GTA West

GTA West Corridor
Environmental Assessment

Ontario

GTA West Corridor Environmental Assessment

Overview of Forecasting Travel Demand Analysis

Draft for Consultation

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1. INTRODUCTION

1.1 BACKGROUND

The purpose of this report is to provide an overview of the travel demand forecasting undertaken to assess future travel demands and identify existing and future system congestion within the western section of the Greater Golden Horseshoe Area as presented in Exhibit 1-1, the GTAW Preliminary Study Area presented in Exhibit 1-2 and the Preliminary Study Area of Influence in Exhibit 1-3.

Exhibit 1-1: Greater Golden Horseshoe Area – Western Section

Exhibit 1-2: GTAW Preliminary Study Area

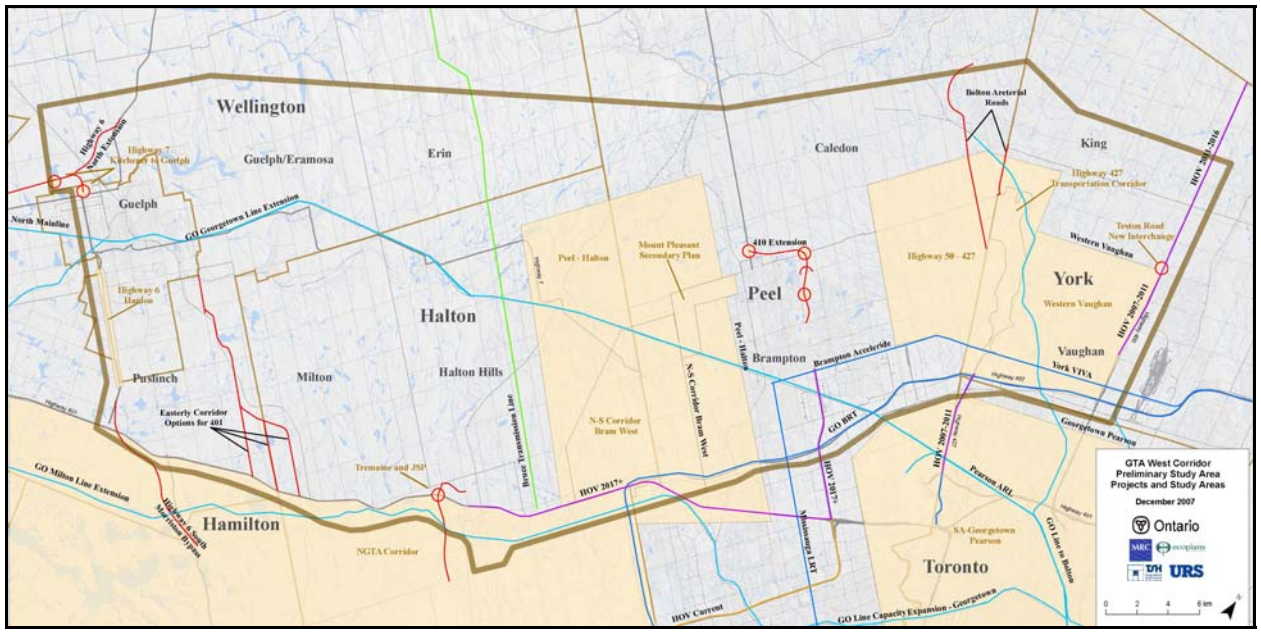
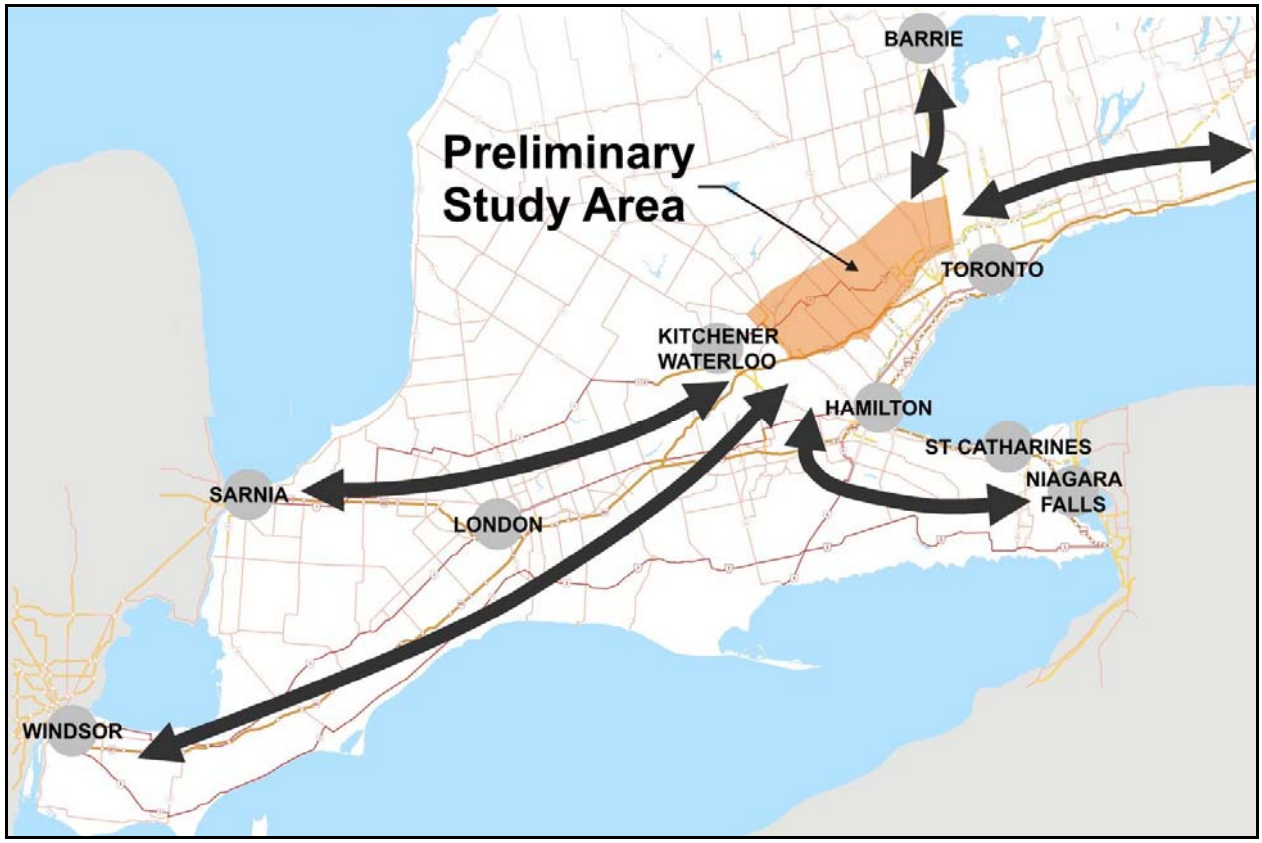


Exhibit 1-3: Preliminary Study Area and Area of Influence



1.2 GGH Model Structure

In 2006, the Ministry of Transportation, Ontario, initiated the development of multi-modal transportation forecasting tools for the Greater Golden Horseshoe (GGH). The GGH Model (GGHM) has been developed to forecast passenger and freight demand on the transportation network for the a.m. and p.m. peak periods. The following discussion summarizes the passenger travel demand forecasting process, provides an overview of the model structure and provides detailed descriptions of each sub-module of the model.

The GGH Model significantly advances the state-of-practice in transportation modelling in the following manner:

- The GGH Model is a major breakthrough in the Province's transportation-land use planning in that it directly links with the Province's Growth Plan (Places to Grow) and provides a transportation demand and forecasting tool to assess the ability of transportation alternatives and supportive options and policies to support the Growth Plan and promote sustainable transportation, reduce urban sprawl, protect the environment, enhance the economy through a more efficient transportation system and other objectives.

- The GGH Model encompasses a rapidly growing mega-region and captures the economic, land use, socio-economic linkages and interactions that influence growth over the regions and cities within the GGH. The model predicts travel demand for the entire GGH area, covering both the morning and evening peak periods and travel choices encompassing service levels in both periods. Previous models developed for the Greater Toronto and Hamilton Area (GTHA) have dealt with a single peak period and interactions between the GTHA and rest of the GGH with external zones or gateways in a static manner.

- The model is multi-modal in nature being able to forecast passenger travel by various modes such as auto driver, auto passenger, transit sub- modes (GO Transit, Local Transit) and non-motorized modes (walk and bicycle). It is also designed to predict combined modes, i.e., park-and- ride on the GO Rail or Rapid Transit stations and capture the characteristics of transit and walk cycle modes at a refined level to assess the viability of these modes. This is done reflecting the complex trip-making characteristics of today's travel, household composition, types of people and jobs, urban form and the available transportation options and sub-options.

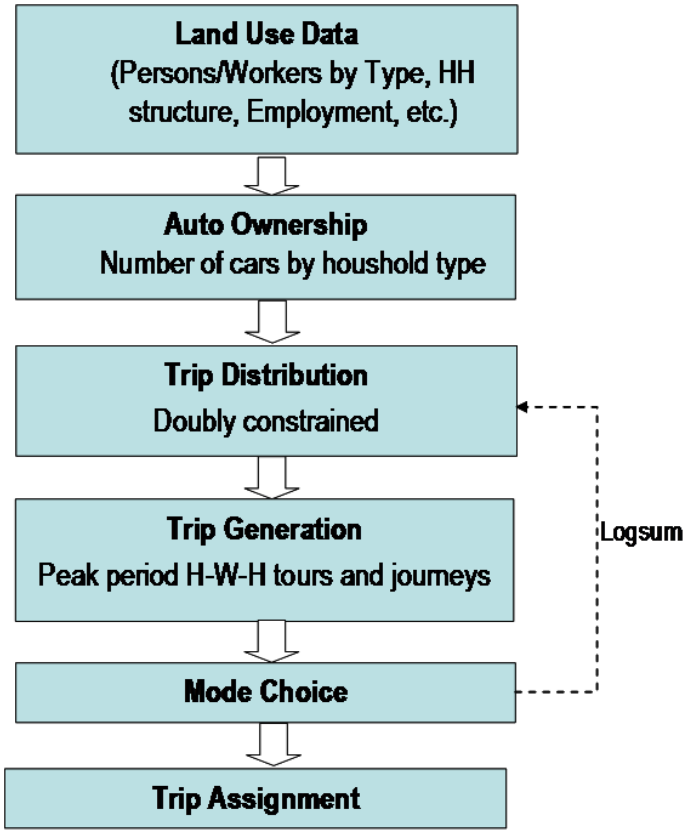
- The model is specifically designed to be sensitive to key variables that influence use of sustainable modes and the benefits of more compact, mixed-use land use and the promotion of nodes and corridors. This is captured in the representation of costs, land use, population, employment demographics and socio-economics at a detailed traffic zone level and takes into account future trends such as aging of the population, changes in household structure, changes in the spatial location of and types of employment in the Region. The model is also designed to capture the Growth Plan land use, including mobility hubs, built-up areas, designated greenfield areas and reflects the density, density targets and urban design of existing and new developments.

Reflecting these features, the model is a valuable planning tool by providing forecasting and evaluation of alternatives for infrastructure planning and environmental assessment studies at system- and project-specific levels and responds to the new demands placed on transportation model in recent years, transitioning from roads and highways emphasis to sustainable transportation.

Approach:

The GGH model system follows the four-stage modelling approach which remains the standard regional forecasting modelling approach world-wide. The four stages are: generation, which determines the number of trips by zone that are made; distribution, which determines the origin-destination flows of trips from zone to zone given the number of trips generated; mode choice, which "splits" these O-D flows by mode of travel; and assignment, which determines the paths used by the modal O-D flows through the road and transit networks.

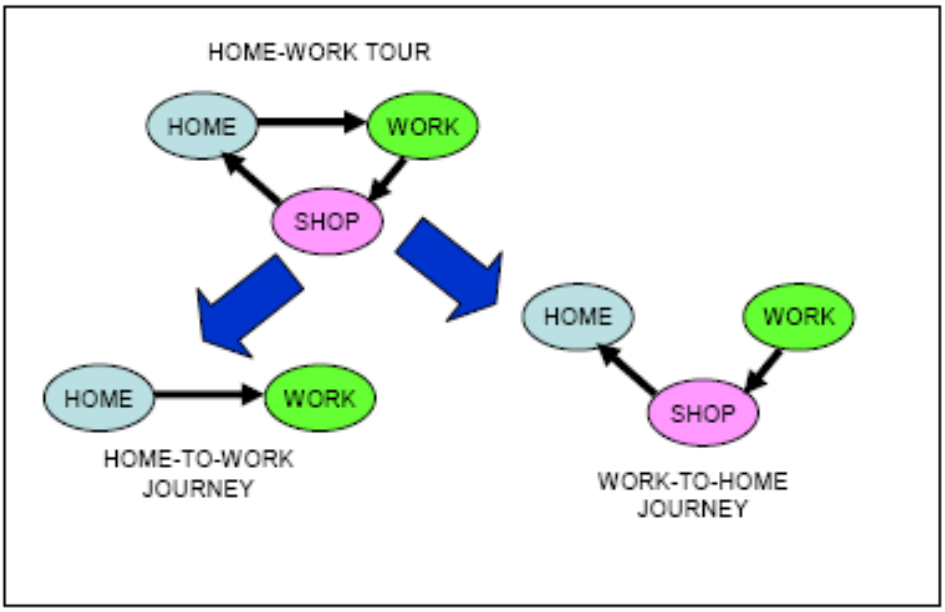
As noted above the GGH Model has been developed with the following design features:



- Sensitivity to land use and Growth Plan objectives - use of land use variables such as density and neighbourhood types in various stages of the model to make it sensitive to land use changes in future affecting travel demand;
- Sensitivity to socio- economic and demographic changes – segmentation of population into various demographic and socio-economic groups allows capturing the impact of change in population mix and employment types on travel demand;
- Linkage between sub-models within the modelling system – upper level models use information from lower level models to better represent the behavioural aspect of travel demand. This includes the determination of trip flows for an origin-destination pair (in the trip distribution model) to be dependent upon the available modes of travel and their relative service levels for that O-D pair (in mode choice model). Equilibrium and convergence between trip distribution, mode split, auto ownership and trip assignment is achieved in the process.

The other important feature of the GGH Model is that "work" and "school" trips are modelled using a "tour-based" approach. A tour is a linked set of trips in which the destination of the second trip is the origin of the first trip, etc. A tour begins and ends at the same location, referred to as the anchor point for the tour. Most tours are home-based;

i.e., they begin and end at home. Tours are also referred to as trip chains. A journey consists of one or more trips. Journeys typically represent "half tours". The example below illustrates the relationship between Tour and Journey. A tour consisting of trips from home to work, work to shopping and shopping to home can be defined as consisting of two journeys: a home-to-work journey (which involves only one trip, the direct trip from home to work) and work-to-home journey (which involves two trips, the trip from work to shopping and the trip from shopping to home).



The key advantage of the concept of tours is that it allows the model to directly address key behavioural linkages between home and work and home and school. That is, the fundamental relationship governing travel in peak periods is the journey to work and school in the morning and the return journey in the afternoon. Additional stops between home and work (which break the journey into more than one trip) are generally secondary to these primary movements. As a modelling strategy it makes behavioural sense to model these primary linkages first and then deal with intermediate stops separately.

Two home-based tours/journey types are considered in the model system:

- Home-work-home tours, with each tour subdividing into a home-to- work journey and a work-to-home journey.
- Home-school-home tours, with each tour subdividing into a home-to- school journey and a school-to-home journey.

Non-work/school travel to/from home and intermediate stops on home- work/school-home tours and non-home-based travel during the peak periods are all modelled as one-way journeys.

Data:

Three sets of data provide the basis for GGH Model development, calibration and validation:

- **Transportation Tomorrow Survey (TTS)** of 2001 is the main source of travel behaviour data that forms the basis for calibrating the model functions and parameters of the GGH Model. While the survey data have been validated, there is a known under-representation of total travel when compared to traffic count data in all of the TTS datasets. The TTS data have been corrected for under-reporting of trips by respondents before the model calibration process. Finally, the Regional Municipality of Waterloo was included in the survey in 1996 but not in 2001. As this area represents a significant part of the GGH, the 1996 data have been updated to 2001 and added to the 2001 TTS data.

- **2001 Census data**, corrected for undercount by Region, provides the basis for the development of land use input data that includes population and employment at the traffic zone level, segmented by relevant variables such as person's age, sex, occupation type and status, employment by industry type, etc.

- **2001 Cordon and traffic count data** – peak hour and peak period vehicle classified count and traffic count data from various agencies in the GGH have been compiled for the validation of model predictions. This also included the GO Transit passenger on/off counts at stations.

The GGH Model also includes a commercial vehicle module that generates, distributes and assigns commercial vehicle trips by truck type for the 12.5 hour daytime period and distributes trips to the a.m. and p.m. peak periods using time of day factors from available traffic counts data. It is noted that the current GGH Commercial Vehicle Model represents Phase One of the model development that provides inter-city, intra-urban and external gateway truck travel estimates.

The GGHM (Metrolinx) – Modelling Methodology and Results for the Draft Regional Transportation Plan – Backgrounder – October 2008 provides an overview of the GGHM model limitations, model input assumptions, network assumptions, cost assumptions and model adjustments. A summary of key limitations and assumptions that affect the GTAW Corridor Planning and Environmental Assessment Study documented in the Backgrounder – October 2008 report and the ***GTHA Travel Demand Overview Report – June 2008 – Draft*** include:

A summary of the 2001 and 2031 population and employment forecasts for the Greater Golden Horseshoe Area is presented in Table 1-1.

Table 1-1: GGH Existing and Future Population and Employment Forecasts

	Population (millions)		**Employment (millions)**	
	2001	**2031**	**2001**	**2031**
GTA - Hamilton	5.810	8.620	2.950	4.330
Niagara	0.427	0.511	0.186	0.218
Wellington	0.195	0.321	0.099	0.158
Subtotal	***6.432***	***9.452***	***3.235***	***4.706***
Other GGH	1.360	2.048	0.575	0.854
Total GGH	***7.792***	***11.500***	***3.810***	***5.560***
Growth		**48%**		**46%**

Road Network Assumptions

- Future road network includes the Province's five year capital program and high occupancy (HOV) network and road improvements identified in the upper and single tier Transportation Master Plans. These improvements reflect an additional 4,600 lane-km of major arterial road widenings and extensions by 2031. Key 400 series highway improvements identified include:
    - QEW HOV lanes from Trafalgar Road to Guelph Line
    - Highway 6 widening from Highway 403 to Highway 5
    - Highway 410 extension from Mayfield Road to Highway 10
    - Highway 427 extension from Highway 7 to Major Mackenzie Drive
    - Highway 400 widening (6 to 8 lanes) from Major Mackenzie Drive to Teston Road
    - Highway 401 westbound express and collector additional lanes from Jane Street to Kipling Avenue
    - Highway 401 eastbound collector and additional lanes from Avenue Road to Leslie Street
    - Highway 401 widening from Brock Road to Highway 12
    - Highway 401 widening from Weston Road to Salem Road
    - Highway 407 East from west of Brock Road to Highway 115 and north-south links in Ajax and Oshawa
    - Highway 404 extension from Green Lane to Ravenshoe Road
    - Highway 404 northbound HOV lane from Sheppard Avenue to Beaver Creek
    - Highway 406 widening from Regional Road 27 to Port Robinson Road

Transit Network Assumptions:

- Future transit network includes the proposed Big Move 25 year transit plan that reflects the 52 projects identified in the MoveOntario 2020 plan plus:
    - **Express Rail** – Electrified Lakeshore Regional Express service between Hamilton and Oshawa;
    - **Commuter Rail** – Commuter rail service linkages outside the GTHA to Niagara Falls, Cambridge, Guelph, and Peterborough;
    - **Metro** – Extension of the Scarborough Rapid Transit (SRT) to Malvern Town Centre;
    - **Other Rapid Transit (BRT or LRT) within/adjacent to GTA West Preliminary Study Area –**
        - Extension of a line on Hurontario Street north to Mayfield Road

- New line on Dundas Street in Halton and Mississauga
- New east-west line in York, north of Highway 7
- BRT in mixed traffic along the Highway 407 / 401 corridors from Halton to Durham
- New line joining North Pickering with Downtown Pickering
- Trafalgar Road from QEW to Highway 407

Auto Operating Costs:

- Auto operating costs were assumed to increase 200 per cent in real terms from 2008 levels by the year 2031 to capture potential increases related to escalation of gas prices and possible implementation of road pricing.

Non-Residential Parking Costs:

- Cost of non-residential parking was assumed to increase by 50 per cent in real terms over the 2006 levels in mature urban areas with existing paid parking. Areas subject to paid parking were assumed to expand by 2031 to include urban growth centres, nodes/corridors and major employment areas in urbanized areas with high densities.

Transit Fares:

- Transit fares reflect current fares, in real terms, with fare integration between local transit operators.

Transit Headways and Speeds:

- Headways and operating speeds of various transit modes as identified in the ***GGHM (Metrolinx) – Modelling Methodology and Results for the Draft Regional Transportation Plan – Backgrounder – October 2008*** is presented in Table 1-2.

Table 1-2: GGHM Headways and Operating Speed Assumptions

Mode	Peak Period Headway (minutes)	Nominal Operating Speed (km/hr)
Regional Express	5	80
Commuter Rail (GO Rail)	10	50-60 *
Urban RT (LRT, BRT, Transitway)	2 - 3	30 – 80 **
Metro (Subway/SRT)	2	40

*50 km/hr on all-stop services and 60 km/h on express services

** 30 km/hr on surface LRT / BRT; 80 km/hr on grade separated Transitway

1.3 Metrolinx Transportation System Analysis

In the development of the Big Move (Metrolinx RTP), the GGH Model was used to assess system performance measures that allowed the Metrolinx staff to assess the impacts and sensitivities of various network alternatives. Specific details from the alternative network analysis are documented in the ***GGHM (Metrolinx) – Modelling Methodology and Results for the Draft Regional Transportation Plan – Backgrounder – October 2008*** report. Specific system performance indicators that are of interest to the GTAW study are presented in Table 1-3.

Table 1-3: Metrolinx System Performance Indicators

Indicator	2006	2031 Current Trends	2031 Metrolinx RTP Forecast
Transit Mode Split	16.5%	16.9%	26.2%
Average length of Home Based Work Trips	15.2 km	14.9 km	15.6 km
a.m. peak period auto trips in GTHA*	2,068,000	3,106,930	2,609,942
a.m. peak hour vehicle kilometre travelled	12.5	16.8	14.4
Vehicle kilometres of travel per capita	2.1	2.0	1.7

* GTHA – Greater Toronto Hamilton Area

Source: Modelling Methodology and Results for the Draft Regional Transportation Plan

1.4 The Big Move – Transforming Transportation in the GTHA

The Regional Transportation Plan, which is now referred to as the Big Move, has developed a comprehensive list of transit priorities that are to be implemented in the next 25 years. The 25 Year plan, shown on Exhibit 1-4 identifies the following regional transit initiatives that are relevant to:

- Full day, 2-way GO service to Georgetown and Milton; and
- Possible Regional rail extensions to Guelph, Kitchener and Cambridge.

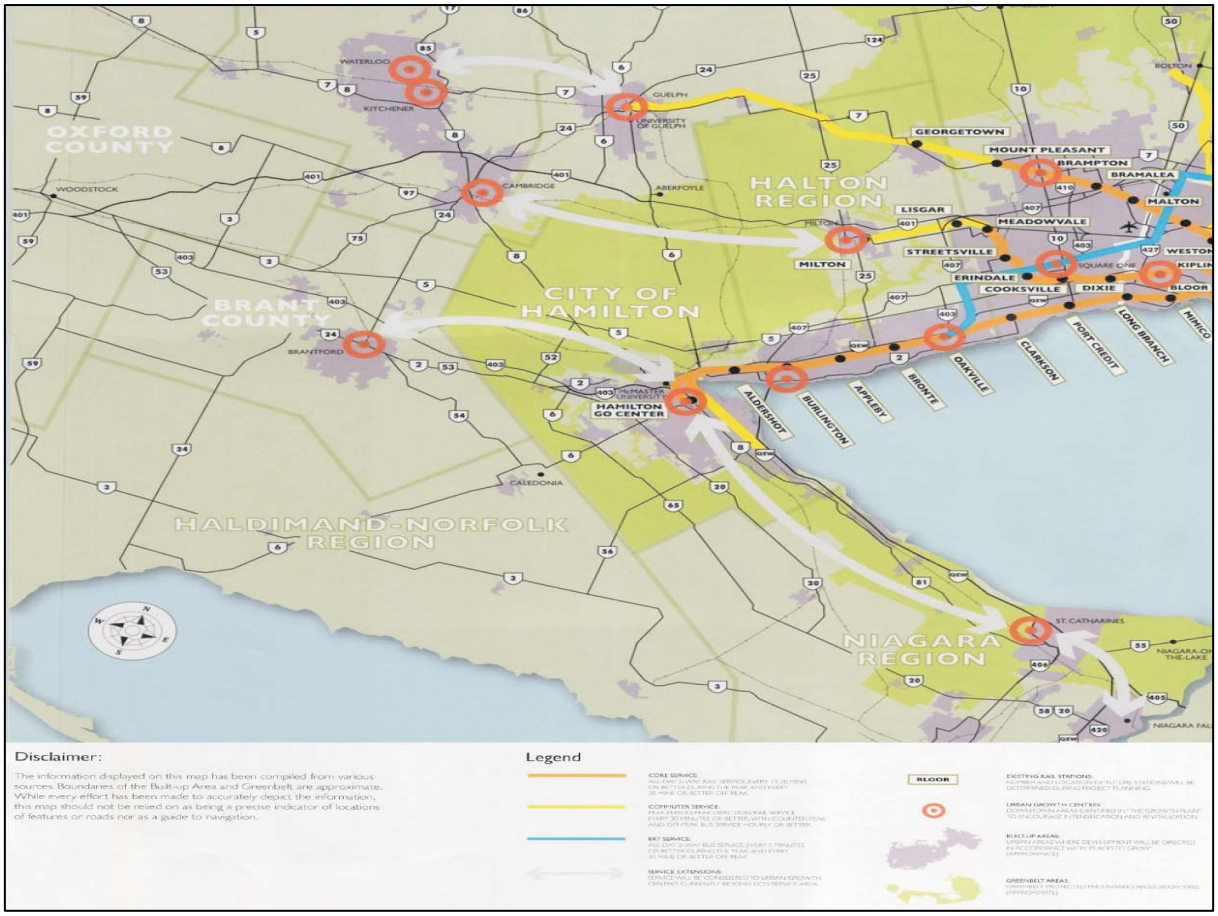
Exhibit 1-4: 25 Year Plan for Regional Rapid Transit and Highway Network

Reprinted from "The Big Move" report

1.5 GO Transit 2020 Service Plan

In December 2008, GO Transit released the GO 2020 Strategic Plan that provides vision, objectives, goals and a service strategy to meet the region's longer distance public transportation needs in the coming decades. GO's Vision is to be the preferred choice for inter-regional travel in the Greater Golden Horseshoe. Exhibit 1-5 represents the GO Transit 2020 Service Plan included in the *GO 2020 Strategic Plan* – December 2008.

Exhibit 1-5: GO Transit 2020 Service Plan



Reprinted from "GO Transit 2020" Report

2. GTAW TRAVEL DEMAND FORECASTING APPROACH

The GTAW demand forecasting analysis uses the following approaches to obtain a range of travel demands by specific market:

- Inter-regional Commuting demand utilizes the GGH Model to assess both auto and transit ridership demand for two land use allocations;
- Goods Movement travel utilizes a Strategic Demand Model approach that builds on historical trends and future goods movement market forecasts for truck, rail, marine and air;
- Tourism and Recreation travel utilizes a Strategic Demand Model approach that builds on historical trends and future tourist market outlooks.

In addition to the GGH MODEL and Strategic Model approach, the travel demand analysis incorporates transportation demand and travel characteristics obtained from consultation with the following groups:

- Transportation Service Providers
  - Examples include: GO Transit, intercity bus operators represented by the Ontario Motor Coach, Ontario Trucking Association, Canadian National (CN) Railways, Canadian Pacific (CP) Railways, Railway Association of Canada
- Business and Commercial Stakeholders
  - Examples include Home Depot, The Bay
- Municipal Advisory Group
- Community Advisory Group

The following sections provide background as well as travel demand analysis for inter-regional commuting. Section 3 discusses the System Analysis with the Strategic Model Approach for Goods Movement and Tourism & Recreation, discussed in Section 4.

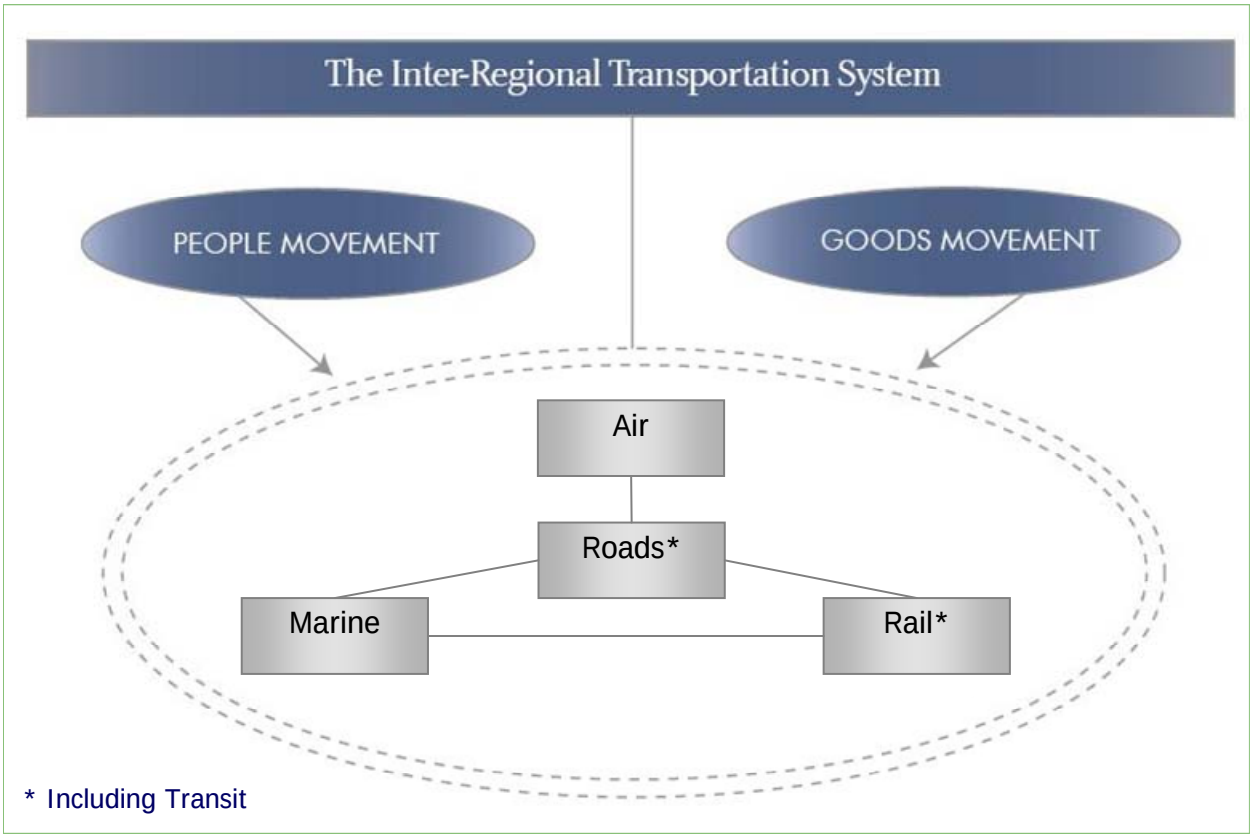
2.1 Inter-regional Transportation System

A key component of the GTAW Corridor Planning and Environmental Assessment Study is to assess the inter-regional travel demands utilizing the transportation system within the Study Area as well as adjacent impact areas. Thus, the GTAW travel demand analysis focus is on how well the inter-regional transportation system accommodates longer distance commuting; goods movement and tourism and recreational travel.

Exhibit 2-1 provides a schematic representation of the inter-regional transportation system for the movement of both people and goods. The road and transit system provides the essential linkages between the other modes (Rail, Air, Marine). Within the context of the inter-regional transportation system presented, an efficient road and transit system allows the other modes to operate more efficiently in the movement of people and goods.

The review of trip movement patterns in the Study Area indicates that virtually all inter-regional trips use the road / transit system at some point of the trip for either part or the entire trip.

Exhibit 2-1: The Inter-regional Transportation System



2.2 GGH Model Input Parameters

The GGH Model provides travel demand forecasts for all areas within the Greater Golden Horseshoe for both the a.m. peak hour and the p.m. peak hour. The validation for the GGH Model documented in the ***GGH Travel Demand Forecasting Model Validation Report – Draft – June 2008*** is focused on travel flows at a regional level and trip assignment flows at major screenline locations located within the GTHA and Regions of Niagara and Waterloo. The conclusion of the base year model validation was that "the GGH Model provides good representation of travel at the regional and screenline level".

2.2.1 GGH Model Land Use Forecasts

The existing and future (2031) land use allocation utilized in the GGH Model is documented in the ***Land Use Projections for the Golden Horseshoe – February 2008*** report. The land use allocation procedure uses the population and employment guidelines identified in Places to Grow. A summary of the population and employment allocation by Region / County / City within the GGH is presented in Table 2-1.

Population in the GGH is forecast to increase by 48% between 2001 and 2031 with the forecast population growth representing approximately 3.7 million new inhabitants.

Employment in the GGH is forecast to increase by 46% between 2001 and 2031 with the forecast employment growth representing approximately 1.75 million new jobs.

Within the Greater Toronto Hamilton Area (GTHA), the population is forecast to increase from 5.81 million persons in 2001 to 8.620 persons by 2031. This growth represents a growth of approximately 50%. The employment growth in the GTHA is forecast to increase from 2.95 million in 2001 to 4.33 million in 2031 representing a 48% growth.

Population and employment growth in the GGH Outer Ring (Municipalities beyond the GTHA) is forecast to grow by 45% and 42% respectively. The population in the Outer Ring is forecast to increase from 1.98 million in 2001 to 2.88 million by 2031. The employment growth is forecast to grow from .87 million in 2001 to 1.24 million by 2031.

The GGH Model land use allocation to the municipalities within the GTAW Preliminary Study is presented in Table 2-2. The land use allocation indicates that the population is anticipated to increase by 122% whereas the employment is anticipated to increase by 115%.

Table 2-1: GGH Places to Grow Population and Employment Growth Allocation (Thousands)

Region / County / City	Population			Employment		
	2001	2031	% Growth	2001	2031	% Growth
Region of Durham	530	960	81%	190	350	84%
Region of York	760	1,500	97%	390	780	100%
City of Toronto	2,590	3,080	19%	1,440	1,640	14%
Region of Peel	1,030	1,640	59%	530	870	64%
Region of Halton	390	780	100%	190	390	105%
City of Hamilton	510	660	29%	210	300	43%
GTHA Total	**5,810**	**8,620**	**48%**	**2,950**	**4,330**	**47%**
County of Northumberland	80	96	20%	29	33	14%
County of Peterborough	56	149	15%	16	60	13%
City of Peterborough	74			37		
City of Kawartha Lakes	72	100	39%	20	27	35%
County of Simcoe	254	667	70%	85	254	65%
City of Barrie	108			53		
City of Orillia	30			16		
County of Dufferin	53	80	51%	19	27	42%
County of Wellington	85	321	65%	36	158	60%
City of Guelph	110			63		
Region of Waterloo	456	729	60%	236	366	55%
County of Brant	35	173	34%	16	71	29%
City of Brantford	94			39		
County of Haldimand	46	56	22%	17	20	18%
Region of Niagara	427	511	20%	186	218	17%
Outer Ring Total	**1,980**	**2,880**	**45%**	**870**	**1,240**	**43%**
Total GGH	**7,790**	**11,500**	**48%**	**3,810**	**5,560**	**46%**

Table 2-2: GTAW Places to Grow Population and Employment Growth Allocation (Thousands)

Region / County / City	Population			Employment		
	2001	2031	% Growth	2001	2031	% Growth
City of Vaughan	190	431	127%	124	261	110%
City of Brampton	340	740	118%	136	317	133%
Town of Caledon	54	117	117%	19	48	153%
Town of Halton Hills	50	99	98%	16	34	113%
Town of Milton	33	204	518%	22	78	255%
City of Guelph	110	187	70%	68	109	60%
County of Wellington	85	134	58%	31	49	58%
GTAW Total	**862**	**1,912**	**122%**	**416**	**896**	**115%**

2.2.2 Alternate Land Use Allocation – GTAW Study Area

An alternate land use allocation scenario was developed by the Project Study Team to reflect the current (2008) land use planning information from the municipalities within the GTAW study area. Meetings were held with municipal staff to obtain the most current data from growth management exercises being undertaken by municipalities. A detailed land use allocation analysis was undertaken to allocate population and employment to the Growth Plan Designations defined as:

- Urban Growth Centre (UGC) – core areas designates for high density
- Built Boundary (BB) – the built up urban area
- Designated Growth Area – Areas identified for future development but not built
- Whitebelt (WB) – Areas currently outside the urban envelop

The Growth Plan population and employment allocation for each upper-tier municipality was maintained throughout the Alternate Land Use allocation procedure. The ALU allocation procedure reallocates population and employment to local municipalities. The results of this reallocation procedure are presented in Table 2-3.

Table 2-3: Comparison of RTP and ALU Allocations within GTAW Study Area (Thousands)

Region / County / City	Population			Employment		
	2031 RTP	2031 ALU	Absolute Difference	2031 RTP	2031 ALU	Absolute Difference
City of Vaughan	431	419	-12	261	276	+15
City of Brampton	740	758	+18	317	320	+3
Town of Caledon	117	113	-4	48	49	+1
Town of Halton Hills	99	70	-29	34	40	+6
Town of Milton	204	260	+56	78	100	+22
City of Guelph	187	175	-12	109	95	-14
County of Wellington	134	147	+13	49	63	+14
GTAW Total	**1,912**	**1,942**	**+30**	**896**	**943**	**+47**

The Alternate Land Use (ALU) for 2031 provides for 30,000 in additional population and 47,000 in additional employment within the GTAW Study Area. The ALU allocation also reflects a lower allocation to the Urban Growth Centres with increased allocation to Built Boundary (BB) and Whitebelt (WB) areas. It must be emphasized that this allocation plan is based on current municipal planning and is subject to change as the conformity exercise proceeds. This study will revisit the post conformity land use allocations to check whether changes to current assumptions would affect travel demand forecasting results.

2.2.3 Road Network Development – GTAW Study Area

The GGH Model 2031 road network is based on the MTO 5-year capital plan, Municipal Transportation Master Plans and available capital works programs. As noted in Section 1.2, the GGH Model includes a significant number of road system improvements throughout the Greater Golden Horseshoe including highway widenings.

Specific to the GTAW Study Area and Area of Influence, the major Provincial Highway and freeway improvement assumptions included in the 2031 GGH Model road network are summarized in Table 2-4 and Table 2-5.

For additional road network development, refer to ***GGHM – Future Road and Transit Network Development – Draft – June 2007*** report.

Table 2-4: GTAW and Area of Influence - 2031 Provincial Highway Network Improvements

Facility	From	To	Number of Lanes (2-way)	
			2006	2031
Provincial Highways				
Highway 407 ETR	Hurontario Street	Highway 404	6	10
Highway 410 Ext.	Bovaird Drive	Highway 10		4
Highway 427 Extension	Highway 7	Major Mackenzie Drive		4
Highway 7 New	Conestoga Parkway	Hanlon Parkway		4
Freeway HOV Lanes				
QEW	Guelph Line	Trafalgar Road	6	8+HOV
QEW	Trafalgar Road	Highway 403	6	8+HOV
QEW	Highway 403	Highway 427	6	4+HOV
QEW	Centennial Parkway	Fruitland Road	6	6+HOV
QEW	Fruitland Road	Highway 406	6	6
Highway 400	Major Mackenzie Dr.	Highway 9	6	6+HOV
Highway 401	RR 25	Highway 410	6	6+HOV to 12+HOV
Highway 403	QEW	Highway 407	4	6+HOV

Table 2-5: GTAW and Area of Influence - 2031 Arterial Road Network Improvements

Facility	From	To	GGHM Number of Lanes (2-way)		TMP Number of Lanes
			2006	2031	
Peel Region					
Highway 7	WC Boulevard	Highway 410	2	6	6
Wanless Drive	Hurontario Street	WC Boulevard	2	4	4
Mayfield Road	WC Boulevard	Hurontario Street	2	4	4
Mayfield Road	Hurontario Street	Dixie Road	2	6	6
Mayfield Road	Dixie Road	Highway 50	2	4	4
Britannia Road	Highway 407	Hurontario Street	4	6	6
Clarkway Drive	Mayfield Road	Highway 50	2	4	4
Heritage Road	Bovaird Drive	Mayfield Road	2	4	4
The Gore Road	Bovaird Drive	Mayfield Road	2	4	4
Chinguacousy Road	Hwy 407	Mayfield Road	2	6	6
Torbram Road	Highway 407	Countryside Dr.	4	6	6
Mississauga Road	Steeles Avenue	Mayfield road	2	4	4
Mississauga Road	Highway 401	Steeles Avenue	4	6	6
Bramalea Road	Steeles Avenue	Queen Street	4	6	6
Bramalea Road	Sandalwood Dr	Mayfield Road	2	4	4
WC Boulevard	Steeles Avenue	10^{th} Side Road	2	6	6
WC Boulevard	10^{th} Side Road	Mayfield Road	2	4	4
Queen Street	Highway 410	Highway 427	4	6	6
Derry Street	Highway 407	Highway 410	4	6	6
Steeles Avenue	Hurontario Street	WC Boulevard	4	6	6
Bramwest Parkway	Steels Avenue	Mayfield Road		4	4
Halton Region					
Dundas Street	RR 24	Highway 403	4	6	6
RR 25	Speers Road	Derry Road	2	4	4
Trafalgar Road	Britannia Road	Highway 7	2	4	4
Trafalgar Road	Upper Middle Road	Highway 407	4	6	6
Guelph Line	Mainway	Upper Middle St	4	6	6
Derry Road	James Snow Parkway	Ninth Line	2	4	4
Burnhamthorpe Road	RR 25	Ninth Line	2	4	4
Britannia Road	RR 25	RR 13	2	4	4
Wellington / Guelph					
Clair Road	Laird Road	Victoria Road	2	4	4
Victoria Road	York Road	Stone Road	2	4	4
Edinburgh Road	London Road	RR 124	2	4	4
Stone Road	Victoria Road	Watson Parkway	2	4	4
Stone Road Extension	Stone Road	RR 124		2	2
Woodlawn Road Ext.	Woodlawn Road	Watson Road		2	2

2.2.4 Transit Network Development - GTAW Study Area

The GGH Model 2031 transit network includes the Metrolinx (The Big Move) 25 year Transit Plan which includes GO Rail service improvements, subway extensions, new BRT and LRT services as well as increased service frequencies on existing inter-regional transit routes.

Specific transit system improvements within the GTAW Study Area and GTAW Area of Influence are summarized in Table 2-6 and shown graphically in Exhibit 1-4. More detail on the 15 year and the 25 year (2031) Transit Plan is provided in *The Big Move* – 2008 report with respect to those projects.

Table 2-6: GTAW and Area of Influence - 2031 Transit Network – Assumed Improvements

Transit Service Improvements	25 year Plan (2031)
Georgetown GO Expansion	
- Full Service to Georgetown	X
- Peak Period Service to Guelph	X
- Service Extension to City of Waterloo	X
Milton GO Expansion	
- Full Service to Milton	X
- Service Extension to Cambridge	X
Trafalgar / Main BRT	
- Downtown Milton to Highway 407	X
Highway 403 Transitway	
- Midtown Oakville – Renforth / Airport	X
Mississauga Transitway	
- WC Boulevard to Renforth Drive	X
Steeles Accelerride	
- Lisgar GO to Highway 427	X
Brampton Accelerride	
- Queen Street (Main St to Highway 50)	X
Hurontario LRT	
- Lakeshore Road to Queen Street Brampton	X
Highway 10 (Hurontario) BRT	
- Mayfield West to Downtown Brampton	X
Burlington Connector BRT	
- Fairview GO to Downtown Burlington	X
Dundas Street BRT	
- Brant Street to Kipling Subway Station	X
Trafalgar BRT	
- Highway 407 to Midtown Oakville	X

2.3 GGH Model Outputs

The GGH Model developed by MTO and utilized in the preparation of the Metrolinx – The Big Move transportation plan provided the base 2001 and 2031 peak hour (a.m. and p.m.) travel auto and transit person trip movements on the transportation system. The following discussion provides an overview of the model trip control totals, travel characteristics, auto and truck network assignments and transit person assignments.

2.3.1 GGH Model Data Sets

Travel demand information obtained from the GGH Model presented in Table 2-7 reflects the control totals of the data sets for both the RTP (Metrolinx) Land Use Allocation and the Alternate Land Use (ALU) Allocation as well as the forecast increase in trip making between 2001 and 2031. Further discussion on land use alternatives is presented in Section 2.2.2.

Table 2-7: GGHM Travel Demand Data

	GGH			GTAW		
	2001	**2031**	**Growth**	**2001**	**2031**	**Growth**
a.m. peak period						
Total Person						
- RTP	3,056,559	5,034,161	65%	373,334	862,313	131%
- ALU	3,056,559	5,062,436	66%	373,334	881,943	136%
Autos						
- RTP	2,206,200	3,268,400	48%	293,000	596,800	104%
- ALU	2,206,200	3,203,100	45%	293,000	608,900	108%
Transit Person						
- RTP	462,400	1,049,090	127%	25,200	127,200	405%
- ALU	462,400	1,067,400	131%	25,200	130,700	419%
p.m. peak period						
Total Person						
- RTP	3,893,175	6,794,897	75%	404,815	1,097,322	171%
- ALU	3,893,175	6,814,314	75%	404,815	1,114,050	175%
Autos						
- RTP	2,786,000	4,354,100	56%	318,900	766,800	140%
- ALU	2,786,000	4,285,100	54%	318,900	779,200	144%
Transit Person						
- RTP	511,500	1,181,500	131%	15,700	101,400	547%
- ALU	511,500	1,204,700	136%	15,700	102,600	555%

In addition to the trip tables provided, existing and future travel time skim matrices for both the a.m. and p.m. peak hours were obtained along with the existing and future road and transit networks.

According to the summary presented in Table 2-7, the total person trip control for the Greater Golden Horseshoe indicates that the total person trip growth ranges between 65% and 75% for the a.m. and p.m. peak periods. Total person flows between the GTAW Study Area in the a.m. and p.m. peak periods will experience an increase ranging from 131% to 175%.

The auto trip control information presented in Table 2-7 for the Greater Golden Horseshoe indicates that range of increase of auto trip making in the a.m. and p.m. peak periods is between 45% and 56% whereas the GTAW Study Area will experience an increase range of 104% to 144% for the same time period.

Similarly, the transit person trip control information presented in Table 2-7 indicates that the a.m. and p.m. peak period transit person trip making increases will range between 127% to 136% for the Greater Golden Horseshoe area, whereas the GTAW study area will experience trip making increases between 405% and 555%.

This significant travel growth in the GTAW study area reflects the significant increases in population and employment planned for the area.

The explosive growth in transit trips in the GTAW is a reflection of the population/employment factors and more importantly, a result of the significant transit services proposed by 2031 over what exists in the area today.

2.3.2 GGH Model Travel Flows

The GTAW Preliminary Study Area has a mix of travel components:

- Internal trips – those trips that originate and are within the study area;
- Internal to external trips – those trips that originate within the study area but are destined elsewhere;
- External to internal trips – those trips that originate outside of the study area but are destined to the study area; and
- Through trips – those trips that neither originate nor end within the study area but pass through as part of their journey.

Thus, the inter-regional commuting patterns and issues must be viewed from a broader system base that includes the western area of the Greater Golden Horseshoe.

Summaries of the 2006 p.m. peak hour and 2031 p.m. peak hour Total Person travel flows by Regional Municipality are presented in Table 2-8 and Table 2-9 respectively. These tables illustrate the level of trip making between and within the different regions. The total person trip flows presented in Table 2-8 and Table 2-9 provide the basis for assessing inter-regional travel flows across municipal boundaries as shown in Table 2-11 and Table 2-12. The number of inter-regional trips crossing municipal boundaries is highest at the Toronto / Peel Boundary. This is a reflection of the density of population and employment and the high level of interaction between communities in this contiguous urban area. Trips decrease across boundaries to the west of Toronto etc. / Peel boundary reflecting the greater self containment of those urban centres. The significant peak hour travel flows across the boundaries of Toronto etc. / Peel, Peel / Halton and Halton / Hamilton suggest that the transportation analysis requires a review of all possible inter-regional person modes.

Table 2-8: 2006 p.m. Peak Hour Total Person Travel (Thousands)

	Niagara Gateway	Niagara	Brant	Waterloo	Wellington	Hamilton	Halton	Peel	Toronto York Durham	Total
Niagara Gateway	0.0	1.3	0.0	0.0	0.0	0.1	0.1	0.1	0.3	1.9
Niagara	0.6	99.0	0.1	0.1	0.0	1.9	0.6	0.3	0.9	103.5
Brant	0.0	0.1	25.9	0.7	0.1	1.5	0.3	0.1	0.5	29.0
Waterloo	0.0	0.1	1.5	110.2	3.4	0.9	0.7	0.6	1.5	119.0
Wellington	0.0	0.1	0.1	4.4	34.9	0.5	0.7	0.6	0.8	42.0
Hamilton	0.0	3.8	1.6	0.8	0.4	90.4	5.1	1.0	1.5	104.7
Halton	0.0	1.4	0.5	0.8	1.2	9.6	73.7	9.4	4.3	101.0
Peel	0.0	0.7	0.2	1.4	1.4	2.3	15.4	185.6	35.5	242.3
Toronto etc.	0.2	1.9	1.1	2.8	1.5	3.3	10.6	50.8	862.0	934.1
Total	0.9	108.5	31.0	121.3	42.9	110.4	107.2	248.3	907.1	1,677.6

Table 2-9: 2031 p.m. Peak Hour Total Person Travel (Thousands)

	Niagara Gateway	Niagara	Brant	Waterloo	Wellington	Hamilton	Halton	Peel	Toronto York Durham	East North Ext	West South Ext	Total
Niagara Gateway	0.0	2.5	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.1	3.3
Niagara	1.9	102.8	0.0	0.1	0.2	2.9	1.0	0.5	1.3	0.2	1.5	112.6
Brant	0.0	0.0	29.9	1.7	0.2	1.5	0.1	1.0	0.7	0.4	2.5	38.1
Waterloo	0.1	0.2	2.2	163.5	6.6	1.1	1.6	1.2	0.9	1.0	3.3	181.6
Wellington	0.0	0.2	0.4	6.9	60.1	0.6	2.3	2.1	2.5	2.6	0.7	78.5
Hamilton	0.1	5.8	2.3	0.9	0.5	125.8	10.2	1.4	3.1	0.4	5.6	156.3
Halton	0.1	1.8	0.7	0.9	2.9	17.1	135.9	20.0	12.1	1.6	0.9	193.9
Peel	0.1	0.5	0.6	1.3	2.8	1.7	27.4	284.4	70.5	11.1	0.7	401.1
Toronto etc.	0.2	1.2	0.7	1.0	2.1	3.4	16.4	79.7	1185.8	33.2	1.6	1325.4
East/North Ext	0.0	0.3	0.9	0.5	1.6	0.4	0.9	6.5	17.8	189.3	0.5	218.7
West/South Ext	0.1	0.6	1.0	1.2	0.4	0.9	0.2	0.6	0.9	0.4	8.5	14.7
Total	2.6	116.0	38.9	178.1	77.6	155.7	196.2	397.4	1295.8	240.2	25.8	2724.3

A summary of number of person trips that stay within each Upper Tier municipality is presented in Table 2-10. It is noted that all the Upper Tier Municipalities reflect significant self containment, with the percentage of trips internal to the municipalities ranging from a high of 91% in Niagara Region to a low of 71% in Peel Region for the year 2031.

Table 2-10: Afternoon Peak Hour Total Person Municipal Self Containment (Thousands)

Upper Tier Municipality	2006			2031		
	Total Person	Trips Remaining Within	% Self Containment	Total Person	Trips Remaining Within	% Self Containment
Niagara	103.5	99.0	96%	112.6	102.8	91%
Brant	29.0	25.9	89%	38.1	29.9	78%
Waterloo	119.0	110.2	93%	181.6	163.5	90%
Wellington	42.0	34.9	83%	78.5	60.1	77%
Hamilton	104.7	90.4	86%	156.3	125.8	81%
Halton	101.0	73.7	73%	193.9	135.9	70%
Peel	242.3	185.6	77%	401.1	284.4	71%
Toronto/York/Durham	934.1	862.0	92%	1,325.4	1,185.8	89%

The GGH Model calculates 2031 a.m. and p.m. peak period Total Person, Transit Person and Auto trip tables at a detailed traffic zone level. Traffic zones can be aggregated to Regional and Municipal planning districts in order to assess:

- Self Containment (trips staying within the Region); and
- Inter-regional travel across municipal boundaries; and
- Transit Mode Share (per cent of trips using transit).

Travel characteristics are usually assessed on a peak hour basis. Therefore, the peak period travel flow information was converted to peak hour using a peak period to peak hour factor of 0.4, which is typical of travel characteristics in the Study Area (from TTS). A summary of the 2031 p.m. peak hour travel characteristics without externals to GGH is presented in Exhibit 2-2. The supporting 2031 peak hour total person trips and transit person trips follow the summaries.

The initial review of 2031 p.m. total person trips was an assessment to flows generally influenced by GTAW/NGTA study areas and remaining GTA municipalities as shown in Table 2-11 and Exhibit 2-2.

Table 2-11: 2031 p.m. Total Person Inter-regional Flows Across Municipal Boundaries

	p.m. peak hour	
Municipal Boundaries	**EB / NB**	**WB / SB**
Niagara Gateway	2,485	3,258
Niagara / Hamilton	9,802	6,442
Brant / Hamilton	1,562	2,379
Hamilton / Halton	18,167	26,163
Peel / Halton	38,915	51,045
Toronto+York+Durham / Peel	87,360	100,947
Halton / Wellington	10,568	11,050
Hamilton / Wellington	2,249	1,837
Wellington / Waterloo	10,198	10,061

Exhibit 2-2: 2031 p.m. Peak Hour Total Person Travel Characteristics without GGH Externals

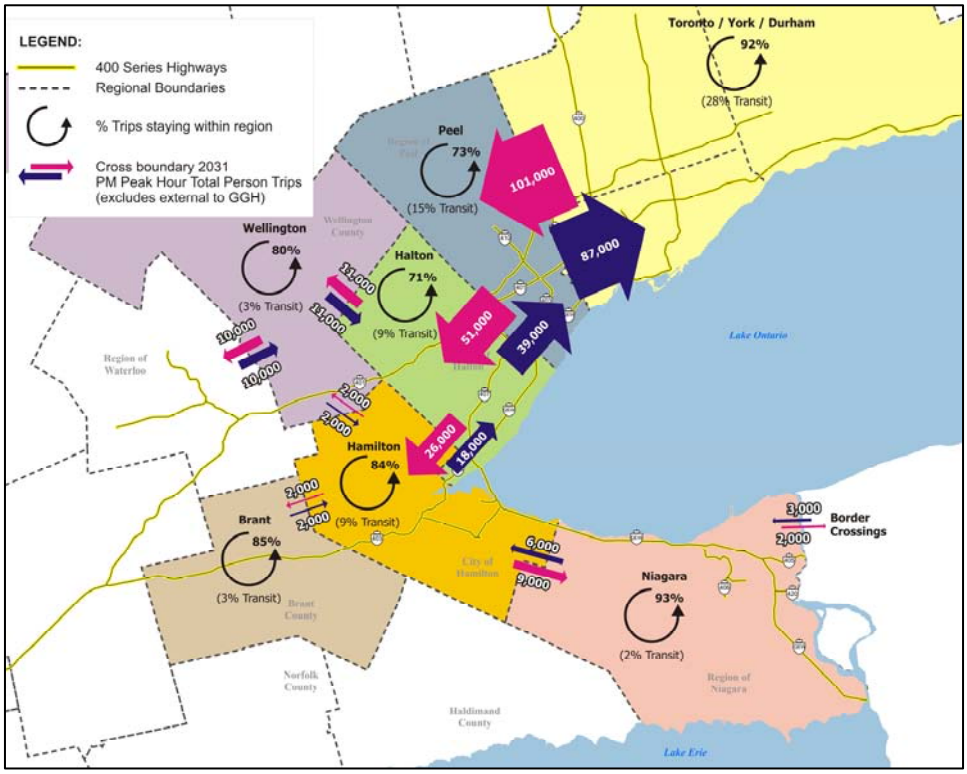


Table 2-12 provides a comparison of the observed 2006 p.m. peak hour total person movement with the 2031 p.m. peak hour flows for the major boundary crossings. These inter-regional flows are illustrated in Exhibit 2-3 and Exhibit 2-4. It should be noted that the 2006 total person volumes are based on the Transportation Tomorrow Survey (TTS) data and do not include externals; however the 2031 total person volumes include trips within the GGH and external areas.

Table 2-12: Afternoon Peak Hour Total Person Inter-regional Flows Across Municipal Boundaries within the GGH

	2006		2031	
Municipal Boundaries	**EB / NB**	**WB / SB**	**EB / NB**	**WB / SB**
Niagara Gateway	883	1,875	2,609	3,349
Niagara / Hamilton	8,422	4,472	11,344	8,704
Brant / Hamilton	2,362	3,445	3,772	5,394
Hamilton / Halton	12,598	21,236	21,027	29,889
Peel / Halton	21,664	42,659	55,330	67,052
Toronto+York+Durham / Peel	45,180	72,140	110,024	118,083
Halton / Wellington	4,893	9,057	16,190	16,824
Hamilton / Wellington	1,604	1,449	3,842	8,969
Wellington / Waterloo	7,220	10,361	16,639	23,192

Exhibit 2-3: 2006 p.m. Peak Hour Total Person Travel Characteristics

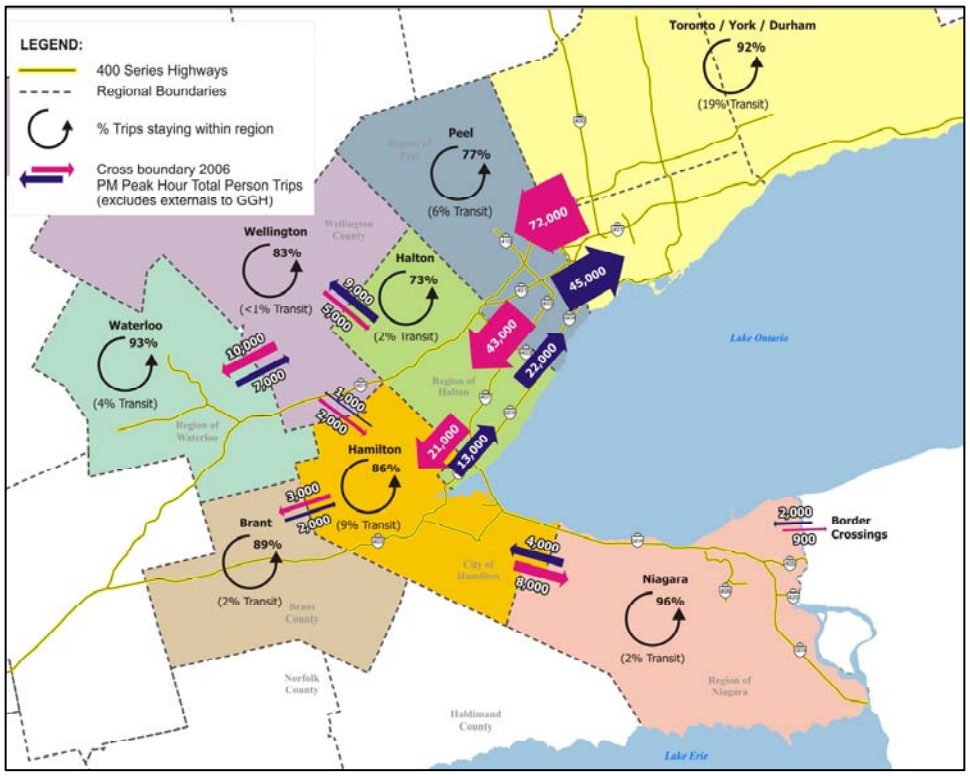
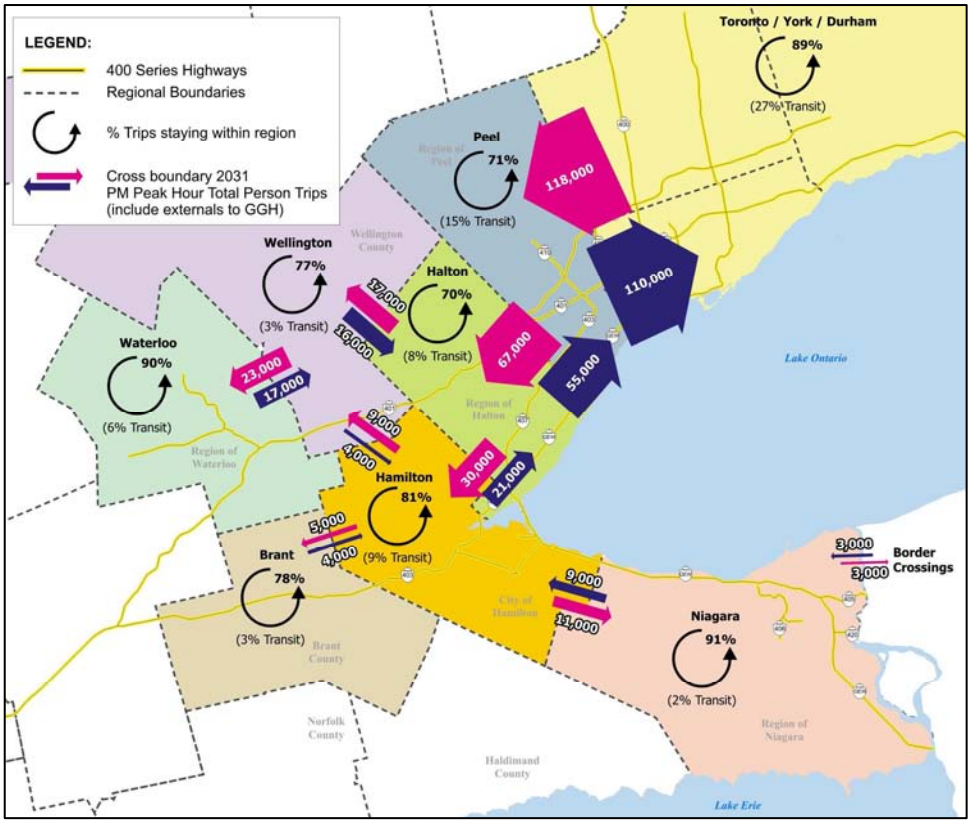


Exhibit 2-4: 2031 p.m. Peak Hour Total Persons Travel Characteristics



A comparison of forecast 2031 travel characteristics in relation to observed 2006 travel characteristics by Regional Municipality is summarized in Table 2-13.

Table 2-13: Comparison of Existing and Forecast Travel Characteristics

Regional Municipality	Self Containment		Auto %		Transit %		Transit from PD 1	
	2006	2031	2006	2031	2006	2031	2006	2031
Niagara	96%	91%	98%	98%	2%	2%	100	105
Hamilton	86%	81%	91%	88%	9%	9%	605	1,245
Brant	89%	78%	98%	97%	2%	3%	30	35
Waterloo	93%	90%	96%	93%	4%	6%	45	130
Wellington	83%	77%	100%	96%	0%	3%	185	180
Halton	73%	70%	98%	88%	2%	8%	3,560	5,840
Peel	77%	71%	94%	82%	6%	15%	8,400	14,170

2.3.3 GGH Model Mode Shares

The observed 2006 p.m. peak hour transit person trips for the Regional Municipalities were developed from the 2006 TTS data and summarized in Table 2-14. The transit mode share component of the GGH Model calculates the number of 2031 peak period transit person trips based on costs assumptions, service assumptions and travel time comparisons between the auto and transit modes as documented in the Metrolinx RTP – The Big Move report. A summary of the 2031 p.m. peak hour transit person travel flows are presented in Table 2-15.

Table 2-14: 2006 p.m. Peak Hour Transit Person Travel (Thousands)

	Niagara Gateway	Niagara	Brant	Waterloo	Wellington	Hamilton	Halton	Peel	Toronto York Durham	Total
Niagara Gateway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Niagara	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.1
Brant	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Waterloo	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5
Wellington	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	1.7
Hamilton	0.0	0.0	0.0	0.0	0.0	7.4	0.2	0.1	0.1	7.8
Halton	0.0	0.0	0.0	0.0	0.0	0.3	1.1	0.3	0.2	1.9
Peel	0.0	0.0	0.0	0.0	0.0	0.0	0.2	10.9	2.4	13.5
Toronto etc.	0.0	0.2	0.0	0.1	0.2	0.7	4.0	12.1	158.7	176.0
Total	0.0	2.1	0.5	4.7	1.8	8.5	5.4	23.4	161.5	208.0

Table 2-15: 2031 p.m. Peak Hour Transit Person Travel (Thousands)

	Niagara Gateway	Niagara	Brant	Waterloo	Wellington	Hamilton	Halton	Peel	Toronto York Durham	East North Ext	West South Ext	Total
Niagara Gateway	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Niagara	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Brant	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Waterloo	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5
Wellington	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.2	0.0	0.0	2.4
Hamilton	0.0	0.1	0.0	0.0	0.0	10.7	0.8	0.4	2.1	0.0	0.0	14.1
Halton	0.0	0.0	0.0	0.0	0.0	1.5	7.9	1.6	5.3	0.0	0.0	16.4
Peel	0.0	0.0	0.0	0.1	0.1	0.5	2.4	31.7	23.4	0.1	0.0	58.3
Toronto etc.	0.0	0.1	0.0	0.2	0.3	2.5	8.8	30.5	318.9	1.5	0.0	362.8
East/North Ext	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	4.5	0.0	4.6
West/South Ext	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	2.6	1.1	10.6	2.5	15.2	20.0	64.4	350.1	6.1	0.1	472.6

An estimate of the percentage of total person trips using transit (i.e. transit mode share) is calculated from the p.m. peak hour total person trips presented in Table 2-8 and Table 2-9 with the p.m. peak hour transit person trips presented in Table 2-14 and Table 2-15. The resulting 2006 p.m. peak hour transit mode share is presented in Table 2-16 with the 2031 p.m. peak hour transit mode share presented in Table 2-17.

Table 2-16: 2006 p.m. Peak Hour Transit Mode Share (Percentage)

	Niagara Gateway	Niagara	Brant	Waterloo	Wellington	Hamilton	Halton	Peel	Toronto etc.	Total
Niagara Gateway	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Niagara	0%	2%	0%	12%	0%	1%	0%	0%	10%	2%
Brant	0%	11%	2%	1%	0%	1%	2%	0%	0%	2%
Waterloo	0%	0%	0%	4%	0%	0%	1%	0%	1%	4%
Wellington	0%	0%	0%	1%	5%	0%	0%	4%	5%	4%
Hamilton	0%	0%	2%	0%	0%	8%	3%	10%	6%	7%
Halton	0%	0%	0%	0%	0%	3%	2%	4%	5%	2%
Peel	0%	0%	0%	2%	1%	1%	1%	6%	7%	6%
Toronto etc.	0%	9%	4%	3%	16%	21%	37%	24%	18%	19%
Total	0%	2%	2%	4%	4%	8%	5%	9%	18%	12%

Table 2-17: 2031 p.m. Peak Hour Transit Mode Share (Percentage)

	Niagara Gateway	Niagara	Brant	Waterloo	Wellington	Hamilton	Halton	Peel	Toronto York Durham	East North Ext	West South Ext	Total
Niagara Gateway	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Niagara	0%	2%	0%	0%	0%	1%	1%	0%	1%	0%	0%	2%
Brant	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	0%	3%
Waterloo	0%	0%	0%	6%	1%	0%	3%	3%	2%	0%	0%	6%
Wellington	0%	0%	0%	1%	4%	0%	2%	2%	6%	0%	0%	3%
Hamilton	0%	2%	0%	1%	0%	8%	8%	31%	67%	0%	0%	9%
Halton	0%	2%	1%	1%	1%	9%	6%	8%	44%	0%	0%	8%
Peel	0%	3%	1%	5%	3%	29%	9%	11%	33%	1%	0%	15%
Toronto etc.	0%	11%	5%	18%	12%	73%	54%	38%	27%	5%	1%	27%
East/North Ext	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	0%	2%
West/South Ext	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Total	0%	2%	3%	6%	3%	10%	10%	16%	27%	3%	0%	17%

A comparison of the growth of transit travel flows for selected inter-regional interchanges within the GTAW study area between 2001 and 2031 is presented in Table 2-18.

Table 2-18: Inter-regional Peak Hour Transit Person Trips

Toronto Bound			Waterloo Bound		
	a.m. Peak Hour			p.m. Peak Hour	
	2001	2031		2001	2031
Waterloo to			**Toronto PD1 to**		
Guelph	0	41	Mississauga	5,379	7,711
Milton	0	0	Brampton	1,662	5,811
Halton Hills	0	4	Halton Hills	277	651
Brampton	0	36	Milton	145	751
Mississauga	0	29	Guelph	59	103
Toronto PD1	34	147	Waterloo	43	128
Rest of Toronto	17	47			
Guelph to			**Rest of Toronto to**		
Milton	0	1	Mississauga	2,035	7,283
Halton Hills	0	13	Brampton	598	6,521
Brampton	0	33	Halton Hills	39	286
Mississauga	0	23	Milton	13	209
Toronto PD1	67	112	Guelph	0	48
Rest of Toronto	0	42	Waterloo	15	43
Milton to			**Mississauga to**		
Halton Hills	0	31	Brampton	574	6,133
Brampton	0	82	Halton Hills	8	179
Mississauga	7	323	Milton	20	282
Toronto PD1	181	883	Guelph	10	20
Rest of Toronto	13	234	Waterloo	25	25
Halton Hills to			**Brampton to**		
Brampton	0	275	Mississauga	308	3,740
Mississauga	8	200	Halton Hills	0	249
Toronto PD1	342	732	Milton	0	72
Rest of Toronto	47	252	Guelph	0	31
			Waterloo	0	33
Brampton to			**Halton Hills to**		
Mississauga	588	5,239	Milton	0	29
Toronto PD1	1,852	6,698	Guelph	9	13
Rest of Toronto	603	5,495	Waterloo	0	5
Mississauga to			**Milton to**		
Brampton	347	2,774	Guelph	0	1
Toronto PD1	6,734	8,275	Waterloo	0	0
Rest of Toronto	2,064	6,596	**Guelph to**		
			Waterloo	0	38

2.3.4 GGH Model Network Auto and Truck Assignment Flows

The a.m. and p.m. peak hour auto trip tables developed for both the 2031 RTP (Big Move) and the ALU (Alternate Land Use) allocation were assigned to the 2031 road network. The road assignment process utilizes an equilibrium assignment technique, which is an iterative process in which trips are assigned to the road network based on initial travel times followed by travel times that are then recalculated based on the assigned volumes (congestion). This process is repeated until no trip between any given origin-destination pair can be rerouted to a faster path.

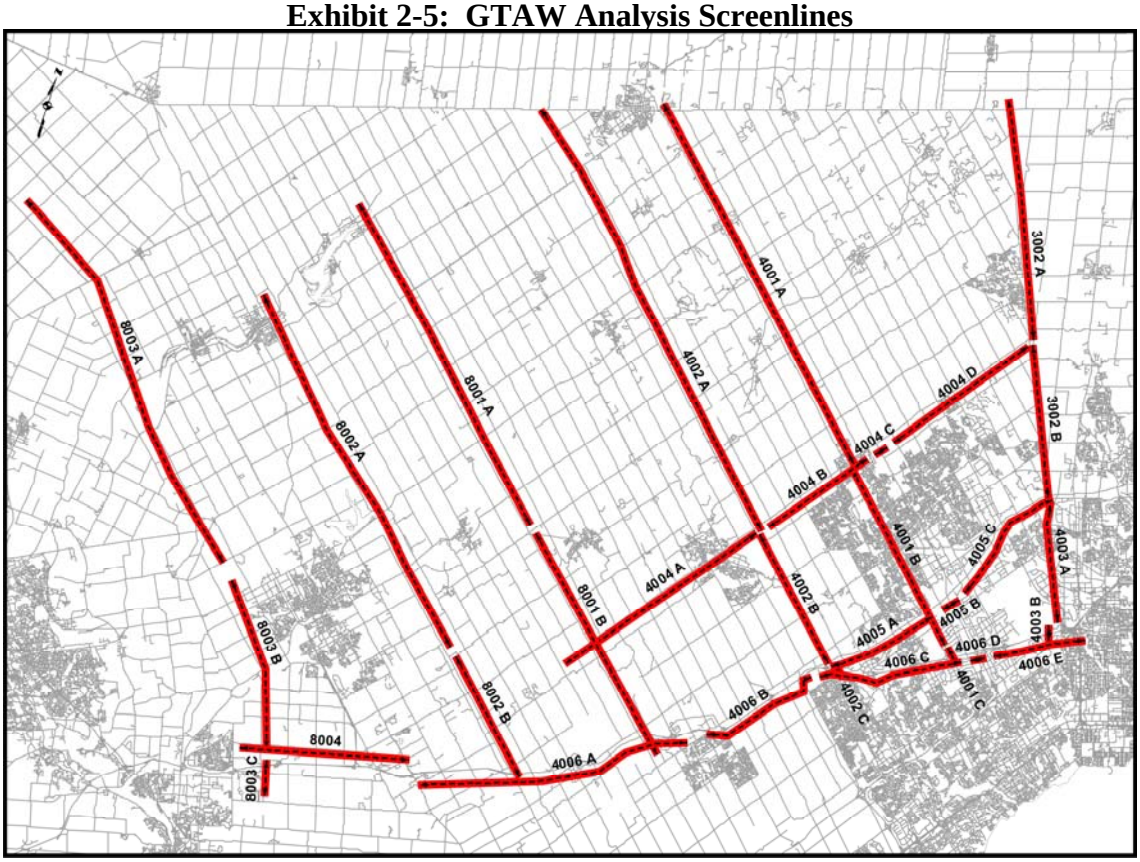
The 2031 a.m. and p.m. peak hour truck trip tables, developed for the RTP, were also assigned to the 2031 road network. The peak hour truck volumes were added to the auto assignments on a screenline basis to establish a.m. and p.m. peak hour vehicle flows along selected corridors and across selected screenlines.

A screenline is an imaginary or real boundary that defines a broad corridor across which traffic flows. The screenline may represent one or several road links. Each roadway link has the ability to accommodate a maximum number of vehicles, referred to as its capacity. As volume increases on each link, the speed on the link deteriorates and the volume flow becomes unstable, an indicator of congested traffic conditions.

In order to establish an appropriate range of 2031 peak hour vehicle demand forecasts along corridors and screenlines, a Business As Usual (BAU Trend) forecast of auto flows was established by growing the 2001 Transportation Tomorrow Survey (TTS) peak hour auto trip tables based on the proposed increase of population and employment forecast for the RTP. This growth factor process is technically referred to as a *Furness* or *Fratar* method.

The GTAW analysis screenlines presented on Exhibit 2-5 capture the 2031 a.m. and p.m. peak hour east – west and north – south travel at selected points within the Preliminary Study Area.

Exhibit 2-5: GTAW Analysis Screenlines



The 2031 peak hour auto assignments at selected screenlines and the growth anticipated is presented in Table 2-19 for the a.m. peak hour and Table 2-20 for the p.m. peak hour.

Table 2-19: 2031 Eastbound / Southbound a.m. Peak Hour Auto Growths at Screenline Location

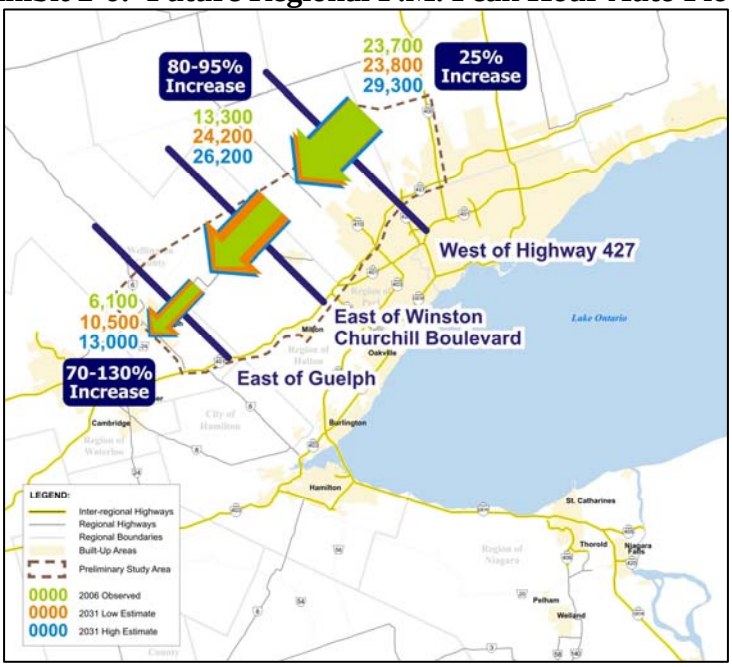
Screenline		2006	2031 a.m. peak hour EB /SB			% Growth		
No.	Location	Obs	RTP	ALU	BAU	RTP	ALU	BAU
8003	West of Guelph	8,003	10,208	10,776	11,235	128%	135%	140%
8002	East of Guelph	5,780	9,106	10,228	12,601	158%	177%	218%
8001	West of Milton	7,101	8,643	10,181	13,257	122%	143%	187%
4002	West of WCB	13,197	21,186	21,348	29,684	161%	162%	225%
4001	East of Highway 10	31,443	38,085	38,449	51,778	121%	122%	165%
3002	East of Highway 50	12,869	20,670	17,966	26,573	161%	140%	206%
4003	West of Highway 427	22,196	19,738	19,864	28,810	89%	89%	130%
3001	East of Highway 400	18,355	28,264	25,513	34,678	154%	139%	189%
8004	North of Highway 401 - Wellington	5,396	6,304	6,609	8,023	117%	122%	149%
4006	South of Highway 401 – Halton / Peel	41,904	49,062	45,982	71,285	117%	111%	170%
4005	South of Highway 407	25,708	31,078	31,539	44,336	121%	123%	172%
4004	South of Mayfield Rd.	12,365	18,536	20,655	24,808	150%	167%	201%

Table 2-20: 2031 Westbound / Northbound p.m. Peak Hour Auto Growths at Screenline Location

Screenline		2006	2031 p.m. peak hour WB / NB			% Growth to 2006 Observed Values		
No.	Location	Obs	RTP	ALU	BAU	RTP	ALU	BAU
8003	West of Guelph	8,790	11,828	12,469	10,794	135%	142%	123%
8002	East of Guelph	6,139	11,886	13,008	10,501	194%	212%	171%
8001	West of Milton	7,266	11,846	13,173	10,165	163%	181%	140%
4002	West of WCB	13,324	25,294	26,190	24,201	186%	197%	182%
4001	East of Highway 10	31,641	44,860	46,279	51,398	142%	146%	162%
3002	East of Highway 50	12,960	23,238	21,636	26,329	179%	167%	203%
4003	West of Highway 427	23,704	23,745	23,436	29,335	100%	99%	124%
3001	East of Highway 400	20,662	35,395	33,759	36,448	171%	163%	176%
8004	North of Highway 401 - Wellington	5,907	8,213	8,352	6,541	139%	141%	111%
4006	South of Highway 401 – Halton / Peel	38,974	66,369	65,027	63,226	170%	167%	162%
4005	South of Highway 407	25,308	37,991	38,428	39,726	150%	152%	157%
4004	South of Mayfield Rd.	12,628	26,050	25,514	23,659	187%	202%	187%

The 2031 RTP, ALU and BAU auto assignments provide a range of auto demand across each screenline as the various scenarios reflect differing transit mode shares, trip distribution characteristics and land use allocation. Exhibit 2-6: Future Regional P.M. Peak Hour Auto Flows illustrates the westbound 2031 p.m. peak hour auto demand ranges across specific screenlines within the GTAW study area. Traffic volumes in the GTAW Study Area will increase by approximately 25% to 130% by 2031.

Exhibit 2-6: Future Regional P.M. Peak Hour Auto Flows



As indicated earlier, the GGH Model simulates both short and long distance truck volumes for the 2031 a.m. peak hour. The 2031 p.m. peak hour truck flows were derived by transposing the a.m. peak hour truck volumes, which is consistent with observed truck volume characteristics in the study area. The resulting truck volumes are added to the 2031 peak hour auto assignment to 2031 a.m. and p.m. peak hour vehicle flows across each screenline. The screenline summaries for 2031 a.m. peak hour vehicle assignment is presented in Table 2-21 and 2031 p.m. peak hour vehicle assignment presented in Table 2-22.

Table 2-21: 2031 Eastbound / Southbound Screenline a.m. Peak Hour Vehicle Assignments

Screenline		a.m. peak hour Autos			Trucks	a.m. peak hour Vehicles		
No.	Location	RTP	ALU	BAU		RTP	ALU	BAU
8003	West of Guelph	10,208	10,776	11,235	1,488	11,696	12,264	12,723
8002	East of Guelph	9,106	10,228	12,601	1,433	10,539	11,661	14,034
8001	West of Milton	8,643	10,181	13,257	1,419	10,062	11,600	14,676
4002	West of WCB	21,186	21,348	29,684	2,547	23,733	23,895	32,231
4001	East of Highway 10	38,085	38,449	51,778	2,852	40,937	41,301	54,630
3002	East of Highway 50	20,670	17,966	26,573	1,061	21,731	19,027	27,634
4003	West of Highway 427	19,738	19,864	28,810	1,963	21,701	21,827	30,773
3001	East of Highway 400	28,264	25,513	34,678	1,506	29,770	27,019	36,184
8004	North of Highway 401 - Wellington	6,304	6,609	8,023	568	6,872	7,177	8,591
4006	South of Highway 401 – Halton / Peel	48,654	46,361	70,409	3,772	52,834	49,754	75,057
4005	South of Highway 407	31,078	31,539	44,336	1,099	32,177	32,638	45,435
4004	South of Mayfield Rd.	18,536	20,655	24,808	1,404	19,940	22,059	26,212

Table 2-22: 2031 Westbound / Northbound Screenline p.m. Peak Hour Vehicle Assignments

Screenline		p.m. peak hour Autos			Trucks	p.m. peak hour Vehicles		
No.	Location	RTP	ALU	BAU		RTP	ALU	BAU
8003	West of Guelph	11,828	12,469	10,794	1,486	13,314	13,955	12,280
8002	East of Guelph	11,886	13,008	10,501	1,442	13,328	14,450	11,943
8001	West of Milton	11,846	13,173	10,165	1,414	13,260	14,587	11,579
4002	West of WCB	25,294	26,190	24,201	2,523	27,817	28,713	26,724
4001	East of Highway 10	44,860	46,279	51,398	2,841	47,701	49,120	54,239
3002	East of Highway 50	23,238	21,636	26,329	927	24,165	22,563	27,256
4003	West of Highway 427	23,745	23,436	29,335	2,040	25,785	25,476	31,375
3001	East of Highway 400	35,395	33,759	36,448	1,428	36,823	35,187	37,876
8004	North of Highway 401 - Wellington	8,213	8,352	6,541	550	8,763	8,902	7,091
4006	South of Highway 401 – Halton / Peel	66,369	65,027	63,226	3,773	70,142	68,800	66,999
4005	South of Highway 407	37,991	38,428	39,726	1,154	39,145	39,582	40,880
4004	South of Mayfield Rd.	26,050	25,514	23,659	1,415	27,465	26,929	25,074

The RTP and ALU land use scenarios included with RTP GGH Model results in the lower range of auto and total vehicle flows forecast for 2031 relative to the BAU as these alternatives reflect significantly increased transit use, higher automobile operating costs, higher parking charges in the Urban Growth Centres and optimized transit service and fare systems.

The BAU scenario that includes the RTP 2031 land use but maintains the existing (2001 TTS) travel characteristics and mode choice generally reflect the higher end of auto and vehicle flows crossing the selected screenlines.

2.3.5 GGH Model Transit Assignment Flows

The a.m. and p.m. peak period transit trip tables were developed for both the 2031 RTP (Big Move) and the ALU (Alternate Land Use). These allocations were assigned to the 2031 transit network. The transit assignment process utilizes line specific headways and boarding times for all transit lines. The assignment results provide information on the number of transit trips assigned to each mode. Table 2-23 and Table 2-24 summarize the a.m. and p.m. peak period transit assignments in the peak direction for land use allocations by GO Rail, GO Bus, and LRT crossing the GTAW screenlines.

Based on the transit assignment summaries, GO Rail is the primary mode for inter-regional trips for both the RTP and ALU land use scenarios. The ALU scenario reflects higher transit demand for areas west of Toronto due to higher population and employment forecasts for these areas. The RTP land use scenario indicates higher transit percentages compared to the ALU scenario. For relatively self-contained urban centres with strong live-work relationships such as Guelph, the demand for long-distance commuting to other centres is lower.

Table 2-23: 2031 a.m. Peak Period Transit Assignments

Screenline		RTP (EB/SB)			ALU (EB/SB)		
No.	**Location**	GO Rail	GO Bus	LRT	GO Rail	GO Bus	LRT
8003	West of Guelph	526	0	0	631	0	0
8002	East of Guelph	692	94	0	862	68	0
8001	West of Milton	692	122	0	862	94	0
4002	West of WCB	2,002	679	0	1,945	404	0
4001	East of Highway 10	27,798	223	0	30,609	120	0
3002	East of Highway 50	1,685	191	0	609	140	0
4003	West of Highway 427	34,400	240	2,090	33,073	136	2,209
3001	East of Highway 400	0	9	0	0	4	0
4006	South of Highway 401 – Halton / Peel	0	316	8,180	0	204	8,050
4005	South of Highway 407	33,142	93	7,791	34,069	85	8,031
4004	South of Mayfield Rd.	2,002	387	1,530	1,945	228	2,747

Table 2-24: 2031 p.m. Peak Period Transit Assignments

Screenline		RTP (WB/NB)			ALU (WB/NB)		
No.	**Location**	GO Rail	GO Bus	LRT	GO Rail	GO Bus	LRT
8003	West of Guelph	713	0	0	887	0	0
8002	East of Guelph	916	86	0	1,136	63	0
8001	West of Milton	916	109	0	1,136	84	0
4002	West of WCB	2,064	445	0	2,075	239	0
4001	East of Highway 10	28,380	52	0	33,887	52	0
3002	East of Highway 50	1,421	46	0	545	43	0
4003	West of Highway 427	35,532	84	2,639	31,476	86	2,772
3001	East of Highway 400	0	11	0	0	6	0
4006	South of Highway 401 – Halton / Peel	0	35	13,183	0	23	13,630
4005	South of Highway 407	35,742	21	11,062	38,692	14	11,817
4004	South of Mayfield Rd.	2,064	266	1,932	2,075	127	3,962

2.3.6 Corridor Screenline Operating Conditions Analysis

The analysis of the future transportation conditions in the Study Area was undertaken assessing the existing (2006) and forecast (2031) vehicle demands crossing corridor specific screenlines discussed in the technical document *Environmental Assessment Overview of Transportation and Economic Conditions (July 2008).*

The screenline operating condition analysis process includes a review of the existing (2006) roadway supply (capacity) and future planned (2031) roadway capacity that crosses each corridor screenlines and an assessment of the existing (2006) and future (2031) vehicle demand (volume). Screenline Volume / Capacity (V/C) ratios were calculated for the following planning periods:

- 2006 – Existing conditions
- 2031 – Regional Transportation Plan (RTP) – Metrolinx
- 2031 – Alternative Land Use – (ALU)
- 2031 - Business As Usual Trend – (BAU)

The operating conditions for each of the corridor screenlines was identified using the following volume/capacity (V/C) to operating congestion relationship:

- V/C leas than 0.80 – Stable operating condition with possible non-recurring congestion
- V/C 0.80 to 0.90 – Unstable operations reflecting moderate congestion
- V/C greater than 0.90 – Stop and Go operations reflecting major congestion.

A summary of existing and 2031 p.m. peak hour vehicle volumes and existing vehicle capacity crossing each of the major north-south screenlines is presented in Table 2-25 with a summary of the V/C and operating conditions presented in Table 2-26.

Table 2-25: - Existing and 2031 p.m. Peak Hour Vehicle Demand at N-S Corridor Screenlines – East – West Travel

Screenline Location	Existing Vehicle Capacity	Existing Vehicle Demand	2031 RTP Vehicle Demand	2031 ALU Vehicle Demand	2031 BAU Vehicle Demand
East of Guelph (WB) (Highway 7 to Highway 401)	7,900	5,300	9,500	10,100	8,900
West of Guelph (WB) (Highway 7 to Highway 401)	7,900	7,000	10,200	10,600	10,200
East of WC Blvd (WB) (Highway 7 to Highway 401)	14,600	12,300	21,700	22,200	21,800
East of Highway 10 (WB) (Mayfield Rd. to Highway 401)	35,100	29,700	39,200	40,200	44,700
East of Highway 50 (WB) (Mayfield Rd. to Highway 401)	16,400	12,400	19,800	18,700	22,200
West of Highway 400 (WB) (Teston Rd. to Steeles Ave.)	16,900	17,700	26,800	23,300	28,500

Table 2-26: Existing and 2031 p.m. Peak Hour Operating Conditions at N-S Corridor Screenlines Based on Existing Capacity

Screenline Location	Existing V/C and *Operating Conditions*	2031 RTP V/C and *Operating Conditions*	2031 ALU V/C and *Operating Conditions*	2031 BAU V/C and *Operating Conditions*
East of Guelph (WB) (Highway 7 to Highway 401)	V/C – 0.67 *Stable*	V/C – 1.20 *Congested*	V/C – 1.28 *Congested*	V/C – 1.13 *Congested*
West of Guelph (WB) (Highway 7 to Highway 401)	V/C – 0.89 *Unstable*	V/C – 1.30 *Congested*	V/C – 1.34 *Congested*	V/C – 1.30 *Congested*
East of WC Blvd (WB) (Highway 7 to Highway 401)	V/C – 0.84 *Unstable*	V/C – 1.49 *Congested*	V/C – 1.52 *Congested*	V/C – 1.49 *Congested*
East of Highway 10 (WB) (Mayfield Rd. to Highway 401)	V/C – 0.85 *Unstable*	V/C – 1.12 *Congested*	V/C – 1.15 *Congested*	V/C – 1.27 *Congested*
East of Highway 50 (WB) (Mayfield Rd. to Highway 401)	V/C – 0.76 *Stable*	V/C – 1.21 *Congested*	V/C – 1.14 *Congested*	V/C – 1.35 *Congested*
West of Highway 400 (WB) (Teston Rd. to Steeles Ave.)	V/C – 1.05 *Congested*	V/C – 1.59 *Congested*	V/C – 1.38 *Congested*	V/C – 1.69 *Congested*

As noted earlier, the road network in the GGH Model includes planned road improvements identified by the Ministry of Transportation Highways Program and Transportation Master Plans prepared by the municipalities within the Greater Golden Horseshoe area. In order to present the impact that planned roadway improvements have on the operation of the transportation system at selected screenlines, an overview of the 2031 planned capacity and the 2031 p.m. peak hour V/C (Volume / Capacity) and operating conditions at the screenlines based on the planned capacity is provided in Table 2-27.

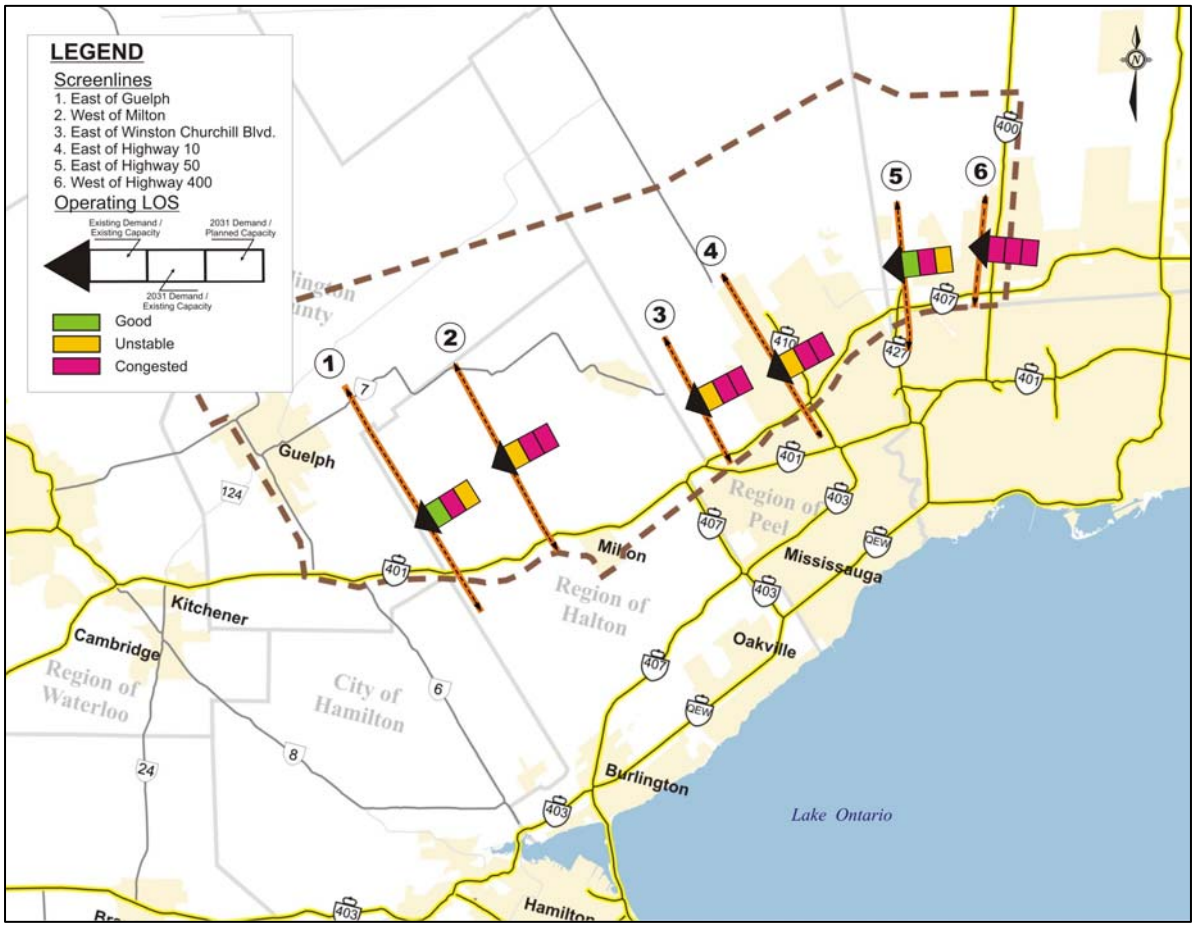
Table 2-27: Existing and 2031 p.m. Peak Hour Operating Conditions at N-S Corridor Screenlines Based on Planned Capacity

Screenline Location	Planned Vehicle Capacity	2031 RTP V/C and *Operating Conditions*	2031 ALU V/C and *Operating Conditions*	2031 BAU V/C and *Operating Conditions*
East of Guelph (WB) (Highway 7 to Highway 401)	**11,000**	V/C – 0.86 *Unstable*	V/C – 0.92 *Congested*	V/C – 0.81 *Unstable*
West of Milton (WB) (Highway 7 to Highway 401)	**9,900**	V/C – 1.03 *Congested*	V/C – 1.07 *Congested*	V/C – 1.03 *Congested*
East of WC Blvd (WB) (Highway 7 to Highway 401)	**24,050**	V/C – 0.90 *Congested*	V/C –0.92 *Congested*	V/C – 0.91 *Congested*
East of Highway 10 (WB) (Mayfield Rd. to Highway 401)	**40,000**	V/C – 0.98 *Congested*	V/C – 1.01 *Congested*	V/C – 1.12 *Congested*
East of Highway 50 (WB) (Mayfield Rd. to Highway 401)	**22,300**	V/C – 0.89 *Unstable*	V/C – 0.84 *Unstable*	V/C – 1.00 *Congested*
West of Highway 400 (WB) (Teston Rd. to Steeles Ave.)	**21,300**	V/C – 1.26 *Congested*	V/C – 1.10 *Congested*	V/C – 1.34 *Congested*

A summary of the operating conditions for the N-S Corridor Screenlines is presented in Exhibit 2-7 for the following conditions:

- Existing p.m. peak hour vehicles and exiting vehicle capacity
- 2031 p.m. peak hour vehicles and existing vehicle capacity
- 2031 p.m. peak hour vehicles and planned vehicle capacity

Exhibit 2-7: Existing and Forecast p.m. Peak Hour N-S Corridor Screenline Operating Conditions



The brief discussion of the existing and future operating conditions at each of the corridor screenlines follows:

- ***East of Guelph Between Highway 7 and Highway 401***
  - Currently this screenline operates at a "Stable" operating condition with a Volume to Capacity ratio of 0.67. However, by year 2031 it is anticipated that the demand will increase by approximately 50% which will result in this screenline operating in a very congested state if no additional road infrastructure capacity is provided. The addition of the planned capacity results in an "Unstable" operating condition.

- ***West of Milton Between Highway 7 and Highway 401***
    - In 2006, approximately 7,000 westbound vehicles crossed this screenline in the p.m. peak hour resulting in a Volume to Capacity ratio of .89 which reflects an "Unstable" operating condition. By 2031, it is anticipated that the p.m. peak hour westbound traffic flows will increase by approximately 50% resulting in a significant shortfall of capacity if no additional road infrastructure capacity is provided. The addition of the planned capacity also reflects a "Congested" operating condition.
- ***East of Winston Churchill Boulevard Between Mayfield Road and Highway 401***
    - In 2006, this screenline exhibited an "Unstable" operating condition with a Volume to Capacity ratio of 0.84. The p.m. peak hour westbound vehicle traffic flows are forecast to almost double suggesting significant congestion levels unless additional road infrastructure capacity is provided. The planned roadway capacity crossing this screenline will result in a "Congested" operating condition by 2031.
- ***East of Highway 10 Between Mayfield Road and Highway 401***
    - Westbound traffic flows crossing this screenline in the p.m. peak hour currently experience "Unstable" operating conditions and will experience "Congested" operating conditions without roadway improvements. To address increased traffic flows across this screenline of approximately 40%, additional road capacity has been identified in the City of Brampton Transportation Master Plan as well as widening of Highway 401 in Mississauga. It is anticipated that notwithstanding these road improvements along with increased transit service identified in the *Big Move – Metrolinx Regional Transportation Master Plan* this screenline will operate at a "Congested" operating level.
- ***East of Highway 50 Between Nashville Road and Steeles Avenue***
    - It is anticipated that by 2031 the westbound p.m. peak hour traffic volume will increase by approximately 60% resulting in this corridor operating in a "Congested" state in comparison to existing roadway capacity and a "Unstable" operating condition with the planned roadway capacity.
- ***West of Highway 400 Between Teston Road and Steeles Avenue***
    - This screenline operates in a "Congested" state for the existing condition, the 2031 forecasts on existing capacity and 2031 forecasts on 2031 planned capacity.

A summary of existing and 2031 p.m. peak hour vehicle volumes and existing vehicle capacity crossing each of the major east-west corridor screenlines, representing north-south travel flows, is presented in Table 2-28 with a summary of the V/C and operating conditions presented in Table 2-29.

Table 2-28: Existing and 2031 p.m. Peak Hour Vehicle Demand at E-W Corridor Screenlines – (North-South Travel)

Screenline Location	Existing Vehicle Capacity	Existing Vehicle Demand	2031 RTP Vehicle Demand	2031 ALU Vehicle Demand	2031 BAU Vehicle Demand
North of Highway 401 (NB) (Highway 24 to Brock Road)	8,850	6,300	8,800	8,900	7,100
South of Highway 401 (NB) (Highway 6 to Highway 25)	5,400	3,500	5,200	6,400	5,600
South of Highway 401 (NB) (Steeles Avenue to 9th Line)	10,700	5,100	12,900	12,000	12,100
South of Highway 401 (NB) (WC Blvd to Highway 403)	28,300	21,500	29,300	29,700	27,800
South of Highway 407 (NB) (WC Blvd to Highway 410)	19,100	16,300	22,900	24,000	23,000
South of Highway 407 (NB) (Tomken Road – Highway 50)	15,300	12,900	16,200	16,900	17,900
South of Mayfield Road (NB) (RR 25 to WC Blvd)	6,300	4,700	6,500	7,200	6,400
South of Mayfield Road (NB) (Heritage Rd. to Hurontario St.)	5,600	2,200	5,400	5,600	5,100
South of Mayfield Road (NB) (Kennedy Rd. to Highway 50)	10,100	7,000	15,700	17,000	16,400

Table 2-29: Existing and 2031 p.m. Peak Hour Operating Conditions at E-W Corridor Screenlines – (North-South Travel) Based on Existing Capacity

Screenline Location	Existing V/C and *Operating Conditions*	2031 RTP V/C and *Operating Conditions*	2031 ALU V/C and *Operating Conditions*	2031 BAU V/C and *Operating Conditions*
North of Highway 401 (NB) (Highway 24 to Brock Road)	V/C – 0.72 *Stable*	V/C – 0.99 *Congested*	V/C – 1.01 *Congested*	V/C – 0.80 *Unstable*
South of Highway 401 (NB) (Highway 6 to Highway 25)	V/C – 0.65 *Stable*	V/C – 0.97 *Congested*	V/C – 1.19 *Congested*	V/C – 1.05 *Congested*
South of Highway 401 (NB) (Steeles Avenue to 9th Line)	V/C – 0.47 *Stable*	V/C – 1.21 *Congested*	V/C – 1.12 *Congested*	V/C – 1.13 *Congested*
South of Highway 401 (NB) (WC Blvd to Highway 403)	V/C – 0.76 *Stable*	V/C – 1.03 *Congested*	V/C – 1.05 *Congested*	V/C –0.98 *Congested*
South of Highway 407 (NB) (WC Blvd to Highway 410)	V/C – 0.85 *Unstable*	V/C – 1.20 *Congested*	V/C – 1.26 *Congested*	V/C – 1.20 *Congested*
South of Highway 407 (NB) (Tomken Road – Highway 50)	V/C – 0.84 *Unstable*	V/C – 1.06 *Congested*	V/C – 1.10 *Congested*	V/C –1.17 *Congested*
South of Mayfield Road (NB) (RR 25 to WC Blvd)	V/C – 0.75 *Stable*	V/C – 1.04 *Congested*	V/C –1.15 *Congested*	V/C – 1.02 *Congested*
South of Mayfield Road (NB) (Heritage Rd. to Hurontario St.)	V/C – 0.39 *Stable*	V/C – 0.96 *Congested*	V/C – 0.99 *Congested*	V/C – 0.92 *Congested*
South of Mayfield Road (NB) (Kennedy Rd. to Highway 50)	V/C – 0.69 *Stable*	V/C – 1.55 *Congested*	V/C –1.68 *Congested*	V/C –1.62 *Congested*

As noted earlier, the road network in the GGH Model includes planned road improvements identified by the Ministry of Transportation Highways Program and Transportation Master Plans prepared by the municipalities within the Greater Golden Horseshoe area. In order to present the impact that planned roadway improvements have on the operation of the transportation system at selected screenlines, an overview of the 2031 planned capacity and the 2031 p.m. peak hour V/C (Volume / Capacity) and operating conditions at the screenlines based on the planned capacity is provided in Table 2-30.

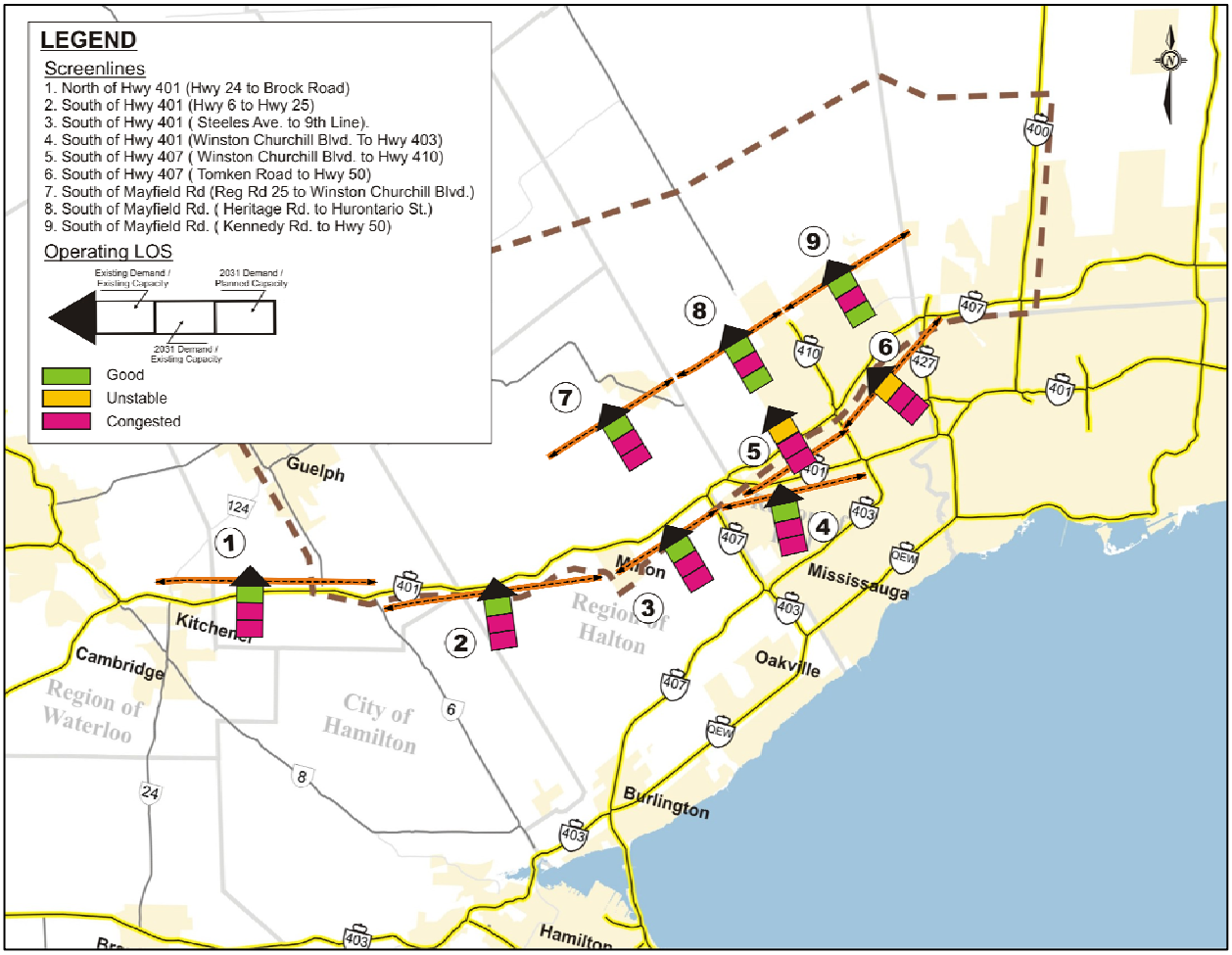
Table 2-30: Existing and 2031 p.m. Peak Hour Operating Conditions at E-W Corridor Screenlines – North-South Travel Based on Planned Capacity

Screenline Location	Planned Vehicle Capacity	2031 RTP V/C and *Operating Conditions*	2031 ALU V/C and *Operating Conditions*	2031 BAU V/C and *Operating Conditions*
North of Highway 401 (NB) (Highway 24 to Brock Road)	**8.850**	V/C – 0.99 *Congested*	V/C – 1.01 *Congested*	V/C – 0.80 *Unstable*
South of Highway 401 (NB) (Highway 6 to Highway 25)	**5,700**	V/C – 0.91 *Congested*	V/C – 1.13 *Congested*	V/C – 0.99 *Congested*
South of Highway 401 (NB) (Steeles Avenue to 9th Line)	**10,250**	V/C – 1.26 *Congested*	V/C – 1.17 *Congested*	V/C – 1.18 *Congested*
South of Highway 401 (NB) (WC Blvd to Highway 403)	**29,800**	V/C – 0.98 *Congested*	V/C – 1.00 *Congested*	V/C –0.93 *Congested*
South of Highway 407 (NB) (WC Blvd to Highway 410)	**19,900**	V/C – 1.15 *Congested*	V/C – 1.21 *Congested*	V/C – 1.16 *Congested*
South of Highway 407 (NB) (Tomken Road – Highway 50)	**14,800**	V/C – 1.10 *Congested*	V/C – 1.14 *Congested*	V/C –1.21 *Congested*
South of Mayfield Road (NB) (RR 25 to WC Blvd)	**5,950**	V/C – 1.10 *Congested*	V/C –1.21 *Congested*	V/C – 1.08 *Congested*
South of Mayfield Road (NB) (Heritage Rd. to Hurontario St.)	**7,500**	V/C – 0.71 *Stable*	V/C – 0.74 *Stable*	V/C – 0.69 *Stable*
South of Mayfield Road (NB) (Kennedy Rd. to Highway 50)	**21,950**	V/C – 0.71 *Stable*	V/C –0.77 *Stable*	V/C –0.74 *Stable*

A summary of the operating conditions for the N-S Corridor Screenlines is presented in Exhibit 2-8 for the following conditions:

- Existing p.m. peak hour vehicles and exiting vehicle capacity
- 2031 p.m. peak hour vehicles and existing vehicle capacity
- 2031 p.m. peak hour vehicles and planned vehicle capacity

Exhibit 2-8: Existing and Forecast p.m. Peak Hour E-W Corridor Screenline Operating Conditions – (North-South Travel)



A brief discussion of the existing and future operating conditions at each of the East - West corridor screenlines follows:

- ***North of Highway 401 (Highway 24 to Brock Road)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Highway 401 (Highway 6 to Highway 25)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Highway 401 (Steeles Avenue to 9th Line)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Highway 401 (Winston Churchill Blvd to Highway 403)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Highway 407 (Winston Churchill Blvd to Highway 410)***
  - Currently this screenline operates at a "Unstable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Highway 407 (Tomken Road to Highway 50)***
  - Currently this screenline operates at a "Unstable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Mayfield Road (RR 25 to Winston Churchill Blvd)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity and planned capacity.

- ***South of Mayfield Road (Heritage Road to Hurontario Street)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity moving back to a "Stable" operating condition when considering 2031 traffic flows in relation to planned roadway capacity.

- ***South of Mayfield Road (Kennedy Road to Highway 50)***
  - Currently this screenline operates at a "Stable" condition, however it is anticipated to operate in a "Congested" state in 2031 when considering 2031 traffic flows in relation to existing capacity moving back to a "Stable" operating condition when considering 2031 traffic flows in relation to planned roadway capacity.

2.3.7 Road Travel Times

Travel times are recorded as part of the auto assignment component of the GGH Model and are calculated during the assignment procedure based on the assigned trip volumes to the network. Table 2-31 indicates the existing p.m. road travel time and Table 2-32 reflects the future road travel times between traffic zones representing Urban Growth Centres (UGC's) within the GTAW study area.

Table 2-31: Existing (2001) p.m. Peak Hour Road Travel Time between UGCs (minutes)

	Kitchener	Guelph	Milton	Brampton	Mississauga	Vaughan	Toronto PD1
Kitchener	0	29	39	59	58	68	87
Guelph	31	0	32	51	51	61	80
Milton	42	35	0	27	26	36	55
Brampton	66	56	30	0	20	30	49
Mississauga	73	66	39	25	0	31	38
Vaughan	84	77	51	35	38	0	37
Toronto PD1	126	119	93	77	61	57	0

Table 2-32: 2031 p.m. Peak Hour Road Travel Time between UGCs (minutes)

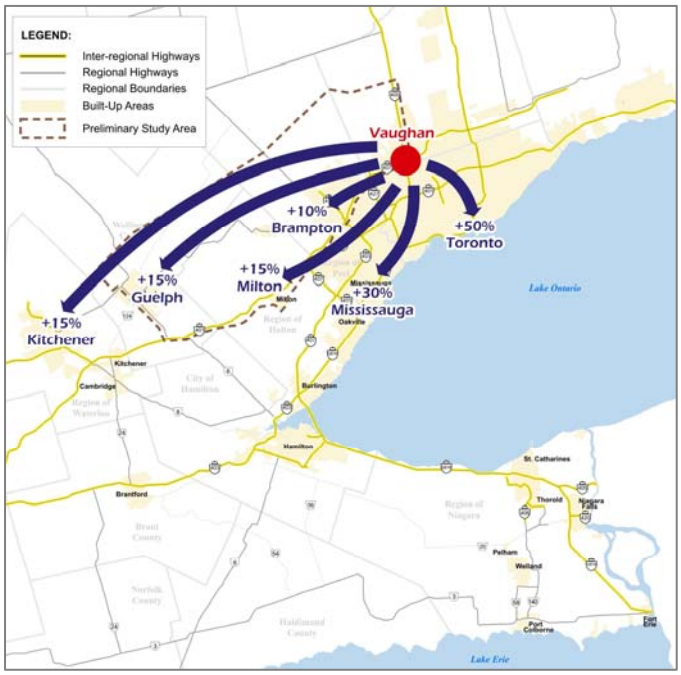
	Kitchener	Guelph	Milton	Brampton	Mississauga	Vaughan	Toronto PD1
Kitchener	0	37	58	88	83	92	128
Guelph	42	0	52	74	77	86	123
Milton	59	50	0	42	39	49	85
Brampton	86	71	48	0	34	36	80
Mississauga	94	86	57	41	0	47	52
Vaughan	95	87	58	38	49	0	56
Toronto PD1	152	143	115	99	66	73	0

A review of Table 2-31 and Table 2-32 indicates that p.m. peak hour travel times are expected to increase over the 30 year period. The increases range from 8% (Toronto PD1 to Mississauga) to 70% (Brampton to Mississauga) with an average increase of about 38%.

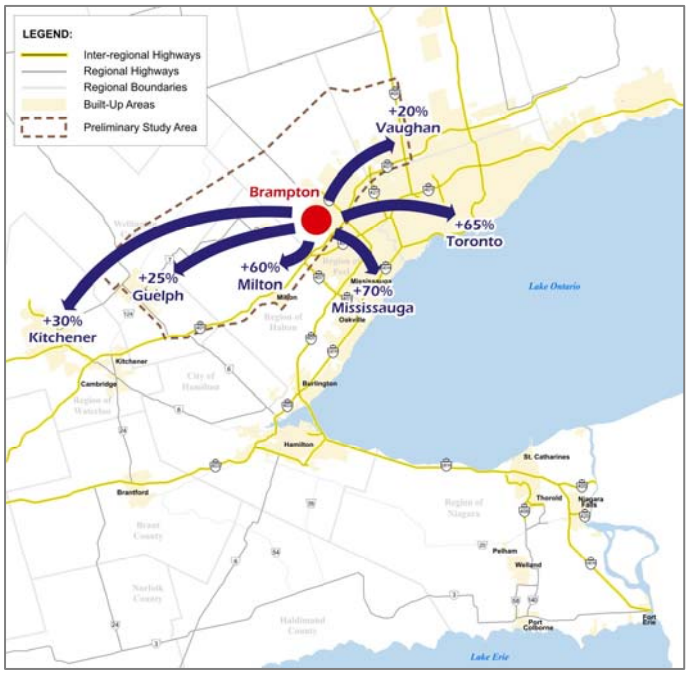
Exhibit 2-9 illustrates the change in auto travel time based on the existing and future travel times for Vaughan Corporate Centre, Downtown Brampton, Downtown Milton, and Downtown Guelph. As illustrated in Exhibit 2-9, road travel times in the GTA West Preliminary Study Area will increase by 10% to 65% by 2031 due to increased road congestion.

Exhibit 2-9: Change in p.m. Peak Hour Auto Travel Times to 2031 between UGCs

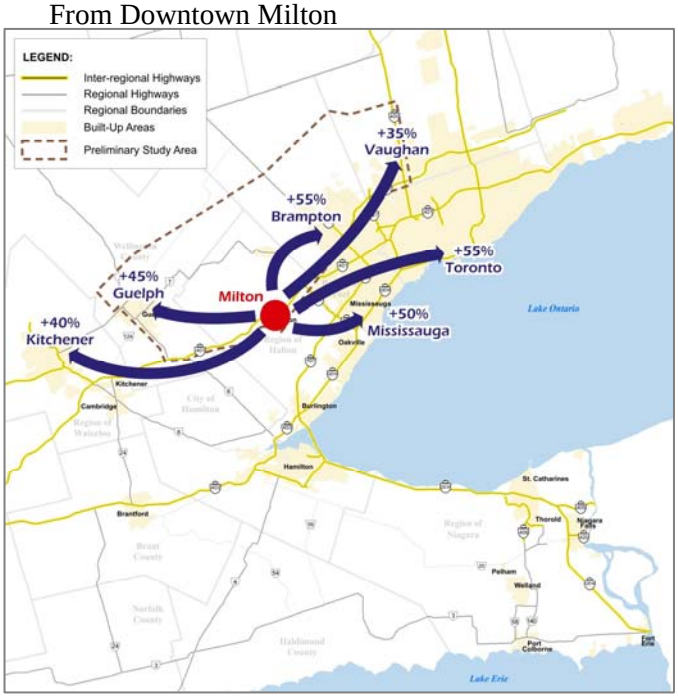
From Vaughan Corporate Centre



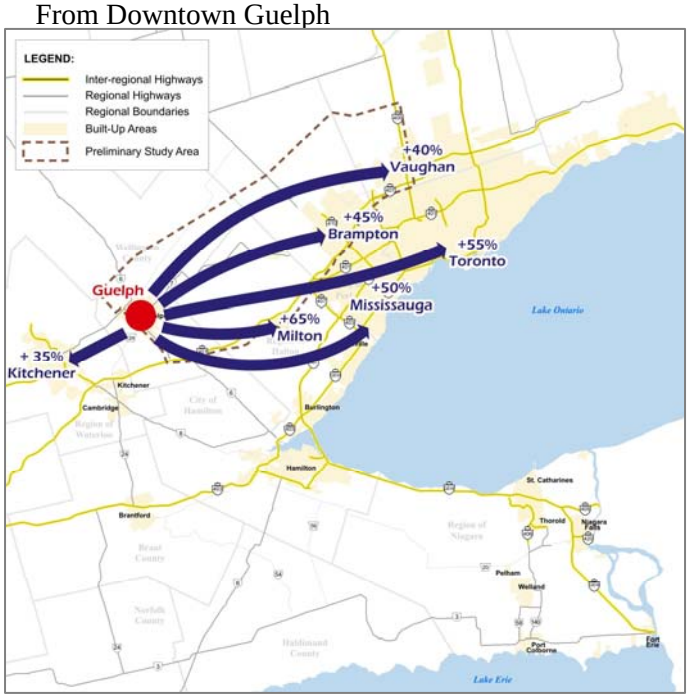
From Downtown Brampton



From Downtown Milton



From Downtown Guelph



2.3.8 Transit Travel Times

Transit travel times are calculated as part of the transit assignment procedure similar to the auto assignment. Table 2-33 and Table 2-34 summarize the existing and future p.m. peak period transit travel times for Urban Growth Centres within the GTAW Preliminary Study Area.

Table 2-33: Existing (2001) p.m. Peak Period Transit Travel Time within UGCs (minutes)

	Kitchener	Guelph	Milton	Brampton	Mississauga	Vaughan	Toronto PD1
Kitchener	0	50	275	180	230	235	220
Guelph	65	0	225	115	85	175	150
Milton	295	235	0	75	55	125	65
Brampton	180	115	80	0	40	60	105
Mississauga	230	85	45	50	0	100	70
Vaughan	235	175	120	70	100	0	65
Toronto PD1	220	150	65	55	45	65	0

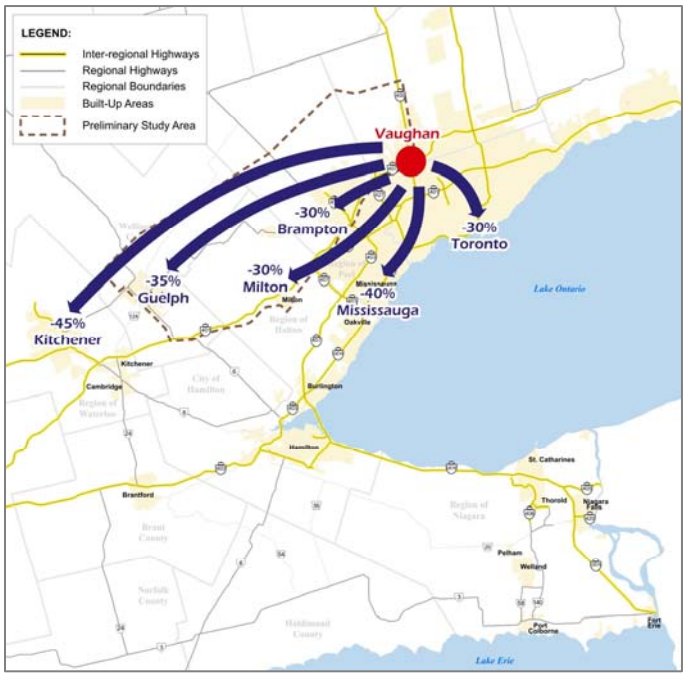
Table 2-34: 2031 p.m. Peak Period Transit Travel Time within UGCs (minutes)

	Kitchener	Guelph	Milton	Brampton	Mississauga	Vaughan	Toronto PD1
Kitchener	0	50	125	75	110	130	110
Guelph	60	0	125	75	110	125	105
Milton	135	120	0	65	40	85	55
Brampton	80	65	65	0	35	50	30
Mississauga	115	100	40	35	0	60	30
Vaughan	130	115	85	50	60	0	45
Toronto PD1	110	95	55	30	30	35	0

Changes in transit travel times were developed based on the existing and future travel times and illustrated in Exhibit 2-10 for Vaughan Corporate Centre, Downtown Brampton, Downtown Milton, and Downtown Guelph. As illustrated in Exhibit 2-10, future transit travel times are anticipated to reduce by 15% to 40% from existing conditions. A limited inter-regional transit market due to self-contained urban centres and increased road congestion pose major transit system constraints.

Exhibit 2-10: Change in p.m. Peak Period Transit Travel Times to 2031 between UGCs

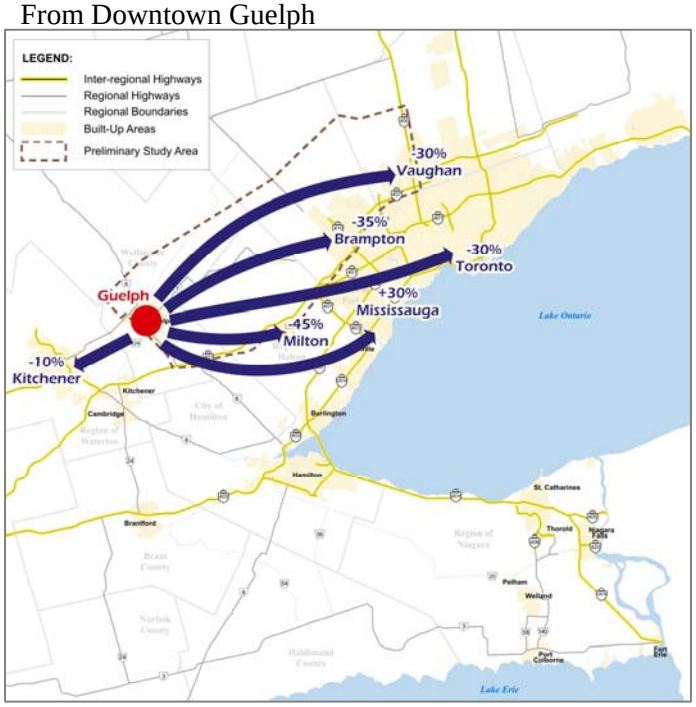
From Vaughan Corporate Centre



From Downtown Brampton

From Downtown Milton

From Downtown Guelph



3. SYSTEM ANALYSIS

3.1 Congestion Analysis

As indicated in Section 2.1, a key component of the GTAW Corridor Planning and Environmental Assessment Study is the assessment of the inter-regional travel demands utilizing the transportation system within the Study Area as well as the adjacent areas of influence. Presently, inter-regional commuter travel, goods movement and recreational/tourist travel within the Greater Toronto and Hamilton Area (GTHA) experience congested networks on a regular basis. It is noted that significant freeway congestion occurs throughout the day on several major freeway corridors and is no longer just a peak period occurrence. To capture the problem of the freeway congestion throughout the day, this congestion was assessed for the peak hour as well as for an average day.

3.1.1 Future (2031) AADT and SADT Estimates

To address existing and forecast freeway congestion for both a typical day and for weekend travel, a congestion analysis procedure was developed that utilized the existing (2006) Annual Average Daily Traffic (AADT) and Summer Average Daily Traffic (SADT) databases. Forecast (2031) corridor AADT and SADT traffic flows for each freeway corridor were calculated based on:

- GGH Model 2031 two-way p.m. peak hour auto assignments were recorded at locations along the freeway corridors to be consistent with locations where existing AADT and SADT traffic data are available;
- Forecast 2031 average daily auto volumes were calculated by dividing the 2031 two-way p.m. peak hour auto volumes by the existing percent design hour volume (DHV) (DHV/AADT) as recorded in the MTO traffic database. The DHV generally represents the 85^{th} percentile relationship of traffic peak hour to 24 hour traffic volume. Within the GTHA, the DHV and peak hour are generally comparable;
- The 2031 average daily truck volumes are estimated by calculating the daily trucks from the 2006 MTO AADT by the defined percent commercial vehicles and then increasing the 2006 truck estimate at a rate of 3% compounded per annum to 2020 and 2% compounded per annum growth beyond 2020;
- The representative 2031 AADT at each key location is calculated by adding the 2031 average annual auto and 2031 average annual commercial vehicles. In instances where the calculated 2031 AADT is lower than existing AADT (GGH Model indicates no growth of traffic on the facility) the 2006 AADT is assumed.
- The 2031 SADT volumes are estimated by applying the GGH Model growth factor to the existing SADT values reported in the MTO database. It is of note that the SADT can range from 10% to 25% higher than the estimated AADT depending on the location. For example, the SADT on Highway 401 between Highway 25 and Highway 407 is 11% higher than the AADT whereas the SADT on the QEW between Casablanca Road and Highway 406 is 25% higher than the AADT.

Exhibit 3-1 provides a summary of the AADT estimates for 2006 and 2031 with the 2006 and 2031 SADT estimates provided in Exhibit 3-2.

Table 3-1: 2006 and 2031 AADT Forecasts

		2006				2031			
		AADT	DHV	%CV	CV	PM Vol*	Auto AADT	CV AADT	AADT
Niagara to GTA Study Area									
	Hwy 24 to Hwy 52	40,800	9.4%	15.6%	6,365	5,003	52,328	12,000	64,300
	Hamilton 52 to Hwy 6 (Fiddlers Green)	57,800	10.2%	20.0%	11,560	6,528	61,600	21,700	83,300
	Hwy 6 W to Hwy 6 E (York Blvd.)	113,100	10.2%	20.0%	22,620	11,062	104,000	42,500	146,500
Hwy 403 Hamilton	Hwy 6 to QEW (Waterdown Road)	140,400	9.4%	9.0%	12,636	10,858	134,680	23,700	158,400
	Hwy 403/QEW to Guelph Line (Brant St.)	182,000	9.4%	25.0%	45,500	15,969	159,000	85,600	244,600
	Guelph Line to Burloak Dr. (Walkers Ln)	175,800	9.4%	10.0%	17,580	15,321	161,100	33,100	194,200
	Burloak Dr. to Third Line (Bronte Rd.)	171,300	9.4%	9.0%	15,417	18,563	195,650	29,000	224,600
QEW Halton	Third Line to Hwy 403 (Trafalgar Rd.)	175,600	10.6%	10.5%	18,438	18,831	175,420	34,700	210,100
	Fort Erie to Hwy 420 (McLeod Rd.)	35,000	10.2%	16.5%	5,775	5,353	50,935	10,900	61,800
	Hwy 420 to Hwy 405 (Mountain Rd.)	90,000	9.8%	7.4%	6,660	7,425	83,340	12,600	95,900
	Garden City Skyway Bridge	82,500	12.0%	12.3%	10,148	9,731	79,807	19,100	98,900
	GC Skyway to Hwy 406 (Ontario St.)	90,600	9.8%	10.7%	9,694	10,185	102,695	18,200	120,900
	Hwy 406 to Niagara Bdy (Casablanca)	91,000	9.8%	15.2%	13,832	11,442	114,480	26,000	140,500
QEW Niagara	Niagara Bndy to Eastport (Burlington St)	143,100	10.0%	15.1%	21,608	14,931	146,028	40,700	186,700
	QEW to Hwy 58 (Glendale Ave.)	54,200	10.2%	3.0%	1,626	6,761	65,960	3,000	69,000
	Hwy 58 to RR 20 (N. of RR 20)	29,500	10.2%	5.9%	1,741	4,161	40,463	3,200	43,700
Hwy 406	RR 20 to East Main (Port Robinson Rd.)	21,100	10.2%	6.0%	1,266	3,771	36,660	2,300	39,000
Hwy 405	QEW to Queenston-Lewiston Bridge	13,300	9.8%	22.0%	2,926	2,470	24,180	5,500	29,700
	Fort Erie to Hwy 130 (Ridge Rd.)	11,700	9.8%	6.9%	807.3	1,957	19,551	1,500	21,100
Hwy 3	Hwy 130 to Chambers Corners (Townline)	5,000	10.1%	16.5%	825	827	8,350	1,600	9,900
	Hwy 403 to Hwy 5 (Dundas St.)	44,900	10.0%	12.8%	5,747	5,247	51,448	10,900	62,300
	Hwy 5 to Campbellville Rd	31,400	9.4%	12.4%	3,894	4,040	42,048	7,400	49,400
Hwy 6	Campbellville Rd to Hwy 401	24,900	10.0%	14.2%	3,536	2,073	21,364	6,600	28,000
407 ETR	QEW to Dundas St					10,228	54,288	3,600	57,900
NGTA	Dundas St to Bronte Rd					12,374	57,584	4,100	61,700
	Bronte Rd to Hwy 403					10,383	47,350	4,300	51,600
GTA-West Study Area									
	Hwy 403 to Hwy 401					7,453	43,562	4,200	47,800
	Hwy 401 to Hwy 410					11,626	77,605	8,000	85,600
	Hwy 410 to Hwy 427					18,272	138,900	12,500	151,400
407 ETR GTAWest	Hwy 427 to Hwy 400					19,948	146,167	15,800	162,000
	Hwy 9 to King Road (Aurora Rd.)	89,100	9.8%	12.0%	10,692	17,382	175,120	20,100	195,200
	King Road to Hwy 407 (Langstaff Rd.)	135,400	10.1%	7.3%	9,884	15,964	157,590	18,600	176,200
Hwy 400	Hwy 407 to Hwy 401 (Finch Ave.)	194,500	10.2%	8.0%	15,560	19,144	186,760	29,200	216,000
	Hwy 24 to Hwy 6	126,100	10.0%	21.3%	26,859	13,120	125,133	50,500	175,600
	Hwy 6 to Hwy 25 (Milton WL)	104,400	10.0%	25.5%	26,622	12,700	118,455	50,000	168,500
	Hwy 25 to Hwy 407 (Trafalgar Rd.)	129,300	9.4%	16.8%	21,722	16,571	171,392	40,800	212,200
	Hwy 407 to Hwy 410 (Mavis Rd.)	167,500	9.4%	13.8%	23,115	17,565	183,606	43,500	227,100
	Hwy 410 to Hwy 427 (Renforth Ave.)	351,200	9.4%	9.0%	31,608	24,448	319,592	59,400	379,000
Hwy 401	Hwy 427 to Hwy 400	408,000	10.2%	9.5%	38,760	30,740	369,240	72,900	442,100
	Hwy 401 to Hwy 407 (Courtney Park Dr.)	170,600	10.2%	10.0%	17,060	16,046	155,700	32,100	187,800
	Hwy 407 to Hwy 7 (Clark Blvd.)	135,400	10.6%	7.0%	9,478	16,293	152,520	17,800	170,300
Hwy 410	North of Hwy 7 (Williams Parkway)	111,000	10.2%	4.2%	4,662	4,841	106,338	8,800	115,100
	Hwy 401 to Hwy 409 (Dixon Rd.)	186,300	9.4%	8.5%	15,836	14,091	170,465	29,700	200,200
Hwy 427	Hwy 409 to Hwy 407 (Rexdale Blvd.)	123,400	10.6%	8.5%	10,489	17,782	166,530	19,800	186,300
Hwy 403	Hwy 407 to Hurontario St	165,700	10.2%	10.0%	16,570	16,452	159,300	31,200	190,500
Mississauga	Hurontario St to Hwy 401 (Eglinton Ave.)	180,100	10.2%	15.0%	27,015	16,452	157,250	50,900	208,100
	Hwy 401 to Guelph Limits	27,100	10.6%	17.4%	4,715	3,332	30,562	8,800	39,400
Hwy 6	Guelph Limits to Hwy 7	39,200	10.6%	10.0%	3,920	4,632	43,200	7,400	50,600
	Hwy 6 to Hwy 25 (Wellington Rd. 27)	7600	9.4%	10.3%	782.8	1,375	14,352	1,400	15,800
Hwy 7	Hwy 25 to WC Blvd (Trafalgar Rd.)	18,200	9.4%	8.6%	1,565	2,318	24,678	2,900	27,600

DHV% = % Design Hour Volume

CV = Commercial Vehicle

*P.M. Vol: GGH Model 2031 p.m. peak hour autos (2-way)

Table 3-2: 2006 and 2031 SADT Forecasts

		AADT		%	SADT	
		2006	2031	Growth AADT	2006	2031
Niagara to GTA Study Area						
Hwy 403 Hamilton	Hwy 24 to Hwy 52	40,800	64,300	58%	45,300	71,400
	Hamilton 52 to Hwy 6 (Fiddlers Green)	57,800	83,300	44%	61,100	88,100
	Hwy 6 W to Hwy 6 E (York Blvd.)	113,100	146,500	30%	119,600	154,900
	Hwy 6 to QEW (Waterdown Road)	140,400	158,400	13%	156,000	176,000
QEW Halton	Hwy 403/QEW to Guelph Line (Brant St.)	182,000	244,600	34%	202,200	271,700
	Guelph Line to Burloak Dr. (Walkers Ln)	175,800	194,200	10%	195,300	215,700
	Burloak Dr. to Third Line (Bronte Rd.)	171,300	224,600	31%	190,300	249,500
	Third Line to Hwy 403 (Trafalgar Rd.)	175,600	210,100	20%	185,800	222,300
QEW Niagara	Fort Erie to Hwy 420 (McLeod Rd.)	35,000	61,800	77%	37,000	65,300
	Hwy 420 to Hwy 405 (Mountain Rd.)	90,000	95,900	7%	111,400	118,700
	Garden City Skyway Bridge	82,500	98,900	20%	99,500	119,300
	GC Skyway to Hwy 406 (Ontario St.)	90,600	120,900	33%	112,200	149,700
	Hwy 406 to Niagara Bdy (Casablanca)	91,000	140,500	54%	112,700	174,000
	Niagara Bndy to Eastport (Burlington St)	143,100	186,700	30%	159,000	207,400
Hwy 406	QEW to Hwy 58 (Glendale Ave.)	54,200	69,000	27%	57,300	72,900
	Hwy 58 to RR 20 (N. of RR 20)	29,500	43,700	48%	31,200	46,200
	RR 20 to East Main (Port Robinson Rd.)	21,100	39,000	85%	22,300	41,200
Hwy 405	QEW to Queenston-Lewiston Bridge	13,300	29,700	123%	16,500	36,800
Hwy 3	Fort Erie to Hwy 130 (Ridge Rd.)	11,700	21,100	80%	14,500	26,100
	Hwy 130 to Chambers Corners (Townline)	5,000	9,900	98%	6,050	12,000
Hwy 6	Hwy 403 to Hwy 5 (Dundas St.)	44,900	62,300	39%	54,200	75,200
	Hwy 5 to Campbellville Rd	31,400	49,400	57%	34,900	54,900
	Campbellville Rd to Hwy 401	24,900	28,000	12%	27,700	31,100
407 ETR NGTA	QEW to Dundas St		57,900	94%		66,100
	Dundas St to Bronte Rd		61,700	58%		67,200
	Bronte Rd to Hwy 403		51,600	21%		56,100
GTA-West Study Area						
407 ETR GTAWest	Hwy 403 to Hwy 401		47,800	14%		51,400
	Hwy 401 to Hwy 410		85,600	30%		91,900
	Hwy 410 to Hwy 427		151,400	69%		160,400
	Hwy 427 to Hwy 400		162,000	33%		170,600
Hwy 400	Hwy 9 to King Road (Aurora Rd.)	89,100	195,200	119%	110,300	241,600
	King Road to Hwy 407 (Langstaff Rd.)	135,400	176,200	30%	164,200	213,700
	Hwy 407 to Hwy 401 (Finch Ave.)	194,500	216,000	11%	205,700	228,400
Hwy 401	Hwy 24 to Hwy 6	126,100	175,600	39%	140,100	195,100
	Hwy 6 to Hwy 25 (Milton WL)	104,400	168,500	61%	116,000	187,200
	Hwy 25 to Hwy 407 (Trafalgar Rd.)	129,300	212,200	64%	143,700	235,800
	Hwy 407 to Hwy 410 (Mavis Rd.)	167,500	227,100	36%	186,100	252,300
	Hwy 410 to Hwy 427 (Renforth Ave.)	351,200	379,000	8%	390,200	421,100
	Hwy 427 to Hwy 400	408,000	442,100	8%	431,500	467,600
Hwy 410	Hwy 401 to Hwy 407 (Courtney Park Dr.)	170,600	187,800	10%	180,400	198,600
	Hwy 407 to Hwy 7 (Clark Blvd.)	135,400	170,300	26%	164,200	206,500
	North of Hwy 7 (Williams Parkway)	111,000	115,100	4%	123,000	127,500
Hwy 427	Hwy 401 to Hwy 409 (Dixon Rd.)	186,300	200,200	7%	207,000	222,400
	Hwy 409 to Hwy 407 (Rexdale Blvd.)	123,400	186,300	51%	130,600	197,200
Hwy 403 Mississauga	Hwy 407 to Hurontario St	165,700	190,500	15%	175,200	201,400
	Hurontario St to Hwy 401 (Eglinton Ave.)	180,100	208,100	16%	190,500	220,100
Hwy 6	Hwy 401 to Guelph Limits	27,100	39,400	45%	28,700	41,700
	Guelph Limits to Hwy 7	39,200	50,600	29%	41,500	53,600
Hwy 7	Hwy 6 to Hwy 25 (Wellington Rd. 27)	7,600	15,800	108%	7,450	15,500
	Hwy 25 to WC Blvd (Trafalgar Rd.)	18,200	27,600	52%	20,200	30,600

3.1.2 Road Capacity Estimates

Daily roadway capacity estimates for the various highway cross-sections were prepared based on a number of assumptions. In the context of this analysis, "capacity" represents the practical upper limit of service volumes on a particular facility, based on actual experience and observation. This will vary depending on the type of facility and its location. Some facilities, such as Highway 401 and the QEW, are exceptional in that travel characteristics along these routes produce higher capacities (i.e., service volumes) than may be experienced on other area facilities of similar types. Capacities of other roadways may increase in urban, built up areas, such as Highway 403 in Hamilton. This is due to the high land use densities served by these facilities and their heavy usage throughout the day. These capacity assumptions are as follows:

- The peak hour peak directional split for all highway facilities is assumed to represent up to 55% of the peak hour traffic flow on rural and smaller facilities, with slightly more balanced splits (54%) in built up areas where peak period traffic runs in both directions (e.g., Highway 401 in the GTA and the QEW in Hamilton);
- The peak hour is typically estimated to be up to 10% of the total daily traffic on highways, particularly on rural and smaller facilities. On larger and more urban facilities, as traffic volumes increase peak periods lengthen and are estimated between 6%-10% of total daily traffic. This is seen on facilities such as Highway 401 and the QEW, which are heavily used throughout the day;
- The vehicle capacity passenger car equivalents of a freeway lane within GTHA is assumed to be 2,200 vehicles per hour;
- The vehicle capacity of a rural undivided highway lane is assumed to be 1,500 vehicles per hour;
- The vehicle capacity of a freeway HOV lane is 75% the capacity of a standard general purpose lane;
- The capacity of a tolled freeway facility is assumed to be 85% of a non-tolled freeway based on discussions with MTO and 407 ETR staff.

Typically, SADT are greater than AADT, and summer travel is generally characterized by longer peak periods and more balanced directional splits as commute trips and tourism and recreation trips overlap. Planning involves weighing the costs and benefits of accommodating peak period traffic conditions. Generally, planning is conducted to consider weekday peak travel conditions and SADT peaks usually represent higher volume conditions and may be particularly important to consider in corridors that accommodate high volumes of tourism/recreation travel. Alternative solutions to the problems and opportunities will consider both weekday peak and summer travel conditions.

A summary of the typical daily highway and freeway capacities assumed in the congestion analysis process are presented in Table 3-3.

Table 3-3: Typical Highway and Freeway Daily Vehicle Capacities*

Facility Type	Freeway Capacity	Tolled Freeway Capacity	Highway Capacity
2-lane	33,000		27,000
4-lane	80,000	68,000	55,000
4-lane plus 1 HOV	110,000		
6-lane	120,000	102,000	82,000
6-lane plus 1 HOV	150,000		
8-lane	160,000	136,000	
10-lane	200,000	170,000	
12-lane	240,000		
14-lane	311,000		
16-lane	356,000		

* Note that highway capacities are greater on major facilities such as Highway 401, Highway 403 and the QEW as a result of the factors and assumptions discussed above.

The maximum daily capacity of the study area highways could increase over time, with the increase in travel throughout off-peak hours, the increase in travel in off-peak directions and the use of technology to increase the maximum hourly vehicular capacity of a freeway lane. It is unknown whether such changes would occur through 2031 and it is unlikely that any of these would have a substantial impact on highway capacity. Therefore, it is assumed that existing highway capacity (with the exception of planned roadway network improvements) will remain constant through to 2031.

3.1.3 Facility Congestion Analysis

The existing (2006) level of congestion for each freeway / highway section, experienced on an average weekday, is based on calculating the Existing Volume / Capacity (V/C) ratio based on the estimated 2006 AADT (Table 3-1) in relation to the existing section cross-section facility capacity presented in Table 3-3. The level of congestion for an average summer day is calculated with a similar approach using the existing (2006) SADT (Table 3-2) in relation to the existing section facility capacity presented in Table 3.3.

The forecast (2031) level of congestion for each freeway / highway section, experienced on an average weekday, is based on calculating the Long Term Volume / Capacity (V/C) ratio based on the estimated 2031 AADT (Table 3-1) in relation to the proposed section facility capacity presented in Table 3-3 for the freeway cross-section defined in the GGH mode. The level of congestion for an average summer day is calculated with a similar approach using the estimated 2031 SADT (Table 3-2) in relation to the proposed section facility capacity, for the freeway cross-section defined in the GGH Model, presented in Table 3-3.

It is noted that the future (2031) capacity estimates for each facility are based on the network assumption identified in the GGH Model and discussed in Section 2.2.3. With respect to the QEW between Casablanca Boulevard and Highway 406, the GGH Model assumed that the proposed HOV lane would be a conversion from an existing general purpose lane and not provided by an additional lane. This assumption is in contrast to the MTO High Occupancy Vehicle (HOV) Lanes – Plan 2007 "Proposed Long Term HOV Lanes" document, which indicates that HOV lanes are for the most part to be on new additional lanes.

To understand the future (2031) congestion implications along the QEW a sensitivity analysis was undertaken. Congestion levels on the QEW between Casablanca Boulevard and Highway 406 were determined assuming a scenario with 4 GPL + 2 HOV and a scenario with 6 GPL + 2 HOV. The 2031 GGH Model auto assignment for each of the QEW HOV scenarios between Casablanca Boulevard and Highway 406 indicated that major congestion is forecast for this section of the QEW in 2031.

A summary of the V/C ratios that identify minor, moderate and major levels of congestion is presented in Table 3-4.

Table 3-4: Congestion Type/ LOS and Volume / Capacity Ratio Summary

Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	**LOS C or better**	**Less than 0.80**	**Non-recurring Congestion***
Moderate	**LOS D**	**0.80 to 0.90**	**Unstable Conditions**
Major	**LOS E or F**	**0.90 and above**	**Congested Conditions (Stop-and-Go)**

* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc.

3.1.4 Peak Hour Congestion Analysis

Analysis of freeway congestion was also conducted on a peak hour basis, which is consistent with the GGH Model's estimation of peak hour travel conditions. This analysis addressed peak hour roadway facility conditions and was used to confirm location and degree of congestion as determined by the daily congestion analysis.

Peak hour one-way AADT automobile volumes were calculated using 2006 AADT data, MTO's percent commercial vehicles and a peak hour directional split of 55%. Based on the Highway Capacity Manual 2000, a passenger car equivalent factor of 1.5 was used to convert commercial vehicle volumes into equivalent automobile volumes. Peak hour factors, based on existing travel characteristics and the carrying capacities of the Study Area's roadway facilities, were used to calculate peak hour volumes from the AADT volumes. The road capacity assumptions described in Section 3.1.2 were used to calculate peak hour V/C ratios and thereby LOS.

For the 2031 analysis, the following components were used to calculate V/C ratios and LOS: the GGH Model's 2031 P.M. peak hour 2-way automobile volumes; 2031 commercial vehicle AADT (based on the commercial vehicle growth assumptions in Section 3.1.1); and peak hour factors, directional split, passenger car equivalent and roadway capacities from the 2006 analysis;

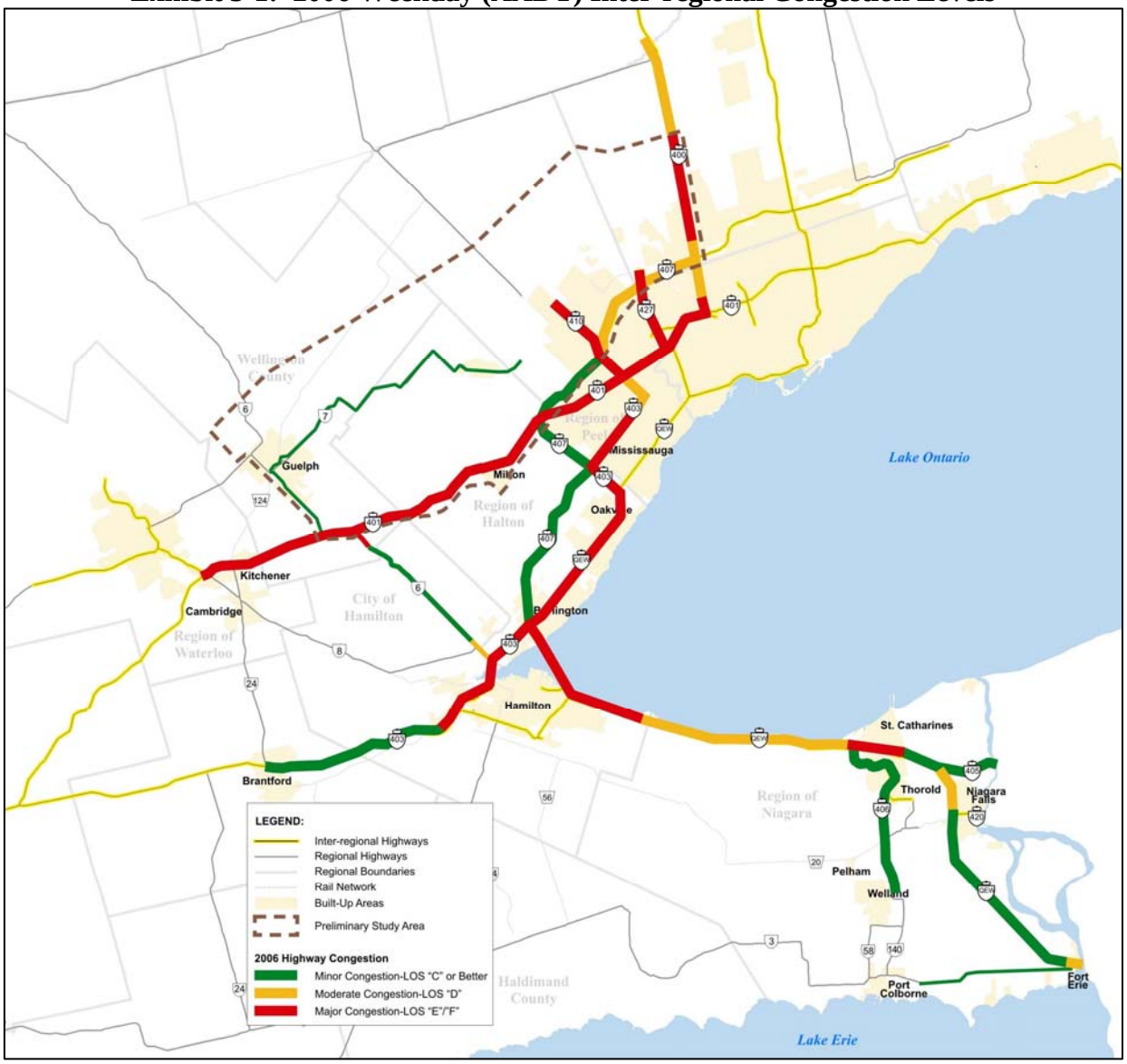
The resulting 2006 and 2031 peak hour V/C ratios/ LOS were compared with the AADT V/C ratios. For both analysis years, this comparison indicated that there is a high degree of correlation between the peak hour and AADT V/C ratios, confirming that "peak hour"-type congestion is and will be experienced throughout the day on many of the roadways within the Study Area.

SADT 2006 peak hour volumes were calculated using the same methodology as used for AADT volumes, with the MTO's 2006 SADT volumes as a basis. As discussed in Section 3.1.1, 2031 peak hour volumes were based on 2031 SADT volumes, calculated by applying the GGH Model growth factor to existing SADT values in the MTO database. Typically, the SADT peak hour V/C ratios are greater than those for the AADT peak hour; indicating that congestion can be more extreme in the summer months. Again, the SADT peak hour V/C ratios were almost equivalent to the SADT daily V/C ratios in both 2006 and 2031, indicating that congestion occurs throughout the day on the major facilities, and is not merely a peak hour phenomenon.

3.1.5 Congestion Mapping

By comparing the existing and forecast AADT values and SADT values to the estimated facility capacities, 2006 and 2031 congestion plots were developed to graphically show congestion on the King's Highways throughout the NGTA and GTA-West study areas. The colour plots denote areas of minor congestion, moderate congestion and major congestion. Exhibit 3-1 summarizes the 2006 weekday AADT and Exhibit 3-2 summarizes the 2006 weekend SADT for areas of congestion.

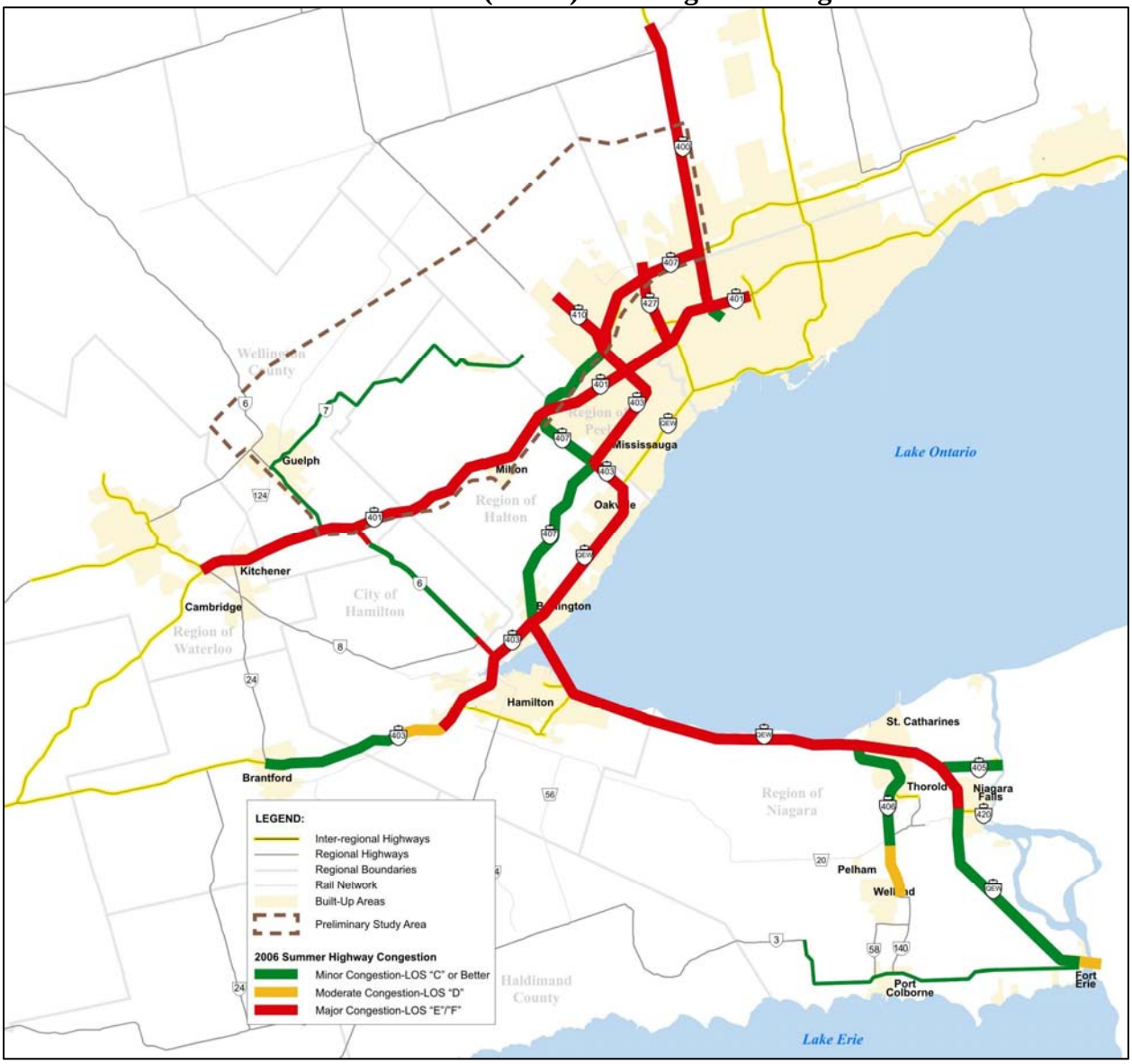
Exhibit 3-1: 2006 Weekday (AADT) Inter-regional Congestion Levels



Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	**LOS C or better**	**Less than 0.80**	**Non-recurring Congestion***
Moderate	**LOS D**	**0.80 to 0.90**	**Unstable Conditions**
Major	**LOS E or F**	**0.90 and above**	**Congested Conditions (Stop-and-Go)**

* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc.

Exhibit 3-2: 2006 Weekend (SADT) Inter-regional Congestion Levels

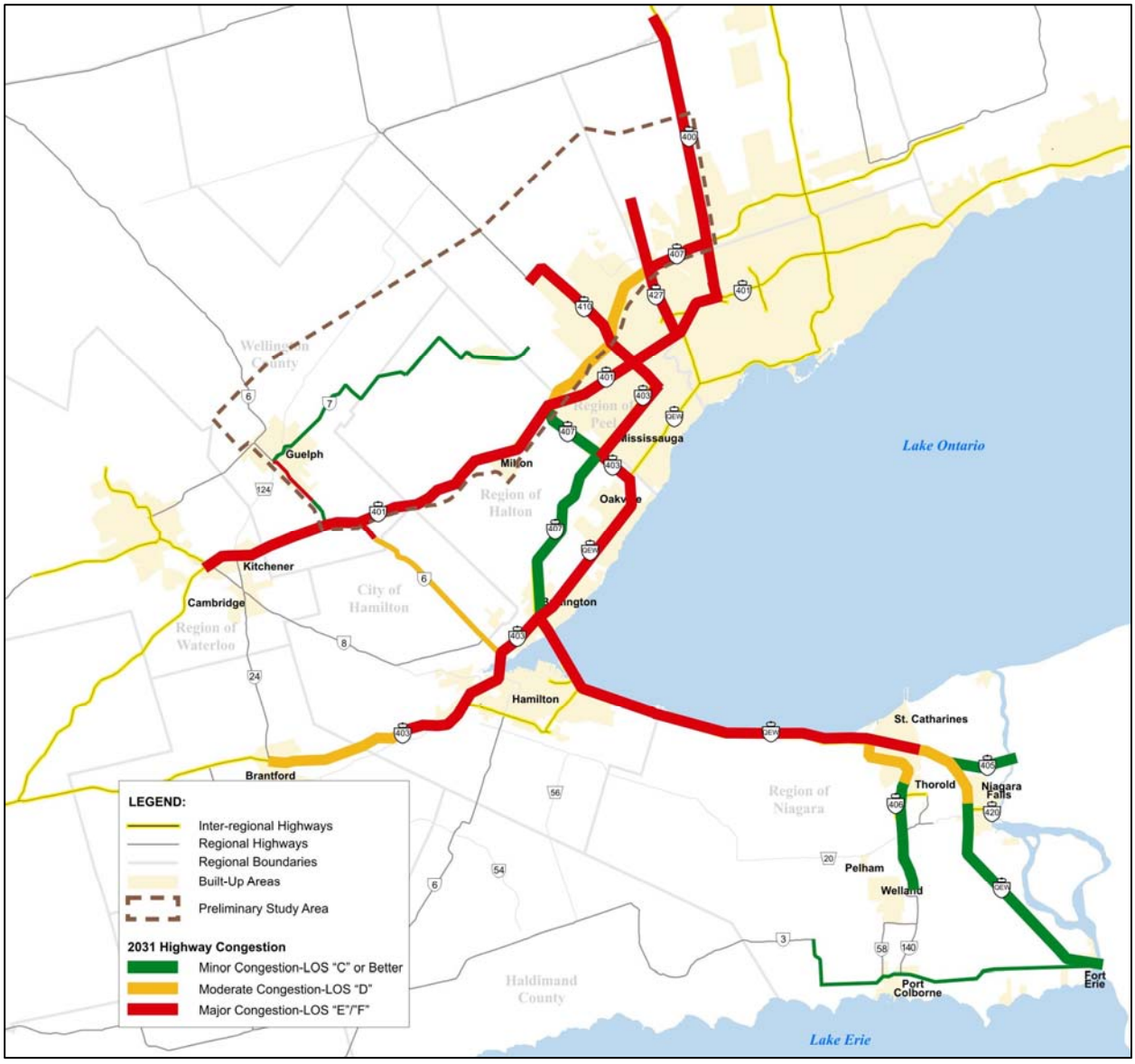


Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	**LOS C or better**	**Less than 0.80**	**Non-recurring Congestion***
Moderate	**LOS D**	**0.80 to 0.90**	**Unstable Conditions**
Major	**LOS E or F**	**0.90 and above**	**Congested Conditions (Stop-and-Go)**

* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc

Exhibit 3-3 summarizes the future (2031) weekday AADT and Exhibit 3-4 summarizes the future (2031) weekend SADT for areas of congestion.

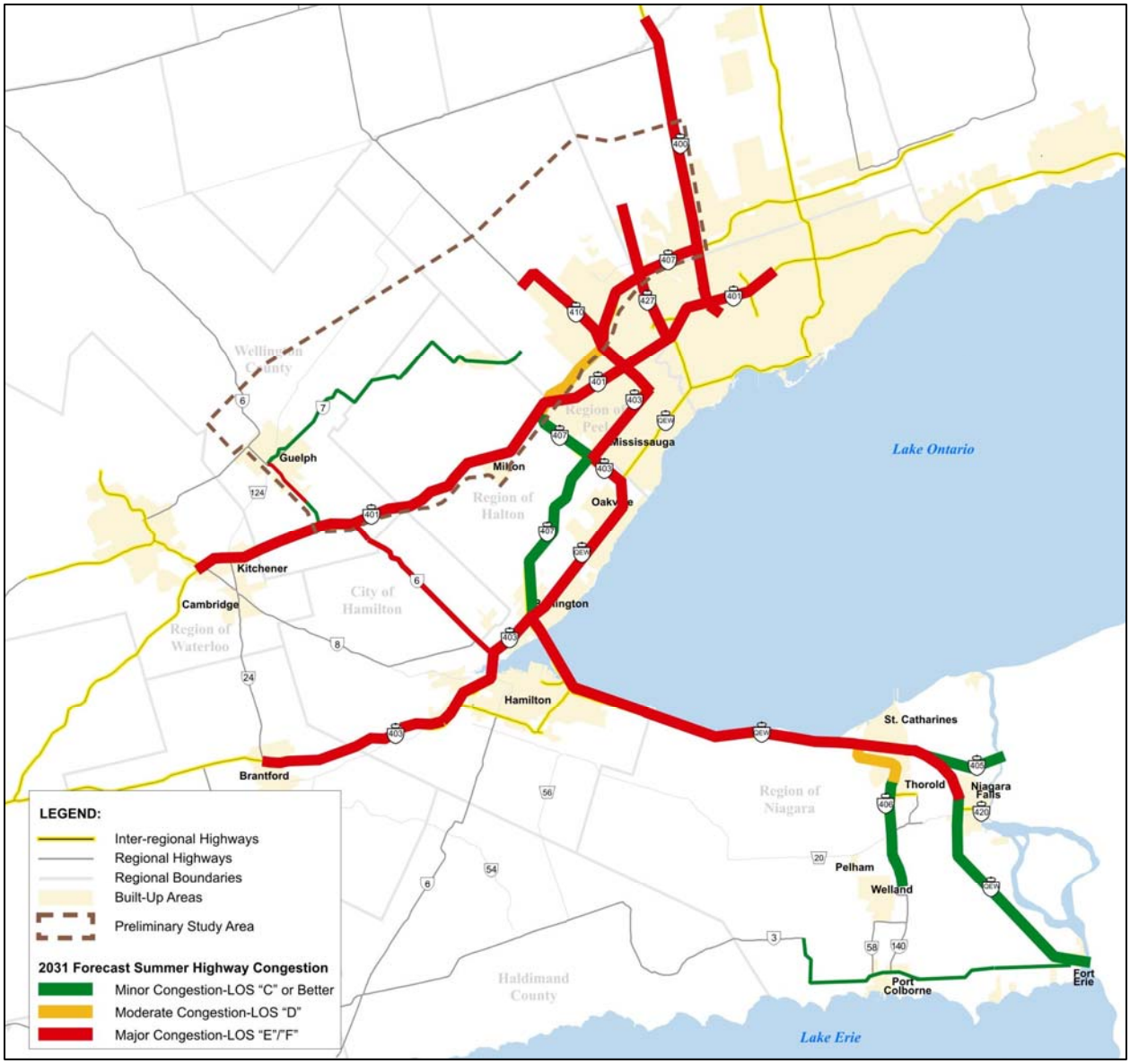
Exhibit 3-3: 2031 Weekday (AADT) Inter-regional Congestion Levels



Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	**LOS C or better**	**Less than 0.80**	**Non-recurring Congestion***
Moderate	**LOS D**	**0.80 to 0.90**	**Unstable Conditions**
Major	**LOS E or F**	**0.90 and above**	**Congested Conditions (Stop-and-Go)**

* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc.

Exhibit 3-4: 2031 Weekend (SADT) Inter-regional Congestion Levels



Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	**LOS C or better**	**Less than 0.80**	**Non-recurring Congestion***
Moderate	**LOS D**	**0.80 to 0.90**	**Unstable Conditions**
Major	**LOS E or F**	**0.90 and above**	**Congested Conditions (Stop-and-Go)**

* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc.

3.2 Facility Analysis

The 2031 base case auto and truck network system assignments used in the assessment of congestion discussed in the previous section are based on the GGH Model. Complementing the GGH Model analysis are network auto assignments related to the Alternate Land Use and Business as Usual (trend) analysis as well as an assumed lower growth in commercial vehicle flows resulting from possible diversion to alternate modes (rail and marine).

A truck diversion analysis was undertaken to establish a lower range of truck forecast to account for the possibility of a shift from truck to rail / marine resulting from increased fuel costs and other shipper considerations. The truck diversion analysis utilized information provided by truck travel survey information from the 1999 Commercial Vehicle Survey conducted by the MTO and from interviews held with Transportation Service Providers during late 2007 and early 2008.

The information from the Transportation Service Providers indicated that the shipper determines the mode to ship goods based on numerous factors including cost, distance, accessibility to service, shipping time and by type of goods being shipped. A survey undertaken by the Canadian Industrial Transportation Association indicated that CITA members would consider a diversion of approximately 10% from trucking to alternate modes given certain assumptions.

An analysis of possible diversion of truck loads to alternate modes based on travel distance and type of goods transported assumed the following:

Travel Distance Diversion

- Truck journeys of less than 500 km would not divert to an alternate mode;
- 10% of truck journeys travelling 500 – 800 km could be diverted
- 25% of truck journeys travelling 800 – 1,600 km could be diverted
- 50% of truck journeys travelling more than 1,600 km could be diverted

Types of Goods Suitable for Diversion

- Agricultural goods and food products
- Wood and wood products
- Metal and Metal Products
- Machinery
- Manufactured products
- Transportation and automotive goods
- Empty containers / trailers

The truck diversion analysis included the following steps:

- Identify representative commercial vehicle survey stations:

  - Highway 401 at Trafalgar Road
  - QEW at Fruitland Road

- Identify proportion of trucks travelling by travel distance category
- Identify proportion of trucks in each travel distance category transporting goods suitable for diversion
- Apply travel distance and goods suitable for diversion proportions to observed truck volumes to establish the percentage of trucks that could be diverted based on these conditions

The results of this analysis indicated that upwards of 8% of the total trucks travelling along Highway 401 could possibly be diverted to alternate modes. The possible diversion of trucks along the QEW corridor was estimated at 3%.

Based on the information from the Transportation Service Providers and the truck diversion analysis from the 1999 Commercial Vehicle Survey, the 2031 low truck forecast assumes that a 10% diversion from trucks to an alternate mode is reasonable.

A summary of the range of demand forecast scenarios reviewed is presented in Table 3-5.

Table 3-5: Summary Range of Travel Demand Forecast

2031 Forecast Demand Scenarios	Autos	Land Use Allocation	High TMS	Low TMS	High Trucks* (Growth)	Low Trucks Diversion (10%)
GGHM Base Case – High (BCH)	GGHM	RTP	Yes		88%	
GGHM Base Case – Low (BCL)	GGHM	RTP	Yes			78%
ALU Base Case	GGHM	ALU	Yes		88%	
BAU (Trend)	BAU	RTP		Yes	88%	

* High truck growth reflects a 3% compound growth for 2007-2020 and 2% compound growth for the 2021-2031 time periods.

A range of 2031 AADT forecasts for the Highway 401 corridor between Highway 6 and Highway 400 and along the QEW corridor between Fort Erie and Burlington Street is presented in Exhibit 3-5 and Exhibit 3-6 respectively. This range of forecasts represents the following scenarios:

- BCH – GGH Model Base Case – High Truck Forecast (2031)
- BCL – GGH Model Base Case – Low Truck Forecast (2031)
- ALU – Alternate Land Use – High Truck Forecast (2031)
- BAU – Business as Usual (Trend) – High Truck Forecast (2031)

Exhibit 3-5: 2031 AADT Forecasts – Highway 401 Corridor

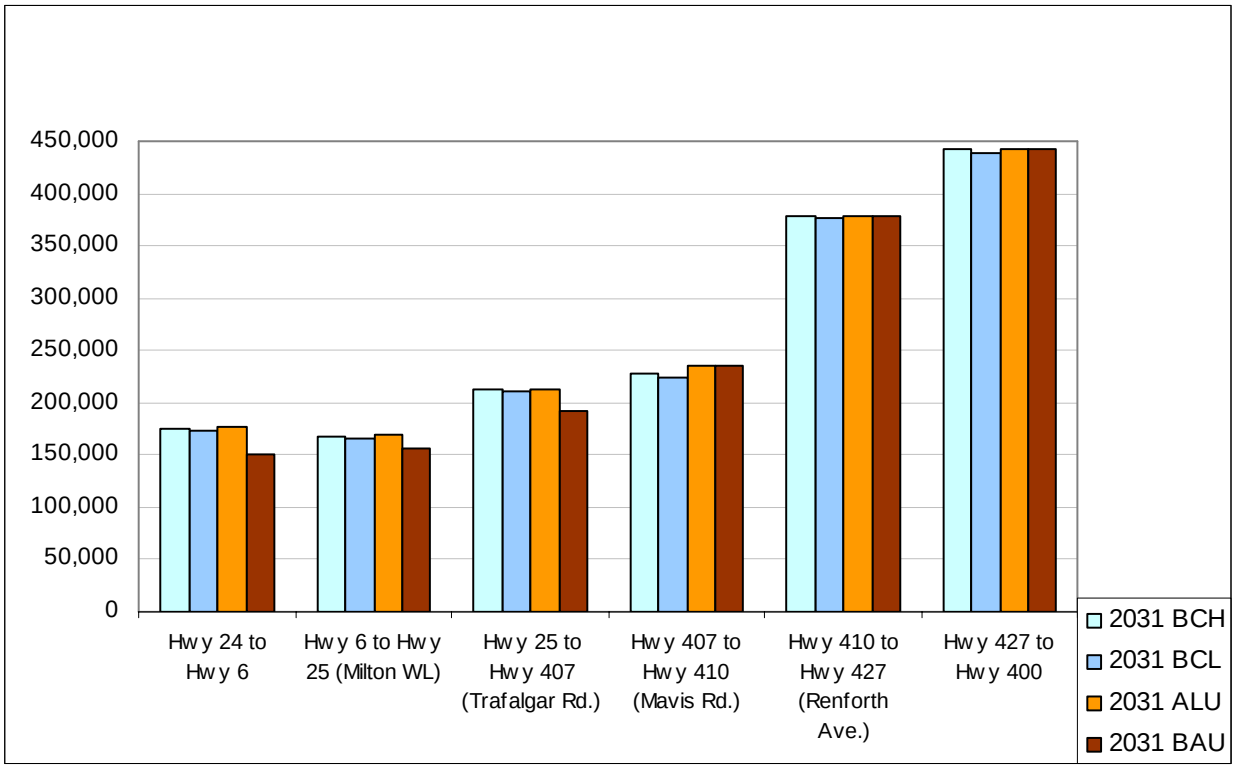
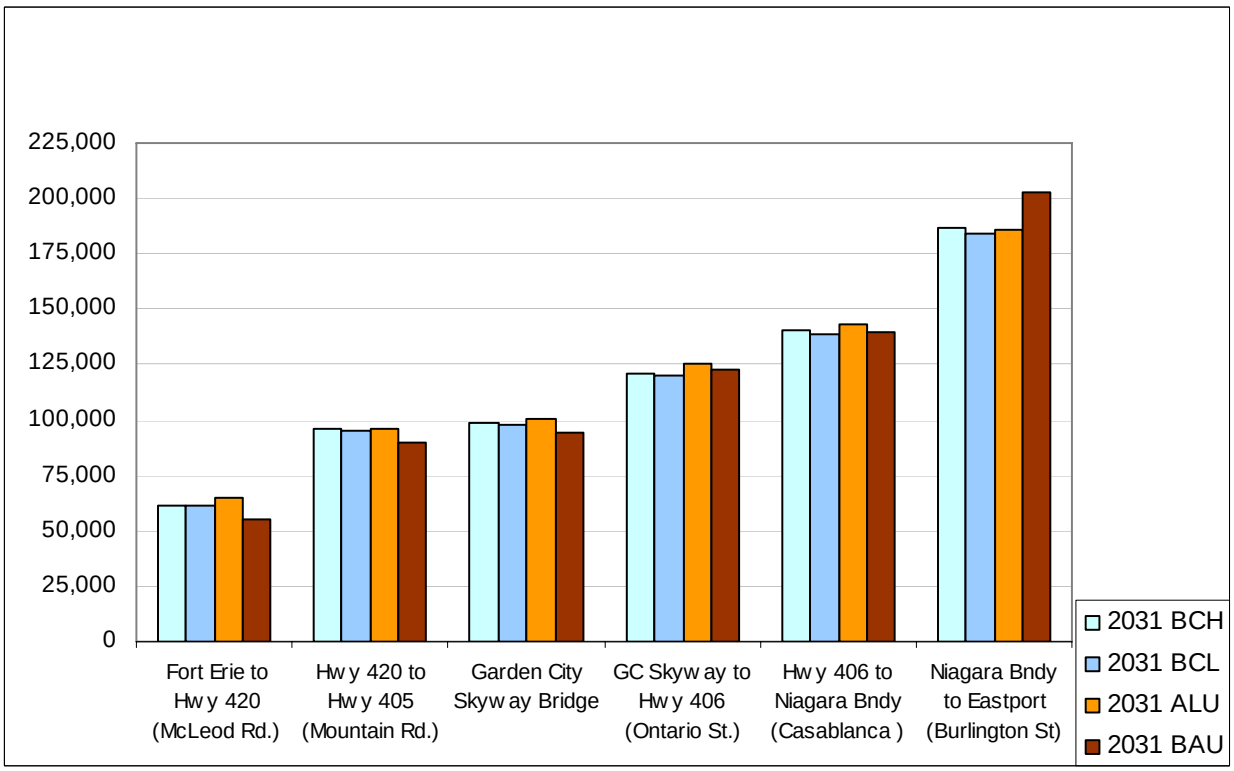


Exhibit 3-6: 2031 AADT Forecasts – QEW Niagara Corridor



An assessment of future lane deficiencies was undertaken along the 400 series highways within the GTAW Preliminary Study Area based on the following information:

- Summary of historical (1960 to 2006) Annual Average Daily Traffic (AADT) and Summer Average Daily Traffic (SADT) data
- Forecast 2031 daily and summer traffic volumes.

The assessment provides a range of traffic forecasts as presented in Exhibit 3-7 through Exhibit 3-14 in relation to the existing and committed/planned capacity. The facility assessments are discussed below in terms of the respective highway corridor.

Highway 401 Corridor

Analysis of historical and forecast traffic demand was undertaken along Highway 401 between Guelph and Highway 400. Historically the traffic along this corridor has been increasing by approximately 2% per annum. The forecast 2031 AADT and SADT traffic volumes are substantially higher than the current volumes indicating lane deficiencies based on planned capacity as presented in Table 3-6.

Table 3-6: Lane Deficiencies along the Highway 401 Corridor

Highway	Location	Existing Lanes	Planned Lanes	Required Lanes	Lane Deficiency
401	Guelph to Highway 25	6	8	10	2
	Highway 25 to Highway 407	6	10+HOV	14	2
	Highway 407 to Highway 410*	8	12+HOV	14	-
	West of Highway 427	12	12	14	2
	West of Highway 400	14	14	16	2

* The section of Highway 401 west of Highway 410 is referenced. The section of Highway 401 crossing the Credit River is planned to be 8 lanes + HOV

Exhibit 3-7 through Exhibit 3-11 illustrate the historical and future travel demand along the Highway 401 corridor. Traffic demand along Highway 401 between Guelph and Highway 410 is currently either approaching capacity or operating at capacity. Highway 401 west of Highway 410 currently experiences major delays due to congestion during peak travel periods. Future traffic volumes along Highway 401 between Highway 410 and Highway 400 also indicate major congestion problems. Therefore, the facility analysis indicates that in the future the Highway 401 either requires significant lane widenings within the existing freeway system or that alternative network capacity be considered in a new transportation corridor.

Exhibit 3-7: Historical and Forecast Travel Volumes at Highway 401 west of Milton

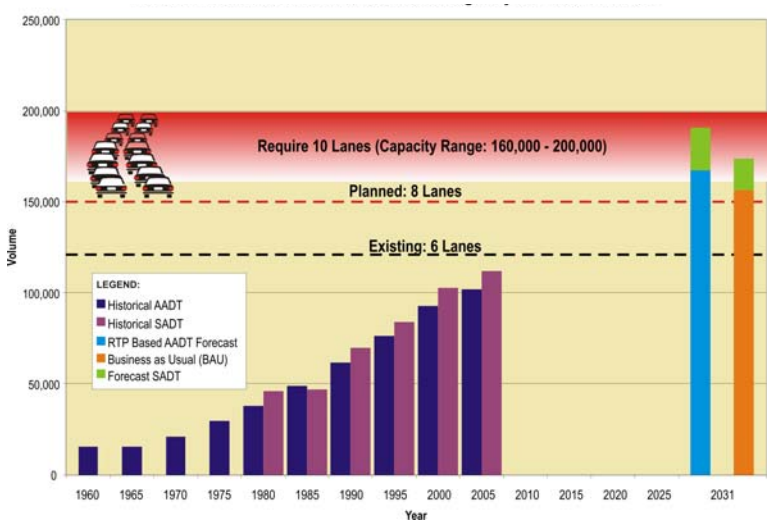


Exhibit 3-8: Historical and Forecast Travel Volumes at Highway 401 east of Milton

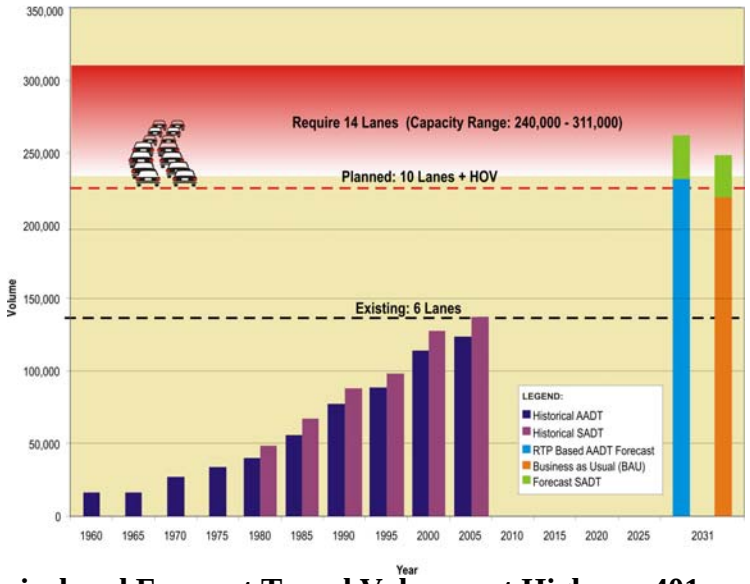


Exhibit 3-9: Historical and Forecast Travel Volumes at Highway 401 west of Highway 410

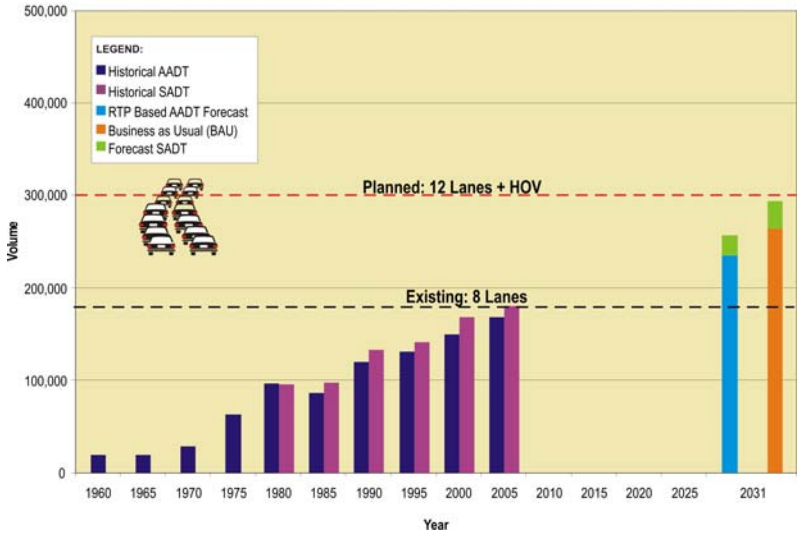


Exhibit 3-10: Historical and Forecast Travel Volumes at Highway 401 west of Highway 427

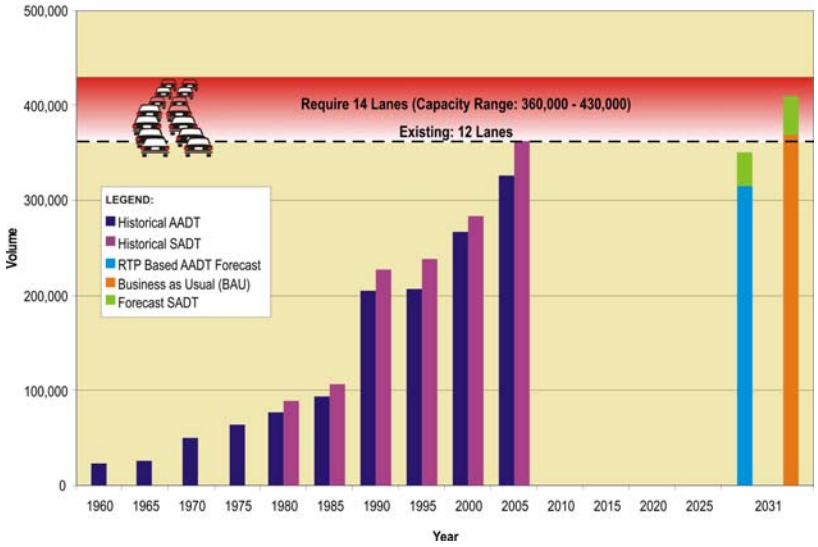
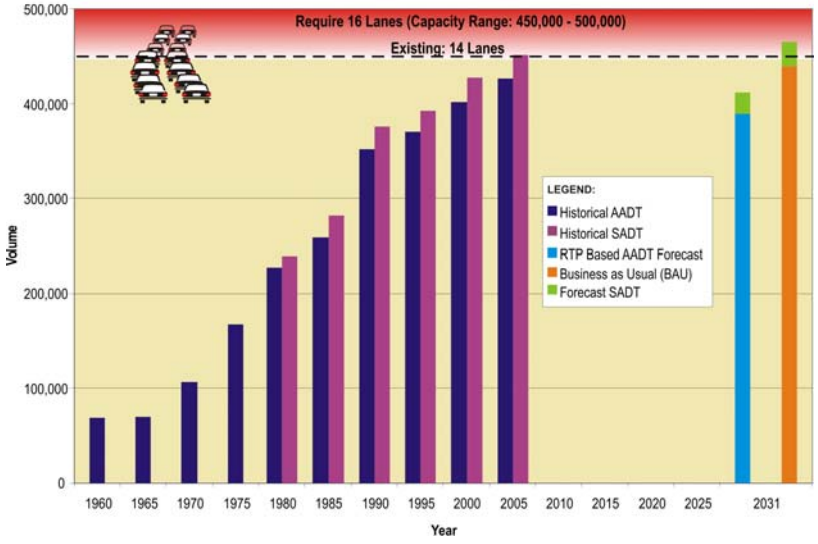


Exhibit 3-11: Historical and Forecast Travel Volumes at Highway 401 west of Highway 400



Highway 400 Corridor

Analysis of historical and forecast travel demand was undertaken along Highway 400 north of Highway 407 and north of Major Mackenzie Drive. Traffic volume along this highway corridor has been increasing by approximately 3% per annum. Future 2031 AADT and SADT volumes are approximately 75% to 95% higher than the existing volumes. Lane deficiencies based on planned roadway improvements are presented in Table 3-7.

Table 3-7: Lane Deficiencies along the Highway 400 Corridor

Highway	Location	Existing Lanes	Planned Lanes	Required Lanes	Lane Deficiency
400	North of Highway 407	10	10	12	2
	North of Major Mackenzie Drive	6	8+HOV	12	2

Exhibit 3-12 and Exhibit 3-13 illustrate the historical and future travel demand along the Highway 400 corridor. Analysis of the traffic volume indicates 21% higher demand during the summer travel period compared to the AADT. This is reflective of higher tourism travel towards Muskoka and Haliburton. To accommodate future travel demand during peak travel period 2 additional lanes are required along this corridor north of Highway 407 and north of Major Mackenzie Drive.

Exhibit 3-12: Historical and Forecast Travel Volumes at Highway 400 North of Highway 407

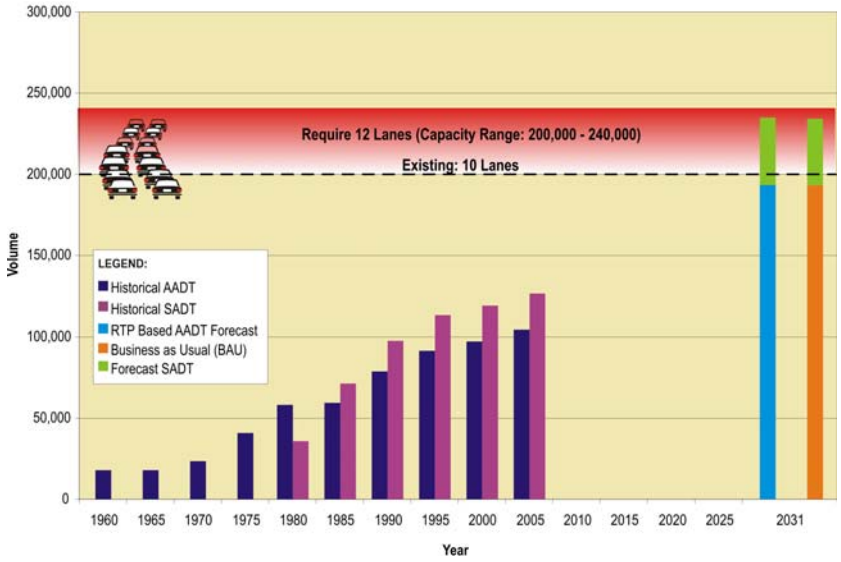
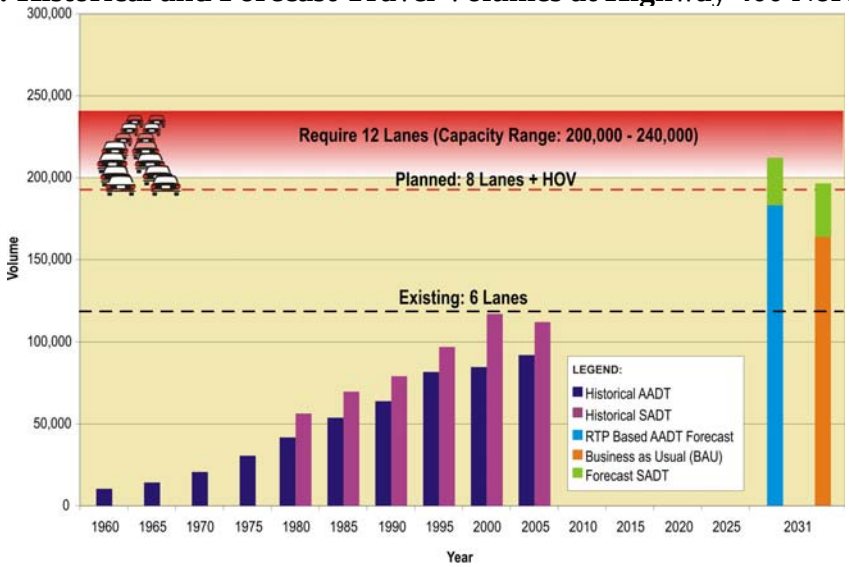


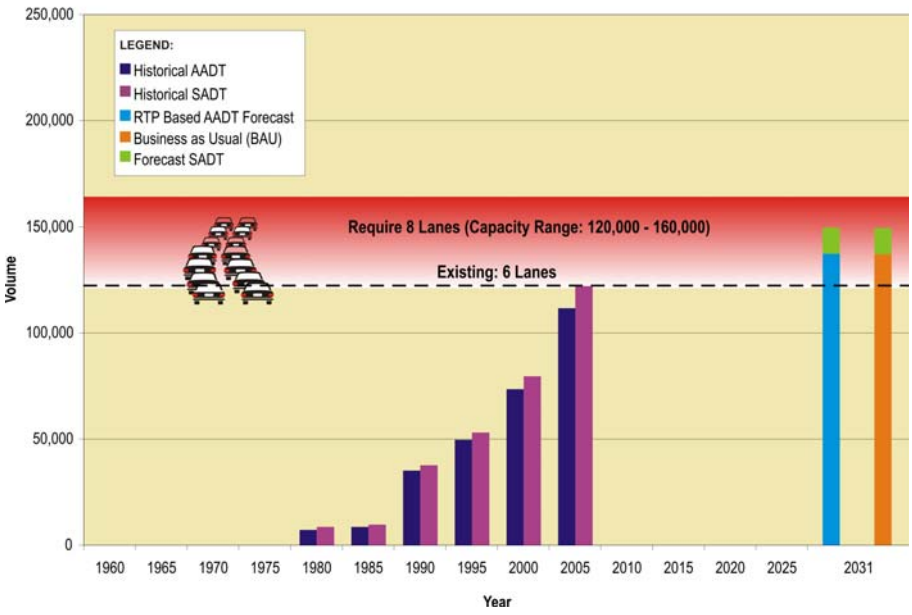
Exhibit 3-13: Historical and Forecast Travel Volumes at Highway 400 North of Major



Highway 410 Corridor

Analysis of traffic volume at Highway 410 was undertaken south of Bovaird Drive. Highway 410 is a 6 lane freeway system at this location. Historical AADT indicate that the traffic volume at the highway corridor is growing by approximately 2% per annum due to substantial population and employment growth within the Peel Region. The summer daily traffic volume is generally 11% higher than the AADT. Exhibit 3-14 provides an illustration of historical and forecast daily traffic volumes at Highway 410 south of Bovaird Drive. Currently traffic demand along Highway 410 south of Bovaird Drive is approaching capacity. During the summer travel period the highway corridor currently operates at capacity. The existing daily traffic volume is expected to increase by upwards of 14% by 2031. As shown in Exhibit 3-14, the existing lane capacity will not be sufficient to accommodate the future traffic growth and will need to be widened to 8 lanes.

Exhibit 3-14: Historical and Forecast Travel Volumes at Highway 410 south of Bovaird Drive



3.3 Select Link Analysis

Auto assignments can be modelled to identify the travel characteristics on a selected facility at a specific location.

The 2031 p.m. peak period westbound auto flows for Highway 401 west of Milton are summarized in Table 3-8. The select link analysis data indicates that approximately 25% of the auto flows are destined for Guelph, 28% for the Region of Waterloo, and 24% for external GGH areas. The flow distributions for this highway segment are illustrated in Exhibit 3-15.

Table 3-8: 2031 p.m. Peak Period Highway 401 Westbound Auto trips West of Milton

From	Trips	%	To	Trips	%
York Region	1,142	8%	Rest of Halton	477	3%
Toronto	4,137	29%	Guelph	3,597	25%
Brampton	1,350	9%	Region of Waterloo	4,030	28%
Mississauga	3,686	26%	Brant	877	6%
Milton	2,406	17%	Hamilton/Haldimand/Niagara	1,002	7%
Others	1,637	11%	External to GGH	3,414	24%
Total	**14,358**		Others	963	7%
			Total	**14,358**	

Exhibit 3-15: Future Highway 401 Westbound Auto Flows West of Milton

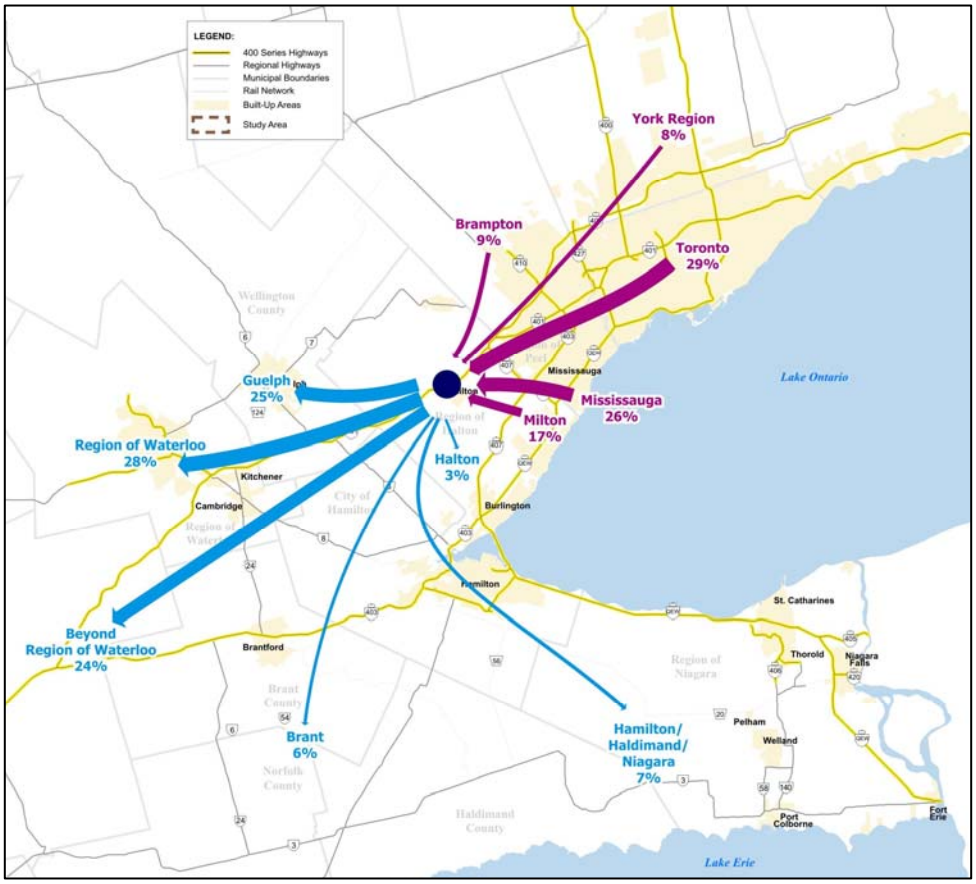
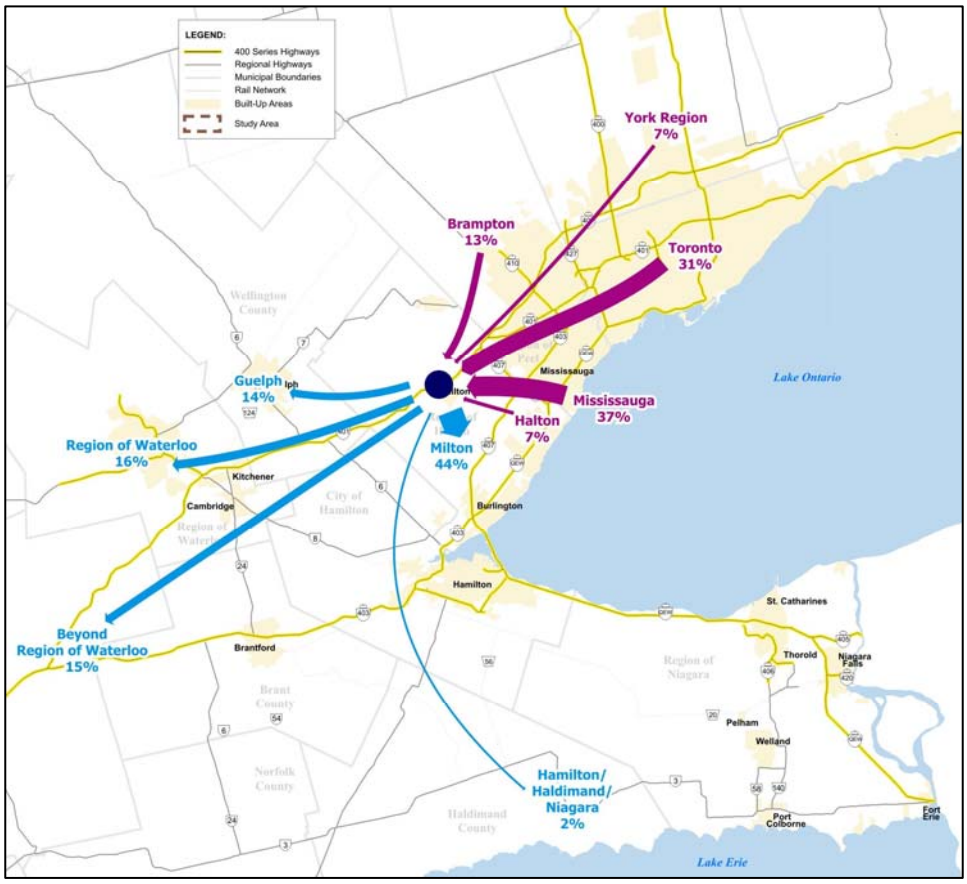


Table 3-9 summarizes the 2031 p.m. peak period westbound auto flows for Highway 401 east of Milton. At this location, approximately 44% of the auto trips are destined for Milton, 14% for Guelph, and 16% for the Region of Waterloo. These distributions are illustrated in Exhibit 3-16.

Table 3-9: 2031 p.m. Peak Period Highway 401 Westbound Auto trips East of Milton

From	Trips	%	To	Trips	%
York Region	1,471	7%	Milton	9,620	44%
Toronto	6,707	31%	Guelph	3,102	14%
Brampton	2,735	13%	Region of Waterloo	3,422	16%
Mississauga	8,050	37%	Hamilton/Haldimand/Niagara	379	2%
Rest of Halton	1,571	7%	External to GGH	3,271	15%
Others	1,310	5%	Others	2,050	9%
Total	**21,843**		**Total**	**21,843**	

Exhibit 3-16: Future Highway 401 Westbound Auto Flows East of Milton



3.4 Future Transit Mode Split Ranges

Transit initiatives anticipated for the future will result in higher transit use within the GTA West Corridor. The following GTA West initiatives were included in the transit forecasts (from Metrolinx RTP 25-year plan [Exhibit 2-8] and GO Transit 2020[Exhibit 2-9]):

- GO Rail expansion to Guelph/Kitchener
- GO Rail expansion to Bolton
- GO Rail frequent all day service to Brampton
- GO Transit all day service to Milton
- Brampton Acceleride
- Main Street/Hurontario Street Rapid transit
- GO Bus to Kitchener-Waterloo

It is anticipated that the future transit travel times between many urban growth centres will decrease with the implementation of the Metrolinx 25-Year Plan (Exhibit 2-8). The GGH Model provides an estimate of the 2031 p.m. peak period total person trips and the resulting transit mode shares as summarized in Table 3-10 for municipalities within the GTA West corridor. Experience in Ontario suggests that the inter-regional transit mode shares between communities at the fringe of the urban areas will range between 5% and 15% of the total person trips.

Table 3-10: Future Transit Mode Splits

Origin / Destination	2031 P.M. Peak Period Total Person Trips				Modelled 2031 Transit Mode Shares			
	Guelph	Milton	Brampton	Vaughan	Guelph	Milton	Brampton	Vaughan
Guelph	84,800	1,490	920	200	6%	0%	7%	2%
Milton	1,270	43,480	4,080	260	0%	10%	2%	4%
Brampton	1,070	6,270	210,080	11,430	7%	3%	11%	12%
Vaughan	130	420	17,040	90,770	4%	7%	12%	9%
Toronto (Downtown)	520	2,440	16,090	12,480	50%	78%	91%	78%
Toronto (Other)	1,770	5,630	47,920	64,590	7%	9%	34%	19%
Kitchener-Waterloo	4,600	1,010	590	30	2%	1%	13%	5%
Cambridge	3,390	1,290	290	10	0%	0%	0%	1%
Mississauga	1,700	13,510	103,990	8,100	3%	5%	15%	16%
Markham	100	130	1,720	27,520	3%	14%	25%	8%
Oakville	570	16,310	3,300	730	1%	1%	12%	23%

4. STRATEGIC MODEL ANALYSIS

4.1 Overview

To complement the GGH Model approach, a strategic demand model (SDM) analysis approach was developed to address freight trips (rail, marine, air) and tourist / recreation trips (auto, rail, marine, air) not included in the GGH Model forecasts. The strategic demand model builds on available data sources, historical data, trend forecasting and factors that influence transportation demand to identify possible trends and anticipated 2031 travel demands in assessing the associated transportation problems.

The available data sources used as part of the SDM include Transportation Tomorrow Survey, Census data, Statistics Canada data, MTO Commercial Vehicle Surveys, municipal goods movement studies, and economic and tourism analysis. These data sources provide the basis of reviewing past trends and developing forecast estimates by each market segment. Similarly, the factors that influence transportation demand provide the basis to assess impacts of future travel demand associated with each market segment.

The following discussion provides an overview and discussion of the background data reviewed and analyzed as part of the strategic demand analysis.

4.2 Factors Influencing Transportation Demand

A number of elements have a bearing on the scope and nature of the transportation problems and opportunities that must be addressed within the GTAW corridor. Transportation supply and demand characteristics are key elements in this regard. Supply characteristics include the capacity of existing and planned transportation system infrastructure for all modes of travel – road, rail, marine and air, related to the movement of both people and goods. Supply characteristics are presented in the draft ***Overview of Transportation and Socio-Economic Conditions Report (July 2008).*** Demand characteristics include the potential future growth in person trips and goods movements and the alternative modes of travel used.

The three key factors that influence the transportation demand are Policy, Economy and Trade, and Tourism and Recreation. Each of these factors is discussed in the following sections.

4.2.1 Policy

Government policy documents provide direction on land use location and growth levels, infrastructure planning, trade, tourism and environmental protection. These polices have strong potential to influence future transportation demand in the GTA West Preliminary Study Area by shaping population and employment growth, stimulating economic and tourism growth and establishing a vision for the transportation system. The following policy documents provide the motivation for changing travel patterns, modes and volumes in the Preliminary Study Area.

Provincial Policy Statement, 2005

The Provincial Policy Statement, 2005 (PPS) recognizes the complex inter-relationships among economic, environmental and social factors in planning and embodies good planning principles. It includes policies on key issues that affect our communities, such

as: the efficient use and management of land and infrastructure; protection of the environment and resources; and ensuring appropriate opportunities for employment and residential development, including support for a mix of uses.

PPS policies influence transportation demand primarily through municipal planning policy as the Planning Act, R.S.O. 1990 requires that official plans have regard for matters of provincial interest and are consistent with the PPS. Specifically, municipalities shall include policies that integrate transportation and land use considerations at all stages of the planning process and provide the necessary infrastructure to support current and projected needs in a coordinated, efficient and cost-effective manner.

Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe (GGH), 2006 (Growth Plan) outlines a set of policies for managing growth and development as well as guiding planning decisions in the GGH over the next 25 years (to 2031). This broad based plan represents a planning "vision" for the Provincial Government. As a part of this vision, the plan outlines a strategy for "Where and How to Grow", "Infrastructure to Support Growth", "Protecting What is Valuable" and "Implementation".

Similar to the PPS, Growth Plan policies influence transportation demand primarily through municipal planning policy, as the Planning Act requires that official plans have regard for matters of provincial interest. Specifically, municipal official plans must conform to the Growth Plan's population and employment intensification and density targets and growth forecasts by June 2009. Key among these policies are the growth forecasts included in the plan, which set population and employment targets for each upper-tier municipality in the GGH, through 2031. A summary of the population and employment forecasts, based on available Regional Municipality information (circa 2007), are presented in Table 4-1 and Table 4-2 respectively.

Table 4-1: GTA West Population Forecasts

Preliminary Study Area Municipality	2006 Population	2031 Population	Population Increase	% Increase
City of Vaughan	243,000	431,000	188,000	77%
City of Brampton	424,000	740,000	316,000	75%
Town of Caledon	57,000	117,000	60,000	105%
Town of Halton Hills	55,000	98,000	43,000	78%
Town of Milton	54,000	204,000	150,000	278%
County of Wellington	85,000	134,000	45,000	53%
City of Guelph	115,000	187,000	72,000	63%
Total	**1,033,000**	**1,907,000**	**874,000**	**85%**

Table 4-2: GTA West Employment Forecasts

Preliminary Study Area Municipality	2006 Employment	2031 Employment	Employment Increase	% Increase
City of Vaughan	156,000	260,000	104,000	67%
City of Brampton	177,000	317,000	140,000	79%
Town of Caledon	24,000	48,000	24,000	100%
Town of Halton Hills	21,000	34,000	13,000	62%
Town of Milton	34,000	150,000	116,000	341%
County of Wellington	34,000	49,000	15,000	44%
City of Guelph	74,000	109,000	35,000	47%
Total	**520,000**	**967,000**	**447,000**	**86%**

These targets reflect a level of growth in population and employment in the Preliminary Study Area that will add significant travel demands to an already congested transportation network. Such increases in population and employment will result in growth in person trips for work, school, shopping and recreation as well as goods movement trips related to manufacturing, trade, distribution services, retail etc.

In the GTA West Preliminary Study Area, the following Urban Growth Centres are designated in the Plan – Downtown Guelph, Downtown Milton, Downtown Brampton and Vaughan Corporate Centre. These centres are intended to be the locations of substantial growth and will act as "nodes" within the GTA West Preliminary Study Area. The Growth Plan also establishes "designated Greenfield areas", which are intended for expansion of settlement areas, subject to all the other policies of the plan. Efficient transportation links between these Urban Growth Centres are envisaged to be fundamental to the success of this Growth Plan.

The growth related policies affect the location and density of development, the availability of land, the mixture of uses and timing of development. The Growth Plan's focus on intensification in built up areas, Urban Growth Centres, major transit corridors and stations, brownfields (*i.e. undeveloped or previously developed properties that may be contaminated. They are usually, but not exclusively, former industrial or commercial properties that may be underutilized, derelict or vacant*) and greyfields (*i.e. previously developed properties that are not contaminated. They are usually, but not exclusively, former commercial properties that may be underutilized, derelict or vacant*) recognizes the need to evolve or reduce our reliance on the automobile as the primary travel mode for commuting and other trips. It promotes transit infrastructure investment needed to support sustainable growth. This is consistent with the vision of the Metrolinx RTP (The Big Move).

Consistent with the anticipated growth and policies for managing this growth, one can expect significant additional demands and therefore significant challenges on the transportation network through the GTA West Preliminary Study Area. These challenges will heavily influence goods movement, commuter, tourist and recreational travel.

Greenbelt Plan

The Greenbelt Plan (2005) includes plans and policies to: protect against loss and fragmentation of agricultural lands; provide permanent protection to natural heritage and water resource systems; and to provide for a range of economic and social activities associated with rural communities. The goals of the Infrastructure and Natural Resources policies of the Plan are to support infrastructure that is consistent with the aim of the Greenbelt Plan and Growth Plan, while seeking to minimize the impact on the environment.

Similar to the PPS and Growth Plan, the Greenbelt Plan policies influence transportation demand primarily through municipal planning policy as the Planning Act requires that official plans have regard for matters of provincial interest. The Greenbelt Plan includes strict policies that address how new transportation infrastructure can be integrated in specific areas and mandates the needs and justification that the provincial and municipal government must provide in proposing improvements to or new facilities through the Greenbelt planning area.

The Greenbelt Plan influences where development and to some degree where infrastructure serving development can occur. This will influence trip making – how and where trips are made between communities and Urban Growth Centres

Building a National Tourism Strategy - A Framework for Federal / Provincial / Territorial Collaboration and the Ontario Tourism Strategy

The National Tourism Strategy and the Ontario Tourism Strategy relate specifically to the factors influencing the tourism industry. The objective of the National Tourism Strategy is to position Canada as an accessible destination for tourists by ensuring efficient, affordable and secure travel. The Ontario Tourism Strategy recognizes the vital role that tourism plays in the continuing economic success and development of Ontario focusing on areas that have the potential to become international travel destinations such as Toronto and Niagara. The documents focus on ensuring secure, efficient and integrated international gateways and border crossings and increasing capacity and integration of all modes of travel including international gateway airports, rail, marine and road to meet the anticipated growth in tourism.

Specifically, the tourism strategies have the potential to influence transportation demand in the GTA West Preliminary Study Area by:

- Promoting Toronto and surrounding area as a world class tourist destination;
- Emphasizing the importance of providing an efficient and secure transportation system and travel choice options to facilitate tourist travel; and
- Recognizing the importance of providing infrastructure as an enabler to building a strong and sustainable tourism industry.

Municipal Policies

In addition to provincial and federal policies, local area policy documents exist, or are currently being developed, that are being considered in the context of the GTA West Preliminary Study Area. At the municipal level, official plans provide the context and boundaries within which a municipality operates with regard to land use, development

and growth and helps to ensure that future planning and development will meet the specific needs of the community. The Planning Act requires that an official plan conform to, or does not conflict with provincial plans, has regard for matters of provincial interest, and is consistent with the PPS.

Municipal policies have the potential to influence transportation demand in the GTA West Preliminary Study Area by shaping the patterns of demand and in turn impacting the modes of travel that will accommodate that demand. Transportation demand is influenced by the following factors:

- **Land use patterns** - directing growth to specific locations in a municipality (e.g. while the magnitude of travel demand is dependent on the various types of land uses, the distribution of travel in a region is affected by the location and density of the corresponding land use);
- **Service requirements and location** – policies outlining what services such as roads, watermains, sewers, parks and schools will be needed and where they are to be located impacts the timing, location and type of transportation infrastructure required;
- **Where and in what order development will occur** – dictates timing of transportation development;
- **Development related policies** - in-fill housing, mixed-use development, brownfield redevelopment strategies influence where new residential, industrial and commercial developments locate;
- **Economic development policies** – attract investment into a community in terms of new employment opportunities and are a catalyst for development of special nodes (i.e. industrial parks, energy parks);
- **Transportation Master Plans** - integrate land use and transportation growth management policies to identify long-term infrastructure needs to meet future transportation demands and provide a context and framework for future transportation decisions;
- **Transit Strategies** - developing neighbourhood communities to mix commercial, residential, services, amenities, reducing the need to drive (transit oriented development). Effective transit depends upon density and the number of people that can be served within a close proximity of a transit route; and
- **Coordination of planning policies between regions** - willingness of municipalities to create planning policy that transcends to a more regional view, not only expanding to other areas but facilitating transportation planning between regions.

Niagara Escarpment Plan

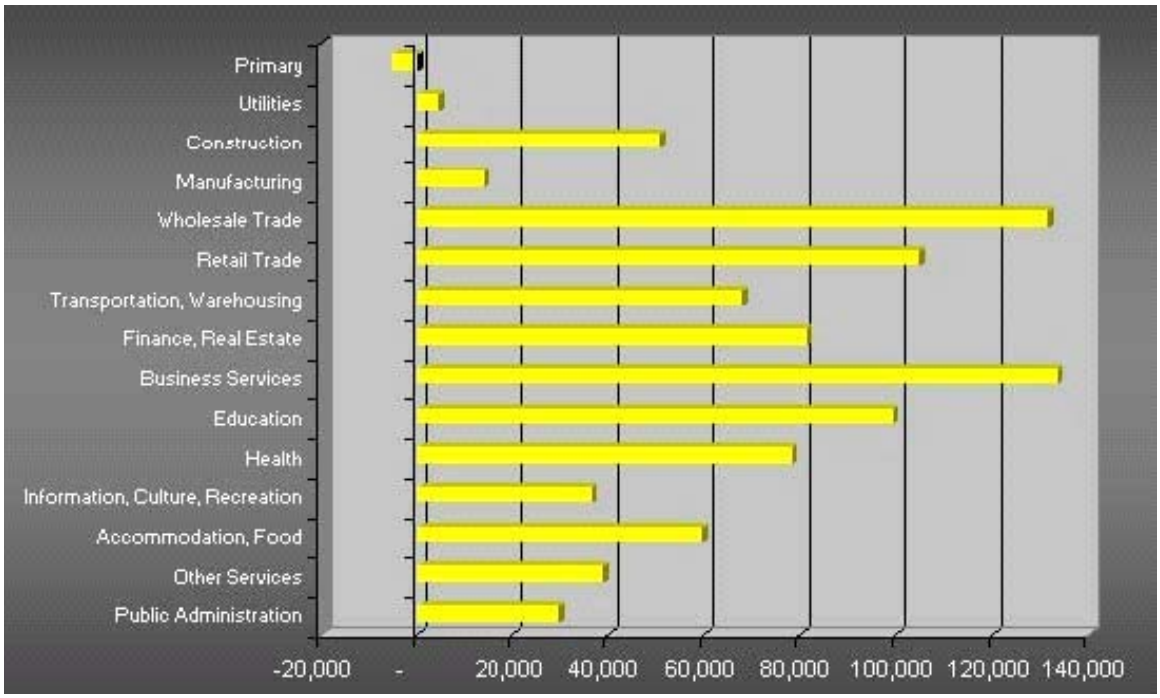
The Niagara Escarpment Plan (NEP) controls development within the NEP area through limitations on new lot creation and limitations on permitted uses. Its intent is to balance development, preservation, and public use. The NEP establishes land use designations, policies and criteria for the protection of the lands within its policy area. Official plans are required to conform to the NEP. The objective of the NEP is to design and locate

new and expanded transportation and utility facilities so the least possible change occurs in the environment and the natural and cultural landscape. The NEP policies will impact where and how new transportation facilities are built to meet the increase in transportation demand in the GTA West Preliminary Study Area. Similar to the Greenbelt Plan, the NEP influences where development and to some degree infrastructure to serve development can occur. This will influence trip making – how and where trips are made between communities and between Urban Growth Centres.

4.2.2 Economy and Trade

The economy of the Greater Golden Horseshoe is being reshaped by a number of demographic and economic factors. The GTA West Preliminary Study Area has been characterized by significant employment in the following sectors: wholesale/trade; retail trade; business service and transportation/warehouse sectors. Over the past several decades, employment growth in Ontario has been driven by the service sector, with wholesale trade as the second largest industry. Employment forecasts by employment sector to 2031 indicate significant growth in Wholesale Trade, Retail Trade, Education and Health sectors over the longer term as shown in Exhibit 4-1

Exhibit 4-1: Study Area Employment Sector New Job Growth: 2001-2031



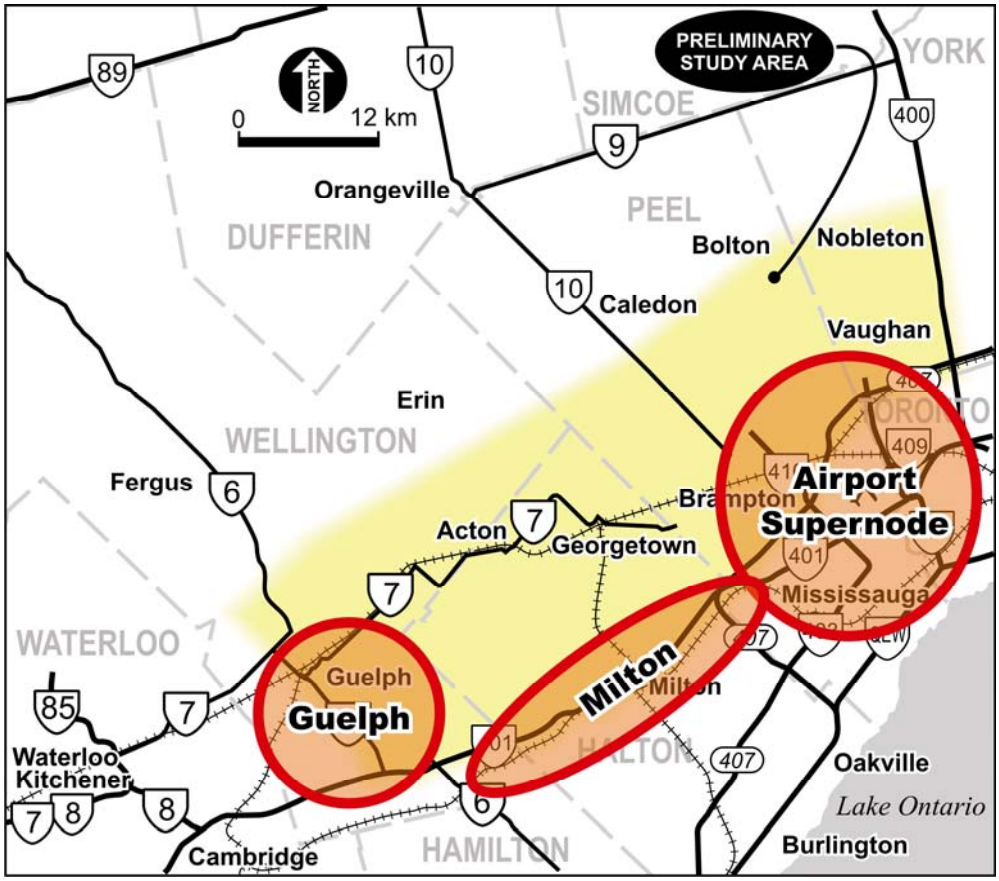
Source: Centre for Spatial Economics

The growth in employment in business services, education, health and retail suggests increased mobility in both automobile and transit use. Growth in the wholesale trade sector suggests increased freight movements will need to be accommodated by road, rail marine and air.

The major economic focus areas influencing transportation demand within the Preliminary Study Area as shown on Exhibit 4-2 include the Toronto Pearson

International Airport (wholesale trade, transportation/warehouse, business services), Milton (emerging distribution cluster) and Guelph (auto parts, food processing and transportation/warehouse). Employment sector changes in these economic focus areas change both commuting and goods movement travel characteristics.

Exhibit 4-2: Economic Focus Area



In addition to changing employment sectors within the GTAW Preliminary Study Area there are several factors that influence the Trade and the Economy within Canada, Ontario and the Greater Golden Horseshoe Area. The following provides an overview of several key factors:

Existing Trade - Ontario's economy has become heavily export-based, making the Ontario economy particularly sensitive to external factors such as the valuation of the dollar, the strength of other economies, especially the U.S., and the effects of rising fuel prices on costs of goods movement. General statistics based on the Ontario Exports fact sheet for the year 2008 indicate that:

- 82% of Ontario's exports were to the U.S.
- 61% of Ontario's imports were from the U.S.
- The trucking industry moves approximately 66% of the total imports and exports, followed by rail (15%), air (12%) and marine (7%).

A summary of the main commodities exported from Ontario to the U.S by value in 2008 are presented in Exhibit 4-3 and main commodities imported from the U.S. to Ontario by value in 2008 are presented in Exhibit 4-4.

Exhibit 4-3: Main Commodities Exported from Ontario to U.S. by Value

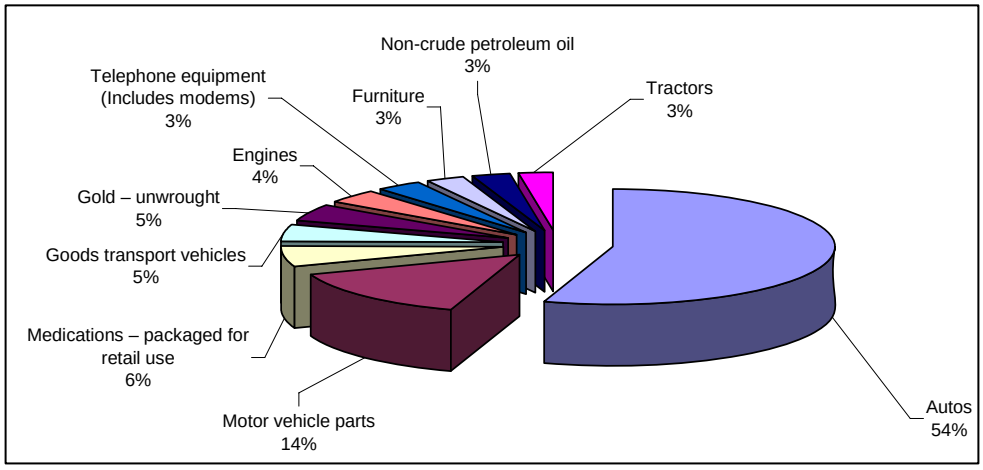
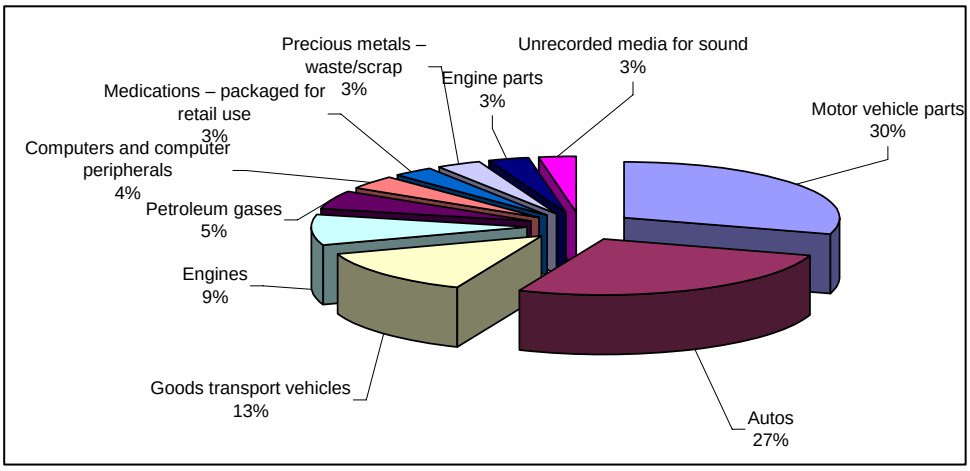


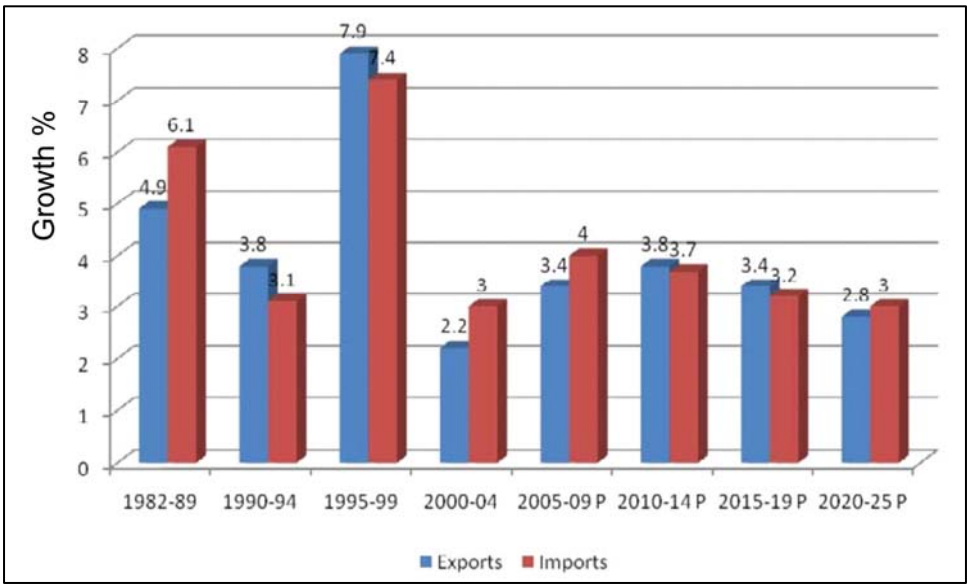
Exhibit 4-4: Main Commodities Imported from U.S. to Ontario by Value



Source: Statistics Canada International Trade Division, March 2009

Future Trade – Notwithstanding the current recession, continued strong trade activity between Ontario and the U.S. is forecast to continue as indicated on Exhibit 4-5 based on information from the Ontario Government data sources. To meet these future trade forecasts, an efficient transportation system to open markets, development of supply chains, delivery of goods and support for economic services is required. Given the expected growth in the trade and economy throughout the GTAW Preliminary Study Area, there will be increased reliance on an efficient transportation system in the coming years.

Exhibit 4-5: Main Commodities Imported from U.S. to Ontario by Value



Source: 2005/2006 Ontario Government

4.2.3 Tourism and Recreation

Tourism and recreation travel represent a major component of weekend and summer travel within Ontario. General statistics related to tourism and recreation by category are summarized below based on information assembled by PKF Consulting:

- **Domestic Tourist Travel**
  - Travel within Ontario accounted for 9.8 million of the total 17.3 million visits to Ontario in 2005.
  - Intra-provincial and interprovincial visitation is forecast to continue to increase over the next 15 years, especially in the overnight segment due to increased transportation system congestion.
- **United States Visitation**
  - Ontario has experienced increased outbound travel to the U.S. by Ontario residents; however, the inbound U.S. visits are forecast to decline due to economic and travel restrictions such as the Western Hemisphere Travel Initiative.
- **Overseas Visitation**
  - The overseas visitation to Ontario is expected to grow at an average rate of 1.7% per annum. This visitation growth reflects increased visitation from non-traditional travel markets such as China, Japan, Mexico and Latin America.

4.3 Forecast Transportation Demand

The following sections provide an overview of the existing and future conditions by travel mode for the Goods Movement and Tourism and Recreation. This information supplements the GGH Model forecasts discussed in Section 2.

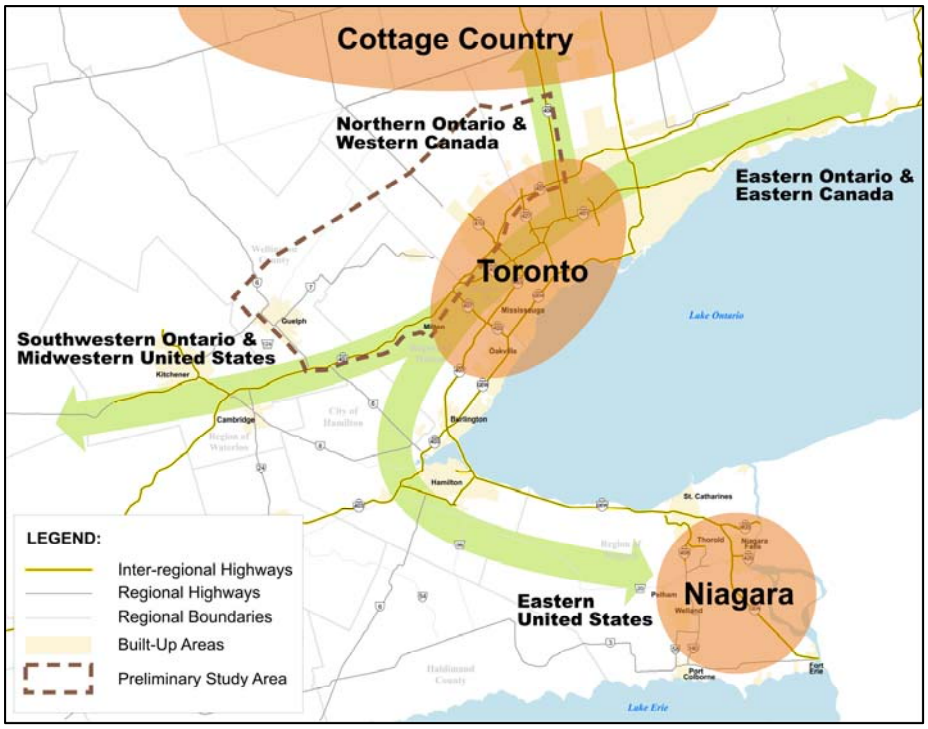
In the discussion regarding Goods Movement, it is important to note that the mode choice for shipping goods is at the discretion of the shipper in order to maximize the shipping efficiency and costs. A summary of shipping mode choice by type of good shipped and reasons for selecting specific modes to ship goods is presented in Exhibit 4-6.

Exhibit 4-6: Goods Movement by Mode

Mode	Type of Goods Typically Shipped	Why are certain products shipped by each mode?
Truck	• Consumer Goods-household products	• <500km for journey length • Increasing reliance on "just in time" delivery • Multiple destinations of goods and without alternative linkages to the transportation system • Relatively smaller quantities of goods shipped at one time
Rail	• Bulk Goods/Containers - forest products, chemicals, automotive, ore/minerals	• >500km for journey length • Rail system connected efficiently to origin of bulk goods • Higher relative weight of products • Large quantities of goods shipped at one time
Marine	• Bulk Goods/Containers -grain, iron ore coal, general cargo/consumer goods	• >500km for journey length • Efficient and cost effective mode for transport of goods overseas when compared to air • Large quantities of goods shipped at one time
Air	• Machinery/Manufactured Goods - perishable foods, medical supplies/equipment	• >500km for journey length • High value products • High degree of time sensitivity • Lower relative weight and quantity of goods shipped

In the discussion of Tourism and Recreation Travel it is important to understand the tourism and recreational travel market. Exhibit 4-7 provides an overview of the major Tourism and Recreational visitor destinations in Ontario.

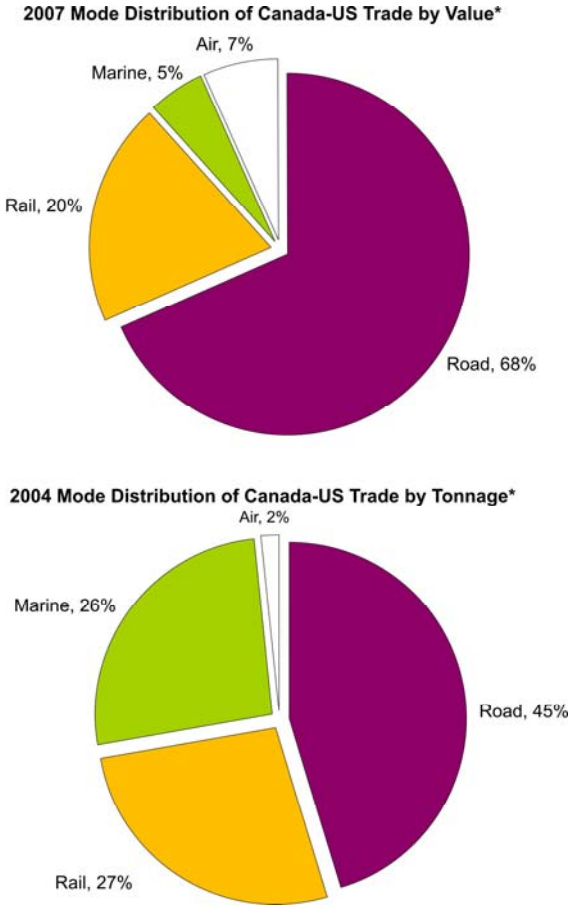
Exhibit 4-7: Visitor Destinations in Ontario



4.3.1 Goods Movement – Commercial Vehicle Transportation

Goods movement is heavily reliant on the road network and the use of commercial vehicles for either destined trips (trucking) or intermodal trips (rail/marine/air to truck). The dominance to the commercial vehicles in transporting goods is presented in Exhibit 4-8, which indicates that for Canada to U.S. trade the road mode carries 68% by value and 45% by tonnage. The rail mode represents 20% by value and 27% by tonnage followed by the marine mode that transports 5% by value and 26% by tonnage. The air mode transports the least amount of goods in that air accounts for 7% by value and 2% by tonnage.

Exhibit 4-8: Existing Goods Movement by Mode



The number of daily commercial vehicles travelling on the inter-regional transportation system, based on MTO 2006 traffic count database, is presented in Exhibit 4-9. It is noted that goods movement through the GTAW Preliminary Study Area primarily uses Highway 401, Highway 427, Highway 410 and Highway 400. Currently all the 400 series highways experience major congestion during the peak travel periods within the study area that impact the efficiency of commercial vehicle travel. It is important to note that within the GTAW Preliminary Study Area, commercial vehicles represent a significant proportion of total existing traffic as summarized in Table 4-3.

Exhibit 4-9: 2006 Commercial Vehicle Volume Flows

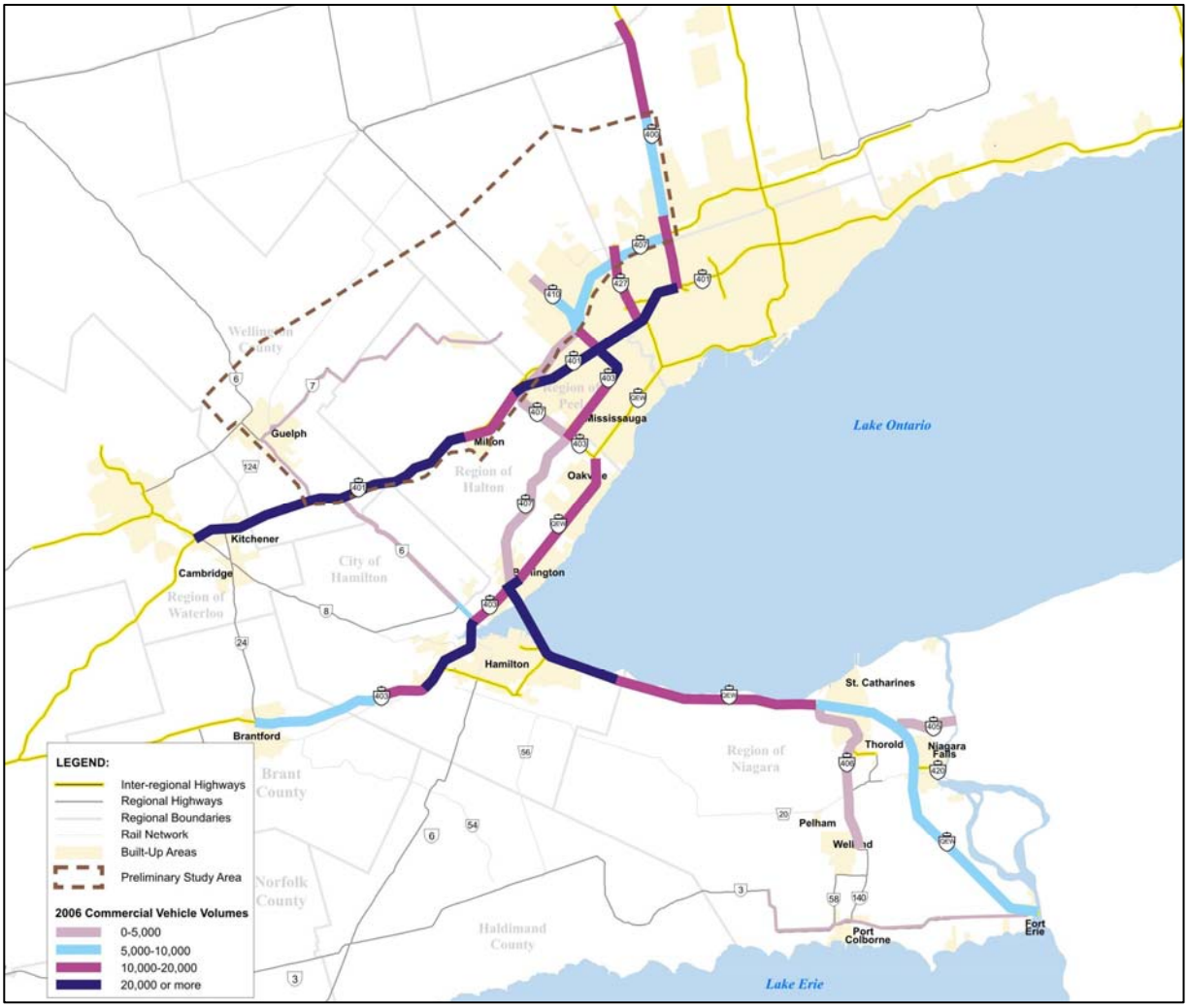
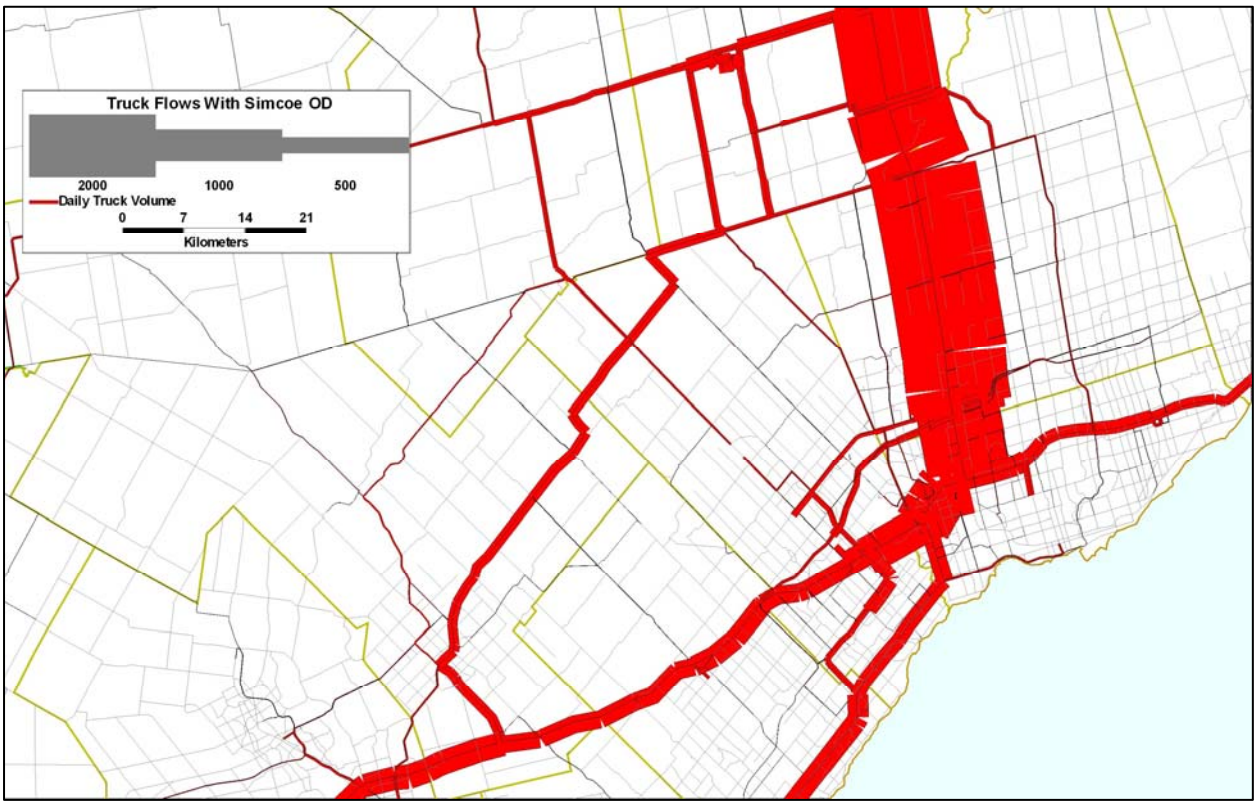


Table 4-3: Percentage of Commercial Vehicles by Inter-Regional Facility (2006 Conditions)

Freeway Section	% Commercial Vehicles	Freeway Section	% Commercial Vehicles
Highway 401		**Highway 403**	
- West of RR 25	19%	- West of Hurontario St.	10%
- West of Highway 401	18%	- West of Winston Churchill	15%
- West of Highway 410	14%	- West of Highway 6	20%
- West of Highway 427	9%	**QEW**	
- West of Highway 400	10%	- West of Highway 403	15%
Highway 410		- West of RR 25 (Bronte Rd.)	15%
- North of Highway 401	10%	- Skyway Bridge	16%
- North of Steeles Ave.	9%	- West of Casablanca Blvd	14%
- North of Queen St.	4%	- West of Highway 406	13%
Highway 427		- Garden City Skyway	12%
- North of Highway 401	9%	- North of Highway 420	10%
- North of Highway 407	9%	- South of Highway 420	17%

Although the majority of the commercial vehicle trips utilize the 400 series highways, the extensive road congestion within the GTAW Preliminary Study Area results in commercial vehicles shifting to regional and county roads. The extent of the commercial vehicle diversion that can occur is presented in Exhibit 4-10. This represents a "snapshot" of daily commercial vehicle trips to and from Simcoe County that includes the Honda Manufacturing plant and several auto parts manufacturers. The information presented in Exhibit 4-10, based on data from the MTO Commercial Vehicle survey, indicates that the congestion and unreliability of the Highway 400 / Highway 401 interchange complex results in longer distance truck travel using the secondary road network to travel from Simcoe / Highway 400 to Guelph / Highway 401. The secondary roads being used in this case include; Highway 89, Highway 9, Highway 50, RR 124 and Hanlon Expressway. The practise of commercial vehicles using the secondary road system to avoid severely congested areas is currently common place and will continue to increase as the traffic flows increase. This "cut-through" practise of large commercial vehicles using secondary roads instead of the provincial 400 series highways has significant community, social, noise and safety concerns

Exhibit 4-10: Daily Commercial Vehicle Trips to and from Simcoe County



Specific to the GTAW Preliminary Study Area, the MTO Commercial Vehicle Survey database for the Putnam Truck Inspection Station (Highway 401 – west of Highway 403), shown in Exhibit 4-11, indicates that 46% of the commercial vehicle trips are classified as intra-provincial (staying within Ontario) travelling approximately 255 km.

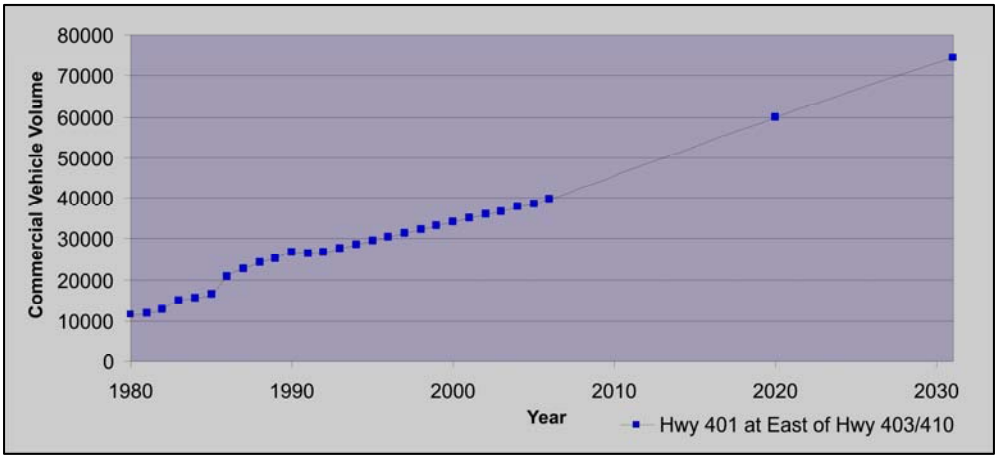
Exhibit 4-11: 2006 Commercial Vehicle Trip Distributions – Highway 401

Route Type	Percent of Trips	Annual Commodity Value (M$)	Mean Distance (km)
Intra-Ontario	46%	209	255
Interprovincial	2%	11	1095
International	52%	414	1150
All Trips	*100%*	*634*	*737*

A review of the commercial vehicle volumes on Highway 401 east of the Highway 403 / Highway 410 interchange indicates that commercial vehicles increased from approximately 12,000 daily vehicles in 1980 to approximately 40,000 vehicles by 2006, representing an increase of 233%. The historical commercial vehicle counts at this Highway 401 location have increased by an average per annum simple growth rate of 9%.

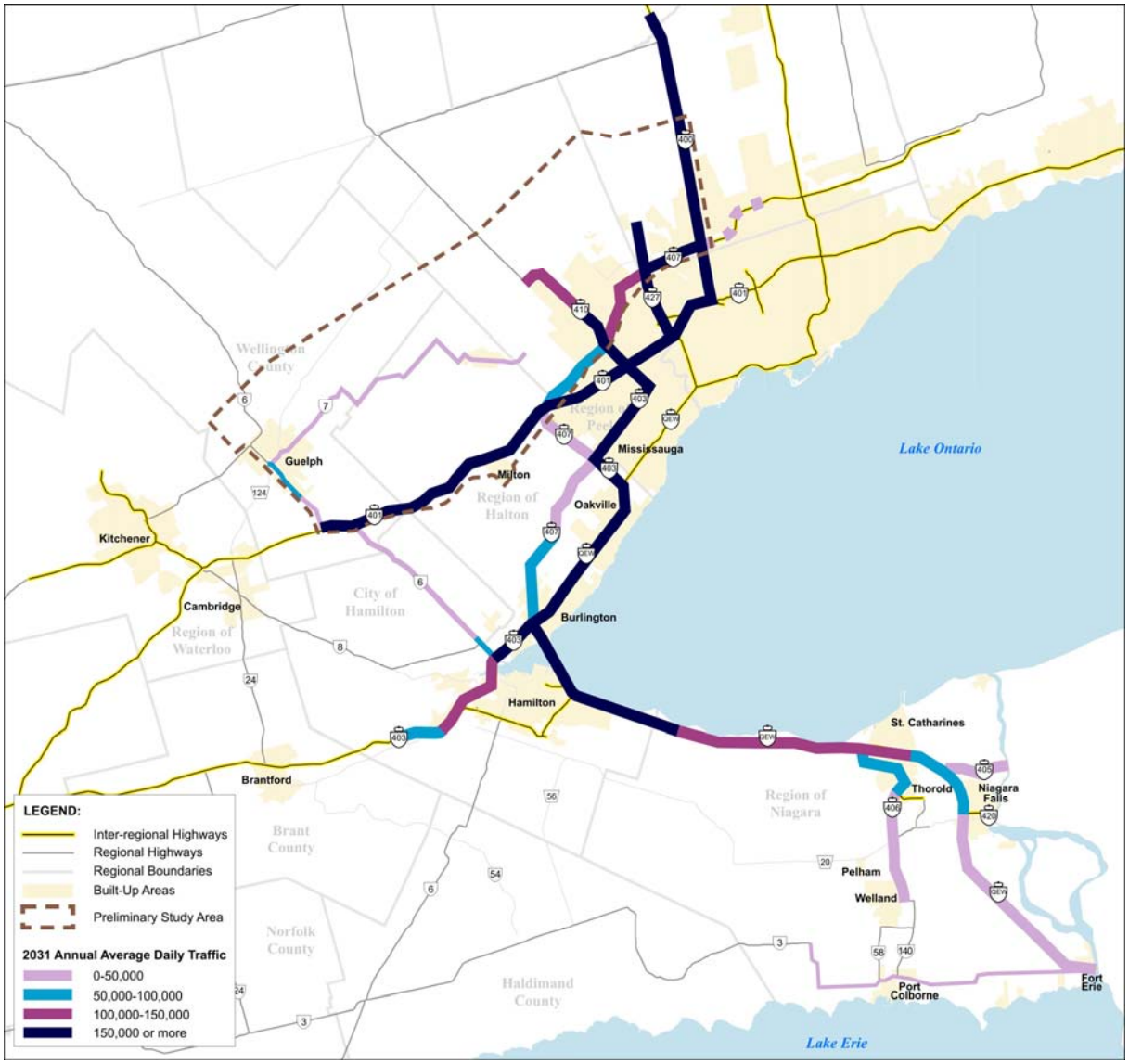
Recent transportation studies at the major border crossings at Peace Bridge and Ambassador Bridge indicate the commercial vehicle flows are forecast to increase by 3% compounded per annum between 2006 and 2020 and 2% compounded per annum growth between 2020 and 2031. The forecast growth of commercial vehicles presents an 88% increase in commercial vehicles on the provincial 400 series highways between 2006 and 2031 or a per annum simple growth rate of 3.5%. The proposed forecast growth in commercial vehicles is 60% less than what was experienced in the last 25 years. An example of historical and forecast commercial vehicle volumes on Highway 401 east of the Highway 403 / Highway 410 interchange is presented in Exhibit 4-12.

Exhibit 4-12: Historical and Forecast Commercial Vehicles on Highway 401



It is recognized that the auto manufacturing industry is one of the major drivers of the trucking industry and that the current reduced activity at the "Big 3" auto plants will impact trucking activities in the short term. However, with the population forecast to increase by over 3 million persons in the Greater Golden Horseshoe in the next 25 years along with the continued desire of Canada and Ontario to build upon a world class transportation system that will drive international trade and economic growth (Ontario-Quebec Continental Gateway and Trade Corridor MOU). These considerations support the forecast of commercial vehicle volumes increasing by approximately 90% over the next 25 years to be a reasonable estimate. A summary of the forecast 2031 daily commercial vehicle volumes on the inter-regional transportation system is presented in Exhibit 4-13.

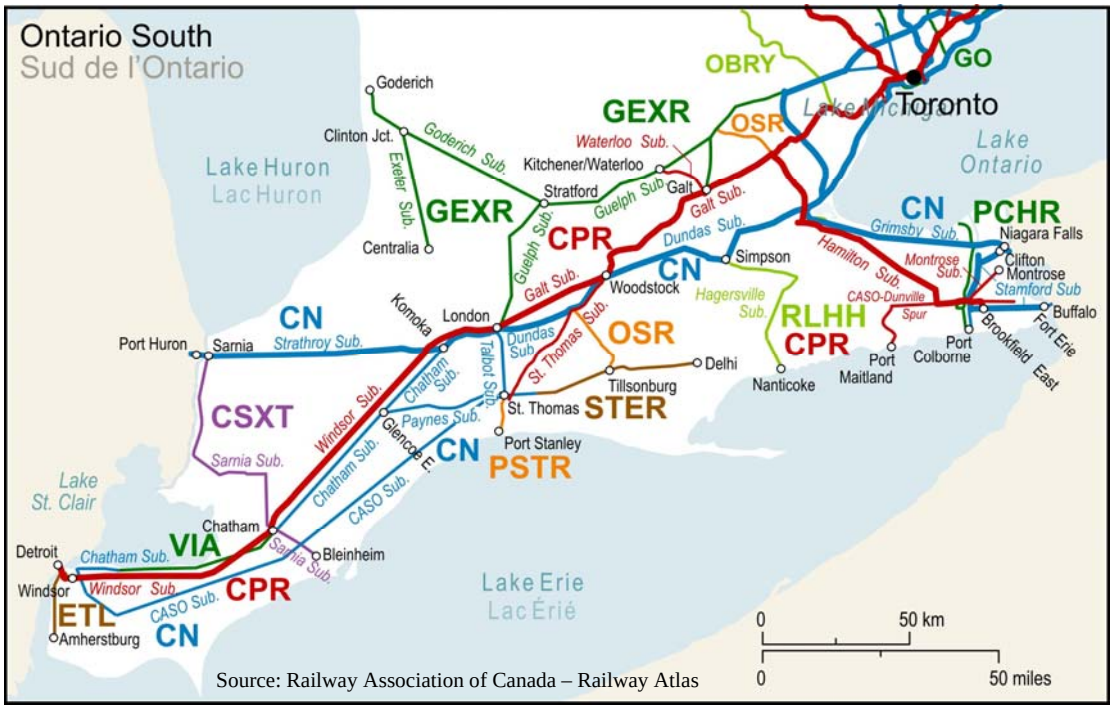
Exhibit 4-13: 2031 Commercial Vehicle Volumes – Inter-Regional Transportation



4.3.2 Goods Movement – Rail Transportation

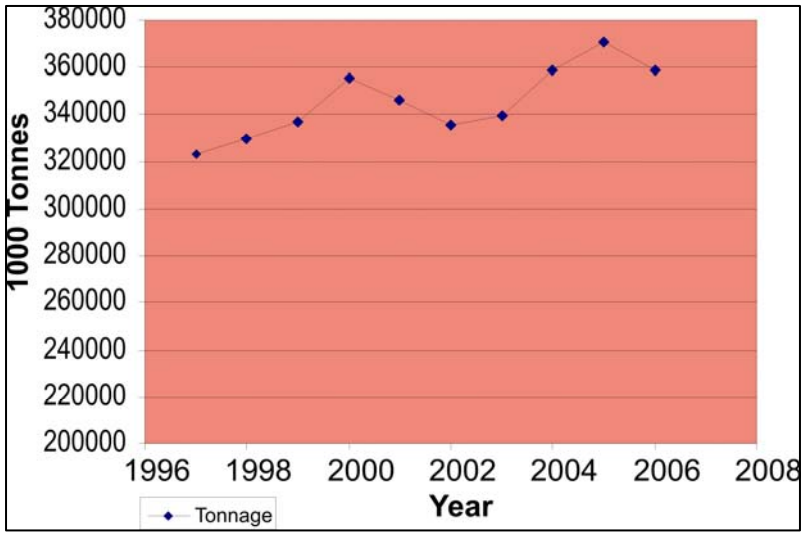
The rail system in Southwestern Ontario includes approximately 1,300 km of Class I (CN and CP mainlines) rail service and approximately 250 km of Class II (Short Haul) rail service. The main commodities transported by rail include forest products, chemicals, automotive, ore and minerals. Exhibit 4-14 provides an overview of the existing rail service in Southwestern Ontario.

Exhibit 4-14: Existing Rail Service in Southwestern Ontario



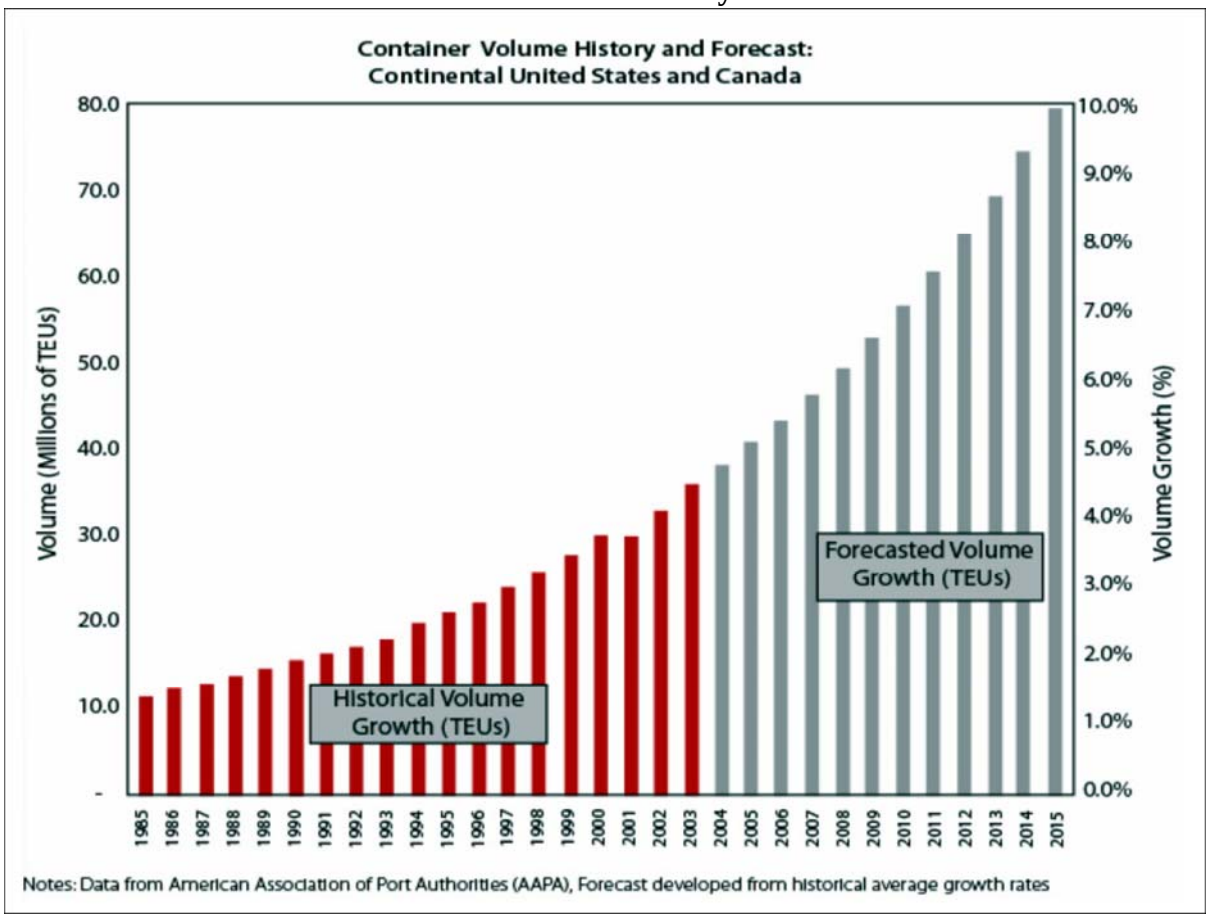
Rail intermodal traffic has experienced strong growth with an average annual growth rate of 4.9% between 1997 and 2006. A summary of the tonnage of goods moved by rail between 1997 and 2006 is presented on Exhibit 4-15.

Exhibit 4-15: Rail Tonnage Transported 1997 to 2006



The shift to a global economy has significantly increased the number of containers moved by rail since 1985 as shown in Exhibit 4-16. It is anticipated that the number of containers will drive the future rail growth, which is forecast to increase by 30% over the next 25 years.

Exhibit 4-16: Container Volume History and Forecasts



Source: Trends in Containerization and Capacity at Canadian Port, Economic Division, January 2006

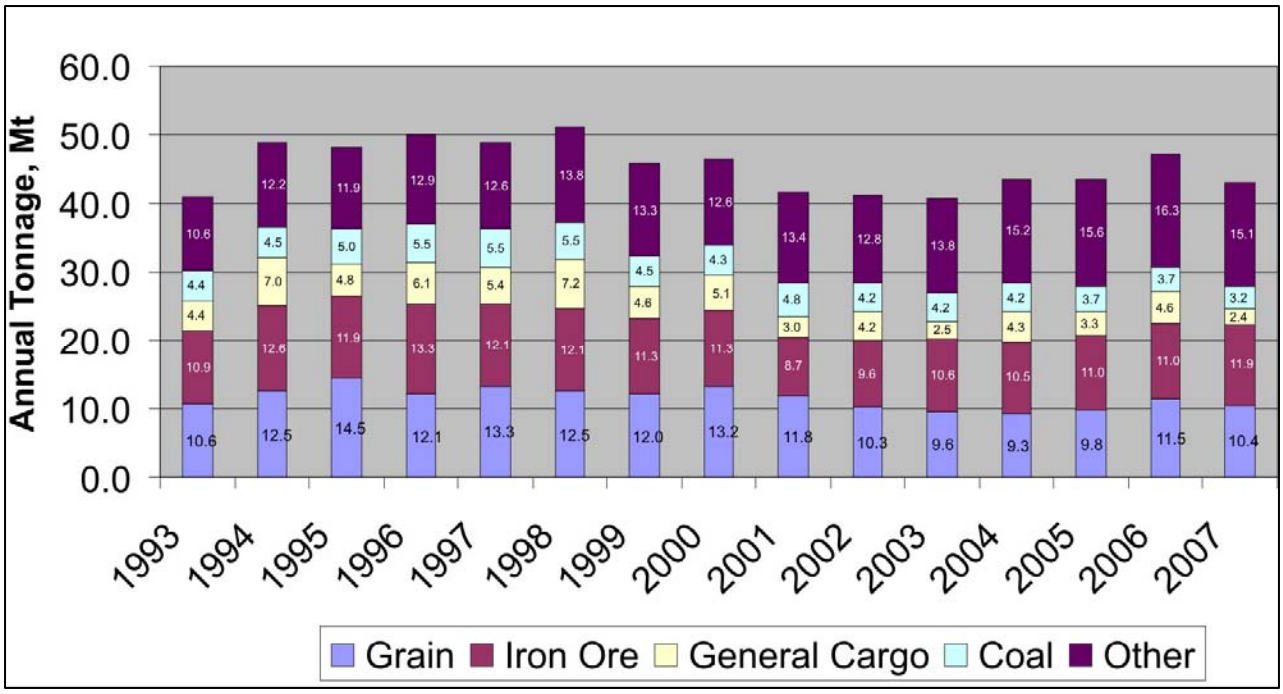
During discussions with the Class I rail companies, as part of the Transportation Service Providers consultation, the rail companies indicated that the existing rail system capacity could accommodate the forecast rail growth with rail capacity improvements at selected rail to rail interchanges within the Greater Golden Horseshoe area:

- Within the GTAW Preliminary Study Area are the key rail pinch point requiring upgrades is the Georgetown Junction.

4.3.3 Goods Movement – Marine Transportation

Existing marine service adjacent to both the GTAW and NGTA Preliminary Study Areas is located at Petro-Canada Oakville; Port of Hamilton; Port of Port Dalhousie; Welland Canal and Port of Port Colborne. The main commodities transported by marine service include grain; coal; iron ore and steel. A summary of the tonnage and types of commodities transported on the St. Lawrence Seaway is presented in Exhibit 4-17.

Exhibit 4-17: St. Lawrence Seaway Traffic by Commodity (1993-2007)



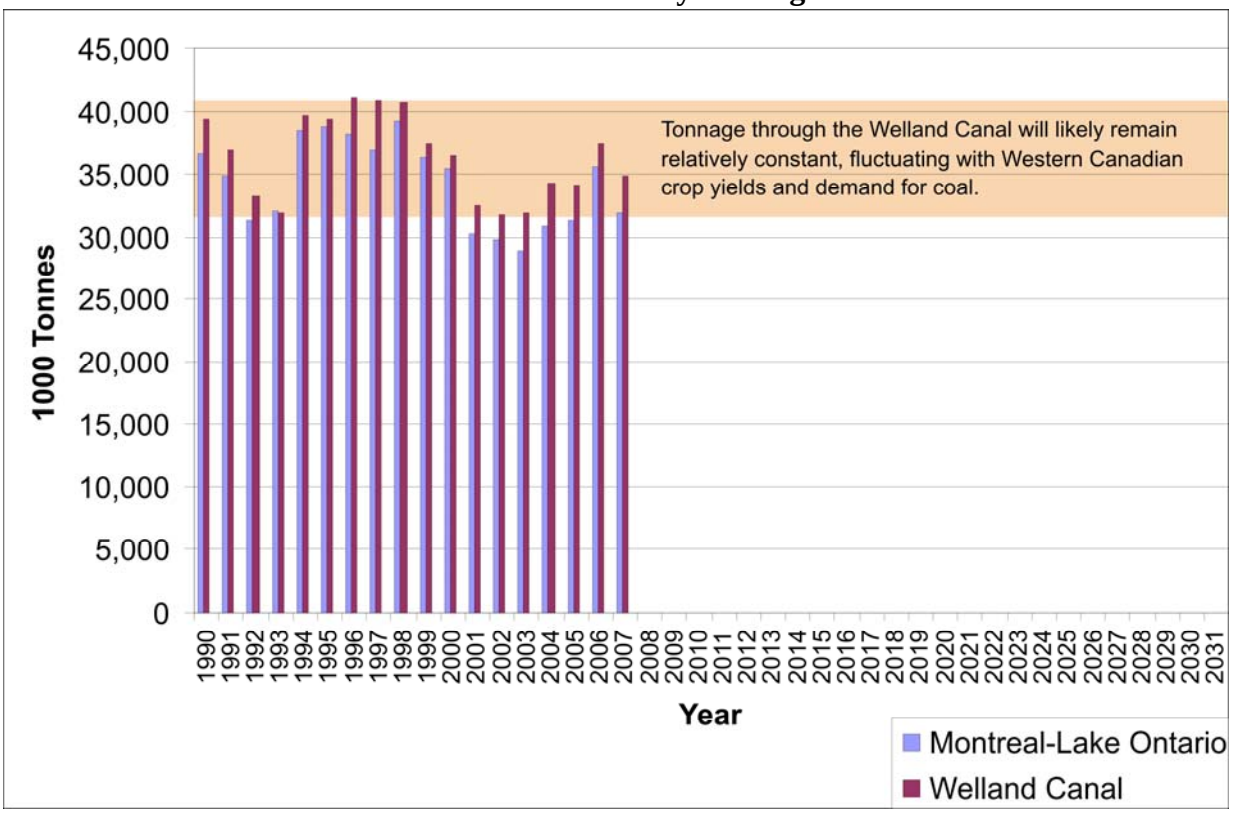
Source: Transport Canada, *Transportation in Canada2007: An Overview*, May 2008

The Port of Hamilton marine service that influences goods movement for both the GTAW and NGTA Preliminary Study Areas is ranked as the 8th busiest Canadian Port handling domestic and international traffic. In 2006, the Port of Hamilton handled approximately 13 million tonnes of cargo.

Discussions with the marine service providers as part of the Transportation Service Providers stakeholder consultation indicated that there is excess capacity in both the St. Lawrence Seaway and at the Port of Hamilton to accommodate increased tonnage. The main constraints to the marine service is the congestion / bottlenecks at port interface locations with road / trucking services and the fact that marine service does not operate year round. The constrained channel of inland route does not accommodate larger ocean fleets.

Although trends of tonnage shipped on the St. Lawrence Seaway, shown on Exhibit 4-18, indicate stable growth over the next 25 years, improved infrastructure for short sea (cross lake) shipping may reverse the trend and thus increase the tonnage shipped on the St. Lawrence Seaway.

Exhibit 4-18: St. Lawrence Seaway Tonnage Forecast



Source: Transport Canada, *Transportation in Canada 2007: An Overview*, May 2008 (historic data only)
*Trends based on extrapolation from reported past St. Lawrence Seaway shipments

4.3.4 Goods Movement – Air Transportation

Within and adjacent to the GTAW and NGTA Preliminary Study Area are the following international airports that accommodate goods movement:

- Toronto Pearson International Airport;
- Hamilton International Airport; and
- Region of Waterloo International Airport.

The main commodities shipped by air include:

- Small / Precision Machinery / Electrical Motors;
- Manufactured Goods (Mobile phones / Ipods etc.);
- Transport Equipment; and,
- Plastics / Chemical products.

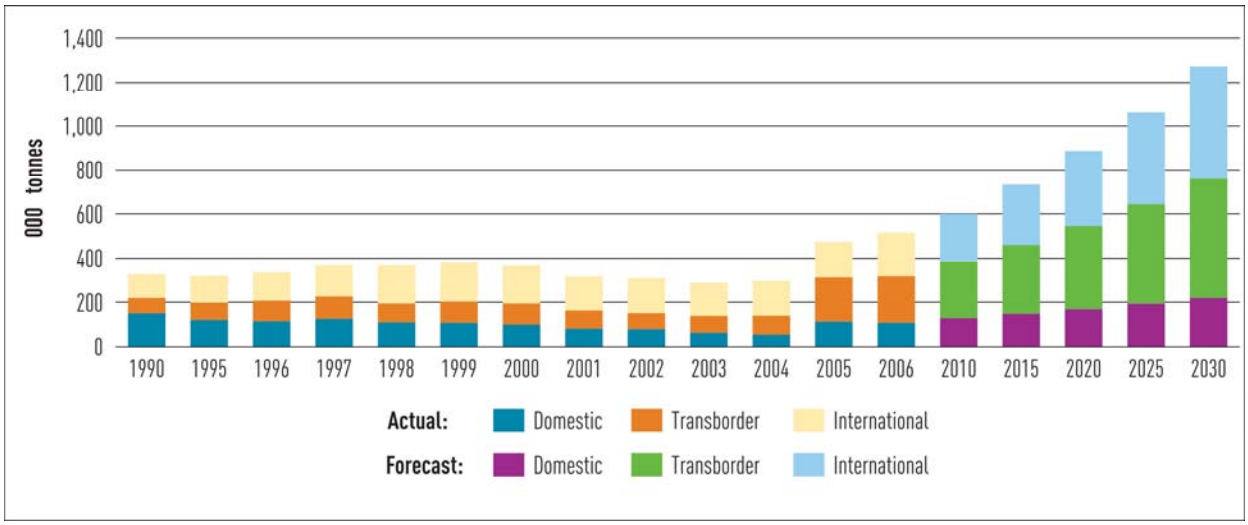
The major constraints noted by the air service representatives during the consultation with Transportation Service Providers is that existing road congestion impacts ability to get time sensitive goods to and from airports.

A review of air cargo growth at the Hamilton International Airport indicates that air cargo increased by 350% between 1992 and 2003. In fact global air cargo has been growing at

a rate of 2-3 times that of GDP growth. It is also of note that only 42% of the maximum metric tonnes capacity at Toronto Pearson International Airport was utilized in 2006 indicating that significant increase in air cargo tonnage can be accommodated without expanding existing air cargo infrastructure.

A summary of the air cargo demand forecast identified in the Toronto Pearson International Airport – 2008 Airport Master Plan is presented on Exhibit 4-19.

Exhibit 4-19: Toronto Pearson International Airport Tonnage Forecast



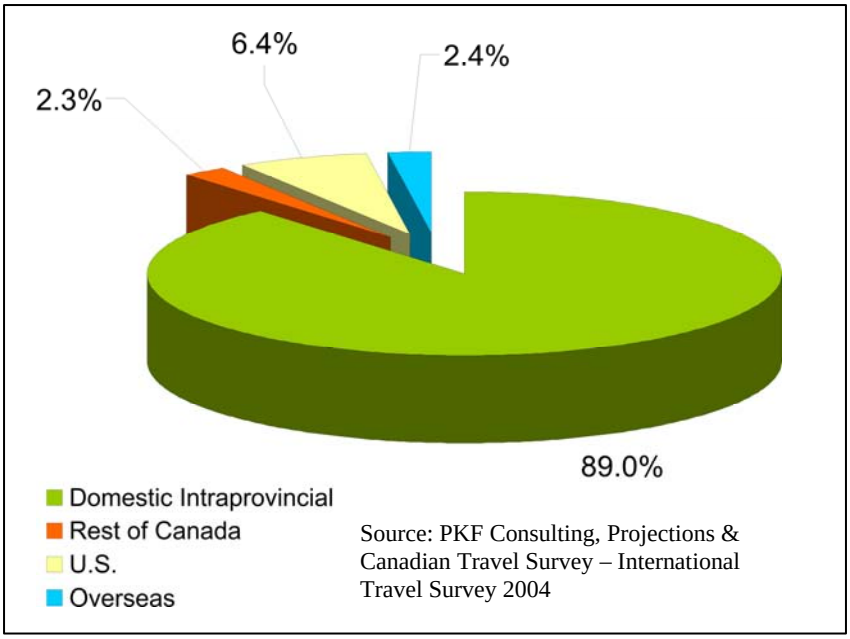
Source: Taking Flight – The Airport Master Plan 2008 – 2030 – Toronto Pearson International Airport

4.4 Tourism and Recreation

Within and adjacent to the GTAW Preliminary Study Area, the vast majority of the tourism and recreational trips originate locally and is largely by private vehicles and relies on travel using Highway 401 and Highway 400 which are heavily congested.

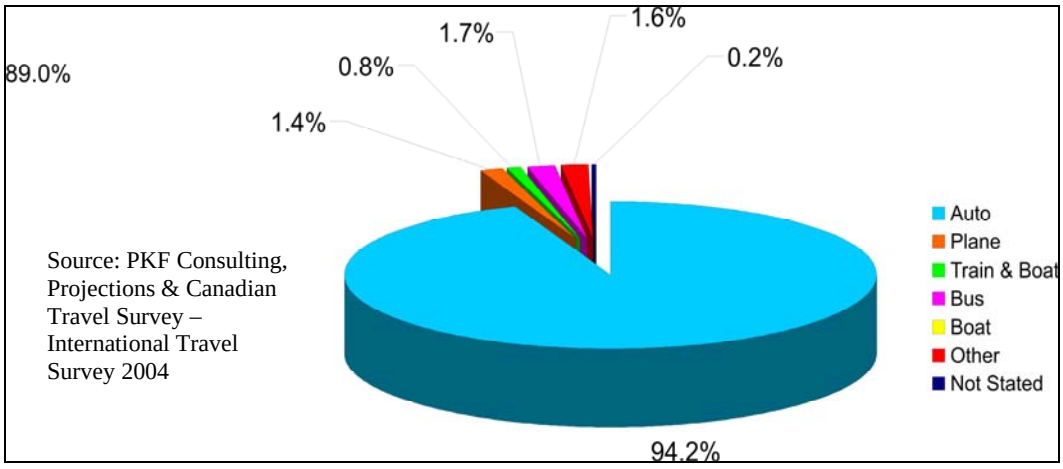
Specific to the GTAW Preliminary Study Area almost 90% of the inbound visitors were classified as domestic intra-provincial with over 6% and 2% originating from the U.S. and overseas respectively. A graphical summary of the origin of inbound visitors to the GTAW Preliminary Study Area is presented in Exhibit 4-20. It is of note that over 94% of visitors to the GTAW utilized the automobile as presented on Exhibit 4-21.

Exhibit 4-20: Origin of Inbound Visitors to GTA West (2004)



Source: PKF Consulting, Projections & Canadian Travel Survey – International Travel Survey 2004

Exhibit 4-21: Visitor Mode of Transportation to GTA West (2004)



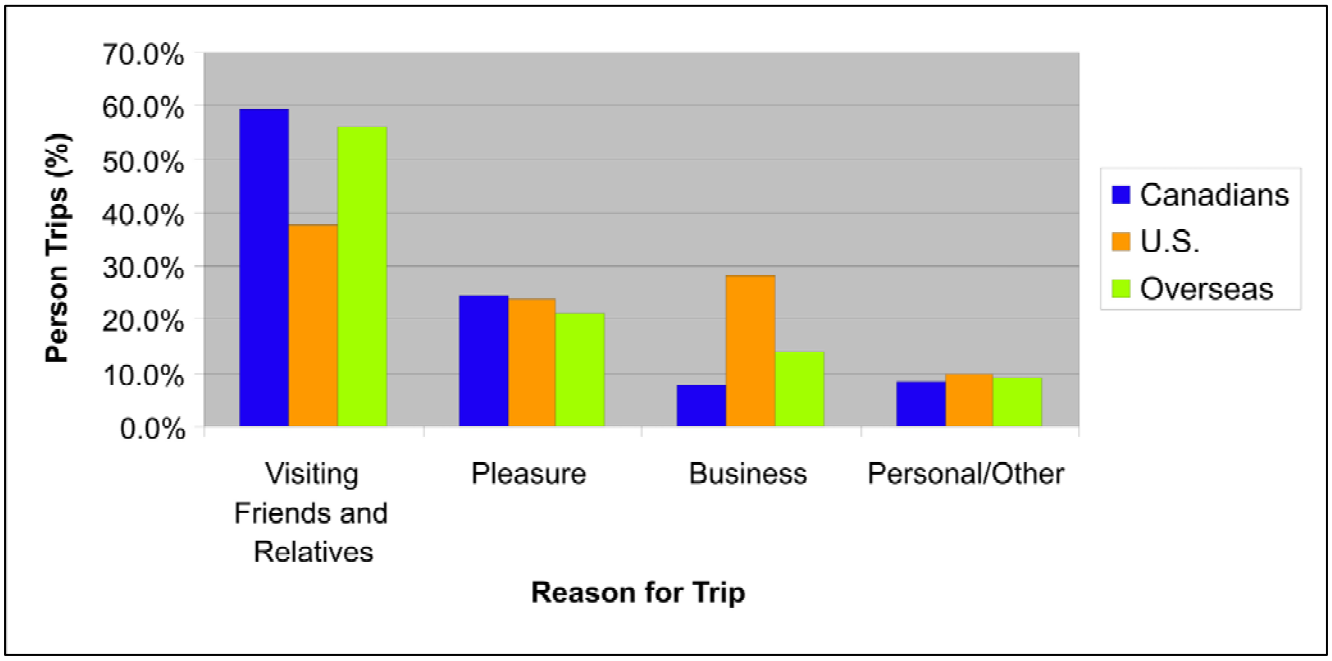
Source: PKF Consulting, Projections & Canadian Travel Survey – International Travel Survey 2004

Given the predominance of the automobile for visitor travel to the GTAW Preliminary Study Area, the Canadian Automobile Association was contacted as part of the Transportation Service Providers consultation program. The key tourist / transportation issues raised by Canadian Automobile Association included:

- "The number of trucks on the road is a concern"
- "There are poor transportation links between communities"
- "Inherent problems exist in retrofitting communities (communities have been built around the car)"

The primary trip purpose for visitors to the GTAW Preliminary Study Area is "visiting friends and relatives", followed by pleasure, business and personal/other as shown on Exhibit 4-22.

Exhibit 4-22: Visitors Trip Purpose to GTA West Preliminary Study Area



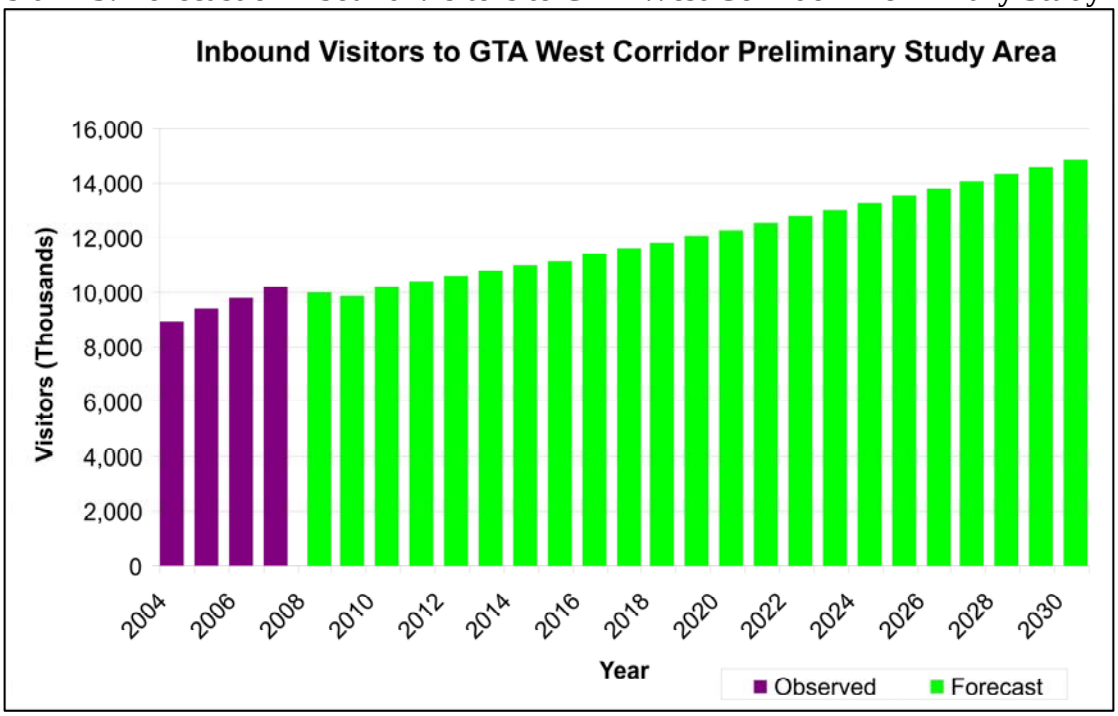
The outlook for tourist travel is that tourist travel to the GTAW Preliminary Study Area will increase by 50% over the next 25 years based on the following visitor market segments:

- **Intra-Provincial Visitor Travel**
  - The outlook for the intra-provincial tourist and recreational travel is that it will continue to grow in the longer term with same day visits and non-business visits expected to lead growth. The increase in intra-provincial travel is in part due to the implementation of the Western Hemisphere Travel Initiative resulting in more Ontario residents choosing to travel within the Province instead of the U.S.

- **Inter- Provincial Travel**
  - The outlook for the inter-provincial travel is that it is anticipated to grow at an average annual rate of 1.1%.
- **Overseas Visits to Ontario**
  - In the near term, it is expected that the overseas visitation to Ontario will grow at an average rate of 5.7% with Japan having the largest increase in overseas visits to Ontario.

A summary of the forecast visitors to the GTAW Preliminary Study Area is presented on Exhibit 4-23.

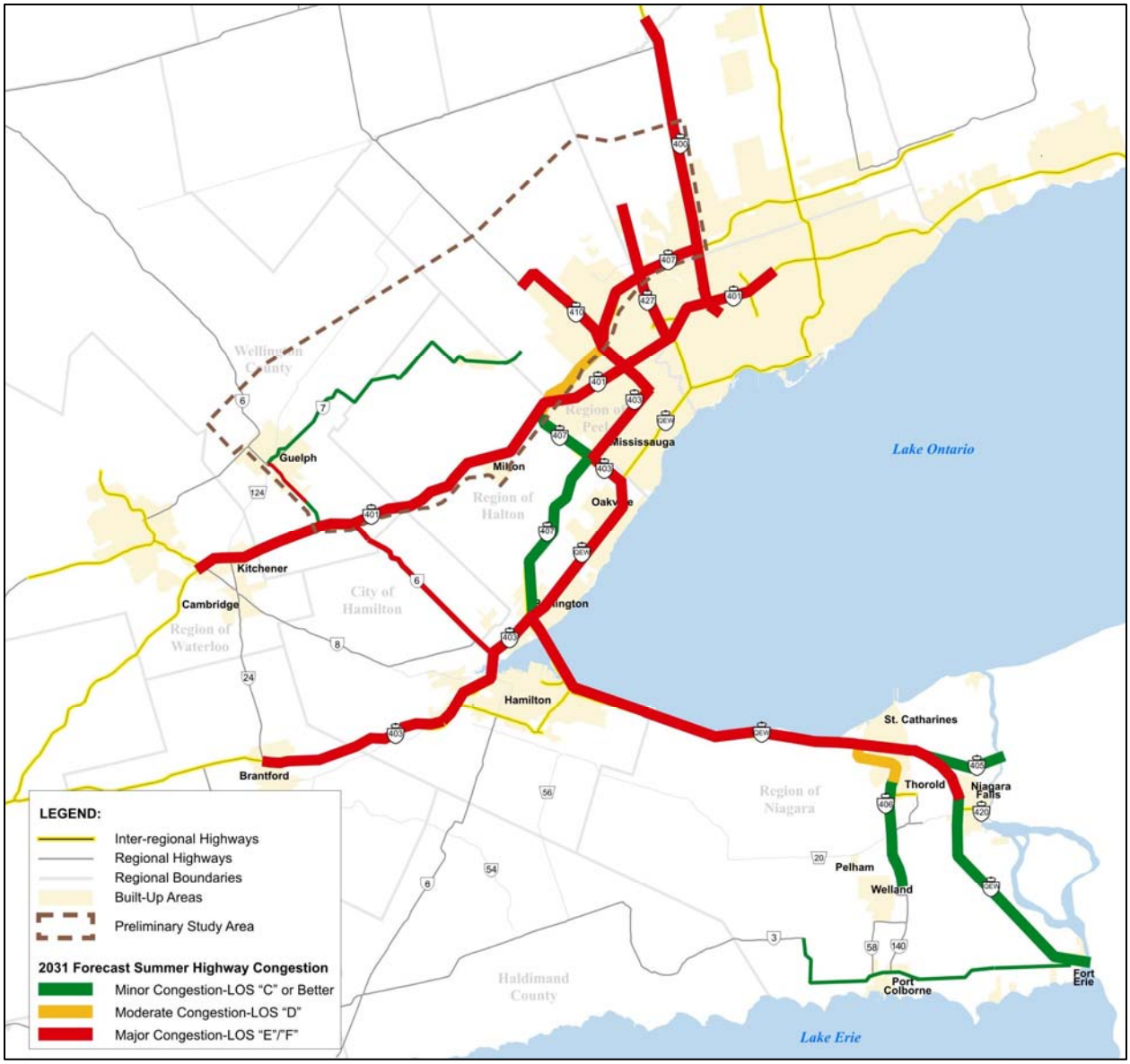
Exhibit 4-23: Forecast of Inbound Visitors to GTA West Corridor Preliminary Study Area



As discussed in Section 3, the existing inter-regional transportation system experiences significant congestion during the weekend / summertime periods on majority of the 400 series highway facilities. The congestion levels worsen during the start and end of holiday long weekends resulting in driver frustration and in some cases safety concerns. From a tourist / recreation perspective the significant road congestion on the inter-regional transportation system does little to enhance the overall experience of the tourist / recreation trip and therefore can result in fewer trips being made unless significant improvement to the transportation network level of service is forthcoming.

The forecast 2031 weekend (SADT) inter-regional congestion levels, shown on Exhibit 4-24, indicate significant congestion that will impede tourism / recreational travel unless additional transportation system improvements are provided beyond those recommended in The Big Move document.

Exhibit 4-24: 2031 Weekend (SADT) Inter-Regional Congestion Levels



Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	**LOS C or better**	**Less than 0.80**	**Non-recurring Congestion***
Moderate	**LOS D**	**0.80 to 0.90**	**Unstable Conditions**
Major	**LOS E or F**	**0.90 and above**	**Congested Conditions (Stop-and-Go)**

* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc.

GLOSSARY OF TERMS

AADT **Annual Average Daily Traffic**

The total volume of traffic passing a point or segment of a highway facility in both directions for one year, divided by the number of days in the year

ALU **Alternate Land Use Allocation**

A scenario developed by the Project Team to reflect current (2008) land use planning information from the municipalities within the Study Area

BCS **Business and Commercial Stakeholder**

Includes large corporations / industries, business associations, logistics providers, shipping associations; and universities / colleges – consulted to assist with development of Study Area knowledge

EA **Environmental Assessment**

Decision-making process that promotes good environmental planning by assessing the potential effects of proposed activities, undertaken under the Ontario Environmental Assessment Act; the purpose of the EA is to provide for the protection, conservation and wise management of Ontario's natural, social/cultural and economic environment

ETR **Express Toll Route**

All-electronic, barrier-free toll highway currently extending from Burlington to Pickering

GGH **Greater Golden Horseshoe**

The geographic area designated as the Greater Golden Horseshoe growth plan area in Ontario Regulation 416/05

GGH Model **Greater Golden Horseshoe Model**

Comprehensive travel demand forecasting model, designed for use in all major Provincial studies in the GGH including the Metrolinx RTP; considers automobile and transit commuter trips and truck freight trips

GTA **Greater Toronto Area**

The metropolitan region encompassing the City of Toronto, the four surrounding Regional Municipalities (Durham, Halton, Peel and York)

GTHA **Greater Toronto and Hamilton Area**

The metropolitan region encompassing the City of Toronto, the four surrounding Regional Municipalities (Durham, Halton, Peel and York) and the City of Hamilton

HOV Lane **High Occupancy Vehicle Lane**

A roadway lane designated for use only by vehicles with a specified minimum number of occupants (>1); can also be opened to buses, taxis and carpools

LOS **Level of Service**

A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience

MAG **Municipal Agencies Group**

Comprised of representatives from the City of Guelph, County of Wellington, and Regions of Halton, Peel, and York, to consult with the Project Team throughout the duration of the EA Study

MTO **Ontario Ministry of Transportation**

Provincial agency responsible for Ontario's transportation and roads

RAAG **Regulatory Agency Advisory Group**

Established for Project Team consultation with potentially affected Provincial ministries, agencies and Federal departments

RTP **Regional Transportation Plan/ "The Big Move"**

A long-term strategic plan for the GTHA for an integrated, multi-modal regional transportation system, developed by Metrolinx with a mandate from the Greater Toronto Transportation Authority Act 2006

SADT **Summer Average Daily Traffic**

Average twenty four hour, two way traffic for the period July 1st to August 31st, including weekends

Screenline

An imaginary or real boundary that defines a broad corridor across which traffic flows

SDF Model **Strategic Demand Forecasting Model**

Planning approach used to forecast trips not included in the GGH Model: goods movement by rail, marine and air freight and tourism and recreation

travel by all modes; considers historical growth trends (Business as Usual – BAU) as well as future influences

Select Link

Auto assignments can be modelled to identify the travel characteristics on a selected facility at a specific location. This process is called the select link analysis

% Self-Containment

The percentage of trips originating and destining within the same Region

Travel Time

The time (or cost) for the shortest path computed at the last iteration for an O-D pair; it is close to the average travel time (or cost) if the assignment is close to convergence

TSP **Transportation Service Providers**

Stakeholders include: municipal transit; inter-regional transit; freight rail service; air service; transportation associations / organizations; and trucking organizations - consulted to assist with development of Study Area knowledge

UGC **Urban Growth Centres**

Twenty-five centres designated in the Provincial Growth Plan, planned as focal areas for investment in institutional and region-wide public services, as well as commercial, recreational, cultural and entertainment uses; to accommodate and support major transit infrastructure; to serve as high density major employment centres; and to accommodate a significant share of population and employment growth

V/C Ratio **Volume / Capacity Ratio**

A level-of-service measure for roadways comparing roadway demand (vehicle volumes) with roadway supply (carrying capacity); <0.8 typically considered minor, non-recurring congestion; 0.8-0.9 typically considered moderate congestion/ approaching unstable conditions; >0.9 typically considered major congestion/ unstable, “stop and go” conditions