

Appendices



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Appendix 1

Metrolinx technical studies and academic background research

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

Appendix 1A: Metrolinx technical studies

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

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

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

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

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

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

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

New Mobility Background Paper. Prepared by WSP. 2016.

Regional Parking Policy Study. Prepared by WSP. 2017.

Regional Road Network Characterization. Prepared by WSP. 2017.

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

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

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

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

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

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

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

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

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

Appendix 1B: Academic background research

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix 2

Developing the 2041 Regional Transportation Plan

Appendix 2A: 2041 Regional Transportation Plan evaluation process

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

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

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

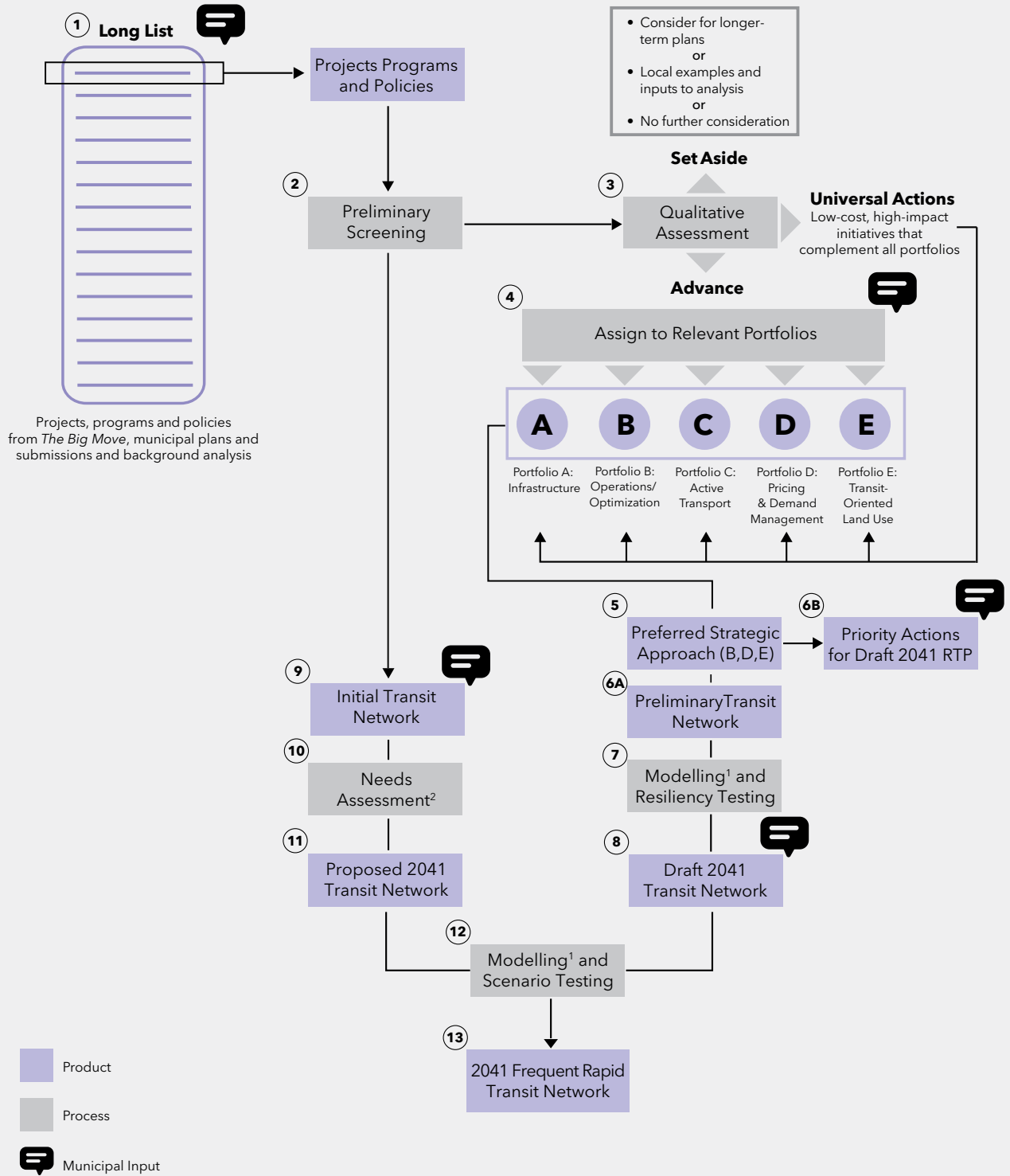
The portfolios represent 5 key strategic areas of emphasis:

- A. Infrastructure
- B. Operations/optimization
- C. Active transportation
- D. Pricing and demand management
- E. Transit-oriented land use

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

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

Figure 2A-1 Evaluation methods diagram



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

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

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

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

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

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

- a review of the “long list” (Step 1);
- feedback toward developing and refining the Portfolios (Step 4), the Priority Actions (Step 6) and the Draft Transit Networks (Steps 8 and 10); and
- feedback on technical background papers.

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

Appendix 2B: Scenario development

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

Resiliency assessment

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

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

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

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

- Infrastructure;
- Operations/optimization;
- Active transportation;
- Pricing and transportation demand management;
- Targeted pricing with equity considerations; and
- Transit-oriented land use.

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

- Increase in non-auto mode share;
- Decrease in congested vehicle kilometres travelled;
- Emissions reductions;
- Improvement to transport equity and access;
- Reduction in transit travel time;
- Efficient movement of goods; and
- Improvement to quality of life and health.

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

Figure 2B-1: Alternative futures used in scenario planning

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



Rapid Growth of Core Areas

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



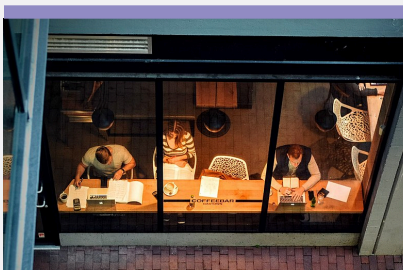
Rapid Adoption of Emerging Technologies

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



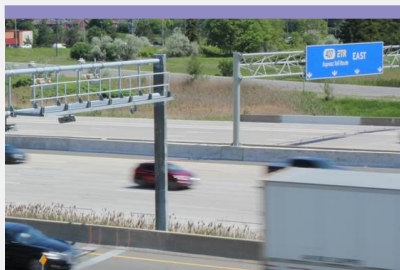
Extreme Climate Change

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



On-Demand Economy

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



User-Pay Economy

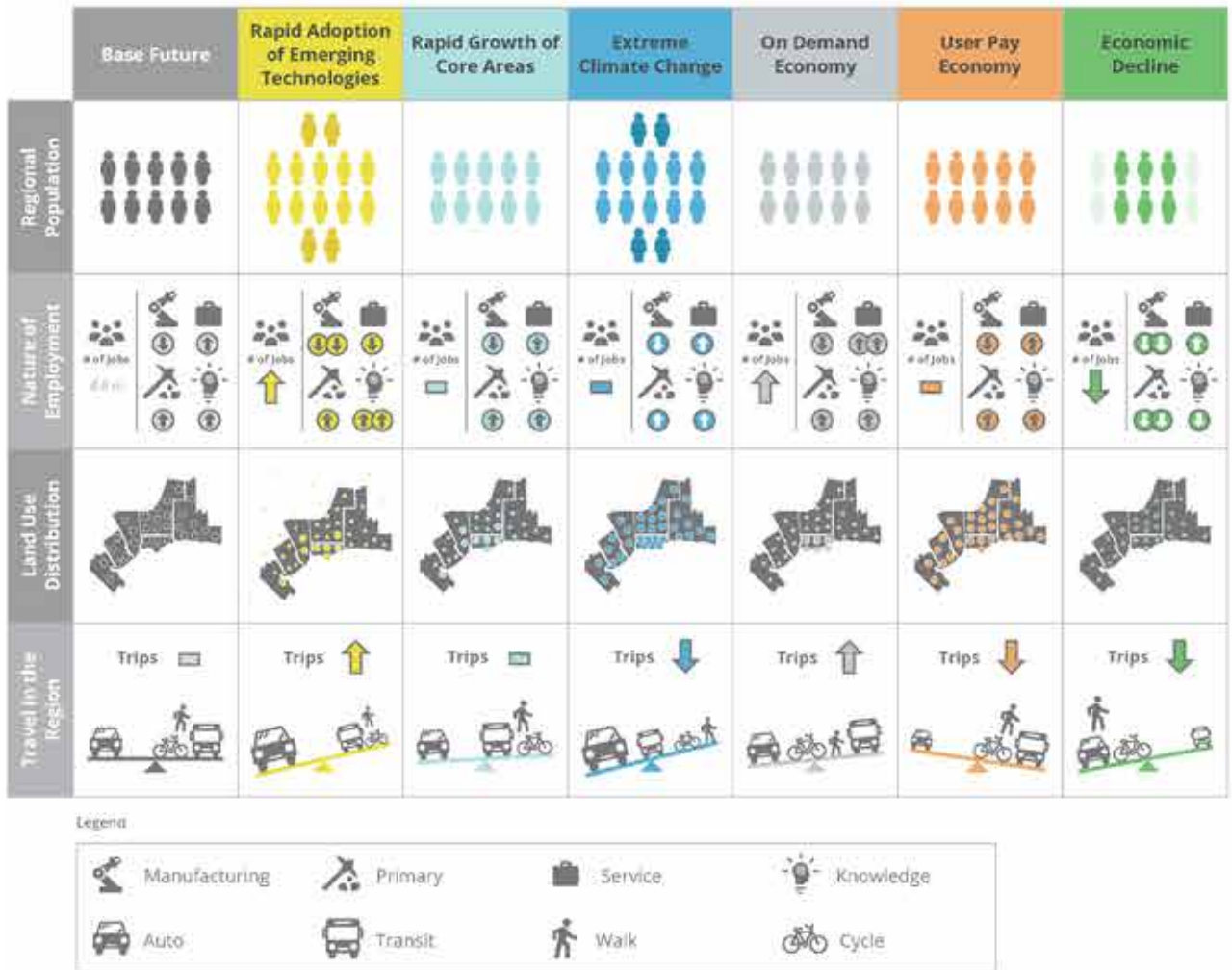
The entry of private companies into the transportation sector could potentially dilute the cost-recovery of conventional transportation systems, and increase travel costs for those who can least afford it. In this scenario, low- and medium-income people would be more likely to choose walking and cycling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



Economic Decline

The convergence of domestic and global trends, such as a changing markets and decreasing levels of immigration, could threaten the region’s ability to continually invest in our transportation and other infrastructure and services. In this scenario, people may find driving longer distances an attractive option due to less congestion and transit service reductions.

Figure 2B-2: Variables considered in resiliency assessment

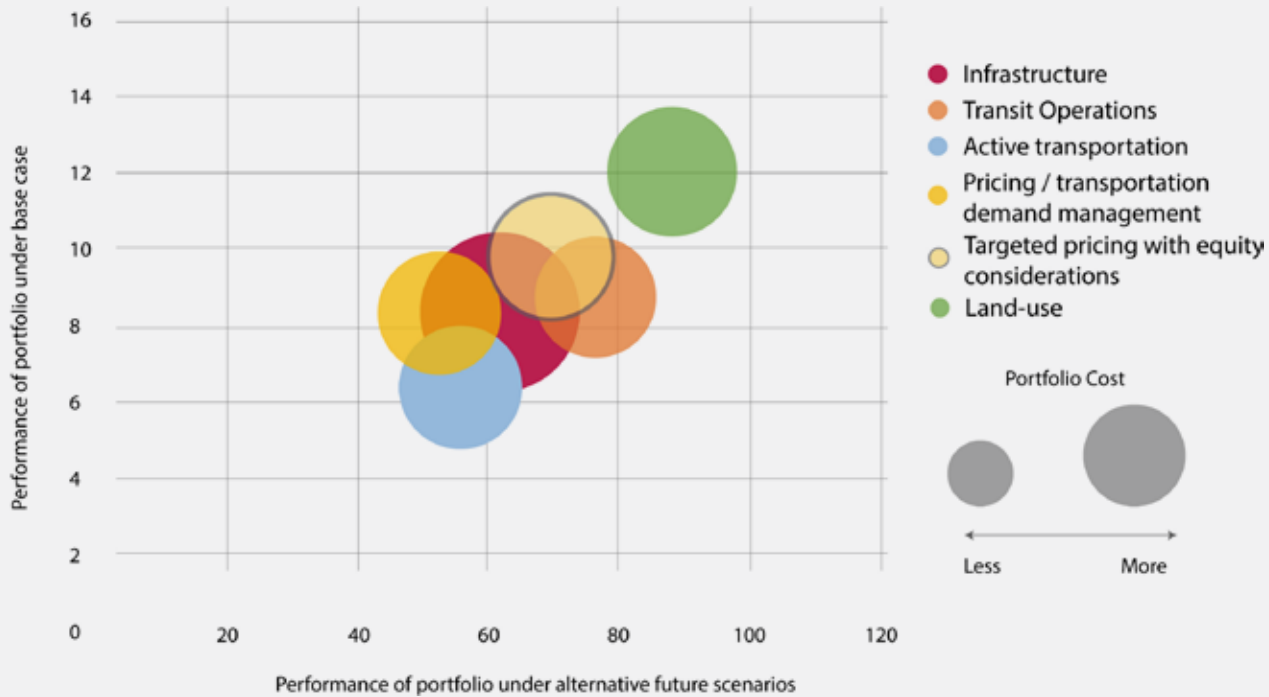


The resulting composite score for each strategy under all alternative future scenarios is shown in Figure 2B-3, compared to the score each strategy received under the base future scenario. The better performing strategies are those with high scores under both the base future and alternative futures. In the face of such high levels of uncertainty, the resiliency assessment showed that emphasizing transit operations rather than fixed infrastructure, planning for transit-supportive land use, and introducing pricing led to the best overall outcomes across the six scenarios.² As the analysis was high-level,

the results would vary with more specific information about the strategies. For instance, targeted pricing as a generic strategy under-performed on the transport equity and access measure, but a specific pricing program (e.g. weekly or monthly caps for residents or a rebate for low-income families) would garner a higher overall score.

² While an economic evaluation of each strategy was not undertaken, many other regions have found operational improvements are more cost-effective than infrastructure expansion (and BRT is more cost effective than LRT), although corridors with particularly high demand do merit rail investment. Litman, T. Evaluating Public Transit Benefits and Costs: Best Practice Guidebook, 2017.

Figure 2B-3: Resiliency analysis of strategic directions for the 2041 RTP against future scenarios



Modelling the scenarios

In addition to the more qualitative resiliency assessment shown in Figure 2B-3, the six scenarios were combined to create two contrasting scenarios for modelling purposes in order to quantitatively assess the resiliency of the future base 2041 RTP.

These two contrasting scenarios effectively represent a high- and a low-demand scenario that bracket the baseline future case, in which the distribution and growth of population and employment across the region in 2041 was consistent with the *Growth Plan*. The costs of travel in the region by mode were treated as a continuation of existing trends, i.e. “business as usual.”

Feedback received from key stakeholders on the six initial scenarios highlighted the need to recognize that the scenarios are not mutually exclusive.

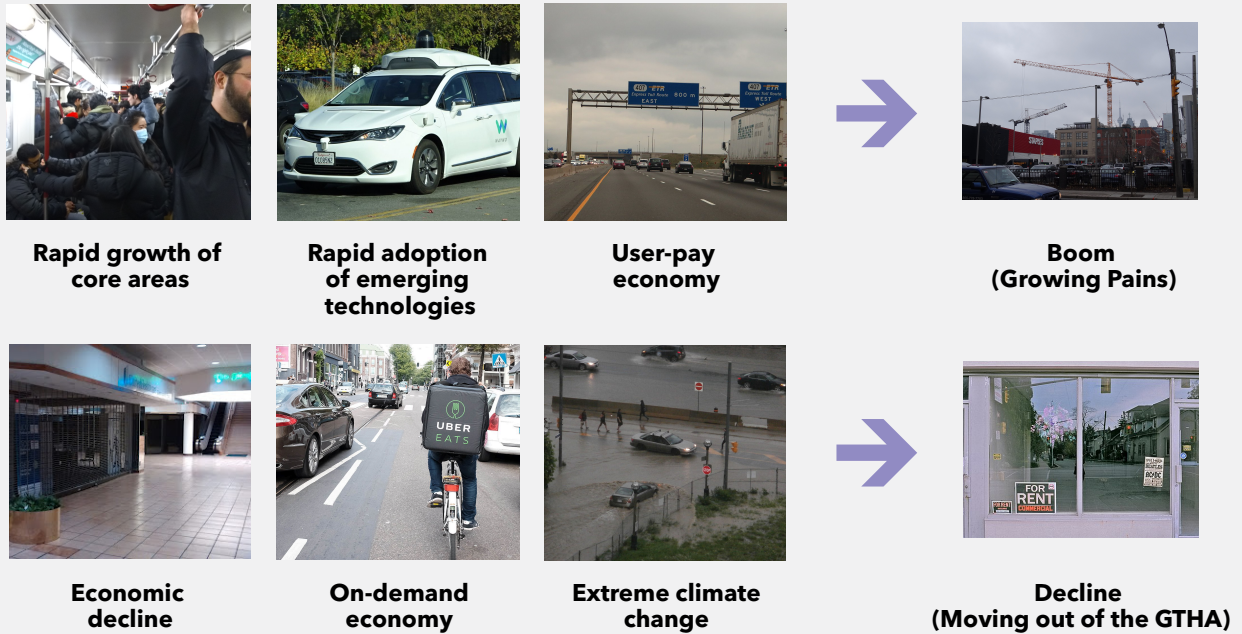
In order to generate the high- and low-demand scenarios, different aspects of the six scenarios were combined. The high growth “Boom” scenario incorporates aspects of Rapid Growth of Core Areas, the Rapid Adoption of Emerging Technologies and the User-Pay Economy. The low demand “Decline” scenario incorporates aspects of Economic Decline, Extreme Climate Change and the On-Demand Economy (see Figure 2B-4).

The *Growth Plan* forecasts were modified in these scenarios as follows:

In the Boom Scenario:

- Regional population was 14% higher than the official *Growth Plan* forecasts.
- Regional employment was 9.6% higher.
- Toronto’s growth outpaced current trends with employment 25% higher than the official *Growth Plan* figures.
- In addition, the Boom scenario assumed considerable growth in the outer ring beyond the Greenbelt. It also assumed a 5% reduction in auto operating costs to reflect the impact of a high penetration of automated vehicles.

Figure 2B-4: Linkages between scenarios



In the Decline Scenario:

- Employment dropped substantially – 13% lower than 2011 levels and 47% below the expected 2041 level.
- The Decline scenario assumed a 5% increase in auto operating costs, reflecting the worsened condition of the road network, as well as a 5% increase in toll rates³ and a 5% increase in transit fares above inflation, as the higher maintenance costs (e.g. due to climate change impacts) would be covered by fewer travellers throughout the region.
- This scenario was extreme in the sense that the population was fixed at 2011 levels but aged to reflect the increase in the senior population expected by 2041.











Parking costs and parking supply did not vary between the base future forecast and the Boom and Decline scenarios.

In addition to the Boom and Decline scenarios, a third scenario was modelled that reflects how housing and employment market forces would distribute population and employment across the GTHA in the absence of the *Growth Plan* controls and allowing development to occur in new greenfield areas (the “Market” scenario).

The model outcomes for the Boom, Decline, and Market scenarios are shown compared to the 2041 RTP under baseline future conditions in Figure 2B-5.

³In addition to road tolls on the 407 ETR, all future networks included High Occupancy Toll (HOT) lanes combined with HOV lanes in selected corridors. The network that represents the 2041 RTP included over 1,100 lane-km of HOV/HOT lanes.

Figure 2B-5: Model outcomes of various land use scenarios on the 2041 RTP

THEME	INDICATOR	DESCRIPTION	2041 PLAN (BASELINE FUTURE)	SCENARIO RESULTS		
				2041 MARKET	2041 DECLINE	2041 BOOM
PLAN DELIVERABLES						
	GTHA Population (Millions)	In the decline scenario, the population of the GTHA is similar to what it was in 2011, but percentage of seniors increases	10.1	10.1	6.5	11.5
	GTHA Employment (Millions)	In the decline scenario, employment in the GTHA is similar to what it was in 2011	4.8	4.8	2.6	5.3
	Concentration of population in Toronto	In the decline scenario, a significantly higher proportion of the population lives in Toronto	34%	34%	40%	36%
	Concentration of employment in downtown Toronto	In the boom and decline scenarios, jobs are more concentrated in downtown Toronto, comparable to the market trend scenario	12%	14%	15%	14%
PLAN OUTCOMES						
TRANSIT ACCESS	 People near transitⁱ	The fraction of people that live within walking distance of frequent rapid transit is comparable across all three scenarios	38%	39%	39%	39%
	 Jobs near transitⁱ	The fraction of all jobs that are within walking distance of frequent rapid transit follows the concentration of employment in downtown Toronto	49%	51%	53%	50%
	 Jobs accessible within 60 minutes by transitⁱⁱ	The average GTHA resident will have access to fewer jobs within 1 hour by transit in the decline scenario, and more in the boom scenario	1,060,000	1,070,000	910,000	+1,160,000
	 % of GTHA jobs accessible within 60 minutes by transitⁱⁱ	The average GTHA resident will have access to a greater proportion of all jobs in the GTHA in the decline scenario	22%	22%	35%	22%
MODE OF TRANSPORTATION	 Transit tripsⁱⁱⁱ	The number of transit trips in the region generally follows regional population and employment	1.9 million	2.0 million	1.4 million	2.1 million
	 Transit mode shareⁱⁱⁱ	Transit mode share improves the most in the decline scenario, largely because driving costs are higher	14.7%	15.5%	16.4%	14.9%
	 Active tripsⁱⁱⁱ	The number of active trips in the region generally follows regional population and employment	1,390,000	1,380,000	980,000	1,550,000
	 Active mode shareⁱⁱⁱ	The decline scenario has the higher proportion of walking and cycling trips	10.7%	10.7%	11.8%	10.5%
QUALITY OF LIFE	 Transit travel timeⁱⁱ	Rail travel times are comparable in all scenarios, but bus travel is faster in the decline scenario due to less highway congestion	39 minutes	40 minutes	36 minutes	40 minutes
	 Congested driving^{iv}	Congested vehicle kilometres travelled are far lower in the decline scenario, since all travel, including driving, is reduced	8.1 million	8.4 million	1.9 million	9.9 million
	 Environmental impact	Greenhouse gas emission per capita from auto driver trips are lowest in the decline scenario	1.5 tonnes	1.5 tonnes	0.9 tonnes	1.6 tonnes

ⁱ Walking distance is 400 m from Priority Bus/Streetcar, BRT and LRT, and 800 m from Subway and Frequent Regional Rail.

ⁱⁱ Represents trips made between 6:45 a.m. - 8:45 a.m.

ⁱⁱⁱ Represents trips in the morning and afternoon peak periods (6:00 - 9:00 a.m. and 3:00 - 7:00 p.m.).

^{iv} Represents trips made in the morning peak hour.

Appendix 2C: Report of the Residents' Reference Panel

In spring 2017, Metrolinx convened a Residents' Reference Panel made up of 36 volunteer residents from across the Greater Toronto and Hamilton Area to provide input into the 2041 RTP. Thousands of invitations were sent out to residents, and final participants were randomly selected from amongst the respondents to reflect the diversity of the region. Over the course of five full-day sessions, the Panel's task was to learn about regional transportation, services and policies, consider different perspectives, weigh priorities, and make recommendations on a course of action.

Panelists worked through their values, issues, and priorities to present a set of recommendations to Metrolinx. The Panel made recommendations in seven key areas.

Recommendations of the Residents' Reference Panel

1) Connectivity, convenience and integration

Today, disconnected transportation services lead to longer, more frustrating commutes that discourage the use of transit.

In the next five years, Metrolinx and its partners should:

- Actively coordinate routes and schedules among all 11 GTHA transit agencies;
- Integrate all intermodal information into the Triplinx app to help solve the first- and last-mile issue. This should include fares, real-time service and traffic updates, parking availability, bike-share services, cycling facilities, and potential on-demand micro-transit services;
- Make PRESTO more convenient. Possible improvements could include more machines, the ability to purchase and load cards anywhere and on the mobile app with no 24-hour delay, and the ability to pre-load monthly passes; and
- Integrate transit fares across the system. The panel endorsed a fare-by-distance structure with four conditions:
 - A low-cost flat fare within a "virtual zone" within a certain radius from the start of every trip;
 - Discounts for trips made during off-peak hours;
 - Maintaining existing discounts for students, seniors, and families travelling together; and
 - Applying monthly passes or fare caps through the PRESTO card.

In the long term, Metrolinx and its partners should:

- Pursue amendments to legislation such as the City of Toronto Act in order to remove barriers to service integration; and
- Create direct connections between regional hubs so that passengers do not always have to connect at Union Station.

2) Equity and accessibility

Today, consistency of accessible infrastructure across the transportation system is lacking, and the system faces increasing pressure with changing demographics, including an aging population and non-English-speaking newcomers.

In the next five years, Metrolinx and its partners should:

- Improve all facets of the transportation journey to ensure barrier-free access for all populations. This includes support for active transportation users, families with children, non-English speakers, and differently-abled individuals.

In the long term, Metrolinx and its partners should:

- Implement new discounts or subsidies for low-income residents in a simple yet discreet manner through the universal PRESTO fare card.

3) Health, comfort and safety

Today, transportation options in the GTHA are not as comfortable or as safe as they could be for all users.

In the next five years, Metrolinx and its partners should:

- Improve infrastructure for active transportation, including an expanded network of protected bike lanes, particularly to key transit hubs;
- Improve lighting in parking lots and at crosswalks; and
- Increase the availability of washrooms and potable water at transit stations.

In the long term, Metrolinx and its partners should:

- Install emergency buttons and/ or bus shelters at bus stops where safety is of particular concern; and
- Anticipate the possible need to increase the visibility of security at subway entry points.

4) A well-planned region

Today, our regionally fragmented transportation-planning structure appears to delay decision-making and cause bottlenecks that impede implementation. This frustrates residents who want to see quicker, evidence-based decision-making and action.

In the next five years, Metrolinx and its partners should:

- Strengthen the regional transportation governance model in order to promote greater alignment between municipal, regional, and provincial priorities, reinforce the need for greater cooperation and coordination between operators, and expedite the delivery of major transportation projects.

In the long term, Metrolinx and its partners should:

- Prioritize transit expansion in areas of high employment and residential density, keeping economic viability in mind.

5) Exemplary environmental footprint

Today, it is important for everyone to help meet and exceed emissions reduction targets in accordance with our national goals, in a manner that enhances current and future residents' quality of life without negatively impacting the environment or deterring investment.

In the next five years, Metrolinx and its partners should:

- Encourage the use of public transit and active transportation by whatever means are found to be the most effective, including rewards programs, monthly fare caps, and subsidized discounts; and
- Improve air quality inside and around stations and corridors through the increased use of greenery, enhanced ventilation and filtration, and better maintenance of vehicles and stations.

In the long term, Metrolinx and its partners should:

- Increase procurement from suppliers with environmental certifications.

6) Prosperity and competitiveness

Today, congestion is a barrier to prosperity and growth. Transportation plans are not fully aligned with economic development outside downtown Toronto. As a result, they fail to leverage the economic activity in these areas.

In the next five years, Metrolinx and its partners should:

- Identify regional nodes where expanded transit services and a mix of other land uses can be developed, considering partnerships with existing businesses and leasing space to retailers.

In the long term, Metrolinx and its partners should:

- Utilize emerging technologies (such as autonomous vehicles) to make the system more efficient where possible; and
- Facilitate the efficient movement of goods and people by better utilizing existing road infrastructure (such as dedicated transit lanes).

7) Public awareness and communication

Today, most residents do not understand why they should get out of their cars to use public transit, walk or cycle. Residents are insufficiently informed about ongoing or future projects and strategies as well as associated benefits. As a result, those critical of transit have disproportionately shaped public opinion.

In the next five years, Metrolinx and its partners should:

- Enhance the profile of regional transportation planning by promoting user benefits associated with ongoing projects, new investments, and behaviour change;
- "Own its space" and use existing transit and real estate assets to communicate to current users; and
- Launch an annual or biannual update about transit expansion that can be distributed to all GTHA residents.

In the long term, Metrolinx and its partners should:

- Create specialized campaigns to promote any new services or plans, including fare integration;
- Raise the profile of transit options outside of Toronto; and
- Elevate the status of transportation policy to that of health and education, making it the third pillar in a successful, healthy, and prosperous society.

The report and video of the Residents' Reference Panel is available on Metrolinx's website.

Appendix 2D: Profiles of the regional personas

To better understand travel behaviours and attitudes toward transportation in the GTHA, Metrolinx worked with Northstar Research Partners to conduct a survey of over 8,500 people and to hold numerous focus groups across the region to understand the types of GTHA residents, how they travel, and their perceptions. Feedback was used to develop six regional traveller personas – a typology that can provide insight into the travel behaviour and preferences of GTHA residents, and a lens through which the strategies of the 2041 RTP could be viewed.

Summary profiles of the six regional personas

Generally, across the region, residents' perceptions of safety, convenience, comfort, predictability, cost and speed of travel determine the mode they choose – whether to drive, walk, cycle or take transit. While most travellers are generally satisfied with travel in the region, they often find it to be slow, stressful and not well-integrated. Transit is often viewed negatively compared to driving, and not viewed as a first choice for getting around, especially outside the urban core.

More detailed descriptions of the behaviour and preferences of the six personas are found in Figure 2D-1. The scenario planning (Appendix 2B) also looked at the different scenarios through the lens of the personas, as discussed in *Navigating Uncertainty: Exploration of Alternative Futures for the GTHA*.

Figure 2D-1 Regional personas

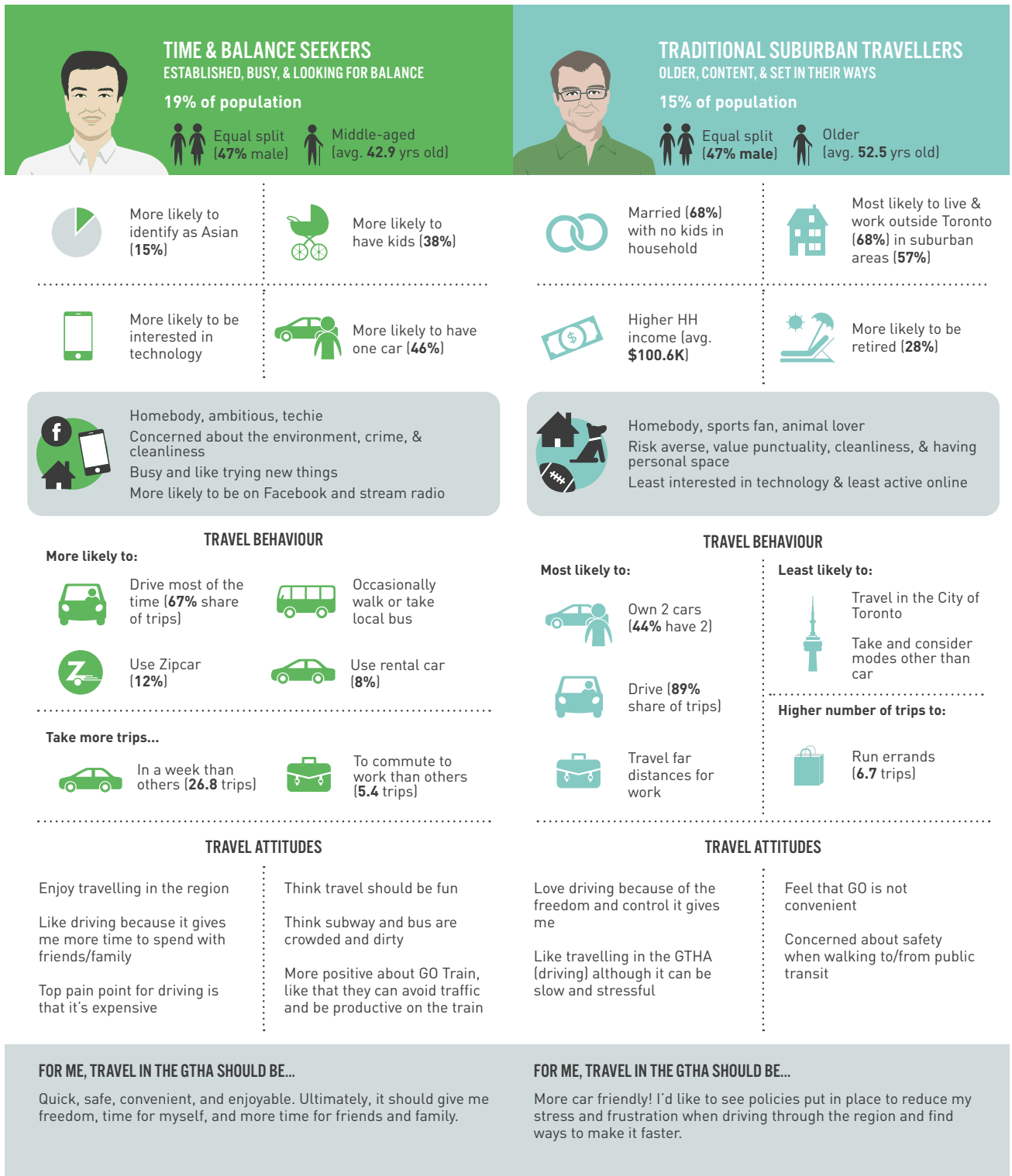


Figure 2D-1 Regional personas

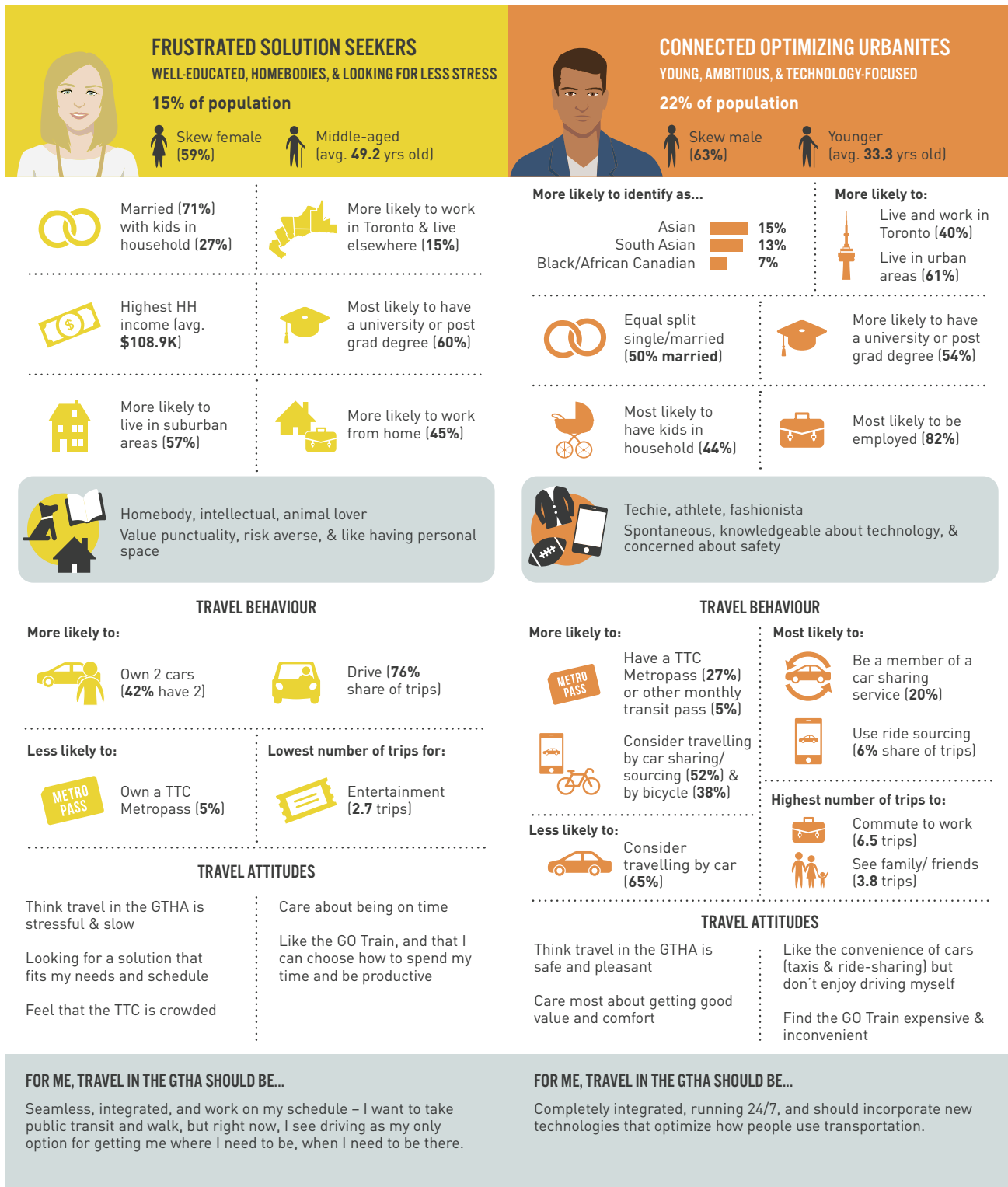
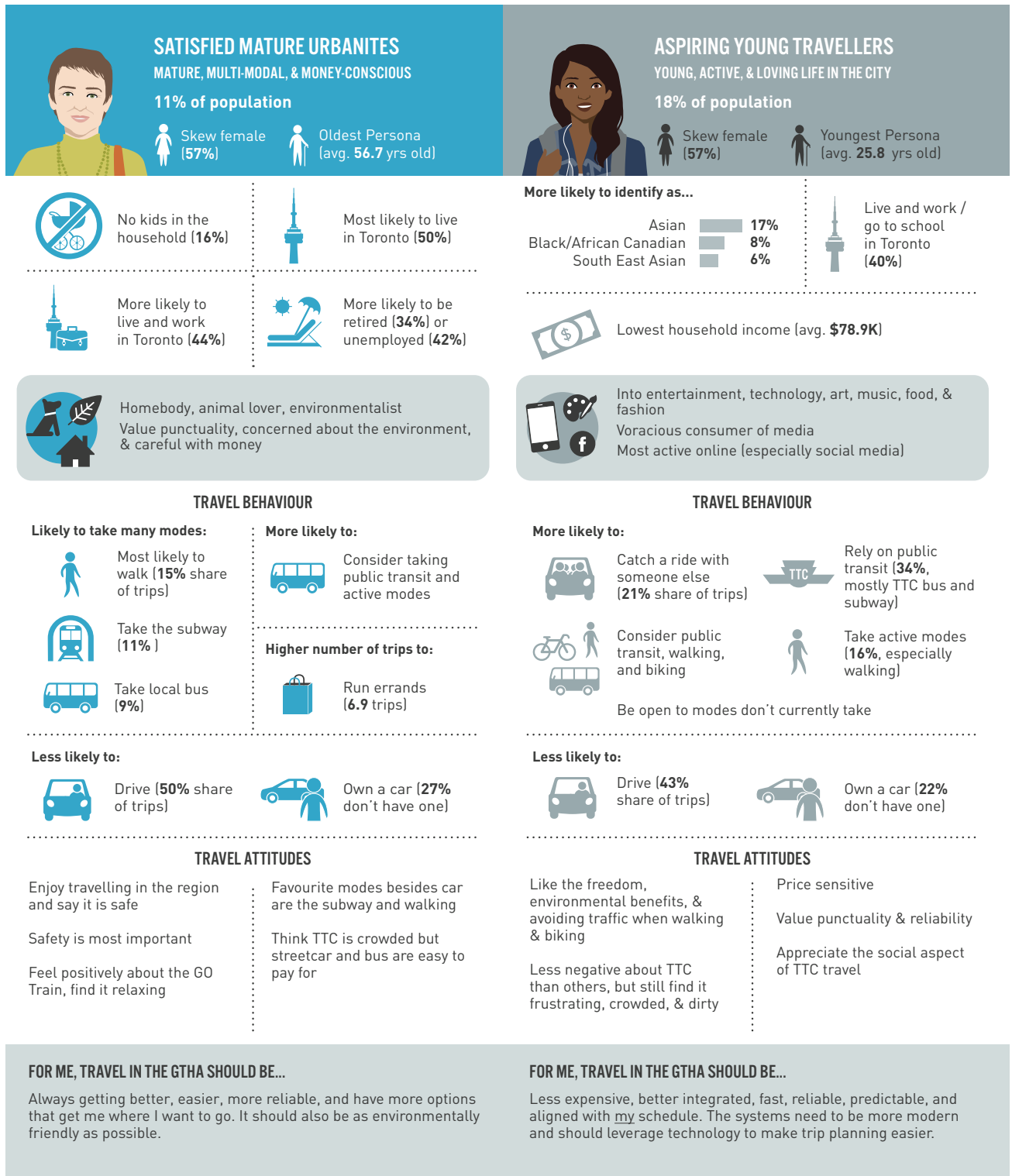


Figure 2D-1 Regional personas



1. Time and Balance Seekers

Time and Balance Seekers (TBSs) are hard-working and family-oriented, and rely primarily on the car. They are open to non-auto options, but have concerns about the safety and cleanliness of public transit, and want to enjoy the trip and arrive quickly at their destination in order to have more time for themselves and their family. TBSs are receptive to GO rail transit, particularly for commuting and going into Toronto for fun. TBSs want travel in the GTHA to be quick, safe, convenient, and enjoyable. Ultimately, it should give them freedom, time for themselves, and more time for friends and family.

2. Traditional Suburban Travellers

Suburban and car-dedicated, Traditional Suburban Travellers (TSTs) are the least likely to consider other modes. The car is convenient and comfortable and provides freedom and control. Their interest is in car-friendly approaches that reduce the stress and frustrations they experience while driving for most of their activities. TSTs are the most challenging to motivate to change their current travel behaviour, given their dependence on, and loyalty to, their cars.

3. Frustrated Solution Seekers

Frustrated Solution Seekers (FSSs) are educated, affluent suburban drivers who would like to use other modes, but prefer the convenience and reliability of a car. FSSs are typically female, and travel into Toronto for work. When it comes to getting around, FSSs mostly drive, as it is seen as quick, door-to-door, and gives them their own space, but is often stressful. They are looking for a first- and last-mile solution that fits their needs and schedules. They are open to the GO train, but do not find the current transit system to be seamless or integrated. FSSs want to take public transit and walk, but right now see driving as the only option for getting where they need to be, when they need to be there.

4. Connected Optimizing Urbanites

Connected Optimizing Urbanites (COUs) are young, active, city-dwelling professionals who frequently travel around the region. They take a variety of modes but are looking for quick, convenient and direct connections. They are seeking an integrated transportation system that uses technology. Most often male, COUs take transit but do not really enjoy it, and seek alternatives like ride-sourcing, which provides the 24/7 door-to-door service and connectivity they seek. They are most likely to be the early adopters of new transportation technologies, including autonomous vehicles.

5. Satisfied Mature Urbanites

Satisfied Mature Urbanites (SMUs) are older, Toronto-dwelling residents who do not travel very far outside their community. They feel that they have many transportation options and are largely satisfied. They are often female and most likely retired, although many still work in the city. SMUs have a relatively small transportation footprint. They are environmentalists and prefer walking or taking public transit. For the most part, they are very satisfied with transportation in the region, feeling that they are well-served by the wide array of options. They are less interested in new technological innovations (although they do anticipate that technology will help improve travel) and are reticent about the introduction of autonomous vehicles for themselves. They want travel in the GTHA to always be getting better, easier, and more reliable.

6. Aspiring Young Travellers

Aspiring Young Travellers (AYTs) are young, active, and loving life in the city. While they have many positive associations with car travel, they look to public transit, rides with others, and active transportation to get where they need to go. AYTs are likely to continue using these modes. While price may be a barrier to taking transit for all travel, AYTs are looking for better system integration and technologies that make travel more predictable, easier, and faster.

Appendix 3

List of transit projects

Appendix 3A: Projects completed 2008-2017 (Map 3)

Project#	Project Name
1	Kitchener GO Extension (Georgetown GO - Kitchener GO)
2	Barrie GO Extension (Barrie South GO - Allandale GO)
3	West Harbour GO Extension (Aldershot GO - West Harbour GO)
4	Mississauga Transitway (Winston Churchill Blvd. - Renforth Dr.)
5	Highway 7 East BRT (Yonge St. - Unionville GO)
6	Davis Drive BRT (Yonge St. - Newmarket GO)
7	UP Express (Union Station - Toronto Pearson International Airport)
8	Gormley GO Extension (Richmond Hill GO - Gormley GO)
9	Toronto-York Spadina Subway Extension (Sheppard Ave. - Highway 7)

Appendix 3B: Projects In Delivery (Map 3)

Project#	Project Name
10	Eglinton Crosstown LRT (Weston Rd. - Kennedy Station)
11	Sheppard East LRT (Don Mills Station - Morningside Ave.)
12	Finch West LRT (Finch West Station - Humber College)
13	Scarborough Subway (Kennedy Station - Scarborough Town Centre)
14	Hamilton B-Line LRT (McMaster University - Eastgate Mall)
15	Highway 7 West BRT (Helen St. - Yonge St.)
16	Hurontario LRT (Port Credit GO - Steeles Ave.)
17	Yonge BRT (North) (Mulock Dr. - Davis Dr.)
18	Yonge BRT (South) (Highway 7 - 19th Ave.)
19	Bloomington GO Extension (Gormley GO - Bloomington GO)
20	Bowmanville GO Extension (West of Oshawa GO - Martin Rd.)
21	Confederation GO Extension (West Harbour GO - Confederation GO)
22	Niagara GO Service (Confederation GO - Niagara Falls GO)
23	Lakeshore West Two-Way, All-Day GO Service (Aldershot GO - Hamilton GO)
24	Barrie Two-Way, All-Day GO Service (Aurora GO - Allandale Waterfront GO)
25	Kitchener Two-Way, All-Day GO Service (Mount Pleasant GO - Kitchener GO)
26	Stouffville Two-Way, All-Day GO Service (Unionville GO - Mount Joy GO)
27	Kitchener 15-min GO Service (Union Station - Mount Pleasant GO)
28	Barrie 15-min GO Service (Union Station - Aurora GO)
29	Stouffville 15-min GO Service (Union Station - Unionville GO)
30	Lakeshore West 15-min GO Service (Union Station - Aldershot GO)
31	Lakeshore East 15-min GO Service (Union Station - Oshawa GO)

Appendix 3C: Projects In Development (Map 4)

Project#	Project Name
32	Dundas West Priority Bus (Bronte Rd. - Brant St.)
33	Dundas BRT (Kipling Station - Bronte Rd.)
34	Brampton Queen St. BRT (Main St. - Highway 50)
35	Eglinton West LRT (Weston Rd. - Toronto Pearson International Airport)
36	Highway 7 West BRT Extension (Highway 50 - Helen St.)
37	Waterfront West LRT (Union Station - Port Credit GO)
38	Waterfront East LRT (Union Station - Coxwell Ave.)
39	Relief Line Subway (Sheppard Ave. - Osgoode Station)
40	Yonge North Subway Extension (Finch Station - Highway 7)
41	Yonge BRT (Richmond Hill, Aurora, Newmarket) (19th Ave. - Mulock Dr.)
42	Eglinton East LRT (Kennedy Station - Sheppard Ave.)
43	Highway 7 East BRT Extension (Unionville GO - Donald Cousens Pkwy.)
44	Durham-Scarborough BRT (Scarborough Centre - Simcoe St.)

Appendix 3D: Other projects proposed in the 2041 Regional Transportation Plan (Map 5)

GO Rail

Project#	Project Name
46	Lakeshore West 15-min GO Service Extension (Aldershot GO - Hamilton GO)
53	Milton 15-min GO Service (Union Station - Milton GO)
88	Barrie 15-min GO Service Extension (Aurora GO - East Gwillimbury GO)
89	Stouffville 15-min GO Service Extension (Unionville GO - Mount Joy GO)
90	Richmond Hill Two-Way, All-Day GO Service (Union Station - Richmond Hill GO)
97	Lakeshore East 15-min GO Service Extension (to Downtown Oshawa GO)
100	Lakeshore East Two-Way, All-Day GO Service (Downtown Oshawa GO - Martin Rd.)

Subway

Project#	Project Name
73	Line 2 Subway and Bloor-Yonge Station Capacity Enhancements
74	Sheppard Subway West Extension (Sheppard Station - Sheppard West Station)

BRT/LRT

Project#	Project Name
45	Waterfront West LRT Extension (Port Credit GO - Mississauga Rd.)
47	Hamilton A-Line BRT (West Harbour GO - Rymal Rd.)
54	Trafalgar BRT/LRT (Oakville GO - Highway 407)
61	Downtown Mississauga Transitway & Terminal (Mavis Rd. - Hurontario St.)
62	Hurontario LRT North Extension (Steeles Ave. - Brampton GO)
70	Finch West LRT West Extension (Humber College - Toronto Pearson International Airport)
71	Jane North BRT/LRT (Highway 7 - Major Mackenzie Dr.)
72	Jane South BRT/LRT (Bloor St. - Highway 7)
75	Steeles BRT/LRT (Jane St. - McCowan Rd.)
76	Finch West LRT East Extension (Finch West Station - Finch Station)
77	Leslie North BRT/LRT (Highway 7 - Major Mackenzie Dr.)
78	Don Mills/Leslie BRT/LRT (Sheppard Ave. - Highway 7)
79	McCowan BRT/LRT (Ellesmere Rd. - Steeles Ave.)
81	Sheppard East LRT Extension (Morningside Ave. - Meadowvale Rd.)
83	Malvern Connection (Sheppard Ave. & Morningside Ave. - Markham Rd. via McLevin Ave.) Note: this is a continuation of the Eglinton East LRT service
85	Major Mackenzie BRT/LRT (Jane St. - Leslie St.)
98	Simcoe BRT/LRT (Downtown Oshawa GO - Highway 407)

Priority Bus / Priority Streetcar

Project#	Project Name
48	Hamilton A-Line South Priority Bus (Rymal Rd. - Hamilton Munro International Airport)
49	Dundas Connector Priority Bus (McMaster University - Downtown Dundas)
50	Hamilton L-Line Priority Bus (Downtown Hamilton - Waterdown)
51	Hamilton S-Line Priority Bus (Ancaster Business Park - Confederation GO)
52	Hamilton Mohawk T-Line Priority Bus (Centre Mall - Meadowlands Terminal)
55	Brant Priority Bus (Lakeshore Rd. - Dundas St.)
56	Bronte/Regional Road #25 Priority Bus (Bronte GO - Steeles Ave.)
57	Derry Priority Bus (Bronte Rd. - Humber College)
58	Harvester/Speers/Cornwall Priority Bus (Waterdown Rd. - Port Credit GO)
59	Eglinton Mississauga Priority Bus (Highway 407 - Renforth Dr.)
60	Trafalgar North Priority Bus (Highway 407 - Milton GO)
63	Britannia/Matheson Priority Bus (Highway 407 - Renforth Dr.)
64	Hurontario North Priority Bus (Brampton GO - Mayfield West)
65	Dixie/Bramalea Priority Bus (Lakeshore Rd. - Bovaird Dr.)
66	Airport Rd. Priority Bus (Castlemore Ave. - Toronto Pearson International Airport)
67	Erin Mills/Mississauga Rd. Priority Bus (Clarkson GO - Bovaird Dr.)
68	Bovaird/Castlemore Priority Bus (Mount Pleasant GO - Highway 427)
69	Steeles West Priority Bus (Lisgar GO - Jane St. via Humber College)
80	Finch East Priority Bus (Finch Station - McCowan Rd.)
82	Kingston Priority Bus (Main Street Station - Eglinton Ave.)
84	Major Mackenzie West Priority Bus (Highway 427 - Jane St.)
86	Major Mackenzie East Priority Bus (Leslie St. - Mount Joy GO)
87	Green Lane Priority Bus (Davis Dr. - East Gwillimbury GO)
91	Steeles/Taunton Priority Bus (McCowan Rd. - Harmony Rd.)
92	Whites Rd. Priority Bus (Highway 407 - Pickering GO)
93	Brock Rd. Priority Bus (Bayly St.- Highway 7)
94	Westney Priority Bus (Bayly St. - Highway 2)
95	Bayly Priority Bus (Pickering GO - Whitby GO)
96	Brock St./Baldwin Priority Bus (Whitby GO - Brawley Rd.)
99	Highway 2 Priority Bus (Simcoe St. - Martin Rd.)
101	Highway 7 Pickering Priority Bus (Donald Cousens Pkwy. - Brock Rd.)
102	Brampton Queen West Priority Bus (Mississauga Rd. - Main St.)
103	Highway 27 Priority Bus (Kipling Station - Steeles Ave.)
104	Dufferin Priority Bus (Exhibition GO - Wilson Station)
105	St. Clair Priority Streetcar (St. Clair Station - Jane St.)
106	Spadina Priority Streetcar (Union Station - Spadina Station)

Appendix 3E: Projects beyond 2041 (not mapped)

Project Name
Bolton Rail Service (Union Station - Bolton)
Crosstown Rail Service (Dundas St. - Summerhill)
Havelock Rail Service (Union Station/Summerhill - Locust Hill)
Seaton Rail Service (Union Station/Summerhill - Seaton)
Richmond Hill 15-minute GO Service (Union Station – Richmond Hill GO)
Highway 407 Transitway (Hurontario Rd. - Brock Rd.)
Relief Line Subway West Extension (Osgoode Station - Bloor West) ¹

¹ Earlier planning will occur, and will be reviewed as part of the next RTP review taking into consideration RER and streetcar priority.

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

Appendix 4

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Appendix 5

Consolidated 2041 Regional Transportation Plan Priority Actions

Priority Actions for Strategy 1: Complete the delivery of current regional transit projects

- 1.1 Complete In Delivery projects (see Map 3) by 2025, including the GO RER program; the Hurontario, Eglinton, Hamilton B-Line and Finch West LRT lines; and the Highway 7 and Yonge BRT lines:**
- Ensure that all projects together deliver a regionally consistent, seamless and high-quality customer experience.
- 1.2 Advance the In Development transit projects (see Map 4) through preliminary design, detailed design and construction.**
- 1.3 Strengthen Union Station’s capacity as the centre of GO RER:**
- In consultation with the City of Toronto and the provincial and federal governments, develop a plan to address rail service capacity at Union Station to accommodate the growth of GO RER beyond 2025.
 - Ensure that all decisions regarding improvements to Union Station and adjacent areas are consistent with and protect for long term objectives.
- 1.4 Coordinate planning and implementation of In Delivery and In Development projects with the Province, federal government and VIA Rail Canada, focusing on:**
- high speed rail;
 - high frequency rail;
 - optimizing shared resources including Union Station and rail corridors; and
 - integrating services for a seamless traveller experience.

Priority Actions for Strategy 2: Connect more of the region with frequent rapid transit

- 2.1 Implement a comprehensive and integrated Frequent Rapid Transit Network by 2041 that includes:**
- existing subway, transitway and BRT services (See Map 3);
 - 15-minute GO Regional Express Rail on the Lakeshore East and West, Kitchener, Stouffville and Barrie Corridors, In Delivery for 2025 (see Map 3);
 - In Delivery BRT and LRT projects (see Map 3);
 - In Development projects (see Map 4);
 - additional transit infrastructure improvements to resolve key gaps (proposed new LRT and BRT projects, see Map 5);
 - additional 15-minute GO Regional Express Rail services beyond 2025 (see Map 5);
 - a Priority Bus and Priority Streetcar system that connects existing and planned rapid transit, LRT and BRT (see Map 5); and
 - Frequent Regional Express Bus services (see Map 5 and Map 7).
- 2.2 Strengthen and support the ability of local transit to provide reliable service in urban areas where demand for transit is high, and to connect to the Frequent Rapid Transit Network.**
- 2.3 Develop and implement a 24-hour transit network composed of strategic regional routes to address growing off-peak markets and destinations.**
- 2.4 Deliver a Regional Express Bus Network to serve long-distance transit markets not served by GO RER (see Map 7).**

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

- Coordinate with the Greater Toronto Airports Authority, Ports Toronto, the John C. Munro Hamilton International Airport and the federal government on ground transportation plans to the region's airports and surrounding areas.
- Coordinate with the planning and implementation of Pearson Airport's Regional Transit Centre to facilitate enhanced transit access to the airport, and to enable Pearson and the surrounding employment areas to continue supporting economic growth throughout the GTHA.

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

Priority Actions for Strategy 3: Optimize the transportation system

3.1 Advance the integration of transit services and fares:

- Remove barriers to create an integrated fare system that supports seamless and consistent travel for passengers across municipal boundaries.
- Ensure progress toward seamless travel and increase ridership by taking a regional view of setting fares and concessions for transit, and by developing innovative fare products.

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

- Fully implement the *GO Rail Station Access Plan* (2016) to achieve higher shares of station access by walking, cycling, transit, passenger pick-up and drop-off, and carpooling.
- Invest in first- and last-mile solutions to maximize all-season access to and from all rapid transit stations, including but not limited to:
 - priority transit access;
 - pedestrian access to workplaces and destinations;
 - improved on-demand services including taxis and micro-transit services (with potential applications in rural areas);
 - on- and off-site bicycle facilities; and
 - car-share and bike-share programs.
- Recover the cost of providing parking at GO stations to help shift trips to modes that do not require parking, and to allow more people to access new train services.

3.3 Set consistent high-quality standards for the traveller experience:

- Focus on reliable service as a first priority for attracting customers to transit, emphasizing the use of transit priority measures.
- Provide travellers with:
 - real-time information;
 - well-designed places that offer shade, shelter, paved surfaces, seating, clear sightlines and lighting;
 - consistent wayfinding across modes;
 - all-season maintenance of sidewalks, bike lanes and paths;

- on-demand service connectivity; and
- concession fares.
- Develop and implement shared customer experience objectives for new regional transit investments and the regional transit network in general.
- Ensure that design excellence is applied to architecture, urban design and landscape architecture.

3.4 Develop and implement a mobility as a service strategy:

- Continually improve the PRESTO fare payment system to support inter-municipal transit trips with a range of fare products and self-service options. Migration to an account-based system will allow customers to access PRESTO via traditional PRESTO cards, credit cards, limited use electronic tickets and mobile wallets.
- Fully integrate regional multimodal trip planning and fare payment into a MaaS platform, incorporating and encouraging mobility options including but not limited to transit, bike-sharing, car-sharing, carpooling and ride-sourcing.

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

- Foster an accessible network of conventional transit and paratransit systems, where riders can transfer easily and conveniently between services, including across boundaries.
- Develop an integrated regional booking platform for specialized transit trips across the region.
- Ensure that on-demand services meet the needs of a diverse range of travellers.
- Provide leadership and ensure consistency in accessible design for transportation services and facilities across the region, with a focus on ensuring that transportation services and facilities are age-friendly and can be used by all residents of the GTHA.
- Collaborate to address challenges to transit access, and the unintended consequences of transit investment, such as increases in housing costs along transit corridors.
- Develop a regional framework for the universal provision of transit passes to low-income groups.

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

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

3.7 Make TDM a priority:

- Collaborate to develop and implement TDM programs as required by the *Growth Plan*.
- Advance workplace TDM programming and encourage private-sector leadership, participation and investment with mandated participation by large employers, institutions and other venues that generate a significant number of trips.
- Develop new approaches to TDM delivery from the fields of service design and behavioural economics.
- Reinvigorate carpooling with a compelling and user-friendly online regional platform integrated with trip planning and payment tools, and drive participation, including removing regulatory obstacles to user incentives.
- Deliver TDM programming to support all new rapid transit services, transit station areas, and areas impacted by major construction and events.
- Develop incentives for off-peak travel to reduce peak travel demands and, in the case of transit, to grow off-peak ridership.
- Continue to explore how mobility pricing (e.g., parking, road pricing, HOT lanes and off-peak fares) could be used to shift travel behaviour.
- Assess the feasibility and potential of vanpool services.

3.8 Expand the current HOV lane network:

- Identify and prioritize a seamless network of HOV lanes on the highways in the GTHA, encouraging higher-occupancy vehicle travel and supporting faster, more reliable bus service (see Map 7).
- Incentivize ridesharing using the HOV lane network for trips that are difficult to make by transit or active transportation.
- Identify opportunities to implement HOV lanes on arterial roads to support the Frequent Rapid Transit Network.
- Continue the implementation of HOT lanes on HOV lanes that have excess capacity.

3.9 Further integrate road and transit planning operations:

- Invest in the regional coordination and deployment of ITS and smart corridors to support effective congestion management and transit priority operations.
- Coordinate the planning and operation of transit, roads and on-street parking within each municipality, across municipal boundaries, and where municipal, regional and provincial roads meet.

3.10 Define and support a regional goods movement system:

- Advance collaboration between the public and private sector to implement a Regional Strategic Goods Movement Network (see Map 8) that links goods-generating activity centres, intermodal terminals and regional gateways.
- Study goods movement priority features for new and existing freight corridors, including but not limited to intelligent lane utilization and truck-only lanes.
- Support development of innovative freight hubs, including planning for and protecting complementary land uses. Consider the use of transit stations as a pick-up location for small parcels, and support other innovative urban freight practices to reduce door-to-door delivery. Explore and implement flexible freight delivery times, including off-peak delivery, where applicable.
- Establish a GTHA urban freight data monitoring program, including the ongoing collection of freight data.
- Expand awareness and education efforts regarding goods movement planning, design and operational issues, with particular reference to e-commerce impacts and potential delivery innovations (e.g., bicycle use) on the volume and nature of freight movement in the region.

3.11 Promote integrated planning for rail corridors:

- Coordinate with MTO in its investigation of the potential for shared freight and passenger use of critical rail corridors in the GTHA.
- Where corridor capacity studies indicate separation of uses is required, develop and promote plans for freight rationalization.
- Ensure that community safety is given high priority in planning for goods movement on rail corridors.

Priority Actions for Strategy 4: Integrate transportation and land use

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

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

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

- Coordinate creation of station area plans that catalyze desired land uses and support transit investments.
- Systematically locate publicly funded institutions and facilities near stations on Priority Transit Corridors and subway lines.
- Integrate joint development early in rapid transit project planning and in procurement schedules, utilizing new partnerships between the public and private sector.
- Update the *Mobility Hub Guidelines* to address emerging challenges and opportunities related to the integration of land use and transportation, and incorporate new tools and guidance for planning Mobility Hubs.
- Update the network of Mobility Hubs to reflect the Frequent Rapid Transit Network, the *Growth Plan*, municipal plans, and 2041 forecasts for population, employment and transit ridership.

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

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

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

- Develop shared investment criteria in cycling facilities that focus on cycling potential and connectivity, consistent with regional and local plans.
 - Adopt a complete streets approach in the delivery of transit infrastructure investments, incorporating facilities for walking and cycling access to transit stations.
 - Expand and promote bike-share in locations where there is an opportunity to meet and increase the demand for cycling.
- 4.6 Develop and implement a Regional Cycling Network (see Map 9), creating new on- and off-road facilities that connect areas with high cycling potential to rapid transit stations and Urban Growth Centres, helping commuter cyclists traverse boundaries and physical barriers.**
- 4.7 Embed TDM in land use planning and development :**
- Use TDM plans in the development approval process to ensure that major residential, commercial and institutional developments are designed and operated to reflect the passenger transportation hierarchy, with realistic, long-term implementation plans.
 - Develop regional TDM standards and guidelines.
 - Leverage the development approval process to generate dedicated funding for TDM programming.
- 4.8 Rethink the future of parking:**
- Coordinate the development of a region-wide policy that:
 - provides guidelines and encourages best practices in parking management;
 - identifies common goals for on- and off-street parking management, especially near transit stations;
 - supports land use and transportation objectives;
 - acknowledges the varied urban, suburban and rural contexts of the GTHA;
 - anticipates autonomous vehicles and shared mobility;
 - incorporates environment-friendly features;
 - can be leveraged for local policy making; and
 - includes public education and demonstrates the benefit of new parking practices.
 - Coordinate station area parking requirements with the expansion of transit infrastructure and services (e.g., amend applicable transit station area by-laws as a condition for transit station approval to support local mode share targets). Zoning standards should be reviewed, with the expectation that minimum parking requirements will be reduced, particularly in transit-supportive neighbourhoods.
 - Adopt a region-wide approach to parking management for the arrival of shared mobility and autonomous vehicles.
 - Research and regularly publish existing parking-related data and emerging trends to improve parking planning and management.
- 4.9 Coordinate across ministries, school boards, municipalities, service providers, public health agencies, non-governmental organizations and other stakeholders to establish school travel programs and service solutions for Kindergarten to Grade 12 that encourage future generations of pedestrians and cyclists:**
- Continue to advance active and sustainable school travel through regional coordination and delivery of the school travel program. Adopt approaches that are location-specific to ensure that solutions involving walking, cycling and transit are tailored to each community.
 - Expand the resources and community capacity available to advance active and sustainable school travel in the GTHA, including to high school students.
 - Develop policies, plans and standards that prioritize active and sustainable travel by children and youth in school areas and the broader community (e.g., to recreational facilities and cultural facilities).
- 4.10 Assess the need for a Transportation Planning Policy Statement and a Transportation Master Plan regulation, as provided for in the Metrolinx Act 2006, to support the implementation of the 2041 RTP.**

Priority Actions for Strategy 5: Prepare for an uncertain future

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

- Work collaboratively to harmonize local regulations and develop regional policies and guidance to enable innovation while meeting the needs of GTHA residents.
- Proactively test and evaluate new services and technologies (e.g., micro-transit, on-demand and shared mobility) in emerging markets where conventional transit and active transportation are not meeting demand.
- Coordinate and establish partnerships that complement existing and committed transit services.

5.2 Develop a region-wide plan for autonomous mobility:

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

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

- Plan and build a transportation system that can continue to operate in extreme weather events that accompany climate change.
- Design new infrastructure and strengthen existing infrastructure to resist extreme weather.
- Ensure that the management of existing infrastructure assets, and the design and construction of future assets, are climate resilient.
- Adopt and coordinate policies and procedures coordinated among all transportation stakeholders (e.g., road, transit and emergency management agencies) to respond to extreme weather events.

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

- Develop and update coordinated emergency response plans to minimize impacts of extreme weather events, security incidents, electricity blackouts, network outages, cyber-attacks and other future threats on travellers, assets and operations.
- Advance cyber-security, backup systems and resiliency plans to prevent and mitigate service disruptions and data breaches.
- Undertake regular emergency response exercises with community participation to train staff, test infrastructure and evaluate emergency protocols.

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

- Align regional and local efforts to mitigate greenhouse gas emissions with international, federal and provincial efforts to meet the Paris Climate Change Accord, and with Ontario's goal of reducing emissions to 80% below 1990 levels by 2050.
- Continue supporting compact and mixed-use development, complete streets and other measures that help reduce travel by motor vehicles.
- Deploy infrastructure to support electric vehicle use throughout the region's public and private transportation systems.
- Invest in the transition to low-carbon public and private vehicle fleets, including transit vehicles and trucks.
- Further collaborate among governments to enhance fuel efficiency and increase the availability of low-carbon fuels.

5.6 Develop a regional transportation big data strategy:

- Create a regional transportation big data portal, providing consistent and transparent data collection, management and reporting.
- Establish regional standards for transportation data sourcing, formatting, privacy, security, ownership and reporting.
- Identify and acquire new transportation data on all modes of transportation for planning and operations (e.g., crowd-sourced traffic data).
- Advance coordination and standardization of transportation forecasting, modelling and business case methodologies to support decision-making and evaluation.

5.7 Develop a strategy for innovation in mobility to:

- Drive innovation related to new services, tools and business models.
- Develop outcome-based approaches beyond traditional procurement and formal partnerships:
 - identify and leverage companies with innovative products and services that can benefit travellers or improve operations;
 - remove barriers to partnerships (e.g., overly rigid procurement rules);
 - test and minimize risks associated with new ideas, products and approaches; and
 - explore innovative funding and financing options such as loans and loan guarantees.

Appendix 6

Transportation trends in the GTHA

This appendix examines trends in travel behaviour in the Greater Toronto and Hamilton Area, and in particular what has changed since 2006. *The Big Move Baseline Monitoring Report* (2013) and the *Discussion Paper for the Next Regional Transportation Plan* released in August 2016 also focused on key transportation trends. This appendix builds on that work and adds information on 2016 travel patterns, which was not available at the time the *Discussion Paper* was released.

The tables and figures in this appendix have been generated primarily from a household travel survey called the Transportation Tomorrow Survey (TTS) for the survey years 2006, 2011 and 2016. Certain selected tables also include Census tabulations from Statistics Canada.¹

¹ While both the TTS and MTO's Greater Golden Horseshoe Model (GGHM) contain information on travel in the broader Greater Golden Horseshoe (GGH), the results presented in this appendix are restricted to travel within the Greater Toronto and Hamilton Area (GTHA).

Growth trends

Population and employment are key drivers in generating travel throughout the region. The GTHA demonstrates substantial and sustained growth with a 14% increase in population and a 13% increase in employment between 2006 and 2016 (Table 6-1)². Table 6-1 also indicates the annual growth rate for each regional municipality between 2006 and 2016. The table also calculates the annual growth rate each municipality would have to maintain in order to meet the projected population and employment targets from the *Growth Plan*.

When looking at total travel captured by the Transportation Tomorrow Survey, total travel has declined very slightly on a per capita basis between 2006 and 2016, while commuting to work during the AM and PM peak periods appears to be stable (see Table 6-2). Work trips per capita declined slightly from 2006 to 2011, but returned to 2006 levels in 2016, perhaps reflecting a return to higher levels of employment in the GTHA.

Table 6-1: Population and employment growth in the GTHA

	2006	2011	2016	2041	Annual Growth Rate	
					2006-2016	2016-2041
Population						
Toronto	2,609,200	2,704,600	2,871,100	3,400,000	0.8%	0.7%
Peel	1,212,800	1,339,800	1,468,700	1,970,000	1.7%	1.3%
York	931,800	1,065,500	1,149,100	1,790,000	2.1%	1.8%
Durham	584,300	626,100	671,800	1,190,000	1.3%	2.4%
Halton	457,700	516,400	569,400	1,000,000	2.1%	2.3%
Hamilton	523,600	535,600	561,000	780,000	0.5%	1.4%
GTHA Total	6,319,400	6,788,000	7,291,100	10,130,000	1.3%	1.4%
Employment						
GTHA Total	3,185,200	3,317,400	3,610,000	4,820,000	1.3%	1.2%

Source: Hemson Consulting Ltd. based on Statistics Canada Annual Demographic Estimates, Statistics Canada 2006 Census, 2011 Census, 2011 National Household Survey, and 2016 Census; *Growth Plan for the Greater Golden Horseshoe, 2017*.

Table 6-2: Overall travel in the GTHA

	2006		2011		2016	
	Trips	Trips per capita	Trips	Trips per capita	Trips	Trips per capita
Total daily trips	12,078,808	2.1	13,406,319	2.0	13,040,637	1.9
Peak period* work trips	2,785,708	0.5	2,958,794	0.4	3,262,906	0.5

* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

²Note that these tabulations use adjusted population totals (incorporating undercount adjustments) rather than the official Census count. Statistics Canada estimated there was a nationwide undercount of 2.9%, which generally is higher for urban areas, such as the GTHA.

Auto ownership trends

One of the key drivers for mode choice, particularly the decision to take transit, is auto availability. Figure 6-1 examines the presence of autos at the household level.

One interesting finding is that zero-auto households declined between 2006 and 2011, then increased in 2016, slightly surpassing 2006 levels. This is likely due to a combination of factors, with the most important being survey methodology. The 2016 TTS did a better job of capturing low-income residents, particularly in Toronto, and thus is a better reflection of transportation in the region than 2011. In addition, there are more options available, such as the presence of ride-sourcing companies such as Uber, and an expansion of the ridesharing system (Car2Go and ZipCar) that allows households to “shed” an auto.

On the other hand, even in Toronto (outside of downtown) the number of 3+ auto households has increased slightly. This increase in 3+ auto households is particularly pronounced in Durham (+4% between 2006 and 2016) and Hamilton (+4% between 2006 and 2016). Across the GTHA, between 2006 and 2016, zero auto households increased by approximately 0.5% and 3+ auto households increased by 2% (see Figure 6-3).

While auto ownership is tied to location, with urban neighbourhoods having overall lower levels of auto ownership due to a combination of individuals having more alternatives to auto ownership (including access to car-sharing services) and higher parking costs, household income and household size are also key factors with higher income households more likely to own autos than low income households when controlling for household size. Table 6-3 indicates that lower income households (\$0-39,999) own less than one auto on average, while the highest income households (\$125,000+) own slightly more than two autos on average. Indeed, just under 3% of the highest income households own zero autos, compared to over 50% of households below \$15,000 in household income.

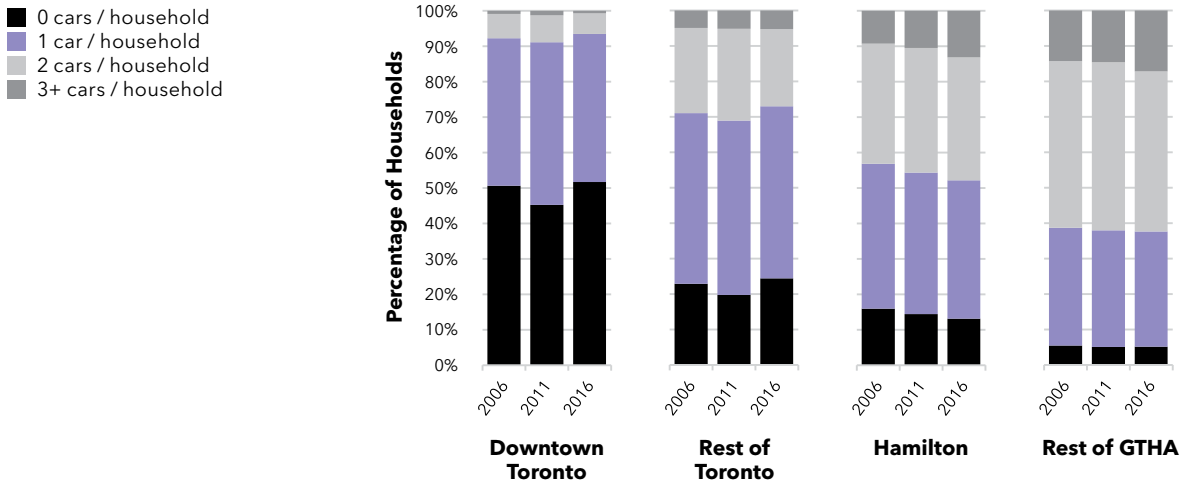
Figure 6-2 shows the combined impact of income and household size. As expected, as household size increases, the number of vehicles increases and for 3+ person households, zero auto ownership is relatively rare, even among the lowest income households.

Table 6-3: Household auto ownership by income (2016)

	Cars / Household				Average Cars / Household
	0	1	2	3+	
\$0 to \$15,000	53%	39%	7%	1%	0.6
\$15,000 to \$40,000	28%	54%	15%	3%	0.9
\$40,000 to \$60,000	13%	52%	28%	7%	1.3
\$60,000 to \$100,000	9%	41%	39%	11%	1.6
\$100,000 to \$125,000	5%	28%	49%	18%	1.9
\$125,000 and above	3%	20%	51%	26%	2.1

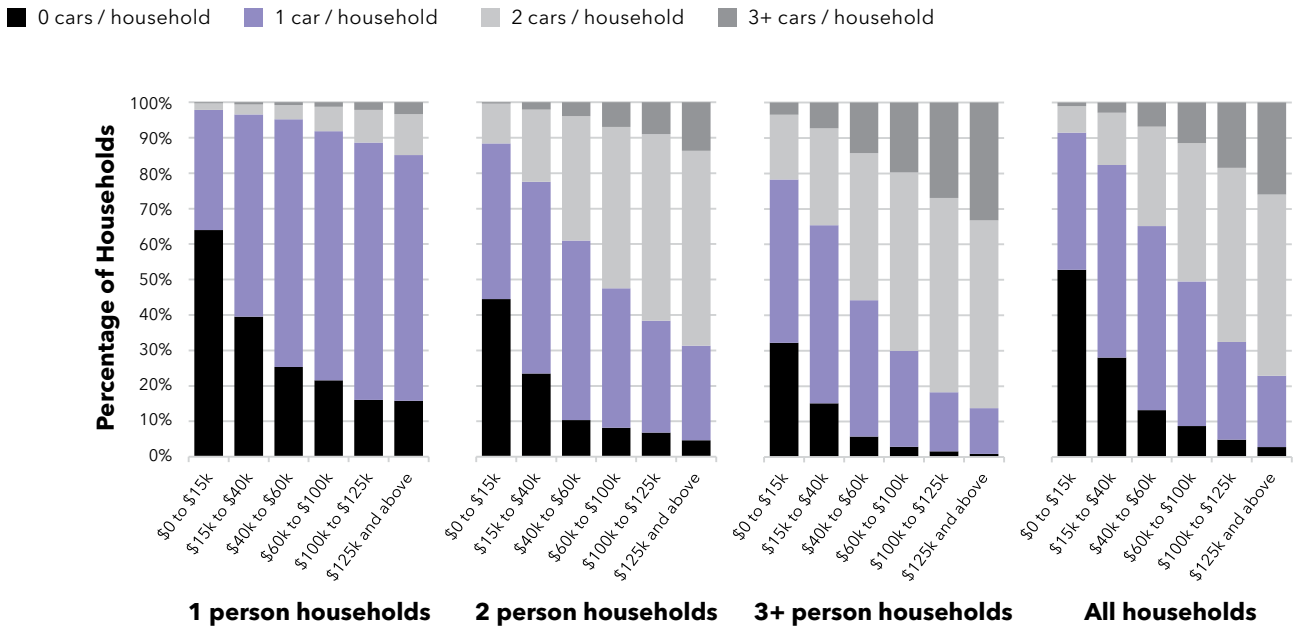
Source: University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey.

Figure 6-1: Household auto ownership



Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

Figure 6-2: Household auto ownership by income and household size (2016)



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

Travel trends

Knowing the starting point and ending point of a trip is extremely important in predicting the mode taken for that trip, as the trip length as well as the transit alternatives vary dramatically. To avoid listing the thousands of individual combinations of trip origins and trip destinations, travel patterns are grouped into a smaller number of travel markets, such as travel to or from downtown Toronto or travel that is internal to an upper-tier municipality. Travel to downtown Toronto is often served by local transit (TTC) or GO Bus or GO Rail. Travel that is internal to a 905 municipality such as Hamilton or Peel can often be made by walking, cycling or local transit. However, it is often difficult to undertake 905-to-905 travel spanning municipalities on transit, due to the disjointed nature of transit across municipal boundaries. This type of trip (905-to-905 travel) is almost always made by auto, so when this travel market is growing, as it has between 2006 and 2016 (see Figure 6-3), reducing auto travel is particularly challenging.

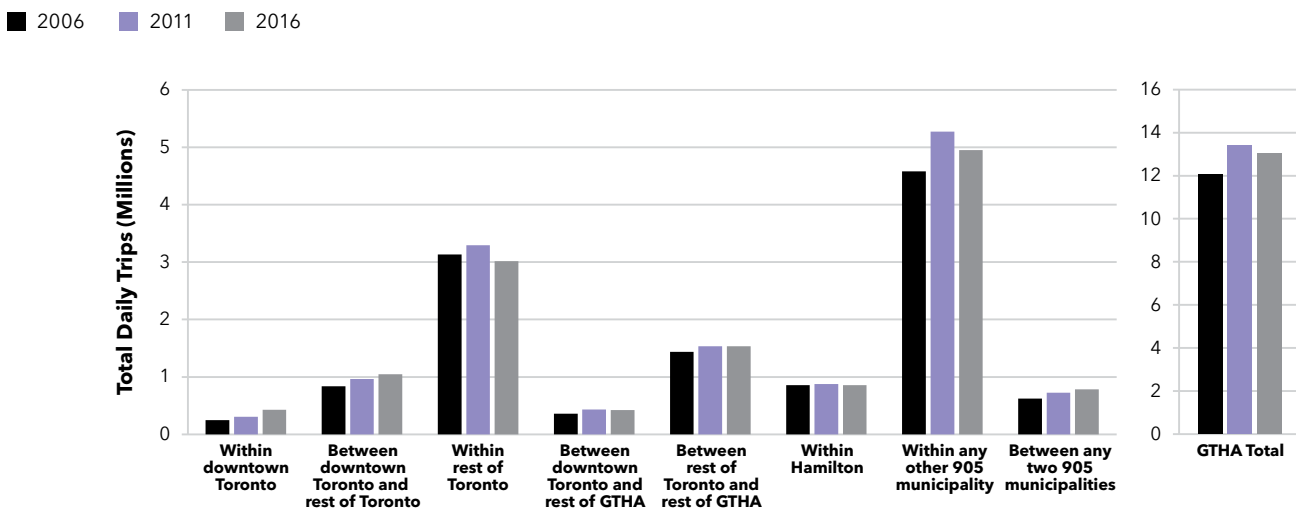
Figure 6-3 displays the travel markets for daily travel (all purposes) while Figure 6-5 is restricted to commute trips made during the AM and PM peak travel times, defined

as trips leaving between 6:00-8:59 AM or 3:00-6:59 PM. These travel markets are broadly stable between 2006 and 2016. The concentration of travel, including work trips, to downtown Toronto increases very slightly (approximately 1%), and Toronto trips that do not involve downtown Toronto decreases very slightly. Trips within a single 905 municipality decrease slightly and 905-to-905 travel increases slightly (approximately 1%). While the trends are moving in the “wrong” direction, indicating longer trip patterns that are harder to serve by transit and thus add to higher levels of air pollutant emissions, the overall picture remains of a region marked by stability in its travel markets.

The travel markets demonstrate significantly different patterns of mode use (for daily trips of all travel purposes see Figure 6-4). As one would expect, trips involving downtown Toronto show high transit usage - over 60% transit usage if the trip began in another part of Toronto and ended in downtown Toronto (or the reverse) in 2016 and a 56.5% transit mode share for travel outside of Toronto to downtown Toronto (or the reverse) in 2016. This transit mode share is increasing modestly over time.

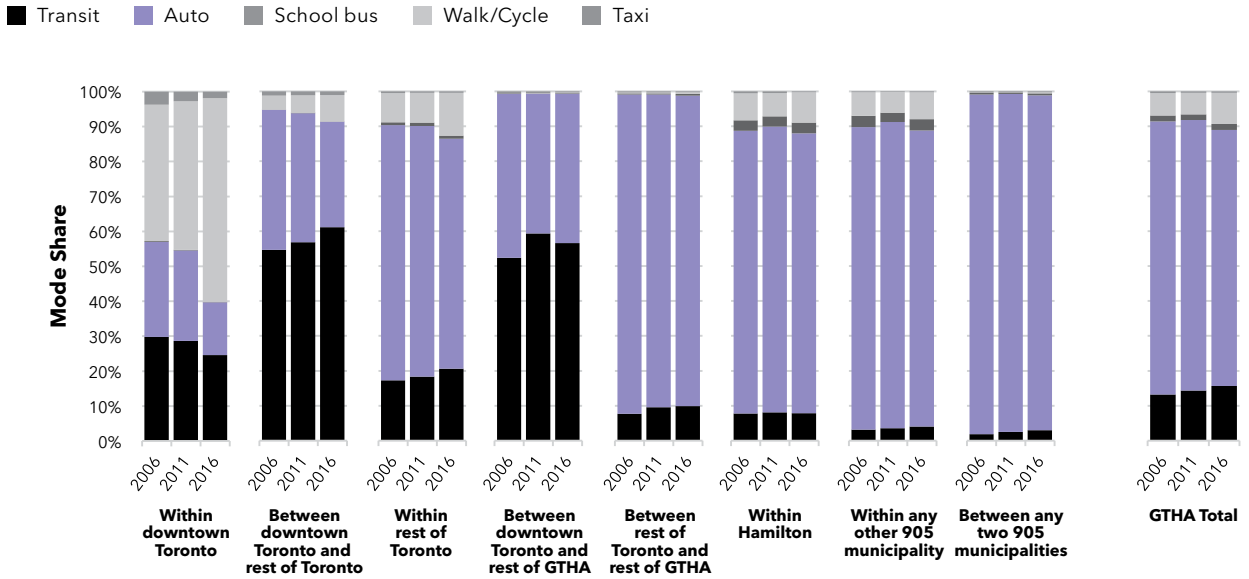
Auto travel within Toronto (for trips not involving downtown) is quite high, though the trend is indicating a decrease in auto mode share over time (from 73% to 65.5%) and an increase in walking, cycling and transit for these trips.

Figure 6-3: Total daily trips by travel market



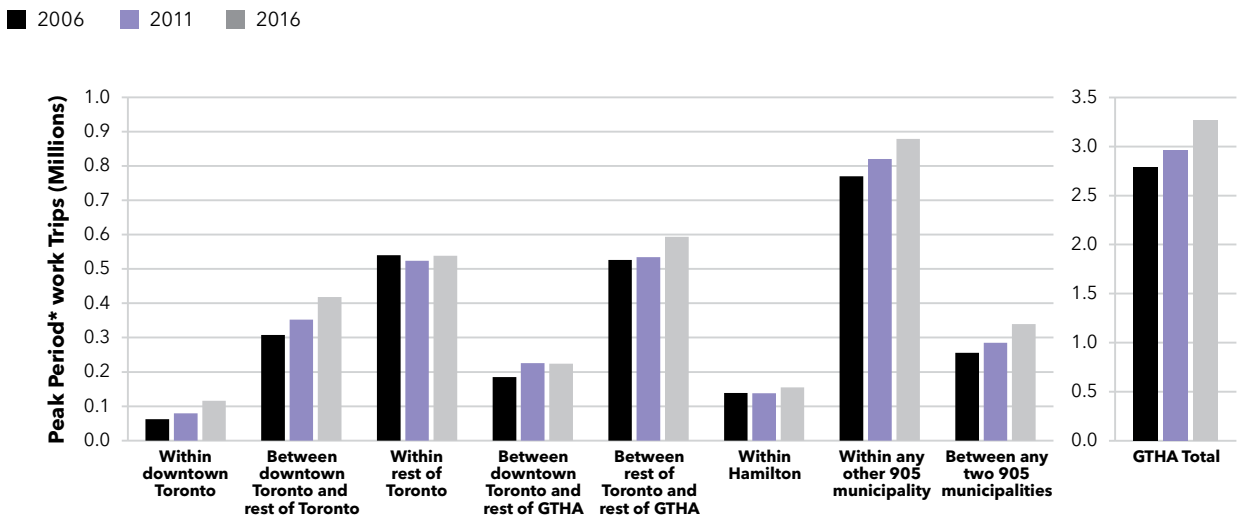
Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

Figure 6-4: Mode share by travel market (total daily trips)



Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey

Figure 6-5: Total work trips by travel market (peak period*)

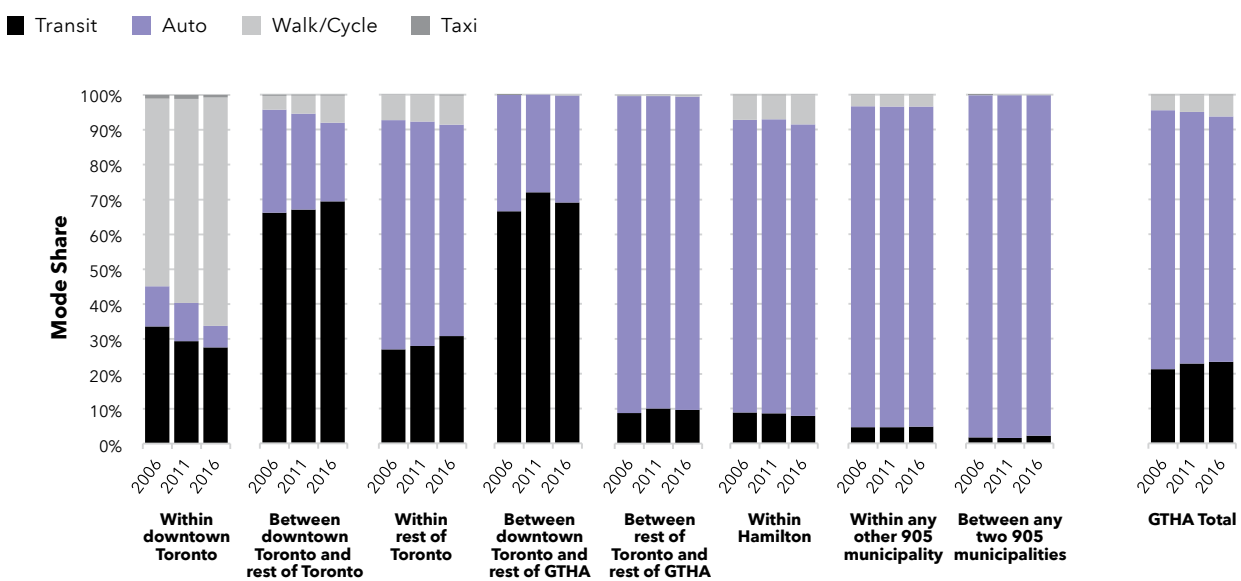


* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.
 Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey

Transit mode share for trips internal to Hamilton is roughly double that of trips internal to the other 905 municipalities, though transit mode share in Hamilton appears to be flat between 2006 and 2016, while it is increasing slightly in the other 905 municipalities. Transit mode share for 905-to-905 travel is also increasing modestly, though this travel market is heavily dominated by auto (96% in 2016). Ride-sourcing (e.g. hailing an Uber vehicle) was added as a specific mode in 2016. Note that Uber only arrived in Toronto in 2011, and if anyone had reported using it in the 2011 TTS survey, it would have been classified as other. Ride-sourcing mode share has almost an identical pattern as taxi mode share across all the travel markets.

Figure 6-6 reports the mode shares of work trips, during the AM and PM peak periods. The patterns are quite similar. It is notable that travel to the downtown, regardless of whether it originates within or outside of Toronto, reaches 69% transit mode share.

Figure 6-6: Mode share by travel market (peak period* work trips)



* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.
 Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey

Trends by income

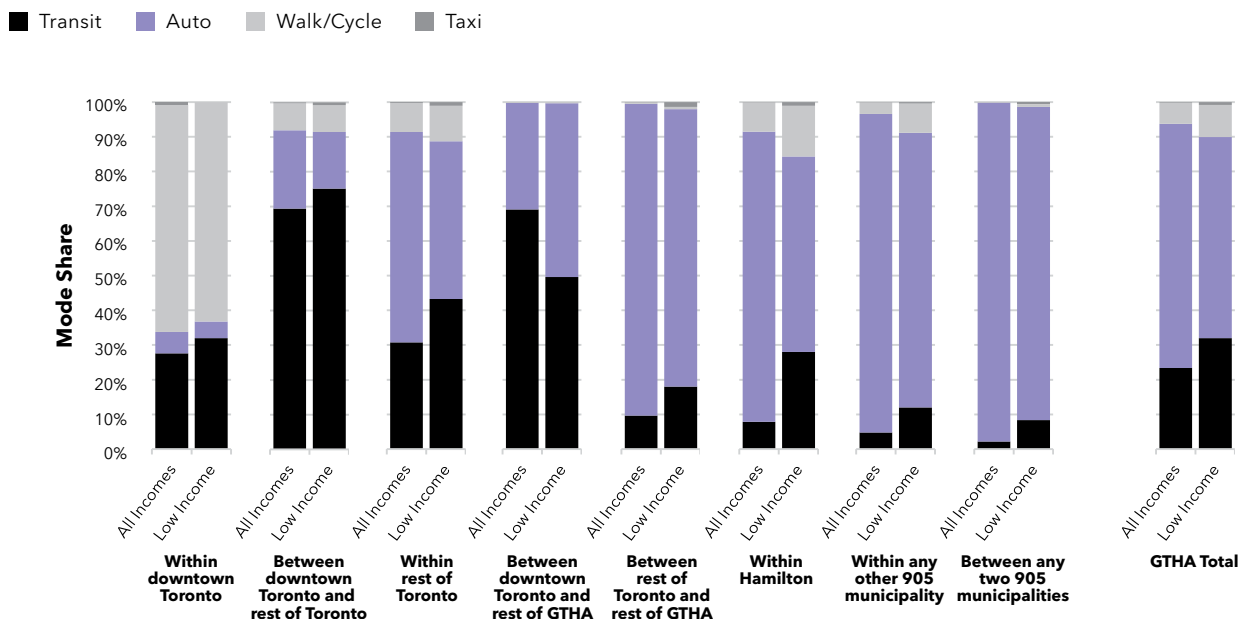
In addition to tracking overall travel patterns across the GTHA, it is important to focus on travellers that may have unique travel needs, specifically low-income individuals, seniors, and children making trips to school. These three groups were examined in Metrolinx's *Baseline Monitoring Report* (2013), and this appendix extends the analysis to 2016.

As the TTS did not include any questions on income prior to 2016, the *Baseline Monitoring Report* was restricted to using the Journey-to-Work information from the Canadian Census for 2006 and 2011. Low-income individuals were defined as those living in households with the lowest quartile of income, which varied based on household size.³ It is also worth noting that the Census asks about a typical commute to work, whereas the TTS asks about all travel, including work trips, for a

specific day. These definitions lead to slight differences in the results, particularly in the usage of taxis, which may be used occasionally, including by low-income individuals, but are rarely a typical commute mode. Thus, it is not possible to generate true trends between 2011 and 2016, due to the different methodology, though the general pattern of low-income work trips seems quite similar over time.

Mode share comparisons are most useful when organized by travel markets, i.e. the origin and the destination of the trip. Figure 6-7 looks at 2016 work trips and compares all AM/PM work trips made by all individuals (already reported in Figure 6-6) and compares these mode splits to the travel patterns of low-income workers.

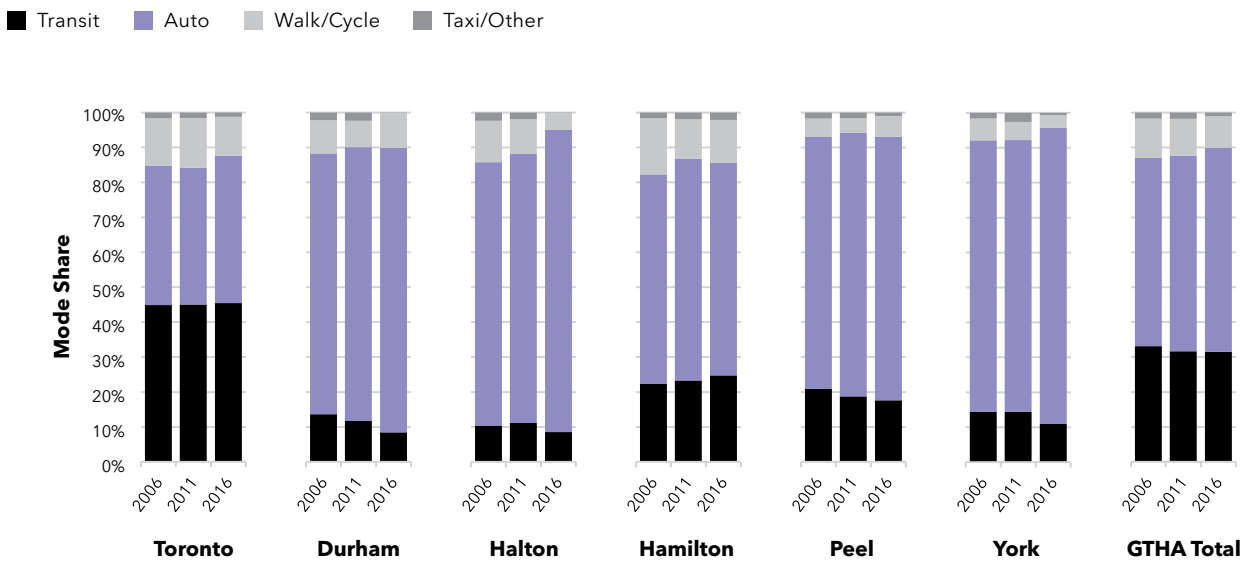
Figure 6-7: Mode share by travel market for peak period* work trips by all workers and low-income workers (2016)



* Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.
 Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey

³ Specifically, Low income status based on LICO-Before Tax (Person) was used to determine low-income status. The income thresholds can be viewed at <http://www.statcan.gc.ca/pub/75f0002m/75f0002m2016002-eng.htm>. In 2016, the TTS added household income and for the purpose of Figure 6-7 and Figure 6-8, low income is categorized as \$0-39,999 in household income, regardless of household size.

Figure 6-8: Mode share for peak period* work trips by low-income workers by municipality of origin (2016)



*Peak period is from 6:00 a.m. - 9:00 a.m. and 3:00 p.m. - 7:00 p.m.
 Source: Statistics Canada 2006 Census and 2011 Census; University of Toronto Data Management Group, 2016 Transportation Tomorrow Survey.

Figure 6-8 shows the mode split for work trips made by workers in low-income households, grouped by the municipality in which the work trip originated. For 2016, ride-sourcing was combined with taxi and “other” modes. There are several interesting findings, including that taxi/ride-sourcing to work in Toronto, while a very small percentage, does appear to be increasing.

Travel going to downtown Toronto from within Toronto has a broadly similar pattern, though low-income workers do rely more heavily on transit and less on auto modes. The shift away from auto is much more marked for Toronto work trips that do not begin or end downtown, where only 45.5% of these trips are made by auto, compared to 60.4% for all workers, though it is interesting that taxi/ride-sourcing is higher. While only a small percentage of work trips are made by taxi or ride-sourcing, a higher percentage of low-income work trips are being made by taxi or ride-sourcing across the board, with the exception of trips that begin and end in downtown Toronto. To some extent this reflects the fact that if a low-income individual needs an auto for some particular purpose, then they are generally more likely not to have an auto available and thus would be reliant upon taxis.⁴

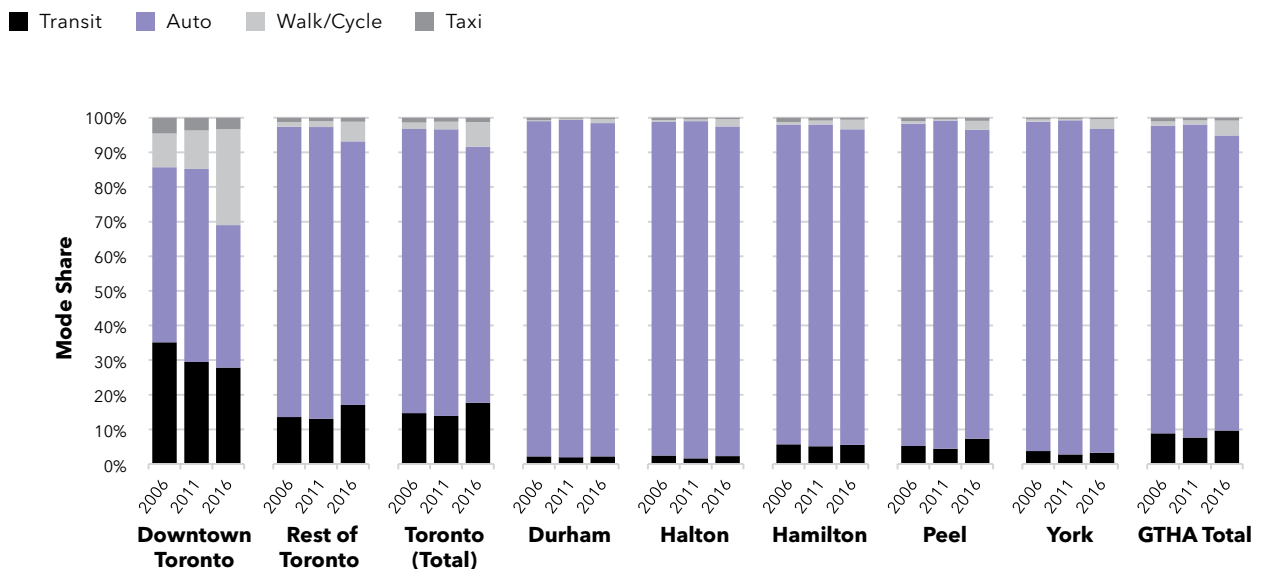
⁴ The same strategy can be found for low income individuals who use taxis to complete grocery shopping trips. See Clifton, Kelly J. “Mobility strategies and food shopping for low-income families: A case study.” *Journal of Planning Education and Research* 23(4), 2004.

Trends by age

Perhaps the single most surprising finding is that low income workers from outside Toronto are considerably more likely to take an auto mode (50%) than the general population (31%), and indeed are more likely to travel by auto than to take transit downtown. Whether this is due to the perceived high cost of GO Rail fares or higher levels of carpooling/vanpooling or simply the need to be working shifts that do not coincide with GO Rail schedules is unclear. This finding, while affecting only a relatively small proportion of regional trips, should be probed further. Low-income workers making work trips outside of Toronto are considerably more likely to take transit or make an active trip than the general population, though auto use is still the dominant mode (over 90% for 905-to-905 travel).

Figure 6-9 focuses on travel by seniors. This is an extension of Figure 11 in the *Baseline Monitoring Report* with more geographic specificity (the results are grouped by the home municipality of the seniors making these trips). One of the more promising trends is that trips made by auto across all municipalities have declined after a long period of increase (1986 to 2011). The overall total in 2016 is 85%, a decrease of approximately 4% from 2006 and a decrease of over 5% from 2011. Even the taxi/ride-source trips have declined slightly, from a low base. This is offset by a small increase in transit use. It is worth noting that the overall transit use for all trips (10% in 2016) is still somewhat below the GTHA average for all trips (16% in 2016, as reported in Figure 6-4). The majority of the shift in behavior stems from an increase in active mode share (primarily walking) in all regions, with major increases found in Toronto.

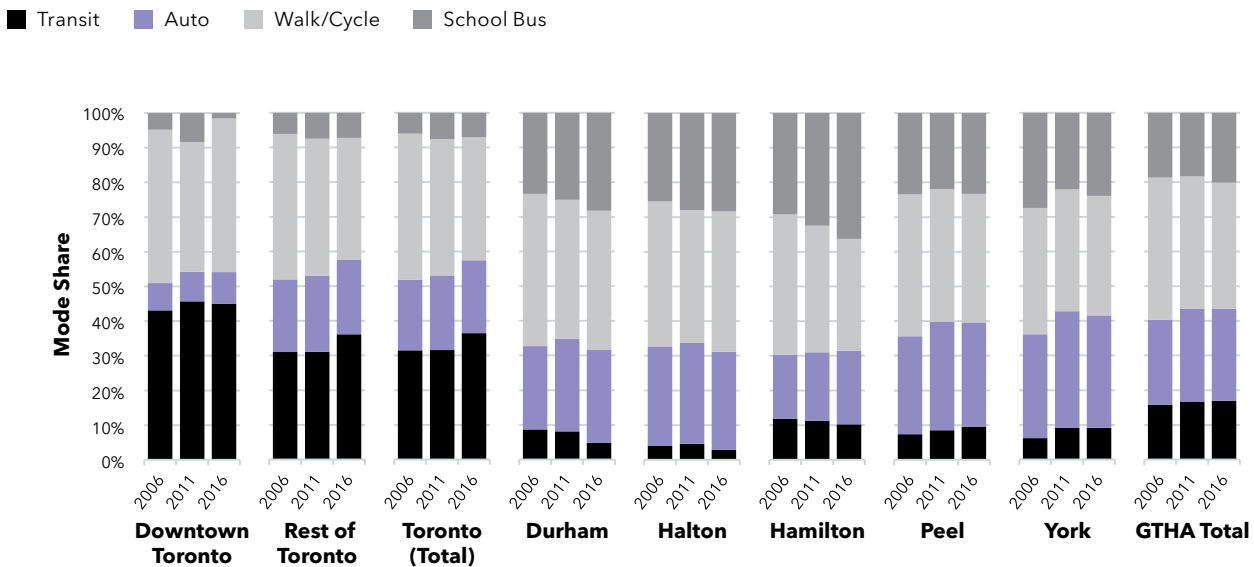
Figure 6-9: Mode share for seniors (65+) by municipality of origin (total daily trips)



Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

Figure 6-10 focuses on school trips made by children, aged 12-16. This is an extension of Figure 10 in the *Baseline Monitoring Report* with more geographic specificity (the results are grouped by the home municipality of the children making these school trips). In contrast to seniors, where there is a marked decrease in travel by auto, there was an increase in auto mode share for school trips from 1986 to 2011, though the auto mode share is largely stable between 2011 and 2016. Transit share is slightly up across all school trips in the GTHA, though this is largely driven by an increase in the rest of Toronto (from 31% in 2011 to 36% in 2016). Specific municipalities, such as Durham and Halton, had noticeable decreases in transit use between 2011 and 2016. School bus usage is up across all school trips in the GTHA, and walking/cycling (and other) trips are down slightly. Children living in downtown Toronto do demonstrate a counter-trend with a significant increase in active mode share and a steep decrease in school bus use.

Figure 6-10: Mode share for children (12-16) by municipality of origin (school trips)



Source: University of Toronto Data Management Group, 2006, 2011 and 2016 Transportation Tomorrow Survey.

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