GTHA Cordon Count Program
Coordinating Committee

GTHA-wide Cordon Count Program - Analysis of Trends, 2001 - 2022

Final Report - 10 June 2025

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EXECUTIVE SUMMARY

Introduction

This report is a detailed analysis of the Greater Toronto and Hamilton Area (GTHA) Cordon Count Program data. The analysis assesses trends in the cordon counts conducted between 2001 and 2022 and shifts in travel patterns and behaviour in the GTHA, especially in light of pandemic-induced changes, as the basis for investigating the effectiveness of transportation policies, new infrastructure and other initiatives.

The traffic counts have been conducted every 2 to 3 years by the cities of Toronto and Hamilton and the Regional Municipalities of Durham, York, Peel and Halton. The counts are conducted on roads, rapid transit lines and commuter rail lines that cross a series of screenlines, which are imaginary lines along municipal boundaries, major infrastructure, major watercourses and other physical features. Vehicles and their occupants are counted by vehicle class. Different methods are used for the counts, including manual counts and automatic traffic recorders (ATRs). Eight sets of counts are included in this current analysis: 2001, 2004, 2006, 2009, 2011, 2014, 2016 and 2022.

This report is the latest in a series of trends studies. It was commissioned by the Region of Durham on behalf of the six municipalities and the Ontario Ministry of Transportation (MTO). Input was also provided by the Data Management Group at the University of Toronto (DMG), where the count data are compiled and stored.

This report is unique for two reasons: the most recent (2022) counts took place at a time when post-pandemic travel patterns were still evolving; and the actual collection of data encountered challenges that resulted in numerous gaps. In addition, the vehicle classes, coverage and other attributes have continued to change over time. There have also been concerns about the usability of occupancy data, especially for transit vehicles. Recent years have seen the emergence of new ‘big data’ sources and new data collection technologies. As a result, an important objective for this report was to recommend new approaches for conducting the counts going forward and identify potential opportunities for broadening the use of the data.

Approach

The analysis focuses on 12 sets of strategic screenlines – that is, screenlines at the inter-municipal boundaries as well as selected intra-municipal screenlines.

To enable a consistent and meaningful comparison across the eight counts, common definitions were developed for the time periods to be analyzed: the AM and PM commuter peak periods were defined by 4-hour blocks (6:00 – 10:00 and 15:00 – 19:00, respectively). These replace the 2- and 3-hour peaks that had been used in

previous analyses and which varied over time and by location. This allowed the inclusion of a 5-hour inter-peak (mid-day) period, which travel surveys have shown to be a fast-growing period for travel.

Several alternatives were considered to address the 2022 data gaps. In the end, it was agreed to use the 2022 data where practical, meaningful and traceable, while being cautious and acknowledging the data gaps.

As a first step, the usability of the 2016 data as a reference benchmark was confirmed. This was important because several of the previous (2014) counts record reductions counter to the preceding years' growth patterns and 2016's subsequent relatively high growth rates.

Snapshot of travel changes

The 'big picture' is that 2022 volumes show a pronounced reduction relative to 2016. This is true for total vehicles and for auto vehicles, which make up the large majority of vehicles crossing the screenlines. The reduction occurs variably by time period and by direction over the day and across the strategic screenlines (although there are instances of growth).

A review of auto use on the GTHA's expressways also shows reductions in 2022: this is especially noticeable because the 2001-2016 growth rates for expressway auto use are greater than those for auto use across the strategic screenlines as a whole over the same period.

Auto occupancies also drop in 2022, again varying by screenline, time of day and direction. Auto occupancies on expressways alone (many of which have high-occupancy vehicle lanes) also drop through the day: the 2022 persons per vehicle (PPV) averages on expressways are lower than those of the screenlines as a whole, which marks a reversal of average PPVs to 2016.

Occupancies for municipal transit were not available for several screenlines. At the seven screenlines for which usable data were available, the transit occupancies show reductions in both directions and by time of day. The same occurs for GO Bus occupancies. GO Rail data were not available for 2022. School bus occupancies drop sharply in 2022.

In contrast to the general trend of reduced passenger vehicle volumes and occupancies, commercial vehicle traffic has grown in 2022. As measured by the combined sum of medium and heavy truck volumes, growth generally occurs at all times and directions across the strategic screenlines. This may reflect changing economic conditions and purchasing patterns (e.g., the continued rise in e-commerce purchasing) and other factors. Note also that the truck counts include long-haul traffic.

Finally, travel by direction at six screenlines is almost equally balanced at different times of day, with other screenlines relatively well balanced by direction over the day. However, two screenlines show a reversal in the peak direction in 2022 at certain times of day: this may reflect year-to-year fluctuations or differences in how the 2022 counts were conducted.

In sum, the 'big picture' review shows that reductions in 2022 passenger volumes (measured by passenger vehicle numbers and, where available, occupancies) occur across the GTHA, countering 2001 – 2016 growth patterns. There are exceptions by time period, mode, location and direction. In contrast, commercial vehicle volumes continue to grow.

Factors influencing travel in 2022

The overall downward pattern in travel is discernable but must be qualified, given the significant gaps and inconsistencies in the 2022 data, especially in vehicle occupancies. However, the extent to which the gaps impact these findings (i.e., how real is the downward pattern?) must be considered in light of continued population growth and ongoing development (even with the pandemic disruptions) and new and expanded transportation infrastructure such as the extension of Highway 407 from Oshawa to Highway 35/115, Highway 418, new HOV lanes on Highway 400, the Highway 427 extension and the TTC Line 1 subway extension. The increased truck activity is evidence of continued economic growth, even with the pandemic disruptions, inflation and other factors.

The 2022 Transportation Tomorrow Survey (TTS) offers insights into the observed downward screenline count patterns. A preliminary comparison with the 2016 TTS shows clear reductions in travel activity across the GTHA. In particular, there is a 6% reduction in 24-hour person-trips among the six municipalities, especially to and from Toronto and Peel. There is also a 25% reduction in 24-hour home-to-work commutes among the six municipalities, including 30% reduction in AM peak period travel (measured over three hours): this reduction in commuting activity is pervasive across the GTHA between the six municipalities, albeit with some exceptions; it can also be noted that growth in intra-municipal travel has been observed in some parts of the GTHA. Daily person-trip rates also drop.

Several factors may contribute to these reductions, including an ongoing shift to a hybrid working environment for many workers, a changing economy and inflation. More research is needed to understand the implications of these and other contributing factors on the counts.

In sum, the observed reductions in the 2022 screenline counts are consistent with reductions in overall trip-making as recorded in the 2022 TTS. However, data gaps and anomalies in the 2022 counts make it difficult to be definitive.

Going forward: a framework for the GTHA cordon counts

The counts have long been used to support the development of travel demand forecasting models and to inform transportation planning analyses. Other uses demonstrate a potential additional importance: measuring dynamic changes in travel behaviour, supporting travel surveys and 'big data' applications, informing solutions to accommodating growth in mid-day travel, plan/policy monitoring and evaluation, input to new planning tools, and informing emerging issues, budget priorities and resiliency planning.

To facilitate these potential applications and address the challenges raised through the analysis, the study made recommendations for developing a framework for conducting future GTHA cordon counts. The underlying principle is **consistency**: the GTHA is a major integrated metropolitan region and is the key driver of Ontario's and the nation's economy. This means that travel behaviour in one GTHA municipality affects travel in the neighbouring municipalities – this is true for the counts as it is for the TTS. A GTHA-wide framework potentially offers economies of scale that could reduce individual municipalities' costs.

The framework has four components:

- **Set the stage** by making short-term enhancements to the CCDRS database, transitioning to an updated, GIS-compatible database environment that allows for more flexible use and adopting common definitions for vehicle classes and count durations.
- **Develop a cycle for GTHA-wide counts**, using a five-year counting cycle that is built around the strategic screenlines while incorporating the remaining municipal screenlines, and using visual counting technology to promote accuracy and completeness. This spreads the funding and resource requirements while promoting consistency and minimizing gaps.
- **Add incremental analytical capabilities and connectivity with other data sources**, including the use of GPS trip traces to validate counts and fill in gaps, integrating available transit ridership data in lieu of occupancy counts, adding AADT and other factors, developing GIS-based visualization tools to link to other transportation and non-transportation data bases.
- **Communicate the data** to broader audiences, by developing a library of user queries and data tabulations, developing summary profiles and findings tailored to technical and non-technical audiences, collaborating with other governments and researchers to examine how the counts could be used for other analyses (like equity), and investing opportunities for Federal government applications of the data.

TABLE OF CONTENTS

Detailed profile of each strategic screenline, 2001-2022 (spreadsheet provided separately)

LIST OF FIGURES

LIST OF TABLES

GLOSSARY OF KEY TERMS

The table below explains key terms and acronyms that are used in this report.[1]

Term / acronym	Explanation
400-series highways	Comprising Provincial highways 400, 401, 403, 404, 409, 410, 412, 418 and 427, the 407 ETR and 407 East, and the Queen Elizabeth Way.
AADT	Average annual weekday traffic – the mean daily traffic on a section of road, calculated as the total annual vehicle traffic (all vehicle classes) divided by 365 (days in a year).
AM peak period	The 4-hour block of time between 6:00 and 10:00, within which the morning commuter peak occurs.
ATR	Automatic traffic recorder - typically tubes laid across a road that are used to detect the passage of vehicles by class.
Auto occupancy	The number of occupants of a person vehicle (auto or light truck), including the driver. See also persons per vehicle.
Cab	Taxicab.
CCDRS	Cordon Count Data Retrieval System, a software developed to summarize and retrieve count data that are stored with the DMG.
Count	The recording of vehicles and their occupants crossing the screenline stations in each direction within a defined period of time, typically on a single day.
Directional balance	The closeness to which total trip volumes in the direction of heaviest traffic volumes are matched by traffic volumes in the opposite direction at a given station or screenline.
DMG	Data Management Group at the University of Toronto, which compiles and maintains the counts.
FHWA	US Federal Highway Administration, referring to FHWA's standardized classification of vehicle types (see *Traffic Monitoring Guide*, https://www.fhwa.dot.gov/policyinformation/tmguide/tmg_2013/vehicle-types.cfm).
GPS	Global positioning system.

[1] Drawn in part from MMM Group, *Greater Toronto Area Cordon Count Program, Transportation Trends 1991-2006, Technical Report*, prepared for the Data Management Group, 2008.

Term / acronym	Explanation
GTHA	Greater Toronto and Hamilton Area, which comprises the cities of Toronto and Hamilton and the Regional Municipalities of Durham, York, Peel and Halton.
Home-to-work	A trip made from a worker's place of residence to their place of work. As used in the TTS.
HOV	High-occupancy vehicle – i.e., a personal vehicle with at least one passenger in addition to the driver.
Inter-peak period	The 5-hour block of time between 10:00 (the AM peak) and 15:00 (the PM peak). Also referred to as the mid-day period.
Mid-day period	See inter-peak.
Mode	Means of transportation used to move people (autos, light trucks, cabs, transit, GO Bus and school bus) and goods (medium trucks, heavy trucks and trucks with one or more trailers).
Mode shares	The proportion of people who travel by each passenger mode.
MT + HT	The combination of medium and heavy truck volumes.
OD	The start (origin) and end (destination) points of a trip.
PCS	Permanent count station – a point on a road at which permanently-installed devices count traffic continuously.
Peak AM and counter-peak directions	A common determination of directions used in this report to present the screenline counts across all times of day. Peak direction refers to the peak direction of travel that occurs in the AM peak period. The counter-peak is the reverse direction, and often is the actual peak direction of travel during the PM peak period.
PM peak period	The 4-hour block of time between 15:00 and 19:00, within which the afternoon commuter peak occurs.
PPV	Persons per vehicle – average number of occupants of a person vehicle (autos or light trucks). See also auto occupancy.
Reverse travel	A trip in the direction opposite to the heaviest traffic flow. When considered for the AM or PM peak periods, the concept commonly concerns the 'reverse commute.'
Screenline	An imaginary, strategically located line spanning major roads and highways and other human-made transportation infrastructure (e.g., railways), a municipal boundary or a natural boundary, across which all personal, commercial and transit vehicles and their occupants are counted.

Term / acronym	Explanation
Stations	The roads, highways, rail lines and rapid transit lines along a screenline at which personal, commercial and transit vehicles and their occupants are counted. Screenlines typically comprise several stations.
Strategic screenlines	The set of inter-municipal and key intra-municipal screenlines used in this analysis to examine major travel patterns in the GTHA.
Total count period	The 13-hour sum of the 4-hour AM peak period, the 5-hour mid-day or inter-peak period and the 4-hour PM peak period, beginning at 6:00 and ending at 19:00.
Total vehicles	All motorized vehicles that cross a screenline.
Transit	A grouping of counts that comprise municipal, regional, intercity and other transit vehicles and their occupants. Includes TTC streetcars and the TTC subway but excludes GO Bus, GO Rail and school bus.
TTS	*Transportation Tomorrow Survey*, a household travel survey conducted approximately every 5 years and most recently in 2022-2023.
Vehicle classification	Categorization of vehicles by type, commonly following the US Federal Highway Administration's *Vehicle Category Classification* of 13 classes that are defined by vehicle configuration, number of axles and number of tires.
Vehicles	All motorized vehicles (autos, light trucks, cabs, trucks, transit vehicles, GO Buses and school buses) that use the surface road network.

1 INTRODUCTION

1.1 Purpose

This report is a detailed analysis of the Greater Toronto and Hamilton Area (GTHA) Cordon Count Program data. The analysis has three stated objectives:

1. Conduct a comprehensive trends analysis of the cordon counts conducted between 2001 and 2022, covering eight sets of counts in total (2001, 2004, 2006, 2009, 2011, 2014, 2016 and 2022).
2. Assess changes in travel patterns and behaviour in the GTHA, especially in light of the pandemic-induced changes.
3. Conduct a thorough investigation of the effectiveness of transportation policies and programs, the impacts of inter-regional traffic including trucks, and the performance of enhanced transportation and services.

An additional objective is to recommend new approaches for conducting the counts going forward and to identify potential opportunities for broadening the use of the data. This is in response to several identified challenges described in section 1.3, as well as the emergence of new data sources and new data collection technologies.

The analysis was commissioned by the Region of Durham, acting on behalf of the GTHA Cordon Count Program Coordinating Committee. The Committee members comprise the Cities of Toronto and Hamilton, the Regional Municipalities of Durham, Halton, Peel and York, and the Ontario Ministry of Transportation (MTO) Input was also provided by the Data Management Group at the University of Toronto (DMG). This report represents the primary deliverable of the analysis.

1.2 Overview of the GTHA Cordon Count Program

The GTHA Cordon Count Program is a long-standing collaboration of the six municipalities, MTO and DMG listed above. Every 2-3 years, the six municipalities conduct classified traffic counts across a series of screenlines and cordons across the GTHA. The most recent set of counts was conducted in 2022, which are the first post-pandemic counts. (Note that some counts were conducted in spring 2023, although the counts are labelled as the 2022 count program.) The counts, typically covering up to 12-13 hours (or more) on a working weekday, provide data on private, transit and commercial vehicle volumes and, for some vehicles, their occupants.

For several years through 2011, the DMG summarized each new year's data set and historical trends across the major screenlines. More extensive trends studies were commissioned periodically, most recently in 2017. These studies have variably looked at key trends by time of day and transportation mode, including GO Rail, GO Bus,

municipal/regional transit, commercial vehicles and school buses. The studies examined trends in the use of major roads and transit facilities, peaking characteristics, auto occupancy, the use of high-occupancy vehicle lanes and reverse and cross commuting. They have also looked at population growth and trends in home-base work trips (from the *Transportation Tomorrow Survey - TTS*) across the GTHA as explanatory factors for changes in screenline volumes.

The DMG compiles and maintains a database of the counts. Users can access the database online via the *Cordon Count Data Retrieval System* (CCDRS), a bespoke software. Individual municipalities' counts are available from the 1980s (from 1975 for the City of Toronto). Users can tabulate different combinations of counts by jurisdiction, count year, screenline, station, time period and vehicle / occupancy class. The data are stored as supplied by the municipalities – accordingly, if a particular station or vehicle class is not counted, then that is recorded as a zero-value in the database. Various documents support the CCDRS, including a *Users Manual*,[2] an inventory of the types of data collected by each municipality by count year, screenline maps provided by each municipality, a list of stations and screenlines, and a list of reference station geocodes.

1.3 Challenges and opportunities

The municipalities have collaborated with each other, especially to share the responsibility and costs of the counts along common screenlines (i.e., at inter-municipal boundaries). However, although many aspects of the counts are common to all municipalities, the Coordinating Committee noted several differences as well as challenges:

- Data collection methods have varied, including manual counts, ATR tube counts and new technologies.
- Coverage of vehicle occupancies, especially for transit vehicles, varies, with some municipalities extrapolating occupancies from past years. Some municipalities have questioned the utility of occupancies, given the inherent difficulty in discerning accurately the occupants of a fast-moving vehicle.
- Even though many vehicle classifications and vehicle groupings are common to all municipalities, there are some variations and exclusions. These classifications and groupings have also varied over time.
- The compositions of some screenlines have changed over time, especially with the addition of new roads and transit facilities.

[2] *Cordon Count Data Retrieval System (CCDRS) Users Manual*, DMG, September 2004 (https://dmg.utoronto.ca/wp-content/uploads/2022/09/ccdrs_manual.pdf).

- The counting period durations and start years for the counts vary by municipality. There have been some changes over time within each municipality's count programs, according to their own needs and priorities.
- MTO has its own traffic count monitoring program across the Provincial highway system. However, to ensure consistency with the adjoining municipal counts, for the Cordon Count Program all Provincial highways within the GTHA are counted by the respective municipalities.[3]
- Finally, the 2022 counts proved to be problematic, due to individual municipalities' funding constraints and limited contractor availability to conduct the counts. These problems led to inconsistencies in how the counts were conducted as well as gaps in the stations counted and in the types of data collected (especially transit occupancies). GO Rail ridership (occupancy) data, normally supplied by Metrolinx, were not gathered for 2022.

1.4 Report organization

This report has three chapters in addition to this introductory chapter:

- Approach – a description of the approach and method used for the analysis, including a listing of the screenlines chosen for the analysis (Chapter 2).
- GTHA-wide profile – a 'big picture' snapshot of the 2022 counts and changes relative to previous counts, along with a review of factors that influence these changes (Chapter 3).
- Going forward – a framework for the GTHA-wide Cordon Count Program to support the needs of current users and broaden interest among potential new users, based on review of new approaches for conducting the counts and enhancing the database's analytical potential (Chapter 4).

The report is accompanied by one spreadsheet, which provides detailed tabulations for each of the analyzed screenlines. The spreadsheet is provided separately.

[3] MTO's daily traffic volume data are reported for selected links on each Provincial highway, in MTO's *Provincial Highways Traffic Volumes 1988-2019, 2021* report. (Highway 407 data are not included.) Annual and seasonal daily averages are provided, along with the traffic pattern type (e.g., urban commuter or tourist), accident rates and characteristics of each link. Some counts are derived from permanent count stations. Total vehicles and the proportions of trucks are reported, but there are no other breakdowns (and some counts and truck proportions may occasionally be extrapolated from previous counts. For details, see https://www.library.mto.gov.on.ca/SydneyPLUS/TechPubs/Theme.aspx?r=702797&f=files%2fProvincial_Highways_traffic_Volumes_1988-2021.pdf&m=resource.

1.5 Limitations

The CCDRS data were used as provided. With some limited exceptions noted in the ensuing discussion, no attempts were made to fill in gaps in the 2022 data. This was done primarily because, as will be seen, the observed 2022 patterns are different from previous patterns and, accordingly, treatments such as extrapolations of historical data, could not apply.

1.6 Acknowledgements

The analysis was conducted by David Kriger Consultants Inc. (DKCI) for the GTHA Cordon Count Program Coordinating Committee. The procurement was arranged through the Region of Durham on behalf of the Committee. David Kriger conducted the analysis, authored this report and is responsible for its content. The views expressed in this report do not necessarily represent official policies of the members of the Coordinating Committee.

DKCI acknowledges the guidance and direction provided by Anthony Caruso (now with the Town of Cobourg) and Chris Leitch of the Region of Durham. Appreciation is extended to the members of the Coordinating Committee for their advice and insights:

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- Lina Elmorshedy, Chris Fong and Melissa Alexander, Regional Municipality of Halton.
- Muhammad Khan, Ontario Ministry of Transportation.
- Reuben Briggs, Data Management Group.

2 APPROACH

2.1 Strategic screenlines

In consultation with the Coordinating Committee, it was agreed to analyze 12 sets of screenlines. As with previous trends studies, these comprise inter-municipal boundaries as well as some internal (east-west) screenlines. The analysis also included screenlines surrounding Hamilton, for which counts had started in 2016.

Figure 1 shows the 'strategic' screenlines used for the analysis. Screenlines added to those used in the previous (2017) trends analysis are shown in red.

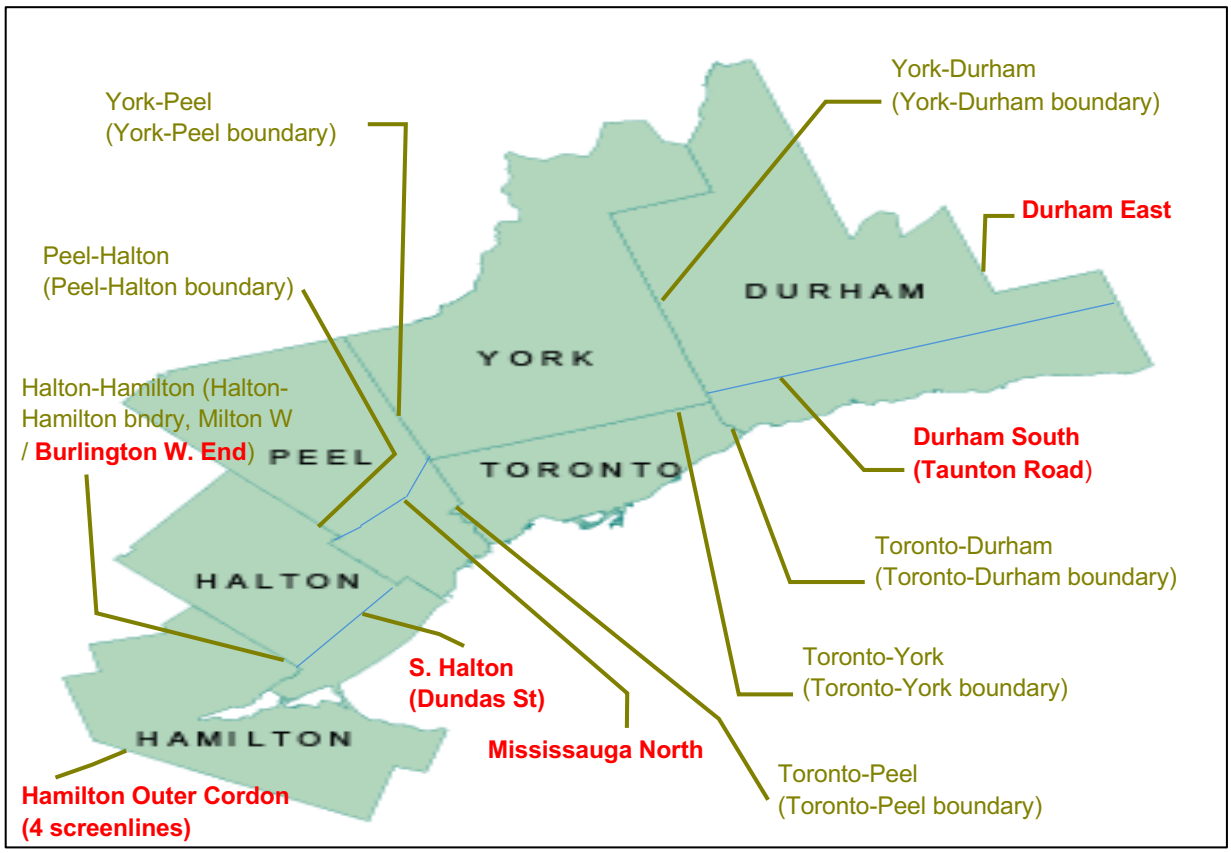

Figure 1. Strategic screenlines

Adapted from *GTHA Cordon Count Program, 2011 to 2016 Transportation Trends, Draft Technical Report, December 2017.*

The additions are:

- Durham East, covering the boundary between Durham Region and Northumberland County and Kawartha Lakes.

- Durham South, an internal east-west screenline at Taunton Road within Durham Region.
- Mississauga North, an internal screenline within Peel Region.
- South Halton, an internal screenline at Dundas Street within Halton Region.
- The addition of Burlington West End to the Halton-Hamilton screenline, to capture travel along the Queen Elizabeth Way / Highway 403 corridor. The ensuing analysis reports this extended screenline. However, data for the original screenline are reported in the accompanying spreadsheet.
- Hamilton Outer Cordon, which envelops the City of Hamilton with a combination of screenlines. Data for the constituent screenlines are reported in the spreadsheet.

Table 1 lists the constituent screenlines and stations used for the analysis, noting differences for 2022.

Table 1. Screenlines and stations comprising strategic screenlines

Screenline *	2001 - 2016	2022
Durham East	Durham 22, 56, 57, 58	Durham 22, 56, 57, 58
Durham South (Taunton Road)	Durham 11, 12, 13, 14, 15, 16, 17	Durham 11, 12, 13, 14, 15, 16, 17
Toronto – Durham	Toronto 1003	Toronto 1003 plus Durham stations 2701, 2801, 2803, 2805, 2806
York-Durham	York 2	York 2 plus Durham station 6401
York-Peel	York 3	York 3 plus Peel station 407
Toronto-York	Toronto 1002	Toronto 1002 (excludes 400-series highways)
Toronto-Peel	Toronto 1001	Toronto stations 400, 402, 403, 404, 405, 406, 419, 467 and Peel stations 107, 108, 131, 134, 140, 240, 242, 243, 244, 245, 500
Mississauga North	Peel 42	Peel 42
Peel-Halton	Peel 31 (excluding Peel stations 94, 100) 2016: Peel stations 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 61, 62, 65, 142, 280, 411, 414	Peel stations 4, 9, 10, 61, 65, 142, 280, 411, 414 (data not available for remaining Peel stations)
South Halton (Dundas Street)	Halton S-B3 and S-O3	Halton S-B3 and S-O3

Table 1. Screenlines and stations comprising strategic screenlines

Screenline *	2001 - 2016	2022
Halton-Hamilton	Halton S-F1 and S-L2 (excluding Halton stations 4264, 4265, 4266)	Halton S-F1 and S-L2 (excluding Halton stations 4264, 4265, 4266)
Halton-Hamilton North *	Halton S-F1 (excluding Halton stations 4264, 4265, 4266)	Halton S-F1 (excluding Halton stations 4264, 4265, 4266)
Hamilton Outer Cordon	Hamilton 2, 4, 6, 7, 8, 9	Hamilton 2, 4, 6, 7, 8, 9
Hamilton North (Puslinch-Waterloo) *	Hamilton 2, 4	Hamilton 2, 4
Hamilton West (Brant County) *	Hamilton 6	Hamilton 6
Hamilton West (Haldimand County) *	Hamilton 7	Hamilton 7
Hamilton Southeast (Niagara) *	Hamilton 8, 9	Hamilton 8, 9

* Some names are developed by consultant for easy reference. Screenlines listed from east to west, south to north.

2.2 Approach: focus on consistency

Following a review of the 2022 CCDRS data and in consultation with the Coordinating Committee, the consultant proposed a two-part approach for the conducting the analysis:

- To enable comparisons, look for commonalities. This focus on consistency also provides a basis for future analyses.
- Push / extend the 2022 data where practical, meaningful and traceable – but be cautious and acknowledge the data gaps.

While this approach limits some of the analysis that had been conducted in previous trends studies, it has the advantage of providing a defensible and traceable understanding of trends as well as a basis for future analysis.

This approach has practical implications for the analysis, which are described below.

2.3 Common time periods for comparisons

This discussion derives the time periods used for the analysis.

First, a review of the CCDRS determined that individual municipalities' count durations varied, as summarized in Table 2. In 2022, counts began as early as 5:30 in Durham,

York and Peel Regions and ended as late at 20:30 in Peel Region.[4] The 2017 trends analysis used a common GTHA-wide duration of 6:00 – 19:00 for its review of 2011 and 2016 data which, based on the review, was carried forward for 2022.

Table 2. Count durations, 2011, 2016 and 2022

Municipality	2011	2016	2022
Durham	5:30 – 20:00	5:30– 20:00	5:30– 20:00
York	5:30 – 20:00	5:30– 20:00	5:30 – 20:00
Toronto	6:00 – 20:00	6:00 – 20:00	6:00 – 20:00
Peel	5:30 – 20:30	5:30– 20:30	5:30– 20:30
Halton	6:00 – 20:00	6:00 – 20:00	6:00 – 20:00
Hamilton	--	6:00 – 20:00	6:00 – 20:00

Sources: *GTHA Cordon Count Program, 2011 to 2016 Transportation Trends, Draft Technical Report*, prepared by LEA, December 2017, and consultant's review of the CCDRS data.

Second, the consultant reviewed the durations of the AM and PM peak periods. The most recent trends study compared 2016 and 2011, using 3-hour definitions for the AM and PM peak periods between 6:00 – 10:00 and 15:00 – 19:00.[5] However, within each of these 4-hour blocks, the three-hour peak shifted between the two years for some screenlines – often by only a quarter-hour: given the current analysis' extended backwards look to 2001, it is likely that greater shifting would occur, potentially precluding meaningful comparisons over the 21-year period.

Previous DMG studies used fixed two-hour durations (7:00 – 9:00 and 16:00 – 18:00) for its comparisons; however, the AM and PM commuter peak periods have long been determined to exceed these durations.

For almost all screenlines, the differences between the three-hour peaks varied only by small increments within the four-hour block. That is, for the AM peak period, in 2022 the differences among peaks starting at 6:00, 6:15, 6:30, 6:45 and 7:00 were generally small. Similarly small differences were observed for the PM peak period.

Accordingly, the consultant proposed the use of fixed four-hour blocks for the AM and PM periods, 6:00 – 10:00 and 15:00 – 19:00. These fixed blocks also enabled the

[4] For clarity, all times are described in 24-hour format.

[5] LEA, *GTHA Cordon Count Program, 2011 to 2016 Transportation Trends, Draft Technical Report*, December 2017.

tabulation of a fixed five-hour inter-peak (mid-day) block, 10:00 – 15:00, which, as discussed in the next chapter, has its own dynamics. Combined, the three blocks also enable an analysis over the complete 13-hour 'day.' [6]

2.4 Treatment of data gaps

As noted, there are several gaps in the 2022 data. In consultation with Coordinating Committee members, gaps at some inter-municipal screenlines were addressed by combining individual station counts from the two participating municipalities in lieu of using the reported screenline total which, unlike previous years, had not included the full set of station counts.[7]

In consultation with Durham staff, a nearby count was used for a missing 407 ETR count in the York-Durham screenline (Durham station 6401). This was an exception, and was usable only because there was a single, lightly used interchange between the screenline and the proxy count location (407 ETR west of Brock Road – Durham station 6209). To use this, a 2016-2022 growth factor was derived from the proxy 407 ETR count and applied to the actual 2016 count.

For gaps elsewhere, the consultant considered extrapolating earlier counts. However, this proved problematic for several reasons:

- As discussed in the next chapter, travel trends through the pandemic and beyond contrasted with previous growth trends – i.e., extrapolated growth trends would not reflect actual 2022 changes.
- Comparative counts were not available for vetting any extrapolation. For example, the MTO counts, while providing a broad geographical coverage within the GTHA, are available only to 2021.
- Inconsistencies in 2016-2022 growth rates were observed between manual and ATR counts.

Accordingly, it was agreed with the Coordinating Committee to take the 2022 data as far as could be done consistently, acknowledging the gaps and using the 2016 and 2022 TTS to vet the results.

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6 Note that the CCDRS records the start times at 1 minute past the hour – i.e., 6:01, 10:01 and 15:01.

7 For example, whereas the Toronto-Peel and Toronto-Durham screenlines had previously been reported using Toronto screenlines 1001 and 1003, respectively, for 2022 the data for these screenlines were apparently incomplete. To address the gap, data for individual stations were combined from the municipalities that had shared the counts.

2.5 2016 as a benchmark

As becomes apparent in the ensuing discussion, the 2016 counts mark an important reference point. However, several screenlines show significant reductions in 2014, followed by strong growth in 2016. Figure 2 shows an example at the York-Durham screenline for total vehicles. This raises the question as to whether the 2014 counts are unusually low or the 2016 counts are unusually high which, in turn, would impact the understanding of the 2022 trends.

From a review of the data, there are gaps in the 2014 data that may contribute to the reductions – for example, not all transit buses are counted, and some buses are counted but not their occupants. In fact, not all stations were counted in 2014, reflecting the more abbreviated counts that are done in non-TTS / non-Census years.[8] There are otherwise no apparent reasons that point to a reduction – i.e., the GTHA continued to develop and its economy grew, both of which are motivating factors for travel. On the other hand, absent the 2014 drop the 2016 counts would be reasonably consistent with historical growth trends.

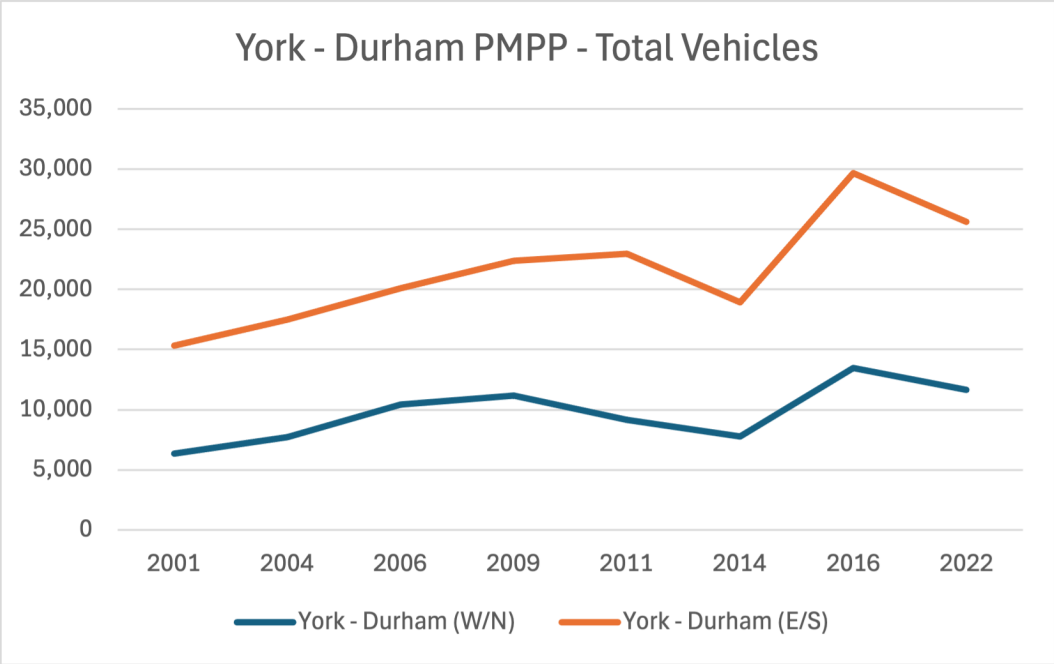


Figure 2. 2014 reduction in total vehicles - example

Refers to 3-hour PM peak period.

[8] R Biggs, DMG, note to DKCI, 13 March 2025.

From this review, the consultant concluded that the 2016 counts provide a robust basis to serve as a benchmark for the 2022 trends.[9] More broadly, while the conclusion is seemingly intuitive given the 2014 data gaps, this analysis illustrates the need for caution when discerning growth trends for 2022 (which also has several data gaps) and over long time periods.

[9] Note that this review is based on observations. A detailed statistical analysis is beyond the scope of this analysis and, in any event, would be complicated by the data gaps.

3 GTHA-WIDE PROFILE: THE BIG PICTURE IN 2022

3.1 Snapshot of travel changes

3.1.1 Total vehicles

Table 3 summarizes 2022 volumes for all motorized vehicles at all strategic screenlines across the GTHA. The data are shown for four time periods, by direction (where the "peak" and "counter-peak" directions are defined according to the 2022 AM peak direction). The table also shows 2001 and 2016 volumes, along with growth rates from 2001 to 2016 and 2016 to 2022.[10]

Table 3. Total vehicles and changes over time

Time of day	Peak direction (as determined by 2022 AM period, for total vehicles)				
	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
6:00 - 10:00	417,127	611,244	524,507	47%	-14%
10:00 - 15:00	350,813	570,252	534,499	63%	-6%
15:00 - 19:00	341,749	576,988	518,789	69%	-10%
6:00 - 19:00 (13h)	1,109,689	1,758,484	1,577,795	58%	-10%

Time of day	Counter-peak direction (as determined by 2022 AM period, for total vehicles)				
	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
6:00 - 10:00	282,542	463,678	424,686	64%	-8%
10:00 - 15:00	344,174	558,735	545,097	62%	-2%
15:00 - 19:00	444,973	679,748	640,265	53%	-6%
6:00 - 19:00 (13h)	1,071,689	1,702,161	1,610,047	59%	-5%

Over the course of the 13-hour day, the total 2022 volumes in the peak and counter-peak directions are reasonably well balanced (1,577,795 total vehicles in the AM peak direction and 1,610,047 total vehicles in the counter-peak direction), recognizing that the 11 evening and nocturnal hours are not counted and that there are variations by individual screenline (see section 3.1.6). While seemingly self-evident, this balance is a

[10] While these totals provide a 'big picture' indication of changes across the strategic screenlines as a whole, the reader is reminded that the percent changes at individual screenlines may vary. Refer to the accompanying spreadsheet of changes over time at each screenline.

basic confirmation of the usability of the counts: i.e., the counts are consistent with travellers largely making the return trip home from whatever activity they partake over the day.

The 2022 volumes represent a change from earlier years in several ways:

- Whereas the volumes to 2016 show growth from 2001 (and the detailed interim count-to-count volumes generally show growth), 2022 volumes show a pronounced reduction relative to 2016. **This pre-/post- 2016 inflection is a consistent theme throughout this report.**
- Up to 2016, the peak direction commuter volumes represent the highest numbers among the time periods. That is, the AM peak direction volumes and the counter-peak volumes in the PM (the PM peak direction volumes) see the highest volumes in their respective directions – e.g., the 611,244 total vehicles in the AM peak direction in 2016, and the 679,748 total vehicles in the PM counter-peak (PM peak direction). These numbers exceed trips in the reverse direction, consistent with the dominance of commutes between home and work or school, and the PM counter-peak numbers are the highest of all time periods and directions. These characteristics are consistent with established travel patterns between the six municipalities across the GTHA, as evidenced by the TTS (although intra-municipal characteristics may differ).

  In contrast, the 2022 reductions are greatest in the peak AM direction, at -14%. Coupled with reductions of up to -8% in the AM counter peak direction, -6% in the peak PM direction (same direction as the AM counter peak direction) and -10% in the PM counter peak direction (same direction as the AM peak direction), this suggests a reduction in work-/school-commutes, which is discussed in section 3.2.

  Throughout, the mid-day total vehicle volumes tend to be reasonably well balanced by direction. This is consistent with the 'out-and-back' nature of non-discretionary activities like shopping or personal appointments that typify the inter-peak period. However, in 2022 total mid-day vehicle volumes exceed total AM volumes in each direction. Total mid-day volumes drop between -2% and -6%.

Table 4 and Table 5 provide details of total vehicle volumes for each of the strategic screenlines summarized above, respectively for the AM peak direction and the counter peak direction. Note that the 2022 peak AM direction for South Halton (Dundas Street) has reversed from previous years, from southbound to northbound, though the highest mid-day and PM peak volumes occur in the southbound direction. The difference in total volumes between the two directions in the AM is small, at less than 3%.

Table 4. Total vehicles by strategic screenline, 2022 – by peak AM direction

Screenline	Peak direction (as determined by 2022 AM period)					
	Dir	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
Durham East	W/S					
6:00 - 10:00		9,666	12,499	12,282	29%	-2%
10:00 - 15:00		9,708	12,830	14,743	32%	15%
15:00 - 19:00		8,251	12,050	14,743	46%	22%
6:00 - 19:00 (13h)		27,625	37,379	41,768	35%	12%
Durham South (Taunton Rd)	S					
6:00 - 10:00		20,256	36,132	35,150	78%	-3%
10:00 - 15:00		21,323	38,532	43,337	81%	12%
15:00 - 19:00		23,632	46,654	46,291	97%	-1%
6:00 - 19:00 (13h)		65,211	121,318	124,778	86%	3%
Toronto - Durham	W					
6:00 - 10:00		54,796	69,124	43,437	26%	-37%
10:00 - 15:00		32,110	43,204	36,344	35%	-16%
15:00 - 19:00		26,476	38,513	32,887	45%	-15%
6:00 - 19:00 (13h)		113,382	150,841	112,668	33%	-25%
York-Durham	W/N					
6:00 - 10:00		15,892	32,244	26,566	103%	-18%
10:00 - 15:00		9,069	16,182	13,498	78%	-17%
15:00 - 19:00		8,129	16,898	14,490	108%	-14%
6:00 - 19:00 (13h)		33,090	65,324	54,554	97%	-16%
York-Peel	E					
6:00 - 10:00		35,293	54,031	51,264	53%	-5%
10:00 - 15:00		27,483	40,807	44,882	48%	10%
15:00 - 19:00		28,394	45,987	50,848	62%	11%
6:00 - 19:00 (13h)		91,170	140,825	146,994	54%	4%

Table 4. Total vehicles by strategic screenline, 2022 – by peak AM direction

Screenline	Peak direction (as determined by 2022 AM period)					
	Dir	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
Toronto-York *	S					
6:00 - 10:00		172,521	219,125	44,140	27%	-80%
10:00 - 15:00		148,384	185,344	53,341	25%	-71%
15:00 - 19:00		156,775	194,537	52,870	24%	-73%
6:00 - 19:00 (13h)		477,680	599,006	150,351	25%	-75%
Toronto-Peel	E					
6:00 - 10:00		137,691	135,579	101,873	-2%	-25%
10:00 - 15:00		127,618	143,799	114,485	13%	-20%
15:00 - 19:00		126,465	145,961	98,987	15%	-32%
6:00 - 19:00 (13h)		391,774	425,339	315,345	9%	-26%
Peel - Mississauga N *	S					
6:00 - 10:00		75,302	96,836	63,534	29%	-34%
10:00 - 15:00		53,723	95,229	62,071	77%	-35%
15:00 - 19:00		46,176	98,817	52,504	114%	-47%
6:00 - 19:00 (13h)		175,201	290,882	178,109	66%	-39%
Peel-Halton	E					
6:00 - 10:00		73,098	140,938	124,040	93%	-12%
10:00 - 15:00		53,967	143,945	112,063	167%	-22%
15:00 - 19:00		49,530	128,589	109,636	160%	-15%
6:00 - 19:00 (13h)		176,595	413,472	345,739	134%	-16%
South Halton (Dundas St) **	S					
6:00 - 10:00		30,198	50,226	49,839	66%	-1%
10:00 - 15:00		34,723	55,792	63,557	61%	14%
15:00 - 19:00		41,392	71,851	65,762	74%	-8%
6:00 - 19:00 (13h)		106,313	177,869	179,158	67%	1%

Table 4. Total vehicles by strategic screenline, 2022 – by peak AM direction

Screenline	Peak direction (as determined by 2022 AM period)					
	Dir	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
Halton-Hamilton	E					
6:00 - 10:00		40,237	35,245	34,269	-12%	-3%
10:00 - 15:00		34,812	32,647	42,298	-6%	30%
15:00 - 19:00		29,480	28,193	36,346	-4%	29%
6:00 - 19:00 (13h)		104,529	96,085	112,913	-8%	18%
Hamilton Outer Cordon ***	IB			(to Hamilton)		
6:00 - 10:00			45,226	45,787	N/A	1%
10:00 - 15:00			42,514	49,292	N/A	16%
15:00 - 19:00			42,292	48,799	N/A	15%
6:00 - 19:00 (13h)			130,032	143,878	N/A	11%

* In 2022, 400-series highways were not counted at Toronto-York and only three stations were counted at Mississauga North.

** 2022 marks change in peak AM direction from historical norms.

*** IB is inbound to Hamilton. OB is outbound from Hamilton.

Table 5. Total vehicles by strategic screenline, 2022 – by counter-peak AM direction

Screenline	Counter-peak direction (as determined by 2022 AM period)					
	Dir	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
Durham East	E/N					
6:00 - 10:00		5,738	9,533	9,504	66%	0%
10:00 - 15:00		9,831	13,041	14,518	33%	11%
15:00 - 19:00		12,479	14,882	14,518	19%	-2%
6:00 - 19:00 (13h)		28,048	37,456	38,540	34%	3%
Durham South (Taunton Rd)	N					
6:00 - 10:00		16,714	34,840	32,463	108%	-7%
10:00 - 15:00		20,139	37,723	44,048	87%	17%
15:00 - 19:00		25,024	45,439	47,467	82%	4%
6:00 - 19:00 (13h)		61,877	118,002	123,978	91%	5%
Toronto - Durham	E					
6:00 - 10:00		18,978	28,802	23,066	52%	-20%
10:00 - 15:00		30,484	38,360	36,468	26%	-5%
15:00 - 19:00		54,002	62,595	47,167	16%	-25%
6:00 - 19:00 (13h)		103,464	129,757	106,701	25%	-18%
York-Durham	E/S					
6:00 - 10:00		5,838	14,411	11,584	147%	-20%
10:00 - 15:00		8,878	17,520	14,578	97%	-17%
15:00 - 19:00		17,312	35,669	31,228	106%	-12%
6:00 - 19:00 (13h)		32,028	67,600	57,389	111%	-15%
York-Peel	W					
6:00 - 10:00		26,547	38,390	40,458	45%	5%
10:00 - 15:00		26,088	38,936	40,470	49%	4%
15:00 - 19:00		38,197	54,889	56,655	44%	3%
6:00 - 19:00 (13h)		90,832	132,215	137,583	46%	4%

Table 5. Total vehicles by strategic screenline, 2022 – by counter-peak AM direction

Screenline	Counter-peak direction (as determined by 2022 AM period)					
	Dir	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
Toronto-York *	N					
6:00 - 10:00		125,280	164,699	33,154	31%	-80%
10:00 - 15:00		147,710	185,692	50,222	26%	-73%
15:00 - 19:00		184,188	241,523	53,971	31%	-78%
6:00 - 19:00 (13h)		457,178	591,914	137,347	29%	-77%
Toronto-Peel	W					
6:00 - 10:00		106,881	109,225	99,529	2%	-9%
10:00 - 15:00		122,225	126,609	124,247	4%	-2%
15:00 - 19:00		138,685	142,614	131,171	3%	-8%
6:00 - 19:00 (13h)		367,791	378,448	354,947	3%	-6%
Peel - Mississauga N *	N					
6:00 - 10:00		42,415	81,979	43,259	93%	-47%
10:00 - 15:00		53,663	92,553	49,673	72%	-46%
15:00 - 19:00		84,267	110,957	59,860	32%	-46%
6:00 - 19:00 (13h)		180,345	285,489	152,792	58%	-46%
Peel-Halton	W					
6:00 - 10:00		40,734	114,636	101,192	181%	-12%
10:00 - 15:00		57,107	149,177	121,933	161%	-18%
15:00 - 19:00		78,750	150,171	139,717	91%	-7%
6:00 - 19:00 (13h)		176,591	413,984	362,842	134%	-12%
South Halton (Dundas St) **	N					
6:00 - 10:00		38,062	54,491	48,489	43%	-11%
10:00 - 15:00		37,296	55,723	61,921	49%	11%
15:00 - 19:00		39,541	66,986	71,732	69%	7%
6:00 - 19:00 (13h)		114,899	177,200	182,142	54%	3%

Table 5. Total vehicles by strategic screenline, 2022 – by counter-peak AM direction

Screenline	Counter-peak direction (as determined by 2022 AM period)					
	Dir	2001 vehs	2016 vehs	2022 vehs	2001-2016 vehs (%)	2016-2022 vehs (%)
Halton-Hamilton	W					
6:00 - 10:00		23,050	25,554	28,143	11%	10%
10:00 - 15:00		32,126	33,124	37,484	3%	13%
15:00 - 19:00		40,983	40,922	40,698	0%	-1%
6:00 - 19:00 (13h)		96,159	99,600	106,325	4%	7%
Hamilton Outer Cordon ***	OB			(from Hamilton)		
6:00 - 10:00			33,796	30,258	N/A	-10%
10:00 - 15:00			48,522	49,430	N/A	2%
15:00 - 19:00			65,581	59,912	N/A	-9%
6:00 - 19:00 (13h)			147,899	139,600	N/A	-6%

* In 2022, 400-series highways were not counted at Toronto-York and only three stations were counted at Mississauga North.

** 2022 marks change in peak AM direction from historical norms.

*** IB is inbound to Hamilton. OB is outbound from Hamilton.

Note that previous trends studies summarized total persons crossing the screenlines. However, the 2022 counts had several missing or inconsistent transit occupancy data, as well as a lack of GO Rail ridership data, which preclude the tabulation of total persons. (See also section 3.1.4 on mode shares.)

3.1.2 Autos and auto occupancy

Autos have historically dominated travel across the GTHA screenlines. This section summarizes how auto volumes and occupancies have changed over time.

Table 6 summarizes 2022 auto travel for all strategic screenlines across the GTHA (excluding Toronto-York and Mississauga North). The table presents total autos, total auto persons, average persons per vehicle (PPV), and the number and percent of HOV2+ vehicles. Table 7 summarizes the percentage changes between 2016 and 2022. Figure 3 shows the percentage changes pre- and post-2016, by direction.

While total auto vehicle trips have grown in the 15-year period to 2016, the 2022 auto vehicle trip volumes record a drop or, at best, a small growth relative to 2016. This is true for both the peak and counter-peak directions.

In the peak AM direction, the PM peak period grows fastest to 2016 (a 53% growth rate), with the mid-day (10:00 – 15:00) period growing almost as fast (52% growth). In the counter-peak AM direction, the mid-day grows fastest to 2016 at 56%. The mid-day in 2022 gains slightly (3%) in the peak AM direction while AM and PM volumes drop, and the mid-day's counter-peak drop is less than that of the other two periods.

Growth in the PM peak period is robust in the 15 years to 2016, with growth in the AM peak period moderately lower than that of the PM peak period. However, the 2022 AM peak losses are significant in both directions (up -15%). The 2022 PM peak losses are similar to the AM in the counter-peak direction (typically, though not always, the peak PM direction), at -13%, though the loss in the AM peak direction is only -1%. These 2022 shifts are consistent with more people working / studying from home and more workers in a hybrid (office / home) working arrangement that reduces both AM and PM commuting, while continued mid-day growth reflects additional activity generated by people who are working / studying at home, which continues into the PM peak period. These behavioural shifts are explored further in section 3.2.

Table 6. Autos and auto occupancy, 2022

Time of day	Peak direction (as determined by 2022 AM period, for total vehicles)						
	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
6:00 - 10:00	422,537	459,597	1.09	35,519	8.4%	44%	-12%
10:00 - 15:00	427,611	481,739	1.13	51,365	12.0%	52%	3%
15:00 - 19:00	462,379	521,542	1.13	55,813	12.1%	53%	-1%
6:00 - 19:00	1,312,526	1,462,877	1.11	142,696	10.9%	50%	-3%

Time of day	Counter-peak direction (as determined by 2022 AM period, for total vehicles)						
	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
6:00 - 10:00	321,881	353,198	1.10	29,816	9.3%	47%	-15%
10:00 - 15:00	404,828	455,987	1.13	48,202	11.9%	56%	-5%
15:00 - 19:00	494,464	557,307	1.13	58,613	11.9%	51%	-13%
6:00 - 19:00	1,221,173	1,366,493	1.12	136,631	11.2%	51%	-11%

Data are summarized for all GTHA strategic screenlines except Toronto-York and Mississauga North.

Table 7. Percent changes, 2016 - 2022

% change wrt to 2016 by time of day	Peak direction (as determined by 2022 AM period, for total vehicles)					Counter-peak direction (as determined by 2022 AM period, for total vehicles)				
	Total autos	Total auto persons	Avg PPV	HOV 2+	% HOV 2+	Total autos	Total auto persons	Avg PPV	HOV 2+	% HOV 2+
6:00 - 10:00	-12%	-12%	-1%	-17%	-6%	-15%	-18%	-3%	-31%	-19%
10:00 - 15:00	3%	1%	-3%	-14%	-17%	-5%	-9%	-4%	-28%	-24%
15:00 - 19:00	-1%	-5%	-4%	-23%	-22%	-13%	-15%	-2%	-25%	-13%
6:00 - 19:00	-3%	-6%	-2%	-18%	-16%	-11%	-14%	-3%	-27%	-18%

Data are summarized for all GTHA strategic screenlines exceot Toronto-York and Mississauga North.

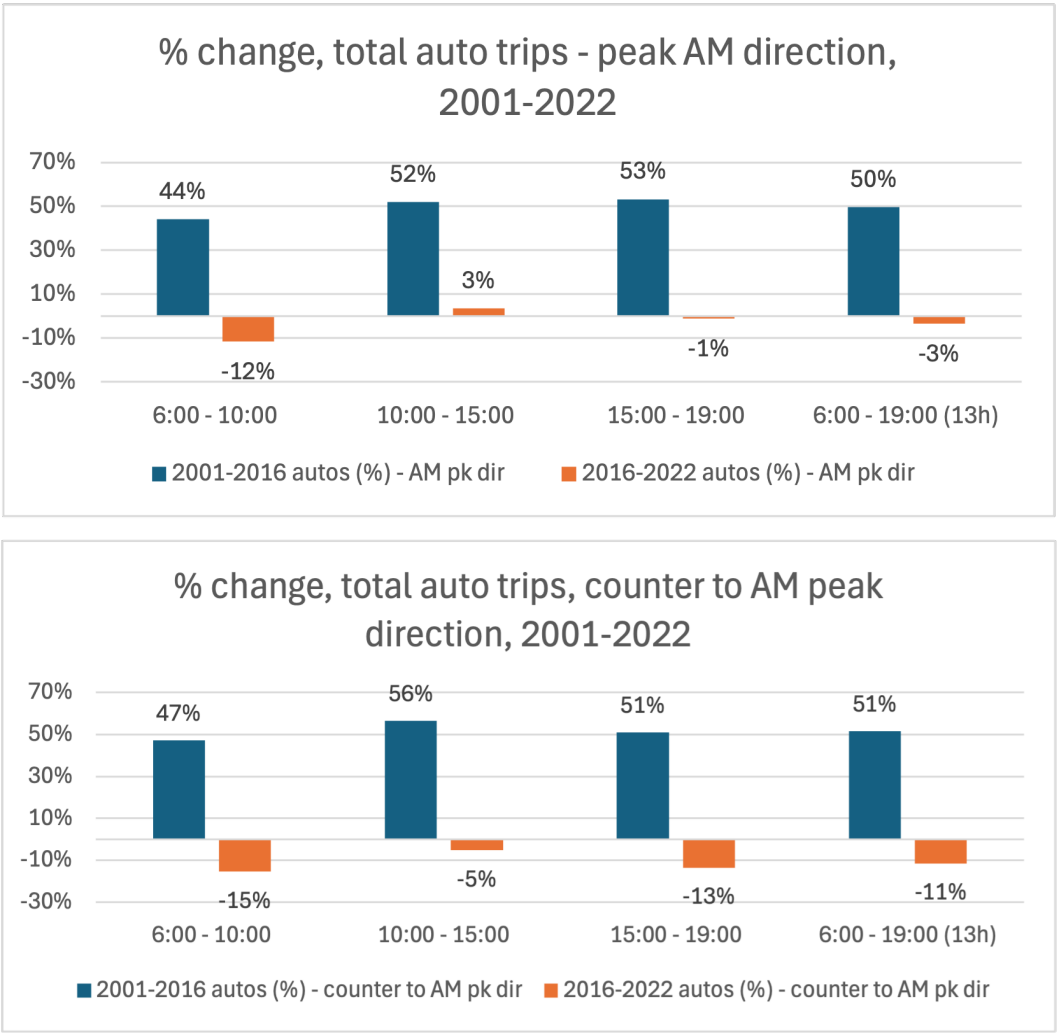


Figure 3. Auto trips, % change, total of strategic screenlines, 2001-2022

Excludes outliers (Toronto-York and Mississauga North). Percentages rounded to nearest unit.

Figure 4 shows the average differences among the strategic screenlines. On average, auto trips have dropped in the respective peak AM and PM directions (-8% and -12%, respectively, noting that peak PM direction is generally, though not always, the counter direction to the AM peak direction). AM auto trips show the greatest drop among all time periods, at -14% in the counter peak direction. The mid-day has the strongest growth in the peak AM direction (6%) and the lowest percent loss in the counter-peak direction (-4%), with the PM peak also showing slight growth (2%) in the peak AM direction.

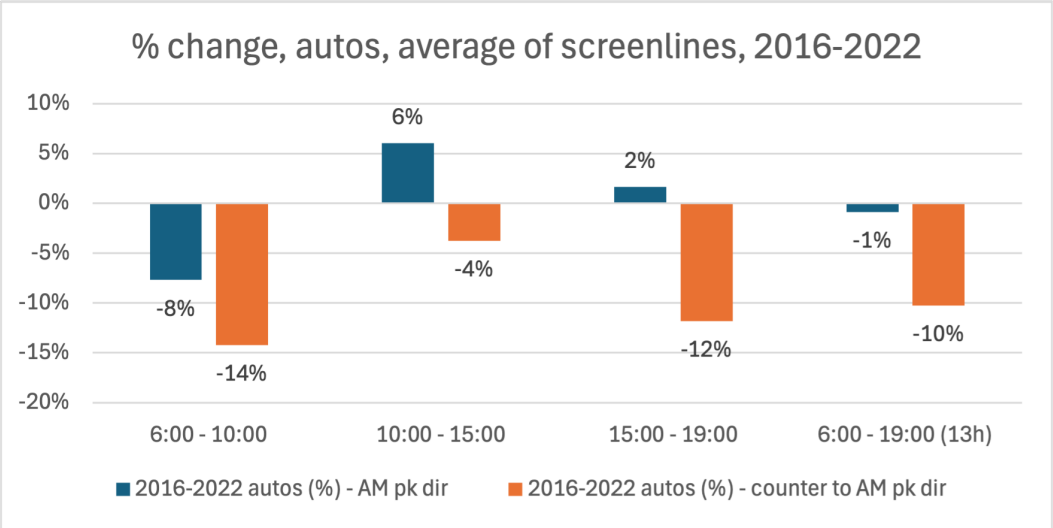


Figure 4. Auto trips, % change, average of strategic screenlines, 2016-2022

Excludes outliers (Toronto-York and Mississauga North). Percentages rounded to nearest unit.

Table 8 and Table 9 provide details of autos and auto occupancies for each of the strategic screenlines summarized above, respectively for the AM peak direction and the counter peak direction. A few points should be noted:

- The 2022 peak AM direction for Durham East and Toronto-Peel has reversed from previous years: though the Durham East screenline is based on complete 2022 counts, the Toronto-Peel reversal, with the two directions almost equal, might reflect differences in counting methods and sources compared with previous years. The Durham East screenline is also consistent with increased outbound (eastbound) long-haul medium and heavy truck traffic, which more than doubles compared with 2016 (see also section 3.1.5).
- The values account for the available auto occupancy categories, which vary among the six municipalities. Most municipalities use up to four categories for autos, with York Region using up to six categories for some years. York Region also considers light trucks as autos and, as such, its counts have up to four occupancy classes for these vehicles. This impacts only the York-Durham and York-Peel values, which are sourced from York Region counts. (The lack of light vehicle occupancies elsewhere means that these data cannot be included in auto vehicle or auto occupancy tabulations elsewhere.)
- Finally, a caution: as noted throughout the rest of this report, the reliability of vehicle occupancy counts is problematic, given the difficulty associated with recording such information when large volumes of different classes of vehicles are moving at high speeds. While the occupancies recorded here appear to be reasonable, analysts should be mindful of their potential limitations. Section 3.2 describes potential ways to address these challenges.

Table 8. Autos and auto occupancy by strategic screenline, 2022 – as determined by peak AM direction

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)							
	Dir	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
Durham East *	E/N							
6:00 - 10:00		9,831	11,355	1.16	1,454	14.8%	71%	39%
10:00 - 15:00		12,361	14,619	1.18	2,151	17.4%	35%	29%
15:00 - 19:00		13,778	15,892	1.15	2,033	14.8%	16%	17%
6:00 - 19:00 (13h)		35,970	41,866	1.16	5,638	15.7%	33%	26%
% change wrt 2016, 13h		26%	26%	0%	25%	-1%		
Durham South (Taunton Rd)	S							
6:00 - 10:00		25,271	28,876	1.14	3,472	13.7%	86%	-20%
10:00 - 15:00		30,704	34,915	1.14	4,035	13.1%	93%	-7%
15:00 - 19:00		34,300	39,014	1.14	4,502	13.1%	105%	-18%
6:00 - 19:00 (13h)		90,275	102,805	1.14	12,009	13.3%	95%	-15%
% change wrt 2016, 13h		-15%	-14%	1%	-5%	13%		
Toronto - Durham	W							
6:00 - 10:00		38,512	42,026	1.09	3,406	8.8%	29%	-38%
10:00 - 15:00		29,654	34,980	1.18	5,079	17.1%	37%	-15%
15:00 - 19:00		28,755	34,860	1.21	5,891	20.5%	45%	-11%
6:00 - 19:00 (13h)		96,921	111,866	1.15	14,376	14.8%	35%	-25%
% change wrt 2016, 13h		-25%	-23%	3%	-4%	28%		
York-Durham **	W/N							
6:00 - 10:00		23,562	26,328	1.12	2,671	11.3%	110%	-22%
10:00 - 15:00		11,086	13,125	1.18	2,002	18.1%	78%	-23%
15:00 - 19:00		12,324	14,873	1.21	2,373	19.3%	107%	-20%
6:00 - 19:00 (13h)		46,971	54,325	1.16	7,045	15.0%	100%	-22%
% change wrt 2016, 13h		-23%	-22%	1%	-15%	10%		

Table 8. Autos and auto occupancy by strategic screenline, 2022 – as determined by peak AM direction

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)							
	Dir	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
York-Peel **	E							
6:00 - 10:00		45,006	47,599	1.06	2,530	5.6%	54%	-8%
10:00 - 15:00		38,301	41,265	1.08	2,933	7.7%	48%	10%
15:00 - 19:00		45,258	47,520	1.05	2,243	5.0%	64%	8%
6:00 - 19:00 (13h)		128,565	136,384	1.06	7,706	6.0%	55%	2%
% change wrt 2016, 13h		2%	-3%	-5%	-42%	-43%		
Toronto-York ***	S							
6:00 - 10:00		38,380	46,150	1.20	7,008	18.3%	29%	-80%
10:00 - 15:00		45,611	58,087	1.27	10,900	23.9%	27%	-71%
15:00 - 19:00		47,538	61,375	1.29	12,013	25.3%	24%	-73%
6:00 - 19:00 (13h)		131,529	165,612	1.26	29,921	22.7%	27%	-75%
% change wrt 2016, 13h		-75%	-73%	7%	-63%	48%		
Toronto-Peel *	W							
6:00 - 10:00		86,644	94,150	1.09	7,080	8.2%	7%	-7%
10:00 - 15:00		103,854	117,055	1.13	12,358	11.9%	12%	-1%
15:00 - 19:00		116,928	132,410	1.13	14,245	12.2%	6%	-8%
6:00 - 19:00 (13h)		307,426	343,615	1.12	33,683	11.0%	9%	-5%
% change wrt 2016, 13h		-5%	-11%	-5%	-35%	-31%		
Peel - Mississauga N ***	S							
6:00 - 10:00		23,942	26,102	1.09	2,155	9.0%	6%	-66%
10:00 - 15:00		28,085	31,349	1.12	3,258	11.6%	33%	-50%
15:00 - 19:00		20,033	20,448	1.02	409	2.0%	77%	-71%
6:00 - 19:00 (13h)		72,060	77,899	1.08	5,822	8.1%	32%	-63%
% change wrt 2016, 13h		-63%	-64%	-3%	-72%	-23%		

Table 8. Autos and auto occupancy by strategic screenline, 2022 – as determined by peak AM direction

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)							
	Dir	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
Peel-Halton	E							
6:00 - 10:00		84,171	88,155	1.05	3,877	4.6%	42%	-4%
10:00 - 15:00		72,253	77,067	1.07	4,584	6.3%	88%	-4%
15:00 - 19:00		70,325	74,871	1.06	4,309	6.1%	84%	-6%
6:00 - 19:00 (13h)		226,749	240,093	1.06	12,770	5.6%	67%	-4%
% change wrt 2016, 13h		-4%	-13%	-9%	-63%	-61%		
South Halton (Dundas St)	N							
6:00 - 10:00		42,653	45,996	1.08	3,239	7.6%	53%	-11%
10:00 - 15:00		54,543	60,706	1.11	5,817	10.7%	67%	13%
15:00 - 19:00		66,544	74,943	1.13	7,972	12.0%	86%	7%
6:00 - 19:00 (13h)		163,740	181,645	1.11	17,028	10.4%	69%	4%
% change wrt 2016, 13h		4%	3%	0%	4%	1%		
Halton-Hamilton	E							
6:00 - 10:00		27,236	29,072	1.07	1,768	6.5%	-19%	-6%
10:00 - 15:00		33,316	35,879	1.08	2,435	7.3%	-17%	38%
15:00 - 19:00		30,389	32,459	1.07	1,985	6.5%	-11%	31%
6:00 - 19:00 (13h)		90,941	97,410	1.07	6,188	6.8%	-16%	19%
% change wrt 2016, 13h		19%	18%	-1%	17%	-2%		
Hamilton Outer Cordon ****	IB	(to Hamilton)						
6:00 - 10:00		39,651	46,040	1.16	6,022	15.2%	N/A	1%
10:00 - 15:00		41,539	52,128	1.25	9,971	24.0%	N/A	19%
15:00 - 19:00		43,778	54,700	1.25	10,260	23.4%	N/A	16%
6:00 - 19:00 (13h)		124,968	152,868	1.22	26,253	21.0%	N/A	12%
% change wrt 2016, 13h		12%	22%	9%	101%	80%		

* 2022 marks change in peak AM direction from historical norms.
** York-Durham and York-Peel values are sourced from York counts and include light truck volumes and occupants.
*** In 2022, 400-series highways were not counted at Toronto-York and only three stations were counted at Mississauga North.
**** IB is inbound to Hamilton. OB is outbound from Hamilton.

Table 9. Autos and auto occupancy by strategic screenline, 2022 – counter-peak direction (determined by 2022 AM)

Screenline	Counter-peak direction (as determined by 2022 AM period, for total vehicles)							
	Dir	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
Durham East *	W/S							
6:00 - 10:00		5,575	6,342	1.14	726	13.0%	30%	-43%
10:00 - 15:00		7,259	8,515	1.17	1,191	16.4%	34%	-23%
15:00 - 19:00		7,838	9,212	1.18	1,323	16.9%	43%	-16%
6:00 - 19:00 (13h)		20,672	24,069	1.16	3,240	15.7%	35%	-28%
% change wrt 2016, 13h		-28%	-27%	2%	-20%	11%		
Durham South (Taunton Rd)	N							
6:00 - 10:00		22,908	26,025	1.14	3,002	13.1%	118%	-23%
10:00 - 15:00		30,926	35,044	1.13	3,910	12.6%	98%	-4%
15:00 - 19:00		35,742	40,850	1.14	4,872	13.6%	82%	-13%
6:00 - 19:00 (13h)		89,576	101,919	1.14	11,784	13.2%	96%	-13%
% change wrt 2016, 13h		-13%	-12%	1%	-5%	9%		
Toronto - Durham	E							
6:00 - 10:00		19,445	23,064	1.19	3,474	17.9%	51%	-16%
10:00 - 15:00		29,641	35,080	1.18	5,134	17.3%	26%	-3%
15:00 - 19:00		42,681	47,743	1.12	4,825	11.3%	13%	-23%
6:00 - 19:00 (13h)		91,767	105,887	1.15	13,433	14.6%	23%	-16%
% change wrt 2016, 13h		-16%	-13%	3%	8%	28%		
York-Durham **	E/S							
6:00 - 10:00		10,034	11,657	1.16	1,477	14.7%	120%	-22%
10:00 - 15:00		12,271	14,840	1.21	2,256	18.4%	77%	-22%
15:00 - 19:00		28,250	33,042	1.17	4,515	16.0%	97%	-17%
6:00 - 19:00 (13h)		50,555	59,540	1.18	8,248	16.3%	96%	-19%
% change wrt 2016, 13h		-19%	-18%	1%	-13%	6%		

Table 9. Autos and auto occupancy by strategic screenline, 2022 – counter-peak direction (determined by 2022 AM)

Screenline	Counter-peak direction (as determined by 2022 AM period, for total vehicles)							
	Dir	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
York-Peel **	W							
6:00 - 10:00		34,930	38,102	1.09	3,097	8.9%	45%	2%
10:00 - 15:00		34,175	38,785	1.13	4,348	12.7%	45%	5%
15:00 - 19:00		50,508	59,550	1.18	8,244	16.3%	43%	1%
6:00 - 19:00 (13h)		119,613	136,437	1.14	15,689	13.1%	44%	3%
% change wrt 2016, 13h		3%	7%	4%	41%	37%		
Toronto-York ***	N							
6:00 - 10:00		28,458	35,314	1.24	5,933	20.8%	34%	-80%
10:00 - 15:00		42,542	53,513	1.26	9,769	23.0%	29%	-73%
15:00 - 19:00		48,586	60,391	1.24	10,686	22.0%	33%	-78%
6:00 - 19:00 (13h)		119,586	149,218	1.25	26,388	22.1%	32%	-77%
% change wrt 2016, 13h		-77%	-75%	8%	-64%	56%		
Toronto-Peel *	E							
6:00 - 10:00		85,104	93,608	1.10	8,078	9.5%	1%	-29%
10:00 - 15:00		94,269	106,256	1.13	11,259	11.9%	20%	-21%
15:00 - 19:00		87,745	99,287	1.13	10,563	12.0%	18%	-31%
6:00 - 19:00 (13h)		267,118	299,151	1.12	29,900	11.2%	12%	-27%
% change wrt 2016, 13h		-27%	-31%	-5%	-50%	-31%		
Peel - Mississauga N ***	N							
6:00 - 10:00		15,081	15,674	1.04	482	3.2%	62%	-72%
10:00 - 15:00		12,445	13,067	1.05	616	4.9%	38%	-77%
15:00 - 19:00		11,771	12,200	1.04	372	3.2%	10%	-85%
6:00 - 19:00 (13h)		39,297	40,941	1.04	1,470	3.7%	29%	-79%
% change wrt 2016, 13h		-79%	-81%	-7%	-93%	-67%		

Table 9. Autos and auto occupancy by strategic screenline, 2022 – counter-peak direction (determined by 2022 AM)

Screenline	Counter-peak direction (as determined by 2022 AM period, for total vehicles)							
	Dir	2022 autos	2022 auto persons	Avg PPV	HOV 2+	% HOV 2+	2001-2016 autos (%)	2016-2022 autos (%)
Peel-Halton	W							
6:00 - 10:00		54,838	58,364	1.06	3,446	6.3%	95%	-7%
10:00 - 15:00		72,092	78,676	1.09	6,332	8.8%	84%	-4%
15:00 - 19:00		92,767	101,771	1.10	8,492	9.2%	39%	-2%
6:00 - 19:00 (13h)		219,697	238,811	1.09	18,270	8.3%	64%	-4%
% change wrt 2016, 13h		-4%	-14%	-10%	-53%	-51%		
South Halton (Dundas St)	S							
6:00 - 10:00		43,534	46,611	1.07	2,948	6.8%	78%	-1%
10:00 - 15:00		55,577	61,299	1.10	5,497	9.9%	73%	16%
15:00 - 19:00		60,424	66,725	1.10	5,961	9.9%	84%	-9%
6:00 - 19:00 (13h)		159,535	174,635	1.09	14,406	9.0%	79%	1%
% change wrt 2016, 13h		1%	-1%	-2%	-18%	-19%		
Halton-Hamilton	W							
6:00 - 10:00		22,039	23,141	1.05	1,027	4.7%	4%	13%
10:00 - 15:00		28,980	30,959	1.07	1,856	6.4%	-5%	18%
15:00 - 19:00		35,105	37,462	1.07	2,198	6.3%	-2%	-2%
6:00 - 19:00 (13h)		86,124	91,562	1.06	5,081	5.9%	-1%	8%
% change wrt 2016, 13h		8%	4%	-3%	-30%	-35%		
Hamilton Outer Cordon ****	OB	(from Hamilton)						
6:00 - 10:00		23,474	26,284	1.12	2,541	10.8%	N/A	-16%
10:00 - 15:00		39,638	46,533	1.17	6,419	16.2%	N/A	0%
15:00 - 19:00		53,404	61,665	1.15	7,620	14.3%	N/A	-7%
6:00 - 19:00 (13h)		116,516	134,482	1.15	16,580	14.2%	N/A	-7%
% change wrt 2016, 13h		-7%	-4%	3%	13%	22%		

* 2022 marks change in peak AM direction from historical norms.
** York-Durham and York-Peel values are sourced from York counts and include light truck volumes and occupants.
*** In 2022, 400-series highways were not counted at Toronto-York and only three stations were counted at Mississauga North.
**** IB is inbound to Hamilton. OB is outbound from Hamilton.

- The tables provide details on average PPV and HOV 2+ volumes and percentages. As Figure 5 shows, the PPVs have dropped, with reductions up to -4.4% in the mid-day. The range of reductions intuitively appears plausible. However, the corresponding reductions in HOV 2+ volumes and percentages seem quite high, as evidenced by changes in Table 8 and Table 9 (up to 101% at the Hamilton Outer Cordon inbound). In at least some of these cases, the great differences may be attributed to an extrapolation of ATR counts. Caution is advised in the use of the 2022 HOV 2+ volumes and percentages.

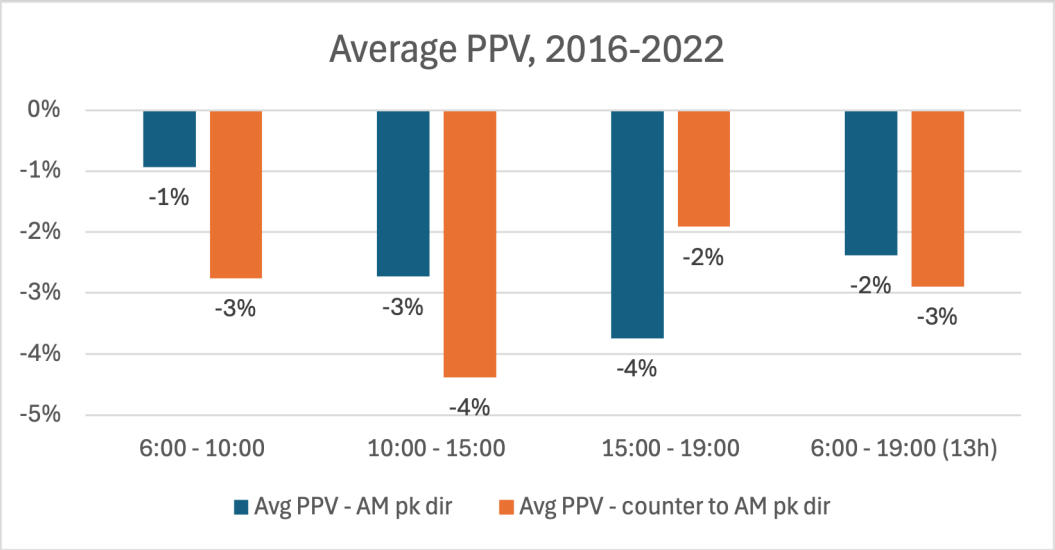


Figure 5. Average persons per vehicle, total of strategic screenlines, 2016-2022

Excludes outliers (Toronto-York and Mississauga North). Percentages rounded to nearest unit.

3.1.3 HOV use on expressways

This section examines auto usage on the expressways that cross the strategic screenlines. The intent is to understand how HOV use has changed on key facilities, many (though not all) of which have dedicated HOV lanes. The analysis considers all 400-series highways, including the Queen Elizabeth Way and Highway 407 ETR. Figure 6 shows how expressway auto volumes (all occupancies) have changed in the peak and counter-peak directions from 2001 to 2016 and 2016 to 2022.

Between 2001 and 2016, auto trips on expressways more than double in all time periods in the counter-peak direction. In the AM peak direction, auto trips on expressways grow up to 91% in the mid-day and 83% in the PM peak but only by 60% in the AM peak.

The 2016-2022 changes vary when compared to the changes across the entire

screenline. The changes for the expressways are generally consistent with the losses observed in the AM peak for the screenlines as a whole (see Figure 3). For the counter-peak direction, the proportional losses are similar across the day. However, in the AM peak direction, mid-day expressway auto trips drop by -4% compared with a screenline-wide increase of 3%. Similarly, in the same direction, PM expressway auto trips drop by -10%, compared with a screenline-wide increase of only -1%.[11]

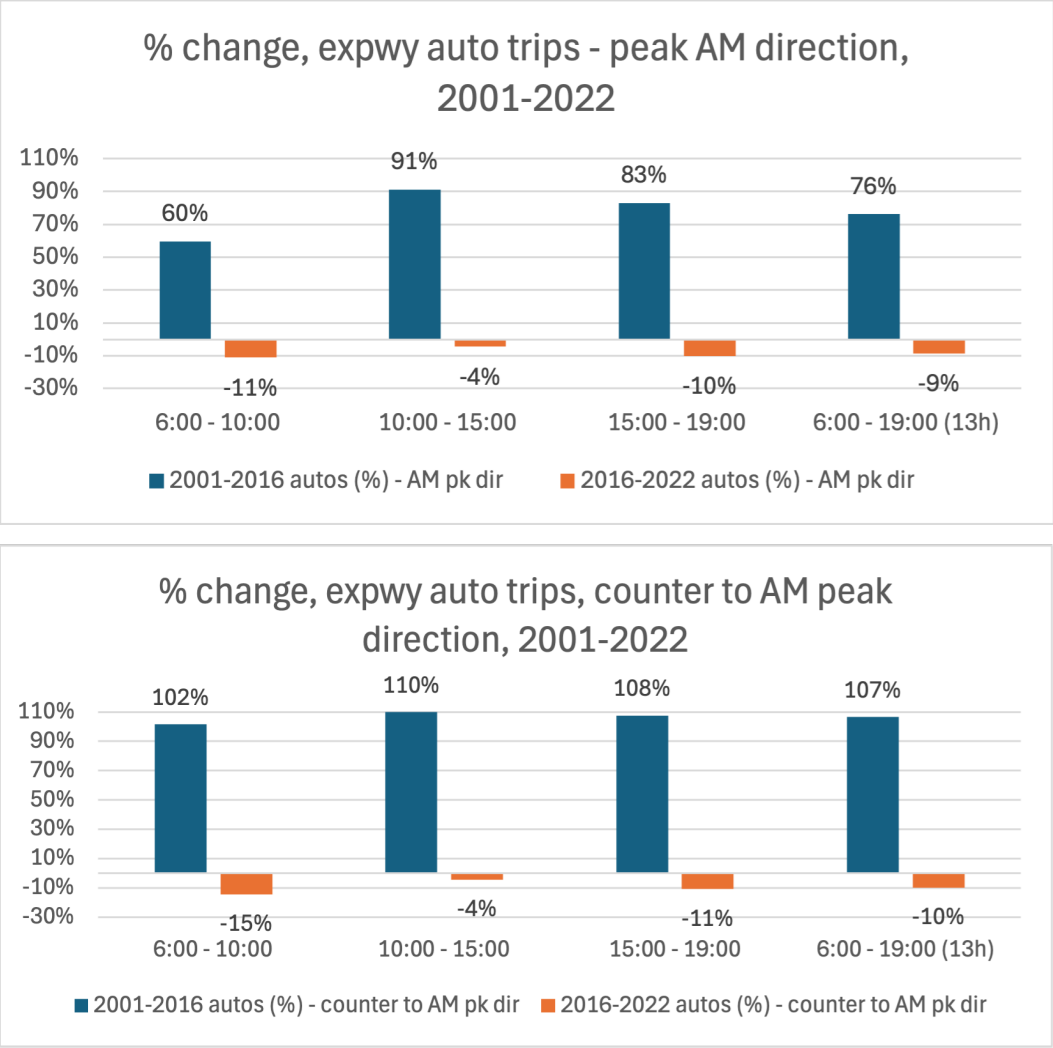


Figure 6. Expressway auto trips, % change, total of strategic screenlines, 2001-2022

Excludes outliers. Toronto-York excluded from all comparisons for consistency, because 2022 data not available for Toronto-York. Percentages rounded to nearest unit.

[11] The reader is reminded that the strategic screenlines included (excluded) may differ by mode.

Figure 7 shows the average differences among the strategic screenlines. The relative increases and losses are generally comparable with those across the screenlines, although with some moderate amplification in the PM (see Figure 4).

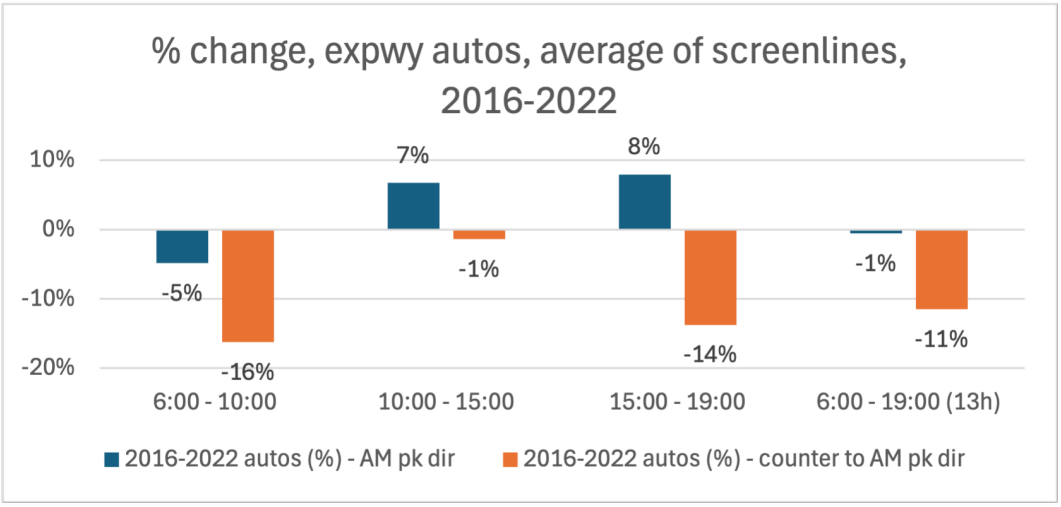


Figure 7. Expressway auto trips, % change, average of strategic screenlines, 2016-2022

Excludes outliers. Toronto-York excluded from all comparisons for consistency, because 2022 data not available for Toronto-York. Percentages rounded to nearest unit.

Figure 8 shows the changes in average PPV on expressways. Average PPVs dropped over all times in both direction – in all cases, between 2 and 3 times greater than the reduction rates across all roads (see Figure 5). Whereas in 2016 the average expressway PPVs were equal to or greater than those for all roads, for all time periods and directions, the reverse is true in 2022 (see Table 10).

The reductions and the reversals are evident in Table 10, which compares the average PPVs by time of day and direction for 2016 and 2022. For both years, the mid-day and PM peak periods have the highest average PPVs. This is consistent with the broader mix of discretionary trip purposes that typify the mid-day especially but also the PM peak – e.g., people travelling together for a restaurant meal – than is typically the case in the AM peak, in which non-discretionary work and school commutes dominate.

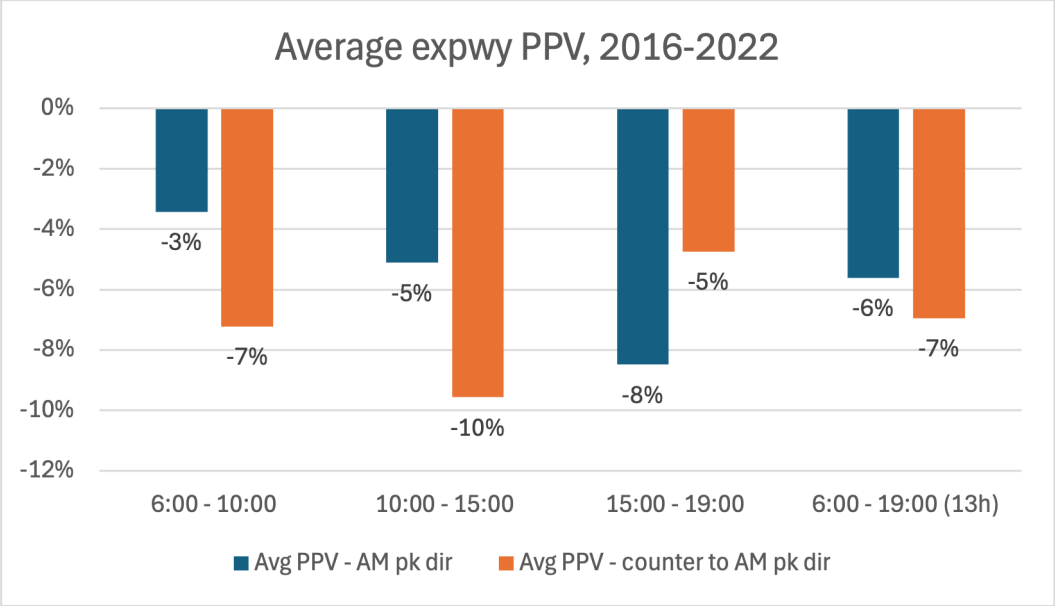


Figure 8. Average persons per vehicle, expressways, total of strategic screenlines, 2016-2022

Percentages rounded to nearest unit.

Table 10. Comparison of average PPV rates, 2016 and 2022

2016 Time of day	Avg PPV - pk dir		Avg PPV - counter pk dir	
	Screenline as a whole	Expressways	Screenline as a whole	Expressways
6:00 - 10:00	1.10	1.12	1.13	1.14
10:00 - 15:00	1.16	1.17	1.18	1.18
15:00 - 19:00	1.17	1.17	1.15	1.16
6:00 - 19:00 (13h)	1.14	1.15	1.15	1.16
2022 Time of day	**Avg PPV - pk dir**		**Avg PPV - counter pk dir**	
	Screenline as a whole	Expressways	Screenline as a whole	Expressways
6:00 - 10:00	1.09	1.07	1.10	1.07
10:00 - 15:00	1.13	1.09	1.13	1.08
15:00 - 19:00	1.13	1.10	1.13	1.08
6:00 - 19:00 (13h)	1.11	1.09	1.12	1.08

3.1.4 Mode shares

This section presents shares by mode across the strategic screenlines. Shares are summarized for six categories:

- Auto drivers.
- Auto passengers.
- Cabs (taxis – all occupants).
- Transit persons, comprising all occupants of municipal, regional, other and intercity transit – all on bus.[12]
- School bus.
- GO Bus.

These categories are drawn from those used in previous trends studies. Note also that gaps in vehicle occupancies in 2022, especially among various transit operators, limit the tabulations for that year. As noted, the 2022 CCDRS data do not include GO Rail ridership counts.[13] Details are presented in the ensuing sections.

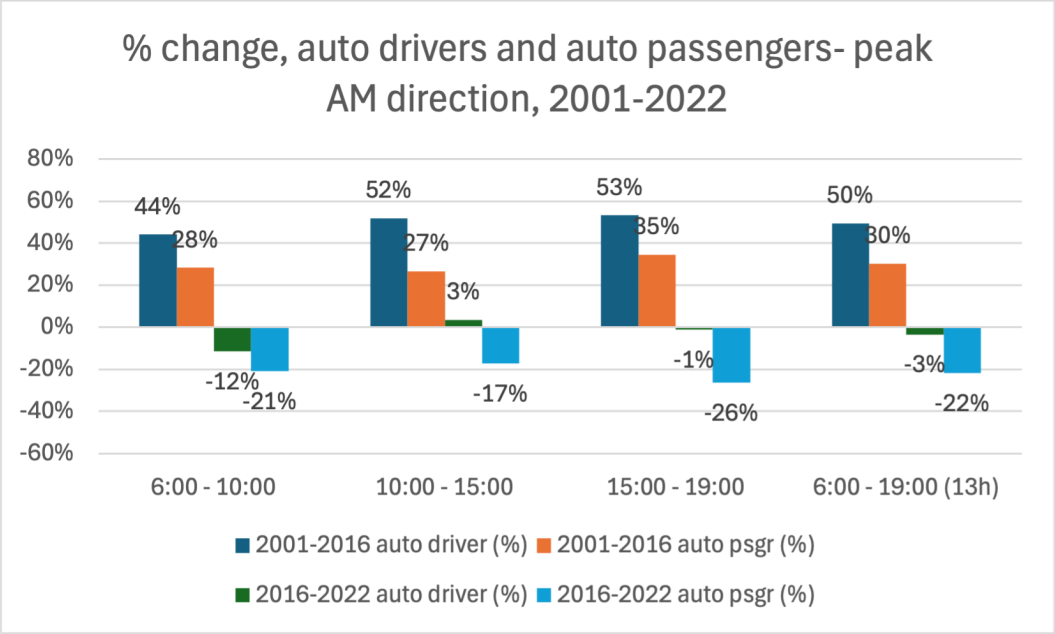
Auto drivers and auto passengers

Figure 9 shows how auto driver and auto passenger volumes have changed over time. In the peak AM direction, between 2001 and 2016 auto driver volumes grow faster than auto passenger volumes across the day. In 2022, auto driver and auto passenger trips generally drop, more so for the latter, although mid-day auto drivers grow by 4%.

In the counter-peak direction, between 2001 and 2016 auto drivers and auto passengers both increase, but auto passengers increase faster than auto drivers for the AM and mid-day periods. The reverse is true for the PM. Auto passenger trips grow two-third faster in the counter-peak as they do in the peak direction (50% versus 30% over the 13h period) – by comparison, auto drivers grow at about the same rates in both directions (51% versus 50% respectively over the 13h period). By 2022, auto driver and auto passenger trips all drop in the counter-peak direction, generally in greater proportions than for the peak AM direction.

[12] Also includes TTC streetcar and TTC subway. Neither of these modes crosses any of the strategic screenlines, except for the TTC subway Line 1 extension, opened in 2017, which crosses the Toronto-York screenline. However, neither the Toronto nor the York 2022 counts include TTC subway. Note that GO Bus is treated separately from transit in the CCDRS.

[13] GO Rail counts are typically sourced from Metrolinx.



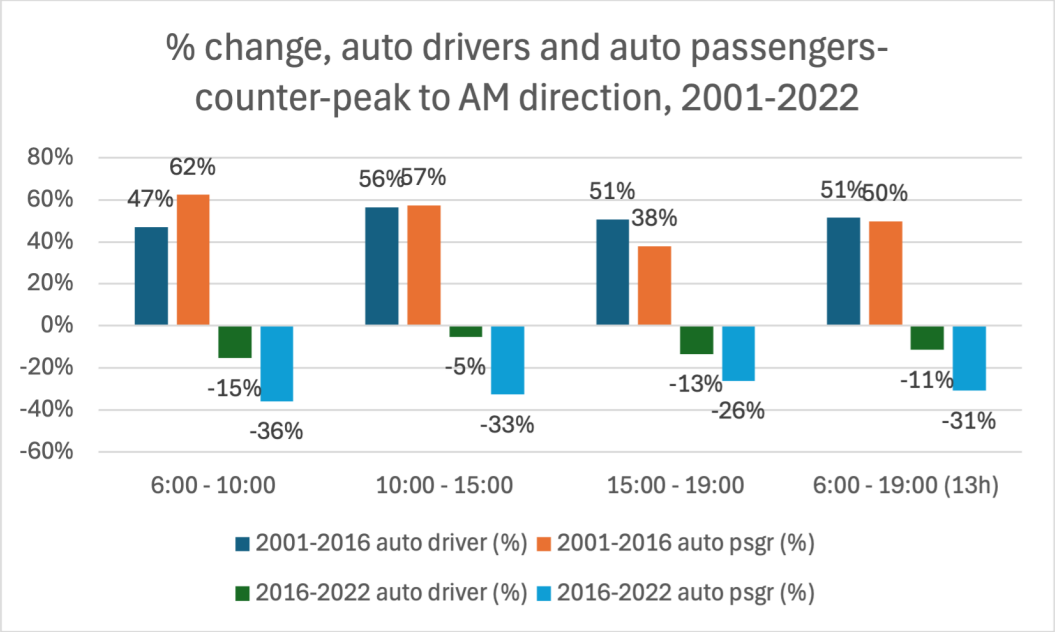


Figure 9. Auto drivers and auto passengers, % changes, 2001-2022

Percentages rounded to nearest unit.

Cabs

In 2022, people in cabs (drivers and passengers) comprise 0.3% of trips in the peak AM direction (a 13h total of 4,044 trips) and 0.2% of trips in the counter-peak direction (a 13h total of 3,129 trips). The highest proportion of trips in the AM peak direction occurs in the mid-day period, at 0.3%.

These proportions across all strategic screenlines are almost certainly too high, given the gaps in transit ridership numbers.

Because of the very small numbers, coupled with the rise of ride-hailing trips (Uber, etc.), comparisons with 2016 are not provided in this summary, although the detailed year-by-year numbers are provided in the accompanying spreadsheet.

Transit

A review of the transit occupancy data indicates that complete 2022 data are available only for seven Toronto, Peel and Halton screenlines. Occupancies for the other screenlines are not recorded, or they correspond to implausibly large reductions compared to 2016 (i.e., the recorded 2022 numbers are a fraction of the 2016 numbers). Some screenlines have data for one direction only.[14]

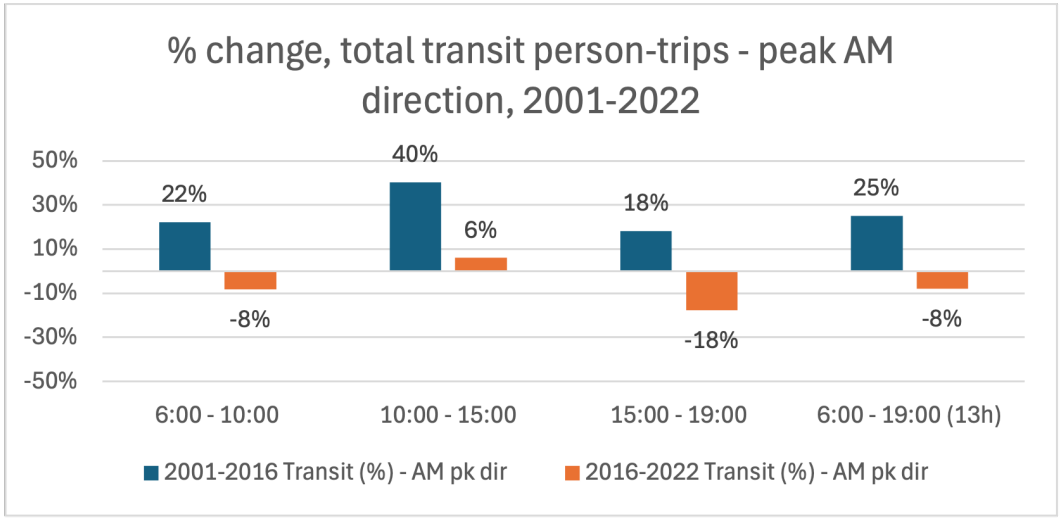
Figure 10 shows how transit occupancies have changed for the seven screenlines.

Transit numbers increase across the 2001-2016 period for all time periods in both directions – increasing by 25% in the peak AM direction across the 13h period and increasing in the counter peak direction by 10% across the 13h period.

In 2022, reductions are observed across almost all time periods in both directions. Reductions are more pronounced in the counter peak direction (-37% across the 13h period) than in the peak AM direction (-8% across the 13h period).

While these findings are broadly consistent with the overall pre-/post-2016 inflection trends observed for autos (see Figure 3 and Figure 4), though with lower pre-2016 growth rates and higher post-2016 losses, it is important to note that the transit findings reflect only a subset of the strategic screenlines. For reference, Table 11 and Table 12 list the values for the full set of strategic screenlines, by time period for the peak AM and counter-peak directions, respectively.

[14] The seven included screenlines are Toronto-Durham, Toronto-York, Toronto-Peel, York-Peel, Peel-Halton, South Halton and Halton-Hamilton.



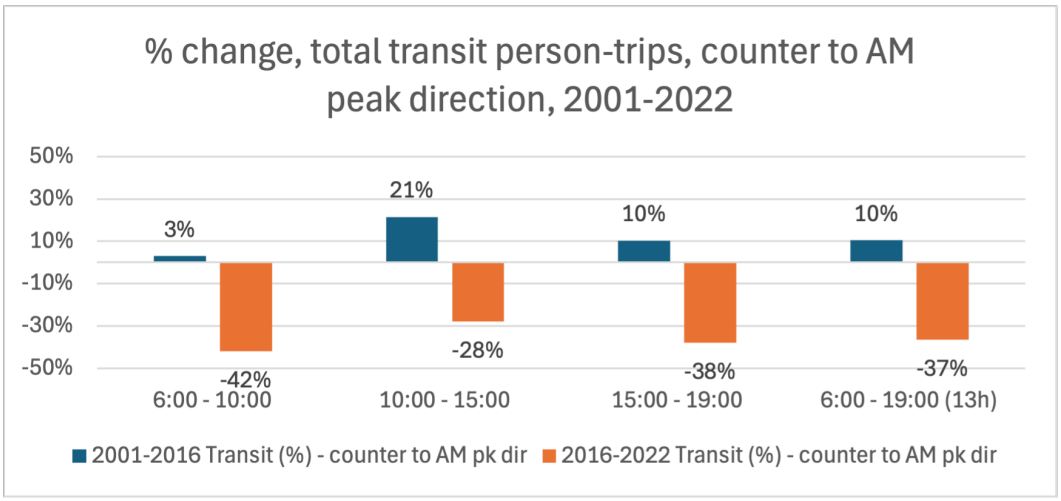


Figure 10. Transit occupants, % changes, 2001-2022 (7 screenlines)

Includes Toronto-Durham, Toronto-York, Toronto-Peel, York-Peel, Peel-Halton, South Halton and Halton-Hamilton screenlines. Percentages rounded to nearest unit.

Table 11. Transit occupancy by strategic screenline, 2001-2022 – peak direction (as determined by AM peak)

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 transit *	2016 transit *	2022 transit *	2001-2016 transit (%)	2016-2022 transit (%)
Durham East	W/S					
6:00 - 10:00		98	211	5	115%	-98%
10:00 - 15:00		727	362	57	-50%	-84%
15:00 - 19:00		851	192	33	-77%	-83%
6:00 - 19:00 (13h)		1,676	765	95	-54%	-88%
Durham S (Taunton Rd)	S					
6:00 - 10:00		365	1,260	12	245%	-99%
10:00 - 15:00		343	2,252	12	557%	-99%
15:00 - 19:00		453	2,613	3	477%	-100%
6:00 - 19:00 (13h)		1,161	6,125	27	428%	-100%
Toronto - Durham *(included in Figure 10)*	W					
6:00 - 10:00		172	247	605	44%	145%
10:00 - 15:00		669	344	631	-49%	83%
15:00 - 19:00		576	608	619	6%	2%
6:00 - 19:00 (13h)		1,417	1,199	1,855	-15%	55%
York-Durham	W/N					
6:00 - 10:00		13	0	1	-100%	N/A
10:00 - 15:00		3	16		433%	-100%
15:00 - 19:00		4	10		150%	-100%
6:00 - 19:00 (13h)		20	26		30%	-100%
York-Peel *(included in Figure 10)*	E					
6:00 - 10:00		615	1,358	809	121%	-40%
10:00 - 15:00		143	771	885	439%	15%
15:00 - 19:00		219	604	971	176%	61%
6:00 - 19:00 (13h)		977	2,733	2,665	180%	-2%

Table 11. Transit occupancy by strategic screenline, 2001-2022 – peak direction (as determined by AM peak)

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 transit *	2016 transit *	2022 transit *	2001-2016 transit (%)	2016-2022 transit (%)
Toronto-York ** *(included in Figure 10)*	S					
6:00 - 10:00		4,096	10,214	7,574	149%	-26%
10:00 - 15:00		1,925	7,272	6,280	278%	-14%
15:00 - 19:00		4,419	10,700	7,407	142%	-31%
6:00 - 19:00 (13h)		10,440	28,186	21,261	170%	-25%
Toronto-Peel *(included in Figure 10)*	E					
6:00 - 10:00		7,883	6,406	7,109	-19%	11%
10:00 - 15:00		5,802	4,915	6,735	-15%	37%
15:00 - 19:00		8,285	7,403	6,931	-11%	-6%
6:00 - 19:00 (13h)		21,970	18,724	20,775	-15%	11%
Peel - Mississauga N	S					
6:00 - 10:00		2,280	4,295		88%	-100%
10:00 - 15:00		1,060	3,949		273%	-100%
15:00 - 19:00		2,340	4,697		101%	-100%
6:00 - 19:00 (13h)		5,680	12,941		128%	-100%
Peel-Halton *(included in Figure 10)*	E					
6:00 - 10:00		1,410	1,331	673	-6%	-49%
10:00 - 15:00		951	790	614	-17%	-22%
15:00 - 19:00		1,325	948	884	-28%	-7%
6:00 - 19:00 (13h)		3,686	3,069	2,171	-17%	-29%
South Halton (Dundas St) *(incl. in Figure 10)*	S					
6:00 - 10:00		362	1,995	1,621	451%	-19%
10:00 - 15:00		217	2,117	2,010	876%	-5%
15:00 - 19:00		467	2,290	1,581	390%	-31%
6:00 - 19:00 (13h)		1,046	6,402	5,212	512%	-19%

Table 11. Transit occupancy by strategic screenline, 2001-2022 – peak direction (as determined by AM peak)

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 transit *	2016 transit *	2022 transit *	2001-2016 transit (%)	2016-2022 transit (%)
Halton-Hamilton *(included in Figure 10)*	E					
6:00 - 10:00		909	1,283	1,643	41%	28%
10:00 - 15:00		695	1,319	995	90%	-25%
15:00 - 19:00		1,449	1,915	1,145	32%	-40%
6:00 - 19:00 (13h)		3,053	4,517	3,783	48%	-16%
Hamilton Outer Cordon ***	IB	(to Hamilton)				
6:00 - 10:00			1,345	135	N/A	-90%
10:00 - 15:00			1,805	201	N/A	-89%
15:00 - 19:00			2,475	300	N/A	-88%
6:00 - 19:00 (13h)			5,625	636	N/A	-89%

* Transit includes municipal (all modes), regional, other and intercity, as defined by each municipality.

** Toronto-York screenline's transit data are based on York screenline 4-I/4-O to address inconsistencies in Toronto screenline 1002, which is used for all other modes. Note that neither screenline includes the 400-series highways in 2022.

*** IB is inbound to Hamilton. OB is outbound from Hamilton. 2022 data show a reversal in peak direction – however, the occupancies also drop by +/-90% which suggests that data are missing.

Table 12. Transit occupancy by strategic screenline, 2001-2022 – counter-peak direction (determined by AM peak)

Screenline	Counter-peak direction (as determined by 2022 AM pd, for total vehs)					
	Dir	2001 transit *	2016 transit *	2022 transit *	2001-2016 transit (%)	2016-2022 transit (%)
Durham East	E/S					
6:00 - 10:00		503	242	39	-52%	-84%
10:00 - 15:00		463	481	64	4%	-87%
15:00 - 19:00		183	277	27	51%	-90%
6:00 - 19:00 (13h)		1,149	1,000	130	-13%	-87%
Durham S (Taunton Rd)	N					
6:00 - 10:00		498	2,200	2	342%	-100%
10:00 - 15:00		358	2,875	10	703%	-100%
15:00 - 19:00		579	1,527	4	164%	-100%
6:00 - 19:00 (13h)		1,435	6,602	16	360%	-100%
Toronto - Durham *(included in Figure 10)*	E					
6:00 - 10:00		733	418	287	-43%	-31%
10:00 - 15:00		346	639	456	85%	-29%
15:00 - 19:00		153	290	406	90%	40%
6:00 - 19:00 (13h)		1,232	1,347	1,149	9%	-15%
York-Durham	E/S					
6:00 - 10:00		42	36		-14%	-100%
10:00 - 15:00		41	25		-39%	-100%
15:00 - 19:00		20	12		-40%	-100%
6:00 - 19:00 (13h)		103	73		-29%	-100%
York-Peel *(included in Figure 10)*	W					
6:00 - 10:00		273	682	471	150%	-31%
10:00 - 15:00		266	470	679	77%	44%
15:00 - 19:00		212	1,044	864	392%	-17%
6:00 - 19:00 (13h)		751	2,196	2,014	192%	-8%

Table 12. Transit occupancy by strategic screenline, 2001-2022 – counter-peak direction (determined by AM peak)

Screenline	Counter-peak direction (as determined by 2022 AM pd, for total vehs)					
	Dir	2001 transit *	2016 transit *	2022 transit *	2001-2016 transit (%)	2016-2022 transit (%)
Toronto-York ** *(included in Figure 10)*	N					
6:00 - 10:00		6,576	10,323	7,309	57%	-29%
10:00 - 15:00		3,086	7,579	6,019	146%	-21%
15:00 - 19:00		5,423	11,317	9,066	109%	-20%
6:00 - 19:00 (13h)		15,085	29,219	22,394	94%	-23%
Toronto-Peel *(included in Figure 10)*	W					
6:00 - 10:00		7,050	6,168	2,815	-13%	-54%
10:00 - 15:00		5,212	5,698	2,610	9%	-54%
15:00 - 19:00		9,303	7,819	3,110	-16%	-60%
6:00 - 19:00 (13h)		21,565	19,685	8,535	-9%	-57%
Peel - Mississauga N	N					
6:00 - 10:00		2,035	3,554		75%	-100%
10:00 - 15:00		2,295	3,449		50%	-100%
15:00 - 19:00		2,340	5,125		119%	-100%
6:00 - 19:00 (13h)		6,670	12,128		82%	-100%
Peel-Halton *(included in Figure 10)*	W					
6:00 - 10:00		1,610	791	561	-51%	-29%
10:00 - 15:00		1,925	500	863	-74%	73%
15:00 - 19:00		2,415	755	679	-69%	-10%
6:00 - 19:00 (13h)		5,950	2,046	2,103	-66%	3%
South Halton (Dundas St) *(incl. in Figure 10)*	N					
6:00 - 10:00		328	1,813	962	453%	-47%
10:00 - 15:00		294	1,039	1,176	253%	13%
15:00 - 19:00		475	2,062	1,687	334%	-18%
6:00 - 19:00 (13h)		1,097	4,914	3,825	348%	-22%

Table 12. Transit occupancy by strategic screenline, 2001-2022 – counter-peak direction (determined by AM peak)

Screenline	Counter-peak direction (as determined by 2022 AM pd, for total vehs)					
	Dir	2001 transit *	2016 transit *	2022 transit *	2001-2016 transit (%)	2016-2022 transit (%)
Halton-Hamilton *(included in Figure 10)*	W					
6:00 - 10:00		368	1,268	377	245%	-70%
10:00 - 15:00		394	1,093	468	177%	-57%
15:00 - 19:00		833	1,970	1,075	136%	-45%
6:00 - 19:00 (13h)		1,595	4,331	1,920	172%	-56%
Hamilton Outer Cordon ***	OB	(from Hamilton)				
6:00 - 10:00			1,261	150	N/A	-88%
10:00 - 15:00			4,203	375	N/A	-91%
15:00 - 19:00			2,309	205	N/A	-91%
6:00 - 19:00 (13h)			7,773	730	N/A	-91%

* Transit includes municipal (all modes), regional, other and intercity, as defined by each municipality.

** Toronto-York screenline's transit data are based on York screenline 4-I/4-O to address inconsistencies in Toronto screenline 1002, which is used for all other modes. Note that neither screenline includes the 400-series highways in 2022.

*** IB is inbound to Hamilton. OB is outbound from Hamilton. 2022 data show a reversal in peak direction – however, the occupancies also drop by +/-90% which suggests that data are missing.

GO Bus

Similar to the transit occupancies, complete 2022 GO Bus occupancy data are available for seven screenlines.[15] Figure 11 shows how occupancies have changed for these screenlines. GO Bus occupancy experiences high growth rates across all time periods and in both directions between 2001 and 2016, with occupancies more than doubling in the peak AM direction (a 13h increase of 123%) and increasing by two-thirds in the counter-peak direction (a 13h increase of 67%). In 2022, GO Bus occupancy drops for all time periods in the peak AM direction, representing a 13h reduction of -13%, though only a -4% reduction in the AM peak period. In the counter-peak direction, the PM peak period experiences a -10% reduction (in the peak PM direction). However, there are increases in the AM peak (11%) and mid-day (16%).

School bus

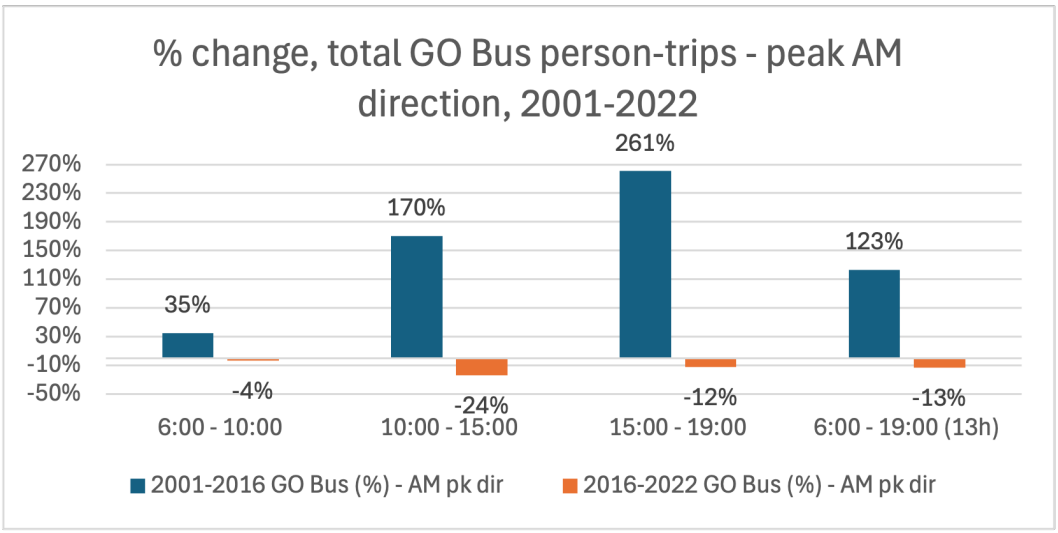
School bus occupancies are available for all screenlines except Mississauga North in 2022. Figure 12 shows growth patterns between 2001 and 2016 for all time periods and both directions, except for the mid-day counter-peak, which has a loss of -36%. The strongest growth occurs in the two commuter peaks, counter to the respective peak directions: 33% growth in the counter-peak AM direction and, in the PM, 63% in the AM peak direction (though also 29% in the counter-peak direction). The mostly bi-directional growth pattern is consistent with the pervasive distribution of schools throughout mainly residential areas, as opposed to being concentrated in employment areas.

In 2022, reductions of +/- 50% are recorded across all time periods and directions, except for the peak AM direction in the PM, which shows a reduction of -36%. Though they are consistent with overall screenline trends, these reductions may also reflect post-pandemic online-only learning at some local school boards at the time the counts were conducted. Post-pandemic shortages in school bus drivers, which resulted in some reductions in service in the GTHA and elsewhere, are another possible factor.[16] More research is needed.

Nonetheless, the 2022 school bus shares never exceed 1.2% of all person-trip shares (recognizing that the absence of transit and GO occupancies drives up the share). In 2022, 14,545 occupants are recorded in the peak direction over the 13h period, and 12,710 occupants are recorded in the counter-peak direction over the same period.

[15] The seven screenlines are Toronto-Durham, Toronto-York, Toronto-Peel, York-Peel, Peel-Halton, South Halton and Halton-Hamilton.

[16] S Hassan, *School bus driver shortages in several Ontario cities likely to continue: officials*, CityNews, posted 21 September 2022.



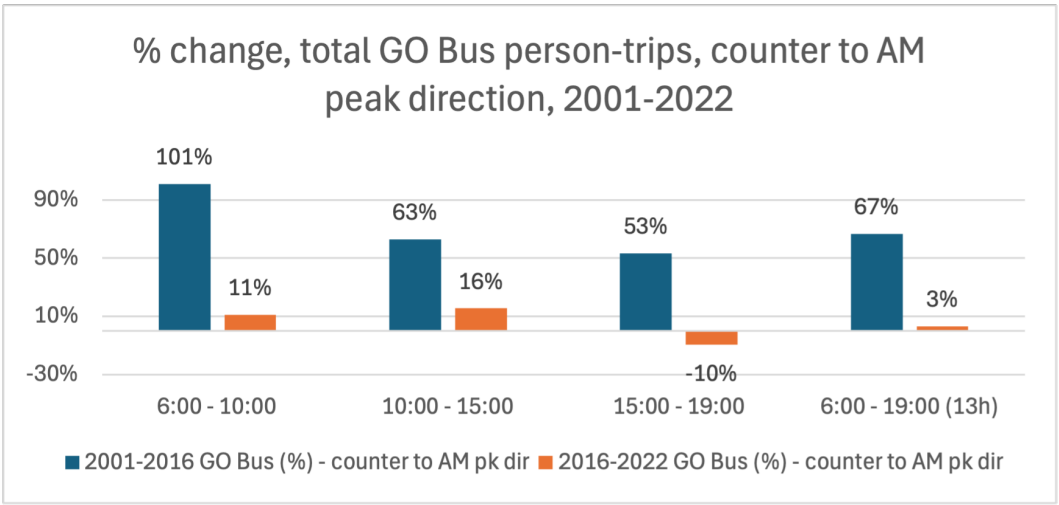
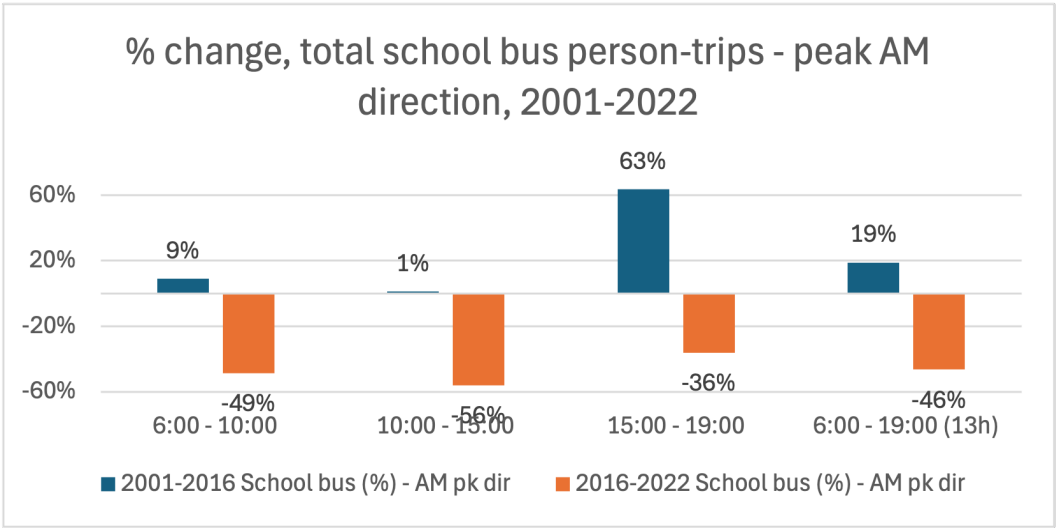


Figure 11. GO Bus occupants, % changes, 2001-2022 (7 screenlines)

Includes Toronto-Durham, Toronto-York, Toronto-Peel, York-Peel, Peel-Halton, South Halton and Halton-Hamilton screenlines. Percentages rounded to nearest unit.



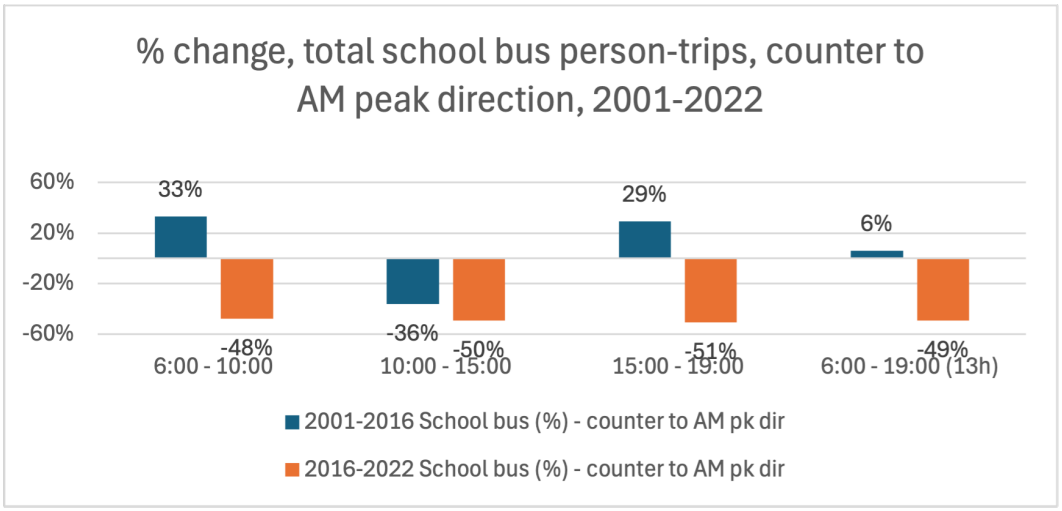


Figure 12. School bus occupants, % changes, 2001-2022

Excludes Mississauga North screenline for all comparisons. Percentages rounded to nearest unit.

3.1.5 Commercial vehicles (medium and heavy trucks)

This category comprises medium and heavy trucks. The category includes trucks with one or more trailers, multi-trailer trucks (such as long-combination vehicles) and aggregates vehicles, which some municipalities count separately. The category does not include light trucks, consistent with previous trend studies and reflecting the difficulty in distinguishing between commercial and personal uses of these vehicles.[17]

Figure 13 shows the pre- and post-2016 changes in medium and heavy truck (MT+HT) volumes across all strategic screenlines.[18] Uniquely, MT+HT vehicles show growth across all time periods in both directions before and after 2016. This is consistent with sustained demand for goods and commodities through and beyond the pandemic disruptions.

Table 13 and Table 14 list the 2022 MT+HT volumes by strategic screenline for the peak and counter-peak directions, respectively. Screenlines at the eastern and western edges of the GTHA show strong outwards flows, counter to commuter flows - for example, in the AM peak period, eastbound at Durham East, northbound at Durham South and outbound at the Hamilton Outer Cordon. In part, this reflects the inclusion of long-haul trucks in the counts. Details can be found in the accompanying spreadsheet.

The AM peak direction (34%) and the counter-peak PM direction (23%) have the highest 2022 growth rates among all time periods relative to 2016. This is coincident with reductions in passenger vehicle (auto) traffic at these times, which suggests that reduced peak period traffic volumes (reduced congestion) could be conducive to shifting trucking schedules; changing economic conditions, changing purchasing patterns (e-commerce purchasing) and other factors may also have an impact. More research is needed to understand MT+HT patterns post-2016.

Even so, the mid-day continues to have the highest overall MT+HT volumes, at 41%-43% of the 13h MT+HT totals in 2022 – down slightly from the 44%-45% shares in 2001 and 2016. This is consistent with historical commercial vehicle activity, which features urban and long-haul activity throughout the day. This also underscores the need to better understand mid-day travel activity, in addition to the commuter peaks.

[17] As noted, York Region tabulates light truck occupancies for inclusion with auto occupancies.

[18] Excluding Toronto-York and Mississauga North.

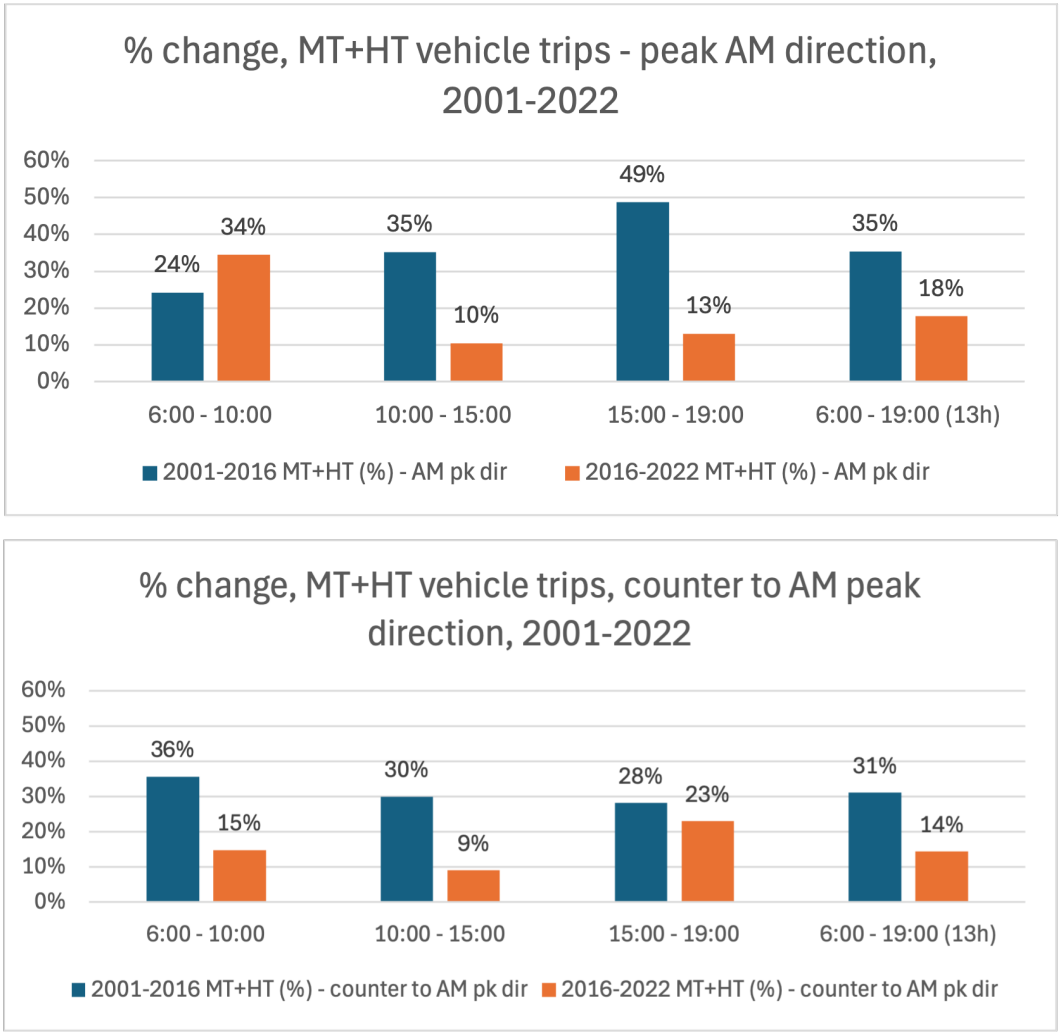


Figure 13. Medium and heavy trucks (MT+HT), % changes, 2001-2022

Excludes Toronto-York and Mississauga North screenlines. Percentages rounded to nearest unit.

Table 13. Medium and heavy trucks by strategic direction, 2022, peak direction

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 MT+HT	2016 MT+HT	2022 MT+HT	2001-2016 MT+HT (%)	2016-2022 MT+HT (%)
Durham East	W/S					
6:00 - 10:00		1,433	759	1,563	-47%	106%
10:00 - 15:00		2,031	1,183	2,613	-42%	121%
15:00 - 19:00		1,307	776	2,050	-41%	164%
6:00 - 19:00 (13h)		4,771	2,718	6,226	-43%	129%
Durham South (Taunton Rd)	S					
6:00 - 10:00		1,151	1,890	3,331	64%	76%
10:00 - 15:00		1,911	2,464	4,737	29%	92%
15:00 - 19:00		1,121	1,383	4,345	23%	214%
6:00 - 19:00 (13h)		4,183	5,737	12,413	37%	116%
Toronto - Durham	W					
6:00 - 10:00		2,758	2,665	6,030	-3%	126%
10:00 - 15:00		3,875	4,774	7,504	23%	57%
15:00 - 19:00		2,107	3,156	5,858	50%	86%
6:00 - 19:00 (13h)		8,740	10,595	19,392	21%	83%
York-Durham	W/N					
6:00 - 10:00		1,321	1,713	1,426	30%	-17%
10:00 - 15:00		970	1,731	1,500	78%	-13%
15:00 - 19:00		601	1,248	1,266	108%	1%
6:00 - 19:00 (13h)		2,892	4,692	4,192	62%	-11%
York-Peel	E					
6:00 - 10:00		3,480	4,688	4,248	35%	-9%
10:00 - 15:00		3,955	5,818	4,465	47%	-23%
15:00 - 19:00		2,720	3,778	3,712	39%	-2%
6:00 - 19:00 (13h)		10,155	14,284	12,425	41%	-13%

Table 13. Medium and heavy trucks by strategic direction, 2022, peak direction

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 MT+HT	2016 MT+HT	2022 MT+HT	2001-2016 MT+HT (%)	2016-2022 MT+HT (%)
Toronto-York	S					
6:00 - 10:00		8,055	8,870	2,278	10%	-74%
10:00 - 15:00		11,807	12,401	3,569	5%	-71%
15:00 - 19:00		6,512	8,364	1,773	28%	-79%
6:00 - 19:00 (13h)		26,374	29,635	7,620	12%	-74%
Toronto-Peel	E					
6:00 - 10:00		8,630	8,475	9,611	-2%	13%
10:00 - 15:00		14,788	15,666	12,153	6%	-22%
15:00 - 19:00		7,610	10,972	6,285	44%	-43%
6:00 - 19:00 (13h)		31,028	35,113	28,049	13%	-20%
Peel - Mississauga N	S					
6:00 - 10:00		4,446	4,734	3,449	6%	-27%
10:00 - 15:00		6,549	10,461	4,017	60%	-62%
15:00 - 19:00		3,419	6,098	1,876	78%	-69%
6:00 - 19:00 (13h)		14,414	21,293	9,342	48%	-56%
Peel-Halton	E					
6:00 - 10:00		5,304	5,946	11,242	12%	89%
10:00 - 15:00		8,041	10,776	14,630	34%	36%
15:00 - 19:00		4,783	7,545	9,502	58%	26%
6:00 - 19:00 (13h)		18,128	24,267	35,374	34%	46%
South Halton (Dundas St)	S					
6:00 - 10:00		3,195	3,017	3,516	-6%	17%
10:00 - 15:00		4,474	4,565	4,812	2%	5%
15:00 - 19:00		3,228	2,216	2,474	-31%	12%
6:00 - 19:00 (13h)		10,897	9,798	10,802	-10%	10%

Table 13. Medium and heavy trucks by strategic direction, 2022, peak direction

Screenline	Peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 MT+HT	2016 MT+HT	2022 MT+HT	2001-2016 MT+HT (%)	2016-2022 MT+HT (%)
Halton-Hamilton	E					
6:00 - 10:00		2,481	4,183	5,046	69%	21%
10:00 - 15:00		3,686	6,700	7,437	82%	11%
15:00 - 19:00		2,072	3,835	4,390	85%	14%
6:00 - 19:00 (13h)		8,239	14,718	16,873	79%	15%
Hamilton Outer Cordon *	IB			(to Hamilton)		
6:00 - 10:00			3,621	3,693	N/A	2%
10:00 - 15:00			5,452	5,449	N/A	0%
15:00 - 19:00			3,087	3,058	N/A	-1%
6:00 - 19:00 (13h)			12,160	12,200	N/A	0%

* IB is inbound to Hamilton. OB is outbound from Hamilton.

Table 14. Medium and heavy trucks by strategic screenline, 2022, counter-peak direction

Screenline	Counter-peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 MT+HT	2016 MT+HT	2022 MT+HT	2001-2016 MT+HT (%)	2016-2022 MT+HT (%)
Durham East	E/N					
6:00 - 10:00		1,205	836	1,890	-31%	126%
10:00 - 15:00		2,154	1,344	2,848	-38%	112%
15:00 - 19:00		1,626	814	1,621	-50%	99%
6:00 - 19:00 (13h)		4,985	2,994	6,359	-40%	112%
Durham South (Taunton Rd)	N					
6:00 - 10:00		1,226	1,996	3,443	63%	72%
10:00 - 15:00		1,712	2,528	4,713	48%	86%
15:00 - 19:00		767	1,326	3,798	73%	186%
6:00 - 19:00 (13h)		3,705	5,850	11,954	58%	104%
Toronto - Durham	E					
6:00 - 10:00		2,038	2,718	4,408	33%	62%
10:00 - 15:00		3,819	4,168	7,774	9%	87%
15:00 - 19:00		2,072	2,931	6,964	41%	138%
6:00 - 19:00 (13h)		7,929	9,817	19,146	24%	95%
York-Durham	E/S					
6:00 - 10:00		706	1,419	1,230	101%	-13%
10:00 - 15:00		1,040	1,725	1,672	66%	-3%
15:00 - 19:00		1,093	1,333	1,394	22%	5%
6:00 - 19:00 (13h)		2,839	4,477	4,296	58%	-4%
York-Peel	W					
6:00 - 10:00		2,865	3,871	3,656	35%	-6%
10:00 - 15:00		3,647	6,126	4,574	68%	-25%
15:00 - 19:00		3,194	4,577	3,980	43%	-13%
6:00 - 19:00 (13h)		9,706	14,574	12,210	50%	-16%

Table 14. Medium and heavy trucks by strategic screenline, 2022, counter-peak direction

Screenline	Counter-peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 MT+HT	2016 MT+HT	2022 MT+HT	2001-2016 MT+HT (%)	2016-2022 MT+HT (%)
Toronto-York	N					
6:00 - 10:00		6,929	8,623	1,943	24%	-77%
10:00 - 15:00		11,739	12,917	3,536	10%	-73%
15:00 - 19:00		7,005	7,961	1,753	14%	-78%
6:00 - 19:00 (13h)		25,673	29,501	7,232	15%	-75%
Toronto-Peel	W					
6:00 - 10:00		8,652	8,308	6,182	-4%	-26%
10:00 - 15:00		14,983	13,267	10,701	-11%	-19%
15:00 - 19:00		7,793	7,424	6,228	-5%	-16%
6:00 - 19:00 (13h)		31,428	28,999	23,111	-8%	-20%
Peel - Mississauga N	N					
6:00 - 10:00		4,241	4,751	2,440	12%	-49%
10:00 - 15:00		7,887	8,080	5,495	2%	-32%
15:00 - 19:00		4,417	4,823	4,339	9%	-10%
6:00 - 19:00 (13h)		16,545	17,654	12,274	7%	-30%
Peel-Halton	W					
6:00 - 10:00		5,338	8,094	11,236	52%	39%
10:00 - 15:00		9,306	13,594	15,349	46%	13%
15:00 - 19:00		4,319	6,535	8,544	51%	31%
6:00 - 19:00 (13h)		18,963	28,223	35,129	49%	24%
South Halton (Dundas St)	N					
6:00 - 10:00		3,993	3,077	2,908	-23%	-5%
10:00 - 15:00		5,472	4,203	4,357	-23%	4%
15:00 - 19:00		3,808	2,292	2,605	-40%	14%
6:00 - 19:00 (13h)		13,273	9,572	9,870	-28%	3%

Table 14. Medium and heavy trucks by strategic screenline, 2022, counter-peak direction

Screenline	Counter-peak direction (as determined by 2022 AM period, for total vehicles)					
	Dir	2001 MT+HT	2016 MT+HT	2022 MT+HT	2001-2016 MT+HT (%)	2016-2022 MT+HT (%)
Halton-Hamilton	W					
6:00 - 10:00		2,633	4,740	4,863	80%	3%
10:00 - 15:00		4,328	7,035	6,886	63%	-2%
15:00 - 19:00		2,386	3,948	4,151	65%	5%
6:00 - 19:00 (13h)		9,347	15,723	15,900	68%	1%
Hamilton Outer Cordon *	OB			(from Hamilton)		
6:00 - 10:00			3,801	4,802	N/A	26%
10:00 - 15:00			6,387	6,966	N/A	9%
15:00 - 19:00			3,489	3,361	N/A	-4%
6:00 - 19:00 (13h)			13,677	15,129	N/A	11%

* IB is inbound to Hamilton. OB is outbound from Hamilton.

3.1.6 Reverse travel

Historically, commuter peak period volumes have been focused on one direction in the AM peak period and then in the opposite direction in the PM peak period. Table 15 summarizes how these patterns evolve over time. The table shows the balance between the peak direction and the reverse direction (directions are appropriate to the time of day). The table also shows the peak compass direction by time of day. It indicates which directions reverse compared to 2016. It also indicates whether the mid-day peak direction coincides with that of the AM or the PM periods. Key points to note:

- Six screenlines have an almost equal balance in 2022 (within 3%), by different times of day. These are Durham East and Durham South in the mid-day and PM, Toronto-Durham in the mid-day, Toronto-Peel in AM, South Halton in the AM and mid-day, and the Hamilton Outer Cordon in the mid-day.[19] Of these, the almost-equal balance is a continuation of 2016 (or earlier) trends at three screenlines: Durham East in the mid-day, Durham South in the mid-day and PM, and South Halton in the mid-day.[20]
- Three screenlines are reasonably well balanced across the day, at upwards of 80% for each of the three time periods: these are Halton-Hamilton, with Durham South and South Halton having balances of 90% and higher. Several other screenlines show a similar balance (upwards of 80%) for individual time periods.
- Two screenlines show reversals of the peak direction at specific times of day, relative to 2016. These are Toronto-Peel in the mid-day (westbound to 2016, eastbound in 2022) and South Halton in the AM (northbound to 2016, southbound in 2022) and the PM (southbound to 2016, northbound in 2022). However, total vehicle volumes in these times are reasonably well balanced, at 92%, 97% and 92% respectively in 2022 – suggesting that the reversals may reflect year-to-year fluctuations or inconsistencies in the 2022 data.
- The peak compass direction varies over the day for all strategic screenlines except Durham East. Stated another way, the mid-day peak direction is the same as that of the AM for six strategic screenlines and the PM for the other six screenlines, although five screenlines are almost equally balanced in the mid-day (Durham East, Durham South, Toronto-Durham, South Halton and Hamilton Outer Cordon).
- As noted, over the course of the day it can be expected that travellers will return

[19] Toronto-York is almost equally balanced in the PM. However, this includes only municipal roads: no 400-series data are available for 2022.

[20] Three percent is an arbitrary threshold, based on judgement. Several other screenlines had balances in the low 90 percents, as can be seen in Table 15.

to the origin – that is, trips will be balanced over the 13h period. The table shows this is not always the case for 2022, or for 2001 and 2016. The imbalance likely reflects trips that are made outside the 13h period, missing data (for 2022) and the inclusion of long-haul truck trips in the counts (which do return the same day).

These findings provide indications of directional balances and shifts. However, given the 2022 data gaps, it is difficult to discern broad patterns definitively. These findings should be considered with caution.

Table 15. Directional balance, total vehicles – 2001, 2016 and 2022

Screenline	2022 directional balance						
	2001	2016	2022	Balanced (w/in 3%)	Reversed dir wrt 2016	Mid-day pk dir	Peak direction by period
Durham East							
6:00 - 10:00	59%	76%	77%				W/S
10:00 - 15:00	99%	98%	98%	X		AM	W/S
15:00 - 19:00	66%	81%	98%	X			W/S
6:00 - 19:00 (13h)	98%	100%	92%				W/S
Durham South (Taunton Rd)							
6:00 - 10:00	83%	96%	92%				S
10:00 - 15:00	94%	98%	98%	X		PM	N
15:00 - 19:00	94%	97%	98%	X			N
6:00 - 19:00 (13h)	95%	97%	99%				S
Toronto - Durham							
6:00 - 10:00	35%	42%	53%				W
10:00 - 15:00	95%	89%	100%	X		PM	E
15:00 - 19:00	49%	62%	70%				E
6:00 - 19:00 (13h)	91%	86%	95%				W
York-Durham							
6:00 - 10:00	37%	45%	44%				W/N
10:00 - 15:00	98%	92%	93%			PM	E/S
15:00 - 19:00	47%	47%	46%				E/S
6:00 - 19:00 (13h)	97%	97%	95%				E/S
York-Peel							
6:00 - 10:00	75%	71%	79%				E
10:00 - 15:00	95%	95%	90%			AM	E
15:00 - 19:00	74%	84%	90%				W
6:00 - 19:00 (13h)	100%	94%	94%				E
Toronto-York							
6:00 - 10:00	73%	75%	75%				S
10:00 - 15:00	100%	100%	94%			AM	S
15:00 - 19:00	85%	81%	98%	X			N
6:00 - 19:00 (13h)	96%	99%	91%				S

Table 15. Directional balance, total vehicles – 2001, 2016 and 2022

Screenline	2022 directional balance						
	2001	2016	2022	Balanced (w/in 3%)	Reversed dir wrt 2016	Mid-day pk dir	Peak direction by period
Toronto-Peel							
6:00 - 10:00	78%	81%	98%	X			E
10:00 - 15:00	96%	88%	92%		X	PM	W
15:00 - 19:00	91%	98%	75%				W
6:00 - 19:00 (13h)	94%	89%	89%				W
Peel - Mississauga N							
6:00 - 10:00	56%	85%	68%				S
10:00 - 15:00	100%	97%	80%			AM	S
15:00 - 19:00	55%	89%	88%				N
6:00 - 19:00 (13h)	97%	98%	86%				S
Peel-Halton							
6:00 - 10:00	56%	81%	82%				E
10:00 - 15:00	95%	96%	92%			PM	W
15:00 - 19:00	63%	86%	78%				W
6:00 - 19:00 (13h)	100%	100%	95%				W
South Halton (Dundas St)							
6:00 - 10:00	79%	92%	97%	X	X		S
10:00 - 15:00	93%	100%	97%	X		AM	S
15:00 - 19:00	96%	93%	92%		X		N
6:00 - 19:00 (13h)	93%	100%	98%				N
Halton-Hamilton							
6:00 - 10:00	57%	73%	82%				E
10:00 - 15:00	92%	99%	89%			AM	E
15:00 - 19:00	72%	69%	89%				W
6:00 - 19:00 (13h)	92%	96%	94%				E
Hamilton Outer Cordon							
6:00 - 10:00	N/A	75%	66%				IB
10:00 - 15:00	N/A	88%	100%	X		PM	OB
15:00 - 19:00	N/A	64%	81%				OB
6:00 - 19:00 (13h)	N/A	88%	97%				IB

3.2 Factors influencing travel in 2022

The 'big picture' review shows that reductions in 2022 passenger volumes (measured by vehicle numbers and, where available, occupancies) occur across the GTHA, countering 2001 – 2016 growth patterns. There are exceptions by time period, mode, location and direction. In contrast, commercial vehicle (MT+HT) volumes continue to grow.

The overall downward pattern is discernable but must be qualified given the significant gaps and inconsistencies in the 2022 data, especially in vehicle occupancies. However, the extent to which the gaps impact the findings – i.e., how real is the downward pattern? – must be considered in light of, continued population growth and ongoing development (even with the pandemic disruptions) and new transportation infrastructure like Highway 418, the Highway 407 extension from Oshawa to Highway 35/115, the Highway 427 extension and the TTC Line 1 subway extension. The increased truck activity is evidence of continued economic growth, even with the pandemic disruptions, inflation and other factors.

The 2022 TTS offers insights into the downward pattern. A preliminary comparison with the 2016 TTS shows clear reductions in travel activity across the GTHA.

Table 16 is derived from an origin-destination (OD) matrix of 24-hour person-trips among the six municipalities that comprise the GTHA study area. The upper part of the table shows differences between the 2016 and 2022 TTS. The lower part of the table shows the percentage differences that these represent relative to the 2016 ODs.

Overall, there are 800,000 fewer trips in 2022 compared to 2016 – a reduction of -6%. The greatest reductions occur in trips to, from and especially within Toronto (-14% origins and destinations, as well as trips to, from and within Peel (-6% origins and -7% destinations). Elsewhere, there is a mix of inter-municipal reductions (mostly) and a smaller number of increases. Intra-municipal increases also are apparent in Durham, York, Halton and Hamilton, although a more spatially granular analysis of the TTS would be needed to show definitively how these relate to changes at the screenlines within each municipality. These findings are consistent with the changing role of the denser, built up GTHA cores whose historical attraction as multi-purpose activity 'magnets' may be mitigated by increased remote working, schooling, shopping (e-commerce) and other remote activities. The remote activities in turn facilitate short trips to local restaurants, services and so on. While the TTS results are preliminary and more research is needed, these tendencies are broadly consistent with those observed in other post-pandemic household travel surveys in which the consultant has been involved.

FROM: \ TO:	CITY OF TORONTO	DURHAM	YORK	PEEL	HALTON	HAMILTON	REGION TOTAL
CITY OF TORONTO	-551,800	-29,400	-87,500	-65,000	-15,300	200	-748,900
DURHAM	-27,700	93,900	-1,600	-700	400	-100	64,300
YORK	-90,100	-1,600	102,500	-9,300	600	-700	1,200
PEEL	-64,500	-500	-9,900	-62,700	-16,600	-500	-154,800
HALTON	-14,600	600	300	-16,900	75,300	-8,300	36,300
HAMILTON	-600	100	-700	-800	-7,500	7,300	-2,200
REGION TOTAL	-749,400	63,000	3,000	-155,500	37,000	-2,200	-804,000

FROM: \ TO:	CITY OF TORONTO	DURHAM	YORK	PEEL	HALTON	HAMILTON	REGION TOTAL
CITY OF TORONTO	-12%	-22%	-20%	-20%	-26%	1%	-14%
DURHAM	-21%	10%	-4%	-6%	27%	-10%	6%
YORK	-20%	-4%	7%	-11%	6%	-20%	0%
PEEL	-20%	-5%	-11%	-3%	-13%	-3%	-6%
HALTON	-25%	43%	3%	-13%	10%	-10%	3%
HAMILTON	-3%	11%	-21%	-4%	-9%	1%	0%
REGION TOTAL	-14%	6%	0%	-7%	4%	0%	-6%

Table 16. Reductions in GTHA 24h person-trips, all purposes, TTS, 2016 to 2022

Source: RA Malatest, prepared for the Ontario Ministry of Transportation. **Preliminary. For use in this analysis only. May be subject to change in final TTS reports.**

Blue colouring indicates increased ODs, with the greatest percent increases shown in the most intensive shading. Pink colouring indicates reduced ODs, with the greatest percent reductions shown in the most intensive shading.

Percentages rounded to nearest unit.

Table 17 summarizes the 24h home-to-work person-trip ODs. Here, a -25% reduction is observed - a reduction of 639,300 person-trips (equivalent to 80% of the total daily reduction). The reductions are focused on trips to, from and within Toronto and Peel, as before, but also between and within most other municipalities as well. These results are consistent with the observed reductions in screenline count volumes during the 4h AM and PM periods, which are further evidenced by a -19% reduction in total ODs and a reduction of -30% in home-to-work ODs in the AM peak period.

It should be noted that daily person-trip rates have dropped since 2016 – that is, people are making fewer trips than before. Overall reductions range from -6.3% among Hamilton residents and -7.5% among Durham residents, to -10.2% among York and Halton residents, -13.0% among Peel residents and -14.0% among Toronto residents.

It is recognized that the comparisons are inexact and that the findings should be considered as indicative: The TTS and the cordon counts were conducted at different times of the year. The TTS covers different time periods than the counts – namely, a 24h day (versus 13h counts) and a 3h AM peak period (6:00 – 8:59 am versus the 4h block). The ODs do not consider trips to or from locations beyond the six municipalities. The home-to-work trips are directional – they do not consider the return-home trip. Trips observed in the screenline counts are made by residents and non-residents of each jurisdiction. Note also that the TTS data refer to trips made by individuals 11 years of age and older – no age distinction is made in the counts. **Nonetheless, the findings serve as an important and necessary validation of the overall downward pattern in travel activity across the GTHA.**

Other, still-ongoing factors such as the transition to a hybrid working arrangement, a changing economy and inflation likely also impact travel behaviour. Additional research is needed to fully understand the factors that influence the 2022 counts, and how these relate to the data gaps, contractor capacity and different counting methods.

Finally, although a general downwards trend seems consistent with the TTS, significant anomalies and gaps are scattered in the counts. The question arises, then, how and if the 2022 counts should be considered in a future trend analysis? The 2022 counts should be considered, though with some caution and the need to be mindful of the gaps in any trend analysis. The unique, post-pandemic circumstances of the 2022 downwards trend points to the usable 2022 counts as a benchmark, i.e., as a reference point going forward that may or may not be predictable from the pre-2016 growth. In other words, suppose a hypothetical set of 2025 traffic counts shows that 2016 volumes have been recouped. That could imply an ultra-fast growth with respect to the 2022 counts - is it reasonable, then, to assume that this growth rate continues? Or, if 2022 is ignored, are the 2025 volumes appropriate indicators of long-term traffic volumes? Either way, it may be too soon to tell, and longer-term indicators would depend on what one sees in the next set of counts, or in the next TTS or what other, passive data show.

FROM: \ TO:	CITY OF TORONTO	DURHAM	YORK	PEEL	HALTON	HAMILTON	REGION TOTAL
CITY OF TORONTO	-252,500	-700	-22,900	-13,400	-2,400	900	-291,000
DURHAM	-27,600	-8,700	-7,300	-2,300	100	100	-45,800
YORK	-60,200	100	-39,500	-7,600	-400	0	-107,500
PEEL	-42,100	500	-7,200	-65,800	-4,200	-600	-119,400
HALTON	-13,400	100	-1,100	-19,400	-15,600	-2,200	-51,400
HAMILTON	-2,000	0	-500	-500	-7,600	-13,800	-24,300
REGION TOTAL	-397,800	-8,700	-78,200	-109,100	-30,100	-15,400	-639,300

FROM: \ TO:	CITY OF TORONTO	DURHAM	YORK	PEEL	HALTON	HAMILTON	REGION TOTAL
CITY OF TORONTO	-30%	-6%	-22%	-17%	-25%	60%	-27%
DURHAM	-34%	-7%	-28%	-34%	25%	100%	-20%
YORK	-37%	2%	-19%	-25%	-16%	0%	-26%
PEEL	-33%	36%	-20%	-21%	-15%	-20%	-23%
HALTON	-39%	25%	-23%	-35%	-17%	-18%	-26%
HAMILTON	-21%	0%	-29%	-5%	-21%	-11%	-14%
REGION TOTAL	-31%	-6%	-20%	-22%	-18%	-11%	-25%

Table 17. Reductions in GTHA 24h home-to-work person-trips, TTS, 2016-2022

Source: RA Malatest, prepared for the Ontario Ministry of Transportation. **Preliminary. For use in this analysis only. May be subject to change in final TTS reports.**

Blue colouring indicates increased ODs, with the greatest percent increases shown in the most intensive shading. Pink colouring indicates reduced ODs, with the greatest percent reductions shown in the most intensive shading.

Percentages rounded to nearest unit.

4 GOING FORWARD: A COMMON FRAMEWORK

This chapter considers opportunities for future enhancements to the GTHA Cordon Count Program. The chapter examines uses of the counts, and data collection techniques and database enhancements that would support the development of a common but flexible GTHA-wide Cordon Count Program.

4.1 Importance of the counts: current and potential uses

Coordinating Committee members noted that the counts are especially important for the validation of their travel demand forecasting models. The counts serve as a validation of the TTS data expansion. The counts are also used to inform transportation plans and policies, ranging from site planning approvals, corridor-specific environmental assessments and functional plans to long-range transportation master plans.

These applications are all common to transportation plans and analysis in other major cities across Canada and elsewhere. Users tend to be the Coordinating Committee members, local municipalities and their consultants.

The counts also lend themselves to other potential applications. These reflect emerging transportation and non-transportation applications:

- **Dynamic changes.** Many profound short-term changes in travel behaviour may impact long-term investments and priorities. Notable are the post-pandemic reductions in transit ridership, which impact revenue streams and the provision of service; remote activities that have altered travel patterns (working, schooling, personal appointments, purchasing and more); economic fluctuations due to supply chain disruptions; and the emergence of new mobility technologies. The dynamism of these changes – such as the evolution of the hybrid work environment and consumers' demands for 24/7 deliveries of their purchases - implies the need for an ongoing understanding of how infrastructure is used. Periodic data collection also misses intervening changes, which can be profound.
- **More frequent travel surveys.** Some urban areas in Canada and elsewhere are moving to small-sample continuous or annual household travel surveys to replace or complement their periodic large-sample household travel surveys. Calgary has had a continuous survey since 2012 and will soon be partnering with Edmonton on the next generation of these surveys. Ottawa-Gatineau is examining the feasibility of a continuous or annual survey. Agencies noted it was easier to secure smaller-scale funding over an extended period rather than a single big 'ask.' They also noted the improved ability to report on the dynamic changes described above, especially in response to public and political queries. They similarly noted benefits to modelling and forecasting these changes.

- **Mid-day travel.** This analysis has illustrated the importance of documenting mid-day travel, to accommodate growing and changing demands for the movement of both people and goods, local (within the GTHA) and long-haul, that occur outside the two commuter peaks.
- **Monitoring and evaluation.** The counts can inform funding priorities, the evaluation of planning alternatives, and program indicators and outcomes. For example, some municipalities (e.g., Calgary) have adopted network performance indicators, whose regular reporting would be informed by counts.
- **New planning tools.** Multi-modal approaches to providing traveller choices and making the optimal use of corridor capacity are well established in planning practice. Municipalities have adopted new tools to support these approaches, such as multi-modal level of service guides and measuring accessibility. Multi-modal counts are important for supporting these new tools.
- **Emerging issues.** Understanding travel impacts on equity, health and other profound, emerging municipal issues. For example, the counts could be used to inform or validate estimates of air quality along individual corridors.
- **Benchmarking.** The counts can serve as a benchmark starting point for detailed studies to address public concerns about auto traffic or, especially, truck traffic in safety studies, truck route network plans and other initiatives.
- **Informing budget priorities.** Constraints on municipal capital and operating budgets can require finer-grained assessments of the impacts of planned improvements. For example, the counts could inform the prioritization of candidate roads for scarce state-of-good-road-repair funding. The counts can also inform cost-sharing decisions on roads that use multiple jurisdictions.
- **Resiliency and disruptions.** Improving network resiliency and managing climate disruptions are emerging topics on the horizon. Both topics potentially impact budgeting, the costs of insurance premiums, emergency responses and contingency plans for moving goods and people. The counts provide a clear understanding of how individual roads are used and can inform how road closures and other disruptions would impact network capacity, emergency route plans and priorities.
- **Complementary data.** Finally, the availability of ‘Big Data’ and the emergence of machine learning have significantly expanded the ability to profile and understand travel behaviour and how it varies spatially and temporally. Even as their capabilities expand, there will still be an ongoing need for counts and other established data to validate the new sources and tools, fill in gaps, and more.

In sum, the counts’ primary applications likely will continue to be for transportation planning analytics. However, the emerging topics presented above point to other

potential applications that could attract interest and support from other users within and outside the transportation realm.

4.2 Data collection approaches

This discussion considers the methodological challenges of conducting the counts and ways to address them. To recap, these challenges include data gaps (especially occupancies), inconsistencies in how the data are collected, changing and inconsistent definitions, and contractor availability - all of which must be considered in the context of post-pandemic funding constraints. Details are provided in section 1.3.

As noted, the counts commonly have been conducted manually (observers in the field who can record different vehicle types and, to some extent, their occupants) or by using automatic traffic recorders (ATRs to discern vehicle types but not their occupants. Manual counts typically are conducted for a single day (more precisely, during daylight hours) while ATR counts can be conducted over a 24h or longer period. Manual counts must be staffed, whereas ATR counts require staff to set up, take down and occasionally monitor the equipment. Both types of counts require post-processing. Neither system is failure-safe: manual counts can be subjected to observer error, and unattended ATR devices can malfunction.

4.2.1 Data collection technologies and data sources

Two considerations are pertinent to this discussion. The first concerns the availability of new **electronic technologies and data sources**. These potentially can obviate some of the challenges associated with manual and ATR counts:

- **Electronic visual detection technologies** can track vehicles as they pass by, thereby replacing the manual observations. They offer precision, the ability to distinguish among different vehicle classes, coverage over extended durations and increased analytical capabilities (e.g., tracking of day-to-day or seasonal variations). Miovision is one example, with several GTHA municipalities having permanent installations.[21] Analytical summaries can be provided by vehicle class or groups of classes, time of day and duration according to the subscriber's needs.

  However, the technologies cannot count vehicle occupants. **Apps** have been tested for specific applications – notably, to monitor compliance on HOV lanes. However, the practical status of these apps is not known.[22] Conceivably, if/as

[21] Miovision is described here as an example of the technology. The discussion is not meant as an endorsement of a specific vendor.

[22] Consultant's discussion with Olivia Babcock of Miovision, 1 November 2024.

reliable apps are developed for this purpose, they also could be applied to autos, light trucks, cabs, paratransit vehicles and mini-buses.

The consultant was not able to identify apps that visually track transit vehicle occupancy. However, other electronic data sources potentially could be linked to the counts, as part of a post-processing of the counts. For example, some transit signal priority systems use automatic passenger counters (APC) to trigger the signal if an approaching bus has a certain level of occupancy (e.g., a bus that is 75% or more full).[23] The Toronto Transit Commission deploys the Transit app, which uses APC data to alert customers of the occupancies of approaching transit vehicles, measured in ranges (up to 30% is not busy, up to 80% is busy, more than 80% is very busy).[24] Conceivably, the APC counts could be linked to a bus observed at a specific station, time and direction, as part of a post-processing of the data. GO Bus ridership data could also be investigated. (This is conceptually akin to the incorporation of GO Rail ridership data in the CCDRS, albeit at a much larger scale.)

School bus occupancies conceivably could also be added after the counts are completed, in consultation with the relevant school board.

Because the technologies offer 24/7/365 coverage, they could be used to validate the existing CCDRS counts and interpolate between count years.[25]

- **GPS trip traces** offer 24/7/365 trip origin-destination patterns, as well as precise routings and time stamps. These features offer a means to enhance spatial and temporal coverage, fill in data gaps, and examine day-to-day and seasonal variations. These data are already used in the GTHA. The City of Edmonton used StreetLight to fill in gaps that resulted from the cancellation of the city's 2020 (pandemic) counts. Older StreetLight data were used to discern shifts in travel patterns arising from the pandemic and allow a more granular calibration of the city's travel demand forecasting model.[26] [27]

  Although the GPS traces do not constitute an alternative to counts, the Edmonton experience shows how the traces could be used to validate existing

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[23] Ibid.

[24] *Real-time Bus Occupancy Information*, Toronto Transit Commission, no date (https://www.ttc.ca/riding-the-ttc/Real-Time-Bus-Occupancy-Info).

[25] Olivia Babcock discussion. In the GTHA, many of the Miovision installations are operated by local municipalities, whose permission would be needed for use with the CCDRS data.

[26] StreetLight is described here as an example of the technology. The discussion is not meant as an endorsement of a specific vendor.

[27] *Using Big Data to Address Data Gaps and Validate Travel Demand Models*, StreetLight case study, no date, www.streetlightdata.com.

counts, fill in gaps, provide additional spatial granularity and potentially extend the counts temporally (e.g., to 24 hours or to different seasons of the year). The GPS traces could also be used to interpolate between count years. GPS traces offer the benefits of 'force of numbers,' though it is important to note that the data sources, expansion methods and the spatial/temporal granularity of the expansion, and the usability of the data for capturing multi-modal activity are uncertain.

- **Permanent count station** (PCS) data could be used to validate periodic counts and to interpolate between count years. For example, the City of Calgary has 30 PCS across the city, which supplement counts that are conducted on its other roads. The PCSs allow Calgary to monitor changes, inform the reporting of annual network performance metrics, and validate the manual counts. The permanent count data also support Calgary's continuous household travel survey. However, although at least some of the six GTHA partners have PCS count stations, it is not clear whether the PCSs can distinguish among vehicle classes or whether they record only total vehicles.

4.2.2 Data collection cycle

The second consideration is the development of a **cycle** in which the counts could be conducted. The idea is to have a set frequency for the counts, perhaps tied to the Census year (which is also the TTS year). The GTHA-wide cordon counts, at least for the strategic screenlines analyzed in this report, adhere to this cycle (2022 is an exception, most likely due to the pandemic and the related delay of to the TTS). There are intervening counts at two- and three-year offsets.

Ottawa-Gatineau deployed a five-year cycle for many years. The entire region was counted every fifth year. Some strategic screenlines were also counted annually. All other screenlines were counted at least once in the intervening years. The City of Ottawa's use of Miovision now yields the data at any time, although the city must pay for whatever periods are desired: in other words, a cycle could still be developed, and it should be noted that the City of Gatineau uses other methods for its counts, in collaboration with the Provincial ministry of transportation.

Drawing on Ottawa-Gatineau's cycle, a cycle would provide a regular pattern of counts across the GTHA. The idea is that the same resources – e.g., Miovision or similar – could be deployed across the GTHA with the costs spread over multiple years and apportioned according to the number of count locations in each jurisdiction. A contractor could be engaged for the five-year period, to supply Miovision (or similar) for the counts or otherwise conduct the counts in a consistent manner. The contractor would also be responsible for validating and editing the data each year and for developing a clean and consistent dataset to be uploaded to the CCDRS. The cycle would focus on the

strategic screenlines analyzed in this report: the partner municipalities could count other locations according to need, as long as the count classifications, durations, etc., were consistent with those used for the strategic screenlines' cycle.

The deployment of a multi-agency cycle could strengthen the financial support for the counts among individual municipalities, because the counts are now part of a GTHA-wide data framework. In this way, agencies would not be competing for scarce contractor resources (which raises costs), with budgeting spread out over time.[28] Assuming that all municipalities participate in the first year of the cycle as the full GTHA-wide strategic count, then the loss of funding by one municipality for an intervening year would limit the impact on the overall count integrity.

4.3 Database

The CCDRS is a unique compilation of the six municipalities' counts over several years. The compilation offers users a single source for accessing the data. However, the data are stored as provided by the source, which results in inconsistencies in the data's ordering and so on. This makes it difficult to conduct comparative analysis. The data are also output in text format, which must be imported to other packages for analysis. In its current state, it would be difficult to develop visualization and links to other data sources that could greatly expand the use of this resource.

The 2008 trends study recommended the development of a relational database management system in a GIS-based environment.[29] This study echoes that recommendation. This would greatly enhance the accessibility and usability of the CCDRS data – for example, by showing the location of individual stations and screenlines (which now must be interpreted manually, as noted in the 2008 study). A more flexible database environment also facilitates linking the CCDRS data to other databases like travel times (as proposed by one of the partners): more broadly, it would support the ability of users to define custom queries, which could be shared.

In the interim, several short-term measures could quickly enhance the usability of the data. These measures would offer immediate benefits to users. They also serve as

[28] This is not to minimize possible operational constraints, such as staff shortages and the practicalities of setting up, monitoring and take down of limited counting infrastructure. These constraints would have to be factored into the development of the cycle, budgets, schedules and so on. The idea is that these could be better coordinated and the constraints more easily addressed as part of a coordinated multi-agency initiative, rather than each agency separately seeking pursuing the same limited resources.

[29] MMM Group, *Greater Toronto Area Cordon Count Program, Transportation Trends 1991-2006, Technical Report*, prepared for the Data Management Group, 2008.

essential steppingstones to a more flexible database environment. The consultant recommends that the partners:

- Conduct a detailed review of the CCRDS data, to ensure that data are consistently coded and stored. For example, the order in which directional data are presented for some counts varies between years and, in some instances, by time period within the same year. This requires additional verification before the data can be analyzed, once exported.
- Prepare updated reference materials, including lists of screenline and station numbers and names, updated maps that show the screnlines and stations clearly, and an updated list of the vehicle classifications that were used in each partner's most recent counts. Where neighbouring municipalities have divided a boundary screenline's counts between them, the numbering used by both municipalities should be referenced. The CCDRS data should also be consistent with these reference materials (e.g., the database vehicle classifications occasionally differ from those in the vehicle classification list). A summary of each municipality's data collection methods would provide further insight.
- Update the CCDRS software to enhance flexibility and add capabilities. For example, the CCDRS returns an error message without specifying the cause (e.g., if a vehicle or occupancy class does not exist for a particular year or count period). Nor does the presentation of data in the software highlight or identify gaps in years, null data and so on, making it difficult to understand and use the data.[30] Allowing multiple time periods over multiple years and multiple municipalities in the same query would simplify the use of the data. Additional capabilities could include the development of AADT, day-of-week, weekday/weekend and seasonal factors that could be attached to the CCDRS count records and applied by CCDRS users if/as they desire.[31] Other capabilities could include linkages to other databases: it can be noted that the City of Toronto recently released its classification counts to open data.[32] The Users' Manual would have to be updated to reflect these enhancements.

[30] If the query asks for multiple vehicle classes and/or occupancies, and one of these is missing, the query is rejected without identifying which class or occupancy is missing. A workaround is to include "total vehicles" (i.e., all available vehicles) in the query: in this way, the query is processed and the problematic field is shown with a "0" in the response. However, the process is not intuitive and requires some trial-and-error to discern.

[31] These factors would have to be developed by each of the six municipalities for their own data – for practicality, it would be meaningful to focus on the most recent data (2016 and 2022).

[32] *City of Toronto publishes new transportation datasets that highlight travel trends and support traffic management actions*, City of Toronto news release, 31 January 2025. See also

4.4 Definitions

This section proposes a common set of definitions for the future conduct of the counts. There are two types: vehicle classifications and temporal.

A common set of **vehicle classifications** greatly simplifies analysis and comparison, even for screeenlines that are located entirely within the same municipality. The classifications used by individual municipalities have evolved over the years. However, many definitions are now common among the municipalities. Going forward, the consultant recommends the following for the Coordinating Committee's consideration:

- Ensure definitions among all vehicle types are clear and consistent, using FHWA's vehicle category classification.[33]
- Retain the four auto occupancy classes (1 through 4+ occupants), and include four occupancy classes for passenger light vehicles as well (according to York Region's definition). Consider a separate category for commercial light vehicles, counting only the vehicles and not the occupants: while likely impractical for all counts, separate counts at a sample of stations and time periods might offer insights as proxies for, say, different types of roads (expressways, arterials, collectors) and contexts (urban, suburban, rural) that could be applied, or not, as individual municipalities desire.
- For consistency, it may be useful to retain the same number of categories for cabs. However, given the very small numbers of cabs and depending on how the data are collected, it may be practical to reduce the number of categories, to driver (1 occupant) or driver + passengers (2+ occupants).
- Transit is now mostly grouped into 'municipal' and 'intercity' categories, which should be retained with occupancies sourced as described in section 4.2.1. Consideration should be given to distinguishing municipal bus and municipal rail transit (streetcars, LRT and subway).
- Retain school bus, GO Bus and GO Rail as is, with occupancies sourced as described in section 4.2.1.
- For trucks, a distinction should be made between single units and articulated (tractor-trailer) units. Current designations vary among the municipalities, and it is difficult to ascertain the differences between 'medium trucks' and 'heavy trucks,'

https://open.toronto.ca/dataset/traffic-volumes-midblock-vehicle-speed-volume-and-classification-counts/.

[33] *Traffic Monitoring Guide, Appendix C Vehicle Types*, US Federal Highway Administration, as of 7 November 2014.

and whether the latter includes articulated units (tractor plus one or more trailers) or is limited to single units. To address this, the consultant recommends that the Coordinating Committee consider the following three categories for trucks: medium (single units), tractors with one trailer and tractors with multiple trailers:

  - Define the truck classes according to the FHWA vehicle classification scheme. For example, medium trucks would comprise Classes 6 and 7, trucks with one trailer would comprise Classes 8-10 and trucks with multiple (two) trailers would comprise Classes 9-13.
  - The distinction between vehicles with one trailer and vehicles with multiple (i.e., two) trailers clarifies the current definition. It also potentially allows long-combination vehicles (LCVs) to be distinguished: though they are limited to designated routes on 400-series highways and on designated municipal routes to/from the highways,[34] industry demand for LCVs is growing.
  - Commercial light trucks with trailers should be considered as light trucks (i.e., a single category for commercial light trucks, regardless of the number of trailers). These would be grouped under FHWA Classes 3 or 5. If commercial and personal light trucks can be differentiated reliably, then commercial light trucks could be tabulated as a separate category (they are not included in the MT + HT analysis included in this report).
- Some municipalities count bicycles, pedestrians and all-terrain vehicles. There may also be interest in other, new types of vehicles, not otherwise counted but now in the TTS (such as e-scooters). The Coordinating Committee should consider the interest and demand for including these categories throughout the GTHA (recognizing that these categories may be applicable only at certain stations), or whether they should be deployed only where desired.

Common **temporal definitions** should be developed. Going forward, the consultant recommends:

- Consider starting all counts at 5:30 to capture early morning activity. (This would entail an earlier start to Toronto's, Halton's and Hamilton's counts, from 6:00 in 2022, as summarized in Table 2.)

[34] *Long Combination Vehicle Program*, Ontario Ministry of Transportation, published 28 March 2022, https://www.ontario.ca/page/long-combination-vehicle-program.

- Consider extending all counts to 20:00 to capture evening activity. (This would not preclude Peel's 20:30 cut off.)[35]
- Continue to summarize the data by 15-minute intervals in the CCDRS.
- Consider conducting 24h counts at selected strategic locations, to capture nocturnal truck and other activity.
- Investigate the practicality and utility of developing day-to-day, weekday/weekend and seasonal variation factors from an electronic visual detection technology (if these technologies are deployed, i.e., Miovision or similar) to incorporate into the CCDRS database. Users could have the option of using these factors, if/as they desire.

4.5 Recommendations: A framework for the GTHA cordon counts

Drawing from the preceding discussions, this section offers recommendations for developing a framework for conducting future GTHA cordon counts. The underlying principle is **consistency**: the GTHA is a major integrated metropolitan region and is the key driver of Ontario's and the nation's economy. This means that travel behaviour in one GTHA municipality affects travel in the neighbouring municipalities – this is true for the counts as it is for the TTS. A GTHA-wide framework potentially offers economies of scale that could reduce individual municipalities' costs.

The framework has four components:

- **Set the stage:**
  - Make short-term updates to enhance the usability and accessibility of the CCDRS database, including a review of the database and transitioning to an updated, GIS-compatible database environment. Section 4.3 provides details.
  - Adopt common definitions for vehicle classes and count durations. Section 4.4 provides details.

- **Develop a cycle for GTHA-wide counts** – ideally, in the TTS / Census year (every fifth year). This spreads the funding and resource requirements while promoting consistency and minimizing gaps. This has several components:

[35] The purpose of these extensions is to provide temporal consistency. However, future trends studies or annual reports might require redefinitions of the 4h – 5h – 4h time blocks used in the current analysis.

- Use the same count method for the cycle, focusing on using an electronic visual detection technology (Miovision or similar) for the cycle.
- Focus on the strategic screenlines (the 12 sets of screenlines that are included in this study's screenlines, as shown in Figure 1) as the cycle's anchor, counted together in the first or fifth year.
- Count strategic screenlines at least once within the intervening years, at an agreed set interval that allows each municipality's strategic screenlines to be counted in the same year.
- Municipalities can count other 'internal' screenlines at desired times within the cycle. Count methods could vary (e.g., manual or ATR could be used), as long as the counts are conducted consistently with and validated against the strategic counts. It is important that these counts are integrated within the CCDRS, even if their main purpose is for internal municipality-specific uses like municipal model calibration: this ensures complementarity with the strategic screenlines, should a broader application be needed).

- **Add incremental analytical capabilities and connectivity with other data sources:**
  - Ensure that all count data (both the strategic screenlines and the internal screenlines) are integrated within the CCDRS consistently and reliably, according to the definitions and data quality protocols described in the preceding tasks.
  - Implement new or activate existing PCS locations within the GTHA to monitor changes and validate counts.
  - Use StreetLight or similar GPS data vendors to validate counts and fill in gaps, recognizing limitations with respect to the usability of these data for modes other than the dominant auto. Some municipalities are using GPS data for other applications, like travel model development, which potentially allows the subscription costs to be be shared.
  - Monitor the state of vehicle occupancy apps for potential use in capturing occupancies for autos, cabs, light trucks and paratransit and, in the interim, review existing manual occupancy counts to ascertain data quality, usability and representativeness to potentially serve as proxies where such data are missing from the CCDRS counts.
  - Develop algorithms to integrate occupancy (ridership) data from municipal and regional transit as well GO Bus and GO Rail with the corresponding CCDRS data.

- Consider adding other capabilities like adding AADT factors to the count records that users could deploy at their discretion.
- Consider developing GIS tools to visualize CCDRS data with other transportation data like travel times and speeds. Consider also broadening these applications to non-transportation data bases like population density and land use.

- **Communicate the data:**
  - Develop a library of queries and data tabulations developed by users that can be accessed by all CCDRS subscribers.
  - Develop summary profiles and findings at regular intervals, tailored to technical audiences (e.g., methodological studies and research) and non-technical audiences (e.g., summary profiles that could be presented to municipal council).
  - Collaborate with other governmental ministries and researchers to explore how the counts could be applied to non-traditional uses like equity considerations. This could open an opportunity for additional sponsors for the counts.
  - Investigate opportunities for Federal government applications of the data, to support initiatives such as research on trade flows and Transport Canada's current supply chain management strategy. This could open an opportunity for the Federal government to help sponsor the data collection.