Discussion Paper

for the Next Regional Transportation Plan

GREATER TORONTO AND HAMILTON AREA

METROLINX
An agency of the Government of Ontario

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ABOUT METROLINX AND THE REGIONAL TRANSPORTATION PLAN

As the regional transportation agency for the Greater Toronto and Hamilton Area (GTHA), Metrolinx is committed to planning, building and operating transportation that supports a high quality of life, a thriving, sustainable and protected environment and a strong, prosperous and competitive economy.

Under provincial legislation, Metrolinx has a mandate to provide leadership in the co-ordination, planning, financing, development and implementation of an integrated, multi-modal transportation network that conforms with the policies of *Ontario's Growth Plan for the Greater Golden Horseshoe* and complies with other provincial transportation policies and plans in the regional transportation plan area. Metrolinx is also responsible for the operation of the regional transit system, GO Transit, the PRESTO electronic fare payment system and the UP Express airport rail link.

Metrolinx works closely with provincial ministries and the region's municipalities and transit agencies to implement the Regional Transportation Plan, and engages with civic, academic, business and community partners to realize the collective vision for the region's transportation system, as set out in the Regional Transportation Plan.

As Metrolinx embarks on a review of *The Big Move* – the first Regional Transportation Plan – we are marking a decade of championing multi-modal, connected and integrated mobility solutions in the Greater Toronto and Hamilton Area. The next Regional Transportation Plan will be made available in mid-2017.

Table of Contents

Executive Summary

A review of the GTHA's first Regional Transportation Plan (RTP), *The Big Move*, is underway. The review of the RTP provides an opportunity to take stock of and build on the foundation of *Big Move* projects. It supports us working together as a region toward the completion of an updated RTP in 2017.

The RTP guides the work being done to transform the way people and goods move in the Greater Toronto and Hamilton Area. Its Vision, Goals and Objectives provide a blueprint to support decision-making by municipalities, agencies, and the provincial government. Developed and implemented jointly with a diverse range of partners and stakeholders, the RTP sets out how the transportation system contributes to a high quality-of-life, thriving, sustainable and protected environment and a strong, prosperous and competitive economy, now and into the future.

This discussion paper presents an opportunity for the public, and all partners and stakeholders in planning, building and implementing the region's transportation system, to reflect on how well it is working today in the context of the *Growth Plan for the Greater Golden Horseshoe*, and on its performance in the future.

BUILDING MOMENTUM

Since 2008, great progress has been made, with 94% of *The Big Move* actions and policies completed/continuous or in progress. Together with Metrolinx, provincial ministries, municipalities, transit agencies, and stakeholders have implemented a wide range of *Big Move* transportation improvements. These efforts are transforming, and will continue to transform, mobility in the Greater Toronto and Hamilton Area. Some examples include:

The GO Regional Express Rail program is being implemented across the region, bringing two-way all-day rapid transit service to the region.

The region's first Light Rail Transit line is under construction along the Eglinton Avenue corridor.

Bus Rapid Transit is operating and continuing to be expanded in **York Region** and **Mississauga**.

UP Express has reached its one-year service milestone, connecting riders between Union Station and Lester B. Pearson International Airport.

The Toronto-York-Spadina Subway Extension is under construction – the first subway line to extend outside the City of Toronto.

Strategies to improve goods movement have been introduced across the region.

Ontario's #CycleON strategy is supporting municipalities in expanding cycling infrastructure and programs.

Hamilton and **Toronto** have introduced **bike-sharing programs**.

Municipalities have integrated **mobility hubs** into **official plans** and **transportation master plans**.

Transit agencies and **municipalities** are improving **specialized transit coordination** and delivery to facilitate **cross-boundary travel.**

The **Triplinx** regional transportation app and the **PRESTO** smart card are making getting around the region easier.

THE REGION'S TRANSPORTATION SYSTEM: KEY FACTS[1]

566
km of rapid transit in the GTHA

64
GO train stations

2
million PRESTO customers

Includes GO Service Area and Ottawa.

668
million transit trips taken in the GTHA annually

69.5
million GO transit annual boardings (2015)

300,000+
daily Union Station transit users

553
km of provincial highways within the GTHA

Includes 407 ETR (107km)

5
municipal expressways

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

3.46
million cars owned in the GTHA

33
carpool lots in the GTHA

3
international airports

Lester B. Pearson International Airport, John C. Munro Hamilton International Airport, Billy Bishop Toronto City Airport

13.6
million daily trips made by GTHA residents

1
ferry terminal

Toronto

2
freight intermodal terminals

Brampton, Vaughan

3
major ports

Toronto, Hamilton, Oshawa

KEEPING THE MOMENTUM GOING

Keeping this momentum going, leveraging current investments and continuing to work as a region by incorporating new and projected growth into our planning can drive the transportation system to keep up with and manage growth in a sustainable way. Progress is being made and every level of government has recognized the need to make significant investments in the region's transportation system. The provincial 2014 *Moving Ontario Forward* plan is an unparalleled provincial commitment to invest $31.5B over ten years for transit, transportation and other priority infrastructure projects across the province including approximately $16B for priority rapid transit projects in the GTHA. Public awareness of the mobility challenge and the need for timely solutions is being voiced across the region, creating the momentum that will help shape the updated RTP. Civic, business, academic and neighbourhood organizations have weighed in, contributing to a vibrant dialogue about the future of one of the world's most liveable urban regions.

Since the release of *The Big Move,* the planning context has continued to shift. This discussion paper reflects on past changes and how we can incorporate them into current and future efforts. Climate change and new mobility, for example, are altering the way we plan, build and operate transportation. There are new technologies, such as real-time trip planning and ride-sharing applications that need to be built into planning for mobility in the region. The region is moving out of a "catch-up" era and focusing on collaborative planning to better optimize investments, reflecting the perspective and growing experience of this region to create a regional transportation system that works into the future.

WORKING TOGETHER

The scope and timing of the Regional Transportation Plan review addresses the requirements of *The Metrolinx Act, 2006* and **aligns with the Province of Ontario's review of *The Growth Plan for the Greater Golden Horseshoe,*** which continues to call for compact development that makes the best use of land in the region, and an effective and integrated transportation system to keep people and goods moving sustainably.

The two plans work together to direct the region's population and employment growth to align with the transportation system. The updated RTP will work in concert with the efforts of the Province to manage growth and address climate change to 2041, another ten years beyond *The Big Move*'s original long-range planning horizon.

WHAT IS INCLUDED IN THE DISCUSSION PAPER?

We are re-igniting a conversation about a shared vision for the region's transportation system that looks at where we have been, what we need to do and the way to get there.

Throughout the paper we ask you to take a look at transportation planning in a regional context and to start thinking about the links between land use and transportation. Opportunities for transit, managing congestion, supporting active transportation, creating safer more complete streets and moving freight are some examples of topics that need your input to shape how our communities grow and how we will move around the region in the future.

This review of the RTP recognizes the need for on-going investment in transportation infrastructure to support growth and to update the RTP from the foundation provided by *The Big Move*. The emphasis on increasing transit mode share remains, to be accomplished through solutions that complement rapid transit investments, and address diverse market needs. This discussion paper proposes updating the original *Big Move* vision, goals and objectives, as well as exploring:

- Opportunities to leverage the committed transit investments;
- Opportunities to connect and align the transportation system in the region; and
- Opportunities for exploring and incorporating new mobility.

The updated RTP will be developed from a new baseline and incorporate emerging best practices and transportation innovations, aligned with current provincial plans, policies and guidelines.

WE WANT TO HEAR FROM YOU

This discussion paper is meant to spark a conversation across the region. At the end of the paper you will find the section called "**What Do You Think?**" intended to guide consideration of the Regional Transportation Plan's review, and we want to hear from you. The regional plan draws on the expertise of individuals and groups across the region. We need and welcome your feedback, experiences and participation in the process of updating the Regional Transportation Plan. This will help us collectively as we continue to improve connections in the Greater Toronto and Hamilton region over the next 25 years.

1
Opening Up The Conversation

A coordinated and integrated regional transportation plan is essential to address the challenges residents of this region face. The Regional Transportation Plan (*The Big Move*) is being updated with input from a wide range of partners, stakeholders and the general public. This is the beginning of our year-long conversation to determine the next Regional Transportation Plan.

MANDATE TO REVIEW. The review of the Regional Transportation Plan (RTP) is a requirement of the *Metrolinx Act, 2006*, which states that the RTP must be reviewed at least every ten years.

This discussion paper outlines Metrolinx's review of the Regional Transportation Plan. It includes an assessment of progress since 2008 and a look ahead to opportunities and challenges to inform the future update of the RTP. It invites readers to answer key questions as part of a public conversation about what the *next* plan should try to accomplish, and how.

Using the input received for this discussion paper, Metrolinx and its municipal partners will work towards the next RTP. A draft updated Regional Transportation Plan is planned for public comment in mid-2017, with the final RTP to be completed later that year. An Implementation Plan will follow, to be developed jointly with municipalities, identifying detailed processes, the roles of various partners and stakeholders, and a range of investment strategy tools to put the RTP into action.

Many technical and academic research reports have informed this review and will inform the development of the next RTP. More information is available at **www.metrolinx.com/theplan**.

1.1 A Dynamic Region

THE GREATER TORONTO AND HAMILTON AREA (GTHA) is a growing and prosperous metropolitan region. Its diverse and talented population, dynamic economy and robust institutions have helped it become an increasingly attractive place to live, work and invest. The GTHA is one of the fastest-growing regions in North America, expected to add approximately 110,000 new residents every year from 2011 to 2041, joining the 7 million people who are already here.[2] The need to keep the region moving over the long-term – to get people and goods where they need to go – is a complex task that involves several levels of government, service providers, businesses, communities, institutions and all of us as individuals.

OUR LIVES ARE INCREASINGLY MORE COMPLEX. More and more the demands of our lives require a greater variety of trips and destinations, and the region's transportation system needs to be able to grow and evolve to meet our ever-changing needs. This means we need a more multi-modal system, providing a range of options for people to get around, including driving alone or carpooling, cycling, walking, and taking local transit or taking GO Transit. Today, 79% of trips are made by car.[3] The transportation system also provides not only for people to move but also goods movement – by truck, rail and bicycle. The regional transportation system functions across many jurisdictions (see Figure 1). Together, the connectivity between the parts of the system has a large impact on how easily people and goods can travel in this region. Many different partners and stakeholders are involved in how each part of the system functions independently and how the different parts function together as a coordinated, integrated transportation network.

THE BIG MOVE is the current 25-year multi-modal Regional Transportation Plan (RTP) for the Greater Toronto and Hamilton Area (GTHA), adopted in 2008. It is the first regional transportation plan covering the entire GTHA. The plan was developed to conform to the *Growth Plan for the Greater Golden Horseshoe 2006 (Growth Plan)*[i] which together with the Greenbelt Plan sets out the Province's long term vision for where and how the region should grow. It has been the basis of prioritizing investment and initiatives over the last ten years.

THE REGION: KEY FACTS

8,242km²
size of the GTHA

9
municiple transit agencies

30
municipalities

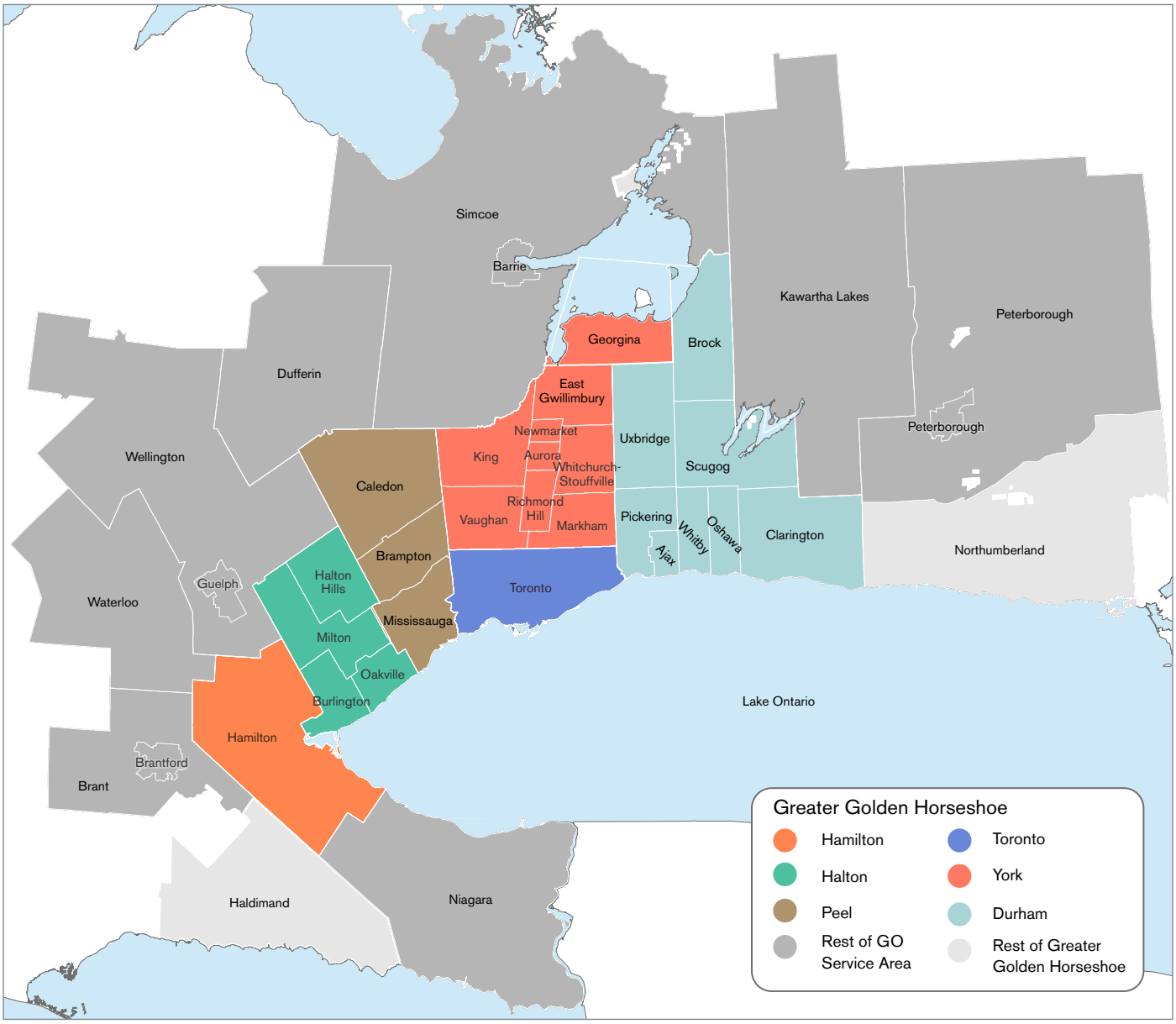
1.5
times the size of Prince Edward Island

1
regional transit agency

7.2
million people (2015)

[i] *An updated proposed* Growth Plan for the Greater Golden Horseshoe (2016) *has been released by the Ontario Growth Secretariat for public comment and feedback.*

Figure 1: Map of the Greater Golden Horseshoe, including the GTHA and the GO Service Area



GO Transit Service will be added to Brantford in Fall 2016.

PROGRESS. Since 2008, the Province, Metrolinx, GTHA municipalities and transit agencies have invested historic levels of funding, as well as energy and experience, to support the growth and mobility of the region. The region is now beginning to experience the impact of investments in rapid transit infrastructure. Many projects from *The Big Move* have received committed funding, are being built or are complete, allowing for a reset of the foundation for the next 25 years, to 2041. The next Regional Transportation Plan will be recalibrated to reflect the accomplishments of regional and local area municipalities, transit agencies, Metrolinx, the Province and others to implement *The Big Move*. We now know so much more about the region and the transportation system, which creates an even better position from which to develop the next plan.

SO MUCH HAS CHANGED. The world in 2016 is different than it was in 2008. Many of the factors that influence transportation needs and solutions have changed – economic trends, development patterns, municipal priorities, funding gaps and opportunities, energy and climate change concerns, income distribution, technology and new business models – and this will lead to different objectives and responses.

NEW WAYS OF DOING THINGS. The transportation "toolbox" has expanded over the last decade. There are more, and better, ways to meet the region's goals – such as the Triplinx online travel planner, the PRESTO electronic fare card, new cycling facility designs, and best practice guidelines for creating mobility hubs and transit- and freight-supportive communities.

NEW HORIZON YEAR – 2041. As the ten-year anniversary of *The Big Move* approaches, the current review of Ontario's plans for the Greater Toronto and Hamilton Area and for the Greater Golden Horseshoe will use a planning horizon of 2041 rather than 2031. That represents an additional decade of population and employment growth to be served by the region's planned transportation system. Regional planning initiatives will be aligned, taking into consideration the same horizon year.

THE REGION'S TRANSIT SYSTEM

Local Transit in the GTHA is provided by nine agencies: the Toronto Transit Commission (TTC), the Hamilton Street Railway; Oakville Transit, Burlington Transit and Milton Transit in Halton Region; Brampton Transit and Mississauga Transit in Peel Region; York Region Transit/Viva in York Region; and Durham Region Transit.

Regional transit is provided by GO Transit trains and buses in the GTHA, and beyond. Seven GO Train lines radiating across the region from Union Station operate in weekday peak periods, with some off-peak and weekend service, and multiple GO Bus routes also extend across the regional service area.

UP Express airport rail service provides access between Union Station rail terminal and Lester B. Pearson International Airport.

1.2 Thinking as One Region

Metrolinx was created in 2006 to ensure the region's transportation system would function as a whole – greater than just the sum of its parts – to meet current and future needs of the growing population.

People travel across municipal boundaries because many activities of our daily lives – work, higher education, leisure, recreation and health care – are organized within the broader region. Municipal governments have transportation and land use plans that support local goals and objectives in moving people and goods within their boundaries, but people's trips and the movement of goods – to meet daily needs for work, school, business and other activities – take place within a single economic region. To function effectively to meet diverse transportation needs, the transportation system and its key elements (e.g. transit, road and freight systems) need overall coordination and integration to deliver maximum benefits for all.

A VISION FOR GROWTH IN THIS REGION. Through the *Provincial Policy Statement* and the *Growth Plan for the Greater Golden Horseshoe (Growth Plan)*, the Province of Ontario has committed to a vision of a vibrant, compact and transit-supportive region. The *Growth Plan* sets the vision for the region and its urban structure, and Metrolinx and municipalities are required to conform to the *Growth Plan* and work to implement this vision in the Greater Toronto and Hamilton Area. The Province is undertaking a coordinated review of the four provincial land-use plans that cover the Greater Golden Horseshoe area, including the *Growth Plan*, the *Greenbelt Plan*, the *Oak Ridges Moraine Conservation Plan*, and the *Niagara Escarpment Plan*. Many of the proposed amendments to the four plans are aimed at building more complete communities, mitigating the impacts of climate change, and better linking transit to where people live and work.

The proposed amendments to the *Growth Plan*, released in May 2016, provide an even stronger framework for a more compact and transit-supportive region. Higher intensification rates (60%), higher designated greenfield area targets (80 people and jobs per ha) and major transit station area targets, as well as strengthened policies around settlement area expansion, will collectively provide significant support for optimizing provincial transit investments.

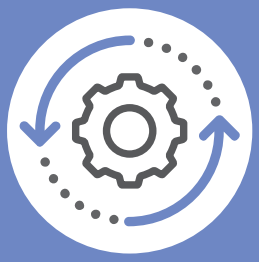
BLUEPRINT FOR A REGIONAL TRANSPORTATION SYSTEM. In 2008 *The Big Move* – the first RTP for the region – was established by the Metrolinx Board of elected representatives to guide and advance shared goals and objectives for mobility in the GTHA. Today, the RTP helps us to create, recognize and act on the opportunities that come from thinking, planning and moving as one region. As a guiding document, the RTP describes what the Province, Metrolinx and municipalities should address to support optimal mobility and access within the region. It outlines the policies, infrastructure and services required to meet shared goals like managing congestion, improving the commuting experience, limiting emissions and intensifying development. The Ontario Ministry of Transportation has also commenced a process to develop a long-term multi-modal transportation plan for the broader Greater Golden Horseshoe region, that will build on the RTP and the *Growth Plan*, and look ahead at the transportation challenges and opportunities for 2051 and beyond.

DELIVERING ON THE PLAN'S PROMISE. Since the creation of the RTP, the Province of Ontario has supported Metrolinx in delivering on the plan. The *Moving Ontario Forward* program of over $31.5 billion for the next 10 years is of historic proportion and is an investment that many stakeholders have identified as being long overdue.

Ontario climate change initiatives complement both the policy directions, and the infrastructure investments to take the region even further beyond the 25 year horizon of the RTP and the *Growth Plan*.

Ontario climate change initiatives complement policy directions and infrastructure investments in order to take the region beyond the 25-year horizon of the RTP and the *Growth Plan*.

Together with numerous local supporting actions by municipalities, the private sector, and the not-for-profit sector, we are increasingly moving forward with a more coherent and integrated vision of a sustainable future for the region.



2
Ten Years of Progress

This section describes progress made in implementing *The Big Move*'s strategies and actions. It begins with an overview of progress to-date, followed by a description of the many committed projects in the Regional Transportation Plan that are now either completed, continous or in progress.

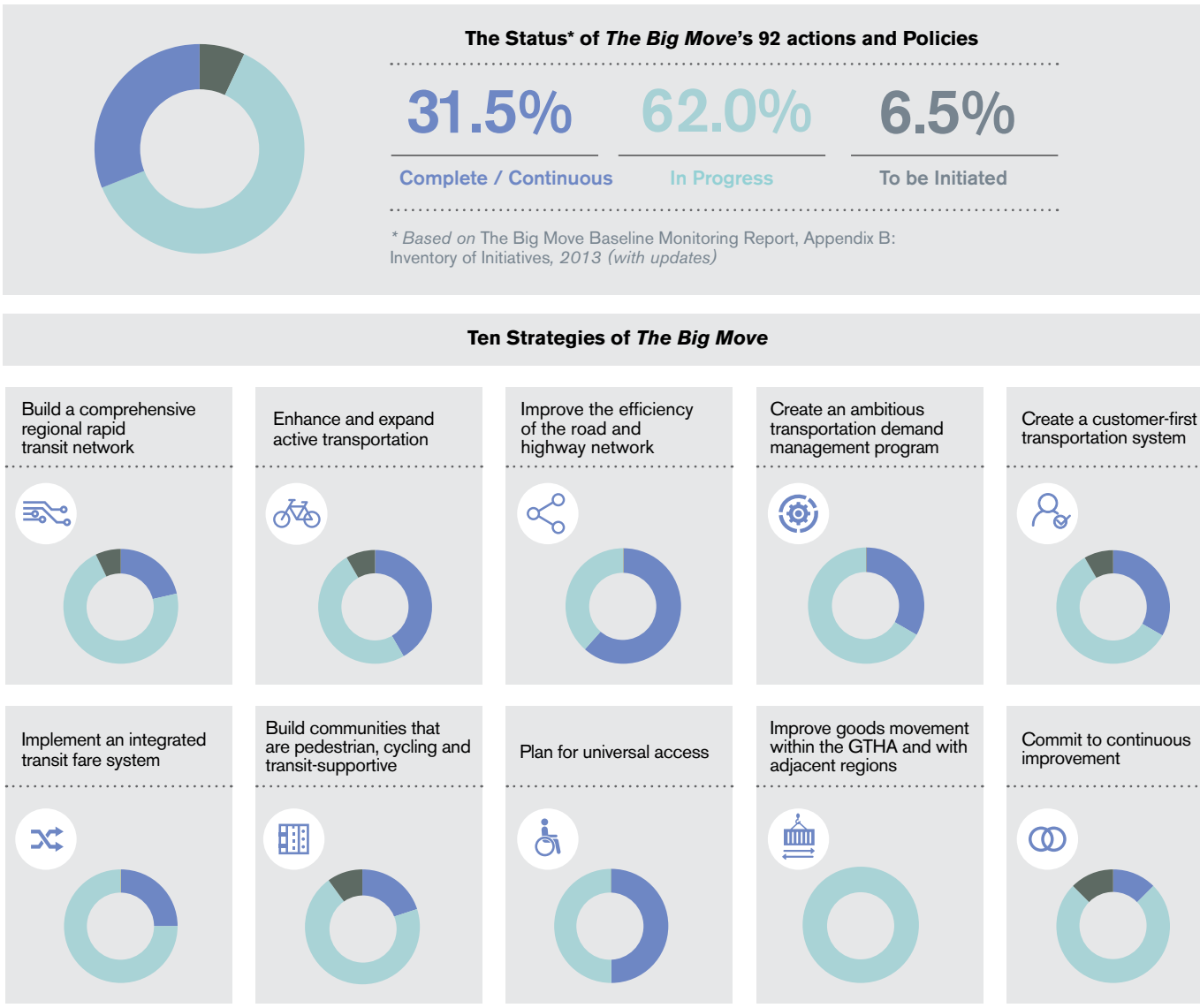
2.1 *The Big Move*: Meeting the Challenge

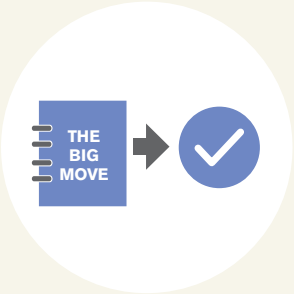
THE BIG MOVE set out ten strategies to achieve its Vision, Goals and Objectives (See Figure 2). The plan sets out a bold shift in thinking about all modes of transportation: the shift from a focus on moving vehicles to prioritizing the movement of people, proposing a change in perspective about how our system is designed and how it functions.

Today, progress is represented by the fact that 94% of the plan's actions and supporting policies are complete/ continuous or in progress (see Figure 2).[4] (See *The Big Move Priority Action* and *Supporting Policy technical paper* for full list.)

PUTTING THE TEN STRATEGIES IN MOTION. While putting major rapid transit investments in motion, Metrolinx and its many partners have also been implementing numerous projects and initiatives that reflect the full breadth of the ten strategies in *The Big Move*. Together, these initiatives are having an impact on mobility in the region. *The Big Move Baseline Monitoring Report (2013)* provides a comprehensive review of progress on all of the actions and policies in *The Big Move*.

Figure 2: Progress on Implementation





EXAMPLES OF *THE BIG MOVE* IN ACTION

Strategy #1
BUILD A COMPREHENSIVE REGIONAL RAPID TRANSIT NETWORK

- Metrolinx is introducing GO Regional Express Rail and launched UP Express
- The City of Toronto, Metrolinx and their partners are revitalizing Union Station
- Metrolinx is continuing construction on the Eglinton Crosstown LRT in Toronto, and has provided the GO rail extension to Kitchener-Waterloo
- Mississauga's MiWay is completing a bus rapid transit system
- York Region is upgrading its bus system with separated rapidways, under VivaNext

Strategy #2
ENHANCE AND EXPAND ACTIVE TRANSPORTATION

- Metrolinx added walking and cycling bridges and underpasses across major highways, rail lines and waterways
- Public transit agencies added bike racks to all GTHA transit buses
- Ontario introduced the provincial #CycleON strategy
- Municipalities provided new walking and cycling facilities – from trails to painted or separated bicycle lanes – and updates to active transportation plans
- Hamilton and Toronto, launched their bike-sharing programs

Strategy #3
IMPROVE THE EFFICIENCY OF THE ROAD AND HIGHWAY NETWORK

- MTO is building new carpool parking lots, high-occupancy vehicle lanes on 400-series highways, and extensions to Highways 410, 404, 407 and 427
- Metrolinx introduced priority parking for carpool users at 49 GO Transit stations
- Municipalities added capacity to arterial roads across the region

Strategy #4
CREATE AN AMBITIOUS TRANSPORTATION DEMAND MANAGEMENT PROGRAM

- Municipalities and Metrolinx expanded the Smart Commute workplace program to provide TDM programming for approximately 330 members (with 720,000 employees), and launched many initiatives to support active school travel

Strategy #5
CREATE A CUSTOMER-FIRST TRANSPORTATION SYSTEM

- Metrolinx launched the Triplinx regional travel planning tool
- Toronto, Hamilton, Brampton, Durham and York Region transit agencies and Metrolinx introduced real-time information for transit services
- Metrolinx supported the Call-One joint paratransit booking centre during the 2015 PanAm Games
- Metrolinx and local transit providers are developing a seamless network wayfinding program

Strategy #6
IMPLEMENT AN INTEGRATED TRANSIT FARE SYSTEM

- Metrolinx, UP Express and all transit agencies (except Milton) have adopted the PRESTO fare card system
- Metrolinx and GTHA transit providers outside Toronto have fare integration agreements providing discounted travel on municipal transit to-and-from GO services

Strategy #7
BUILD COMMUNITIES THAT ARE PEDESTRIAN, CYCLING AND TRANSIT-SUPPORTIVE

- Metrolinx introduced *Mobility Hub Guidelines* and the *GO Transit Rail Parking and Station Access Plan* (now being updated in the context of GO RER)
- MTO published the *Transit-Supportive Guidelines*
- Municipalities have integrated mobility hubs into official plans and transportation master plans
- Metrolinx and GTHA municipalities have initiated parking studies, such as Mississauga's parking strategy for the City Centre

Strategy #8
PLAN FOR UNIVERSAL ACCESS

- Metrolinx established the regional Accessibility Advisory Committee comprised primarily of people with disabilities, to provide input on the accessibility elements of a broad range of Metrolinx projects
- Municipalities and transit agencies are improving specialized transit coordination and delivery including establishing a Memorandum of Understanding that recognizes eligibility between specialized transit service providers to facilitate cross-boundary travel

Strategy #9
IMPROVE GOODS MOVEMENT WITHIN THE GTHA AND WITH ADJACENT REGIONS

- Metrolinx undertook the *GTHA Urban Freight Study*, established the multi-sectoral GTHA Urban Freight Forum and an urban goods movement data framework
- Ontario published the *Freight-Supportive Guidelines*
- GTHA regions are taking a strategic approach to goods movement, with a range of studies and plans, such as the Region of Peel's *Goods Movement Strategic Plan*

Strategy #10
COMMIT TO CONTINUOUS IMPROVEMENT

- Metrolinx has undertaken new research into a variety of transportation questions and supported local initiatives across the region, such as Milton's dynamic transit pilot project
- Collaborative partnerships have been established with the University of Toronto's Transportation Modelling Group, as well as with local and regional municipalities, non-governmental organizations and academic institutions

2.2 Expansion of the Rapid Transit System

One of the most dramatic shifts that followed *The Big Move* was the expansion of the region's rapid transit system, starting with the early successes of the 2008/2009 "Quick Wins" program. The priority projects identified by the RTP garnered the "First Wave" of investments that totalled over $16 billion. Through the *Moving Ontario Forward* program in 2015, an additional $15.5 billion has been proposed to advance the "Next Wave" projects in the GTHA.

Figure 3 presents a map of rapid transit in 2008, and Figure 4 presents a map of funded GTHA rapid transit projects expected to be completed by 2025, as well as "Next Wave" projects that are being advanced through further planning and design.

A HUGE STEP FORWARD: GO REGIONAL EXPRESS RAIL: The impact of the RTP reverberated in 2015 when the Province of Ontario announced its commitment to faster, more frequent, GO rail service with electrification on core segments of the network including UP Express. This initiative will transform the GO rail network from a largely rush-hour service into an all-day, two-way rapid transit network, increasing transit ridership, reducing trip times and helping to manage congestion. The GO RER concept was set out in *The Big Move* and is continuing to be implemented through the Province's *Moving Ontario Forward* plan.

Today, GO RER is creating new potential across the region, with a view to improving convenience, unlocking development potential, and making employment centres more accessible with 15-minute frequent train services. Rush-hour GO rail services will also be expanded in order to make connections to other transit systems more convenient and to reduce customers' reliance on schedules. GO RER will provide four times the number of trips in off-peak periods, such as evenings and weekends, and twice the number of trips during peak rush-hour periods. Upgrading most of the GO rail system from diesel to electric engines on core areas of the network will enable faster travel speeds, more frequent service, and reduced operating costs and emissions.

Every area of the GTHA will see improvements with GO RER. GO ridership is anticipated to almost double – an increase to approximately 127 million customers – within five years of completion.[5]

Figure 3: GTHA Rapid Transit Network in 2008

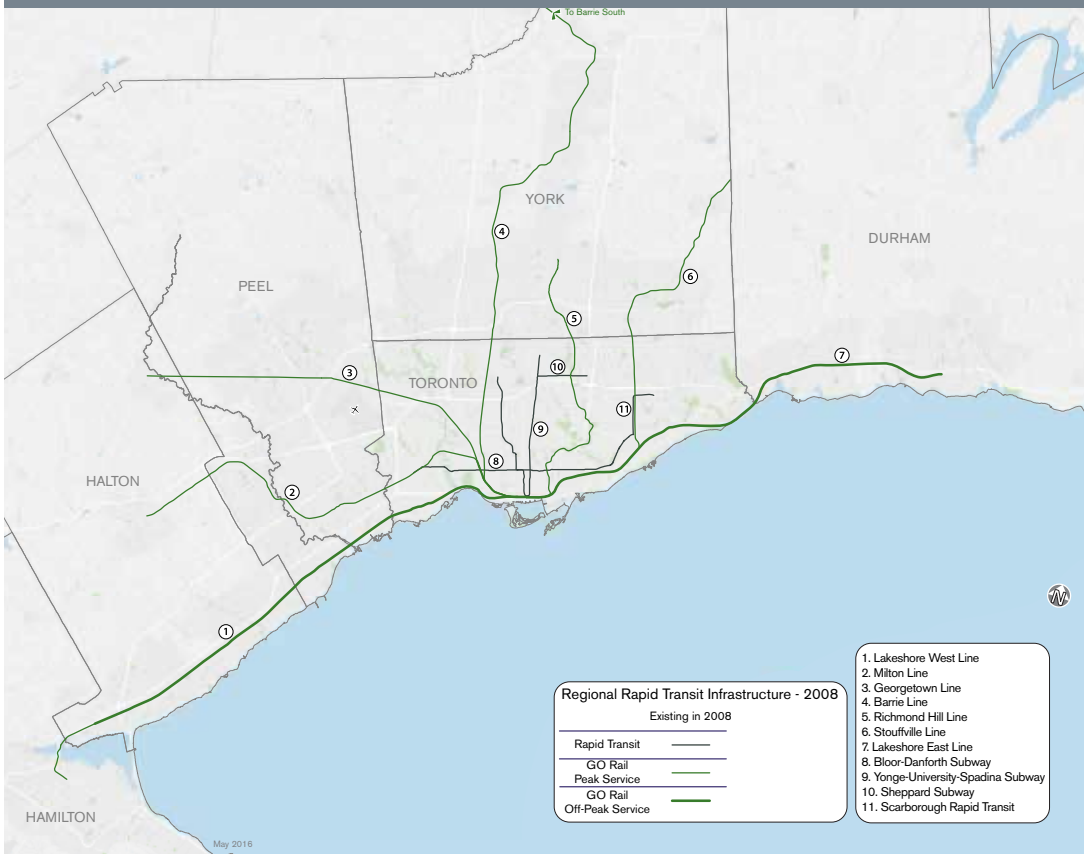


Figure 4: GTHA Rapid Transit Network in 2025 (Funded and Completed Projects) and Projects under Development

RTP QUICK WINS and FIRST WAVE PROJECTS

The first steps to implement *The Big Move* included:

$740 million worth of "Quick Wins." Completed projects include an expansion of GO Transit's bus and rail fleet, the acquisition of new buses for municipal transit agencies, the introduction of the "DRT Pulse" enhanced bus service in Durham and the addition of bike racks on every bus in the GTHA.

"First Wave" projects. The implementation of the rapid transit network identified in *The Big Move* began in earnest with the commitment of significant funding to a "First Wave" of transit projects drawn from the Plan's list of Top Priority transit projects. While several projects have been completed, many are currently in the planning or building phases of implementation.

Projects partially or fully operational, since 2008:

York Region VivaNext rapidways (first major segment opened 2013). This project includes more than 34 km of dedicated express bus lanes on major roads including Highway 7, Yonge Street and Davis Drive.

Mississauga Transitway (first segment opened 2014). This 18 km corridor that parallels Highway 403 and Eglinton Avenue will allow buses to run unhindered by general traffic when fully completed, connecting the TTC subway system, Mississauga City Centre and employment hubs such as the Airport Corporate Centre.

UP Express (Opened 2015). This direct rail link between Toronto Pearson International Airport and Union Station offers 15-minute frequency with stops at Weston and Bloor GO stations.

GO Transit rail service expansion (on-going). Multiple projects to expand the extent, quality and quantity of regional rail service as identified in *The Big Move* have been completed since 2008, including the introduction of hourly bi-directional mid-day service on the Kitchener line between Union and Mount Pleasant and the extension of the Lakeshore West line to the new West Harbour station in Hamilton. The extension of the Richmond Hill line to the new Gormley station will open in late 2016. This GO expansion has been supported by upgrades to Canada's busiest transportation hub, Union Station, as prioritized in 2008 as "Big Move #3". Completed and ongoing work includes revitalization of the train shed and switches as well as expanded concourses, new PATH connections, and a second subway platform intended to accommodate a significant increase in passenger flow.

Projects currently being planned, designed or built (but not complete):

Toronto-York Spadina Subway Extension (Planned opening late 2017). This extension from Downsview Station to Vaughan Metropolitan Centre will be the first subway line to extend outside of the City of Toronto.

Eglinton Crosstown LRT (Planned opening 2021). This 19km route, with more than 10km underground, will carry riders across Toronto from Weston Road to Kennedy subway station.

Finch West LRT (Planned opening 2021). This 11km line will run from the Finch West subway station now under construction at Keele Street to Humber College.

Sheppard East LRT (dates to be determined). This line will run almost 13km from Don Mills subway station to east of Morningside Avenue.

Scarborough Rapid Transit (dates to be determined). The funding for the Scarborough Rapid Transit project identified in *The Big Move* in 2008 has been reallocated to a replacement project led by the City of Toronto, the extension of the Bloor Danforth subway. The Scarborough subway extension is currently in the planning phase.

RTP NEXT WAVE PROJECTS

A "Next Wave" of projects was initially identified in 2012, drawing from the balance of *The Big Move*'s list of Top Priority projects. The proposed scope of GO rail expansion would be further enhanced following the provincial government's 2014 commitment to GO Regional Express Rail.

Projects with full funding commitments include:

GO Regional Express Rail (Phased implementation 2014–2024). The GO RER program is a $13.5 billion capital investment to transform the GO network from a commuter-oriented service to a comprehensive regional rapid transit option. Service levels on all seven GO rail lines will expand and electric service, (every 15 minutes or better in both directions throughout the day), will be introduced on core areas of five lines: Lakeshore East, Lakeshore West, Kitchener, Barrie and Stouffville. UP Express electrification will also be achieved through the GO RER program.

Hurontario LRT (Planned opening 2022). This 20-km service between Port Credit and the Brampton Gateway terminal at Steeles Avenue will link four mobility hubs and support planned urban growth areas. It will connect to the Mississauga Transitway and planned Dundas Street BRT as well as the Milton and Lakeshore West GO lines.

Hamilton LRT (Planned opening 2024). This project will run across the lower portions of the City of Hamilton, connecting McMaster University to Queenston Circle through the city's downtown core. It will connect to West Harbour GO station as well as a future pedestrian link to Hamilton GO Centre.

Additional Next Wave projects with planning and design underway include:

Relief Line. This new rapid transit line would provide new access options to the GTHA's largest employment area, downtown Toronto, and relieve Yonge subway line congestion.

Yonge North Subway Extension. This proposed extension from Finch Station in Toronto to Highway 7 in Richmond Hill would be the second subway extension reaching beyond the City of Toronto, connecting to Viva BRT lines running to the north, west and east as well as the Richmond Hill GO line.

Dundas Street BRT. This 40km east-west transit project would cross the western GTHA, connecting Brant Street in the City of Burlington to Kipling subway station in Toronto. It would connect the Milton GO line, the Bloor-Danforth subway and the Hurontario LRT.

Durham-Scarborough BRT. This new line would run from the Scarborough Civic Centre in Toronto to downtown Oshawa in Durham Region via Highway 2, connecting the downtown cores of Pickering, Ajax, Whitby and Oshawa to one another and offering Durham residents improved access to the TTC rapid transit network.

NEXT WAVE RAPID TRANSIT PROJECTS WILL ENABLE MORE PEOPLE TO REACH JOBS AND MEET OTHER DAILY NEEDS USING TRANSIT.

GTHA jobs and residents within 800m of rapid transit

2011 Rapid transit network		2031 Rapid transit network[6]	
9%	of residents	21%	of residents
19%	of jobs	33%	of jobs

The implementation of all Next Wave rapid transit projects has been forecasted to create up to:

900,000 person-years of employment

and contribute up to

$130B to Ontario's economy[7]

3 The Next Plan

The next Regional Transportation Plan will build on the foundation provided by *The Big Move*. This section explores the opportunities and challenges that have arisen since 2008. Some of these are outlined in the box on the next page.

A SHARED REGIONAL VISION

By updating the Regional Transportation Plan's Vision, Goals and Objectives.

BRINGING ALL PUBLIC TRANSIT SYSTEMS TOGETHER

By expanding, improving and integrating the GTHA's family of transit services.

MORE THAN JUST TRANSIT

By improving the travel experience and cooperation by better integrating active transportation, road efficiency, congestion management, goods movement, transportation demand management and supportive land uses.

NEW MOBILITY

By preparing for a potential transformation of urban transportation, sparked by advances in technology and business model innovation brought by new entrants to the transportation sector.

3.1 A Shared Vision: Updating the Vision, Goals and Objectives

A STRATEGIC FOUNDATION. The policies and actions in a long-range transportation plan should be based on a strong conceptual foundation. In 2008, that foundation was set by municipal leaders, key stakeholders and the general public. Now, as part of developing the next RTP, Metrolinx has begun consulting in order to review and update The Big Move's Vision, Goals and Objectives.

The aim of the review and update of the RTP Vision, Goals and Objectives is to:

- Ensure the Vision continues to resonate with that of stakeholders;
- Clarify the distinction between the Vision, Goals and Objectives;
- Consolidate the 13 existing Goals with a greater focus on transportation;
- Reduce redundancy between the Goals and Objectives, and
- Better align the Objectives with existing or desired data, including the Key Performance Indicators (KPIs) described in the *The Big Move Baseline Monitoring Report (2013)*.

The key triple bottom line messages found within the original Vision still hold in 2016 and have been left largely intact, with some minor modifications. The 13 original Goals and 37 Objectives have been consolidated into 6 Goals and 19 Objectives in the proposed draft. Figure 5 illustrates the original and proposed RTP Goals.

Proposed Updated Vision, Goals, and Objectives

VISION

"In 2041, the region's integrated transportation system will allow people to get around easily and will contribute to a high quality-of-life, a thriving, sustainable and protected environment, and a prosperous and competitive economy. It will:

- Offer a variety of options for getting around reliably, comfortably, conveniently and safely, contributing to a **high quality-of-life**;
- Make it easy to choose modes of travel that reduce our environmental footprint and contribute to a **thriving, sustainable and protected environment**; and
- Connect people to jobs, move goods and deliver services efficiently throughout the region, supporting a **strong, prosperous and competitive economy.**"

Figure 5: Original and Proposed Updated RTP Goals

ORIGINAL GOALS	PROPOSED GOALS
A. Transportation Choices B. Comfort and Convenience (split) J. Multi-Modal Integration K. Interconnectedness	A. CONNECTIVITY, CONVENIENCE AND INTEGRATION B. EQUITY AND ACCESSIBILITY
B. Comfort and Convenience (split) D. Safe and Secure Mobility C. Active and Healthy Lifestyles	C. HEALTH, COMFORT AND SAFETY
H. Foundation of an Attractive and Well-Planned Region	D. A WELL-PLANNED REGION
F. A Smaller Carbon Footprint and Lower Greenhouse Gas Emmissions G. Reduced Dependence on Non-Renewable Resources	E. EXEMPLARY ENVIRONMENTAL FOOTPRINT
I. Prosperity and Competitiveness L. Efficiency and Effectiveness E. Fairness and Transparency M. Fiscal Sustainability	F. PROSPERITY AND COMPETITIVENESS

GOAL A: CONNECTIVITY, CONVENIENCE AND INTEGRATION

OBJECTIVES

1. People have appropriate, realistic options to move easily and reliably from place to place.
2. People have the information they need to optimize their travel decisions.
3. Transit services and fares are seamlessly integrated.
4. All transportation modes are coordinated.

GOAL B: EQUITY AND ACCESSIBILITY

OBJECTIVES

5. Transit offers affordable access to jobs, services and major destinations, and is competitive for most trips.
6. Transit fleets and transportation infrastructure, services and technology are accessible to users of all ages and abilities.

GOAL C: HEALTH, COMFORT AND SAFETY

OBJECTIVES

7. Walking and cycling are attractive and realistic choices for most trips.
8. Transit offers an attractive, high-quality user experience.
9. People feel safe and secure when travelling, with continuous progress toward eliminating injuries and deaths from transportation.
10. Goods are moved safely and securely.

GOAL D: A WELL-PLANNED REGION

OBJECTIVES

11. The transportation system supports compact and efficient development.
12. Integrated transportation and land use planning reduces the need for travel and encourages walking, cycling and taking transit.
13. Transit infrastructure and services have the capacity to meet demand.

GOAL E: AN EXEMPLARY ENVIRONMENTAL FOOTPRINT

OBJECTIVES

14. The transportation system is adaptive and resilient to the stresses of a changing climate, uses resources efficiently, and fits within the ecosystem's capacity.
15. The transportation system contributes to the achievement of provincial targets for greenhouse gas emission reductions.

GOAL F: PROSPERITY AND COMPETITIVENESS

OBJECTIVES

16. Travel times are predictable and reasonable.
17. The transportation system offers value to users and governments by providing economical, reliable and environmentally sustainable movement of people and goods.
18. Governments promote innovation in the transportation sector.
19. Sustainable, coordinated funding supports transportation operations, maintenance and expansion.

CROSS TOWN TRAVEL TIMES CUT IN MISSISSAUGA WITH BUS RAPID TRANSIT (BRT)

MISSISSAUGA, PEEL REGION

Upon full implementation in 2017, the BRT will serve 5 million riders annually, saving riders an average of between 15 and 18 minutes on a crosstown journey. It features heated waiting areas, WiFi, full accessibility, and multi-modal integration with bicycle lockers at each of its 12 stations.

Building the Plan

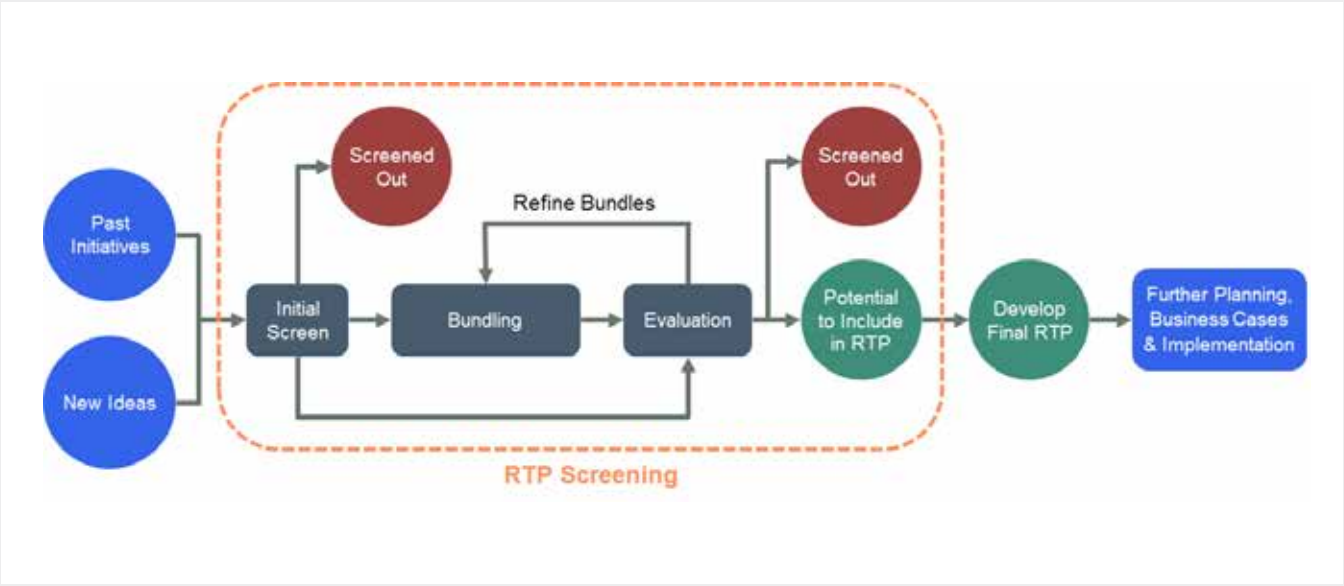
The updated Vision, Goals and Objectives will provide the foundation for evaluating initiatives for the next Regional Transportation Plan. Just as *The Big Move* featured a series of transportation projects, prioritized to realize the Vision, Goals and Objectives, the next plan will feature both priority transportation projects and region-wide programs alongside complementary initiatives.

This plan development process will inventory a wide variety of programs, policies and projects, including projects that have not been initiated to date from *The Big Move*; ideas from provincial and municipal partners, stakeholders and the public; as well as those that are generated internally through Metrolinx's research and development. In order to develop the next regional plan, Metrolinx will apply an initial screening to determine what should proceed to the next step of the process and how they should be bundled with complementary programs or projects for the evaluation phase.

The projects, programs and policies will be assessed against their expected contributions toward achieving the Vision, Goals, and Objectives of the RTP, and to advancing the RTP key performance indicators. The evaluation criteria will be both qualitative and quantitative, and will be designed to capture changes that can positively influence travel outcomes (e.g. reduced journey times, improved transit access) or quality-of-life (e.g. reduced emissions, improved safety or physical activity). An overview of the proposed approach is shown in Figure 6.

The RTP screening is applied at the early stages of planning, whereas the Metrolinx Business Case multi-account framework and the Metrolinx Project Prioritization Framework occur later in the planning process. All of these processes are used to assist Metrolinx in delivering results.

Figure 6: RTP Screening



3.2 Leveraging the Transit Investment

The Big Move's approach to addressing the need to "catch up with growth" was to recommend a dramatic expansion of major transit infrastructure across the region. While considering the need for additional infrastructure, the updated Regional Transportation Plan will focus more on the need to make the best possible use of the region's transit assets and maximize the return on prior investments. This section discusses a number of ways in which Metrolinx and its partners can do this, thereby making transit and other modes an even more valuable and integral part of daily life for millions of the region's residents.

The next RTP will recognize the need to attract new riders while also investing in those who are already using transit today, providing them with greater access, frequency, reliability, speed, affordability, comfort and convenience.

Creating a more seamless regional transit experience for customers will present several challenges: better integrating GO Transit with nine municipal transit systems (and integrating the nine with each other); providing better connections between transit and other modes; leveraging the power of new mobility technologies and business models while avoiding their pitfalls; meeting public expectations, and overcoming fiscal challenges.

A variety of strategies are needed to address the different transit markets in the region. A range of options exist depending on conditions in any given market area. For example, areas with slower growth and lower densities need different approaches from areas with higher growth and higher densities. Some options – like shared mobility – may have the greatest potential to address gaps in an existing low growth area with low transit mode share, while the biggest impact in a high growth, high transit mode share area may be made by enhancing local transit service, or by combining enhanced local service with other options. However, no option needs to be considered in isolation from others (see Figure 7).

GO Regional Express Rail: A Critical Catalyst

The next RTP will need to reinforce the commitments and progress that the GO Regional Express Rail is delivering by 2024. This program is now more than just lines in *The Big Move*. The next RTP will need to reflect the specifics of the committed program currently under construction and represent specific implications for addressing growth in the region for an additional ten years out, to 2041.[8]

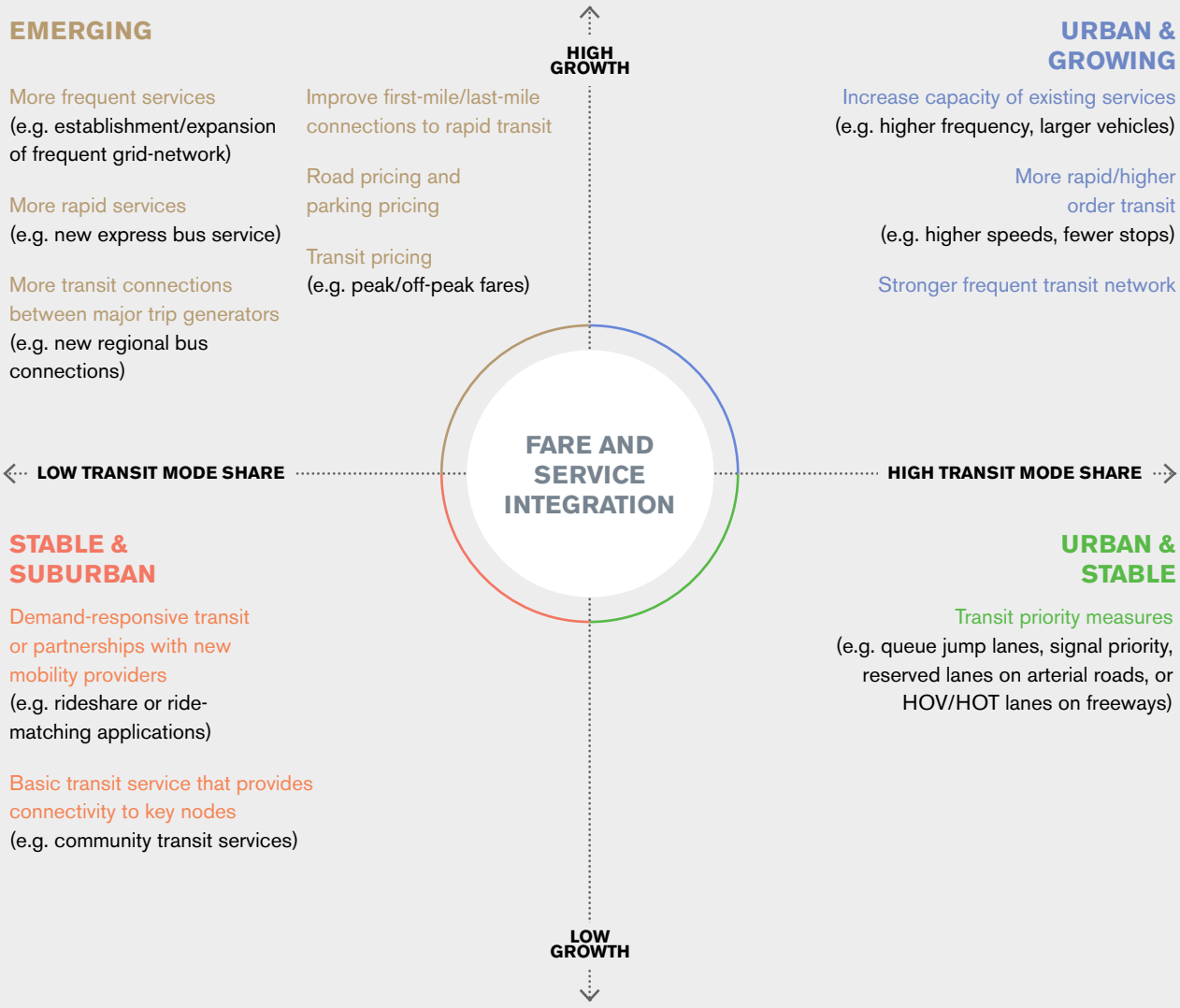
NEW AND EXISTING STATIONS. As part of GO RER, Metrolinx is proposing several new station locations that will add to the 64 existing GO stations, pending funding confirmations. The next RTP will further support development of GO stations as important hubs for daily activity, and not simply arrival and departure points. Increasing commercial and residential densities, in line with the proposed *Growth Plan*, around station areas and addressing GO station parking lots and facilities will be an important aspect for the systems success. Since 2008, parking at GO stations has grown by 19,000 spaces to a total of 72,000 spaces system-wide, making Metrolinx the largest parking provider in North America.

DURHAM DESIGNATES BUS-ONLY LANES

AJAX, DURHAM REGION

Durham Region's first bus-only lanes opened in the Town of Ajax along 1.4km of Highway 2 in 2014. The street redevelopment included cycle lanes along this main corridor.

Figure 7: Potential Transit Solutions for Different Areas in the GTHA



BRAMPTON TRANSIT GETS PEOPLE MOVING

BRAMPTON, PEEL REGION

Since its launch in September 2010, Brampton Transit's Züm has increased transit ridership by increasing service levels, providing state-of-the art buses, infrastructure improvements, and customer-focused technologies. Transit priority signals and bus lanes help Züm buses to be reliable. Brampton Transit's ridership has increased 72% from 12.3 million riders in 2009 (prior to Züm) to 21.2 million riders in 2015.

ALL MODE ACCESS TO STATIONS. Convenient station access for pedestrians, cyclists, transit customers, drivers and car-poolers is a key to making GO RER service a success. While parking at GO stations will remain important for many communities across the region, Metrolinx is also working with local transit providers and municipalities to make it easier to reach stations by other modes, to reduce the reliance on more parking spaces at GO stations as ridership grows with GO RER service enhancements. That is, to optimize the investment in GO RER and maximize potential ridership, it will be necessary to increase the station access transit mode share. An important part of achieving this goal will be providing bus facilities at GO stations, and transit priority measures on and off the station sites. In addition, it will involve working with transit agencies to adjust local transit services to match GO RER service levels, to provide convenient, effective transfers for passengers travelling in both directions throughout the day, and with municipalities to support travel behaviour change with programming, campaigns, awareness and support. Innovation will also need to be encouraged to develop new, attractive and cost-effective on-demand services to stations.

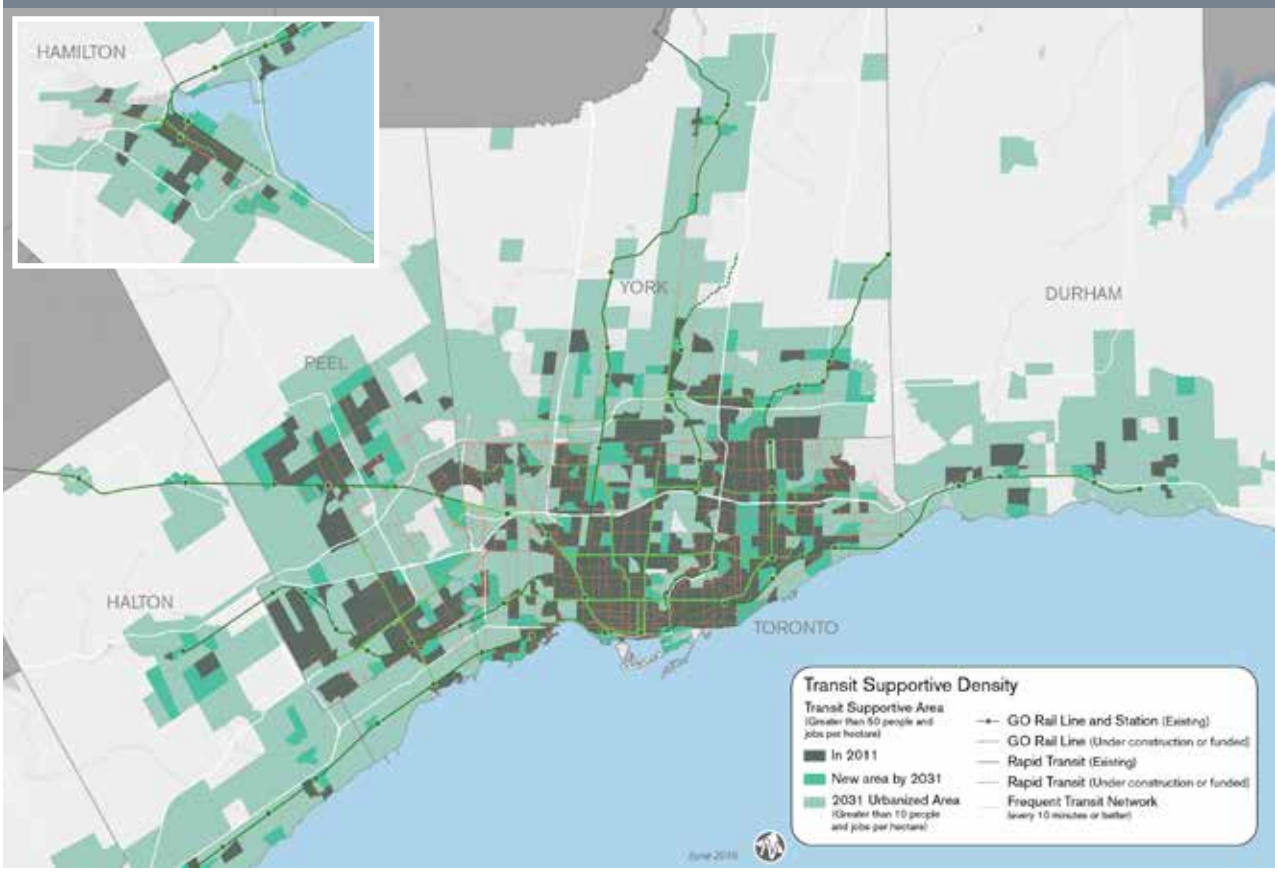
Continuing Transit Expansion

CREATING CONNECTIVITY. In considering what future rapid transit projects are needed in the GTHA, the next RTP will take as its starting point *The Big Move*'s many completed/continuous, in progress or to be initiated projects (see Chapter 2). It will then consider what the remaining gaps and additional needs are for transit capacity to service regional growth to 2041, ten years beyond *The Big Move*'s planning horizon of 2031. In general, the next plan will focus on additions to the rapid transit network by improving its reach where needs are identified (e.g. through minor extensions), connectivity could be improved (e.g. through the addition of "missing links" between different corridors and strengthening connections to GO RER), or by servicing emerging corridors with high transit ridership potential (e.g. strengthening the GO bus network to complement GO RER).

RE-ENFORCING THE *GROWTH PLAN*. Figure 8 shows areas in the GTHA that were dense enough (i.e. having at least 50 residents plus jobs per hectare) to support cost-effective transit service delivery as of 2011 (in dark green), and development areas that were not transit-supportive in 2011 but will be by 2031 (in lightest green). New, sufficiently dense development areas are generally well-aligned with existing rapid transit lines, or with future rapid transit or GO RER corridors. The *Growth Plan* identifies and sets policies for Urban Growth Centres and Major Transit Station Areas to align density and transportation. More specifically, the proposed *Growth Plan* has policies in the following areas:

- Sets out a vision for regional growth, with a strong focus on intensification along nodes and corridors served by transit, and promoting transit as a first priority for moving people.
- Strengthens policies around complete communities, sets density targets for major transit station areas, identifies priority corridors (which align with committed and funded projects), includes policies to improve the design of transit stations and station areas and promotes transit service integration.
- Includes employment policies that seek to better connect jobs and transit, strengthens transit connections to key trip generators and office parks, and includes strengthened TDM policies.
- Introduces strategic growth areas, frequent transit, active transportation and complete streets terminology.

Figure 8: Existing and Future Transit Supportive Areas, GTHA (2011 and 2031) [9]



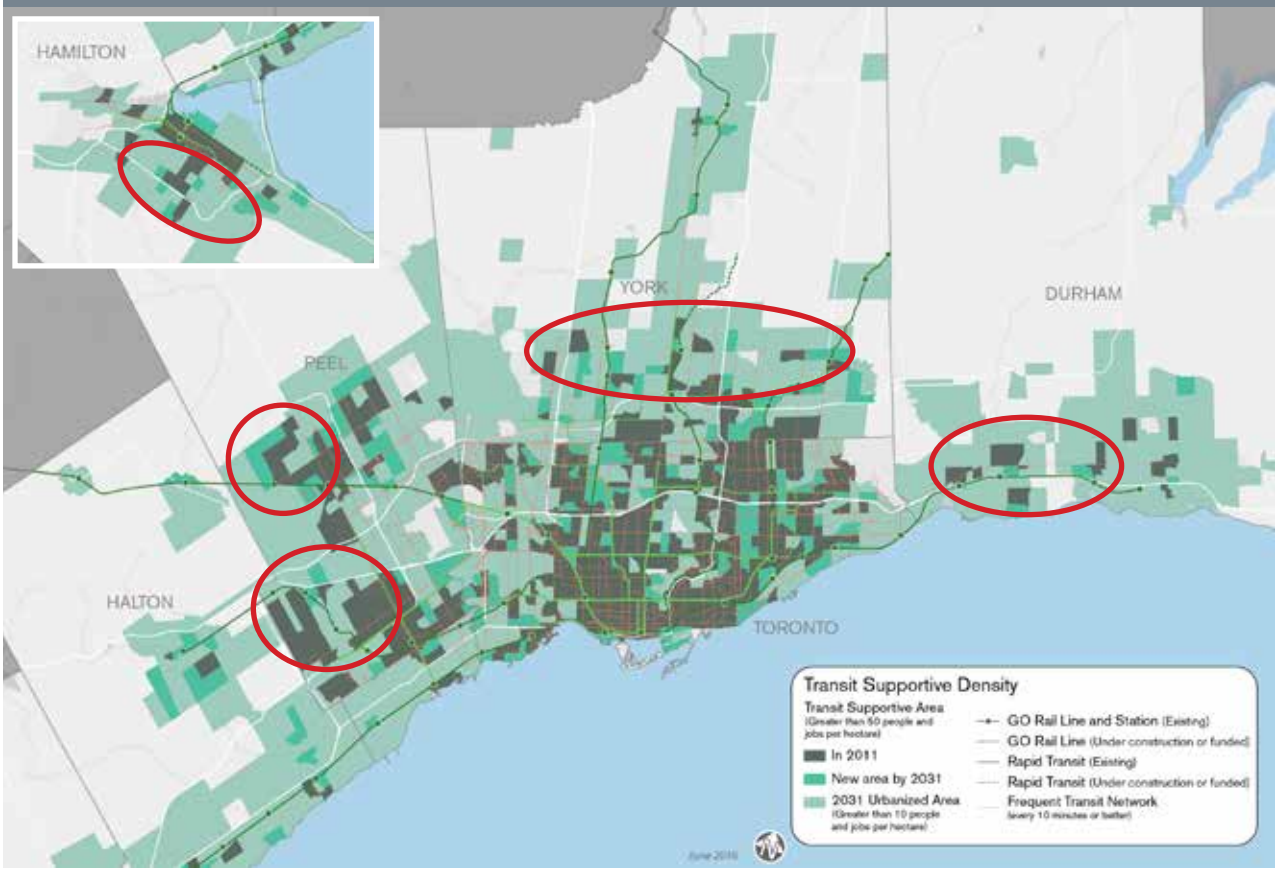
People-Centred Transit

OFFERING A MORE INTEGRATED AND INTUITIVE TRANSIT EXPERIENCE. The next Regional Transportation Plan will emphasize the key role of the GTHA's nine local transit systems in providing service to support GO RER and other rapid transit services. Over time, the goal of offering transit users a consistent, familiar experience regardless of where they travel in the region will become even more important. As in *The Big Move*, transit systems are adopting common approaches to planning and delivering service – from the criteria used to define frequent transit networks, to common transfer policies and customer information platforms. The streamlining of cross-boundary transit trips, which today are complicated by different routes, schedules, fares and hours of services between adjacent communities, will help to advance this goal. Taking transit across boundaries should be as seamless as driving across boundaries.

FOCUSING ON CUSTOMER NEEDS. A customer-centered approach as part of transit planning and service decision-making (e.g. fare systems, schedule information and trip planning) supports efforts to increase ridership through infrastructure and service investments. Many transit agencies are adopting customer charters with measurable objectives for customer service, and reporting on their progress. More transit agencies are working to provide real-time transit schedule information to their customers. Metrolinx's traveller information system, Triplinx, now offers GTHA-wide transit trip planning assistance, and over time will be enhanced to offer fare calculations, bike share information and real-time next arrival schedules.

Metrolinx Design Excellence is working to advance good design in order to build ridership and improve the customer experience. It integrates design thinking into all significant Metrolinx capital investments at an early stage, broadening the organization's focus beyond engineering and infrastructure delivery toward fostering constructive city building across the region. Areas of focus include architecture, landscape

Figure 9: Areas of Opportunity to Expand Frequent Transit Service Anchored by GO RER [10]



architecture, urban design, public realm and customer experience.

Metrolinx is also renovating a number of GO stations to improve safety and comfort, such as adding lighting and heated shelters. Metrolinx also has a new back-up power standard for stations and facilities in the event of power outages. Establishing safety-enhancing features to increase customers' sense of personal security is also important to understand and incorporate into customer-centered planning.[11]

Metrolinx is also pursuing opportunities to provide additional amenities and services at GO stations to improve the customer experience. For instance, the GO-Zipcar partnership, launched in 2014, has already expanded to thirteen stations across the region. In addition, by the end of 2016, all but one of the GTHA transit agencies will use the PRESTO electronic fare card that enables integrated payment and fare structures, in order to simplify the payment system for customers.

EXPANDING THE GRID OF FREQUENT TRANSIT NETWORKS. Transit systems across the GTHA are focusing on complementing their downtown-focused or GO station-focused radial networks with frequent transit networks (FTNs) that offer more frequent transit service (generally every 10 minutes or less) on direct, grid-based routes anchored by major hubs including GO and rapid transit stations. In 2015 the TTC introduced a Frequent Transit Network – a grid of 10 minute minimum bus and streetcar service on major routes. Increasing the frequency of transit service on a grid system serves local trips better and can build capacity and attractiveness in a "virtuous cycle", attracting more riders and justifying additional service. A regional FTN would benefit from consistent practices (e.g. priority measures, service standards and marketing) across transit systems to deliver a level of service that is consistently aligned with transit supportive densities across the region.

There are several areas outside Toronto that have densities supportive of frequent transit services that could be anchored by connections to GO RER, as shown in Figure 9. Numerous municipalities in the GTHA have implemented planning efforts and

analysis to designate new frequent transit network lines in their Official Plans.

PRESERVING AND IMPROVING CONNECTIVITY TO KEY DESTINATIONS. One advantage of a frequent transit network is that it can service multiple commercial and employment areas, increasing access to jobs and services for residents throughout the region. It can also involve community-based transportation services, an important component to improving connectivity in low-density communities. With a focus on meeting the transportation needs of a specific population(s), community transportation also has the potential to play a growing role with the emergence of flexible, demand-responsive approaches to delivering transportation services.

MOVING PEOPLE, NOT JUST VEHICLES. A conventional objective of road operations is to move as many motor vehicles as possible, regardless of how many people they carry. This results in all vehicles being given equal priority on roadways. In congested areas, this can lead to slow speeds, low reliability and higher operating costs for transit, as transit vehicles (buses and streetcars) are reduced to moving at the speed of traffic. Shifting the focus to moving as many people as possible (rather than vehicles) would give priority to transit vehicles, resulting in more efficient operations, higher speeds, greater reliability, and ultimately, increased ridership.

Transit priority measures include the creation of reserved transit lanes on arterials and expressways, transit priority signals and queue jump lanes. Many of the highest-frequency, highest-demand transit routes across the GTHA (e.g. those operating on grid-based frequent transit networks) would likely return the greatest value from a concerted effort to give buses priority in mixed traffic situations.

An Integrated Fare System

A TRANSFORMATIVE OPPORTUNITY. The vast majority of trips on public transit (other than GO Transit) across municipal boundaries are far from seamless, and discourage additional customers. Co-fare arrangements that encourage cross boundary transit use have been in place between GO Transit and local operators for many years. The exception remains between TTC services and other transit systems currently requiring a second fare. As well, additional travel time – obstacles arise from the historically independent operations of GO Transit and the GTHA's nine municipal transit systems. The growth in transit use across boundaries has created demand for a more connected, integrated user experience. Transit fare integration can lead to more competitive transit options and an effectively expanded transit network, and be a transformative step for transit in the region.

Since 2008, the emergence of the PRESTO electronic fare card and payment system has provided a strong foundation and opportunity to comprehensively re-think regional transit fare structures. It provides convenience to customers while enabling integrated payment and fare structures. In the future, PRESTO will continue to offer the primary electronic fare payment system for the region and provide a regional platform for integrated fares. It will also develop its technology and products to efficiently allow for more convenience, flexibility and integration, such as the ability for customers to use credit and debit cards for tapping onto the PRESTO system.

AN INTEGRATED, HARMONIZED APPROACH TO FARES. The existing approach to fares in the region is complex, and a new solution requires planning and collaboration to support the development of transit services between municipalities. Metrolinx is addressing this challenge for the first time on a system-wide basis, developing a modelling platform that is tailored to the GTHA's unique circumstances. Different regional fare structures are being analyzed in consultation with municipalities and transit agencies. This investigation

TORONTO IMPROVES SURFACE TRANSIT

TORONTO

The Toronto Transit Commission is adding 50 new buses that will serve 24 of the city's busiest bus routes during peak hours to reduce crowding. In 2015, the TTC launched its Frequent Transit Network. All streetcar routes and 52 bus routes now constitute a 10-minute-or-better service network.

Figure 10: Mobility Hubs Designated by *The Big Move*

Source: Metrolinx Mobility Hub Guidelines, 2011.

will help to develop a potential vision for transit fares in the region that will consider short-, medium- and long-term opportunities.

An integrated, harmonized and customer-first regional fare structure, with a consistent and fair approach to calculating and paying fares, has the potential to simplify the customer experience and transit system operations. For many years GO Transit has been operating with a co-fare agreement with all GTHA local transit operators except the TTC. Improved agreements between transit agencies could minimize the barriers created by transfers.

Fare structure is foundational to an integrated fare system, but in addition, work will need to advance with municipalities and the Province to also address issues of fare concessions (e.g. discounts for seniors, students), fare products (e.g. weekend passes, family rates) and fare price. Issues of equity and access will also be key considerations for the region.

Mobility Hubs

A COMPLEX CHALLENGE. One major recommendation in *The Big Move* was to create a system of 51 "mobility hubs" (see Figure 10). A mobility hub is an area that is a tangible demonstration of the benefits of integrating land use and transportation. Each mobility hub includes a major rapid transit station in its immediate surroundings, and serves a critical function as the origin, destination, or transfer point for a significant number of trips. Each is a place where different modes of transportation come together, and where an emphasis is needed on serving the "first mile" and "last mile" of transit trips, and on supporting higher-density transit-supportive development. The creation of successful mobility hubs requires effective land use and transportation planning, committed private sector partners, and strong stakeholder engagement and commitment to a common vision.

ACCELERATING ACTION. The next RTP offers an opportunity to review and refine the criteria for the designation of mobility hubs, and to consider updates to the list of mobility hub locations in view of new rapid transit plans or development activities. Ontario's proposed *Growth Plan* amendments would prioritize integrated land use and transportation planning in "strategic growth areas", including mobility hubs.

3.3 A Connected and Aligned Region

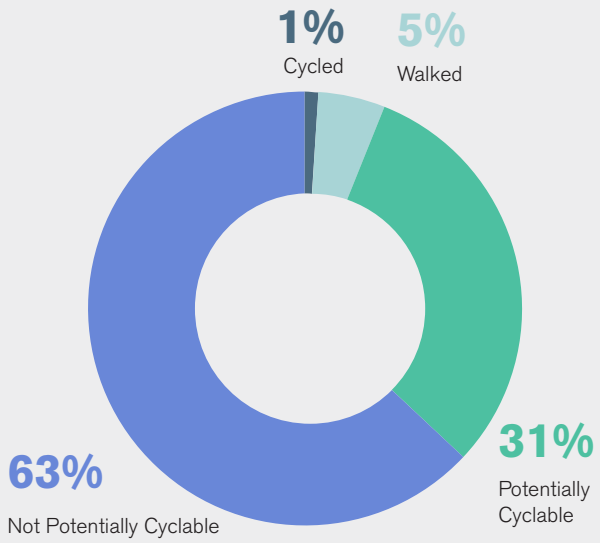
This section discusses several areas outside the realm of public transit services where the Regional Transportation Plan could offer stronger guidance in response to region-wide opportunities. Most of these are within the jurisdiction of municipal governments, rather than Metrolinx. Many are also being considered from the perspective of broader, province-wide interests as part of the Ministry of Transportation's long-term Greater Golden Horseshoe transportation plan now underway. Considering opportunities through a regional lens will allow Metrolinx and its partners to identify ways of developing more consistent, connected and integrated transportation connections, infrastructure and services.

Supporting Active Transportation

CAPTURING MORE SHORT TRIPS. Cycling and walking are clean, healthy, affordable, flexible and available to almost everyone from children to seniors. *The Big Move* emphasized active transportation for these reasons, and public support for cycling and walking has grown since 2008.

There is potential to increase walking and cycling for short trips in the GTHA. Residents make many short trips, but very few of these trips actually happen by active transportation; Figure 11 shows GTHA mode share grouped by cycling potential (e.g. trips are less than 5 km long and not taken to pick-up/drop-off a passenger). Furthermore, one-third of all car trips have the potential to be cycled.[12] A map showing the geographic distribution of cycling mode share in the GTHA in 2011 by origin is shown in Figure 12.

Figure 11. Mode Share of Household Trips in the GTHA, by Cycling Potential, 2011

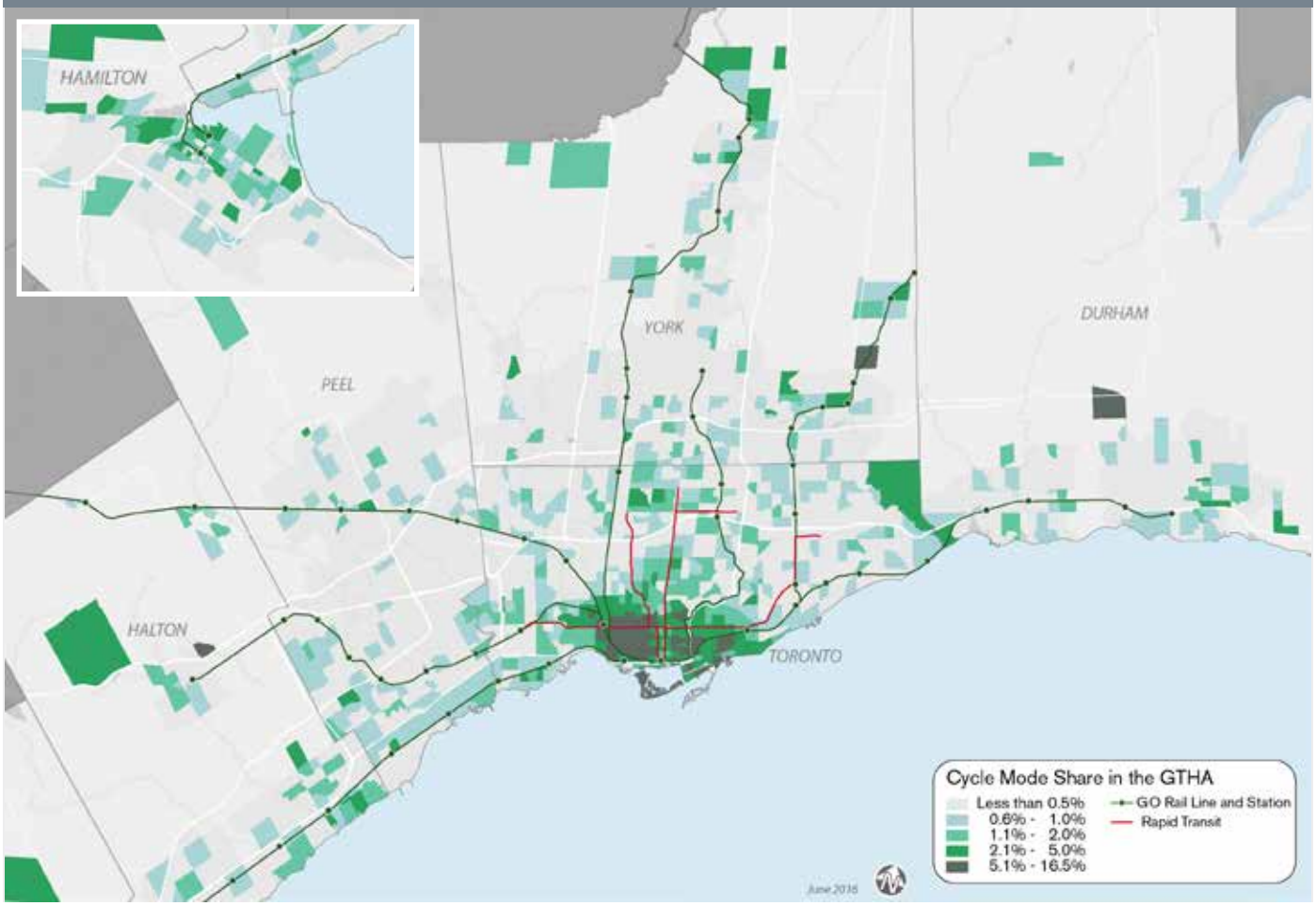


Source: Transportation Tomorrow Survey, 2011.

While overall GTHA average cycling and walking mode shares have not changed very much since 1991 (see Figure 28 in Appendix 1), there have been large increases for certain market segments, especially within downtown Toronto. Cycling trips in particular have increased substantially between 2006 and 2011, with the number of trips almost doubling and cycling mode shares increasing substantially for many market segments, as shown in Figure 31 in Appendix 1. Overall, active transportation is expected to increase slightly in most parts of the GTHA to 2031, as shown in Figure 28 in Appendix 1.

IMPROVING ACTIVE TRANSPORTATION PLANS. There are many reasons for low rates of cycling to work. Walking and cycling plans can identify, cost and prioritize the measures needed to fill gaps in a community's infrastructure or services. Most GTHA municipalities have cycling plans, but about half do not have a plan to improve pedestrian infrastructure and services. This lack of attention to walking can also indirectly discourage transit use. By setting objectives with targets, active transportation plans can also guide data collection to help monitor and measure changes over time and help to coordinate routes that cross municipal boundaries, which is especially important for building networks. The proposed *Growth Plan* would require municipalities to plan for safe and continuous active transportation networks. In 2014, Ontario launched the #CycleON provincial cycling strategy which identified initiatives in progress, to undertake, and others that are long-term, and included two new programs: the Ontario Municipal

Figure 12: Geographic Distribution of Cycling Mode Shares in the GTHA, by Trip Origin (2011)



Source: Transportation Tomorrow Survey, 2011.

Cycling Infrastructure Program to help municipalities build new and improve existing cycling infrastructure, and the Cycling Training Fund to help partners develop, enhance and deliver cycling skills training programs.

OVERCOMING BARRIERS THROUGH INFRASTRUCTURE. An immediate way to make walking and cycling safer is through infrastructure, such as protected bike lanes and high-visibility pedestrian crossings. The best walking and cycling routes are straight lines, and providing attractive facilities on major roads can help people reach key destinations. Missing links and other obstacles create discontinuous networks and prevent people from walking or biking, even for short trips. Active travel can also be discouraged by snow and ice build-up on sidewalks, trails and roads during the winter. For some people, the barrier of not having a bicycle at hand for a given trip can be overcome through bike-sharing programs like those already operating in the cities of Toronto and Hamilton. Bike-sharing is also important for facilitating flexible, one-way or multi-modal (first-mile/last-mile) trips. Regional coordination could make active transportation more attractive to people who travel around the region and want to cycle or walk in different areas; enhancing bike-sharing systems can actually stimulate additional multi-modal trips as people take advantage of the systems to bike to and from major transit stations.

LAND USE PLANNING AND DESIGN. The provincial requirement to intensify existing communities and reduce greenfield development supports active transportation, because increasing the density and mix of development can encourage shorter trips that are easy to make on foot or by bike. The proposed *Growth Plan* also encourages the development of a vibrant public realm and prioritizing quality urban design to encourage walking and cycling.

In recent years, many organizations have identified the health benefits of physical activity, which has become more challenging to undertake for many reasons: the nature of work has changed and generally become more sedentary; greater numbers of people are living in low-density, car-based neighborhoods; and often, the relatively low number of stores, parks, schools, community facilities and job opportunities that can be reached by walking or cycling leads to fewer opportunities for physical activity.

In 2014, GTHA Medical Officers of Health called for full funding and implementation of *The Big Move*, as well as stronger provincial policies to support transit and active transportation, and more effective integration of those modes into urban planning processes.[13]

In addition, promoting good design through municipal plans and by-laws can lead to greater comfort, security, accessibility and aesthetics that encourage active modes. There are opportunities for municipalities to mandate supportive land uses – from overall growth patterns to building setbacks – in their official plans, to adopting zoning by-laws that require bicycle parking at all trip destinations, and promoting development designs that connect new developments to nearby sidewalks and cycling facilities. Metrolinx is looking closely at improving "first-mile/last-mile" connections at GO stations to complement GO RER service expansion, as well as designing stations to protect for future transit-oriented development. Making it easier for GO customers to connect into and out of the regional transit network – using a variety of transportation modes – is a priority.

STRATEGIES TO IMPROVE WALKING AND CYCLING SAFETY.
International experience shows that higher volumes of pedestrians and cyclists are typically accompanied by lower collision rates involving those road users – an effect dubbed "safety in numbers". For this reason, steps to increase the number of pedestrians and cyclists across the region are also likely to improve their safety over time.

Another effective approach is to improve the behaviour of all road users, such as through driver awareness campaigns, cycling skills training, and the enforcement of laws like those recently enacted in Ontario regarding passing distances, "dooring" of cyclists and clearing of pedestrian crossings. In order to better monitor progress toward safer walking and cycling, there remains a need for more consistent and comprehensive data collection by municipalities and policing organizations across the region.

PROMOTING ACTIVE TRAVEL BY CHILDREN AND YOUTH.
Today, fewer young people walk or cycle to school and other daily destinations than 25 years ago (see Figure 42 in Appendix 1).[14] More are driven by their parents due to safety and security concerns, demands of the workplace, a lack of sidewalks and protected road crossings, and the trend away from smaller neighbourhood schools and facilities toward larger centralized ones.[15,16] Not only are children and their families driving to school, but are also reliant on car trips to access activities outside of school hours. Researchers believe that this reduction in active, independent movement is detrimental to the health and development of young people. It may also be shaping their future travel habits in unsustainable ways.

HAMILTON GETS MOVING ON TWO WHEELS

HAMILTON REGION

As part of efforts to increase cycling mode share and creating a multi-modal future, the City of Hamilton has adopted a cycling master plan, outlining future developments. The Cannon Street Cycle Track pilot project, a 3km two-way physically separated cycle track, opened in fall 2014. 2014 also marked the launch of Hamilton's "Sobi" bike sharing system. Serving an area of over 40km^2, the system provides a fleet of 750 bikes and 110 docking stations.

PICKERING PEDESTRIAN ACCESS ENHANCED

PICKERING, DURHAM REGION

With the construction of a fully-enclosed pedestrian bridge that spans 14 lanes of Highway 401, the Pickering GO station is now a short walk from new office development in the City Centre.

CITY OF TORONTO & WATERFRONT TORONTO

TORONTO

Waterfront Toronto unveiled the revitalized Queens Quay Boulevard in the summer of 2015 – a new Complete Street featuring a streetcar right-of-way, wide pedestrian thoroughfares, and a multi-use pathway that connects formerly fragmented waterfront trails. With a focus on active transportation, public space, and pedestrian realm improvements, Queens Quay sets an innovative precedent.

Creating Safer, More Complete Streets

A CHANGING VIEW ON THE ROLE OF ROADS. The vast majority of daily trips in the region – by foot, bike, car, bus and truck – are made on roads and highways, so making them safer and more efficient can strengthen the region's quality of life, economy and environment. At the same time, it is important to balance the mobility function of roads with their role as public spaces. There is growing recognition that roads need to be sensitive to their context, and support adjacent residential or commercial activities.

A COMPLETE STREETS APPROACH. Complete streets are roads that are planned, designed, refurbished, reconstructed and built for all users regardless of mode, age or ability. They are safer, more efficient and attractive for transit-users, cyclists and pedestrians, as well as car and truck drivers, and they are considered and appropriately accommodated in their community context. They include elements such as lighting, benches, signage and wayfinding, trees, patios, utilities and stormwater management. While not every street can accommodate all potential users and functions, planning and design activities can explicitly integrate social, economic and environmental priorities to maximize quality-of-life. The City of Toronto is developing Complete Street Guidelines to direct future development in the city. The proposed *Growth Plan* would require municipalities to adopt a complete streets approach.

VISION ZERO. A movement attracting recent attention in the region is Vision Zero, an international initiative based on the concept that no one should be killed or seriously injured while using the road transport system. From its origin in Sweden, Vision Zero has been adopted by national and local governments across Europe and North America. It promotes safety while preserving the key functions of roads, and integrates strategies related to road design, vehicle technology, education and enforcement.

Managing Congestion

The Regional Transportation Plan review presents an opportunity to revisit how congestion is managed across the region's municipalities to improve the speed and reliability of travel by car, bus and truck. Excessive congestion makes industry less competitive, can cause businesses to relocate, and make it difficult for companies to attract the skilled workers they need. Congestion costs the GTHA's residents and economy about $3.3 billion each year (about $1,600 per household) through delays to people and goods, vehicle operating costs and collisions, and $2.7 billion each year in lost economic activity that creates jobs. Without new strategies to better manage congestion, these annual costs are expected to rise to $8 billion for GTHA residents and $7 billion in economic activity by 2031.[17]

OPERATIONAL EFFICIENCY. While it is increasingly accepted that new and wider roads will not resolve congestion, making the most efficient use of roads remains part of the congestion management toolbox in many areas of the region. In many corridors, giving priority to transit vehicles, carpools, cyclists and pedestrians can minimize the demand for travel by car. To prioritize transit and reduce delays for all users, municipalities can remove bottlenecks by adjusting traffic signals, modifying road configurations, updating rules

and enforcing on-street loading, stopping and parking regulations. Sophisticated tools to identify and remove collisions and other unexpected incidents, and to provide drivers with routing information for those events as well as for weather-related conditions, can preserve the road system's reliability. Operational efficiency is also extremely important for addressing access to and from GO rail stations.

SMARTER ROADS. Advances in technology raise the possibility for "smart roads" to play an active role in managing congestion. Roadside or in-road sensors and road-to-vehicle communications have the potential for real-time operational adjustments (e.g. changes in signal timing or HOV lane eligibility) and driver information (e.g. weather or road surface conditions, routing advice). The emergence of autonomous vehicles could also require significant road network upgrades to enable self-driving cars, buses and trucks.

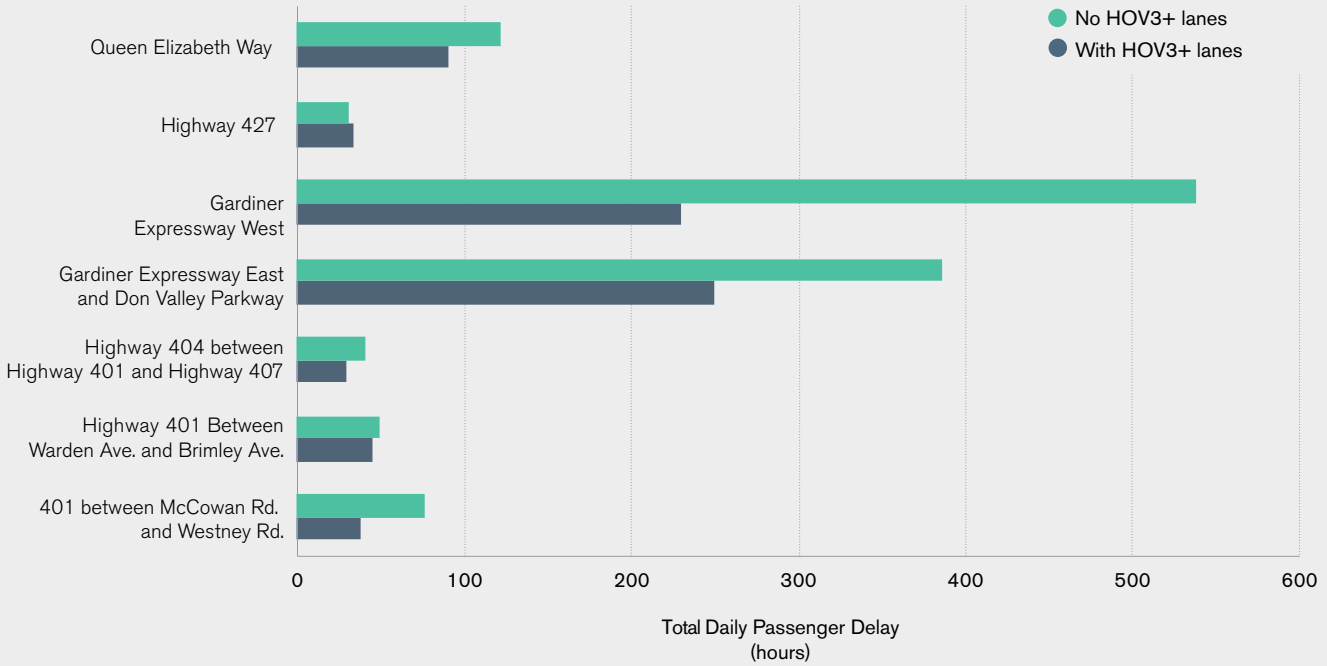
MANAGED LANES. While auto trips are not expected to be significantly impacted by recent transit commitments, the introduction of more high-occupancy vehicle (HOV) transit lanes on regional highways would affect auto times.

Within the region, the Province of Ontario operates HOV lanes on Highways 403, 404 and the Queen Elizabeth Way, and will expand those by 2031 to create a 300km network of HOV lanes on 400-series highways. Ontario has announced that, over time, some of those HOV lanes will be converted to HOT (high-occupancy toll) lanes that can be used by drivers of single-occupant vehicles who have purchased a permit; the Province can also increase the minimum number of HOV occupants from two to three as lane demands grow. Ontario recently launched an HOT pilot project on the Queen Elizabeth Way.

Buses and carpools move many more people than single-occupant vehicles and, where volumes warrant, consideration should be given to granting them priority on HOV lanes on freeways and arterial roads. Currently, the City of Toronto operates five arterial road HOV corridors, typically in weekday peak periods.

The results of provincial pilot HOV lanes during the Pan/ParaPan American Games in summer 2015 were positive, and demonstrate the untapped potential of transportation demand management initiatives to improve the transportation system. HOV3+ lanes on the Gardiner and

Figure 13: GO Bus Passenger Time Savings with HOV3+



Source: GO Bus Operations

Note: Passenger delay is measured as travel time greater than scheduled travel time multiplied by the number of passengers affected

the Don Valley Parkway had the largest impact on GO passengers in terms of reducing delay (see Figure 13). Regional highways are carrying an increasing amount of transit users on GO buses and local transit buses. Better travel times and reliability on highways used by buses could lead to a steep increase in bus ridership, while also decreasing bus operating costs. The benefits of HOV lanes for transit vehicles and carpoolers across the region could be accelerated by increasing both the scope and pace of their implementation.

Moving Urban Freight

A COMPLEX SECTOR WITH HIGH STAKES. The region's economy relies on the ability to move goods quickly, reliably, safely, and with acceptable costs and environmental impacts. The region's network of air, marine, rail, road and pipeline facilities involves both the public sector (Metrolinx, the Ministry of Transportation, municipalities, ports, airports) and the private sector (retailers, manufacturers, builders, railways, trucking companies, couriers and logistics providers, among others). Growing congestion and a greater industry reliance on logistics and efficient freight transport have raised the stakes around protecting freight's positive contribution to the region's economy.

STRATEGIC GOODS MOVEMENT NETWORK. The existing truck route networks designated by GTHA municipalities are intended to protect sensitive neighbourhoods and road infrastructure from the impact of high heavy truck volumes, but they do not provide a constructive framework for supporting economic development. Some other regions in North America have identified a network of strategically important routes for truck freight. In this region, such routes might be under municipal or provincial jurisdiction, but represent the most efficient links between major goods-generating activity centres, intermodal terminals and regional gateways. A strategic goods movement network could act as a lens for prioritizing the location and timing of truck-friendly improvements to road geometry or operations, and for understanding the potential impact of new truck restrictions.

IMPROVING COMPATIBILITY WITH LAND USE. Conflicts between goods movement and land use planning have become more acute as new residential and industrial developments extend the GTHA's urban boundary, and as redevelopment occurs in older neighbourhoods near freight-intensive areas. In addition, the growing popularity of last-mile deliveries stemming from the rise of on-line shopping could mean more traffic on local roads. However, several approaches to lessen these impacts are emerging. For example, land use plans and policies can cluster freight-intensive developments near efficient freight routes to facilitate shorter truck trips or to keep trucks from driving through sensitive areas. MTO has developed freight-supportive guidelines to help municipalities develop official plans, zoning and development approvals practices that protect the interests of businesses and residents. The proposed *Growth Plan* is strengthening its corridor protection policy to ensure that corridors for goods movement can be developed when they are needed in the future.

COLLABORATION AND KNOWLEDGE-BUILDING. As a follow-up to *The Big Move*, Metrolinx's *GTHA Urban Freight Study (2011)* identified the need for better regional consultation and planning around goods movement. It also highlighted the need for new data collection and analytical tools to improve the understanding of freight patterns as e-commerce boosts the demand for express delivery to homes and businesses.

REDUCING ENVIRONMENTAL IMPACTS. Action is needed to reduce freight's environmental effects such as air emissions, noise and vibration. Boosting the efficiency of the "last mile" of freight movements could help, and might include the creation of urban distribution centres that allow carriers to consolidate goods, share vehicles and increase the efficiency of deliveries; or the creation of low-emission zones where high-emitting vehicles are prohibited or must pay a fee to enter.

Reducing the Demand for Travel

EXPANDING TRANSPORTATION DEMAND MANAGEMENT (TDM). Transportation Demand Management (TDM) strategies use information, education and incentives to influence the demand for travel and support public investments in roads, transit, sidewalks and trails. TDM makes some travel choices (typically walking, cycling, transit, carpooling or teleworking) more attractive, and encourages people to try new ways of getting around. TDM measures can increase ridership on new rapid transit corridors – something of interest given the extensive plans for new transit

YORK REGION EXPANDS ITS CYCLING NETWORK

YORK REGION

Coupling transportation redevelopment with active transportation infrastructure, the Highway 7 East Viva BRT project included cycle lanes along its length. The Region also has plans for a multi-use path on Highway 7's protected centre median.

facilities across the region. They can also minimize disruption during road and transit construction projects by encouraging the use of different modes or routes.

INCREASING EFFECTIVENESS. While several years of TDM programming have laid a solid foundation for the GTHA, TDM's true potential has not yet been realized. Perhaps the best example of how it could support the region's transportation goals came during the 2015 Pan/Parapan American Games, when TDM's ability to balance travel demand with transportation capacity was demonstrated through the temporary expansion of the HOV lane network, supported by additional cost-effective strategies like travel planning tools, flexible working hours and communications.[15] Employers also have a leadership role to play in implementing flexible working hours and other measures that would support more effective functioning of the region's transportation network. Opportunity exists to better integrate TDM into the land development process, including stronger policy (e.g. requiring TDM plans with applications), active transportation-supportive design and infrastructure (e.g. bicycle parking), programming (e.g. individualized marketing) and funding mechanisms (e.g. dedicated development charges).

Metrolinx has several tools (e.g. the PRESTO electronic fare card, the Triplinx travel planner, and various elements of the Smart Commute program) that could be used to give more support to TDM programming, and new tools could go further by enabling dynamic real-time ride-matching. Municipalities could also consider regulations requiring TDM programs in large workplaces, or financial tools such as parking charges or various forms of road pricing. Smart Commute also collaborates with local partners to support active and sustainable school travel through program implementation (e.g. School Travel Planning pilot, Bike to School Day), regional coordination (e.g. Active and Sustainable School Transportation Regional Hub), strategy development and research.

A LOOK AHEAD. The contribution of TDM to the vision of the next RTP could be enhanced by creating an overarching policy framework that clarifies roles and improves coordination among all partners and stakeholders. At a regional level, clearer guidance could help municipalities improve TDM programs and performance measurement, and new policies and tools could support the delivery of major infrastructure investments and optimize the uptake of new transit services. Funding tools could be used to encourage collaboration and implementation of a scalable set of TDM measures. The proposed *Growth Plan* requires that municipalities develop TDM plans to ensure that these strategies are considered in the planning process.

Designing for All Modes

The region's urban form – that is, the buildings, street-blocks, and road patterns that make up the structure of the region – has an impact on how well the transportation system can support the economy, and particularly the knowledge economy which relies heavily on attracting the "creative class". Today's developments will influence travel demand for decades. Throughout the region, and particularly in its fast-growing areas, there is an urgent need to make sure that new developments improve travel options for residents and employees, and that public investments enhance the regional transportation system and strengthen the economy. A number of municipalities have been working to push the envelope in requiring new developments to be more supportive of sustainable travel modes.

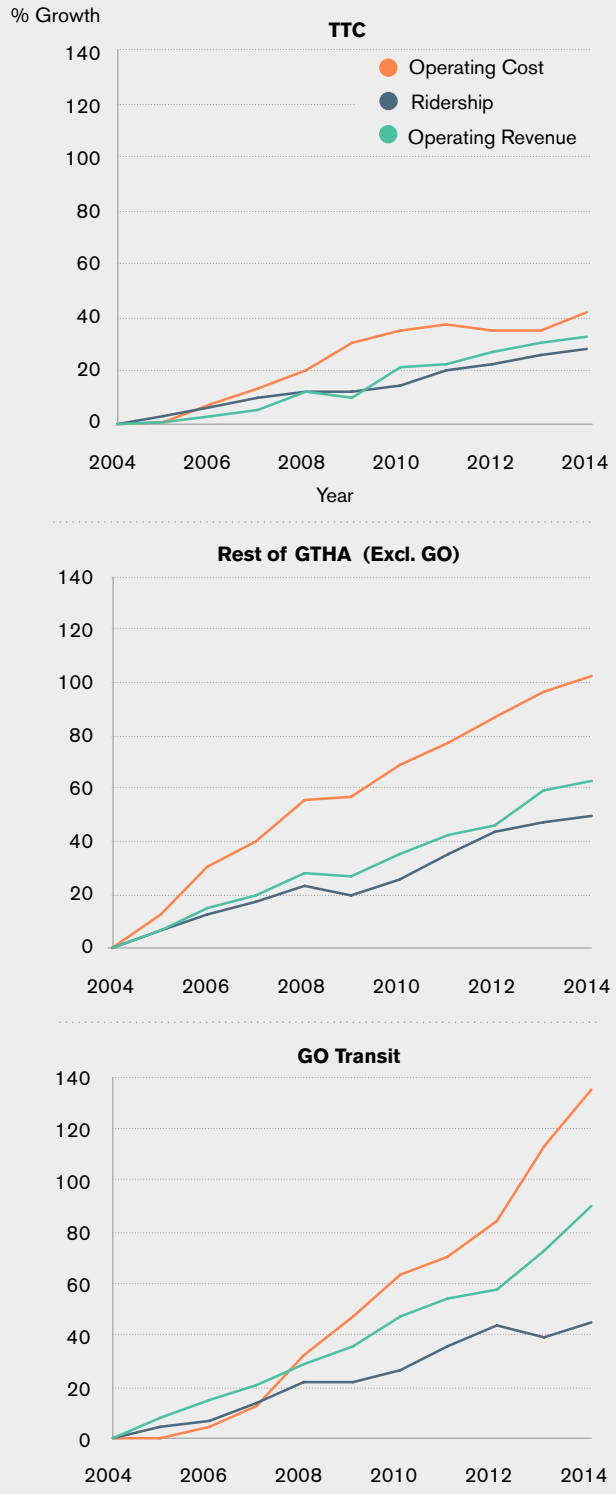
DEVELOPMENT APPROVALS. Municipalities are influential when adopting policies, by-laws and approval practices that build support for walking, cycling, transit and carpooling into new homes, condos, offices, stores and institutions. For instance, municipalities can encourage developments that provide carpool parking, bicycle storage, showers and change rooms, and direct connections to nearby sidewalks and bus stops.

PARKING STRATEGIES.

Municipalities have a role to play in determining the amount of parking included in new developments; such as requiring parking structures rather than at-grade lots, promoting shared parking among neighbouring land uses and charging drivers to park in public places. Ineffective parking management in private developments can easily undermine major public investments and prevent the achievement of regional transportation goals. Behavioural research has shown that the provision of free or heavily discounted parking at the workplace is one of the key factors in commuters deciding to drive to work, even when transit alternatives are available.[18,19] Residential parking availability plays a role in making car ownership more attractive, and updating zoning codes to reduce the amount of parking required in new housing developments can be another tool in reducing auto ownership and increasing transit and active mode share.[20]

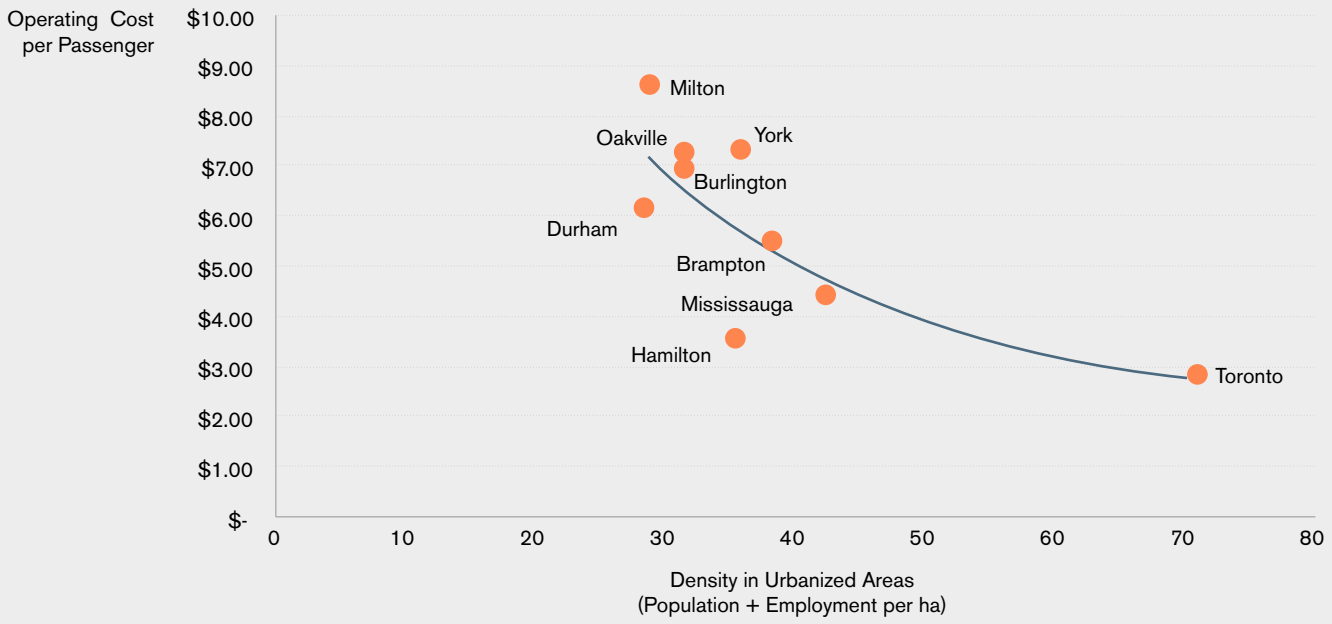
It is also important to consider the future of parking with the eventual arrival of autonomous vehicles (see Section 3.4), as well as the potential impact of peer-to-peer parking. If less parking will be needed, opportunities for complete streets and other city-building initiatives may become easier to implement.

Figure 14: Comparison of Trends in Transit Operating Costs, Revenues, and Ridership, 2008-2014



Source: Canadian Urban Transit Association (CUTA)

Figure 15: Relationship of Transit Operating Cost to Urban Density, GTHA (2014) [21]



Sustainable Funding

The Regional Transportation Plan review also provides an opportunity to advance the public dialogue about transportation funding in the region. In many jurisdictions, long-range plans are aligned with fiscal plans that describe how proposed infrastructure and service will be provided.

The RTP review also provides an opportunity to reconsider revenue tools as a means of influencing travel behavior, in addition to generating the funds needed to implement the strategies and policies for the region's transportation system.

AN IMBALANCE BETWEEN COSTS AND FUNDING. As assets age and congestion mounts, the rehabilitation and expansion of the GTHA's transportation infrastructure is becoming more urgent. Transit ridership is accelerating while operating costs grow even faster, and transit systems are facing strong competition with other public services for the funds they need to pay for maintenance, fuel, drivers and security (Figure 14). Even with the new federal funding for infrastructure committed in the 2016 budget as well as prior provincial commitments, it is becoming evident that new funding tools are required to continue planning, building and operating an effective regional transportation system.

COMPLEX GOVERNANCE. Who plans transportation infrastructure, who builds it, and who pays for it involves the Province of Ontario, Metrolinx, regional and local municipalities, and nine transit agencies. While Metrolinx is a planning and coordinating body for transit infrastructure in the GTHA, its provincial and municipal partners also build major public works.

While emerging on-demand services are presenting opportunities to enhance mobility, a complex web of long-standing provincial and municipal legislation and regulations are in place, developed over decades to reflect the public interest. However, today they are relatively slow to respond to the emergence of on-demand services and pose a challenge to their complementary and orderly deployment across the region.

OPERATIONAL CONSIDERATIONS. A dramatic increase in the quantity of transit service across the region will be needed to achieve the proposed vision, goals and objectives for the next Regional Transportation Plan and to support the transportation needs of the region. This is especially true in areas where rapid population growth is expected, current ridership is low, and transit services typically recover only a small proportion of their operating costs from the fare box.

Increases in operating cost are generally related to service improvements, which can result in higher ridership (see Figure 14), particularly where densities are high enough to support transit use. However operating revenue does not always increase proportionally and

many transit agencies may continue to suffer from low fare-box recovery rates. Operating costs are generally proportional to urban density (see Figure 15), and as a result, cost-recovery rates are typically lower in suburban municipalities. If transit agencies are going to increase service levels, particularly to match GO RER service levels, and leverage other investments in rapid transit infrastructure, solutions to funding enhanced operating costs will have to be found, including how partners work together to help manage operating costs that arise from strengthening regional-scale services.

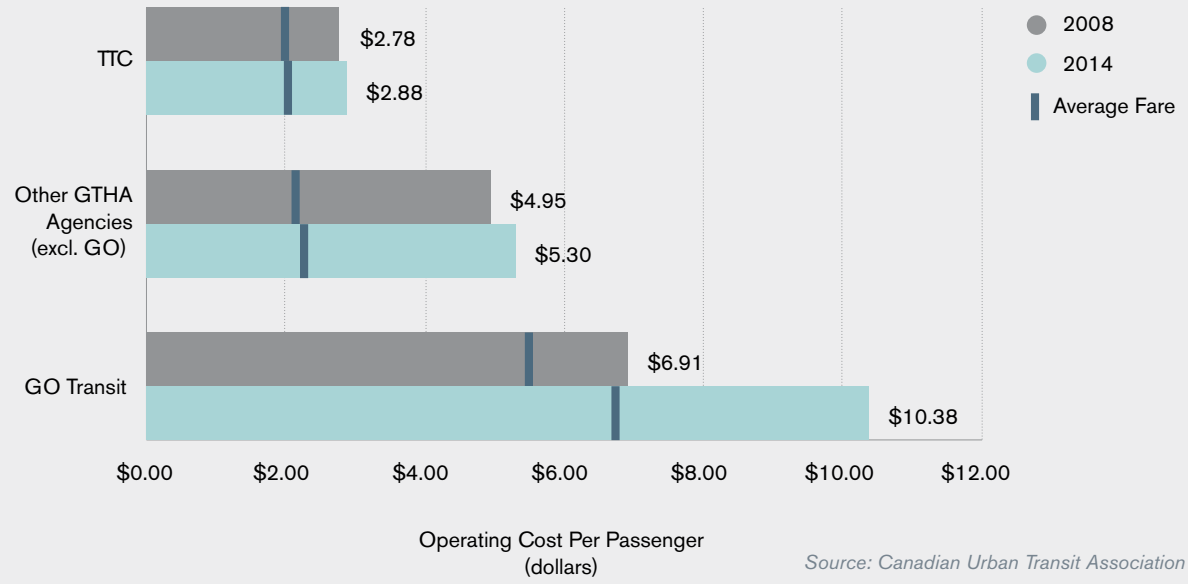
Another issue that will have an impact on the ability to increase transit service is that operating costs are increasing faster than ridership, particularly on GO Transit (Figure 14). Given the goal of keeping transit affordable and to generally maintain high levels of transit ridership, GO Transit fares have not kept pace with operating costs, with the gap widening between 2008 and 2014 (see Figure 16).

POSSIBLE FUNDING TOOLS. Metrolinx's 2013 Investment Strategy recommended raising $2 billion annually in new revenues for GTHA transit infrastructure and services, walking and cycling facilities, mobility hubs, roads and urban freight, and the preferred tools to generate these funds. It recommended four guiding principles to be applied to the selection of new funding tools: dedication of revenues to specific outcomes, fairness, regional equity and accountability and transparency. The update of the Regional Transportation Plan provides an opportunity to revisit or clarify these principles.

Some revenue tools would serve two purposes: they would provide a more stable revenue source for funding transit infrastructure and operating cost shortfalls, and also be used to reshape the region. Road tolls or road pricing would have a significant impact on mode choice and would also encourage a more compact development pattern. Metrolinx has reviewed the investment practices of regional transportation authorities around the world, and found that the use of multiple funding tools can increase funds, but also change travel behaviour.

Value capture financing is one approach that has been used internationally. When government makes key infrastructure investments, typically in water/sewer connections or transportation infrastructure, considerable "unearned" profits accrue to land developers. Value capture financing explicitly reclaims for government a portion of the profit that is unlocked due to governmental action and then leverages additional borrowing capacity against these future value capture payments.[22,23] While development charges are quite common in Ontario, other types of value capture have not commonly been considered, and in some cases, a new legal framework may be requried to enable this type of financing.

Figure 16: Operating Cost per Revenue Passenger in 2008 and 2014



Source: Canadian Urban Transit Association (CUTA)

3.4 The Next Generation of Mobility

Advances in mobility service models, autonomous and connected vehicle technologies, and mobile applications loom large over any future vision of transportation in the region. The next Regional Transportation Plan will lay the groundwork for an ongoing process of anticipating and responding to influential trends.

Emerging New Mobility Options

The travel choices available to residents for decades are being reinvented as new mobility models and technologies are emerging outside traditional government planning and delivery frameworks. They could bring benefits, but also controversy and complexity.

TRANSPORTATION NETWORK COMPANIES (TNCs) (e.g. Uber, Lyft, BlancRide, Bridj) are rapidly becoming highly visible and disruptive forces in cities around the world. Through the flexibility of mobile communications and the "sharing economy," TNCs offer a wide variety of services. The most popular form involves travellers hiring non-commercial drivers to transport them to their destination, but can also facilitate ride-sharing, carpooling and ride-matching. Advanced multi-modal trip planning tools can now instantly pair carpool drivers and passengers for a trip, and facilitate digital payments to share driving expenses. Additionally they are leading to new options such as demand-responsive (on-demand) transit services with routes determined in real-time. TNCs have the potential to compete with personal cars and taxis as well as with public transit. At present, regulation is evolving, with some Canadian municipalities establishing local regulations, typically in isolation of one another in the same region. Commonly identified regulatory issues include car insurance, service for passengers with disabilities, security, competition with taxicabs, and mode shift from transit. By contrast to Canadian jurisdictions, a host of American states have passed statewide bills to regulate TNCs and ridesharing.

Overall, these emerging new mobility models can be complementary to transit, provide more efficient services for segments of the population (e.g. low density areas), and have the potential to fill gaps that transit has traditionally found challenging (e.g. first mile-last mile connections). However, there is a risk that the benefits of on-demand mobility services to the individual could eclipse the societal benefits of a more coordinated and balanced mobility system resulting, for example, in increased vehicle travel, less viable transit service, or less equitable access and mobility for those that have fewer options.

Transportation network companies and ride-sharing companies are likely to increase demand for trips that were traditionally made by taxi mode in 2011. However, these companies also have plans to promote trips made by multiple travelers (e.g. Uber Pool and Lyft Line), which has considerable potential to decrease overall motorized vehicle kilometres travelled (vkt). At the same time, these improvements will only come about if most of the shared ride travelers were previously taxi riders or drivers. If TNCs draw significant ridership from former transit riders or from people using active modes, overall vkt could increase as a result of this new service. One recent study suggested that almost half of Uber users in San Francisco were drawing predominantly from transit and active modes.[24]

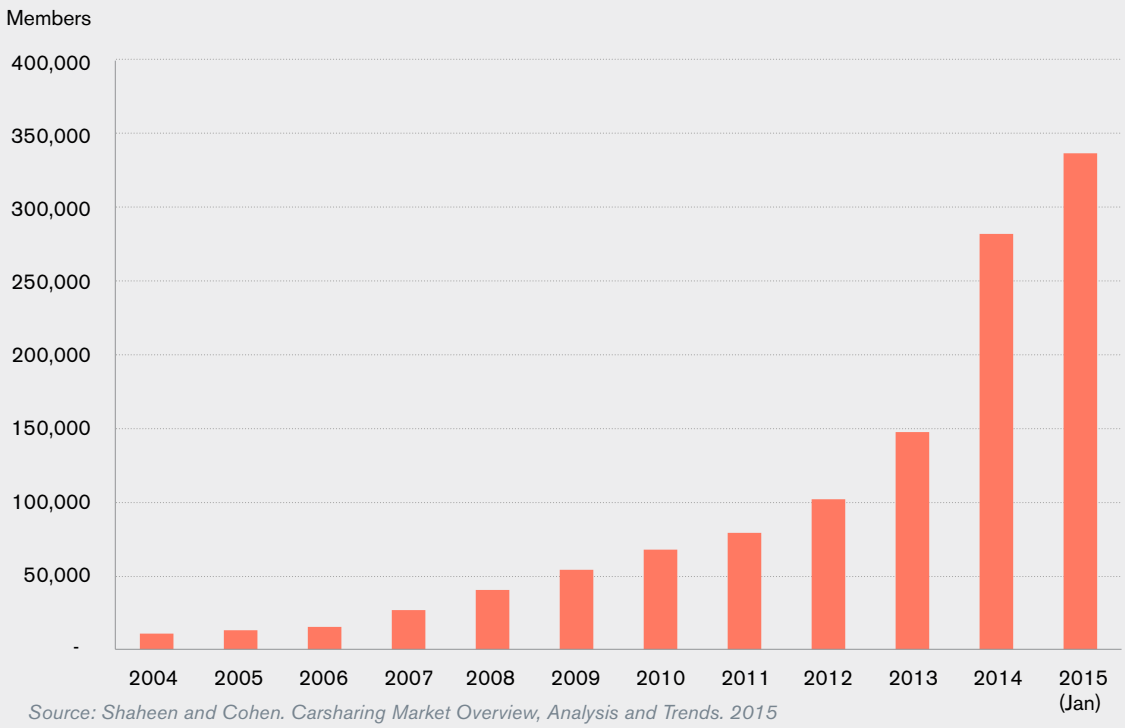
CAR-SHARING is growing rapidly (see Figure 17), and reflecting that many younger professionals in dense urban areas may have a lessened interest in the expense of car ownership and maintenance. Between January 2014 and January 2015, car-sharing memberships in Canada grew by 50%.[25] Shifts in technology and consumer behaviour

MILTON TACKLES THE FIRST AND LAST MILE

MILTON, HALTON REGION

For the cost of a standard local transit fare, Milton's GO Connect Drop-Off evening service provides flexible shuttle service for each rider who arrives in Milton on the GO train. The service is provided to 110 riders each weekday evening, providing a local solution to the "first-mile/last-mile" challenge of accessing the GO station.

Figure 17: Growth in Car-Sharing Membership in Canada



Source: Shaheen and Cohen. Carsharing Market Overview, Analysis and Trends. 2015

have led to new models of car-sharing, including peer-to-peer, and will likely become more popular as these models mature and innovate. Research suggests car-sharing has the potential to reduce car ownership and car use, but parking supply is a constraint to its growth, and opportunity exists to adapt traditional parking provision and policies to optimize its use.[26]

MOBILITY-AS-A-SERVICE is an emerging model for marketing a comprehensive suite of multi-modal services. Travelers plan and pay for their mobility needs through a single portal that integrates the services of multiple providers (e.g. transit systems, car or bike share providers, taxis), and choose from several on-demand services for each trip. Treating transport as a service encourages providers to look at mobility from the perspective of customers and their needs, recognizing that desired changes to the transportation system (e.g. congestion relief) cannot be brought about by focused development of a single transport mode, but instead requires an integrated approach.

CONNECTED VEHICLES use new technologies that allow vehicle-to-vehicle and vehicle-to-infrastructure communication to improve road safety, reduce congestion and emissions, and boost the effective capacity of roads without widening them. Connected vehicles represent an incremental and largely positive change to current road use; in Toronto, connected vehicles have the potential to reduce travel times by 37%, reduce emissions by 30%, and improve safety indicators by 45%.[27] The United States Department of Transportation estimates that vehicle-to-vehicle connectivity could affect or eliminate up to 76% of multi-vehicle crashes involving light-duty vehicles.[28]

AUTONOMOUS VEHICLES (also called fully-automated vehicles, driverless cars or self-driving cars) can read their surroundings and make intelligent decisions about their direction, speed and interaction with other road users. Autonomous vehicles (AVs) could lead to the more flexible use of private cars, as well as to customized and lower-cost transit services. Their widespread use could improve safety for all road users (given that 90% of crashes are caused by human error), and enhance mobility options for non-drivers (e.g. seniors, youth and persons with disabilities). AVs could provide an effective solution to "first mile" and "last mile" barriers facing travelers trying to get to and from rapid transit stations (particularly in suburban areas), and could reduce the cost of long-distance trucking.

Other potential benefits include improved traffic circulation, increased road capacity and reduced emissions

– especially in conjunction with connected vehicle technologies. Their advancement may allow for the redeployment of road capacity for pedestrian and cyclist use, and redevelopment of land previously used for parking. These advances could have the greatest benefit for customers in lower-density suburban or rural areas, where conventional transit can be expensive to deliver and require long walking distances and waiting times. At the same time, suburban households may be the least likely to embrace these options.

Factors that will influence adoption include vehicle availability and features; consumer acceptance; government regulation; privacy and security regulations, and insurance industry adjustments, and it may take decades before they become commonplace. Uncertainty also surrounds whether consumers will gravitate towards ownership or shared-use of autonomous vehicles, which will significantly influence the impacts on the transportation system. Government will need to monitor progress and plan scenarios and policy accordingly to ensure optimal outcomes from AV technology, and screen major investments through the lens of AVs.

VEHICLE FUEL-EFFICIENCY AND ELECTRIC VEHICLES (EVs) continue to represent an opportunity for the transportation sector to make a big impact on reducing greenhouse gas emissions(GHGs). EVs will play an important part in Ontario's *Climate Change Strategy* by reducing transportation emissions, the largest GHG source in the province. Ontario has set a long-term goal to reduce emissions by 80% below 1990 levels by 2050, and is promoting the adoption of battery electric and plug-in hybrid electric vehicles as one means of achieving reductions.

The Electric Vehicle Incentive Program was introduced by MTO in 2010, and updated in 2016 to reward early adopters and develop market demand for new technology. The number of electric vehicles registered in the program is shown in Figure 18. In parallel, the Ontario Green Investment Fund is being directed towards the build-out of a public electric vehicle charging station network. Since 2010, more than 6,000 EVs have been sold in Ontario[29], and more than 1,000 public charging stations have opened. Metrolinx is also installing electric vehicle charging infrastructure at several of its GO stations (see Figure 18).

Municipalities are also taking a leadership role in supporting electric vehicles by including EV policies in their community energy planning processes, installing public charging and priority parking spaces, and promoting EV resources to residents and businesses.

Embracing New Mobility Opportunities

Going forward, transportation planning, modelling and project assessment will need to consider the impact of emerging mobility and technology trends.

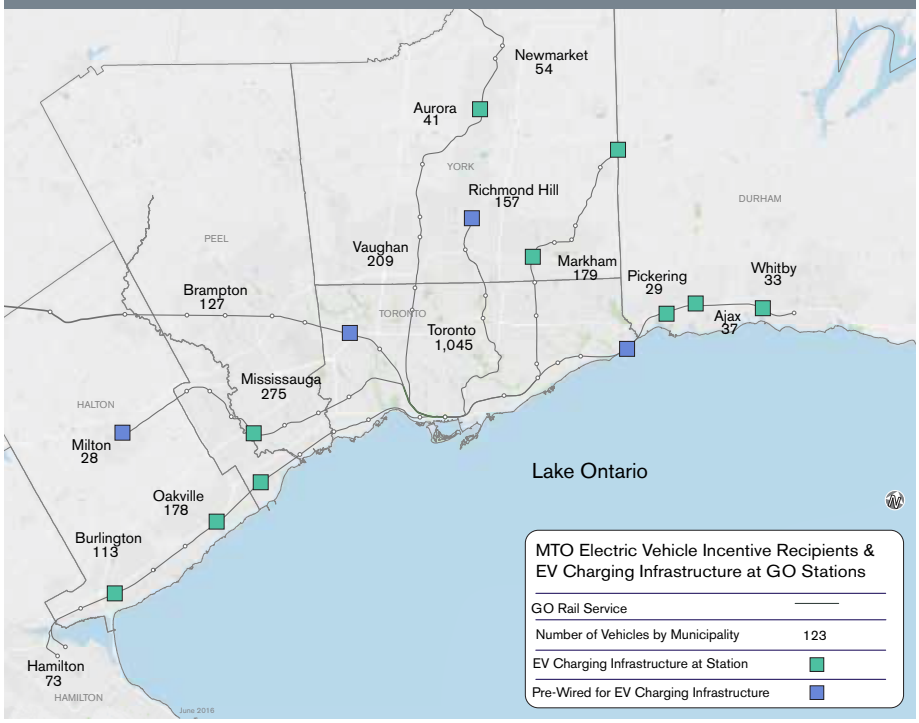
Metrolinx has begun to explore a number of possible models for the delivery of new mobility options in the region with our municipal partners who have responsibility for local transit service and regulating private transportation services. Many of these models involve partnerships with the private sector to develop a more integrated suite of services that complement the central role of public transit in meeting traveller needs. These could include collaboration on new travel choices in areas with low transit service levels, emergency ride home options for Smart Commute participants and on-demand accessible transportation services. In setting the parameters within which the private sector operates, government can provide enough space for technological and service innovation, as well as establish technical and social standards to abide by. The possible benefits of such models could include improved user mobility and convenience, better user information, lower public sector

BURLINGTON TRANSIT GOES MOBILE

BURLINGTON, HALTON REGION

In recognition of growing mobile web traffic, Burlington Transit launched a mobile-friendly website in 2016, complete with real-time bus data. Riders can now view a live map featuring the exact location of their bus from their mobile device.

Figure 18: Electric Vehicles in the Incentive Program and Charging Infrastructure at GO Stations



Source: Ontario Ministry of Transportation

costs, and more effective use of public resources, such as large buses. In considering these options, it will be necessary to focus on areas where new partnerships can fill gaps in the conventional services provided by the public sector, or where current services can be improved upon and delivered more efficiently.

The role of governments in vehicle technology is expected to revolve around establishing protocols and upgrading roads and roadside infrastructure to enable communications with vehicles and their users. Metrolinx and municipalities must act to maximize the benefits of innovation while mitigating the costs. They can do so by monitoring the progress of related technologies and the impacts of pilot testing, by supporting research and development that advances the public interest (e.g. in areas such as congestion, safety and accessibility), and by enacting timely legislation and regulation. Ontario is the first province to allow for the testing of automated vehicles and related technology on-road, and with the Ontario Centres of Excellence Connected Vehicle/ Automated Vehicle Program there is a supportive legislative environment for the region to be a leader in this area.

Overall, coordination is needed between different levels of government, and across boundaries. For example, Metrolinx is partnering with the City of Toronto to better assess the speed at which these technologies will be adopted (once they become commercially available) and how this might vary between urban and suburban households. This work will inform the scenarios used in the RTP's screening process (see section 3.1).

New mobility relies on, and creates a vast amount of data, using smartphones to receive and generate trip data and enabling more flexible and adaptive transportation services. The field of data management will require increased attention to ensure privacy, ownership and security concerns are met, and that big data appropriately informs transportation decision-making. Data generation and monitoring can even enable new policy tools for demand management (e.g. pay-as-you-drive insurance, active transportation incentive programs). Ultimately, government could potentially act as a steward for mobility-related data in the region, maintaining its integrity, security and openness.

While autonomous vehicles could have a major impact on personal mobility, connected vehicles represent an incremental change to current road use; the role of governments could revolve mainly around establishing protocols and upgrading roads and roadside infrastructure to enable communications with vehicles and their users. Metrolinx and municipalities can monitor the progress of related technologies and the impacts of pilot testing, support research and development that advances the public interest (e.g. in areas such as congestion, safety and accessibility), and, in conjunction with the Province, enact timely legislation and regulation.

4
WHAT DO YOU THINK?

Help us create the next Regional Transportation Plan.

Comment online
www.metrolinxengage.com

E-mail us:
theplan@metrolinx.com

Learn more about the 25-year multi-modal transportation plan for the region:
www.metrolinx.com/theplan

Send us your responses **by Monday, October 31, 2016**. We'll use them to shape the draft and final versions of the next Regional Transportation Plan.

Look for **more information on our website this fall and into early 2017**, when we will launch a variety of public consultations to help develop the plan.

Discussion Questions

The following questions are intended to guide consideration of the RTP's review, as described in this discussion paper.

Toward a shared vision of the future

- Do the Vision, Goals and Objectives resonate with you and the 2041 future you would wish for?
- Did we miss anything?
- Does anything belong in another policy or document?

Opportunities for better transit & transportation

- Do the areas of focus for the next RTP make sense to you?
- Are there other opportunities or challenges you want the plan to consider?
- Do you have specific local transit or transportation situations that will benefit from a more regional lens?
- Looking beyond 2031, what should the RTP include to ensure that transportation expansion continues to meet regional growth to 2041?

Opportunities for regional integration & collaboration

- Have we identified the key areas for improved regional/local integration and connectivity?
- Are there other areas where local and regional connections and integration need to be addressed?
- Where are the opportunities to improve regional collaboration to better support the implementation of the RTP? Are new tools required?
- How should regional equity be addressed in the next RTP and subsequent Implementation Plan? How should issues of transit equity and access be addressed?

Opportunities for new mobility

- How should the RTP focus on emerging influences including carsharing, on-demand services and autonomous vehicles?

APPENDIX 1:
Profile of The Region

This section begins by describing how the region's future growth will affect its transportation system, and how transportation can contribute to sustainable growth of both residential and employment areas. It then describes key performance indicators to examine the contribution that committed transportation investments are making towards satisfying the goals of the RTP.

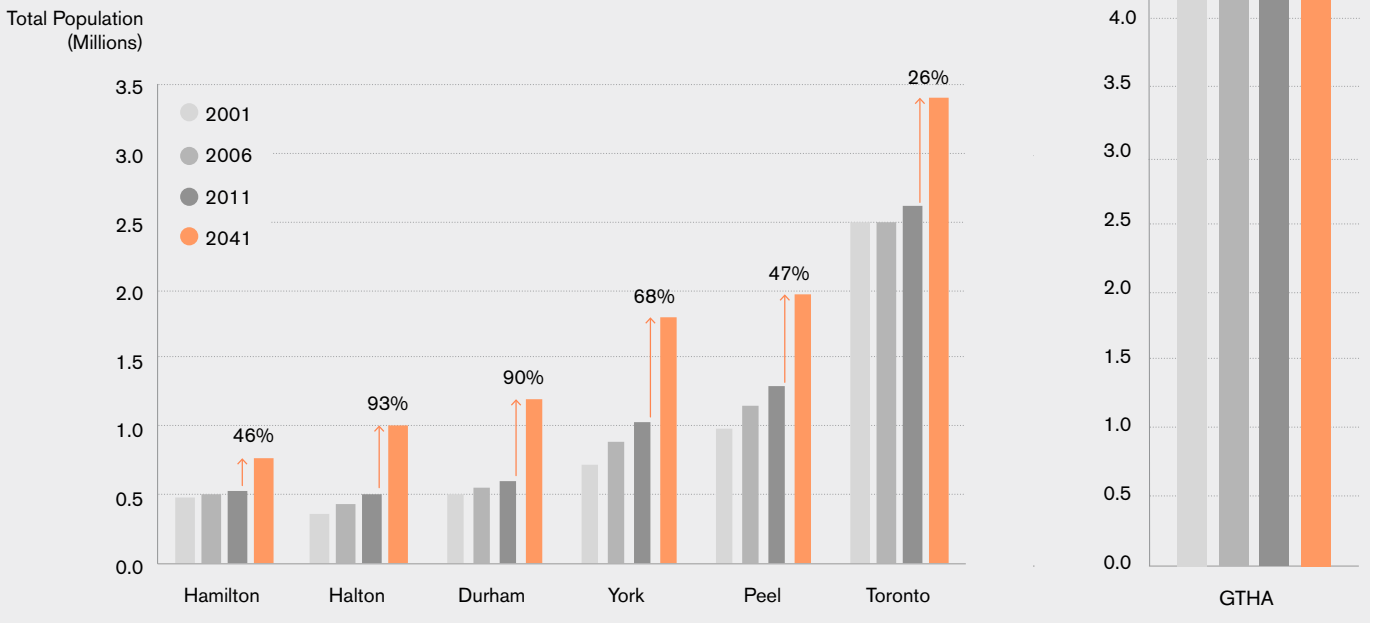
Regional Growth Context

Population Growth in the GTHA

Cities and suburbs will grow in population. The GTHA's population is expected to increase from 7.2 million people in 2015 to 10.1 million in 2041, resulting in higher population densities (see Figure 19). The City of Toronto will remain the most populous municipality, but most growth will happen elsewhere – with Durham, Halton, Peel and York regions seeing population increases of more than 50%.[30] Over the last decade, demand for urban living in central Toronto, rising house prices and the *Growth Plan*'s implementation has encouraged a greater mix of housing types among all new dwelling units in the GTHA (see Figure 20).[31]

As shown in Figure 21, the share of seniors (age 65 and up) is expected to increase dramatically as the population continues to grow, becoming the dominant age cohort by 2041.[32] This has strong implications for future mobility throughout the region.

Figure 19: Projected Growth in GTHA Population



Source: Statistics Canada and the Growth Plan for the Greater Golden Horseshoe (2006).
Note: Metro

Employment Growth in the GTHA

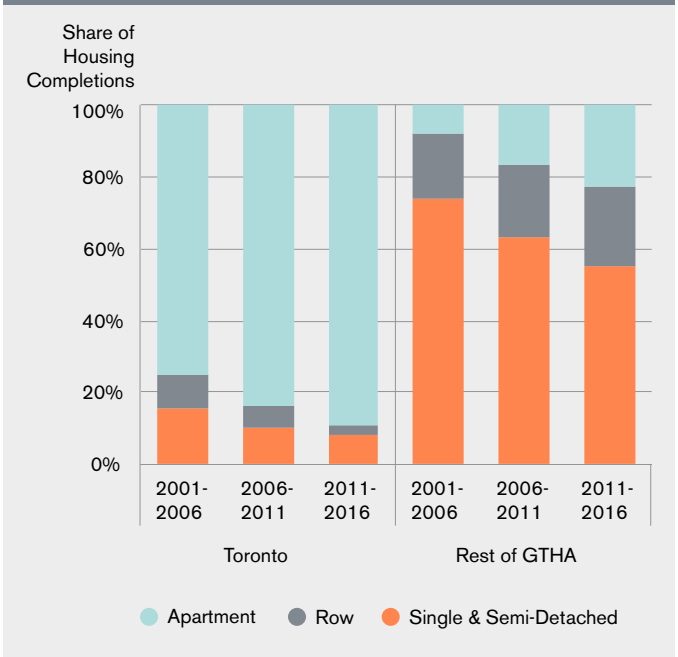
EMPLOYMENT WILL GROW AND THE LOCATION OF JOBS WILL SHIFT. The number of jobs in the GTHA is expected to keep pace with population, rising from 3.3 million in 2011 to 4.8 million in 2041 (see Figure 22).[33] Since 2006, employment located inside and outside of the City of Toronto has been relatively balanced. However, the City is forecasted to be home to only 36% of the region's jobs in 2041, with the majority of growth forecasted to be outside Toronto.[34] This is in part due to the population-related growth outside of Toronto and the growth in non-office sectors. To support employment growth, the existing and planned transportation system needs to take into account the growth in jobs and their location across the region.

A SHIFTING ECONOMIC FOUNDATION. The GTHA's economy and employment patterns have changed in the last three decades. Almost 200,000 manufacturing jobs have disappeared since 2001, mostly in older industrial areas, and the sector's share of regional employment dropped to 10% in 2015 from 20% in the mid-1980s. Increasingly, the region's economy is based on professional and technical services (including knowledge-based organizations and creative businesses) in addition to the retail, healthcare and institutional services required by a growing population.[35]

The location of jobs is a determinant of how people travel to work. Higher density, office employment tends to be more conducive to transit use, for example, whereas lower density employment types, including warehouse and manufacturing facilities and low density suburban office parks, are more difficult to serve with transit. People tend to choose how they get to work based on where they work rather than where they live, so to keep the region moving transit needs to align with where jobs are located in sufficient density to support transit use.

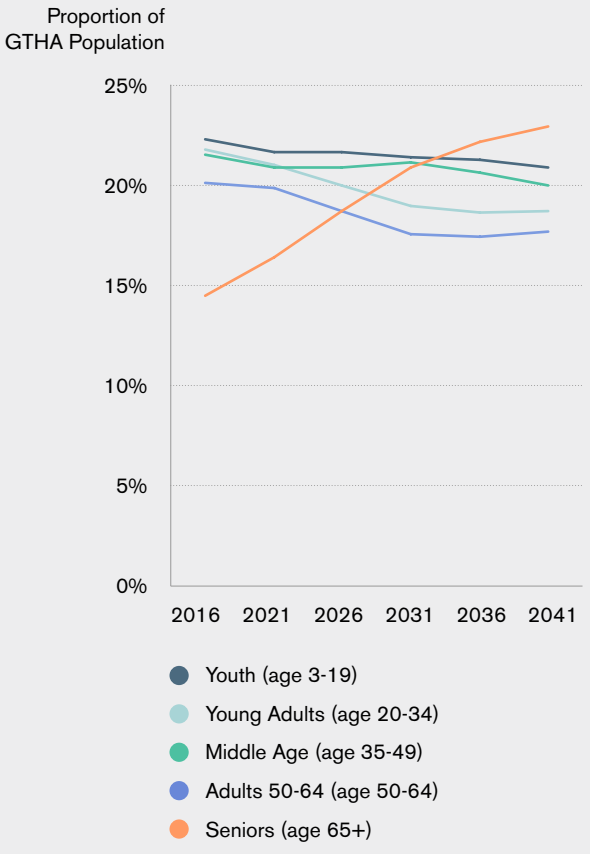
OFFICE GROWTH IN DOWNTOWN TORONTO. Since 2006, in a reversal of trends in the 1990s, there has been more than twice as much major office development in Toronto's core as everywhere else in the GTHA (see Figure 22), growing from 40% to 46% of the total office employment in the GTHA in the last ten years.[36]

Figure 20: Proportion of Dwelling Units by Type Built between 2001 and 2016.



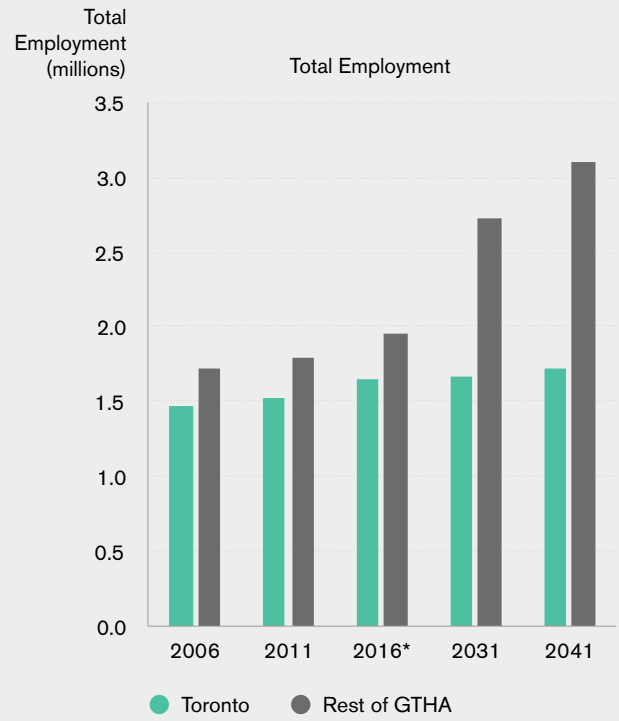
Source: Hemson Consulting Ltd. with data from CMHC Monthly Housing Market Tables

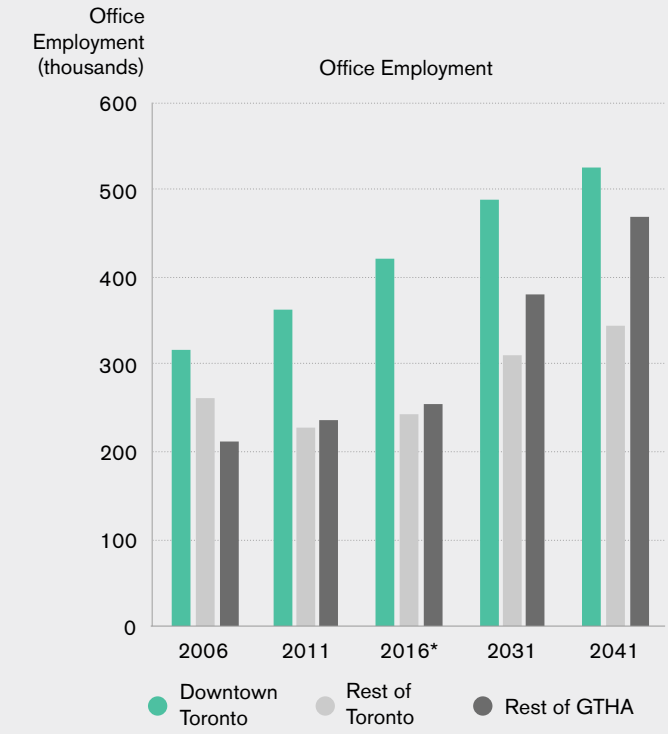
Figure 21: Proportion of GTHA Population by Age Group, 2016-2041



Source: Ministry of Finance Population Projections

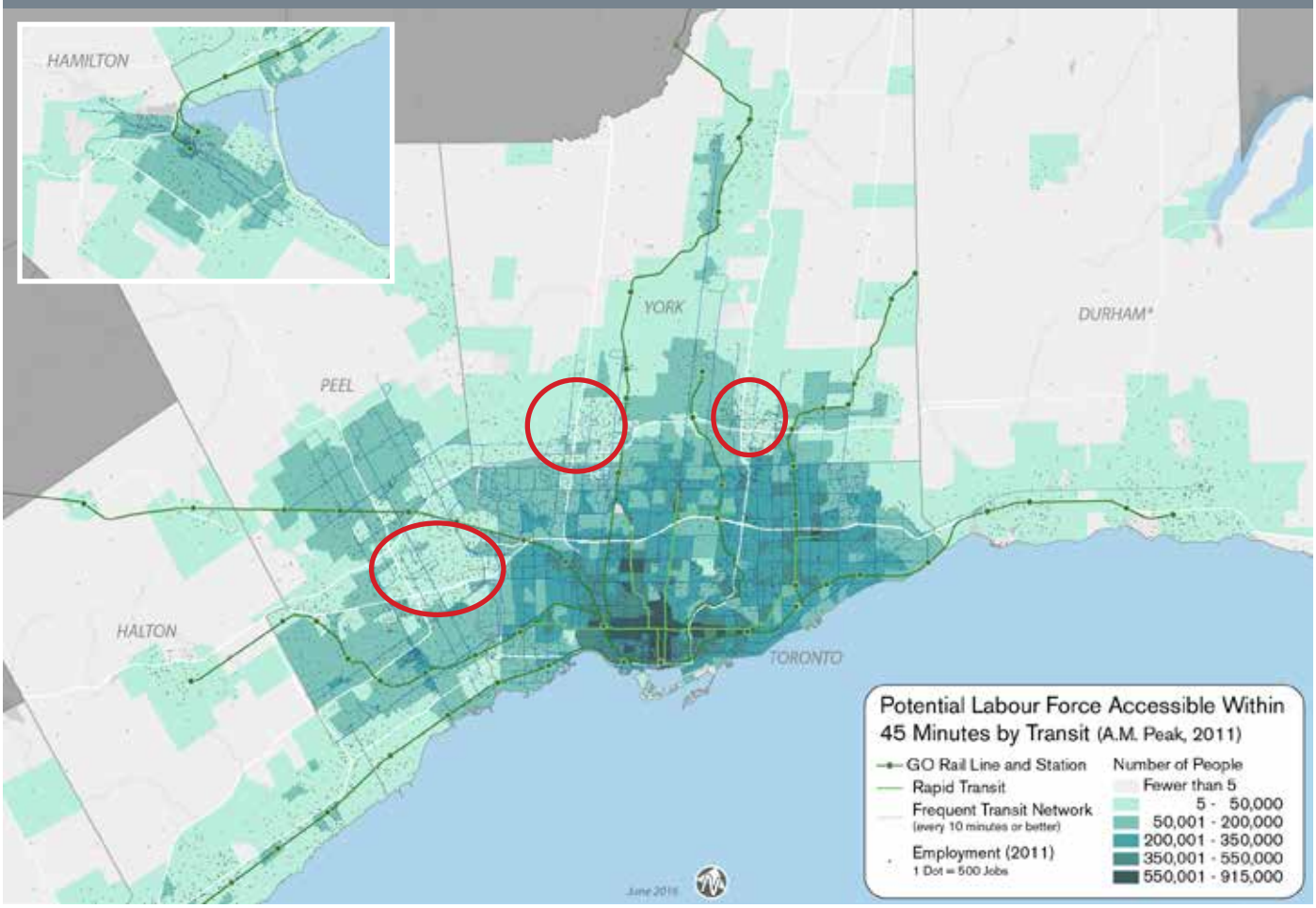
Figure 22: Total Employment and Office Employment in the GTHA





Source: Hemson Consulting Ltd. with data from Statistics Canada 2011 National Household Survey, Growth Plan for the Greater Golden Horseshoe (2006)
**Note: 2016 data are estimated*

Figure 23: Accessibility to Labour Force within 45 minutes by Transit (2011)[37]



Areas with high employment but poor access to potential labour force by transit are circled in red.
**Note: Data for Durham include access by GO Transit only. Durham Region Transit route data were not available at the time of writing.*

Downtown Toronto will likely remain the focus of office development for some time, in part due to the competition among employers to attract a young workforce. This downtown-oriented growth reinforces demand for transit services that feed Toronto's core. At the same time, with the implementation of GO RER bi-directional service, there is an opportunity to cluster office growth outside the downtown core around suburban rail stations and in Urban Growth Centres served by this program.

OAKVILLE MAKES IT EASIER FOR LOCAL TRANSIT USERS

OAKVILLE, HALTON REGION

In 2009, Oakville began restructuring its transit system to meet the needs of residents travelling within the town. Six new grid-system bus routes were introduced and service was increased to make crosstown journeys quicker and more direct. These changes resulted in a sharp increase in ridership growth and higher fare-box recovery.

THE GROWTH OF MEGAZONES. At the same time as growth in Toronto's downtown core, another important economic trend since 2001 has been the rapid emergence of large employment centres near Highway 407's interchanges with Highways 404 and 400, and around Lester B. Pearson International Airport.[38] "Megazones" are not homogenous across their area – they typically consist of various uses which makes consistent transportation access difficult. These three suburban "megazones" are not well served by transit and have become major contributors to regional traffic congestion. While together they host about 15% more jobs than downtown Toronto (543,000 versus 465,000), they generate about 250% more car-based work trips (950,000 versus 267,000).[39]

Some firms in these areas need access to low-cost labour to be competitive, and public transit is vital to their ability to attract potential employees. However, the megazones have relatively poor transit access related to the areas where potential workers live, creating an opportunity for potential new services. The map in Figure 23 shows the potential labour force accessible to different areas of the GTHA within 45 minutes by transit (including walk access time, wait time, transfer time(s) and in-vehicle time). The map highlights many areas that have high employment (including megazones, shown as red circles), but are relatively difficult for people to access by transit. There are also many areas that are accessible to many people by transit, but there are few jobs in those areas. Given the vast possible variances between areas of high employment or population, different transportation solutions will be needed to serve different contexts.

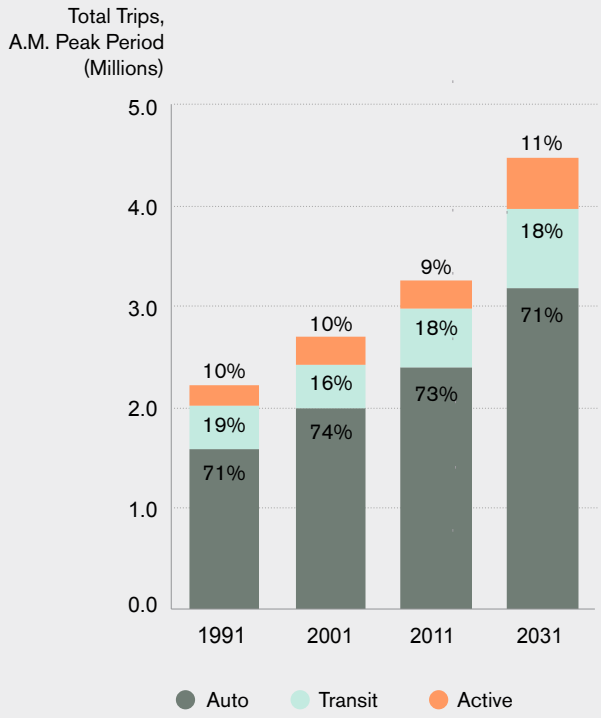
DECLINING TRANSIT POTENTIAL IN OLDER EMPLOYMENT AREAS. As manufacturing employment has dropped, so has the number of employees in traditional employment areas in industrial areas and inner suburban business parks. However, the demand for space in older industrial areas has not changed with increasing automation and a greater logistics orientation, as they still require large facilities, even while functioning with fewer employees. In the process, serving these areas with high-quality, cost-effective transit becomes even more difficult to provide.

Travel Demand

With the growth in population and jobs comes growth in travel. In 2011, a total of 13.2 million trips were made on average, by all modes (except school bus), each day within in the GTHA. Of these, 3.3 million were made during the morning peak period (6:30 a.m. to 9:30 a.m.). By 2031, the number of trips in the morning peak period is expected to grow to 4.5 million (see Figure 24).

The number of person-trips made by car or transit in the morning peak hour will increase from almost 3 million in 2011 to almost 4 million in 2031 with the committed transit network in place.

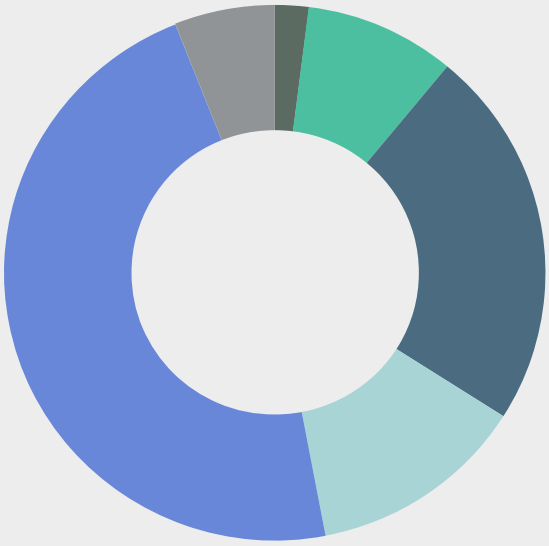
Figure 24: Growth in Total Morning Peak Period Trips



Source: Transportation Tomorrow Survey and MTO Greater Golden Horseshoe Model.
Note: Does not include School Bus.

Figure 25: Relative Morning Peak Period Travel Demand for Different GTHA Travel Markets, 1991-2031

Projected distribution of total trips per travel market, 2031



2.4%
Within Downtown

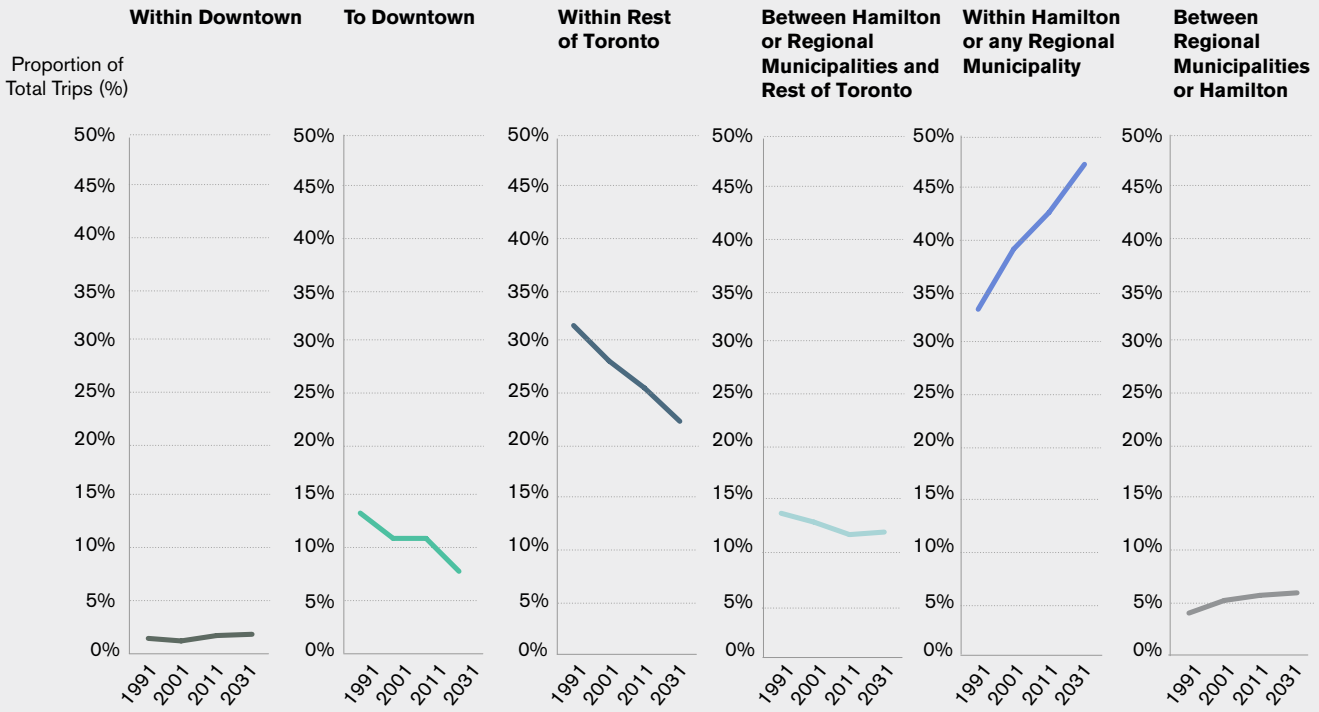
6%
Between Regional Municipalities or Hamilton

8.7%
To Downtown

12.7%
Between Hamilton or Regional Municipalities and Rest of Toronto

23%
Within Rest of Toronto

47.2%
Within Hamilton or any Regional Municipality



Source: Transportation Tomorrow Survey and MTO Greater Golden Horseshoe Model.

Although the number of transit trips will increase by about 36% between 2011 and 2031, the number of auto trips will increase by almost the same proportion (33%), from about 2.4 million trips in 2011 to 3.2 million trips.[40]

Provincial investments in rapid transit infrastructure have allowed the region to keep up with overall growth – this is significant. However, transit mode share is not expected to increase significantly by 2031, remaining constant at approximately 20% of all trips taken in the region (see Section 3.3 for a full discussion of mode share).[41] While more people will take public transit, the car can be expected to remain the most prevalent travel mode for most people.

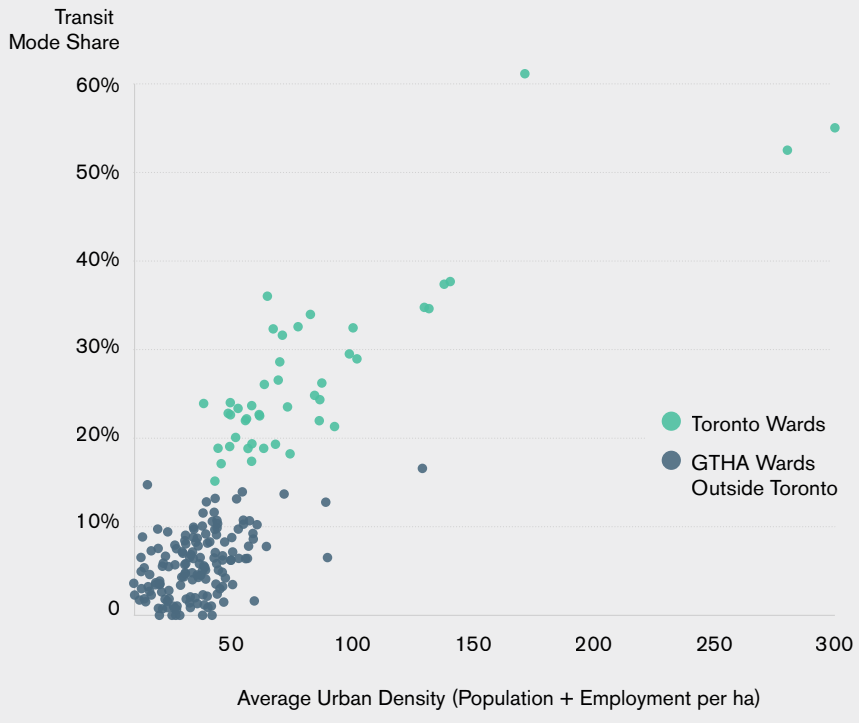
TRAVEL DEMAND PATTERNS ARE CHANGING. Figure 25 shows the change in total trips from 1991 to 2031, as a percentage of all trips in the GTHA, for different travel markets (specific trip origin and destination combinations). The largest travel market is for trips within any single or upper-tier municipality outside of Toronto, with trips growing from 34% of all trips in the GTHA in 1991 to almost half (47%) of all trips in the GTHA by 2031. In addition, trips destined to downtown Toronto are decreasing, from 14% of all trips in the GTHA in 1991 to only 9% of trips in 2031. Together these present challenges to maintaining and growing transit mode share, as the current transit network is heavily focused on radial trips into downtown, and does not serve the demands of cross-regional travel as well.

Making Transportation and Land Use Work Together

Communities with mixed land uses provide more opportunities to bring home and work closer together, potentially reducing the length of motorized trips and making walking and cycling more attractive. Greater density in new and established communities leads to more cost-effective transit service, which in turn enables better service and higher ridership (see Figure 26).

Intensification is an opportunity to improve the mix of uses and density at the same time, while also making best use of transportation investments. Ontario's *Growth Plan*

Figure 26: Relationship of Urban Density to Transit Mode Share by GTHA Ward (2011)



Source: IBI Group based on Transportation Tomorrow Survey, Statistics Canada 2011 Census and National Household Survey.

calls for the development of complete communities that not only minimize distance between living and working spaces, but utilizes a fast, reliable and integrated transportation system to keep people and goods moving.

TARGETS FOR DENSITY AND CONNECTIVITY. The *Growth Plan* envisions compact, mixed-use and transit-supportive communities where people can live, work and play through their lifetimes. It sets targets for municipalities to increase land use densities in established communities, urban growth centres, greenfield areas and around major transit stations. The *Growth Plan* also requires municipalities to plan communities that offer diverse housing types, mixed land uses and a variety of employment opportunities, and to support walking, cycling and transit through urban form and a highly connected street network. The proposed *Growth Plan* continues to strengthen these policies. This includes planning for complete communities, setting density targets for major transit station areas, identifying and protecting priority corridors, and improving the design of transit stations.

Overall, the *Growth Plan* has worked to intensify the existing urban areas, and the proposed *Growth Plan* recognizes the importance of going even further by proposing a 60% intensification target.[42] However, challenges remain with respect to integrating growth with public transit infrastructure:

- From 2001 to 2011, only 18% of new population growth in the GTHA happened near frequent transit networks, and only 10% happened within 1km of a GO station (see Section 3.2 for further discussion).[43]
- Very few of the 333 "major transit station areas" identified in official plans across the Greater Golden Horseshoe have achieved the densities recommended by the Ministry of Transportation's *Transit-Supportive Guidelines*:
  - » By 2011, only 24 out of 68 existing Toronto subway stations met the threshold of 200 people and jobs per hectare.
  - » Only 1 out of 22 existing light rail or bus rapid transit stations met the threshold of 160 people and jobs per hectare.[44]

The *Growth Plan* and the Regional Transportation Plan work together to ensure that where and how the region grows aligns with frequent and rapid transit. Proposed amendments to the *Growth Plan* – part of the Province's Co-ordinated Land Use Planning Review – are currently available for public feedback (to September 30th, 2016). The proposals include new policies that identify strategic growth areas where development and transit infrastructure should be aligned and integrated.

Figure 27: Key Performance Indicators for the Regional Transportation Plan

GOODS MOVEMENT

MODE OF TRANSPORTATION

VEHICLE KILOMETRES TRAVELLED

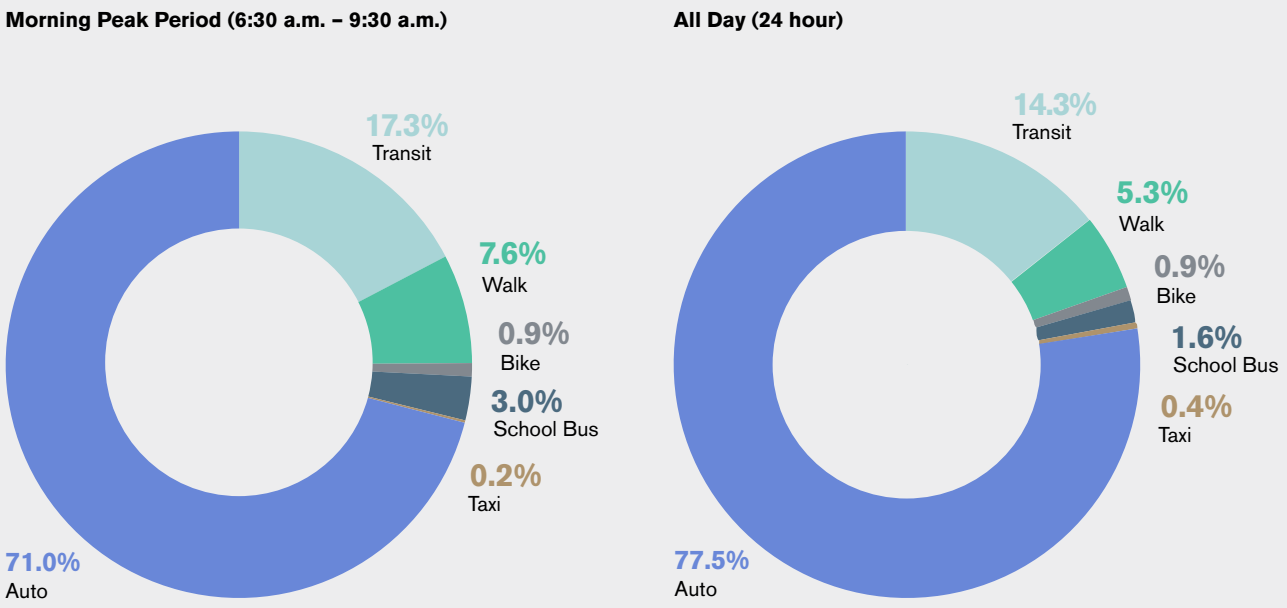
GHG EMISSIONS

COMMUTE TIME

TRANSIT ACCESS AND EQUITY

SAFETY

Figure 28: Overall Mode Shares in the GTHA for All Trips (2011)



Source: Transportation Tomorrow Survey, 2011.

Performance of the Region's Transportation System

This section examines how well the region's transportation system is working today, and how its performance might change in the future. To guide the discussion, this paper presents seven key performance indicators that Metrolinx will apply to measure progress toward the goals of the Regional Transportation Plan (see Figure 27). These performance indicators are useful for providing a closer look at existing and future conditions. The ability to measure the performance of the region's transportation network is improving, but remains a work in progress.

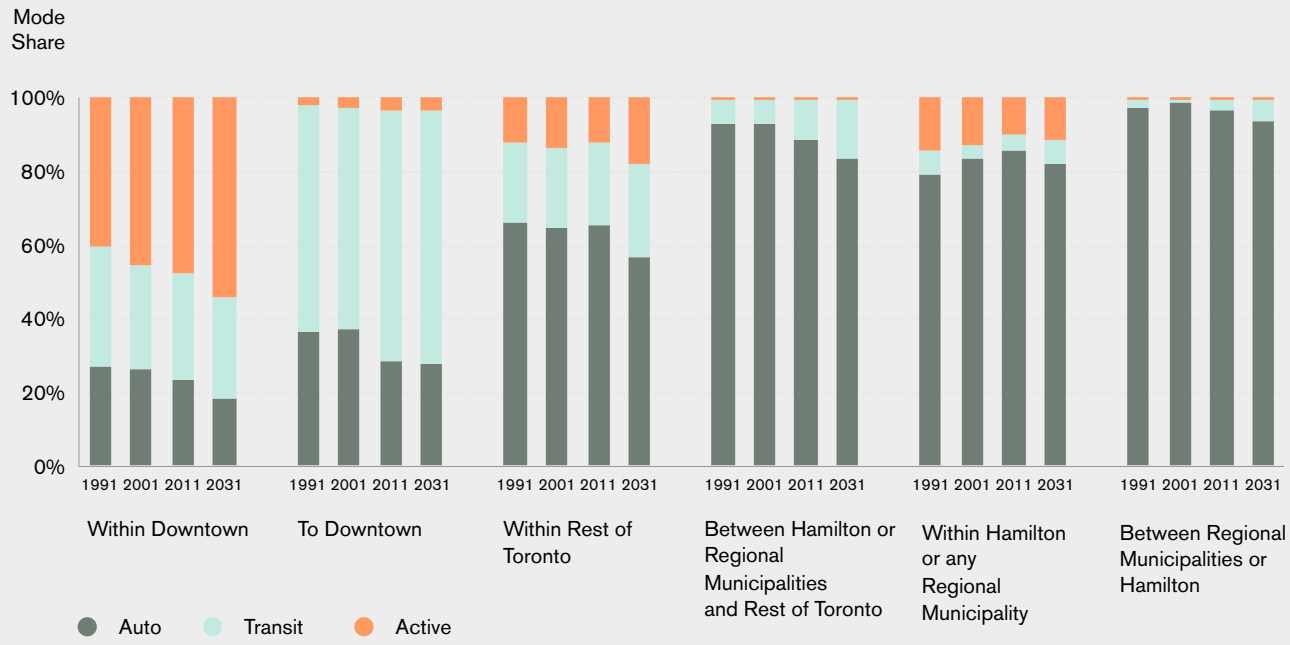
What modes do we use?

Mode share is a key measure of how residents are using various transportation options – driving alone, sharing a ride (carpooling and vanpooling), using public transportation (commuter rail, heavy rail, and/or bus transit), and walking and biking. Figure 28 shows car trips are the predominant mode of transportation for most trips in the GTHA.

DIFFERENT MARKETS USE DIFFERENT MODES. Several distinct travel markets exist within the GTHA, and different strategies will be needed to address the unique transportation challenges that each presents. Travel markets represent, very broadly, the types of trips that people make throughout the region, and are defined by geography (trip origins and destinations), trip length, and the mode(s) of travel that are predominantly available or used (automobiles, transit and active) for trips within the market.

As shown in Figure 29, the single largest travel market identified represents trips made within any single- or upper-tier municipality in the GTHA outside of Toronto. In 2031, this market will represent 47% of all trips in the GTHA, 82% of which are forecasted to be made by car. The markets for travel between single- and upper-tier municipalities (including Toronto, other than downtown) represent an additional 19% of trips, most of which (87%) are also forecasted to be by auto.[45] Together, these markets represent a challenge, and an opportunity, to increase transit use throughout the GTHA.

Figure 29: GTHA Mode Shares for Key Travel Markets (a.m. peak period), 1991 – 2031



Source: Transportation Tomorrow Survey and MTO Greater Golden Horseshoe Model.

A majority of trips from all parts of the region that are destined to downtown Toronto are made by transit, and a significant number (23% in 2011, rising to 25% in 2031) of trips made within Toronto use transit. Otherwise, the transit mode share is much lower for trips to, from and within municipalities outside of Toronto, increasing only slightly by 2031. Auto trips can be expected to represent 94% of all trips between single and upper-tier municipalities outside Toronto in 2031, down only slightly from 97% in 2011.[46] Overall, cars can be expected to continue to carry a majority of trips in the GTHA (from 73% in 2011 to 71% in 2031, see Figure 24).

Considering all trips that cross upper- or single-tier municipal boundaries, including those trips destined for Toronto, the transit share is substantial for all trips across the entire day (16%). This relatively high percentage of cross-border trips is marginally higher for work trips (18%) than for non-work trips (13%). Nonetheless, 13% transit share for non-work trips is an encouraging number, especially given that GO RER improvements to off-peak service has not been introduced to the region. In addition, the all-day percentage is only slightly below the a.m. peak share (20% for work and non-work purposes), presenting an opportunity to highlight the potential value of fare and service integration among transit agencies.

TRENDS IN TRANSIT RIDERSHIP. Transit ridership across the GTHA has outpaced population growth over the last decade, particularly for GO Transit and the other transit systems outside the City of Toronto (see Figure 30). At the same time, per-capita transit ridership levels (see Figure 31) still vary considerably among municipalities, with Toronto residents taking transit about four times more often on average than residents of Mississauga or Hamilton, and still eight to ten times more often than residents of Brampton, which has experienced a 70% growth in total transit ridership since 2008.[47] Areas of the GTHA that have the lowest transit ridership today are those that will also experience the greatest rates of future population and employment growth: a challenge to the goal of increasing transit mode share.

CYCLING IS GROWING AS A MODE OF CHOICE. Walking and cycling carry a substantial share of trips within downtown Toronto, and to a lesser degree within the rest of Toronto and other GTHA municipalities. Active modes are

negligible for longer trips to downtown Toronto, and between single and upper-tier municipalities. By 2031, walking and cycling mode shares are expected to grow within Toronto (even representing a majority of trips within downtown Toronto), but not elsewhere. Cycling and walking trips all-day for different travel markets are shown for 2006 and 2011 in Figure 33. The number of cycling trips increased tremendously from 2006-2011, more than doubling within downtown, and increasing by 50% – almost 100% more than in most other other travel markets.

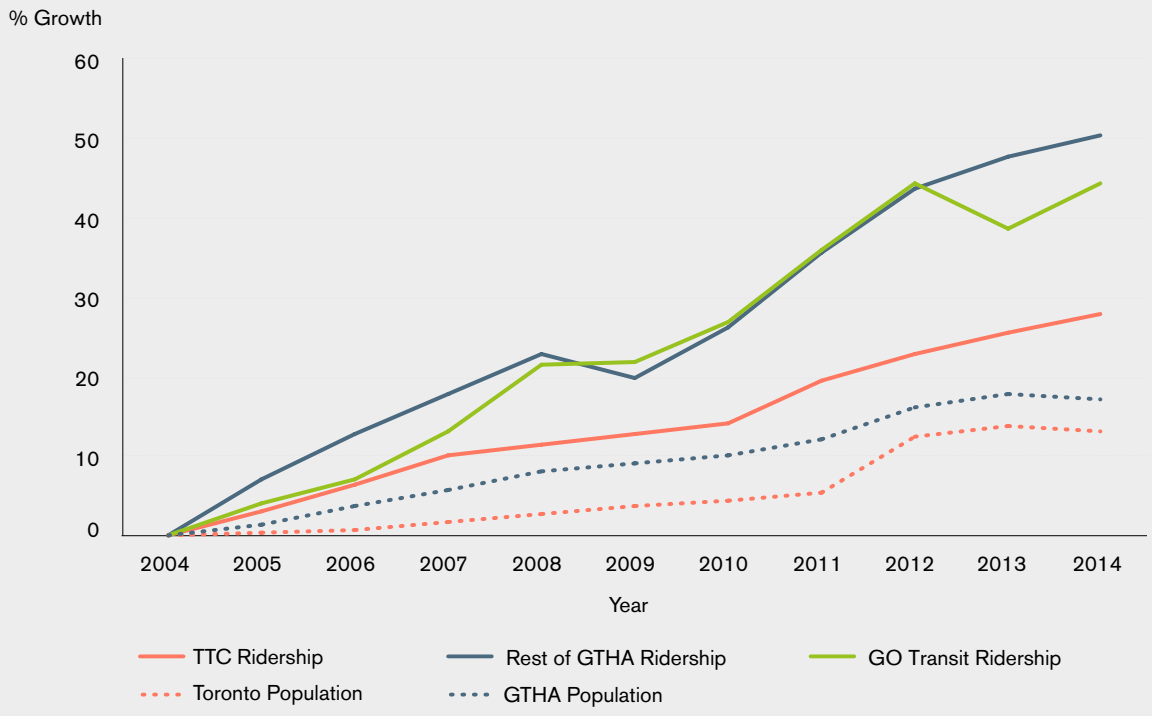
TAXI MODE SHARE. Taxi is another mode that demonstrates clear geographical patterns. Taxi trips within downtown Toronto were 2.8% of all trips made all day in 2011. The taxi mode share for trips between downtown and the former pre-amalgamated City of Toronto is 1.7% all day, and drops to about 1% for trips within the former City of Toronto.[48] On average throughout the GTHA, the taxi mode share is low at about 0.4% of all trips (see Figure 28). Figures for emerging, private, on-demand services (such as Uber) are not known.

HALTON MAKES LONG TERM PLANS FOR ACTIVE TRANSPORTATION

HALTON, HALTON REGION

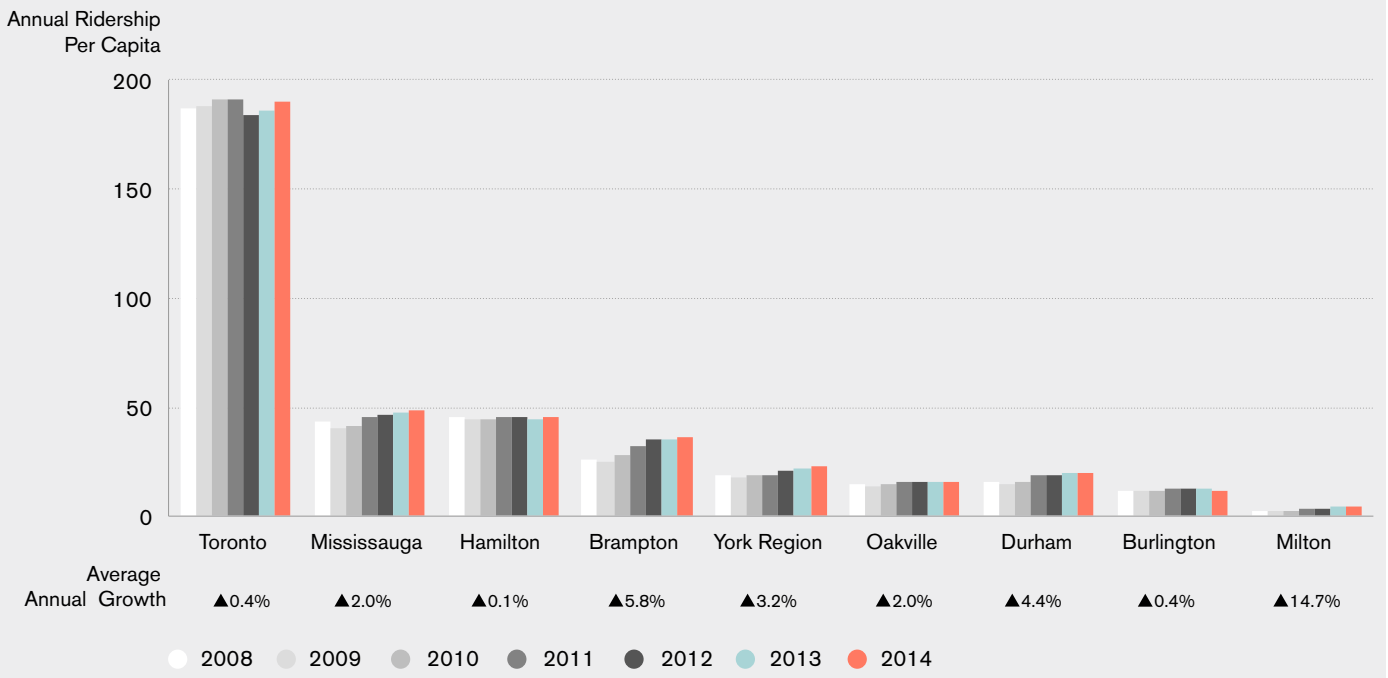
Halton Region has begun work on an Active Transportation Master Plan with an outlook to 2031. The Region is aiming to promote non-motorized travel throughout Halton – safely, affordably and sustainably.

Figure 30: Relative Growth in Transit Ridership and Service Area Population, Toronto and GTHA, 2004 – 2014



Source: Canadian Urban Transit Association.

Figure 31: Annual Transit Ridership per Capita, 2008 – 2014



Source: Canadian Urban Transit Association.

How much do we drive?

Vehicle-kilometres travelled (vkt) is an important measure of motor vehicle use that is directly linked to several undesirable impacts including greenhouse gas emissions, air pollution, traffic noise, road congestion, road repair and rehabilitation costs, automobile operating costs, and personal exposure to safety risks. Given the growth expected in the region, the total vkt in the GTHA is forecasted to increase from 17.6 million km in 2006 to 24.0 million km in 2031 in the morning peak period alone, with the committed rapid transit network in place. This increase is primarily due to the increase in total population, as the total vkt per person will remain about the same, decreasing only slightly from 2006 to 2031 (3%).[49] Despite this 3% decrease in per capita vkt, the region is expected to increase in population by 40%, leading to an increase in overall emissions of approximately 36%. However, due largely to improvements in automobile fuel efficiency, GHG emissions due to (morning peak) vkt will actually decrease by 25% over this period, assuming 5% of vehicles will be electric by 2031.

YORK REGION'S MYTRIP ENCOURAGES SUSTAINABLE TRAVEL CHOICES

YORK REGION

MyTrip is a Transportation Demand Management pilot program, currently underway, to encourage residents in six newly developed neighbourhoods to make sustainable travel choices (transit, cycling and walking).

What is the impact on the climate?

One specific concern associated with the goal of supporting sustainable regional growth is the impact of population growth and economic development on greenhouse gas (GHG) emissions.

TRANSPORTATION EMISSIONS ARE RISING. Since 1990, Ontario's GHG emissions from transportation have risen more than those from any other sector, and now represent the largest source of emissions, at 34% of all emissions in the province. Over three-quarters of transportation emissions come from cars, trucks, buses and other on-road motor vehicles.[50]

The Province of Ontario has succeeded in meeting its 2014 target of reducing total GHG emissions to 6% below 1990 levels, largely through shutting down coal-fired electricity generating plants and the slowdown in the manufacturing sector. The Province has further adopted the ambitious goals of a 15% reduction in total GHG emissions from 1990 levels by 2020, a 37% reduction by 2030, and an 80% reduction by 2050.[51] Reductions from the transportation sector are expected to play a significant role in meeting these targets.

Today, driving is the dominant option in many of the GTHA's fastest-growing suburban areas, and is likely to remain the dominant option into the future (see Figure 29). Overall vehicle kilometres travelled in the GTHA are forecasted to continue to increase with population growth. Even though vehicles are becoming more fuel efficient and electric vehicles are likely to make up an increasing share of the vehicle fleet, total vkt is still increasing, potentially offsetting individual vehicle direct emissions efficiency gains. Further, overall GHG emissions could continue to rise due to the lifecycle emissions impacts of personal vehicle use.

LEVERS TO SLOW GROWING EMISSIONS. The Regional Transportation Plan can contribute to Ontario's goal of reducing overall GHG emissions by promoting a shift in individual travel choices from driving to more energy-efficient options like public transit, active transportation, carpooling or teleworking, and enabling shorter, fewer and more efficient car trips by building denser, mixed-use communities.

Providing people with an attractive and flexible suite of transportation alternatives that allow them to reach work, education, shopping, health care and social opportunities will be essential to reducing reliance on single-occupant vehicles.

LINKS TO ENERGY AND EMISSIONS. In addition to promoting a shift in individual travel choices, Metrolinx will release an Energy and Emissions Management Plan in 2016, which includes actions for minimizing energy and emissions from its fleet and facilities. The Plan includes initiatives to promote a culture of continuous improvement in energy conservation, as well as investing in capital projects and technology solutions that incorporate best practices in energy management and conservation.

Ontario's new *Climate Change Action Plan* was released in June 2016, the Province's five-year plan to fight climate change, reduce greenhouse gas pollution and transition to a low-carbon economy. Actions in the plan are designed to meet the challenges of reducing transportation emissions. It includes actions that:

- reduce emissions from the existing vehicle fleet on Ontario's roads today,
- promote adoption of the non-polluting vehicles now and in the future,
- support cycling and transit, and
- address the movement of goods, including by truck and rail.

In addition, the plan will support the planning and development of low-carbon communities. It includes actions to help municipalities strengthen local land-use policies to help fight climate change; to enable local energy planning and mapping; and to reduce traffic congestion and transportation emissions generally.

The *Infrastructure for Jobs and Prosperity Act, 2015* establishes planning principles for future infrastructure projects that minimize environmental impacts and are resilient to climate change.

The *Metrolinx Sustainability Strategy (2015-2020)* promotes the construction and operation of transportation infrastructure that is more resilient in the face of extreme weather events.

Metrolinx will establish a *Corporate Climate Adaptation Plan* in 2018 for facilities, practices and protocols.

Metrolinx will release an *Energy and Emissions Management Plan* in 2016 for GO vehicle fleet and facilities.

ELECTRIFICATION OF TRANSIT WILL HELP REDUCE EMISSIONS. In addition to encouraging mode shift from single occupant vehicles to more sustainable modes, the transit system itself is a source of GHGs. Electrification of transit is another way to reduce the GHG impacts of the transportation system. The GO RER program is part of the committed suite of transit projects. Most of the electrified portion of the network is planned to operate with 15-minute headways, all day (see Section 2.2).

The production of electricity in Ontario is relatively clean, relying primarily on nuclear and hydro-electric sources for generation, and as a result, in 2031, a diesel locomotive on average will produce about 20 times more GHG emissions per km than an electric locomotive or Electric Multiple Unit (EMU) train. The current GO RER service concept is expected to provide approximately triple the total number of train service km in 2031, compared to just increasing current service levels to match population growth, while emitting only half the total greenhouse gases (see Figure 32).

LINKS TO AIR QUALITY. In addition to GHGs, motor vehicles emit air pollutants such as sulphur oxides, nitrogen oxides, volatile organic compounds and particulate matter. Measures such as Ontario's Drive Clean program have led to significant reductions in these smog-forming air pollutants and fewer smog days.[52] The electrification of both personal vehicles and public transit, including the GO Rail fleet, will further contribute to reductions in air pollutants and have a positive impact on air quality and health, particularly for people living in close proximity to major transportation corridors.

CLIMATE ADAPTATION AND RESILIENCE ARE ESSENTIAL. Transportation authorities throughout the GTHA need to prepare for the extreme weather that climate change will bring, such as more frequent and intense rainstorms and more extreme temperature fluctuations, which can lead to flooding and other impacts on transportation infrastructure. Metrolinx and municipalities across the region are working to identify climate-related vulnerabilities of their transportation infrastructure and other interdependent systems, including electricity and stormwater.

Further, beyond enhancing the resiliency of infrastructure itself, Metrolinx is helping to improve the overall resiliency of the region and the communities it serves by providing integrated, multimodal transportation options to build more redundancy into the transportation system.

Figure 32: GHG Emissions from GO Rail Operations, 2016 – 2031

	2016	2031 without GO RER	2031 with GO RER
Diesel Train km (million/year)	4.3	4.7	1.9
Electric Train km (million/year)	-	-	12.4
Total Train km (million/year)	4.3	4.7	14.3
Emissions from Train Operations (kt CO^2-equivalent/year)	126	137	70

Source: Metrolinx, GO Regional Express Rail Initial Business Case.

SMART COMMUTE REACH IS EXPANDING

ALL REGIONS

Through partnership and collaboration, Metrolinx and GTHA municipalities have grown the Smart Commute workplace program to more than 300 workplaces with initiatives such as carpool ride-matching, discounted transit passes and telework arrangements.

Figure 33: Cycling and Walking Mode Share for Different Travel Markets, 2006 – 2011 (all-day)

	2006				2011					
	Cycle		Walk		Cycle		Walk			
	Trips	Mode Share	Trips	Mode Share	Trips	Mode Share	Trips	Mode Share	Change in Cycling	Change in Walking
Within Downtown Toronto	10,100	4.1%	86,300	34.9%	22,900	7.6%	105,100	35.1%	127%	22%
Between Old City of Toronto and Downtown	17,500	4.3%	13,100	3.2%	29,700	6.4%	14,100	3.0%	69%	7%
Within Rest of Old Toronto	13,200	2.6%	76,200	15.3%	20,100	4.0%	74,900	14.8%	53%	-2%
Between Rest of Toronto and Old Toronto	5,700	0.6%	8,300	0.8%	11,200	1.0%	8,800	0.8%	96%	7%
Within Rest of Toronto	7,000	0.3%	155,900	7.6%	11,500	0.5%	159,900	7.3%	65%	3%
Within GTHA Municipalities Outside Toronto	22,200	0.4%	352,800	6.5%	28,300	0.5%	339,100	5.5%	27%	-4%
Between GTHA Municipalities	1,400	0.1%	2,400	0.1%	2,700	0.1%	2,300	0.1%	97%	-6%
Total	**77,100**	**0.6%**	**695,000**	**5.8%**	**126,300**	**0.9%**	**704,200**	**5.3%**	**64%**	**1%**

Source: Transportation Tomorrow Survey.

LEADING LOW IMPACT DEVELOPMENT DESIGN

MISSISSAUGA, PEEL REGION

The City of Mississauga, the Region of Peel and both Credit Valley Conservation Authority and the Toronto and Region Conservation Authority are national leaders in developing measures to reduce flood risk through the incorporation of Low Impact Development design into specific projects such as parking lots and roads.

How long does it take to get to work?

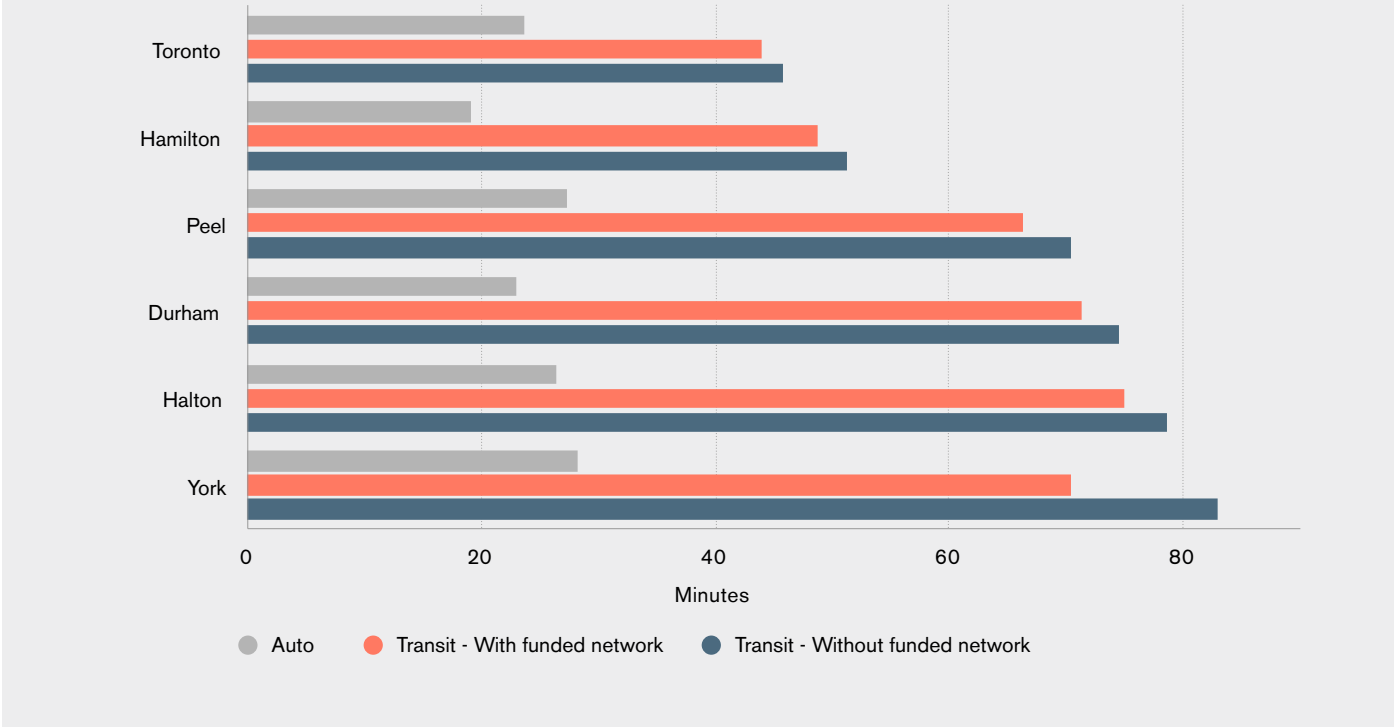
The average commuter in the GTHA spends 58.4 minutes a day getting to and from work (across all modes)[53] – longer than almost any other region in North America. This does not include the time spent dropping children off at school, or stopping to run errands.

NEW INVESTMENTS IN PUBLIC TRANSIT INFRASTRUCTURE WILL HAVE AN IMPACT. Currently funded transit projects from *The Big Move* will have an impact on the time spent on transit across the GTHA in 2031 (see Figure 34). For example, in Toronto these projects are expected to reduce the average transit travel time from 46 minutes to 44 minutes. The greatest impact was found in York Region, where transit trips would be reduced from 83 to 70 minutes.[54] The average transit travel time is expected to improve with the committed investments, but different types of complementary strategies will be needed to have a significant impact on overall commute times.

Is transit available and does it provide access?

A VITAL OPTION. Connecting people and the places they travel to by public transit is essential to the economic and social well-being of the region. With significant investments in transit infrastructure underway, it is essential that the transit system be optimized to meet the daily needs of all segments of the population across the region. In particular, how well the transit system connects where people live to where their jobs are is a key indicator of the health of the transit system. To be effective and induce high transit mode splits, transit must not only be fast and reliable, but it also must be convenient, frequent, and take people where they need to go.

Figure 34: Projected (one-way) Travel Time in the a.m. Peak Period for All Trips, by Origin (2031)



Source: IBI Group using MTO Greater Golden Horseshoe Model.

Figure 35: Proximity of Residents and Jobs to Transit (2011)

	Residents in Walking Distance of Transit	Share of Service Area Population	Job in Walking Distance of Transit	Share of Service Area Employment
Frequent Transit				
Within Toronto	2,344,000	86	1,370,000	91%
Outside Toronto	994,000	25%	653,000	35%
GTHA Average	3,337,000	50%	2,023,000	60%
Any Transit				
Within Toronto	2,600,000	96%	1,471,000	97%
Outside Toronto	3,314,000	84%	1,558,000	84%
GTHA Average	5,915,000	89%	3,029,000	90%

Note: Walking distance is defined as being an 800m straight line distance to rapid transit or a 400m straight line distance to local and frequent transit.
Source: IBI Group based on Statistics Canada 2011 Census and National Household Survey, Google Transit.

NETWORK COVERAGE. As shown in Figure 35, the GTHA is currently well-served by transit, with 90% of people and 92% of jobs within walking distance of some form of transit (400m for local services and 800m for rapid transit). However, in 2011 only 10% of residents and 20% of jobs were within walking distance (800m) of rapid transit. With the committed transit network in place, this is expected to increase to 21% and 29%, respectively, in 2031 (see Figure 36).

The presence of a frequent transit network (transit service operating every 10 minutes or less) can greatly enhance overall access to the transit system and connectivity to destinations because the time penalties associated with long transfers can impose significant barriers on overall mobility. While most of Toronto is well-served by a frequent transit network, other than in some parts of Brampton and Mississauga, the frequent transit services are sparse. About 87% of Toronto residents are within walking distance of frequent transit, whereas only about 25% of residents in the rest of the GTHA are within walking distance of frequent transit (See Figure 35).

ACCESS TO EMPLOYMENT. Although the vast majority of people in the GTHA have access to some kind of transit service, the connectivity to employment opportunities that the transit system provides varies considerably throughout the region. Figure 37 shows the number of jobs that are accessible from each part of the GTHA within 45 minutes by transit (including walk access time, wait time, transfer time(s) and in-vehicle time). The map highlights many areas that have high population but relatively poor access to employment opportunities by transit. There are also many areas that have good access to employment but few residents, such as the airport corporate centre or the large employment centres near Highway 400 at Highway 407 in Vaughan, and around Highway 404 at Highway 7 in Markham.

Figure 38 shows the number of jobs in the GTHA that are accessible to the average resident of downtown Toronto, Toronto, and the entire GTHA, within 45 minutes and 90 minutes by

Figure 36: Proximity of Residents and Jobs to the Rapid Transit Network, 2011 and 2031

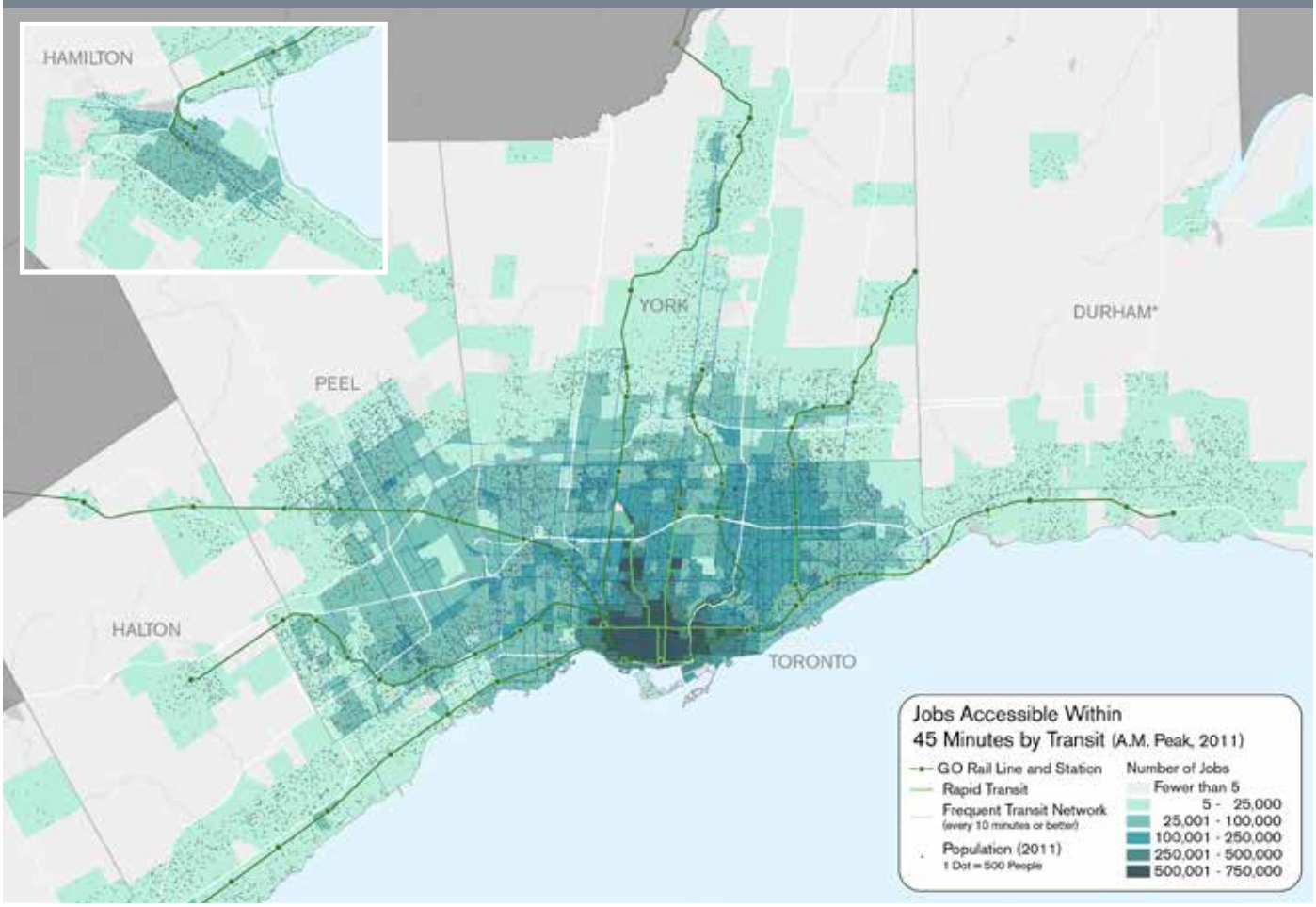
	Residents within Walking Distance of Rapid Transit	Share of Service Area Population	Jobs within Walking Distance of Rapid Transit	Share of Service Area Employment
2011				
Within Toronto	615,000	23%	651,000	43%
Outside Toronto	-	0%	-	0%
GTHA Average	615,000	9%	664,000	19%
2031				
Within Toronto	1,186,000	37%	949,000	57%
Outside Toronto	660,000	12%	450,000	17%
GTHA Average	1,847,000	21%	1,400,000	33%

Source: IBI Group based on Statistics Canada 2011 Census and National Household Survey, Google Transit.
Note: Walking distance is defined as being an 800m straight line distance to rapid transit or a 400m straight line distance to local and frequent transit.

transit. A person living in downtown Toronto has access to almost 600,000 jobs (about 19% of all jobs in the GTHA) on average, whereas a person living elsewhere in the GTHA has access to only 110,000 jobs on average (about 4% of all jobs in the region), within 45 minutes by transit. Within 90 minutes by transit, the average resident of downtown has access to 43% of all jobs in the region, and the average resident of the GTHA has access to 23% of all jobs within the region. A study conducted by the Brookings Institute looked at accessibility to transit and employment in 100 metropolitan areas in the United States, including the number of jobs accessible within 90 minutes by transit to the average resident of each area.[55] Results for similar-sized cities were comparable to results presented in Figure 38 for the GTHA, with Chicago and Philadelphia-area residents having access to 24% of all jobs in their respective regions. Other metropolitan areas performed better, such as Boston (30%), San Francisco (35%) and New York (37%).

From the perspective of the employer, the number of people that can access each job, on average, within 45 minutes and 90 minutes by transit, are shown in Figure 39. The average job in downtown Toronto can be accessed by 610,000 people within 45 minutes by transit, about 10% of all residents in the GTHA, and by 2.7 million people within 90 minutes by transit (44% of all GTHA residents). On average throughout the GTHA, each job can be accessed by 3% and 25% of the GTHA population within 45 minutes and 90 minutes by transit, respectively.

Figure 37: Number of Jobs Accessible within 45 minutes by Transit (2011)[56]



**Data for Durham includes access by GO Transit only. Durham Region Transit route data were not available at the time of writing.*

Is transit accessible to those who need it the most?

In addition to connecting people to places, transit serves a critical role in society in providing affordable access to employment opportunities, health care, education, social, shopping, and more. The social equity role of transit does not require that all individuals be treated equally, but rather that they should treated appropriately and fairly. Equity considerations in transportation can include considering income disparity, gender, age, racialized grouping, new immigrants, physical or mental disability and housing insecurity.

DURHAM'S FOCUS ON ACCESSIBILITY

DURHAM REGION

Durham Region Transit's bus fleet became 100% accessible in 2014. The move toward accessibility also brought down the average age of DRT buses from 14 to 7 years. More than 75% of previously inaccessible bus stops had been paved by 2014, improving ease of use for all transit users.

Figure 38: Number of Jobs Accessible to the Average Resident within 45 and 90 minutes by Transit (2011)[57]

	45 MINUTES		90 MINUTES	
By Residents of	**Number of Jobs Accessible**	**Fraction of All GTHA Jobs**	**Number of Jobs Accessible**	**Fraction of All GTHA Jobs**
Downtown Toronto	584,700	19%	1,358,500	43%
Toronto	217,200	7%	1,221,100	39%
GTHA Average	111,100	4%	722,000	23%

Figure 39: Number of People that have Access to Each Job, on Average, 45 and 90 minutes by Transit (2011)[58]

	45 MINUTES		90 MINUTES	
To Jobs in	**Number of People that have Access**	**Fraction of All GTHA Residents**	**Number of People that have Access**	**Fraction of All GTHA Residents**
Downtown Toronto	608,700	10%	2,681,600	44%
Toronto	392,500	6%	2,321,000	38%
GTHA Average	214,900	3%	1,502,600	25%

TRANSIT IS BECOMING MORE ACCESSIBLE TO ONTARIANS WITH DISABILITIES. The accessibility required by Ontario legislation is within reach, but challenges remain including inaccessible bus stops in suburban and rural areas with poor sidewalk networks, and older rapid transit stations without accessible ramps, doors, escalators, elevators and wayfinding. The *Accessibility for Ontarians with Disabilities Act, 2005* requires Ontario's transportation systems to be fully accessible by 2025. Nearly 90% of GO rail stations and almost half of the GTHA's subway and rapid transit stations are already accessible, and between 2002 and 2010 the proportion of accessible vehicles in GTHA transit fleets grew from 31% to 91%.[59, 60]

TRANSIT EQUITY IS A GROWING CHALLENGE. Many of the region's low-income households lack access to fast, frequent, reliable service. If they cannot drive or choose not to drive, then they face reduced opportunities to reach work, shopping and other activities; if they do drive, then the costs of owning and operating a car can reduce their ability to pay for food and housing. These equity considerations are important to the quality-of-life for many GTHA residents.[61] Figure 39 shows areas of the GTHA that have good access to transit and areas that have a high proportion of residents with low incomes (areas of need). Many areas of need do not currently have good access to transit; this is an issue that will have to be addressed in the updated RTP.

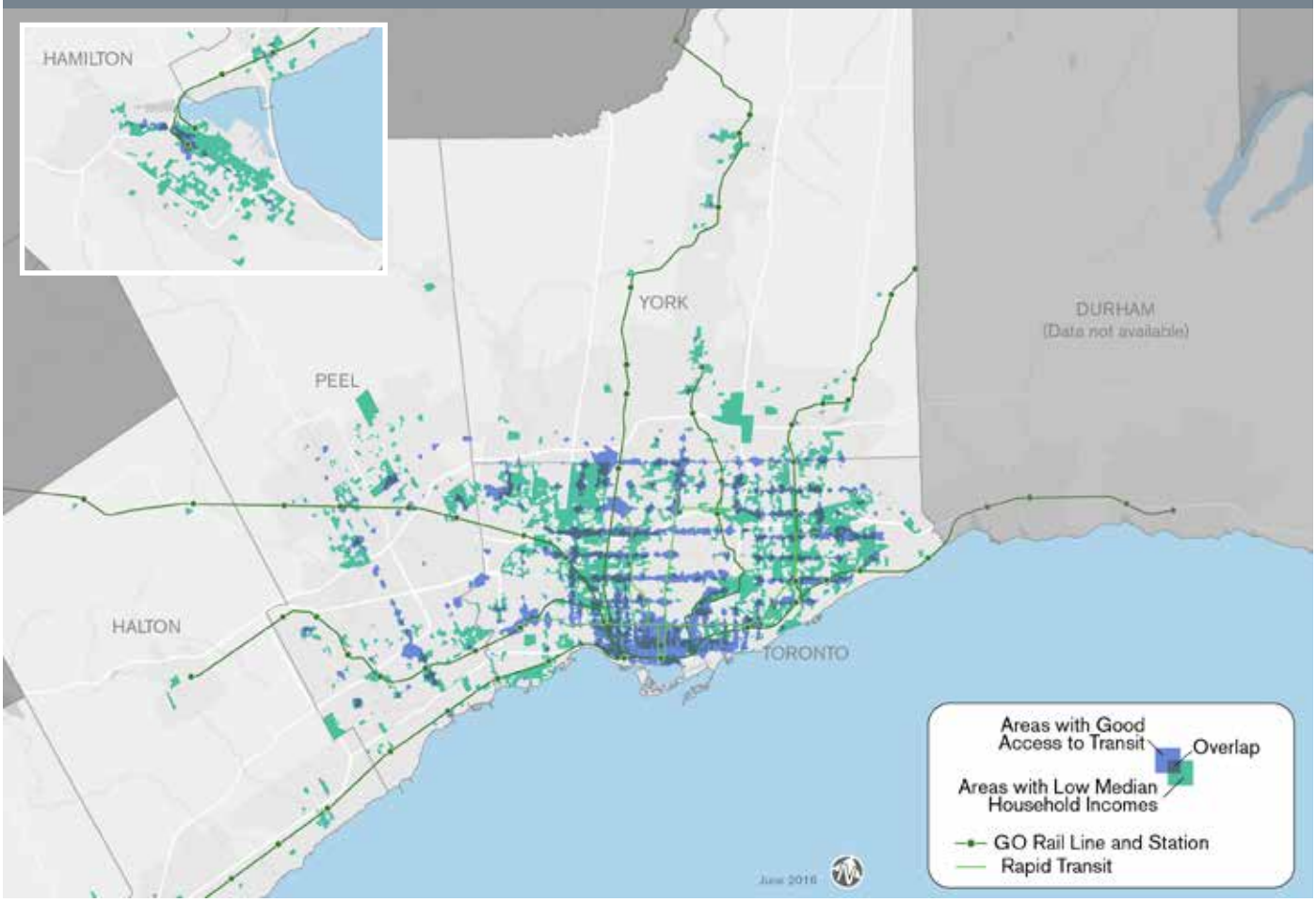
One potential consequence of increasing transit access to areas of need is that property values may increase, which can have a detrimental impact on renters and low-income residents.[62, 63, 64] Comprehensive planning efforts are required to counter impacts on affordability that arise from improved access to transit, such as with the development of transit hubs.[65] The *Growth Plan* includes policies for a mix of housing in the development that occurs around transit corridors to enhance housing choices for those who rely on transit.

PRECARIOUS WORK. A major study carried out by McMaster University and the United Way found that 50% of all workers in the GTHA held permanent, full-time jobs.[66] Precarious employment (working one or more part-time or contract jobs to make ends meet), is the reality for many in the region. Additional research has shown that precarious employment disproportionately impacts younger workers, female workers and immigrants to Canada.[67, 68] Access to reliable public transit is particularly important for this segment of the population.

Traditional transit services generally cannot provide a sufficient level of service to enable individuals working multiple jobs to access multiple locations. Enhancing off-peak service and improving transfer points can help to some degree, but some daily commutes cannot be served effectively by transit, particularly when the destinations are widely dispersed.

TRAVEL BY CHILDREN AND YOUNG ADULTS. The arrival of the "echo boom" generation, and the migration of young adults from Canada and other countries, has led to a large increase in the number of young adults in the GTHA. Young adults already use transit more than older adults (See Figure 41) and new cohorts of children and young adults seem likely to continue or increase their high level of ridership. Recent studies across North America have shown that fewer young people possess a driver's license[69], though

Figure 40: Geographies of Need and Good Access to Transit in the GTHA (2011)[70]

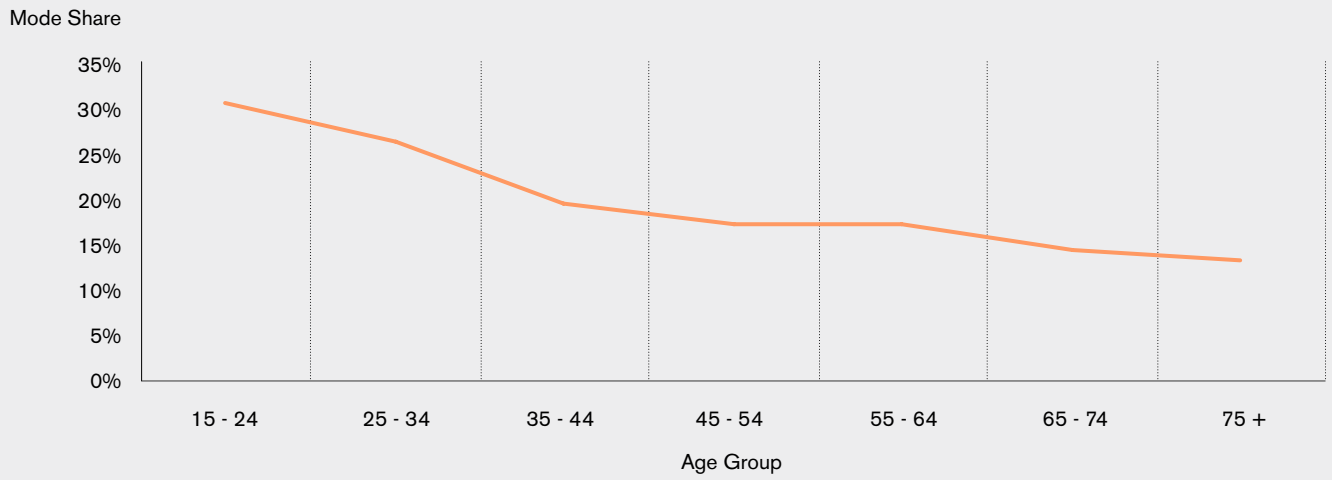


panel studies have suggested the younger generation is deferring obtaining driver's licenses and car ownership rather than giving them up entirely.[71] Young adults tend to see transit as one part of a "mobility package" that allows them to choose the preferred mode for each trip. Their expectations are leading transit systems to improve comfort, provide flexible schedules and make real-time information available.

The GTHA has specific challenges with respect to travel by children and young adults. While many children still walk or bike to school, this percentage has been declining (see Figure 42). A growing body of local collaborative research by Smart Commute and municipal, community, and academic partners examines the root causes and offers a variety of suggestions to increase walking and biking to school, from new programs and curriculum updates to greater consideration of the built environment and access to schools (e.g. location decisions, parking, congestion management). In addition, Toronto's four universities have partnered to create StudentMoveTO, which recently released a report highlighting the opportunity for improving university student travel patterns in the region.[72]

TRAVEL BY SENIORS. Older adults in the GTHA travel more by car than they used to; the proportion of trips they make by transit has dropped from 16% to 7% over the last 20 years.[73] This is partly because more seniors are staying in their own homes as they age, and because more are living in suburban areas where using transit is more difficult. Seniors also tend to make trips in off-peak periods when transit service is reduced, and travel to local destinations rather than major employment centres. A lifestyle that relies on car ownership can be challenging for seniors, including those on fixed incomes, and can become a problem if personal health issues lead to the loss of a driver's license. These issues will only grow in importance as the GTHA's population of seniors is expected to more than double by 2041 (see Figure 21). In addition to the likely drop in transit ridership that will occur as working age adults retire, the demand on paratransit services by those with mobility constraints is likely to be considerable, although it is possible that new mobility services can help to fill this gap.

Figure 41: Public Transit Mode Share at Peak Times for Different Age Groups, GTHA (2011)



Source: Transportation Tomorrow Survey, 2011.

How safe are our roads?

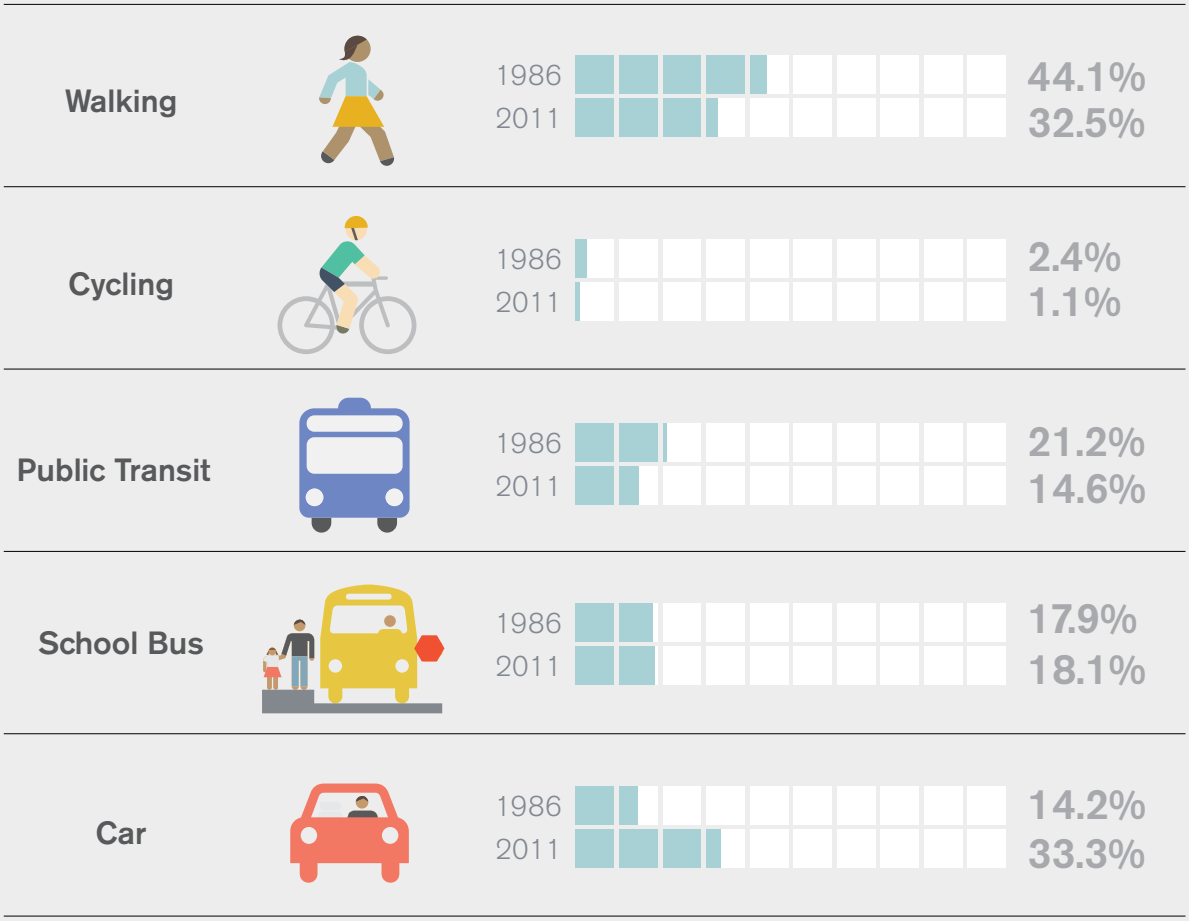
SAFETY IS IMPROVING. Better design of roads and vehicles, and programs such as Share the Road and Reduce Impaired Driving Everywhere (RIDE), are making the GTHA's transportation system safer. There has been a significant decline in injuries and fatalities on GTHA roads since the early-1990s, and the per-capita rates of injury and death have dropped as well.[74]

Much remains to be done to improve safety for pedestrians and cyclists, including increased awareness campaigns aimed at drivers and increased enforcement efforts to target impaired drivers, as well as improving infrastructure with better lighting and improved signage and potentially separating different road users where possible. Vision Zero is an international road traffic safety initiative that focused on eliminating fatalities and serious injuries among all road users.

The Regional Transportation Plan will look to the successes of Vision Zero to see what lessons can be applied to improve safety in the region.

In addition to infrastructure improvements, technological improvements in automobiles are likely to lead to fewer car accidents. Many of these features have already been introduced into existing automobiles and more safety features can be expected in the future. The ultimate safety feature might come in the form of autonomous vehicles, which could remove human error from driving entirely.

Figure 42: Mode Shares for Trips to School by Youth (ages 11 to 17) in the GTHA, 1986 and 2011[75]



Pedestrian injuries and fatalities are fairly stable but trending downwards (see Figure 43). One area of considerable concern is that while teenagers and young adults are the most likely to be hit, in part because they are more likely to be walking in areas with high traffic levels, seniors are disproportionately killed.[76] These trends are similar to Ontario-wide trends. Further research is needed to develop this information specifically for the region.

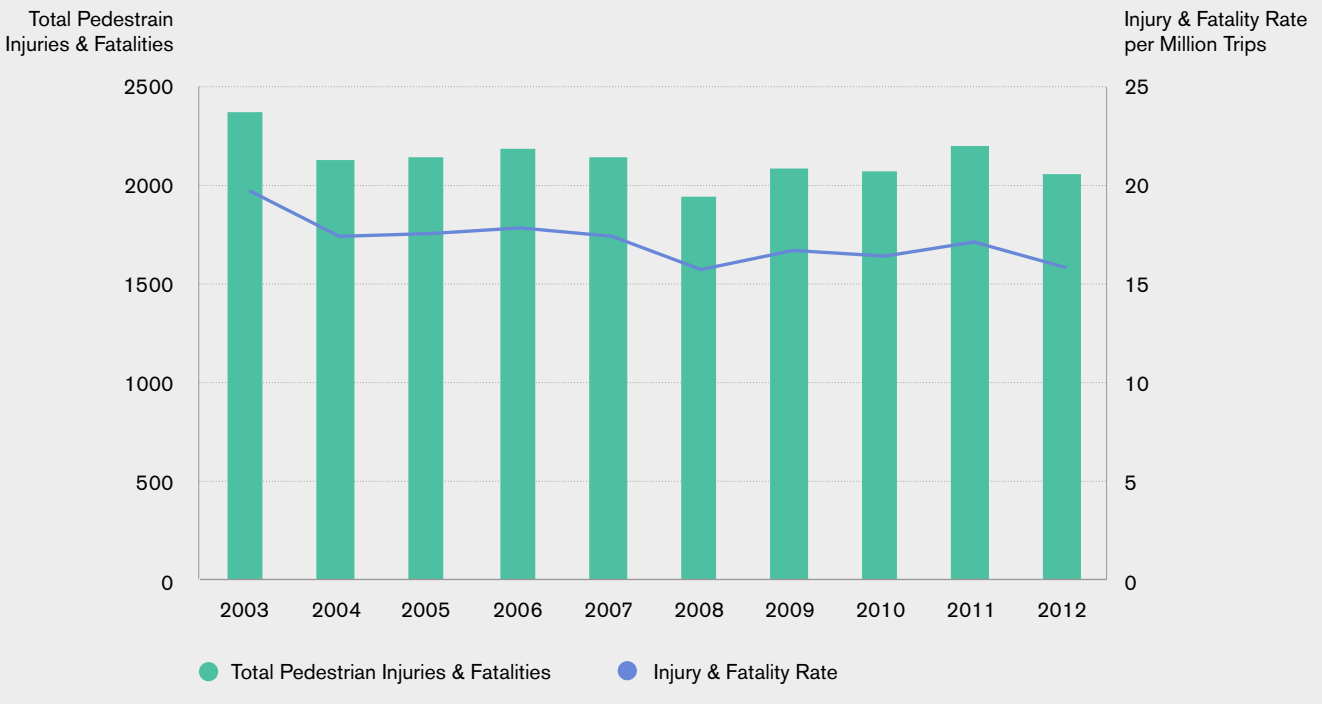
Does freight move safely and efficiently?

THE IMPORTANCE OF GOODS MOVEMENT. The GTHA is a major manufacturing, importing and exporting region, and its national role as a freight transportation and logistics hub helps it attract new businesses. Modern supply chains are designed to minimize inventories, and businesses depend on predictable freight transport. The region's overall economic success hinges on the cost-effectiveness of goods movement – especially trucking – for businesses across the GTHA.

Background research to support the RTP review identified three key issues in the GTHA: congestion, managing land use compatibility, and reducing the environmental impact of goods movement.

The GTHA is experiencing a growth in truck traffic and volume across the region, and across the time of day, which has an impact on congestion and emissions.[77] Figure 44 displays the truck traffic volume growth on Highway 401 – the backbone of the provincial goods movement network.

Figure 43: Pedestrian Collision Injuries and Fatalities in the City of Toronto, 2003 – 2012 (Total and per 1 Million Trips Travelled)

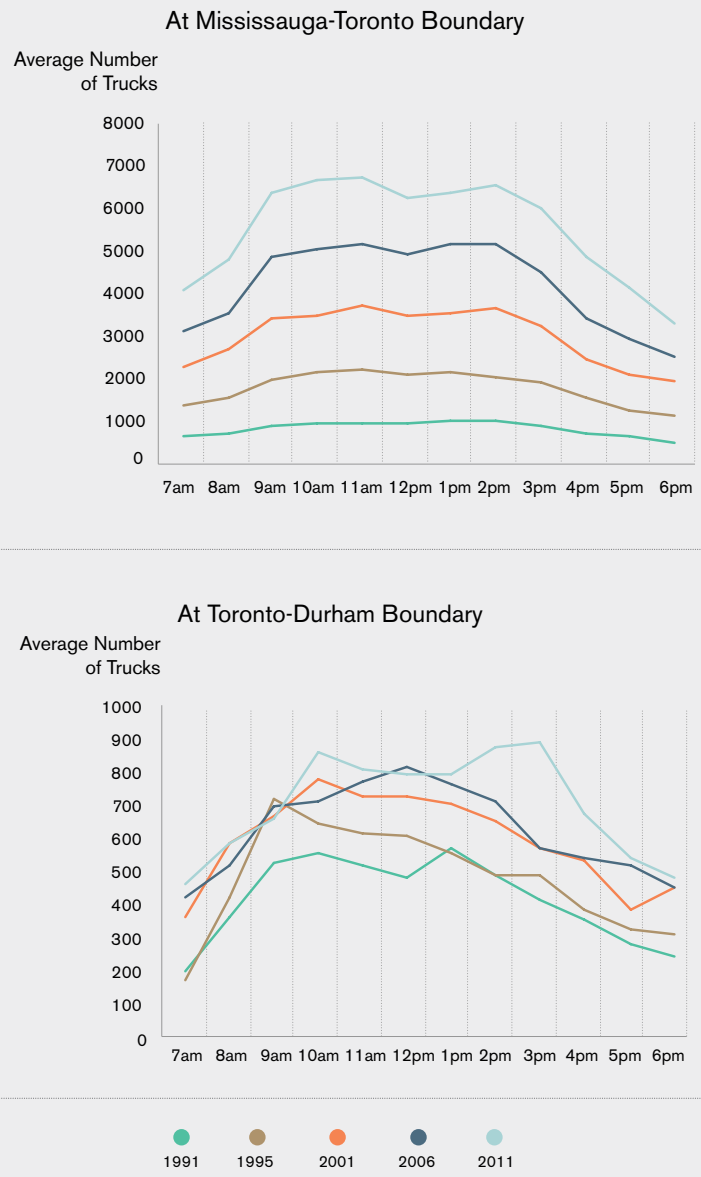


Source: City of Toronto Police Motor Vehicle Collision Reports 2003 – 2012; Toronto Tomorrow Survey, 2006, 2011.

The Regional Transportation Plan will involve creation of a new indicator to measure goods movement. In order to better measure progress and guide freight supportive planning, metrics are necessary to evaluate actions and the broader performance of the transportation system as it relates to goods movement. Potential indicators could relate to:

- Travel time (goods travel time),
- Reliability (buffer index),
- Cost (transportation and logistics price index),
- Environment (air pollution index), and
- Safety (motorized vehicle road incidents involving injuries or fatalities or freight train incidents involving injuries or fatalities).

Figure 44: Growth in Truck Volumes on Highway 401 Westbound



Source: David Kriger Consultants Ltd., and CPCS. Regional Transportation Plan Legislative Review Backgrounder: Urban Goods Movement. 2015

PEEL PLANS FOR GOODS MOVEMENT

PEEL REGION

The Region of Peel's Goods Movement Strategic Plan was developed with 23 Actions to encourage efficient transportation of goods within the region. The plan is supported by the Goods Movement Task Force, a public-private partnership that meets regularly to discuss efficiency, competitiveness, and sustainability within the Region.

APPENDIX 2
Background Research & Analysis to Support the RTP Review

Technical Papers

- *Active Transportation Background Paper*. Prepared by Steer Davies Gleave. 2015.
- *Context Paper on the Regional Economy, Demographic Outlook and Land Use*. Prepared by Hemson Consulting Ltd., and IBI Group. 2016.
- *A Shared Vision: Updating the Vision, Goals & Objectives*. Prepared by Metrolinx. 2016.
- *New Mobility Background Paper*. Prepared by WSP. 2016.
- *Regional Transportation Plan Legislated Review Backgrounder: Urban Goods Movement*. Prepared by David Kriger Consultants Ltd., and CPCS. 2016.
- *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area*. Prepared by IBI Group. 2016.
- *Screening Process for the GTHA Regional Transportation Plan*. Prepared by Steer Davies Gleave. 2016.
- *Social Equity & Transit: Background Paper to Inform the Regional Transportation Plan for the Greater Toronto and Hamilton Area*. Prepared by Metrolinx. 2016.
- *The Big Move Priority Actions and Supporting Policy Review*. Prepared by Metrolinx. 2016.
- *Transportation Demand Management Background Paper*. Prepared by Steer Davies Gleave. 2015.

Partnerships with Academic Institutions

Buliung, Ron, Colley, Michele, and Salmon, Briana. *School Travel in the GTHA: A Report on Trends*. 2015. Access at: http://smartcommute.ca/wp-content/uploads/2016/02/School_Travel_Trends_GTHA_En.pdf

Buliung, Ron. *Phase 1: Children's Independent Mobility in the Greater Toronto and Hamilton Area: Setting the Stage*. 2014. Access at: http://smartcommute.ca/wp-content/uploads/2016/03/Phase-1-Childrens-Independent-Mobility-in-the-GTHA-EN.pdf

Buliung, Ron. *Phase 2: Children's Independent Mobility Across the City of Toronto*. 2014. Access at: http://smartcommute.ca/wp-content/uploads/2016/03/Phase-2-Childrens-Independent-Mobility-in-Toronto-EN.pdf

Casello, Jeff, Chiu, Kitty and Yeung, Kevin. *Quantitative TDM Assessment in a Large Metropolitan Area: Greater Toronto and Hamilton Area*. 2015. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Quantitative_TDM_Assessment_in_a_Large_Metropolitan_Area_GTHA.pdf

Casello, Jeff, and Hall, Daniel. *Activity Centre: Integration of the planning and operations of public transit in the GTHA.* 2013. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Activity_Centre_Report.pdf

Castel, Evan, and Farber, Steve. *Benchmarking the Health and Public Transit Connection in the GTHA: An Analysis of Survey Microdata*. 2016.

El-Geneidy, Ahmed, and Buliung, Ron, Ehab Diab, van Lierop, Dea, Langlois, Myriam and Legrain, Alexander. *Non-Stop Equity: Assessing daily intersections between transit accessibility and social disparity across the Greater Toronto and Hamilton Area (GTHA)*. 2014. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Non-stop_equity_Assessing_daily_intersections_between_transit_accessibility_and_social_disparity_across_the_GTHA.pdf

Hertel, Sean, Keil, Roger, and Collens, Michael. *Next Stop: Equity – Routes to fairer transit access in the Greater Toronto and Hamilton Area*. 2016. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Next_Stop_Equity_Routes_to_fairer_transit_access_in_the_GTHA.pdf

Hess, Paul, and Nigro, Jacob. *Assessing Walkability: Using built environmental variables and population distribution to estimate and model walkability conditions around suburban GO Transit Stations*. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Assessing_Walkability_Draft_Report.pdf

Hess, Paul and Smith Lea, Nancy, Bidordinova, Asya and Klassen, Jeana. *Identifying and Overcoming Barriers to the Implementation of Active Transportation Policies.* 2014. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Identifying_and_Overcoming_Barriers.pdf

Johal, Sunil, Zon, Noah, Dragicevic, Nevena and Urban, Michael (Mowat Centre). *Public Policy Implications of the Sharing Economy for the Transportation Sector*. 2016.

Mahmoud, M. S., Habib, K. N., and Shalaby, Amer. *Demand Modelling of Cross-Regional Intermodal Commuting Trips in the Greater Toronto and Hamilton Area.* 2014. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Demand_Modelling_of_Cross-Regional_Intermodal_Commuting_Trips_in_the_GTHA.pdf

Mitra, Raktim, and Smith Lea, Nancy. *Cycling Behaviour in the Greater Toronto and Hamilton Area.* 2015. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Cycling_Behaviour_in_the_GTHA.pdf

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. Access at: http://www.metrolinx.com/en/regionalplanning/rtp/research/Assessing_and_Measuring_the_Factors_Affecting_Mobility_Transportation_Accessibility_and_Social_Need.pdf

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Tom Goodeve
Melissa Green-Battiston
Hilary Holden
Selma Hubjer
Richard Hui
Alicia Jakaitis
Barb Koopmans
Brian Lee
Chris Leitch
Christine Lee-Morrison
Paul May
Rod McPhail
Richard Nethery
Joseph Palmisano
Andrew Pearce
Joe Perrotta
Karyn Poad
Maureen Van Ravens
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Prasenjit Roy
Sabbir Saiyed
Jill Stephen
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Mike Wehkind
Henrik Zbogar
Bruce Zvaniga
Nadeem Zahoor

MUNICIPAL PLANNING LEADERS FORUM

Brian Bridgeman
Jane Clohecy
Kealy Dedman
Richard Forward
Ron Glenn
Rob Horne
Jennifer Keesmaat
Barb Koopmans
Daniel Kostopoulos
Dan Labrecque
Heather MacDonald
John MacKenzie
Rino Mostacci
Martin Powell
Ed Sajecki
Michelle Sergi
Mary Lou Tanner
Jason Thorne
Mary-Frances Turner
Geoff Wright

RTP INTERNAL STEERING GROUP

Trevor Anderson
Philippe Bellon
Andrew Bodrug
Angela Brinklow
Chris Burke
Carleen Carroll
Elise Croll
Lorna Day
Joshua Engel-Yan
Daniel Fisher
Ersoy Gulecoglu
Jennifer Gray
Linda Hall
Daniel Haufschild
Elana Horowitz
Beth Kapusta
Jessica Kosmack
Nancy Leon
Stephan Mehr
Fausto Natarelli
Nadine Navarro
Anna Pace
Peter Paz
Bert Peverini
David Pritchard
Becky Upfold
Jennifer van der Valk
Eve Wyatt

PROJECT TEAM & INTERNAL CONTRIBUTORS

Tom Aylward-Nally
Antoine Belaieff
Shahrzad Borjian
Marcus Bowman
Nancy Caetano
Matthew Canaran
Anthony Caruso
Quentin Chiotti
Jodi Ferguson
Chris Fong
Naren Garg
Alexandra Goldstein
Andrea Gusen
Antonia Hammer
Devin Horne
Briana Ingram
Michelle Kearns
Kyle Kellam
Lorne Kinsella
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Malcolm Mackay
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Jennifer McGowan
Becca Nagorsky
Jennifer Niece
Erik Olaveson
Lisa Orchard
Elli Papaiannou
Peter Paz
Krystal Perepeluk
Eric Petersen
Jack Phelan
Graham Procter
Lisa Salsberg
Fred Sztabinski
Kelly Thornton
Josh Tzventarny
Leslie Woo

AND MEMBERS OF THE:

- Transit Leaders Forum
- Active and Sustainable School Travel Regional Hub
- TDM Coordinating Committee
- Urban Freight Forum

MUNICIPAL WORKSHOPS (FALL 2015)

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Sarah Cellini
Anita Fabac
Joanne Hickey-Evans
Trevor Horzelenberg
Ed John
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Lorissa Skrypniak

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Mary Lou Tanner
Vito Tolone

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Hai Quing Xu

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Susan Tanabe

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Karen Whitney

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Mitch Stambler

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Hubert Ng

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Cory Bluhm
Dorothy McCabe
Justin Readman
Brandon Sloan

CITY OF WATERLOO
Philip Hewitson
Scott Nevin

TOWNSHIP OF WOOLWICH
John Scarfone

CONSULTING FIRMS

Brook McIlroy with CPCS, and David Kriger Consultants Ltd.
Deloitte Analytics
IBI Group, with Hemson Consulting, Glenn Pothier GLPI, and Noxon Associates
Steer Davies Gleave
WSP/Parsons Brinckerhoff/ MMM Group

ACADEMICS

MCGILL UNIVERSITY
Ahmed El-Geneidy
Ehab Diab
Myriam Langlois
Alexander Legrain
Dea van Lierop

MOWAT CENTRE
Sara Ditta
Nevena Dragicevic
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Alan Walks

UNIVERSITY OF WATERLOO
Jeff Casello
Kitty Chiu
Kevin Yeung

YORK UNIVERSITY
Michael Collens
Sean Hertel
Roger Keil

List of Figures

References

[1] Metrolinx. *Metrolinx Celebrates 2 million PRESTO customers,* 2016 (media release); Metrolinx. *The Big Move Baseline Monitoring Report,* 2013; Metrolinx. *Info to GO: Quick Facts,* 2016; GO Transit. *About Union Station,* 2016; Ontario Ministry of Transportation. *Annual Average Daily Traffic Counts,* 2012; University of Toronto Data Management Group, *Transportation Tomorrow Survey*, 2011. Ontario Ministry of Transportation. *Carpool Lots*. 2015; Toronto Transit Commission. TTC Ridership Counts, 2014.

[2] Ontario Ministry of Municipal Affairs and Housing. *Growth Plan for the Greater Golden Horseshoe – Office Consolidation.* 2013.

[3] University of Toronto Data Management Group. *2011 Travel Survey Summaries for the Greater Toronto and Hamilton Area*. 2014.

[4] Metrolinx. *The Big Move Baseline Monitoring Report.* 2013.

[5] Metrolinx. *GO Regional Express Rail Initial Business Case*. 2015.

[6] For the purpose of this analysis, the 2031 transit network assumes the following committed rapid projects (shown in Figure 4) will be in service: YRT Viva BRT, Mississauga Transitway BRT, Toronto-York Spadina Subway Extension, Eglinton Crosstown LRT, Finch West LRT, Huontario LRT, Hamilton LRT, Sheppard East LRT, and GO Regional Express Rail. Any 2031 estimates presented in this paper developed using the MTO Greater Golden Horseshoe Model were developed on the basis of this transit network. The year 2031 is used as the forecast year for analysis purposes because it aligns with Metrolinx's current travel demand modelling framework and allows the impact of the currently funded and committed transit projects to be evaluated.

[7] Metrolinx. *Metrolinx Investment Strategy: Investing in our Region, Investing in our Future*. 2013.

[8] Metrolinx is updating the model forecast year to 2041 as part of the concurrent background work that will enable the updated RTP to make recommendations about potential new transit projects, policies and programs beyond the current 2031 horizon year and ensure adopted policies conform to the Growth Plan (see Endnote 6).

[9] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area.* 2016.

[10] Ibid.

[11] Metrac. *Community Safety Audits*. 2016.

[12] Mitra, Raktim, and Smith Lea, Nancy. *Cycling Potential in the Greater Toronto and Hamilton Area (Preliminary Findings).* 2016.

[13] Medical Officers of Health in the GTHA (Hamilton, Peel, Simcoe, Muskoka and Toronto). *Improving Health by Design – a Call for Healthy Communities.* 2014.

[14] Metrolinx. *School Travel in the GTHA: A Report on Trends.* 2015. Access at http://smartcommute.ca/wp-content/uploads/2016/02/School_Travel_Trends_GTHA_En.pdf

[15] Metrolinx. *Greater Toronto and Hamilton Area School Travel Household Attitudinal Study Report.* 2011. Access at http://www.metrolinx.com/en/projectsandprograms/schooltravel/ENG-2011GTHASchoolTravelStudy.pdf

[16] Buliung, Ron. *Phase 1: Children's Independent Mobility in the Greater Toronto and Hamilton Area: Setting the Stage.* 2014. Access at: http://smartcommute.ca/wp-content/uploads/2016/03/Phase-1-Childrens-Independent-Mobility-in-the-GTHA-EN.pdf.

[17] HDR. *Costs of Road Congestion in the Greater Toronto and Hamilton Area. Final Report*. 2008. Access at http://www.metrolinx.com/en/regionalplanning/costsofcongestion/ISP_08-015_Cost_of_Congestion_report_1128081.pdf

[18] Willson, R. W., & Shoup, D. C. *Parking subsidies and travel choices: assessing the evidence.* Transportation, 17(2), 141-157. 1990.

[19] Badland, H. M., Garrett, N., & Schofield, G. M. *How does car parking availability and public transport accessibility influence work-related travel behaviors*?. Sustainability, 2(2), 576-590. 2010.

[20] Guo, Z. *Home parking convenience, household car usage, and implications to residential parking policies*. Transport Policy, 29, 97-106. 2013.

[21] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area*. 2016.

[22] Rybeck, R. *Using value capture to finance infrastructure and encourage compact development*. Public Works Management & Policy, 8(4), 249-260. 2004.

[23] Smith, J. J., & Gihring, T. A. *Financing transit systems through value capture*. American Journal of Economics and Sociology, 65(3), 751-786. 2006.

[24] Rayle, L., Dai, D., Chan, N., Cervero, R., & Shaheen, S. *Just a better taxi? A survey-based comparison of taxis, transit, and ridesourcing services in San Francisco.* Transport Policy, Vol. 45, pp. 168–178. 2016.

[25] Shaheen, S., & Cohen, A. Carsharing Market Overview, Analysis & Trends. 2015. Access at http://tsrc.berkeley.edu/sites/default/files/Summer%202015%20Carsharing%20Outlook_Final%20(1)_0.pdf

[26] WSP. *New Mobility Background Paper.* 2016.

[27] Olia, A., Hossam, A., Baher, A & 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.

[28] U.S. Department of Transportation, National Highway Traffic Safety Administration. *Frequency of Target Crashes for IntelliDrive Safety Systems.* 2010. Access at http://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2010/811381.pdf

[29] FleetCarma. *Electric Vehicle Sales in Canada: 2015 Final Numbers*. Access at http://www.fleetcarma.com/ev-sales-canada-2015/

[30] Ontario Ministry of Municipal Affairs and Housing. *Growth Plan for the Greater Golden Horseshoe – Office Consolidation.* 2013.

[31] Hemson Consulting Ltd. *Context Paper on the Regional Economy, Demographic Outlook and Land Use.* 2016.

[32] Ontario Ministry of Finance. *2013-2041 Ontario Population Projections By-Age Reference Scenario.* 2014.

[33] Hemson Consulting Ltd. *Context Paper on the Regional Economy, Demographic Outlook and Land Use.* 2016.

[34] Ontario Ministry of Municipal Affairs and Housing. *Growth Plan for the Greater Golden Horseshoe – Office Consolidation.* 2013.

[35] Neptis Foundation. *Planning for Prosperity: Globalization, Competitiveness and the Growth Plan for the Greater Golden Horseshoe.* 2015.

[36] Hemson Consulting Ltd. *Context Paper on the Regional Economy, Demographic Outlook and Land Use.* 2016.

[37] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area.* 2016.

[38] Neptis Foundation. *Planning for Prosperity: Globalization, Competitiveness and the Growth Plan for the Greater Golden Horseshoe.* 2015.

[39] Ibid.

[40] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area.* 2016.

[41] Ibid.

[42] Province of Ontario. *Performance Indicators for the Growth Plan for the Greater Golden Horseshoe, 2006.* 2015.

[43] Neptis Foundation. *Growing Pains: Understanding the New Reality of Population and Dwelling Patterns in the Toronto and Vancouver Regions.* 2015.

[44] Ibid.

[45] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area.* 2016.

[46] Ibid.

[47] Ibid.

[48] University of Toronto Data Management Group. *2011 Travel Survey Summaries for the Greater Toronto and Hamilton Area.* 2014.

[49] Ontario Ministry of Transportation. *MTO Greater Golden Horseshoe Model: V3.* 2016.

[50] Ontario Ministry of the Environment. *Ontario's Climate Change Strategy.* 2015.

[51] Ibid.

[52] Ibid.

[53] Statistics Canada. *2011 National Household Survey.* 2013.

[54] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area.* 2016.

[55] Tomer, A., Kneebone, E., Puentes, R., & Berube, A. *Missed Opportunity: Transit and Jobs in Metropolitan America. Metropolitan Policy Program at Brookings.* 2011.

[56] IBI Group. *Regional Transportation Plan Review: Transit Needs and Opportunities for the Greater Toronto and Hamilton Area.* 2016.

[57] Ibid.

[58] Ibid.

[59] Toronto Transit Commission. *Accessible Transit Services Plan - 2012 Status Report.* Access at http://www.ttc.ca/TTC_Accessibility/Accessible_Transit_Services_Plan/Accessible_Service_Transit_Plan_2012.jsp

[60] Metrolinx. *Metrolinx Annual Accessibility Plan 2012.* Access at http://www.metrolinx.com/en/aboutus/publications/Accessibility_Plan_2012_EN.pdf

[61] Hertel, S., Keil, R., & Collens, M. *Next Stop: Equity – Routes to fairer transit access in the Greater Toronto and Hamilton Area.* 2016.

[62] Lin, J. *Gentrification and transit in northwest Chicago.* Journal of the Transportation Research Forum (Vol. 56, No. HS-043 476). 2002.

[63] 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.

[64] Grube-Cavers, A., & Patterson, Z. *Urban rapid rail transit and gentrification in Canadian urban centres: A survival analysis approach.* Urban Studies, 52(1), 178-194. 2015.

[65] Pollack, S., Bluestone, B., & Billingham, C. *Maintaining Diversity in America's Transit-Rich Neighborhoods: Tools for Equitable Neighborhood Change.* Report Prepared by the Dukakis Center for Urban and Regional Policy at Northeastern University. 2010. Also see: http://communityinnovation.berkeley.edu/tod-and-social-equity

[66] Poverty and Employment Precarity in Southern Ontario research group. *It's More than Poverty: Employment Precarity and Household Well-being.* 2013. Access at http://www.unitedwaytyr.com/document.doc?id=91

[67] Fuller, S., & Vosko, L. F. *Temporary employment and social inequality in Canada: Exploring intersections of gender, race and immigration status.* Social Indicators Research 88.1 (2008): 31-50.

[68] 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 (2004): 115-139.

[69] Sivak, M., & Schoettle, B., University of Michigan Transportation Research Institute. *Recent Decreases in the Proportion of Persons with a Driver's License across All Age Groups.* 2016.

[70] Metrolinx. *Social Equity & Transit: Background Paper to Inform the Regional Transportation Plan for the Greater Toronto and Hamilton Area.* 2016.

[71] Delbosc, A. *Delay or forgo? A closer look at youth driver licensing trends in the United States and Australia.* Transportation (2016): 1-8.

[72] StudentMoveTO. A*n overview of early findings.* 2016. Access at http://www.studentmoveto.ca/wp-content/uploads/2016/04/StudentMoveTO.Handout_4Uni.v2.pdf

[73] Metrolinx. *The Big Move Baseline Monitoring Report.* 2014.

[74] Ibid.

[75] Metrolinx. *School Travel in the GTHA: A Report on Trends.* 2015. Access at http://smartcommute.ca/wp-content/uploads/2016/02/School_Travel_Trends_GTHA_En.pdf

[76] Bassil, K., Rilkoff, H., Belmont, M., Banaszewska, A., & Campbell, M. *Pedestrian and Cyclist Safety in Toronto.* Report for Toronto Public Health. 2015.

[77] David Kriger Consultants Ltd., & CPCS. *Regional Transportation Plan Legislative Review Backgrounder: Urban Goods Movement.* 2015.


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ZONE