2041 Regional Transportation Plan

For the Greater Toronto and Hamilton Area

RTP REGIONAL TRANSPORTATION PLAN

METROLINX

Message from the Chair

On March 8, 2018, the Metrolinx Board of Directors unanimously adopted the 2041 Regional Transportation Plan (2041 RTP) for the Greater Toronto and Hamilton Area (GTHA). It is my pleasure to introduce this plan as the successor to *The Big Move*, the GTHA's first long-range transportation plan.

This plan is about providing even more people with access to fast, frequent and reliable transit, and making it easier for travellers to use transit, or travel by bike or on foot. Our region is growing quickly – and we must continue the work underway to ensure that people can get to where they need to go, today and in the future.

The Board of Directors recognizes the role of the Province, which established Metrolinx as an agency in 2006, and has demonstrated its commitment to the quality of life, environment and economy of the GTHA by investing in the transportation system. We look forward to continuing to work with the Minister of Transportation and ministry staff to implement this plan. The evidence shows we have made significant progress over the last decade, due to these major investments by the Province of Ontario, and by GTHA municipalities and the federal government.

While Metrolinx authored this plan, it was developed closely with our partners in over 30 GTHA and GO Transit service area municipalities who provided expertise to shape this plan. The 2041 RTP will be implemented not just by Metrolinx, but by all of the partners with a stake in its success. More than ever, Metrolinx and its partners are thinking and functioning like a region. To deliver on the promise of this plan, all partners will need to continue to work together. Our collective success depends on us making progress in how we make decisions, fund transportation, set priorities and monitor our progress.

The Board would also like to recognize the contribution of the many civic organizations and private sector stakeholders who shared their time and insights to support this plan.

Most importantly, we would like to acknowledge the contributions of the travelling public – those using the region's transportation system every day – to help develop this plan. Without their willingness to engage on the issues, share ideas, and aim high, this plan would not have been possible.

As Chair, I also acknowledge the stewardship provided by the Metrolinx Board of Directors. It is my pleasure to serve with this group of leaders whose guidance of the 2041 RTP has been exceptional.

Everyone has a role to play in making the system work. Together as a region, we will keep the GTHA moving.

J. Robert S. Prichard
Chair

Metrolinx
Board of Directors

J. Robert S. Prichard, Chair
Chair, Torys LLP

Upkar Arora
CEO, Purpose Capital Ltd.

Katherine Bardswick
Past President and CEO,
Co-operators Group Ltd.

Rahul Bhardwaj
President and CEO, Institute of
Corporate Directors

Bryan Davies
Chair, Financial Services
Regulatory Authority

Janet Ecker
Past President & CEO,
Toronto Financial Services Alliance

Bill Fisch
Former Chair and CEO,
Regional Municipality of York

Anne Golden
Distinguished Visiting Scholar &
Special Advisor, Ryerson University
Past President and CEO, Conference
Board of Canada

Marianne McKenna
Founding Partner,
KPMB Architects

Rose M. Patten
Special Advisor to the CEO,
BMO Financial Group

Bonnie Patterson
Professor Emeritus, Business &
Consultant, Higher Education
Leadership & Governance

Howard Shearer
CEO, Hitachi Canada

Sharleen Stewart
President, SEIU Healthcare

Carl Zehr
Former Mayor of the
City of Kitchener

Message from the President & Chief Executive Officer

These are remarkable times for transportation in the Greater Toronto and Hamilton Area (GTHA):

- More than $30 billion is being invested in rapid transit infrastructure over the next eight years.

- An extension of the Yonge-University Subway to Vaughan Metropolitan Centre opened in late 2017.

- Led by Metrolinx, the Eglinton Crosstown light rail transit (LRT) line is under construction in Toronto, and more Viva/YRT bus rapid transit (BRT) is being built in York Region.

- UP Express has answered the decades-long call for a fast, permanent rail link between downtown Toronto and Lester B. Pearson International Airport.

- Planning and engineering design is underway for 14 projects including expansions of LRT, BRT and subway services.

- The Regional Express Rail program, our most ambitious program yet, will transform the region with frequent, two-way all-day rail service, more than doubling the number of GO Transit riders by 2031.

- Union Station—the hub of the regional transit network—is expanding to meet the needs of 300,000 people who use it every weekday, and even more who will use it in the future.

- Across the GTHA and Ottawa, fare payment has been modernized with the PRESTO fare card.

The work of building an integrated transportation system for the GTHA is truly underway.

When the Province of Ontario created Metrolinx as a new regional transportation agency in 2006, a generation of underinvestment in transit had become a challenge. Travellers in the GTHA wanted action to address congested highways, gridlocked urban streets, unfriendly transit, and a shortage of well-maintained bikeways and and sidewalks. With the release in 2008 of *The Big Move*, the region's first-ever transportation plan, Metrolinx set out a common vision for the region and a blueprint of how to transform transportation.

The expansion of transit in the GTHA is the largest in North America today, but our job is far from over. By 2041, over 10 million people will live in our region—comparable to Paris or London. We need to plan for a future of continued population and employment growth, an aging population and other demographic changes, the shifting nature of work, new transportation technologies and services, and the impacts of climate change.

In short, we cannot stop. This plan, the 2041 Regional Transportation Plan (2041 RTP), is a call to move forward by further putting people's needs at the core of transportation planning and operations. We need to increase our capacity to move people around the GTHA. Transit infrastructure alone will not be sufficient to meet the needs of a growing region. Transit agenices need to address both the quantity and quality of transit service. Transit must become more accessible, frequent, reliable, safe, comfortable and convenient.

Metrolinx's mandate spans the GTHA and the GO Transit service area. Ours is a unique opportunity to plan, build, operate and connect transportation in the region. We cannot do this alone. The transportation system of the future will require new approaches to financing and more collaborative decision-making. By working with our federal, provincial and municipal partners, the private sector and other stakeholders, we can create an integrated transportation system for 2041 that supports a high quality of life, a prosperous economy and a healthy environment.

We would like to thank the Metrolinx Board of Directors for its guidance, the Provincial government for entrusting Metrolinx with this important mandate, and the many municipal officials, civic organizations, educational institutions and citizens who took time to participate in the creation of this plan.

Phil Verster
President & Chief Executive Officer

Table of Contents

Appendices

Appendix 1:
Metrolinx technical studies and academic
background research

Appendix 2:
Developing the 2041 Regional Transportation Plan

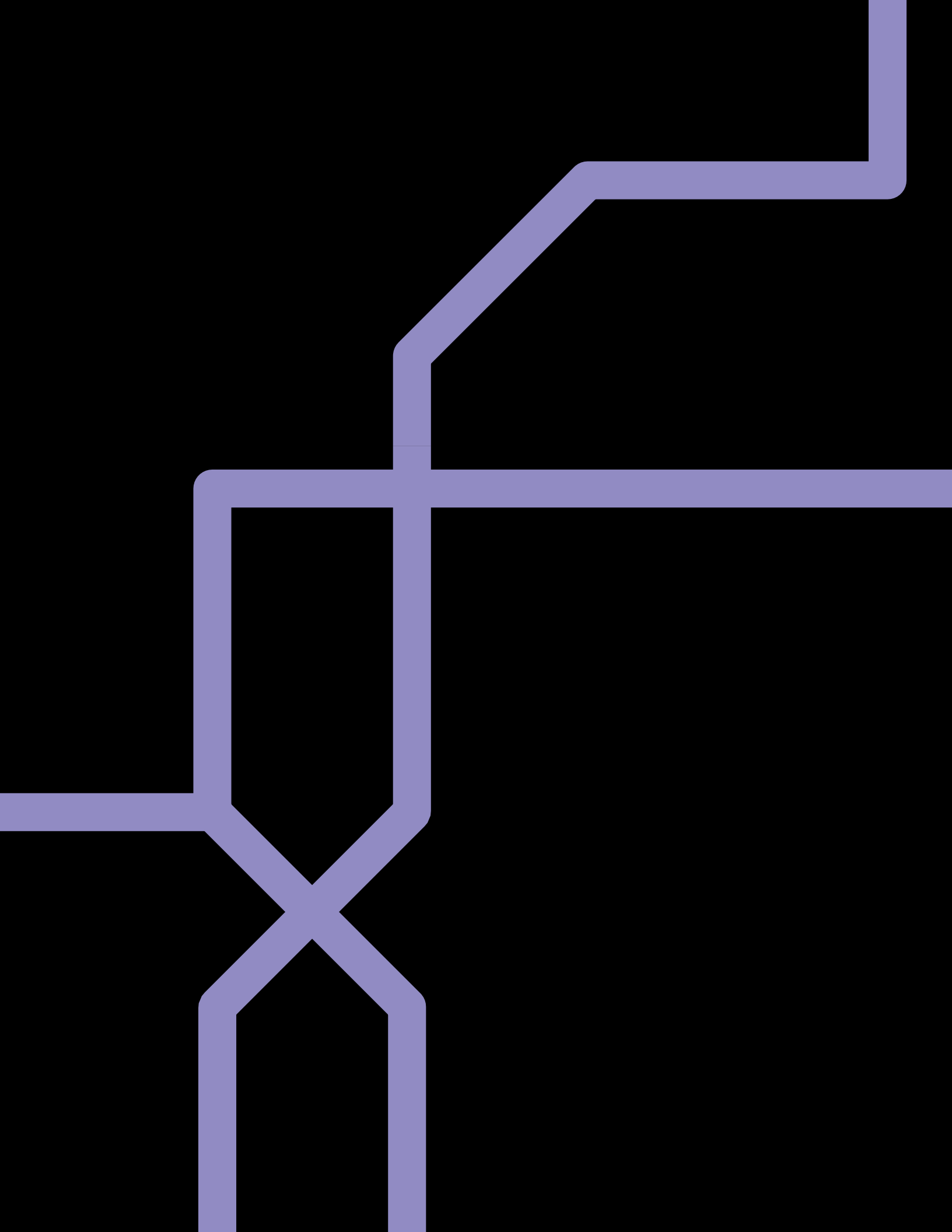Appendix 3:
List of transit projects
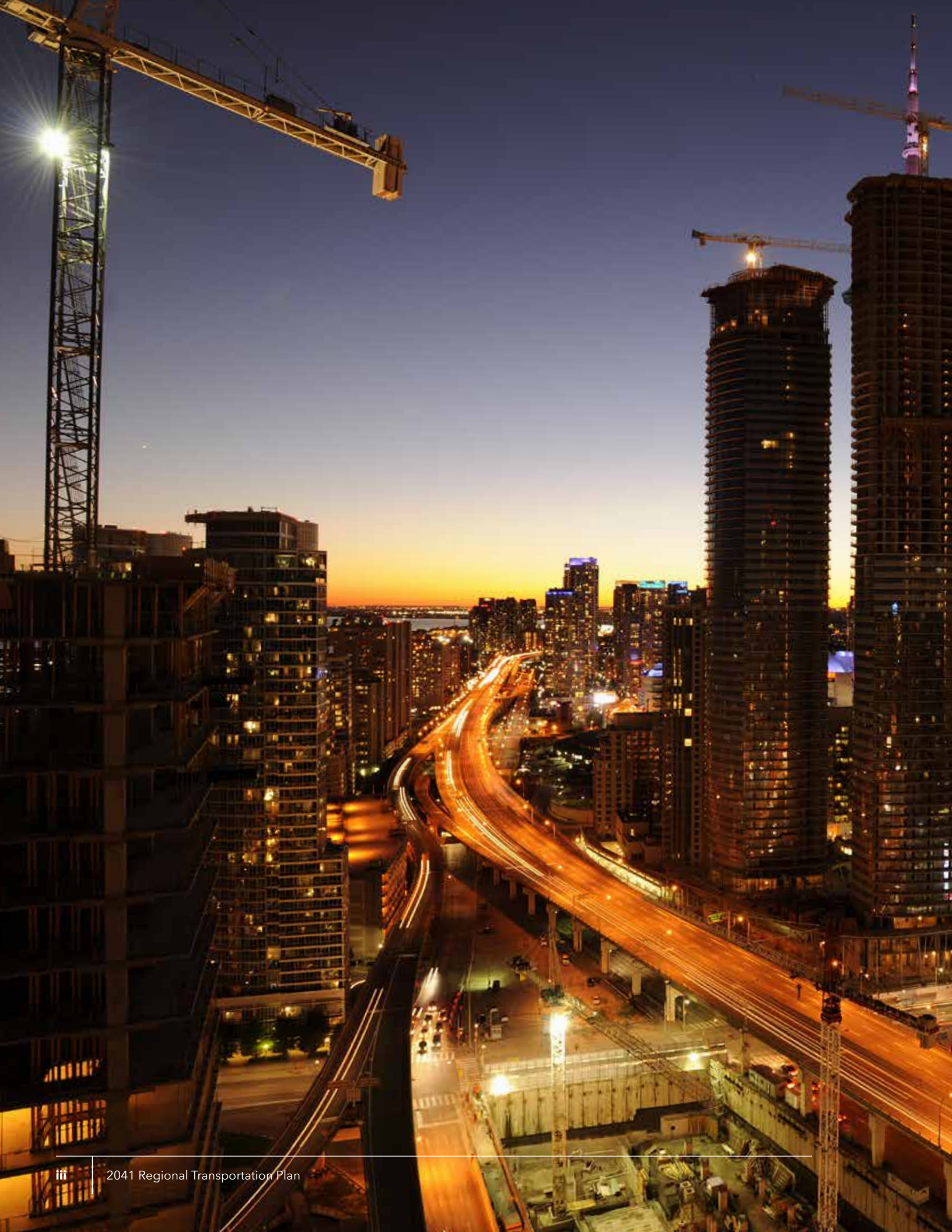
Appendix 4:
Additional resources

Appendix 5:
Consolidated 2041 Regional Transportation Plan
Priority Actions

Appendix 6:
Transportation trends in the GTHA

List of Acknowledgements

Executive
Summary

The Greater Toronto and Hamilton Area (GTHA) is one of the fastest growing regions in North America. Its dynamic economy and diverse population attract about 110,000 new residents every year, and will reach a total population of more than 10 million people by 2041. The region will look and feel very different than it does today, just as it now feels different than it did 25 years ago.

Keeping our growing and changing region moving – getting people and goods to where they need to go – will be ever more vital for the region's economy, quality of life and natural environment. As the region becomes more complex and interconnected, it will require not only new transportation infrastructure, but also new transportation services and new ways of working together.

The 2041 Regional Transportation Plan (2041 RTP) for the GTHA is a blueprint for creating an integrated, multi-modal regional transportation system that will serve the needs of residents, businesses and institutions. It supports Ontario's *Growth Plan for the Greater Golden Horseshoe, 2017*, which sets out a broad vision for where and how the region will grow, and identifies policies on transportation planning in the GTHA.

The 2041 RTP presents a common vision for the region:

The GTHA will have a sustainable transportation system that is aligned with land use, and supports healthy and complete communities. The system will provide safe, convenient and reliable connections, and support a high quality of life, a prosperous and competitive economy, and a protected environment.

The Goals of the 2041 RTP are to achieve strong connections, complete travel experiences, and sustainable and healthy communities.

The 2041 RTP was developed by Metrolinx and builds on the success of *The Big Move*, the first RTP for the GTHA that was released in 2008. *The Big Move* was the springboard for a historic $30 billion investment in rapid transit that has led to the completion of nine major transit projects:

- UP Express (Union Station - Pearson International Airport);

- Highway 7 bus rapid transit (Yonge – Unionville GO);

- Davis Drive bus rapid transit (Yonge – Newmarket GO);

- Mississauga Transitway (Winston Churchill – Renforth);

- Toronto York Spadina Subway Extension; and

- four GO Transit extensions (Kitchener, Barrie, Richmond Hill and Lakeshore West lines).

Fourteen more transit projects are In Delivery, which means that they are either in the engineering design stage or under construction.

There is little doubt that *The Big Move* moved the yardstick significantly for regional transportation, but the work is far from complete. In a region that will continue to grow rapidly, it is vital that governments collaborate to further build out the transportation system and increase the capacity for people and goods to move around the GTHA. It is also important to make the best possible use of transportation assets, and to provide the best traveller experience possible. This work requires approaches to funding and decision-making that effectively serve the needs of a maturing region.

The 2041 RTP builds on *The Big Move* by putting traveller needs at the core of planning and operations.

This will be done by:

- providing even more people with fast, frequent and reliable transit;

- integrating fares and services to allow people to move seamlessly across the region;

- designing communities, transit stations and Mobility Hubs to support transit use and active transportation;

- anticipating and preparing for integrated mobility systems that use emerging transportation technologies and business models;

- using parking demand strategies to encourage car-sharing and other modes besides the car;

- addressing the beginning and end of a traveller's journey—the first- and last-mile;

- optimizing the use of roads and highways to support transit and goods movement; and

- embedding design excellence, sustainability and universal access in transit planning.

Goals

Strong Connections

Complete Travel Experiences

Sustainable and Healthy Communities

Strategies

1

Complete Delivery of Current Projects

2

Connect the Region

3

Optimize the System

4

Integrate Transportation and Land Use

5

Prepare for an Uncertain Future

To achieve the 2041 RTP's Vision and Goals, this plan is organized around five Strategies that drive action.

1

Complete the delivery of current regional transit projects

There can be no slowing down of the current multi-billion dollar commitments to expanding transit infrastructure. A major focus of the 2041 RTP is the development of GO Regional Express Rail (RER), transforming today's GO rail system from a commuter-focused service into one that offers frequent two-way, all-day service. Completion of the remaining fourteen In Delivery transit projects (i.e., under construction or in the engineering design stage), and of the thirteen additional projects that are In Development (i.e., in advanced stages of planning and design), will extend the reach of convenient transit via subway, bus rapid transit (BRT), light rail transit (LRT) and GO Transit.

2

Connect more of the region with frequent rapid transit

A Frequent Rapid Transit Network (FRTN) will connect more people in the region with the places they want to go, and provide an attractive alternative to driving. Priority Bus corridors will be an important part of the FRTN, bringing fast and frequent transit services to parts of the region that have not yet developed the density or ridership needed to support LRT, BRT or subway services. Meeting travellers' needs to 2041 will also require further expansions to GO RER, other surface transit systems and subways across the GTHA, and connections to other communities within the Greater Golden Horseshoe.

STRATEGY

3

Optimize the transportation system

Optimizing the GTHA's transportation system means making the most of what we have. First, this means integrating fares and services across the region so travellers can move seamlessly from one transit system to another without paying a second fare. The traveller experience will be enhanced as better multimodal options are provided for the first- and last-mile of every trip. Integrated mobility services will allow travellers to access a fully coordinated, enhanced suite of mobility services from different providers. The transportation system will provide universal, barrier-free access. An enhanced system of high-occupancy vehicle (HOV) lanes will support faster, more reliable bus service and help make carpooling more attractive. Roads and highways will be managed to support transit use.

STRATEGY

4

Integrate transportation and land use

To achieve the 2041 RTP's Vision, transportation investments and decisions must align with land use plans. This plan contains actions to better integrate transportation planning and land use, especially around transit stations and Mobility Hubs. Regional collaboration, supported by appropriate regulatory measures, will encourage the planning of communities and road networks to support transit, cycling and walking. Parking management will encourage car-sharing and prepare the region for the arrival of autonomous vehicles. A Regional Cycling Network will make it easier for commuter cyclists to make longer trips, overcome barriers and connect more easily to rapid transit stations.

STRATEGY

5

Prepare for an uncertain future

We live in a time of constant and accelerated change. Metrolinx and GTHA municipalities will work with the Province to plan and prepare for the deployment of new transportation technologies, including autonomous vehicles. Regional coordination will produce a transportation system that is resilient to flooding and other impacts of climate change. Joint actions, including a transition to low-carbon transit vehicles, will reduce greenhouse gas emissions. Transit agencies will partner with the private sector to drive innovation in mobility.

How will the plan make a difference?

Implementation of this plan will have a profoundly positive impact on travellers. The GTHA of 2041 will see many benefits, compared to today:

- more than 20 times the current length of frequent rapid transit routes;

- more than triple the current number of residents and double the number of jobs within walking distance of frequent rapid transit;

- stabilized, and in many cases improved, transit travel times;

- a Regional Cycling Network that doubles the length of dedicated cycling facilities in the GTHA;

- double the number of walking and cycling trips; and

- progress towards the goal of having 60% of school trips made by walking or cycling.

These improvements to the quantity, proximity, reliability, comfort and convenience of rapid transit service will be particularly important for low-income residents and others who rely heavily on transit. Economic competitiveness and productivity in the GTHA will also benefit from better connections between workers and employers.

Residents and Jobs within Walking Distance of Frequent Rapid Transit [1]
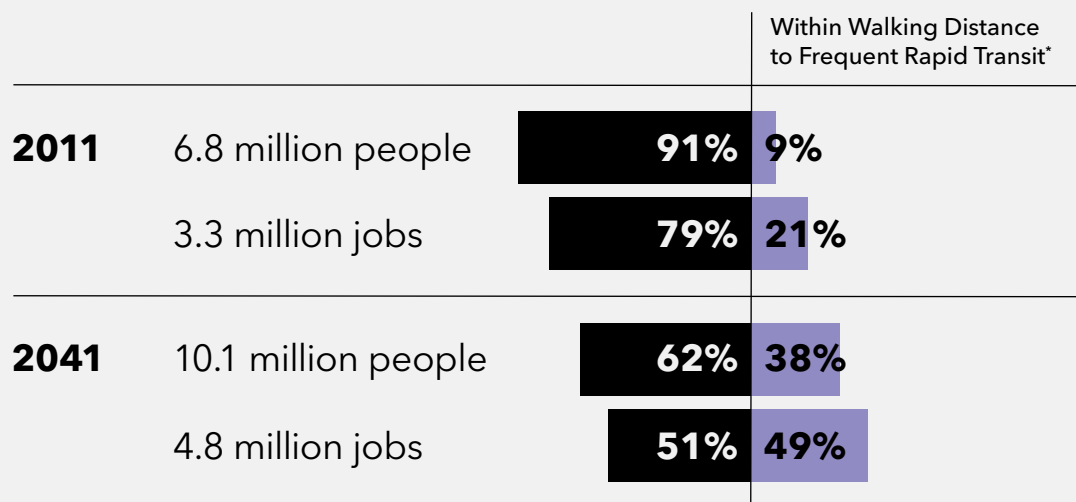
			Within Walking Distance to Frequent Rapid Transit*
2011	6.8 million people	91%	9%
	3.3 million jobs	79%	21%
2041	10.1 million people	62%	38%
	4.8 million jobs	51%	49%

* Walking Distance is 400 m from Priority Bus, BRT and LRT lines, and 800 m from subway and 15-minute GO stations

Frequent Rapid Transit Network
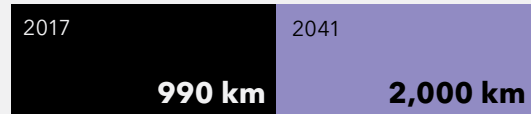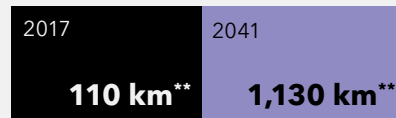
2017	2041
110 km	**1,860 km***

Regional Cycling Network

2017	2041
990 km	**2,000 km**

HOV Lanes Network

2017	2041
110 km**	**1,130 km****

*Includes 15-minute GO Rail service, subway, BRT, LRT, Priority Bus, Priority Streetcar and Frequent Regional Express Bus corridors.

**lane-km. Lane-km accounts for roadway length as well as the number of lanes in each direction.

Next steps

The 2041 RTP articulates and responds to the shared goals of Metrolinx, municipalities and other partners across the region. The scale of growth anticipated in the GTHA—a 41% increase in population between 2016 and 2041—and the extent and complexity of the future transportation system, demand new levels of cooperation and collaboration among the Province, municipalities, transit agencies, the private sector, and residents.

As a regional transportation agency with a legislated mandate to plan the multimodal transportation system in the GTHA, Metrolinx is in a unique position to catalyze action by:

• providing technical expertise and guidance;

• coordinating regional initiatives;

• convening stakeholders; and

• providing a regional perspective on projects, programs and policies.

However, Metrolinx cannot undertake this work alone: success of the 2041 RTP is premised on all stakeholders responsible for aspects of the transportation system working together. Implementing its Strategies and Priority Actions will require us to improve the ways we collaborate, and to be innovative in how we approach our regional goals for transportation.

1 Introduction

What is the 2041 Regional Transportation Plan?

The Greater Toronto and Hamilton Area (GTHA) has emerged as one of the world's most desirable places in which to live, work, learn and invest. Its diverse and talented population, dynamic economy and robust institutions have made the GTHA one of the largest and fastest-growing regions in North America. About 110,000 new residents are expected every year through 2041, joining the 7.2 million people already here today.[2]

This substantial growth—to more than 10 million people by 2041—will bring many challenges. How will we move people and goods in ways that are safe, efficient, affordable and sustainable? How will we meet the transportation needs of tomorrow's travellers, businesses and institutions? The region's continued success will depend on smart, timely and optimized transportation infrastructure investments—and that takes planning.

This 2041 Regional Transportation Plan (2041 RTP) for the GTHA outlines how governments and transit agencies will work together to continue building an integrated transportation system that supports a high quality of life, a prosperous and competitive economy, and a protected environment. The 2041 RTP has been developed by Metrolinx, the provincial agency mandated with improving the coordination and integration of all modes of transportation in the GTHA. It represents the advice of the Metrolinx Board to the Province, and fulfils Metrolinx's legislative requirements under the *Metrolinx Act, 2006*.

The 2041 RTP is the second transportation plan for the GTHA developed by Metrolinx. The first—known as *The Big Move*—was released in 2008, and focused on transforming transportation in the GTHA through nine 'Big Moves' and ten strategies to create an integrated multimodal transportation system. *The Big Move* set the stage for today's massive investments in rapid transit, and was the foundation for completing a dedicated rail link to Pearson International Airport (UP Express), GO Transit expansions, and bus rapid transit (BRT) systems in the Regions of Peel and York. These transit projects will be vital to keep our region moving while minimizing congestion and harmful automobile emissions.

Chapter 2 provides detail on the fourteen rapid transit projects that are 'In Delivery' (i.e., those under construction or in the engineering design stage). Chapter 3 offers information on thirteen additional 'In Development' projects (i.e., those in advanced stages of planning and design) that will extend the reach of subways, BRT, light rail transit (LRT) and GO Transit. Appendix 3 contains a complete list of all recently completed, In Delivery and In Development transit projects, plus those that are newly proposed in the 2041 RTP.

The 2041 RTP builds on *The Big Move* by putting the needs of travellers at the core of transportation planning and operations. It aims to build a truly integrated transportation system for the GTHA—one that is comprehensive, connected, accessible, sustainable and focused on people—and one that supports safe streets, active transportation and healthy communities. This will require more than simply expanding and optimizing the rapid transit network; it will require collective work to integrate planning, transit fares and service, and to develop new approaches to financing and collaborative decision-making in the region.

At the heart of the RTP are five Strategies:

- Complete the delivery of current regional transit projects;

- Connect more of the region with frequent rapid transit;

- Optimize the transportation system;

- Integrate transportation and land use; and

- Prepare for an uncertain future.

The Vision and Goals for 2041, and the five Strategies and Priority Actions that relate to them, are presented in Chapter 3, "Vision, Goals, Strategies and Priority Actions".

The 2041 RTP conforms to the *Growth Plan for the Greater Golden Horseshoe, 2017* (The *Growth Plan*), which, together with the *Greenbelt Plan* (2017) and other provincial land-use policy documents,[3] sets the policy framework for managing growth, establishing complete communities and delivering sustainable transportation choices. The 2041 RTP goes beyond the *Growth Plan* to provide more detailed strategies and actions for the GTHA's entire transportation system. The *Growth Plan* and the 2041 RTP align to support the Ontario's *Climate Change Action Plan* (2016) and the goal of a low-carbon

future. All three plans work together to encourage people to travel less by car, make shorter trips, live closer to work, and use available resources more efficiently.

The 2041 RTP uses the *Growth Plan*'s planning horizon of 2041, which is ten years later than the 2031 horizon used in *The Big Move*. However, because some key data sources used to develop the plan are from 2011, as 2016 data were not yet available (e.g., the Canadian Census and the Transportation Tomorrow Survey), it relies on forecasts made for 2041 using a 2011 base year.

Why was it developed?

Much has changed in the decade since *The Big Move* was released in 2008. Significant investments have been made in rapid transit. But progress continues to be accompanied by challenges. The GTHA has experienced rapid population growth along with shifts in demographics and the nature of work. Poverty continues to be an issue, and housing affordability is an increasing concern. New transportation technologies have been developed, and disruptive business models are challenging the status quo. All this means that integrating and coordinating transportation planning across the GTHA is more important than ever. It is vital that transportation dollars are well spent, and that access to transportation options is improved. Chapter 3 explains how the 2041 RTP addresses these influences and challenges.

Figure 1: Regional Transportation Plan timeline

The Big Move	Baseline Monitoring Report	Discussion Paper for the RTP	Residents' Reference Panel	Draft RTP	Consultation	Final Plan
DEC 2008	SEPT 2013	AUG 2016	MAR 2017	SEPT 2017	FALL 2017	MARCH 2018

How was it developed?

The 2041 RTP has been developed collaboratively over a two-year period, with input from transportation experts, municipal planning professionals, stakeholders from across the region, and the lived experiences of GTHA residents (see Figure 1 for key points in the process). It also incorporates the forecasts and policy directions of the *Growth Plan*, and extensive research into a wide range of strategies to improve the traveller experience in the region, including active transportation, climate change resiliency, transportation demand management (TDM), intelligent transportation systems (ITS), and goods movement. Appendix 1 contains a list of background reports and academic studies that informed the plan, while Appendix 2 offers more details on the entire process of developing this plan.

Metrolinx developed this plan's Strategies and Priority Actions by weighing alternative projects, programs and policies against key objectives and performance criteria such as transit ridership growth and accessibility to jobs. In addition, Metrolinx used three innovative tools to inform and enrich the 2041 RTP:

- **Scenario planning–**To evaluate the plan's resiliency, Metrolinx tested the recommended strategies and priority actions against six future scenarios. Those scenarios (which included potential economic decline, the rapid adoption of emerging technologies, and extreme climate change) involved varied assumptions about the amount and distribution of population and employment growth, the nature of employment, and the quality of travel choices.[4]

- **Residents' Reference Panel–**Metrolinx invited 36 volunteer residents, reflecting the GTHA's diversity, to learn about regional transportation, weigh priorities and make recommendations. Panel members identified six guiding values: convenience and reliability, safety, affordability and cost-effectiveness, environmental sustainability, comfort and good design, and long-term planning and economic growth.

- **Regional traveller profiles–**Metrolinx conducted surveys and focus groups to understand how GTHA residents travel and their perceptions of travel in the region.[5] It used the survey information to create six detailed profiles of fictional travellers– based on how much they travel, how and why they travel, and their attitudes towards public transit and active transportation–that served as lenses to assess possible actions.

More information on the tools used to develop the 2041 RTP can be found in Appendix 2, as well as in the *2041 Regional Transportation Plan Evaluation Process Backgrounder*, which details how individual components of the plan were assessed.

Development of this plan involved two major points of broad public consultation. First, Metrolinx released a *Discussion Paper for the Next Regional Transportation Plan* in August 2016, inviting partners, stakeholders and the public to comment on its suggested directions. Second, a Draft 2041 RTP was released on September 29, 2017, followed by a six-week review period during which Metrolinx led a multi-pronged engagement process involving the general public, stakeholders, municipal councils, municipal staff and provincial ministries.

What will it achieve?

Full implementation of the 2041 RTP will lead to an integrated and seamless transportation system for the GTHA. It will improve the traveller experience and offer enhanced transportation choices. It will improve access to reliable and frequent rapid transit, and will make travel more affordable by reducing the need to own a car—benefits of particular importance for elderly and low-income residents. The 2041 RTP will help achieve the Province's objectives for land use intensification and the reduction of greenhouse gas (GHG) emissions. It will offer health benefits from a reduction in air pollution and an increase in active transportation, and will improve economic competitiveness and productivity in the GTHA. Chapter 3 offers more detail on key expected outcomes.

How will it be implemented?

The 2041 RTP is a plan for the entire region and those who plan, build, maintain and operate its transportation system. It articulates the goals shared by Metrolinx, the Province, and the GTHA's municipalities and transit agencies, and the actions required to work towards achieving an integrated transportation system. It will also inform Metrolinx's internal corporate strategies, and guide the organization in its day-to-day work of planning, building, operating and connecting multimodal transportation across the region.

Implementing the 2041 RTP will require a concerted effort by all partners, a regional mechanism to coordinate transportation planning and investment, and a regional approach to long-term funding. Implementation and funding are shared responsibilities of Metrolinx and its partners, including federal, provincial and municipal governments. Realizing the Vision will also require the involvement of the private sector, NGOs and other civic organizations, academic partners and the general public.

Metrolinx has developed a paper entitled *Making It Happen* that explores analysis and engagement options to help implement the 2041 RTP. It discusses key issues including:

- best practices for project prioritization;

- criteria for evaluating project benefits;

- project interdependencies and bundling;

- early implementation actions;

- how all levels of government can be part of decision-making; and

- strategies for municipal and provincial collaboration.

2

Setting the Stage
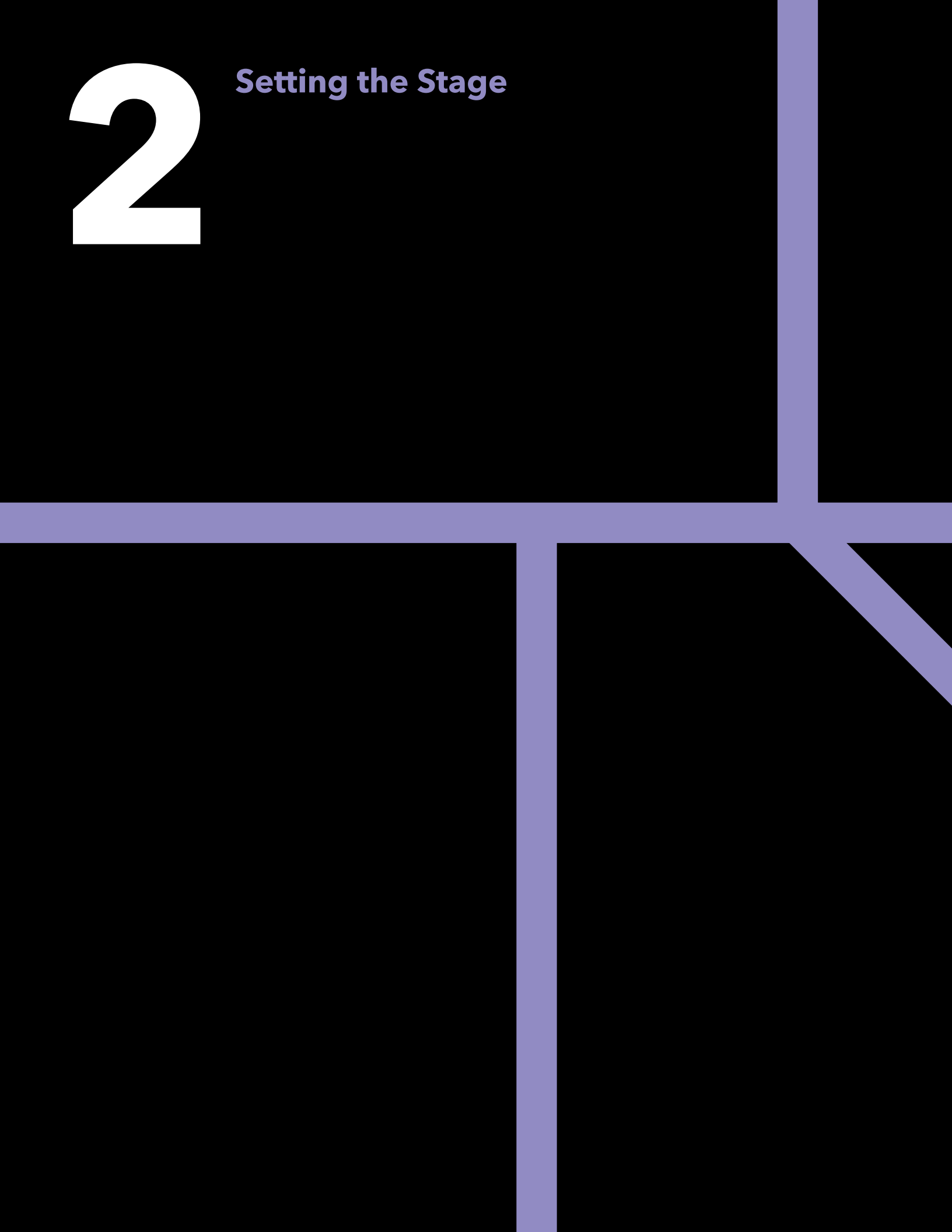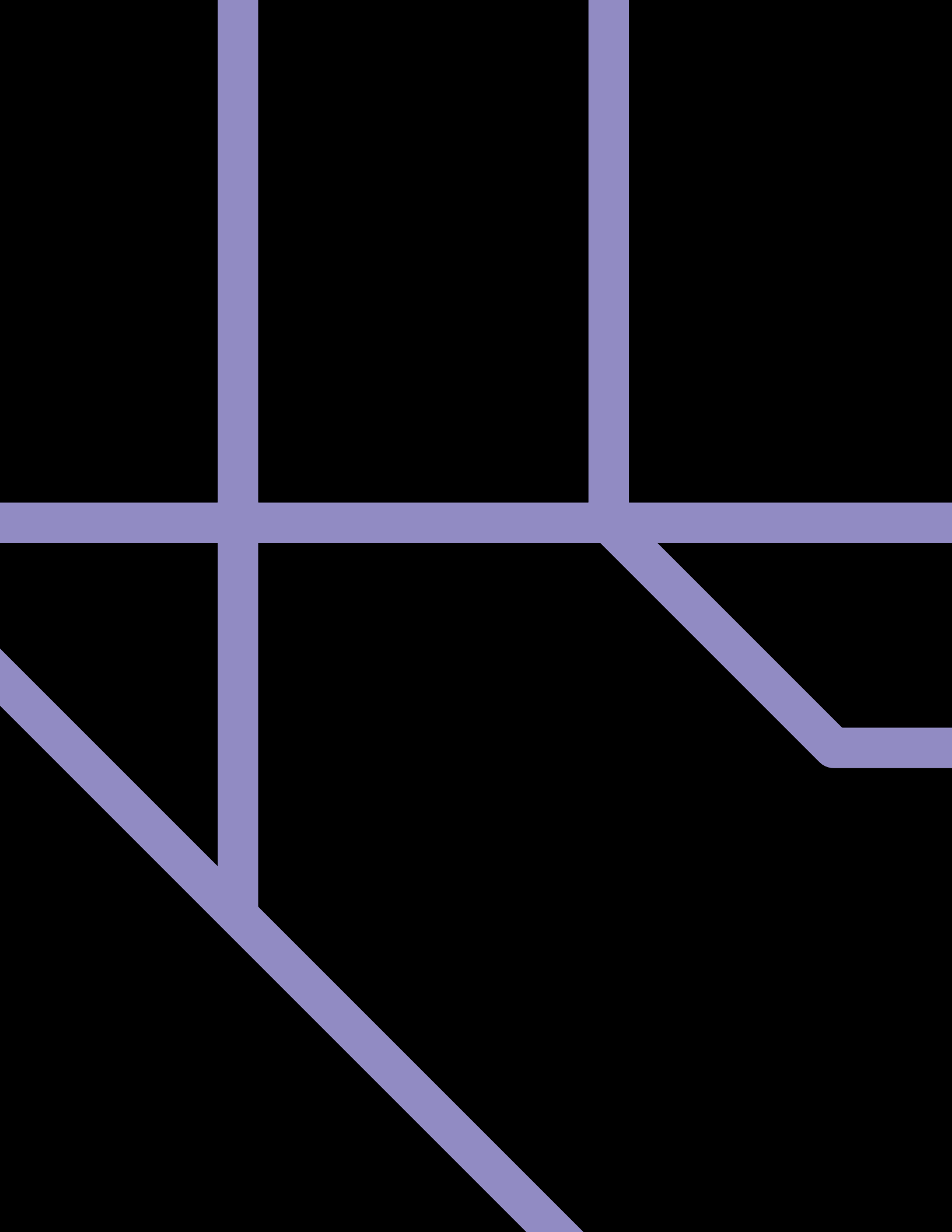
An overview of transportation in the GTHA

The 2041 RTP needs to support and reflect the GTHA's unique character. The region is large—50% bigger than Prince Edward Island—and stretches 170 km from west to east (see Map 1). Its 7.2 million people live in 30 municipalities. It includes high-density and low-density residential areas, commercial and employment lands, extensive green space, and rural and agricultural areas. The Oak Ridges Moraine and Niagara Escarpment are prominent landforms with special status under provincial law.

There are nine conventional municipal transit agencies, eight specialized transit agencies, and one regional transit agency (Metrolinx) in the region. Figure 2 provides some key facts about the existing transportation system, which includes roads and highways, public transit, three international airports, two intermodal freight terminals and three major ports. There are about 3.64 million cars in the region, and its residents take about 728 million transit trips annually.[6]

Thirty years ago, the region's dominant travel pattern was characterized by commuters travelling into Toronto in the mornings for work, and outward from the city in the evenings. With the growth of communities outside Toronto and the development of employment and amenities across the region, this is no longer the case. Today, traffic and transit move in all directions at all times of the day and night. Residents may live in Pickering and work near Pearson Airport, or live in Toronto and work in Hamilton.

As the GTHA has grown, it has become more integrated socially and economically. It also has stronger ties to the rest of the Greater Golden Horseshoe (GGH), notably to the Region of Waterloo via the "Toronto-Waterloo Innovation Corridor". The health and prosperity of this inter-regional technology cluster depends in part on having strong transportation connections.

Figure 2:
Key Facts about the GTHA's transportation system [7]

500 km

of regional rail
and rapid transit
in the GTHA

Includes GO rail, subway,
Scarborough RT and BRT.

61

GO train stations
in the GTHA

300,000+

daily Union Station
transit users

69.2

million GO transit trips
taken annually (2016)

PRESTO

3.2+

million PRESTO
customers

Includes GO service Area
and Ottawa.

5

municipal
expressways

Don Valley Parkway, Gardiner
Expressway, Allen Road, Red
Hill Valley Parkway, Lincoln M.
Alexander Parkway

728

million transit trips taken in the GTHA annually (2016)

585 km

of provincial highways within the GTHA

Includes 407 ETR (107 km), Highway 407 (22 km) and Highway 412 (10 km).

3.64

million cars owned in the GTHA (2016)

33

carpool lots in the GTHA

110

lane-km of HOV or HOT lanes

13.3

million daily trips made by GTHA residents (2016)

1.2

million daily walk and cycle trips made by GTHA residents (2016)

400+

bike-share stations

3,575

bike-share bicycles

Hamilton, Toronto

4,900

buses and streetcars

1,462

subway and GO train cars

Government roles in the Regional Transportation Plan

Metrolinx

Metrolinx was created by the Province under the *Metrolinx Act, 2006*. Its role is to develop and adopt a transportation plan for the regional transportation area (currently the GTHA) and to coordinate and set priorities for its implementation. As specified in the *Metrolinx Act, 2006*, the Regional Transportation Plan must:

- take into consideration all modes of transportation, including highways, railways, local transit systems, the regional transit system, cycling and walking;

- make use of intelligent transportation systems and other innovative technologies;

- comply with the Minister's transportation plans, policies and strategies for the province as they apply to the regional transportation area;

- comply with the prescribed provincial plans and policies;

- conform with the growth plans prepared and approved under the *Places to Grow Act, 2005* applicable in the regional transportation area;

- promote the integration of local transit systems in the regional transportation area with each other and with the regional transit system;

- work towards easing congestion and commute times in the regional transportation area;

- work towards reducing transportation-related air pollutants and greenhouse gas emissions in the regional transportation area; and

- promote transit-supportive development to increase transit ridership and to support the viability and optimization of transit infrastructure.

Metrolinx also plans for and operates GO Transit service in the GO Transit service area (see Map 1), which is established by regulation under the *Metrolinx Act, 2006.*

Map 1: The GTHA and GO Transit service area

Legend:
- Hamilton
- Halton
- Peel
- Toronto
- York
- Durham
} GTHA
- Rest of GO Service Area
- Rest of the Greater Golden Horseshoe

0 5 10 km
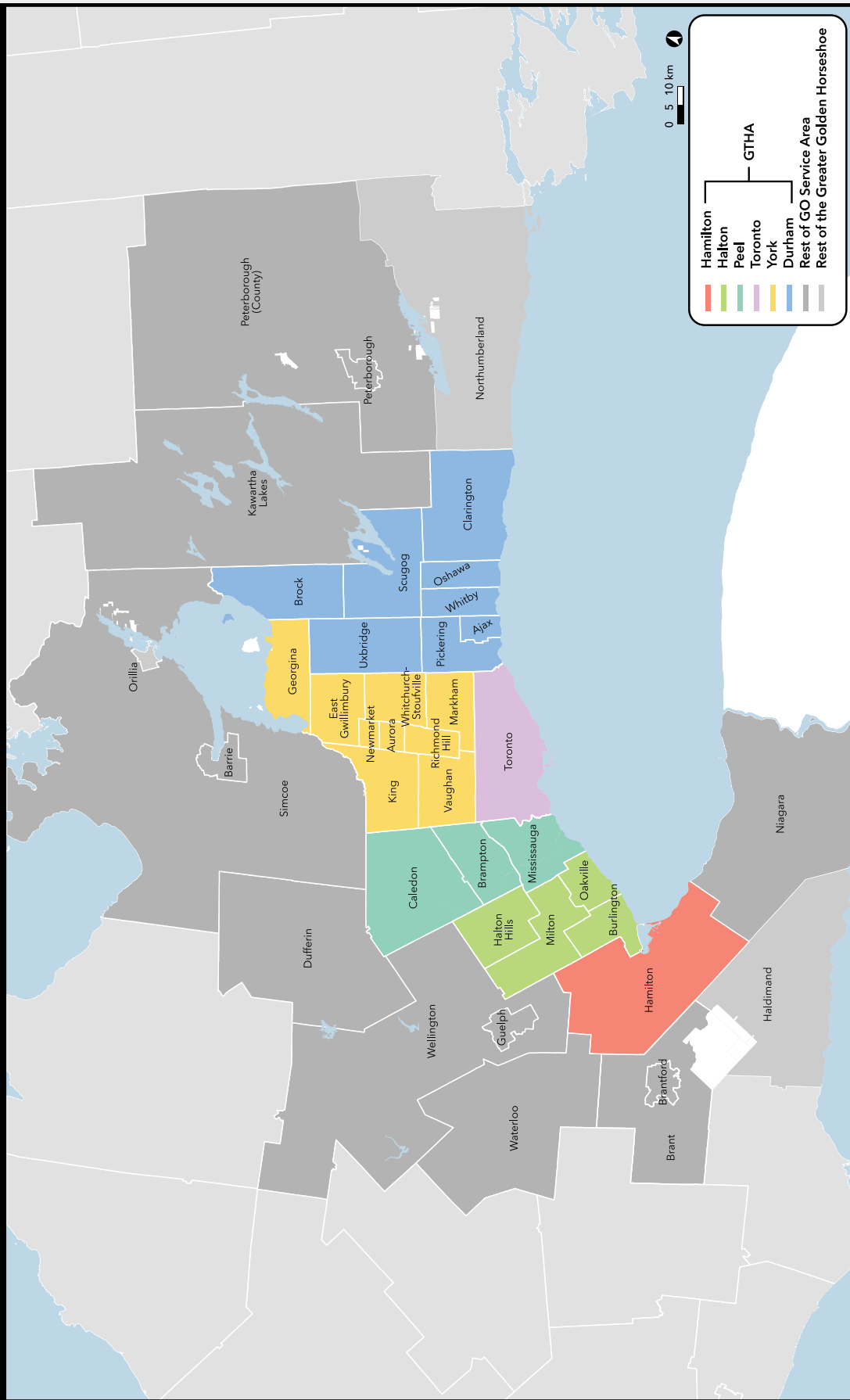
Province of Ontario

The *Provincial Policy Statement, 2017* (PPS) provides province-wide policy direction on matters of provincial interest to land use planning and development.

The Province's *Growth Plan for the Greater Golden Horseshoe*, *2017* (the *Growth Plan*, issued under the *Places to Grow Act, 2005*) sets out a broad vision for where and how growth will occur in the GGH, and includes policies on transportation planning.

Municipalities in the GGH are required, under the *Planning Act* and the *Places to Grow Act, 2005* to bring their official plans into conformity with the *Growth Plan* within legislated timeframes. This implementation mechanism is integral to the integration of transportation system planning with land use planning.

The *Growth Plan* was recently updated based on a comprehensive review. The updated plan, which came into effect on July 1, 2017, sets out a broad vision for transportation within the GGH. It includes policies to improve integration between transportation and land use planning decisions across the region, including:

- identifying Priority Transit Corridors and requiring municipalities to plan for minimum density targets around Major Transit Station Areas in these corridors, and to prioritize planning for those areas including zoning that implements *Growth Plan* policies;

- requiring the adoption of a complete streets approach when designing, refurbishing or reconstructing existing or planned streets and street networks, and highlighting the importance of active transportation, particularly for transit;

- directing municipalities to work with transit service operators, the Province, Metrolinx where applicable and each other to support transit service integration within and across municipal boundaries;

- promoting joint development and alternative municipal development standards, such as reduced parking standards, in order to achieve transit-supportive densities; and

- requiring municipalities to develop and implement TDM policies in official plans and other planning documents.

The Minister of Transportation has a mandate to "oversee a world-class provincial transit and transportation system that moves people and goods safely, efficiently and sustainably to support a globally competitive economy and a high quality of life". The Province's policy priorities and the Minister's mandate letter set the policy framework for transportation in the province and the region. The Ministry of Transportation (MTO) funds transit and transportation capital investments through its *Moving Ontario Forward* program and other mechanisms. Funding public transit is a key focus of the Province's *Long-Term Infrastructure Plan*, released in November 2017. The Province also provides eligible municipalities a predictable and stable source of funding to improve and expand their transit services through the Gas Tax program.

The Province created Metrolinx in 2006 to provide leadership in the coordination, planning, financing, development and implementation of an integrated, multimodal transportation network in the GTHA. The Minister sets Metrolinx's priorities through annual mandate letters and other letters of direction, as provided through the *Metrolinx Act, 2006*. Metrolinx has a mandate to develop and adopt a transportation plan that must comply with the prescribed provincial plans and policies and conform with the growth plans prepared and approved under the *Places to Grow Act, 2005* within the GTHA.

The MTO is developing a long-term multimodal transportation plan for 2051 for the Greater Golden Horseshoe (*GGH Transportation Plan*).[8] The work will provide direction to transportation agencies and service providers for all modes, including highways, railways, regional transit, cycling and walking. Along with the *Growth Plan* and other provincial plans, the *GGH Transportation Plan* aims to support broader government objectives such as economic growth and prosperity, health and equity, environmental sustainability, resiliency and adaption to climate change.

The GGH Transportation Plan

MTO is currently undertaking a planning study for transportation infrastructure and policy strategies to 2051, as well as a long-term transportation vision for 2071.

This plan will include provincial transportation policies and strategies to optimize mobility across the GGH, including:

- *goods movement (cross-border);*

- *long-distance and international travel;*

- *transit and transportation linkages between the GTHA and the broader GGH region;*

- *strategies to optimize the efficiency of existing networks; and*

- *strategies to prepare for emerging mobility models and technologies, such as automated vehicles, aerial drones, and mobility as a service models, and how these will change the way people and goods move in the region.*

Municipalities

Most GTHA municipalities have developed a multimodal Transportation Master Plan (TMP) that addresses transit, roads and active transportation; others include detailed transportation networks and policies in their official plans. While they are not required to do so by legislation, municipalities develop TMPs to complement official plans and support the integration of transportation planning with land use planning. Some municipal TMPs also consider policy areas such as safety, goods movement and TDM that would benefit from a regional lens.

In recent years new global companies have started to offer mobility services that do not fit the traditional definitions of transit or taxis, and which transcend municipal boundaries. Governments are now having to determine what the potential impacts of these services will be. Clear regional policy would encourage consistency among municipalities, a step that could induce more companies to enter the market.

The 2041 RTP builds on municipal TMPs and official plans (OPs) and integrates them into a coherent and logical plan for the whole region. Strong municipal leadership provides a foundation for some of the region-wide approaches in this plan, and remains crucial to the success of these approaches.

The Big Move legacy

The Big Move in 2008 came at a time when decades of underinvestment in transit had led to "congested roads and highways, gridlocked urban streets, unreliable and inconvenient transit, and a lack of safe bikeways and pedestrian pathways".[9] Map 2 shows the regional rail and rapid transit system as it was then.

Ten years later, it is evident that The Big Move was the springboard for a historic investment of more than $30 billion. This investment is improving and expanding all rapid transit throughout the GTHA. Perhaps most notably, it is funding the transformation of GO Transit from a commuter-focused service into a two-way, all-day service, with 15-minute service on many parts of the network. The introduction of half-hour service on the Lakeshore line in 2013 was the largest service expansion in GO Transit's history, and two-way all-day service has already been introduced on the Barrie, Kitchener and Stouffville lines.

The Big Move contained dozens of strategies and priority actions for all aspects of the transportation system. Work has begun on almost all the recommended actions, but the major focus of implementation has been the planning and construction of rapid transit. Significant improvements to the rapid transit network are improving access, choice and level of service for travellers across the GTHA. Recently completed projects include:

- UP Express (connecting Union Station with Pearson International Airport);

- Highway 7 BRT (Yonge – Unionville GO);

- Davis Drive BRT (Yonge – Newmarket GO);

- Toronto York Spadina Subway Extension;

- Mississauga Transitway (Winston Churchill – Renforth); and

- four GO Transit extensions (Kitchener, Barrie, Richmond Hill and Lakeshore West lines).

Fourteen more transit projects are in delivery (Figure 3).[10] These projects include GO RER, five LRTs, three BRTs, four GO Transit extensions and a subway extension. All are targeted for completion by 2024. Map 3 shows the existing and In Delivery regional rail and rapid transit network. Appendix 3 contains a full list of the transit projects that have been completed since 2008, are In Delivery, In Development, or proposed in this plan.

Figure 4 highlights more of the accomplishments of The Big Move. They include revitalization of Union Station, the adoption of the PRESTO card system by transit agencies throughout the GTHA, the introduction of bus bypass lanes on the Don Valley Parkway and 400-series highways, and the construction of more than 25 new bridges and underpasses that allow pedestrians and cyclists to cross highways, rail lines and waterways. With many rapid transit projects underway and shovels in the ground across the region, it is important to ensure that these investments are completed and optimized to maximize their benefits for travellers.

Figure 3:
In Delivery transit projects

Metrolinx and partners are delivering an array of new rapid transit solutions across the Greater Toronto and Hamilton Area to serve the people currently travelling in and out of the GTHA, and support the projected future growth in the region.

GO Regional Express Rail (RER)

The GO RER program will shift from a largely commuter system to a comprehensive regional rapid transit option. Additional stations and line extensions will bring the GO rail network to new markets which will enable seamless travel across the region. There will be service improvements on all 7 lines with 5 lines seeing electric trains running two-way all-day service every 15 minutes or better.
Opening Year: 2024

Yonge BRT (North)

Bus rapid transit along Yonge St.; connects to the Viva Davis Drive rapidway.
From Savage Rd. to Davis Dr. in Newmarket.
Length: 2.4 km
Opening Year: 2018

Yonge BRT (South)

Bus rapid transit along Yonge St.; connects to the Viva Highway 7 rapidway and future Yonge North Subway Extension.
From Highway 7 to 19th Ave./Gamble Rd.
Length: 6.5 km
Opening Year: 2018

Highway 7 West BRT

Extension of the Highway 7 Viva rapidway westward; links Richmond Hill and Vaughan.
From Yonge St. in Richmond Hill to Helen Ave. in Vaughan.
Length: 16 km
Opening Year: 2019

Bloomington GO Extension

Extension of the Richmond Hill line north to the border of Richmond Hill and Aurora.
From Gormley Station to Bloomington Rd. and Highway 404 in Richmond Hill.
Length: 4 km
Opening Year: 2019

Eglinton Crosstown LRT

New light rail transit corridor across Eglinton Ave., including a 10 kilometre underground portion.
From Mount Dennis to Kennedy Station in Toronto.
Length: 19 km
Opening Year: 2021

Confederation GO Extension

Extension of the Lakeshore West line; links Stoney Creek to downtown Toronto.
From West Harbour Station to Centennial Parkway in Hamilton.
Length: 9 km
Opening Year: 2021

Finch West LRT

New light rail transit corridor along Finch Ave.; links the Toronto-York Spadina Subway Extension and Humber College.
From Finch West Station to Humber College in Toronto.
Length: 11 km
Opening Year: 2021

Hurontario LRT

New light rail transit corridor along Hurontario St.; links Port Credit to downtown Mississauga and Brampton.
From Port Credit GO Station to Steeles Ave.
Length: 20 km
Opening Year: 2022

Niagara GO Service

New peak-period GO rail service; links Niagara Falls to Hamilton.
From Confederation Station in Hamilton to Niagara Falls.
Length: 62 km
Opening Year: 2023

Bowmanville GO Extension

Extension of the Lakeshore East line; links Bowmanville and downtown Oshawa to downtown Toronto.
From Oshawa Station to Bowmanville.
Length: 20 km
Opening Year: 2024

Hamilton B-Line LRT

New light rail transit corridor through downtown Hamilton along Main and King Streets, and Queenston Rd.
From McMaster University to Eastgate Square in Hamilton.
Length: 14 km
Opening Year: 2024

Scarborough Subway

Extension of the Bloor-Danforth Subway eastward; links Scarborough and downtown Toronto.
From Scarborough Centre to Kennedy Station in Toronto.
Length: 6 km
Opening Year: Less than 10 years

Sheppard East LRT

New light rail transit corridor along Sheppard Ave., extending rapid transit access eastward from Don Mills Station.
From Don Mills Station to east of Morningside Ave. in Toronto.
Length: 13 km
Opening Year: Less than 10 years

Figure 4: Projects from The Big Move that support investments in transit infrastructure

The Big Move set out ten strategies to achieve its Vision, Goals and Objectives. Here is a snapshot of progress to date and some key examples of actions and policies.

The Status of the Big Move's 92 Actions and Policies*

31.5% Complete/ Continuous

62% In Progress

6.5% To be Initiated

The Big Move Strategies

Build a comprehensive regional rapid transit network

Enhance and expand active transportation

Improve the efficiency of the road and highway network

Create an ambitious transportation demand management program

Create a customer-first transportation system

Implement an integrated transit fare system

Build communities that are pedestrian, cycling and transit-supportive

Plan for universal access

Improve goods movement within the GTHA and with adjacent regions

Commit to continuous improvement

Accomplishments

- The City of Toronto, Metrolinx and their partners are undertaking an $800 million **revitalization of Union Station.**

- Public transit agencies added **bike racks** to all GTHA transit buses (4200+).

- Metrolinx introduced **priority parking for carpool users** at 49 GO Transit stations.

- **Bus bypass lanes** were introduced to the Don Valley Parkway by the City of Toronto, and to Highway 403 and Highway 401 by the Ministry of Transportation.

- Municipalities and Metrolinx **expanded the Smart Commute** program to provide TDM programming for over 300 members.

- Metrolinx launched the **Triplinx** regional travel planning tool, and introduced the **GO Passenger Charter**.

- Transit agencies throughout the GTHA (and Ottawa) have adopted the **PRESTO fare card** system, with more than 3.2 million cards activated.

- Metrolinx and municipalities added over 25 new **walking and cycling bridges and underpasses** across highways, rail lines and waterways.

- Metrolinx introduced Mobility Hub Guidelines and the GO Rail Station Access Plan.

- Metrolinx established the Regional Accessibility Advisory Committee.

- Metrolinx established the multi-sectoral GTHA Urban Freight Forum and a goods movement data framework.

- Convened the Planning Leaders Forum (commissioners and heads of municipal planning deparments in the Greater Golden Horseshoe) for 8 years.

*For more details, please see *The Big Move Baseline Monitoring Report and Supporting Documents*, 2013 and *The Big Move Priority Action and Supporting Policy Review*, 2016. Available at: http://www.metrolinx.com/en/regionalplanning/rtp/review.aspx

Map 2: 2008 Regional rail and rapid transit network

Legend

Urban Growth Centre
GGH Built Boundary
Greenbelt Designation
Expressway / Provincial Highway
GO Rail Station
International Airport

Existing as of 2008

Subway
GO Rail - Two-Way All-Day
GO Rail - Peak Only

DURHAM

YORK

TORONTO

PEEL

HALTON

SIMCOE

HAMILTON

Downtown Oshawa
Downtown Pickering
Scarborough Centre
Markham Centre
Richmond Hill Centre / Langstaff Gateway
North York Centre
Yonge-Eglinton Centre
Downtown Toronto
Billy Bishop Toronto City Airport
Vaughan Metropolitan Centre
Newmarket Centre
To Barrie South
Etobicoke Centre
LBPIAirport
Downtown Brampton
Downtown Mississauga
Midtown Oakville
Downtown Milton

Downtown Barrie

Downtown Burlington
Downtown Hamilton
Hamilton International Airport

0 5 10 km

Map 3: Existing and In Delivery regional rail and rapid transit projects

New Since 2008
1. Kitchener Extension
2. Barrie Extension
3. West Harbour Extension
4. Mississauga Transitway
5. Highway 7 East BRT
6. Davis Drive BRT
7. UP Express
8. Gormley Extension
9. Spadina Subway Extension

Projects In Delivery
10. Eglinton Crosstown LRT
11. Sheppard East LRT
12. Finch West LRT
13. Scarborough Subway
14. Hamilton B-Line LRT

15. Highway 7 West BRT
16. Hurontario LRT
17. Yonge North BRT
18. Yonge South BRT
19. Bloomington Extension
20. Bowmanville Extension
21. Confederation Extension
22. Niagara Extension
23. Lakeshore West Line Two-Way All-Day
24. Barrie Line Two-Way All-Day
25. Kitchener Line Two-Way All-Day
26. Stouffville Line Two-Way All-Day
27. Kitchener Line 15-min
28. Barrie Line 15-min
29. Stouffville Line 15-min
30. Lakeshore West Line 15-min
31. Lakeshore East Line 15-min

For more details, see Appendix 3A and 3B.

All project definitions are subject to change based on negotiations and agreements with railways, environmental assessments, business case analysis, and further planning.

DURHAM
YORK
NIAGARA
SIMCOE
PEEL
WATERLOO
HALTON
HAMILTON
TORONTO

Downtown Oshawa
Downtown Pickering
Scarborough Centre
Markham Centre
Richmond Hill Centre
Langstaff Gateway
North York Centre
Yonge-Eglinton Centre
Downtown Toronto
Billy Bishop Toronto City Airport
LBPIA Airport
Etobicoke Centre
Vaughan Metropolitan Centre
Downtown St. Catharines
Newmarket Centre
To Allandale Waterfront
Downtown Barrie
Downtown Mississauga
Downtown Brampton
Downtown Milton
Midtown Oakville
Downtown Burlington
Downtown Hamilton
Hamilton International Airport
To Niagara
Uptown Waterloo
Downtown Kitchener
Downtown Guelph
Region of Waterloo International Airport
To Kitchener

0 5 10 km

Key influences on transportation

The future will be one of rapid and unpredictable change, filled with a range of challenges and opportunities. This plan acknowledges that there will be unpredictables that may either accelerate or stunt progress. The 2041 RTP must build in the ability to remain relevant, effective and efficient under a range of possible futures.

This section examines several factors that are expected to influence transportation in the GTHA over the life of this plan:

- growth is continuing and growth patterns are changing;

- the demographic profile of the region is changing;

- poverty is becoming more prevalent;

- housing has become increasingly expensive;

- the nature of work is changing;

- disruptive business models are challenging the transportation status quo;

- new transportation technologies are emerging; and

- climate change is a real and increasing concern.

Growth is continuing and growth patterns are changing

Over the next 25 years, the GTHA is expected to grow to 10.1 million people and the number of jobs is expected to rise to 4.8 million[11] (see Figure 5). The *Growth Plan* contains population and employment forecasts for individual municipalities that those municipalities must use to plan and manage their growth. These forecasts, and policy directions for where and how future growth must be accommodated, enable the coordination of region-wide growth management. In order to account for demographic and economic changes, the *Growth Plan* forecasts are reviewed at least every five years in consultation with municipalities.

While most population and job growth to 2041 will occur in GTHA municipalities outside Toronto (see Figure 6), significantly more growth than previously forecasted is now expected to take place in Toronto, particularly downtown.[13] Suburban centres outside Toronto, including designated Urban Growth Centres, may not see the concentration of growth as quickly as envisioned in the *Growth Plan*. Outside Toronto, detached and semi-detached homes are expected to continue to dominate the housing market; still, higher-density housing is becoming increasingly common in these areas, and significant urban centres outside Toronto are starting to emerge.

Figure 5: GTHA population and employment growth, 2006-2041[12]
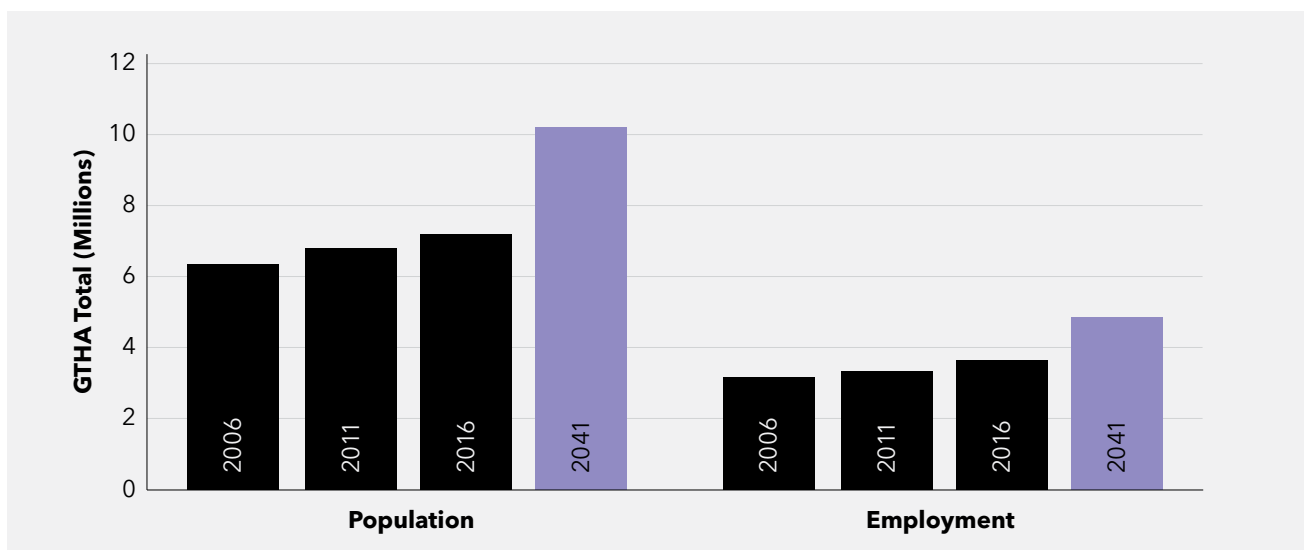
Office employment, which is a major driver of transit use, is becoming increasingly concentrated in downtown Toronto and in a few large suburban employment centers (see Figure 7).[14] Importantly, significant employment growth is also occurring outside the designated Urban Growth Centres and away from existing and planned rapid transit services. Suburban employment areas continue to be designed around the car, which are difficult to serve by transit and to navigate on foot or by bicycle.

The concentration of growth in downtown Toronto, particularly of office employment, is expected to continue, furthering the need for increased transit capacity and access to downtown from across the region. Nonetheless, most growth in the region is forecasted to take place outside Toronto, resulting in a significant increase in total trips within and between these municipalities (see Figure 8). Travel in these fast-growing markets outside Toronto has traditionally been dominated by the automobile, with transit now carrying only about 4% of trips in the peak periods (see Figure 9). Overall, 25% of population growth and 20% of growth in transit trips to 2041 are projected to be in areas of the GTHA where the current transit mode share is less than 5%.

Figure 6: Population growth by upper and single-tier municipality, 2016-2041

41% Growth by 2041 in the Greater Toronto and Hamilton Area
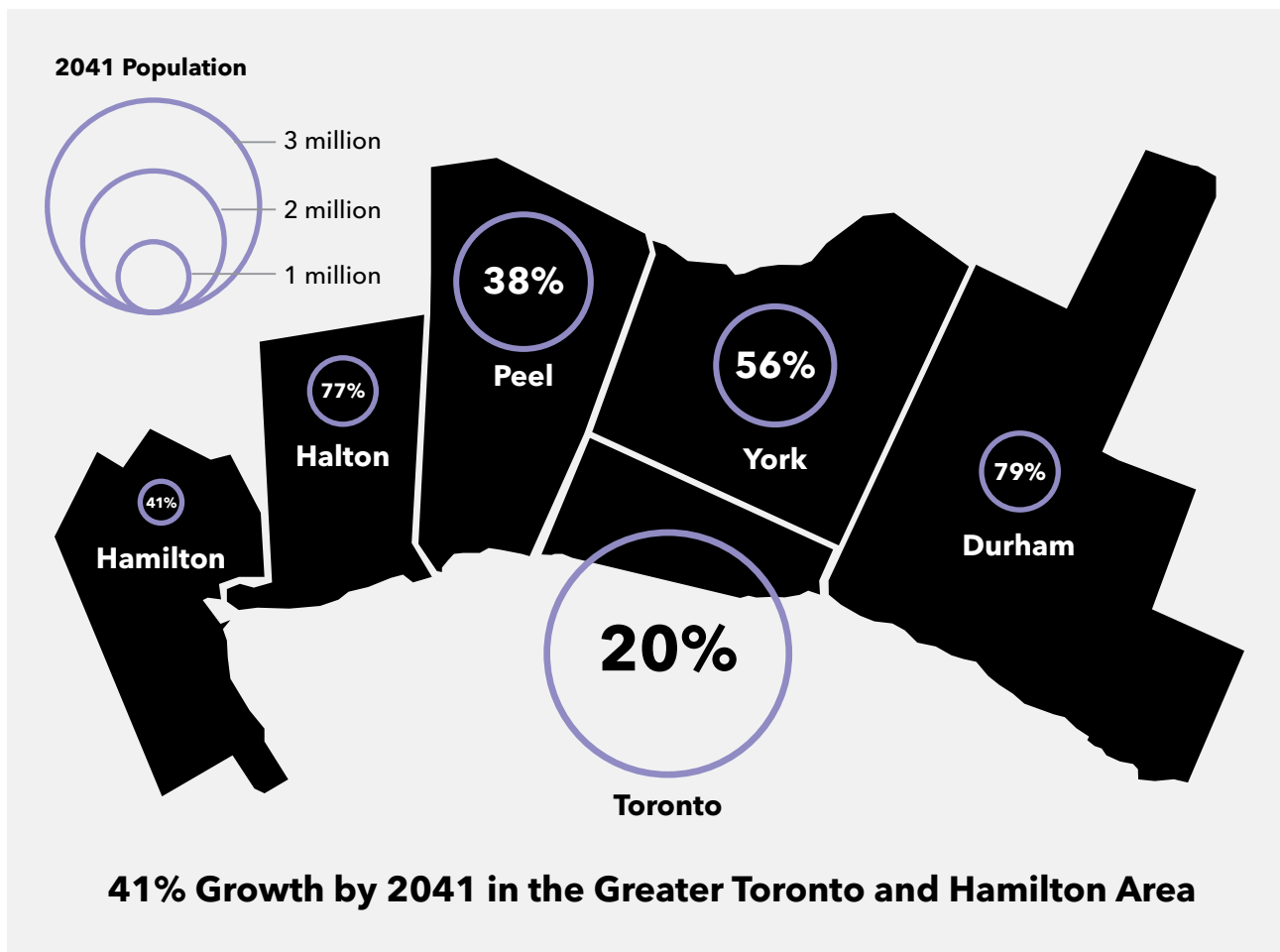
Source: Statistics Canada 2016 Census; *Growth Plan for the Greater Golden Horseshoe, 2017.*

Figure 7: Growth in office employment, 2006-2041[15]
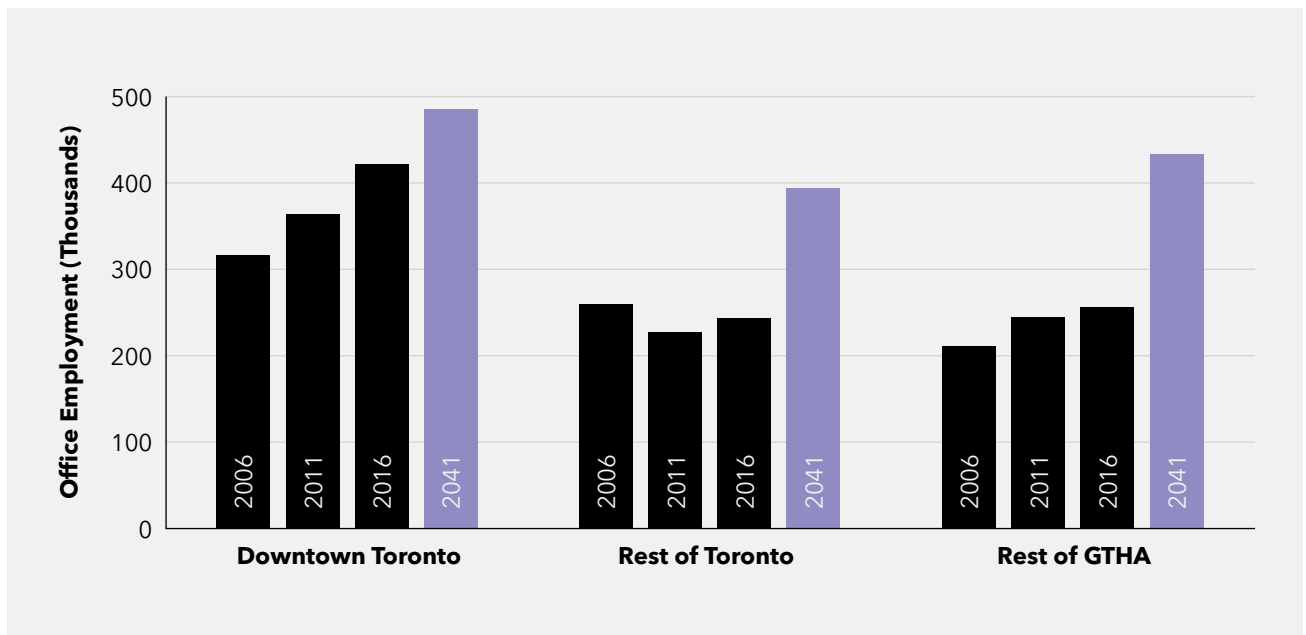
The demographic profile of the region is changing

Demographic projections in the GTHA are highly sensitive to immigration policy and economic trends. While the population of the region is growing rapidly, it is also changing. The number of seniors at least 65 years old will double by 2035, and seniors as a proportion of the total population will increase from 14% in 2016 to almost 24% by 2041 (see Figure 10).[16] Understanding this shift will help us plan and manage the transportation system, because different age groups have different transportation needs.[17] Seniors are less likely to use transit, for example, which will create challenges for the next generation of mobility services. The GTHA's population is also becoming more diverse, with population growth increasingly driven by immigration.[18] Understanding the travel preferences of the future population will be important in planning for parts of the region where household sizes and auto ownership rates could change over time.
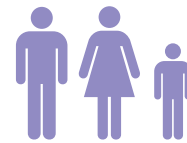
25%

of new population growth is projected to be in areas where the current transit mode share is below 5%

40%

of the GTHA population will be in areas where the transit and active mode share will increase by at least 5%

Figure 8: Total peak period travel demand by travel market, 2011 and 2041

■ 2011
■ 2041

Figure 9: Peak period mode shares, 2011

■ Auto
■ Transit
■ Active

*6:00 - 9:00 a.m. and 3:00 - 7:00 p.m.

Figure 10: Proportion of GTHA population by age group, 2016-2041

Source: Ontario Ministry of Finance Population Projections, 2017.

Poverty is becoming more prevalent

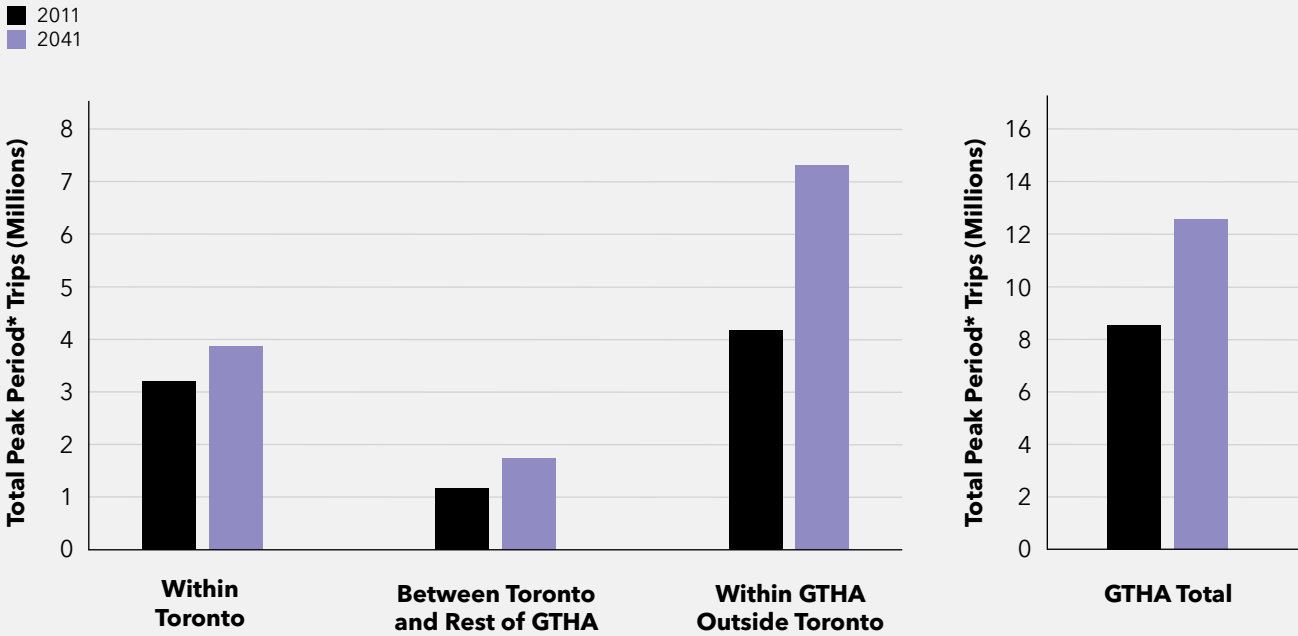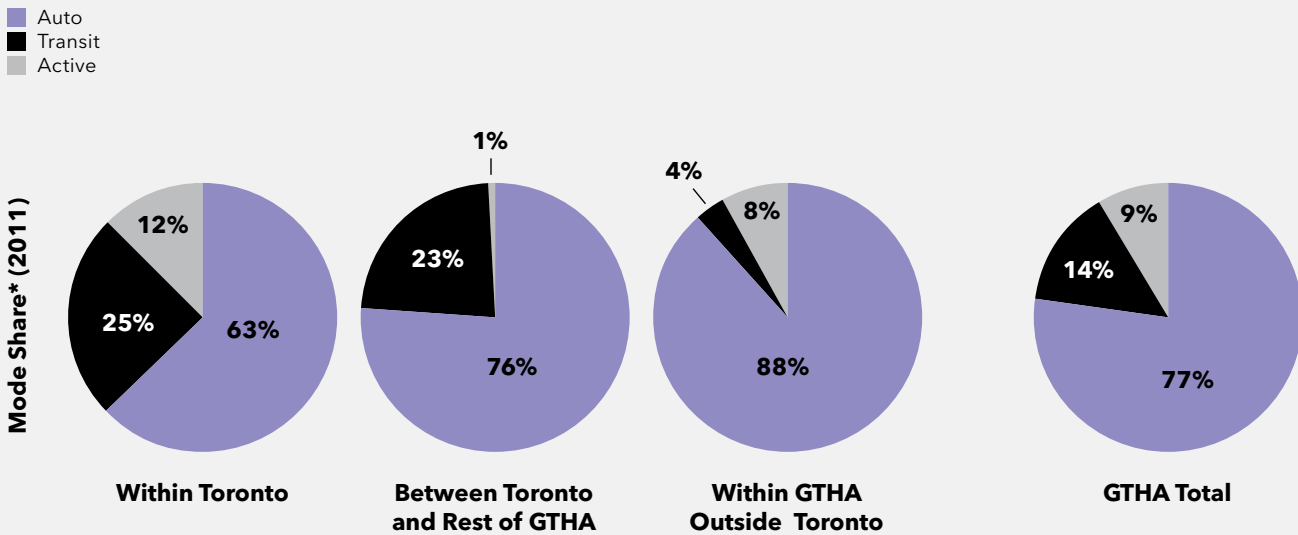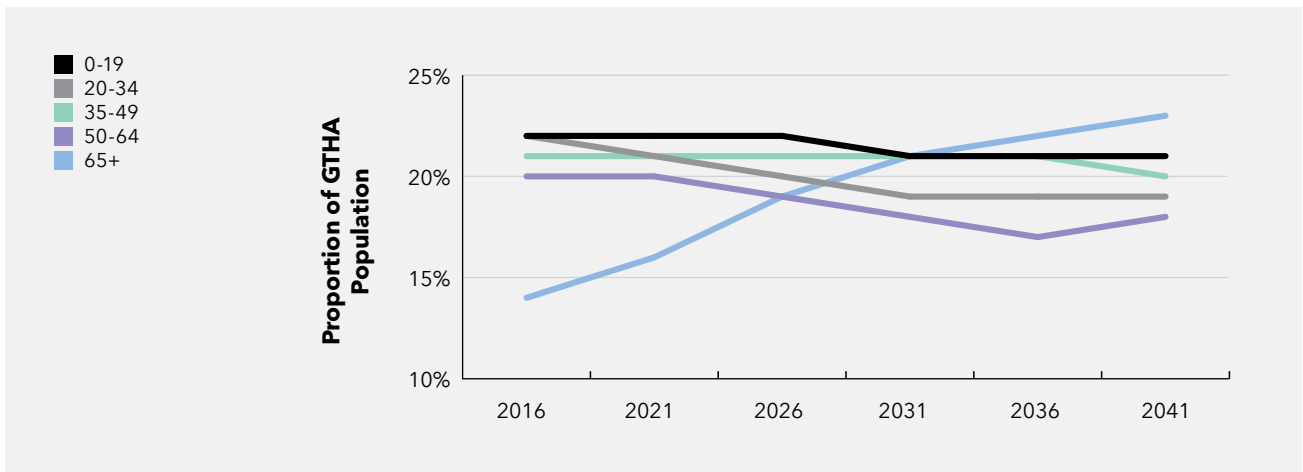Despite some improvement since the recession of 2008, poverty is becoming more common in the GTHA. In Toronto, for example, the proportion of seniors living in poverty increased from 10.5% in 2011 to 12.1% in 2014.[19] In 2011, more than one-third of all households and 43% of renters spent more than 30% of their income on housing,[20] a common marker of affordability. Low-income households tend to depend more on transit, but are also more likely to live in areas with poor access to frequent rapid transit; this can limit access to employment opportunities, health care, education and other services.

Housing has become increasingly expensive

The cost of housing in the GTHA has risen dramatically over the past decade,[21] which has affected housing choice in the region and the travel and commuting patterns of residents. Rising housing prices have been a major factor in spurring the development of condominiums in downtown Toronto and other areas in the region with good access to transit. In downtown Toronto, the average household size is decreasing,[22] but population growth has increased the demand for transit where it is already near capacity, and where congestion and other factors have affected transit's reliability. As many families and larger households feel priced out of the housing market in core areas, some are choosing to locate further away where housing is more affordable. This poses a growing transportation challenge because lower-density suburban areas typically have poorer access to transit.

The relationship between the cost of housing and proximity to transit is complex. Generally, areas with better transit access have higher property values[23] and can be more expensive to live in. However, research also shows that improved transit access can lower the cost of commuting.[24] In other words, while a resident in an area with good transit access may pay more for housing, they can reduce their overall living costs by using transit and reducing or eliminating the costs of car ownership. It will be increasingly important to monitor the combined affordability of housing and transportation.

The nature of work is changing

Automation and communication technologies are changing the kind of work people do, and how and where they do it. A recent study suggested that in the United Kingdom 30% of all jobs are at risk of being automated in the next 20 years, which could cause significant unemployment.[25] The same trends and resulting pressures on job retention are found in the GTHA. The proportion of people who work a nine-to-five job is decreasing,[26] and a recent study found that only 50% of GTHA workers hold permanent, full-time jobs.[27] Precarious employment—working one or more part-time or contract jobs to make ends meet—is the reality for many residents, and disproportionately impacts younger and female workers, as well as new Canadians.[28] When people work more irregular jobs, particularly in multiple locations, they are more likely to see the automobile as a better way of getting around than transit.

Disruptive business models are challenging the transportation status quo

Broader, faster access to technology and markets has ushered in the on-demand economy that caters to the independence and instantaneous demands of consumers. A well-known example is Uber, which started in 2009 as an internet-based alternative to traditional taxicabs, with independent drivers using their own cars. By July 2016, Uber had logged two billion rides worldwide and in 2017 provided an estimated 60,000 daily rides in Toronto.[29]

Another emerging trend is the rise of mobility as a service (MaaS) platforms around the world. These MaaS platforms are integrated mobility services available by subscription, and offer travellers access to public and private transportation services—public transit, taxi, car rental, ride-sourcing, ridesharing, car-sharing and bike-sharing through a single app (Figure 11). The future roles and responsibilities of public organizations in planning for and delivering these services have not been established.

Figure 11: Mobility as a service concept

Public Transit   Bike-Sharing   Ridesharing   Ride-Sourcing

Car-Sharing   Micro-Transit   Taxi
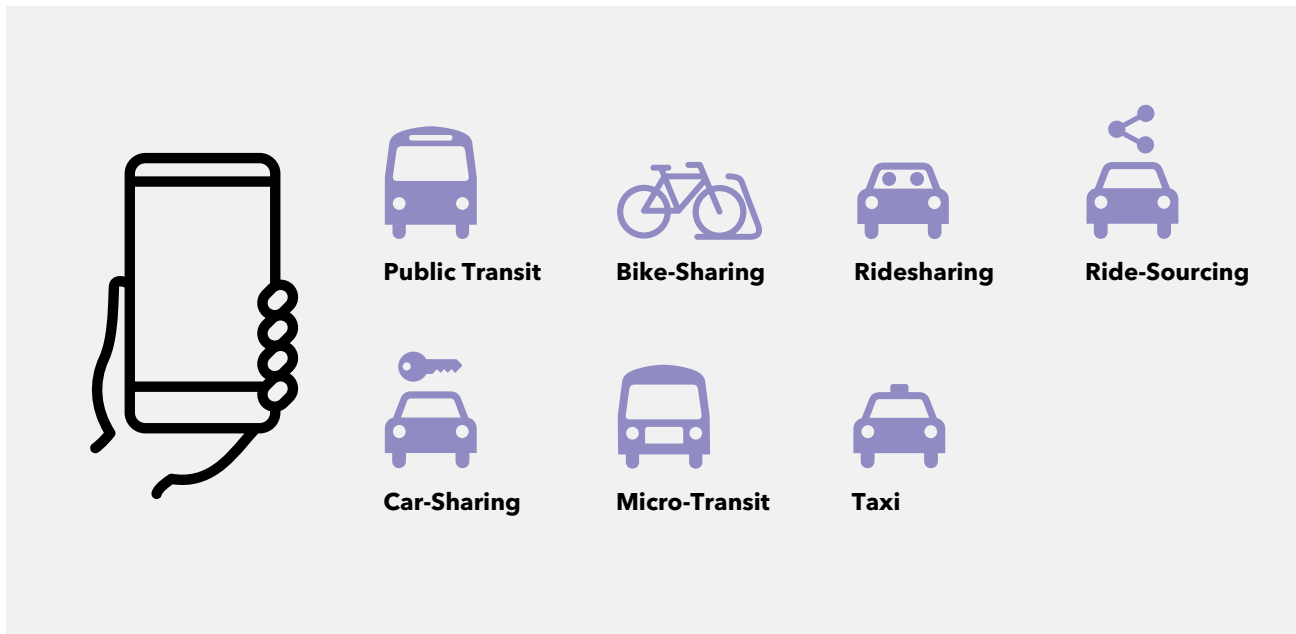
New transportation technologies are emerging

Real-time access to information and the market potential of new technologies are rapidly changing how people make travel decisions, how they travel, and what they expect of the transportation system.

Autonomous and connected vehicles are primed to have major implications on mobility. Some experts predict that robo-taxis (autonomous cabs) will account for 27% of passenger travel by 2030;[30] other studies predict a slower fleet turnover and higher share of private, rather than shared, autonomous vehicles.[31] Autonomous shuttle buses were first showcased in Europe in 2014 and are being piloted around the world, including near Montreal.

Many experts predict that autonomous vehicles could make mobility easier, safer and more seamless, improving mobility options in areas not well served by transit. They could also be extremely disruptive—creating inequitable access to services, impacting the workforce, and drawing customers away from transit systems. The arrival of private autonomous vehicles will almost certainly result in an increase in vehicle-kilometres travelled, which will worsen road congestion.[32] Autonomous vehicles could also change how and where goods move in the region, and how businesses function.

It is essential to clearly identify the public interest and the role of government in managing and adapting to these new technologies. Municipalities in the GTHA have identified a need for a coordinated, regional approach to prepare for the changes that new technologies and business models will bring.

Climate change is a real and increasing concern

Transportation is both affected by the impacts of climate change and a major contributor to the problem. Climate change impacts are already being experienced in the GTHA, and experts predict that there will be hotter temperatures, more intense rainfall events, and more severe and frequent storms in the future.[33] The total economic cost of weather events in Canada is increasing over time (Figure 12). A region with an integrated, multimodal transportation system will be more resilient to extreme weather events. Designing new infrastructure for a changing climate, strengthening existing networks, and updating operational protocols will all help the transportation system function well under difficult and changing climate conditions.

In Ontario, the transportation sector is the leading source of GHG emissions, representing 33% of the total (Figure 13).[34] In its *Climate Change Action Plan (2016-2020)* the Province committed to reducing GHG emissions to 80% below 1990 levels by 2050.[35] Efforts to reduce GHG emissions usually have the benefit of reducing other air contaminants and improving air quality. Implementation of the 2041 RTP can play a significant role in helping meet these reduction targets through the electrification of GO Rail and the adoption of low-carbon forms of transportation. Metrolinx's *Sustainability Strategy* outlines the specific steps the organization will take to meets its sustainability goals.[36]

Reducing greenhouse gas emissions

The GO RER program will more than triple the number of rail service kilometres compared to 2016. Electrification of the system will reduce the GHG emissions from operations by almost half of what was emitted in 2016.

Source: Metrolinx, GO Regional Express Rail Initial Business Case

Figure 12: Losses in Canada due to catastrophic weather events

A Quebec Floods
B Eastern Ice Storm
C Ontario Wind and Rain
D Alberta and Toronto Floods
E Fort McMurray Fire
— Estimated Trend
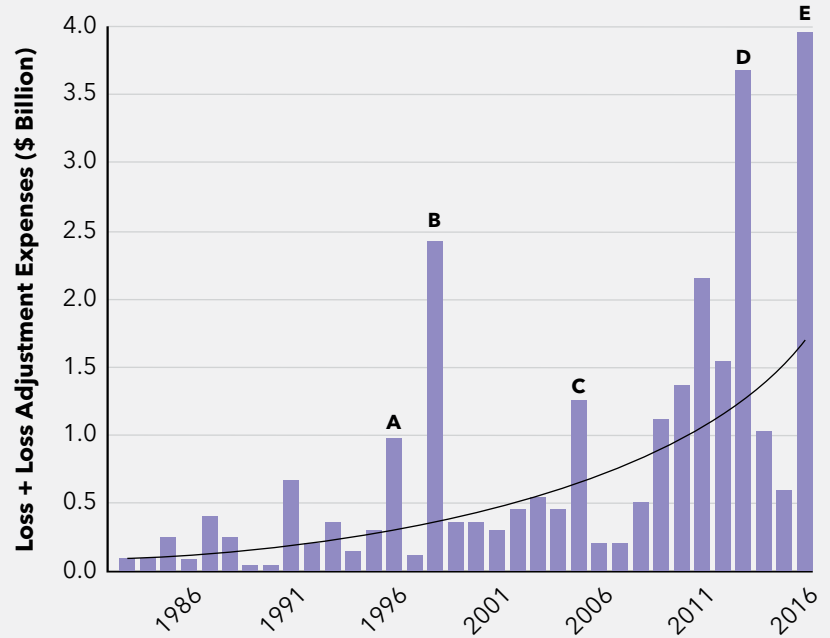
Source: Insurance Bureau of Canada, *Facts of the Property and Casualty Insurance Industry in Canada*, 2017.

Figure 13: Greenhouse gas emissions by economic sector in Ontario

■ Transportation
■ Buildings
■ Heavy Industry
■ Waste & Others
■ Agriculture
■ Oil and Gas
■ Electricity
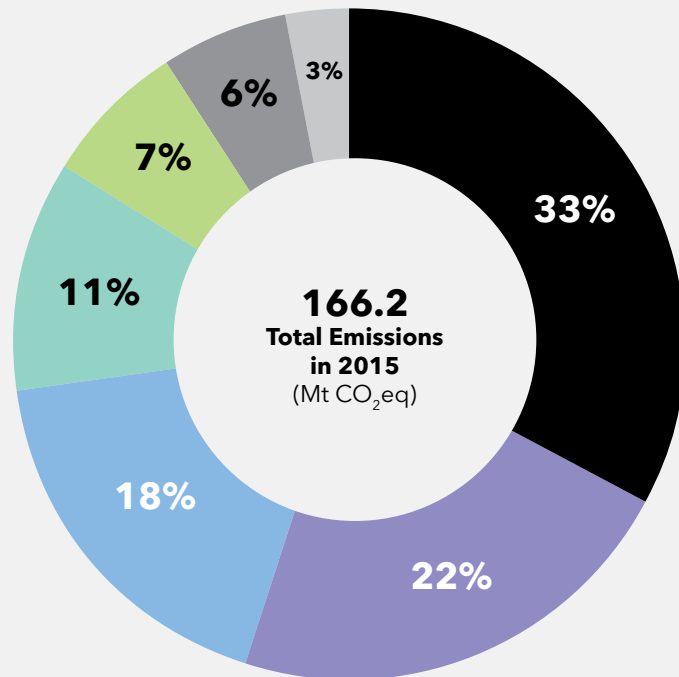
Source: Environment and Climate Change Canada, *National Inventory Report 1990-2016: Greenhouse Gas Sources and Sinks in Canada*, 2017.

166.2
Total Emissions in 2015
(Mt CO_2eq)

33%
22%
18%
11%
7%
6%
3%

Regional challenges

The Big Move set the stage for today's massive investments in rapid transit, and the 2041 RTP aims to build on these successes. However, there are a number of challenges that stand in the way of fully implementing the policies and actions in the Regional Transportation Plan. These are explored in this section.

Stronger integration of transportation and land use

Although the importance of integrating transportation planning with land use has long been established, decisions about land use planning, transportation planning, and investments are still often made in isolation. Full integration of municipal transportation and land use plans with the 2041 RTP is voluntary, and the priorities of municipal transit and transportation investments may not always be aligned.

The Growth Plan sets a strong policy framework for where and how to grow, and requires that municipalities plan for intensification. However, its implementation requires that municipalities and the private sector work towards the same goal. Ultimately, municipal policies and market forces jointly determine where growth is distributed. Competing objectives have sometimes led to jobs and services being located in areas that cannot support high-quality transit.[37] It is then a challenge to connect these areas to the rapid transit network.

Growth does not always happen as planned. At present, more than anticipated population and office employment growth is taking place in downtown Toronto.[38] This is positive for transit use, walking and cycling. At the same time, growth is not occurring as quickly as planned in some of the other Urban Growth Centres identified in the Growth Plan. The 2041 RTP must use approaches that will be viable under a range of growth outcomes.

Notwithstanding the higher than anticipated growth in Toronto, most population and employment growth is forecasted to be in newly urbanized areas.[39] While travel to downtown Toronto is expected to increase, travel between suburban regions will grow even faster (see Figure 8).[40] Historically, this travel market has been dominated by single-occupant automobile use (see Figure 9), so in the face of increasing growth it is critical to reduce the share of people who drive alone. Otherwise, the result will be higher costs for travellers and significantly more congestion and emissions region-wide, generating significant economic costs to the region.

How local communities are planned also affects our ability to achieve transportation goals. Communities with a mix of uses and sufficiently high densities can create the opportunity to walk, bike or take transit. However, many new roads and developments are designed to give preference to the movement of cars and trucks rather than transit users, pedestrians and cyclists. Without significant changes to community design practices, new transit services will not grow ridership, and active transportation will remain inconvenient, unsafe and uncomfortable.

Moving people, not just vehicles

For much of the twentieth century, transportation planning focused on moving cars as efficiently as possible. This resulted in streets that are designed for cars, with little room for transit vehicles, pedestrians and cyclists. Agencies in charge of roads, signals, parking, taxis and transit need to collaborate more closely to focus on moving people, not just vehicles, as efficiently as possible.

Focusing on the traveller

To develop the 2041 RTP, Metrolinx undertook intensive research—including panels, focus groups and surveys—to better understand travellers in the GTHA and their needs.[41] It is clear that people travelling across the region have high expectations and want to have consistent, reliable, convenient, clean and low-cost travel options regardless of their preferred mode and what municipal boundaries they cross. People care little about what system they are on or who operates it—they simply want to get where they are going as quickly, comfortably and reliably as possible. Despite progress being made in coordinating fares and service, decisions by individual transit agencies may not always prioritize travellers' end-to-end journey experience. Ultimately, this means they may fail to attract and retain travellers.

Integrating fares and service

With the implementation of the PRESTO fare card, transit users have an easy and consistent way to pay fares across the region. The next challenge is establishing and coordinating a fully integrated fare structure and set of fare products and concessions. Most jurisdictions with fare integration use either zone- or distance-based fares. The main challenge of fare integration will be to find a way to preserve affordability and avoid placing an undue burden on transit users who will have to pay more.

Transit services often end at municipal borders, creating barriers to traveling by transit across municipal boundaries. On a typical weekday, 21% of all trips in the region cross municipal boundaries in the morning peak period, half of which are destined to Toronto. Of trips destined to Toronto, about 49,000 trips, or 13% of all trips, use local transit (not including GO Transit), which represents about 10% of all local transit trips in the GTHA in the morning peak period. Of these, about 25% walk or drive into Toronto to access transit. The remaining 75%, or 37,000 trips, access local transit outside of Toronto and thus face a double fare. This represents 7.5% of all local transit trips in the GTHA in the morning peak period.[42] Double fares make cross-boundary transit services less attractive and reduce demand.[43] Double fares especially impact low-income residents who are dependent on transit. Fare and service barriers may cause low income residents to avoid making cross-boundary trips entirely, potentially depriving them of educational or employment opportunities and access to services. Most transit agencies in the GTHA have individual co-fare agreements with adjacent service providers. These agreements make cross-boundary trips more affordable for travellers.

GTHA transit systems developed around communities contained within municipal boundaries, but as those communities have grown people cross their boundaries more often. Today, many neighbouring communities with strong social and economic links have poor cross-border transit connections, and this can discourage transit use even where co-fare agreements exist. This is especially true for travellers between Scarborough, York and Durham, between Etobicoke and Mississauga, and between North York and York Region. Many of the frequent rapid transit routes proposed in the 2041 RTP cross municipal boundaries, and their benefits can be maximized through better fare and service integration.

Travel across municipal boundaries can be especially problematic for residents with disabilities—most customers need to book each leg of their trip with a different agency. There are eight different specialized transit systems in the GTHA, and transferring between them requires long transfer windows and complicated booking processes. These transit systems also have differing service models and eligibility practices.

Providing seamless specialized transit

During the 2015 Pan Am/Parapan Am Games, MTO coordinated with public transit agencies to ensure services were able to keep everyone moving. This included the introduction of "Call One," an integrated booking system for users of specialized transit services who needed to travel across the region. The system eliminated the need for users to contact each separate municipal provider (e.g. Mobility Plus in York Region and Wheel-Trans in Toronto) to coordinate their trip.

Coordinating decision-making

Decisions about transit and transportation are made daily at all levels of government. Most agencies work to support regional objectives, where feasible, but in some cases it can be a challenge to reconcile regional and local goals. In contrast, Metrolinx's focus is predominantly a regional one. Part of its focus is to ensure that others are working in alignment to achieve regional goals, despite their diverse mandates and responsibilities. Governments have significantly increased their support for transit over the last decade and progress has been made on key areas such as regional fare and service integration, yet more formal coordination and region-wide policies are required. All GTHA governments need to embrace new ways of working collaboratively to ensure that decision-making reflects and supports regional priorities and plans.

Additionally, the GTHA, the larger GO Transit service area, and the even larger GGH are overlapping areas that function as a single regional economy. Metrolinx has heard from some municipalities outside the RTP planning area that they would like Metrolinx to have a planning role in their communities, especially as it relates to the expansion of GO services.

Providing sustainable and long-term funding

The Province of Ontario has made an unprecedented investment—more than $30 billion—in the GTHA's transit infrastructure. While this committed funding will cover the capital costs of building fourteen rapid transit projects by 2025, it does not include maintenance and replacement costs. Additional funding from all levels of government will be needed to enable additional rapid transit projects after 2025 and to optimize the transportation system in collaboration with other levels of government.

Financial resilience requires sufficient funding sources that are tied directly to the 2041 RTP. Funding must address capital and operating costs, financing and asset management costs, and the costs of maintaining infrastructure assets in a state of good repair. Sustainable and reliable funding is required to align planning with what can be reliably delivered, year after year.

These important implementation issues of funding and decision-making are discussed further in the *Making It Happen* paper.

3

Vision, Goals, Strategies and Priority Actions
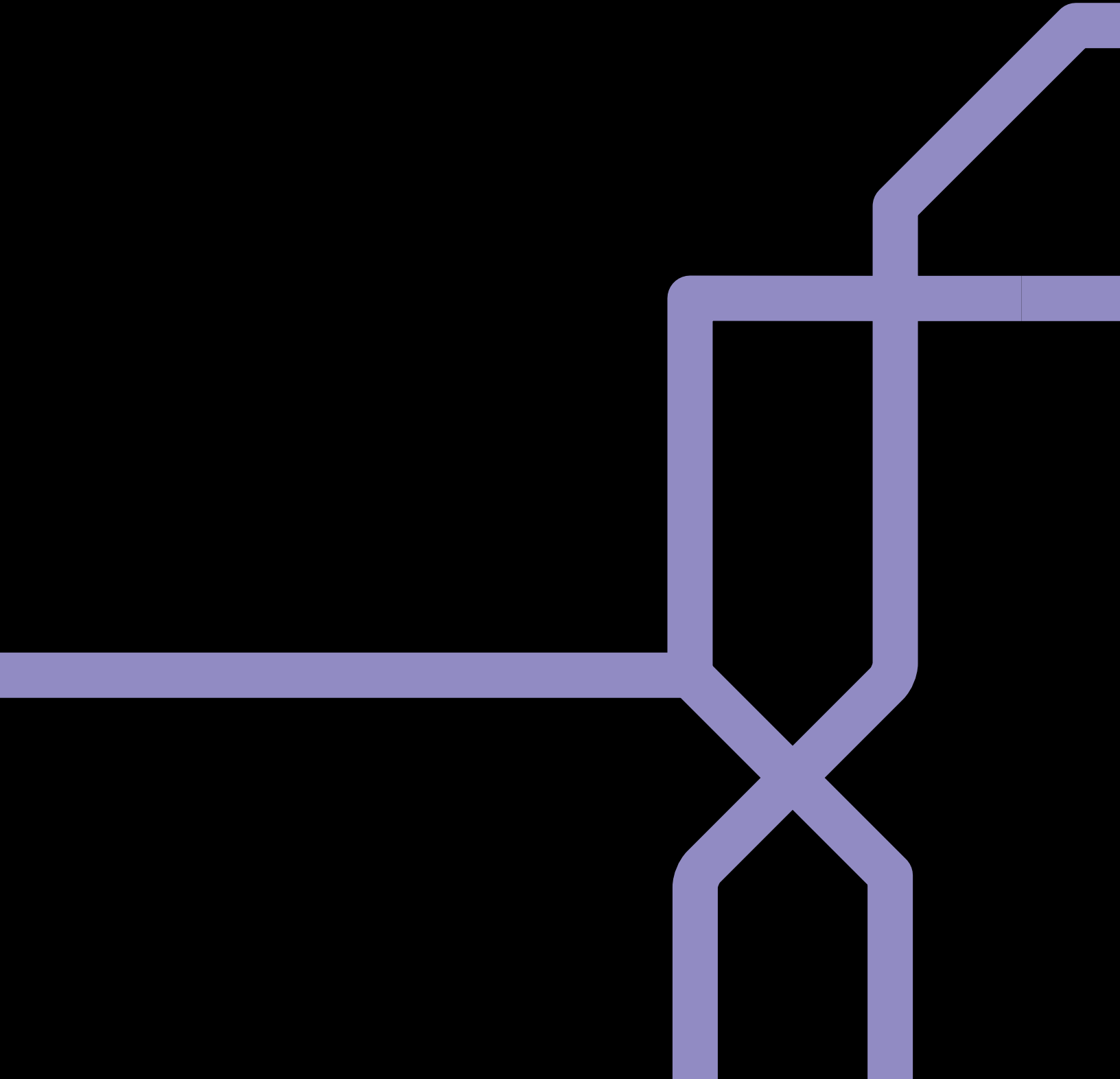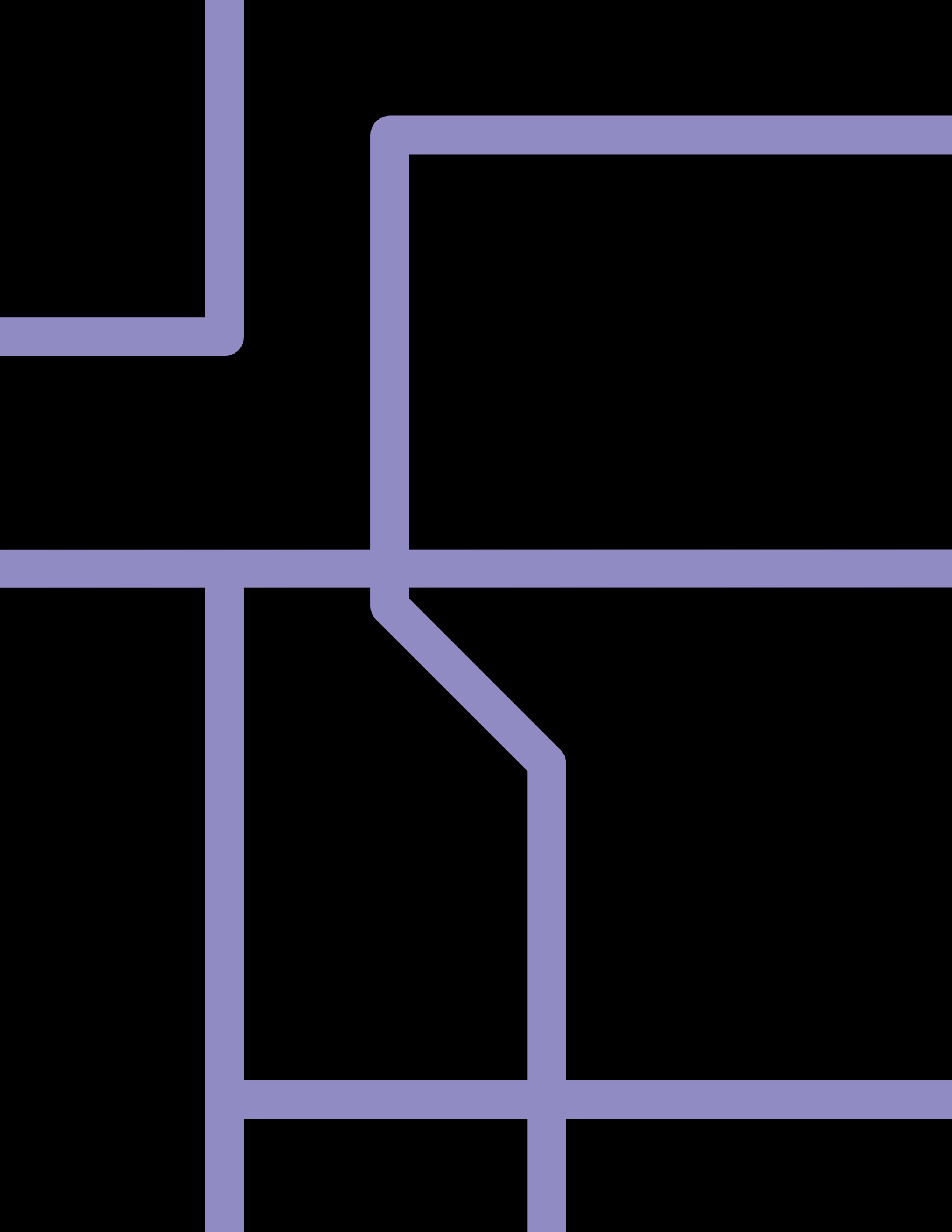
Vision and Goals

The 2041 RTP holds firm to the original vision of *The Big Move*, but now refines it into the following more concise statement:

Vision 2041:
The GTHA will have a sustainable transportation system that is aligned with land use, and supports healthy and complete communities. The system will provide safe, convenient and reliable connections, and support a high quality of life, a prosperous and competitive economy, and a protected environment.

In pursuit of this Vision the 2041 RTP adopts the following Goals:

- **Strong connections—**
  Connecting people to the places that make their lives better, such as homes, jobs, community services, parks and open spaces, recreation, and cultural activities.

- **Complete travel experiences—**
  Designing an easy, safe, accessible, affordable and comfortable door-to-door travel experience that meets the diverse needs of travellers.

- **Sustainable and healthy communities—**
  Investing in transportation for today and for future generations by supporting land use intensification, climate resiliency and a low-carbon footprint, while leveraging innovation.

Central to the Goals and Objectives of the 2041 RTP is the creation of a 'people-centred' transportation system—one that improves people's lives by giving travellers attractive choices. Travellers can ask themselves, "Should I take the GO train, or carpool with my co-worker? Should I take the LRT, or try bike-sharing? Should I walk or take a local bus to my express bus stop? Should I use the Triplinx app to help choose my mode and route?" More and better choices will give people—regardless of their ability, income, home location or schedule—greater access to places in the GTHA.

Another fundamental outcome of this plan will be a regional transit system that is convenient, reliable, and safe. Some parts of the system will run rapidly and frequently and allow people to move quickly over long distances. Other parts will provide local access and offer 24-hour service for those who work nights or stay out late. The system will provide universal access for travellers with disabilities, and will be affordable for people with low incomes who need it most. The system will sustain GTHA communities and businesses, and minimize the impact of transportation on the natural environment.

Setting the stage with transit-supportive guidelines

The Ministry of Transportation's best practice guidelines for transit-supportive development, urban design and transit operations, draw from the experiences of communities in Ontario, across North America, and abroad.

This plan's path to achieving the Vision, Goals and Objectives is described by five key Strategies:

- **Strategy 1–Complete the delivery of current regional transit projects;**

- **Strategy 2–Connect more of the region with frequent rapid transit;**

- **Strategy 3–Optimize the transportation system;**

- **Strategy 4–Integrate transportation and land use; and**

- **Strategy 5–Prepare for an uncertain future.**

Each Strategy includes a number of Priority Actions, which have been identified by screening alternative projects, programs, and policies against key performance criteria. The Strategies and Priority Actions also reflect the passenger transportation hierarchy in Ontario's *Transit-Supportive Guidelines* (2012), and promote a shift in travel behaviour across all modes, while recognizing the diverse needs of travellers.[44] In declining order, that hierarchy assigns priority to: trip avoidance or shortening; active transportation, such as walking and cycling; public transit; ridesharing (carpooling, vanpooling); car-sharing, ride-sourcing and taxis; and single-occupant vehicles.

The subsequent sections of this chapter address each Strategy in turn.

Strategy 1
Complete the delivery of current regional transit projects

Continue building GO Regional Express Rail to transform transit

The Big Move set in motion a historic expansion of rapid transit infrastructure across the region. Starting with the early successes of the 'Quick Wins' program, followed by the 'Top Transit Priorities' and the provincial *Moving Ontario Forward* program, more than $30 billion in rapid transit investments has been committed. Nine projects have been completed, and fourteen others are In Delivery (i.e., under construction or in the engineering design stage, as listed in Figure 3). This new infrastructure will build on the region's considerable base of existing transportation assets including Union Station in downtown Toronto and the Lester B. Pearson International Airport, both of which support significant employment concentrations and will remain focal points for transit investment. These projects will provide significant benefits to the people, businesses and institutions in the GTHA, connecting people to more places by transit, making transit a more viable option, and reducing emissions from transportation.

To sustain the current momentum, Strategy 1 recommends completing regional transit projects that are now In Delivery or In Development, while also modifying some projects from *The Big Move* to reflect more up-to-date information. Doing so will help municipalities meet the Province's *Growth Plan* goals by increasing transit's accessibility to more residents of the GTHA.

GO RER is underway, and represents a major focus of the Province's *Moving Ontario Forward* commitment. It will transform the existing GO rail system from a commuter-focused service into a two-way, all-day service on core segments of the network (see Map 3 and Figure 14). The expansion of GO RER after 2025 is addressed in Strategy 2.

By 2025 the ten-year, $16-billion GO RER program will double GO train service during peak periods and quadruple service during off-peak periods. Electrification will reduce transit operating costs and environmental impacts, and boost travel speeds. All seven GO corridors will see service improvements, with electrified service on core segments, running every 15 minutes or better all-day, in both directions.

GO RER includes additional stations and line extensions to expand GO rail's customer base and provide new seamless connections to other rapid and local transit. New stations are being added to the existing 66 stations. These stations also have the potential to attract new development and intensification in existing communities.

To support GO RER beyond 2025, governments and transit agencies will need to develop a plan to address rail service capacity at Union Station, in coordination with near-term planning for GO RER.

Figure 14: GO RER program to 2025

Improved rapid transit service is coming to the GTHA with Metrolinx's GO Regional Express Rail (GO RER) program. As new subway, light rail transit and bus rapid transit are built across the region, the GO RER program will transform the existing GO rail system into the backbone of an integrated regional rapid transit network.

Since its launch in 1967, the GO Rail system has focused on the suburb-to-downtown commuter market, with diesel locomotive-hauled trains operating primarily in the peak period and in the peak direction. The system has undergone incremental expansions in frequency, span and extent of service since its inception in 1967, most notably the introduction of 30-minute two-way all-day service on the Lakeshore lines in 2013.

The 10-year GO RER program represents a fundamental transformation of the GO rail system from a largely commuter system to a comprehensive regional rapid transit option. Infrastructure expansion, including new tracks, bridges, signals and fleet, will enable the doubling of peak period GO train service and quadrupling of off-peak service by 2024. All seven corridors will see service improvements, with five corridors seeing electric trains running every 15 minutes or better in both directions throughout the day. Additional stations and line extensions will bring the GO rail network to new markets, and new connections to rapid and local transit will enable seamless travel across the region.

GO RER will reduce travel times and give people more ways to get where they want to go with:

Trains every 15 minutes

Service in both directions

Faster electric trains

4x more off-peak, evening and weekend service

2x more weekday rush-hour service

Continue building LRT, BRT and subway projects that are In Delivery

In addition to GO RER, the Province's *Moving Ontario Forward* program includes a commitment to build thirteen LRT, BRT and subway projects by 2025. These projects, currently under construction or in the engineering design stage, include five LRT lines (Eglinton Crosstown, Sheppard East, Finch West, Hamilton B-Line and Hurontario), three BRT lines (Highway 7 West, Yonge North and Yonge South), four GO Transit extensions, and a subway extension (Scarborough), as shown in Figure 3 and Map 3. Together with GO RER, these projects will be the foundation of the future Frequent Rapid Transit Network (see Strategy 2).

Advance key rapid transit projects that are In Development

The next generation of regional transit projects—those that are In Development (in advanced stages of planning and design)—are required to meet the needs of the region in the near term. Thirteen projects have received significant commitments for planning and design from federal, provincial and municipal governments. These projects (listed in Figure 15 and shown on Map 4) include the Relief Line, the Yonge subway extension, and various BRT and LRT lines.

Coordinate with high speed rail projects

For several years, MTO has studied high speed rail in the context of improving Ontario's internal travel connections and linking it to the global economy through international gateway hubs. In spring 2017, the Province announced its intention to move ahead with preliminary design and environmental assessment of a high speed rail corridor between Toronto and Windsor that will take into account the GO RER expansion program. VIA Rail has also recently announced its intention to pursue a high frequency rail project in the Toronto to Quebec City corridor.

Extensive collaboration will be needed between rail service providers, including Metrolinx and VIA Rail, to ensure that the implementation processes and outcomes of GO RER, the Province's high speed rail concept and VIA's high frequency rail service are coordinated and complementary, and use public funds effectively.

Figure 15: In Development rapid transit projects

Planning is underway for the next rapid transit projects to be delivered in the Greater Toronto and Hamilton Area. These new corridors and extensions will complement the existing network, and continue the momentum of North America's largest rapid transit expansion program.

Brampton Queen St. BRT/LRT

Upgrade of existing Queen St. Zum to rapid transit; links downtown Brampton and York Region.
From Downtown Terminal in Brampton to Highway 50 at the Vaughan border.
Length:13 km

Dundas BRT

New bus rapid transit corridor along Dundas St.; links Toronto, Mississauga and Oakville.
From Kipling Station in Toronto to Bronte Rd. in Oakville.
Length: 22 km

Dundas West Priority Bus

Priority Bus along Dundas St.; links Burlington with Oakville and the Dundas BRT.
From Brant St. in Burlington to Bronte Rd. in Oakville.
Length: 18 km

Durham-Scarborough BRT

Upgrade of existing DRT Pulse service to bus rapit transit along Highway 2; links downtown Oshawa and Scarborough.
From Simcoe St. in Oshawa to Scarborough Centre in Toronto.
Length: 36 km

Eglinton East LRT

Extension of Eglinton Crosstown LRT eastward; links Kennedy Station, University of Toronto Scarborough and Sheppard Ave.
From Kennedy Station to Sheppard Ave. East in Toronto
Length: 10.7 km

Eglinton West LRT

Extension of the Eglinton Crosstown LRT westward to Pearson Airport.
From Mt. Dennis in Toronto to Renforth Gateway and Pearson Airport in Mississauga.
Length: 12 km

Highway 7 East BRT Extension

Extension of the Highway 7 Viva Rapidway eastward; linking Unionville and Cornell.
From Unionville GO Station to Cornell in Markham.
Length: 5.5 km

Highway 7 West BRT Extension

Extension of the Highway 7 Viva Rapidway westward; links Vaughan and Brampton.
From Helen St. in Vaughan to Highway 50 at the Brampton border.
Length: 11.5 km

Relief Line Subway

New subway line linking downtown Toronto, the Bloor-Danforth Subway and Sheppard Ave.; will manage congestion on the Yonge Subway Line.*
From Osgoode Station to Sheppard Ave. East in Toronto.
Length: 18 km

Waterfront East LRT

New light rail transit corridor along the waterfront; links downtown Toronto, the Port Lands and the Beach.
From Union Station to Coxwell Ave. in Toronto.
Length: 7 km

Waterfront West LRT

New light rail transit corridor along the waterfront; links downtown Toronto and Port Credit.
From Union Station in Toronto to Port Credit GO Station in Mississauga.
Length: 22.3 km

Yonge BRT (Richmond Hill, Aurora, Newmarket)

Bus Rapid Transit along Yonge St.; links Richmond Hill, Aurora and Newmarket.
From 19th Ave. in Richmond Hill to Mulock Dr. in Newmarket.
Length: 14.5 km

Yonge North Subway Extension

Extension of the Yonge Subway north into York Region; links Richmond Hill to Downtown Toronto.
From Finch Station in Toronto to Highway 7 in Richmond Hill.
Length: 7.4 km

*Length, alignment, station locations and technology for Relief Line North (Danforth Ave. to Sheppard Ave.) to be determined through the Relief Line North Project Assessment.

Legend

Urban Growth Centre
GGH Built Boundary
Greenbelt Designation
Existing or Future Expressway /
Provincial Highway
Existing or In Delivery GO Rail Station
Planned GO Rail Station
International Airport

Existing and In Delivery
Regional Rail and Rapid Transit

Projects In Development

Subway
LRT / BRT
Priority Bus / Priority Streetcar

Projects In Development

32. Dundas West Priority Bus
33. Dundas BRT
34. Brampton Queen Street BRT / LRT
35. Eglinton West LRT
36. Highway 7 West Extension
37. Waterfront West LRT
38. Waterfront East LRT
39. Relief Line Subway
40. Yonge North Subway Extension
41. Yonge BRT
42. Eglinton East LRT
43. Highway 7 East Extension
44. Durham-Scarborough BRT

For more details, see Appendix 3C

All project definitions are subject to change
based on negotiations and agreements with
railways, environmental assessments,
business case analysis, and further planning.

DURHAM
YORK
TORONTO
PEEL
HALTON
NIAGARA
SIMCOE
HAMILTON
WATERLOO

Downtown Oshawa
Downtown Pickering
Scarborough Centre
Markham Centre
Newmarket Centre
Richmond Hill Centre / Langstaff Gateway
North York Centre
Yonge-Eglinton Centre
Downtown Toronto
Billy Bishop Toronto City Airport
Vaughan Metropolitan Centre
Etobicoke Centre
LBPIA Airport
Downtown Mississauga
Downtown Brampton
Downtown Milton
Midtown Oakville
To Allandale Waterfront
Downtown St. Catharines

Downtown Barrie

Downtown Burlington
Downtown Hamilton
Uptown Hamilton
Hamilton International Airport
To Niagara

Downtown Guelph
Uptown Waterloo
Downtown Kitchener
Region of Waterloo International Airport
To Kitchener

0 5 10 km

Priority Actions for Strategy 1

1.1

Complete In Delivery projects (see Map 3) by 2025, including the GO RER program; the Hurontario, Eglinton, Hamilton B-Line and Finch West LRT lines; and the Highway 7 and Yonge BRT lines:

- Ensure that all projects together deliver a regionally consistent, seamless and high-quality customer experience.

1.2

Advance the In Development transit projects (see Map 4) through preliminary design, detailed design and construction.

1.3

Strengthen Union Station's capacity as the centre of GO RER:

- In consultation with the City of Toronto and the provincial and federal governments, develop a plan to address rail service capacity at Union Station to accommodate the growth of GO RER beyond 2025.

- Ensure that all decisions regarding improvements to Union Station and adjacent areas are consistent with and protect for long term objectives.

1.4

Coordinate planning and implementation of In Delivery and In Development projects with the Province, the federal government and VIA Rail Canada, focusing on:

- high speed rail;

- high frequency rail;

- optimizing shared resources including Union Station and rail corridors; and

- integrating services for a seamless experience.

Strategy 2
Connect more of the region with frequent rapid transit

The expansion of convenient, fast and frequent rapid transit across the region currently underway will provide travellers with good alternatives to driving, in particular for trips to and from downtown Toronto. Strategy 2 is focused on extending the reach of frequent rapid transit and connecting various parts of the GTHA with a Frequent Rapid Transit Network.

With GO RER and subways acting as its spine, the Frequent Rapid Transit Network will connect urban centres, employment nodes and regional destinations with Priority Bus, Frequent Regional Express Bus, LRT and BRT projects. It will help municipalities meet the Province's *Growth Plan* goals by making frequent rapid transit more accessible to more GTHA residents.

These transit investments will have wide-reaching benefits for quality of life through reduced congestion and automobile dependency, improved air quality and reduced greenhouse gas emissions, improved travel affordability, better health, and greater accessibility to different parts of the region.

Toronto improves surface transit

The City of Toronto's Official Plan (2015) commits to "increasing transit priority throughout the City by giving buses and streetcars priority at signalized intersections and by introducing other priority measures… such as reserved or dedicated lanes for buses and streetcars; and limiting or removing on street parking during part or all of the day" as a means of supporting its growth management objectives.

The Toronto Transit Commission (TTC) also launched its 10-Minute-or-Better service network in 2015 for all streetcar routes and 52 bus routes. In 2017, it announced an enhanced Express Bus Network that will provide new or enhanced service on 13 routes (with another 8 pending future review). The network will offer 15-minute or better frequencies all day, using strategies to improve speed and reliability such as queue jump lanes and transit signal priority. The City of Toronto in conjunction with the TTC also initiated the King Street Pilot project, which uses a variety of turning and parking restrictions for automobiles, as a contribution towards the development of a comprehensive Surface Transit Priority Plan that lets buses and streetcars move more quickly on key corridors without getting stuck in traffic.

Develop a Frequent Rapid Transit Network across the GTHA

Strategy 2 proposes the development of a Frequent Rapid Transit Network across the GTHA to provide high-quality transit to more people in more places (see Map 5 and Map 6).[45] The network is a logical approach to the problem of moving people efficiently by transit in a region with multiple major population and employment concentrations, where travel demand patterns are increasingly dispersed and not simply focused on one central core. This strategy proposes several additional BRT, LRT, Priority Bus, subway and RER projects (see Map 5) in addition to existing and planned projects to form an integrated Frequent Rapid Transit Network (see Map 6) that will allow people to travel quickly and seamlessly across the GTHA.

Many regions in North America have frequent transit networks that offer a base grid of 10- to 15-minute service (e.g., TransLink's Frequent Transit Network[46] in Metro Vancouver). The Toronto Transit Commission (TTC) also operates a network of frequent bus and streetcar services. The Frequent Rapid Transit Network proposed in Strategy 2 goes beyond frequent service to also provide high-quality, fast and reliable service across the GTHA. As Figure 16 shows, it will feature:

- 15-minute service or better, all-day, seven days a week;

- more reliable service through the use of managed lanes to provide protection for transit from mixed traffic, and transit signal priority measures;

- faster service due to wide spacing of stops and transit signal priority; and

- efficient transfers between routes, enabling a traveller to get anywhere in the GTHA easily and reliably without looking at a schedule.
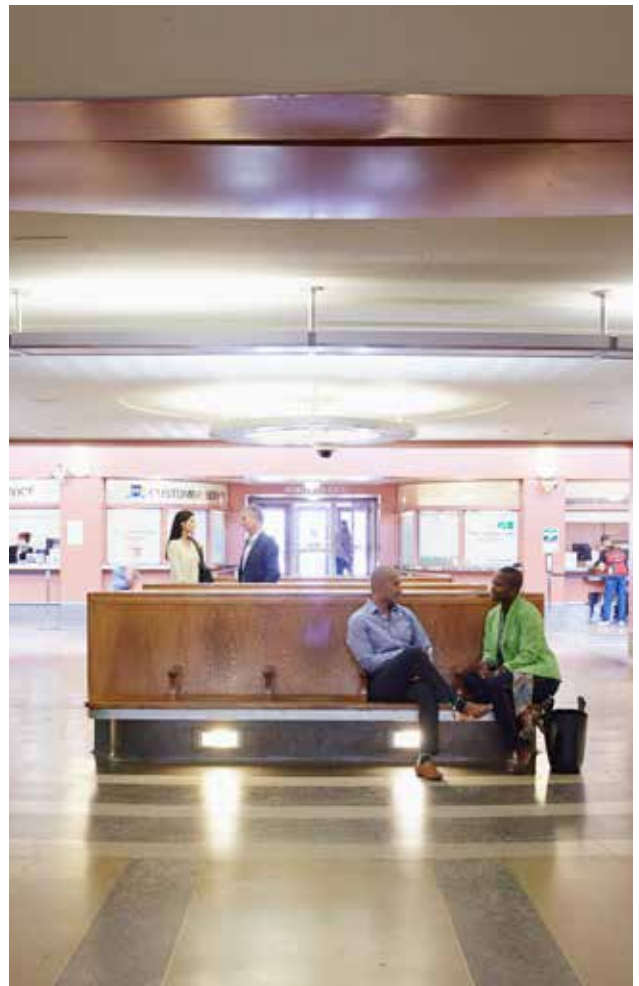
The Frequent Rapid Transit Network consists of regionally significant, high-demand transit corridors that connect Urban Growth Centres, key Mobility Hubs and areas of high population or employment density. It will fill gaps in the regional network, and provide improved transit service throughout the region, including in the lowest income areas where it is needed most. A key strategy will be the use of managed lanes to provide protection for transit from mixed traffic, transit signal priority, and other improvements. As Figure 17 shows, major elements of the Frequent Rapid Transit Network will include:

- existing rapid transit lines (see Map 2);

- 15-minute all-day GO RER service and other recently completed and In Delivery rapid transit projects (see Map 3);

- In Development transit projects (see Map 4);

- additional LRT, BRT and subway projects to meet regional needs to 2041 (see Map 5);

- expansion of 15-minute GO RER beyond 2025 (see Map 5);

- Priority Bus and Priority Streetcar corridors (see Map 5); and

- Frequent Regional Express Bus routes (see Map 5 and Map 7).

The Frequent Rapid Transit Network includes a variety of transit services because areas with slower growth and lower densities need different approaches than those with higher growth and higher densities.[47] It will be most effective where residential and employment areas are located close to transit stations, so travellers can easily walk to and from home or work. It will provide strong, high-quality transit connections to all parts of the region, and not just to downtown Toronto.

Gaps in connectivity will need to be addressed through service integration, including the connection of local bus services to the Frequent Rapid Transit Network. The Frequent Rapid Transit Network would in some cases replace existing services, and in other cases would need to work alongside existing local services that provide local stops while the Frequent Rapid Transit Network service would make fewer stops.

The Frequent Rapid Transit Network will focus on providing a consistent and seamless traveller experience regardless of who operates the various parts of the system. Close collaboration among Metrolinx, the Province, municipalities and transit agencies will be key to establishing priorities, identifying roles and responsibilities and knitting the region together with frequent rapid transit.

Expand 15-minute GO RER after 2025

GO RER will be a catalyst for how people use rapid transit in the region and a strong anchor for the Frequent Rapid Transit Network, as well as generating positive economic benefits.[48] Building on the current GO RER program, Strategy 2 proposes expanding the 15-minute, two-way all-day GO rail network to include service on the Milton line, and extensions of 15-minute service on the Barrie, Stouffville and Lakeshore East and West lines (see Map 5). The need for new stations on the network will be assessed during implementation planning, including business case review.

Providing 15-minute, two-way, all-day service on the Milton Line will be subject to a review of physical constraints, will require extensive infrastructure investments including track expansions and upgrades, and may include the construction of a new freight rail corridor. The proposed RER expansion would be subject to negotiations with freight rail operators where the corridors are not in public ownership.

Build additional LRT, BRT and subway projects

In addition to the transit projects that are In Delivery and In Development, Strategy 2 proposes building several new LRT, BRT and subway projects by 2041 (see Map 5). These are needed to fill key gaps in the rapid transit network and address capacity needs. Most of these projects were identified in *The Big Move* for 2031, and they continue to be needed within the 2041 RTP's time horizon.

BRT service reduces travel times in Mississauga

The 18-km Mississauga Transitway, opened in 2014, allows buses to run unhindered by general traffic and connects to the TTC subway system, Mississauga City Centre and employment hubs like the Pearson International Airport Corporate Centre. Upon full implementation, the BRT line will serve 5 million riders annually with time savings of 15 to 18 minutes per trip. Each of its 12 stations features heated waiting areas, wireless internet access, bicycle lockers and full accessibility.

Figure 16: Key principles of the Frequent Rapid Transit Network

Legend:
- Frequent Rapid Transit Network
- Local Transit Network
- Regional Rail & Express Bus
- Municipal Boundary
- Urban Growth Centre
- Area of High Population & Employment Density
- Area of Low Income

Criteria
- Regionally significant routes
- Congested, high demand corridors
- Connects major centres (UGCs, employment areas, large institutions)
- Serves areas of high population and employment density
- Serves low income areas
- Fills gaps in service where transit times are not competitive with the car
- Efficient transfers and integration with local and regional routes

Characteristics
- Frequent: 10-15 minute all-day service, seven days a week
- Reliable: signal priority measures and traffic protection
- Fast: wide spacing between stops
- Efficient transfers between services

Components
- Subway
- Bus Rapid Transit (BRT)
- Light Rail Transit (LRT)
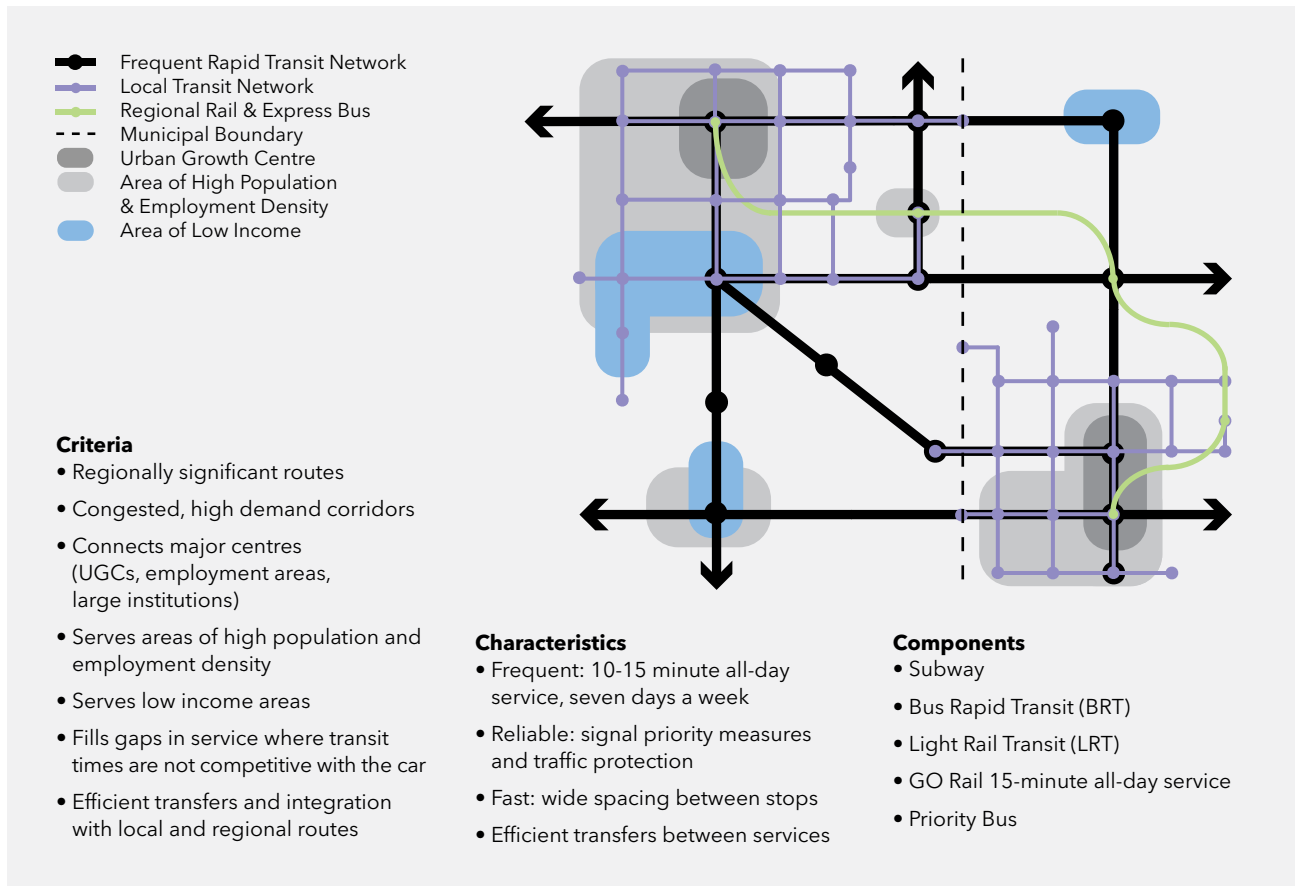- GO Rail 15-minute all-day service
- Priority Bus

Figure 17: Components of the Frequent Rapid Transit Network

Develop Priority Bus corridors

Many parts of the GTHA are some distance away from existing, In Delivery, In Development, and proposed LRT, BRT, subway and GO rail facilities. To improve transit service in these areas, Strategy 2 proposes the creation of Priority Bus corridors (see Map 5). These are a practical and cost-effective way of providing fast, frequent and reliable transit service to more people without the need for a dedicated right-of-way (see Figure 18). Priority Bus corridors will be part of the Frequent Rapid Transit Network, along with BRT, LRT, subway and 15-minute GO RER corridors.

Priority Bus corridors can have many benefits. They allow buses to run quickly and reliably by providing protection from mixed traffic (e.g., HOV lanes on arterial roads, turn prohibitions or other traffic restrictions) and using other transit priority measures such as queue jump lanes and signal priority at intersections. Priority Bus routes running in Priority Bus corridors will have wider spacing between stops (e.g., every 300 to 800 metres) to improve travel times over longer distances. Features such as all-door boarding and safe, comfortable stations can further improve service and enhance the customer experience. An advantage of Priority Bus corridors is the potential to implement additional priority measures (e.g., new queue jumps, more aggressive signal priority, or new turn prohibitions for mixed traffic) as conditions evolve (e.g.,

in response to population and employment growth, or an increase in congestion). These corridors can eventually be converted into BRT, LRT or even subway corridors as demand grows. They can also be adapted to new uses, such as carrying driverless shuttles when autonomous vehicle technologies arrive. Finally, Priority Bus corridors are likely to have lower per-kilometre capital costs than BRT and LRT corridors, and can be implemented more quickly than other more capital intensive investments.

Different Priority Bus features can be used in different corridors to achieve desired transit speed and reliability targets in varying conditions (e.g., ridership, congestion, right-of-way constraints). Figure 19 shows typical features of Priority Bus corridors, and compares them to BRT corridors which have many similarities. Priority Bus corridors and BRT corridors can be used together while maintaining route and schedule flexibility; a single bus route could operate in a BRT corridor through a higher-density area and continue into a Priority Bus corridor in a lower-density area, without requiring passengers to transfer (see Figure 20). The same principles and benefits of Priority Bus corridors can be applied to streetcars and light rail vehicles to create Priority Streetcar corridors. As with BRT and Priority Bus, a light rail vehicle could operate partially in an LRT corridor and in a Priority Streetcar corridor depending on local conditions, without requiring a transfer.

The creation of a Priority Bus corridor network for the GTHA will require a collaborative strategy that addresses implementation priorities as well as the roles and responsibilities of various municipal departments. A rollout of the Priority Bus corridor network could begin quickly, and the performance of individual routes could be reviewed at fixed time intervals to determine where enhancements or other adjustments are appropriate. The creation of Priority Bus corridors in congested, high-demand areas can provide dramatic improvements to transit service in the short term as more capital-intensive solutions (e.g. BRT, LRT, subway) are implemented over the longer term.

Many international cities have reinvented their bus networks to include high-performing bus services, and have attracted more riders (Figure 21). Closer to home, several GTHA transit agencies have started to introduce some Priority Bus features along high-demand routes to provide enhanced bus services that are faster, more reliable and comfortable.[49] The proposed Priority Bus corridor network for the GTHA builds on many of these routes, some of which are expected to see sufficient demand to warrant BRT construction by 2041.

Examples of some enhanced transit routes in the GTHA today include:

- Brampton Transit's five Züm bus routes, which boast 15-minute service (all day, or in some cases only during peak periods), queue-jump lanes at some intersections, transit signal priority at key intersections used when buses are behind schedule, and real-time next-bus arrival information at stops.

- Durham Transit's Pulse route on Highway 2, which features 15-minute service or better all day, transit signal priority at some intersections, and dedicated bus lanes along some sections.

- York Region Transit's six Viva routes, which offer 15-minute service or better on much of the network, transit signal priority at some intersections, dedicated BRT rights-of-way in some sections, and interlined routes that share a dedicated right-of-way.

- The TTC's express bus routes, which have wider stop spacing along with some use of HOV lanes, and limited transit signal priority. The TTC is also planning a next-generation express bus network offering 15-minute service or better, with queue jump lanes at selected intersections and expanded use of transit signal priority.

- The City of Toronto and TTC's King Street pilot project, which has sped up streetcar routes using a variety of turning and parking restrictions for automobiles, and curbside stops to improve pedestrian access.

Figure 18: Typical features of Priority Bus

Reliable

Integrated Service

All-Day Service

Queue Jump Lanes

Fast

Signal Priority

Protection from Mixed Traffic

Frequent Service

Safe, Comfortable Stations with Passenger Information
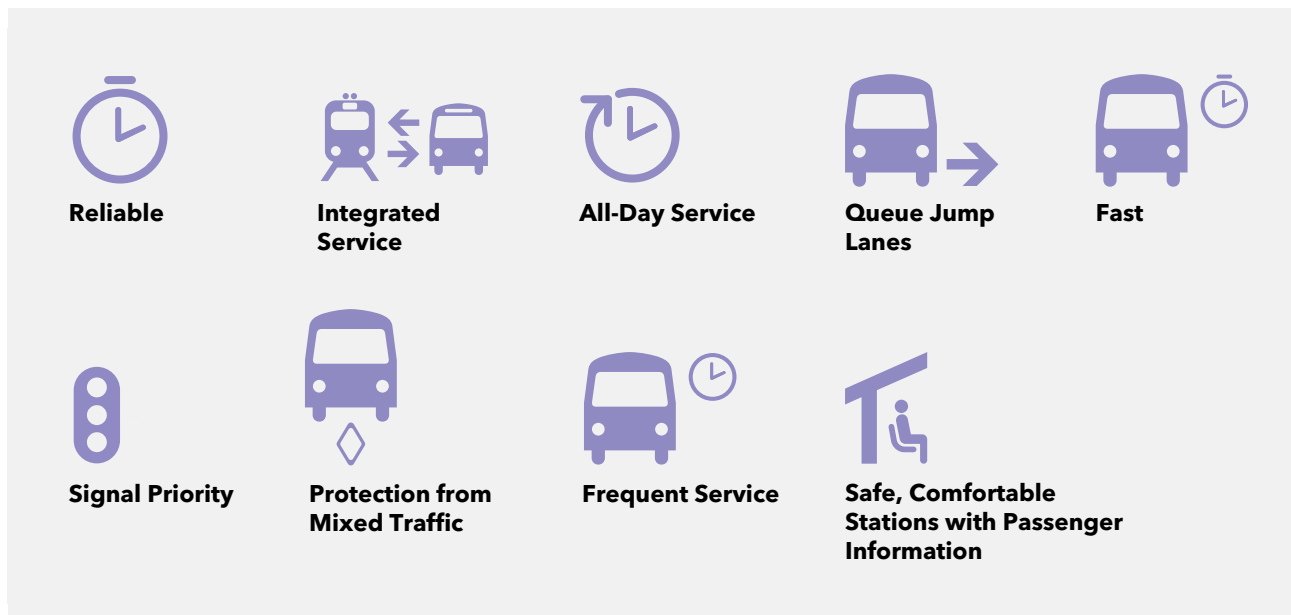
Figure 19: Key characteristics of Priority Bus and BRT

BRT Corridor

- Dedicated right-of-way
- Two-way median-aligned busway
- Left turn prohibitions
- Platform-level boarding
- Supporting bicycle infrastructure
- Bike parking
- Highest average operating speeds

Priority Bus Corridor

- Enforced HOV lane or other traffic restrictions
- Typically aligned to curb
- Queue jump lanes
- Faster operating speed than mixed-traffic operation

Shared

- Minimum 10-15 minute service, all day
- Wider station spacing (0.3 - 1 km)
- Signal priority at intersections along corridor
- Regionally significant, high-demand corridor
- Reliable, with minimal bunching

- Off-board fare collection, all-door boarding
- Well maintained infrastructure
- Safe, comfortable, accessible stations
- Passenger information
- Multiple routes using corridor

Source: Adapted from The Institute for Transportation and Development Policy, The BRT Standard, 2016.

Figure 20: Example of bus operations in Priority Bus and BRT corridors

Mixed Traffic   **Priority Bus Corridor**   **BRT Corridor**

Some measures that can be used to improve speed and reliability of transit in priority corridors:

1. Shared bus and HOV lane
2. Queue jump lane for buses
3. Transit Signal Priority
4. Dedicated bus lane

Multiple bus routes can share Priority Bus and BRT corridors, and operate in mixed traffic, without the need to transfer.
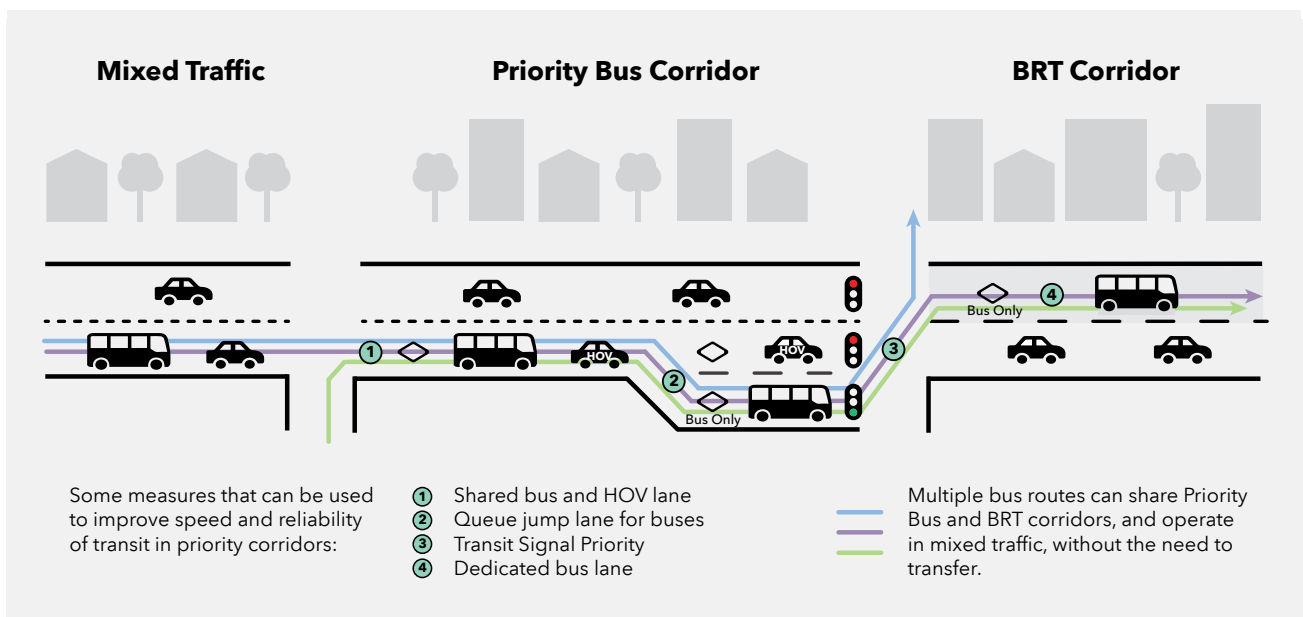
Develop Frequent Regional Express Bus routes

With the implementation of RER and the delivery of all-day service on most GO rail corridors, GO bus routes and services will be reviewed as they evolve towards playing a new role in the region's transit network. Routes can be restructured to increasingly link transit hubs and Urban Growth Centres, enhancing and creating new connections in the network.

Implement Frequent Regional Express Bus Service

Frequent Regional Express Bus is a new type of service proposed for core areas of the region not well-served by 15-minute GO RER. With 15-minute service or better all day, these longer distance routes are also part of the Frequent Rapid Transit Network. Different types of investments (than for Priority Bus) are needed to ensure these buses provide superior service and reliability compared to today's GO bus routes. This includes taking advantage of an expanded managed lanes network on 400-series and other major highways, or by using Highway 407 which has a high level of service due to its tolling structure. Other opportunities include dedicated bus access ramps to minimize delay for buses entering and exiting highways, and convenient, high-quality stations directly on or adjacent to the highway that minimize delays for through-service passengers while providing good connections to other frequent rapid transit and local transit routes.

Map 5 and Map 7 show the proposed Frequent Regional Express Bus routes and managed lanes network. The network of HOV lanes and other managed lanes on 400-series highways will be determined by MTO in consultation with Metrolinx, as part of the ongoing *GGH Transportation Plan*.

Building improved stations and transit connections along Highway 407 could boost the effectiveness of frequent east-west bus routes in the corridor, and could be implemented before the construction of a separate, dedicated transitway. Similar treatments can be phased in along other highway corridors where HOV infrastructure is in place to allow for reliable operation of Frequent Regional Express bus services without the need to widen the highway. Further discussion of HOV lanes is presented under Strategy 3.

The region's network of carpool lots will serve as important hubs for accessing Regional Express Bus services. Where appropriate, these carpool lots can also be integrated with stations.

Develop coordinated regional transit routes

Operating less frequently, Regional Express Bus routes are a second new type of GO bus route (see Map 7). They would serve the transit needs of areas not well connected by the regional rail network, typically over longer distances. These services are similar to today's GO bus services but could operate more reliably than today by taking advantage of HOV lanes on highways and other transit priority measures that would be put in place for the Frequent Rapid Transit Network.

Two-way, all-day GO Rail service on the Richmond Hill line and on the Bowmanville extension will provide additional regional service to areas that can benefit from improved capacity and service but do not require the frequency proposed for the Frequent Rapid Transit Network.

Ottawa Transitway: Queensway Station (top), Longfield Station (bottom).

Figure 21: Examples of enhanced bus systems in the United States and Australia with features of Priority Bus

Seattle, RapidRide

- Service at least every 10 minutes during peak periods, and approximately every 15 minutes all day and on weekends.
- Services fewer stops for faster travel.
- Makes extensive use of Transit Signal Priority technology to the signals – shortening a red light, or extending a green light – to ensure buses remain on schedule, even in mixed traffic.
- On some lines, uses queue jump lanes to bypass traffic.
- Utilizes roadway improvements such as HOV lanes, bus bumpouts.
- Contactless smart card is used for off-board payment enabling all-door boarding.
- Real time passenger information at the stations shows time until the next bus arrives.
- Automated Vehicle Location system determines buses' actual location on the route.

Portland Metropolitan Area, The Vine

- Service every 10 minutes during peak periods, every 15 - 30 minutes all day and on weekends.
- Operates in mixed traffic with curbside stations.
- Transit Signal Priority allows Vine buses to communicate with the signal system along the route.
- Off-board Fare Collection: Customers may pre-purchase fares at ticket vending machines at each station before boarding which will speed up boarding.
- Low-floor buses in combination with raised station platforms for level boarding.
- Stations are located approximately 500 m apart.
- Stations include real-time arrival signs.

Los Angeles, Metro Rapid

- Express bus service with bus rapid transit characteristics.
- Operates in mixed environments and HOV lanes.
- Has fewer stops than the local bus service.
- Rapid stops located only at major intersections and transfer points.
- Signal priority is used within the City of Los Angeles boundaries.
- Service five days a week, at least every 10 minutes during peak periods and every 20 minutes midday and evenings. Some rapid routes operate on weekends as well.

Sydney, Metrobus

- Service every 10 minutes during peak periods, every 15 minutes during off-peak periods during the day, and every 20 minutes in the evening and on weekends.
- Uses HOV lanes and transit signal priority.
- Spaces between stops are increased.
- Easy connections – Metrobus services stop at major bus and rail interchanges.
- Wheelchair-friendly – entry and priority seating make Metrobus very accessible.
- Each bus features the latest environmental controls to reduce greenhouse gas emissions.

Extend GO Transit service outside the GTHA

Metrolinx's mandate includes providing GO rail and bus services to municipalities in the GO Transit service area outside the GTHA. Increased service levels are In Delivery, and are expected to grow in support of *Growth Plan* implementation. Future planning for GO Transit infrastructure and services will continue to consider the needs of the outer ring, and will be coordinated with local municipal plans to support station area access and development.

Develop a regional 24-hour transit network

 The provision of 24-hour transit service is becoming more important as the regional economy grows more diversified and part-time and contract employment becomes more prevalent. Currently, only the TTC has a 24-hour bus/streetcar network. As housing costs rise, lower-income households are likely to disperse throughout the region, farther away from quality transit. Lower-income households are more likely to rely on transit, and members of low-income households are more likely to hold part-time or contract jobs. A reliable 24-hour transit network throughout the region would improve access to employment and other opportunities for people who need it most, and make it easier for people who depend on transit to get around in a 24-hour society. While the 24-hour transit network would be comprised of routes offered by the various operators in the GTHA, it would be designed to function as an integrated and connected system.

Züming Along

Since 2010, Brampton Transit has increased transit ridership by boosting service levels and introducing Züm, a network of five enhanced bus routes with limited stops to improve speed. Züm uses state-of-the-art buses and customer-focused technologies to improve the attractiveness of the service. Infrastructure that enables transit signal priority was implemented to improve reliability. The number of riders using Brampton Transit increased 72% from 12.3 million in 2009 (prior to Züm) to 21.2 million in 2015.

Strengthen and support local transit services

Although the 2041 RTP will significantly increase the number of people that live within walking distance of frequent rapid transit service, most people will still access the Frequent Rapid Transit Network using local transit or another mode. Local transit services thus play an important role in supporting the Frequent Rapid Transit Network; they also carry a majority of all transit riders, including low-income groups, and a majority of transit riders during off-peak periods (i.e., mid-day, weekends and evenings).

There are many important local routes operated by transit agencies across the GTHA that carry substantial numbers of riders but are not part of the regionally significant Frequent Rapid Transit Network. This does not preclude municipalities and local transit agencies from implementing transit priority measures on locally significant routes.

The Toronto streetcar network, in particular, along with several TTC bus routes, plays an important role in connecting significant numbers of people to jobs, shopping, entertainment, education and other services. Many Toronto residents rely on transit for their daily travel needs. About 52% of households in downtown Toronto and 24% of households in the rest of Toronto do not own a car (see Figure 22).[50] Several TTC streetcar and bus routes carry more riders on an average day than are carried by some entire transit systems in the GTHA. Given the importance of these routes, many of which run along important east-west arteries through the centre of downtown Toronto, the largest concentration of employment in Canada, they should be considered for inclusion in the Frequent Rapid Transit Network. With protection from traffic, wider spacing between stops, and traffic signal priority, they could provide a reliable and fast connection through the heart of the city for hundreds of thousands of daily users. The City of Toronto's Official Plan includes policies for transit priority on key surface transit routes. Currently, the King Street pilot project limits automobile traffic to prioritize streetcar travel along the central portion of the route; the results of this pilot will provide insight into the feasibility and effectiveness of traffic restrictions in dense urban areas.
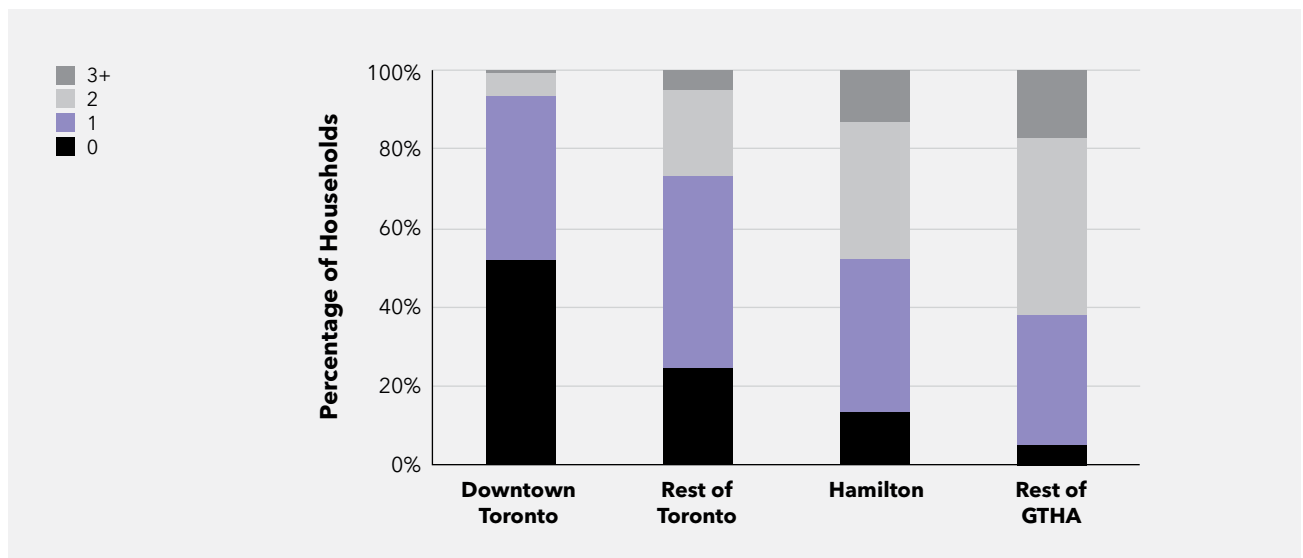
Improve airport access by transit

Lester B. Pearson International Airport (LBPIA) is the busiest airport in Canada, and the airport area represents the second-highest concentration of jobs in the GTHA.[51] The Union Pearson Express and improved local and regional bus services have introduced new transportation options for airport passengers, employees, and those that live in the vicinity of the airport. Proposed linkages through the Eglinton West LRT, the Finch West LRT, and other Priority Bus corridors will further enhance transportation options.

At this time, however, travel to the region's airport areas, in particular Pearson International Airport and John C. Munro Hamilton International Airport, is still dominated by auto use.[52] Changing this will require the development of more attractive and integrated transit services, and better connectivity by transit and active transportation. Implementing these measures will require coordination with the many stakeholders responsible for these critical hubs of employment, commerce and tourism.

The Greater Toronto Airports Authority has recently brought forward a plan for a new Regional Transit Centre at Pearson Airport to support ongoing airport growth and strengthen the airport's role as a regional economic development catalyst. As proposed, this new Regional Transit Centre has the potential to boost transit access to the airport as well as the surrounding employment area, and to better connect the airport with surrounding communities and the larger region. [53]

Figure 22: Average household vehicle ownership in the GTHA, 2016

Source: University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey

Map 5: 2041 Frequent Rapid Transit Network

Legend

- Urban Growth Centre
- GGH Built Boundary
- Greenbelt Designation
- Expressway / Provincial Highway
- Existing or In Delivery GO Rail Station
- Planned GO Rail Station
- International Airport
- Potential Future Airport
- Existing, In Delivery & In Development Regional Rail and Rapid Transit

Frequent Rapid Transit
- Subway
- LRT / BRT
- GO Rail - 15-min Two-Way All-Day
- Priority Bus / Priority Streetcar
- Frequent Regional Express Bus
- TTC Streetcar Network

Regional Rail
- GO Rail - Two-Way All-Day

45. Waterfront West LRT Extension
46. Lakeshore West Line 15-min Extension
47. Hamilton A-Line
48. Hamilton A-Line South
49. Dundas Connector
50. Hamilton L-Line
51. Hamilton S-Line
52. Hamilton Mohawk T-Line
53. Milton Line 15-min
54. Trafalgar
55. Brant
56. Bronte / Regional Road #25
57. Derry
58. Harvester / Speers / Cornwall
59. Eglinton Mississauga
60. Trafalgar North
61. Downtown Mississauga Transitway
62. Hurontario LRT North Extension
63. Britannia / Matheson
64. Hurontario North
65. Dixie / Bramalea

66. Airport Rd.
67. Erin Mills / Mississauga Rd.
68. Bovaird / Castlemore
69. Steeles West
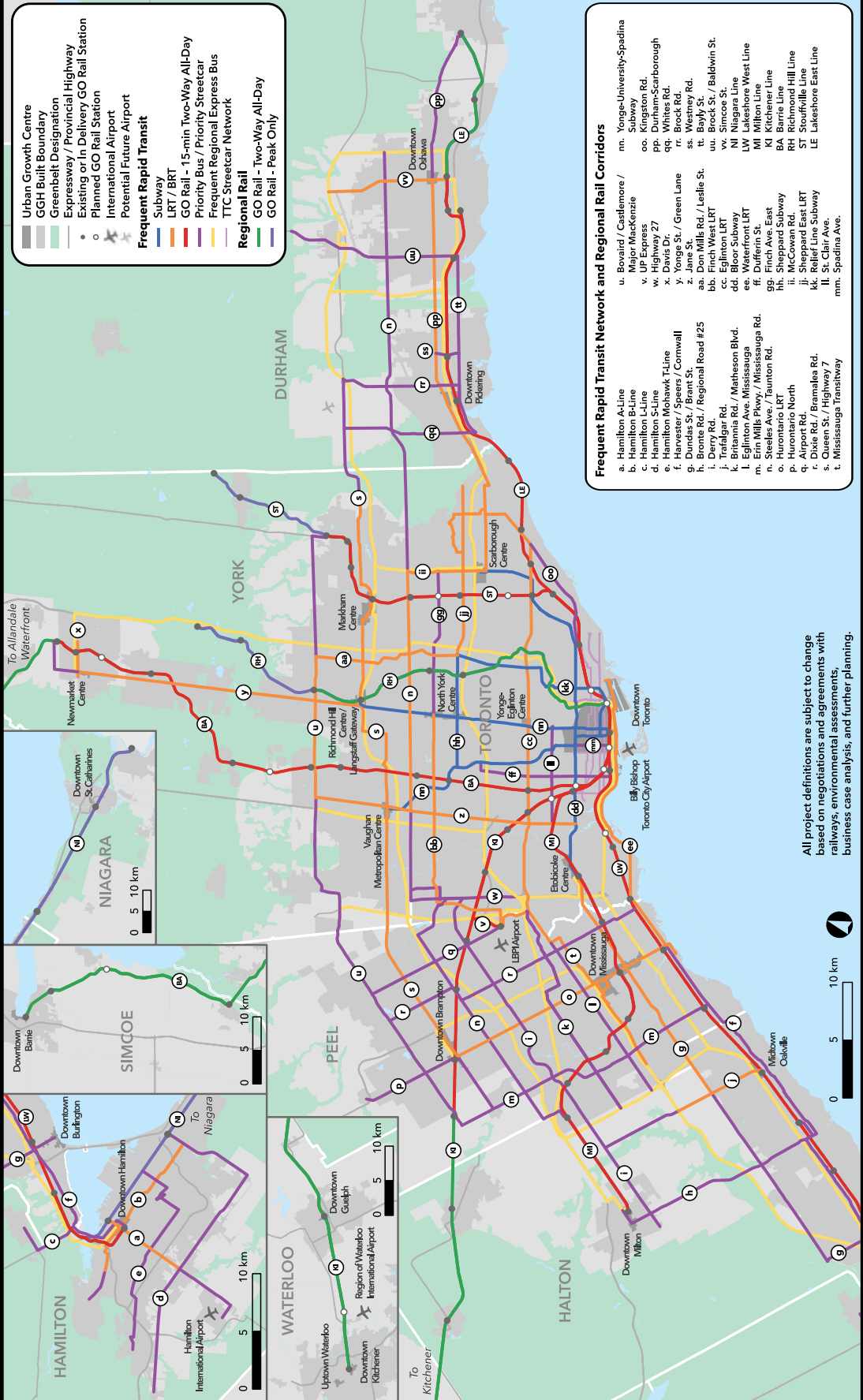70. Finch West LRT West Extension
71. Jane North
72. Jane South
73. Line 2 and Bloor / Yonge capacity enhancements
74. Sheppard Subway West Extension
75. Steeles
76. Finch West LRT East Extension
77. Leslie North
78. Don Mills / Leslie
79. McCowan
80. Finch East
81. Sheppard East LRT Extension
82. Kingston
83. Malvern Connection
84. Major Mackenzie West
85. Major Mackenzie

86. Major Mackenzie East
87. Green Lane
88. Barrie Line 15-min Extension
89. Stouffville Line 15-min Extension
90. Richmond Hill Line Two-Way All-Day
91. Steeles / Taunton
92. Whites Rd.
93. Brock Rd.
94. Westney
95. Bayly
96. Brock St. / Baldwin
97. Lakeshore East Line 15-min Extension
98. Simcoe
99. Highway 2
100. Lakeshore East Line Two-Way All-Day
101. Highway 7 Pickering
102. Brampton Queen West
103. Highway 27
104. Dufferin
105. St. Clair
106. Spadina

For more details, see Appendix 3D

All project definitions are subject to change based on negotiations and agreements with railways, environmental assessments, business case analysis, and further planning.

Map 6: Complete 2041 Frequent Rapid Transit Network

Urban Growth Centre
GGH Built Boundary
Greenbelt Designation
Expressway / Provincial Highway
Existing or In Delivery GO Rail Station
Planned GO Rail Station
International Airport
Potential Future Airport

Frequent Rapid Transit
Subway
LRT / BRT
GO Rail – 15-min Two-Way All-Day
Priority Bus / Priority Streetcar
Frequent Regional Express Bus
TTC Streetcar Network

Regional Rail
GO Rail – Two-Way All-Day
GO Rail – Peak Only

Frequent Rapid Transit Network and Regional Rail Corridors

a. Hamilton A-Line
b. Hamilton B-Line
c. Hamilton L-Line
d. Hamilton S-Line
e. Hamilton Mohawk T-Line
f. Harvester / Speers / Cornwall
g. Dundas St. / Brant St.
h. Bronte Rd. / Regional Road #25
i. Derry Rd.
j. Trafalgar Rd.
k. Britannia Rd. / Matheson Blvd.
l. Eglinton Ave. Mississauga
m. Erin Mills Pkwy / Mississauga Rd.
n. Steeles Ave. / Taunton Rd.
o. Hurontario LRT
p. Hurontario North
q. Airport Rd.
r. Dixie Rd. / Bramalea Rd.
s. Queen St. / Highway 7
t. Mississauga Transitway
u. Bovaird / Castlemore / Major MacKenzie
v. UP Express
w. Highway 27
x. Davis Dr.
y. Yonge St. / Green Lane
z. Jane St.
aa. Don Mills Rd. / Leslie St.
bb. Finch West LRT
cc. Eglinton LRT
dd. Bloor Subway
ee. Waterfront LRT
ff. Dufferin St.
gg. Finch Ave. East
hh. Sheppard Subway
ii. McCowan Rd.
jj. Sheppard East LRT
kk. Relief Line Subway
ll. St. Clair Ave.
mm. Spadina Ave.
nn. Yonge-University-Spadina Subway
oo. Kingston Rd.
pp. Durham-Scarborough
qq. Whites Rd.
rr. Brock Rd.
ss. Westney Rd.
tt. Bayly St.
uu. Brock St. / Baldwin St.
vv. Simcoe St.
NI Niagara Line
LW Lakeshore West Line
KI Kitchener Line
BA Barrie Line
RH Richmond Hill Line
ST Stouffville Line
LE Lakeshore East Line

All project definitions are subject to change based on negotiations and agreements with railways, environmental assessments, business case analysis, and further planning.

HAMILTON
Hamilton International Airport
Downtown Hamilton

NIAGARA
Downtown St. Catharines

SIMCOE
Downtown Barrie

WATERLOO
Uptown Waterloo
Downtown Kitchener
Region of Waterloo International Airport
Downtown Guelph

PEEL
Downtown Brampton
Downtown Mississauga

HALTON
Downtown Milton
Midtown Oakville
Downtown Burlington

YORK
Newmarket Centre
Markham Centre
Richmond Hill Centre / Langstaff Gateway
Vaughan Metropolitan Centre

DURHAM
Downtown Oshawa
Downtown Pickering

TORONTO
Downtown Toronto
North York Centre
Yonge-Eglinton Centre
Scarborough Centre
Etobicoke Centre
Billy Bishop Toronto City Airport
LBPIA Airport

To Allandale Waterfront
To Niagara
To Kitchener

0 5 10 km

Urban Growth Centre
GGH Built Boundary
Greenbelt Designation
Existing or Future Expressway / Provincial Highway
Existing, In Delivery or Planned GO Rail
Station
International Airport
Potential Future Airport
Existing Express Toll Highway
Future Express Toll Highway
MTO Existing HOV Network
MTO Committed HOV Route
MTO Proposed HOV Route
Proposed Route for further HOV study

Regional Rail
GO Rail - 15-min Two-Way All-Day
GO Rail - Two-Way All-Day
GO Rail- Peak Only

Regional Bus
Proposed Regional Express Bus
Proposed Frequent Regional Express Bus

All project definitions are subject to change based on negotiations and agreements with railways, environmental assessments, business case analysis, and further planning.

Priority Actions for Strategy 2

2.1

Implement a comprehensive and integrated Frequent Rapid Transit Network by 2041 that includes:

- existing subway, transitway and BRT services (see Map 3);

- 15-minute GO Regional Express Rail on the Lakeshore East and West, Kitchener, Stouffville and Barrie Corridors, In Delivery for 2025 (see Map 3);

- In Delivery BRT and LRT projects (see Map 3);

- In Development projects (see Map 4);

- additional transit infrastructure improvements to resolve key gaps (proposed new LRT and BRT projects, see Map 5);

- additional 15-minute GO RER services beyond 2025 (see Map 5);

- a Priority Bus and Priority Streetcar system that connects existing and planned rapid transit, LRT and BRT (see Map 5); and

- Frequent Regional Express Bus services (see Map 5 and Map 7).

2.2

Strengthen and support the ability of local transit to provide reliable service in urban areas where demand for transit is high, and to connect to the Frequent Rapid Transit Network.

2.3

Develop and implement a 24-hour transit network composed of strategic regional routes to address growing off-peak markets and destinations.

2.4

Deliver a Regional Express Bus Network to serve long-distance transit markets not served by GO RER (see Map 7).

2.5

Improve access to airports, and prioritize transit use by airport passengers and workers:

- Coordinate with the Greater Toronto Airports Authority, Ports Toronto, the John C. Munro Hamilton International Airport and the federal government on ground transportation plans to the region's airports and surrounding areas.

- Coordinate with the planning and implementation of Pearson Airport's Regional Transit Centre to facilitate enhanced transit access to the airport, and to enable Pearson and the surrounding employment areas to continue supporting economic growth throughout the GTHA.

2.6

Strengthen connections between the GTHA and the Region of Waterloo, to support the economic prosperity of the GGH and the growth of one of North America's largest technology clusters.

Strategy 3
Optimize the transportation system

Integrate transit fares and services

Optimizing the GTHA's transportation system means making the best possible use of existing and future transportation assets. Actions recommended in Strategy 3 include integrating fares and services, planning for the first- and last-mile of each traveller's journey, improving the traveller experience, providing universal access, using design excellence in planning, improving safety, and using roads and highways efficiently.

The 2041 RTP focuses on providing a seamless transit experience for travellers through integrated fares, payments, services and schedules. The expansion of regional rapid transit in the GTHA makes fare integration a pressing issue, especially with the vision of a Frequent Rapid Transit Network that crosses multiple boundaries.

To date, progress on integrating elements of transit fares (including fare levels, fare structure, transfers, products, concessions and payment methods) has been limited and voluntary. Transit agencies outside Toronto have been working to better integrate their services, and they typically recognize each other's transfers. Most local transit agencies provide reduced fares for people transferring to or from GO. The PRESTO card makes it easier for a traveller to make seamless transfers between different transit service providers.

There is much potential for increased cross-boundary ridership, but significant barriers exist to operating cross-boundary services. These barriers need to be addressed and Metrolinx, in partnership with the region's transit agencies, has done extensive work in this area.

There are currently eleven different fare structures in the GTHA, with each transit service provider setting its own rules and prices. There are also different co-fare arrangements when travellers transfer between transit systems. This has created complex fare rules and fare barriers that discourage transit riders from using multiple transit systems.

One barrier is that transit users travelling to or from Toronto—including 48,000 people each weekday morning who use the TTC for part of their trip—generally pay two fares to transfer between the TTC and adjacent transit systems.[54] This may lead people to drive to a transit station across the boundary to avoid paying two fares, or to avoid using transit altogether. For low-income residents who depend on transit the double fare can challenge the affordability of transit use, effectively reducing their access to educational or employment opportunities.

Another barrier is that fares can differ for services that cover the same basic route. For example, GO base fares are significantly higher than the fares for local transit services in the same corridor (e.g., Kipling to Union). Also, there are differences among the loyalty programs and passes offered by different transit agencies, each of which has its own unique way of encouraging and rewarding frequent ridership.

Further fare and service integration will require approaches to collaboration, decision-making and funding that balance regional coordination and local autonomy and ensure that the needs of low-income users are addressed. Transit is critical to the mobility of people with limited income, and equitable transit access and transit affordability will need to be key considerations in any GTHA fare strategy. A more formal process that engages all GTHA transit agencies in these issues is required to create a completely integrated transportation system.

Plan for the first- and last-mile

New rapid transit projects across the GTHA will bring quality transit services closer to many more people and jobs. Maximizing the use of these new services will require a renewed emphasis on providing multimodal options for the first- and last-mile of every passenger trip. It is not sustainable to rely primarily on rapid transit users driving to stations and parking for free. New solutions are needed.

The TTC is well known for its comprehensive system of bus and streetcar routes that connect to the subway system. Similarly, local transit routes across the region can connect to the Frequent Rapid Transit Network. The 2016 *GO Rail Station Access Plan* set targets for reducing the proportion of people who access GO stations by automobile. Figure 23 shows the anticipated growth in GO rail ridership to 2031 with the implementation of GO RER, and the substantial increase in the percentage of trips that access GO stations by local transit, carpooling and active transportation (from 38% to 62% of all trips) that will be needed to serve GO ridership growth, in view of constraints on parking supply.

The *GO Rail Station Access Plan* also gives direction on improving multimodal connections from GO stations to key destinations using travel options such as conventional and micro-transit services, carpooling, walking and cycling. The Access Plan focuses on improving customer access to platforms, not just stations, and prioritizes access by local transit services over access by single-occupant vehicles. Similar approaches will be needed at other GTHA rapid transit stations and carpool parking lots to ensure easy access to regional and rapid transit by all modes. A highly collaborative, region-wide approach to first- and last-mile travel is needed to offer an attractive and effective range of options.

> ## Milton tackles the first- and last-mile
>
> *For the cost of a standard local transit fare, Milton's Evening GO Drop-Off provides a flexible shuttle service for riders arriving in Milton on the GO train in the evening. In 2017, the service was provided to over 6,000 riders.*

Figure 23: Shift in GO station access mode required to accommodate growth in GO rail trips to 2031
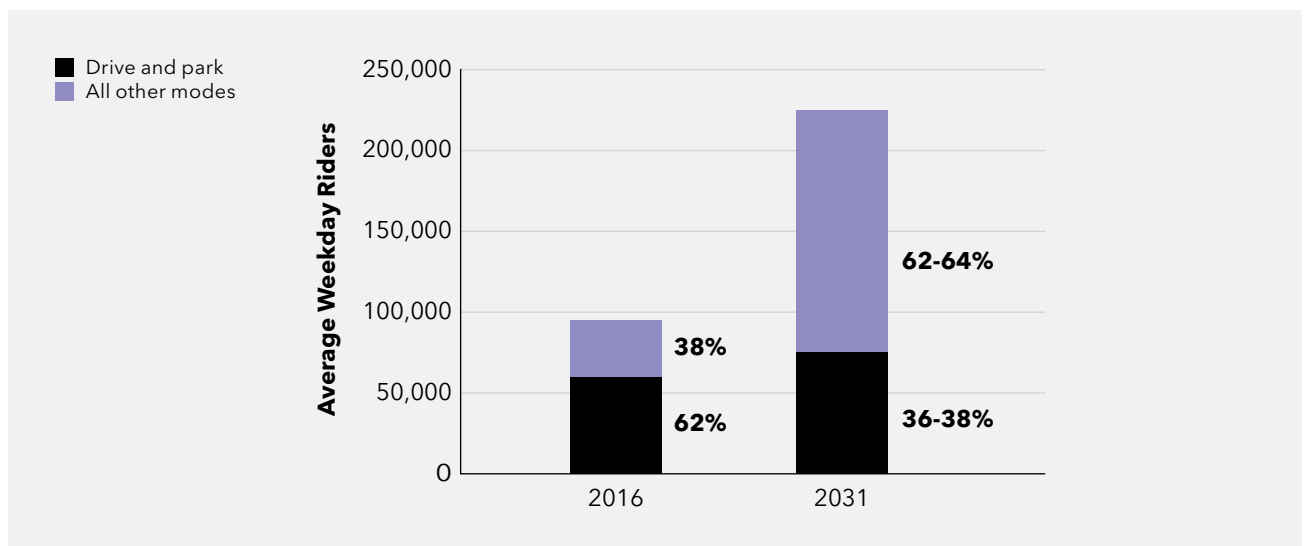
Source: Metrolinx, *GO Rail Station Access Plan*, 2016.

Focus on the traveller experience

Creating a quality traveller experience is central to the 2041 RTP, and more must be done to improve the experience of transit users. Services should be reliable and on time, fares and routes should be easy to navigate, and real-time travel information as well as payment and self-serve options need to be expanded. Acknowledging the fact that transit journeys are door-to-door trips that involve multiple modes and often cross municipal boundaries will help the region progress toward seamless integration. Traveller safety and convenience should remain at the centre of all decisions.

Strategy 3 recommends development of a mobility as a service (MaaS) system. MaaS offers travellers a suite of travel options (e.g., transit, car-share, bike-share and taxi) from different providers through a single app. An integrated system could include trip planning and payments, possibly on a subscription basis. Metrolinx can play a leadership role in enabling or coordinating the activities of service providers—public and private, conventional and emerging—as they work together to develop MaaS solutions that meet the diverse needs of individual customers.[55]

Going mobile

In 2016, Burlington Transit launched a mobile-friendly website, complete with real-time bus data. Travellers can now use their mobile phone to view a live map that shows the exact location of their bus.

Integrated mobility through a single app

'Whim', a MaaS solution, was launched in Helsinki in 2016 and provides customers with access to public transportation and taxis using a mobile app. Users find routes, fees, tickets, timetables, booking and travel options in one place.

Source: http://maas.global/

**Durham Region's focus
on accessibility**

*Durham Region Transit's bus fleet became
100% accessible in 2014. By the same year
more than 75% of previously inaccessible
bus stops had been paved, making it easier
for all transit users to get on board.*

Provide universal access

Transit plays a critical role in giving people affordable access to employment opportunities, health care, education, recreation, shopping and other needs. Universal and barrier-free access is required under the *Accessibility for Ontarians with Disabilities Act, 2005* and is a core component of an integrated regional transportation network that offers both conventional and paratransit services.

Ensuring that transit is designed to be age-friendly, taking into consideration the needs of both younger and older travellers, is important for community building and to make the transit system usable for all. Emerging technologies and the quality of design for universal access are levers to optimize benefits for all transit users. Universal access principles will help the GTHA's transportation system support and encourage travellers with diverse abilities.

Embed design excellence in transportation planning

Metrolinx routinely incorporates design excellence concepts in architecture, urban design and landscape architecture in the development of its transit projects (e.g., the Eglinton Crosstown LRT), and has also integrated public art.

Design excellence goes beyond visuals to actually knit the built fabric together. It incorporates everything from universal signage and wayfinding that help travellers find their way, to providing cross-platform transfers so travellers do not have to negotiate stairs. If it is incorporated into planning from the outset, supported throughout and done properly, there is no cost premium to improving the look and feel of transit. Improving the quality of design in the GTHA's transportation system can help deliver a more comfortable, pleasing and seamless traveller experience that will make transit the preferred mode for more people.

Keep safety a priority

While the GTHA's transportation system remains one of the safest in North America, too many serious injuries and fatalities occur each year, particularly among vulnerable users (children, older adults, pedestrians and cyclists).[56] Many of these are preventable. Educating all road users, providing protected bike lanes, setting lower speed limits on roads and designing streets for all users can all improve safety.

Ontario is a leader in developing road safety laws, programs and standards. Recent legislation (e.g., the *Safer School Zones Act, 2017* and the *Making Ontario's Roads Safer Act, 2015)* has:

- increased penalties in the areas of impaired driving, distracted driving, and cyclist and pedestrian safety;

- helped municipalities target unsafe drivers and protect children, seniors, other pedestrians and cyclists; and

- given municipalities more tools to fight speeding and dangerous driving.

Across Canada and internationally, many jurisdictions have taken a systems approach to reducing injuries and fatalities from transportation. 'Vision Zero' is a multipronged strategy that involves transportation planners and engineers, public health services, police, community groups and others working together to eliminate fatalities and serious injuries. Vision Zero asks stakeholders to examine how they work together, and emphasizes that although road design is at the core of safer streets, it is also important to work towards safer speeds, vehicles and operating practices (see Figure 24).

Today in the GTHA, data on fatalities and serious injuries from transportation are not systematically collected or analyzed at a regional level. Safety programs are typically fragmented, limiting their reach and effectiveness. Prevention requires a spectrum of interconnected strategies to change policies and practices, educate providers, increase collaboration, and enhance individual knowledge.

This plan recommends incorporating the Vision Zero framework into the planning and operation of the GTHA's transportation system. This broad, multistakeholder approach to transportation safety can yield significant improvements in both transportation safety and travellers' perceptions of it.

Figure 24: Vision Zero principles

Vision Zero

Vision Zero is a concept invented in Sweden whereby governments aim to reduce transportation fatalities to zero.

It takes a system-wide approach to address all factors that lead to fatalities by focusing on both preventing collisions through a combination of prevention programs and good design, and ensuring that any accidents that do occur are not fatal through design and regulatory standards.

Several governments at all levels have adopted Vision Zero strategies, including the City of Toronto.

Principles

- No loss of life is acceptable.

- Traffic fatalities and serious injuries are preventable.

- We all make mistakes.

- We are physically vulnerable when involved in motor vehicle collisions.

- Eliminating fatalities and serious injuries is a shared responsibility between road users and those who design and maintain our roadways.

Perspectives on safety

A safe regional transportation system takes a comprehensive approach to safety: people are safe, goods are secure, and equipment is well-maintained. Safety also means that everybody can trust, access and use the system without feeling vulnerable.

Final Report of the Residents' Reference Panel on the Regional Transportation Plan

Figure 25: The concept of TDM

Reduce   Remode   Reroute   Retime
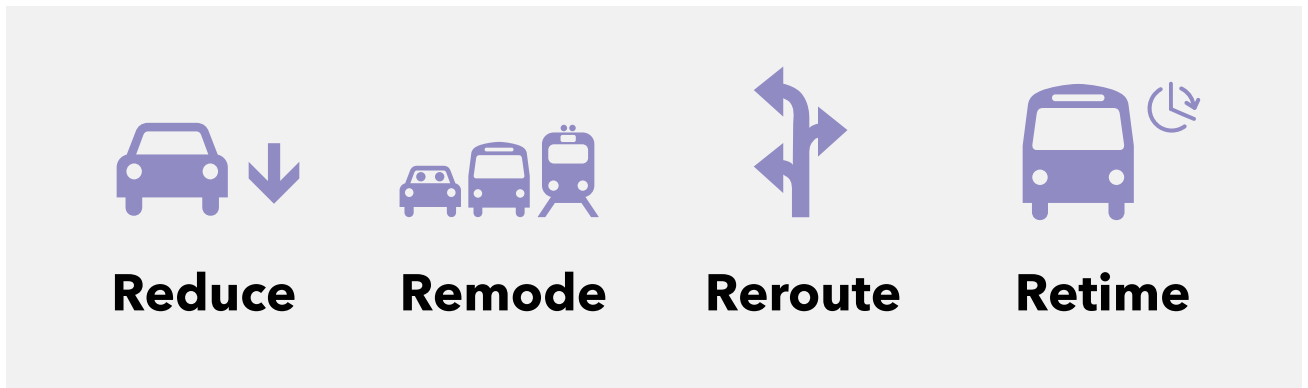
Shaping travel choices through MyTrip

MyTrip is a TDM pilot program in York Region. It encourages residents in six newly developed neighbourhoods to make sustainable travel choices including transit, cycling and walking.

Reinvent transportation demand management

TDM strategies are key to unlocking the benefits of new investments in transportation infrastructure and services, and to making the best use of the transportation system's available capacity. TDM uses a variety of tools including carpooling and vanpooling, HOV lanes, telework and park-and-ride (see Figure 25). It provides a high return on investment, and also supports environmental and health objectives.[57]

The Metrolinx Smart Commute program has expanded to engage more than 300 employers with TDM initiatives such as carpool ridematching, discounted transit passes, active transportation promotion, and telework arrangements. TDM strategies are also being incorporated into municipal policies and plans.

There is an opportunity to apply new region-wide TDM approaches and technologies, and to create innovative partnerships with third-party mobility service providers and technology companies. Jurisdictions such as the San Francisco Bay Area, London (UK) and Paris (France) have achieved significant results with TDM tools such as differential peak/off-peak transit fares, parking charges, HOV lanes and mandatory workplace programs for large employers.[58] Some municipalities in the GTHA now require TDM plans as part of the development approval process, to ensure that new developments support non-driving travel options.

This plan recommends several actions to make TDM programs more attractive and effective.

Figure 26: GO bus passenger time savings from HOV lanes during 2015 Pan Am Games

* Three or more persons in vehicle
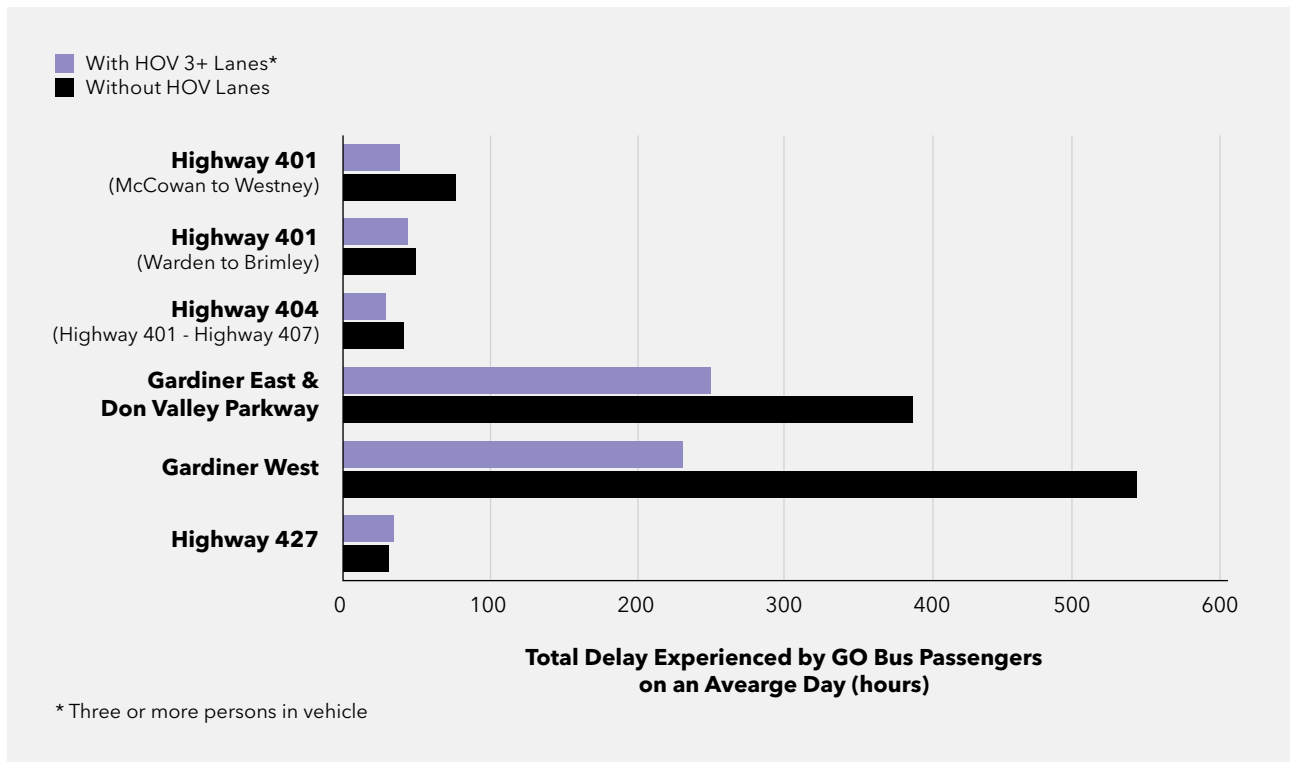
Source: Metrolinx GO Planning.

Expand the HOV lane network

This plan recommends an extensive network of HOV lanes on 400-series highways, as well as on the Gardiner Expressway, Don Valley Parkway and other major highways, giving priority to vehicles with more than one occupant. The GTHA's recent experience with HOV lanes during the 2015 Pan Am/Pan Parapan Games demonstrated a clear benefit in reducing delay for GO bus riders, leading to a more reliable and attractive service (see Figure 26).

A regional approach to HOV lanes or other managed lanes will encourage carpooling and transit use, support faster and more reliable bus service, and help make solo driving less attractive. As discussed in Strategy 2, Frequent Regional Express Bus routes would run largely in HOV lanes on 400-series highways to maintain fast, reliable service. A managed lane network for 400-series highways will be determined by MTO, in consultation with Metrolinx, as part of the *GGH Transportation Plan*. Many municipalities in the GTHA operate HOV lanes on arterial roads or have included them in their TMPs, which can provide significant benefits to transit riders and carpoolers.

HOV lanes can be created from existing highway lanes or lanes on arterial roads, and do not necessarily require road widening. They are also flexible, and could be used in the future for autonomous shuttles or other shared services. In locations where HOV lanes have residual capacity, it may be appropriate to introduce high-occupancy toll (HOT) lanes and allow single-occupant vehicles to pay a fee for using a managed lane otherwise reserved for buses and carpoolers. MTO has recently initiated a HOT lane pilot program on the Queen Elizabeth Way that will inform long-term HOT lane planning, including dedicated HOT lanes with electronic tolling on part of Highway 427. Tolling can also be expanded more broadly to include some form of charging on all roads (e.g., paying a fee for each kilometre driven). Although road tolls or vehicle charges for all kilometres travelled can deliver a reduction in congestion, they remain one of the most challenging mechanisms for all decision-makers, because of their high profile, unpopularity with drivers, and questions about fairness.

Manage roads and highways to support transit

The Province and GTHA municipalities have made some progress in managing roads and highways to support transit by expanding the network of HOV lanes on highways and arterial roads. The reliability and speed of bus service in mixed-traffic environments can be improved further by using ITS technologies and data.

Existing ITS systems across the GTHA are fragmented, and the 2041 RTP presents an opportunity to strategically plan, deploy, integrate and operate transportation systems management, which encompasses ITS, for traffic management and the implementation of the Frequent Rapid Transit Network and Priority Bus corridors. 'Smart corridors' that integrate a number of different ITS components could employ a range of ITS tools, depending on the context, as shown in Figure 27.[59]

In general, there is considerable room for improved collaboration among provincial and municipal agencies in charge of roads, signals, parking, taxis and transit to create a system of roads and highways that is more efficient and focused on moving transit, pedestrians, cyclists, and freight, not just automobiles.[60]

Optimize highway, major road and rail networks for goods movement

The efficient movement of goods and services in the GTHA is essential to the region's economic prosperity and quality of life—a fact sometimes not recognized by the general public. A staggering amount of goods (with an estimated value of $3.5 billion) is moved by rail and truck in the GTHA every day.[61] Regional goods movement activity is expected to grow by about 35% between 2016 and 2041.[62]

In a multimodal transportation system, it is essential to identify how to move people and goods effectively using shared infrastructure. Optimizing the highway and major road network for goods movement will support the efficient, reliable and safe movement of trucks, while reducing costs and environmental impacts. This optimization requires an understanding of where freight is moving to and from, and the nature of goods being shipped. Providing reliable connections for trucks and other modes to access intermodal yards and freight clusters—areas with high concentrations of land uses related to logistics, warehousing and the movement of cargo—will help ensure that goods move efficiently throughout the region.

Figure 27: Potential Intelligent Transportation Systems (ITS) tools

Signal Coordination

Variable Message Signs

Variable Speed Limits

Highway Ramp Metering

Data Sharing

Centralized Monitoring

Multi-Modal Managemant

Incident Management

Managed Lanes

Signal Priority

Dynamic Signal Retiming
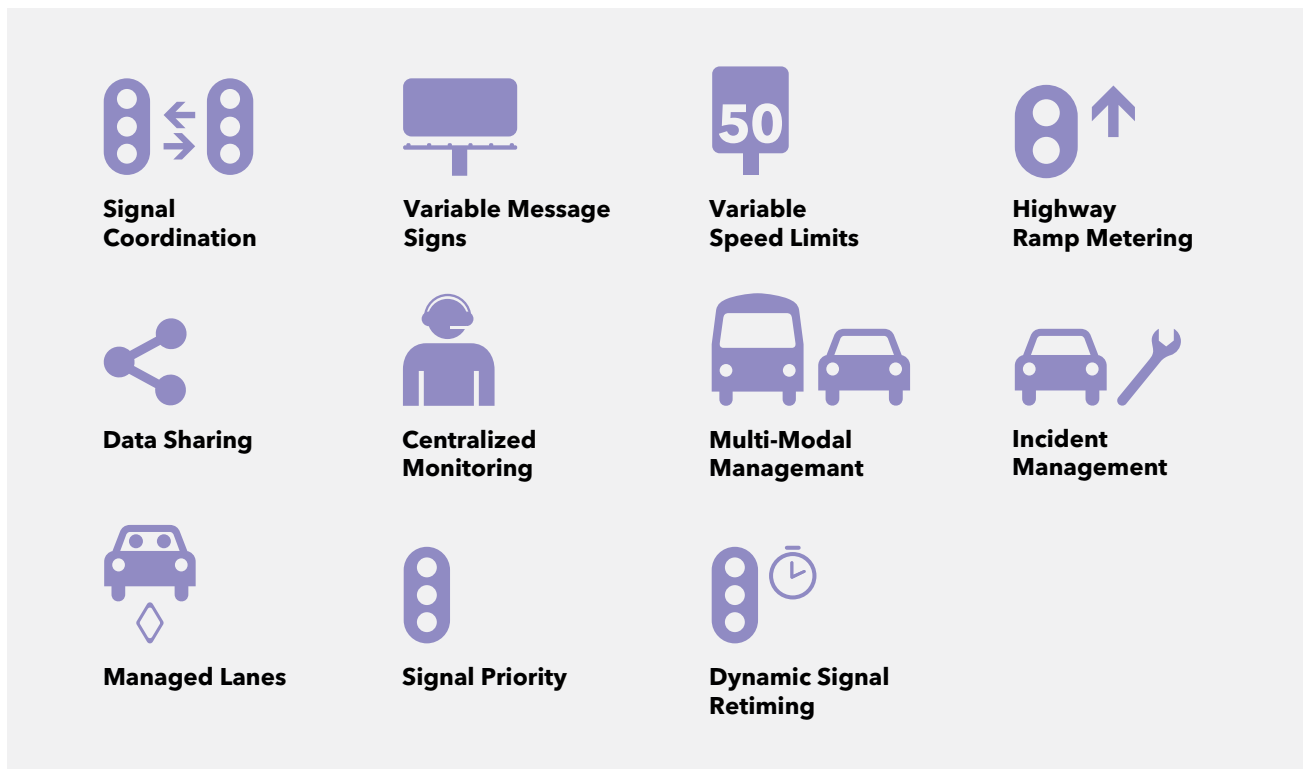
Innovative freight strategies (e.g., creating urban freight hubs, using transit stations as pick-up locations for small parcels, or moving freight outside peak periods) could reduce the need for and impacts of door-to-door delivery in urban cores.[63] Bicycle delivery could reduce the environmental impact of delivery vehicles, including noise and air pollution.[64] Taken together, these measures can help reduce conflicts with other vehicles while maintaining the region's economic competitiveness.

Strategy 3 recommends collaboration between the public and private sectors to develop a regional Strategic Goods Movement Network (SGMN), as well as other actions to enhance the movement of goods (see Figure 28 and Map 8). The MTO and several partners, notably the Region of Peel, have done significant work in the area of goods movement. In 2016, MTO released its *Freight-Supportive Guidelines* to help municipalities understand, support and plan for freight movement. The Province is now developing a goods movement network as part of the *GGH Transportation Plan*. The Regional Strategic Goods Movement Network will inform the development of a GGH goods movement network.

With the GTHA experiencing sustained rapid growth, the region's rail corridors also are experiencing increased demand for both freight and passenger movement. As the Province and Metrolinx continue to increase GO rail service, planning must consider long-term rail needs and opportunities including the separation of passenger and freight rail services on existing and future rail corridors. The need to examine the separation of rail services, particularly on segments of the GO rail network not in public ownership, is due not only to increasing passenger and freight rail volumes, but also to potential challenges in operating different types of trains in a single corridor after electrification.

Proceeding with freight rationalization will entail close cooperation among all levels of government and private freight rail operators, as well as community consultation. MTO's *GGH Transportation Plan* will consider a number of issues to enhance freight movement including freight rationalization, particularly if additional rail infrastructure is required.

The Region of Peel: A leader on goods movement

The Region of Peel's Goods Movement Strategic Plan was updated in 2017 with nine new actions to encourage the efficient transportation of goods within the region. The plan is supported by Peel's Goods Movement Task Force, a public-private group that meets regularly to advance efficiency, competitiveness and sustainability in the region.

Figure 28: Key principles of the regional Strategic Goods Movement Network

- Core Regional Routes
- Connectors to Primary Freight Clusters
- Connectors to Secondary Freight Clusters
- Regional Connectors
- Primary Freight Clusters
- Secondary Freight Clusters
- ⬡ Existing Intermodal Terminals
- - - - Municipal Boundary
- Road with Rapid Transit Route

1. Core regional routes include 400-series highways, municipal expressways and King's highways.

2. Connectors to primary clusters provide direct routes to primary freight clusters, intermodal terminals, airports and ports.

3. Connectors to secondary clusters provide direct routes to secondary freight clusters.

4. Regional connectors provide inter-regional options.

5. Multiple routes at appropriate spacing to ensure network resiliency and reliability.

6. Route selection attempts to minimize road conflict with other road uses including rapid transit.

Map 8: Regional Goods Movement Network for roads and highways

Legend

Intermodal Terminal
Major Port
Major Airport
GGH Built Boundary
Greenbelt Designation
Primary Freight Cluster
Secondary Freight Cluster
Core Regional Route
Proposed Core Regional Route for further study
Freight Cluster Connector
Proposed Cluster Connector for further study
Regional Connector
Proposed Regional Connector for further study
Existing or Future Expressway / Provincial Highway
Railway Network

All project definitions are subject to change based on negotiations and agreements with railways, environmental assessments, business case analysis, and further planning. Freight cluster definitions do not necessarily correspond to official land use designations.

0   5   10 km

KAWARTHA LAKES
PETERBOROUGH
NORTH-UMBERLAND
DURHAM
Bowmanville
Oshawa
Pickering
Whitchurch-Stouffville
Markham
Newmarket
Aurora
YORK
Richmond Hill
Vaughan
TORONTO
SIMCOE
Bolton
Caledon
PEEL
Brampton
Mississauga
Oakville
Georgetown
Burlington
HALTON
Milton
Hamilton
DUFFERIN
Orangeville
WELLINGTON
GUELPH
HAMILTON
WATERLOO
Cambridge
BRANT
BRANTFORD

Priority Actions for Strategy 3

3.1

Advance the integration of transit services and fares:

- Remove barriers to create an integrated fare system that supports seamless and consistent travel for passengers across municipal boundaries.

- Ensure progress toward seamless travel and increase ridership by taking a regional view of setting fares and concessions for transit, and by developing innovative fare products.

3.2

Expand first- and last-mile choices at all transit stations:

- Fully implement the *GO Rail Station Access Plan* (2016) to achieve higher shares of station access by walking, cycling, transit, passenger pick-up and drop-off, and carpooling.

- Invest in first- and last-mile solutions to maximize all-season access to and from all rapid transit stations, including but not limited to:

  - priority transit access;

  - pedestrian access to workplaces and destinations;

  - improved on-demand services including taxis and micro-transit services (with potential applications in rural areas);

  - on- and off-site bicycle facilities; and

  - car-share and bike-share programs.

- Recover the cost of providing parking at GO stations to help shift trips to modes that do not require parking, and to allow more people to access new train services.

3.3

Set consistent high-quality standards for the traveller experience:

- Focus on reliable service as a first priority for attracting customers to transit, emphasizing the use of transit priority measures.

- Provide travellers with:

  - real-time information;

  - well-designed places that offer shade, shelter, paved surfaces, seating, clear sightlines and lighting;

  - consistent wayfinding across modes;

  - all-season maintenance of sidewalks, bike lanes and paths;

  - on-demand service connectivity; and

  - concession fares.

- Develop and implement shared customer experience objectives for new regional transit investments and the regional transit network in general.

- Ensure that design excellence is applied to architecture, urban design and landscape architecture.

3.4

Develop and implement a mobility as a service strategy:

- Continually improve the PRESTO fare payment system to support inter-municipal transit trips with a range of fare products and self-service options. Migration to an account-based system will allow customers to access PRESTO via traditional PRESTO cards, credit cards, limited use electronic tickets and mobile wallets.

- Fully integrate regional multimodal trip planning and fare payment into a MaaS platform, incorporating and encouraging mobility options including but not limited to transit, bike-sharing, car-sharing, carpooling and ride-sourcing.

3.5

Place universal access at the centre of all transportation planning and designing activities:

- Foster an accessible network of conventional transit and paratransit systems, where riders can transfer easily and conveniently between services, including across boundaries.

- Develop an integrated regional booking platform for specialized transit trips across the region.

- Ensure that on-demand services meet the needs of a diverse range of travellers.

- Provide leadership and ensure consistency in accessible design for transportation services and facilities across the region, with a focus on ensuring that transportation services and facilities are age-friendly and can be used by all residents of the GTHA.

- Collaborate to address challenges to transit access, and the unintended consequences of transit investment such as increases in housing costs along transit corridors.

- Develop a regional framework for the universal provision of transit passes to low-income groups.

3.6

Eliminate transportation fatalities and serious injuries as part of a regional Vision Zero program.

- Incorporate the Vision Zero framework into regional transportation planning by developing an approach to transportation design standards, speed limits and public education with the aim of zero fatalities and serious injuries from transportation.

3.7

Make TDM a priority:

- Collaborate to develop and implement TDM programs as required by the *Growth Plan*.

- Advance workplace TDM programming and encourage private-sector leadership, participation and investment with mandated participation by large employers, institutions and other venues that generate a significant number of trips.

- Develop new approaches to TDM delivery from the fields of service design and behavioural economics.

- Reinvigorate carpooling with a compelling and user-friendly online regional platform integrated with trip planning and payment tools, and drive participation, including removing regulatory obstacles to user incentives.

- Deliver TDM programming to support all new rapid transit services, transit station areas, and areas impacted by major construction and events.

- Develop incentives for off-peak travel to reduce peak travel demands and, in the case of transit, to grow off-peak ridership.

- Continue to explore how mobility pricing (e.g., parking, road pricing, HOT lanes and off-peak fares) could be used to shift travel behaviour.

- Assess the feasibility and potential of vanpool services.

3.8

Expand the current HOV lane network:

- Identify and prioritize a seamless network of HOV lanes on the highways in the GTHA, encouraging higher-occupancy vehicle travel and supporting faster, more reliable bus service (see Map 7).

- Incentivize ridesharing using the HOV lane network for trips that are difficult to make by transit or active transportation.

- Identify opportunities to implement HOV lanes on arterial roads to support the Frequent Rapid Transit Network.

- Continue the implementation of HOT lanes on HOV lanes that have excess capacity.

3.9

Further integrate road and transit planning operations:

- Invest in the regional coordination and deployment of ITS and smart corridors to support effective congestion management and transit priority operations.

- Coordinate the planning and operation of transit, roads and on-street parking within each municipality, across municipal boundaries, and where municipal, regional and provincial roads meet.

3.10

Define and support a regional goods movement system:

- Advance collaboration between the public and private sector to implement a Regional Strategic Goods Movement Network (see Map 8) that links goods-generating activity centres, intermodal terminals and regional gateways.

- Study goods movement priority features for new and existing freight corridors, including but not limited to intelligent lane utilization and truck-only lanes.

- Support development of innovative freight hubs, including planning for and protecting complementary land uses. Consider the use of transit stations as a pick-up location for small parcels, and support other innovative urban freight practices to reduce door-to-door delivery. Explore and implement flexible freight delivery times, including off-peak delivery, where applicable.

- Establish a GTHA urban freight monitoring program, including the ongoing collection of freight data.

- Expand awareness and education efforts regarding goods movement planning, design and operational issues, with particular reference to e-commerce impacts and potential delivery innovations (e.g., bicycle use) on the volume and nature of freight movement in the region.

3.11

Promote integrated planning for rail corridors:

- Coordinate with MTO in its investigation of the potential for shared freight and passenger use of critical rail corridors in the GTHA.

- Where corridor capacity studies indicate separation of uses is required, develop and promote plans for freight rationalization.

- Ensure that community safety is given high priority in planning for goods movement on rail corridors.

Strategy 4
Integrate transportation and land use

Transportation decisions affect land use, and how we plan and design our region has an impact on transportation systems. As the GTHA and its transportation system expand, there is a great opportunity to create more complete, connected, healthy and sustainable communities by reducing automobile dependence, improving access to services and amenities, and supporting transit and active transportation.

More than $30 billion in transit investments arising from *The Big Move* will deliver more rapid and frequent transit service across the region over the next decade. These investments support the *Growth Plan's* vision for intensification and complete communities, and its policies for transportation planning. The *Growth Plan* uses strong language to describe the importance of integrating land use and infrastructure planning, and the need for intensification at rapid transit stations, connected urban centres, increased transportation choice, and efficient goods movement. Implementation of the 2041 RTP is a chance for Metrolinx to work with municipalities in support of the *Growth Plan*, especially through planning for Major Transit Station Areas and employment areas, the development of complete streets, and the use of innovative approaches to parking and TDM.

Intensify and integrate development at Major Transit Station Areas

Transit stations link people to jobs, schools and amenities, and their close integration with commercial, residential and office uses is an essential approach to station development or redevelopment. Several examples of integrated development can be found along the Yonge Subway corridor, but other examples have been slow to appear in the GTHA. Experience over the last decade has highlighted the need for greater consideration of development objectives in transit project planning and procurement, and for clearer delineation of the roles and responsibilities of public and private parties in optimizing the potential of critical station locations. Metrolinx can play a leadership role in ensuring that development and redevelopment around stations meets the objectives of the *Growth Plan* and the 2041 RTP.

Sufficient land use density at stations is important to ensure significant two-way, all-day ridership on GO RER. The *Growth Plan* prioritizes planning and sets density targets for development for stations on Priority Transit Corridors—corridors where investments in frequent rapid transit are committed. The *Growth Plan* requires the design of Major Transit Station Areas to feature transit-supportive densities and multimodal access options that focus on walking, cycling and transit. Major Transit Station Areas can be attractive locations for new employment, public institutions and regionally significant services, as well as prime opportunities for collaboration by public and private sectors to create transit-oriented developments that enhance transit service.

In 2016, when Metrolinx approved advancing new stations on four corridors for GO RER and SmartTrack, it requested that "municipalities where these recommended new stations are located provide resolutions… demonstrating their commitment to implementing transit-supportive land uses around stations, and sustainable station access". This approach could be a model for future investment in transit stations.

Create a system of connected Mobility Hubs

Mobility Hubs were introduced in *The Big Move* and remain an important planning concept. They are Major Transit Station Areas at key intersection points on the Frequent Rapid Transit Network. Mobility Hubs are intended to create important transit network connections, integrate various modes of transportation and accommodate an intensive concentration of places to live, work, shop or play. They are particularly significant because of their combination of existing or planned frequent rapid transit service with an elevated development potential.

Map 3 shows Mobility Hubs on Priority Transit Corridors and subway lines.

Since 2009, 43 of the 51 Mobility Hubs identified in *The Big Move* have experienced residential and employment growth, with the median growth rate of each Mobility Hub approximately double that of the region's overall growth. However, progress toward the support of transit in the region's Mobility Hubs varies greatly in terms of density, form, function and rapid transit phasing. With the continued expansion of the region's Frequent Rapid Transit Network, Mobility Hubs present a vital opportunity to maximize the benefits of transit investments, establish a well-connected regional transit network, and foster transit-oriented development through collaboration by public and private sectors.

Metrolinx's *Mobility Hub Guidelines* (2011) are a tool for all parties to address the existing and anticipated opportunities and challenges of integrating transportation and development functions at these important locations. The *Mobility Hub Guidelines* will be updated to reflect new provincial policy and the 2041 RTP.

Coordinate RTP with municipal land use plans

Metrolinx provides occasional input to the Province's review of the official plans of upper- and single-tier municipalities through the Province's One Window process, which is a formal mechanism for reviewing municipal plans. Metrolinx can also ask to review planning applications submitted to municipalities and other planning documents (e.g., secondary plans and zoning by-law amendments), but there is no formal mechanism to guide this process and for Metrolinx to advise on alignment with the RTP. Strategy 4 recommends development of such a process.

Oakville plans for a vibrant Mobility Hub

The Town of Oakville has prepared a Midtown Oakville Strategy to support the transformation of the Mobility Hub into a "vibrant and vertical" urban centre for people to live and work. The strategy includes an environmental assessment, a parking strategy and urban design guidelines. It re-imagines this Mobility Hub as a mixed-use, transit-oriented community at one of the busiest GO stations on the network.

Encourage walking and cycling through better design

Making walking and cycling safe and accessible is a cornerstone of complete communities and the *Growth Plan's* goals for intensification. While 22% of trips in today's GTHA are short enough to be made by walking and 56% of trips are short enough to be cycled,[65] only 11% of trips are actually made on foot or by bike.

Walking and cycling activity is highly dependent on density, built form, supportive infrastructure, and users' perceptions of attractiveness, convenience and safety. In Toronto, for example, the share of trips that start and end in the downtown area made by walking and cycling is more than 50%, and has grown significantly in the last decade.

Many areas in the GTHA are not conducive to walking, particularly suburban employment areas and some post-war residential neighbourhoods. While many destinations and jobs are located within walking distance of frequent transit, walking is deterred by the absence of sidewalks that are continuous, well maintained and well lit. These barriers are even more profound for elderly persons or those with mobility restrictions. To encourage walking from transit stops, buildings should be located close to the road with quality pedestrian routes leading to the entrance. The street network should provide as many direct routing options as possible. Figure 29 shows a neighbourhood street network that has been reconfigured from an auto-oriented design to be more pedestrian-friendly.

Making it easy to walk

With the construction of a fully enclosed pedestrian bridge across a 14-lane section of Highway 401, pedestrians can now walk easily from the Pickering GO station to new office development in the City Centre.

The 2041 RTP includes a number of actions to significantly increase walking and cycling trips. Investments to support active transportation are relatively small compared to those for rapid transit and highways, but their congestion, health and safety impacts can be significant. For example, better all-season maintenance of sidewalks near rapid transit stations can make walking a more viable option for transit users living nearby, and reduce the need for costly station parking.

A complete streets approach that prioritizes walking and cycling in the design and operation of roads and new surface transit corridors will promote healthier and safer forms of travel. Complete streets principles are intended to make pedestrians, cyclists and transit users of all ages safe and comfortable.[66] Supporting measures can include traffic calming, safe and convenient pedestrian linkages to transit, and improved bicycle amenities.

Figure 29: Street network before and after pedestrian-friendly redesign

Source: Adapted from the City of Toronto Six Points Interchange Reconfiguration Project.

Develop a Regional Cycling Network

The many barriers to bicycle commuting in the GTHA include a lack of safe bike lanes, discontinuous cycling networks, physical barriers such as highways, and the built form of many areas. Cycling infrastructure can help overcome these barriers, and can be developed at a relatively low cost with a high return on investment. Strategy 4 recommends the development of a Regional Cycling Network to provide a cohesive network of regional corridors and local routes that facilitate commuter cycling.

Developing a GTHA commuter cycling network supports the goals of *CycleON: Ontario's Cycling Strategy* and *Ontario's Climate Change Action Plan*. The Province is committed to helping create better cycling networks, more cycling facilities in urban areas and more bike parking at transit stations and provincially-owned public facilities. Through the Ontario Municipal Commuter Cycling Program, starting in 2017-18, the Province is providing direct funding to municipalities from cap-and-trade proceeds to support the development of commuter cycling infrastructure.

The focus of the Regional Cycling Network is to provide cycling commuters with more bike lanes, separated bike lanes or cycle tracks in heavily travelled corridors, especially across municipal boundaries and for longer trips. Its success will require the Province and municipalities to establish common design standards and supporting funding.[67] The Regional Cycling Network acts as a spine that links local routes and facilities. It will:

• bring cycling facilities closer to more people;

• cross municipal boundaries; and

• connect transit stations, Urban Growth Centres and other regional destinations (e.g., universities).

When complete, the Regional Cycling Network will provide:

• paved riding surfaces;

• bike lanes, separated bike lanes or cycle tracks where speeds or traffic volumes are higher;[68]

• clear and consistent wayfinding signage; and

• routes that are direct and help users cross physical barriers such as waterways and 400-series highways.

Figure 30 identifies the key principles of the Regional Cycling Network, and Map 9 shows the proposed network.

Figure 30: Key principles of the Regional Cycling Network

Primary Network (3-5 km grid)
Secondary Network (1-3 km grid)
Local / Recreation Network
Municipal Boundary
Urban Growth Centre
Transit Station
Physical Barrier Crossing
Area with High Cycling Potential

1. Crosses municipal boundaries
2. Links urban growth centres
3. Connects to transit stations
4. Crosses physical barriers
5. Provides direct commuter routes
6. Connects to local routes
7. Facilitates longer trip distances
8. Aligns with high cycling potential
9. Designated or separated bike lanes *
10. Wayfinding signage & maintenance guidance *

* Not shown on concept diagram

Address parking management in land use planning

Free or inexpensive parking encourages driving, even when quality travel alternatives exist. Excessive parking is often mandated by zoning by-laws, making development more expensive than necessary. Although *The Big Move* recommended updates to municipal parking requirements, there has been inconsistent progress across the GTHA. A comprehensive approach to applying best practices in parking management is even more necessary today, because on-demand services and autonomous vehicles are likely to change the demand for off-street parking as well as on-street parking, especially the need for loading areas where vehicles can pick up or drop off passengers.

Through secondary plans, zoning by-laws and development applications, the land use planning process can help minimize parking demands by ensuring that residential and commercial sites support walking, cycling, car-sharing and transit use. Strategy 4 recommends actions to manage both parking supply and demand through the land use planning process. Parking management can also apply to transit stations, such as by setting a maximum number of parking spaces to be built at new stations.

The 2041 RTP presents an opportunity to make parking management a regional priority, and to support development of parking standards, guidelines and supply forecasts that municipalities can use in planning and regulating off-street parking. Parking standards and guidelines could be regionally coordinated, but should remain sensitive to the context and characteristics of different locations. Parking policies should coordinate off-street parking supply with transit expansion, support other alternatives to driving, recognize the need for deliveries and passenger pick-up and drop-off, and encourage innovations such as car-sharing and dynamic parking pricing.

Approaches that could be quickly implemented across the region include shared parking, unbundled parking for multi-family housing, the provision of bike parking and preferential parking spaces for car-sharing, electric vehicles and carpools; some of these initiatives support *Growth Plan* policies relating to intensification and Major Transit Station Areas. Other parking strategies could reduce environmental impacts through innovative parking facility design and approaches to reducing heat islands, stormwater run-off and salt use.

Encourage students to walk and cycle to school

School-related trips account for 20% of travel by GTHA residents in the morning peak period. The proportion of students driving or being driven to school has more than doubled since 1986 while active travel to school has steadily declined, contributing to traffic congestion, physical inactivity and developmental impacts.[69] Government and community organizations have been working to reverse these trends through the School Travel Planning and Active and Safe Routes to School programs, coordinated regional campaigns, research, education and training programs and facility improvements.

In addition to improving the built environment to support walking and cycling, and developing the Regional Cycling Network, Strategy 4 contains specific actions to advance active and sustainable school travel, with the goal of 60% of students walking or cycling to school. Success will improve public health, safety and the environment, and will help today's children and youth to become tomorrow's adult pedestrians, cyclists and transit users.

Assess the need for a Transportation Planning Policy Statement

The 2041 RTP and municipal land use decisions must be consistent with the *Provincial Policy Statement (PPS)* and conform to the Province's *Growth Plan*—a requirement that ensures major transit investments and new developments support the provincial vision for growth. However, municipalities are not required to align their municipal transportation plans with the 2041 RTP. While some progress has been made through collaboration, the transportation and land use decisions made by the Province, municipalities and developers need to be better coordinated to fully achieve the GTHA's vision for growth.

The *Metrolinx Act, 2006* enables the Minister of Transportation to develop a Transportation Planning Policy Statement (TPPS) that could provide more specific transportation policy direction than the *Growth Plan*. A TPPS could support the implementation of the RTP by including additional policy detail on how municipal Transportation Master Plans should address parking, road design, station access, transit service planning and Mobility Hub development among other issues. It would support closer alignment between transportation and land use in the region and further the goals of the *PPS* and the *Growth Plan*.

Hamilton gets moving on two wheels

Implementation of the City of Hamilton's Cycling Master Plan has been proceeding on several fronts. Among its successes are the 3-km Cannon Street cycle track that opened in 2014, and the Hamilton Bike Share program that offers a fleet of 825 bikes at 130 docking stations across the city.

The 2041 RTP will work towards

60%

of children walking and cycling to school

Regional Cycling Routes
Primary Route
Secondary Route
Draft Province-wide Network
Waterfront Trail
Greenbelt Route

GGH Built Boundary
Greenbelt Designation
GO Rail Service
Existing or Future Expressway /
Provincial Highway
Urban Growth Centre
Existing, In Delivery or Planned
GO Rail Station
Provincial Highway Crossing

2041 Urban Density
Very High (Over 80 persons + jobs / ha)
High (30 - 80 persons + jobs / ha)

All project definitions and specific routing
details are subject to change based on
environmental assessments, further
analysis, and municipal planning.

0   5   10 km

KAWARTHA LAKES
PETERBOROUGH
NORTH-UMBERLAND
DURHAM
SIMCOE
YORK
PEEL
DUFFERIN
WELLINGTON
HALTON
GUELPH
HAMILTON
BRANT
BRANTFORD
WATERLOO
TORONTO

Bowmanville
Downtown Oshawa
Downtown Pickering
Stouffville
Scarborough Centre
Markham Centre
Richmond Hill Centre
Langstaff Gateway
Newmarket Centre
North York Centre
Yonge-Eglinton Centre
Downtown Toronto
Vaughan Metropolitan Centre
Bolton
Downtown Brampton
Etobicoke Centre
Downtown Mississauga
Midtown Oakville
Downtown Burlington
Downtown Hamilton
Downtown Milton
Georgetown
Downtown Guelph
Downtown Cambridge
Downtown Brantford
Uptown Waterloo
Downtown Kitchener

Priority Actions for Strategy 4

4.1

Develop an approach and framework for Metrolinx to review and provide input to secondary plans, publicly funded development plans and large-scale planning applications (e.g., at GO stations) to advise on alignment with the 2041 RTP.

4.2

Make investments in transit projects contingent on transit-supportive planning being in place.

4.3

Focus development at Mobility Hubs and Major Transit Station Areas along Priority Transit Corridors identified in the Growth Plan:

- Coordinate creation of station area plans that catalyze desired land uses and support transit investments.

- Systematically locate publicly funded institutions and facilities near stations on Priority Transit Corridors and subway lines.

- Integrate joint development early in rapid transit project planning and in procurement schedules, utilizing new partnerships between the public and private sector.

- Update the *Mobility Hub Guidelines* to address emerging challenges and opportunities related to the integration of land use and transportation, and incorporate new tools and guidance for planning Mobility Hubs.

- Update the network of Mobility Hubs to reflect the Frequent Rapid Transit Network, the *Growth Plan*, municipal plans, and 2041 forecasts for population, employment and transit ridership.

4.4

Evaluate financial and policy-based incentives and disincentives to support transit-oriented development. Work collaboratively to build on and develop regional and site-specific measures and tools to encourage development that supports growth management and transportation objectives.

4.5

Plan and design communities, including development and redevelopment sites and public rights-of-way, to support and promote the greatest possible shift in travel behaviour, consistent with Ontario's passenger transportation hierarchy:

- Develop region-wide standards for highways, overpasses, roads and streets to consistently reflect the passenger transportation hierarchy.

- Develop shared investment criteria for cycling facilities that focus on cycling potential and connectivity, consistent with regional and local plans.

- Adopt a complete streets approach in the delivery of transit infrastructure investments, incorporating facilities for walking and cycling access to transit stations.

- Expand and promote bike-share in locations where there is an opportunity to meet and increase the demand for cycling.

4.6

Develop and implement a Regional Cycling Network (see Map 9), creating new on- and off-road facilities that connect areas with high cycling potential to rapid transit stations and Urban Growth Centres, helping commuter cyclists traverse boundaries and physical barriers.

4.7

Embed TDM in land use planning and development:

- Use TDM plans in the development approval process to ensure that major residential, commercial and institutional developments are designed and operated to reflect the passenger transportation hierarchy, with realistic, long-term implementation plans.

- Develop regional TDM standards and guidelines.

- Leverage the development approval process to generate dedicated funding for TDM programming.

4.8

Rethink the future of parking:

- Coordinate the development of a region-wide policy that:

  - provides guidelines and encourages best practices in parking management;

  - identifies common goals for on- and off-street parking management, especially near transit stations;

  - supports land use and transportation objectives;

  - acknowledges the varied urban, suburban and rural contexts of the GTHA;

  - anticipates autonomous vehicles and shared mobility;

  - incorporates environment-friendly features;

  - can be leveraged for local policy making; and

  - includes public education and demonstrates the benefit of new parking practices.

- Coordinate station area parking requirements with the expansion of transit infrastructure and services (e.g., amend applicable transit station area by-laws as a condition for transit station approval to support local mode share targets). Zoning standards should be reviewed, with the expectation that minimum parking requirements will be reduced, particularly in transit-supportive neighbourhoods.

- Adopt a region-wide approach to parking management for the arrival of shared mobility and autonomous vehicles.

- Research and regularly publish existing parking-related data and emerging trends to improve parking planning and management.

4.9

Coordinate across ministries, school boards, municipalities, service providers, public health agencies, non-governmental organizations and other stakeholders to establish school travel programs and service solutions for Kindergarten to Grade 12 that encourage future generations of pedestrians and cyclists:

- Continue to advance active and sustainable school travel through regional coordination and delivery of the school travel program. Adopt approaches that are location-specific to ensure that solutions involving walking, cycling and transit are tailored to each community.

- Expand the resources and community capacity available to advance active and sustainable school travel in the GTHA, including to high school students.

- Develop policies, plans and standards that prioritize active and sustainable travel by children and youth in school areas and the broader community (e.g., to recreational and cultural facilities).

4.10

Assess the need for a Transportation Planning Policy Statement and a Transportation Master Plan regulation, as provided for in the Metrolinx Act, 2006, to support the implementation of the 2041 RTP.

Strategy 5
Prepare for an uncertain future

Prepare for new business models and technologies

It is not enough for Metrolinx and its partners to complete the delivery of current regional transit projects, connect more of the region with frequent rapid transit, optimize the transportation system, and integrate transportation and land use in the GTHA. While doing all this, we must also prepare for an uncertain future.

Because there are limits to how well planners can predict what will happen in coming decades, development of the 2041 RTP considered a range of possible futures. The plan emphasizes adaptive strategies that enable adjustments as the impacts of disruptive technologies are felt.

Disruption is here—just as cars reshaped cities in the twentieth century, emerging transportation technologies and business models are changing metropolitan areas in the twenty-first century. Already, car-sharing and ride-sourcing are blurring the lines between public and private transportation. Municipalities have authority to regulate private transportation companies, but a GTHA-wide approach could address cross-boundary travel and provide a more seamless experience for users.

Furthermore, advancements in automation and robotics are making autonomous vehicles—including shared autonomous vehicles—a reality. Although there is uncertainty about how quickly this technology will be adopted, autonomous vehicles are expected to dramatically change how people and goods are moved, and to have substantial impacts on our transportation and land use systems.[70] Ontario has launched a pilot project, with growing participation, allowing autonomous vehicle testing on public roads under certain conditions.

New mobility systems provide detailed data that can be used to plan and deliver better ways of meeting traveller needs. There are related issues around data privacy, however, and they loom even larger as the private sector's role in transportation data collection grows.

Strategy 5 addresses the need for all levels of government to work together to protect the public interest, while fostering innovation and partnerships that can create new or improved services for travellers.

Be prepared for accelerated change

We live in an era characterized by economic, political and environmental uncertainties, generational shifts and rapid technological advances that will challenge governments, and in extreme cases, pose threats to the transportation system. For example, many emerging transportation technologies and payment systems rely on internet connectivity, representing a vulnerability to cyber-attacks and electricity blackouts. In response, transportation systems need to be flexible, responsive, secure and resilient. By addressing these challenges and harnessing the opportunities associated with new technologies, we can improve the performance of the transportation system. The 2041 RTP promotes regional approaches that will help the GTHA prepare for accelerated change.

Build resilience to climate change

As noted in Chapter 2, the GTHA is already experiencing the impacts of climate change. Experts predict the region will experience hotter temperatures, more intense rainfall events, and more severe and frequent storms in the future. A region that is well serviced by alternative modes of transportation will be more resilient to potential travel disruptions caused by extreme weather. A climate-resilient transportation system provides options for travellers to reach their destinations safely, and protects important transportation assets. Metrolinx's *Climate Adaption Strategy* outlines key actions to prepare for extreme weather events, such as performing detailed vulnerability risk assessments, preparing a *Summer Readiness Plan* for hot temperatures, and evaluating flood risk for rail lines. Strategy 5 takes steps to make the regional transportation system more resilient by designing for future extreme weather, updating infrastructure to withstand the impacts of climate change and rebound after extreme weather events, and developing policies and protocols to respond to extreme weather events.

Perspectives on environmental sustainability

An environmentally sustainable regional transportation system is designed to reduce our reliance on fossil fuels and minimize air and noise pollution. It maximizes the use of technological innovations and sustainable materials to increase durability and efficiency, and reduce waste.

Final Report of the Residents' Reference Panel on the Regional Transportation Plan

Reduce greenhouse gas emissions

As noted in Chapter 2, transportation is the leading source of greenhouse gas emissions in Ontario (33% of total emissions in 2015). Reducing greenhouse gas emissions from transportation will require three concurrent strategies:

- Promote modal shift from personal automobiles and reduce personal vehicle travel demand through land use changes, improvements to transit services and street design, new TDM programs, and reducing barriers to walking, cycling and transit use.

- Encourage more energy-efficient driving behaviour and improve the energy efficiency of vehicles.

- Reduce fuel carbon content by replacing gasoline and diesel with alternative fuels that have a lower carbon content such as biofuels, hydrogen or low-carbon sources of electricity.

Many actions that reduce greenhouse gas emissions also reduce other vehicle pollutant emissions that are tied to chronic respiratory conditions, cardiovascular disease and lung cancer. Replacing car use with walking and cycling, including for the first- and last-mile of transit trips, not only helps our climate but also reduces air pollution and improves population health.

To help achieve the Province's ambitious goal of reducing GHG emissions to 80% below 1990 levels by 2050,[71] the GTHA needs both a bold low-carbon transportation strategy and increased collaboration among all levels of government. Among other initiatives, the region's transit agencies can reduce emissions by introducing low-carbon vehicles such as electric buses. Metrolinx's *Sustainability Strategy* outlines how the organization will support Ontario's *Climate Change Action Plan (2016-2020)* by becoming climate resilient, reducing energy use, integrating sustainability into supply chains, minimizing ecosystem impacts, and enhancing community benefits.

Use big data to optimize infrastructure and improve services

"Big data" refers to the massive volume of structured and unstructured data collected by today's companies and institutions—a volume so large that it is difficult to process with traditional tools. As the GTHA transportation system grows and changes, an ever-greater mountain of data are being collected on freight, vehicle and traveller movements. However, these data are being gathered by many different agencies, companies and mobility providers. While transportation data have historically been collected by the public sector, the role of private firms such as mobility companies and mobile phone providers is growing. Big data presents opportunities to develop and track new metrics related to regional transportation policy objectives. However, the increasing number and variety of data collectors also increases the risk that transportation planners will not have access to the right information at the right time. Increased cooperation between the public and private sectors can address this.

There is a strong history of collaboration between governments and transit agencies in the GTHA on gathering travel data, such as the Transportation Tomorrow Survey, which is conducted every five years. Strategy 5 recommends the development of a regional big data strategy for all modes of transportation. By identifying, gathering and sharing relevant data, agencies can better target resources where they are needed, use infrastructure more efficiently, and improve traveller services. These steps need to prioritize data security and privacy protection.

City of Toronto seizes the power of big data

The City of Toronto's Transportation Services Division created the Big Data Innovation Team in 2015 with the mission of leveraging emerging transportation datasets together with existing City data to develop a new understanding of transportation issues across all modes of travel. The team uses modern data science practices to analyze transportation data and measure the impacts of the City's policies, and partners actively with Universities, researchers and the Toronto tech community to drive its agenda. The team established a monitoring and evaluation program for the King Street Transit Pilot that relies on using sensor data to regularly track the performance of the project against a range of multimodal metrics.

Leverage innovation

In the GTHA and around the world, the private sector increasingly provides innovative services that can complement existing public transit services. New mobility services will not replace frequent, high-capacity transit systems, but strategic partnerships represent an opportunity to develop services that increase ridership and efficiency while preserving value and transparency. Transportation agencies around the world are finding that a creative, open approach to partnering with third parties and/or procuring their services is necessary to close the gap between current practices and the anticipated potential for on-demand mobility.

To benefit from the innovations offered by new mobility companies, governments need to break down barriers, provide flexibility in procurement, and develop processes that can respond quickly to new opportunities and changing conditions. It is critical for the public sector to experiment and share lessons learned. Strategy 5 identifies how partnering for innovation can be used to embrace new services, tools and business models.

Priority Actions for Strategy 5

5.1

Develop a regional framework for on-demand and shared mobility:

- Work collaboratively to harmonize local regulations and develop regional policies and guidance to enable innovation while meeting the needs of GTHA residents.

- Proactively test and evaluate new services and technologies (e.g., micro-transit, on-demand and shared mobility) in emerging markets where conventional transit and active transportation are not meeting demand.

- Coordinate and establish partnerships that complement existing and committed transit services.

5.2

Develop a region-wide plan for autonomous mobility:

- Plan and prepare for the deployment of connected and autonomous vehicles, including consideration of policy and regulatory tools that may be required to meet transportation goals (e.g., road safety, congestion management, efficient freight movement).

- Update transportation and building standards for the arrival of autonomous vehicles (e.g., standards for parking and loading spaces).

5.3

Coordinate across the region to improve climate resiliency of the transportation system:

- Plan and build a transportation system that can continue to operate in extreme weather events that accompany climate change.

- Design new infrastructure and strengthen existing infrastructure to resist extreme weather.

- Ensure that the management of existing infrastructure assets, and the design and construction of future assets, are climate resilient.

- Adopt and coordinate policies and procedures among all transportation stakeholders (e.g., road, transit and emergency management agencies) to respond to extreme weather events.

5.4

Coordinate across the region to ensure the safety, security and emergency preparedness of the transportation system:

- Develop and update coordinated emergency response plans to minimize impacts of extreme weather events, security incidents, electricity blackouts, network outages, cyber-attacks and other future threats on travellers, assets and operations.

- Advance cyber-security, backup systems and resiliency plans to prevent and mitigate service disruptions and data breaches.

- Undertake regular emergency response exercises with community participation to train staff, test infrastructure and evaluate emergency protocols.

5.5

Proactively prepare for a future with low-carbon mobility options:

- Align regional and local efforts to mitigate greenhouse gas emissions with international, federal and provincial efforts to meet the Paris Climate Change Accord, and with Ontario's goal of reducing emissions to 80% below 1990 levels by 2050.

- Continue supporting compact and mixed-use development, complete streets and other measures that help reduce travel by motor vehicles.

- Deploy infrastructure to support electric vehicle use throughout the region's public and private transportation systems.

- Invest in the transition to low-carbon public and private vehicle fleets, including transit vehicles and trucks.

- Further collaborate among governments to enhance fuel efficiency and increase the availability of low-carbon fuels.

5.6

Develop a regional transportation big data strategy:

- Create a regional transportation big data portal, providing consistent and transparent data collection, management and reporting.

- Establish regional standards for transportation data sourcing, formatting, privacy, security, ownership and reporting.

- Identify and acquire new transportation data on all modes of transportation for planning and operations (e.g., crowd-sourced traffic data).

- Advance coordination and standardization of transportation forecasting, modelling and business case methodologies to support decision-making and evaluation.

5.7

Develop a strategy for innovation in mobility to:

- Drive innovation related to new services, tools and business models.

- Develop outcome-based approaches beyond traditional procurement and formal partnerships:

  - identify and leverage companies with innovative products and services that can benefit travellers or improve operations;

  - remove barriers to partnerships (e.g., overly rigid procurement rules);

  - test and minimize risks associated with new ideas, products and approaches; and

  - explore innovative funding and financing options such as loans and loan guarantees.

How will the 2041 Regional Transportation Plan make a difference?

The Strategies and Priority Actions in this chapter provide a blueprint for achieving the 2041 RTP's Vision and Goals—but what will happen if these projects, programs and policies are not implemented? As population and employment grow, travel demand will increase and pressure will build on an already strained transportation system. Without initiatives that attract new transit users, congestion will get much worse.

What will the 2041 RTP achieve if implemented? To answer this question, Metrolinx compared three scenarios:

• the 2011 base year;

• a 2041 "do minimum" option in which only projects currently under construction are completed; and

• full implementation of the 2041 RTP.

Full implementation of the 2041 RTP would increase the length of the Frequent Rapid Transit Network by more than 25 times and introduce a regional cycling network that doubles the current length of dedicated cycling facilities, and add over 1,000 lane-kilometres of HOV lanes to the region's highways.

As illustrated in Figure 31, the 2041 RTP offers substantial benefits to GTHA residents. It will bring frequent rapid transit service close to many more homes, and greatly improve access to jobs and other services that people rely on. Full implementation will provide the average GTHA resident with access to 320,000 more job opportunities within a one-hour commute by transit. The percentage of people living within walking distance of frequent rapid transit will increase by four times, and the percentage of jobs within walking distance of frequent rapid transit will more than double (see Figure 32).

As shown in Figure 33 and Figure 34, implementation of the 2041 RTP will increase the use of transit in all travel markets. It will result in 700,000 more transit trips in the GTHA during weekday peak periods, representing a 55% increase over 2011. This ranges from a 39% increase in Toronto where transit is already strong, to a 144% increase in trips between GTHA municipalities outside Toronto, where the potential for new ridership is greater.

Transit services will benefit from rapidly growing concentrations of population and employment—Urban Growth Centres, for example—will see significant gains in transit mode share.

Full implementation of the 2041 RTP will reduce average transit trip times, despite the increase in population (Figure 35). In the "do minimum" scenario, transit travel times would be worse outside Toronto, further depressing relatively low transit mode shares.

Figure 31: 2041 RTP proposed deliverables and outcomes

THEME	INDICATOR	DESCRIPTION	SCENARIO RESULTS			IMPROVEMENT (PLAN VS. 2011 BASE)
			2011 BASE	DO MINIMUM[VII]	2041 PLAN	
PLAN DELIVERABLES						
	Frequent Rapid Transit routes[I]	Length of the Frequent Rapid Transit Network will **increase by more than 25 times**	68 km	156 km	1,860 km[I]	+1,790 km
	Cycling routes	Length of Regional Cycling Network will double	990 km	990 km	2,000 km	+1,010 km
	HOV / HOT lanes[II]	Total length of HOV or HOT lanes will **increase by over 1,000 lane-km**	73 lane-km	110 lane-km	1,130 lane-km	+1,057 lane-km
PLAN OUTCOMES						
TRANSIT ACCESS	People near transit[III]	The fraction of people that live within walking distance of frequent rapid transit will **increase by 4 times**	9%	11%	38%	4.0x
	Jobs near transit[III]	The fraction of all jobs that are within walking distance of frequent rapid transit will **more than double**	21%	21%	49%	2.3x
	Jobs accessible within 60 minutes by transit[IV]	The average GTHA resident will have access to **320,000 more jobs** within 1 hour by transit	740,000	620,000	1,060,000	+320,000
	% of GTHA jobs accessible within 60 minutes by transit[IV]	The % of all jobs available to the average GTHA resident in 60 minutes by transit will remain stable, but 9 percentage points greater than it would be in the Do Minimum scenario	22%	13%	22%	stable
MODE OF TRANSPORTATION	Transit trips[V]	There will be about **700,000 more transit** trips during the daily peak periods	1.2 million	1.6 million	1.9 million	+700,000
	Transit mode share[V]	Transit mode share will **increase slightly**, but would decrease by 2 percentage points in the Do Minimum scenario	14.2%	12.3%	14.7%	+0.5 points
	Active trips[IV]	The number of walking and cycling trips will **double** in the morning peak period	740,000	1,010,000	1,390,000	+650,000
	Active mode share[V]	Active mode share will **increase by 2.2 percentage** points during the peak periods	8.5%	7.8%	10.7%	+2.2 points
QUALITY OF LIFE	Transit travel time[IV]	Average transit travel time in the GTHA will **decrease slightly**, while the region sees significant growth	41 minutes	46 minutes	39 minutes	-2 minutes
	Congested driving[VI]	Congested vehicle kilometers traveled will **decrease by 3 million** kilometers compared to the Do Minimum scenario	3.7 million	11.1 million	8.1 million	+4.4 million
	Environmental impact	Greenhouse gas emissions per capita from auto driver trips will **decrease by 40%**	2.7 tonnes	1.6 tonnes	1.5 tonnes	-1.2 tonnes

[I] Includes 15-minute GO Rail service, subway, BRT, LRT, Priority Bus, Priority Streetcar and Frequent Regional Express Bus corridors.
[II] Lane-km accounts for roadway length as well as the number of lanes in each direction.
[III] Walking distance is 400 m from Priority Bus, BRT and LRT, and 800 m from subway and frequent regional rail.
[IV] Represents trips made between 6:45 a.m. - 8:45 a.m.
[V] Represents trips in the morning and afternoon peak periods (6:00 - 9:00 a.m. and 3:00 - 7:00 p.m.).
[VI] Represents trips made in the morning peak hour.
[VII] The "do minimum" scenario was developed to envision a future where the only additions to the existing transportation system are those In Delivery projects which have already been implemented or where construction has begun (as of 2018). Thus, the network is expanded beyond a "do nothing" scenario, but is still less extensive than the system envisioned after the In Delivery projects are completed (Map 3).

The 2041 RTP will have a significant impact on congestion, compared to the "do minimum" scenario, with 3 million fewer vehicle-kilometres travelled in congested conditions. This reduction in congestion, combined with expected improvements in automobile fuel efficiency, will yield a 40% decrease in per-capita greenhouse gas emissions from automobile trips. Achieving the goal of 100% low-emission transit vehicles would further reduce overall emissions.

Implementation of the 2041 RTP will also support an increase in active travel, with walking and cycling trips doubling from 2011. As shown in Figure 34, the percentage of travel mode share for active transportation will increase across all travel markets.

For individual travellers, an integrated transportation system will increase access to rapid transit and improve travel time reliability. These benefits are particularly important for low-income persons and other groups that rely on public transportation.

In terms of the regional economy, an integrated transportation system will improve the GTHA's competitiveness and productivity by:

- better connecting workers to employers, allowing for specialization of skills; and

- providing businesses with access to more markets, and facilitating connections between suppliers and purchasers.

Additional economic benefits will come from transit infrastructure construction and operation, which will help create jobs in construction, supply chain and service industries.

Cumulatively, the outcomes of 2041 RTP implementation are far-reaching and highly beneficial for the GTHA.
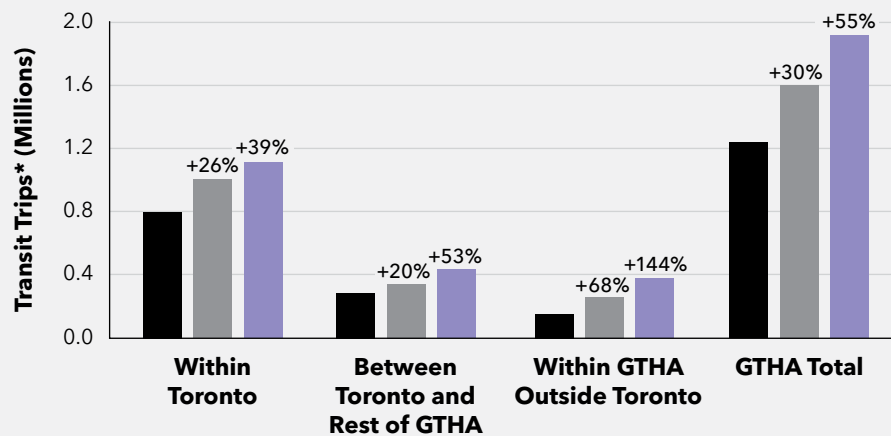
Figure 32: Residents and jobs within walking distance of frequent rapid transit[72]
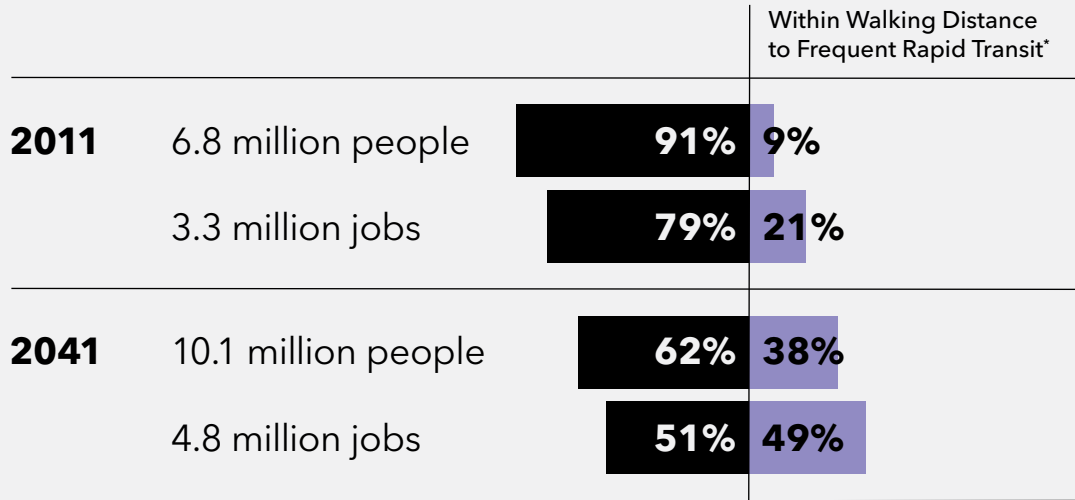
Within Walking Distance
to Frequent Rapid Transit*

2011	6.8 million people	91% 9%
	3.3 million jobs	79% 21%
2041	10.1 million people	62% 38%
	4.8 million jobs	51% 49%

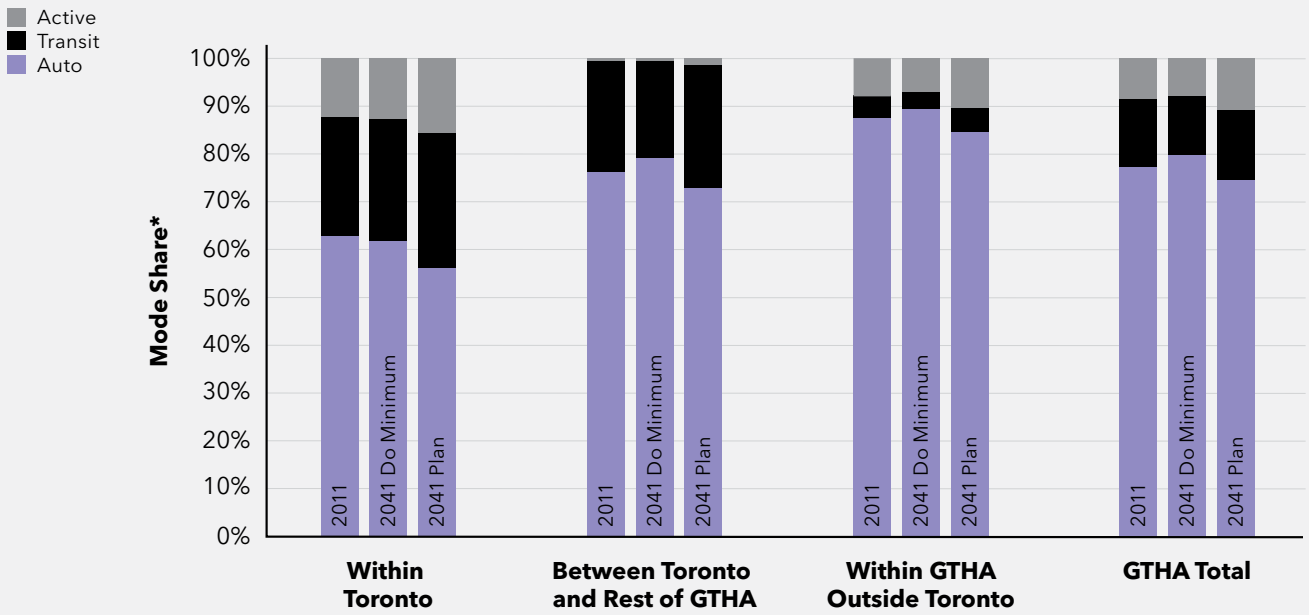* Walking Distance is 400 m from Priority Bus, BRT and LRT lines, and 800 m from subway and 15-minute GO stations

Figure 33: Increase in transit trips by travel market

- ■ 2011
- ■ 2041 Do Minimum
- ■ 2041 Plan

Transit Trips* (Millions)

Within Toronto: +26%, +39%
Between Toronto and Rest of GTHA: +20%, +53%
Within GTHA Outside Toronto: +68%, +144%
GTHA Total: +30%, +55%

* During the peak periods
(6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.)

Figure 34: Travel mode share by travel market

Legend:
- Active
- Transit
- Auto

Y-axis: Mode Share*

Categories: Within Toronto; Between Toronto and Rest of GTHA; Within GTHA Outside Toronto; GTHA Total

Bars labeled: 2011, 2041 Do Minimum, 2041 Plan

* During the peak periods (6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.)

Figure 35: Average transit travel time by travel market

Legend:
- 2011
- 2041 Do Minimum
- 2041 Plan

Y-axis: Average Transit Travel Time* (min)

Categories: Within Toronto; Between Toronto and Rest of GTHA; Within GTHA Outside Toronto; GTHA Total
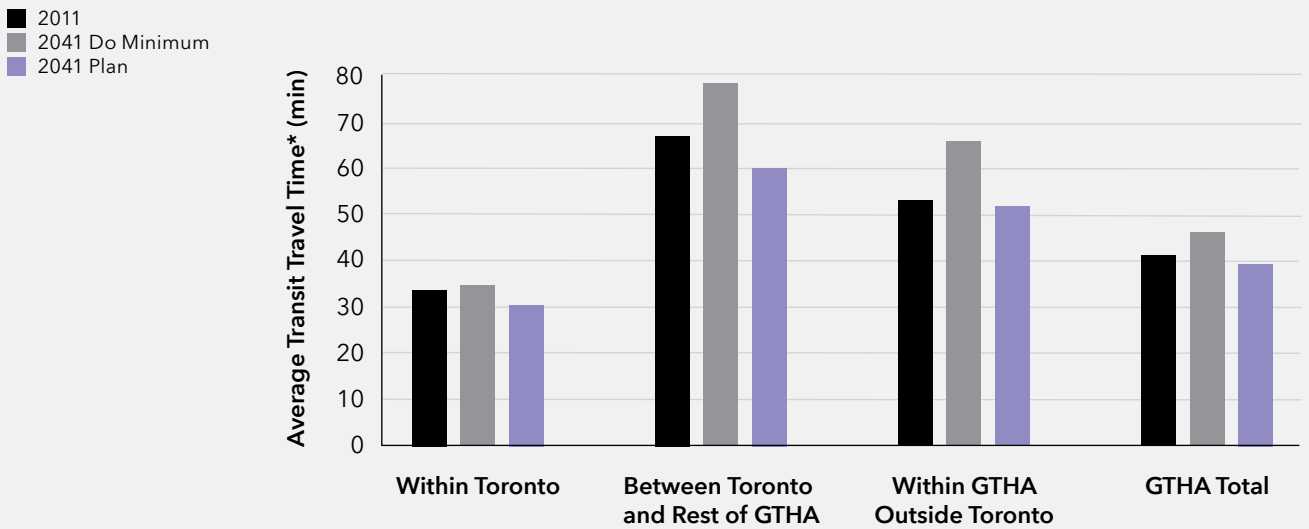
* Represents trips made between 6:45 a.m. - 8:45 a.m.

4

**Next Steps –
Making it Happen**
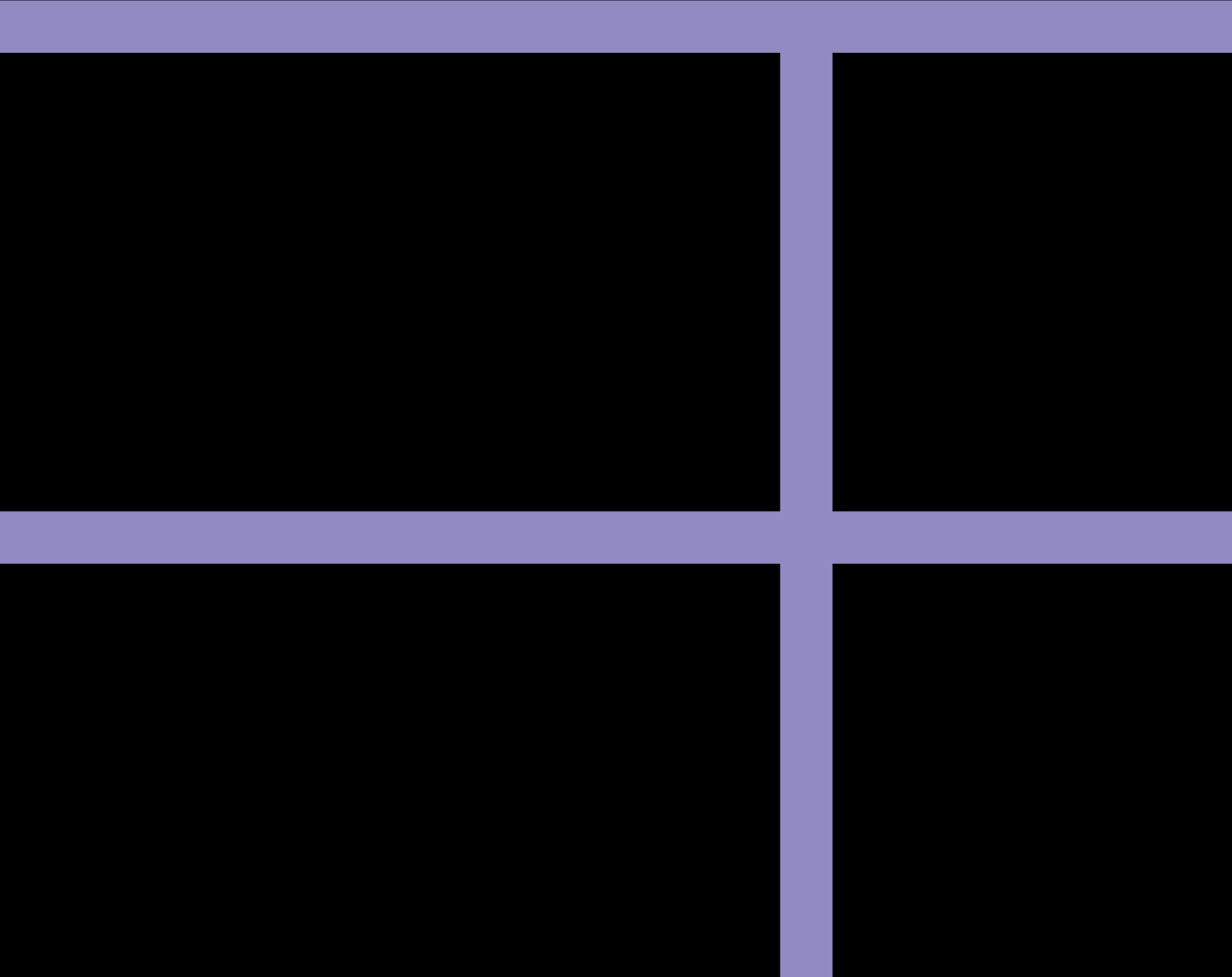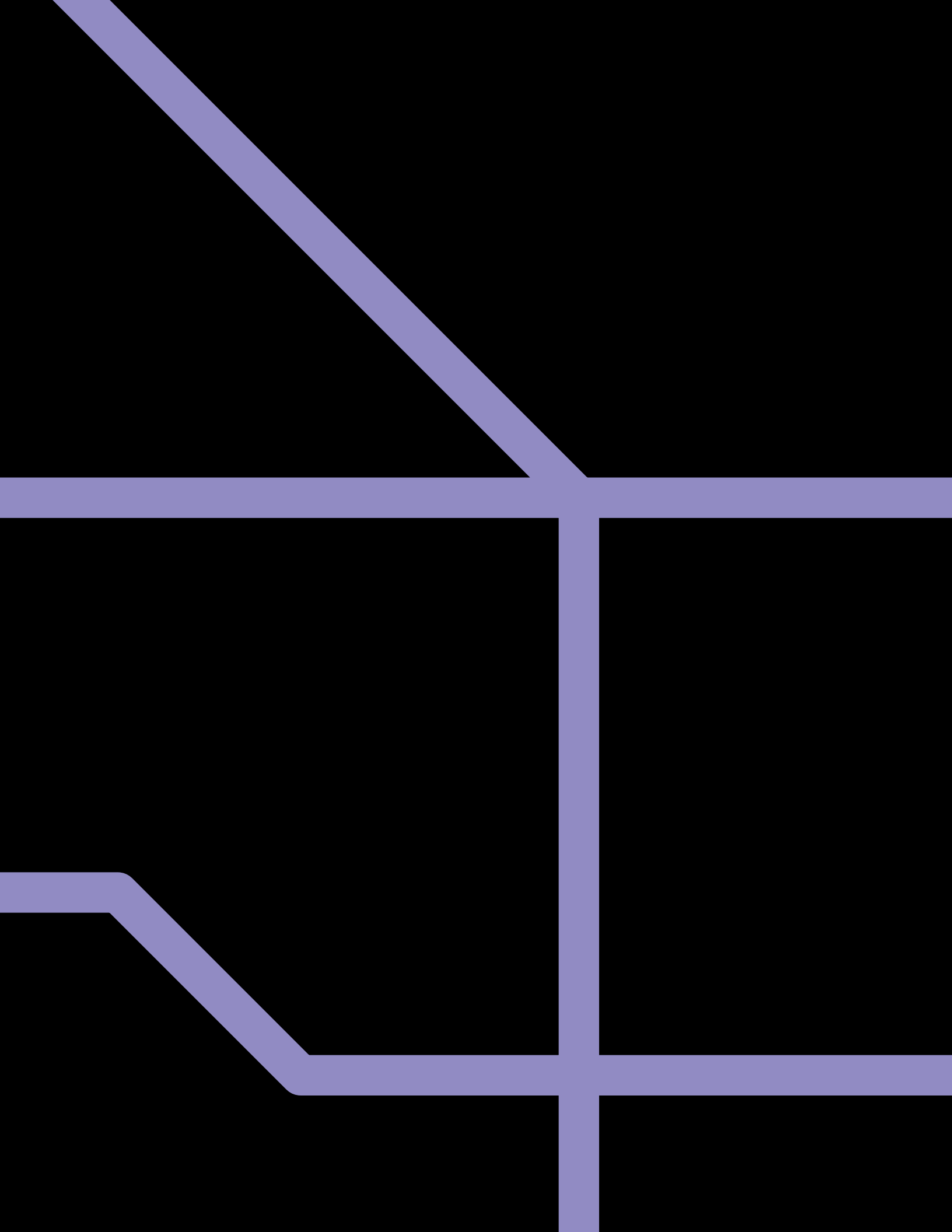
The GTHA, with its growing population and booming economy, is becoming one of the world's great urban areas. It is widely recognized for its liveability, dynamic business environment, world-class universities, diverse cultural institutions and healthy environment. But enormous challenges are posed by the scale of the GTHA's expected growth – a 41% increase in population from 2016 to 2041–and the fact that much of that growth will occur in greenfield areas. Many people will need to travel long distances, and the changing nature of work will result in more commuters moving in all directions throughout the day.

Successfully managing the impacts of continued growth will demand a maturation of the region with respect to its structure (e.g., built form, open space, infrastructure) and social infrastructure and services (e.g., schools, hospitals, libraries). It will also demand new ways of making decisions through regional collaboration (e.g., on prioritization, integration, planning and monitoring) and ensuring financial sustainability (e.g., financing, funding and revenue-generation).

Building a comprehensive, integrated multimodal transportation system over the next 25 years is a vital part of ensuring that the region can prosper through future growth. But the complex transportation system of the future cannot be built without new approaches to regional decision making. Roles and responsibilities need to be more clearly defined, and projects prioritized and phased effectively. To ensure success, meet the goals of the Growth Plan and ensure that money is spent wisely, it is imperative that we re-think how regional transportation decisions are made and how the transportation system is financed.

Over the last ten years, while we have developed new processes and tools for analysis and collaboration, we have learned that new improved approaches are needed to realize the full potential of the regional transportation system. To begin advancing towards the fully integrated transportation system of the future that is envisaged in this plan, we will need to establish new processes for projects and programs in the 2041 RTP to advance from planning to design and delivery, irrespective of who funds, operates and owns the infrastructure.

As a regional transportation agency with a legislated mandate to plan the multimodal transportation system in the GTHA, Metrolinx is in a unique position to catalyze action by:

- providing technical expertise and guidance;

- coordinating regional initiatives;

- convening stakeholders; and

- providing a regional perspective on projects, programs and policies.

However, Metrolinx cannot undertake this work alone. The task at hand is complex. Success of the 2041 RTP will require that all stakeholders responsible for different aspects of the transportation system work together to make it work seamlessly. Implementing its Strategies and Priority Actions will require us to collaborate, and to be innovative in how we approach our regional goals for transportation.

List of Figures

List of Maps

Map	Title
1	The GTHA and GO Transit service area
2	2008 Regional rail and rapid transit network
3	Existing and In Delivery regional rail and rapid transit projects
4	In Development rapid transit projects
5	2041 Frequent Rapid Transit Network
6	Complete 2041 Frequent Rapid Transit Network
7	Proposed 2041 HOV and Regional Express Bus Network
8	Regional Goods Movement Network for roads and highways
9	2041 Regional Cycling Network

Photo Credits

- Brampton Transit
- Blair Underhill
- City of Hamilton
- City of Mississauga
- City of Ottawa
- City of Toronto
- Durham Region Transit
- IBI Group
- Marc Bruxelle
- Metrolinx
- MiWay
- Steer Davies Gleave
- Toronto Transit Commission
- WSP
- York Region Rapid Transit Corporation

List of Acronyms

- **AV:** Autonomous vehicles
- **BRT**: Bus rapid transit
- **GDP:** Gross domestic product
- **GGH**: Greater Golden Horseshoe
- **GHG:** Greenhouse gas
- **GTHA**: Greater Toronto and Hamilton Area
- **HOV**: High-occupancy vehicle
- **ITS**: Intelligent transportation systems
- **LBPIA**: Lester B. Pearson International Airport
- **LRT**: Light rail transit
- **MaaS**: Mobility as a service
- **MTO**: Ontario Ministry of Transportation
- **OP:** Official Plan
- **PPS:** Provincial Policy Statement
- **RER:** Regional Express Rail
- **RTP**: Regional Transportation Plan
- **SGMN:** Strategic Goods Movement Network
- **TDM**: Transportation demand management
- **TMP**: Transportation master plan
- **TPPS:** Transportation Planning Policy Statement
- **TTC**: Toronto Transit Commission
- **YRT:** York Region Transit

Glossary

A

Active transportation: As defined in the *Provincial Policy Statement (2014)* human-powered travel, including but not limited to, walking, cycling, inline skating and travel with the use of mobility aids, including motorized wheelchairs and other power-assisted devices moving at a comparable speed.

Autonomous vehicles: Vehicles, including cars and buses, using an assortment of on-vehicle sensors and connected technology to take over some or all aspects of the task of driving. Partially autonomous vehicles employ automated features such as parking and lane-change assistance, and collision avoidance. Fully autonomous vehicles operate all driving functions without the intervention of a human driver. May be personally owned or shared. Can include driverless taxis. See *connected vehicles.*

B

Big data: Large sets of structured or unstructured data, typically much larger than traditional survey data (e.g., internet clickstream data, social media content, email text, mobile-phone call records or location data, machine data captured by sensors), that don't fit well in traditional databases. Big data can be used to support predictive and user-behaviour analytics, including geo-referencing of data about travel patterns. Big data can inform transportation research and analysis, and provide personalized products and services.

Bicycle lane: A bicycle lane is a portion of a roadway which has been designated by pavement markings and signage for the exclusive use of cyclists. *See separated bike lane and cycle track.*

Bike-sharing: A type of shared mobility that refers to the shared use of a bicycle or fleet of bicycles by multiple users that are available on-demand and allow for flexible rental periods and payment structures (e.g., single-use or as part of a subscription). Typically, users access bikes through a network of tech-enabled stations which are often located in higher-density areas or near transit stations. "Dockless" bike-share systems allow bikes to be left anywhere within a predefined service zone. *See shared mobility and first- and last-mile.*

Bus rapid transit (BRT): Transit infrastructure and service with buses running in their own exclusive right-of-way, fully separated from traffic, typically with signal priority measures in place and longer spacing between stops than conventional bus routes (typically 500 metres to 1 kilometre) to maintain higher average speeds and ensure reliability of the service. May include additional features to improve operational efficiency and enhance the customer experience, such as off-board fare collection, platform-level boarding, and real-time passenger information. *See Regional Express Bus and Priority Bus corridor.*

C

Car-sharing: A type of shared mobility that provides members with 24-hour access to a fleet of vehicles that are available on-demand and allow for flexible rental periods and payment structures (e.g., single-use or as part of a subscription). Services can be two-way, requiring customers to borrow and return the vehicle to the same location, or one-way, allowing customers to pick up and drop off vehicles at different locations within a designated service area. *See shared mobility.*

Connected vehicles: Vehicles that are enabled to communicate with other vehicles, mobile electronic devices, and connected road infrastructure (e.g., traffic signals). Many vehicles already use some connected technology, such as GPS-enabled navigation systems. *See autonomous vehicles and intelligent transportation systems.*

Complete communities: As in the *Growth Plan for the Greater Golden Horseshoe, 2017*, places such as mixed-use neighbourhoods or other areas within cities, towns, and settlement areas that offer and support opportunities for people of all ages and abilities to conveniently access most of the necessities for daily living, including an appropriate mix of jobs, local stores, and services, a full range of housing, transportation options and public service facilities. Complete communities are age-friendly and may take different shapes and forms appropriate to their contexts.

Complete streets: As in the *Growth Plan for the Greater Golden Horseshoe, 2017*, streets planned to balance the needs of all road users, including pedestrians, cyclists, transit-users, and motorists. A complete streets approach also involves design, operation, and maintenance of roadways to enable safe, convenient, and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation.

Cycle track: A cycle track is a cycling facility adjacent to and physically separated from motor vehicle travel lanes by a curb, bollards or other form of barrier. A raised cycle track is elevated above the road surface. A cycle track may be designed for one-way or two-way travel, and is designated for the exclusive use by cyclists and is distinct from the sidewalk. *See separated bike lane and bicycle lane.*

D

Design excellence: A strategy to deliver seamless integrated transportation systems to the traveller. It is inclusive of architecture, urban design, landscape architecture, signage and wayfinding, and integration of public art. Design excellence encompasses all of the touch points at which the traveller interacts with the transportation system, including delivery of: universal access and accessibility, fare integration, safety and comfort, trip planning and integrated technology.

F

First- and last-mile: This describes the challenge of moving people between transit stations, mobility hubs, or fixed-route transit services and their home, workplace or other major destination. The concept applies broadly to making improvements in transit access for all people trying to reach transit regardless if they live within one mile of a transit station or mobility hub. Alternatives to driving and parking a car can be advanced with, for example, programs that support carpooling; well-maintained infrastructure that facilitates walking and cycling, prioritzes transit access; and initiatives that support new mobility, like on-demand shuttle services. It can also describe moving goods between major intermodal hubs, such as rail yards and airports, and their final destination, such as retail stores, restaurants or even customers' homes.

Freight cluster: As per *Ontario's Freight-Supportive Guidelines* (2016), groupings of similar uses that generate freight. Identifying and planning for these clusters is intended to minimize potential conflicts along freight routes, corridors, and the type of on-coming traffic that transport trucks may encounter when exiting or entering a site.

Frequent Rapid Transit Network: A seamless and reliable network of transit services running at least every 10-15 minutes all-day, every day. The Frequent Rapid Transit Network will consist of transit routes and corridors that ensure fast and reliable service through the use of dedicated infrastructure, design elements, and other supporting investments as required (e.g., full grade separation, exclusive right-of-way, HOV lanes, queue jump lanes, wider stop spacing than conventional transit routes, signal priority, or other transportation systems management measures). The Frequent Rapid Transit Network proposed will allow transit users to make efficient transfers between routes on the network, which includes subways, bus rapid transit, light rail transit, frequent (15-minute) two-way all-day GO rail, Priority Bus corridors, and Frequent Regional Express Bus. This updates the term "Regional Rapid Transit" used in *The Big Move* (2008) Regional Transportation Plan. *See Priority Bus corridor, bus rapid transit, light rail transit and Regional Express Bus.*

G

Greater Golden Horseshoe (GGH): As in the *Growth Plan for the Greater Golden Horseshoe, 2017*, the geographic area identified as the Greater Golden Horseshoe Growth Plan area in Ontario Regulation 416/05 under the *Places to Grow Act*, 2005.

Growth Plan for the Greater Golden Horseshoe: A long-term provincial plan that works together with the Greenbelt Plan, the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan to manage growth, build complete communities, curb sprawl and protect the natural environment.

H

High-occupancy toll (HOT) lane: A high-occupancy vehicle (HOV) lane that single occupant vehicles are also permitted to use by paying a toll. *See high-occupancy vehicle lane.*

High-occupancy vehicle (HOV) lane: A lane of roadway that is typically designated for use only by vehicles with a specified minimum number of occupants or transit vehicles. May also be used to support Priority Bus routes.

I

In Delivery projects: Transit projects in the GTHA that are either under construction or in the engineering design stage.

In Development projects: Transit projects in the GTHA that are in advanced stages of planning and design.

Integrated mobility: A practice that describes the unification of different transportation modes and mobility providers into a network connecting travellers from their trip origin to their final destination through seamless connections supported by the use of barrier-free planning, design, infrastructure and technology solutions (e.g., integrated payment, mobility as a service, real-time information and trip planning across multiple modes). *See mobility as a service and new mobility.*

Intelligent transportation systems (ITS): A form of transportation systems management that uses real-time information technology to provide traffic-responsive, area-wide traffic control and information that allows transportation providers to optimize system operations and enables travellers to use the system more efficiently, effectively, and conveniently. ITS includes planning, deployment, integration and operations to provide a cohesive, end-to-end solution for all transportation users, including traveller information and electronic payment. *See transit priority measures and transportation systems management.*

L

Light rail transit (LRT): Transit infrastructure and services consisting of light rail vehicles running in an exclusive right-of-way, fully separated from traffic, typically with transit signal priority measures in place and longer spacing between stops than conventional transit routes (typically 500 metres to 1 kilometre) to maintain higher average speeds and ensure reliability of the service. Typically include additional features to improve operational efficiency and enhance the customer experience, such as off-board fare collection, platform-level boarding, and real-time passenger information.

Local transit: A passenger transit system that is operated principally within an upper-tier, lower-tier or single-tier municipality, with routes that serve generally short to medium distance trips. Parts of local transit routes may overlap with parts of the Frequent Rapid Transit Network and share the infrastructure and transit priority features. Local transit routes will also play an important role in connecting people to the Frequent Rapid Transit Network for longer distance trips. Local transit in the GTHA is provided by Burlington Transit, Brampton Transit, Durham Region Transit, Hamilton Street Railway, Milton Transit, MiWay (Mississauga Transit), Oakville Transit, the Toronto Transit Commission and York Region Transit/VIVA.

Low-carbon: In the transportation sector, refers to vehicles that produce minimal greenhouse gas emissions through the adoption of electric and alternative-fuel vehicle technologies. Reducing greenhouse gas emissions from the transportation sector typically focuses on minimizing travel and shifting to more environmentally sustainable modes, technologies and fuels.

M

Major Transit Station Area: As in the *Growth Plan for the Greater Golden Horseshoe 2017*, the area including and around any existing or planned higher order transit station or stop within a settlement area; or the area including and around a major bus depot in an urban core. Major transit station areas generally are defined as the area within an approximate 500-metre radius of a transit station, representing about a ten-minute walk. *See Mobility Hubs.*

Managed lanes: Lanes on highways or arterial roads that have measures in place to restrict the number of single occupant vehicles and prioritize high-occupancy vehicles or transit. *See high-occupancy vehicle lane and high-occupancy toll lane.*

Micro-transit: A type of shared mobility that refers to small-scale, flexible transportation services, using shuttles or vans, with dynamically-generated, rather than fixed, routes to provide rides that are often ordered on-demand using a mobile app. Multiple passengers share trips with others who have similar routes or destinations. *See shared mobility and on-demand mobility.*

Mobility as a service: A new mobility technology that describes the integration of various transport services including public transit, bike or car-sharing, taxis, ride-sourcing and other forms of shared mobility that are bundled together and consumed on a subscription basis to meet the particular needs of individuals. *See new mobility, car-sharing, ride-sourcing and shared mobility.*

Mobility Hubs: Mobility Hubs are Major Transit Station Areas at the intersection of two or more Frequent Rapid Transit Network routes, designed to support a high number of transit boardings and alightings, and facilitate seamless, efficient transfers between modes. They have and/or are planned to have a high density mix of jobs, residences, public services, and other land uses that encourage and support transit use and active transportation, or the potential to develop into areas with a high-density mix of land uses. *See Major Transit Station Area.*

Mode share: The percentage of person-trips made by one mode of travel relative to the total number of trips made by all modes. This term is derived from that provided by the *Growth Plan for the Greater Golden Horseshoe, 2017* for "modal share".

Multimodal: Relating to the availability or use of more than one form of transportation for a single trip, such as automobiles, walking, cycling, buses, rapid transit, rail (such as commuter and freight), trucks, air, and marine (e.g., cycling or driving to a transit station). This term is derived from that provided by the *Growth Plan for the Greater Golden Horseshoe, 2017*, for "multimodal". *See mode share.*

N

New mobility: A term to describe the suite of emerging transportation services and that are enabled through the development and convergence of technologies (e.g., smartphones, real-time data, autonomous and connected vehicles) and business models (e.g., shared mobility and mobility as a service). *See autonomous vehicles, connected vehicles, mobility as a service, and shared mobility.*

O

On-demand mobility: Shared mobility services that are provided to the user within a short time period upon request, either by telephone or mobile electronic device. *See shared mobility.*

Outer ring: The geographic area consisting of the Cities of Barrie, Brantford, Guelph, Kawartha Lakes, Orillia, and Peterborough; the Counties of Brant, Dufferin, Haldimand, Northumberland, Peterborough, Simcoe, and Wellington; and the Regions of Niagara and Waterloo. This term is derived from that provided by the *Growth Plan for the Greater Golden Horseshoe, 2017*.

P

Priority Bus corridor: Transit corridor allowing buses to operate quickly and reliably without the need for a dedicated right-of-way by providing protection from mixed traffic (e.g., HOV lanes on arterial roads, turn prohibitions or other traffic restrictions) and using other transit priority measures such as queue jump lanes and signal priority at intersections. Priority Bus routes operating in Priority Bus corridors typically have wider spacing between stops (e.g., every 300 to 800 metres) to improve travel times over long distances. Features such as all-door boarding and safe, comfortable stations can further improve service and enhance the customer experience. As part of the Frequent Rapid Transit Network, buses running in Priority Bus corridors will operate at least every 15 minutes, all-day. The same concepts may be applied to light rail vehicles or streetcars, which can operated as Priority Streetcar corridors in the absence of a dedicated right-of-way. *See bus rapid transit, Regional Express Bus and Frequent Rapid Transit Network.*

Priority Transit Corridor: Transit corridors identified in the *Growth Plan for the Greater Golden Horseshoe, 2017*, Schedule 5, or as further identified by the Province for the purpose of implementing the *Growth Plan*. Also see Growth Plan Policy 2.2.4 "Transit Corridors and Station Areas".

Q

Queue jump lanes: Short, dedicated transit lanes that allow transit vehicles to bypass queues at intersections and, in combination with transit signal priority, allow buses to easily enter traffic flow in a priority position. Applied thoughtfully, queue jump treatments can reduce delay considerably, resulting in run-time savings and increased reliability. *See transit signal priority.*

R

Regional Cycling Network: A network of commuter-oriented cycling routes and dedicated infrastructure that supports longer-distance trips (typically greater than five kilometres), supports cycling trips across municipal boundaries and between Urban Growth Centres, and provides connections to rapid transit stations. Infrastructure may include bike lanes, cycle tracks, and multi-use trails.

Regional Express Bus: Transit service consisting of buses running primarily along highways and typically connecting two or more significant destinations separated by longer distances than would normally be travelled on a conventional transit route. Operating speeds can be significantly higher than conventional transit, with limited stops or wider stop spacing (typically two to eight kilometres). Significant destinations include urban centres, transportation hubs and large institutions. Frequent Regional Express Buses operate every 15 minutes or better all-day and are part of the Frequent Rapid Transit Network. *See bus rapid transit and Priority Bus.*

Regional Express Rail (RER): The ten-year (to 2024) GO Regional Express Rail (RER) program is a suite of infrastructure and service improvements that will transform GO rail from a largely commuter system to a comprehensive regional rapid transit service. Infrastructure expansion, including new tracks, bridges, signals and rolling stock, will allow for increased peak period service on all existing GO rail routes and the addition of electric train service running every 15 minutes or better in both directions throughout the day on five of seven corridors. By 2024, peak period train service will double and off-peak train service will quadruple.

Regional transportation system: As in the *Provincial Policy Statement*, 2014, the multimodal transportation system, including all of the municipalities of the Greater Toronto and Hamilton Area and the broader GO Transit service area, consisting of services and infrastructure such as, "facilities, corridors and rights-of-way for the movement of people and goods, and associated transportation facilities including transit stops and stations, sidewalks, cycle lanes, bus lanes, high-occupancy vehicle lanes, rail facilities, parking facilities, park-and-ride lots, service centres, rest stops, vehicle inspection stations, inter-modal facilities, harbours, airports, marine facilities, ferries, canals and associated facilities such as storage and maintenance".

Ride-sourcing: A type of vehicle-for-hire shared mobility that refers to service providers that use an online or app-based platform to connect passengers with drivers of personal vehicles. Operators are known as transportation network companies or private transportation companies. *See shared mobility and on-demand mobility.*

Ridesharing: A type of shared mobility that refers to both traditional carpooling and dynamic carpooling, where passengers with a common destination share a vehicle and the costs of a trip. Traditional carpool drivers provide a pre-organized ride for a passenger based on having a common route or final destination, such as a shared workplace. Dynamic carpooling relies on real-time connectivity between drivers and passengers to book trips on demand based on the passenger having an origin and destination that aligns with a driver's pre-determined route. A fare, not exceeding the cost of operating the vehicle on a non-profit basis (as defined under the *Public Vehicles Act*), is typically paid for this service. *See shared mobility and on-demand mobility.*

Ridematching: The process whereby passengers with a common destination, often a shared workplace, are matched in order to share a vehicle and the costs of a trip (e.g. using the Smart Commute tool). *See ridesharing.*

S

Separated bike lane: A separated bicycle lane is a portion of a roadway which has been designated by special pavement markings or a physical barrier and signage for the exclusive use of cyclists. This facility type provides additional spatial or physical separation between motorists and cyclists. *See bicycle lane and cycle track.*

Shared mobility: A type of new mobility that refers to a broad set of transportation services and business models that are shared among users, such as bike-sharing, car-sharing, micro-transit, ride-sourcing, and ridesharing. *See new mobility.*

Specialized transit: Also referred to as "paratransit" or "custom transit", specialized transit provides door-to-door service to eligible individuals with disabilities and seniors who are not able to use conventional transit for all or part of their travels. Specialized transit works with conventional transit service providers to form a broader accessible transit network. It is usually funded and delivered by a municipality.

T

Telework: A transportation demand management strategy that allows employees to work from home by connecting to their employer's computer system. The employee's work files and e-mail are usually available ensuring that they are never out of the corporate loop. Meetings can also be conducted remotely through conference calls and web conferencing. *See transportation demand management.*

Transit priority measures: Techniques designed to minimize delays for buses or rail vehicles at intersections and along congested roads to provide a faster, more reliable trip. Transit priority measures include high-occupancy vehicle lanes, bus-only lanes, transit signal priority, turning restrictions for automobiles, and queue jump lanes. *See intelligent transportation systems, transportation systems management, transit signal priority and queue jump lanes.*

Transit signal priority: Transit signal priority tools modify traffic signal timing or phasing when transit vehicles are present to prioritize the movement of transit vehicles over automobiles, either conditionally when the transit vehicle is behind schedule or unconditionally for all arriving transit. Transit signal priority can be a powerful tool to improve both reliability and travel time, especially on corridor streets with long signal cycles and distances between signals. In urban contexts, benefits are significantly amplified when implemented alongside other strategies like dedicated transit lanes or queue jump lanes. *See intelligent transportation systems.*

Transit-supportive: Urban planning and design that focusses on making transit more viable and attractive, including compact, mixed-use development that has a high level of employment and residential density and an urban form that supports walking and cycling.

Transportation demand management (TDM): As in the *Provincial Policy Statement* (2014), a set of strategies that result in more efficient use of the transportation system by influencing travel behaviour by mode, time of day, frequency, trip length, regulation, route, or cost. Examples include: carpooling, vanpooling, and shuttle buses; parking management; site design and on-site facilities that support transit and walking; bicycle facilities and programs; pricing (road tolls and/or transit discounts); flexible working hours and telework; high-occupancy vehicle lanes; park-and-ride; incentives for ridesharing, using transit, walking and cycling initiatives to discourage drive-alone trips.

Transportation systems management (TSM): A set of operational strategies that improve the safety, performance and efficiency of the existing transportation network and infrastructure through the management and operation of integrated, intermodal surface transportation systems, including technology, services, and processes. Intelligent transportation systems (ITS) is considered a specific form of TSM. *See intelligent transportation systems.*

U

Urban Growth Centres: Existing or emerging downtown areas shown in Schedule 4 in the *Growth Plan for the Greater Golden Horseshoe, 2017*, and as further identified by the Minister (of Municipal Affairs) on April 2, 2008. They represent twenty-five downtown areas that are intended to be mixed-use, high-density, and transit-supportive focal points for residential and employment growth and intensification in a municipality.

V

Vision Zero: Vision Zero aims to achieve transportation systems with no fatalities or serious injuries using a variety of interventions. These include engineering for safer street design, enforcing laws such as speeding or impairment that have a significant correlation to fatalities or major injuries, and educating drivers, cyclists and pedestrians on safety measures and the impacts of law-breaking.

Vehicle-kilometres travelled: A measure of roadway use, commonly used in estimating congestion, that reflects the distance that an individual drives, or, more typically, the cumulative distance driven by all vehicles in an urban region during a specified period of time. Vehicle-kilometres travelled can reflect the link between land use and transportation. Land uses that are further away from each other result in longer trip lengths, more traffic on roadways and more vehicle-kilometres travelled, for example.

W

Wayfinding: An orientation system consisting of signage, mapping, and the provision of other information that enables travellers to choose a preferred route, monitor their journey and recognize when they have arrived. Wayfinding systems may be designed to guide people through a complex built environment such as a transportation hub or as an aid to navigate a transit or cycling network.

Endnotes

1. Hemson Consulting Ltd. based on Statistics Canada 2011 Census and 2011 National Household Survey.
2. Ontario Ministry of Municipal Affairs. *Growth Plan for the Greater Golden Horseshoe.* 2017.
3. Including the *Oak Ridges Moraine Plan*, 2017 and the *Niagara Escarpment Plan*, 2017.
4. WSP. *Navigating Uncertainty: Exploration of Alternative Futures for the Greater Toronto and Hamilton Area*, 2017.
5. Northstar Research Partners. *Metrolinx Persona Development Research – Persona Narrative Report,* November 30, 2016.
6. University of Toronto Data Management Group. 2011 Transportation Tomorrow Survey. CUTA, *Canadian Transit Fact Book: 2015 Operating Data*, 2016.
7. Metrolinx, *Presto Quarterly Report*, June 2017; CUTA, *Canadian Transit Fact Book: 2015 Operating Data*, 2016; Metrolinx, *2016 GO Ridership*; GO Transit, *About Union Station*, 2016; University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey; Ontario Ministry of Transportation, *Carpool Lots*, 2017.
8. Ontario Ministry of Transportation. Available at www.gghtransport2051.ca (as of September, 2017).
9. Metrolinx. *The Big Move*, 2008.
10. Metrolinx. *The Big Move Baseline Monitoring Report*, 2013.
11. Ontario Ministry of Municipal Affairs. *Growth Plan for the Greater Golden Horseshoe*, *2017*.
12. Hemson Consulting Ltd. based on Statistics Canada Annual Demographic Estimates, 2006 Census, 2011 Census, 2011 National Household Survey, and 2016 Census; *Growth Plan for the Greater Golden Horseshoe, 2017.*
13. Hemson Consulting Ltd. and IBI Group. *Context Paper on the Regional Economy, Demographic Outlook and Land Use,* 2016.
14. Ibid.
15. Hemson Consulting Ltd. based on Statistics Canada 2006 Census and 2011 National Household Surveys, municipal employment surveys, and office building occupancy and construction data.
16. Ontario Ministry of Finance. *2013-2041 Ontario Population Projections by Age-Reference Scenario*, 2014.
17. Scheiner, J., and Holz-Rau., C. *"A Comprehensive Study of Life Course, Cohort, and Period Effects on Changes in Travel Mode Use."* Transportation Research Part A: Policy and Practice 47 (2013): 167-181.
18. Hemson Consulting Ltd. and IBI Group. *Context Paper on the Regional Economy, Demographic Outlook and Land Use,* 2016.
19. Toronto Foundation. *Toronto's Vital Signs Report,* 2016.
20. Statistics Canada, 2011 National Household Survey.
21. Hemson Consulting Ltd. and IBI Group. *Context Paper on the Regional Economy, Demographic Outlook and Land Use,* 2016.
22. Toronto Office of City Planning. *Profile Toronto: Housing Occupancy Trends, 1996-2011*. 2015.
23. Royal Bank of Canada and Pembina Institute. *Priced Out: Understanding the Factors Affecting Home Prices in the GTA*, 2013.
24. CANCEA. *Regional Express Rail's Impact on Housing Affordability in the Greater Golden Horseshoe*, 2016.
25. Berriman, R. *Will Robots Steal Our Jobs? The Potential Impact of Automation on the U.K. and Other Major Economies*, 2017.
26. Nisen, M. "The 9-to-5 Office Workday is Dying in America." *Quartz,* 2015.
27. Lewchuk, W., et al. *The Precarity Penalty: The Impact of Employment Precarity on Individuals, Households and Communities and What to Do About It*, 2015.
28. Ibid.
29. City of Toronto. Municipal Licensing and Standards Office, 2017.
30. Roland Berger. *A CEO Agenda for the (R)evolution of the Automotive Ecosystem*, 2016.
31. Ryerson University. *Autonomous Vehicles in the Greater Toronto-Hamilton Area: 2016 Consumer Survey*.
32. Childress, Suzanne, Brice Nichols, Billy Charlton, and Stefan Coe. "Using an activity-based model to explore the potential impacts of automated vehicles." *Transportation Research Record 2493*, 2015.; Truong, Long T., Chris De Gruyter, Graham Currie, and Alexa Delbosc. "Estimating the trip generation impacts of autonomous vehicles on car travel in Victoria, Australia." *Transportation* 44(6), 2017.
33. Bush, E.J., Loder, J.W., James, T.S., Mortsch, L.D. and Cohen, S.J. (2014): *An Overview of Canada's Changing Climate*; in Canada in A Changing Climate: Sector Perspectives on Impacts and Adaptation, (ed.) F.J. Warren and D.S. Lemmen; Government of Canada, Ottawa, Ontario.
34. Environment and Climate Change Canada. *National Inventory Report 1990–2015: Greenhouse Gas Sources and Sinks in Canada*, 2017.
35. Ontario. *Climate Change Mitigation and the Low-Carbon Economy Act*, 2016.
36. Metrolinx. *Sustainability Strategy 2015-2020*, 2016.
37. Neptis Foundation. *Brief: Misalignment of Growth and Infrastructure Means Growing Pains for the GTHA*, 2015.

38. Hemson Consulting Ltd. and IBI Group. *Context Paper on the Regional Economy, Demographic Outlook and Land Use,* 2016.
39. Ibid.
40. Metrolinx. *RTP Discussion Paper*, August 2016.
41. MASS LBP. *Final Report and Recommendations of the Residents' Reference Panel on the Regional Transportation Plan,* 2017.
42. University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey.
43. Metrolinx. *Greater Toronto and Hamilton Area Fare Integration - Stage 2 Report 1: Fare Integration Concept Development Report*, 2016.
44. Ontario Ministry of Transportation. *Transit-Supportive Guidelines*, 2012.
45. IBI Group. *Regional Transit Network Planning Study*, 2017.
46. City of Vancouver. *Frequent Transit Network in Metro Vancouver*, 2017.
47. IBI Group. *Transit Needs and Opportunities for the Greater Toronto and Hamilton Area*. 2016.
48. Metrolinx. *GO RER Business Case*, 2015.
49. Segments not yet converted to full BRT, but benefitting from priority measures and operational enhancements.
50. University of Toronto Data Management Group. 2016 Transportation Tomorrow Survey.
51. SDG. *Transportation Study of the Pearson Airport Area*, 2015.
52. Ibid.
53. Greater Toronto Airports Authority. *Toronto Pearson International Airport: Growing Canada with a Mega-Hub Airport*, December 2016; Greater Toronto Airports Authority. *Pearson Connects: A Multi-Modal Platform for Prosperity*, February 2016.
54. University of Toronto Data Management Group. 2011 Transportation Tomorrow Survey.
55. WSP. *New Mobility Background Paper*, 2016.
56. Ontario Ministry of Transportation. *Ontario Road Safety Annual Report 2014*, 2017.
57. Transport Canada. *Transportation Demand Management for Canadian Communities: A Guide to Understanding, Planning and Delivering TDM Programs*, 2011.
58. SDG. *Transportation Demand Management Background Paper*, 2015.
59. IBI Group. *Transportation Systems Management: Regional Transportation Plan Background Paper*, 2017.
60. WSP. *Regional Road Network Background Study*, 2017.
61. Ontario Ministry of Transportation. Commercial Vehicle Survey, 2012; United States Census Bureau. *Commodity Flow Survey*, 2012.
62. Ontario Ministry of Transportation. Commercial Vehicle Survey, 2006, 2012; Hemson Consulting Ltd. *Greater Golden Horseshoe Growth Forecasts to 2041, Technical Report (November 2012) Addendum*.
63. Pembina Institute and Toronto Atmospheric Fund. *Delivering the Goods: Opportunities for Low-Carbon Goods Movement in Toronto*, 2014
64. Pembina Institute. *Cyclelogistics: Opportunities for Moving Goods by Bicycle in Toronto*, 2017.
65. SDG. *Active Transportation Background Paper*, 2015.
66. Transport Canada. *Complete Streets: Making Canada's Roads Safer for All*. Case Study 72 in *Case Studies in Sustainable Transportation*, 2009.
67. IBI Group. *Regional Transportation Plan Cycling Network Study*, 2017.
68. Ontario Ministry of Transportation. Book 18 Ontario Traffic Manual, 2013.
69. Buliung, Ron, et al. *School Travel in the GTHA: A Report on Trends*. 2015.
70. Grush Niles Strategic. *Ontario Must Prepare for Vehicle Automation*, 2016; and WSP. *Driving Towards Driverless: A Guide for Government Agencies*, 2016.
71. Ontario Ministry of the Environment and Climate Change. *Ontario's Climate Change Strategy*, 2015.
72. Hemson Consulting Ltd. based on Statistics Canada 2011 Census and 2011 National Household Survey.

Appendices

Table of Contents

Appendix 1
Metrolinx technical studies and academic background research

The review and update of the Regional Transportation Plan was informed by extensive technical analysis, as well as independent research conducted through partnerships with Canadian universities. Studies and research papers are published on Metrolinx's website.

Appendix 1A: Metrolinx technical studies

A Shared Vision: Updating the Vision, Goals and Objectives. Metrolinx. 2016.

Active Transportation Background Paper. Prepared by Steer Davies Gleave. 2015.

Backgrounder to the Legislated Review of the Regional Transportation Plan. Metrolinx. 2017.

Context Paper on the Regional Economy, Demographic Outlook and Land Use. Prepared by IBI Group and Hemson Consulting Ltd. 2016.

GTHA Strategic Goods Movement Network Study. Prepared by CPCS and David Kriger Consultants. 2017.

Mobility Hub Policy Review. Prepared by Brook McIlroy. 2017.

Navigating Uncertainty: Exploration of Alternative Futures for the Greater Toronto and Hamilton Area. Prepared by WSP. 2017.

New Mobility Background Paper. Prepared by WSP. 2016.

Regional Parking Policy Study. Prepared by WSP. 2017.

Regional Road Network Characterization. Prepared by WSP. 2017.

Regional Transit Network Planning Study. Prepared by IBI Group. 2017.

Regional Transportation Plan Cycling Network Study. Prepared by IBI Group. 2017.

The 2041 Regional Transportation Plan Evaluation Process Backgrounder. Metrolinx. 2018.

The Big Move Priority Actions and Supporting Policy Review. Metrolinx. 2016.

Transit Access and Equity in the Greater Toronto and Hamilton Area Background Paper. Metrolinx. 2017.

Transit Needs and Opportunities Background Paper. Prepared by IBI Group. 2016.

Transportation Demand Management Background Paper. Prepared by Steer Davies Gleave. 2015.

Transportation Systems Management: Regional Transportation Plan Background Paper. Prepared by IBI Group. 2017.

Urban Goods Movement Background Paper. Prepared by CPCS and David Kriger Consultants. 2016.

Appendix 1B: Academic background research

Buliung, Ron, et al. *School Travel in the GTHA: A Report on Trends*. 2015.

Buliung, Ron. *Phase 1: Children's Independent Mobility in the Greater Toronto and Hamilton Area: Setting the Stage*. 2014.

Buliung, Ron. *Phase 2: Children's Independent Mobility Across the City of Toronto*. 2014.

Cassello, Jeff. *Quantitative TDM Assessment in a Large Metropolitan Area: Greater Toronto and Hamilton Area*. 2015.

Cassello, Jeff and Hall, Daniel. *Activity Centre: Integration of the Planning and Operations of Public Transit in the GTHA*. 2013.

Castel, Evan and Farber, Steve. *Benchmarking the Health and Public Transit Connection in the GTHA: An Analysis of Survey Microdata*. 2017.

El-Geneidy, Ahmed M., et al. *Non-Stop Equity: Assessing Daily Intersections Between Transit Accessibility and Social Disparity Across the Greater Toronto and Hamilton Area*. 2014.

Hertel, Sean, Keil, Roger and Collens, Michael. *Switching Tracks: Towards Transit Equity in the Greater Toronto and Hamilton Area*. 2015.

Hertel, Sean, Keil, Roger and Collens, Michael. *Next Stop: Equity - Routes to Fairer Transit Access in the Greater Toronto and Hamilton Area*. 2016.

Hess, Paul, and Nigro, Jacob. *Assessing and Improving Walkability Conditions in Suburban GO Transit Station Areas*. 2014.

Hess, Paul, et al. *Identifying and Overcoming Barriers to the Implementation of Active Transportation Policies*. 2014.

Johal, Sunil, et al. (Mowat Centre). *Public Policy Implications of the Sharing Economy for the Transportation Sector*. 2016.

Laidlaw, Kailey, Sweet, Matthias and Olsen, Tyler. *Forecasting the Outlook for Automated Vehicles in the Greater Toronto and Hamilton Area using a 2016 Consumer Survey*. 2017.

Mahmoud, Mohamed S., Habib, Khandker N. and Shalaby, Amer. *Demand Modelling of Cross-Regional Intermodal Commuting Trips in the Greater Toronto and Hamilton Area*. 2014.

Mitra, Raktim and Smith Lea, Nancy. *Cycling Behaviour and Potential in the Greater Toronto and Hamilton Area*. 2016.

Olsen, Tyler, Laidlaw, Kailey and Sweet, Matthias. *Automated Vehicles in the Greater Toronto and Hamilton Area: Overview from a 2016 Consumer Survey – Part A: Summary and Discussion and Part B: Data Overview*. 2017.

Spencer, Greg. *Economic Clusters in the Greater Toronto and Hamilton Area and Their Relationship with the Region's Transportation Infrastructure*. 2017.

Sweet, Matthias, et. al. (Ryerson School of Urban and Regional Planning). *Workshop Report: Autonomous Vehicles in the Greater Toronto and Hamilton Area: A Discussion on Policy and Professional Perspectives*. 2017.

Walks, Alan. *Assessing and Measuring the Factors Affecting Mobility, Transportation, Accessibility, and Social Need: Barriers to Travel among Those with Low Income and Other Vulnerable Groups*. 2015.

Appendix 2
Developing the 2041 Regional Transportation Plan

Appendix 2A: 2041 Regional Transportation Plan evaluation process

This appendix provides a high-level overview of the process followed to evaluate initiatives - projects, programs and policies - for the 2041 RTP. More detailed information about the process is contained in the *2041 Regional Transportation Plan Evaluation Process Backgrounder*, which also presents details on how individual components of the plan were assessed. Figure 2A-1 provides a schematic overview.

As shown in Figure 2A-1, steps 1 through 4 present the development of preliminary portfolios, starting with the generation of the long list (Step 1). The long list is an inventory of potential projects, programs and policies generated to develop the Draft 2041 Portfolios and, more broadly, to support the development of Strategies and Priority Actions for the 2041 RTP and subsequent implementation planning. The long list includes projects from *The Big Move* (2008), technical reports, academic research, Metrolinx studies and best practice reviews undertaken to support the legislated review of the RTP, as well as from municipal transportation master plans, official plans, transit plans, and local studies.

The first stage of screening (Step 2) required initiatives to meet all of the eligibility criteria, to ensure it was regionally significant and supportive of the early draft RTP vision, goals and objectives. The initiatives that passed through the screening were scored against 20 criteria (Step 3) that aligned with the early draft vision, goals and objectives assigned (either individually or as part of a bundle) and were assigned to a preliminary portfolio.

The portfolios represent 5 key strategic areas of emphasis:

A. Infrastructure

B. Operations/optimization

C. Active transportation

D. Pricing and demand management

E. Transit-oriented land use

Universal Actions are relatively low-cost, high-impact initiatives, drawn from the long list, that provide region-wide benefits and would be supportive of all portfolios. Universal Actions were included in every portfolio.

The results of the portfolio analysis (Step 5) shaped the initial strategic approach for the Draft 2041 RTP: a combination of operations/optimization, pricing and demand management, and transit-oriented land use.

Figure 2A-1 Evaluation methods diagram

① **Long List**

Projects Programs and Policies

• Consider for longer-term plans
  or
• Local examples and inputs to analysis
  or
• No further consideration

Projects, programs and policies from *The Big Move*, municipal plans and submissions and background analysis

② Preliminary Screening

③ Qualitative Assessment

Set Aside

Advance

Universal Actions
Low-cost, high-impact initiatives that complement all portfolios

④ Assign to Relevant Portfolios

A Portfolio A: Infrastructure

B Portfolio B: Operations/Optimization

C Portfolio C: Active Transport

D Portfolio D: Pricing & Demand Management

E Portfolio E: Transit-Oriented Land Use

⑤ Preferred Strategic Approach (B,D,E)

⑥B Priority Actions for Draft 2041 RTP

⑥A PreliminaryTransit Network

⑦ Modelling¹ and Resiliency Testing

⑧ Draft 2041 Transit Network

⑨ Initial Transit Network

⑩ Needs Assessment²

⑪ Proposed 2041 Transit Network

⑫ Modelling¹ and Scenario Testing

⑬ 2041 Frequent Rapid Transit Network

Product

Process

Municipal Input

¹ Demand modelling was undertaken using the Greater Golden Horseshoe model (version 4), a model that Metrolinx and the Province use to guide planning and investment decisions.
² See *Regional Transit Network Planning Study*.

The outcome of the portfolio analysis was the Preliminary Transit Network (Step 6A) and a set of Priority Actions (Step 6B). The performance of the Preliminary Transit Network was assessed using demand modelling and a resiliency assessment (Step 7), resulting in the Draft Transit Network (Step 8), which was further reviewed with additional demand modelling and scenario testing (Step 12). Appendix 2B contains more detailed discussion of the scenarios and their role in sensitivity testing and resiliency testing of the Draft 2041 RTP. For further detail see *Navigating Uncertainty: Exploration of Alternative Futures for the GTHA*.

The portfolio analysis work was complemented by a systematic analysis of area- and corridor-level regional transit needs. This exercise, which built upon the *Transit Needs and Opportunities Background Paper*, ran in parallel and is represented as Steps 2 and 9 through 11. Transit projects from the long list and municipal feedback were evaluated against a set of criteria, including existing and future land uses, areas of social needs, flows, existing demand and transit competitiveness with auto. For further detail see the *Regional Transit Network Planning Study*.

Projects that best fulfilled the area and corridor needs, and worked best together as part of a comprehensive regional frequent rapid transit network, were combined into a proposed network (Step 11).

The transit networks that emerged from the two processes were reviewed and synthesized into the Draft 2041 Frequent Rapid Transit Network (Step 13) in the Draft 2041 RTP. The modelling results of the Draft 2041 Frequent Rapid Transit Network indicated positive performance of the network. Based on municipal feedback, providing additional information on routing and overall feasibility, minor adjustments were made to a small number of Priority Bus Routes in the Draft 2041 Frequent Rapid Transit Network.

Municipal input was incorporated throughout the process at key points, including:

- a review of the "long list" (Step 1);

- feedback toward developing and refining the Portfolios (Step 4), the Priority Actions (Step 6) and the Draft Transit Networks (Steps 8 and 10); and

- feedback on technical background papers.

For the modelling results, please refer to Table 2B-1 in Appendix 2B. Individual project assessments can be found in *The 2041 Regional Transportation Plan Evaluation Process Backgrounder*.

Appendix 2B: Scenario development

While the 2041 RTP has been developed in alignment with the *Growth Plan for the Greater Golden Horseshoe*, 2017 (*Growth Plan*) population and employment forecasts and policy directions for where and how the region will grow, the Strategies and Priority Actions were also tested against a number of alternative potential future scenarios. Each scenario is based on a core broad conceptual idea of a possible alternate future, which shape and influence key demographic, economic, technology and environmental indicators that are used to measure the impacts of each scenario on travel in the region. The alternative future scenarios used in developing the 2041 RTP are shown in Figure 2B-1. The scenario process provided insight into the types of strategies that would be most resilient in the face of uncertainty.

Resiliency assessment

The six scenarios were considered as part of a resiliency assessment of the potential strategies for the 2041 RTP. Each scenario changed the assumptions compared to a baseline future case in which the distribution and growth of population and employment across the region in 2041 was consistent with the *Growth Plan*. Other trends, such as the nature of employment (i.e. job types) and the amount and costs of travel in the region by mode, were treated as a continuation of existing trends, i.e. "business as usual" (see Figure 2B-2).[1]

In the base case, travel costs are assumed to be stable in real terms (i.e. any increase is at the annual rate of inflation).

These changes led to different predicted travel demand. The scenarios were not intended to be mutually exclusive; they recognize that advances in technology could happen concurrently with an expansion of the on-demand economy, or economic decline could (and would likely) occur in an extreme climate change scenario. Each was selected to showcase what might happen if an existing trend was amplified.

Six different combinations of alternative transportation, land use and pricing strategies for the future transportation system were created and tested under the six alternative future scenarios to determine which would be the most resilient to all possible futures. The six potential strategies that were tested each focused on investing resources into distinct areas of emphasis:

* Infrastructure;

* Operations/optimization;

* Active transportation;

* Pricing and transportation demand management;

* Targeted pricing with equity considerations; and

* Transit-oriented land use.

The strategies were evaluated under different future scenarios and given a composite score based on how well they performed against seven criteria:

* Increase in non-auto mode share;

* Decrease in congested vehicle kilometres travelled;

* Emissions reductions;

* Improvement to transport equity and access;

* Reduction in transit travel time;

* Efficient movement of goods; and

* Improvement to quality of life and health.

---

[1] Navigating Uncertainty: Exploration of Alternative Futures for the Greater Toronto and Hamilton Area. Prepared for Metrolinx by WSP. 2017.

Alternative Scenarios have been modelled to consider how the Draft Plan's strategies can be resilient and flexible under a range of possible future conditions. Scenario planning is a tool to help manage the risk of trends unfolding differently than forecasted.

Rapid Growth of Core Areas

Infrastructure in our largest and busiest cities, already having well-used and congested systems, could become increasingly stressed. In this scenario, suburban commuters could face longer travel times due to congestion, and parking supplies could shrink.

Rapid Adoption of Emerging Technologies

Autonomous and electric vehicles, for example, could create a tolerance for longer commutes and increases in vehicle trips, adding to congestion. In this scenario, people may choose other modes over transit, in favour of the independence and comfort.
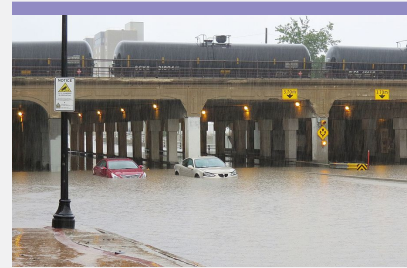
Extreme Climate Change

Infrastructure costs and service interruptions could increase rapidly, with more frequent and severe weather events such as storms and extreme temperatures. In this scenario, people could take transit less, and conflicts between vehicles and pedestrians could increase with congestion.
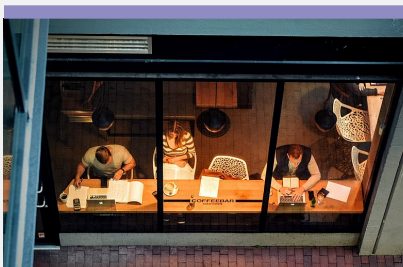
On-Demand Economy

The rise of the casual or "gig economy" could create dispersed and lower density employment clusters, potentially making some fixed infrastructure and services less efficient and responsive. In this scenario, people could become more reliant on technology to make travel decisions and would be more likely to ride-share.
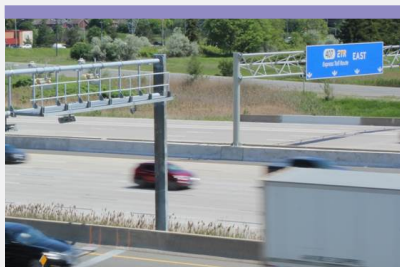
User-Pay Economy

The entry of private companies into the transportation sector could potentially dilute the cost-recovery of conventional transportation systems, and increase travel costs for those who can least afford it. In this scenario, low- and medium-income people would be more likely to choose walking and cycling options over vehicle travel, and live closer to work when feasible.

Economic Decline

The convergence of domestic and global trends, such as a changing markets and decreasing levels of immigration, could threaten the region's ability to continually invest in our transportation and other infrastructure and services. In this scenario, people may find driving longer distances an attractive option due to less congestion and transit service reductions.

Figure 2B-2: Variables considered in resiliency assessment
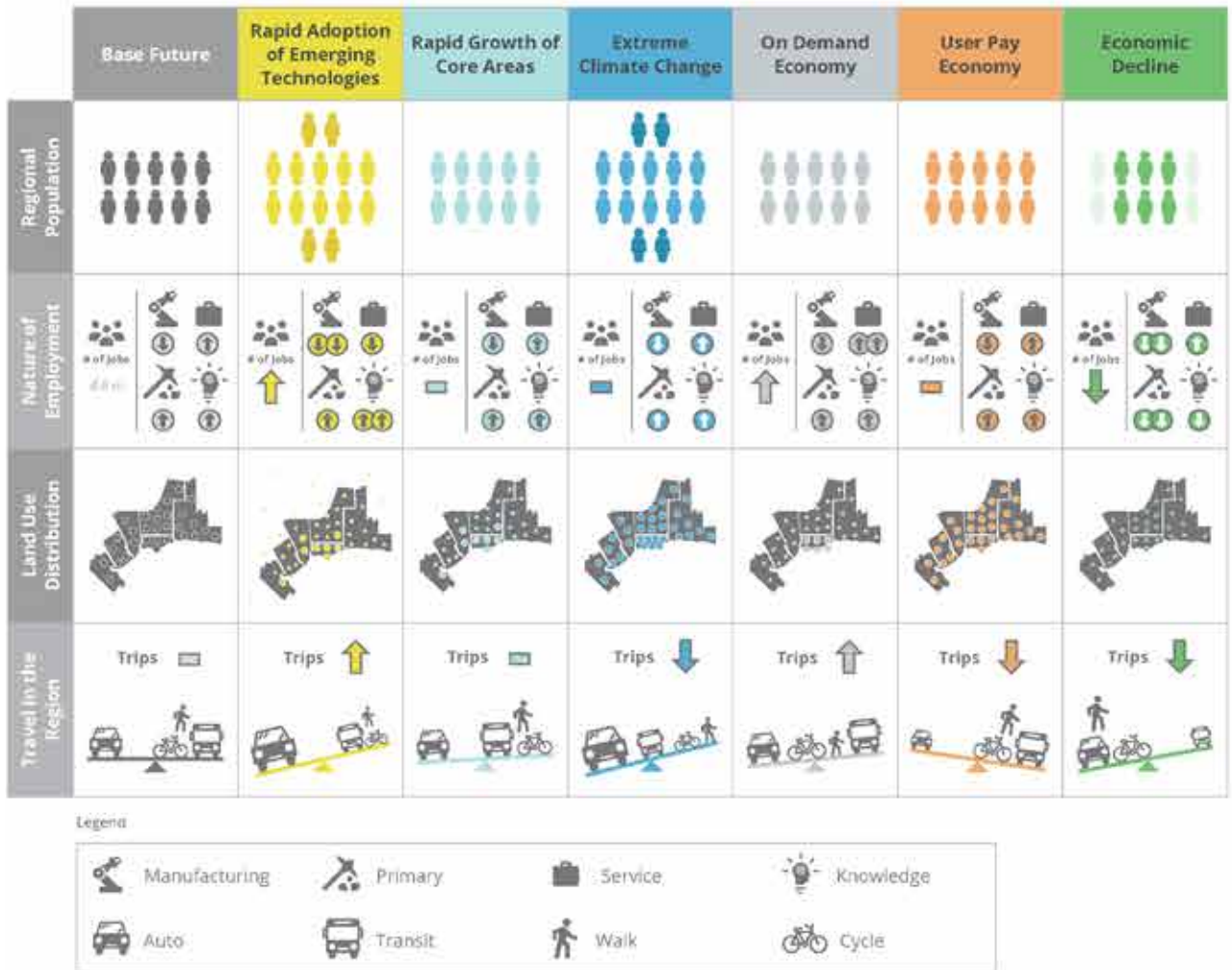
The resulting composite score for each strategy under all alternative future scenarios is shown in Figure 2B-3, compared to the score each strategy received under the base future scenario. The better performing strategies are those with high scores under both the base future and alternative futures. In the face of such high levels of uncertainty, the resiliency assessment showed that emphasizing transit operations rather than fixed infrastructure, planning for transit-supportive land use, and introducing pricing led to the best overall outcomes across the six scenarios.[2] As the analysis was high-level, the results would vary with more specific information about the strategies. For instance, targeted pricing as a generic strategy under-performed on the transport equity and access measure, but a specific pricing program (e.g. weekly or monthly caps for residents or a rebate for low-income families) would garner a higher overall score.

[2] While an economic evaluation of each strategy was not undertaken, many other regions have found operational improvements are more cost-effective than infrastructure expansion (and BRT is more cost effective than LRT), although corridors with particularly high demand do merit rail investment. Litman, T. Evaluating Public Transit Benefits and Costs: Best Practice Guidebook, 2017.

Figure 2B-3: Resiliency analysis of strategic directions for the 2041 RTP against future scenarios
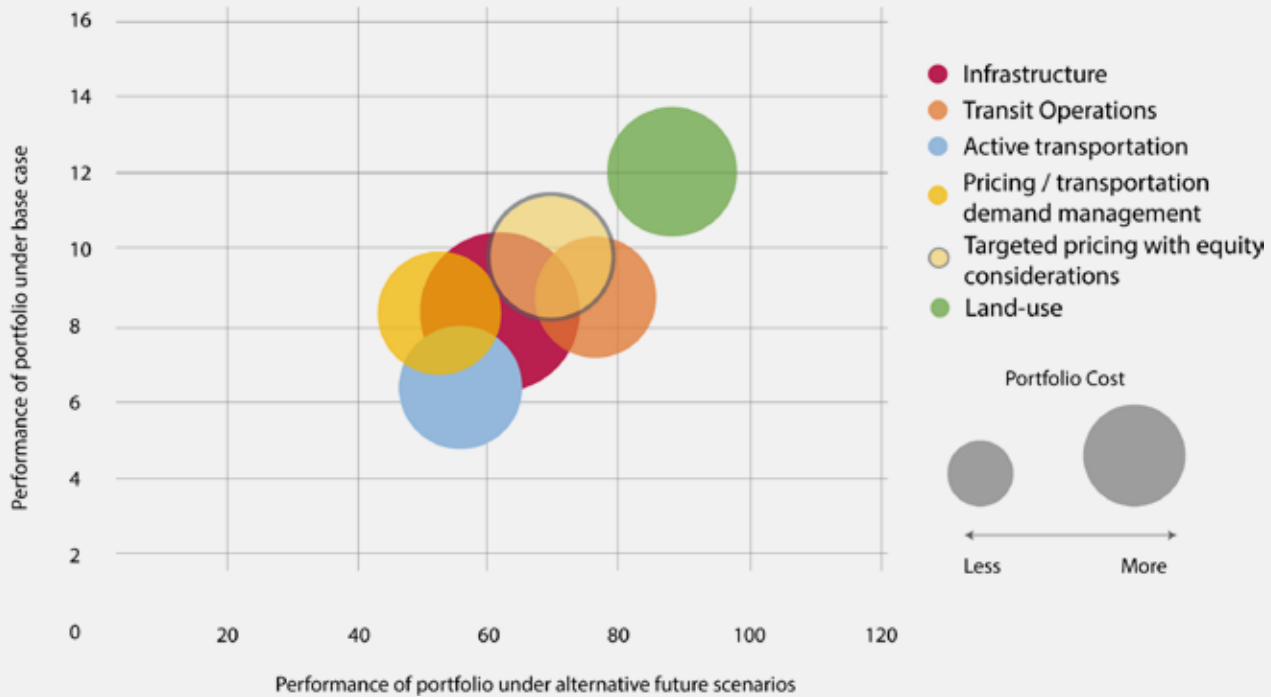
Modelling the scenarios

In addition to the more qualitative resiliency assessment shown in Figure 2B-3, the six scenarios were combined to create two contrasting scenarios for modelling purposes in order to quantitatively assess the resiliency of the future base 2041 RTP.

These two contrasting scenarios effectively represent a high- and a low-demand scenario that bracket the baseline future case, in which the distribution and growth of population and employment across the region in 2041 was consistent with the *Growth Plan*. The costs of travel in the region by mode were treated as a continuation of existing trends, i.e. "business as usual."

Feedback received from key stakeholders on the six initial scenarios highlighted the need to recognize that the scenarios are not mutually exclusive.

In order to generate the high- and low-demand scenarios, different aspects of the six scenarios were combined. The high growth "Boom" scenario incorporates aspects of Rapid Growth of Core Areas, the Rapid Adoption of Emerging Technologies and the User-Pay Economy. The low demand "Decline" scenario incorporates aspects of Economic Decline, Extreme Climate Change and the On-Demand Economy (see Figure 2B-4).

The *Growth Plan* forecasts were modified in these scenarios as follows:

In the Boom Scenario:

- Regional population was 14% higher than the official *Growth Plan* forecasts.

- Regional employment was 9.6% higher.

- Toronto's growth outpaced current trends with employment 25% higher than the official *Growth Plan* figures.

- In addition, the Boom scenario assumed considerable growth in the outer ring beyond the Greenbelt. It also assumed a 5% reduction in auto operating costs to reflect the impact of a high penetration of automated vehicles.

Figure 2B-4: Linkages between scenarios

Rapid growth of core areas

Rapid adoption of emerging technologies

User-pay economy

→

Boom (Growing Pains)

Economic decline

On-demand economy

Extreme climate change

→

Decline (Moving out of the GTHA)
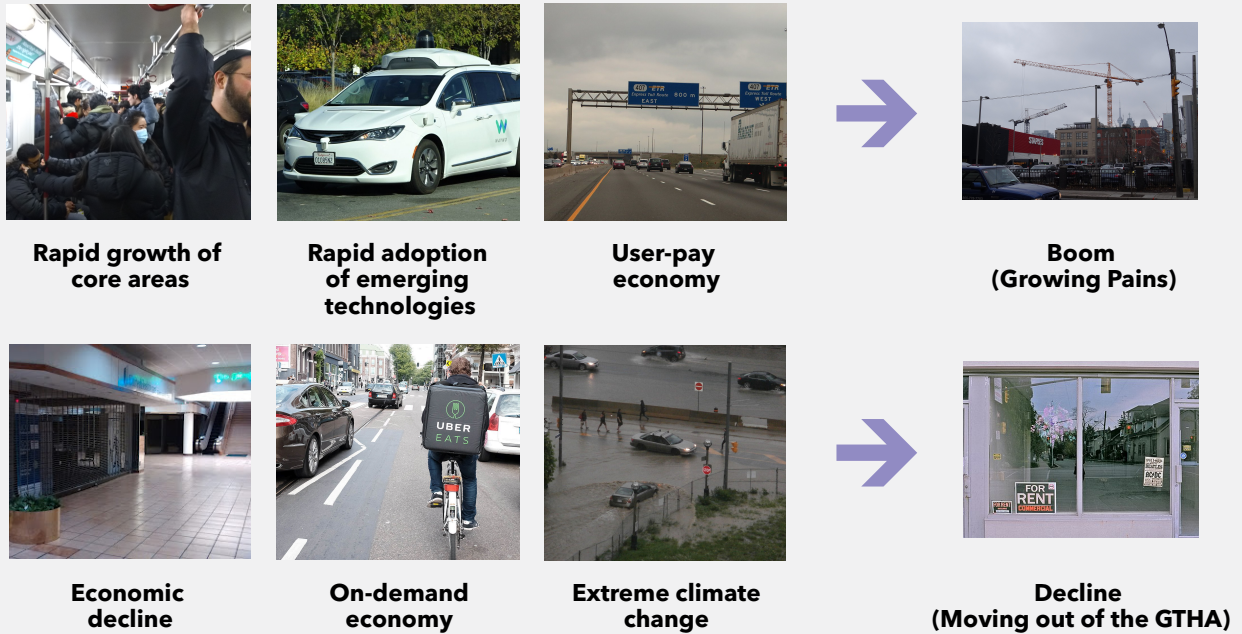
In the Decline Scenario:

- Employment dropped substantially — 13% lower than 2011 levels and 47% below the expected 2041 level.

- The Decline scenario assumed a 5% increase in auto operating costs, reflecting the worsened condition of the road network, as well as a 5% increase in toll rates[3] and a 5% increase in transit fares above inflation, as the higher maintenance costs (e.g. due to climate change impacts) would be covered by fewer travellers throughout the region.

- This scenario was extreme in the sense that the population was fixed at 2011 levels but aged to reflect the increase in the senior population expected by 2041.

Parking costs and parking supply did not vary between the base future forecast and the Boom and Decline scenarios.

In addition to the Boom and Decline scenarios, a third scenario was modelled that reflects how housing and employment market forces would distribute population and employment across the GTHA in the absence of the *Growth Plan* controls and allowing development to occur in new greenfield areas (the "Market" scenario).

The model outcomes for the Boom, Decline, and Market scenarios are shown compared to the 2041 RTP under baseline future conditions in Figure 2B-5.

[3] In addition to road tolls on the 407 ETR, all future networks included High Occupancy Toll (HOT) lanes combined with HOV lanes in selected corridors. The network that represents the 2041 RTP included over 1,100 lane-km of HOV/HOT lanes.

Figure 2B-5: Model outcomes of various land use scenarios on the 2041 RTP

THEME	INDICATOR	DESCRIPTION	2041 PLAN (BASELINE FUTURE)	SCENARIO RESULTS		
				2041 MARKET	2041 DECLINE	2041 BOOM
PLAN DELIVERABLES						
	GTHA Population (Millions)	In the decline scenario, the population of the GTHA is similar to what it was in 2011, but percentage of seniors increases	**10.1**	**10.1**	**6.5**	**11.5**
	GTHA Employment (Millions)	In the decline scenario, employment in the GTHA is similar to what it was in 2011	**4.8**	**4.8**	**2.6**	**5.3**
	Concentration of population in Toronto	In the decline scenario, a significantly higher proportion of the population lives in Toronto	**34%**	**34%**	**40%**	**36%**
	Concentration of employment in downtown Toronto	In the boom and decline scenarios, jobs are more concentrated in downtown Toronto, comparable to the market trend scenario	**12%**	**14%**	**15%**	**14%**
PLAN OUTCOMES						
TRANSIT ACCESS	**People near transit[I]**	The fraction of people that live within walking distance of frequent rapid transit is comparable across all three scenarios	**38%**	**39%**	**39%**	**39%**
	Jobs near transit[I]	The fraction of all jobs that are within walking distance of frequent rapid transit follows the concentration of employment in downtown Toronto	**49%**	**51%**	**53%**	**50%**
	Jobs accessible within 60 minutes by transit[II]	The average GTHA resident will have access to fewer jobs within 1 hour by transit in the decline scenario, and more in the boom scenario	**1,060,000**	**1,070,000**	**910,000**	**+1,160,000**
	% of GTHA jobs accessible within 60 minutes by transit[II]	The average GTHA resident will have access to a greater proportion of all jobs in the GTHA in the decline scenario	**22%**	**22%**	**35%**	**22%**
MODE OF TRANSPORTATION	**Transit trips[III]**	The number of transit trips in the region generally follows regional population and employment	**1.9 million**	**2.0 million**	**1.4 million**	**2.1 million**
	Transit mode share[III]	Transit mode share improves the most in the decline scenario, largely because driving costs are higher	**14.7%**	**15.5%**	**16.4%**	**14.9%**
	Active trips[II]	The number of active trips in the region generally follows regional population and employment	**1,390,000**	**1,380,000**	**980,000**	**1,550,000**
	Active mode share[III]	The decline scenario has the higher proportion of walking and cycling trips	**10.7%**	**10.7%**	**11.8%**	**10.5%**
QUALITY OF LIFE	**Transit travel time[II]**	Rail travel times are comparable in all scenarios, but bus travel is faster in the decline scenario due to less highway congestion	**39 minutes**	**40 minutes**	**36 minutes**	**40 minutes**
	Congested driving[IV]	Congested vehicle kilometres travelled are far lower in the decline scenario, since all travel, including driving, is reduced	**8.1 million**	**8.4 million**	**1.9 million**	**9.9 million**
	Environmental impact	Greenhouse gas emission per capita from auto driver trips are lowest in the decline scenario	**1.5 tonnes**	**1.5 tonnes**	**0.9 tonnes**	**1.6 tonnes**

[I] Walking distance is 400 m from Priority Bus/Streetcar, BRT and LRT, and 800 m from Subway and Frequent Regional Rail.
[II] Represents trips made between 6:45 a.m. - 8:45 a.m.
[III] Represents trips in the morning and afternoon peak periods (6:00 - 9:00 a.m. and 3:00 - 7:00 p.m.).
[IV] Represents trips made in the morning peak hour.

Appendix 2C: Report of the Residents' Reference Panel

In spring 2017, Metrolinx convened a Residents' Reference Panel made up of 36 volunteer residents from across the Greater Toronto and Hamilton Area to provide input into the 2041 RTP. Thousands of invitations were sent out to residents, and final participants were randomly selected from amongst the respondents to reflect the diversity of the region. Over the course of five full-day sessions, the Panel's task was to learn about regional transportation, services and policies, consider different perspectives, weigh priorities, and make recommendations on a course of action.

Panelists worked through their values, issues, and priorities to present a set of recommendations to Metrolinx. The Panel made recommendations in seven key areas.

Recommendations of the Residents' Reference Panel

1) Connectivity, convenience and integration

Today, disconnected transportation services lead to longer, more frustrating commutes that discourage the use of transit.

In the next five years, Metrolinx and its partners should:

- Actively coordinate routes and schedules among all 11 GTHA transit agencies;

- Integrate all intermodal information into the Triplinx app to help solve the first- and last-mile issue. This should include fares, real-time service and traffic updates, parking availability, bike-share services, cycling facilities, and potential on-demand micro-transit services;

- Make PRESTO more convenient. Possible improvements could include more machines, the ability to purchase and load cards anywhere and on the mobile app with no 24-hour delay, and the ability to pre-load monthly passes; and

- Integrate transit fares across the system. The panel endorsed a fare-by-distance structure with four conditions:

  ○ A low-cost flat fare within a "virtual zone" within a certain radius from the start of every trip;

  ○ Discounts for trips made during off-peak hours;

  ○ Maintaining existing discounts for students, seniors, and families travelling together; and

  ○ Applying monthly passes or fare caps through the PRESTO card.

In the long term, Metrolinx and its partners should:

- Pursue amendments to legislation such as the City of Toronto Act in order to remove barriers to service integration; and

- Create direct connections between regional hubs so that passengers do not always have to connect at Union Station.

2) Equity and accessibility

Today, consistency of accessible infrastructure across the transportation system is lacking, and the system faces increasing pressure with changing demographics, including an aging population and non-English-speaking newcomers.

In the next five years, Metrolinx and its partners should:

- Improve all facets of the transportation journey to ensure barrier-free access for all populations. This includes support for active transportation users, families with children, non-English speakers, and differently-abled individuals.

In the long term, Metrolinx and its partners should:

- Implement new discounts or subsidies for low-income residents in a simple yet discreet manner through the universal PRESTO fare card.

3) Health, comfort and safety

Today, transportation options in the GTHA are not as comfortable or as safe as they could be for all users.

In the next five years, Metrolinx and its partners should:

- Improve infrastructure for active transportation, including an expanded network of protected bike lanes, particularly to key transit hubs;

- Improve lighting in parking lots and at crosswalks; and

- Increase the availability of washrooms and potable water at transit stations.

In the long term, Metrolinx and its partners should:

- Install emergency buttons and/ or bus shelters at bus stops where safety is of particular concern; and

- Anticipate the possible need to increase the visibility of security at subway entry points.

4) A well-planned region

Today, our regionally fragmented transportation-planning structure appears to delay decision-making and cause bottlenecks that impede implementation. This frustrates residents who want to see quicker, evidence-based decision-making and action.

In the next five years, Metrolinx and its partners should:

- Strengthen the regional transportation governance model in order to promote greater alignment between municipal, regional, and provincial priorities, reinforce the need for greater cooperation and coordination between operators, and expedite the delivery of major transportation projects.

In the long term, Metrolinx and its partners should:

- Prioritize transit expansion in areas of high employment and residential density, keeping economic viability in mind.

5) Exemplary environmental footprint

Today, it is important for everyone to help meet and exceed emissions reduction targets in accordance with our national goals, in a manner that enhances current and future residents' quality of life without negatively impacting the environment or deterring investment.

In the next five years, Metrolinx and its partners should:

- Encourage the use of public transit and active transportation by whatever means are found to be the most effective, including rewards programs, monthly fare caps, and subsidized discounts; and

- Improve air quality inside and around stations and corridors through the increased use of greenery, enhanced ventilation and filtration, and better maintenance of vehicles and stations.

In the long term, Metrolinx and its partners should:

- Increase procurement from suppliers with environmental certifications.

6) Prosperity and competitiveness

Today, congestion is a barrier to prosperity and growth. Transportation plans are not fully aligned with economic development outside downtown Toronto. As a result, they fail to leverage the economic activity in these areas.

In the next five years, Metrolinx and its partners should:

- Identify regional nodes where expanded transit services and a mix of other land uses can be developed, considering partnerships with existing businesses and leasing space to retailers.

In the long term, Metrolinx and its partners should:

- Utilize emerging technologies (such as autonomous vehicles) to make the system more efficient where possible; and

- Facilitate the efficient movement of goods and people by better utilizing existing road infrastructure (such as dedicated transit lanes).

7) Public awareness and communication

Today, most residents do not understand why they should get out of their cars to use public transit, walk or cycle. Residents are insufficiently informed about ongoing or future projects and strategies as well as associated benefits. As a result, those critical of transit have disproportionately shaped public opinion.

In the next five years, Metrolinx and its partners should:

- Enhance the profile of regional transportation planning by promoting user benefits associated with ongoing projects, new investments, and behaviour change;

- "Own its space" and use existing transit and real estate assets to communicate to current users; and

- Launch an annual or biannual update about transit expansion that can be distributed to all GTHA residents.

In the long term, Metrolinx and its partners should:

- Create specialized campaigns to promote any new services or plans, including fare integration;

- Raise the profile of transit options outside of Toronto; and

- Elevate the status of transportation policy to that of health and education, making it the third pillar in a successful, healthy, and prosperous society.

The report and video of the Residents' Reference Panel is available on Metrolinx's website.

Appendix 2D: Profiles of the regional personas

To better understand travel behaviours and attitudes toward transportation in the GTHA, Metrolinx worked with Northstar Research Partners to conduct a survey of over 8,500 people and to hold numerous focus groups across the region to understand the types of GTHA residents, how they travel, and their perceptions. Feedback was used to develop six regional traveller personas – a typology that can provide insight into the travel behaviour and preferences of GTHA residents, and a lens through which the strategies of the 2041 RTP could be viewed.

Summary profiles of the six regional personas

Generally, across the region, residents' perceptions of safety, convenience, comfort, predictability, cost and speed of travel determine the mode they choose – whether to drive, walk, cycle or take transit. While most travellers are generally satisfied with travel in the region, they often find it to be slow, stressful and not well-integrated. Transit is often viewed negatively compared to driving, and not viewed as a first choice for getting around, especially outside the urban core.

More detailed descriptions of the behaviour and preferences of the six personas are found in Figure 2D-1. The scenario planning (Appendix 2B) also looked at the different scenarios through the lens of the personas, as discussed in *Navigating Uncertainty: Exploration of Alternative Futures for the GTHA.*

Figure 2D-1 Regional personas

TIME & BALANCE SEEKERS
ESTABLISHED, BUSY, & LOOKING FOR BALANCE

19% of population

Equal split (**47%** male) — Middle-aged (avg. **42.9** yrs old)

- More likely to identify as Asian (**15%**)
- More likely to have kids (**38%**)
- More likely to be interested in technology
- More likely to have one car (**46%**)

Homebody, ambitious, techie
Concerned about the environment, crime, & cleanliness
Busy and like trying new things
More likely to be on Facebook and stream radio

TRAVEL BEHAVIOUR

More likely to:
- Drive most of the time (**67%** share of trips)
- Occasionally walk or take local bus
- Use Zipcar (**12%**)
- Use rental car (**8%**)

Take more trips...
- In a week than others (**26.8** trips)
- To commute to work than others (**5.4** trips)

TRAVEL ATTITUDES

Enjoy travelling in the region

Like driving because it gives me more time to spend with friends/family

Top pain point for driving is that it's expensive

Think travel should be fun

Think subway and bus are crowded and dirty

More positive about GO Train, like that they can avoid traffic and be productive on the train

FOR ME, TRAVEL IN THE GTHA SHOULD BE...
Quick, safe, convenient, and enjoyable. Ultimately, it should give me freedom, time for myself, and more time for friends and family.

TRADITIONAL SUBURBAN TRAVELLERS
OLDER, CONTENT, & SET IN THEIR WAYS

15% of population

Equal split (**47%** male) — Older (avg. **52.5** yrs old)

- Married (**68%**) with no kids in household
- Most likely to live & work outside Toronto (**68%**) in suburban areas (**57%**)
- Higher HH income (avg. **$100.6K**)
- More likely to be retired (**28%**)

Homebody, sports fan, animal lover
Risk averse, value punctuality, cleanliness, & having personal space
Least interested in technology & least active online

TRAVEL BEHAVIOUR

Most likely to:
- Own 2 cars (**44%** have 2)
- Drive (**89%** share of trips)
- Travel far distances for work

Least likely to:
- Travel in the City of Toronto
- Take and consider modes other than car

Higher number of trips to:
- Run errands (**6.7** trips)

TRAVEL ATTITUDES

Love driving because of the freedom and control it gives me

Like travelling in the GTHA (driving) although it can be slow and stressful

Feel that GO is not convenient

Concerned about safety when walking to/from public transit

FOR ME, TRAVEL IN THE GTHA SHOULD BE...
More car friendly! I'd like to see policies put in place to reduce my stress and frustration when driving through the region and find ways to make it faster.

Figure 2D-1 Regional personas

FRUSTRATED SOLUTION SEEKERS
WELL-EDUCATED, HOMEBODIES, & LOOKING FOR LESS STRESS
15% of population

Skew female (**59%**) Middle-aged (avg. **49.2** yrs old)

Married (**71%**) with kids in household (**27%**)

More likely to work in Toronto & live elsewhere (**15%**)

Highest HH income (avg. **$108.9K**)

Most likely to have a university or post grad degree (**60%**)

More likely to live in suburban areas (**57%**)

More likely to work from home (**45%**)

Homebody, intellectual, animal lover
Value punctuality, risk averse, & like having personal space

TRAVEL BEHAVIOUR

More likely to:

Own 2 cars (**42%** have 2)

Drive (**76%** share of trips)

Less likely to:

Own a TTC Metropass (**5%**)

Lowest number of trips for:

Entertainment (**2.7** trips)

TRAVEL ATTITUDES

Think travel in the GTHA is stressful & slow

Care about being on time

Looking for a solution that fits my needs and schedule

Like the GO Train, and that I can choose how to spend my time and be productive

Feel that the TTC is crowded

FOR ME, TRAVEL IN THE GTHA SHOULD BE...

Seamless, integrated, and work on my schedule – I want to take public transit and walk, but right now, I see driving as my only option for getting me where I need to be, when I need to be there.

CONNECTED OPTIMIZING URBANITES
YOUNG, AMBITIOUS, & TECHNOLOGY-FOCUSED
22% of population

Skew male (**63%**) Younger (avg. **33.3** yrs old)

More likely to identify as...

Asian **15%**
South Asian **13%**
Black/African Canadian **7%**

More likely to:

Live and work in Toronto (**40%**)

Live in urban areas (**61%**)

Equal split single/married (**50% married**)

More likely to have a university or post grad degree (**54%**)

Most likely to have kids in household (**44%**)

Most likely to be employed (**82%**)

Techie, athlete, fashionista
Spontaneous, knowledgeable about technology, & concerned about safety

TRAVEL BEHAVIOUR

More likely to:

Have a TTC Metropass (**27%**) or other monthly transit pass (**5%**)

Consider travelling by car sharing/ sourcing (**52%**) & by bicycle (**38%**)

Most likely to:

Be a member of a car sharing service (**20%**)

Use ride sourcing (**6%** share of trips)

Highest number of trips to:

Commute to work (**6.5** trips)

See family/ friends (**3.8** trips)

Less likely to:

Consider travelling by car (**65%**)

TRAVEL ATTITUDES

Think travel in the GTHA is safe and pleasant

Like the convenience of cars (taxis & ride-sharing) but don't enjoy driving myself

Care most about getting good value and comfort

Find the GO Train expensive & inconvenient

FOR ME, TRAVEL IN THE GTHA SHOULD BE...

Completely integrated, running 24/7, and should incorporate new technologies that optimize how people use transportation.

Figure 2D-1 Regional personas

SATISFIED MATURE URBANITES
MATURE, MULTI-MODAL, & MONEY-CONSCIOUS

11% of population

Skew female (**57%**)

Oldest Persona (avg. **56.7** yrs old)

No kids in the household (**16%**)

Most likely to live in Toronto (**50%**)

More likely to live and work in Toronto (**44%**)

More likely to be retired (**34%**) or unemployed (**42%**)

Homebody, animal lover, environmentalist
Value punctuality, concerned about the environment, & careful with money

TRAVEL BEHAVIOUR

Likely to take many modes:

Most likely to walk (**15%** share of trips)

Take the subway (**11%**)

Take local bus (**9%**)

More likely to:

Consider taking public transit and active modes

Higher number of trips to:

Run errands (**6.9** trips)

Less likely to:

Drive (**50%** share of trips)

Own a car (**27%** don't have one)

TRAVEL ATTITUDES

Enjoy travelling in the region and say it is safe

Safety is most important

Feel positively about the GO Train, find it relaxing

Favourite modes besides car are the subway and walking

Think TTC is crowded but streetcar and bus are easy to pay for

FOR ME, TRAVEL IN THE GTHA SHOULD BE...

Always getting better, easier, more reliable, and have more options that get me where I want to go. It should also be as environmentally friendly as possible.

ASPIRING YOUNG TRAVELLERS
YOUNG, ACTIVE, & LOVING LIFE IN THE CITY

18% of population

Skew female (**57%**)

Youngest Persona (avg. **25.8** yrs old)

More likely to identify as...

Asian **17%**
Black/African Canadian **8%**
South East Asian **6%**

Live and work / go to school in Toronto (**40%**)

Lowest household income (avg. **$78.9K**)

Into entertainment, technology, art, music, food, & fashion
Voracious consumer of media
Most active online (especially social media)

TRAVEL BEHAVIOUR

More likely to:

Catch a ride with someone else (**21%** share of trips)

Rely on public transit (**34%**, mostly TTC bus and subway)

Consider public transit, walking, and biking

Take active modes (**16%**, especially walking)

Be open to modes don't currently take

Less likely to:

Drive (**43%** share of trips)

Own a car (**22%** don't have one)

TRAVEL ATTITUDES

Like the freedom, environmental benefits, & avoiding traffic when walking & biking

Less negative about TTC than others, but still find it frustrating, crowded, & dirty

Price sensitive

Value punctuality & reliability

Appreciate the social aspect of TTC travel

FOR ME, TRAVEL IN THE GTHA SHOULD BE...

Less expensive, better integrated, fast, reliable, predictable, and aligned with my schedule. The systems need to be more modern and should leverage technology to make trip planning easier.

1. Time and Balance Seekers

Time and Balance Seekers (TBSs) are hard-working and family-oriented, and rely primarily on the car. They are open to non-auto options, but have concerns about the safety and cleanliness of public transit, and want to enjoy the trip and arrive quickly at their destination in order to have more time for themselves and their family. TBSs are receptive to GO rail transit, particularly for commuting and going into Toronto for fun. TBSs want travel in the GTHA to be quick, safe, convenient, and enjoyable. Ultimately, it should give them freedom, time for themselves, and more time for friends and family.

2. Traditional Suburban Travellers

Suburban and car-dedicated, Traditional Suburban Travellers (TSTs) are the least likely to consider other modes. The car is convenient and comfortable and provides freedom and control. Their interest is in car-friendly approaches that reduce the stress and frustrations they experience while driving for most of their activities. TSTs are the most challenging to motivate to change their current travel behaviour, given their dependence on, and loyalty to, their cars.

3. Frustrated Solution Seekers

Frustrated Solution Seekers (FSSs) are educated, affluent suburban drivers who would like to use other modes, but prefer the convenience and reliability of a car. FSSs are typically female, and travel into Toronto for work. When it comes to getting around, FSSs mostly drive, as it is seen as quick, door-to-door, and gives them their own space, but is often stressful. They are looking for a first- and last-mile solution that fits their needs and schedules. They are open to the GO train, but do not find the current transit system to be seamless or integrated. FSSs want to take public transit and walk, but right now see driving as the only option for getting where they need to be, when they need to be there.

4. Connected Optimizing Urbanites

Connected Optimizing Urbanites (COUs) are young, active, city-dwelling professionals who frequently travel around the region. They take a variety of modes but are looking for quick, convenient and direct connections. They are seeking an integrated transportation system that uses technology. Most often male, COUs take transit but do not really enjoy it, and seek alternatives like ride-sourcing, which provides the 24/7 door-to-door service and connectivity they seek. They are most likely to be the early adopters of new transportation technologies, including autonomous vehicles.

5. Satisfied Mature Urbanites

Satisfied Mature Urbanites (SMUs) are older, Toronto-dwelling residents who do not travel very far outside their community. They feel that they have many transportation options and are largely satisfied. They are often female and most likely retired, although many still work in the city. SMUs have a relatively small transportation footprint. They are environmentalists and prefer walking or taking public transit. For the most part, they are very satisfied with transportation in the region, feeling that they are well-served by the wide array of options. They are less interested in new technological innovations (although they do anticipate that technology will help improve travel) and are reticent about the introduction of autonomous vehicles for themselves. They want travel in the GTHA to always be getting better, easier, and more reliable.

6. Aspiring Young Travellers

Aspiring Young Travellers (AYTs) are young, active, and loving life in the city. While they have many positive associations with car travel, they look to public transit, rides with others, and active transportation to get where they need to go. AYTs are likely to continue using these modes. While price may be a barrier to taking transit for all travel, AYTs are looking for better system integration and technologies that make travel more predictable, easier, and faster.

Appendix 3
List of transit projects

Appendix 3A: Projects completed 2008-2017 (Map 3)

Project#	Project Name
1	Kitchener GO Extension (Georgetown GO – Kitchener GO)
2	Barrie GO Extension (Barrie South GO – Allandale GO)
3	West Harbour GO Extension (Aldershot GO – West Harbour GO)
4	Mississauga Transitway (Winston Churchill Blvd. – Renforth Dr.)
5	Highway 7 East BRT (Yonge St. – Unionville GO)
6	Davis Drive BRT (Yonge St. – Newmarket GO)
7	UP Express (Union Station – Toronto Pearson International Airport)
8	Gormley GO Extension (Richmond Hill GO – Gormley GO)
9	Toronto-York Spadina Subway Extension (Sheppard Ave. – Highway 7)

Appendix 3B: Projects In Delivery (Map 3)

Project#	Project Name
10	Eglinton Crosstown LRT (Weston Rd. – Kennedy Station)
11	Sheppard East LRT (Don Mills Station – Morningside Ave.)
12	Finch West LRT (Finch West Station – Humber College)
13	Scarborough Subway (Kennedy Station – Scarborough Town Centre)
14	Hamilton B-Line LRT (McMaster University – Eastgate Mall)
15	Highway 7 West BRT (Helen St. – Yonge St.)
16	Hurontario LRT (Port Credit GO – Steeles Ave.)
17	Yonge BRT (North) (Mulock Dr. – Davis Dr.)
18	Yonge BRT (South) (Highway 7 – 19th Ave.)
19	Bloomington GO Extension (Gormley GO – Bloomington GO)
20	Bowmanville GO Extension (West of Oshawa GO – Martin Rd.)
21	Confederation GO Extension (West Harbour GO – Confederation GO)
22	Niagara GO Service (Confederation GO – Niagara Falls GO)
23	Lakeshore West Two-Way, All-Day GO Service (Aldershot GO – Hamilton GO)
24	Barrie Two-Way, All-Day GO Service (Aurora GO – Allandale Waterfront GO)
25	Kitchener Two-Way, All-Day GO Service (Mount Pleasant GO – Kitchener GO)
26	Stouffville Two-Way, All-Day GO Service (Unionville GO – Mount Joy GO)
27	Kitchener 15-min GO Service (Union Station – Mount Pleasant GO)
28	Barrie 15-min GO Service (Union Station – Aurora GO)
29	Stouffville 15-min GO Service (Union Station – Unionville GO)
30	Lakeshore West 15-min GO Service (Union Station – Aldershot GO)
31	Lakeshore East 15-min GO Service (Union Station – Oshawa GO)

Appendix 3C: Projects In Development (Map 4)

Project#	Project Name
32	Dundas West Priority Bus (Bronte Rd. – Brant St.)
33	Dundas BRT (Kipling Station – Bronte Rd.)
34	Brampton Queen St. BRT (Main St. – Highway 50)
35	Eglinton West LRT (Weston Rd. – Toronto Pearson International Airport)
36	Highway 7 West BRT Extension (Highway 50 – Helen St.)
37	Waterfront West LRT (Union Station – Port Credit GO)
38	Waterfront East LRT (Union Station – Coxwell Ave.)
39	Relief Line Subway (Sheppard Ave. – Osgoode Station)
40	Yonge North Subway Extension (Finch Station – Highway 7)
41	Yonge BRT (Richmond Hill, Aurora, Newmarket) (19th Ave. – Mulock Dr.)
42	Eglinton East LRT (Kennedy Station – Sheppard Ave.)
43	Highway 7 East BRT Extension (Unionville GO – Donald Cousens Pkwy.)
44	Durham-Scarborough BRT (Scarborough Centre – Simcoe St.)

Appendix 3D: Other projects proposed in the 2041 Regional Transportation Plan (Map 5)

GO Rail

Project#	Project Name
46	Lakeshore West 15-min GO Service Extension (Aldershot GO – Hamilton GO)
53	Milton 15-min GO Service (Union Station – Milton GO)
88	Barrie 15-min GO Service Extension (Aurora GO – East Gwillimbury GO)
89	Stouffville 15-min GO Service Extension (Unionville GO – Mount Joy GO)
90	Richmond Hill Two-Way, All-Day GO Service (Union Station – Richmond Hill GO)
97	Lakeshore East 15-min GO Service Extension (to Downtown Oshawa GO)
100	Lakeshore East Two-Way, All-Day GO Service (Downtown Oshawa GO – Martin Rd.)

Subway

Project#	Project Name
73	Line 2 Subway and Bloor-Yonge Station Capacity Enhancements
74	Sheppard Subway West Extension (Sheppard Station – Sheppard West Station)

BRT/LRT

Project#	Project Name
45	Waterfront West LRT Extension (Port Credit GO – Mississauga Rd.)
47	Hamilton A-Line BRT (West Harbour GO – Rymal Rd.)
54	Trafalgar BRT/LRT (Oakville GO – Highway 407)
61	Downtown Mississauga Transitway & Terminal (Mavis Rd. – Hurontario St.)
62	Hurontario LRT North Extension (Steeles Ave. – Brampton GO)
70	Finch West LRT West Extension (Humber College – Toronto Pearson International Airport)
71	Jane North BRT/LRT (Highway 7 – Major Mackenzie Dr.)
72	Jane South BRT/LRT (Bloor St. – Highway 7)
75	Steeles BRT/LRT (Jane St. – McCowan Rd.)
76	Finch West LRT East Extension (Finch West Station – Finch Station)
77	Leslie North BRT/LRT (Highway 7 – Major Mackenzie Dr.)
78	Don Mills/Leslie BRT/LRT (Sheppard Ave. – Highway 7)
79	McCowan BRT/LRT (Ellesmere Rd. – Steeles Ave.)
81	Sheppard East LRT Extension (Morningside Ave. – Meadowvale Rd.)
83	Malvern Connection (Sheppard Ave. & Morningside Ave. – Markham Rd. via McLevin Ave.) Note: this is a continuation of the Eglinton East LRT service
85	Major Mackenzie BRT/LRT (Jane St. – Leslie St.)
98	Simcoe BRT/LRT (Downtown Oshawa GO – Highway 407)

Priority Bus / Priority Streetcar

Project#	Project Name
48	Hamilton A-Line South Priority Bus (Rymal Rd. – Hamilton Munro International Airport)
49	Dundas Connector Priority Bus (McMaster University – Downtown Dundas)
50	Hamilton L-Line Priority Bus (Downtown Hamilton – Waterdown)
51	Hamilton S-Line Priority Bus (Ancaster Business Park – Confederation GO)
52	Hamilton Mohawk T-Line Priority Bus (Centre Mall – Meadowlands Terminal)
55	Brant Priority Bus (Lakeshore Rd. – Dundas St.)
56	Bronte/Regional Road #25 Priority Bus (Bronte GO – Steeles Ave.)
57	Derry Priority Bus (Bronte Rd. – Humber College)
58	Harvester/Speers/Cornwall Priority Bus (Waterdown Rd. – Port Credit GO)
59	Eglinton Mississauga Priority Bus (Highway 407 – Renforth Dr.)
60	Trafalgar North Priority Bus (Highway 407 – Milton GO)
63	Britannia/Matheson Priority Bus (Highway 407 – Renforth Dr.)
64	Hurontario North Priority Bus (Brampton GO – Mayfield West)
65	Dixie/Bramalea Priority Bus (Lakeshore Rd. – Bovaird Dr.)
66	Airport Rd. Priority Bus (Castlemore Ave. – Toronto Pearson International Airport)
67	Erin Mills/Mississauga Rd. Priority Bus (Clarkson GO – Bovaird Dr.)
68	Bovaird/Castlemore Priority Bus (Mount Pleasant GO – Highway 427)
69	Steeles West Priority Bus (Lisgar GO – Jane St. via Humber College)
80	Finch East Priority Bus (Finch Station – McCowan Rd.)
82	Kingston Priority Bus (Main Street Station – Eglinton Ave.)
84	Major Mackenzie West Priority Bus (Highway 427 – Jane St.)
86	Major Mackenzie East Priority Bus (Leslie St. – Mount Joy GO)
87	Green Lane Priority Bus (Davis Dr. – East Gwillimbury GO)
91	Steeles/Taunton Priority Bus (McCowan Rd. – Harmony Rd.)
92	Whites Rd. Priority Bus (Highway 407 – Pickering GO)
93	Brock Rd. Priority Bus (Bayly St.– Highway 7)
94	Westney Priority Bus (Bayly St. – Highway 2)
95	Bayly Priority Bus (Pickering GO – Whitby GO)
96	Brock St./Baldwin Priority Bus (Whitby GO – Brawley Rd.)
99	Highway 2 Priority Bus (Simcoe St. – Martin Rd.)
101	Highway 7 Pickering Priority Bus (Donald Cousens Pkwy. – Brock Rd.)
102	Brampton Queen West Priority Bus (Mississauga Rd. – Main St.)
103	Highway 27 Priority Bus (Kipling Station – Steeles Ave.)
104	Dufferin Priority Bus (Exhibition GO – Wilson Station)
105	St. Clair Priority Streetcar (St. Clair Station – Jane St.)
106	Spadina Priority Streetcar (Union Station – Spadina Station)

Appendix 3E: Projects beyond 2041 (not mapped)

Project Name
Bolton Rail Service (Union Station – Bolton)
Crosstown Rail Service (Dundas St. – Summerhill)
Havelock Rail Service (Union Station/Summerhill – Locust Hill)
Seaton Rail Service (Union Station/Summerhill – Seaton)
Richmond Hill 15-minute GO Service (Union Station – Richmond Hill GO)
Highway 407 Transitway (Hurontario Rd. - Brock Rd.)
Relief Line Subway West Extension (Osgoode Station – Bloor West)[I]

[I] Earlier planning will occur, and will be reviewed as part of the next RTP review taking into consideration RER and streetcar priority.

Note: All project definitions are subject to change based on negotiations and agreements with railways, environmental assessments, business case analysis and further planning.

Appendix 4
Additional resources

Accessibility

Metrolinx. *Metrolinx Multi-Year Accessibility Plan.* 2012.

Ontario Ministry of Community and Social Services. *Guide to the Accesibility Standards for Customer Service, Ontario Regulation 429/07*. 2008.

Transport Canada. *Transportation 2030 – A Strategic Plan for the Future of Transportation in Canada*. 2017.

Big data

Brookings Institute. *Modernizing Government's Approach to Transportation + Land Use Data: Challenges and Opportunities*. 2017.

Canada's Big Data Consortium. *Closing Canada's Big Data Talent Gap*. 2015.

Cortright, J. *The Downsides of Data-Based Transportation Planning*. Citylab. 2016.

International Transport Forum/OECD. *Big Data and Transport: Understanding and Assessing Options*. 2015.

The International Association of Public Transport (UITP). *Action Points: Stakeholder Cooperation on Data in Public Transport*. 2017.

The National Association of City Transportation Officials. *City Data Sharing Principles: Integrating New Technologies into City Streets*. 2017.

Climate change

Bush, E.J., Loder, J.W., James, T.S., Mortsch, L.D. and Cohen, S.J. *An Overview of Canada's Changing Climate; in Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation*, (ed.) F.J. Warren and D.S. Lemmen; Government of Canada, Ottawa, ON, p. 23- 64. 2014.

Environment and Climate Change Canada. *National Inventory Report 1990–2014. Greenhouse Gas Sources and Sinks in Canada*. 2016.

Environmental Commissioner of Ontario. *Ontario's Climate Act: From Plan to Progress, Annual Greenhouse Gas Progress Report 2017*. 2018.

Government of Ontario. *Ontario's Five Year Climate Change Action Plan 2016-2020*. 2016.

Metrolinx. *Planning for Resiliency: Toward a Corporate Climate Adaptation Plan*. 2017.

United Nations Treaty Collection. *Paris Agreement*. 2015.

Complete streets

City of Toronto. *Complete Streets Guidelines*. 2016.

Transportation Association of Canada. *Complete Streets: Policy and Practice in Canada*. 2015.

Fare payment

Metrolinx. *PRESTO Farecard Peer Review - Value for Money*. 2011.

Sochor, J., Stromberg, H., and Karlsson, I.C.M. *Implementing Mobility as a Service: Challenges in Integrating User, Commercial, and Societal Perspectives*. Transportation Research Record: Journal of the Transportation Research Board 2536: 1-9. 2015.

Fare integration

Metrolinx. *GTHA Fare Integration Concept Evaluation Backgrounder*. 2016.

Sharaby, Nir, and Yoram Shiftan. *The impact of fare integration on travel behavior and transit ridership*. Transport Policy 21. 2012.

First- and last-mile

Metrolinx. *GO Rail Station Access Plan*. 2016.

Goods movement

Ontario Ministry of Transportation. *Commercial Vehicle Survey*. 2006.

Ontario Ministry of Transportation. *Freight-Supportive Guidelines*. 2013.

Region of Peel. *Goods Movement Strategic Plan*. 2017.

Health and safety

City of Toronto. *Vision Zero: Toronto's Road Safety Plan*. 2017.

Donorfio, Laura KM, Lisa A. D'Ambrosio, Joseph F. Coughlin, and Maureen Mohyde. *Health, safety, self-regulation and the older driver: It's not just a matter of age*. Journal of safety research 39(6). 2008.

Medical Officers of Health in the Greater Toronto and Hamilton Area (Hamilton, Peel, Simcoe, Muskoka and Toronto). *Improving Health by Design – a Call for Healthy Communities*. 2014.

Metrac. *Community Safety Audits*. 2016.

Toronto Public Health. *Pedstrian and Cycling Safety in Toronto*. 2015.

Warburton, Darren ER, Crystal Whitney Nicol, and Shannon SD Bredin. *Health benefits of physical activity: the evidence*. Canadian Medical Association Journal 174(6). 2006.

Zimmerman, Rae. *Mass transit infrastructure and urban health*. Journal of Urban Health 82(1). 2005.

Intelligent transportation systems

ITS Canada. *Surface Transportation-Related Technological Innovation in Canada and Abroad*. 2015.

Managed lanes

Cambridge Systematics. *Integrating Pricing into the Metropolitan Transportation Planning Process: Four Case Studies*. Report for Federal Highways Administration. 2010.

Downs, A. *Still Stuck in Traffic*. Brookings Institute. 2004.

Kwon, J. and Varaiya, P. *Effectiveness of California's High-Occupancy Vehicle (HOV) System*. Transportation Research Part C16 (1): 98-115. 2008.

Xia J, Hossan, M.S., and Asgari, H. *Investigating the Value of Time and Value of Reliability for Managed Lanes*. Report for Florida Department of Transportation. 2015.

Yafeng Y., Lawphongpanich, S., Chen, Z., and Zangui, M. *Deployment Strategies of Managed Lanes on Arterials*. Report for Florida Department of Transportation. 2015.

Mobility hubs

Metrolinx. *Mobility Hub Guidelines*. 2011.

Metrolinx. *Mobility Hub Profiles*. 2014.

Metrolinx. *State of Mobility Hubs*. 2016.

New mobility

Arcadis, HR&A Advisors, and Sam Schwartz. *Driverless Future: A Policy Roadmap for City Leaders*. 2017.

Berriman, R. *Will Robots Steal our Jobs? The Potential Impact of Automation on the UK and other Major Economies*. Price Waterhouse Coopers. 2015.

Roland Berger. *A CEO Agenda for the (R)evolution of the Automotive Ecosystem*. 2016.

FleetCarma. *Electric Vehicle Sales in Canada: 2015 Final Numbers*. 2015.

Fulton, L., Mason, J., and Merous, D. *Three Revolutions in Urban Transportation*. Institute for Transportation and Development Policy. 2017.

Grush Niles Strategic. *Ontario Must Prepare for Vehicle Automation*. 2016.

Isaac, L. *Driving Towards Driverless: A Guide for Government Agencies*. WSP. 2016.

Laidlaw, K., Sweet, M., and Olsen, T. *Automated Vehicles in the Greater Toronto-Hamilton Area: 2016 Consumer Survey – Forecasting the Outlook for AVs*. Ryerson University. 2017.

Litman, T. *Autonomous Vehicle Implementation Predictions.* Victoria Transport Policy Institute. 2017.

MaRS Data Catalyst and Toronto Atmospheric Fund. *Microtransit: An Assessment of Potential to Drive Greenhouse Gas Reductions*. 2016.

Nisen, M. *The 9-to-5 Office Workday is Dying in America*. Quartz. 2015.

Olia, A., Hossam, A., Baher, A. and Saiedeh N.R. *Assessing the Potential Impacts of Connected Vehicles: Mobility, Environmental, and Safety Perspectives*. Journal of Intelligent Transportation Systems 20 (3): 229- 243. 2016.

Rayle, L., Dai, D., Chan, N., Cervero, R., and Shaheen, S. *Just a Better Taxi? A Survey-Based Comparison of Taxis, Transit, and Ride-Sourcing Services in San Francisco*. Transport Policy 45: 168–178. 2016.

Shaheen, S., and Cohen, A. *Car-sharing Market Overview, Analysis and Trend*s. Transportation Research Centre, University of California, Berkeley. 2015.

Shared-Use Mobility Center. *Shared Use Mobility Toolkit for Cities*. 2016.

U.S. Department of Transportation and National Highway Traffic Safety Administration. *Frequency of Target Crashes for IntelliDrive Safety Systems*. 2010.

New models

MaRS Solutions Lab. *Shifting Perspectives: Redesigning Regulation for the Sharing Economy.* 2016.

Mowat Centre. *Policymaking for the Sharing Economy: Beyond Whack-a-Mole*. 2015.

Rybeck, R. *Using Value Capture to Finance Infrastructure and Encourage Compact Development*. Public Works Management & Policy 8(4): 249- 260. 2004.

Smith, J. J., and Gihring, T. A. *Financing Transit Systems through Value Capture*. American Journal of Economics and Sociology 65(3): 751- 786. 2006.

Transit Center. *Private Mobility, Public Interest: How Public Agencies Can Work with Emerging Mobility Providers*. 2016.

Parking

Badland, H. M., Garrett, N., and Schofield, G. M. *How Does Car Parking Availability and Public Transport Accessibility Influence Work-Related Travel Behaviors?* Sustainability 2(2): 576-590. 2010.

Guo, Z. *Home Parking Convenience, Household Car Usage, and Implications to Residential Parking Policies*. Transport Policy 29: 97-106. 2013.

Willson, R. W. and Shoup, D. C. *Parking Subsidies and Travel Choices: Assessing the Evidence*. Transportation 17(2): 141-157. 1990.

Shoup, D. *The High Cost of Free Parking*. APA Planners Press. 2011.

Pearson Airport area, Union Station, high-speed rail

Metrolinx. *Transportation Study of the Airport Area*. 2015.

Pamela Blais. *Unlocking the Potential of the Airport Megazone*. Neptis Foundation. 2016.

Ontario Ministry of Transportation. *About Union Station*. 2016.

Ontario Ministry of Transportation. *High Speed Rail in Ontario: Special Advisor's Final Report*. 2016.

Planning studies, business cases, data sources

CPCS. The Economic Value of Regional Strategies to Improve Transportation Outcomes. Managed Highway Lane Network and Tranit Use: Economic and Financial Perspective. Final Report. 2016.

Metrolinx. *Costs of Road Congestion in the Greater Toronto and Hamilton Area. Final Report*. 2008.

Metrolinx. Business Case Analyses. 2018.

Metrolinx. *Draft Business Case Guidance*. 2018.

Metrolinx. *Info to GO: Quick Facts*. 2016.

Ontario Ministry of Finance. *2013-2041 Ontario Population Projections by Age- Reference Scenario*. 2014.

Ontario Ministry of Finance. *Long-Term Outlook on Ontario's Economy*. 2017.

Statistics Canada. *Canada 2011 Census*. 2017.

University of Toronto Data Management Group. *2011 Travel Survey Summaries for the Greater Toronto and Hamilton Area*. 2014.

Public transit

American Public Transportation Association. *Economic Impact of Public Transportation Investment*. 2014.

Canadian Urban Transit Association. *Public Transit: Building Healthy Communities*. Urban Mobility Issue Paper 48. 2017.

Transit Cooperative Research Program (TCRP). *Livable Transit Corridors: Methods, Metrics, and Strategies*. Transportation Research Board 187. 2016.

Transportation Association of Canada. *Primer on Transportation Funding and Governance in Canada's Large Metropolitan Areas*. 2013.

School travel

McDonald, Noreen. *Household interactions and children's school travel: the effect of parental work patterns on walking and biking to school*. Journal of transport geography 16(5), 2008.

Metrolinx, Green Communities Canada and University of Toronto. *The Costs and Benefits of School Travel Planning Projects in Ontario, Canada*. 2014.

Metrolinx and Ontario Ministry of Transportation. *Active and Sustainable School Transportation Strategy Roadmap Report*. 2013.

Metrolinx. *Greater Toronto and Hamilton Area School Travel Household Attitudinal Study Report*. 2011.

Metrolinx. *School Travel in the GTHA: A Report on Trends*. 2015.

StudentMoveTO. *An Overview of Early Findings*. 2016.

Transportation demand management

Ontario Ministry of Transportation. *Carpool Lots*. 2015.

University of Toronto Data Management Group. *2011 Travel Survey Summaries for the Greater Toronto and Hamilton Area*. 2014.

Metrolinx. *School Travel in the GTHA – a Report on Trends*. 2015.

User experience

Deloitte LLP. *Changing Directions: Rethinking Working and Commuting in the GTHA*. 2017.

Metrolinx. *Final Report and Recommendations of the Residents' Reference Panel on the Regional Transportation Plan*. 2017.

Metrolinx. *GO Transit Ridership Segmentation Report*. 2012.

Metrolinx. *Greater Toronto and Hamilton Area Fare Integration - Stage 2, Report 1: Fare Integration Concept Development Report*. 2016.

Public Transport Victoria. *Public Transport User Experience Journey Maps*. 2016.

Provincial policy and guidelines

Neptis Foundation. *Growing Pains: Understanding the New Reality of Population and Dwelling Patterns in the Toronto and Vancouver Regions*. 2015.

Neptis Foundation. *Planning for Prosperity: Globalization, Competitiveness and the Growth Plan for the Greater Golden Horseshoe*. 2015.

Ontario Ministry of Finance. *2013-2041 Ontario Population Projections by Age -Reference Scenario*. 2014.

Ontario Ministry of Municipal Affairs. *Growth Plan for the Greater Golden Horseshoe, 2006 - Office Consolidation.* 2013; and 2017.

Ontario Ministry of Transportation. *Freight Supportive Guidelines*. 2014.

Ontario Ministry of Transportation. *MTO Greater Golden Horseshoe Model: Version 3, 2016 and Version 4,* 2017.

Ontario Ministry of Transportation. *Transit-Supportive Guidelines.* 2012.

Ontario Ministry of Municipal Affairs. *Performance Indicators for the Growth Plan for the Greater Golden Horseshoe, 2006*. 2015.

Ontario Ministry of Transportation. *CycleON Action Plan 1.0*. 2015.

Other relevant sources

(Includes those cited in the *Discussion Paper for the Next Regional Transportation Plan*, August 2016)

Delbosc, A. *Delay or forgo? A Closer Look at Youth Driver Licensing Trends in the United States and Australia.* Transportation: 1-8. 2016.

Fuller, S., and Vosko, L. F. *Temporary Employment and Social Inequality in Canada: Exploring Intersections of Gender, Race and Immigration Status*. Social Indicators Research 88(1): 31-50. 2008.

Grube-Cavers, A., and Patterson, Z. *Urban Rapid Rail Transit and Gentrification in Canadian Urban Centres: A Survival Analysis Approach*. Urban Studies 52(1): 178-194. 2015.

Kahn, M. E. *Gentrification Trends in New Transit-Oriented Communities: Evidence from 14 Cities That Expanded and Built Rail Transit Systems*. Real Estate Economics 35(2): 155-182. 2007.

Lin, J. *Gentrification and Transit in Northwest Chicago*. Journal of the Transportation Research Forum 56HS-043: 476. 2002.

Mills, M. *Demand for Flexibility or Generation of Insecurity? The Individualization of Risk, Irregular Work Shifts and Canadian Youth*. Journal of Youth Studies 7(2): 115-139. 2004.

Pollack, S., Bluestone, B., and Billingham, C. *Maintaining Diversity in America's Transit-Rich Neighborhoods: Tools for Equitable Neighborhood Change*. The Dukakis Center for Urban and Regional Policy at Northeastern University. 2010.

Poverty and Employment Precarity in Southern Ontario Research Group. *It's More than Poverty: Employment Precarity and Household Well-being*. 2013.

Royal Bank of Canada and the Pembina Institute. *Priced Out: Understanding the Factors Affecting Home Prices in the GTA*. 2013.

Sivak, M., & Schoettle, B. *Recent Decreases in the Proportion of Persons with a Driver's License across All Age Groups*. University of Michigan Transportation Research Institute. 2016.

Statistics Canada. *2011 National Household Survey*. 2013.

Tomer, A., Kneebone, E., Puentes, R., and Berube, A. *Missed Opportunity: Transit and Jobs in Metropolitan America*. Metropolitan Policy Program at Brookings. 2011.

Appendix 5
Consolidated 2041 Regional Transportation Plan Priority Actions

Priority Actions for Strategy 1: Complete the delivery of current regional transit projects

1.1 Complete In Delivery projects (see Map 3) by 2025, including the GO RER program; the Hurontario, Eglinton, Hamilton B-Line and Finch West LRT lines; and the Highway 7 and Yonge BRT lines:

- Ensure that all projects together deliver a regionally consistent, seamless and high-quality customer experience.

1.2 Advance the In Development transit projects (see Map 4) through preliminary design, detailed design and construction.

1.3 Strengthen Union Station's capacity as the centre of GO RER:

- In consultation with the City of Toronto and the provincial and federal governments, develop a plan to address rail service capacity at Union Station to accommodate the growth of GO RER beyond 2025.
- Ensure that all decisions regarding improvements to Union Station and adjacent areas are consistent with and protect for long term objectives.

1.4 Coordinate planning and implementation of In Delivery and In Development projects with the Province, federal government and VIA Rail Canada, focusing on:

- high speed rail;
- high frequency rail;
- optimizing shared resources including Union Station and rail corridors; and
- integrating services for a seamless traveller experience.

Priority Actions for Strategy 2: Connect more of the region with frequent rapid transit

2.1 Implement a comprehensive and integrated Frequent Rapid Transit Network by 2041 that includes:

- existing subway, transitway and BRT services (See Map 3);
- 15-minute GO Regional Express Rail on the Lakeshore East and West, Kitchener, Stouffville and Barrie Corridors, In Delivery for 2025 (see Map 3);
- In Delivery BRT and LRT projects (see Map 3);
- In Development projects (see Map 4);
- additional transit infrastructure improvements to resolve key gaps (proposed new LRT and BRT projects, see Map 5);
- additional 15-minute GO Regional Express Rail services beyond 2025 (see Map 5);
- a Priority Bus and Priority Streetcar system that connects existing and planned rapid transit, LRT and BRT (see Map 5); and
- Frequent Regional Express Bus services (see Map 5 and Map 7).

2.2 Strengthen and support the ability of local transit to provide reliable service in urban areas where demand for transit is high, and to connect to the Frequent Rapid Transit Network.

2.3 Develop and implement a 24-hour transit network composed of strategic regional routes to address growing off-peak markets and destinations.

2.4 Deliver a Regional Express Bus Network to serve long-distance transit markets not served by GO RER (see Map 7).

2.5 Improve access to airports, and prioritize transit use by airport passengers and workers:

- Coordinate with the Greater Toronto Airports Authority, Ports Toronto, the John C. Munro Hamilton International Airport and the federal government on ground transportation plans to the region's airports and surrounding areas.

- Coordinate with the planning and implementation of Pearson Airport's Regional Transit Centre to facilitate enhanced transit access to the airport, and to enable Pearson and the surrounding employment areas to continue supporting economic growth throughout the GTHA.

2.6 Strengthen connections between the GTHA and the Region of Waterloo, to support the economic prosperity of the GGH and the growth of one of North America's largest technology clusters.

Priority Actions for Strategy 3: Optimize the transportation system

3.1 Advance the integration of transit services and fares:

- Remove barriers to create an integrated fare system that supports seamless and consistent travel for passengers across municipal boundaries.

- Ensure progress toward seamless travel and increase ridership by taking a regional view of setting fares and concessions for transit, and by developing innovative fare products.

3.2 Expand first- and last-mile choices at all transit stations:

- Fully implement the *GO Rail Station Access Plan* (2016) to achieve higher shares of station access by walking, cycling, transit, passenger pick-up and drop-off, and carpooling.

- Invest in first- and last-mile solutions to maximize all-season access to and from all rapid transit stations, including but not limited to:
  - priority transit access;
  - pedestrian access to workplaces and destinations;
  - improved on-demand services including taxis and micro-transit services (with potential applications in rural areas);
  - on- and off-site bicycle facilities; and
  - car-share and bike-share programs.

- Recover the cost of providing parking at GO stations to help shift trips to modes that do not require parking, and to allow more people to access new train services.

3.3 Set consistent high-quality standards for the traveller experience:

- Focus on reliable service as a first priority for attracting customers to transit, emphasizing the use of transit priority measures.

- Provide travellers with:
  - real-time information;
  - well-designed places that offer shade, shelter, paved surfaces, seating, clear sightlines and lighting;
  - consistent wayfinding across modes;
  - all-season maintenance of sidewalks, bike lanes and paths;

o on-demand service connectivity; and

o concession fares.

- Develop and implement shared customer experience objectives for new regional transit investments and the regional transit network in general.

- Ensure that design excellence is applied to architecture, urban design and landscape architecture.

3.4 Develop and implement a mobility as a service strategy:

- Continually improve the PRESTO fare payment system to support inter-municipal transit trips with a range of fare products and self-service options. Migration to an account-based system will allow customers to access PRESTO via traditional PRESTO cards, credit cards, limited use electronic tickets and mobile wallets.

- Fully integrate regional multimodal trip planning and fare payment into a MaaS platform, incorporating and encouraging mobility options including but not limited to transit, bike-sharing, car-sharing, carpooling and ride-sourcing.

3.5 Place universal access at the centre of all transportation planning and designing activities:

- Foster an accessible network of conventional transit and paratransit systems, where riders can transfer easily and conveniently between services, including across boundaries.

- Develop an integrated regional booking platform for specialized transit trips across the region.

- Ensure that on-demand services meet the needs of a diverse range of travellers.

- Provide leadership and ensure consistency in accessible design for transportation services and facilities across the region, with a focus on ensuring that transportation services and facilities are age-friendly and can be used by all residents of the GTHA.

- Collaborate to address challenges to transit access, and the unintended consequences of transit investment, such as increases in housing costs along transit corridors.

- Develop a regional framework for the universal provision of transit passes to low-income groups.

3.6 Eliminate transportation fatalities and serious injuries as part of a regional Vision Zero program

- Incorporate the Vision Zero framework into regional transportation planning by developing an approach to transportation design standards, speed limits and public education with the aim of zero fatalities and serious injuries from transportation.

3.7 Make TDM a priority:

- Collaborate to develop and implement TDM programs as required by the *Growth Plan*.

- Advance workplace TDM programming and encourage private-sector leadership, participation and investment with mandated participation by large employers, institutions and other venues that generate a significant number of trips.

- Develop new approaches to TDM delivery from the fields of service design and behavioural economics.

- Reinvigorate carpooling with a compelling and user-friendly online regional platform integrated with trip planning and payment tools, and drive participation, including removing regulatory obstacles to user incentives.

- Deliver TDM programming to support all new rapid transit services, transit station areas, and areas impacted by major construction and events.

- Develop incentives for off-peak travel to reduce peak travel demands and, in the case of transit, to grow off-peak ridership.

- Continue to explore how mobility pricing (e.g., parking, road pricing, HOT lanes and off-peak fares) could be used to shift travel behaviour.

- Assess the feasibility and potential of vanpool services.

3.8 Expand the current HOV lane network:

- Identify and prioritize a seamless network of HOV lanes on the highways in the GTHA, encouraging higher-occupancy vehicle travel and supporting faster, more reliable bus service (see Map 7).

- Incentivize ridesharing using the HOV lane network for trips that are difficult to make by transit or active transportation.

- Identify opportunities to implement HOV lanes on arterial roads to support the Frequent Rapid Transit Network.

- Continue the implementation of HOT lanes on HOV lanes that have excess capacity.

3.9 Further integrate road and transit planning operations:

- Invest in the regional coordination and deployment of ITS and smart corridors to support effective congestion management and transit priority operations.

- Coordinate the planning and operation of transit, roads and on-street parking within each municipality, across municipal boundaries, and where municipal, regional and provincial roads meet.

3.10 Define and support a regional goods movement system:

- Advance collaboration between the public and private sector to implement a Regional Strategic Goods Movement Network (see Map 8) that links goods-generating activity centres, intermodal terminals and regional gateways.

- Study goods movement priority features for new and existing freight corridors, including but not limited to intelligent lane utilization and truck-only lanes.

- Support development of innovative freight hubs, including planning for and protecting complementary land uses. Consider the use of transit stations as a pick-up location for small parcels, and support other innovative urban freight practices to reduce door-to-door delivery. Explore and implement flexible freight delivery times, including off-peak delivery, where applicable.

- Establish a GTHA urban freight data monitoring program, including the ongoing collection of freight data.

- Expand awareness and education efforts regarding goods movement planning, design and operational issues, with particular reference to e-commerce impacts and potential delivery innovations (e.g., bicycle use) on the volume and nature of freight movement in the region.

3.11 Promote integrated planning for rail corridors:

- Coordinate with MTO in its investigation of the potential for shared freight and passenger use of critical rail corridors in the GTHA.

- Where corridor capacity studies indicate separation of uses is required, develop and promote plans for freight rationalization.

- Ensure that community safety is given high priority in planning for goods movement on rail corridors.

Priority Actions for Strategy 4: Integrate transportation and land use

4.1 Develop an approach and framework for Metrolinx to review and provide input to secondary plans, publicly funded development plans and large-scale planning applications (e.g., at GO stations) to advise on alignment with the 2041 RTP.

4.2 Make investments in transit projects contingent on transit-supportive planning being in place.

4.3 Focus development at Mobility Hubs and Major Transit Station Areas along Priority Transit Corridors identified in the Growth Plan:

- Coordinate creation of station area plans that catalyze desired land uses and support transit investments.

- Systematically locate publicly funded institutions and facilities near stations on Priority Transit Corridors and subway lines.

- Integrate joint development early in rapid transit project planning and in procurement schedules, utilizing new partnerships between the public and private sector.

- Update the *Mobility Hub Guidelines* to address emerging challenges and opportunities related to the integration of land use and transportation, and incorporate new tools and guidance for planning Mobility Hubs.

- Update the network of Mobility Hubs to reflect the Frequent Rapid Transit Network, the *Growth Plan*, municipal plans, and 2041 forecasts for population, employment and transit ridership.

4.4 Evaluate financial and policy-based incentives and disincentives to support transit-oriented development. Work collaboratively to build on and develop regional and site-specific measures and tools to encourage development that supports growth management and transportation objectives.

4.5 Plan and design communities, including development and redevelopment sites and public rights-of-way, to support and promote the greatest possible shift in travel behaviour, consistent with Ontario's passenger transportation hierarchy:

- Develop region-wide standards for highways, overpasses, roads and streets to consistently reflect the passenger transportation hierarchy.

- Develop shared investment criteria in cycling facilities that focus on cycling potential and connectivity, consistent with regional and local plans.
- Adopt a complete streets approach in the delivery of transit infrastructure investments, incorporating facilities for walking and cycling access to transit stations.
- Expand and promote bike-share in locations where there is an opportunity to meet and increase the demand for cycling.

4.6 Develop and implement a Regional Cycling Network (see Map 9), creating new on- and off-road facilities that connect areas with high cycling potential to rapid transit stations and Urban Growth Centres, helping commuter cyclists traverse boundaries and physical barriers.

4.7 Embed TDM in land use planning and development :

- Use TDM plans in the development approval process to ensure that major residential, commercial and institutional developments are designed and operated to reflect the passenger transportation hierarchy, with realistic, long-term implementation plans.
- Develop regional TDM standards and guidelines.
- Leverage the development approval process to generate dedicated funding for TDM programming.

4.8 Rethink the future of parking:

- Coordinate the development of a region-wide policy that:
  ○ provides guidelines and encourages best practices in parking management;
  ○ identifies common goals for on- and off-street parking management, especially near transit stations;
  ○ supports land use and transportation objectives;
  ○ acknowledges the varied urban, suburban and rural contexts of the GTHA;
  ○ anticipates autonomous vehicles and shared mobility;
  ○ incorporates environment-friendly features;
  ○ can be leveraged for local policy making; and
  ○ includes public education and demonstrates the benefit of new parking practices.

- Coordinate station area parking requirements with the expansion of transit infrastructure and services (e.g., amend applicable transit station area by-laws as a condition for transit station approval to support local mode share targets). Zoning standards should be reviewed, with the expectation that minimum parking requirements will be reduced, particularly in transit-supportive neighbourhoods.
- Adopt a region-wide approach to parking management for the arrival of shared mobility and autonomous vehicles.
- Research and regularly publish existing parking-related data and emerging trends to improve parking planning and management.

4.9 Coordinate across ministries, school boards, municipalities, service providers, public health agencies, non-governmental organizations and other stakeholders to establish school travel programs and service solutions for Kindergarten to Grade 12 that encourage future generations of pedestrians and cyclists:

- Continue to advance active and sustainable school travel through regional coordination and delivery of the school travel program. Adopt approaches that are location-specific to ensure that solutions involving walking, cycling and transit are tailored to each community.
- Expand the resources and community capacity available to advance active and sustainable school travel in the GTHA, including to high school students.
- Develop policies, plans and standards that prioritize active and sustainable travel by children and youth in school areas and the broader community (e.g., to recreational facilities and cultural facilities).

4.10 Assess the need for a Transportation Planning Policy Statement and a Transportation Master Plan regulation, as provided for in the Metrolinx Act 2006, to support the implementation of the 2041 RTP.

Priority Actions for Strategy 5: Prepare for an uncertain future

5.1 Develop a regional framework for on-demand and shared mobility:

- Work collaboratively to harmonize local regulations and develop regional policies and guidance to enable innovation while meeting the needs of GTHA residents.

- Proactively test and evaluate new services and technologies (e.g., micro-transit, on-demand and shared mobility) in emerging markets where conventional transit and active transportation are not meeting demand.

- Coordinate and establish partnerships that complement existing and committed transit services.

5.2 Develop a region-wide plan for autonomous mobility:

- Plan and prepare for the deployment of connected and autonomous vehicles, including consideration of policy and regulatory tools that may be required to meet transportation goals (e.g., road safety, congestion management, efficient freight movement).

- Update transportation and building standards for the arrival of autonomous vehicles (e.g., standards for parking and loading spaces).

5.3 Coordinate across the region to improve climate resiliency of the transportation system:

- Plan and build a transportation system that can continue to operate in extreme weather events that accompany climate change.

- Design new infrastructure and strengthen existing infrastructure to resist extreme weather.

- Ensure that the management of existing infrastructure assets, and the design and construction of future assets, are climate resilient.

- Adopt and coordinate policies and procedures coordinated among all transportation stakeholders (e.g., road, transit and emergency management agencies) to respond to extreme weather events.

5.4 Coordinate across the region to ensure the safety, security and emergency preparedness of the transportation system:

- Develop and update coordinated emergency response plans to minimize impacts of extreme weather events, security incidents, electricity blackouts, network outages, cyber-attacks and other future threats on travellers, assets and operations.

- Advance cyber-security, backup systems and resiliency plans to prevent and mitigate service disruptions and data breaches.

- Undertake regular emergency response exercises with community participation to train staff, test infrastructure and evaluate emergency protocols.

5.5 Proactively prepare for a future with low-carbon mobility options:

- Align regional and local efforts to mitigate greenhouse gas emissions with international, federal and provincial efforts to meet the Paris Climate Change Accord, and with Ontario's goal of reducing emissions to 80% below 1990 levels by 2050.

- Continue supporting compact and mixed-use development, complete streets and other measures that help reduce travel by motor vehicles.

- Deploy infrastructure to support electric vehicle use throughout the region's public and private transportation systems.

- Invest in the transition to low-carbon public and private vehicle fleets, including transit vehicles and trucks.

- Further collaborate among governments to enhance fuel efficiency and increase the availability of low-carbon fuels.

5.6 Develop a regional transportation big data strategy:

- Create a regional transportation big data portal, providing consistent and transparent data collection, management and reporting.

- Establish regional standards for transportation data sourcing, formatting, privacy, security, ownership and reporting.

- Identify and acquire new transportation data on all modes of transportation for planning and operations (e.g., crowd-sourced traffic data).

- Advance coordination and standardization of transportation forecasting, modelling and business case methodologies to support decision-making and evaluation.

5.7 Develop a strategy for innovation in mobility to:

- Drive innovation related to new services, tools and business models.

- Develop outcome-based approaches beyond traditional procurement and formal partnerships:
  - identify and leverage companies with innovative products and services that can benefit travellers or improve operations;
  - remove barriers to partnerships (e.g., overly rigid procurement rules);
  - test and minimize risks associated with new ideas, products and approaches; and
  - explore innovative funding and financing options such as loans and loan guarantees.

Appendix 6
Transportation trends
in the GTHA

This appendix examines trends in travel behaviour in the Greater Toronto and Hamilton Area, and in particular what has changed since 2006. *The Big Move Baseline Monitoring Report* (2013) and the *Discussion Paper for the Next Regional Transportation Plan* released in August 2016 also focused on key transportation trends. This appendix builds on that work and adds information on 2016 travel patterns, which was not available at the time the *Discussion Paper* was released.

The tables and figures in this appendix have been generated primarily from a household travel survey called the Transportation Tomorrow Survey (TTS) for the survey years 2006, 2011 and 2016. Certain selected tables also include Census tabulations from Statistics Canada.[1]

[1] While both the TTS and MTO's Greater Golden Horseshoe Model (GGHM) contain information on travel in the broader Greater Golden Horseshoe (GGH), the results presented in this appendix are restricted to travel within the Greater Toronto and Hamilton Area (GTHA).

Growth trends

Population and employment are key drivers in generating travel throughout the region. The GTHA demonstrates substantial and sustained growth with a 14% increase in population and a 13% increase in employment between 2006 and 2016 (Table 6-1)[2]. Table 6-1 also indicates the annual growth rate for each regional municipality between 2006 and 2016. The table also calculates the annual growth rate each municipality would have to maintain in order to meet the projected population and employment targets from the *Growth Plan*.

When looking at total travel captured by the Transportation Tomorrow Survey, total travel has declined very slightly on a per capita basis between 2006 and 2016, while commuting to work during the AM and PM peak periods appears to be stable (see Table 6-2). Work trips per capita declined slightly from 2006 to 2011, but returned to 2006 levels in 2016, perhaps reflecting a return to higher levels of employment in the GTHA.

Table 6-1: Population and employment growth in the GTHA

	2006	2011	2016	2041	Annual Growth Rate	
					2006-2016	2016-2041
Population						
Toronto	2,609,200	2,704,600	2,871,100	3,400,000	0.8%	0.7%
Peel	1,212,800	1,339,800	1,468,700	1,970,000	1.7%	1.3%
York	931,800	1,065,500	1,149,100	1,790,000	2.1%	1.8%
Durham	584,300	626,100	671,800	1,190,000	1.3%	2.4%
Halton	457,700	516,400	569,400	1,000,000	2.1%	2.3%
Hamilton	523,600	535,600	561,000	780,000	0.5%	1.4%
GTHA Total	**6,319,400**	**6,788,000**	**7,291,100**	**10,130,000**	**1.3%**	**1.4%**
Employment						
GTHA Total	**3,185,200**	**3,317,400**	**3,610,000**	**4,820,000**	**1.3%**	**1.2%**

Source: Hemson Consulting Ltd. based on Statistics Canada Annual Demographic Estimates, Statistics Canada 2006 Census, 2011 Census, 2011 National Household Survey, and 2016 Census; *Growth Plan for the Greater Golden Horseshoe, 2017*.

Table 6-2: Overall travel in the GTHA

	2006		2011		2016	
	Trips	**Trips per capita**	**Trips**	**Trips per capita**	**Trips**	**Trips per capita**
Total daily trips	12,078,808	2.1	13,406,319	2.0	13,040,637	1.9
Peak period* work trips	2,785,708	0.5	2,958,794	0.4	3,262,906	0.5

* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

[2] Note that these tabulations use adjusted population totals (incorporating undercount adjustments) rather than the official Census count. Statistics Canada estimated there was a nationwide undercount of 2.9%, which generally is higher for urban areas, such as the GTHA.

Auto ownership trends

One of the key drivers for mode choice, particularly the decision to take transit, is auto availability. Figure 6-1 examines the presence of autos at the household level.

One interesting finding is that zero-auto households declined between 2006 and 2011, then increased in 2016, slightly surpassing 2006 levels. This is likely due to a combination of factors, with the most important being survey methodology. The 2016 TTS did a better job of capturing low-income residents, particularly in Toronto, and thus is a better reflection of transportation in the region than 2011. In addition, there are more options available, such as the presence of ride-sourcing companies such as Uber, and an expansion of the ridesharing system (Car2Go and ZipCar) that allows households to "shed" an auto.

On the other hand, even in Toronto (outside of downtown) the number of 3+ auto households has increased slightly. This increase in 3+ auto households is particularly pronounced in Durham (+4% between 2006 and 2016) and Hamilton (+4% between 2006 and 2016). Across the GTHA, between 2006 and 2016, zero auto households increased by approximately 0.5% and 3+ auto households increased by 2% (see Figure 6-3).

While auto ownership is tied to location, with urban neighbourhoods having overall lower levels of auto ownership due to a combination of individuals having more alternatives to auto ownership (including access to car-sharing services) and higher parking costs, household income and household size are also key factors with higher income households more likely to own autos than low income households when controlling for household size. Table 6-3 indicates that lower income households ($0-39,999) own less than one auto on average, while the highest income households ($125,000+) own slightly more than two autos on average. Indeed, just under 3% of the highest income households own zero autos, compared to over 50% of households below $15,000 in household income.

Figure 6-2 shows the combined impact of income and household size. As expected, as household size increases, the number of vehicles increases and for 3+ person households, zero auto ownership is relatively rare, even among the lowest income households.

Table 6-3: Household auto ownership by income (2016)

	Cars / Household				Average Cars / Household
	0	**1**	**2**	**3+**	
$0 to $15,000	53%	39%	7%	1%	0.6
$15,000 to $40,000	28%	54%	15%	3%	0.9
$40,000 to $60,000	13%	52%	28%	7%	1.3
$60,000 to $100,000	9%	41%	39%	11%	1.6
$100,000 to $125,000	5%	28%	49%	18%	1.9
$125,000 and above	3%	20%	51%	26%	2.1

Source: University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey.

Figure 6-1: Household auto ownership
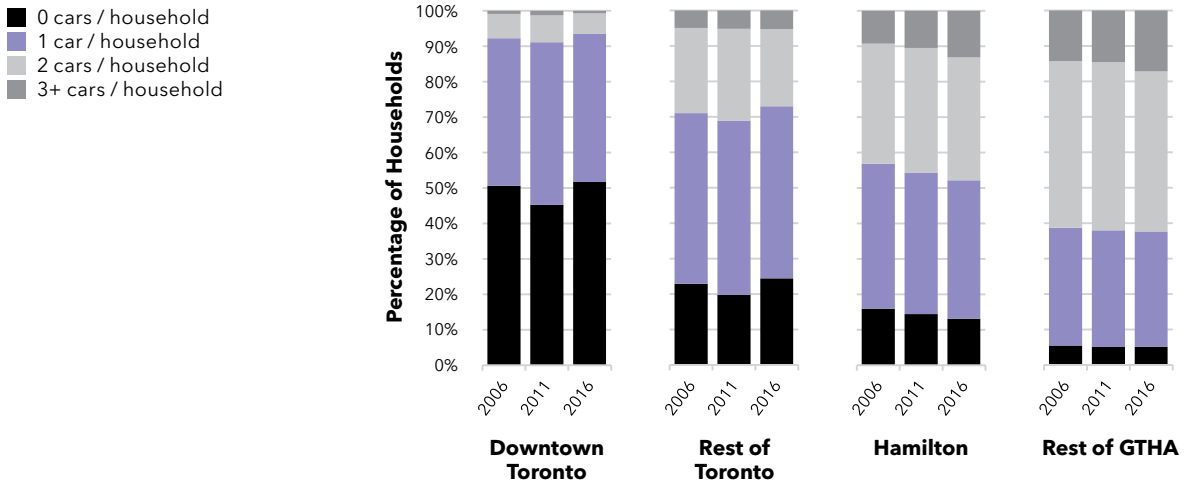
Legend:
- 0 cars / household
- 1 car / household
- 2 cars / household
- 3+ cars / household

Y-axis: Percentage of Households

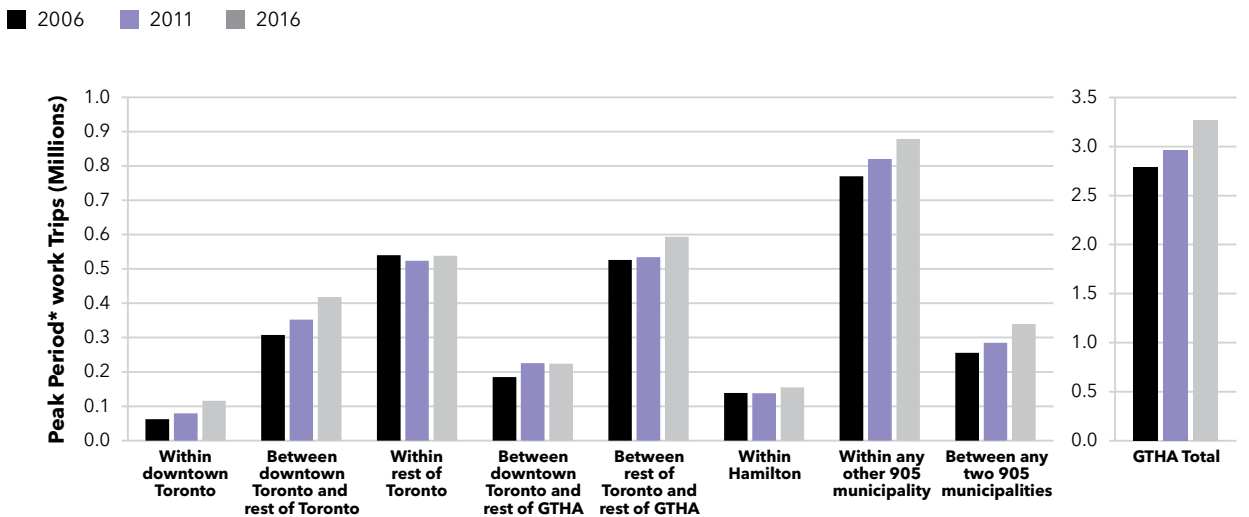X-axis groups: Downtown Toronto, Rest of Toronto, Hamilton, Rest of GTHA (each showing 2006, 2011, 2016)

Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

Figure 6-2: Household auto ownership by income and household size (2016)
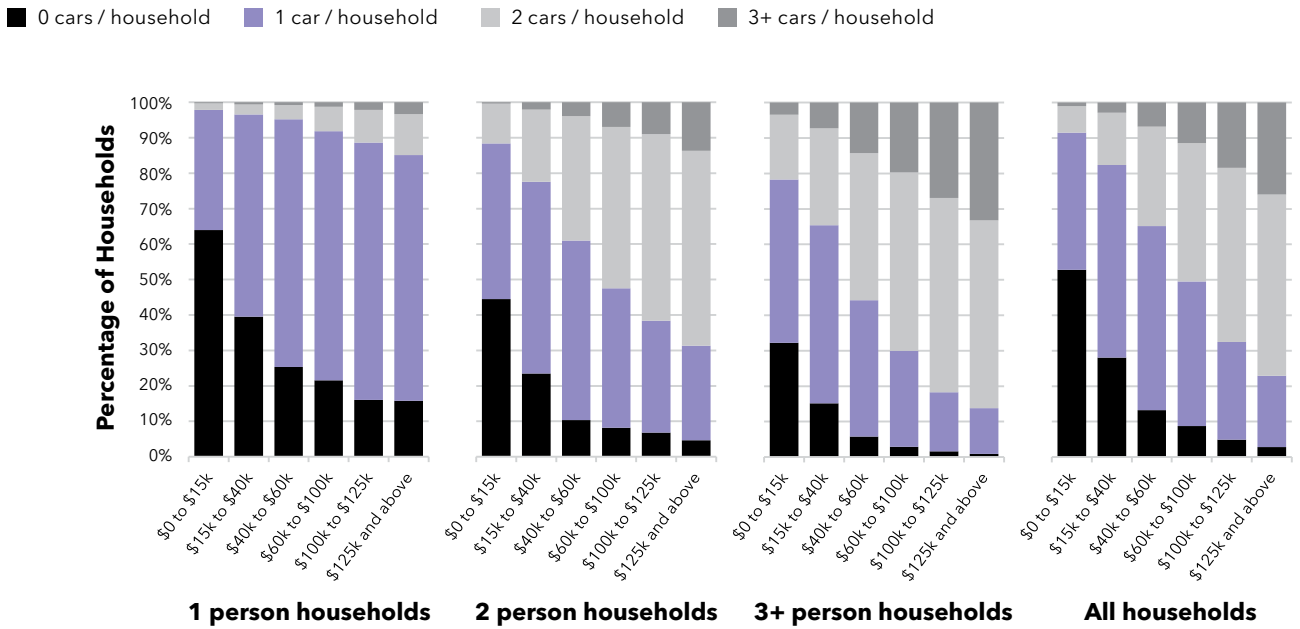
Legend:
- 0 cars / household
- 1 car / household
- 2 cars / household
- 3+ cars / household

Y-axis: Percentage of Households

X-axis groups: 1 person households, 2 person households, 3+ person households, All households (each showing $0 to $15k, $15k to $40k, $40k to $60k, $60k to $100k, $100k to $125k, $125k and above)

Source: University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey.

Travel trends

Knowing the starting point and ending point of a trip is extremely important in predicting the mode taken for that trip, as the trip length as well as the transit alternatives vary dramatically. To avoid listing the thousands of individual combinations of trip origins and trip destinations, travel patterns are grouped into a smaller number of travel markets, such as travel to or from downtown Toronto or travel that is internal to an upper-tier municipality. Travel to downtown Toronto is often served by local transit (TTC) or GO Bus or GO Rail. Travel that is internal to a 905 municipality such as Hamilton or Peel can often be made by walking, cycling or local transit. However, it is often difficult to undertake 905-to-905 travel spanning municipalities on transit, due to the disjointed nature of transit across municipal boundaries. This type of trip (905-to-905 travel) is almost always made by auto, so when this travel market is growing, as it has between 2006 and 2016 (see Figure 6-3), reducing auto travel is particularly challenging.

Figure 6-3 displays the travel markets for daily travel (all purposes) while Figure 6-5 is restricted to commute trips made during the AM and PM peak travel times, defined as trips leaving between 6:00-8:59 AM or 3:00-6:59 PM. These travel markets are broadly stable between 2006 and 2016. The concentration of travel, including work trips, to downtown Toronto increases very slightly (approximately 1%), and Toronto trips that do not involve downtown Toronto decreases very slightly. Trips within a single 905 municipality decrease slightly and 905-to-905 travel increases slightly (approximately 1%). While the trends are moving in the "wrong" direction, indicating longer trip patterns that are harder to serve by transit and thus add to higher levels of air pollutant emissions, the overall picture remains of a region marked by stability in its travel markets.

The travel markets demonstrate significantly different patterns of mode use (for daily trips of all travel purposes see Figure 6-4). As one would expect, trips involving downtown Toronto show high transit usage – over 60% transit usage if the trip began in another part of Toronto and ended in downtown Toronto (or the reverse) in 2016 and a 56.5% transit mode share for travel outside of Toronto to downtown Toronto (or the reverse) in 2016. This transit mode share is increasing modestly over time.

Auto travel within Toronto (for trips not involving downtown) is quite high, though the trend is indicating a decrease in auto mode share over time (from 73% to 65.5%) and an increase in walking, cycling and transit for these trips.

Figure 6-3: Total daily trips by travel market
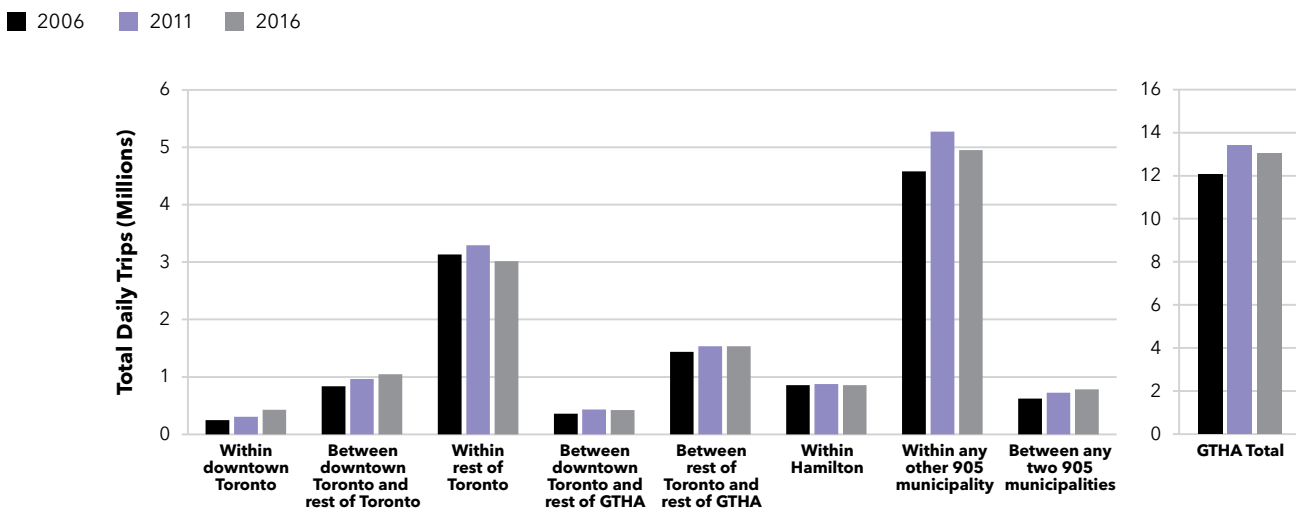
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

Figure 6-4: Mode share by travel market (total daily trips)
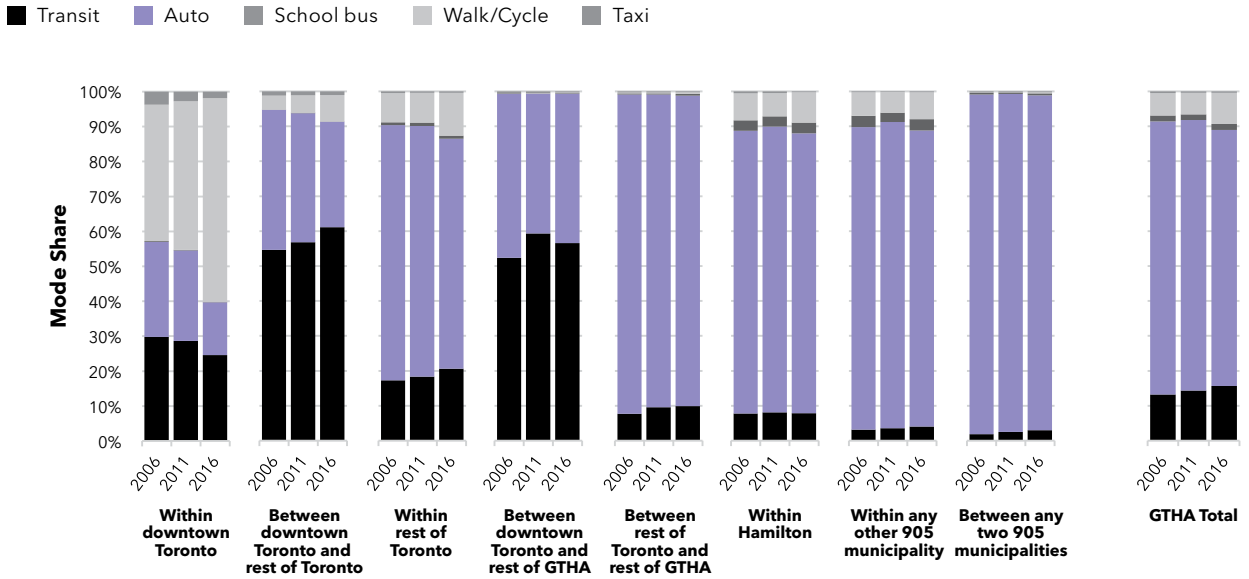
Source: University of Toronto Data Management Group,
2006, 2011 and 2016 Transportation Tomorrow Survey

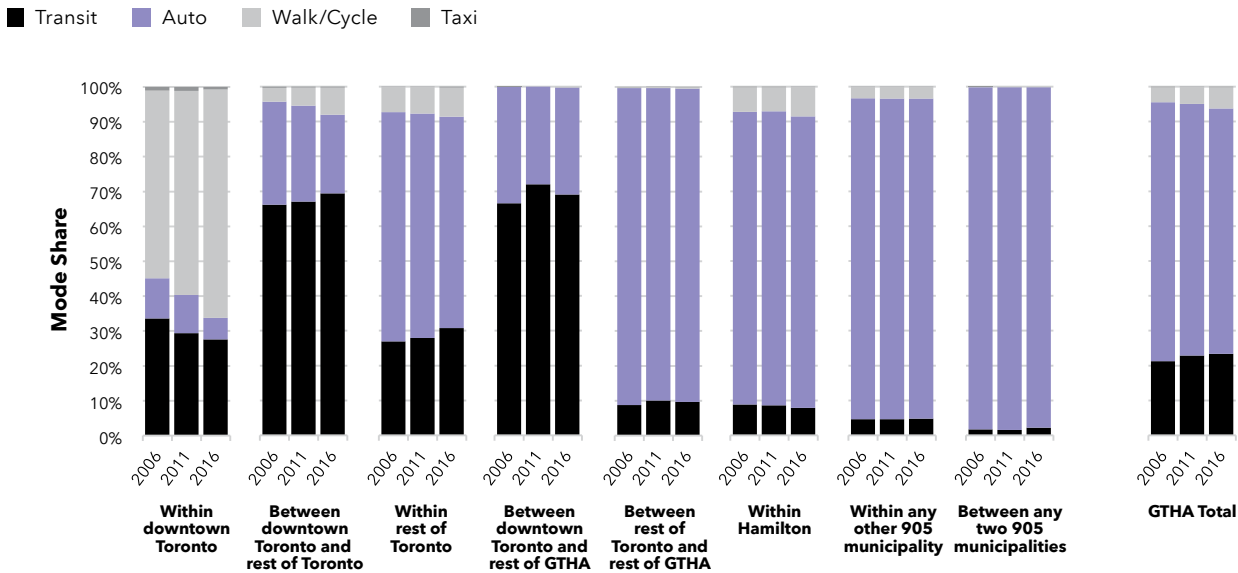**Figure 6-5: Total work trips by travel market (peak period*)**

* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. – 7:00 p.m.
Source: University of Toronto Data Management Group, 2006, 2011
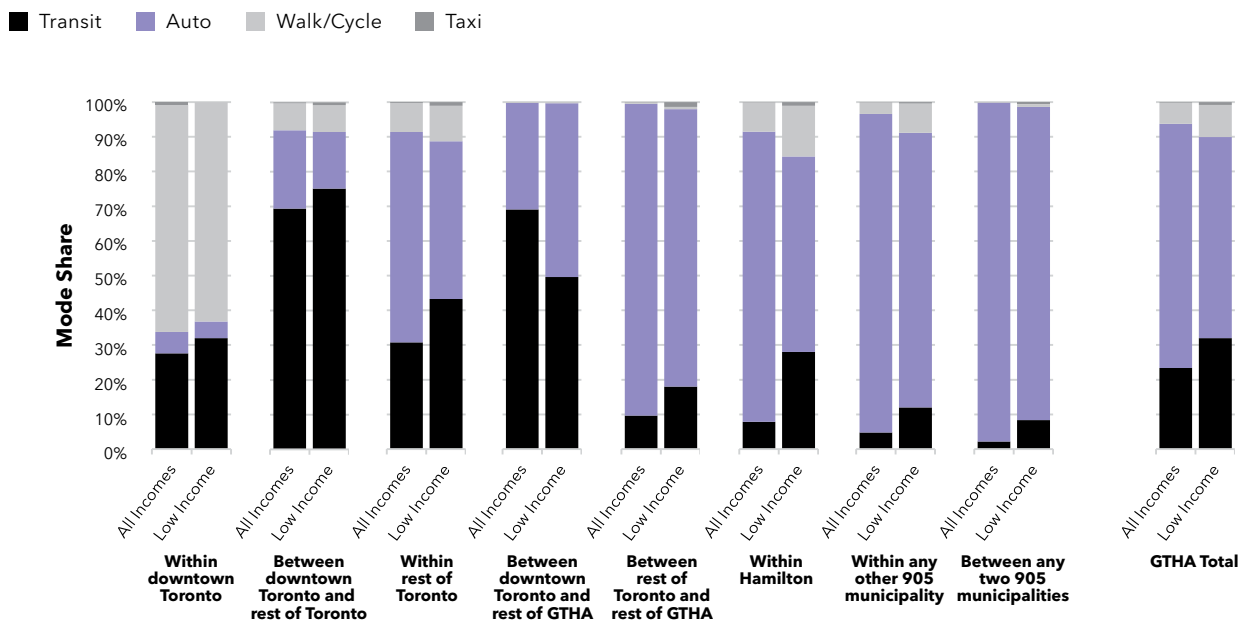and 2016 Transportation Tomorrow Survey

Transit mode share for trips internal to Hamilton is roughly double that of trips internal to the other 905 municipalities, though transit mode share in Hamilton appears to be flat between 2006 and 2016, while it is increasing slightly in the other 905 municipalities. Transit mode share for 905-to-905 travel is also increasing modestly, though this travel market is heavily dominated by auto (96% in 2016). Ride-sourcing (e.g. hailing an Uber vehicle) was added as a specific mode in 2016. Note that Uber only arrived in Toronto in 2011, and if anyone had reported using it in the 2011 TTS survey, it would have been classified as other. Ride-sourcing mode share has almost an identical pattern as taxi mode share across all the travel markets.

Figure 6-6 reports the mode shares of work trips, during the AM and PM peak periods. The patterns are quite similar. It is notable that travel to the downtown, regardless of whether it originates within or outside of Toronto, reaches 69% transit mode share.

Figure 6-6: Mode share by travel market (peak period* work trips)

* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. – 7:00 p.m.
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey

Trends by income

In addition to tracking overall travel patterns across the GTHA, it is important to focus on travellers that may have unique travel needs, specifically low-income individuals, seniors, and children making trips to school. These three groups were examined in Metrolinx's *Baseline Monitoring Report* (2013), and this appendix extends the analysis to 2016.

As the TTS did not include any questions on income prior to 2016, the *Baseline Monitoring Report* was restricted to using the Journey-to-Work information from the Canadian Census for 2006 and 2011. Low-income individuals were defined as those living in households with the lowest quartile of income, which varied based on household size.[3] It is also worth noting that the Census asks about a typical commute to work, whereas the TTS asks about all travel, including work trips, for a

specific day. These definitions lead to slight differences in the results, particularly in the usage of taxis, which may be used occasionally, including by low-income individuals, but are rarely a typical commute mode. Thus, it is not possible to generate true trends between 2011 and 2016, due to the different methodology, though the general pattern of low-income work trips seems quite similar over time.

Mode share comparisons are most useful when organized by travel markets, i.e. the origin and the destination of the trip. Figure 6-7 looks at 2016 work trips and compares all AM/PM work trips made by all individuals (already reported in Figure 6-6) and compares these mode splits to the travel patterns of low-income workers.

Figure 6-7: Mode share by travel market for peak period* work trips by all workers and low-income workers (2016)

* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. – 7:00 p.m.
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey

[3] Specifically, Low income status based on LICO-Before Tax (Person) was used to determine low-income status. The income thresholds can be viewed at http://www.statcan.gc.ca/pub/75f0002m/75f0002m2016002-eng.htm . In 2016, the TTS added household income and for the purpose of Figure 6-7 and Figure 6-8, low income is categorized as $0-39,999 in household income, regardless of household size.

Figure 6-8: Mode share for peak period* work trips by low-income workers by municipality of origin (2016)

Legend: ■ Transit ■ Auto ■ Walk/Cycle ■ Taxi/Other
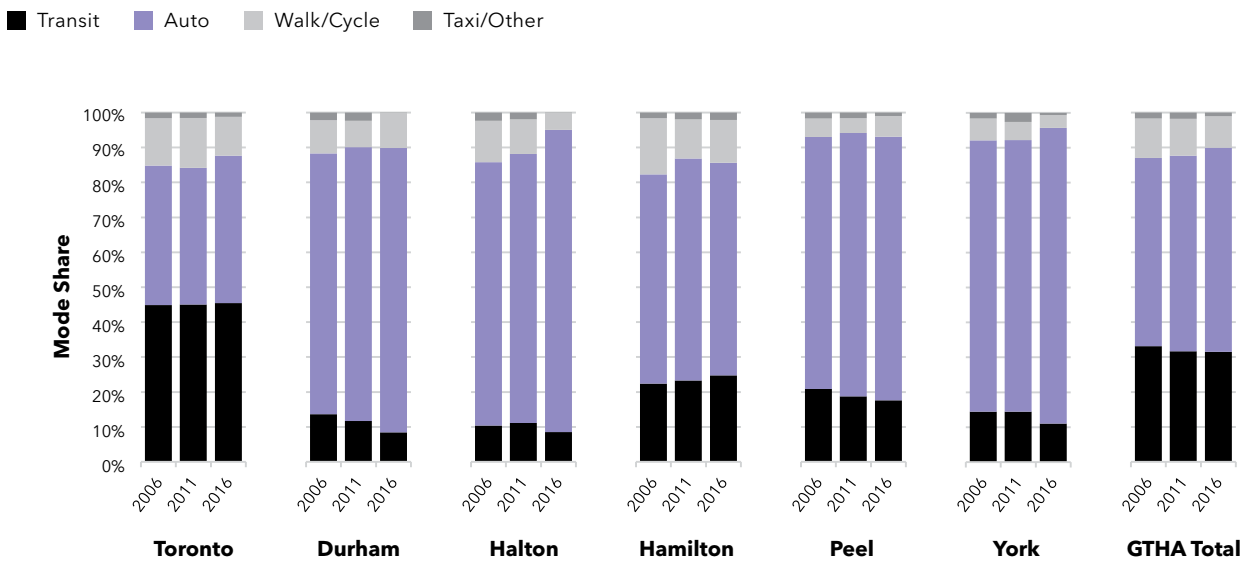
*Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. – 7:00 p.m.
Source: Statistics Canada 2006 Census and 2011 Census; University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey.

Figure 6-8 shows the mode split for work trips made by workers in low-income households, grouped by the municipality in which the work trip originated. For 2016, ride-sourcing was combined with taxi and "other" modes. There are several interesting findings, including that taxi/ride-sourcing to work in Toronto, while a very small percentage, does appear to be increasing.

Travel going to downtown Toronto from within Toronto has a broadly similar pattern, though low-income workers do rely more heavily on transit and less on auto modes. The shift away from auto is much more marked for Toronto work trips that do not begin or end downtown, where only 45.5% of these trips are made by auto, compared to 60.4% for all workers, though it is interesting that taxi/ride-sourcing is higher. While only a small percentage of work trips are made by taxi or ride-sourcing, a higher percentage of low-income work trips are being made by taxi or ride-sourcing across the board, with the exception of trips that begin and end in downtown Toronto. To some extent this reflects the fact that if a low-income individual needs an auto for some particular purpose, then they are generally more likely not to have an auto available and thus would be reliant upon taxis.[4]

[4] The same strategy can be found for low income individuals who use taxis to complete grocery shopping trips. See Clifton, Kelly J. "Mobility strategies and food shopping for low-income families: A case study." Journal of Planning Education and Research 23(4), 2004.

Trends by age

Perhaps the single most surprising finding is that low income workers from outside Toronto are considerably more likely to take an auto mode (50%) than the general population (31%), and indeed are more likely to travel by auto than to take transit downtown. Whether this is due to the perceived high cost of GO Rail fares or higher levels of carpooling/vanpooling or simply the need to be working shifts that do not coincide with GO Rail schedules is unclear. This finding, while affecting only a relatively small proportion of regional trips, should be probed further. Low-income workers making work trips outside of Toronto are considerably more likely to take transit or make an active trip than the general population, though auto use is still the dominant mode (over 90% for 905-to-905 travel).

Figure 6-9 focuses on travel by seniors. This is an extension of Figure 11 in the *Baseline Monitoring Report* with more geographic specificity (the results are grouped by the home municipality of the seniors making these trips). One of the more promising trends is that trips made by auto across all municipalities have declined after a long period of increase (1986 to 2011). The overall total in 2016 is 85%, a decrease of approximately 4% from 2006 and a decrease of over 5% from 2011. Even the taxi/ride-source trips have declined slightly, from a low base. This is offset by a small increase in transit use. It is worth noting that the overall transit use for all trips (10% in 2016) is still somewhat below the GTHA average for all trips (16% in 2016, as reported in Figure 6-4). The majority of the shift in behavior stems from an increase in active mode share (primarily walking) in all regions, with major increases found in Toronto.

Figure 6-9: Mode share for seniors (65+) by municipality of origin (total daily trips)
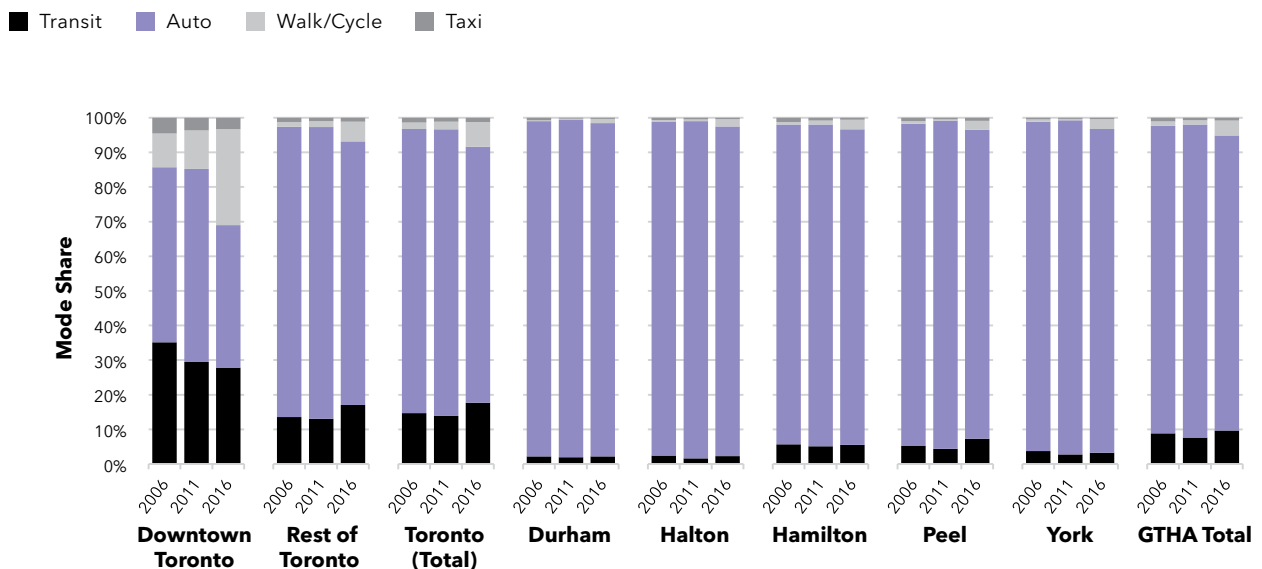
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

Figure 6-10 focuses on school trips made by children, aged 12-16. This is an extension of Figure 10 in the *Baseline Monitoring Report* with more geographic specificity (the results are grouped by the home municipality of the children making these school trips). In contrast to seniors, where there is a marked decrease in travel by auto, there was an increase in auto mode share for school trips from 1986 to 2011, though the auto mode share is largely stable between 2011 and 2016. Transit share is slightly up across all school trips in the GTHA, though this is largely driven by an increase in the rest of Toronto (from 31% in 2011 to 36% in 2016). Specific municipalities, such as Durham and Halton, had noticeable decreases in transit use between 2011 and 2016. School bus usage is up across all school trips in the GTHA, and walking/cycling (and other) trips are down slightly. Children living in downtown Toronto do demonstrate a counter-trend with a significant increase in active mode share and a steep decrease in school bus use.

Figure 6-10: Mode share for children (12-16) by municipality of origin (school trips)
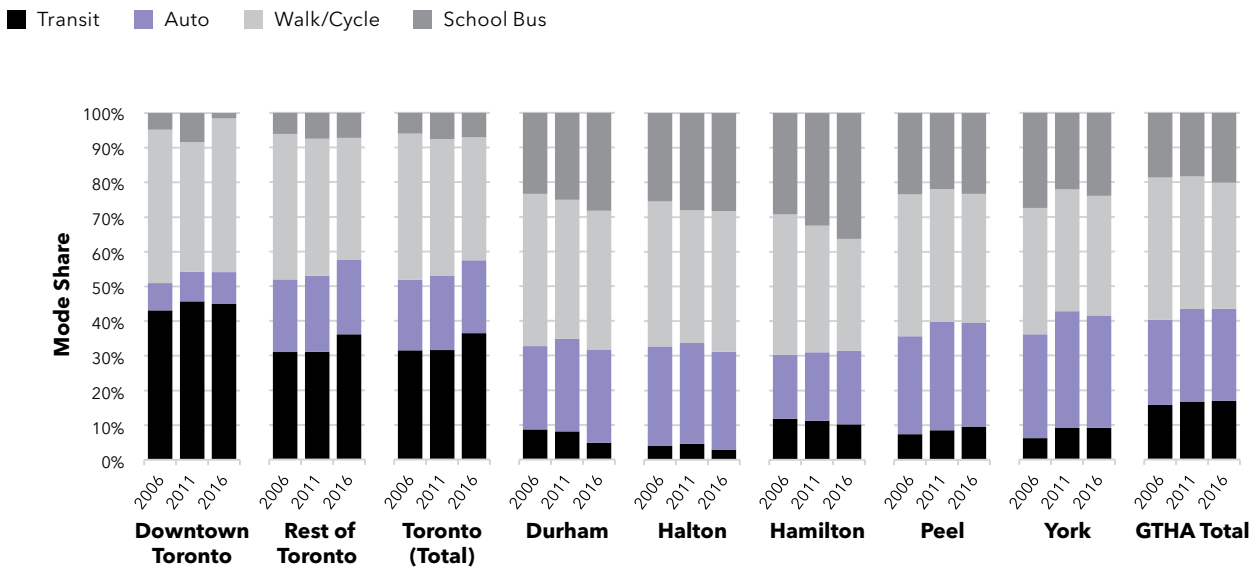
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

List of Acknowledgements

PEEL REGION
Wayne Chan
Lindsay Edwards
Sabbir Saiyed
Janette Smith

CITY OF BRAMPTON
Chris Duyvestyn
Rob Elliot
Brian Lakeman
Heather MacDonald
Malik Majeed
Bishnu Parajuli
Joe Pitushka
Alex Taranu
Henrik Zbogar

BRAMPTON TRANSIT
Alex Milojevic
Doug Rieger
Hank Wang

CITY OF MISSISSAUGA
Eniber Cabrera
Hamish Campbell
Pauline Craig
Helen Noehammer
Ed Sajecki
Matthew Sweet
Susan Tanabe
Erica Warsh
Geoff Wright

MIWAY
Mary-Lou Johnston
Geoff Marinoff

CITY OF TORONTO
Cayla Barda
Gayle Bursey
Nazzerno Capano
Ashley Curtis
Matthew Davis
Barbara Gray
Jacquelyn Hayward Gulati
Michael Hain
Jennifer Keesmaat
Gregg Lintern
Lindsay McCallum
James Perttula
Karen Thorburn

TORONTO TRANSIT COMMISSION
Jacqueline Darwood
Scott Haskill
Mark Mis

REGION OF WATERLOO
Debra Arnold
Michelle Sergi

YORK REGION
Steve Mota
Paul Jankowski
Valerie Shuttleworth
Mary-Frances Turner

YORK REGION TRANSIT
Ann-Marie Carroll

CITY OF MARKHAM
Loy Cheah
Brian Lee
Joseph Palmisano

TOWN OF NEWMARKET
Adrian Cammaert
Mark Krysanowski
Richard Nethery
Jason Unger

TOWN OF RICHMOND HILL
Richard Hui
Ahsun Lee
Hubert Ng
Dan Terzievski

CITY OF VAUGHAN
Stephen Collins
Selma Hubjer
Winnie Lai
Roy McQuillin
John MacKenzie
Andrew Pearce
Melissa Rossi
Jason Schmidt-Shoukri

MINISTRY OF TRANSPORTATION
Mauricio Alamillo
Brian Anders
Shireen Aslam
Pauline Beaupre
Sundar Damodaran
Graham DeRose
Marion Gale
Jiang Yang Hao
John Kemp
Sepideh Khairskhahi
Sophie McKenna
Amy Prisniak
Evan Roberts
Malvika Rudra
Kathy Ruston
Melanie Schade
Dawn Strifler
Shan Sureshan
Josh Switzman
Arthur Tai
Erik Thomsen
Jin Wang

ACADEMIC INSTITUTIONS
McGill University
Mowat Centre
Ryerson University
University of Toronto
University of Waterloo
York University

CONSULTING FIRMS
Access Planning
Brook McIlroy
CPCS
David Kriger Consultants Ltd.
Deloitte Analytics
Glenn Pothier GLPI
HDR
Hemson Consulting
Hertel Planning Associates
IBI Group
Kidd Consulting
MASS LBP
Northstar
Noxon Associates
Steer Davies Gleave
Thompson Ho Transportation Inc.
WSP

Detailed Appendix Photo Credits

Page#	Credit
141	Shey, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Yonge_St_%26_Bloor_St_W.jpg
141	Harry_nl, CC BY-NC-SA 2.0 <https://creativecommons.org/licenses/by-nc-sa/2.0>, via flickr. https://www.flickr.com/photos/harry_nl/49173724402
141	Robert Linsdell from St. Andrews, Canada, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Main_St_Underpass,_Winnipeg_(501460)_(14808084070).jpg
141	Tim Gouw punttim, CC0, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Busy_people_at_a_coffee_shop_(Unsplash).jpg
141	Used with permission by Kitty Chiu
141	Neal Jennings from Toronto, ON, Canada, CC BY-SA 2.0 <https://creativecommons.org/licenses/by-sa/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Allenby_Theatre_Toronto.jpg
144	Used with permission by Eric Petersen
144	Harry_nl, CC BY-NC-SA 2.0 <https://creativecommons.org/licenses/by-nc-sa/2.0>, via flickr. https://www.flickr.com/photos/harry_nl/49173724402
144	Ken Lund from Reno, Nevada, USA, CC BY-SA 2.0 <https://creativecommons.org/licenses/by-sa/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Junction_of_Highway_401_with_Kings_Highway_407,_Halton_Hills,_Ontario_(21651938910).jpg
144	booledozer, Public domain, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Distant_construction_cranes_in_Toronto,_2014_12_03_(7).jpg
144	Used with permission by Eric Petersen
144	Franklin Heijnen, CC BY-SA 2.0 <https://creativecommons.org/licenses/by-sa/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:UberEats_cyclist_in_Amsterdam.jpg
144	mark.watmough, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Toronto_Flash_Floods_June_2013.jpg
144	^ Missi ^ from Mississauga, Canada, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Spot_1_(6392781395).jpg