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Date: 11/4/2019 5:11:28 PM

Subject: Memo - City of Vancouver Strategic Ideas Submission to Transport 2050

Attachments: ENG - Memo to Mayor and Council - City of Vancouver Strategic Ideas Subm....pdf
Appendix A - ENG - TPL - Transport 2050 - CoV - Ideas Submission - 20190....pdf

Dear Mayor and Council,

Please see the attached memo from Cheryl Nelms regarding Transport 2050. A short summary of the memo is as follows:

- A brief summary of TransLink's Transport 2050 Regional Transportation Strategy impetus and process.
- A summary of the transportation ideas generated by city staff for input into TransLink's Transport 2050 process.
- An overview of how ideas were generated including the existing policy basis.
- Brief note on next steps: relation to City-wide Plan and Climate Emergency Response, intentions for periodic council briefings.

If you have any questions, please feel free to contact Cheryl Nelms at 604-873-7348 or cheryl.nelms@vancouver.ca.

Best,
Sadhu

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Pronouns: he, him, his



The City of Vancouver acknowledges that it is situated on the unceded traditional territories of the Musqueam, Squamish, and Tsleil-Waututh peoples.

MEMORANDUM

November 1, 2019

TO: Mayor and Council

CC: Sadhu Johnston, City Manager
Paul Mochrie, Deputy City Manager
Lynda Graves, Administration Services Manager, City Manager's Office
Rena Kendall-Craden, Civic Engagement and Communications Director
Katrina Leckovic, City Clerk
Neil Monckton, Chief of Staff, Mayor's Office
Alvin Singh, Communications Director, Mayor's Office
Anita Zaenker, Chief of Staff, Mayor's Office
Lon LaClaire, Director of Transportation

FROM: Cheryl Nelms
Acting General Manager, Engineering Services

SUBJECT: City of Vancouver Strategic Ideas Submission to Transport 2050

The purpose of this memo is to provide an overview of TransLink's Transport 2050 Regional Transportation Strategy process and a summary of the strategic transportation related ideas which were submitted into the first phase of engagement of this process by the City. The submission document is also provided in *Appendix A*.

Background

TransLink is legislatively mandated to update the Regional Transportation Strategy (RTS) every five years in conjunction with the Regional Growth Strategy. The past RTS plans have had varying levels of scope and scale. Considerable progress has been made toward delivering regional investments first identified in Transport 2021 (1993), the last time a regional plan cast a long-term regional vision. As such, this iteration of the RTS, termed Transport 2050, is intended to provide a similar opportunity for the Region and individual municipalities to put forth a bold, new transportation vision.

TransLink's Transport 2050 Phase 1 engagement strategy included a "Call for Ideas" for member municipalities. The City utilized this call as an opportunity to restate existing City policy, and express staff's ideas to contribute to shaping regional needs, the evolving transportation landscape, and the ongoing climate crisis. The City's ideas submission will be compiled with those from other municipalities, agencies, and the public to provide TransLink a basis from which to build the strategy.

Idea Generation Summary

The City's existing strategic plans provided a strong foundation for idea generation. The ideation process sometimes spans decades; a multitude of past plans and studies were reviewed to incorporate previously identified concepts when and where these aligned with contemporary needs and policy direction. Within this context, the Climate Emergency Response Big Moves 1,2 and 3, and the transportation related Accelerated Actions hasten the need to develop and advance bold ideas.

To augment existing policy direction and facilitate regional integration, staff met and collaborated with counterparts in other municipalities. Within the City, ideas were generated and refined through interdepartmental workshops and working sessions. Ideas were also cross-referenced against those submitted by the public to TransLink's Transport 2050 Ideas Board, which captured over 2,400 individual ideas from residents across the region.

In addition, a high-level needs assessment was undertaken, which considered the following key themes and related factors:

- Equity & Affordability
- Access & Equity of Access
- Resilience (Shocks & Stresses)
- Network Design
- Transit Capacity
- Pricing and Funding
- Automation and New Mobility
- Land Use & Growth Patterns
- Safety & Comfort
- Accessibility

Ideas Summary

The submitted ideas can be grouped into the following broad categories:

Category	Description
<i>Policy & Program Ideas (Attachment 1)</i>	These ideas focus on new policies, programs, guidelines or other generally non-geographic ideas for consideration. They are further classified into the following sub-categories: System Management, Increased Service Levels, Fares & Affordability, Technology, Data & Modelling, Land Use Integration
<i>Interregional to Regional Connectivity (Attachment 2)</i>	This idea expresses a need and vision for Regional Rail corridors in terms of regional desire lines and high-level connectivity needs.
<i>Regional to Sub-regional Network Concepts (Attachment 3)</i>	This is a series of more defined network concept ideas that generally focus on the Vancouver/UBC sub-region with connections into adjacent municipalities. A high-level assessment and policy basis is provided for each concept (1 page plus visual for each in the submission). These concepts express a need for higher order and/or rapid transit to indicate two potential hierarchical levels. In many cases the level of service they aspire to would be similar, with a key potential difference being average operational speed mainly determined by stop spacing. Further study and planning processes would be required in all cases.

Next Steps

TransLink's Transport 2050 process provides the opportunity for the City and the Region to cast a bold, forward thinking transportation vision. TransLink will be undertaking further evaluation of the ideas and public engagement to develop a set of portfolios. These portfolios will contain actions and investments set against their required level of funding to facilitate discussion around trade-offs and to work toward a preferred portfolio and finalized strategy. This process is ongoing, and more detail can be provided as it becomes available. Staff intend to provide council with periodic briefings throughout the Transport 2050 process. Updates will also be provided directly through the Mayor's Council.

These ideas will be carried forward for engagement as part of the City-wide Plan and the Climate Emergency Response.

If you have any questions, please do not hesitate to contact me directly at 604.873.7348 or cheryl.nelms@vancouver.ca.



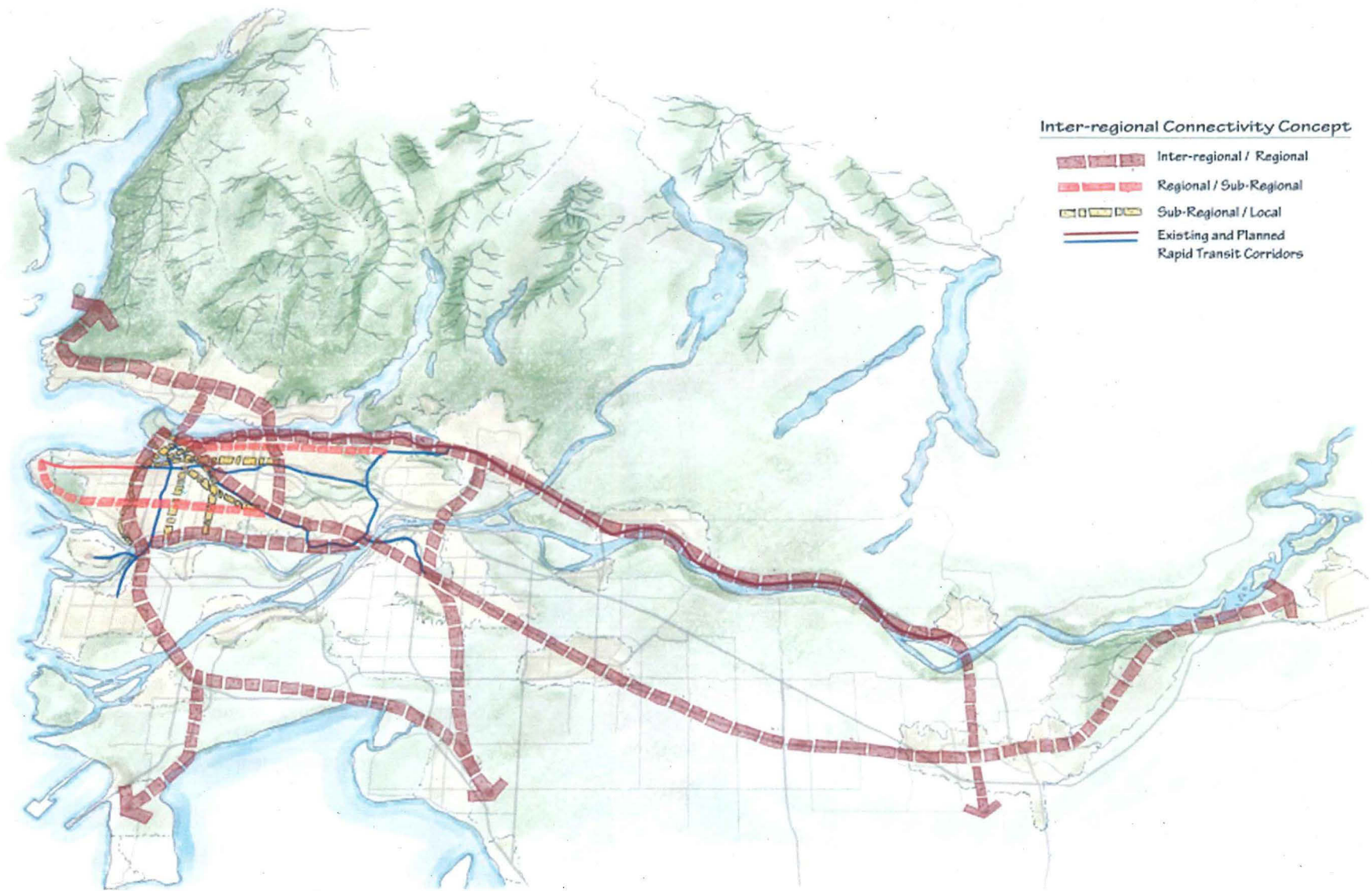
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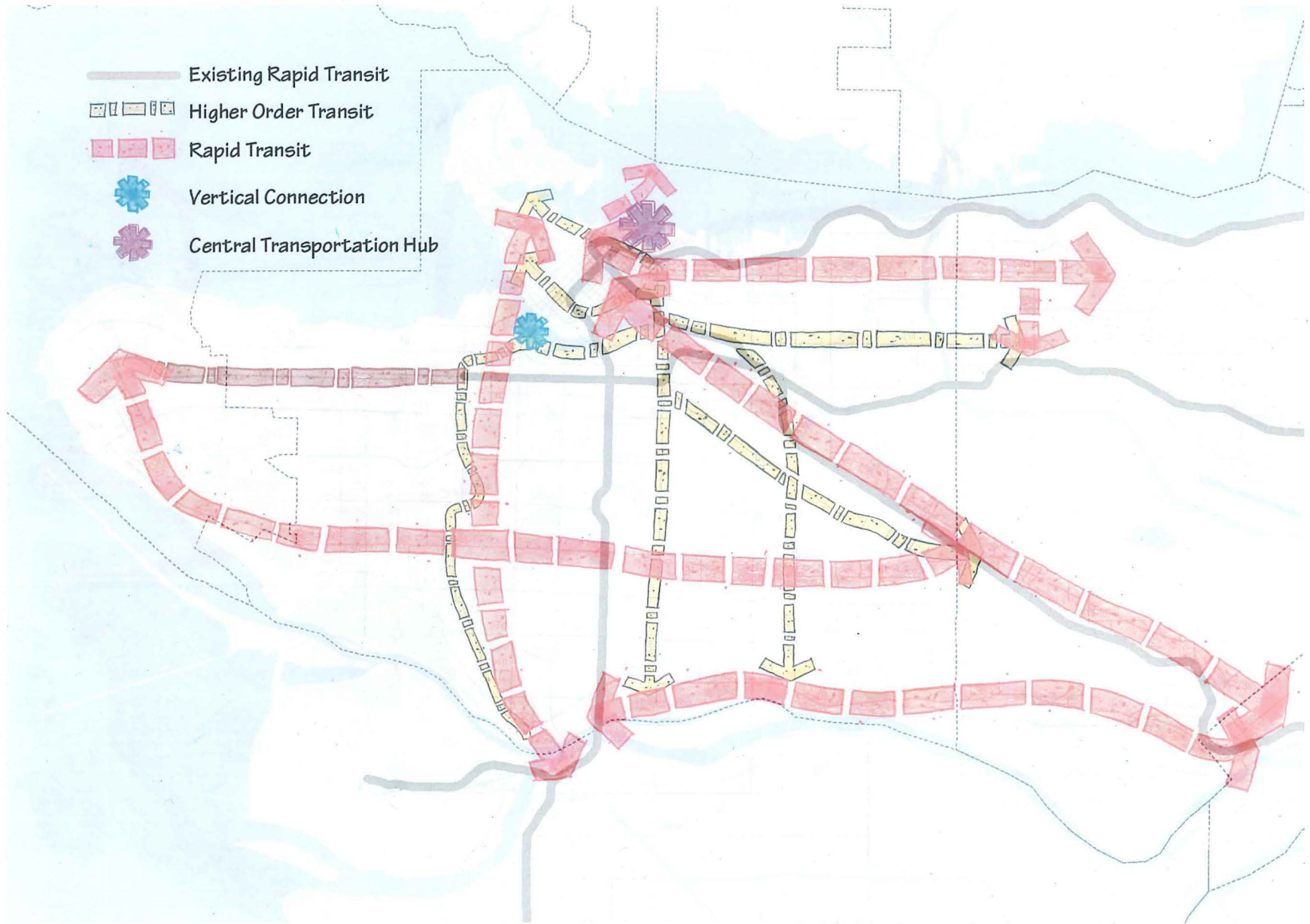
Attachment 1: Summary of Policy and Programmatic Ideas

	Idea	Brief Description
System Management	<i>Transportation Pricing</i>	Appropriately price transportation in a Metro Core focused area as a first phase testbed.
	<i>Major Road Network Definition</i>	Clarify the network functionality and carrying capacity definition of the existing and prospective Major Road Network
	<i>Regional Vision Zero Statement</i>	Regional Vision Zero policy statement and framework, and work cross-jurisdictionally to work toward zero fatalities on the transportation system.
	<i>Urban Freight Evolution</i>	Set of ideas that are intended to contribute toward evolving the region's goods movement and urban freight systems.
	<i>Expand Funding of Regional Cost Share Programs</i>	Expand the level of funds available for regional cost share programs for walking, cycling and transit.
	<i>Active Transportation Connections</i>	Provide key regional serving, AAA active transportation connections between the City and adjacent municipalities.
	<i>Water-based Transit System</i>	Leverage the region's unencumbered waterways to explore more direct connectivity between sub-regions.
Increase Service Levels	<i>Frequent Transit Network</i>	Intensify and redefine the FTN to a clock-face headway which improves upon the current 15 minute definition.
	<i>Overcrowding Guidelines</i>	Modify the overcrowding guidelines by allocating a larger available space per person.
	<i>Headway Based Operations</i>	Operate and use holding strategies on higher frequency routes based on adherence to a desired headway.
	<i>All-door Boarding Policy on All Suitable Routes</i>	Allow bus boardings through all doors on all suitable routes during appropriate time periods.
Fares & Affordability	<i>Fare Capping</i>	Provide a cap on pay-as-you-go fares that align or supersede flat rates offered on time-dependent pre-paid passes (daily, monthly).
	<i>Low Income Passes</i>	Expand the BC Bus Pass Program or otherwise provide concession fares to low-income residents of any age.
	<i>Group / Family Passes</i>	Add a new fare product that facilitates and encourages group travel on the transit system by providing discounts.
	<i>U-Pass Extension to Secondary Schools</i>	Extend the U-Pass BC Program to public secondary school students in lieu of a more broadly applicable low income pass.
Technology, Data & Modelling	<i>Electric Bus Implementation</i>	Work toward a fully electrified bus fleet over time and prioritize regional areas of higher density and routes with greater ridership.
	<i>Access to Opportunities Model</i>	Develop a comprehensive, multimodal Access to Opportunities model to measure the true nature of why residents travel.
	<i>New Mobility</i>	Set of ideas that are intended to utilize emerging mobility technologies to contribute toward a zero carbon, multimodal future.
	<i>Bus Lane Automatic Camera Enforcement</i>	Mount buses with cameras for automatic enforcement of bus lanes, bus zones, and other applicable transit facilities.
Land Use Integration	<i>Downtown Vancouver Off-Street Bus Layover</i>	Identify potential locations and work toward the implementation of a Downtown Vancouver off-street bus layover facility.
	<i>Mobility Hubs & Bike Mobility Centres</i>	Develop policy and delivery mechanisms for the creation of strategically located hubs, core to multi-modal neighbourhoods.
	<i>Frequent Transit Development Areas</i>	Set of ideas that are intended to build on the success of the FTDA strategy and enhance their profile and function.

Attachment 2: The Transport 2050 Network Vision



Attachment 3: Transport 2050 Regional to Sub-regional Network Concepts



Appendix A: Transport 2050 Ideas Submission

(to be attached)

It's time to think bold together



TRANSPORT 2050 IDEAS SUBMISSION

City of Vancouver

*Response to the TransLink Transport 2050 Regional
Transportation Strategy Call for Ideas*

September 2019

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Transport 2050: The Regional Transportation Strategy

City of Vancouver Response to Call for Ideas

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A Transportation Vision for 2050

The year is 2050. Lee, a Vancouver Region resident, leaves to take transit to their job in downtown Vancouver from an outlying neighbourhood. Within 5 minutes they have walked their child across the street to daycare, grabbed a coffee and picked up an online parcel at the town centre, which has just been delivered by e-bike. Using MaaS they seamlessly transition from a driverless shuttle onto rapid transit, then use bike-share from a mobility hub to complete their journey to work.

Once they leave work, Lee runs a few errands via a driverless carshare. As they exit the City Core, they barely notice when their road use account is charged. Lee understands that it's a small price to pay for more efficient travel – increased bus, train, and bike services across the region are taking the pressure off the road network, funded in part by the small amount they pay on the days they need use of a vehicle. Returning to their neighbourhood, the street is full of children playing in expanded public realm, in space that used to be occupied by parked vehicles. The IT network instructs Lee's vehicle to travel slowly through the shared space, yielding to other street users.

On the weekend, Lee and their child use their MaaS family pass on the Express Rail service to visit friends in an outer suburb. Compared to 2020, Lee spends much less money than their parents on transportation, and is able to choose a car-free lifestyle because of the availability of seamless door to door mobility options. A significant reduction in vehicles on the street has resulted in less noise and nearly zero air pollution. The result is a healthier population who willingly choose active travel more often.

To support this vision of the future, a number of ideas first prioritized through TransLink's Transport 2050 process will need to be realized:

- **Transportation pricing** will be an ingrained part of Metro Vancouver's landscape. After early success in the Metropolitan Core, the benefits for people using all modes will have hastened regional adoption. The people across the region will have become accustomed to a more equitable and affordable transportation system, as pricing contributes to delivering improvements and managing congestion, allowing goods to move reliably and efficiently.
- A **distinct transit network hierarchy** will be established and will continue to evolve. The hierarchy will clearly define context specific service levels required to facilitate the capacity and delivery of the appropriate transit functionality and integration for each corridor. Implementation of this hierarchical framework will have enabled strides toward a truly regional rail system, and a stronger fixed route transit hierarchy will also have helped shape the applicability and adoption of autonomous services.
- **Regional Rail** will be a fixture beyond Metro Vancouver up to Squamish and east to Abbotsford, connecting peripheral sub-areas to the core with travel times that that will comfortably enable interregional commuting, especially since the trains will allow for working while in transit. **Expo Line & Canada Line capacity issues will be adequately addressed**, and people crowded into overheated trains will be a thing of the past.
- **Dedicated transit lanes** located on most major corridors will provide significant travel time and reliability benefits, as the Region's surface transportation networks will be used more economically, ecologically, and equitably. The network effects will have freed up additional space for active transportation and public realm improvements. Many streets in urban centres will be prioritised for people walking, and many **residents live close to their daily needs in complete communities**.

- **Frequent, comfortable, and affordable transit service** will provide unprecedented freedom to regional residents to travel when they want, using a service that meets their needs. For most customers, transit schedules will exist only in the background as they rely on MaaS to plan their travel. In many locations, the transit network and the land uses it supports will be competitive with vehicle trips in terms of access provision and travel times.
- **A safe, accessible, and equitable** transportation system will be provided for customers, employees, and the community through a proactive culture which addresses barriers for all those who are marginalized. Fatalities are all but rare and each serious injury is investigated thoroughly to systematically inform future design improvements.
- **Efficient movement of urban freight** will be supported by neighbourhood-scale, zero-emission logistics hubs. As a result, streets across the Region will become safer, quieter and more active. Freight rail will continue to ensure that urban streets are not unduly utilized to move goods long distances.

By 2050, the Region will celebrate having achieved the ambitious targets for actions established in Transport 2050. Every year, the Region will have reallocated the required amount of vehicular space, and implemented the specified number of rapid transit route kilometers, enabled in part by regular commitments from different levels of government and stable revenue from local mobility pricing. These actions will have ensured that mode share and other strategic outcome targets have been met. Yet, there will still be work to do. Transport 2080 will be underway as the painful realities of climate change become evident. As rising sea-levels, heavier rains and heat waves put pressure on our infrastructure, will our future counterparts be left wondering – was the 2050 vision bold enough?

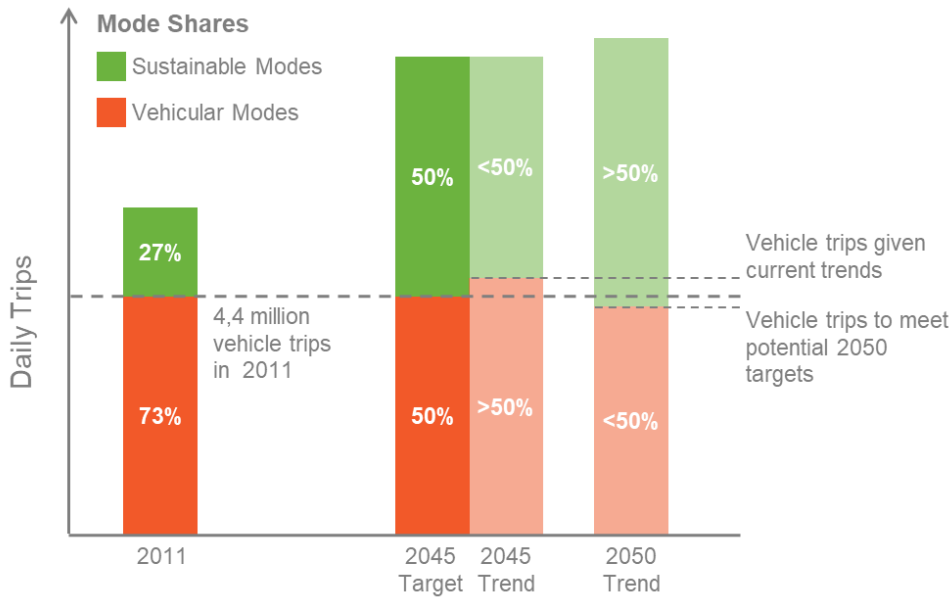
Making the Vision a Reality

In 2020, the Region has the opportunity to chart a path toward the vision outlined above. However, it will not be realized without concerted regional collaboration, complex conversations, support from all levels of government, and most importantly, a partnership with the public and a willingness to price our mobility needs in a more accountable way. To that end, it will require that we all contribute; that we confront the trade-offs; that we coalesce around the challenges we face. It will require that we acknowledge where we are, where we want to be, and the bold action required to achieve this vision.

Where We Are, Where We Want to Be

Building off of Transport 2040, the 2013 RTS Strategic Framework established a regional mode share target of 50% of all trips by sustainable modes by 2045. It noted that to achieve targets, given the projected growth in overall trip making, the amount of daily vehicle trips would need to remain at current levels (approximately 4.4 million daily vehicle trips). The framework also noted that **current trends would not achieve the mode share target**. *Figure 1* below adapts those targets and trends and contextualizes them against a potential Transport 2050 target assuming original target trends were to continue projecting forward (resulting in a sustainable mode share target of approximately 54%).

Figure 1: 2013 RTS Mode Share Targets, Trends & Gaps



The figure clearly shows the gap between the 2045 target and actual trend. That gap increases at the 2050 horizon, assuming that the current 2045 target is not merely delayed. Importantly, to achieve these targets **the implication is that daily vehicle trips must decrease from current levels.**

Mobility Pricing

The recent successful completion of the Mobility Pricing Independent Commission’s (MPIC) exploration of decongestion strategies for the region has provided a set of principles for designing mobility pricing concepts. Some form of mobility or *Transportation Pricing* will be critical to provide reliable mobility and to more aggressively and sustainably fund alternatives to otherwise increasing congestion. Given such a strategy’s ability to manage demand, it will also contribute toward mode shift. The MPIC estimated that the more aggressive pricing scenarios could induce a mode shift of a few percentage points. **It is clear that the Region will currently not meet its mode share targets even with an aggressive pricing scenario in place.**

Regional Rail & Network Hierarchy

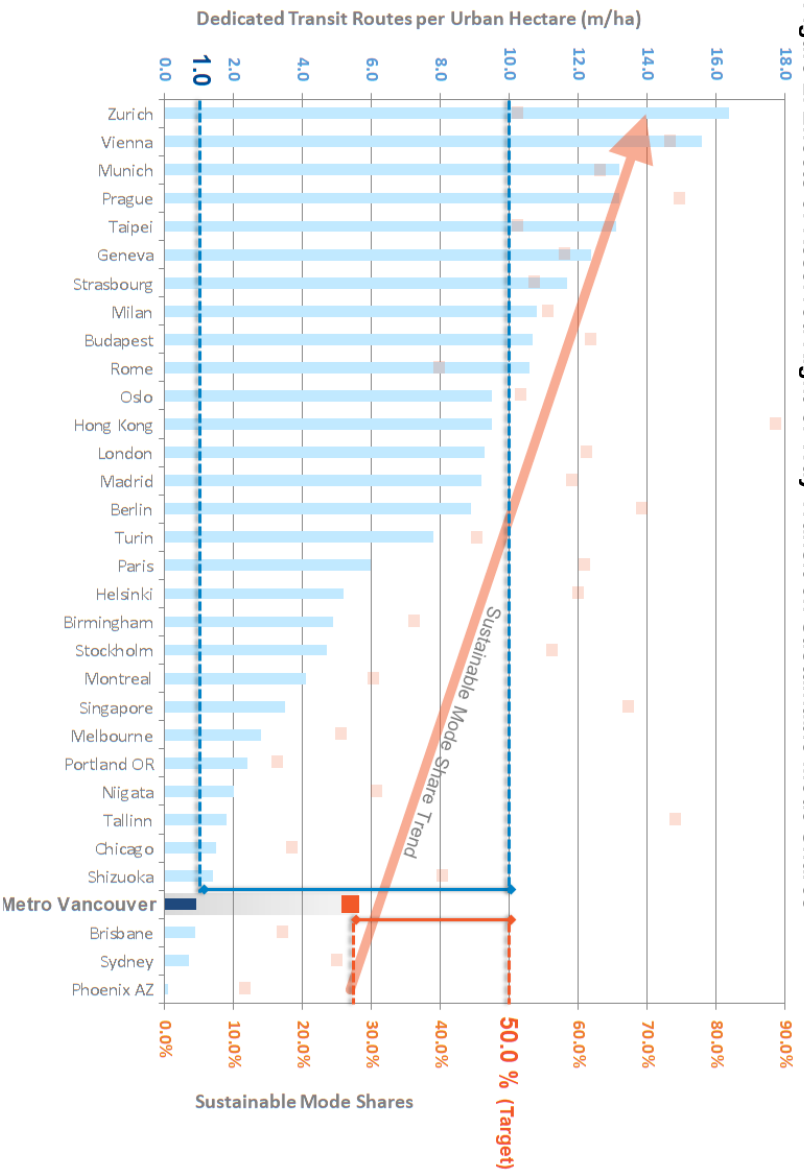
Recent large scale investments have successfully attracted new ridership and contributed toward mode share goals. Despite this encouraging progress, and additional current investments which are underway, more is needed to meet future aspirations. *Figure 2* below benchmarks the effects of dedicated (right of way) transit supply on sustainable mode shares (walk, bike & transit) for select global cities with similar economic conditions to Metro Vancouver. The majority of dedicated transit in these cases typically consists of rail based modes (see *Additional Benchmarking Information* in Appendix A for additional figures).

While many factors contribute to the use of sustainable modes and transit on a daily basis, there is a clear positive relationship between mode share and the amount of dedicated higher capacity rail and bus transit provided per urban area. Compared to other global cities well known as transit cities with high sustainable mode shares, the Region lags significantly in the amount of dedicated higher order transit provided. Compared with these places, the Region has approximately ten times less dedicated transit routes. Assuming the relationship between mode share and dedicated transit provision holds, to achieve the current 2045 targets, it would require the Region to provide about nine to ten times more dedicated transit than is currently provided, comprised of numerous forms of higher order / rapid transit.

THE VISION

Recognizing as well, that the Vancouver Region as a whole is less dense than many places highlighted in *Figure 2*, there will be a continued vital need to coordinate with land use through the Regional Growth Strategy.

Figure 2: Effects of Reserved Right-of-Way Transit on Sustainable Mode Shares¹



The Region needs more dedicated right-of-way for higher order and rapid transit

The Region often finds itself in a situation where there is a strong call for the familiar SkyTrain mode to address rapid transit needs, regardless of the corridor or its relationship to the rest of the region. Given the technology's ease of integration into the existing network, scale benefits, and its demonstrated ability to attract riders, this is often a logical approach. SkyTrain has been indispensable in shaping and connecting the Region and it will continue to be needed to connect regional destinations into the future. However, this same success and the benefits SkyTrain provides at a sub-regional scale may not adequately provide larger scale regional and interregional connectivity. Typical SkyTrain station spacing is shorter than typical regional rail systems, such that at longer travel distances, individual vehicular travel increasingly gains a competitive travel time edge. A service more like the West Coast Express, but with higher frequency and all day service is a clearer expression of a true regional rail offer. As the Metro Vancouver Region, the Lower Mainland and Sea to Sky Corridor, and the Cascadia Super-Region continue to grow, interregional and large scale regional public transit connectivity will be vital to support an increased population and related economic activities.

¹ Source Data: UITP Mobility in Cities Database 2015 & GIS sources for Metro Vancouver

A natural outcome and enabler of an evolution toward interregional connectivity will be increased articulation of hierarchy in the transit network. *Table 1* below provides an indication of network hierarchy and transit supply levels of several well-known transit regions in Europe. Younger, but also well-known transit cities in Asia (e.g. Hong Kong, Singapore), exhibit, or are working towards similar network characteristics meeting their unique needs.

Table 1: Indicative Transit Network Hierarchy and Corresponding Supply Levels²

City	Supply of Hierarchical Network Components (route km)			
	U-Bahn	Tram	S-Bahn	Regional
Munich	100	109	530	-
Hamburg	117	-	239	683
Vienna	79	222	603	1,236
Berlin	146	300	556	3,251
Zurich	-	119	1,254	-

The Region lacks a corresponding hierarchy, though the existing West Coast Express, SkyTrain and B-Line/Rapid Bus services, along with interest in future light rail and streetcar begin to distinguish the characteristics of these services from one another. This idea is expanded on in the submission under *Interregional to Regional Connectivity*. As well, the *Regional to Sub-regional Network Concepts* within this submission speak to a need for increased network hierarchy.

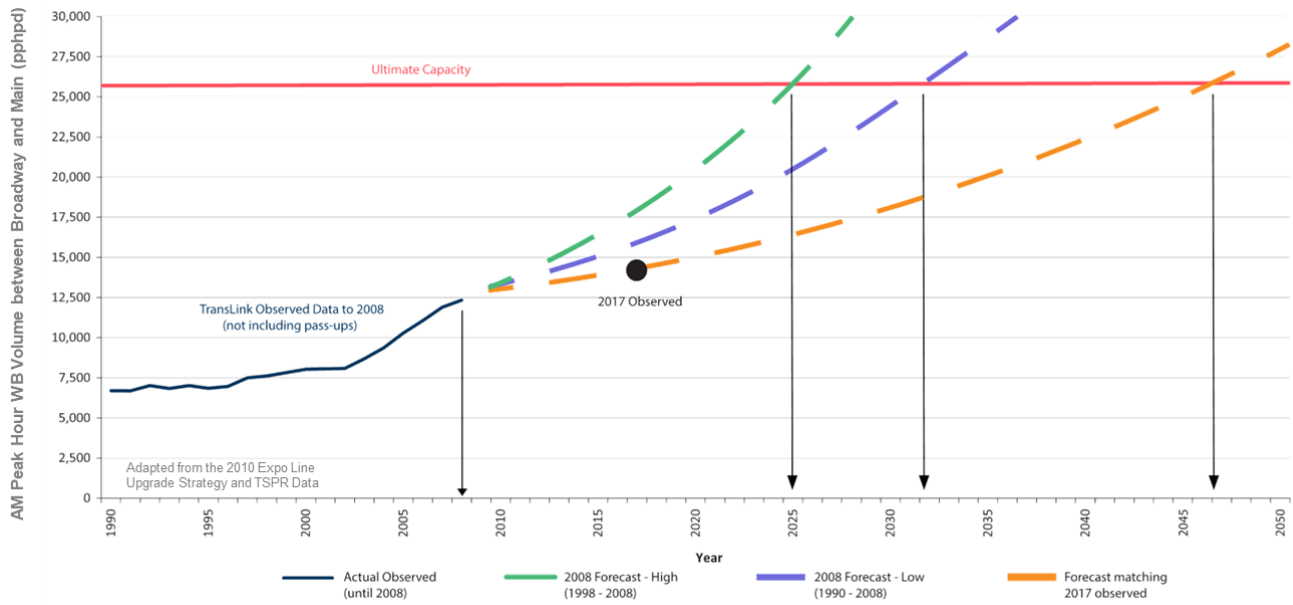
The Region needs a more defined network hierarchy to deliver more interregional to regional scale rail and sub-regional rapid and higher order transit

The Limits of the Existing System

The Expo Line is anticipated to hit ultimate capacity before 2050 as shown in *Figure 3* below. A similar timeline is anticipated for the Canada Line, which will see new patterns emerge after opening of the Broadway Subway, and which may accelerate trends toward ultimate capacity. These issues are within the planning horizon of the Transport 2050 RTS, and will need to figure highly in concept development. These lines are the spine of the transit and transportation system, noting that the ultimate capacity of the Expo Line is equivalent to approximately 26 lanes of directional traffic (a 52 lane road) and thousands of parking spaces. As cities such as Vancouver respond to Climate Emergency and accelerate actions encouraging more sustainable choices than driving, it is easy to imagine that the ultimate capacities of both the Expo and Canada Line may be reached sooner than we realize.

² PSU 2015, Regional Coordination in Public Transportation: Lessons from Germany, Austria, and Switzerland, MAUTC Region III, pgs 2-3

Figure 3: Expo Line Volume Projections



Adapted from the 2010 Expo Line Upgrade Strategy

The Region needs more dedicated higher order, rapid transit and regional interconnectivity to mitigate ultimate capacity issues of the existing system while managing future growth based on a greater desire for transit service.

What it Will Take

The Region continues to make some progress against current mode share targets. While recent and forthcoming large-scale investments, continued transit service improvements, and increased funding towards active transportation modes continue to steer the region toward achieving its goals, it is unlikely these measures alone will fill the gap.

Ambitious Targets

Transport 2050 will need to investigate moving beyond outcome-based targets such as mode share. In order to achieve Regional ambitions, we will need to move to action-based targets, such as these suggested for exploration below:

Table 2: Ambitious Action-based Targets for Exploration

Challenge	Proposed Target
The ongoing climate crisis, regional affordability and equity issues, and transit reliability and overcrowding challenges require that we do more with existing roadspace. Meaningful and lasting solutions to support mode shift all involve road space reallocation.	Reallocate X number of vehicular lane kilometres per year toward transit or active transportation modes.
Some form of mobility or transportation pricing to manage demand and fund investments will undoubtedly move the Region toward mode share targets. Without a clear path forward toward implementation, defining a timeline and scope for an initial phase will be challenging.	Test a first phase of Transportation Pricing within 5 years.
Introducing hierarchy into the higher order and rapid transit network can support increasing interregional and large scale regional transportation needs. However, the scale of investment required is significant and unprecedented.	Develop scenarios that express a commitment to implement a specific number of higher order or rapid transit route kilometres per 5 year period.

The City of Vancouver has historically and will continue to play a large role to advance the conversation around targets within the Region. Existing City policy direction and ongoing initiatives have laid the groundwork for new supportive targets at the regional level, and conversely, ambitious regionally developed targets will support progress toward the City’s own goals.

City Supportive Policy Context

<p>Climate Emergency Response</p> <p>Big Move #2 advances the City's Transportation 2040 Plan mode share targets of 66% of all trips by residents with sustainable modes by 10 years to 2030.</p> <p>As well, the response includes several Accelerated Actions, including expediting bus priority implementation, closing active transportation network gaps and Transportation Pricing</p>	<p>Transportation 2040</p> <p>TRANSIT-SUPPORTIVE PUBLIC REALM</p> <p>"Although the City does not own or operate the regional transit system, it does have significant control over its streets and rights-of-way, which can be used to support transit. Strategically locating transit priority measures such as bus bulges, queue jumpers, signal priority, and lane priority or reallocation can be effective ways to improve transit capacity, speed, and reliability."</p>
<p>Greenest City Action Plan 2.0</p> <p>"Moving beyond the status quo to achieve regional transit mode share targets will require transit ridership to double. This is only possible with significant investment to increase transit capacity. Improvements will bring faster, more frequent, higher capacity, and more reliable service to many more people living and working in the city"</p>	<p>1997 Transportation Plan</p> <p>"Moving more people on the same road network means primarily providing more transit vehicles and making space for transit to operate more effectively. For transit to be effective, it must not be tied up in traffic, and preferably should offer a time advantage over the car."</p> <p>"The discouragement of car use by charging car users a larger share of the costs through user fees such as bridge tolls, gas taxes, increase parking rates, or commuter levies."</p>
<p>Congestion Management Strategy</p> <p>"Street space allocation, signal programming, and network design are the keys to managing congestion. In addition, congestion management strategies that more directly enhance the speed and reliability of transit will also provide more people moving capacity along our frequent transit corridors and help to minimize the operating costs."</p> <p>Initiatives include: Mobility Pricing, Support Rapid Transit Implementation, Implement Spot improvements for transit operations</p>	<p>Complete Streets Policy Framework</p> <p>This framework amended bylaws such that the implementation of Complete Streets and reallocation of space in public rights-of-way can be enabled by authority of the City Engineer. The framework recognizes that Transportation 2040 calls for strategic reallocation of road space. The framework also prioritizes the improvement of travel time reliability for transit and goods movement.</p>

Ideas for Transport 2050

This submission generally utilizes the parameters specified in the “Call for Ideas”. Each idea is given a brief description. Where applicable, the rationale for the idea –motivation– and potential steps required toward implementation – actuation– are also provided.

The ideas presented endeavour to include historical or policy context, respecting the iterative and successive nature of the ideation process: good ideas often take time to flourish, or are considered as such only once their time has come.

The Difficulty Lies Not So Much In Developing New Ideas As In Escaping From Old Ones – John Maynard Keynes

As well, the ideas speak to key themes which emerged out of the Transport 2050 scenario planning and framework process, as well as themes uncovered through the City’s own visioning and idea generation processes. These include:

- Equity & Affordability
- Access & Equity of Access
- Resilience (Shocks & Stresses)
- Network Design
- Transit Capacity
- Pricing and Funding
- Automation and New Mobility
- Land Use & Growth Patterns
- Safety & Comfort
- Accessibility

Submission Structure

The ideas are further stratified into the following categories:

Category	Description
Interregional to Regional Connectivity	This idea expresses a need and vision for Regional Rail corridors in terms of regional desire lines and high-level connectivity needs. With respect to network hierarchy, these services would be toward the top.
Regional to Sub-regional Network Concepts	<p>This series of more defined network concept ideas explicitly incorporate several of the themes listed above, with a focus on access and access equity. As such, in addition to high-level modelling of ridership potential, access analyses were also undertaken and visualized where applicable. These are further documented in <i>Appendix B: Access and Ridership Potential</i>. Owing to the City’s recent launch of the City-wide Plan, these ideas focus on the Vancouver/UBC sub-region, but consider connections into adjacent sub-regions and integration/alignment with Interregional/Regional Concepts. They also serve as baseline aspirations and early parameters within the City-wide planning context.</p> <p>These concepts express a need for higher order and/or rapid transit to indicate two potential hierarchical levels. In many cases the level of service they aspire to would be similar, with a key potential difference being average operational speed determined by stop spacing. Further study and planning processes would be required in all cases.</p>
Local Scale Network Concepts	These are network concepts at the local scale, each of which focuses to varying degrees on closing network gaps and improving or intensifying existing routes, including potential RapidBus service. The ideas are not further described and are suggested for detailed study in the next Vancouver/UBC Area Transportation Plan (2022/2023 as per the 2018 MLBE Project Supportive Policies Agreement)
Policy & Program Ideas	<p>These focus on new policies, programs, guidelines or other generally non-geographic ideas which should be considered. They are further classified into the following sub-categories:</p> <ul style="list-style-type: none"> ➢ System Management ➢ Increased Service Levels ➢ Fares & Affordability ➢ Technology, Data & Modelling ➢ Land Use Integration

Interregional to Regional Connectivity

This visionary idea casts a need for the evolution of the Region's transit network toward true regional rail opportunities, enabling and supporting increased delineation and clearer network hierarchy.

Motivation

Among its peers, the Vancouver Region is rather unique in its near-complete absence of regional rail services and overall network hierarchy. This idea expands on the introductory information, and draws from the assessment in *Appendix A: Motivation for Regional Rail and Network Hierarchy*. In short, this idea is driven by the need to:

- Provide interregional connectivity to facilitate travel times that are competitive with vehicular travel of all types, whether Automated, Connected, Shared or Electric, and which would become even more competitive over time given continued increases in road-based congestion.
- Mitigate future SkyTrain network ultimate capacity constraints.
- Formulate opportunities to improve the West Coast Express beyond a commuter service and explore alternative alignments toward the Metro Core.
- Alleviate the spatial mismatch between affordable housing and job centres to improve affordability.
- Provide the opportunity to reimagine Highway 1 as a people moving corridor with multimodal opportunities and curtail the incremental widening which places ever increasing strain on municipal networks.
- Support growing visitor numbers and population growth on the Sea to Sky Corridor.
- Lay a foundation or be a part of the business case for intercity rail such as high-speed rail to connect the Cascadia Super-Region.
- Contribute toward an evolving hierarchy that comprises of layers including regional rail, rapid transit, higher order transit, and conventional bus transit.

Actuation

Positioning the Region to deliver more regional rail will simultaneously require a concurrent and natural progression toward a more sophisticated network hierarchy. These will be mutually beneficial evolutions, such that regional rail forms the top of the hierarchy and other modes, including higher order and/or rapid transit modes will provide more sub-regional interconnectivity. On the whole, this will require a sea change in how the Region understands transit service delivery and approaches investment implementation. Transport 2050 will lay the groundwork for this evolution in service hierarchy.

To achieve this vision, corridors which align with high level desire lines have been identified such that these could interconnect and/or interline with one another and also speak to the network concepts at a more zoomed in, sub-regional scale. Determining the objectives for each corridor concept through the RTS will uncover more alignment and transit functionality definition. As well, these corridors could be preceded by Express Bus or TrainBus type services to assess and build a market.

The map in *Figure 4* below summarizes the City's Transport 2050 Network Vision in terms of interregional, regional and sub-regional connectivity. *Figure 5* in the next section offers a zoomed in view of network concepts at the sub-regional level.

Figure 4: The Transport 2050 Network Vision

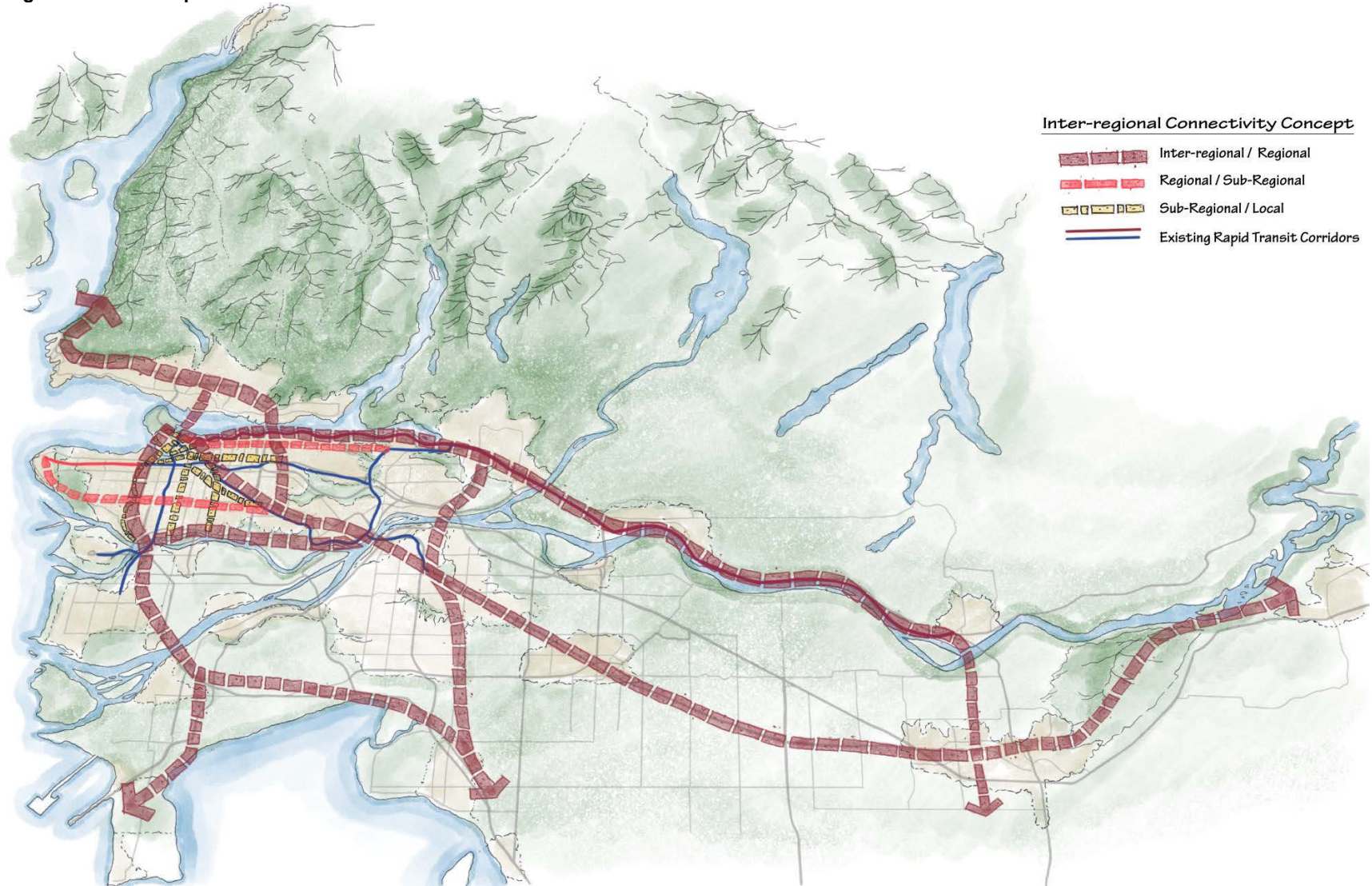
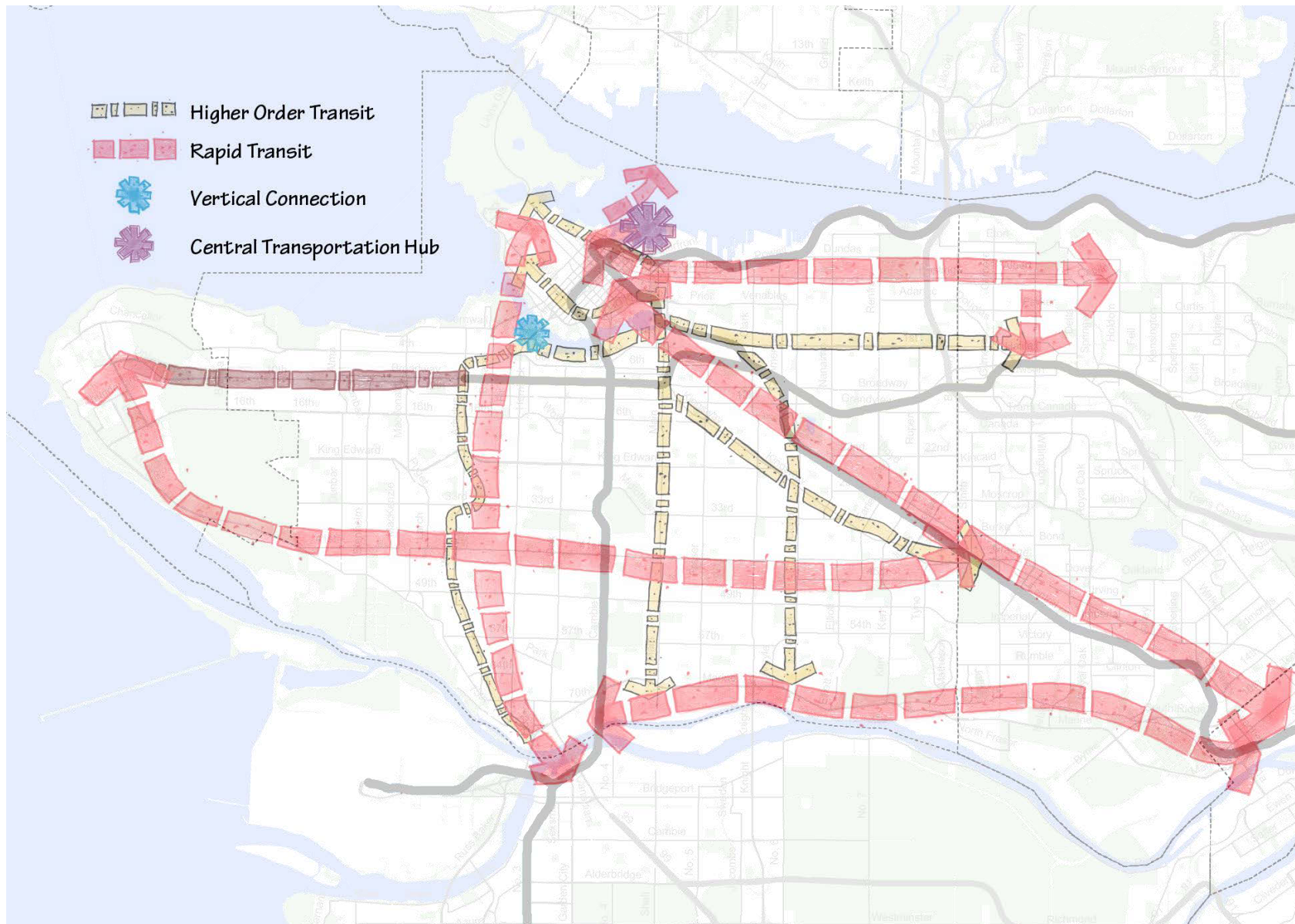


Figure 5: Transport 2050 Regional to Sub-regional Network Concepts



Arbutus to UBC SkyTrain

TransLink, working closely with the City and other partners, is proceeding with further developing the preliminary design of the Arbutus to UBC SkyTrain extension in preparation for the development of a business case for senior government funding. Further project approvals by the Mayors' Council including funding for the development of the business case would occur through a future TransLink Investment Plan.

Motivation

The need for the project is well established in the recently completed Rail to UBC Rapid Transit Study (2019). The below points are a short summary in terms of key submission themes.

Historical and Policy Context

In 1993, the Greater Vancouver Regional District (now Metro Vancouver) approved Transport 2021 which identified the need for rapid transit along the Broadway-Lougheed corridor connecting the Northeast Sector and Central Broadway. The 1997 City Transportation Plan included rapid transit along the Broadway Corridor with possible extension to UBC and in 2000, Council approved a Millennium Line extension to Central Broadway with rapid bus service west to UBC in 2000. This alternative was also approved by the TransLink Board that same year. Transportation 2040 restated Broadway Rapid Transit as the highest priority. The Regional Mayor's Council Vision approved in 2014 called for rapid transit from Commercial Drive to UBC. In 2018 funding was secured for the Broadway Subway Project which will extend the Millennium Line west of VCC-Clark Station to a new terminus at Arbutus Street. In early 2019, City of Vancouver Council endorsed a SkyTrain extension from Arbutus Street to UBC followed by endorsement a month later by the region's Mayors' Council.

Access and Access Equity

The project will provide significantly enhanced access to UBC from all parts of the region, such that all neighbourhoods and communities stand to benefit. Access to regional jobs and amenities will also be improved for the growing number of people living at UBC. As well, the Broadway corridor contains numerous other regional destinations which will be made easier to access via public transit with the full completion of the Broadway Subway Project and further Millennium Line extension from Arbutus Street to UBC.

Resilience & Network Design

The Arbutus to UBC SkyTrain will meet long-term capacity needs, provide fast and reliable service, reduce crowding on multiple parallel bus services, and have low street level impacts.

Ridership Potential

As determined in the Rail to UBC study, SkyTrain was found to attract a significant number of new transit users and generate the highest ridership overall. Given the transfer-free connectivity to the Broadway Subway, it is anticipated that the 7.1 kilometre Arbutus to UBC SkyTrain segment would generate approximately 120,000 boardings per day (16,900 boardings/km). For comparison, the 19 kilometre Canada Line currently sees about 148,000 daily boardings (7,800 boardings /km). On a per km basis, the Arbutus to UBC SkyTrain ridership is anticipated to be significantly greater than that of the existing Canada Line, itself a highly successful service. Importantly, the study also found that SkyTrain offered the greatest ability to expand capacity to meet long-term needs.

Actuation

Regional partners and the Province continue to work collaboratively on delivering the Broadway Subway project. Given that public and stakeholder engagement have determined a high level of support for expanding the SkyTrain network to UBC, the momentum of the Broadway Subway Project should be used to keep the Arbutus to UBC SkyTrain moving forward.

Figure 6: Future Committed SkyTrain Network



REGIONAL/SUB-REGIONAL NETWORK CONCEPTS

Hastings Street Corridor Rapid Transit

Provide a high-capacity rapid transit connection along the Hastings Street corridor extending from downtown Vancouver toward other portions of the region.

Motivation

Historical and Policy Context

The City of Vancouver's Transportation 2040 plan identifies the need for rapid transit on the Hastings Corridor. The plan does not specify exact alignments or identify initial terminus stations.

Access and Access Equity

A rapid transit service on the Hastings Street Corridor would contribute significantly to regional access including Hastings Park and the PNE, a regional destination. Depending on ultimate alignments and station locations, the concept could double access for some neighbourhoods in East Vancouver and western Burnaby, as shown in *Figure 7*.

Ridership Potential

The corridor generates significant existing transit ridership, with over 190,000 daily boardings on the bus routes which utilize it. It has a strong anchor in Downtown Vancouver, a concentration of commercial activity, and higher density populations with a higher propensity for transit use. Rapid transit would build on this corridor's ridership success, with potential to attract a market consisting of local residents adjacent to the corridor and those connecting from locations throughout the region.

Network Design & Resilience

The Hastings Street Corridor as a whole **carries well over 2300 buses per day**: Hastings Street ca.1250, Cordova Street (including Powell Street) ca. 480, and Pender Street ca. 640 buses per day, de facto allowing the corridor to function as a trunk as it approaches downtown. While this creates a high frequency corridor, the trunk function is complex, susceptible to bus speed and reliability issues, and comprising of **significant service duplication**. Bus volumes are so high that buses often impede one another, even while utilizing the existing bus lanes. A rapid transit service would offer an opportunity to simplify the area bus network and conserve bus service resources, while retaining high frequency, and offering greater capacity.

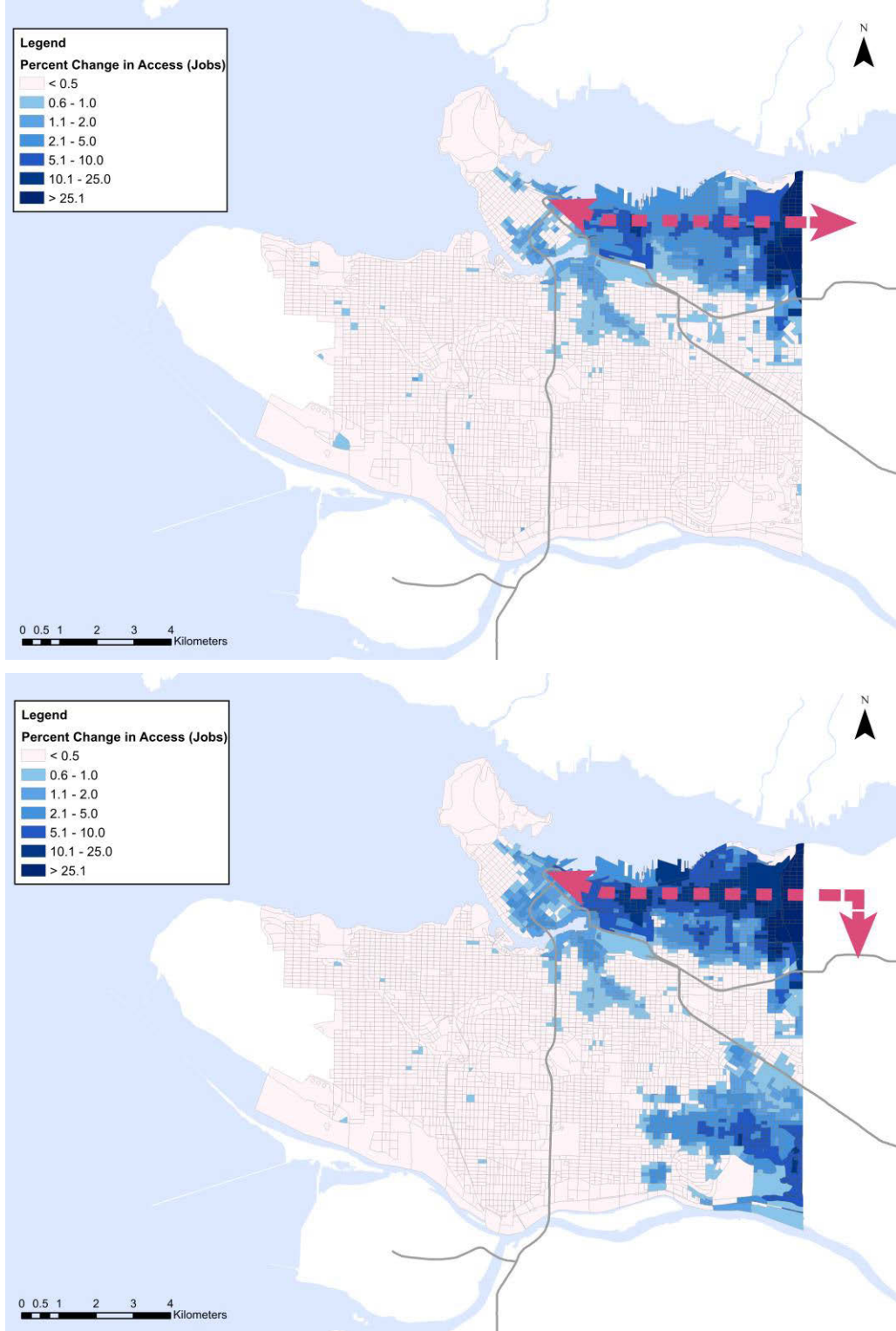
The network concept takes advantage of existing strong anchors and nodal development, with the potential to provide significant regional connectivity. As well, it could play a role in supporting large-scale regional or interregional travel opportunities.

Actuation

Including the identification of new funding sources such as *Transportation Pricing*, the following actions may be required to work toward implementation:

- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine project objectives, exact alignments, and extension opportunities further into the region – preliminary assessment suggests SFU and/or the Willingdon Corridor provide opportune anchors in the shorter term, while the feasibility of connecting to the North Shore should be considered in terms of an overall optimal rapid transit network.
- Incorporate lessons learned from the Broadway Subway strategic land use acquisition for stations, investment planning with senior governments, project implementation and construction process to foster a strong local culture of rapid transit delivery in constrained urban conditions.
- Include opportunities for achieving further rapid transit project benefits by enhancing the public realm and multimodality of the street, including Gastown, as part of the future project definition.
- Continue to augment the bus lane hours and bus service hours on Hastings Street to solidify and create new ridership that will support a strong opening day rapid transit project.

Figure 7: Hastings Street Corridor Rapid Transit Concept & Access Effects



41st / 49th Avenue Corridor Rapid Transit

Provide a high-capacity rapid transit connection along the 41st /49th Avenue corridor from UBC to the Expo Line.

Motivation

Historical and Policy Context

The City of Vancouver's Transportation 2040 plan identifies the need for rapid transit on the 41st /49th Avenue corridor. The plan does not specify exact alignments but generally identifies the terminus anchors to be UBC in the west and existing higher density nodes on the Expo Line in the east.

Access and Access Equity

This idea provides regional and sub-regional access benefits, particularly for areas with lower transit access in southern Vancouver and Burnaby. As well, the corridor continues to add supportive land uses and amenities, further contributing to the level of regional accessibility this idea would provide.

Ridership Potential

The corridor currently generates high ridership levels and caters to a diverse transit market segment, making it one of the region's top transit corridors. UBC attracts and generates a significant number of transit riders. As it and other locations along the corridor continue to grow and add transit-supportive land uses, the transit market potential of this network concept is anticipated to be one of the largest in the region. Preliminary analysis summarized in *Appendix B* and that undertaken in the 2019 Rail to UBC Rapid Transit Study suggest large ridership potential on this corridor.

Network Design & Resilience

The extension of the Broadway Subway to UBC will contribute significantly to daily reliability and travel time savings; however, there exists a need to ensure that the region's transit backbone is fortified and made more resilient at a network level.

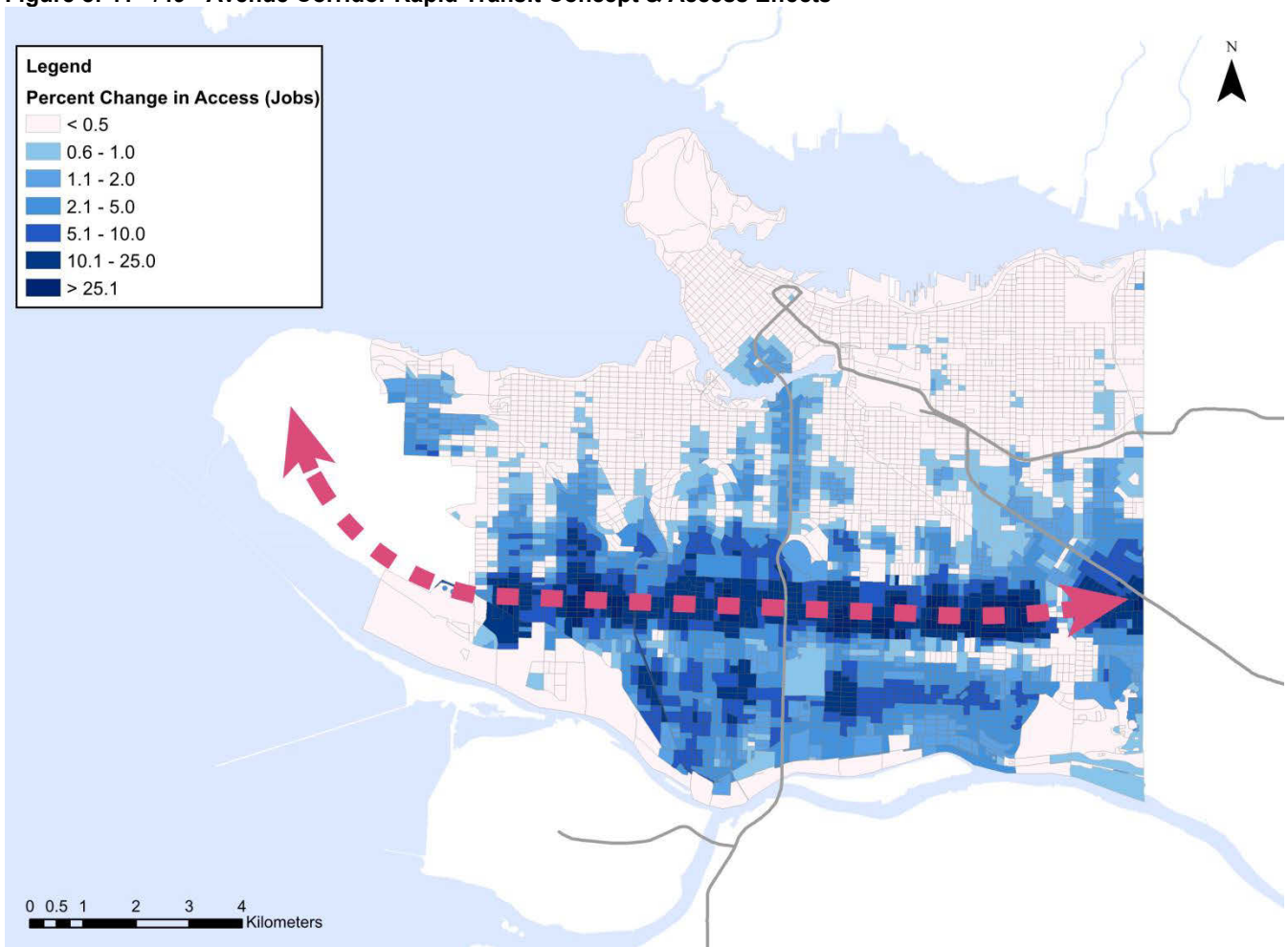
Currently the region's rapid transit network is oriented around the Metropolitan Core, such that tangential transit travel opportunities are difficult and more competitive by vehicular travel. This tangential service will facilitate travel between Richmond/YVR and more easterly sub-regions without the need to divert toward the Metro Core; off-loading future pressure on the Canada Line, and existing and future interchange stations.

Actuation

Including the identification of new funding sources such as *Transportation Pricing*, the following actions may be required to work toward implementation:

- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine exact alignments and connectivity to the existing and future rapid transit network.
- Incorporate lessons learned from the Broadway Subway strategic land use acquisition for stations, investment planning with senior governments, project implementation and construction process to foster a strong local culture of rapid transit delivery in constrained urban conditions.
- Subject to determination of the exact alignments, explore the use of Cambie Corridor to transition between 41st and 49th Avenue and provide an efficient dual interchange station opportunity with the Canada Line and better serve the Oakridge MTC and Langara College.
- Explore multiple eastern terminus connections along the Expo Line, including but not limited to Joyce Station and Metrotown Station.
- Include opportunities for achieving further rapid transit project benefits by enhancing the public realm and multimodality of the street as part of the future project definition.
- Continue to augment the bus lane hours and bus service hours on Hastings Street to solidify and create new ridership that will support a strong opening day rapid transit project.

Figure 8: 41st /49th Avenue Corridor Rapid Transit Concept & Access Effects



Burrard Inlet Rapid Transit

Provide rapid transit connection across Burrard Inlet between Vancouver and the North Shore which connects seamlessly into the regional SkyTrain network to attract new ridership, address travel time reliability and congestion issues, and increase regional access to jobs and recreational opportunities.

Motivation

Historical and Policy Context

The 1962 Rail-Rapid Transit for Metropolitan Vancouver report evaluated the idea of rapid transit to the North Shore, noting that a rapid transit solution may be cheaper than a new vehicular crossing, even if not warranted by transit volumes alone at that time. More recently, the 2012 North Shore Area Transit Plan identified the need to study potential rapid transit corridors. The 2018 Integrated North Shore Transportation Planning Project (INSTPP) advanced this thinking, noting a need to evaluate conditions for rapid transit between the Metropolitan Core and the Lonsdale Regional City Centre, which remains as one of the only designated Regional City Centres with no existing or planned high capacity rapid transit connections. The Burrard Inlet Rapid Transit Feasibility study, which intends to provide further detail on feasible alignments and technologies is now underway.

Access and Access Equity

The North Shore currently has low levels of access to regional opportunities by transit (as shown *Figure 9* below), with transit travel times that are not competitive with vehicular travel. Conversely, the area is challenging to reach for residents in other parts of the region, who work or recreate – or would desire to – on the North Shore. Rapid transit connectivity will also help to alleviate the spatial mismatch between more affordable housing locations and areas of job opportunities located on the North Shore.

Ridership Potential

The Lonsdale corridor is one of the densest urban areas in Canada with over 160,000 residents and jobs within 400 metres of the corridor. The area continues to develop, with the population currently expected to increase by about 38,000 and the number of jobs by 18,000 over the next 20 years. As well, the North Shore offers numerous recreational activities and proximate access to nature which draws tourists and regional residents alike. High capacity, frequent transit could serve many of these recreational trips. The SeaBus is currently a high ridership route, while about a third of people crossing the Lions Gate Bridge are doing so by bus, indicating a significant demand for transit connectivity.

Network Design & Resilience

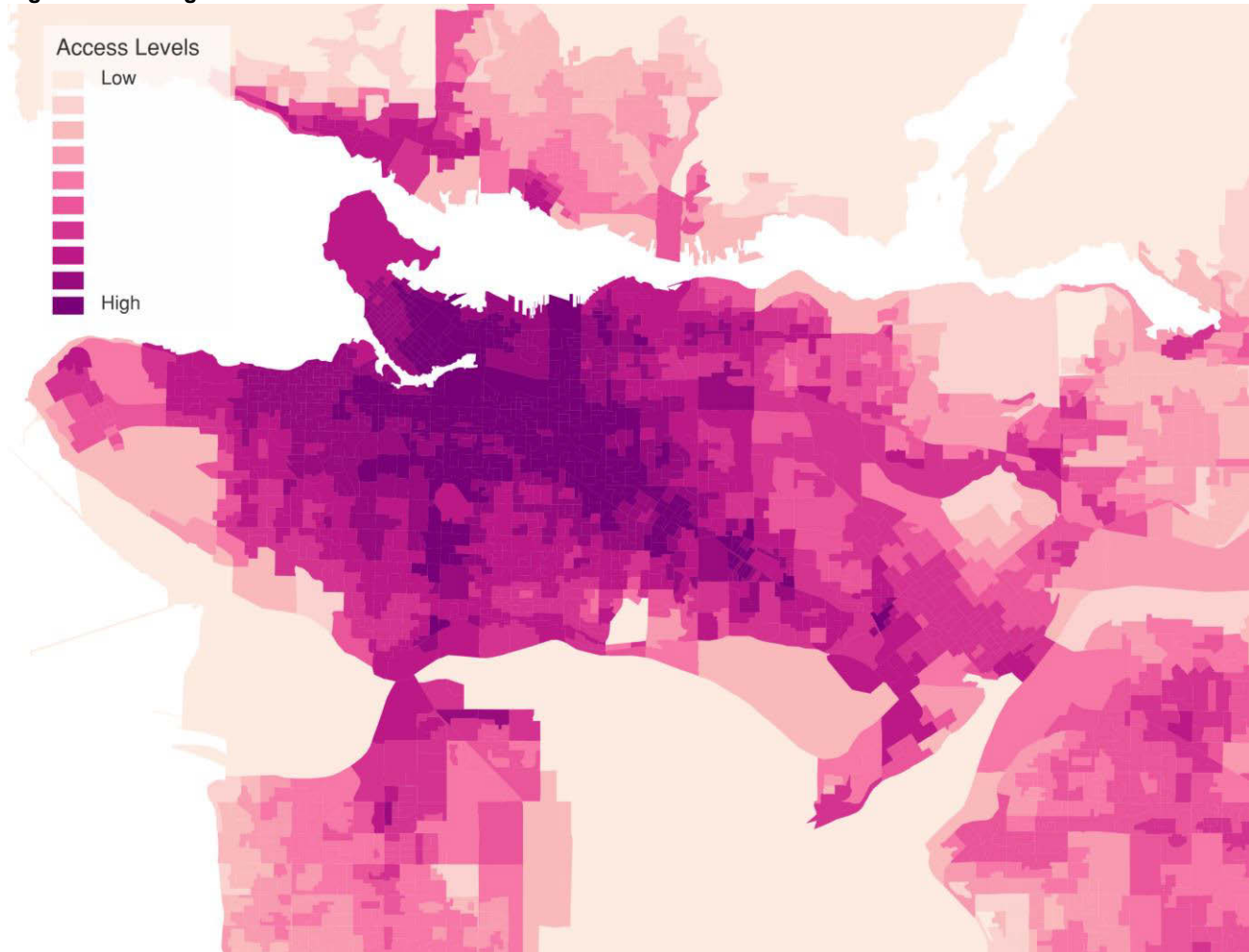
The North Shore transportation network and the two bridges connecting it to the Burrard Peninsula face considerable reliability and congestion issues. A third fixed-link transit crossing will introduce significant resilience to the network and ensure direct and reliable transit travel times, while stabilizing congestion levels. This idea could contribute to interregional connectivity and possibly support multiple modes and functions, including a Sea to Sky connection to Squamish and eventually Whistler.

Actuation

Including the identification of new funding sources such as *Transportation Pricing* and investment from multiple levels of government, the following actions may be required to work toward implementation:

- Successful completion of the Burrard Inlet Rapid Transit feasibility study, including development and more detailed definition around routes and technology options.
- Further feasibility study and analysis to determine preferred alignment option.
- Continued interagency planning coordination, outreach to stakeholders and the public at the local and regional levels to collect community input and priorities.
- Integration with further evolution of the North Shore east/west Rapid Bus corridor, in terms of both extensions of the corridor and additional transit priority for the corridor.

Figure 9: Existing North Shore Access Levels³



The North Shore is characterized by a low level of access (to jobs within a 40 minute transit travel time) despite close proximity to the Metro Core.

³ Note: Larger single geographic areas with a limited or low connectivity public street network exhibit a lower connectivity to the transit network (e.g. Sea Island Way, Big Bend, Annacis Island). The access shown is representative of the access levels from the centroid of these areas, which due to the low public street network connectivity, incurs additional impedance. Given that few people would actually find themselves located at the centroid of these areas, they are likely underestimated in terms of access levels.

Western Corridor Rapid Transit

Provide a rapid / higher order transit connection between Downtown Vancouver and Richmond within the Arbutus Street or Granville Street corridor or a combination of the two.

Motivation

Historical and Policy Context

The idea of rapid transit on the Arbutus corridor has been discussed since the early 1960s in the Rail-Rapid Transit for Metropolitan Vancouver report (1962). The corridor figured highly as part of the Richmond-Airport-Vancouver (RAV) Line studies, which noted several benefits. Although the Canada Line was ultimately selected to run in the Cambie Corridor, these benefits remain and may be similar on Granville Street, which formerly carried the 98 B-Line. The City's Transportation 2040 Plan notes the need to plan for streetcar or light rail on what is now the Arbutus Greenway, while the Arbutus Corridor Official Development Plan notes the corridor can be used for the purposes of non-elevated rail/transit.

Access and Access Equity

To the extent that this network concept connects with the broader rapid transit network in the downtown, the concept has the potential to play a role in significantly increasing access in the downtown neighbourhood of the West End (e.g. up to a 50% more jobs within a 40 min transit trip), where access is low relative to the dense land use. As well, the concept would significantly increase transit accessibility for residents in southwestern areas of Vancouver, although this area is currently characterized by lower density and lower overall accessibility needs.

Ridership Potential

Despite some areas of lower density, the corridor contains ideally spaced nodes of higher land use intensity. As well, increased connectivity between regionally significant anchors including YVR and regionally significant existing and future rapid transit lines (Broadway Subway, 41st Avenue) indicate there is a strong transit market for this concept. Additionally, the concept may draw existing or latent passengers from the Canada Line, alleviating capacity issues.

Network Design & Resilience

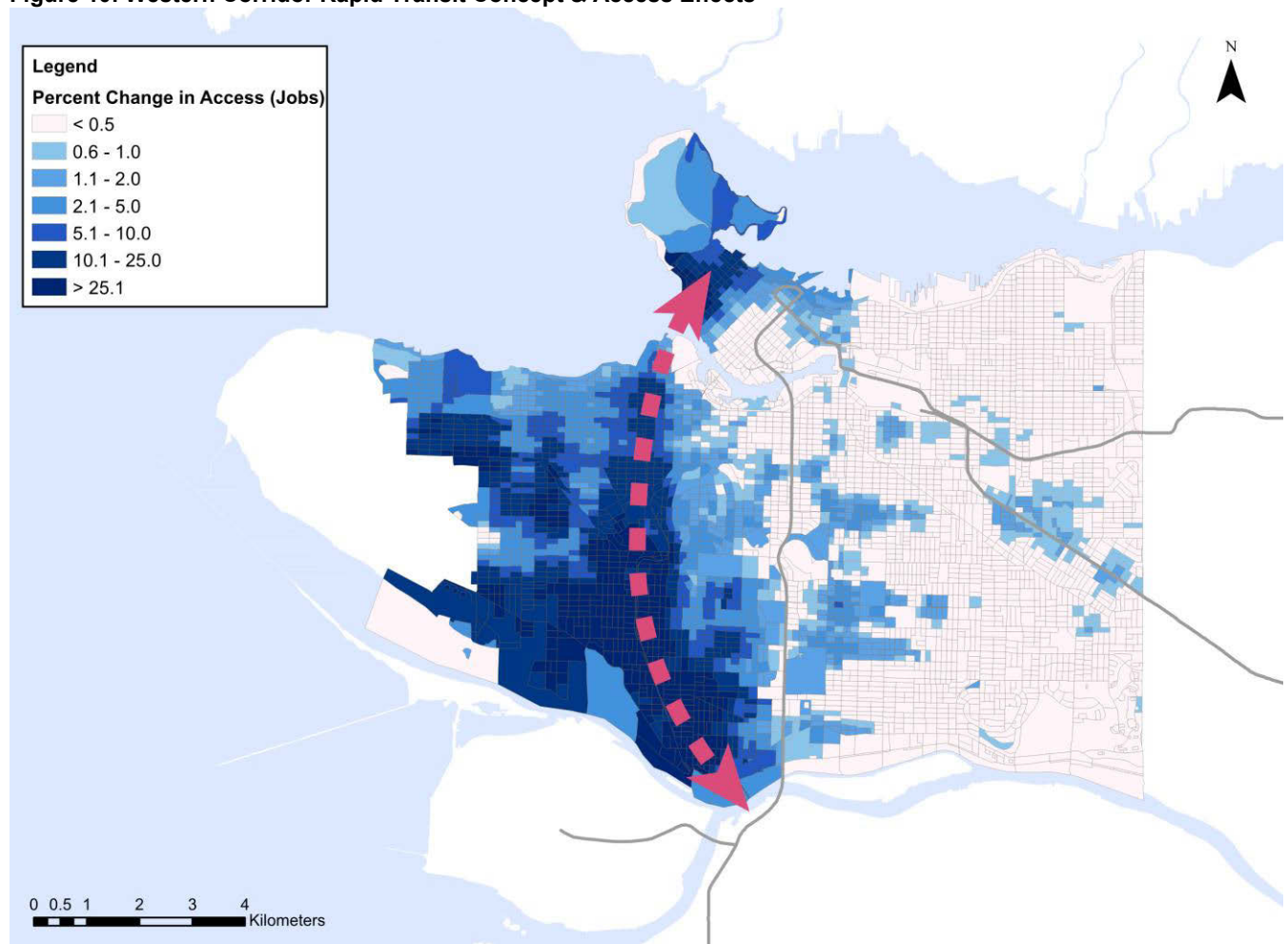
Even with the future plans to lengthen all stations, the Canada Line will hit ultimate capacity before 2050, and will likely require significant capital investment to achieve ultimate capacity. This concept offers an alternative means to increase the capacity of the general desire line, while strengthening the regional transit backbone. It may also contribute toward addressing a longer-term strategy for the Canada Line YVR spur, given the capacity constraints this now creates south of the spur. Depending on ultimate concept objectives, it may play a role in large-scale regional or interregional connectivity.

Actuation

Including the identification of new funding sources such as *Transportation Pricing*, the following actions may be required to work toward implementation:

- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine project objectives, exact alignments, and extension opportunities further south and/or east into the region.
- Explore use of existing linear right-of-way opportunities, such that this could contribute to ease of constructability.
- Consider Granville Street as part of the overall corridor evaluation; the network concept may benefit from utilizing parts or all of this alignment depending on the overall objective of the idea.
- Consider connectivity opportunities with other network concepts, such as *Hastings Street Corridor Rapid Transit*, *Burrard Inlet Rapid Transit*, or other existing lines.
- Consider station and/or terminus locations in the West End.

Figure 10: Western Corridor Rapid Transit Concept & Access Effects



North Fraser Corridor Rapid Transit

Leverage potentially available right of way and explore implementing rapid/higher order transit within the North Fraser Corridor (Marine Drive / Kent Avenue / Marpole Spur) to support increased current and future development at a sub-regional scale and/or to facilitate larger-scale regional connectivity.

Motivation

Historical and Policy Context

The 2004 Northeast Sector Study explored the corridor as an alignment concept to connect to the Northeast Sector (Evergreen Extension). The 2006 East Fraser Lands Official Development Plan identified the potential for future rail-based transit through the area. The 2019 East Fraser Lands Transit Study explored the use of the Marpole Spur rail corridor to provide improved transit service considering various technologies. This study identified the Marpole Spur as an opportunity for longer-term regional transit consideration, all while assuming industrial lands continue to support their city-serving function.

Access and Access Equity

One key objective of this concept is to improve access to and from southern portions of Vancouver and Burnaby. These are currently areas with low comparative levels of access. As well, depending on overarching objective, the concept could contribute to interregional level access improvements.

Ridership Potential

The general corridor contains several existing and developing higher density nodes, including the East Fraser Lands, which could serve as a potential interim terminus. The ridership potential of this network concept will be sensitive to the overall objective and intended function, as well as the level of service offered; this potential may not be manifest in the shorter term.

Network Design & Resilience

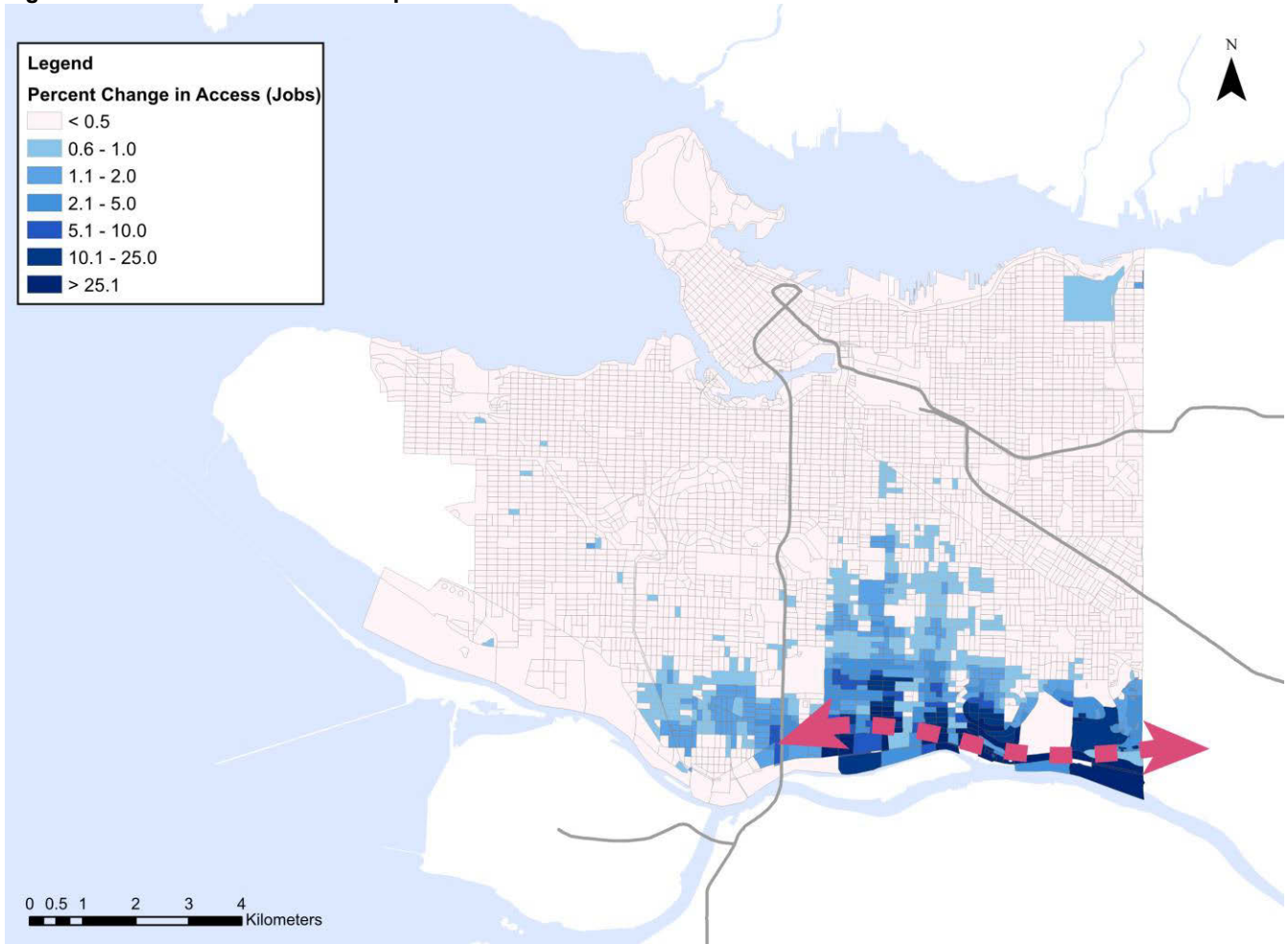
At the broad regional scale, this network concept may provide an opportunity to reduce reliance on the Expo Line to connect the Metro Core with Surrey Metro Centre. At the sub-regional scale, the concept could replace or enhance existing bus services which are currently susceptible to significant overcrowding and reliability issues. Network concepts could take advantage of the Marpole Spur linear right of way if this becomes available in the future. Phasing options will be particularly important such that the value of higher order transit service remain understood, yet do not suggest rezoning of industrial lands, many of which will continue to provide a water-based regional servicing function.

Actuation

Including the identification of new funding sources such as *Transportation Pricing*, the following actions may be required to work toward implementation:

- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine project objectives, potential alignments and phasing, network hierarchy, and extension opportunities further east into the region.
- Consider multiple existing linear right of ways, applicable technologies, and a range of phasing opportunities in further, more detailed alignment exploration, including Marine Drive/Way, the Marpole Spur, and Kent Avenue – preliminary assessment suggests potential to provide considerable bus priority at relatively low capital cost.
- Consider the North Fraser corridor in view of the vision laid forth in the *Interregional to Regional Connectivity* vision.

Figure 11: North Fraser Corridor Rapid Transit



Main Street Higher Order Transit

Provide higher order transit on the Main Street Corridor to support a high ridership and active corridor; potential to connect to existing sub-regional terminus areas or extend further into the region.

Motivation

Historical and Policy Context

The City's Transportation 2040 Plan identifies Main Street as a rapid transit priority. The 2017 False Creek Flats plan provides further policy direction to envision transit priority for the portion of Main Street from Union Street to Broadway including exploration of bus lanes. The historical context of Main Street as a onetime streetcar corridor has left a legacy such that it continues to be conducive to a high level of transit service. This legacy continued in 2009 through the Main Street Urban Showcase Project when the corridor was introduced with additional transit priority.

Access and Access Equity

This network concept provides considerable access benefits to communities in South Vancouver, as well as in areas along perpendicular transit routes (41st Ave, 49th Ave, Marine Dr) owing to increased transit connectivity. As well, this concept would improve access for more vulnerable residents in the DTES by providing connections to vital services on the Main Street corridor.

Ridership Potential

The existing route level ridership in the corridor is the second highest of all predominantly north-south bus corridors in the City. An improved level of service, coupled with future connectivity with improved east-west lines (Broadway Subway, 41st Avenue) is anticipated to translate to a large market potential.

Network Design & Resilience

Transit priority such as dedicated lanes, specifically through the portion between Broadway and Union Street given the limited street network in the False Creek Flats, would support several existing high ridership routes with reliability and travel time issues. As well, the network concept would contribute to mitigating future Canada Line capacity constraints, while potentially strengthening network hierarchy. With the introduction of the Broadway Subway Main Street station, the already active commercial corridor can expect to draw additional people requiring a more resilient north-south service on the corridor.

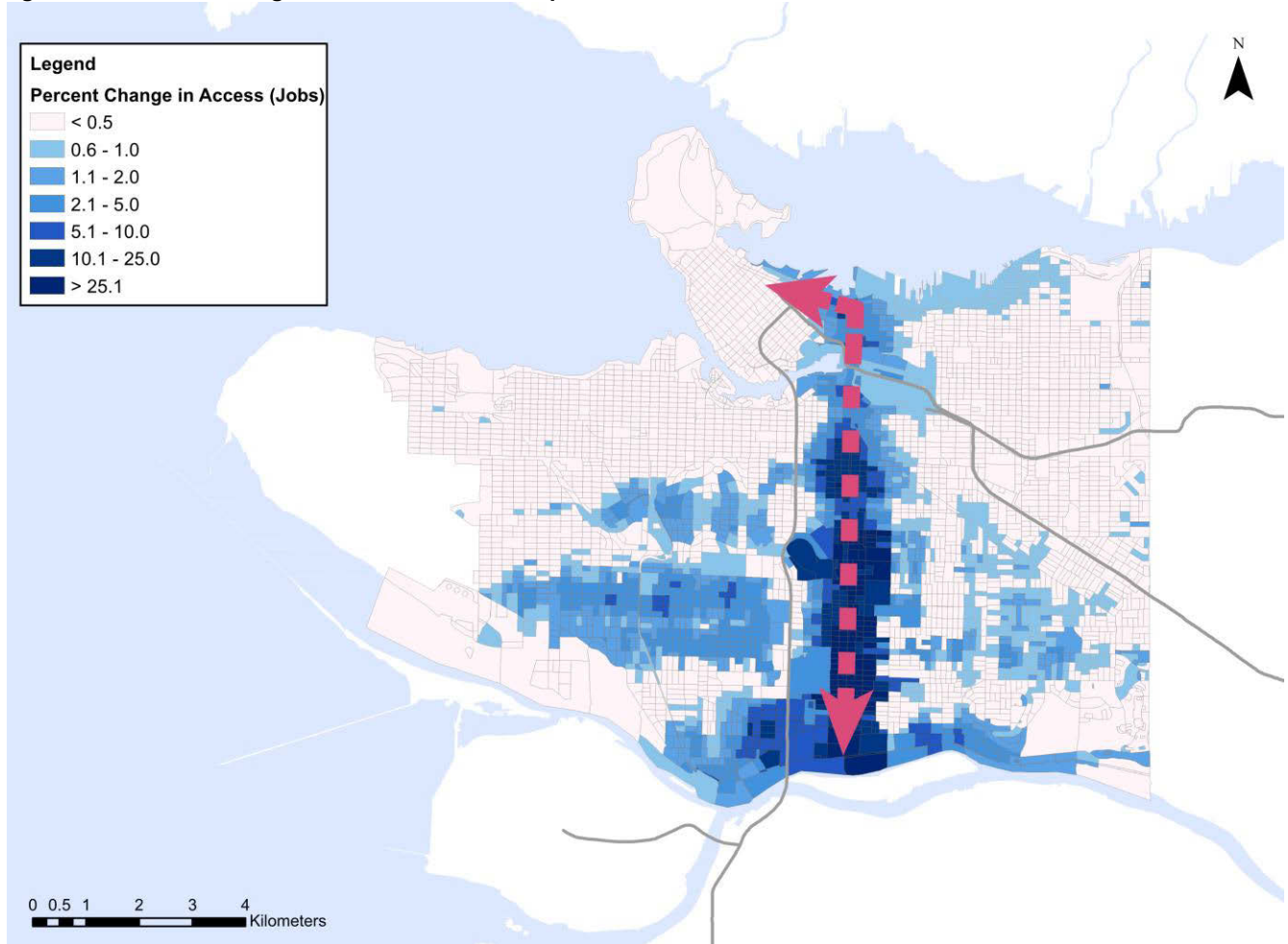
Downtown Vancouver provides a strong north anchor. There is potential to utilize existing strong anchors at Marine Drive Station which would facilitate intensification or replacement of the existing Route 3, or to extend further south in the region depending on ultimate network function.

Actuation

New sustainable funding sources such as *Transportation Pricing* will be required to implement this idea. In addition, the following actions may be required to work toward implementation:

- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine project objectives, exact alignments and terminus locations, and/or extension opportunities further south into the region.
- The Fraser Street corridor exhibits many similar characteristics to Main Street, and should figure in the overall corridor exploration.
- Explore implementation as part of a broader complete street vision for the corridor including dedicated active transportation facilities and an enhanced public realm.

Figure 12: Main Street Higher Order Transit Concept & Access Effects



Kingsway Higher Order Transit

Provide higher order transit on the Kingsway Corridor to support a high ridership and active corridor with increased local access while connecting Downtown Vancouver with the Metrotown Regional City Centre and possibly further east into the region.

Motivation

Historical and Policy Context

The historical context of Kingsway as a onetime streetcar corridor and its unique diagonal cross cutting time savings opportunity continues to position it as a strong transit network link. The 2010 Norquay Village Neighbourhood Centre Plan recognizes the need for continued transit improvements on Kingsway.

Access and Access Equity

This network concept would significantly improve conditions in areas of southeastern Vancouver and southern Burnaby which currently have low access to opportunities by transit. It would also significantly improve accessibility for higher density blocks adjacent to Kingsway.

Ridership Potential

In addition to the existing nodes of transit supportive higher density along the corridor, considerable development is planned for the Norquay Village area which straddles Kingsway. As well, given the potential for the concept to anchor in the Metrotown Regional City Centre, there is an opportunity to generate high ridership.

Network Design & Resilience

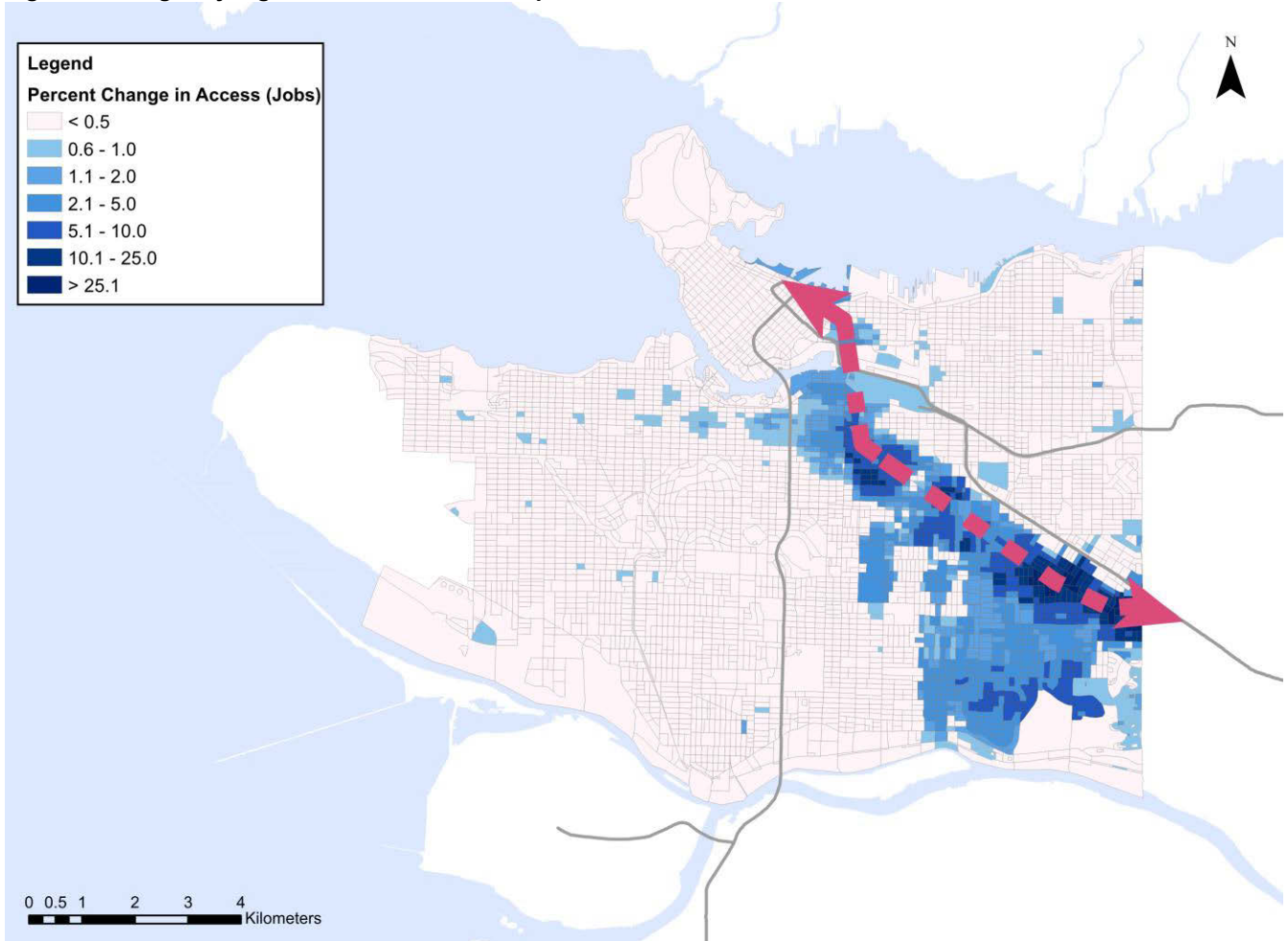
This network concept would complement the Expo Line by serving a more localized and sub-regional function while strengthening network hierarchy, or it could be considered to provide larger-scale regional connectivity. Either of these network functions would contribute to mitigating future Expo Line capacity constraints and ensure that the Expo Line can continue to adequately serve regionally focused trips. Even while Kingsway and the Expo Line largely parallel one another, Kingsway is the historical centre of commercial activity and urban centres and the location where growth continues to be attracted in spite of comparatively limited transit service.

Actuation

New sustainable funding sources such as *Transportation Pricing* will be required to implement this idea. In addition, the following actions may be required to work toward implementation:

- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine project objectives, more exact alignments and terminus locations.
- Consideration that the corridor function as a trunk with spur services to other areas, particularly to areas deeper in southeastern Vancouver to further address low accessibility in these locations.
- Explore implementation as part of a broader complete street vision for the corridor including dedicated active transportation facilities and an enhanced public realm.
- Considerations that the corridor be explored as part of the *Interregional to Regional Connectivity* vision.

Figure 13: Kingsway Higher Order Transit Concept & Access Effects



East 1st Avenue Corridor Higher Order Transit

Provide bus service and work toward higher order transit on the East 1st Avenue Corridor which would connect western Downtown Vancouver with the Brentwood Town Centre and Millennium Line.

Motivation

Historical and Policy Context

The Interurban Railway (Burnaby Lake Line) service historically utilized parts of the corridor until its discontinuation in 1953. More recently and owing to a lack of direct transit services, the 2005 Vancouver/UBC Transit Area Plan identified the need for transit service in the corridor, as did the 2017 Grandview-Woodland Community Plan. The False Creek Flats Area Plan also identified a need to provide improved transit service on Terminal Avenue connecting to East 1st Avenue.

Access and Access Equity

Due to the lack of existing any east-west services on much of this corridor, access benefits of this network concept idea cover significant portions of East Vancouver neighbourhoods and northwestern Burnaby; areas with relatively low current transit accessibility. To the extent that this concept extends into the densely populated western portion of downtown, these benefits are distributed across a large number of residents. The concept's contribution to overall network connectivity also improves access in other adjacent neighborhoods with lower access levels.

Ridership Potential

Much of the existing land use along the conceptual corridor is already transit supportive, with significant development continuing to occur in many of the areas, including both conceptual anchors (the West End and Brentwood Town Centre). The East 1st Ave portion of the corridor currently contains no direct service; however, the prospect of an east-west service better aligns with typical travel desire lines, such that there is potential to significantly draw new passengers and induce mode shift.

Network Design & Resilience

The concept takes advantage of strong existing anchors and direct routing. It may also contribute to increased network hierarchization. As well, it would complement and add resilience to existing and future east-west services:

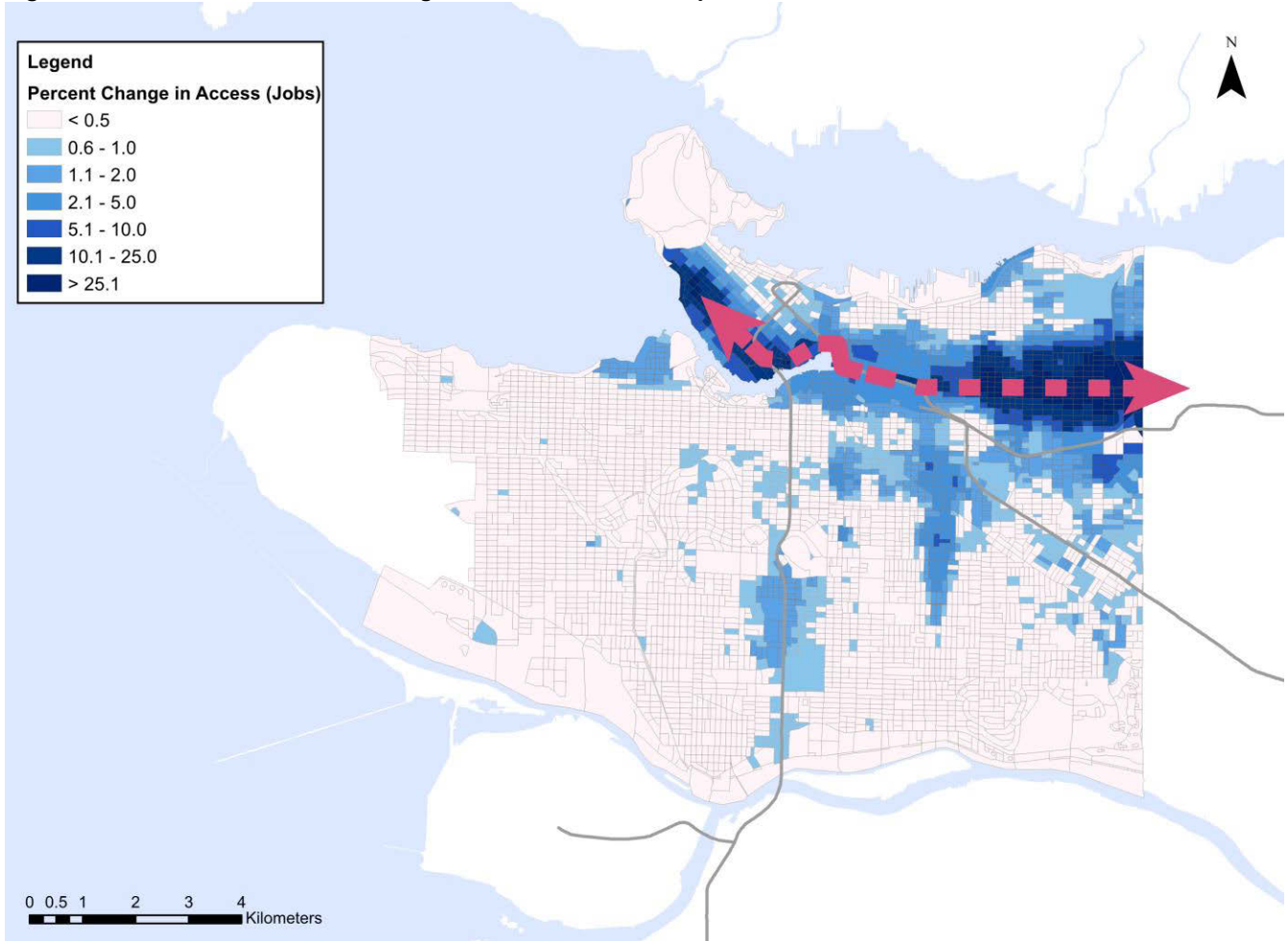
- Contribute toward alleviating capacity constraints on the most congested portion of the Expo Line and the Commercial – Broadway passenger interchange.
- A future *Hastings Street Corridor Rapid Transit* would likely require network modifications, which would impose a transfer on numerous existing customers. The introduction of strong service on the East 1st Avenue corridor would mitigate the future transfer need and strengthen the distributing/feeding role of north-south routes, as well as mitigate Hastings construction impacts.
- Provide the opportunity use the corridor as part of other potential network concept ideas such as *Victoria Drive Corridor Service Directness*.

Actuation

New sustainable funding sources such as *Transportation Pricing* will be required to implement this idea. In addition, the following actions may be required to work toward implementation:

- Provide initial conventional bus service at a minimum, with a mind toward ensuring this service provides a high quality of service from the onset.
- Regional collaboration and cross-jurisdictional partnerships including additional studies to determine project objectives, more exact alignments, and potential impacts to other street users.
- Explore use of existing linear right-of-way opportunities such as on portions of East 1st Avenue.
- Further study to determine how this network concept could fit in with an overall phasing strategy in light of complementary network concepts and Expo Line capacity constraints.

Figure 14: East 1st Avenue Corridor Higher Order Transit Concept & Access Effects



Victoria Drive Corridor Service Directness

Explore options to improve the directness of the planned B-Line route from the southern section of the corridor toward Downtown Vancouver as well as the level of service provided, including potential for higher order transit opportunities.

Motivation

Historical and Policy Context

The Mayor's Council 10-Year Vision Regional Investment Plan identifies a future B-Line service on the corridor which follows the alignment of the existing Route 20. The City's Transportation 2040 Plan identifies the corridor as a rapid transit priority.

Access and Access Equity

The southeastern portion of the City has comparatively low access to opportunities by transit. Improvements both in terms of the level of service provided and route directness to downtown are anticipated to improve the area's accessibility.

Ridership Potential

The existing route ridership in the corridor is the highest of all predominantly north-south bus corridors in the City. The majority of Commercial Drive and portions of Victoria Drive are characterized by active commercial frontages mixed with midlevel density. With the inclusion of a few key transit connectivity nodes, this means that the corridor as a whole contributes to high ridership, as opposed to a few singular nodes of density.

Network Design & Resilience

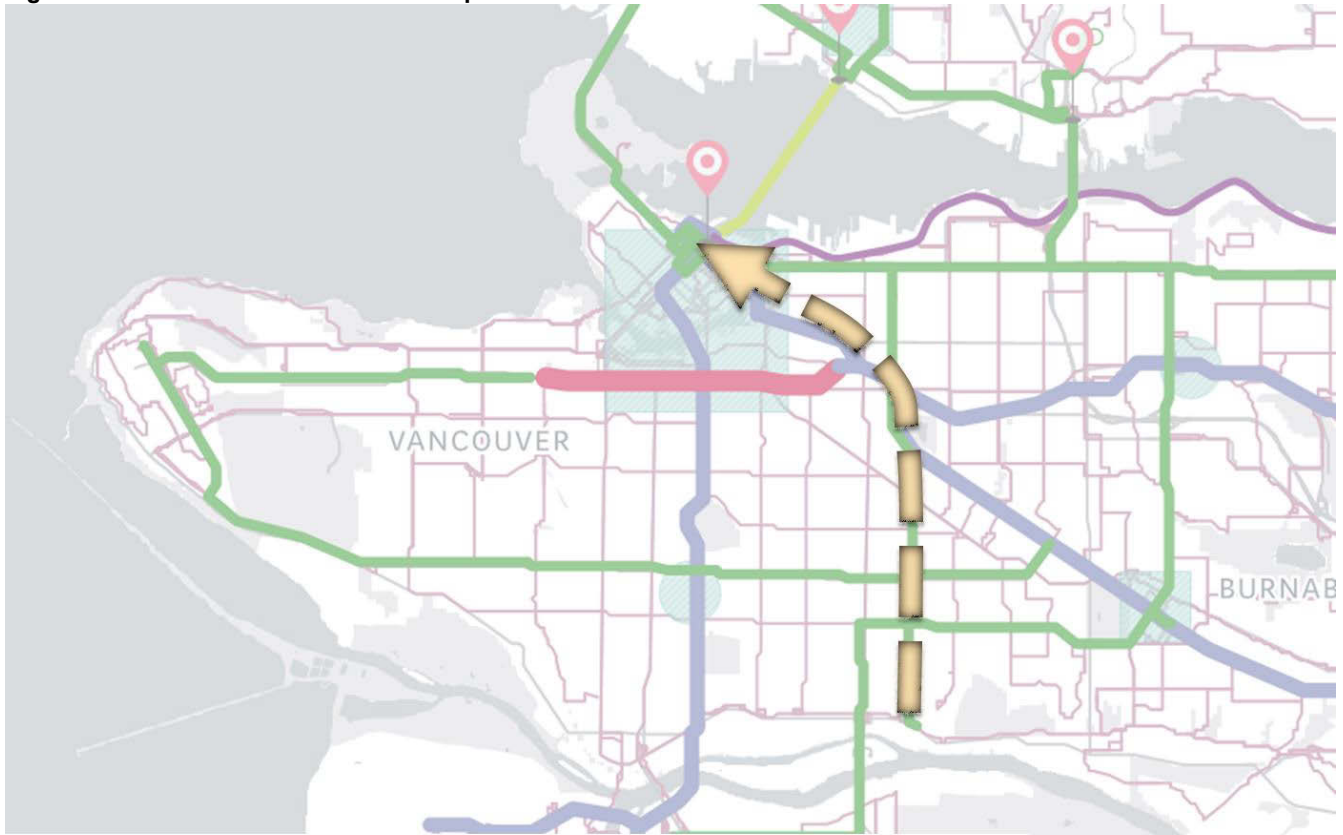
Given the existing ridership assessment noted above, a limited stop B-Line / Rapid Bus type service may have limited positive contribution to the network as a whole; a limited stop service may be more applicable in the southern portion of the corridor (Victoria Drive), particularly if the route were made more direct to downtown. The concept could also include exploration of measures to contribute toward reducing the considerable reliability issues that propagate along the existing Route 20.

Actuation

The funding currently established in the investment plan could be directed toward this modified network concept. Below are additional considerations:

- Further study and interagency collaboration to determine level of service required, opportunities for increased transit priority, and impacts to the existing Route 20 were it to be truncated to facilitate a more direct Victoria Drive to Downtown service.
- Explore improvements to route directness that leverage physical interlining opportunities with network concept ideas including *East 1st Avenue Corridor Higher Order Transit* or *Kingsway Higher Order Transit*.
- The network concept should also consider routing options through the False Creek Flats arterial to provide more service to the future St. Paul's Hospital and Northeast False Creek.

Figure 15: Victoria Drive Corridor Conceptual Service Directness



MAP OF 10-YEAR INVESTMENTS

Specific investments identified for implementation in the first decade of this Vision

Downtown Streetcar Network

Advance a Downtown-False Creek-Arbutus streetcar service including development of a business case that considers phasing alternatives and integration with the broader transit network and/or higher order transit corridor opportunities.

Motivation

Historical and Policy Context

The City has been studying and exploring opportunities to implement a modern streetcar network since the mid-1990s through various plans and studies. City Council endorsed the network in 2006, and various community and strategic plans, including Transportation 2040 provide policy direction to work towards the Downtown Streetcar Network.

Access and Access Equity

A primary objective of this network concept is to provide access to regionally significant cultural and leisure destinations for tourists and residents alike. To the extent that the concept provides increased connectivity to the existing and future rapid transit network, it will provide considerable increased access to these types of destinations. As well, it will also contribute to increased access to opportunities for residents living around False Creek, which continues to see population growth.

Ridership Potential

Analysis using the RTM indicates the potential for significant utilization of the conceptual service⁴. Owing to its function for serving cultural and leisure destinations, the service will attract considerable tourist use as well as local access trips. As well, it will support and be supported by existing and future neighbourhood development.

Network Design & Resilience

The proposed network adds connectivity between existing and future rapid transit lines, which will provide more route options while strengthening network hierarchy. Portions of the network corridors have been preserved for dedicated right of way to ensure enduring reliable service. The technology also provides a perception of permanency and quality of service enhancement, given smoother rides and easier onboard passenger circulation. There is considerable opportunity to achieve green infrastructure co-benefits through the use of green/grass tracks.

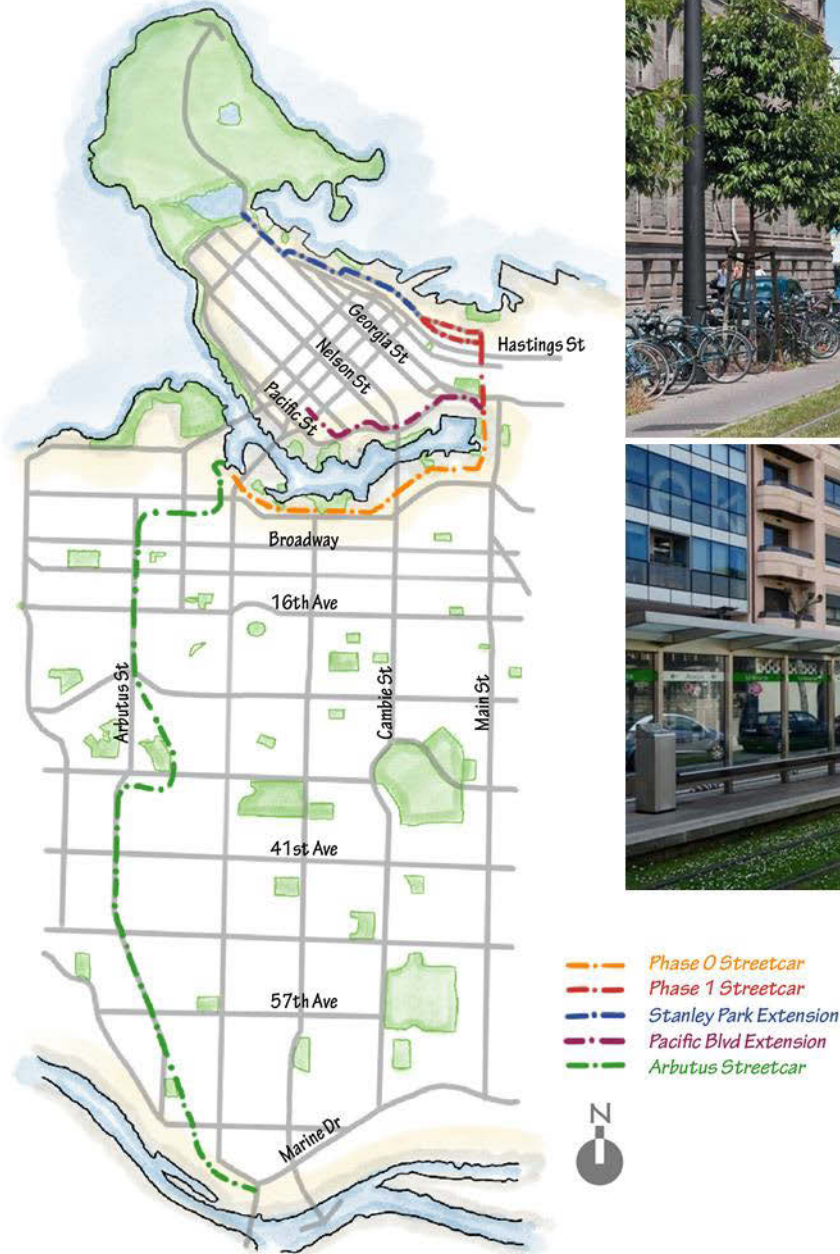
Actuation

The Downtown Streetcar Network is anticipated to provide an additional revenue stream from tourists who are otherwise making vehicle trips, such that it may significantly contribute toward implementing this idea. Alternatively, as per many of the concepts, new sustainable funding sources such as *Transportation Pricing* will need to be in place. In addition, the following actions may be required to work toward implementation:

- Establish project objectives and the network concept's broader role within the existing and future transit network, including phasing opportunities and integration with other higher order transit corridor concepts.
- Work with TransLink on a business case for network integration opportunities.
- Continue to preserve rights of way; explore and consider other methods of ensuring significant transit priority.
- Ensure ongoing street design activities, including the Granville Bridge Connector project, retain future ability to provide streetcar implementation.

⁴ Modelling work for this concept did not include the portion of Arbutus south of Broadway.

Figure 16: Downtown Streetcar Network Concept



REGIONAL/SUB-REGIONAL NETWORK CONCEPTS

Central Waterfront Hub

Create a world-class transportation interchange and dynamic new downtown extension to the Central Waterfront on the South Shore of Burrard Inlet to improve passenger and freight movements.

Motivation

Historical and Policy Context

In 2009, the City of Vancouver Council adopted the Central Waterfront Hub Framework policy. More recently, the City and the Vancouver Fraser Port Authority have developed a new partnership with an expanded study area. The ongoing work will identify updated goals and opportunities for a collaborated long-term vision for a transportation hub.

Access and Access Equity

Downtown Vancouver contains the highest number of jobs in the province. Recently, job growth in the CBD has surpassed projections. Developing a resilient transportation interchange that meets the long-term needs of the area is critical for supporting the wide spectrum of job opportunities that exist within the Downtown and Metropolitan Core. As well, thousands of people travel through the transit hub to access opportunities elsewhere in the Region.

Ridership Potential

The idea represents an important opportunity for additional transit connections, including several of the network concepts ideas in this submission; higher order & rapid transit, regional rail, high speed rail, expanded ferry services, and improved bus accessibility. Already tens of thousands of people travel through the station every day. With the introduction of more service to the Expo Line, Canada Line and the SeaBus in 2019 and 2020, these numbers will only increase. Ridership on the WCE is also growing. This idea would build upon the existing ridership success story within the Region and be a catalyst for increased accessibility to frequent and reliable transit services for residents and visitors alike.

Network Design & Resilience

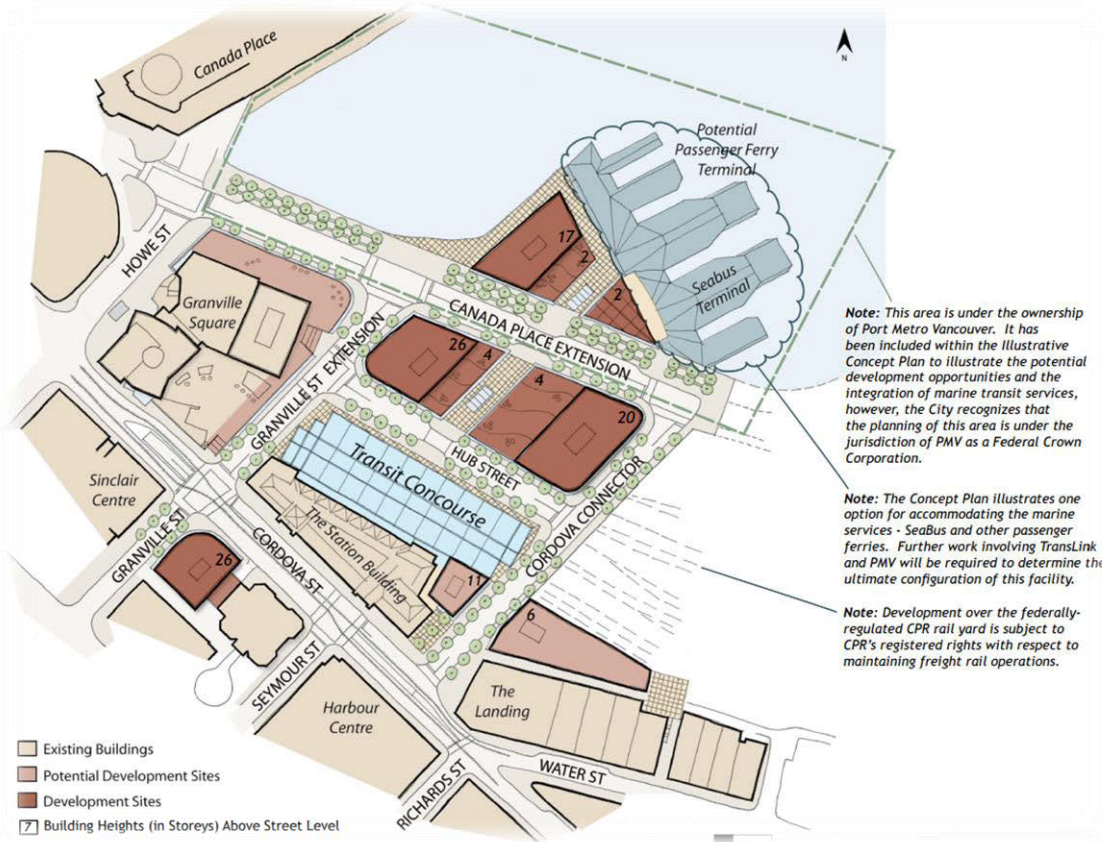
The convergence of multiple high capacity routes into one location supports effective passenger exchange and connectivity. This also places a large amount of pressure on one facility to perform efficiently and remain operational at all times. Having developed incrementally over several decades, the existing transportation infrastructure does not provide a fully integrated facility. It currently becomes congested at peak times and lacks many facilities and amenities required for a high quality transit experience.

This idea would ensure that inefficiencies within the existing station will not limit the potential to grow the capacity of existing lines or provide new connections to evolve the transit network, particularly passenger rail concepts ranging from additional commuter rail services to high speed rail corridors. As well, it would address existing technical challenges including rail operations, site servicing, and potential dangerous good issues within the rail yard.

Actuation

The 2009 Central Waterfront Hub Framework was critical for testing the feasibility of several key technical challenges associated with the station. Although the costs for such a project will be significant, the potential benefits of investing in this location are vast. The City of Vancouver and the Vancouver Fraser Port Authority will continue to work towards an alignment on the opportunities and development objectives for the area; however, additional leadership from TransLink will be critical for advancing several key transit concepts. Completing this exploration exercise in lockstep with the development of Transport 2050 is an important strategic initiative that will help to clarify integration with network concepts, costs, development requirements, and funding partnerships.

Figure 17: Central Waterfront Hub Concept



2009 Central Waterfront Hub Framework Policy Concept



Granville Island Vertical Access

Provide a direct vertically oriented connection between the Granville Street Bridge and Granville Island using an integrated elevator set and staircase.

Motivation

Historical and Policy Context

The general idea has been brought forward in the past through various conceptual renderings and architectural visioning (2002, 2012). The Granville Island 2040 Vision (2017) advanced this idea, and regards the connection as vital to the continued success of the Island, given the concept's significant access benefits. The City recently completed a feasibility study which concluded the project to be technically feasible, and which provided further detail on anticipated benefits and costs.

Access and Access Equity

Granville Island is a regionally significant cultural landmark and destination. Access is currently limited and relies heavily on vehicular access, particularly by residents that live in less proximate areas of the region. By leveraging the highly frequent transit which exists on the bridge, the vertical connection would improve access such that 200,000 and 500,000 additional residents would be within a 30 and 60 minute transit travel time respectively, as visualized in *Figure 18* below.

Ridership Potential

Analysis indicates that the vertical connection has the potential to generate significant usership, such that the connection itself would place among the top 25 bus routes in the Region. The idea would also leverage complementary regional (Broadway Subway) and municipal (Granville Bridge Connector) capital investments, further promoting usership and encouraging sustainable travel including significant net new transit trips. It would also further benefit from higher order transit such as a streetcar connection on Granville Bridge in future plans or in relation to the *Western Corridor Rapid Transit* idea.

Network Design & Resilience

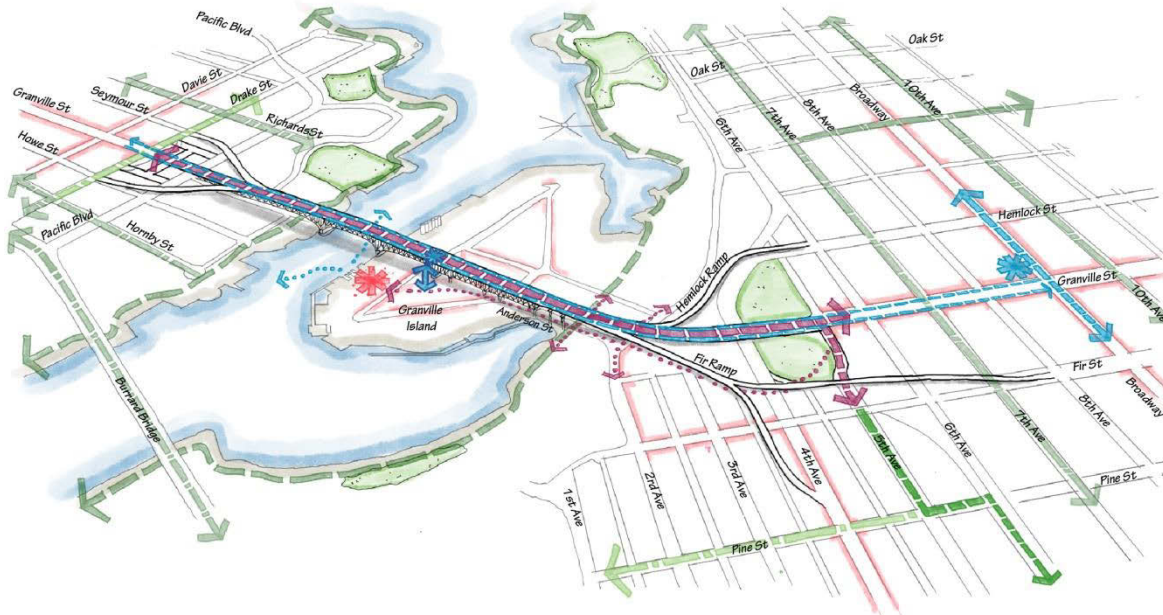
A new transit stop to service the elevator would align with existing stop spacing guidelines, and improve the balance between access and mobility while fully retaining existing route directness. As well, the idea would contribute to showcasing a recalibrated *Major Road Network Definition*, as it would become a centerpiece of the City's multimodal Granville Bridge Connector capital project. As the elevators would be powered by electricity, this idea aligns with a transition to a low carbon fleet.

Actuation

At this stage, studies have concluded the idea to be technically feasible, and associated with considerable benefits. Orders of magnitude costs have also been determined. To advance the idea further, the following actions across multiple agencies (TransLink, CoV, CMHC) should be considered:

- Development of a business case and additional detailed design and analyses including geotechnical study, preferred landing location, bus operations, and design integration into the Granville Bridge Connector.
- Identification of funding sources with the potential for multiple agencies to contribute, including new sources such as transportation pricing, private sector contributions, fare revenue, or revenue generated from area parking charges.
- Establishment of project governance, including potential ownership, operational and maintenance responsibilities, and private sector interest.

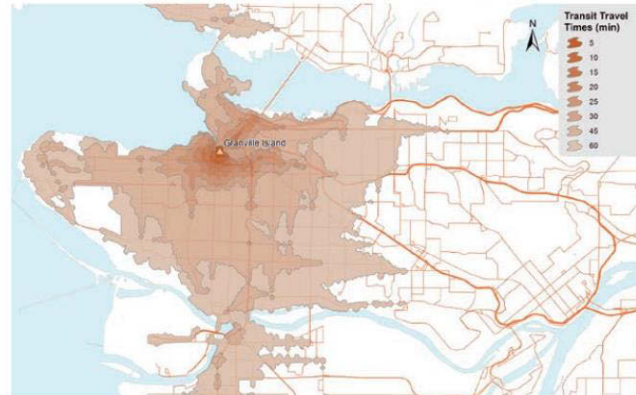
Figure 18: Granville Island Vertical Access Network Integration & Access Effects



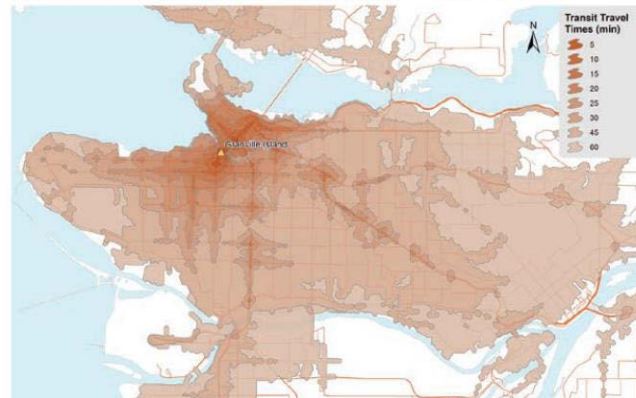
Brisbane Howard Smith Wharves Elevator



Area accessible to Granville Island by transit, by time – Existing conditions



Area accessible to Granville Island by transit, by time – With Elevator



Local Network Concepts

Explore a suite of local scale network concepts which could become new routes, or modify / extend existing routes to fill network gaps or intensify service. These concepts are likely to be best served by conventional bus technologies (midi, standard, or articulated), and are summarized in the following table:

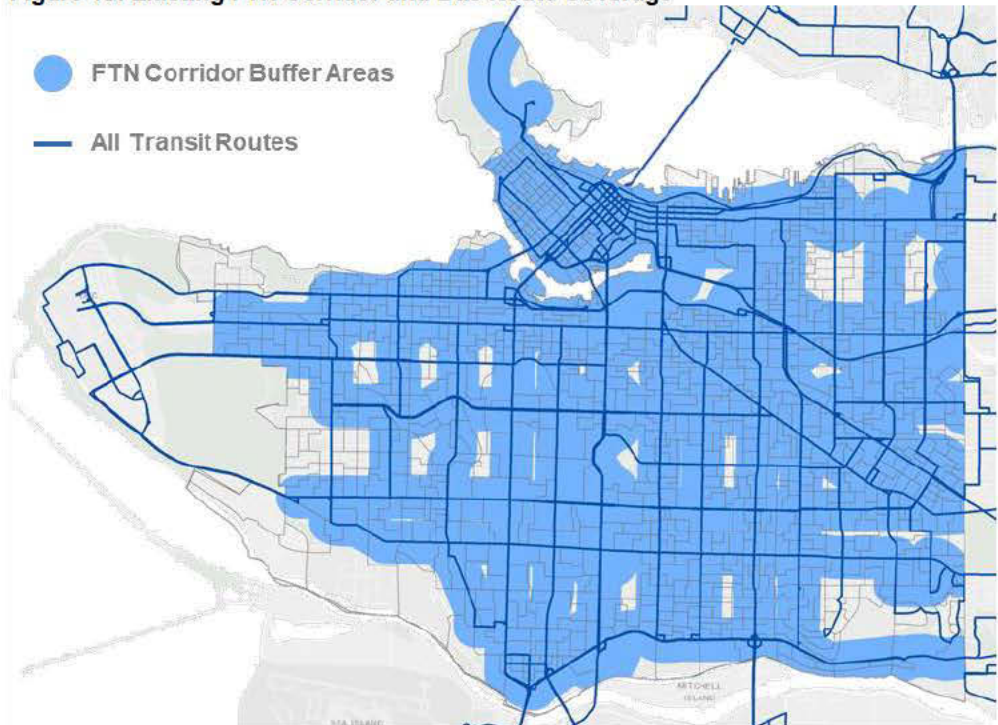
Table 3: Summary of Local Scale Network Concepts

New Route Introductions	Route Intensification
<ul style="list-style-type: none"> ▪ Boundary Road ▪ Further service introduction in southeast Vancouver / south Burnaby⁵ ▪ 33rd Ave west of Cambie St ▪ 57th/54th Ave ▪ Stanley Park Service 	<ul style="list-style-type: none"> ▪ Fraser St ▪ Nanaimo St ▪ 4th Ave ▪ King Edward Ave ▪ 49th Ave ▪ 33rd Ave east of Cambie St

Motivation

The Frequent Transit Network currently covers over 90% of city residents; however, some gaps remain in FTN and bus route coverage, as shown in Figure 19. As well, coverage is a means to an end. A higher level of service frequency or other enhancements are required in tandem with increased coverage to ensure access to opportunities is measurably increased.

Figure 19: Existing FTN Corridor and Bus Route Coverage



Actuation

It is assumed that these ideas would be further studied within the 2022/2023 Vancouver UBC Transportation Area Plan (as per the 2018 MLBE Project Supportive Polices Agreement), and will benefit from high-level direction set forth in the completed Transport 2050 plan, including ideas such as that to *Frequent Transit Network Intensification*. As well, on some corridors ongoing or additional study (such as through the Bus Speed & Reliability Program) may lead toward a need to introduce more bus priority measures or other route enhancements.

⁵ With guidance from the recently completed East Fraser Lands Transit Study (2019)

Policies and Programs

The ideas for consideration in this section focus on new policies, programs, guidelines, or other ideas with currently undefined geography. These are broadly classified as per the table:

Table 4: Summary of Policy and Programmatic Ideas

	Idea	Brief Description
System Management	<i>Transportation Pricing</i>	Appropriately price transportation in a Metro Core focused area as a first phase testbed.
	<i>Major Road Network Definition</i>	Clarify the network functionality and carrying capacity definition of the existing and prospective Major Road Network
	<i>Regional Vision Zero Statement</i>	Regional Vision Zero policy statement and framework, and work cross-jurisdictionally to work toward the adopted goals.
	<i>Urban Freight Evolution</i>	Sub-ideas that are intended to contribute toward evolving the region's good movement and urban freight systems.
	<i>Funding Expansion of Regional Cost Share Programs</i>	Expand the level of funds available for regional cost share programs for walking, cycling and transit.
	<i>Active Transportation Connections</i>	Provide key regional serving, AAA active transportation connections between the City and adjacent municipalities.
	<i>Water-based Transit System Exploration</i>	Leverage the region's unencumbered waterways to explore more direct connectivity between sub-regions.
Increase Service Levels	<i>Frequent Transit Network Intensification</i>	Intensify and redefine the FTN to a clock-face headway which improves upon the current 15 minute definition.
	<i>Overcrowding Guidelines Modification</i>	Modify the overcrowding guidelines by allocating a larger available space per person.
	<i>Headway Based Operations</i>	Operate and use holding strategies on higher frequency routes based on adherence to a desired headway.
	<i>All-door Boarding Policy on All Routes</i>	Allow bus boardings through all doors on all suitable routes during appropriate time periods.
Fares & Affordability	<i>Fare Capping</i>	Provide a cap on pay-as-you-go fares that align or supersede flat rates offered on time-dependent pre-paid passes (daily, monthly).
	<i>Low Income Passes</i>	Expand the BC Bus Pass Program or otherwise provide concession fares to low-income residents of any age.
	<i>Group / Family Passes</i>	Add a new fare product that facilitates and encourages group travel on the transit system by providing discounts.
	<i>U-Pass Extension to Secondary Schools</i>	Extend the U-Pass BC Program to public secondary school students in lieu of a more broadly applicable low income pass.
Technology, Data & Modelling	<i>Electric Bus Implementation & Prioritization</i>	Work toward a fully electrified bus fleet over time and prioritize regional areas of higher density and routes with greater ridership
	<i>Access to Opportunities Model</i>	Develop a comprehensive, multimodal Access to Opportunities model to measure the true nature of why residents travel
	<i>New Mobility</i>	Sub-ideas that are intended to utilize emerging mobility technologies to contribute toward a zero carbon, multimodal future
	<i>Bus Lane Automatic Camera Enforcement</i>	Mount buses with cameras for automatic enforcement of bus lanes, bus zones, and other applicable transit facilities.
Land Use Integration	<i>Downtown Vancouver Off-Street Bus Layover</i>	Identify potential locations and work toward the implementation of a Downtown Vancouver off-street bus layover facility.
	<i>Mobility Hubs & Bike Mobility Centres</i>	Develop policy and delivery mechanisms for the creation of strategically located hubs, core to multi-modal neighbourhoods.
	<i>Frequent Transit Development Areas Enhancement</i>	Sub-ideas that are intended to build on the success of the FTDA strategy and enhance their profile and function.

Transportation Pricing

Continue to advance opportunities to explore appropriately pricing transportation in a Metro Core focused area as a first phase testbed for eventual expansion of equitable pricing of all our transportation choices to the broader region.

Motivation

Some form of transportation pricing in the region has been discussed as far back as the 1973 Transportation for a Livable Region report. The report noted the use of pricing (fares and fees) as a means to capture user benefits associated with expanded transit opportunities⁶. Transport 2021 (1993) noted the use of road pricing as a TDM measure, to signal to users their imposed costs on the system, and as a means to raise revenue for transportation improvements. The City's Transportation 2040 Plan and its predecessor, the 1997 Transportation Plan, also express a need for pricing.

In reality, transportation pricing has existed in crude form since taxes were added to motor fuels. This tax revenue is currently a vital source of transit and transportation service funding. As the Region moves toward adoption of electric vehicle technology in response to various climate emergency declarations and senior government incentives, the gas tax revenue source will contract. It will be crucial to ensure a stable alternative is in place to pre-empt what will be a large funding gap

Recently, work by the Mobility Pricing Independent Commission restated the multifaceted need for more comprehensive pricing. The MPIC's work explored multiple scenarios and ultimately advanced two region-wide concepts. It also found the following⁷:

- That a CBD (downtown Vancouver and Central Broadway) only scenario would have the best revenue collection efficiency, given the lowest implementation costs.
- That although a CBD only concept would not reduce congestion regionally, it would alleviate one of the main hotspots (downtown), potentially demonstrating strong alignment between the level of charges and the time saved and reliability benefits for downtown oriented trips.
- Jurisdictions that have previously implemented decongestion charging/mobility pricing have instituted cordon based systems.

As well, the MPIC work largely based its assessment on the Marginal Social Cost of congestion, which accounted for vehicular travel time related negative impacts only. In reality, the social cost of additional vehicle kilometers travelled (vkts) and associated congestion also includes negative externalities such as local and global pollutants, noise emissions, collisions, travel time impacts to other non-vehicular street users, opportunity cost of space, etc. In dense urban areas such as the Metropolitan Core, these additional costs are considerable. With respect to global GHG emissions, the City's Climate Emergency Response further recognizes the negative aspects of vkts; and the response specifically calls for a City focused transportation pricing review.

As such, this idea repositions the CBD/Metro Core as the Region's preeminent opportunity for a first phase comprehensive Transportation Pricing strategy, for which implementation would be led by the City. While any CBD/Metro Core transportation pricing is regional in nature and is understood to require new legislation from the Province and support from other agencies, it is proposed that the City take the early leadership. This would include using some of the revenue to invest in its own Climate Emergency Response actions and public space goals, and to demonstrate to the broader public across the region that equitable pricing enables greater mobility and access options, improved climate outcomes, and an overall healthier place to move around and enjoy. TransLink, with continued partnerships and City support, could then lead the expansion of transportation pricing to a broader area over time.

⁶ The report called this a "wheelage tax", and one that could be applied in addition to gas tax and in specific locations

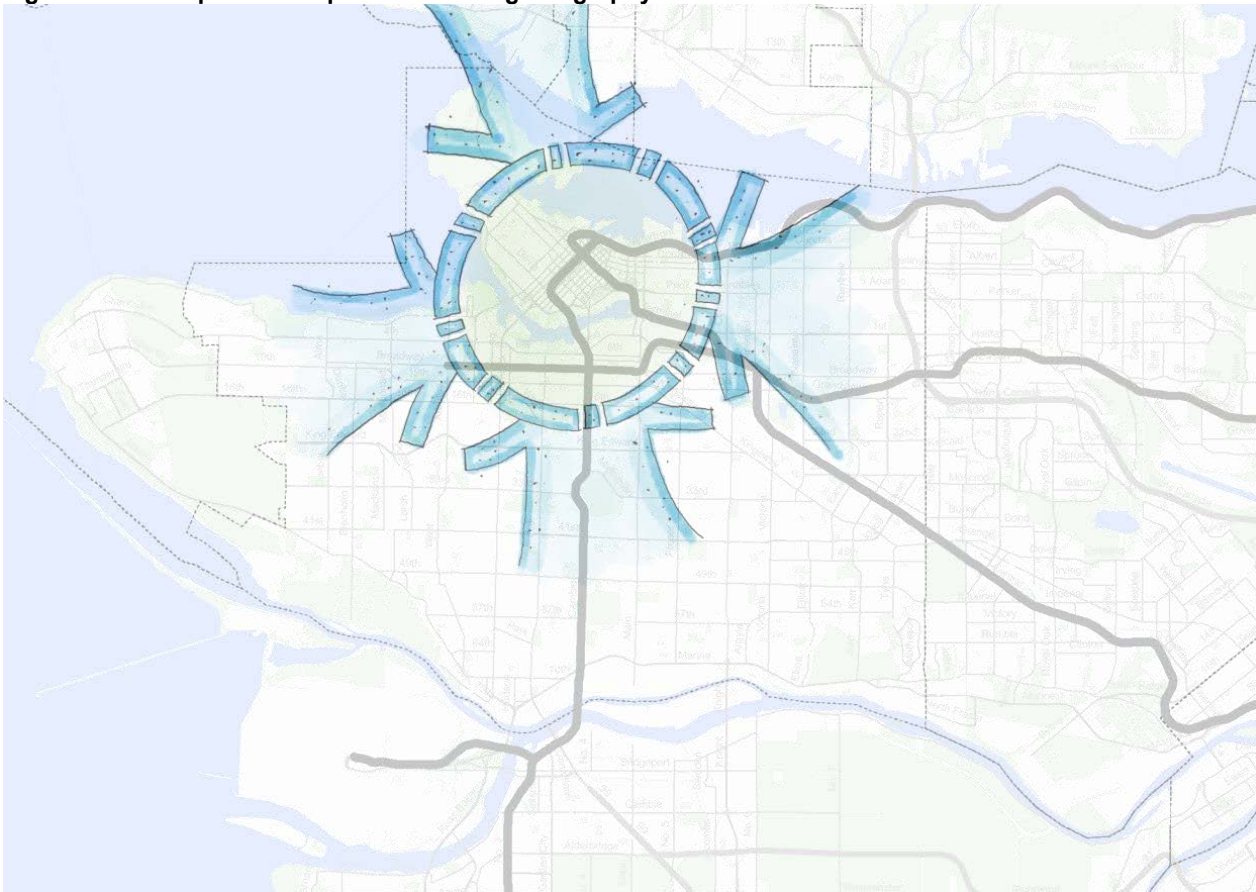
⁷ MPIC 2018, Metro Vancouver Mobility Pricing Study

Actuation

Exploration and implementation of this idea will take concerted regional and cross-jurisdictional support, in particular with TransLink, the Province, and the North Shore municipalities. There are numerous complexities and challenges which will need to be addressed. The following provides a non-exhaustive list of additional considerations:

- Contextualize the MPIC principles and clarify the regional and municipal objectives of the Transportation Pricing strategy.
- Address potential equity issues, highlighting the current inequities of the status quo approach, while identifying opportunities to mitigate impacts. The strategy offers potential to intrinsically provide vertical equity, but will also need to address and mitigate negative impacts where possible.
- Identify a benefits strategy, such that there is mutual city, regional, and public understanding of the revenue flow and reinvestment into sustainable transportation and reduced cost burdens for those most in need (see idea *Fare Capping, Low Income Passes*)
- Explore opportunities to align the strategy with low or zero emissions zones and/or provide exemptions while maintaining an equity lens.
- Explore and or integrate complementary strategies such as curb-side pricing.
- Work with the region and adjacent municipalities, particularly the North Shore to ensure strategies to mitigate potential additional traffic on the Ironworkers Memorial Bridge.
- Explore pricing as a tool to incentivize zero emission and neighbourhood scale urban freight.

Figure 20: Conceptual Transportation Pricing Geography



Major Road Network Definition

Clarify the network functionality and carrying capacity definition of the existing and prospective Major Road Network, such that reallocation of vehicular space toward other modes is generally understood to increase (not decrease) people moving capacity and that these multimodal improvements are required to achieve regional objectives.

Motivation

The existing legislative act (SCBCTA) which governs the MRN states that municipalities must not reduce the capacity, as defined by the amount of persons which are able to travel on the road, when taking any actions or making alterations to MRN segments. Taken literally, this would suggest that actions which reallocate vehicular travel lanes toward space for pedestrians, bicyclists, or transit users, align with the definition and funding parameters. In practise however, reallocation of vehicular capacity towards walking, cycling or transit has been met with uncertainty about whether they could remain as part of the MRN network and have resulted in a loss of funding, based on a loss of vehicle lane-km, despite an increase in people movement capacity.

The redesign of streets to provide safe and efficient movement of bus passengers, bicyclists and pedestrians is and will continue to be required to achieve improved transportation system resilience, equity of space allocation and funding levels, and climate change objectives. Existing funding and future MRN expansion funding should be allocated to explicitly support these objectives.

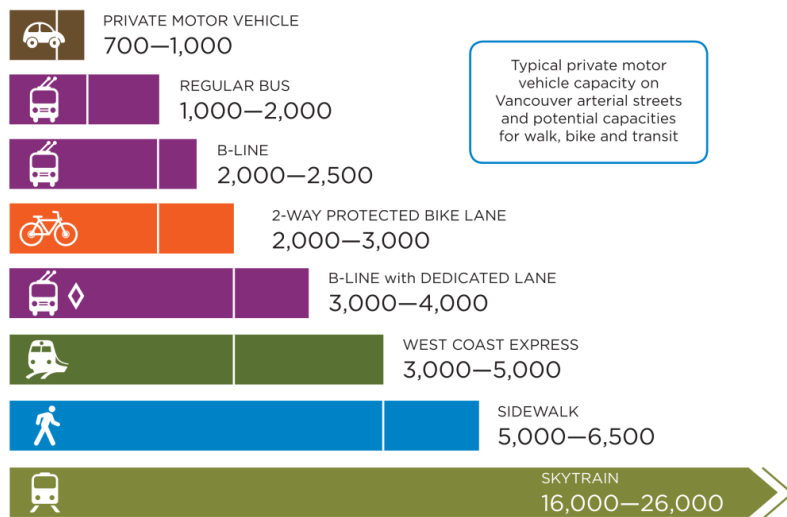


Figure 21: People-Moving Capacity (pphpd – 3 metre width)

Actuation

It is likely that this idea and the understanding of how the MRN contributes to people moving capacity would require a phased approach. This would allow all regional partners to recognize that some MRN corridors will be focused on moving vehicles for many years, but over time could thoughtfully and meaningfully reallocate road space toward sustainable, efficient modes. This idea is a first step towards this evolution, and would additionally require the following actions for consideration:

- Revise the SCBCTA, if required, and to further enshrine the multimodal needs of the MRN by way of people moving capacity definitions.
- Rename the Major Road Network to Major Street Network to indicate multimodality and the multipurpose nature of urban roadways.
- Explore opportunities to prioritize goods movement as part of the multimodal character of streets, including managed goods movement lanes.

Regional Vision Zero Statement

Lead the development of a Regional Vision Zero policy statement and framework, and work cross-jurisdictionally with ICBC and enforcement agencies to work toward the adopted goals.

Motivation

The number of casualty collisions continues to rise in the Lower Mainland⁸. The Vision Zero approach to safety on streets recognizes that human error is an unavoidable aspect of reality in today's transportation systems, where even the most experienced vehicle drivers can cause serious collisions resulting in injury and death.

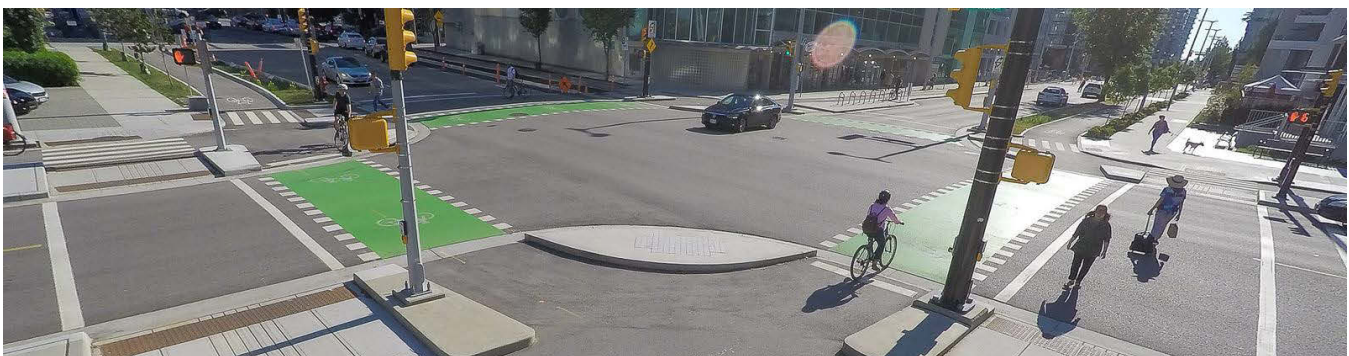
Multiple jurisdictions and agencies around the world have released Vision Zero Policy Statements and associated plans to reduce or eliminate casualties. Closer to Metro Vancouver, Vision Zero efforts have been expressed by the Federal and BC Provincial Government, as well as several municipalities including the City of Vancouver, and the City of Surrey.

As the Regional Transportation Authority that delivers transit service and provides funding toward all modes, there is a significant role for TransLink to play in contributing toward a Vision Zero goal.

Actuation

The following actions should be considered to advance the idea:

- Provide leadership to promote Vision Zero adoption across additional regional municipalities and other applicable agencies, and unify these policies where reasonable.
- Advocate for provincial legislative changes to enable municipal control over blanket speed limits for municipal streets.
- Further link the evaluation criteria, performance, and designs of MRN roadways to a Vision Zero framework.
- Leverage current ridership success to highlight the connection between higher transit use and a safer transportation system⁹, including the corridor level safety effects of bus priority¹⁰.
- Leverage localized municipal success to highlight the connection between increased multimodality and transportation system safety.
- Connect this idea with the idea to *Funding Expansion of Regional Cost Share Programs*, such that the Regional Vision Zero Statement can be shown to translate directly to actions, i.e., projects that increase systemic safety by increasing sustainable mode shares or addressing known real and perceived design-related safety issues are given an extra layer of priority.



⁸ <https://www.icbc.com/about-icbc/newsroom/Documents/crashes-casualty-crashes.pdf>. This includes the Fraser Valley.

⁹ APTA 2018, Public Transit is Key Strategy in Advancing Vision Zero, Eliminating Traffic Fatalities.

¹⁰ Goh et al (2013). Road Safety Benefits from Bus Priority: An Empirical Study. Transportation Research Record, 2352(1), 41–49. <https://doi.org/10.3141/2352-05>

Urban Freight Evolution

This idea is a collection of sub-ideas that are intended to contribute toward evolving the region’s good movement and urban freight systems.

<i>Sub-idea</i>	<i>Motivation</i>	<i>Actuation</i>
Finalize the targets set forth in the Regional Goods Movement Strategy	This will give the Region something more definitive to work toward in the realm of goods movement	Restate the need through the RTS and align these targets with other emerging targets and ideas including <i>Transportation Pricing</i>
Reaffirm the long-term need and role of the Port to deliver goods and support our economy	The Port plays a major role in supporting the regional, provincial, and national economy	Ensure that the RTS provides language to that effect, and that network concepts or other ideas align with the needs of the Port and supporting railway infrastructure, and its integration in urban environments
Explore managed lanes that provide priority and reliable travel for commercial vehicles	As our streets become more congested, there is increasing need to prioritize commercial activity directly over private vehicles in applicable areas, similar to what the Port of Vancouver has already done in Vancouver on the South Shore of the Inlet	Explore opportunities to provide and pair with other modes where applicable, and consider in view of <i>Transportation Pricing</i> opportunities
Support and/or pilot Zero Emission Freight	The movement of freight on streets contributes significantly to local air quality issues, GHG emissions and noise levels	Review current state of practise and innovation; build capacity; explore existing technologies such as underutilized rail; and explore infrastructure needs for a regional and inter-regional network of zero emissions freight
Pilot equitable pricing tools directly for urban freight	Goods movement partners understand well the value of limited road space and the cumulative costs of increased congestion	Utilize zero emission areas or other opportunities to manage time of day, vehicle, fuel type, etc., to build capacity for broader application in a <i>Transportation Pricing</i> concept
Develop New Westminster Rail, Second Narrows Bridge Rail replacement strategy	These and other rail bridges may be nearing the end of their lifecycle, and replacement should incorporate exploration of multimodal opportunities and passenger rail needs	Align with regional rail needs where applicable and engage potential partners early on, including high speed rail concepts to the Metro Core
Regional leadership and guidance to “right-size” urban freight	Streets are often designed around large design vehicles (e.g. WB-19 or similar semi-trailers). A unified approach is required, such that there is a broader incentive for industry to modify/diversify fleet sizes to match the urban context and create safer streets	Consider providing design guidelines, strategies and supportive policy direction, as well working with industry stakeholders in concert with municipal partners to work toward this objective
Provide regional urban freight data collection mechanism	Better data will be foundational for informing curbside management, and guiding policy and planning processes in light of emerging urban delivery trends, carbon targets and increasing street and curb space competition	Work with industry and partners to establish data collection and sharing standards that can be accessed by TransLink and municipalities

Funding Expansion of Regional Cost Share Programs

Expand the level of funds available for regional cost share programs for walking, cycling and transit (i.e. Bicycle Infrastructure Capital Cost-Share (BICCS), Walking Infrastructure to Transit (WITT), Major Road Network and Biking Minor Capital Program (MRNB), and Bus Speed and Reliability (BSR)).

Motivation

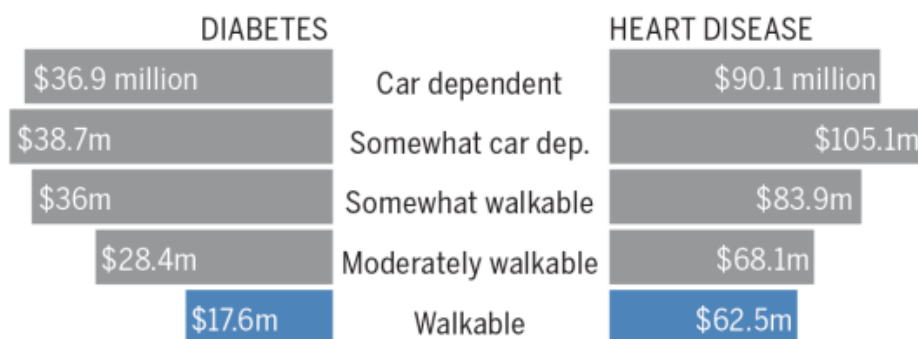
The region must continue to increase the share of travel by all sustainable modes of transportation to meet regional objectives. Since their creation, these programs have been highly oversubscribed and continue to be highly demanded, indicating early success. Expansion of these programs is necessary and will continue to require regional leadership to promote more high-quality and safe infrastructure that is connected and continuous across all communities. An assessment of the current rate of oversubscription suggests that funding for BICCS & WITT would need to increase by 50% per annum to place BICCS & WITT on par with BSR and its committed growth (243% from 2019 to 2022). This would represent a baseline increase, and ideally higher funding targets should be aspired to.

Actuation

The following actions should be considered to implement this idea:

- Work with other Regional and Provincial partners including health authorities to link benefits of active and sustainable travel to health outcomes (Figure 22) and explore opportunities to capitalize on the associated monetary benefits.
- Draw on new funding sources such as *Transportation Pricing* to increase the available program funds.
- Consider additional dedicated funding programs or program add-ons, (or refinement of the OMR guidelines), such that these also contribute toward ongoing maintenance & operations of WITT, BICCS and BSR infrastructure
- Review the conceptual Major Bike Network with municipal partners, including revisiting the goals and objectives of the network, spacing and density of routes, and continue to align cost share programs.
- Consider additional funding for programs that are specifically oriented toward and prioritize the funding of regional connections, mainly via new or enhanced structures (see idea *Active Transportation Connections*).
- Link to the idea of a *Regional Vision Zero Statement* to elevate the need to expand funding toward these programs.

Figure 22: Annual Health Care Costs in Metro Vancouver by Neighbourhood Type



SOURCE: UBC SCHOOL OF POPULATION AND PUBLIC HEALTH

Active Transportation Connections

Provide key regional serving, All Ages & Abilities (AAA) active transportation connections between the City and adjacent municipalities that seamlessly link established regional active routes and enhance regional connectivity between municipal boundaries, and continue to work with municipalities to define principles of the major bike network and other regionally serving facilities.

Motivation

Active transportation will play a critical role in meeting regional mode share targets. However, significant work remains to be done to provide a seamless, safe and comfortable AAA regional network between municipalities. Particularly, there are gaps in active transportation connections crossing municipal boundaries. Moreover, the quality of connections and facilities between different municipalities is uneven and inconsistent, hindering usability and legibility. This idea identifies priority regional connections (see *Figure 23*) to better link the City of Vancouver’s established regionally oriented active routes with adjacent municipalities with the aim to enhance them to AAA standard.

Main Network Role	Connection Idea	Motivation
North-South Regional Commuter Connections	Fraser River Structural Connections and Enhancements	Provide a safe AAA connection over all existing/future Fraser River Bridges to connect to destinations within City of Richmond, YVR Airport, City of Delta & Ferry Terminal
	2 nd Narrows Bridge	Complete the planned AAA connection on both sides
	Lions Gate Causeway	Complete the causeway AAA connection over the “S” curve to connect to Georgia Gateway
East-West Regional Commuter Connections	Connections to UBC/Burnaby/New West leveraging existing greenway routes	Provide direct connections from existing routes to UBC and Burnaby/New West; enhance existing facilities to AAA
Regional Recreational Connections	Regional Greenway Trail along Fraser River	Provide a scenic regional trail along the Fraser River that connects UBC to Vancouver, Burnaby and New West
	YVR	Complete a new active transportation bridge just west of Arthur Laing connecting YVR land and Richmond bike routes with the Arbutus Greenway and Fraser River Trail
	Regional Greenway Trail along Vancouver Harbour/Burrard Inlet	Provide a scenic regional trail along the Vancouver Harbour/Burrard Inlet that connects UBC to Vancouver, Burnaby, Port Moody and Coquitlam
	Central Valley Greenway enhancement	Work toward providing a more continuous connection over the BI rail line in the False Creek Flats area

Actuation

TransLink should play a leadership role to refine the Major Bike Network concept against principles defined in concert with local municipalities, such that the MBN network density better aligns with density of regional destinations and land use. As well, the following should be considered:

- Coordinate implementation of connections (as shown here) and facilities with local municipalities and MoTI.
- Expand levels of funding toward these connections and others, in line with the idea to *Funding Expansion of Regional Cost Share Programs*.

Figure 23: Indicative Active Transportation Connections and Regional Serving Routes



Water-based Transit System Exploration

Leverage the region's unencumbered waterways to explore more direct connectivity between sub-regions, growing water-adjacent neighbourhoods, and popular attractions, including the Burrard Inlet, Fraser River, and Georgia Strait.

Motivation

Many of the Region's Municipalities are working toward densifying town centres or other larger development sites in proximity to waterways. Some municipalities already have significant levels of density adjacent to waterways.

Past study concluded that the available technologies at the time would be expensive to operate on a per passenger basis and possibly problematic and slow in areas with larger currents. Significant improvements to electric and hybrid propulsion technologies have since been made. As well, the Region's road network has since become more congested such that in relative terms, even without technology improvements, unencumbered water-based travel could be quicker than many alternatives. The importance of travel time reliability and its influence on mode choice is now also better understood than in the past. Water-based travel offers the potential for reliable travel, and resilient networks. These networks could also play a role in the event of major incidents on existing and future fixed-link transportation infrastructure.

To the extent that a future *Burrard Inlet Rapid Transit* might replace the existing SeaBus, this exploration could also form the foundations of a SeaBus service modification strategy.

Given the realities of climate change and rising sea levels, water will, whether positively or negatively, play an increasing role in the Region's mobility fabric. This idea is an opportunity to explore how we positively adapt our mobility needs to these realities.

Actuation

The first step in this exploration would be to work with municipalities to better understand existing and planned higher density areas adjacent to waterways. In addition, the following steps should be considered:

- Launch a comprehensive technical feasibility study to understand existing opportunities and challenges, desire lines, integration potential with the broader transit/transportation network, potential customer response (stated preference survey), and review of the latest available technologies.
- Determine potential feasible routes and technology combinations, including options focused on the dual role of serving work commutes and recreational destinations.
- Update or introduce new legislation and policies including new waterway usage standards and infrastructure guidelines.
- Learn from existing services (Q to Q, AquaBus, False Creek Ferries) and potentially pilot routes and gauge the ridership response and monitor other benefits, as well as costs.
- Establish necessary funding levels to implement permanent service expansion if successful.

Frequent Transit Network Intensification

Explore intensifying and redefining the Frequent Transit Network (FTN) to a clock-face headway which improves upon the current 15 minute definition incrementally down to 12, 10, 7.5, and eventually 5 minutes or less over time.

Motivation

Transport 2040 (2008) identified a regional FTN concept which would provide transit service of every 15 minutes or better in a corridor. The implemented FTN concept has been successful in providing a more reliable and liberating network.

This idea would build on the FTN's success and enhance it to a level that facilitates journeys free of schedule consultation¹¹. Increased frequency (lower headways) would also significantly reduce transit journey times by reducing average waiting and transferring times; ridership increases would be anticipated to follow. In the last few years most of the region has seen transit ridership growth outpace service level increases (in terms of annual revenue hours). Currently, this would indicate that there is latent demand, and increased ridership would continue to follow service level improvements.

The rapid transit network already achieves this frequency level of service, as such, the idea applies mainly to the bus network, which will continue to be the workhorse of the transit system for the foreseeable future.

Actuation

This idea leads with a service level vision, which may not be immediately productive on all routes that comprise the existing FTN. As such, it would require a large initial investment ahead of ridership gains, which would require drawing on new funding sources such as *Transportation Pricing*. In addition, the idea would require:

- Working with municipal partners to leverage increased frequencies by striving to provide efficient transit run times; combining the expectation of frequency service levels that improve on the current FTN definition with a certain percentage provision of transit priority along a corridor, creating a transit ridership multiplier effect due to shorter and more reliable journeys.
- Potential further shifting of resources away from non-supportive land uses, and which are not otherwise transportation disadvantaged.
- Working with partners to refine the FTDA parameters (see idea *Frequent Transit Development Areas Enhancement*), including lateral distance from corridors - increased transit service levels tend to increase distances which customers are willing to walk.
- Investigating a more surgical approach (see *Overcrowding Guidelines Modification*) to enhance frequency while retaining system cost-effectiveness, while incrementally working toward this aspiration.

Existing FTN Frequency



Intensified FTN Frequency



¹¹ There is no definitive headway that results in journeys free of schedule consultation; however, prior research has consistently found this to be lower than 15 minutes with more recent research finding the point at which passengers stop arriving at transit stops non-randomly to be at headways of 5 minutes. Luethi et al 2006, Passenger Arrival Rates at Public Transport Stations. The TCRP Transit Capacity and Quality of Service Manual #2 also states a frequency level of service A as defined by headways greater than 10 minutes.

Overcrowding Guidelines Modification

Modify the overcrowding guidelines provided in the 2018 TransLink Transit Service Guidelines by allocating a larger available space per person to determine vehicle capacity.

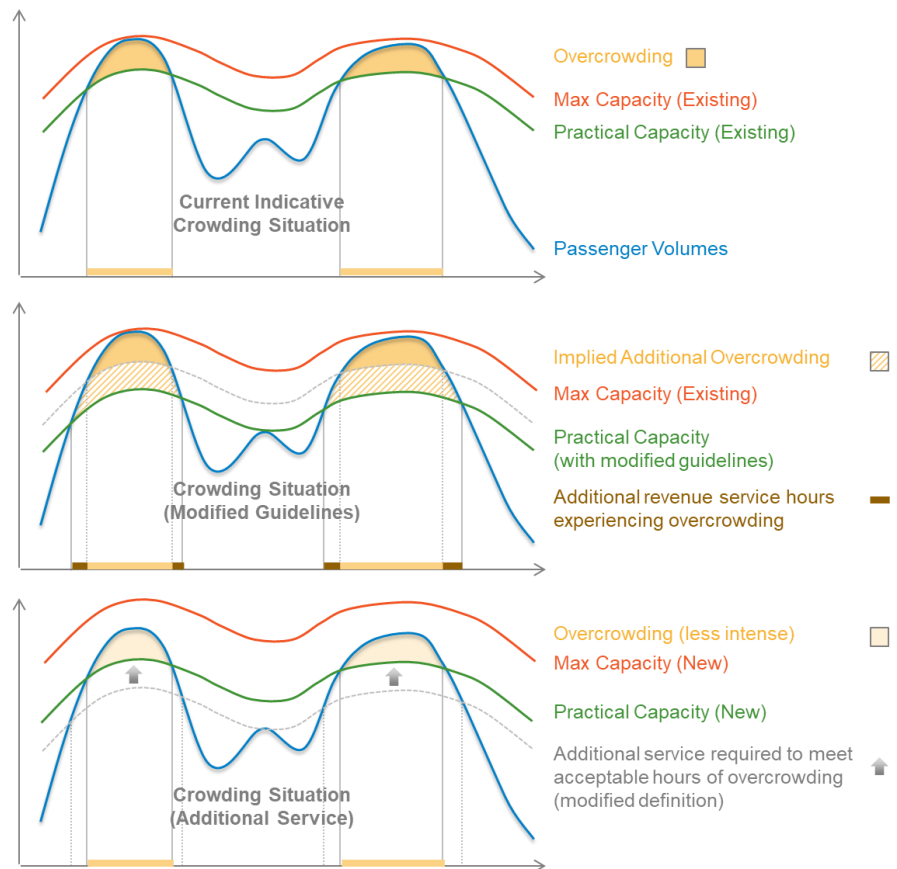
Motivation

This idea does not suggest changing the acceptable number of trips or revenue hours which exceed acceptable passenger load factors, but instead the definition of bus and transit vehicle capacities. The current overcrowding guidelines are based on average vehicle practical capacities that provide 0.35 m² per standing passenger. This approximately represents space needs for an adult male, in where occasional body contact is expected and encumbered passenger movements may increase dwell times. Analysis suggests 0.5 m² of space per standing passenger should be incrementally worked toward over time¹². Above a general reduction in overcrowding, this would have the following benefits:

- Enable passengers with more diverse space needs to board at more times and more reliably (i.e. those with strollers, mobility aids, luggage, etc).
- Enhances the travel experience, provides more comfort, destigmatizes bus travel, and lowers perceived travel times.
- Facilitates more efficient boarding and alighting times, lowering dwell times.
- May result in greater service frequency.
- More surgical and focused than a blanket service frequency increase.

Actuation

This idea is more surgical than a wholesale service increase as is indicated by the *Frequent Transit Network Intensification* idea. An increase in funding through new sources such as *Transportation Pricing* would be required; however, this idea allows new funding and transit resources to be more targeted. In general, the idea should be considered in combination with TDM efforts to promote peak spreading. Based on the above benefits, it is anticipated that ridership gains would follow closely, partially covering increased costs. Ultimately, this idea should be considered in combination with the *Frequent Transit Network Intensification* idea.



¹² This space is approximately equivalent to that provided for a seated passenger and supports a passenger with luggage, balancing comfort with productive service. This would translate practical capacities from 50 to 46 pax (for standard 12 m) and from 75 to 67 pax (for articulated 18m) buses, an 8% and 11% capacity reduction respectively. The suggested modified practical capacities are in line with capacity guidelines for agencies in Germany (VDV Verkehrserschließung und Verkehrsangebot im PNV, 2001)

Headway Based Operations

Operate and use holding strategies on higher frequency routes based on adherence to a desired headway as opposed to a desired schedule.

Motivation

The Transit Service Guidelines 2018 introduce regularity as a metric to capture headway consistency between subsequent transit vehicles. This metric acknowledges that at high enough bus frequencies, customers no longer rely on schedules but nevertheless desire consistent and reliable service without bus bunching. Reducing bus bunching brings both a customer benefit and an operational benefit.

Headway based operations can contribute toward reducing bus bunching, lower crowding, provision of more reliable and consistent service, and the possibility to remove undue schedule slack. The 2005 Vancouver UBC Transit Area Plan recommended piloting this type of operation and extending it to other frequent routes. There may be an opportunity to more comprehensively advance this operational strategy, utilizing new technology, to support the increasing frequency service levels.

Actuation

This idea is not believed to have a material impact on funding requirements; however, bus operations are not in the general purview of municipalities and there may be some unseen barriers and costs. At a high-level, the idea may require:

- Work with CMBC and operators to modify blocks, runcuts, and rosters that may need to be reflective of increased flexibility – this may require modifications to union agreements.
- Leverage the existing TMAC system and technology to modify onboard units to indicate to operators whether they are running fast or slow with respect to adjacent (in line) buses as opposed to scheduled arrivals/departures.
- Explore additional use of operational tactics such as increased use of operational short turning, and increased central monitoring and control of applicable routes.
- Increase public messaging to convey the operational approach and expected benefits, even if on occasion this may cause increased inconvenience.
- Retain shadow schedules such that GTFS and similar data sets still provide a baseline level of service for route planning and other applications.

Headway Based Operations



Schedule Based Operations



All-door Boarding Policy on All Routes

Allow bus boardings through all doors on all suitable routes (system-level implementation of all-door boarding) limited only as necessary during appropriate time periods.

Motivation

The Transit Service Performance Review indicates a trend of increasing bus travel times in many parts of the region. In part, this is due to increases in ridership; buses are dwelling longer at stops to service the growing passenger numbers. As such, there is a need to improve passenger boarding times and builds off of the success from the route-level all-door boarding policy implementation (B-Lines). Data collected before and after all-door boarding implementation for the 95 B-Line found an average dwell time reduction of 39% at a key downtown stop. Dwell time reductions translate to improved bus travel times, travel time reliability, and operation efficiency. Additional benefits of all-door boarding include:

- Improved distribution of waiting passengers, such that queues can be better managed and loading and sidewalk space are less constrained.
- Shorter queue lengths which reduce travel time (waiting) perceptions and humanize the transit experience.
- Improved in-vehicle passenger distribution to maximize available passenger space and reduce crowding perceptions.

Actuation

This idea has the potential to be revenue positive. A concern with all-door boarding is often that fare evasion may increase. While this would need to be monitored, there is evidence that fare evasion would not increase, and may even decrease¹³. To mitigate this concern and leverage the implementation, the following should also be considered:

- Permit all-door boarding during daytime hours only and when passenger loads are higher. This is typical of many systems that implement all-door boarding policies.
- Monitor fare evasion impacts and potentially increase proof of payment enforcement, including repurposing transit fare checking staff to be present more often as transit ambassadors and providing overall customer service improvements.
- Continue to foster a culture of social stewardship both for the transit system and for passenger queuing – there is a source of pride in contributing to a public good, as well as the uniquely organic and largely self-managing passenger queueing dynamic found in the region.
- Work with municipal partners and possibly update transit infrastructure guidelines to improve delineation of bus zones and clearance areas at loading pads where this might be required to support all-door boarding.
- Work with municipal partners to leverage increased frequencies by striving to provide efficient transit run times.
- Explore the use of buses with additional doors

Figure 24: Four-door Articulated Bus



¹³Surveys in San Francisco have found that fare evasion rates have dropped over the period of all-door boarding implementation. Trip speeds improved by 2%. SFMTA 2014 – All-door Boarding Evaluation Final Report

Fare Capping

Provide a cap on pay-as-you-go fares that align as closely as possible with, or supersede flat rates offered on time-dependent pre-paid passes (daily, monthly).

Motivation

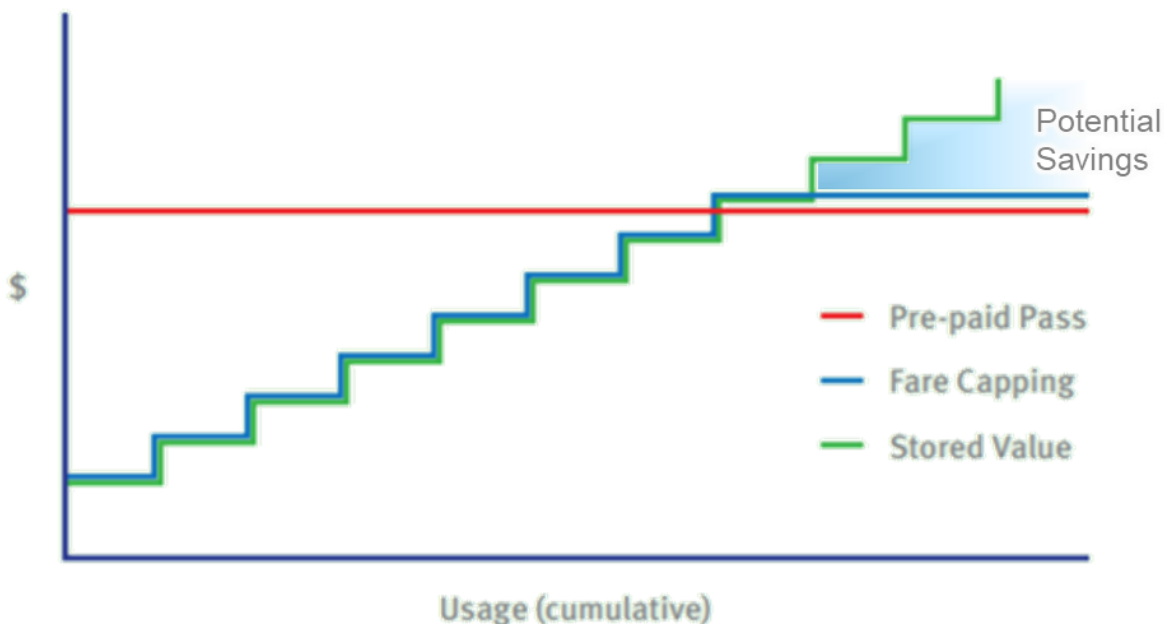
Numerous regions in the world have a fare policy which utilizes fare capping. The 2018 Transit Fare Review previously assessed this idea, concluding that to remain revenue neutral, a new cap would need to be set at a higher rate than the current pre-paid passes (costing all frequent riders – or potentially all riders more). Without fare capping, the riders with the least ability to pay will continue to subsidize riders with the greatest ability to pay – those who have reliable commutes, who can identify the most strategically beneficial fare product, and who can afford to pay up front for the cost of a whole month. This promotes continued inequity in the transit system.

This concept advances the review’s stated intention to continue to explore fare capping, particularly in light of equity principles. This would enable current or new lower-income riders the ability to experience the same or similar level of transit system affordability as a user who has the means to purchase a pre-paid pass up front. Lower fare evasion could also result. As well, this could encourage increased ridership by allowing users that must make multiple daily trips to use the system at lower cost (which they otherwise may not use), which may offset the anticipated costs¹⁴.

Actuation

A future review should incorporate vertical equity dimensions, such that a net revenue neutral outcome would incrementally burden most users, but lower the potential relative burden for those least able to afford it, as shown in Figure 25. As well, the need for a (farebox) revenue neutral objective should be reassessed, instead drawing on *Transportation Pricing* revenue and/or continued work with the Provincial Government to address funding gaps.

Figure 25: Potential Savings and Incremental Cost to All Users with a Fare Capping Product¹⁵



¹⁴ TriMet anticipated some lost revenue would potentially be offset due to lowered need for cash handling and potential reduction in fare evasion <https://transitcenter.org/capandride/>

¹⁵ Adapted from the 2018 Transit Fare Review

Low Income Passes

Expand the BC Bus Pass Program or otherwise provide concession fares to low-income residents of any age.

Motivation

The BC Bus Pass Program is currently applicable to low-income seniors and Persons with Disabilities. Additional concession fare eligibility includes HandyCard holders, youth 14 to 18 (with photo ID) and children 5 to 13 years of age. There is currently no opportunity for low-income residents to access concession fares; however, many of these residents are transportation disadvantaged. Through the City's Poverty Reduction Strategy (forthcoming) engagement process, residents have expressed a need for more low-income passes and other means to make transit more accessible.

As such, this idea concurs with and reaffirms the need to explore expanded discounts for low-income residents, children and youth as was recommended in the recently completed Transit Fare Review (2018). Given the challenge it is to consider these more socially equitable ideas in a 10-Year investment phase, it is critical to consider the funding needs as part of the RTS vision to ensure the Region is creating a transit system that works for all.

Actuation

The concept of a low income pass should be approached from a vertical equity dimension, and across transportation modes. The need for a (farebox) revenue neutral objective should be reassessed, instead drawing on *Transportation Pricing* revenue and/or continued work with the Provincial Government to address funding gaps. As well, low income passes may encourage lower fare evasion, and subsequently reduce uncomfortable confrontations. Additional considerations include:

- Explore the use of low income monthly bus passes on which the cost is based on a sliding scale of income as is used by Calgary Transit. Vancouver City Council has also endorsed the AllOnBoard Campaign which has a number of equity based transit recommendations including a sliding scale for low income residents.
- Utilize the success of existing fare concession programs to address a specific user base where low-income passes might not be as tractable or provide the same level of concession (see idea *U-Pass Extension to Secondary Schools*).
- Work with CMBC and bus operators to enhance training; explore the use of and the empowerment of operators to provide a special pass to those experiencing deep poverty to provide a dignified future boarding experience.



Group / Family Passes

Add a new fare product that facilitates and encourages group travel on the transit system by providing discounts, allowing unlimited travel within a given time period, or some combination of both. Potentially apply to non-peak travel times only.

Motivation

When individuals travel alone on the transit system the out-of-pocket costs are favourable as compared to those for driving alone. However, when travelling as a group, each group member must purchase an individual fare. This quickly positions driving to be seen as a cheaper alternative, and discourages groups from utilizing transit. Through the City's Poverty Reduction Strategy (forthcoming) engagement process, low income families also expressed that the high cost of multiple tickets for a family means that they simply cannot travel around the Region to access cultural, recreation and other amenities.

The system typically has additional capacity at non-peak times (evenings & weekends), and where capacity is constrained at these times, the marginal cost of providing more non-peak service is typically lower than adding service at peak times.

Taken together, the above points indicate an opportunity to cater toward a market segment with latent demand, such that a group pass could be provided in a relatively neutral manner. From an equity perspective, this could also allow groups a more affordable means to access recreational and cultural amenities. Families in particular could benefit from such a pass, for which this and similar concepts are foundational to allow households to make transit their choice mode.

Precedents

German Rail (Deutsch Bahn) offers a "Happy Weekend" ticket for groups of five or less for statewide travel. Many German regional agencies also offer regional group travel cards typically for groups of two to five people (Hamburg's HVV, Munich's MVV, Frankfurt's VGF). In Toronto, MetroLinx's Group Pass is applicable to up to five people with further age restrictions.

Actuation

The recent Transit Fare Review did not make any recommendations around the idea of a group or family pass. There may be an opportunity to implement such a pass ahead of another comprehensive review, given it may prove to be relatively revenue neutral. The idea could be advanced or considered in view of the following:

- Incorporate into a more general off-peak fare pilot program.
- Consider a stepwise rollout, first targeting special times and events, working toward a more regular time period such as on weekends.
- Broaden the pass's appeal and market by formulating it as a "Discovery", "Adventure" or "Exploration" ticket.
- Set the price of a group ticket so it remains relatively revenue neutral overall, such that the foregone revenue from existing riders who may use it is approximately equal to the revenue from additional ridership which such a pass is anticipated to encourage.
- Draw on new funding sources such as *Transportation Pricing* for any remaining revenue shortfalls.
- Explore opportunities for an interregional group pass and work with BC Transit to implement

U-Pass Extension to Secondary Schools

Extend the U-Pass BC Program to public secondary (high) school students in the region in lieu of more broadly applicable *Low Income Passes*

Motivation

Secondary students are currently able to obtain concession fares on Compass card single trips. They also have the option of obtaining a three zone monthly pass. The typical month of travel to school using either of these passes results in a higher total cost of travel per month than the monthly cost of a U-Pass. Preliminary assessment indicates the following considerations:

- In some cases, the relative premium for grade school passes which families pay may be an undue burden and has equity implications.
- U-Pass programs have been found to increase ridership by 10-20% for post-secondary students¹⁶; a similar increase in ridership may occur with secondary students, such that this is a potentially net revenue neutral idea.
- In the region, grade school trips rely heavily on vehicle chauffeuring, despite having the lowest average trip lengths of all trip purposes¹⁷.
- A U-Pass for secondary students would increase autonomy while increasing ridership above and beyond school trips (leverage effects).

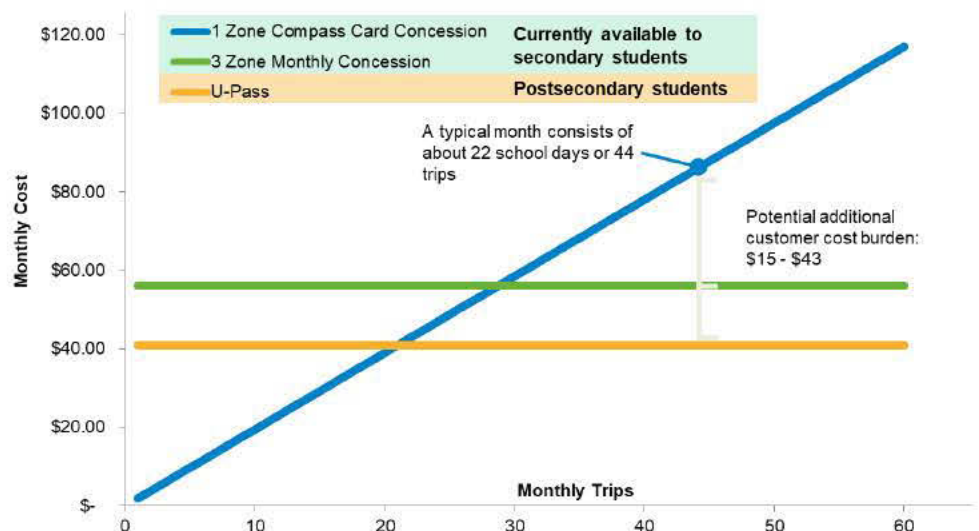
As well, this idea would contribute to the intent of the AllOnBoard Campaign which Vancouver City Council has also endorsed.

Actuation

Based on the above, there is clearly an opportunity to shift current chauffeuring trips to transit. This will require setting a U-Pass rate which balances the need to incentivize transit use and remain net revenue neutral, while not unduly overburdening students/families in some areas with relatively low current transit access or in close proximity to the attended school. The idea could be advanced or considered in view of the following:

- Work with partners including the regional school boards and the province.
- Develop an opt-out program such that it is sensitive to individual needs.
- Consider a U-Pass rate that may also contribute toward funding more services in low service areas.

Figure 26: Concession Pass Comparison



¹⁶ TTC 2018, U-Pass Policy Framework

¹⁷ Trip Diary 2011 for all grade school students. It's likely that secondary students' trips are longer than average grade school trips, and exhibit different mode share characteristics.

Electric Bus Implementation & Prioritization

Work toward a fully electrified bus fleet over time as part of the Low Carbon Fleet Strategy and prioritize regional areas of higher density and routes with greater ridership as part of the rollout and fleet replacement plan, and prioritize Battery Electric Buses (BEBs) where new trolley infrastructure would otherwise be needed.

Motivation

Given BC's electricity mix, buses powered directly by electricity result in the lowest per km GHG emissions, with trolley buses producing slightly more than BEBs¹⁸. The world's climate crisis and national and local climate emergency declarations require an expedited shift toward electrification. As these fleet replacement and additions rollout, denser areas and higher ridership routes should be prioritized for the following reasons:

- Zero tailpipe NOx emissions and very low tailpipe PM emissions
- Decreased noise emissions
- Smoother acceleration and deceleration profiles, benefiting a greater number of passengers
- Maximize the per km operating cost efficiencies of BEBs relative to their increased capital costs¹⁹

Actuation

While trolley buses will continue to play a role, a shift toward in-route charging BEBs is anticipated to result in significant net savings by 2050, but will require higher upfront capital costs. To facilitate and leverage this shift, the following should be considered:

- Reinvest the net savings into increased transit service.
- Work with partners to identify optimal charging infrastructure locations, including the potential to integrate this with a *Downtown Vancouver Off-Street Bus Layover*.
- Draw on new funding sources such as *Transportation Pricing* to support higher upfront capital costs.
- Explore the use of inductive charging technology and infrastructure to minimize the spatial and public realm impacts, while providing the opportunity to further delineate key bus zones. This technology has been applied in some jurisdictions, including Braunschweig, Germany, Gumi, South Korea, and Wenatchee, Washington.



Source: https://www.braunschweig.de/leben/stadtplan_verkehr/e-mobilitaet/emil.html

¹⁸ TransLink 2018, TransLink Low Carbon Fleet Strategy (2020 – 2050)

¹⁹ TransLink 2017, TransLink Bus Fleet - Propulsion Technology Options Presentation

Access to Opportunities Model

Develop a comprehensive, multimodal Access to Opportunities (cumulative accessibility) model such that the transportation system and contemplated improvements are assessed against the underlying reason for mobility – to reach destinations. Such a model would complement the existing Regional Transportation Model and the Ease of Access to Opportunities Framework, and provide further insight on access equity (geographically and across modes), investment potential, and project priority.

Motivation

Traditional transportation modelling typically aims to provide a forecast in terms of mobility outcomes (travel times, volumes, routes, etc). Accessibility modelling differs in that it measures potential or opportunity, and does this in terms of destinations (jobs, schools, retail, and other amenities). Measuring access is truer to the nature of why people travel – to get to destinations, and is often related to “freedom”²⁰. It is an inherent recognition that transportation and land use work as a system; where mobility might tell us how quickly we can get to a place, access tells us how many of those places we can easily travel to.

Accessibility modelling can also be used to gain insight into access equity issues, providing an objective framework to help understand which areas, housing type, or demographic have comparatively high and low access. Once baselines are established, this type of modelling can also be used for scenario planning, and other use cases including:

- Access effects from new transportation investments or policies
- Access effects from land use changes
- Access impacts due to unreliability, congestion, departure time
- Network resilience assessment
- Parking and other TDM requirements for development
- Stakeholder mapping
- Development and amenity siting
- Access impacts related to barrier or lack of barrier-free design
- Access impacts to one mode given a change to another
- Infrastructure improvement and investment prioritization
- As a metric in the RRNS to measure performance in access terms

Access and access improvements have been found to be closely related to ridership outcomes²¹. As such, access metrics can be also be used to cross-validate ridership modelling and provide a visual indication of benefits. As well, access has been shown to be closely related to economic outcomes. This Transport 2050 ideas submission utilized a preliminary version of such a model, which is further documented in *Appendix B: Access and Ridership Potential* and with a use case seen in many of the *Regional to Sub-regional Network Concepts* figures.

Actuation

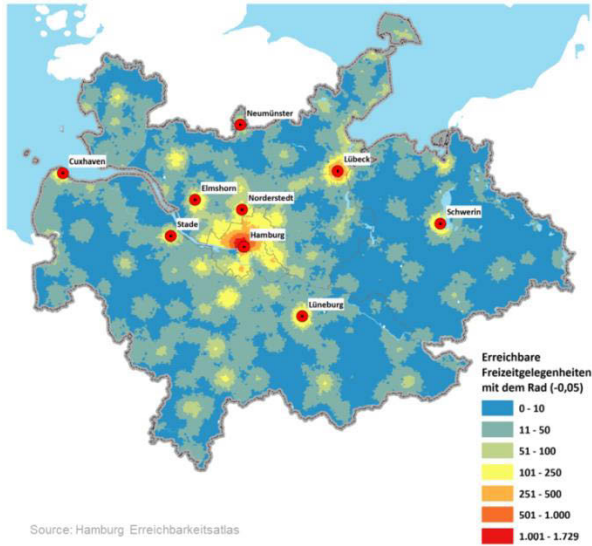
This type of model could be built upon the existing structure of the RTM, make use of existing open source code, commercial products, or from the ground up. They are typically data and computationally intensive. As well, there is no definitive methodology and additional work would be required, including:

- Establishment of a regional working group to further develop framework.
- Collaboration with academia, consultants and potential software developers.
- Increased data standardization and establishment of a central repository for regional data.
- Provision of tool to municipalities, consultants and other interested parties.

²⁰ Walker, Jarrett. 2018. To Predict with Confidence, Plan for Freedom. *Journal of Public Transportation*, 21 (1): 119-127.

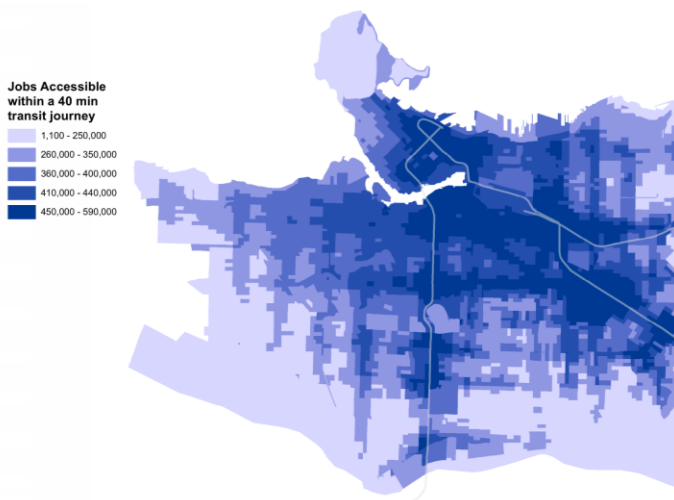
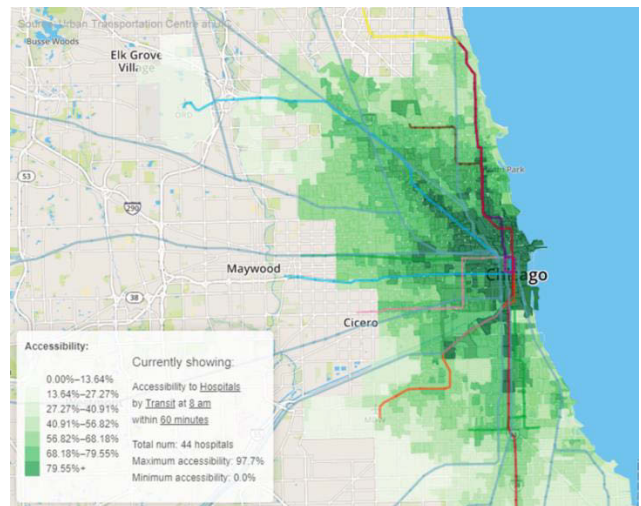
²¹ Owen & Levinson 2015. Modeling the commute mode share of transit using continuous accessibility to jobs, *Transportation Research Part A*.

Figure 27: Access to Opportunities Use Case Examples



Accessibility of recreational opportunities by 30 minute bike ride in Hamburg Region

Level of access to Hospitals by a 60 minute transit travel time in the Chicago Region



Level of access to jobs by a 40 minute transit travel time in the City of Vancouver

New Mobility

Emerging mobility technologies are transforming the transportation system. Technology mega trends can be categorized as shared mobility, electrification, connected technologies and automation. By 2050 it's difficult to know what technologies will be on our streets, with predictions of fully driverless vehicles and passenger drones. The following is a set of sub-ideas for utilizing these technologies for a zero carbon, multi-modal future where everyone can seamlessly travel without owning a car.

Ideas throughout this document also apply to New Mobility including those that support road space reallocation, transportation pricing, and complete communities.

<i>Sub-idea</i>	<i>Motivation</i>	<i>Actuation</i>
Open Data Sharing and Real-Time Data	Data is a valuable tool for planning and decision making. Real-time data can enhance the travel experience, safety, and support dynamic street management. It is being collected across the new mobility ecosystem	Work with industry and all levels of government to establish a regulatory framework for open data sharing and work towards real-time data outputs
Support Mobility as a Service. Augment the existing transit network with publicly governed MaaS services to provide more seamless multimodal travel options.	MaaS can help shape sustainable travel choice as new and shared mobility options are introduced providing alternatives where private vehicular travel has traditionally been the only choice	Identify mechanisms now to ensure seamless app integration for new mobility providers as they roll out in the region; explore viable app development and governance that supports open data sharing and ensures neutral service options; consider owning or developing new subsidiaries that act as service providers
	Many other jurisdictions are partnering with private operators to subsidize transit service which provides on demand service in lieu of fixed-route transit	Establish frameworks which prevent potential MaaS integrated new mobility modes which exhibit decreasing returns to scale from being subsidized at the expense of fixed-route transit or other core mobility needs
Partner with municipalities and other agencies to test MaaS applications across the region and cater to sub-regional needs/local contexts.	Testing MaaS in real-world scenarios will help us understand consumer response, modal capacity and infrastructure technologies	The City of Vancouver, is a potential proving ground for MaaS. 90% of the population live within walking distance of frequent transit and residents have embraced a culture of sharing with over 1.7 million annual bike-share rides and 34% of adult residents are car-share members. On-demand app mobility options like ride-hailing are now available and micro-mobility offerings will continue to increase
Utilize gamification strategies within app platforms	Shared mobility services often offer discounts and other incentives to promote ridership	Consider increased discounts, rewards or other incentives to attract rider loyalty and motivate travel behaviour

Figure 28: MaaS App & Gamification Examples

Whim is an App developed by a Finnish company used in a few cities as a one-stop MaaS platform



Singapore uses gamification with their EZ Link Card to encourage off-peak travel and other travel behaviours



Bus Lane Automatic Camera Enforcement

Mount buses with cameras for automatic enforcement of bus lanes, bus zones, and other applicable transit facilities.

Motivation

The region is introducing an increasing number of bus lanes and transit priority facilities to provide bus passenger priority. The resilience and efficacy of these facilities must be ensured in the face of increasing vehicular congestion, the introduction of ride-hailing services, increasing delivery services, and other demands for curb space.

A recent study investigating bus lane enforcement strategies found that automatic enforcement of bus lanes with bus-mounted cameras provided the largest benefit-cost ratio of all enforcement strategies²². The study noted that automatic enforcement, compared to police/bylaw enforcement, can come with significant fiscal and environmental benefit.

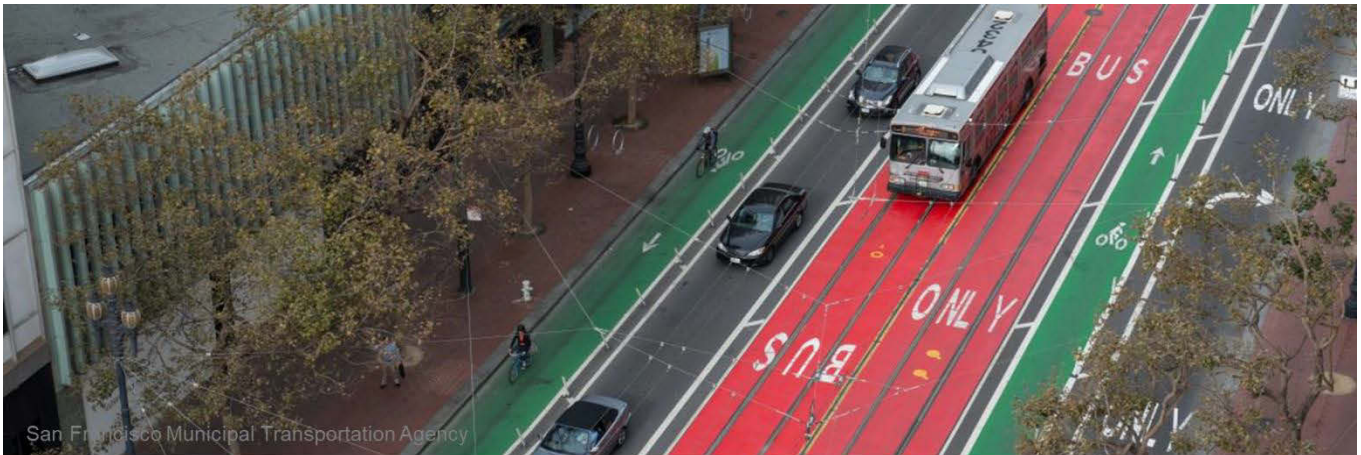
Increased enforcement will also enable the region to confidently provide more innovative bus priority measures, such as offset bus lanes or treatments that require general purpose traffic to turn right and allow through bus movements only.

Actuation

Implementing this idea will likely require or additionally benefit from the following:

- Enabling legislation to permit automatic capture of violations and citations
- Coordination with municipalities, and law enforcement agencies
- Capacity building for appropriate technological architecture (integrate with existing on-board units, centralization and interface with vehicle registry, etc)
- Messaging campaign to the public such that the intent of the strategy is to ensure effective bus lanes and not as a revenue-generating tool
- Increased delineation of the bus lanes through red pavement treatments²³

Given the large estimated benefit-cost ratio, it's anticipated that the strategy would not require net new funding, but would incur initialization costs.



²² National Capital Region Transportation Planning Board 2017, Bus Lane Enforcement Study

²³ The above study noted that automated camera enforcement provides the majority of compliance benefit; however, enhanced pavement markings may improve delineation of permitted areas, such as right turn pockets. As well, red lane treatment may enhance the overall visibility of bus routes and infrastructure, including from the passenger perspective, such that additional unaccounted benefits may accrue and to enable drivers to better understand the presence of facilities.

Downtown Vancouver Off-Street Bus Layover

Identify potential locations and work toward the implementation of a Downtown Vancouver off-street bus layover facility.

Motivation

Street and curb space is becoming increasingly contested in downtown Vancouver. As well, the public realm and adjacent land uses are becoming increasingly activated, and more and more special events are occurring. Combined, these factors make it increasingly challenging to provide a dedicated and well-functioning space for on-street bus layover activities in the Metropolitan Core. Given the required infrastructure need for BEB charging, this challenge will become even larger.

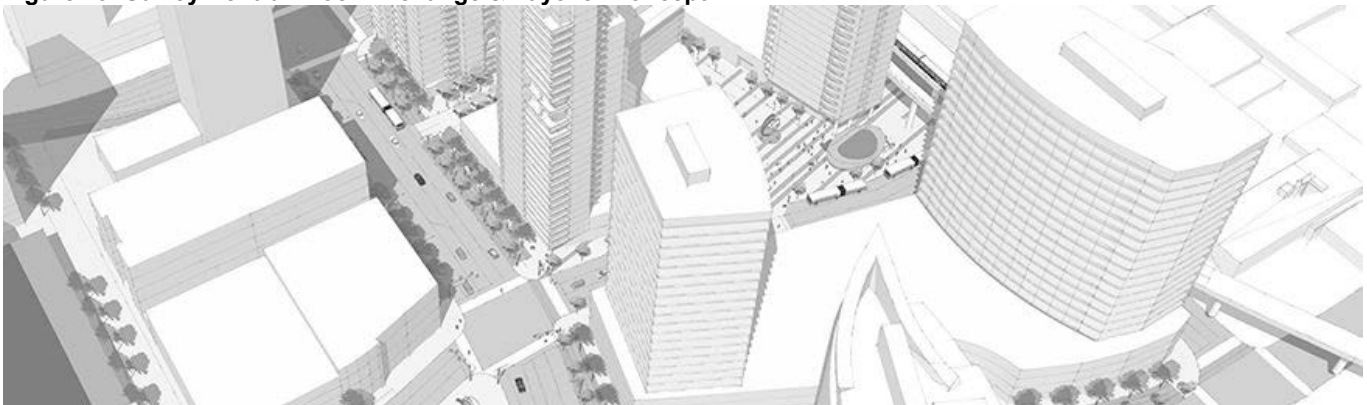
Downtown (and possibly Metro Core) off-street facilities will ensure adequate layover space is consistently and reliably available over the long term, and can assist a transition and investments toward Battery Electric Buses.

Actuation

This idea may require upfront investment costs and coordination with other public and private partners. There may be opportunities to implement this idea such that it is net revenue neutral (or positive), given the potential to create the facility as part of a larger development. In addition, the following actions should be considered:

- Work with municipal partners to provide efficient transit run times, such that the need for schedule recovery time is reduced (see also *Headway Based Operations* as a means to reduce layover needs).
- Consider downtown layover spaces to function more so as a transit interchange or major mobility hub (see idea *Mobility Hubs* rather than a layover space).
- Leverage the switch to a low carbon fleet (see idea *Electric Bus Implementation & Prioritization*) permitting the facility to be constructed to more seamlessly integrate with development and adjacent public realm and potentially provide BEB charging opportunities.
- Work with the City to identify potential locations which balance the transit needs with development and public realm needs.
- Work with the City to identify street improvements to provide on-street passenger exchange opportunities and to reduce bus run time impacts.

Figure 29: Surrey Central Block Exchange & Layover Concept²⁴



²⁴ Source: Via Architecture and City of Surrey North Surrey Recreation Centre Decommissioning Plan Corporate Report 2019

Mobility Hubs & Bike Mobility Centres

Develop policy and delivery mechanisms for the creation of strategically located hubs intended to provide numerous mobility functions that facilitate seamless, convenient, and inclusive multimodality at the core of connected, multi-modal neighbourhood centres.

Bike Mobility Centres, providing secure bike parking and integrated with the secure bike parking at rapid transit stations, can be an early phase of implementation and other modal choices can be added over time.

Motivation

Residents in the region continue to live active and busy lives. They are increasingly combining multiple activities into a journey, increasing their use of sustainable modes and trip-chaining. As well, diverse and new mobility options are increasingly available, leading to a future mobility paradigm where information technology (MaaS) combines with new infrastructure to provide an enhanced multimodal experience. Mobility hubs are needed to function as that flexible interface between technology, new and shared mobility options, and core existing and future transportation networks. In addition, Mobility Hubs represent an opportunity to locate public services, such as electric charging, neighbourhood logistics centres and information kiosks, and overarchingly to create a sense of a place where community members can connect with each other and to regional destinations.

As the region invests in new transit infrastructure and local governments work together to expand the availability of new active transportation and MaaS-enabled new and shared mobility options, it will be necessary for municipalities to offer healthy and visible spaces for the public to easily access these new offerings.

Actuation

Implementing this idea will likely require or additionally benefit from the following:

- Development of guidelines that are scalable to different community sizes, densities, and needs drawing on the review and typological functions as suggested in the Identify Best Practices for Mobility Hubs UBC Report (2019).
- Development of design and implementation guidelines for Bike Mobility Centres expanding on recent designs for more bike parking at stations.
- Development of a prioritization framework to guide implementation based on typological needs of urban centres, town centres, neighbourhoods, FTDA's and other key nodes.
- Creation of a policy framework to work toward inclusion of mobility hubs within station areas of future rapid transit projects.
- Funding to pilot a limited number of mobility hubs that offer a variety of services in different combinations to further identify the best-practice configurations, monitor and work with communities to gauge needs.
- Partner with mobility service providers as well as logistics and delivery companies to integrate smaller scale urban freight and delivery needs (see *Urban Freight Evolution*).
- Identify new potential funding sources, including through partnerships and developments to facilitate delivery throughout the region.

Figure 30: Mobility Hub Examples

Larger Scale Mobility Hub in Nantes, France



Neighbourhood Scale Mobility Hub in Nuremberg, Germany



Frequent Transit Development Areas Enhancement

This idea is a collection of sub-ideas that are intended to build on the success of the FTDA strategy and enhance their profile and function.

Sub-idea	Motivation	Actuation
<p>Advocate through the strategy to implement parking maximums in FTDA as part of TDM and parking management measures.</p>	<p>In line with the Metro Vancouver Parking Study findings, parking in transit accessible areas is typically oversupplied. This places undue upward pressure on housing affordability, diminishes the transit investment, and contributes to a diminished public realm.</p>	<p>Work with Metro Vancouver and municipalities to modify the existing FTDA guidelines and aim to align with municipal bylaws.</p>
<p>Introduce an additional buffer distance of 600 m for the B-Line / Rapid Bus network.</p>	<p>This recognizes that walking catchment areas increase for faster more reliable services²⁵, which would extend the reach of the FTDA in these locations.</p>	<p>Modify the existing FTDA guidelines, and harmonize across other transit infrastructure and service guidelines.</p>
<p>Establish a stronger nexus between funding and prioritization²⁶ - for introductory services or existing transit network enhancements – such that funding is effectively assured in principle insofar municipal intent aligns with FTDA parameters.</p>	<p>To promote sustainable travel behaviours as areas develop, frequent transit provision is preferred ahead of full development build-out; however, this may imply low productivity transit service in the shorter-term but increased benefits in the longer-term. This is a perennial challenge, and requires more of a return toward historical land use and transportation development patterns.</p>	<p>May require setting aside a dedicated pot of funds on an annual basis that is tapped into specifically and only to support this nexus. If not tapped, it could accrue until exceeding an established ceiling level, before it is invested into the general network.</p> <p>The framework being developed through the Transit Service Partnerships Policy may also help facilitate this idea.</p>

²⁵ Translink Transit-Oriented Communities Design Guideline (2013) - Catchment areas for limited stop services such as B-Line are identified as 600 m

²⁶ Identified as a need and quoted from the RGS Implementation Guideline #4, Identifying Frequent Transit Development Areas (2013)

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Appendix A: Motivation for Regional Rail and Network Hierarchy

The Region currently lacks a clear hierarchy in terms of network functionality, as well as a full-fledged Regional Rail system. The following assessment highlights the issue:

SkyTrain

SkyTrain has been indispensable in shaping and connecting the Region and it will continue to be needed to connect regional destinations. However, as the region continues to both grow and require improved intra and inter-regional connectivity, there will be a need to provide functionality which SkyTrain may not be adequately suited for. As well, existing SkyTrain Lines (the Expo and Canada Line) are anticipated to reach their ultimate capacity before 2050; within the planning horizon of this RTS.

As shown in *Table 5* (right), the existing SkyTrain system includes lines with average station spacings between 1.5 and 1.8 kilometres. This spacing is generally conducive to connecting adjacent sub-regions, but falls between typical station spacing for both regional rail and subway systems, as noted in *Table 6* (below).

Table 5: SkyTrain System Station Spacing

Line	Avg station spacing (km)
Expo Line	1.7
Millennium Line	1.8
Canada Line	1.5

Table 6: Typical Rail-based Rapid Transit and Higher Order Transit Station Spacing²⁷

Indicative Mode	Avg speed (km/h)	Peak Freq. (min)	Capacity (pphpd)	Typical Avg. station spacing (km) ²⁸
Express Rail	50-80	5	25,000 – 40,000	2 – 5
Regional Rail	30-50	10	5,000 – 20,000	2 – 5
Subway	25-50	1.5	25,000 – 40,000	0.8 – 1.5
LRT	15-35	1.5	2,000 – 10,000	0.3 – 1.5
BRT	15-40	3	2,000 – 10,000	0.3 – 0.8
Streetcar	10-25	1.5	2,000 – 10,000	0.3- 0.5

The comparison between existing SkyTrain spacing and that of a typical regional rail or subway speaks to the need to explore alternate/modified forms of regional transit such as regional rail, as well as introduce more network hierarchy at the sub-regional and local level.

West Coast Express

The West Coast Express is a step toward establishing true regional rail; one that moves away from a one-way commuter service only. The extended service provided during the 2010 Olympics offered an initial glimpse into this potential opportunity. Recognizing the current limitations of the corridor, it is nevertheless instructive to benchmark the service against regional rail services in other jurisdictions. *Table 7* below provides a further indication that to become a full-fledged transit region, regional rail will play a significant role. It also lends support to continuing to explore opportunities to improve the WCE, including exploration of alternative corridor alignments as it reaches the Metropolitan Core.

²⁷ Metrolinx, The Big Move 2008. The Big Move did not specify a full station spacing range for Subway, LRT, BRT or Streetcar. As such, the spacing noted here was determined by reviewing numerous system spacings and other sources including Vuchic 2005 Urban Transit, Operations, Planning & Economics (Subway), TTC Service Guidelines (Streetcar), FTA Guidelines (LRT), and ITDP Guidelines (BRT). Worth noting is that TransLink’s 2018 Transit Service Guidelines on stop spacing are less mode specific, and tied instead to frequency. Ultimately, right of way category and to some extent technology also play a role, such that there is no one definitive stop spacing guideline and these are system and context sensitive.

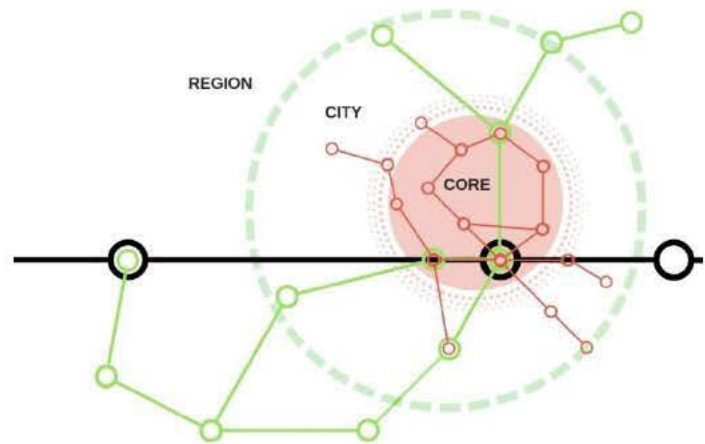
Table 7: Regional Rail Benchmarking²⁹

Network	# of lines	Stations	Length (km)	Peak frequency	Total Pax (2018)	Metro Pop (2018)
West Coast Express	1	8	68	30 mins	2.5 mil	2.6 mil
Minneapolis Northstar Line	1	7	64	30 mins	0.8 mil	3.6 mil
Toronto GO Transit	7	66	452	15 mins	57.4 mil	5.9 mil
Copenhagen S-Tog	7	85	170	5 mins	116 mil	2.0 mi
Vienna S-Bahn	10	181	650	10 mins	109 mil	2.8 mil
Hamburg S-Bahn	6	68	147	10 mins	280 mil	3.3 mil
Munich S-Bahn	12	150	434	10 mins	307 mil	2.9 mil

Network Design & Hierarchy

As shown in *Table 6* above, different indicative modes, based mainly on their level of dedicated right-of-way also have diverse station spacings.

These different network components play different roles in urban areas and ultimately they must work together to service the different mobility and access needs of varying urban geographies. As public transit networks mature, connectivity between routes becomes increasingly important. Conversely, this is an indication of a maturing network. At some level, travel patterns emerge that will see larger demand on some corridors over others (whether for local access or longer distance mobility), regardless of real-world land use models. Higher levels of service are required and ultimately, hierarchy is required to support the emergent demand differently, depending on prevalent volumes desiring access or mobility. This is typically the case in strong transit regions whether they have more distributed land use patterns or more concentrated nodes, particularly for regional rail. The *Additional Benchmarking Information* section below provides further breakdown of mode typologies in many regions



²⁹ Sources: Eurostat 2017, own assessment through agency websites, schedules and local population datasets

Resilience

The Expo Line is anticipated to hit ultimate capacity before 2050 as shown in *Figure 31* below. A similar timeline is anticipated for the Canada Line, which will see new patterns emerge after opening of the Broadway Subway, which may accelerate trends toward ultimate capacity.

Figure 31: Expo Line Volume Projections

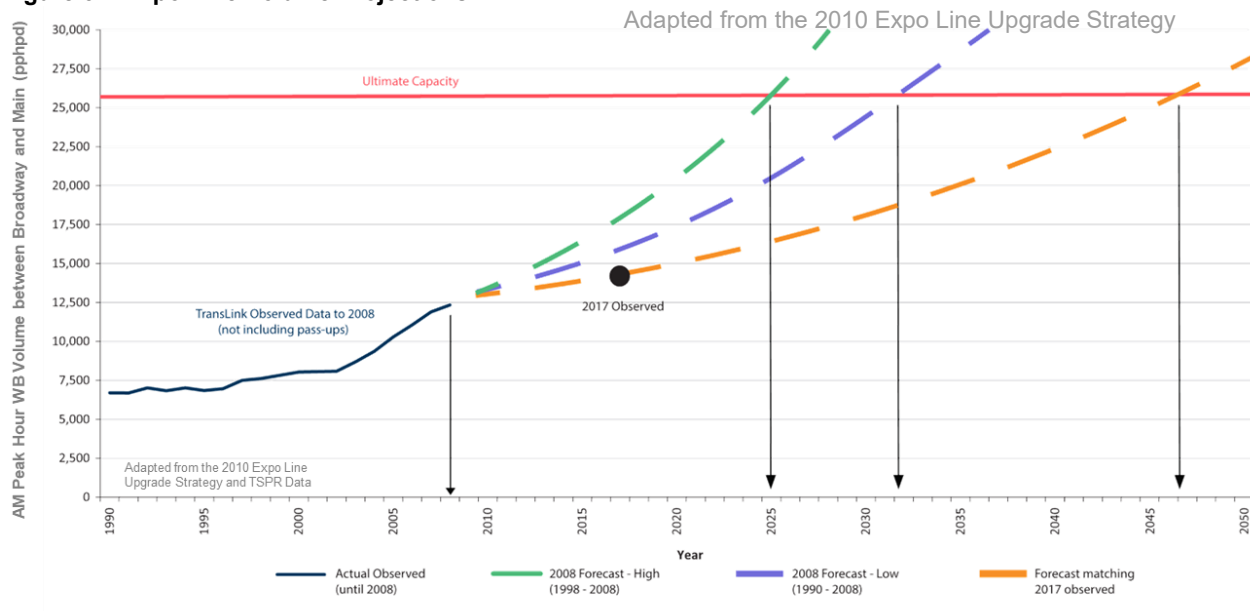
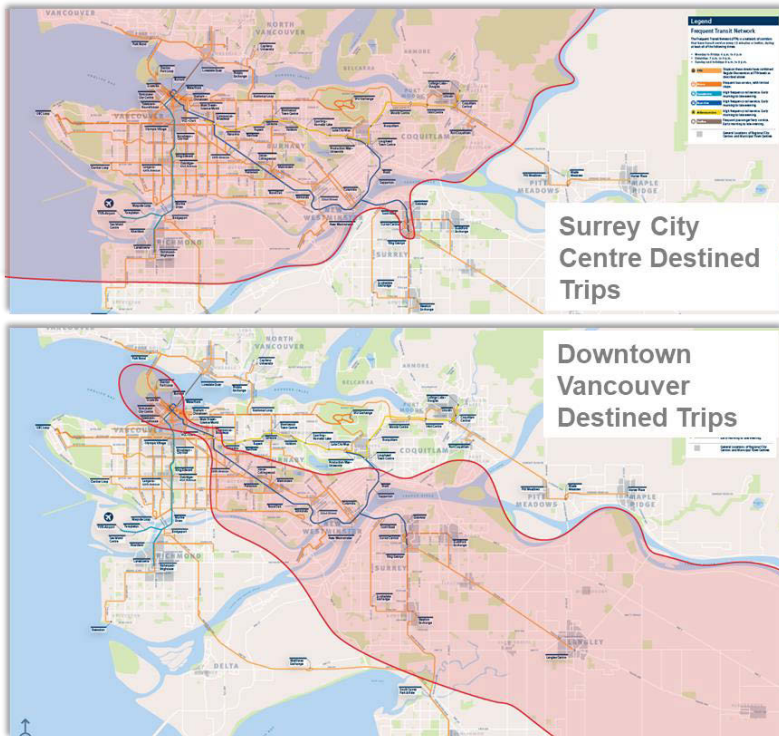


Figure 32: Expo Line “Contributory Area”



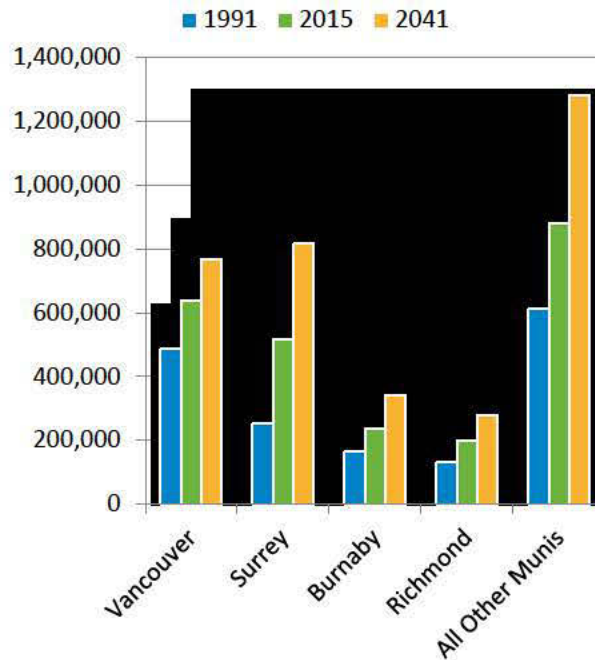
The Region is hugely dependent on the rapid transit network for regional transit connectivity, particularly on the Expo Line as shown in *Figure 32*. The Region needs a strategy in place to address Expo Line and Canada Line ultimate capacity issues. Regional rail would contribute, as would other sub-regional corridors with opportunities for higher order and/or rapid transit.

Ridership Potential

The eastern part of the region has grown substantially over the last 30 years, and these trends are currently anticipated to continue. While the region should strive to provide land uses which allow residents easy walking access to most daily needs, there will be a continued need to facilitate access to jobs and overcome regional housing cost burdens.

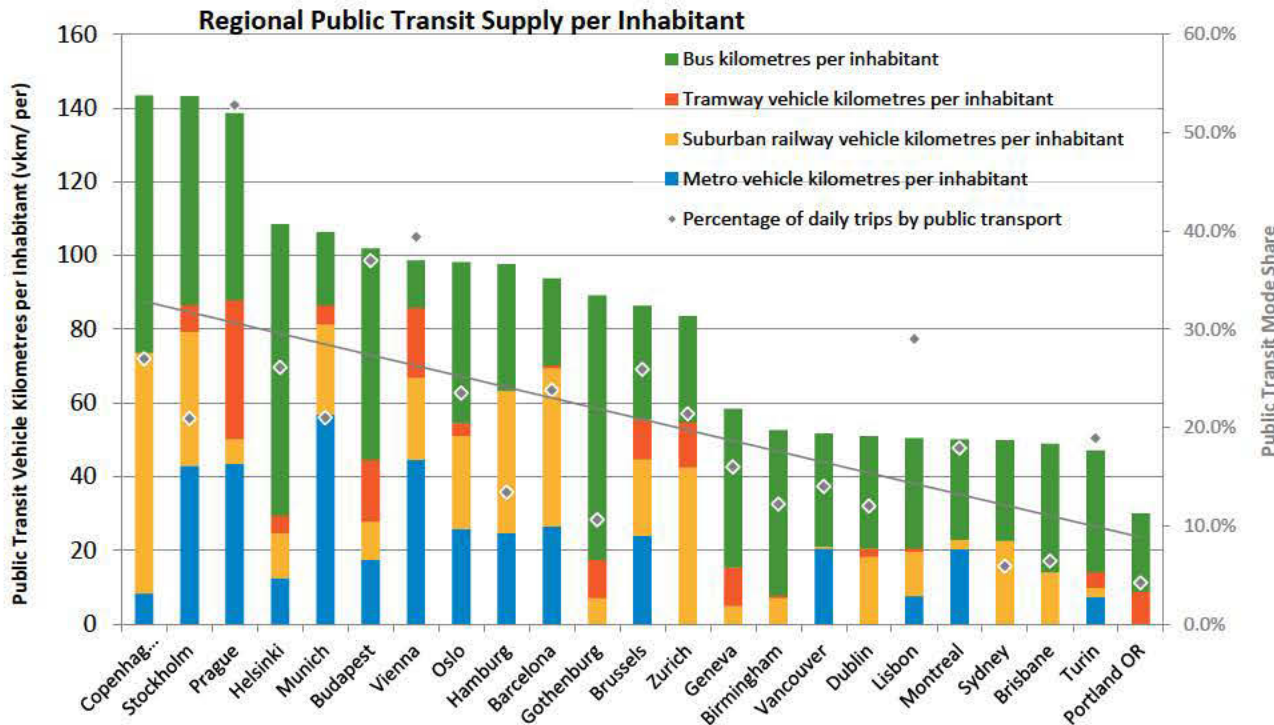
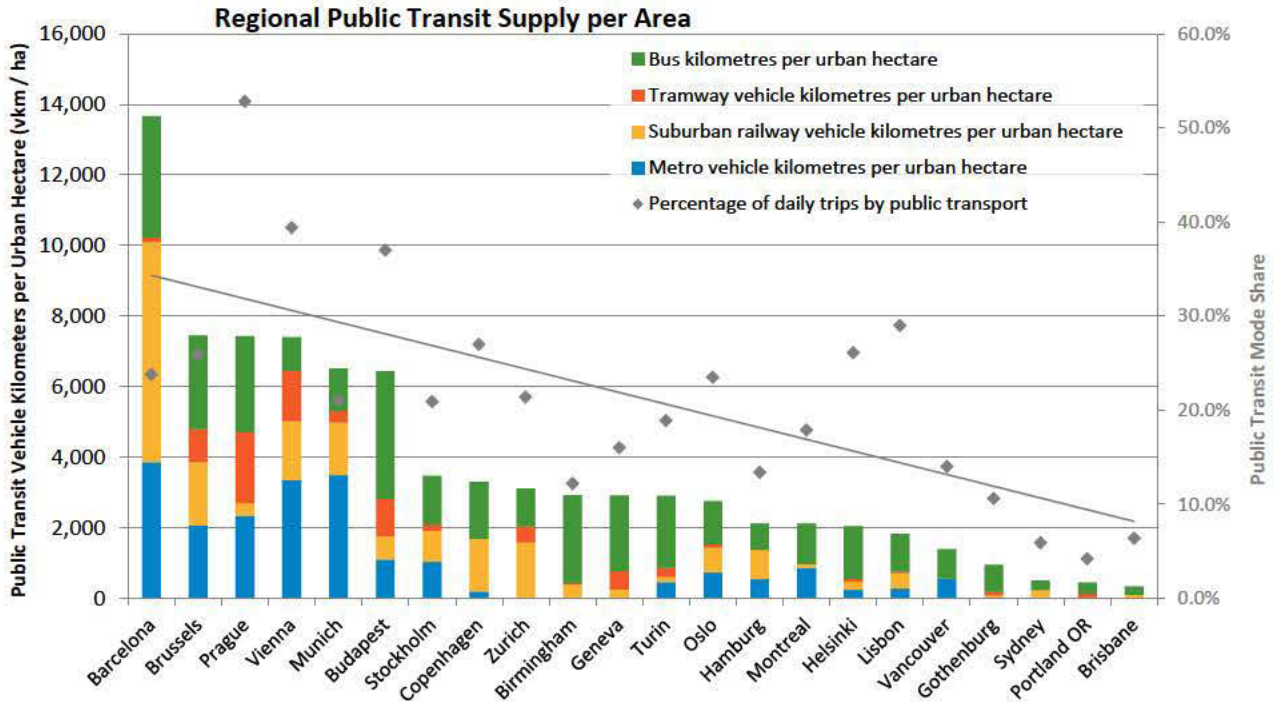
Realizing the ridership potential, particularly in these eastern communities, will require the evolution of a hierarchical network that supports local scale connectivity into a regional network. This will create additional network effects (the WCE ridership levels have since recovered and surpassed those before the opening of the Evergreen Line), and ensure that travel times are competitive for more residents, not just those living directly on the corridor(s). A potential first step may also be to provide more Express Bus or TrainBus type service to assess and build the market.

Figure 33: Regional Population Growth



Additional Benchmarking Information

The figures below utilize data from the UITP Mobility in Cities Database 2015³⁰



³⁰ Not all indicators are supplied for each region in the database, as such not all regions appear in each graph. As well, "Vancouver" is short for Metro Vancouver; here stats are augmented with additional analyses including the addition of the Evergreen Line extension.

Appendix B: Access and Ridership Potential

Many of the ideas in this submission speak to existing and emerging policy direction, particularly the *Regional to Sub-regional Network Concepts*. These were further assessed against two key objectives and associated indicators to improve the order of magnitude understanding of the concepts' potential benefits. The two indicators included **Access to Opportunities** and **Ridership Potential**. *Figure 35* at the end of this section summarizes the potential benefits of many of the network concept ideas in comparative terms using these two indicators. These represent a high-level assessment only and are sensitive to some of the underlying assumptions utilized. The two indicators and these assumptions are further detailed in this section. Not all of the network concept ideas were assessed, including those which are currently being studied in separate processes (i.e. *Arbutus to UBC SkyTrain*, *Burrard Inlet Rapid Transit*, *Victoria Drive Corridor Service Directness*).

Access to Opportunities

This indicator utilizes the cumulative accessibility metric to assess the level of access to opportunities such as jobs, recreational centres, parks, hospitals, or other amenities that residents have within a specified travel time. The methodology closely followed robust academic applications that are increasingly being applied in practise³¹. Key specifications utilized within this work included:

Access to Jobs: Job access is a key driver of transit use and remains public transit's most important function in cities. Job access typically acts as a proxy for access to other vital amenities on aggregate, as where jobs are located, so are important services like hospitals, supermarkets and many recreational opportunities.³²

40 minute Transit Travel Time: This travel time threshold most closely correlates with outcomes in terms of transit ridership, and approximates typical average work commute transit travel times in Metro Vancouver. The travel time threshold includes walking and waiting time at stops.

Network and Land Use Inputs: The analyses utilized GTFS data from the Fall 2018 transit schedule and network. Land use inputs were a combination of census 2016 population and RTM employment and population data. Census dissemination blocks were used to obtain a highly granular result.

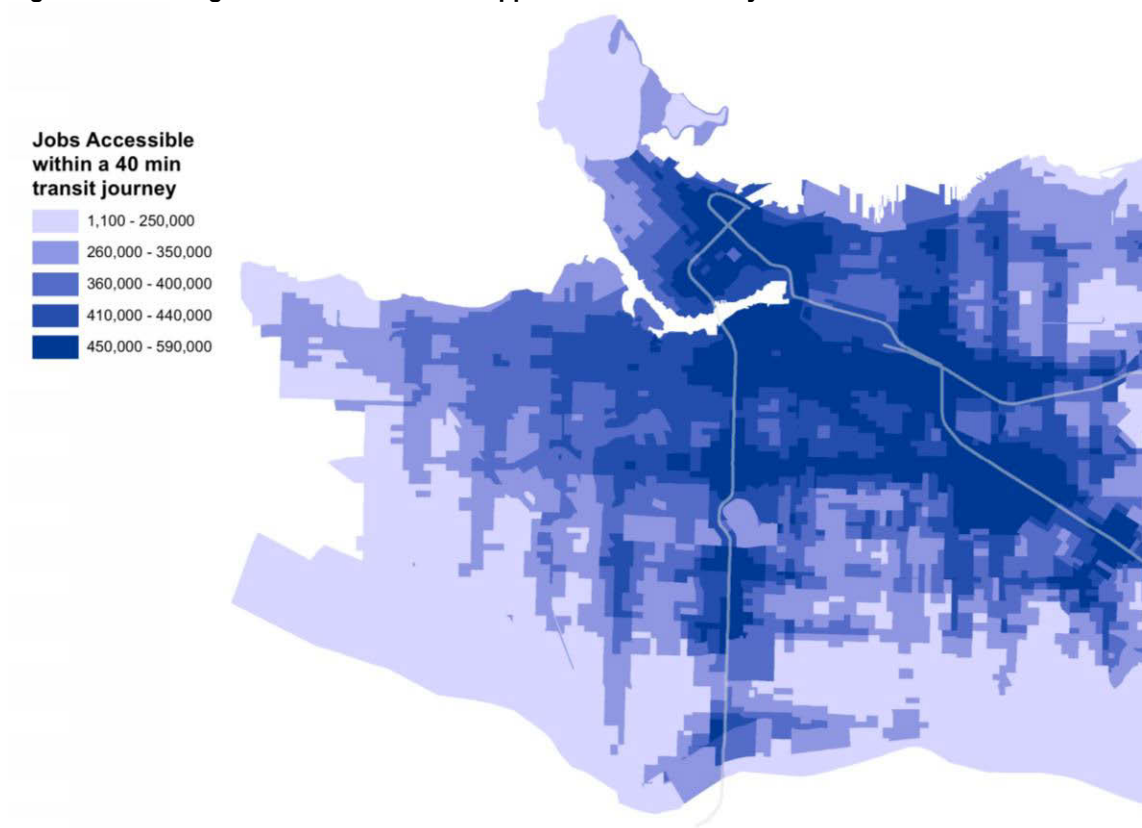
Transit Network Parameters: The access levels measured in these analyses are an abstraction of that which is available to a typical resident departing in the AM period between 8:00 AM and 9:00 PM, when transit service levels are the highest. The analyses is aggregated across 5 minute intervals (departure times) to approximate random departures and flatten the impact of lower frequency services.

Figure 34 below provides the existing levels of access to job opportunities by transit within a 40 minute travel time.

³¹ Owen & Murphy 2017 - Access Across America: Transit 2017 Methodology, Accessibility Observatory, University of Minnesota.

³² Future work would endeavour to explicitly include additional land uses. These analyses require large computational power, and significant time is required to run scenarios which speaks to the need for an Access to Opportunities Model

Figure 34: Existing Levels Access to Job Opportunities in the City of Vancouver



Once having determined the baseline/existing access levels it was possible to assess the access effects of a new network concept. These effects can be viewed at each individual dissemination block level to understand the percentage or absolute increase in access to jobs each network concept might provide. Importantly, this lays the foundational framework for assessing access in terms of vertical equity of access or **access equity**. At this stage, residential density is not yet introduced, and the level of transit service provision could be determined independent of density, such that lower density areas with low levels of access are targeted. To the extent that access equity is an objective, the resultant lower service productivity would not be considered disadvantageous in terms of concept assessment. As this framework was not fully developed and as the ideas in the submission are preliminary concepts, this was considered at a qualitative level only.

The access effects can also be aggregated to provide one value. This explicitly accounts for residential density as well as removes the need to assess access at a specified time threshold; instead utilizing all thresholds up to 60 minutes. Aggregation permits objective comparisons across different network concept ideas as is demonstrated in *Figure 35* below.

Ridership Potential

The ridership potential of the preliminary *Regional to Sub-regional Network Concepts* was also assessed. In many of the concepts this involved modelling existing transit corridors with an assumed level of service improvement, such as indicative higher order transit (e.g. from existing regular bus service to transit service with dedicated right of way and retained shorter station spacing) or indicative rapid transit (with dedicated or complete grade separation and a longer station spacing).

This exploratory exercise utilized the City of Vancouver's Subarea Transportation EMME Model (VanSAM) to test these higher order and rapid transit concepts. Service level parameters were assumed based on analogous existing services found in the region, including operational patterns and frequencies, or from other related studies.

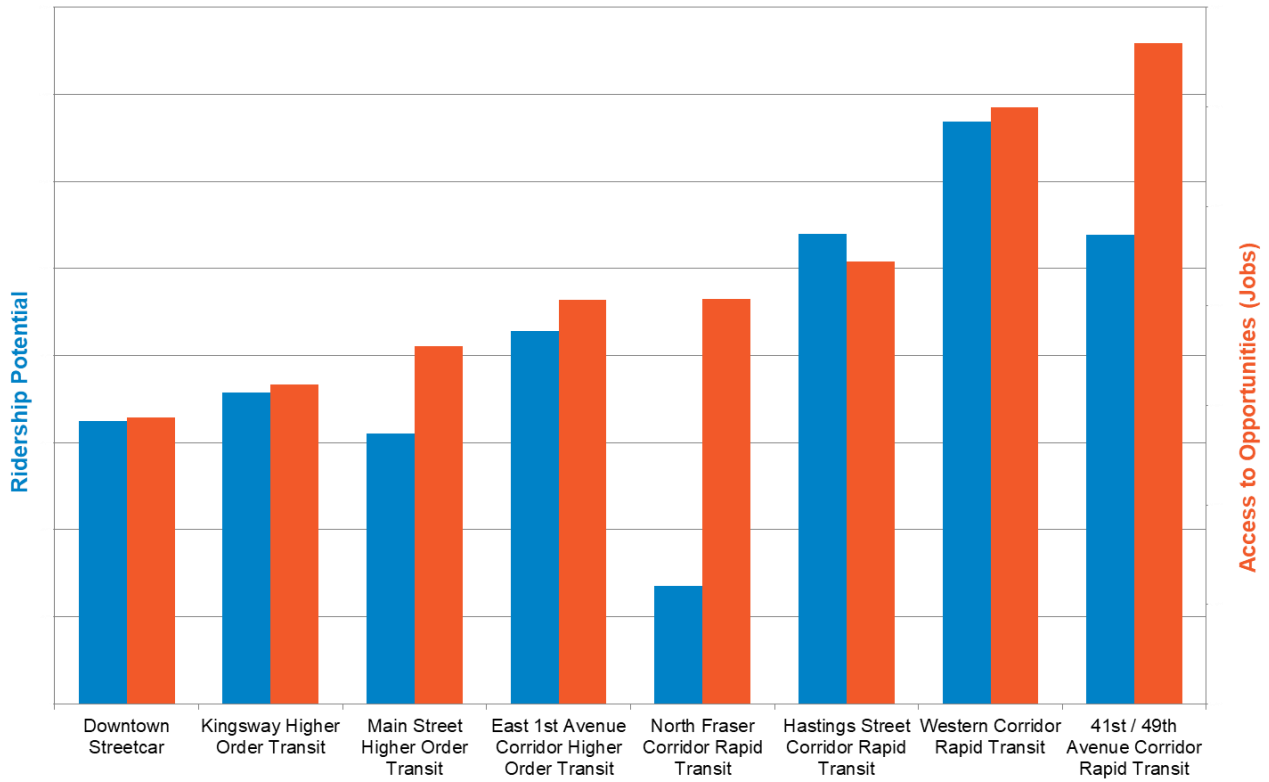
Assumptions around how the existing transit network would be reshaped around any new higher order or rapid transit service introduction were generally limited only to the existing service(s) it was intended to replace or intensify. Services perpendicular to the corridor or which interlined with segments of the explored network concepts were generally retained. For example, the *Hastings Street Corridor Rapid Transit* idea assumed truncation of the existing 95 B-Line at the eastern extent of the modelled network concept.

The general modelling philosophy was to assume a high level of frequency service for all network concepts to limit an otherwise large number of modelling scenarios and permutations. The models were run for both the 2016 base year and the long-range 2045 model horizon year. Both model years assume that the Broadway Rapid Transit extension to UBC is in place.. *Figure 35* below is representative of the ridership potential in today's context (2016), and independent of the combined effects of all the evaluated network concepts.

In a more detailed assessment, additional system characteristics would also be considered such as frequency of the remaining services, integration and network planning of other area services, differing levels of priority, etc. A deeper investigation into time horizons and ridership contributory factors would also be required, including a comparison between the network concept's individual ridership attraction and its incremental overall system contribution.

Given this work was intended only to inform the idea generation stage, the assumptions and limited modelling iterations were considered the appropriate level of assessment to explore order of magnitude ridership potential. Ultimately, more detail regarding the ultimate objective(s) of each network concept and how they fit into a broader conversation and network hierarchy will shape what the concept might look like and this would have sizeable impacts on the ridership potential.

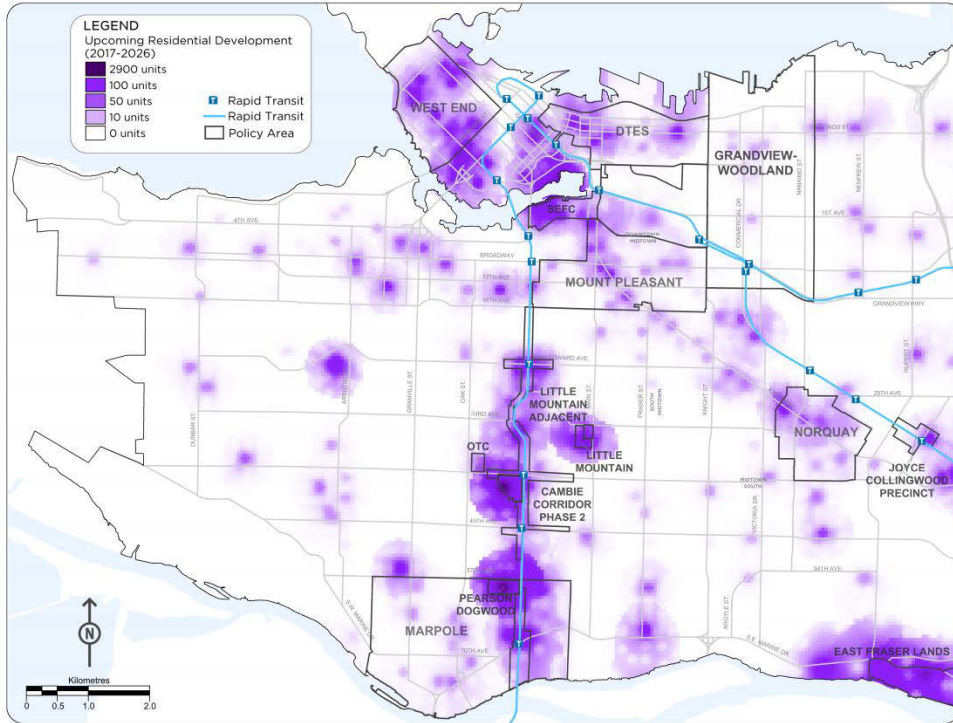
Figure 35: Sub-regional Network Concepts Comparative Assessment



Appendix C: Supporting Data Layers

These layers supported sub-regional network concept idea generation.

Upcoming Residential Development



Projected Population Change

