2001 GTA CORDON COUNT

TRANSPORTATION TRENDS 1991-2001

TECHNICAL REPORT

Prepared on behalf of:

Ministry of Transportation, Ontario
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
City of Toronto
Toronto Transit Commission
GO Transit

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This report was prepared on behalf of the GTA Transportation Research and Data Management Group, which includes representatives of:

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Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
City of Toronto
Toronto Transit Commission
GO Transit
Data Management Group, University of Toronto

Each of these agencies has participated in the collection, validation, storage, and maintenance of the Cordon Count data and related information systems.

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HIGHLIGHTS

Based on a comparison of Cordon Count data from 1991 and 2001, the following have emerged as key trends in transportation across the GTA:

Significant growth in the number of vehicles crossing GTA and regional boundaries…

- Growth typically in excess of 40% over ten years…
- A high rate of growth for trips between the '905' regions and those entering and leaving the GTA…
- Changes in travel patterns resulting from the opening of Highway 407…
- Little change in vehicles entering and leaving Toronto's Central Area…

Steady growth in inter-regional trips on GO Rail but a decline in the use of transit and other bus services for these trips…

- Typically 30% to 40% growth in GO Rail ridership at all screenlines where service is provided…
- Decline or no change in the use of transit and other bus services for inter-regional trips…

General decline in the number of persons carried, on average, in each automobile…

- Average auto occupancy has declined since 1991…
- There are 5% to 10% more autos on the GTA road system today than there would be if average auto occupancy had remained at 1991 levels…
- 3+ high-occupancy vehicles (HOV) represent less than 2% of all vehicles during peak periods at most screenlines…

Significant growth in medium and heavy truck crossings of GTA and regional boundaries…

- Truck traffic increased more than passenger traffic between 1991 and 2001…
- Growth in truck traffic was particularly strong in the western part of the GTA and the rate of growth was high between the '905' regions…
- The proportion of medium and heavy vehicles in peak period traffic increased at most screenlines…

Increase in 'reverse flow' during peak periods…

- 'Reverse-flow' traffic has grown more quickly over the last decade than 'peak-direction' traffic at most screenlines…

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose of this Report…

This report presents an analysis of key transportation trends and issues in the Greater Toronto Area (GTA) based on a comparison of 1991 and 2001 Cordon Count data.

This report approaches transportation from a regional, rather than local, perspective. As such, it focuses on regional and inter-regional travel and does not examine local transportation issues. It is therefore complementary to the Cordon Count analyses and reports prepared by the staff of the individual regions and the City of Toronto.

1.2 Background…

The Cordon Count is a periodic counting program involving over a thousand counting stations across the Greater Toronto Area. Its purpose is the collection of data on the utilization of the transportation system to support system planning and programming.

A formal Cordon Count program was first implemented in 1975 in the City of Toronto (then the Municipality of Metropolitan Toronto). Other GTA regions formalized similar counting programs soon thereafter. The Ministry of Transportation also participated in these programs. Although traffic and transit counts had been conducted for years, the Cordon Count was designed from the start as a systematic program to assist in the identification of transportation trends.

Historically, the program has been undertaken biennially. Schedules are now being adjusted so that the Cordon Count program is synchronized with other data collection programs such as the Transportation Tomorrow Survey (TTS) and Statistics Canada Census.

1.3 What is the Cordon Count?

The cordon count program is essentially a one-day "snapshot" of persons and vehicles passing designated counting stations. Historically, the counts are taken on weekdays (except Fridays) during May and early June (before the school year ends) to ensure that the data is as representative of a typical day as possible.

The Cordon Count program is an invaluable source of data on trends in the growth and distribution of travel. The information produced by the program is used for a variety of purposes by both public and private-sector organizations, including the estimation of future transportation needs, capital works planning, the identification and resolution of transportation issues related to new development, and the development of new initiatives such as high-occupancy vehicle (HOV) programs.

One particularly important feature of the Cordon Count program, contributing to its value in trend assessment, is the fact that it has been conducted continuously over a long period of time, 25 years in some cases. The ability to identify trends, based on Cordon Count data in its current comprehensive form, is dependent upon the pooling of resources and coordination of effort among five municipalities, the province, two transit operators, and a data management group.

1.4 How is the Cordon Count program organized?

The count locations are established along screenlines and cordons, designed to provide as much information as possible on travel into, out of, through, and within the GTA. These screenlines are located along municipal boundaries or along barriers (such as highways or rivers - to minimize the number of stations to be counted). Additional screenlines were developed for the current analysis to best illustrate trends from a GTA perspective. Figure 1-1 shows the screenlines that were used for the analysis contained in this report while Figure 1-2 shows supplementary screenlines that were summarized in the tables in the Technical Appendix but not analyzed in detail in this report.

Whereas most previous Cordon Count summaries have been based on relatively standard definitions of the 3-hour and 12-hour peak periods, the time periods most often used in analysis, the current report utilizes peak period definitions that are tailored to specific conditions at each screenline. Peak periods have been defined based on the time distribution of total vehicle crossings in the peak direction at a given screenline and these definitions have been applied consistently over all analyses for that screenline.

When comparing the analyses and data summaries in this report with those in other Cordon Count reports, possible differences in screenline and peak period definitions should be recognized.

1.5 How are the Counts Undertaken?

The counting process involves classifying every vehicle by type and, where appropriate, by the number of occupants. In this way, a complete picture of person movements, as well as vehicle movements, can be generated. The counts are divided into 15-minute intervals and are stored by station to facilitate analysis at various levels of aggregation.

Much of the Cordon Count data is collected manually as this is currently the only practical method to provide the detailed vehicle classification and auto occupancy information required. Automatic counts or estimates have been increasingly utilized as a supplementary source of vehicular volume and classification data. GO Transit and the Toronto Transit Commission provide ridership counts for their services.

At regional boundaries, counting programs are coordinated to avoid duplication.

1.6 Counting Program and Data Administration…

The Cordon Count data is maintained in a database (Cordon Count Data Retrieval System) by the Data Management Group at the University of Toronto under the direction of the Transportation Research and Data Management Group (TRADMAG) which consists of representatives of the Ministry of Transportation, Ontario, the GTA regions, the City of Toronto, the Toronto Transit Commission, GO Transit, and the Data Management Group.

1.7 Organization of this Report

The analysis of trends and issues is organized under the following headings:

- **Overall changes in travel (persons and vehicles)**
- **Mode of travel**
- **Auto occupancy and high-occupancy vehicles**
- **GO Rail, transit, and other bus travel**
- **Commercial vehicles**
- **Use of major road and transit facilities**
- **Peaking characteristics**

Graphics referenced in each section are grouped at the end of the section.

Following the discussion of trends and issues, a review of methodological issues is presented, along with a glossary of terms. A set of tables for each screenline, summarizing the data used in the analysis of trends and issues is presented as a Technical Appendix under separate cover.

A companion Executive Summary provides a synopsis of the key transportation trends across the GTA.

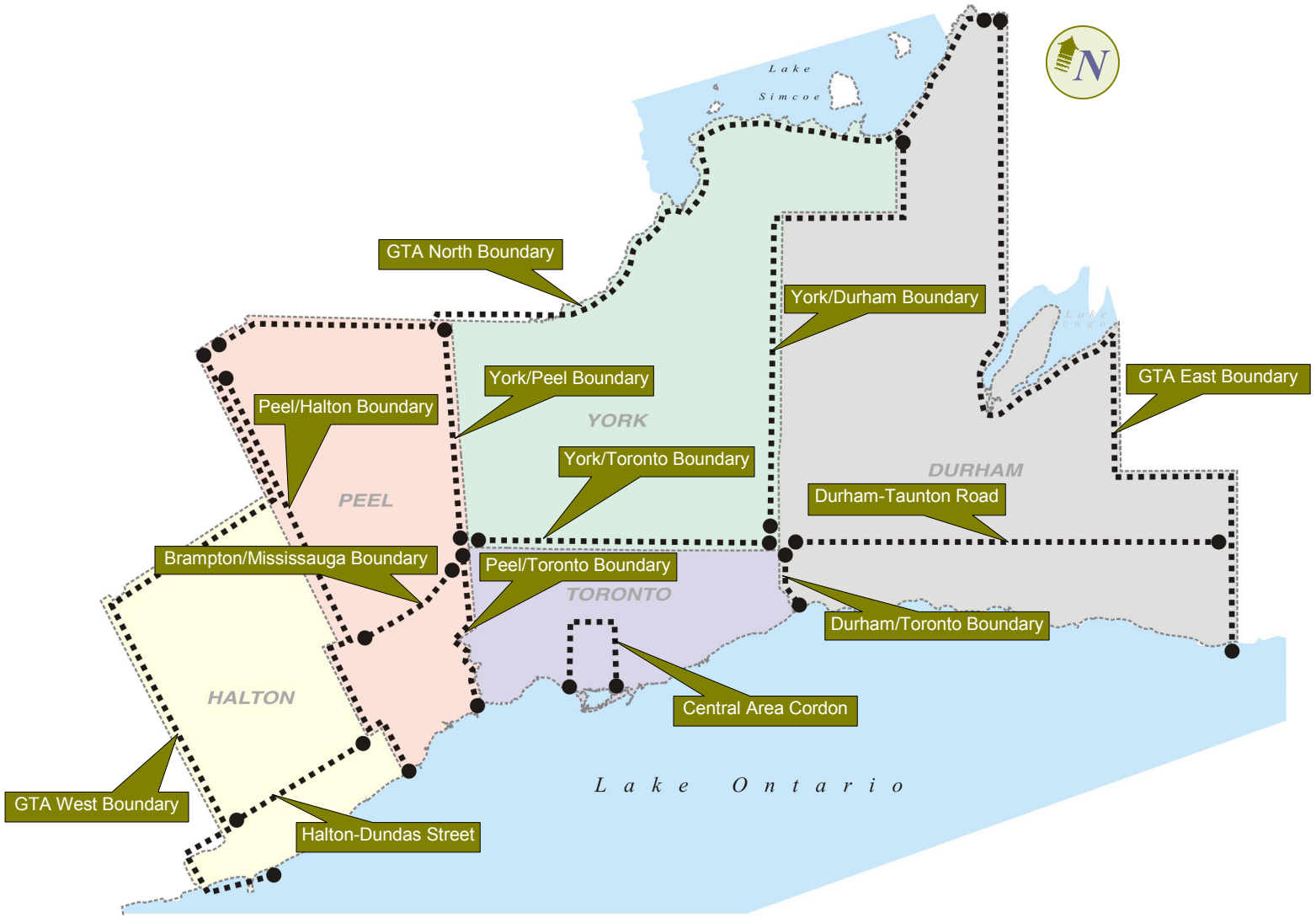


FIGURE 1-1: SCREENLINES INCLUDED IN THE ANALYSIS

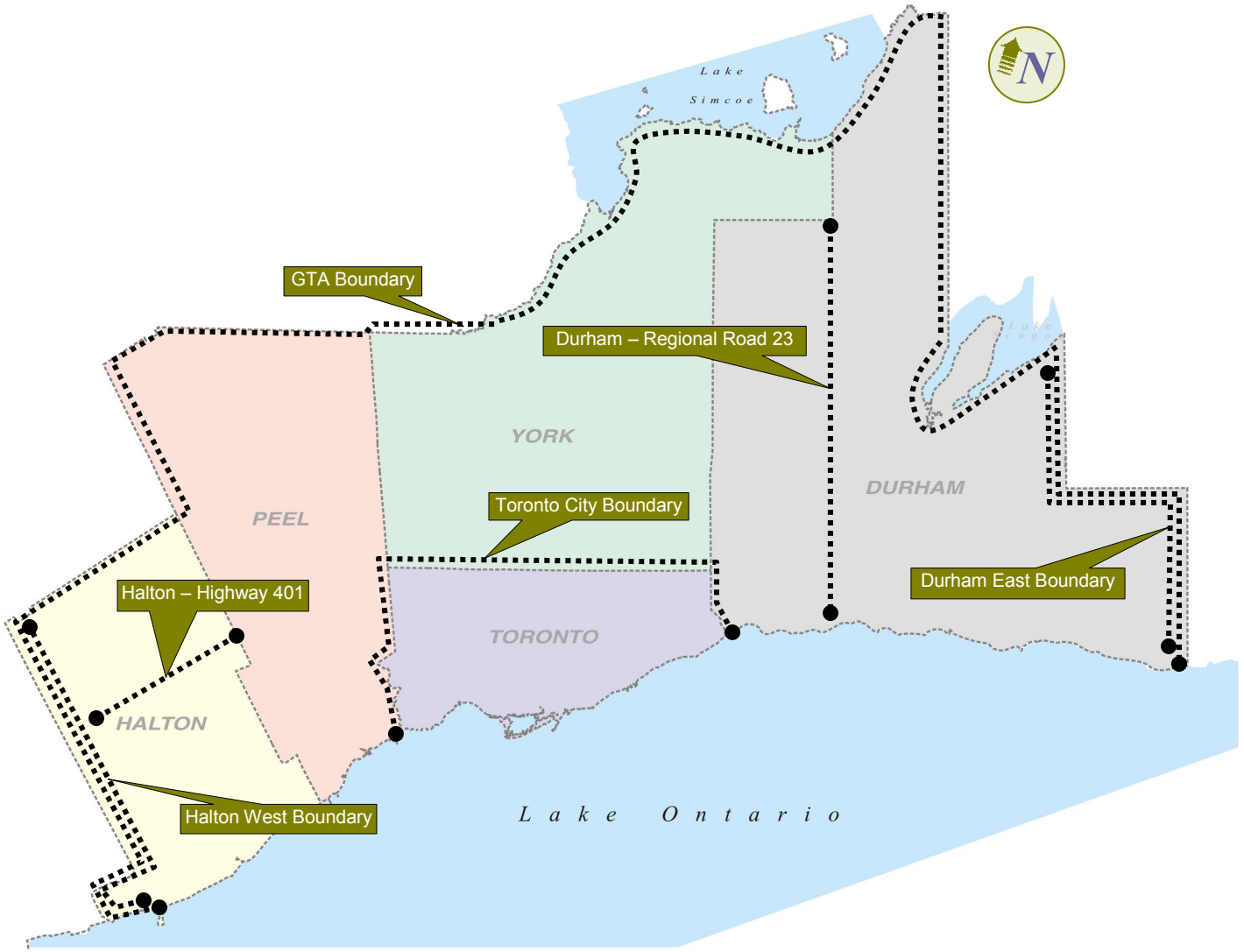


FIGURE 1-2: SUPPLEMENTARY SCREENLINES INCLUDED IN THE SUMMARY TABLES

2 OVERALL CHANGES IN TRAVEL (PERSONS AND VEHICLES)

2.1 Focus…

This section considers overall changes in the number of persons and vehicles travelling across the GTA screenlines during the morning and afternoon peak periods, from a typical weekday in 1991 to one in 2001.

2.2 Refer to…

Figure 2-1 "Change in Number of Persons Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"
Figure 2-2 "Change in Number of Vehicles Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

2.3 Specific Highlights 1991-2001…

- The five screenlines with the highest *numerical* growth in *person* crossings in the peak direction during the morning peak period:

York/Toronto Boundary	+38,900
GTA West Boundary	+19,000
Durham/Toronto Boundary	+16,800
Peel/Halton Boundary	+16,400
Mississauga/Brampton Boundary	+16,100

- The five screenlines with the highest *percentage* growth in *person* crossings in the peak direction during the morning peak period:

York/Peel Boundary	+122%
Durham/Toronto Boundary	+41%
Durham/York Boundary	+35%
Peel/Halton Boundary	+35%
GTA West Boundary	+35%

- The five screenlines with the highest *numerical* growth in *vehicle* crossings in the peak direction during the morning peak period:

York/Toronto Boundary	+42,900
GTA West Boundary	+20,300
Durham/Toronto Boundary	+19,900
Peel/Halton Boundary	+18,800
Mississauga/Brampton Boundary	+17,500

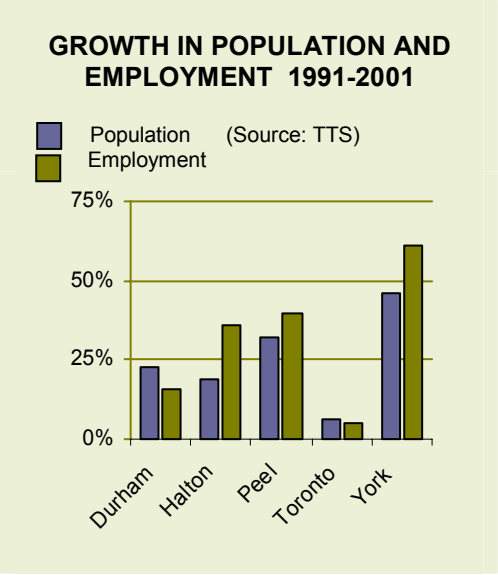
- The five screenlines with the highest *percentage* growth in *vehicle* crossings in the peak direction during the morning peak period:

York/Peel Boundary	+149%
Durham/Toronto Boundary	+61%
GTA West Boundary	+55%
GTA North Boundary	+50%
Mississauga/Brampton Boundary	+47%

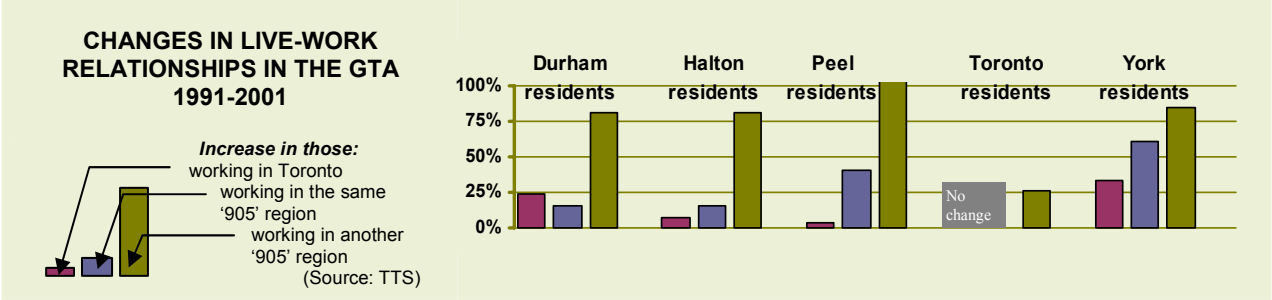
- In most cases, the growth in vehicle crossings was greater than the growth in person crossings.
- In two cases, the Peel/Toronto boundary and the Central Area Cordon, the number of person crossings and the number of vehicle crossings actually decreased in the peak outbound direction during the afternoon peak period.

2.4 Overview of Trends and Issues…

Generally, there has been significant growth in peak period travel throughout the GTA between 1991 and 2001, both numerically and in percentage terms. At most screenlines, growth exceeded 30 per cent over the 10-year period. The growth in travel generally reflects the high rate of growth in population and employment across the GTA, particularly in the '905' regions (see graph below).



Particularly noteworthy has been the high rate of growth in travel between the '905' regions, due in large part to increased interaction between residences in one region and workplaces in another (see graph on next page).



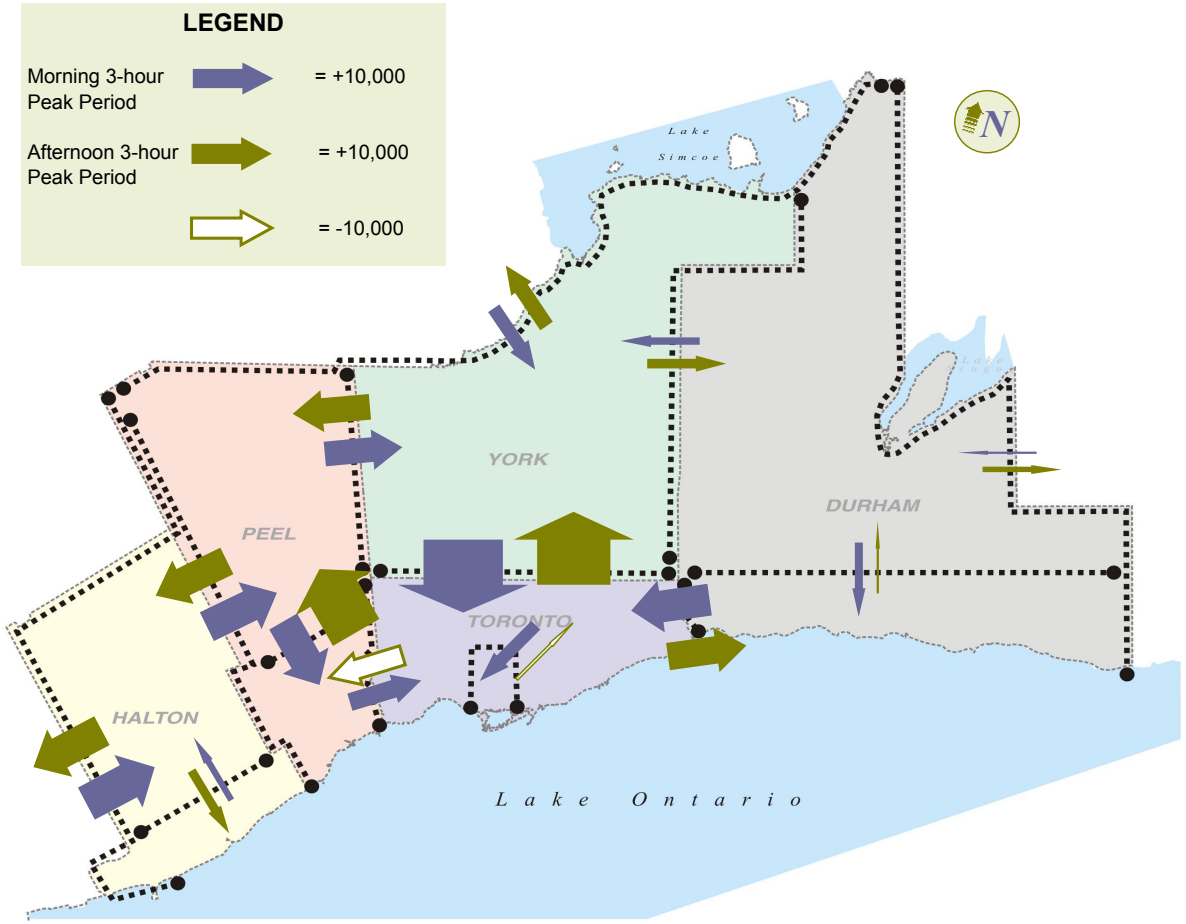
The graph above indicates very clearly that growth in the number of people living in one '905' region and working in another has been much higher than growth in the number of people living in the '905' regions and working in Toronto. Although it does not typically show up with respect to travel across cordon count screenlines along regional boundaries, it is noteworthy that the growth in the number of people living and working within the same region has also been typically higher than the growth in commuting trips to Toronto.

There was also a significant increase, in percentage terms, in peak-period travel across the boundaries of the GTA, particularly to and from the north and west, reflecting expansion of the GTA commuter-shed to include centres such as Barrie, Peterborough, Guelph, Cambridge, and Kitchener-Waterloo.

Travel into and out of the Central Area of Toronto remained relatively stable between 1991 and 2001. Capacity constraints have kept peak period screenline crossings relatively static over the past decade (and in fact over the last several decades). In the years between 1991 and 2001, however, employment within and commuting to the Central Area decreased somewhat due to an economic downturn, although recovery appears to have taken place by 2001.

The staged opening of Highway 407 during the past decade has affected the number of person and vehicle crossings at a number of screenlines. For example, growth at the York/Peel boundary, which is crossed by Highway 407, is higher-than-typical, as is growth at the York/Toronto boundary, which is crossed by roads interchanging with Highway 407. The Peel/Toronto boundary, on the other hand, exhibits lower-than-typical growth.

Due to the high percentage of auto trips across the GTA screenlines, the pattern of growth in person trips is similar to that of vehicle trips. However, it is interesting to note that in most cases, growth in vehicle trips has been greater than growth in person trips. This situation arises partly because of a significant increase in the number of commercial vehicles (whose drivers are not included in the person-trip totals) and partly due to the significant reduction in auto passengers. The relative increase in the percentage of auto drivers is addressed in more detail in the sections on travel mode and auto occupancy.



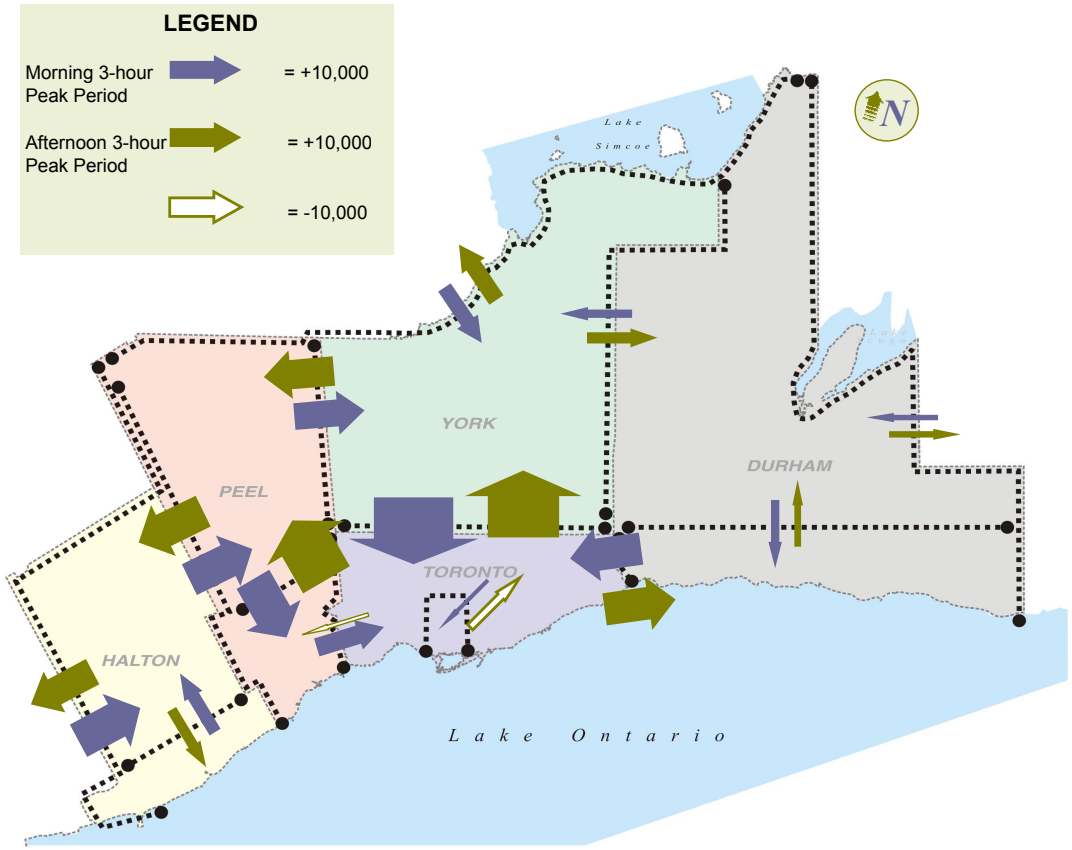
TOTAL PERSONS - Morning 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	37,600	56,600	+19,000	+50%
GTA North Boundary	18,700	25,100	+6,400	+34%
GTA East Boundary	7,700	9,200	+1,500	+20%
Halton - Dundas Street	25,900	29,100	+3,200	+12%
Peel/Halton Boundary	65,400	81,800	+16,400	+25%
Mississauga/Brampton Boundary	53,100	69,200	+16,100	+30%
Peel/Toronto Boundary	136,700	145,600	+8,900	+7%
York/Peel Boundary	10,000	22,100	+12,100	+122%
York/Toronto Boundary	119,100	158,000	+38,900	+30%
York/Durham Boundary	9,700	13,100	+3,400	+35%
Durham/Toronto Boundary	39,300	56,100	+16,800	+41%
Durham - Taunton Road	13,400	17,300	+3,900	+30%
Toronto - Central Area Boundary	310,300	316,800	+6,500	+2%

TOTAL PERSONS - Afternoon 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	46,400	63,500	+17,100	+37%
GTA North Boundary	22,100	29,700	+7,600	+34%
GTA East Boundary	10,700	13,000	+2,300	+21%
Halton - Dundas Street	29,400	34,100	+4,700	+16%
Peel/Halton Boundary	71,400	86,700	+15,300	+22%
Mississauga/Brampton Boundary	50,500	77,100	+26,600	+53%
Peel/Toronto Boundary	152,400	142,400	-10,000	-7%
York/Peel Boundary	11,000	24,500	+13,500	+122%
York/Toronto Boundary	132,100	168,800	+36,700	+26%
York/Durham Boundary	12,700	18,300	+5,600	+45%
Durham/Toronto Boundary	36,600	51,100	+14,500	+38%
Durham - Taunton Road	21,900	23,400	+1,500	+7%
Toronto - Central Area Boundary	315,500	313,700	-1,800	-1%

FIGURE 2-1: CHANGE IN NUMBER OF PERSONS CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001



TOTAL VEHICLES - Morning 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	36,400	56,300	+19,900	+55%
GTA North Boundary	16,800	25,200	+8,400	+50%
GTA East Boundary	6,600	9,400	+2,800	+42%
Halton - Dundas Street	24,000	30,700	+6,700	+28%
Peel/Halton Boundary	51,400	70,200	+18,800	+37%
Mississauga/Brampton Boundary	43,500	63,800	+20,300	+47%
Peel/Toronto Boundary	101,400	111,400	+10,000	+10%
York/Peel Boundary	9,500	23,800	+14,300	+149%
York/Toronto Boundary	100,900	143,800	+42,900	+43%
York/Durham Boundary	9,300	13,500	+4,200	+46%
Durham/Toronto Boundary	28,500	46,000	+17,500	+61%
Durham - Taunton Road	11,600	16,200	+4,600	+40%
Toronto - Central Area Boundary	101,600	103,500	+1,900	+2%

TOTAL VEHICLES - Afternoon 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	43,500	58,800	+15,300	+35%
GTA North Boundary	17,800	26,700	+8,900	+50%
GTA East Boundary	8,600	11,900	+3,300	+39%
Halton - Dundas Street	26,700	32,400	+5,700	+21%
Peel/Halton Boundary	53,400	72,000	+18,600	+35%
Mississauga/Brampton Boundary	40,900	69,800	+28,900	+71%
Peel/Toronto Boundary	110,800	109,500	-1,300	-1%
York/Peel Boundary	9,800	26,000	+16,200	+165%
York/Toronto Boundary	107,600	146,100	+38,500	+36%
York/Durham Boundary	9,300	15,300	+6,000	+64%
Durham/Toronto Boundary	25,400	43,000	+17,600	+69%
Durham - Taunton Road	16,200	19,700	+3,500	+21%
Toronto - Central Area Boundary	109,200	105,200	-4,000	-4%

FIGURE 2-2: CHANGE IN NUMBER OF VEHICLES CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001

3 MODE OF TRAVEL

3.1 Focus…

In this section, trends in the use of the different major travel modes are examined. These modes are auto driver and passenger, GO Rail, and transit and other bus. In an overall GTA context, other travel modes, such as taxis, bicycles, motorcycles, and pedestrians, are not significant enough to warrant detailed investigation.

3.2 Refer to…

Figure 3-1 "Modal Shares for Trips Crossing Screenlines in the Peak Direction – Morning 3-Hour Peak Period – 1991-2001"

3.3 Specific Highlights 1991-2001…

- The five screenlines with the highest *percentage* of *GO Rail* crossings in the peak direction during the morning peak period in 2001:

Durham/Toronto Boundary	19%
Toronto Central Area Cordon	16%
Peel/Halton Boundary	15%
Mississauga/Brampton Boundary	6%
York/Toronto Boundary	4%

- The five screenlines with the highest *percentage* of *auto driver* crossings in the peak direction during the morning peak period in 2001:

York/Durham Boundary	89%
Halton - Dundas Street	88%
GTA West Boundary	87%
GTA West Boundary	86%
York/Peel Boundary	85%

- The five screenlines with the largest decrease in the *percentage of auto passenger* crossings in the peak direction during the morning peak period between 1991 and 2001:

GTA East Boundary	11%
GTA North Boundary	11%
Mississauga/Brampton Boundary	7%
Several at	6%

- The five screenlines with the highest *combined percentage* of *bus/train* crossings in the peak direction during the morning peak period in 2001:

Toronto Central Area Cordon	65%
GTA West Boundary	27%
Durham/Toronto Boundary	20%
Peel/Halton Boundary	20%
Mississauga/Brampton Boundary	12%

3.4 Overview of Trends and Issues…

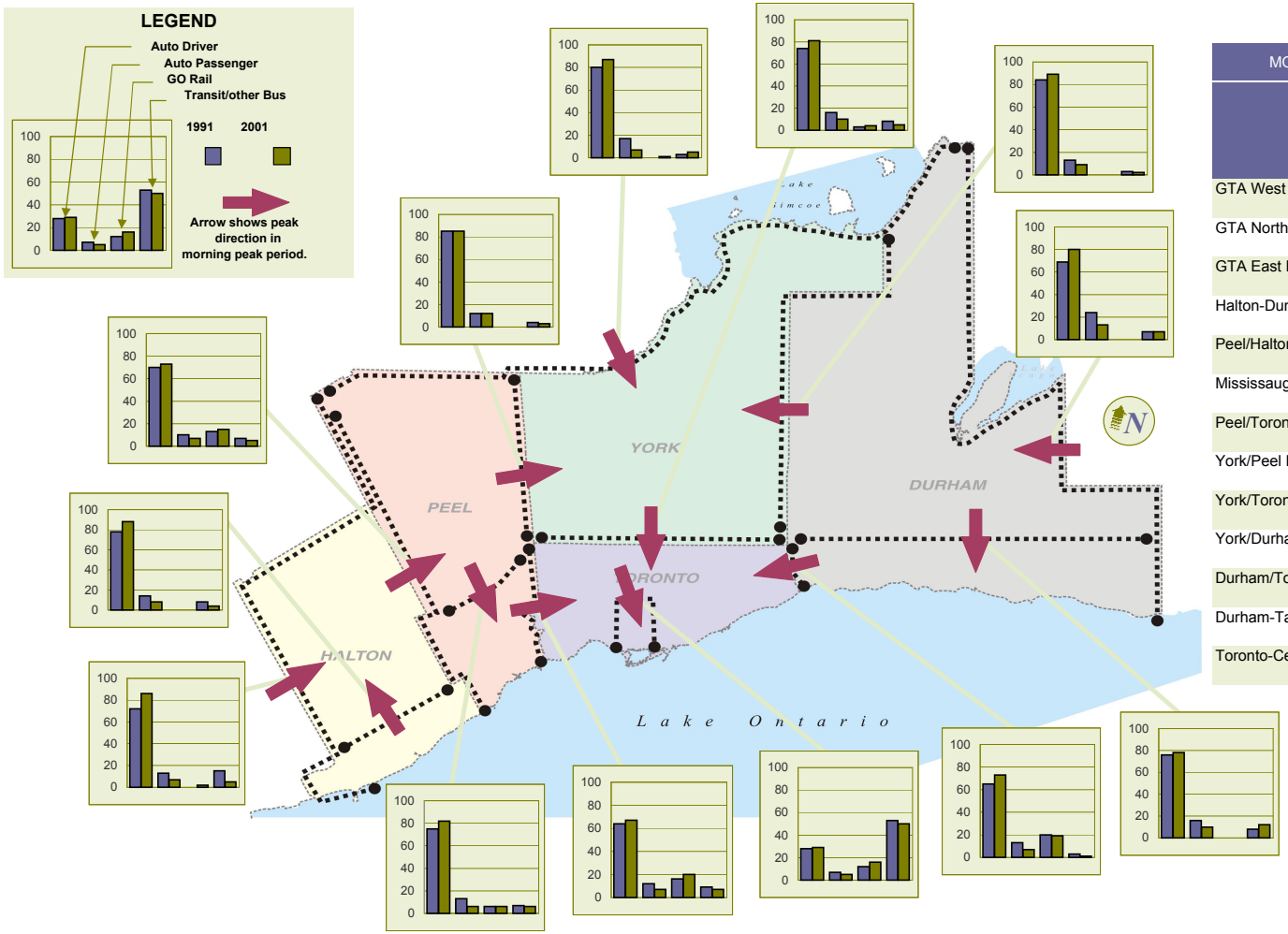
The following discussion is based largely on an evaluation of travel in the peak direction during the morning peak period although the trends are similar for the afternoon peak period.

Perhaps the most obvious trend in modal split (the proportions of person trips using the various possible modes of travel) over the past decade has been an apparently significant and general increase in auto driver trips. Corresponding to this has been an apparently significant and general decrease in auto passenger trips and a lesser decrease in the use of public and private bus services at some screenlines. The trend towards more auto drivers and fewer auto passengers is discussed in more detail in the later section on auto occupancy.

Since the current analysis covers mainly travel across regional boundaries, it does not truly reflect the extent of transit travel across the GTA. With the exception of overlapping municipal transit service across regional boundaries, the principal service areas of municipal and regional transit systems are contained within the regional boundaries and are therefore not cut by the screenlines used in this analysis. Nonetheless, it can be observed that the use of public and private bus services for trips crossing the regional boundaries has typically decreased. Although these decreases are noticeable in percentage terms, they do not appear to be significant numerically in comparison with the decrease in auto passengers.

Across most screenlines where GO Rail service is present, there were steady increases in the use of these services between 1991 and 2001. Again, the percentage increases were more significant than the actual numerical increases. Stable increases in the use of the GO Rail system are to be expected since typical users of the system have made a composite choice, to some extent a medium to longer-term commitment, involving residence and workplace locations and mode of travel, usually involving a

longer trip that would be time-consuming by auto and difficult or impossible by other forms of transit. As might be expected, the Central Area Cordon shows the highest percentage of combined GO Rail and municipal transit use at 65%, due to the high level of commuter rail, subway, and surface transit provided. The other screenlines showing higher-than-average use of rail and bus services either include the heavily utilized Lakeshore GO Rail corridor or are contained within a single region.



MODAL SHARES -Morning 3-hour Peak Period - Peak Direction		Auto Driver	Auto Passenger	GO Rail	Transit/ Other Bus
GTA West Boundary	1991	72	13	-	15
	2001	86	7	2	5
GTA North Boundary	1991	80	18	-	3
	2001	87	7	1	5
GTA East Boundary	1991	69	24	-	7
	2001	81	13	-	7
Halton-Dundas Street	1991	78	14	-	8
	2001	88	8	-	4
Peel/Halton Boundary	1991	70	10	13	7
	2001	73	7	15	5
Mississauga/Brampton Boundary	1991	75	13	6	7
	2001	82	6	6	6
Peel/Toronto Boundary	1991	64	12	16	9
	2001	67	7	20	7
York/Peel Boundary	1991	85	12	-	4
	2001	85	12	-	3
York/Toronto Boundary	1991	74	16	3	8
	2001	81	10	4	4
York/Durham Boundary	1991	84	13	-	3
	2001	89	9	-	2
Durham/Toronto Boundary	1991	65	13	20	3
	2001	73	7	19	1
Durham-Taunton Road	1991	76	16	-	8
	2001	78	10	-	11
Toronto-Central Area Boundary	1991	28	7	12	52
	2001	29	5	16	49

FIGURE 3-1: MODAL SHARES FOR PERSONS CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING 3-HOUR PEAK PERIOD 1991-2001

4 AUTO OCCUPANCY AND HIGH-OCCUPANCY VEHICLES

4.1 Focus…

Previous sections have indicated an apparently significant increase in the number of auto drivers and a decrease in the number of auto passengers and transit and other bus users. In this section, trends in auto occupancy and in the corresponding number of high-occupancy vehicles (HOV's) are considered.

4.2 Refer to…

Figure 4-1 "Average Auto Occupancy for Screenline Crossings in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991- 2001"

Figure 4-2 "Change in the Number of 2+ HOV's Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

Figure 4-3 "Change in the Number of 3+ HOV's Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

4.3 Specific Highlights 1991-2001…

- The five screenlines with the highest average *auto occupancy* in the peak direction during the morning peak period in 2001:

Toronto Central Area Cordon	1.19
GTA East Boundary	1.16
York/Peel Boundary	1.14
Durham - Taunton Road	1.13
York/Toronto Boundary	1.12

- The five screenlines with the lowest average *auto occupancy* in the peak direction during the morning peak period in 2001:

Mississauga/Brampton Boundary	1.08
GTA West Boundary	1.08
GTA North Boundary	1.08
Halton-Dundas Street	1.09
Several at	1.10

- The five screenlines with the largest *percentage change in auto occupancy* in the peak direction during the morning peak period in 2001:

GTA East Boundary	-14%
GTA North Boundary	-12%
GTA West Boundary	-9%
Durham/Toronto Boundary	-8%
Mississauga/Brampton Boundary	-8%

- The five screenlines with the highest percentage of *3+ HOV's* in the peak direction during the morning peak period in 2001:

Toronto Central Area Cordon	6.2%
Peel/Toronto Boundary	3.7%
Durham – Taunton Road	3.4%
Halton - Dundas Street	2.0%
York/Toronto Boundary	1.9%

- The five screenlines with the highest percentage of *2+ HOV's* in the peak direction during the morning peak period in 2001:

Toronto Central Area Cordon	24.2%
Durham – Taunton Road	19.8%
GTA North Boundary	16.4%
York/Toronto Boundary	15.4%
Several at	15.2%

4.4 Overview of Trends and Issues…

In the discussion of the use of different travel modes in the previous section, the increase in auto drivers and decrease in auto passengers was cited as an important trend over the past decade. Another way of looking at this trend is to examine changes in average auto occupancy, or the average number of occupants in automobiles crossing the screenline. For the purposes of this analysis, taxis are not included.

Although the analysis looks specifically at the morning peak period, similar trends are observed in the afternoon peak period unless specifically noted. As the number of auto drivers increases relative to the number of auto passengers, the average auto occupancy decreases. This is seen in Figure 4-1 and the "highlights" summarized above. with the exception of the York/Peel boundary, every screenline has experienced a significant drop in peak-period average auto occupancy since 1991. In 1991, the average auto occupancy ranged from 1.14 to 1.35 across the screenlines considered here. By 2001, this range was 1.08 to 1.19, the percentage decreases ranging up to 14%.

The following example demonstrates the significance of this trend. In 1991, during the morning peak period in the peak direction, approximately 88,100 autos carried some 107,200 persons across the York/Toronto boundary. As a result of the decrease in average occupancy rate from 1.21 to 1.12, the same number of persons now requires 9,200 (8%) more vehicles, equivalent to two 4-lane arterial roads or almost 2 expressway lanes across the screenline. By comparison, the number of people using GO Rail and bus services at this screenline during the same period was approximately 12,600 in 2001.

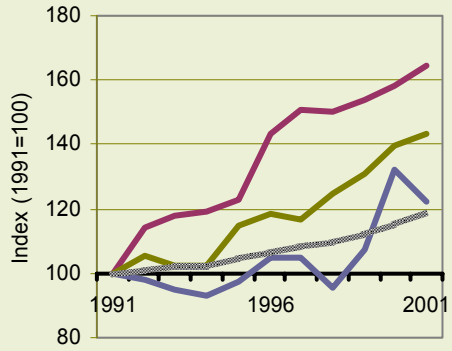
It is apparent that auto occupancy rates have decreased between 1991 and 2001. However, there remains some question as to the actual magnitude of this decrease. Although the data from the Transportation Tomorrow Survey is not entirely comparable with Cordon Count data (household survey vs. field observations), somewhat comparable, although preliminary, results from the TTS survey suggest a smaller decrease in average auto occupancy at most screenlines than is presented here based on Cordon Count data.

It should also be noted that classification of autos passing a counting station by the number of occupants is a difficult task. The sheer numbers of vehicles passing at high-volume locations, the proliferation of tinted windows, and the volume of view-blocking large trucks at some stations are all factors that complicate the counting process. Since these factors have all worsened since 1991, one might suspect that auto occupancy as measured in 2001 could be understated. However, the 2001 TTS results agree more closely with the 2001 Cordon Count results than was the case in 1991.

Although it can be concluded that auto occupancy across the GTA dropped between 1991 and 2001, it is not possible to definitively establish just how large this drop was.

Although speculative, there are several possible factors contributing to the trend towards reduced auto occupancy:

- The cost of operating an automobile has typically not risen as quickly as either transit fares or the overall cost of living. The graph below shows this with respect to gasoline prices, a major component of this operating cost. As a result, there is less incentive to carpool for financial reasons.



This chart shows that gasoline prices (—) have typically increased less than GO Rail fares (—), municipal transit fares (—) and the Consumer Price Index (—). (Source: various)

- Increasing spatial diversity of commuting patterns (recall the discussion in Section 2) may make it more difficult to organize shared rides.
- Increasing levels of part-time employment, increasing flexibility in working hours (and possibly increased workloads and working hours), and childcare arrangements may also make it more difficult to consistently participate in a carpool.

Surprisingly, it is noted that auto ownership rates appear to have remained relatively stable, and have even decreased slightly, over the past decade across the GTA (see table below).

AUTO OWNERSHIP
(AVERAGE AUTOS PER HOUSEHOLD)

	1991	2001
Durham	1.74	1.72
Halton	1.75	1.73
Peel	1.71	1.69
Toronto	1.18	1.08
York	1.87	1.89
GTA overall	1.42	1.40

(Source: TTS)

The drop in average auto occupancy also has implications for the number of high-occupancy vehicles present on the system. For the purposes of this discussion, two alternative definitions for "high-occupancy vehicle" or "HOV" are used. The label "3+ HOV" is applied to that group of vehicles that includes buses, taxis, and automobiles with three or more occupants. This definition is typical in the GTA with respect to the regulations covering exclusive HOV lanes. An alternative definition, "2+ HOV", would also include automobiles with two occupants. This latter definition is more common in the United States.

The apparent decrease in average auto occupancy over the past decade has been large enough to result in an actual reduction in the number of 2+ and 3+ HOV's at most screenlines in the morning peak period. In the afternoon peak period, the picture was similar at most screenlines with respect to 3+ HOV's, although in the case of 2+ HOV's, the decrease in average auto occupancy was not sufficient at most screenlines to offset overall growth in traffic and the number of 3+ HOV's increased in these cases, albeit modestly.

To put this into perspective, at less than half of the screenlines were there sufficient 3+ HOV's in the afternoon peak period in 2001 to justify even one exclusive arterial HOV lane crossing the screenline in the peak direction, leaving aside for the moment the fact that the HOV's may well be dispersed along the length of the screenline. Only between 1 and 6 per cent of all vehicles were 3+ HOV's in 2001. The situation with 2+ HOV's is somewhat better, with typically between 5 and 20 per cent of vehicles across any given screenline being in this category. This would likely be enough to justify a basic network of 2+ HOV lanes.

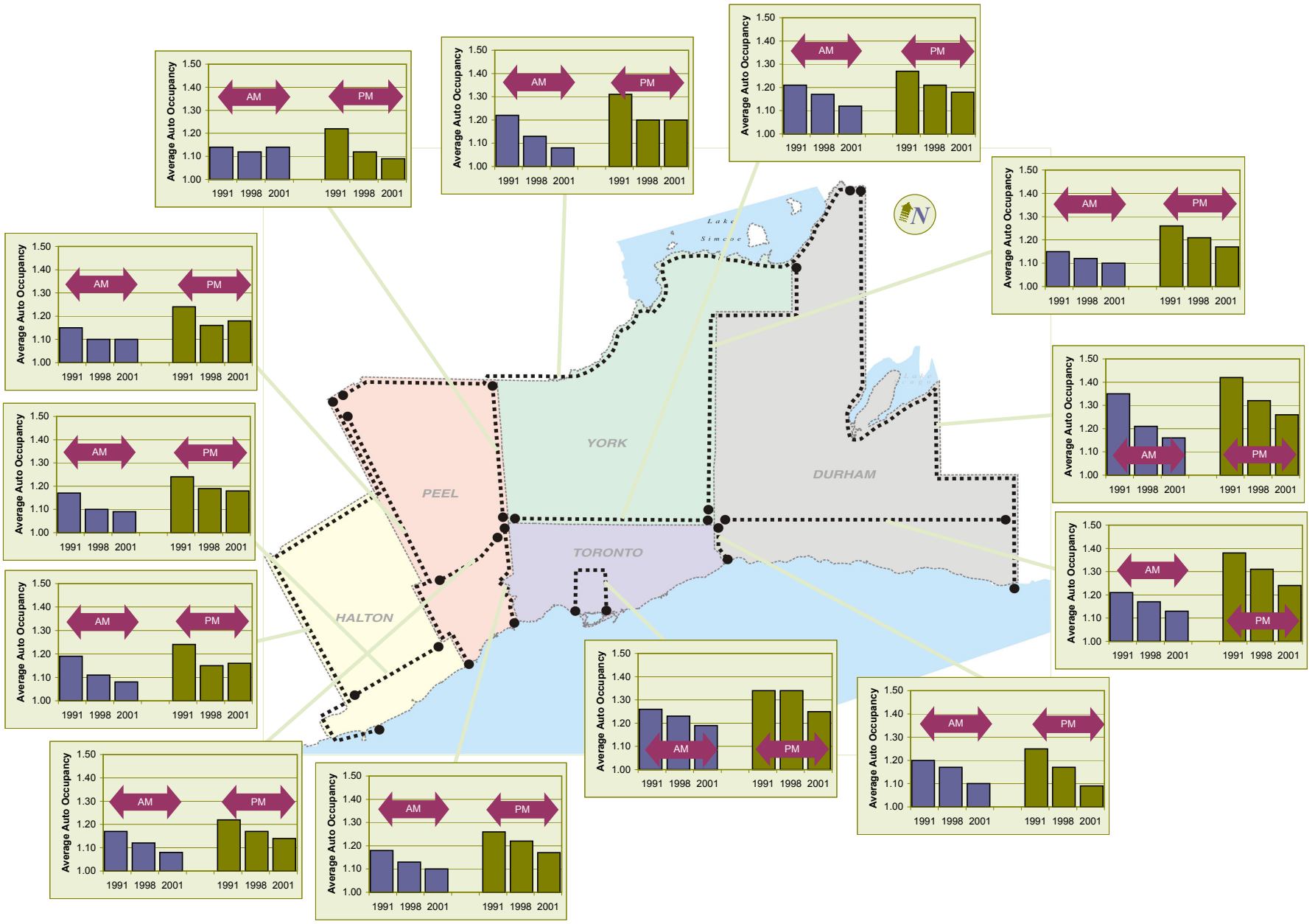
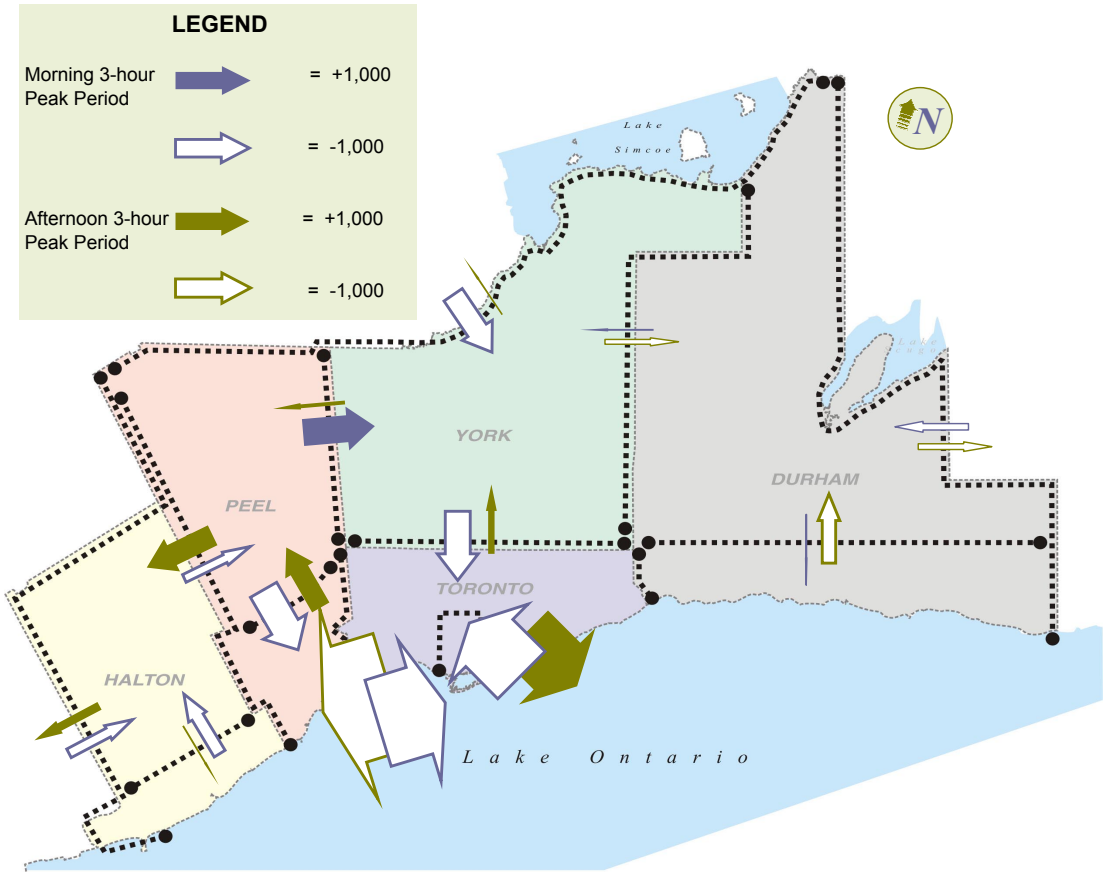


FIGURE 4-1: AVERAGE AUTO OCCUPANCY FOR SCREENLINE CROSSINGS IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001



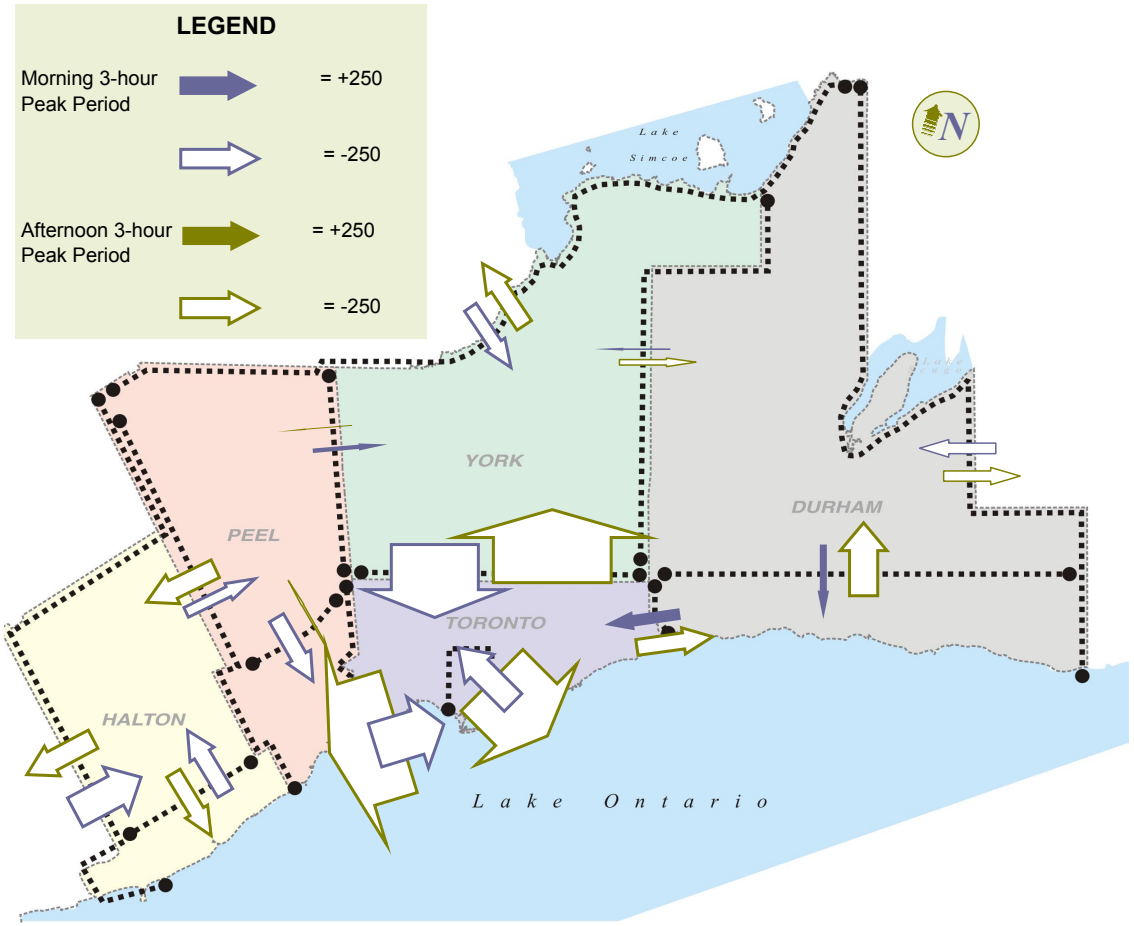
2+ HOV's - Morning 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	4,450	3,910	-540	-12%
GTA North Boundary	2,950	1,740	-1,210	-41%
GTA East Boundary	1,510	1,140	-370	-24%
Halton - Dundas Street	3,000	2,340	-660	-22%
Peel/Halton Boundary	6,210	5,760	-450	-7%
Mississauga/Brampton Boundary	6,000	4,310	-1,690	-28%
Peel/Toronto Boundary	16,030	10,990	-5,040	-32%
York/Peel Boundary	1,080	2,550	+1,470	+136%
York/Toronto Boundary	16,720	15,350	-1370	-8%
York/Durham Boundary	1,190	1,270	+80	+6%
Durham/Toronto Boundary	4,640	3,490	-1,150	-25%
Durham - Taunton Road	1,950	1,910	-40	-2%
Toronto - Central Area Boundary	23,450	19,750	-3,700	-16%

2+ HOV's - Afternoon 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	7,000	7,500	+500	+7%
GTA North Boundary	4,300	4,380	+80	+2%
GTA East Boundary	2,470	2,170	-300	-30%
Halton - Dundas Street	4,530	4,650	+120	+3%
Peel/Halton Boundary	9,710	10,930	+1,220	+13%
Mississauga/Brampton Boundary	7,120	8,250	+1,130	+16%
Peel/Toronto Boundary	23,220	16,610	-6,610	-29%
York/Peel Boundary	1,710	1,910	+200	+12%
York/Toronto Boundary	22,140	22,520	+380	+2%
York/Durham Boundary	2,460	2,170	-290	-12%
Durham/Toronto Boundary	4,980	3,210	-1,770	-36%
Durham - Taunton Road	4,630	3,900	-730	-16%
Toronto - Central Area Boundary	21,850	25,490	+3,640	+17%

FIGURE 4-2: CHANGE IN NUMBER OF 2+ HOV'S CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001



3+ HOV's - Morning 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	880	440	-440	-51%
GTA North Boundary	380	190	-190	-50%
GTA East Boundary	330	180	-150	-44%
Halton - Dundas Street	670	430	-240	-36%
Peel/Halton Boundary	840	710	-130	-15%
Mississauga/Brampton Boundary	950	720	-230	-24%
Peel/Toronto Boundary	3,430	2,830	-600	-17%
York/Peel Boundary	160	210	+50	+32%
York/Toronto Boundary	3,270	2,100	-1,170	-36%
York/Durham Boundary	160	190	+30	+16%
Durham/Toronto Boundary	590	730	+140	+23%
Durham - Taunton Road	390	480	+90	+24%
Toronto - Central Area Boundary	5,650	5,300	-350	-6%

3+ HOV's - Afternoon 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	1,200	930	-270	-23%
GTA North Boundary	640	400	-240	-38%
GTA East Boundary	520	390	-130	-24%
Halton - Dundas Street	870	660	-210	-24%
Peel/Halton Boundary	1,480	1,230	-250	-17%
Mississauga/Brampton Boundary	1,140	1,110	-30	-3%
Peel/Toronto Boundary	5,790	4,000	-1,790	-31%
York/Peel Boundary	210	220	+10	+3%
York/Toronto Boundary	4,390	2,800	-1,590	-36%
York/Durham Boundary	280	210	-70	-25%
Durham/Toronto Boundary	730	520	-210	-29%
Durham - Taunton Road	1,040	660	-380	-36%
Toronto - Central Area Boundary	7,710	6,540	-1,170	-15%

FIGURE 4-3: CHANGE IN NUMBER OF 3+ HOV'S CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001

5 GO RAIL, TRANSIT, AND OTHER BUS TRAVEL

5.1 Focus…

Although dealt with generally in the section on travel mode, this section contains more specific information on the use of various forms of transit across the GTA.

5.2 Refer to…

Figure 5-1 "Change in Number of GO Rail Passengers Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

Figure 5-2 "Change in Number of Transit/Other Bus Passengers Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

5.3 Specific Highlights 1991-2001…

- The five screenlines with the largest *percentage* change in *GO Rail* ridership in the peak direction during the morning peak period between 1991 and 2001:

York/Toronto Boundary	+109%
Peel/Halton Boundary	+43%
Toronto Central Area Cordon	+40%
Peel/Toronto Boundary	+37%
Durham/Toronto Boundary	+34%

(Note: The GTA West and North boundaries increased from 0 to 1,100 and 0 to 200 respectively.)

- Five screenlines *without GO Rail service* in 2001:

GTA East Boundary
Halton - Dundas Street
York/Peel Boundary
York/Durham Boundary
Durham - Taunton Road

- The five screenlines with the largest *percentage* change in *transit and other bus* ridership in the peak direction during the morning peak period between 1991 and 2001:

GTA North Boundary	+160%
York/Peel Boundary	+100%
Durham - Taunton Road	+73%
GTA West Boundary (minimal service)	-54%
Halton - Dundas Street (minimal service)	-52%

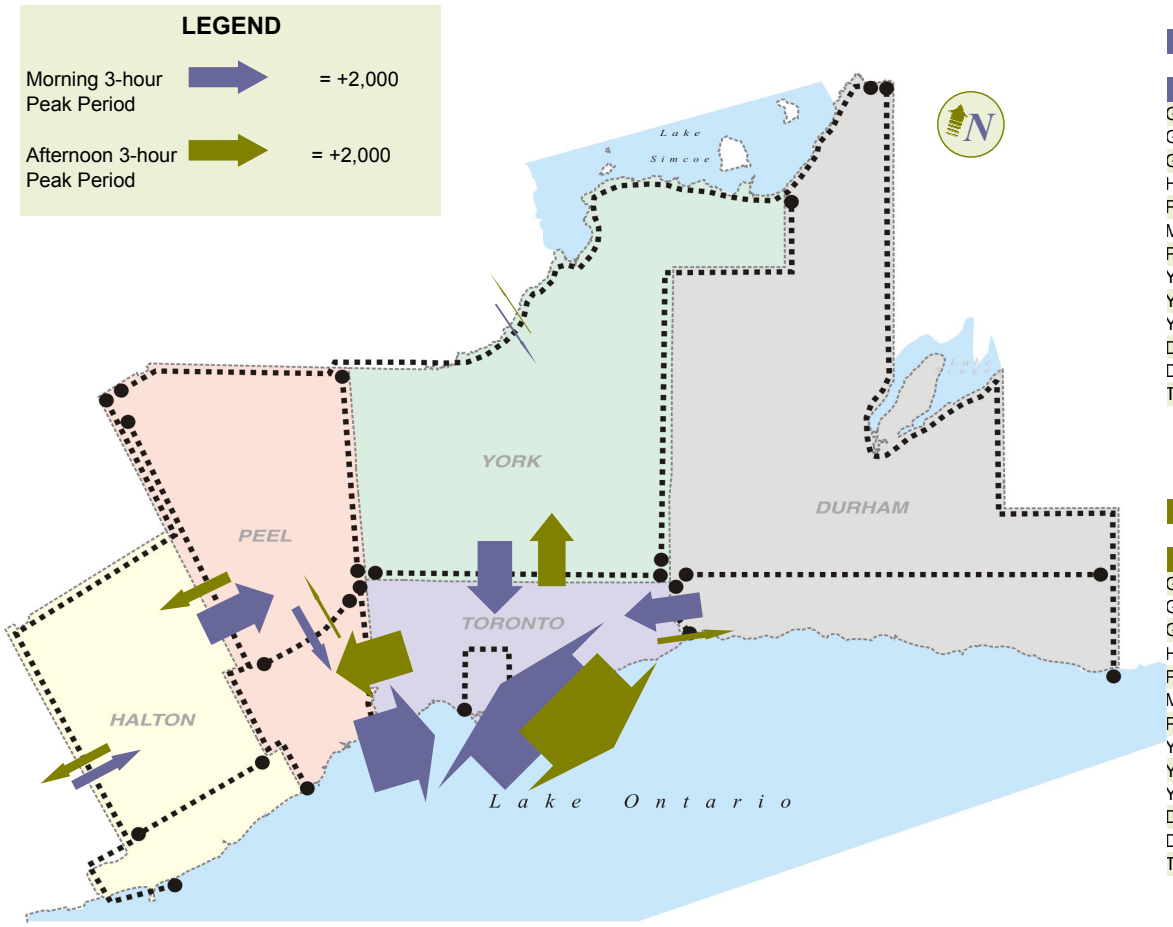
5.4 Overview of Trends and Issues…

In an inter-regional context, bus and train services carry a relatively small proportion of person trips overall, compared to the automobile. However, they represent an important component of the transportation system in certain corridors, such as the Lakeshore corridor. In this corridor, in particular, GO Rail service represents an attractive alternative to congested, capacity-constrained road facilities.

GO Rail services, in corridors where the service exists, has shown a steady increase in ridership over the past decade. With respect to the proportion of total persons carried across the screenlines in the peak direction during peak periods, GO Rail service has typically either shown an increase in market share (6 of 8 screenlines), or has maintained its 1991 market share (2 screenlines). With the exception of the new services added during the decade (Oshawa, Hamilton and Bradford), GO Rail typically carries at least 50 per cent of the total bus/train ridership and as high as 95% in some cases.

As the urbanized area of the GTA and the corresponding commutershed expand, it is expected that these trends with respect to GO Rail use will continue. However, it is noted that ridership has been strongest in the Lakeshore corridor, principally since the GO Rail service there is frequent, runs all day, and is bi-directional. GO Rail service is "lumpy", and if new services are initiated and others expanded, increases in ridership may well proceed by leaps and bounds rather than through steady growth. As noted previously, changing commuting patterns will require review of the current orientation of much of the existing system to radial, peak-direction, peak-period trips to recognize the demand for other trip orientations. It appears that future extensions of the inter-regional rapid transit network may also utilize buses in exclusive or preferred facilities.

As noted earlier, municipal transit services are not well represented at the GTA screenlines since their service areas are largely contained within regional boundaries. Nonetheless, there is a component of municipal transit and other bus travel (including GO buses, school buses, and charter buses) present at the screenlines. The percentage of total person trips on these services was small in 1991 and has typically decreased over the past decade.



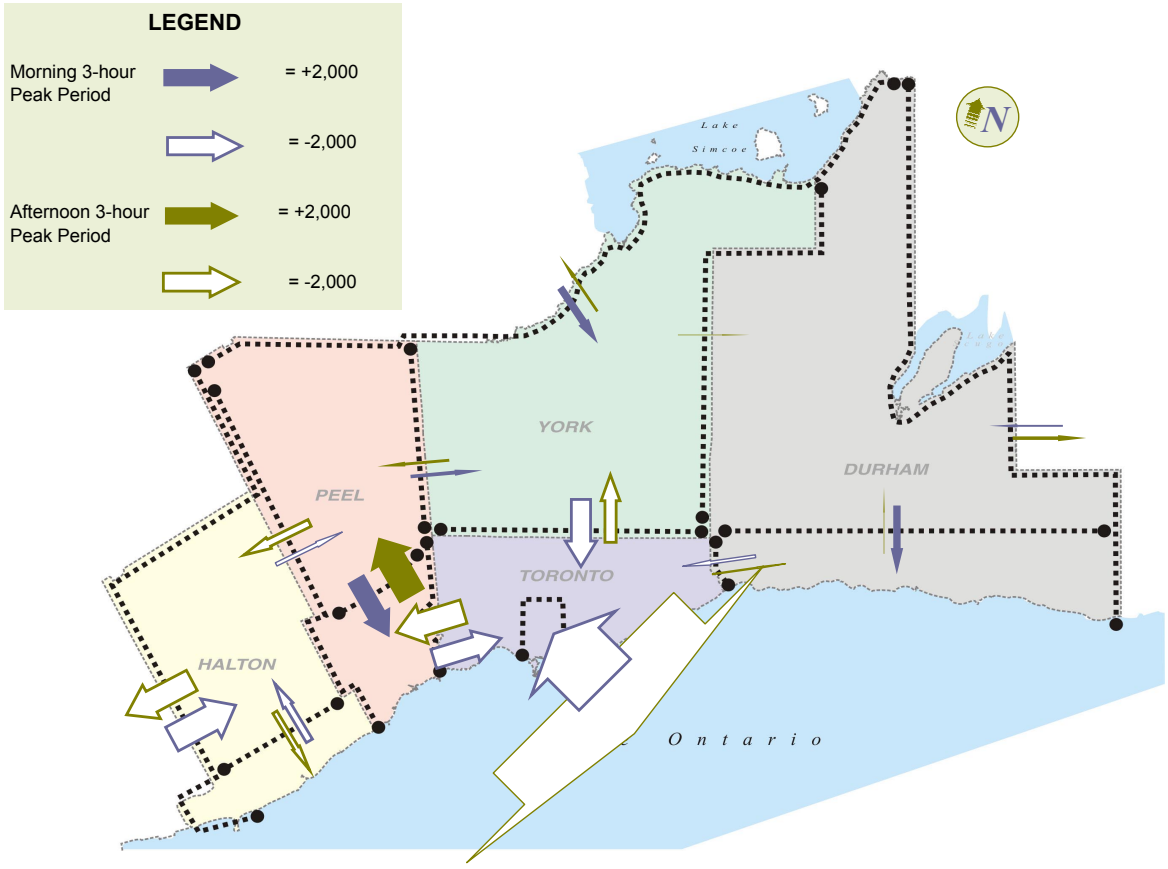
GO RAIL PASSENGERS - Morning 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	-	1,100	+1,100	-
GTA North Boundary	-	200	+200	-
GTA East Boundary	-	-	-	-
Halton - Dundas Street	-	-	-	-
Peel/Halton Boundary	8,300	11,900	+3,600	+43%
Mississauga/Brampton Boundary	3,100	4,100	+1,000	+32%
Peel/Toronto Boundary	21,100	28,900	+7,800	+37%
York/Peel Boundary	-	-	-	-
York/Toronto Boundary	3,300	6,900	+3,600	+109%
York/Durham Boundary	-	-	-	-
Durham/Toronto Boundary	7,700	10,300	+2,600	+34%
Durham - Taunton Road	-	-	-	-
Toronto - Central Area Boundary	37,100	52,100	+15,000	+40%

GO RAIL PASSENGERS - Afternoon 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	-	1,000	+1,000	-
GTA North Boundary	-	100	+100	-
GTA East Boundary	-	-	-	-
Halton - Dundas Street	-	-	-	-
Peel/Halton Boundary	7,000	8,200	+1,200	+17%
Mississauga/Brampton Boundary	2,600	2,900	+300	+13%
Peel/Toronto Boundary	18,000	22,500	+4,500	+25%
York/Peel Boundary	-	-	-	-
York/Toronto Boundary	2,700	5,600	+2,900	+104%
York/Durham Boundary	-	-	-	-
Durham/Toronto Boundary	7,300	7,900	+600	+9%
Durham - Taunton Road	-	-	-	-
Toronto - Central Area Boundary	35,500	47,100	+11,600	+33%

FIGURE 5-1: CHANGE IN NUMBER OF GO RAIL PASSENGERS CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001



TRANSIT/OTHER BUS PASSENGERS
- Morning 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	5,660	2,620	-3,040	-54%
GTA North Boundary	1,330	510	+820	+162%
GTA East Boundary	560	600	+40	+7%
Halton - Dundas Street	2,660	1,680	-780	-86%
Peel/Halton Boundary	4,420	4,000	-420	-10%
Mississauga/Brampton Boundary	4,270	6,320	+2,050	+99%
Peel/Toronto Boundary	11,760	9,530	-2,230	-19%
York/Peel Boundary	750	1,140	+390	+107%
York/Toronto Boundary	9,060	6,930	-2,130	-24%
York/Durham Boundary	300	300	-	-
Durham/Toronto Boundary	1,140	770	-370	-32%
Durham - Taunton Road	1,050	1,920	870	+83%
Toronto - Central Area Boundary	162,640	154,580	-8,060	-5%

TRANSIT/OTHER BUS PASSENGERS
- Afternoon 3-hour Peak Period - Peak Direction

	1991	2001	Change	%
GTA West Boundary	3,850	1,240	-2,610	-68%
GTA North Boundary	1,050	1,340	+290	+28%
GTA East Boundary	230	690	+460	+20%
Halton - Dundas Street	1,580	1,080	-500	-84%
Peel/Halton Boundary	4,330	3,490	-840	-19%
Mississauga/Brampton Boundary	3,010	6,260	+3,250	+108%
Peel/Toronto Boundary	11,830	9,080	-2,750	-23%
York/Peel Boundary	320	640	+320	+103%
York/Toronto Boundary	8,720	7,420	-1,300	-15%
York/Durham Boundary	560	600	+40	+7%
Durham/Toronto Boundary	710	580	-130	-19%
Durham - Taunton Road	1,180	1,320	+140	+12%
Toronto - Central Area Boundary	176,890	148,380	-28,510	-16%

FIGURE 5-2: CHANGE IN NUMBER OF TRANSIT/OTHER BUS PASSENGERS CROSSING SCREENLINES IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001

6 COMMERCIAL VEHICLES

6.1 Focus…

Particularly from an economic perspective, commercial vehicle movement is an important component of travel in the GTA. Not only does the transportation of raw materials, components, and finished products represent a significant component of the cost of consumer goods (and congestion affects these costs directly), but heavy vehicles have a significant effect on the capacity, operation, and physical condition of the road system. The focus in this section is on the trends observed with respect to patterns of truck movement and the proportion of trucks in the overall traffic stream.

This analysis considers only medium (more than four tires touching the road), heavy (more than two axles) trucks and trucks with trailers. These represent the most significant component of the trucking picture in terms of their economic importance and their impact on roadway operations.

6.2 Refer to…

Figure 6-1 "Change in Number of Medium and Heavy Trucks Crossing Screenlines in Both Directions –12-Hour Daytime Peak Period – 1991-2001"

Figure 6-2 "Changes in Medium and Heavy Trucks as a Proportion of All Vehicles Crossing Screenlines in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

Figure 6-3 "Time-of-Day Profile for Medium and Heavy Trucks Crossing Screenlines in Both Directions - 1991, 2001"

6.3 Specific Highlights 1991-2001…

- The five screenlines with the highest *numerical growth* in *medium and heavy trucks* in both directions (combined) during the peak 12-hour period between 1991 and 2001:

Peel/Halton Boundary	+17,400
Peel/Toronto Boundary	+15,900
Mississauga/Brampton Boundary	+13,600
Halton - Dundas Street	+13,000
York/Peel Boundary	+12,200

- The five screenlines with the highest *percentage growth* in *medium and heavy trucks* in both directions (combined) during the peak 12-hour period between 1991 and 2001:

York/Peel Boundary	338%
Halton - Dundas Street	130%
Mississauga/Brampton Boundary	84%
Peel/Halton Boundary	64%
York/Toronto Boundary	52%

- The five screenlines with the highest *percentage of medium and heavy trucks* in both directions during the morning and afternoon peak periods combined in 2001:

GTA East Boundary	13.7%
Halton - Dundas Street	9.3%
York/Peel Boundary	8.4%
GTA West Boundary	7.9%
Peel/Halton Boundary	7.8%

- The five screenlines with the lowest *percentage of medium and heavy trucks* in both directions during the morning and afternoon peak periods combined in 2001:

Toronto Central Area Cordon	2.6%
York/Toronto Boundary	4.2%
Durham – Taunton Road	4.8%
Durham/Toronto Boundary	5.3%
Peel/Toronto Boundary	6.2%

6.4 Overview of Trends and Issues…

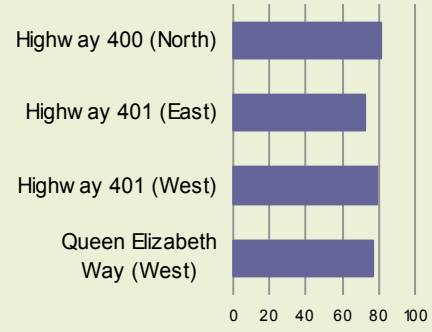
Generally speaking, the percentage increases in screenline crossings of medium and heavy trucks are significantly greater than the corresponding increases in both person and total vehicle crossings. Similarly, these percentage increases are greater than the rates of employment across the GTA would seem to justify. However, it is difficult to assess the factors leading to these high growth rates without more comprehensive information than that provided by the Cordon Count.

One possible factor is the diversion of goods movement activity from the air, rail, and sea modes to truck. It is also noted that truck movements recorded as part of the Ministry of Transportation's 1999/2000 Commercial Vehicle Survey indicate that about 20 to 30 per cent of truck movements entering or leaving the GTA are through trips (see graph below). It is possible that growth has been higher with respect to this through-trip component. This is supported by the typically higher numerical growth in medium and heavy truck movements across the

western portion of the GTA, where the major highway corridors serve as connections to the rest of the Golden Horseshoe and to border crossings in the vicinity of Niagara Falls/Fort Erie and Windsor/Sarnia.

PERCENTAGE OF TRUCKS WITH ORIGINS AND/OR DESTINATIONS WITHIN THE GTA

Location of Survey Stations:	
Highway 400 (North)	King Road (both directions)
Highway 401 (East)	Whitby (eastbound) Bowmanville (westbound)
Highway 401 (West)	Trafalgar Road (both directions)
Queen Elizabeth Way (West)	Oakville (both directions)



(Source: 1999/2000 Commercial Vehicle Survey - MTO)

Significant growth in commercial vehicle traffic over the past decade across the York/Peel, York/Toronto, and Mississauga/Brampton boundary and the Halton - Dundas Street screenlines is indicative of accelerating economic growth in the '905' regions.

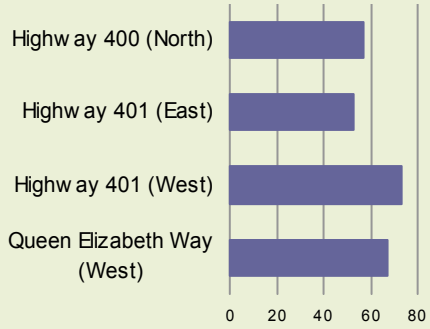
The only screenline exhibiting a decrease in medium and heavy truck crossings between 1991 and 2001 was the Central Area Cordon. This decrease may be tied in to a reduction in manufacturing and warehousing activity in the City and possibly to the shifting of deliveries to times outside the peak periods and even outside the usual working day to facilitate loading/unloading and avoid traffic congestion.

A review of the time-of-day profiles for truck crossings of the screenlines (Figure 6-3) suggests that a significant portion of the growth in truck movement has occurred outside the peak periods, particularly in the case of the afternoon peak period. Some locations, for example, the York/Peel, Peel/Halton, Mississauga/Brampton, Peel/Toronto and GTA West boundaries, exhibit a clearly discernible "top-hat" time-of-day profile with lower growth during the peak periods and higher growth in between these. In other cases, such as the York/Durham and GTA North and East boundaries, the time-of-day profile is flatter, indicating less influence from congestion.

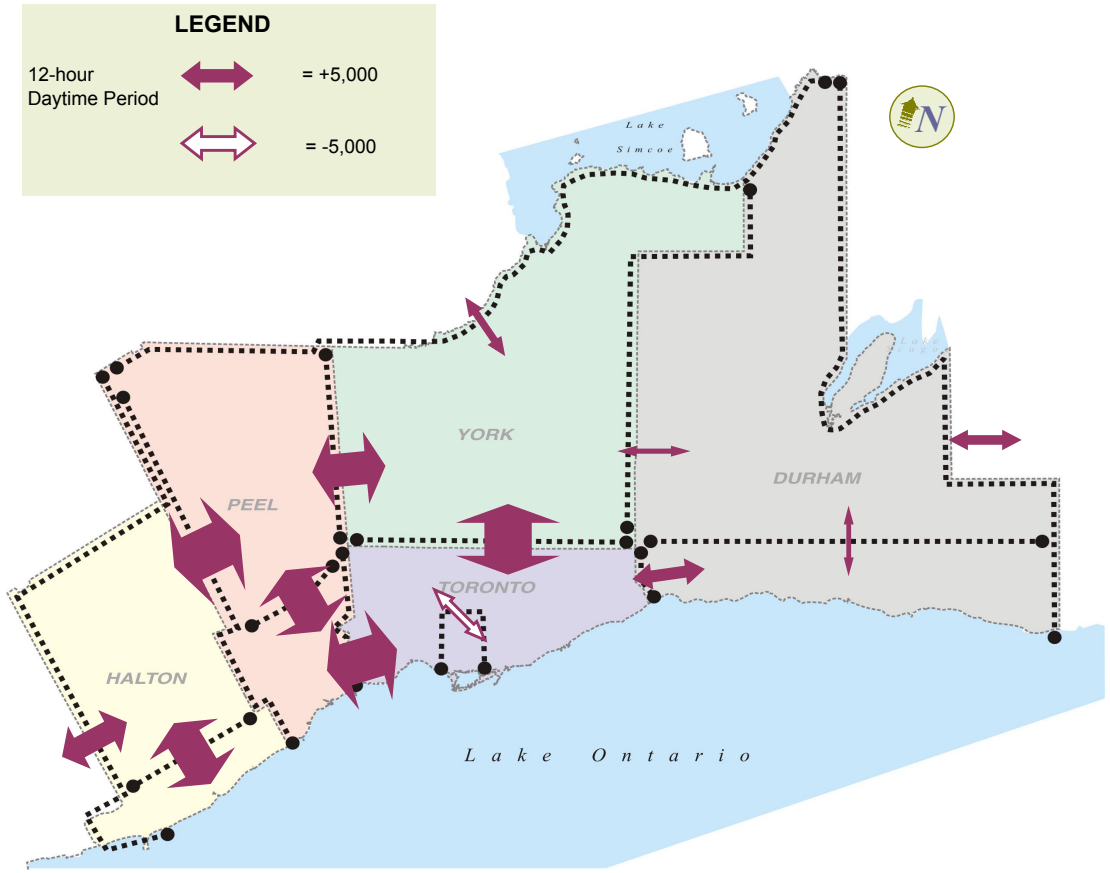
The growth in truck movements is sufficiently high, however, that medium and heavy trucks as a proportion of total vehicles has actually increased at all screenlines except the Durham - Taunton Road Screenline and the Central Area Cordon. The desire to avoid congested peak periods may be offset by the reduced flexibility inherent in the "just-in-time" inventory management systems that have come into vogue over the past decade and by the fact that off-peak travel times are approaching peak-period travel times, particularly on urban streets where daytime parking activity must be factored into the equation.

The 1999/2000 Commercial Vehicle Survey also provides information on the distribution of trucking activity throughout the day. A review of the results of this survey indicates that 50 to 70 per cent of trucking movements to, from, or through the GTA occur in the peak 12-hour daytime period (see graph below) typically covered by the Cordon Count Program. A significant 30 to 50 per cent of trucking movements, at least on the major highways, occurs during the night-time 12-hour period.

PERCENTAGE OF TRUCK MOVEMENTS DURING THE DAYTIME 12-HOUR PERIOD



(Source: 1999/2000 Commercial Vehicle Survey - MTO)



MEDIUM AND HEAVY TRUCKS - 12-hour Peak Period - Both Directions

	1991	2001	Change	%
GTA West Boundary	28,600	36,720	+8,120	+28%
GTA North Boundary	7,540	10,220	+2,680	+36%
GTA East Boundary	7,200	10,540	+3,340	+46%
Halton - Dundas Street	9,970	22,950	+12,980	+130%
Peel/Halton Boundary	27,290	44,730	+17,440	+64%
Mississauga/Brampton Boundary	16,130	29,720	+13,590	+84%
Peel/Toronto Boundary	44,030	59,950	+15,920	+36%
York/Peel Boundary	3,560	15,840	+12,280	+345%
York/Toronto Boundary	32,830	49,750	+16,920	+52%
York/Durham Boundary	6,320	5,360	+1,740	+48%
Durham/Toronto Boundary	11,190	15,790	+4,600	+41%
Durham - Taunton Road	5,950	7,470	+1,520	+26%
Toronto - Central Area Boundary	22,970	20,580	-2,390	-10%

FIGURE 6-1: CHANGE IN NUMBER OF MEDIUM AND HEAVY TRUCKS CROSSING SCREENLINES IN BOTH DIRECTIONS 12-HOUR DAYTIME PEAK PERIOD 1991-2001

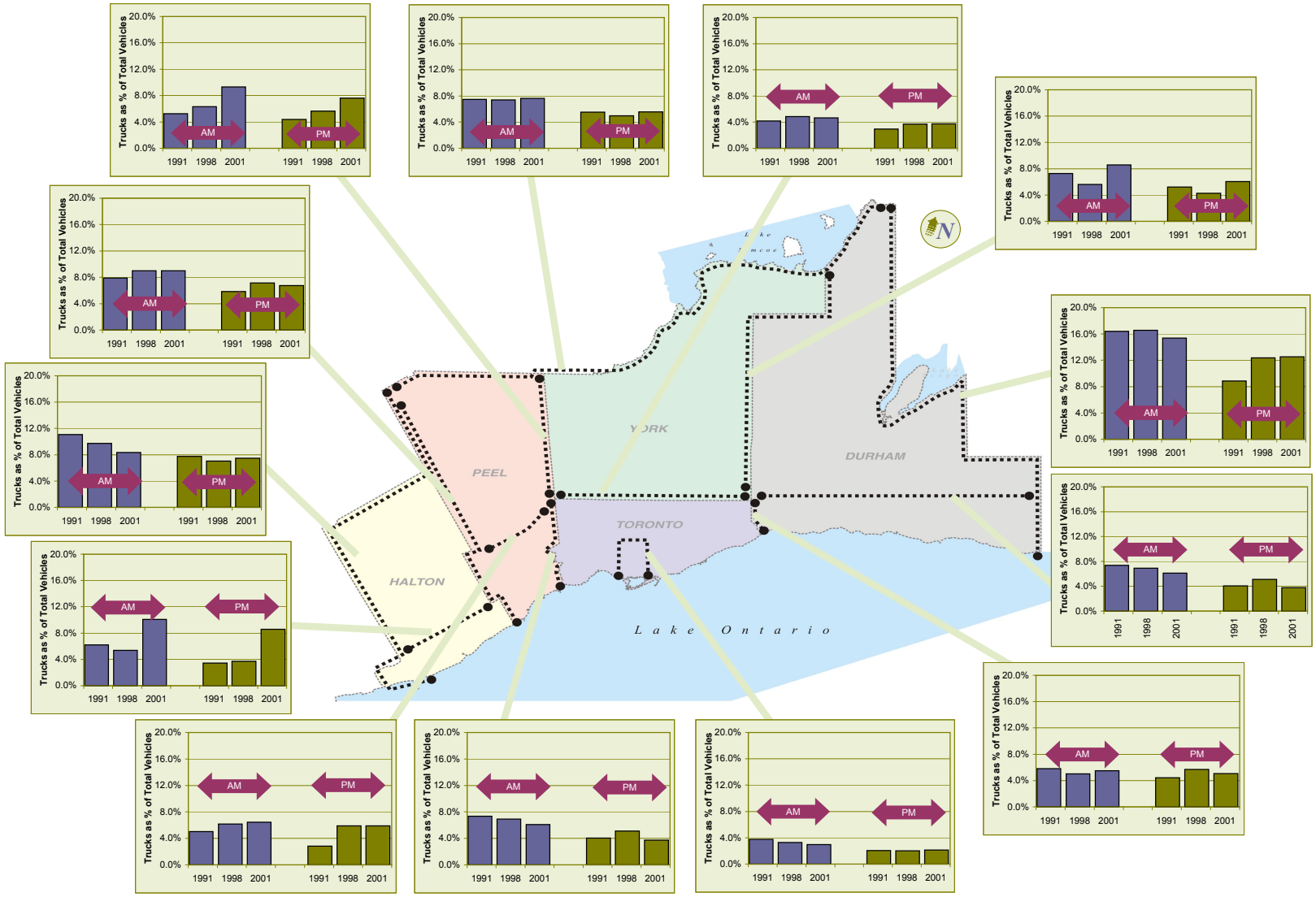


FIGURE 6-2: CHANGES IN MEDIUM AND HEAVY TRUCKS AS A PROPORTION OF ALL VEHICLES CROSSING SCREENLINES IN BOTH DIRECTIONS MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001

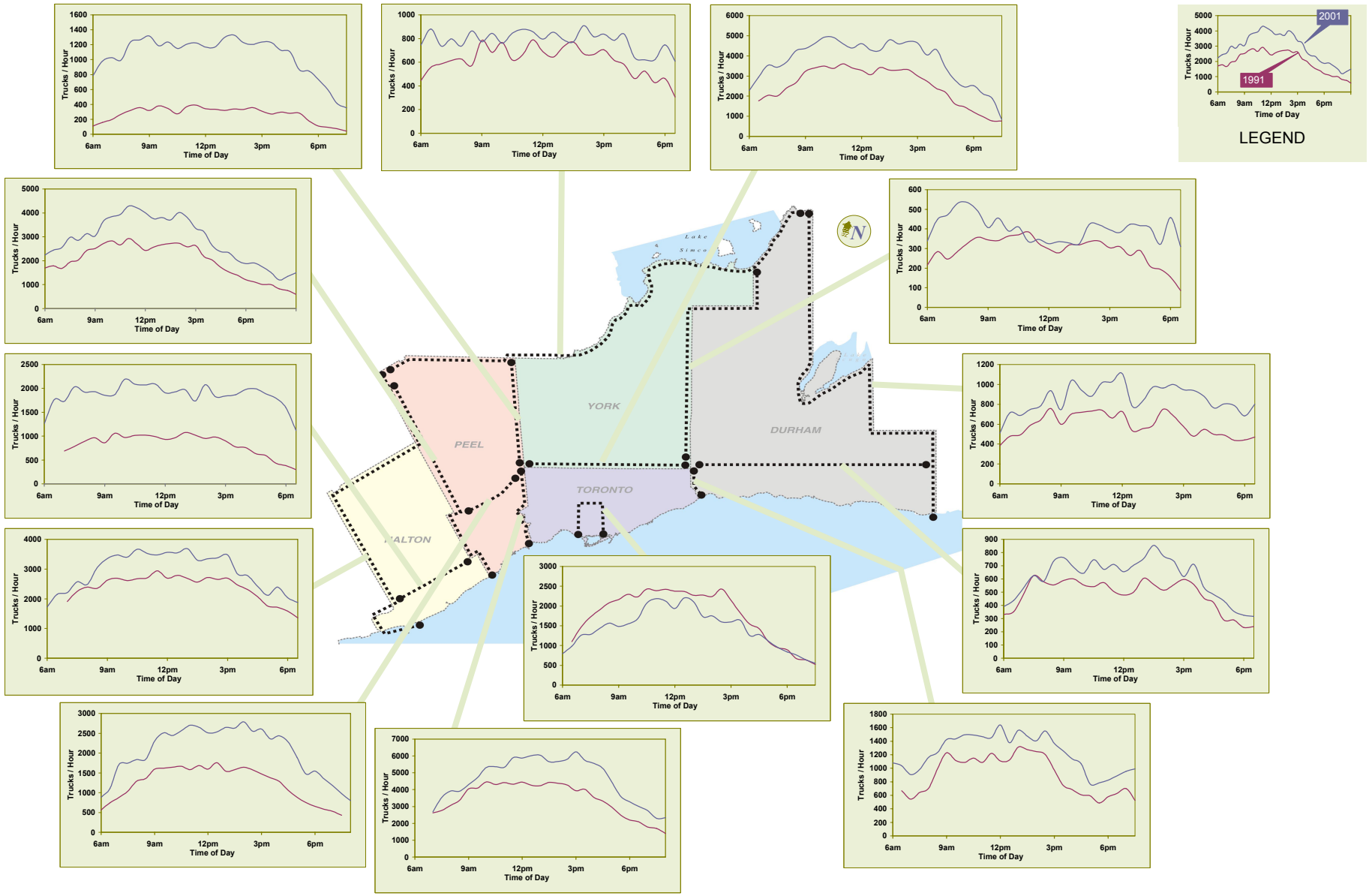


FIGURE 6-3: TIME-OF-DAY PROFILE FOR MEDIUM AND HEAVY TRUCKS CROSSING SCREENLINES IN BOTH DIRECTIONS 1991-2001

7 USE OF MAJOR ROAD AND TRANSIT FACILITIES

7.1 Focus…

Major highways (400-series highways plus the Don Valley Parkway and F.G. Gardiner Expressway) and fixed-rail transit facilities on exclusive rights-of-way (Toronto's subway and Scarborough RT line and the GO Rail system) play a major role in carrying persons across the GTA screenlines. The purpose of this section is to examine just how large that role is.

7.2 Refer to…

Figure 7-1 "The Use of Major Highway and Fixed-Rail Transit Facilities in the Peak Direction - Morning 3-hour Peak Period - 2001"

7.3 Specific Highlights 1991-2001…

- The five screenlines where the major highways carry the *highest percentage of total vehicles crossing the screenline* in the peak direction during the morning peak period in 2001:

GTA West Boundary	77%
Durham/Toronto Boundary	74%
Peel/Toronto Boundary	57%
Peel/Halton Boundary	57%
York/Peel Boundary	55%

- The five screenlines where the major fixed-rail facilities carry the *highest percentage of total persons crossing the screenline* in the peak direction during the morning peak period in 2001:

Toronto Central Area Cordon	65%
Peel/Toronto Boundary	27%
Durham/Toronto Boundary	20%
Peel/Halton Boundary	20%
Mississauga/Brampton Boundary	12%

- Screenlines *without crossing major highways* in 2001:

York/Durham Boundary
Durham - Taunton Road

- Screenlines *without crossing GO Rail service* in 2001:

GTA East Boundary
Halton - Dundas Street
York/Peel Boundary
York/Durham Boundary
Durham - Taunton Road

7.4 Overview of Trends and Issues…

Except in cases of severe congestion, usually the result of incidents, construction activity, or extreme weather, the system of major highways in the GTA is designed to provide higher average travel speeds than surface streets. Similarly, fixed rail services on exclusive rights-of-way are designed to provide better average travel times than street-based transit services. It is not surprising, therefore, that these major road and transit facilities, where they exist, attract a significant share of screenline crossings.

Except in the case of the Central Area Cordon, where major highways cross a GTA screenline, the minimum percentage of vehicle screenline crossings attracted to these facilities was 29 per cent in 2001. Significantly higher percentages are achieved in cases where there are multiple highway crossings, such as the Peel/Halton and Peel/Toronto boundaries, or cases where there are few alternative roads, such as the Durham/Toronto boundary. Even in the case of the York/Peel boundary, where the only highway crossing is the relatively new Highway 407, the percentage of vehicle trips using this facility has already reached 55 per cent.

Where GO Rail service crosses a screenline, the percentage of total person trips attracted to the service ranges from 1 to 20 percent of all person trips. Percentages toward the upper end of the range are typically found along the inner reaches of the Lakeshore corridor, where service is frequent and bi-directional. Percentages toward the lower end of the range are, not surprisingly, found, where service is limited and uni-directional or at the outer limits of GO Rail services. Where subway service has been provided, only at the Central Area Cordon among the screenlines considered here, it has attracted almost 50 per cent of all person trips.

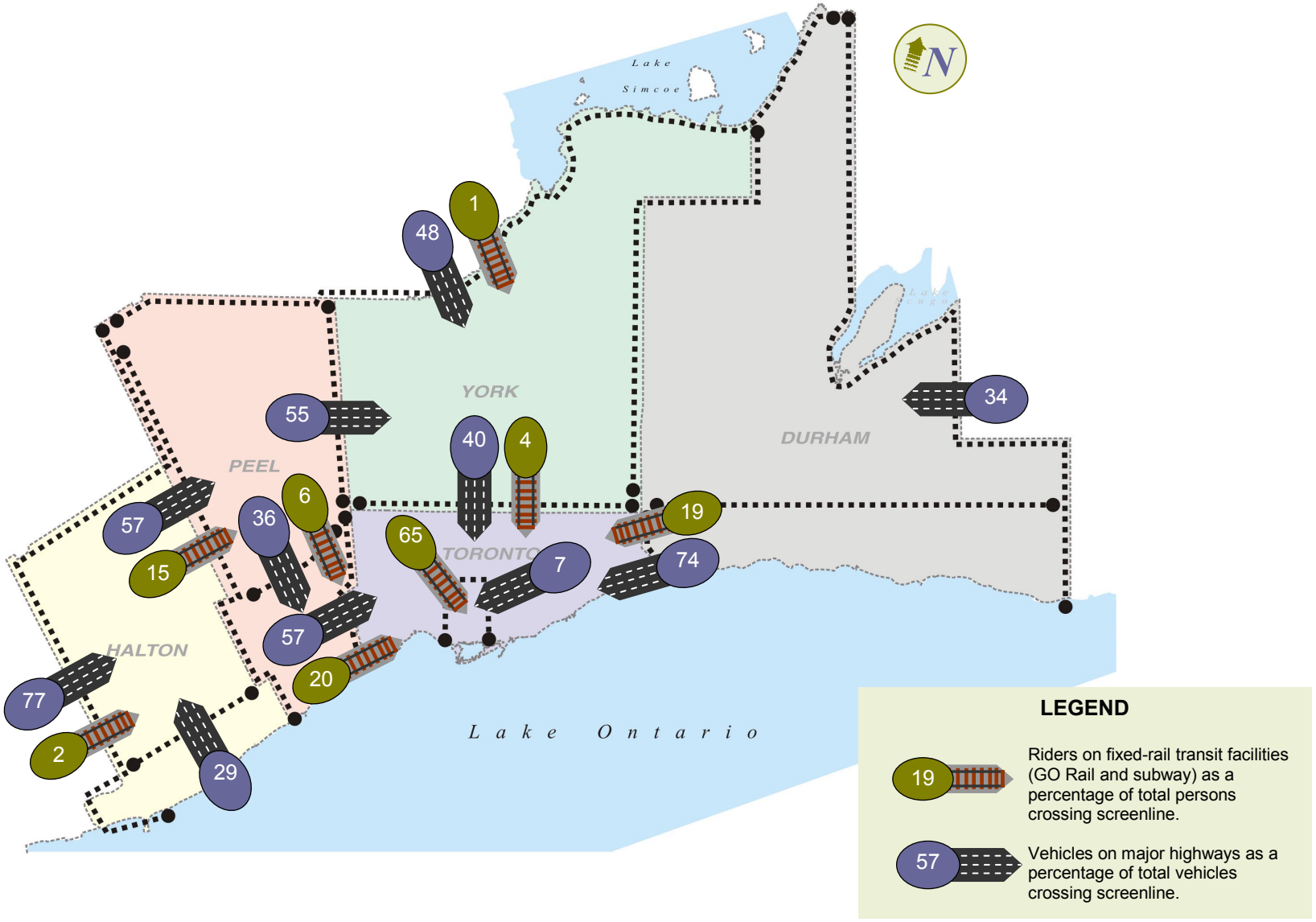


FIGURE 7-1: THE USE OF MAJOR HIGHWAY AND FIXED-RAIL TRANSIT FACILITIES IN THE PEAK DIRECTION MORNING PEAK 3-HOUR PERIOD 2001

8 PEAKING CHARACTERISTICS

8.1 Focus…

Transportation professionals working in the GTA have noticed three emerging trends with respect to the variations in traffic volumes by time and direction. The first is an increase in traffic in what has historically been the "off-peak" direction during peak periods relative to traffic levels in the "peak" direction. The second has been a spreading of peak traffic levels from what was historically a peak hour to what is now a 2 to 4-hour peak period, depending upon location. The final trend has been growth in travel outside the peak periods relative to growth within these periods. These trends are the focus of this section.

8.2 Refer to…

Figure 8-1 "Time-of-Day Profile for all Vehicles at Screenlines – 1991-2001"

Figure 8-2 "Vehicles Crossing Screenlines in the Off-peak-direction (Reverse Flow) as a Proportion of Those in the Peak Direction - Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

Figure 8-3 "Vehicles Crossing Screenlines During the Peak-hour as a Proportion of the 3-Hour Peak-period in the Peak Direction – Morning and Afternoon 3-Hour Peak Periods – 1991-2001"

Figure 8-4 "Vehicles Crossing Screenlines During the Morning and Afternoon 3-Hour Peak-periods as a Percentage of those during the 12-Hour Daytime Peak Period - Both Directions - 1991-2001"

8.3 Specific Highlights 1991-2001…

- The five screenlines with the *highest ratio of off-peak-direction to peak-direction* screenline vehicle crossings during the morning 3-hour peak period in 2001:

Durham - Taunton Road	85.5%
Halton - Dundas Street	78.7%
Peel/Toronto Boundary	77.6%
York/Peel Boundary	77.6%
York/Toronto Boundary	71.1%

- The five screenlines with the largest *increase in the ratio of off-peak-direction to peak-direction* vehicle crossings during the morning 3-hour peak period in 2001:

York/Peel Boundary	+24.2%
Peel/Halton Boundary	+10.0%
Mississauga/Brampton Boundary	+7.7%
Peel/Toronto Boundary	+7.1%
Toronto Central Area Cordon	+3.9%

- The five screenlines with the lowest *ratio of peak-hour to 3-hour peak-period* screenline vehicle crossings in the peak direction during the morning peak period in 2001:

GTA West Boundary	34.5%
GTA East Boundary	35.8%
Peel/Toronto Boundary	36.1%
Durham/Toronto Boundary	37.3%
Toronto Central Area Cordon	37.8%

- The five screenlines with the largest *decrease in the ratio of peak-hour to 3-hour peak-period* screenline vehicle crossings in the peak direction during the morning peak period in 2001:

GTA West Boundary	-6.1%
Halton - Dundas Street	-4.0%
Mississauga/Brampton Boundary	-3.4%
GTA East Boundary	-2.9%
Peel/Toronto Boundary	-2.1%

- The five screenlines with the lowest *ratio of morning and afternoon 3-hour peak periods to the 12-hour daytime peak period* in both directions in 2001:

GTA East Boundary	53.9%
GTA West Boundary	55.8%
Toronto Central Area Cordon	56.4%
Durham - Taunton Road	56.7%
Peel/Toronto Boundary	57.3%

- The five screenlines with the largest *decrease in the ratio of morning and afternoon 3-hour peak periods to 12-hour daytime peak period* in both directions in 2001:

Halton - Dundas Street	-2.1%
York/Peel Boundary	-1.8%
GTA West Boundary	-1.6%
Peel/Halton Boundary	-1.4%
Peel/Toronto Boundary	-0.7%

8.4 Overview of Trends and Issues…

Increasing "Reverse-flow" during Peak Periods…
Historically, in the area now known as the GTA, the peak direction of travel was very markedly inbound to Toronto (towards Union Station) during the morning "rush hour" and outbound from Toronto (away from Union Station) in the evening "rush hour". The same has been true for other communities such as Oshawa, although peak period flows in these communities also included a significant locally-oriented or self-contained component. However, over the past decade, rapid growth of employment in the '905' regions has resulted in a gradual shift in commuting patterns between places of residence and workplaces as discussed in Section 2 of this report.

At most of the GTA screenlines considered here, the reverse flow in the peak periods has increased over the last decade to the point where it is becoming a significant percentage of the historical peak-direction flow. The screenlines with the highest ratio of reverse flow to peak-direction flow show ratios upward of 70 per cent.

However, there are other factors at work affecting this ratio. For example, the construction of Highway 407 has been a factor in the changes in reverse-direction flows at the York/Peel and York/Toronto screenlines as traffic patterns have adjusted to make use of the new facility.

The presence of the Halton-Dundas Street, Durham-Taunton Road, and Mississauga/Brampton boundaries among the screenlines with high or rapidly increasing ratios of reverse to peak-direction commuting flows represents a mixture of influences that are neither easily characterized nor separated, including an increase in self-contained home-work travel within communities such as Oakville, Burlington, Mississauga, and Brampton. Another factor is the relative geographic location of new residential and employment-oriented land uses - there has been a tendency towards intensification of residential development in more urbanized areas while employment-related activities have increasingly located in more suburban locations.

At the fringes of the urbanized area of the GTA, a different dynamic is at work. For example, at the East and West GTA boundary, the ratio of "off-peak-direction" to "peak-direction" flows actually decreased between 1991 and 2001. This is presumably due to the fact that previously, these areas were largely outside the commuter-shed associated with the more urbanized portions of the GTA. Peak-period home-work travel would have been either non-existent, in the case of farmers, or without a coherent pattern, in the case of people working in the many smaller communities. However, in more recent years, the GTA commuter-shed has expanded to include these areas and peak-direction flows to and from the more urbanized areas are now becoming established.

Spreading of the "Rush Hour"…
Historically, commuting was markedly concentrated in morning and afternoon "rush hours" which, at one time, were literally one hour in length. However, as urban development in the GTA has intensified, the "rush hour" of years ago has gradually lengthened to include the "shoulders" on either side.

Contributing to this trend have been two key factors, one involuntary and one voluntary. As "rush-hour" demand on key roads and transit facilities reached and exceeded capacity, some of the demand was delayed involuntarily, extending the rush-hour. As this phenomenon became more prevalent, some commuters began to adjust the start times of their trips either earlier or later to avoid the worst of the congestion. Over time, working day start and end times, parking regulations, transit schedules have been adjusted in recognition of the temporal spreading of peak travel demand and to provide flexibility in trip timing to commuters.

A useful measure of the extent of peak spreading is the ratio of peak-hour (the maximum four consecutive 15-minute periods) to peak period (the maximum 12 consecutive 15-minute periods) travel. Theoretically, when this ratio approaches and even reaches 33 per cent, there is no longer a recognizable peak hour but a consistent 3-hour-long "rush hour". In this context, it is important to note that at virtually all of the screenlines considered here, this ratio is less than 40 percent and has been decreasing over the past decade. Although the ratio has not dropped below 34 per cent in any case, this probably represents a practical minimum limit given minute-to-minute variability in travel demand and system flow.

Although the screenlines comprising the GTA boundary and other screenline sections towards the fringes of the GTA show ratios that are close to the 33 per cent limit, this is typically not a reflection of capacity constraints in these areas. More likely, it is a result of inbound longer-distance commuters advancing their trip start times in recognition of the length of the trip and the patterns of congestion they are likely to encounter as they travel through the more urbanized portion of the GTA, in combination

with local work-trips that may have a later trip start time.

Trends in Travel Outside the Peak Periods…
Over the past decade, there has also been a trend towards increased travel outside the peak periods. At over half of the screenlines considered in this analysis, the ratio of screenline crossings within the 3-hour peak periods to crossings throughout the 12-hour daytime period has decreased, although this increase has typically been small, in the range of 0 to 2.5 per cent. Overall, the ratios for the screenlines analyzed here typically fall within the range of 55 to 65 per cent, both for 1991 and 2001.

Possible reasons for this trend include the following:

- Spreading of peak-period conditions even beyond the 3-hour peak period, particularly in more congested areas.
- Aging of the population and earlier average retirement age, resulting in an increase in demand for personal business, recreation-related and other trips unrelated to employment. Increasingly generous vacation and maternity/paternity provisions may also be a factor.
- An increase in the number of people working part-time hours or other forms of less-structured workdays. Shift work may also be a factor.

At almost half of the screenlines, however, the ratio of screenline crossings during the peak period to those during the 12-hour daytime period have increased. In most cases, these increases are less than one per cent and are well within the limits of normal variability in the counts. Again, however, a different dynamic has likely produced the increases of about 2.5 percent in this ratio at the North and East GTA boundaries and other similar situations. As indicated previously, it is more than likely that the extension of the GTA commutershed to include these areas, particularly over the past decade, has advanced the development of commuting patterns in areas where they did not previously exist to any significant extent.

Although the percentage changes defining this trend are small, some large numbers are involved, and the identification of this trend should serve notice that transportation operations, schedules, and regulations oriented to peak hours and the 3-hour peak period may need to be re-examined in the not-too-distant future.

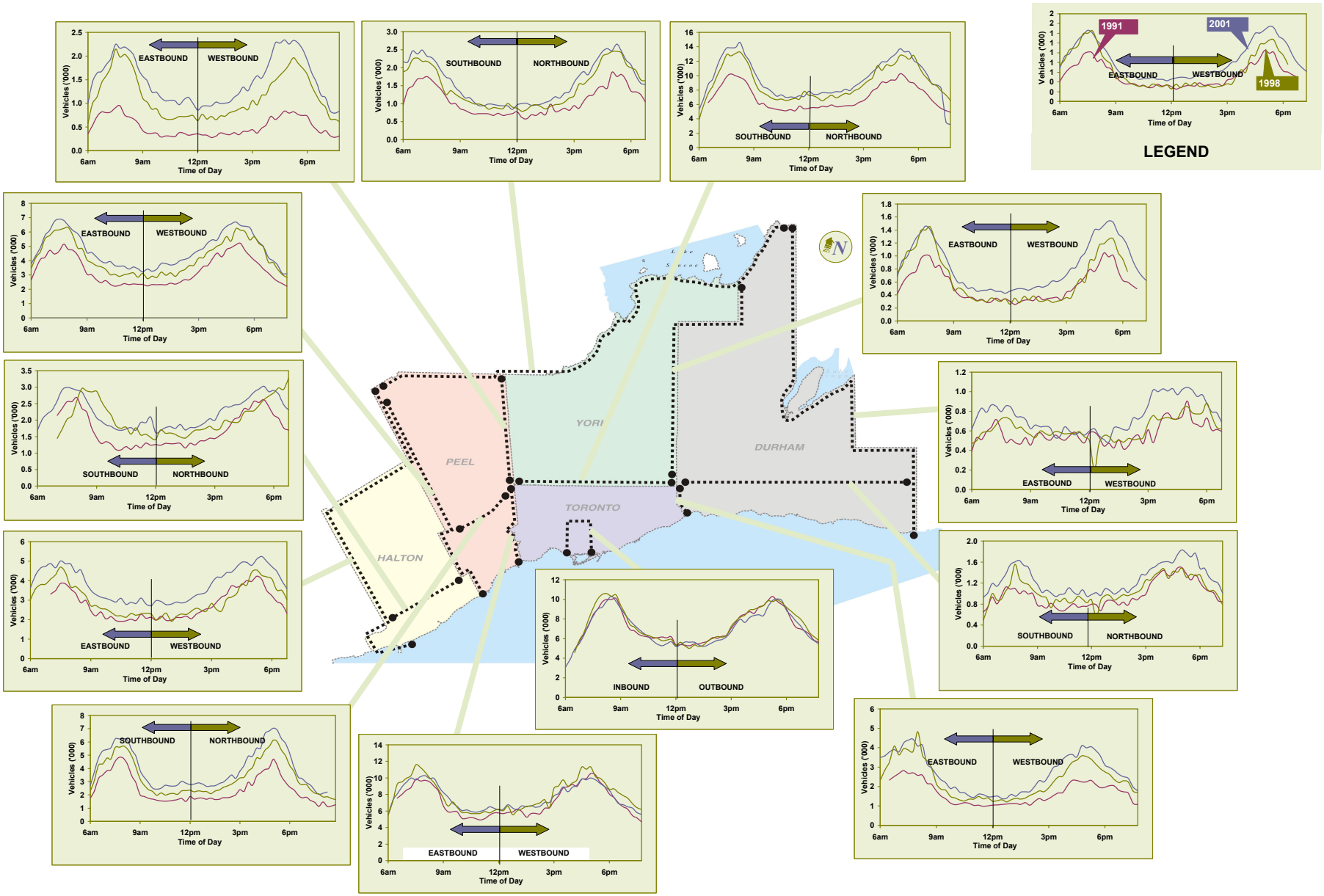
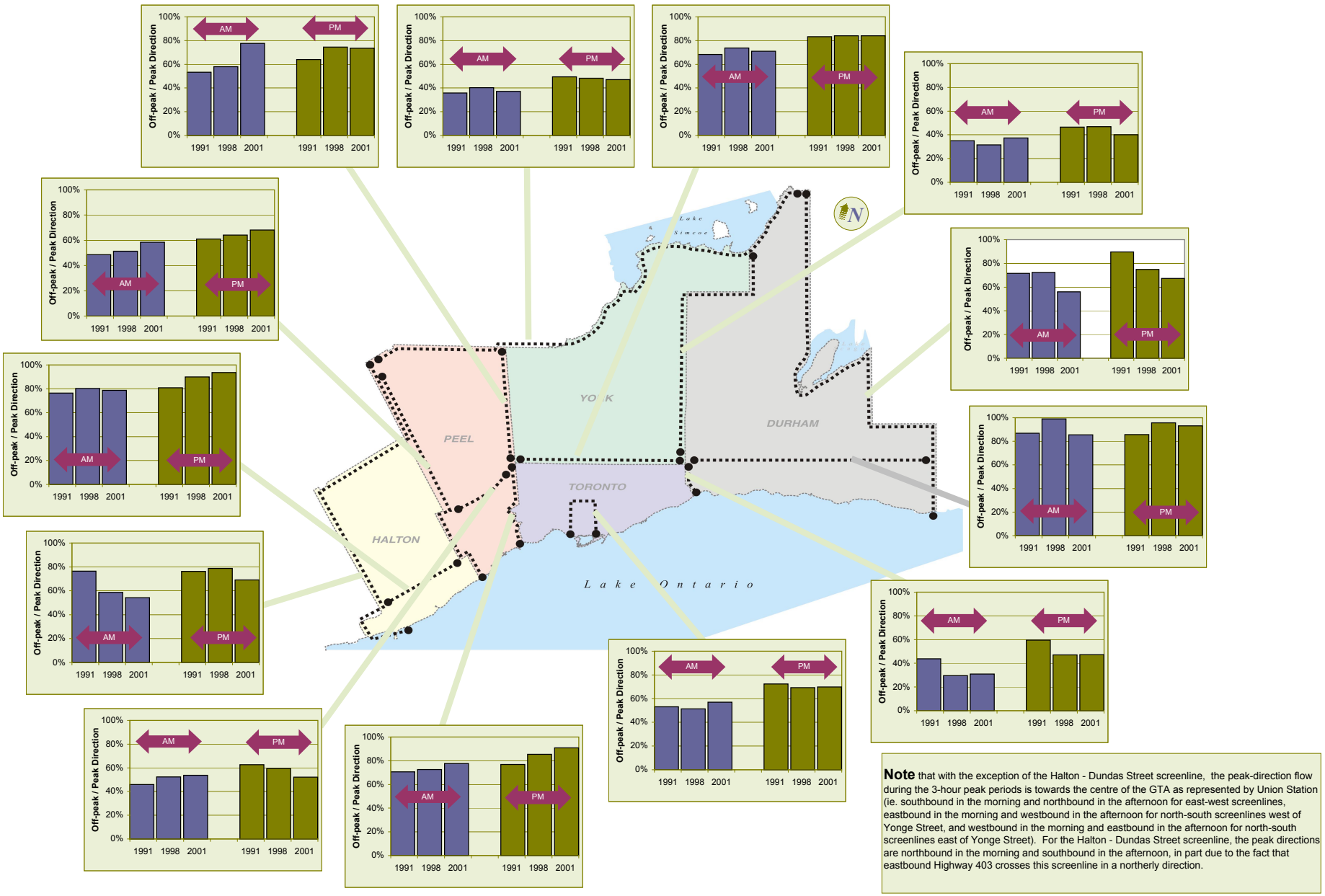
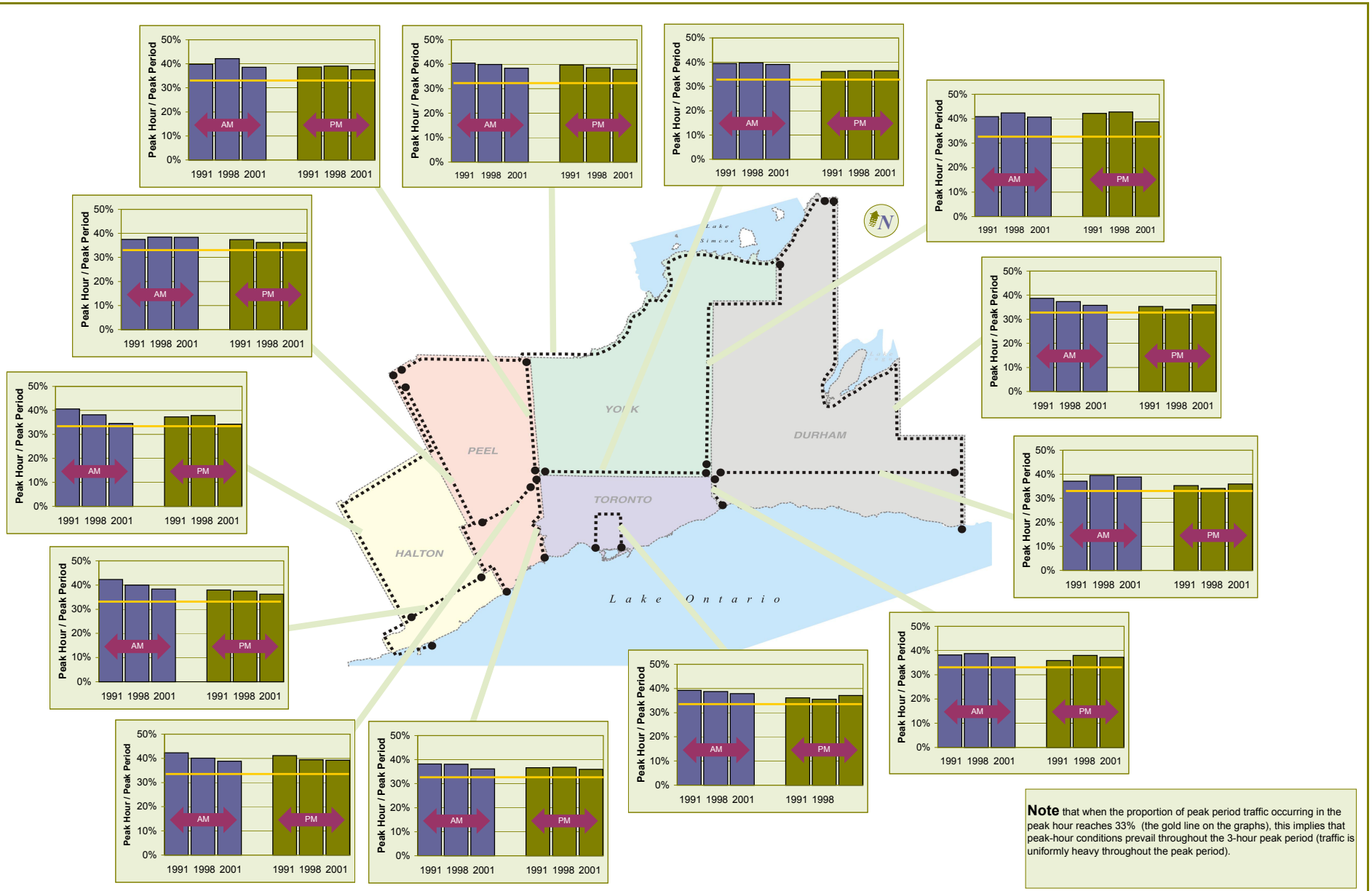


FIGURE 8-1: TIME-OF-DAY PROFILE FOR ALL VEHICLES AT SCREENLINES 1991-2001



Note that with the exception of the Halton - Dundas Street screenline, the peak-direction flow during the 3-hour peak periods is towards the centre of the GTA as represented by Union Station (ie. southbound in the morning and northbound in the afternoon for east-west screenlines, eastbound in the morning and westbound in the afternoon for north-south screenlines west of Yonge Street, and westbound in the morning and eastbound in the afternoon for north-south screenlines east of Yonge Street). For the Halton - Dundas Street screenline, the peak directions are northbound in the morning and southbound in the afternoon, in part due to the fact that eastbound Highway 403 crosses this screenline in a northerly direction.

FIGURE 8-2: VEHICLES CROSSING SCREENLINES IN THE OFF-PEAK DIRECTION (REVERSE FLOW) AS A PROPORTION OF THOSE IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001



Note that when the proportion of peak period traffic occurring in the peak hour reaches 33% (the gold line on the graphs), this implies that peak-hour conditions prevail throughout the 3-hour peak period (traffic is uniformly heavy throughout the peak period).

FIGURE 8-3: VEHICLES CROSSING SCREENLINES DURING THE PEAK HOUR AS A PROPORTION OF THE 3-HOUR PEAK PERIOD IN THE PEAK DIRECTION MORNING AND AFTERNOON 3-HOUR PEAK PERIODS 1991-2001

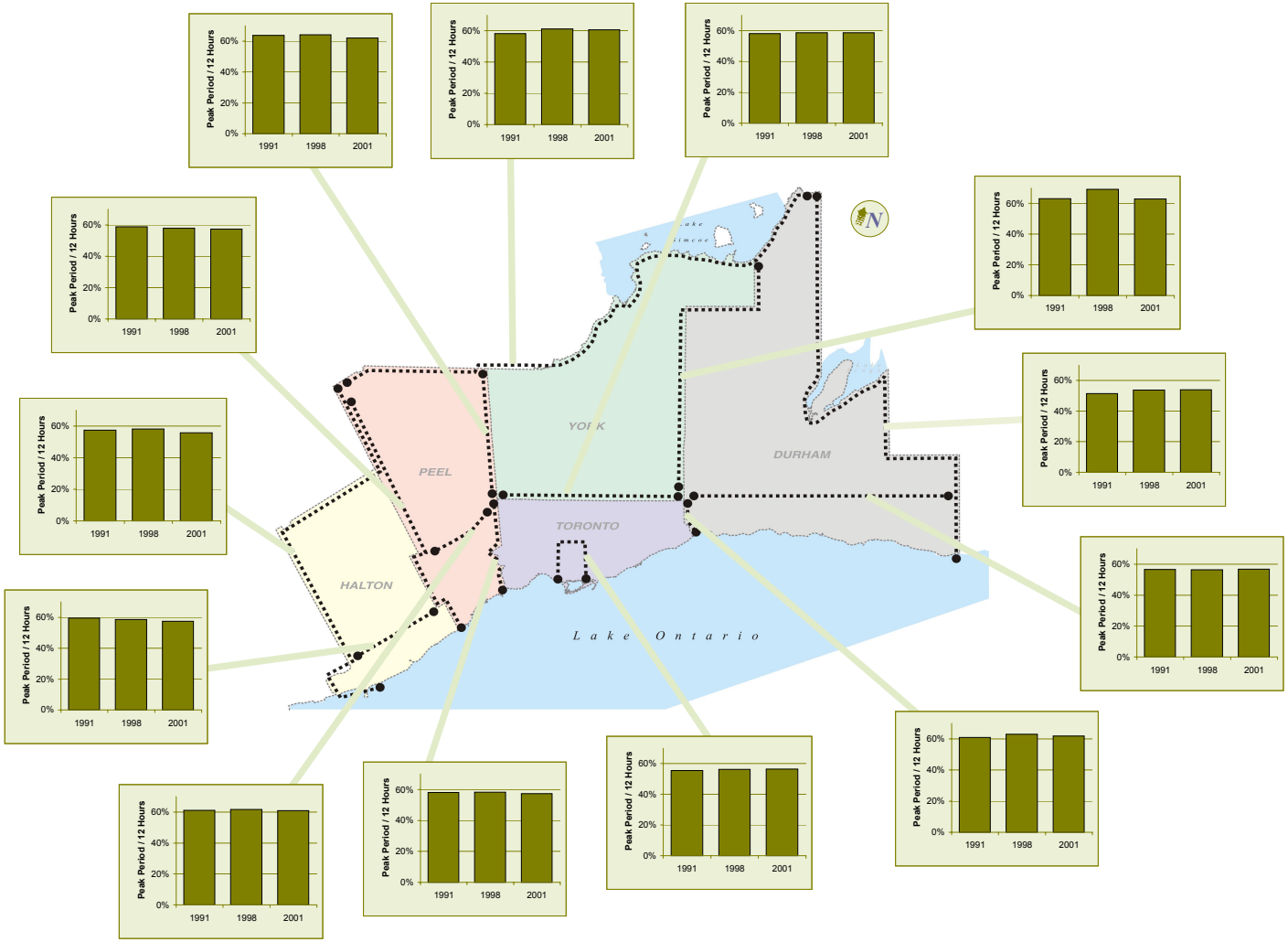


FIGURE 8-4: VEHICLES CROSSING SCREENLINES DURING THE MORNING AND AFTERNOON 3-HOUR PEAK PERIODS AS A PERCENTAGE OF THOSE DURING THE 12-HOUR DAYTIME PEAK PERIOD
BOTH DIRECTIONS
1991-2001

9 CORDON COUNT METHODOLOGICAL ISSUES

In the course of conducting the analyses summarized in this report, several issues concerning the manner in which Cordon Count data is collected and summarized were identified. These issues are not unknown but a brief review of their nature and implications with respect to the consistency and comparability of data is warranted.

Definition of person-trips…
The calculation of person trips varies among the regions of the GTA. In some cases, truck, bus, and taxi drivers are included as person trips while in others, these individuals are excluded from the calculation.

It is suggested that the primary purpose of the trip be considered in defining who should be included in the person trip total. In all three cases identified above, the drivers' should be considered as simply the means of moving the passengers or goods to their desired destination and should theoretically be excluded from person-trip totals. Similarly, average occupancy calculations should exclude these drivers. On the other hand, some vehicles that may be classified as light trucks can carry passengers. Examples include vans used for hotel shuttle services and pick-up trucks or vans used to transport workers between construction locations. In the former case, passengers would be included in occupancy calculations while the driver would not, while in the latter case, both driver and passengers could be considered occupants.

While this issue may affect the results of queries directed to the Data Management Group's Cordon Count Data Retrieval System (CCDRS), it was adjusted for in the analyses presented in this report.

Classification of Heavy Trucks…
In at least one instance in the GTA, heavy trucks are subdivided into trucks with and without trailers. This does not pose any problems as long as one is aware of the fact when querying the CCDRS. Resolution of this issue is not a priority.

Classification of Buses…
There has been variability, over time and between regions, in how buses are recorded. In some cases, school buses have been grouped with charter, GO Transit and other buses, while municipal transit buses have typically been classified separately. This issue is more relevant to older data as it appears to have been resolved in recent years. This variability limited the level of detail of the analysis of bus movements in the current report.

Definition of the 3-hour peak period…
Depending upon the location within the GTA, the 3-hour peak period may be defined differently. Typically, the morning peak period in the Central Area of Toronto is defined as being from 7 to 10 a.m., while this period is typically defined to start earlier as the distance from the Central Area increases. The rationale for this is related to the typical (at least in the past) "wave" of inbound commuting that starts as early as 5:30 a.m. in the outlying areas of the GTA and shows up much later in the more central areas.

In this report, flexible definitions for the 3 and 12-hour peak periods have been employed where the peak periods are simply defined as the 12 highest consecutive 15-minute periods (for the 3-hour peak period) and the 48 highest consecutive 15-minute periods (for the 12-hour peak period). Likewise, queries related to the peak hour would refer the 4 highest consecutive 15-minute periods.

Consideration should be given to adopting this flexible definition as a common approach across the GTA.

Counting period…
The period over which counts are undertaken varies across the GTA depending upon a variety of factors including the safety of counting staff after nightfall, constraints on counting and classification capabilities in low-light conditions, the timing of the "wave" mentioned above in relation to the location of the counting station, and other factors.

As long as the counting period includes the 48 highest consecutive 15-minute periods at a given location (to produce a 12-hour peak daytime period), extensions of the counting period beyond this are not an issue. However, users of the CCDRS should be made aware of the differences in counting periods.

The use of estimated counts and automatic counts…
The Cordon Count Program is not inexpensive and the extensive use of manual counts represents a significant portion of this expense. As a result, some

regions have completed a portion of their counting program using automatic counting equipment or estimating based on past trends.

Provided vehicle classification sampling is conducted rationally and consistently within the constraints of these alternative data-collection methods, there should not be any problems. However, users of the CCDRS should be made aware of the source of individual counts so that they can judge the suitability of the data for its intended purpose.

Count scheduling…
Historically and relatively consistently, Cordon Count programs were conducted every two years, in odd years. However, more recently, conducting these counts in years ending in "1" or "6" (ie. every 5 years) has become a desirable objective given the timing of the Transportation Tomorrow Survey and the Statistics Canada Census, two databases that are often used in conjunction with Cordon Count data.

The need for a count within the intervening five year period varies by area, with more frequent counts being more important in fast-growing areas.

It is recommended that a minimum five-year cycle be maintained for the Cordon Count program on a GTA-wide basis, while additional counts should be at the discretion of each region according to their needs and resources.

GLOSSARY

'905' Region - *consists of the Regional Municipalities of Durham, Halton, Peel, and York.*

Average Auto Occupancy – *average number of occupants in an automobile (does not include the driver in the case of taxis).*

Cordon – *a combination of screenlines that surrounds an area completely.*

Expressway – *includes the 400-series Provincial highways plus the Don Valley Parkway and the F.G.Gardiner Expressway.*

Greater Toronto Area *- consists of the City of Toronto and the Regional Municipalities of Durham, Halton, Peel, and York.*

Heavy Truck – *a truck with more than 2 axles, typically a semi-trailer or truck with trailer.*

HOV or High-Occupancy Vehicle – *includes buses, taxis, and automobiles with at least 2 or 3 occupants (depending upon the prevailing policy).*

Medium Truck – *a truck with more than 4 tires touching the road but with only 2 axles.*

Peak Hour – *the 4 consecutive 15-minute periods that yield the highest counted volume.*

Peak Period – *the 12 consecutive 15-minute periods that yield the highest counted volume (usually begins between 6 and 7 AM in the morning and between 3 and 4 PM in the afternoon.*

Screenline – *a linear group of counting stations designed to capture all or most of the movement across it.*

Total Persons – *all persons crossing a screenline or cordon except for truck, bus, and taxi drivers.*

Transit and other Bus – *includes municipal transit services, GO bus services, inter-regional and charter buses, and school buses.*

Transportation Tomorrow Survey (TTS) – *a survey of the trips made during a single day by the members of a sample of GTA households (and households in other jurisdictions) that has been conducted every 5 years since 1986.*

12-Hour Peak Period – *the consecutive 12 hours yielding the maximum counted volume.*