Innovative Infrastructure Development and Implementation

APTA Study Mission to Canada | July 22–28, 2018

Montreal, Ottawa, Toronto and Vancouver

FINAL REPORT

AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

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The past year at APTA was one filled with change, strengthening of relationships, and leading our industry into the new mobility landscape. There were unparalleled events and meetings showcasing amazing innovative work in the public and private sectors from coast-to-coast and around the globe, including the inaugural APTA Mobility Summit. This ensured APTA was engaged at the highest levels and is now ready to lead our industry in seeking and implementing solutions to today's challenges and plan for those ahead.

Part of that planning came together during the 2018 Study Mission to Canada. With a delegation of our members, and a jam-packed agenda, we learned what our Canadian colleagues are doing in the areas of innovation, infrastructure and mobility.

On behalf of the delegation members, we are delighted to present the final report of APTA's Study Mission to Canada. In it you will find valuable information on the unique governance, infrastructure implementation practices and financial structures in each of the four cities we visited; and it also includes our delegation's key findings. The report aims to be a beneficial resource for all APTA members as you move forward with the planning and construction of your transportation infrastructure projects.

As this report illustrates, we are part of a global industry in which the best ideas need to cross cultures, industries and national borders.

Sincerely,

Nathaniel P. Ford Sr.
APTA Chair (2017-2018)
Chief Executive Officer
Jacksonville Transportation Authority

Paul P. Skoutelas
APTA President and CEO

Introduction and Executive Summary

APTA organized a one-week study mission to Canada on "Innovative Infrastructure Development and Implementation" from July 22-28, 2018. An APTA delegation representing 30 public transportation agencies and businesses visited four Canadian cities to learn how major investments in public transit infrastructure north of the U.S. border are being structured, developed and financed.

APTA 2017-2018 Chair Nathaniel P. Ford Sr. and APTA President and CEO Paul P. Skoutelas led the study mission to Montreal, Ottawa, Toronto and Vancouver. APTA members participated in presentations, site visits, panel discussions and small roundtable exchanges with Canadian public transportation operators and authorities, global business leaders, and federal, provincial and local government officials, including the mayors of Ottawa and Toronto and the Federal Deputy Minister for Infrastructure and Communities. APTA's longstanding partner, the Canadian Urban Transit Association (CUTA), assisted in planning the trip and accompanying the delegation.

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Through the Canadian Public Transit Infrastructure Fund, investments of $2.6 billion[1] in federal funding have been made over the past three years to upgrade and improve public transit systems across Canada. To support the next phase of ambitious public transit projects, the federal government will invest another

$15.2 billion over the next decade through bilateral agreements with provinces and territories. Additional investment from provincial and local governments and from the private sector is expected to top $60 billion over the next 10 years.

Funding is going toward state of good repair, future system improvements and expansions, enhanced asset management, and system optimization and modernization. With the first phase of implementation complete, there were many insights to gain on Canada's experience in using public-private partnerships

1 All financial figures are listed in U.S. dollars (exchange rate as of Feb. 20, 2019).

(P3s) and other alternative financing and procurement approaches, capital project management and the development of new institutional structures.

The delegation began its study mission in Montreal to learn about the region's new organizational structure for strategic governance of public transportation and the financing of commuter rail service for Montreal by the Quebec pension fund.

The study mission continued to Ottawa, Canada's capital and the country's fourth largest city. Ottawa's highly successful Bus Rapid Transit (BRT) reached capacity and is now undergoing a $9 billion transformation as it is converted from bus to rail – a first in the world. This transformation is being undertaken in two stages using a P3 Alternative Finance and Procurement Process Model program.

Participants next spent time in Toronto, where the government of Ontario is making the largest provincial infrastructure investment: more than $145 billion for public infrastructure over 13 years starting in 2014–2015.

The study mission concluded in Vancouver, which is experiencing the highest growth in ridership in Canada. Growth is buoyed by a strong economy and investments in Metro Vancouver's public transit infrastructure, such as the extension of the SkyTrain network that opened in 2016.

II Key Findings

The study mission participants observed a somewhat different approach to federal and local roles in Canada than in the U.S. Canada's federal government directs funding to what it considers transformative transit projects, but local operators have a significant degree of autonomy in how they plan, finance and deliver projects. In addition, provincial governments have designated offices dedicated to assisting the public sector in contract and project management and financing and procurement for large infrastructure investments, including P3 projects. Their goal is to deliver a long-term infrastructure plan on time and on budget.

P3 financing is certainly more of a necessity in Canada than in the U.S., due to the absence of tax-free municipal bonds in Canada, explaining the maturity of the P3 market. In that context, and the hands-on relationship between Canada's provincial governments and local public transit agencies, mission participants gained valuable insights:

1. Extensive partnership building is essential to successful infrastructure development. Good partnership structures entail political, strategic and operational alignment with regular and diligent communication.

2. P3s are simply one modern financing and procurement practice and each public sector infrastructure project is different. When examining P3s as a solution, obtain advice on how to establish a P3, if it is right for the project and how to frame up the key desired outcomes.

3. It is exceptionally helpful to have a national repository of infrastructure development and funding and financing practices, as well as advisory services for public sector owners on how to plan and arrange procurement for complex infrastructure projects.

4. New approaches to infrastructure projects will require culture change within an organization. Equip your organization with the resources and skill sets to manage new and innovative funding and financing practices and to carry out active and collaborative project management.

5. Develop a core leadership team within your organization that best fits the needs for the project and:
    - Includes innovative thinkers who can provide the leadership needed to plan, develop and implement the project.
    - Has a clear strategy to move the project forward.
    - Is pragmatic while maximizing the benefits of the project.
    - Is commercially empowered to make key decisions in a timely manner.

6. Obtain elected, public and community champions for your project by providing a thorough communications strategy that consists of regular project updates.

7. Conduct market testing on the project and key elements including draft documents, key performance indicators (KPIs) and other critical elements. Adjust where required to ensure the protection of public interest and solid competition by the industry for the project.

8. Key strategies for successful P3 deals should emphasize sound relationship building; treat everyone on the project as equals; bring in all necessary expertise; and share in project savings.

9. Accountability must be shared by all project partners. Ensure that risks are clearly allocated and fairly balanced (i.e., the party best equipped to handle the risk is responsible for that risk). However, the public sector should never transfer its reputational, environmental and political risk.

10. Build in State of Good Repair up front, along with the connection with parallel projects. Take the time required to ensure your organization has the capacity to deliver and that the operating company for which a project is being built has enough resources to ensure safety. Enable the private sector to innovate within a project.

11. Do a rigorous procurement options analysis before deciding on a specific project procurement.

12. Be outcome-oriented; articulate, track and manage the intended benefits of the project to ensure they are ultimately achieved. When public transit investment is done well and done right, based on community-driven policies, it has a powerful and transformational impact on the communities it serves.

III National Context

Until this century, Canada's federal government had no historic mandate for public transit policy. Prior to the mid-2000s, transit policy was driven by municipalities. Since that time, there has been a paradigm shift. Now, all three major political parties have transit infrastructure platforms and funding promises, which share the same fundamental goals and beliefs in transit investment as an engine for economic growth and sustainable communities.

The funding structure that has been developed involves a permanent federal gas tax directed entirely to infrastructure investment. Funding is distributed to the provinces, with allocations based on population for distribution to eligible municipal infrastructure investment projects.

Following the 2015 national election, the current federal government published its "Investing in Canada Plan," with public transit as one of the main pillars. The Ministry of Transport (Transport Canada) was separated from the Ministry of Infrastructure (Infrastructure Canada, which itself was only established in 2002), but the distribution of transit infrastructure funding remains with Infrastructure Canada. Funding for 2016-2019 is $2.6 billion under the Public Transit Infrastructure Fund (PTIF)—since extended to 2020. PTIF can fund up to 50 percent of cost for eligible projects.

The federal government has signed bilateral agreements with all provinces for a new 10-year infrastructure program, which is poised to begin distributing funds in 2019. This program will be provide $15.2 billion of federal funding for transit and will generally cover 40 percent of project costs. The funding will be distributed through the provinces, similarly to PTIF.

The federal government has recognized both repairs and improvements as priorities. As the program matures, the focus is shifting away from long-term planning initiatives and more toward measurable outcomes. These include increases in available public transit rides and seats, and modal shifts to public transportation.

The Canada Infrastructure Bank was also established in 2017, with $26.3 billion in capital (of which $3.75 billion is for transit) to be used to attract private investment to extend the reach of public money. This is focused on supporting P3 projects, but so far it is moving very slowly.

IV Montreal

1. Governance

Montreal is the second largest city in Canada, with a population of four million people. However, it is considered a human-scale city, very walkable and bike-friendly. The existing public transit infrastructure includes four metro [heavy rail] lines, six commuter rail lines and more than 700 bus routes.

In the Montreal region, public transit carries 19 percent of 2.5 million daily commutes in the city, with 10 percent of commuters who walk/cycle and 34 percent using transit in the city center. The split of boardings is 48 percent bus, 48 percent metro, and 4 percent commuter rail, giving a total of 500 million boardings per year.

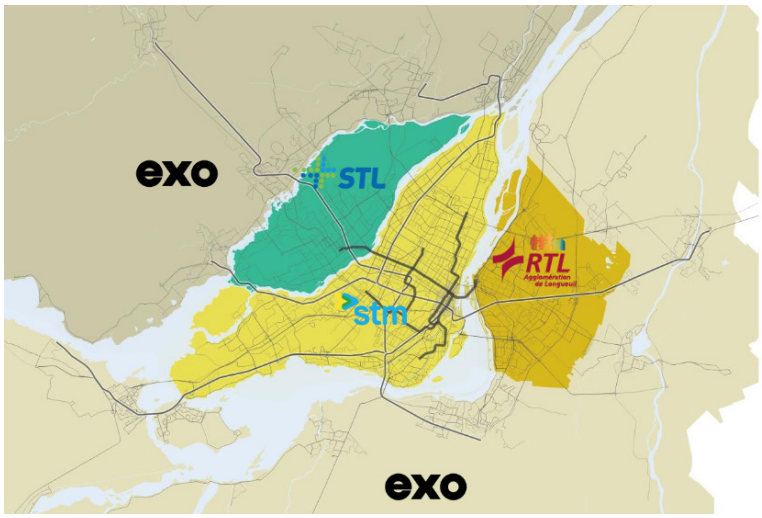
ARTM, Montreal's regional transportation authority, was created on June 1, 2017, to manage transit infrastructure, with a focus on innovation, delivery, mobility and investment. It is a new model for Montreal, similar to Transport for London (TfL) and Ile-de-France Mobilites (IFM) in Paris, as well as TransLink in Vancouver.

ARTM oversees all modes of transit operations. It has restructured the previous 16 operators in four operating organizations:

- STM—operating metro and most of Montreal bus;
- STL and RTL—operating bus routes in the suburbs; and
- EXO—operating commuter rail and exurban bus routes.

The metro system operates entirely below ground. First opened in 1966, it has stations that resemble art galleries. Vehicles have rubber tires similar to the Paris Metro and can hence handle steeper grades and tighter curves than steel wheel rail systems.

EXO operates six CRT commuter rail lines that provide 20 million trips each year; 237 bus lines providing 24 million trips; and paratransit services. These services under the EXO structure were merged from 14 previous operators. EXO is still working through the integration, recognizing that many of the operations are outsourced.



1 Regional PT Authority

4 PT operators
- Exo
- STL
- STM
- RTL

ARTM is currently negotiating operations contracts with each operator, which will eventually establish measurable performance indexes. Initially these are being extended from the existing performance levels. Regular operations committee meetings between ARTM and the operators are used to work through expectations. The division and sharing of decision-making authority is based on core competencies of each agency.

ARTM is responsible for revenue, fare policy and future fare integration. This is a significant change for the transit operators. ARTM has $2.2 billion in revenue and spending, including $900 million from operating revenue. The municipal deficit backfill is capped at 30 percent of operating cost.

2. Infrastructure Implementation

The Reseau Express Metropolitain (REM) Project will convert an existing express bus service corridor and a commuter rail line to automated light metro rail service, delivered through a 100-year P3 contract with CDPQ, the state pension fund. CDPQ is responsible for the design, construction, operation and maintenance of the REM. It will comprise 26 stations, 67 km (42 miles) of a mainline plus two branches (i.e., three services), operating an automated light metro rail with service every 90 or 150 seconds. It will have a fleet of 200 cars operating in four-car trains and stations enclosed with platform screen doors. The line comprises a mix of elevated, tunnel and at-grade segments, including reusing a 100-year-old tunnel. It involves the conversion of the existing Deux-Montagnes commuter rail line to light metro rail standards.

The REM Project will cause significant changes to the regional transit structure. REM will be governed as a new operator under ARTM's structure. Its capital and operating financial structure is unique, but integrated within ARTM's overall budget. To ensure that this transition occurs effectively and without disruption, REM/CDPQ representatives are already integrated into the monthly operating meetings.

Like many US metro systems, the Montreal metro system had previously been starved of investment and suffers a maintenance deficit of some $3 billion. However, now that PTIF funding is available, major investment and rebuilding is taking place:

- STM is receiving 52 new cars, replacing its 50-year fleet. Two additional trains have been ordered, paid for out of delivery delay penalties within the supply contract. The trains are a huge advance in technology, comprising unit trains with open gangways and modular equipment.
- Stations are also being rehabilitated, including the addition of new elevators, providing full accessibility for the first time.

CDPQ Infra

20 hours/day
7 days a week

26 stations
67 km

Main line
2 min. 30 sec.
peak hours

One of the world's largest automated transit system

- A new metro depot is being constructed, at a cost of $330 million.
- An extension of the Blue Line, costing $2.9 billion (including financial costs), is being developed. Engineering has now started, with construction anticipated in 2021-2026.
- State of Good Repair spending is occurring at rapid rate, with $600 million in 2018 alone. While the spending over the last 10 years totaled $3.4 billion, it is necessary to spend $11.3 billion over the next 10 years – and all of it under revenue service conditions.
- Four new traction power substations are being added to improve system redundancy under the power demand for the new cars. In addition, planning is advancing to accommodate new transformers for power feed voltage changes by the utility company from 12kV to 25kV.
- EXO is investing in new rolling stock, including 20 bi-level cars from CRRC and some new locomotives. They are building two new depots as they take over operations from the railroads (CN and CP, who previously maintained the commuter cars in their depots).

Also of note, STM is moving its bus fleet to be 100 percent electric by 2025. It will receive 38 new electric buses next year, with a mix of 10-meter (33-foot) and 12-meter lengths (39-foot). These buses comprise both overnight charging and fast-charging units, as appropriate for longer-distance suburban lines and shorter urban services respectively. The first all-electric line has been in service for a year, running 500 km (more than 300 miles) each day with 3-minute recharging at each end of the line.

3. Financial Structure

For the REM Project

CDPQ is a global institutional fund manager, holding approximately $225 billion in net assets. It is an active, direct investor in transit infrastructure, including Eurostar, InTransit BC and Heathrow Express. CDPQ Infra (CDPQI) is a subsidiary, recently created to directly develop new infrastructure. CDPQI is intended to propose project solutions and perform in-house delivery, planning, financing, execution, operations and maintenance.

The REM project has a $4.7 billion budget, with $2.2 billion coming from CDPQI, $1 billion each from the provincial and federal governments, $221 million from Hydro Quebec, the public electricity company, and $384 million from ARTM. CDPQI carries all the project risk. Funding from ARTM uses a value capture approach through a development charge on new real estate (rather than a tax increment financing grant on existing properties). This is similar to Crossrail in London, Luas in Dublin and Spadina in Toronto. The development charge (charged on the land value, not developed value) has been in effect since May 1, 2018.

During the operations and maintenance (O&M) period of this 100-year contract, ARTM will pay 54 cents per passenger-km, with ridership risk borne by CDPQI. CDPQ needs to generate a return of 6-7 percent per year.

V Ottawa

1. Governance

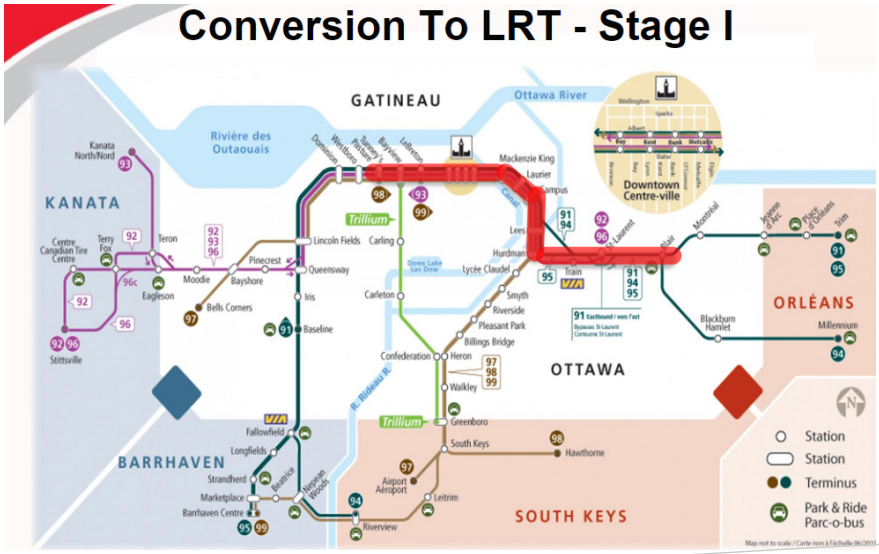
Ottawa, Ontario, is the capital city of Canada. It covers a large area, with a population of one million people. Across the Ottawa River is the city of Gatineau, Quebec, with the two cities together forming the National Capital Region.

The transit provider in Ottawa is OC Transpo, which operates as an entity of the city with policy direction by the city council's Transit Commission. With a stated goal of developing a safe and efficient transit network, the city manages its transit infrastructure development through the Transportation Master Plan (TMP), which defines the associated policy, budget, planning and direction for all transportation modes, including walking and cycling.

2. Infrastructure Implementation

Ottawa's major transit infrastructure effort is to replace its existing grade-separated bus transitways with an automated light rail system. The transitways opened in phases starting in 1983 and have been so successful that bus traffic on surface streets downtown reached a saturation point: buses in bus-only reserved lanes on the downtown one-way pair of streets are backed up a significant distance each day.

The conversion from BRT to LRT is being implemented in two phases, each using a P3 delivery approach. The Phase 1 project is well advanced in construction and was in the testing period at the time of the study mission. The line is expected to carry approximately 11,700 passengers per hour per direction (pphpd) at opening, which would make it the busiest LRT rail line in North America on opening day. As many as 80 percent of existing riders will have a modified commute, primarily changing from a one-seat bus ride to



a two-seat multimodal journey. Three transfer stations will each accommodate more than 100 buses each peak hour. Rail services will operate with the ability to add capacity through train extension and headway of 90 seconds.

The new rail line will provide fully segregated operation. Within the downtown area, the line will operate through a new tunnel, avoiding the on-street congestion currently experienced by buses and allowing for street-level enhancements.

The P3 contract has a Design-Finance-Build-Maintain scope, with OC Transpo retaining operations, both in recognition of existing union agreements and to retain responsibility for the agency's organizational reputation.

The corridor is already seeing transit-oriented development along the line. A 65-story building (to be the tallest in Ottawa) has been approved adjacent to the line and a future hockey stadium is in the planning phase of relocating from the suburbs to downtown.

OC Transpo's and the concessionaire's approach to managing the Phase 1 project for the Confederation Line and its P3 contract include the following characteristics:

- Scoping the work to include associated items, such as provincial highway widening and adjacent utility projects, as well as transferring maintenance of the line, its vehicles and systems to the concessionaire for the duration of the project.
- An organizational structure that includes subject matter experts beyond the technical advisors (i.e., two sets of consultant support) and individual experts for specific project challenges.
- Separate boards for project control and for monitoring project progress.
- Use of an independent certifier for certification of contractual completion, addressing seven streams of readiness requirements for revenue service.
- Use of an independent safety auditor to provide the owner with final validation that the system complies with safety requirements.

There is a heavy focus on stakeholder relations, including across city departments, the National Capital Commission providing federal approvals, and with affected First Nations representatives. Entrances for tunnel stations have been integrated within adjacent privately-owned buildings. Coordination of electromagnetic compatibility/interference has taken place with sensitive labs at the University of Ottawa.

Infrastructure Ontario (IO) was brought in early on so project partners could make use of its expertise in P3s and procurement. IO is an agency of the province of Ontario that supports government initiatives to improve public infrastructure. One of its services is to act as the procurement and commercial lead for major public infrastructure projects in the province.

The P3 contract allows for technology updates after award through a shared savings mechanism, in an effort to avoid technological obsolescence occurring during the project development phase. In addition, a small line segment has been completed and lessons learned were built into the remaining work. There was also a shared incentive mechanism based on days of street closings and bus lane closures (Mobility Matters, essentially a lane rental system) with outcomes to be assessed at the end of the project. "Energy Matters" was also used to provide for sharing of savings and overages based on stated energy use.

The Phase 1 P3 contract only partially considered how the Phase 2 project would be implemented. OC Transpo took a year to review various options on how that could be achieved competitively without placing the Phase 1 Concessionaire in either an advantaged or unfairly excluded situation. The outcome reached is that RTG (Stage 1 concessionaire) will take on some scope directly, including expansion of the yard and vehicle fleet, and has agreed not to compete for the remaining scope on the Confederation Line. However, for the Trillium Line (which is segregated), the firm has no perceived advantage and so is permitted to compete for that work. Federal and provincial governments have agreed to this approach.

In preparing to be the startup rail operator, OC Transpo has used the vehicle mockup as an operator simulation tool. This builds on success with simulators, which are now very sophisticated, for its bus drivers. The simulators can be used to create risk scenarios and repeat actual field situations.

OC Transpo is modifying its control room to include the rail operations function. It contains one large room that includes control for bus, rail, transit police, accessibility and a "pit boss" as a coordinator. It also has a situation room for major events. The agency is creating "playbooks" for each station, to assess risks and prepare for situations.

3. Financial Structure

The BRT to LRT conversion program has the following financial characteristics:

- Stage 1—$1.6 billion capital, providing $2.4 billion in benefits and savings.
- Stage 2—$2.7 billion capital, providing $3.4 billion in benefits and savings.
- A 30-year concession for Operations & Maintenance with an overall capital investment of $9 billion.

Funding is coming from all three levels of government, with some financing provided by the P3 concessionaire. The federal and provincial funding level is $450 million each, one third of an early estimate. As the price increased, the share percentage declined due to the fixed amount. As a result, the two senior levels of government are actually each paying 40 percent of invoices so that full contribution is made during design and construction, not in the Operations & Maintenance phase.

Having considered how to require private investment, it was decided to settled on 15 percent private participation, with the debt-to-equity ratio undefined and therefore left up to proposers. The selected team brought debt through external lenders of $169 million, with $57 million in equity. Interestingly, the city has now elected to take over the debt from the external lenders, improving the credit rating from BBB to AA. The concessionaire's equity is still at risk, which means there is no change to the risk profile.

As a lesson learned, for the Phase 2 contract lenders have insisted on a higher level of equity participation. The city considered issuing its own debt rather than including that in the concession scope but has decided to not take that path.

Because of the risk transfer structure, the city was able to maintain a fairly low level of contingency, at only $75 million.

The contractual milestone payments were rigidly defined and, as the work progressed, they did not line up with critical path based on the contractor's chosen construction approach. Faced with the choice of having the work proceed inefficiently to meet the milestones or revise the payment structure, the city elected to modify the milestones to a more complex structure that matched the more efficient work approach, which required approval by the funding parties. The concessionaire also noted that, while the P3 contract had only 12 milestone payments, the design-build joint venture contractor was paying its subcontractors as the work progressed and incurred a cost-of-money expense in the process.

As a lesson learned for the Phase 2 contract, the payment approach will be changed to an earned value scheme, giving more flexibility to the contractor in terms of its means and methods for the construction work. Monthly payments during the Operations & Maintenance phase are adjusted based on several performance metrics.

VI Toronto

1. Governance

The Toronto Area has several public transit-focused entities including Metrolinx, the regional transit planner and developer and its operator, GO Transit, which runs a major commuter rail system and a commuter bus service for the Greater Toronto and Hamilton Area (GTHA), as well as the Toronto Transit Commission (TTC), the municipal transit operator for the city of Toronto.

Metrolinx was initially created in 2006 as the Greater Toronto Transportation Authority, and was later restructured, adopting the name "Metrolinx", and replacing the previous board structure with an appointed one consisting of 15 private sector appointees. This has led to a more focused and business-oriented approach to planning, development and implementation of major transit projects. It coordinates and partners with transit operators in the GTHA and has developed the 2041 Regional Transit Plan, which was completed in the spring of 2018.

GO Transit, as a branch of the larger Metrolinx whole, is the regional public transit service for the GTHA. In operation since 1967, GO has evolved from a single rail line along Lake Ontario's shoreline into an extensive network of train lines and bus routes that carries more than 70 million passengers a year (2017).

GO connects with every municipal transit system in the GTHA, including TTC. In 2009, GO Transit merged with Metrolinx to combine the organizations' expertise in strategy, planning, operations and implementation of building rapid transit projects faster and better while improving the customer experience.

TTC serves a population of 2.7 million with an average of 1.7 million riders per day. Ridership revenues

cover about 70 percent of annual operating costs. The city provides the annual contribution of the remaining 30 percent, at about $225 million to $300 million per year. The TTC has a governing board composed of elected and appointed officials.

All public transit agencies are working together to deliver an Integrated Regional Transportation Plan (RTP), which takes into account that the population of the Greater Toronto and Hamilton Area (GTHA) is estimated to grow by 41 percent, with the number of jobs rising to 4.8 million by 2041. There has also been a shift in travel pattern as jobs move out to the suburbs. The region is, therefore, moving many key projects and overall improvements concurrently to make significant growth in the availability, frequency and reliability of transit in the region. Maintaining a State of Good Repair of existing assets is also a big issue as underinvestment has been a significant issue.

2. Infrastructure Implementation

More than $22.5 billion is being invested in the region's rapid transit infrastructure over the next eight years, including:

- The Eglinton Crosstown light rail transit (LRT) line under construction in Toronto;
- The Viva/YRT BRT line being built in York Region;
- Planning and engineering design underway for additional projects including expansions of LRT, BRT and subway services;
- The GO Expansion Program, the most ambitious program yet, which will transform the region with frequent, two-way all-day rail service, more than doubling the number of GO Transit riders by 2031;
- Expansion of Toronto's Union Station—the hub of the regional transit network—to meet the needs of 300,000 people who use it every weekday and even more who will use it in the future; and
- Implementation of Automated Train Control over several years to allow reduction of headways to about 90 seconds to add capacity to Line 1. The current subway system is at capacity for Line 1 during peak periods and the current headways are about 2 minutes and 23 seconds.

3. Financial Structure

The Toronto-York Spadina Subway Extension (TYSSE) expands the TTC subway system for Line 1 by 5.4 miles and six stations in a traditional project delivery approach. Three of the stations and part of the line are north of the city of Toronto extending into the York region, and the additional cities served contributed the local share for the new stations. TTC extended the mainline and will be paying for the ongoing operating costs for the extension and stations. This created a public-public approach between the TTC and these cities. Land use zoning provides for major density within walking distance of the new stations and some of the cities are using part of the growth in the tax increment to help fund the stations.

Eglinton Crosstown P3 Project—The Eglinton Crosstown Project is an LRT system being constructed along Eglinton Avenue, which runs east-west in Toronto. It will connect to existing elements of the TTC subway system, GO Transit commuter rail and various bus routes. The estimated cost is $4B (2010) in capital investment - the full contract award to Crosslinx Solutions was $6.9B (2014) which includes construction and maintenance over 30 years. Metrolinx is working closely with Infrastructure Ontario to deliver the project and the TTC will operate it.

The project is being delivered through an AFP (Alternative Financing and Procurement), essentially an alternative financing and risk management approach and a risk-based procurement structure. Metrolinx is viewing this as an opportunity to transform its business model. The project, the biggest AFP in North America at this time, has completed procurement and is under construction.

For the AFP approach, these key elements were considered:

- A core project scope evaluates what to transfer to the private sector and what to retain by the public owner, building a very solid business case methodology and cost-benefit analysis.
- Risk is assigned to the party best able to mitigate and manage the risk in a cost-effective manner. However, risk allocation is to be updated during the project to ensure that project goals are being achieved.
- Investors and lenders provide effective financial oversight of the project.
- Put in place sponsors (such as the Metrolinx board) and a project champion (such as a senior official).
- Ensure the AFP is outcome-focused; establish AFP project objectives and give the private sector incentives to innovate as they deliver
- Match KPIs to the project objectives. The KPIs will guide and become part of the procurement and project agreement documents.
- Develop a strong project agreement and make that part of the RFP process.
- Provide a solid advisory team including an owner's engineer and others where necessary, such as Infrastructure Ontario. (In the U.S., this would typically include outside P3 counsel and outside P3 financial advisors.)
- Ensure that the request for proposal documents and project agreement can accommodate service level changes during the term of the agreement.
- Outline what happens when the project will be handed back to the public owner at the end of the project agreement.

VII Vancouver

1. Governance

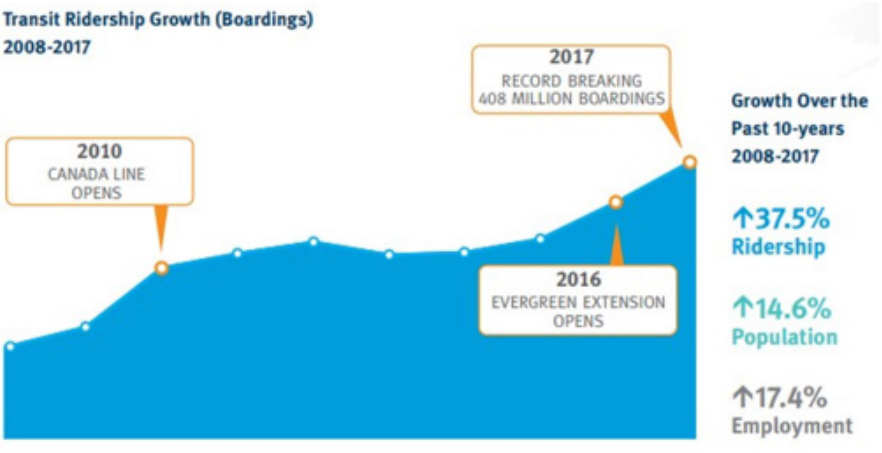
TransLink was created in 1999 as a planning, funding and delivery authority for regional transportation in the Greater Vancouver region. Another regional agency, Metro Vancouver Regional District, oversees regional utilities and regional growth management.

TransLink has a broad multimodal mandate to deliver a regional transportation system that moves people and goods. It operates the region's integrated public transit system, owns and operates some regional bridges and provides cost sharing to municipalities to fund walking, cycling and road infrastructure. Public transit services including light metro transit, commuter rail, BRT, fixed bus routes and passenger ferry are delivered by contracted services or operating companies wholly owned by TransLink.

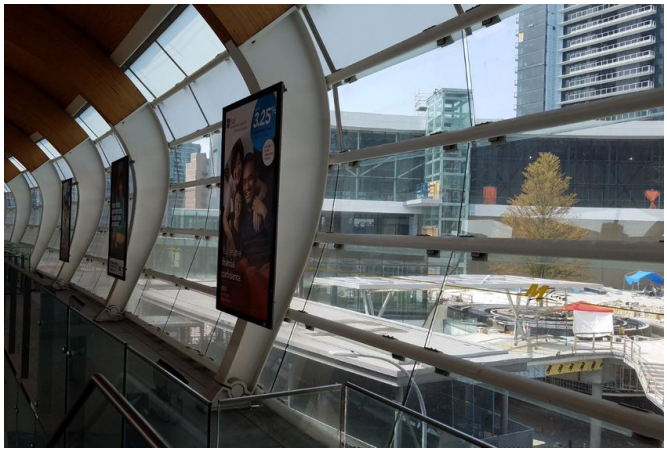
Transit ridership has been steadily growing in the Vancouver region: a 15 percent combined increase for 2016-2018 and a 37.5 percent increase in ridership in the past 10 years). With the region's rapid growth, housing affordability has become the number one issue.

The Mayor's 10-Year Vision is an agreed-upon regional blueprint for investing billions of dollars in transportation over the next 10-year period with major transit goals shown below. To fund the region's share of this 10-Year Vision all at once, TransLink's Mayors' Council on Regional Transportation initially proposed a regional increase to the provincial sales tax, but this was voted down by the public in a 2015 referendum. Subsequent to that, the federal government approved major new funding for transit and, in response, the region's mayors and the provincial government came up with a number of measures to help provide the required local and provincial match, including:

- Transit fare increases;
- Parking fee increases;
- Property tax increases;



New Transit Investments Driving Ridership Growth



- New development cost charges taking effect in 2020 (similar to a one-time development impact fee used in select communities in the U.S.); and
- Commercial revenues.

The overall capital plan is estimated at $7.9 billion, with 29 percent of that financed and the remainder being funded from federal (21 percent), provincial (27 percent) and local pay-as-you-go funding (17 percent from a regional gas tax and the rest coming from reserves and from municipalities). TransLink has solid AA credit ratings that allow for cost effective borrowing when needed.

2. Infrastructure Implementation

TransLink currently has several infrastructure and service improvements underway, including:

- Major Public Transit Projects
  - Millennium Line Broadway Extension—$2.2 billion capital costs
  - Surrey Light Rail (South of Fraser) Line[2]—$1.3 billion capital costs
  - Expo and Millennium Line Upgrades—$1 billion capital costs
- Bus System Upgrades
  - 18 percent increase in bus service
  - 7 new "B" Lines—express bus lines with bus rapid transit elements
  - 8 new service areas
- Seabus
  - One new Seabus
  - Reduced Seabus headways

Canada Line—The Canada Line is a light metro rail line that opened in 2009 and runs from Richmond/Vancouver Airport to Downtown Vancouver. It was built and delivered as a design, build, operate P3. This line was a major success from the standpoint of advancing the project in time for the 2010 Winter Olympics and to provide a rapid transit link from the airport to downtown. Major growth has occurred along the line, with dense development around the stations. Ridership has exceeded the forecasted levels for the P3 Agreement. The P3 agreement does not easily accommodate growth in service levels and this has generated spirited negotiations with the private concessionaire for the Canada Line. Based on this, TransLink issued a caution for further P3 projects that changes in service levels must be adequately addressed as part of the procurement and negotiated P3 agreement for rapid transit projects.

Conversion of BRT Corridors to Rapid Transit Rail—The BRT lines from along Broadway and in Surrey are both over capacity. The proposal is to replace them with rapid transit via rail.

3. Financial Structure

TransLink has an active, ongoing capital program, with all key projects undergoing an extensive evaluation of the funding, financing and overall project delivery approach. This includes internal TransLink analysis and consultation with Partnerships BC, an advisory service provided by the province of British Columbia that helps the public sector in the planning and procurement of complex infrastructure projects. The process includes key evaluation along with reviews with management and approval by the TransLink board prior to final approval of the project funding, financing and overall project delivery approach. This ensures a systematic approach to project delivery that considers funding, finance, risk allocation and related elements to deliver the project in the most cost-effective manner. Projects

2 Project suspended as of December 2018

are approved in phases and all major projects have a dedicated project management office.

Part of the mission of TransLink is to support a compact urban area in the Vancouver region in coordination with the other regional municipalities. There has, hence, been close coordination among transit corridors, stations and land use. The aim is that this growth supports the growing needs of the transportation network.

Major density has been focused in the area of transit corridors, specifically around public transit stations. Development partnerships have been created that include the following principles:

- Locate destinations along right-of-way;
- Consider distances covered on a well-coordinated street network;
- Design places for people;
- Concentrate activities near frequent transit;
- Encourage a mix of uses; and
- Discourage unnecessary driving.

This process has been captured in Transit-Oriented Communities Guidelines used by local municipalities and developers to understand what transportation services TransLink is likely to provide in different land use contexts. To facilitate more growth directly around rapid transit stations, TransLink has an established "Adjacent and Integrated Development (AID) Process" focused on third-party developments not owned by the agency wish to integrate with existing transit-adjacent developments. The results of this overall program have been and are forecasted to be very successful, as shown in the lower graphic at $18.8 billion ($25 billion Cdn.). TOD projects are extensive both downtown and in outer areas where major density existed or was under development at every rapid transit link.

Key value capture from land development around public transit stations includes development cost charges and levies; community charges (non-transit); a density bonus; contributions (land, other assets and funding); and land development that supports transit (optimization, integration, timely development).

TransLink is also focused on mobility and designing this as a service that would be priced accordingly. This includes a Mobility Pricing Study and review of transit fares to price mobility fairly for users of the service. The Mobility Pricing Study is in part a response to a loss of purchasing power of the fuel tax, considering the increase in fuel efficiency of motor vehicles and the expected high growth in electric vehicles. TransLink is also focused on supporting bikeshare services and on-demand transit to provide mobility between home and major transit services.

Regional Context:
2045 Population (est) @ Rapid Transit Stations

APPENDIX I— 2018 International Study Mission Participants

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Note: Positions and affiliations at the time of the study mission, July 2018.