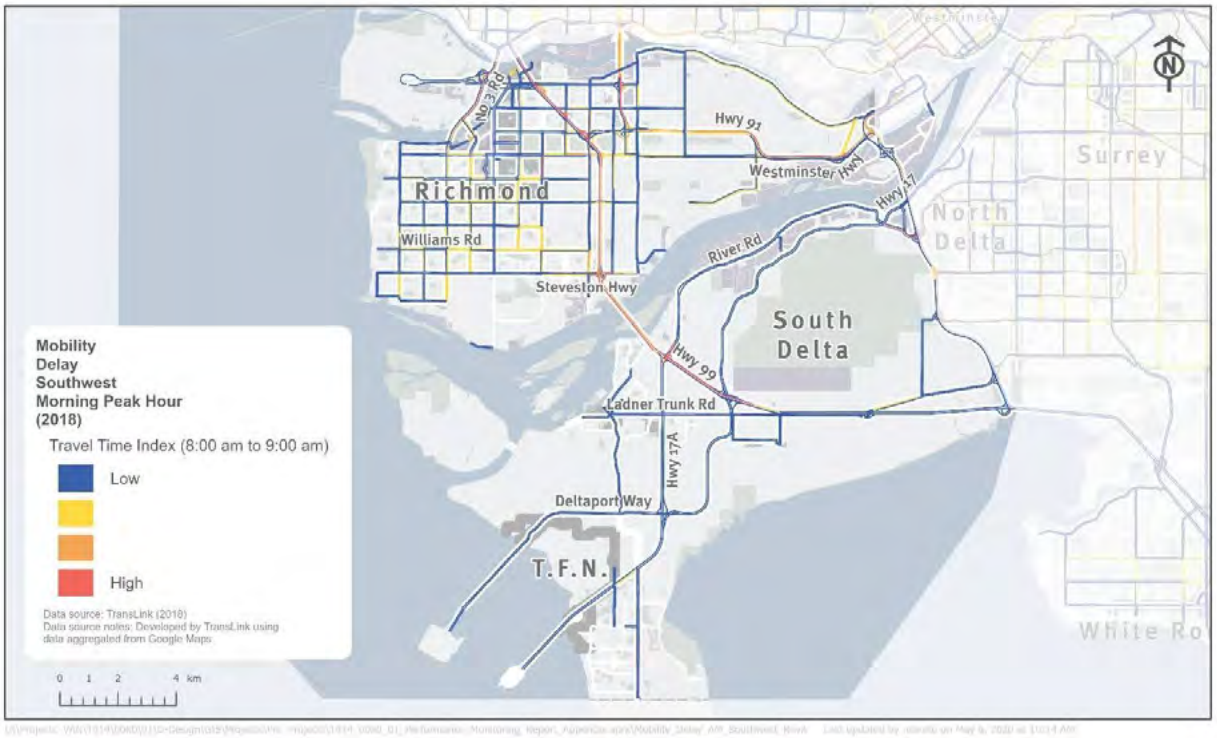


SEVERITY

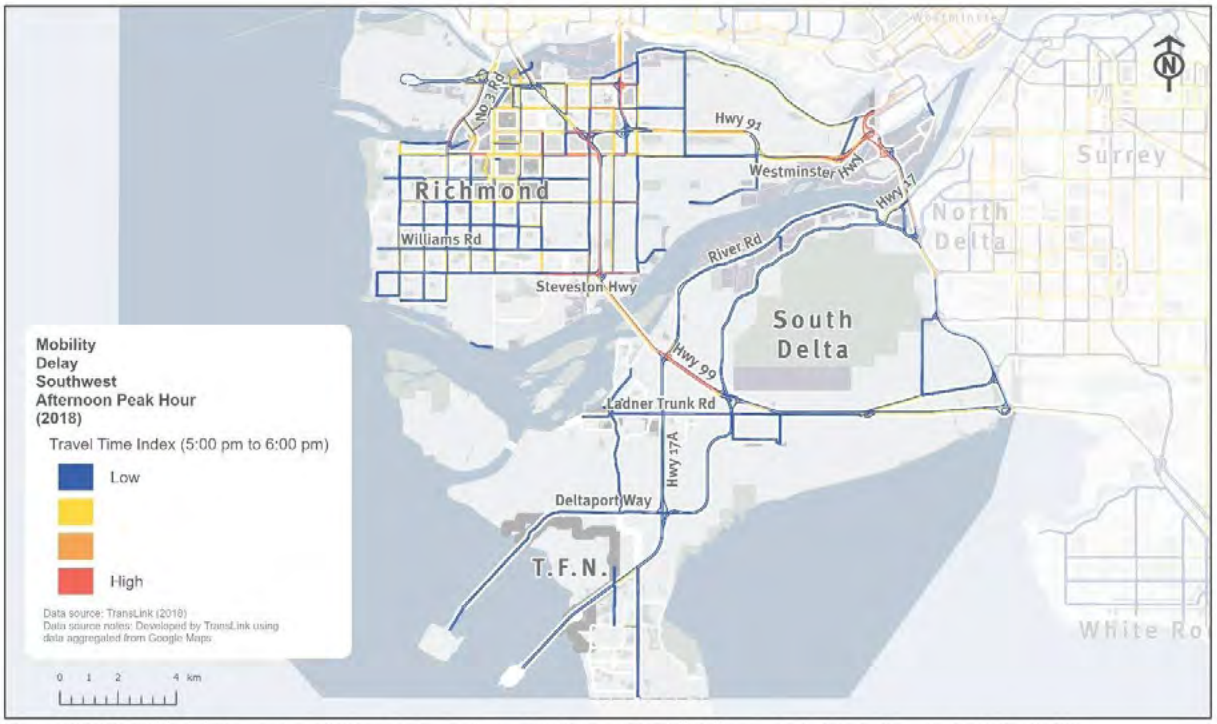


SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION)

MOBILITY – DELAY (AM)

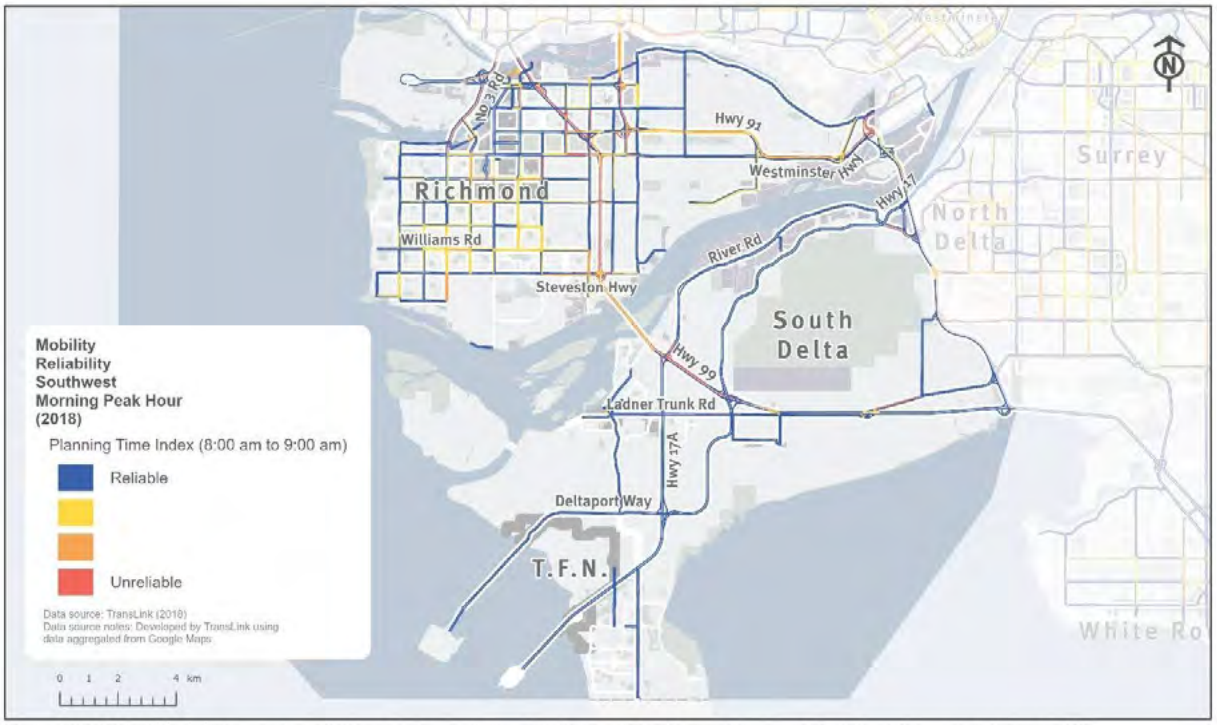


MOBILITY – DELAY (PM)

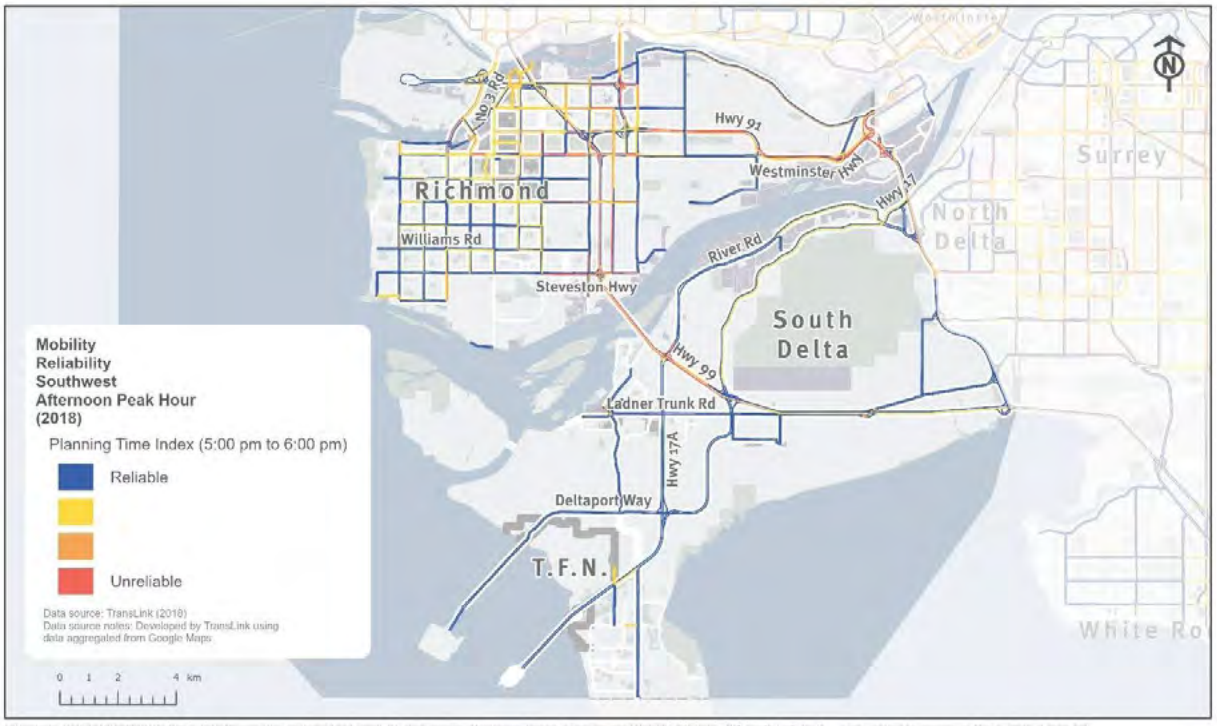


SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION)

MOBILITY – RELIABILITY (AM)

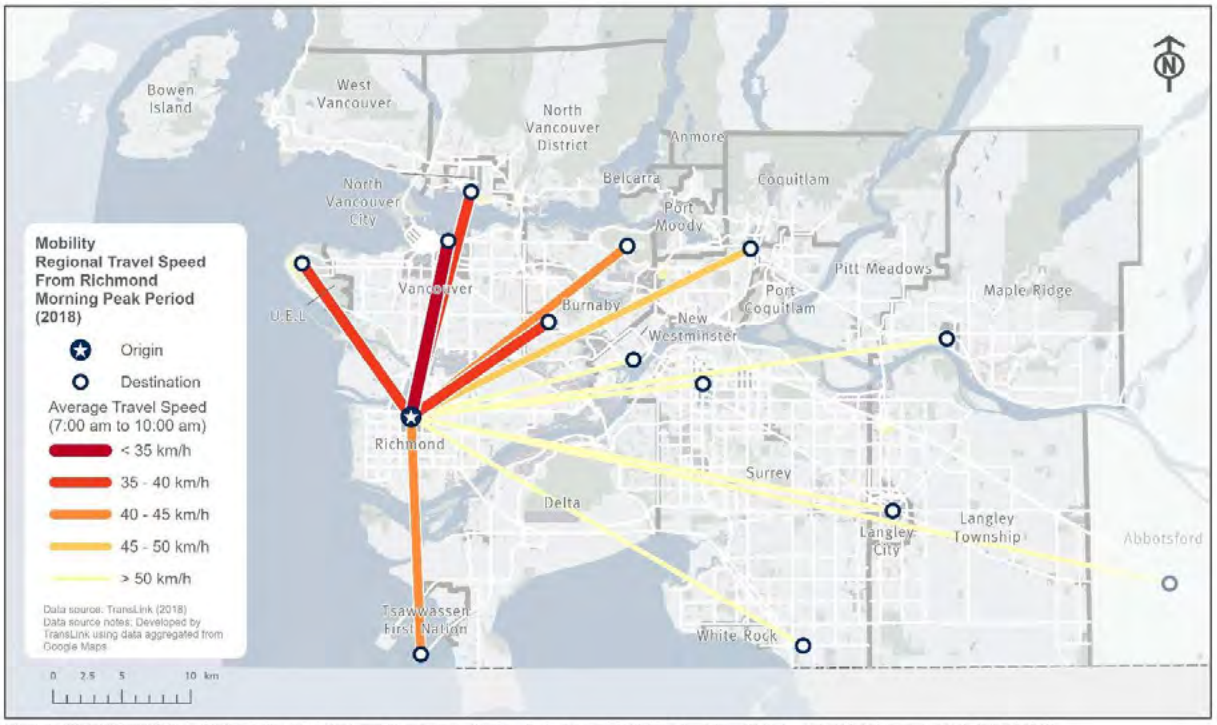


MOBILITY – RELIABILITY (PM)

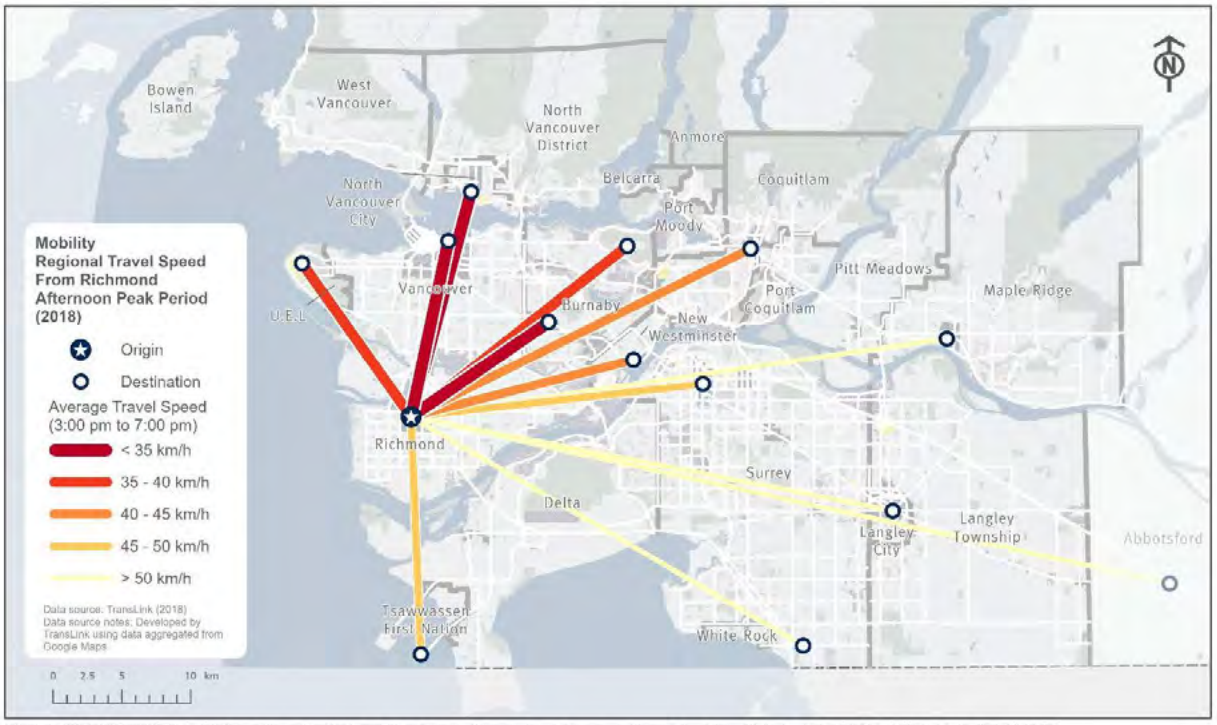


SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION) – MOBILITY

REGIONAL TRAVEL TIME (AM): RICHMOND

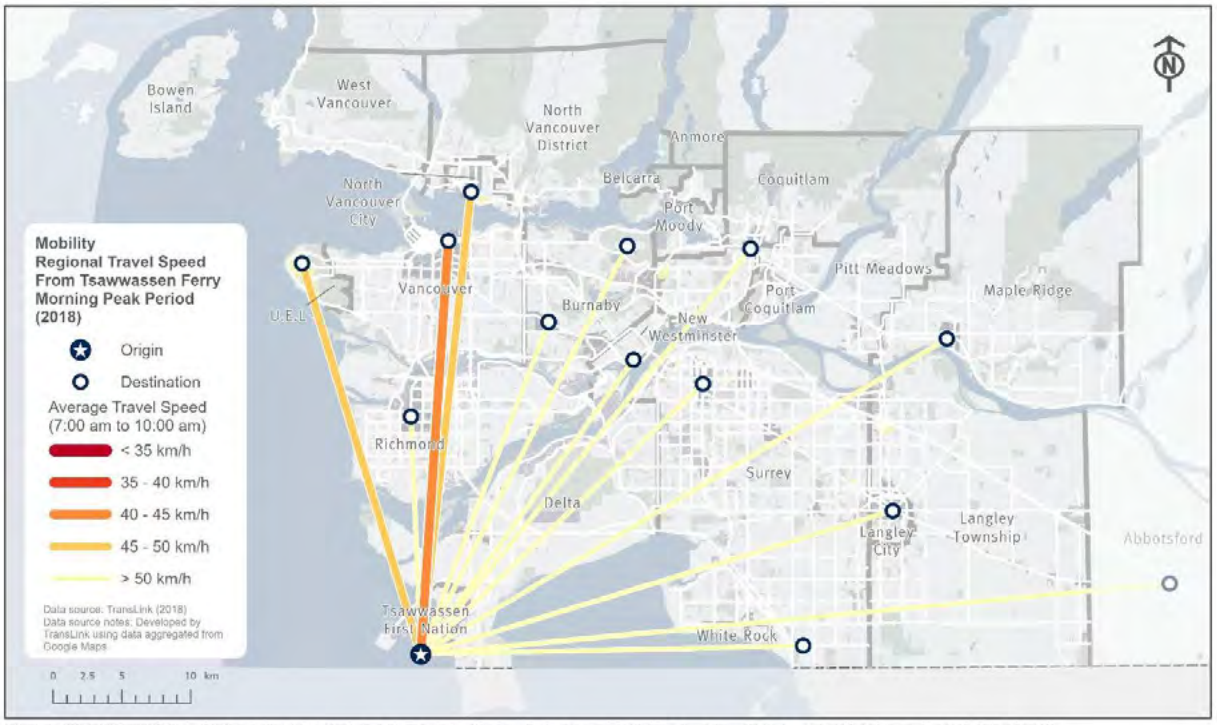


REGIONAL TRAVEL TIME (PM): RICHMOND

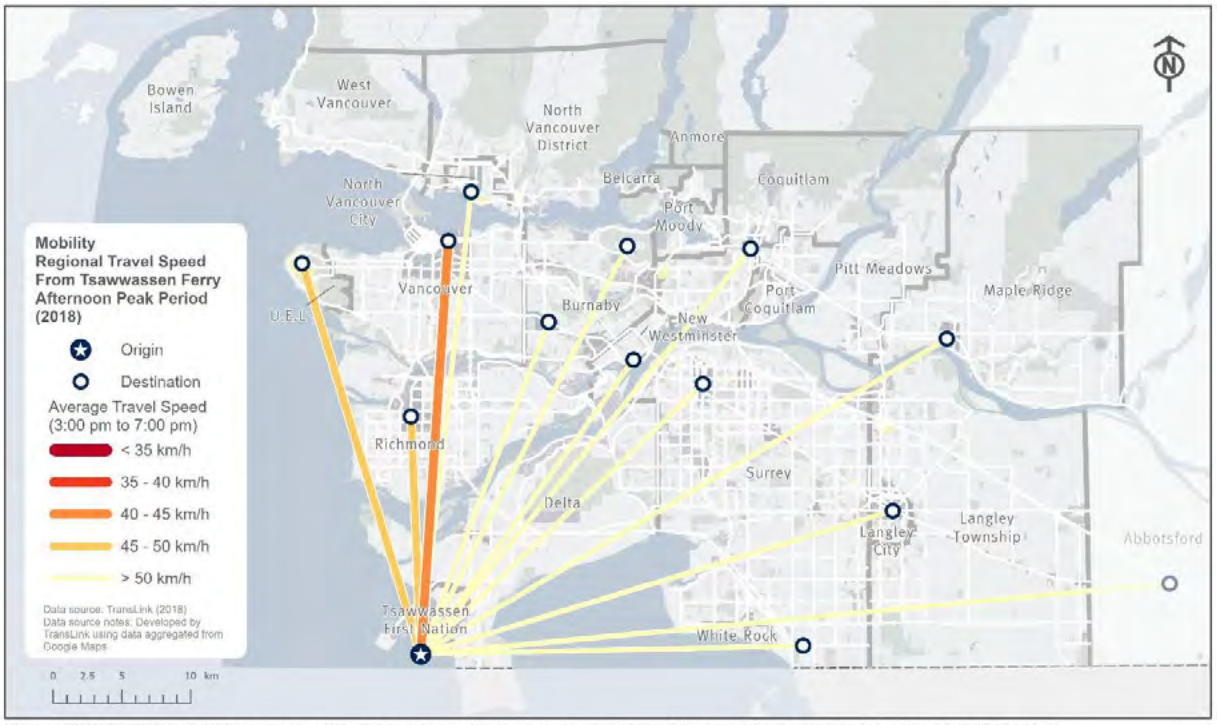


SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION) – MOBILITY

REGIONAL TRAVEL TIME (AM): TSAWWASSEN FERRY



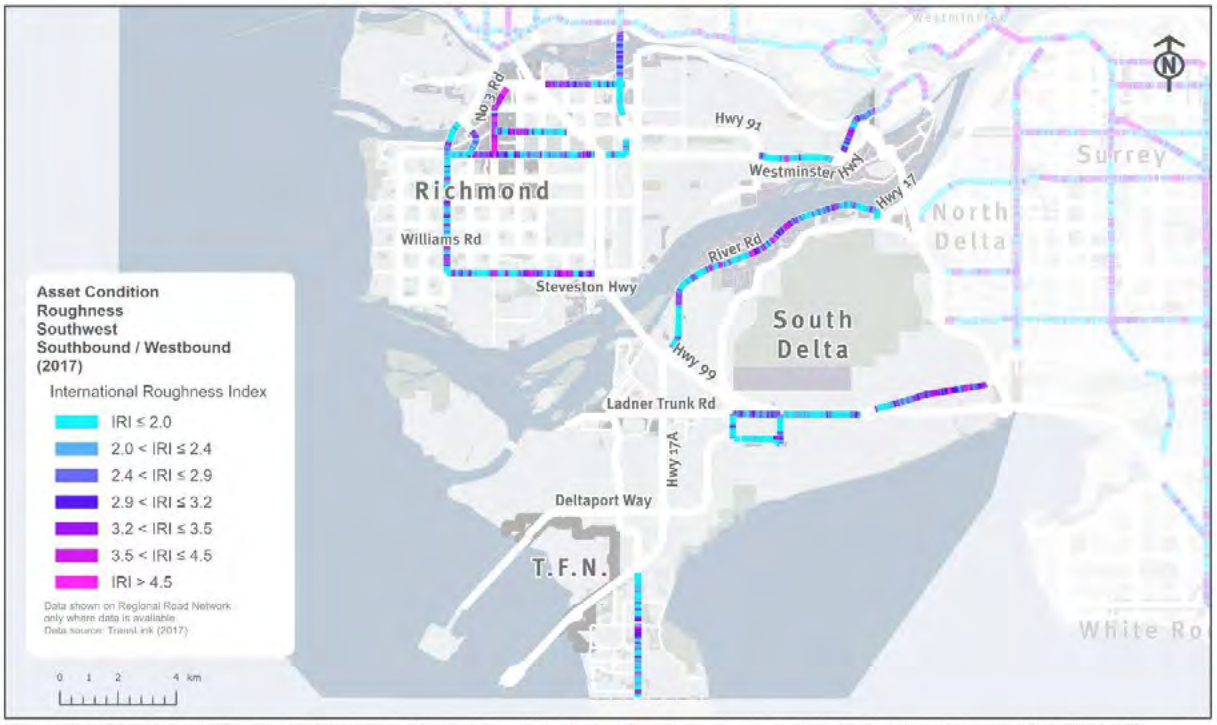
MOBILITY – REGIONAL TRAVEL TIME (PM): TSAWWASSEN FERRY



SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION) – ASSET CONDITION

ROUGHNESS (NE)

ROUGHNESS (SW)

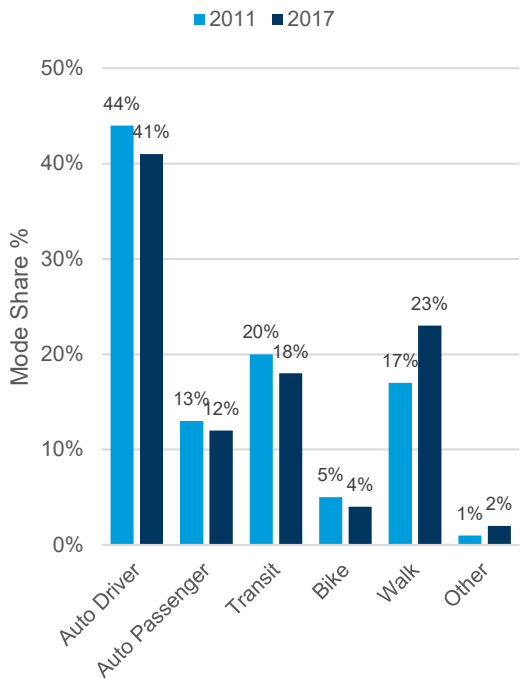


SOUTHWEST (RICHMOND /SOUTH DELTA / TSAWWASSEN FIRST NATION) – ASSET CONDITION PAVEMENT CONDITION (NE)

ASSET CONDITION – PAVEMENT CONDITION (SW)

VANCOUVER / UBC

MODE SHARE SUMMARY



SAFETY SUMMARY

Vancouver / UBC Sub-Region Safety Statistics for Intersections on the RRN

Total collisions per year:	**19,610**
Total crashes causing an injury or fatality:	**7,030**
Crashes per year causing injury or fatality per 100,000 residents:	**1,031**
Crashing causing injury or fatality per 100 million vehicle kilometres travelled:	**292**
TransLink Crash Severity Index for sub-region:	**4.2**

Data source: ICBC (2013 – 2017)

Data notes: Limited to crashes at intersections on TransLink's RRN where data is available.

TRIP DISTANCE SUMMARY

Vancouver / UBC Sub-Region Average Trip Distance

	2011	2017
Auto Driver	**8 km**	**8 km**

Data source: TransLink Trip Diary 2011, 2017

ASSET CONDITION SUMMARY

Vancouver / UBC Sub-Region Asset Condition Statistics

	Northbound / Eastbound	Southbound / Westbound
Roughness (average weighted IRI value):	**2.91**	**2.56**
Pavement Condition (average weighted PCI value):	**75.66**	**77.89**

Data source: TransLink 2017. Includes the MRN and some other regional roads.

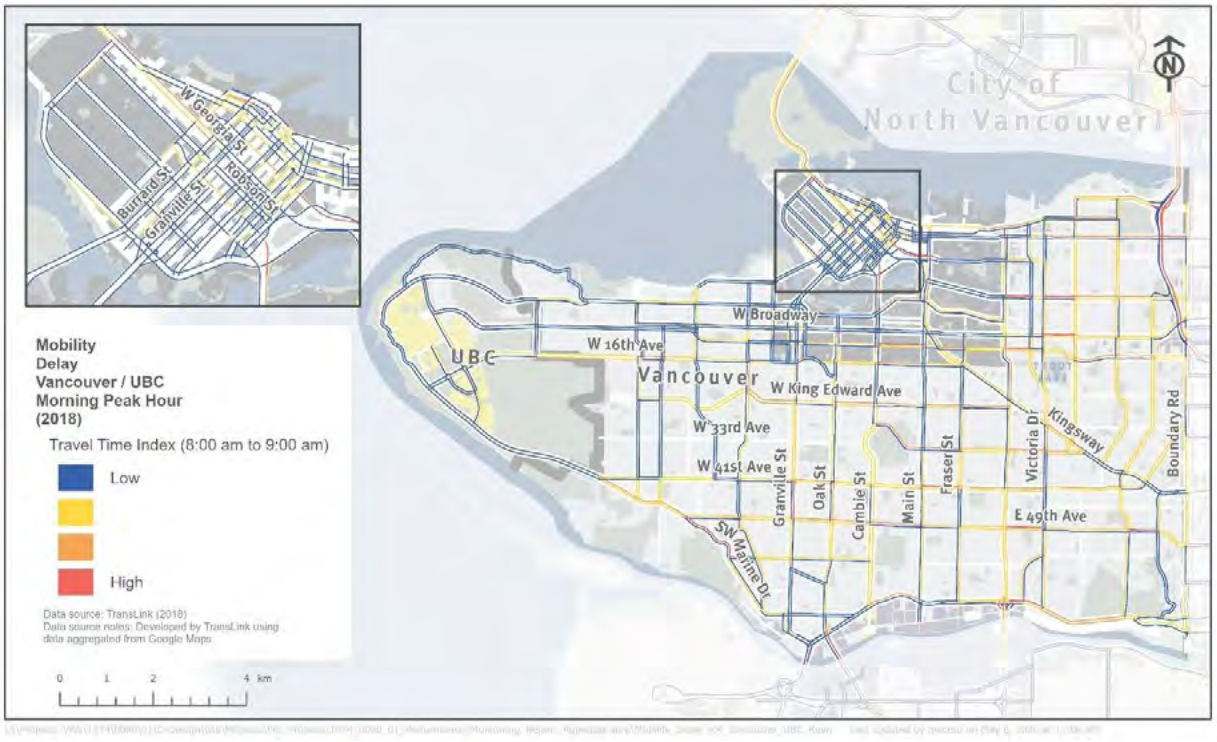
VANCOUVER / UBC – SAFETY

FREQUENCY

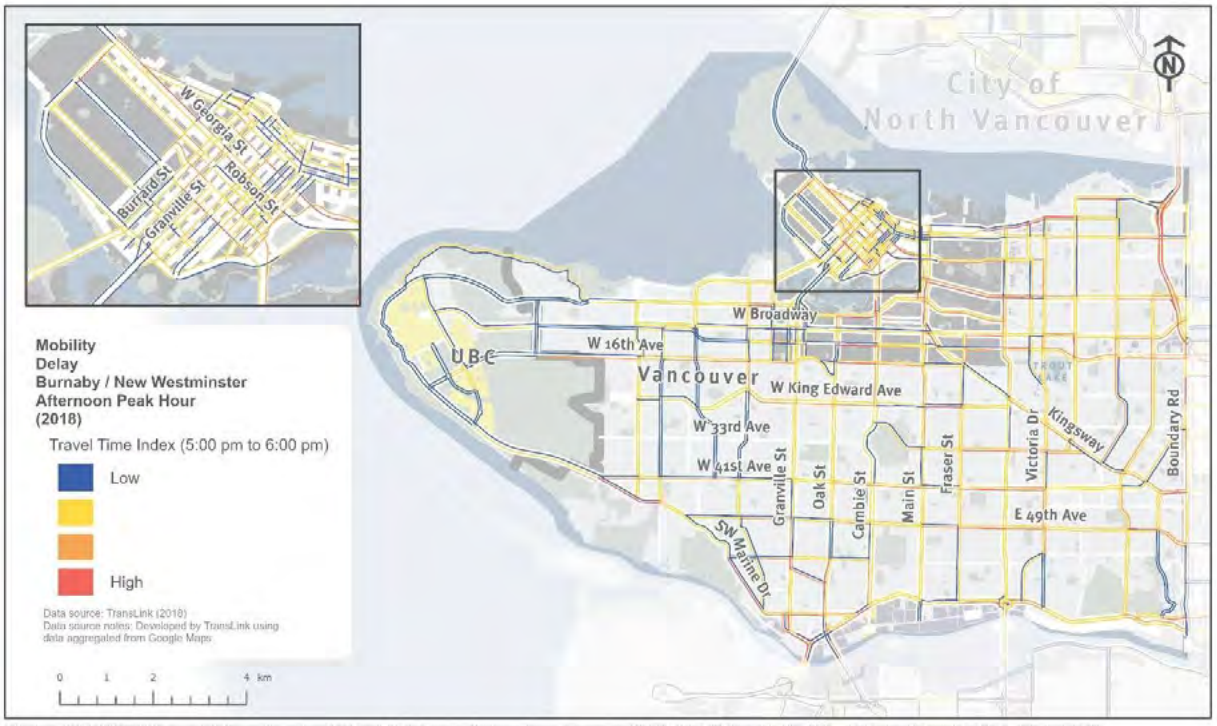
SEVERITY

VANCOUVER / UBC – MOBILITY

DELAY (AM)

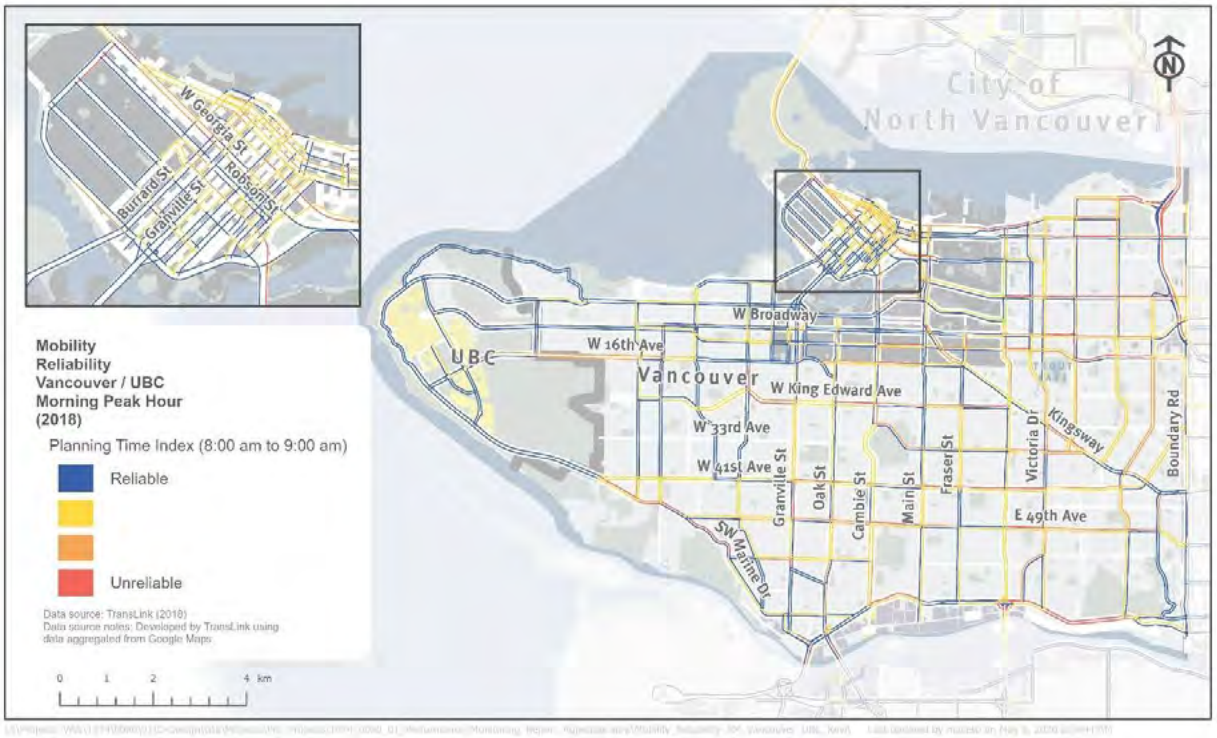


DELAY (PM)

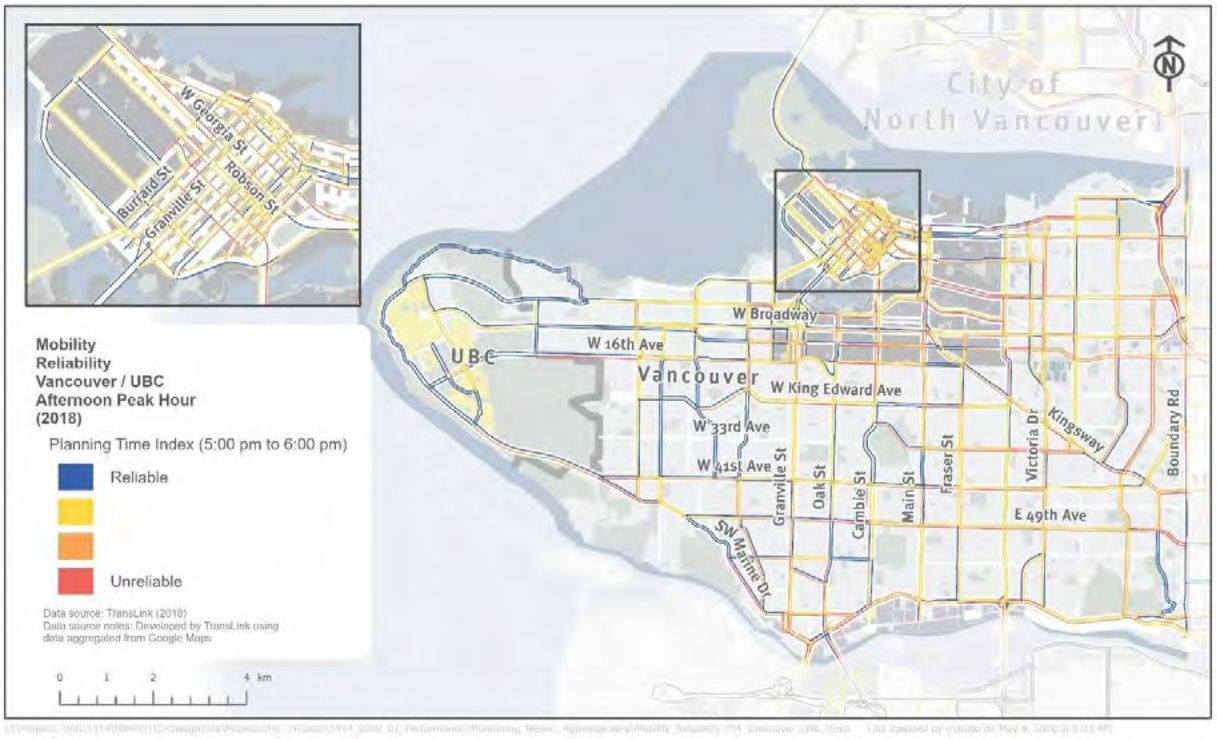


VANCOUVER / UBC – MOBILITY

RELIABILITY (AM)

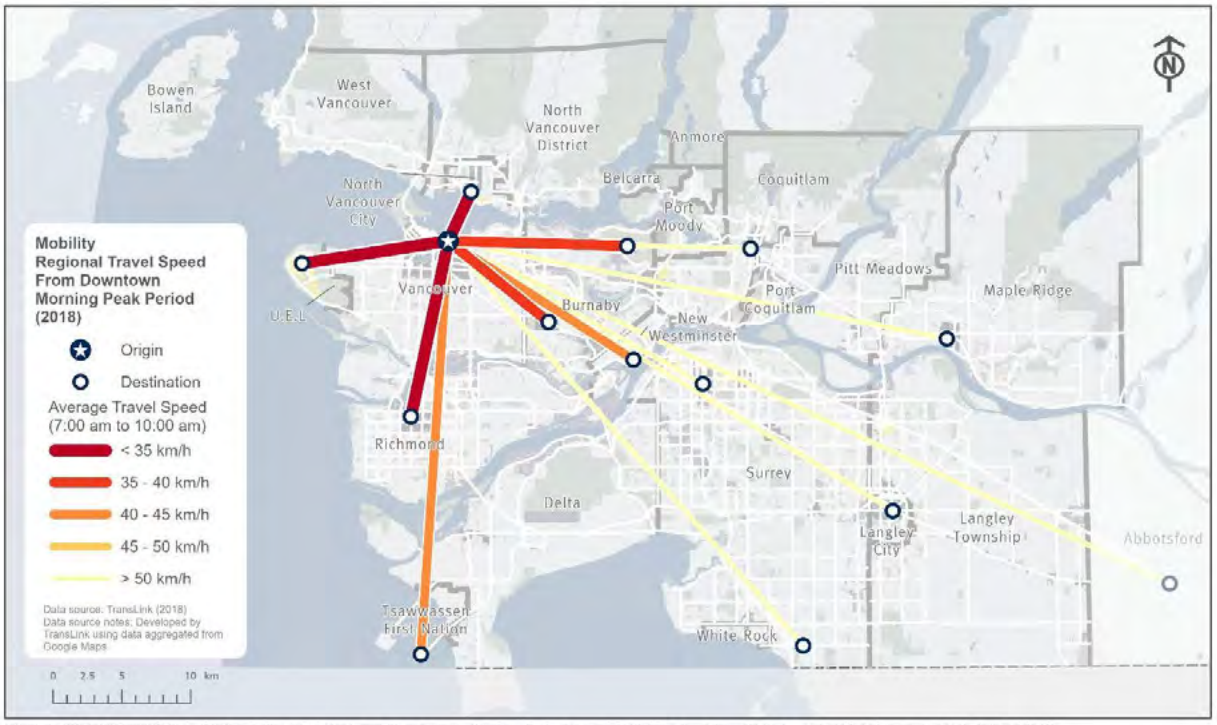


RELIABILITY (PM)

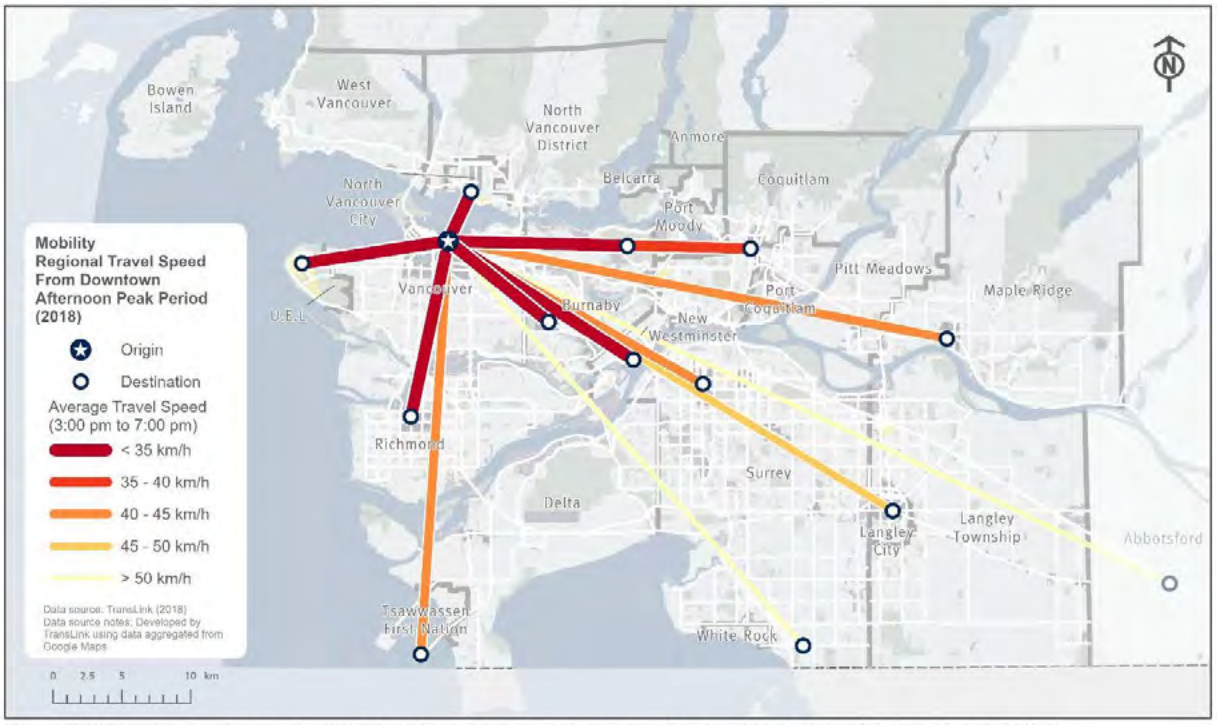


VANCOUVER / UBC – MOBILITY

REGIONAL TRAVEL TIME (AM): DOWNTOWN

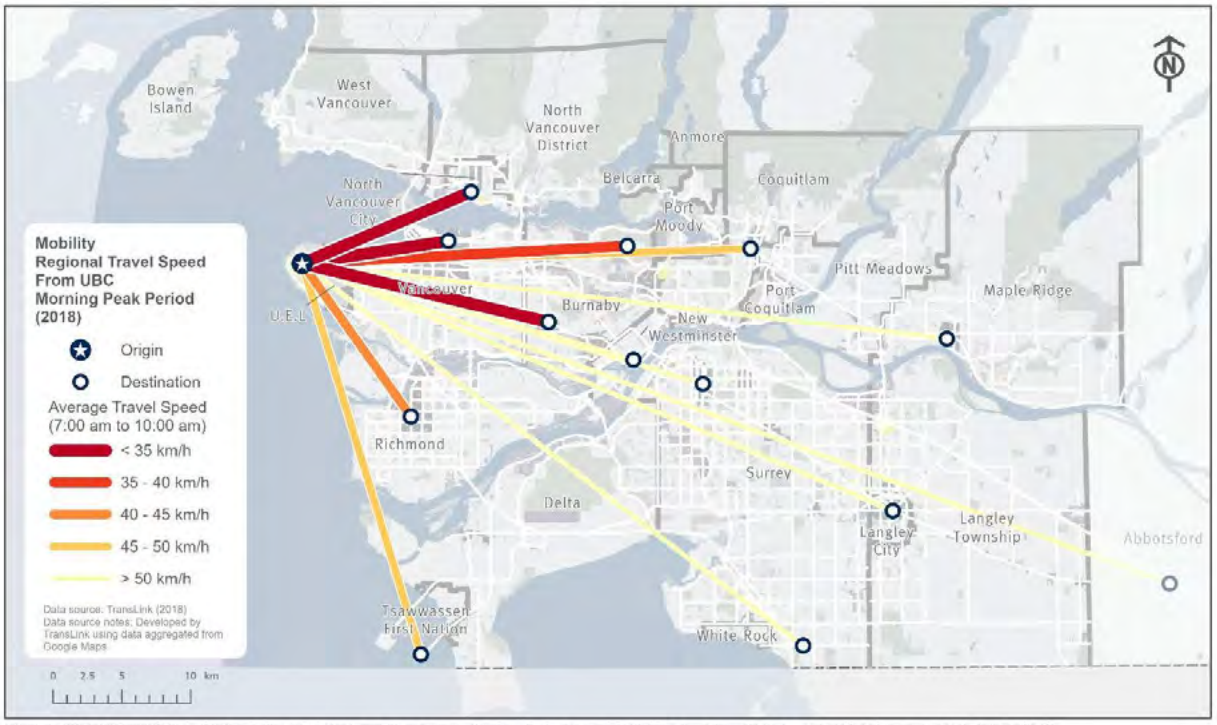


REGIONAL TRAVEL TIME (PM): DOWNTOWN

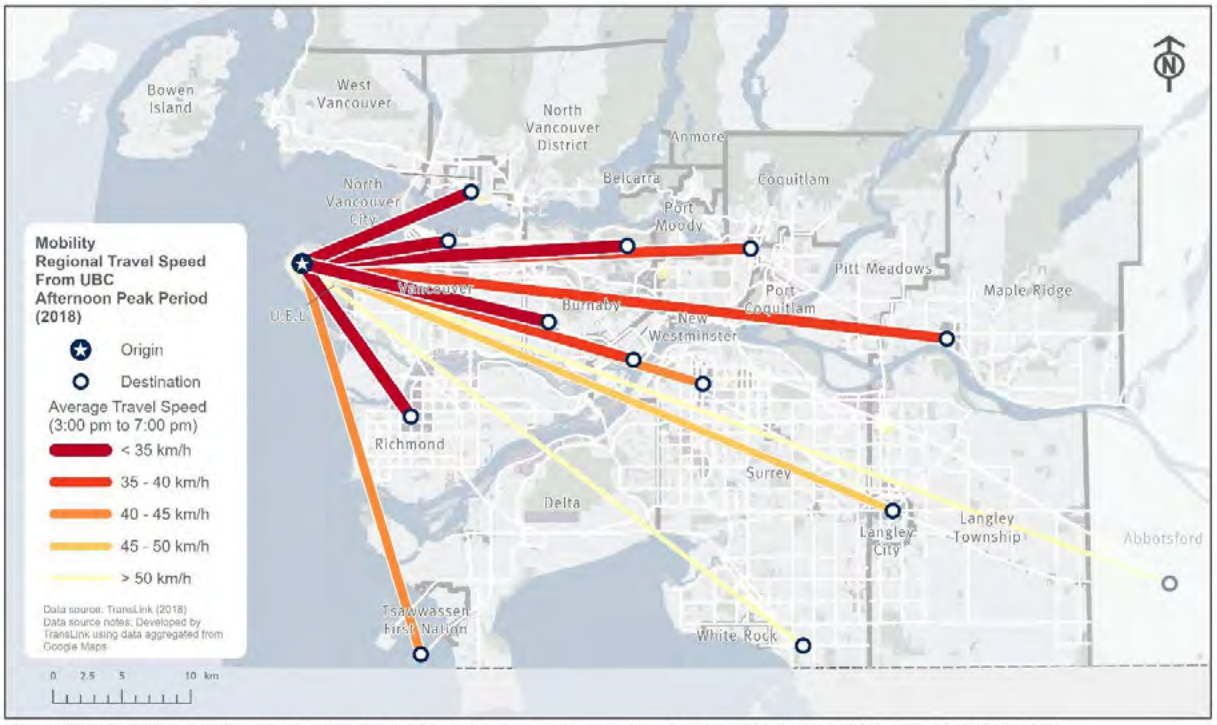


VANCOUVER / UBC – MOBILITY

REGIONAL TRAVEL TIME (AM): UBC

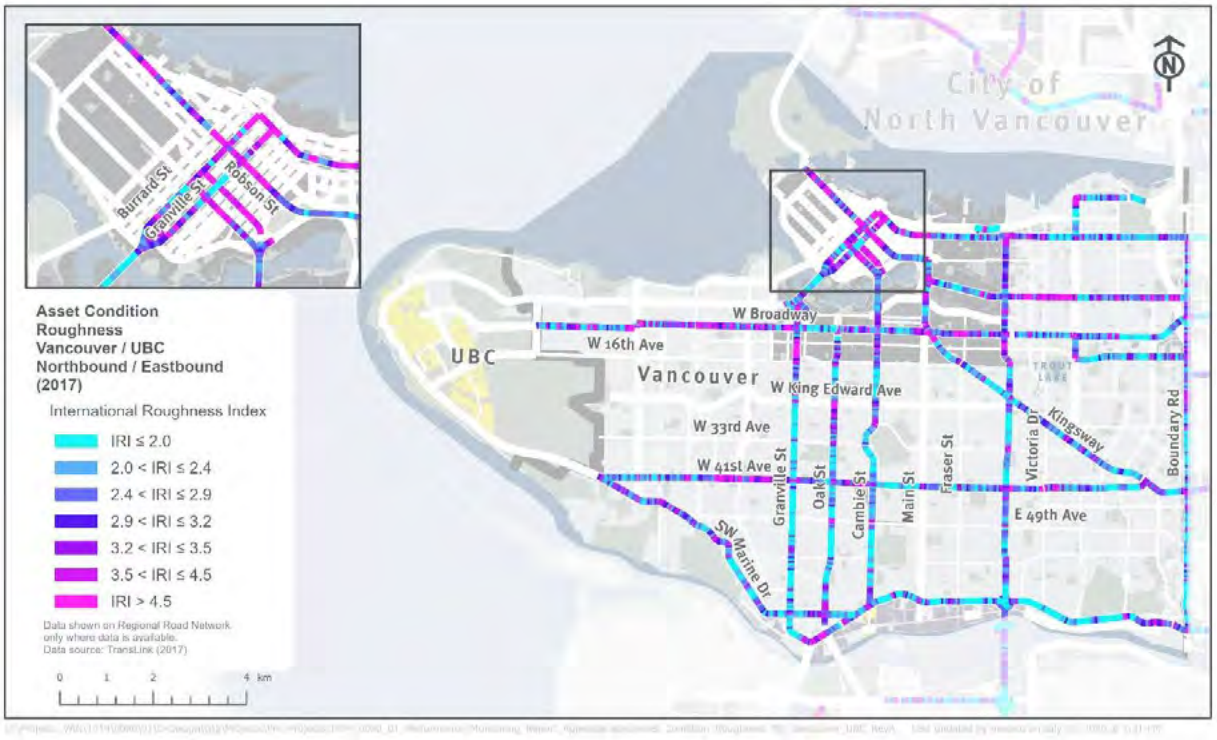


REGIONAL TRAVEL TIME (PM): UBC

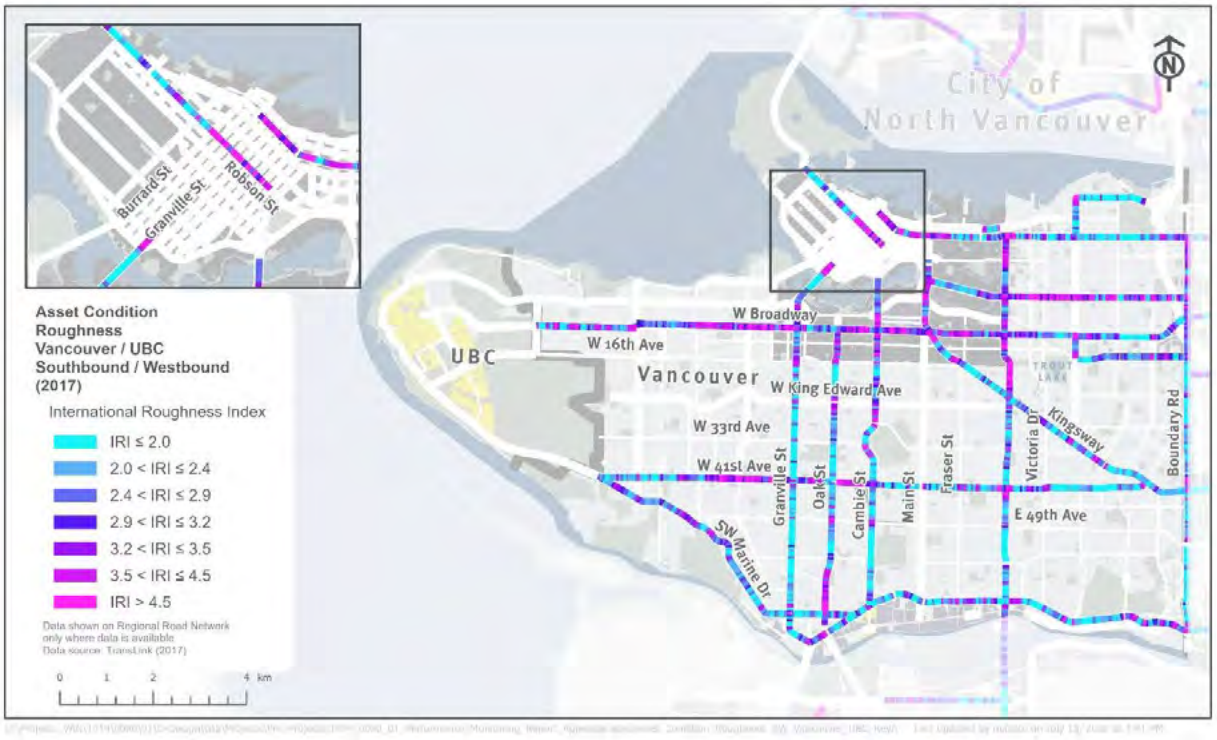


VANCOUVER / UBC – ASSET CONDITION

ROUGHNESS (NE)

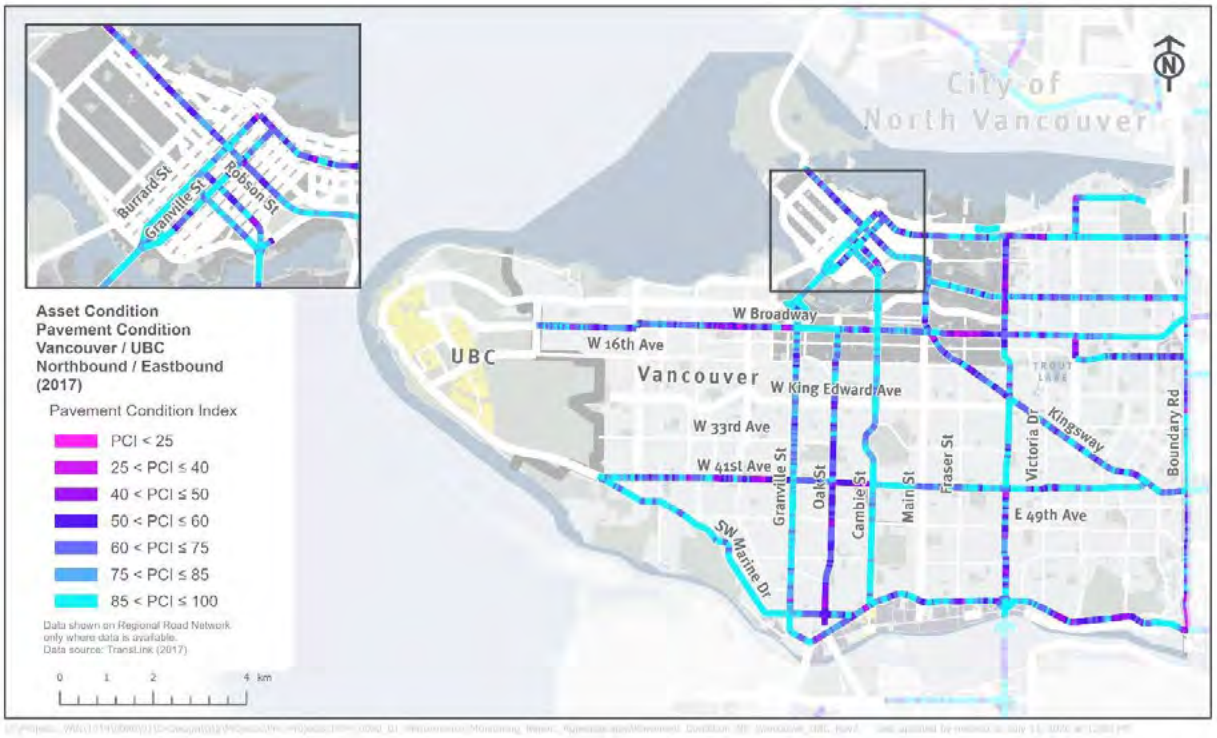


ROUGHNESS (SW)



VANCOUVER / UBC – ASSET CONDITION

PAVEMENT CONDITION (NE)



ASSET CONDITION – PAVEMENT CONDITION (SW)