City of Brampton

Planning and Development Department

Transportation and Transit Master Plan Sustainable Update 2009 - Supplementary Analyses - Appendix F

Brampton

November 2009

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1. INTRODUCTION

This Supplementary Analyses Report is a Technical Appendix to the TTMP Sustainable Update 2009. Its intent is to provide documentation for the technical analysis undertaken as part of the Brampton TTMP Sustainable Update 2009, which serves as the technical support and background for the infrastructure and service level information included in the City of Brampton Development Charge Background Study input for Roads and Transit Services.

The 2009 TTMP recommendations are based on the analysis presented in this report as well as on the input received from the public, City staff, and stakeholders. Further details regarding policy, staging, broader transit and land use strategy, implementation and other issues and recommendations are included in the overall TTMP Sustainable Update 2009.

1.1 Purpose and Scope

The purpose of the 2009 TTMP study is to update the 2004 Transportation and Transit Master Plan (TTMP) to expedite the implementation of the transportation vision. Key goals of the 2009 TTMP update are to further enhance the vision of Brampton's transportation system and make it fully compatible with bold long term goals set by the Growth Management Plan. The Growth Management Plan goals include:

- Embracing compact communities
- Sustainable development
- Protecting the natural environment
- Economic vitality
- Healthy communities
- Providing safe, affordable, and efficient transportation for people and goods

The analyses described in this report are completed under the direction of the Core Technical Committee and are intended to provide technical insight and input to the transportation and development related decisions.

The Report documents technical analyses completed for the study between June 2007 and November 2009 and documents assumptions, methods and findings for the transportation modeling and forecasting, evaluation of land use, transit and road networks, the outcomes of alternative development scenarios and various sensitivity tests, evaluation of the Central Area, recommendations and implementation guidelines. As noted above, the focus of this document is the technical background to support the infrastructure and service level information related to the roads and transit infrastructure included in the City of Brampton's Development Charges Background Study. Further details regarding policy, staging, broader transit and land use strategy, implementation and other issues and recommendations are included in the 2009 TTMP.

The results of these tasks are described in **Chapters 2** to **9** respectively in this report.

Travel Demand Forecasting Method (Chapter 2): In this Chapter we document the structure and the performance of the PM Peak Hour travel demand forecasting model used during the course of the study. The discussion on model validation and network coding assumptions supplements the examination of methodology applied to trip generation, distribution and assignment. The intricacies of the City model, developed by Peter Dalton, are further discussed in **Technical Appendix A**.

Transit Modal Split Calculation (Chapter 3): This section of the report describes the assumptions, methods and the results of modal split methodology used for the study.

Land Use Forecasts and Travel Distribution (Chapter 4): This section discusses and documents population and employment forecasts used in base-line travel demand analyses for each of the horizon year. Population and employment assumptions used in sensitivity tests for various development staging are discussed in Chapter 7. In Chapter 3 the reader will find a discussion on travel distribution patterns between 2006 and 2031, as forecasted by the model.

TTMP Alternatives (Chapter 5): This section presents the results of the assessment of the four transportation alternatives developed and evaluated for the 2009 TTMP. Section 5.5 discusses and documents the selection of the preferred alternative.

Transit Network Alternatives (Chapter 6): In this chapter we present the results of the evaluation of the various components of the transit network, justification for the selection of new Bus Rapid Transit corridors and the extension of services on other corridors identified in earlier studies.

West Brampton Road Network (Chapter 7): This chapter documents the inputs, methodology and the results of technical analyses for road network alternatives in the west part of Brampton including the North South Transportation Corridor (NSTC); documents the results of the assessment of the development staging in North West Brampton and Bram West in relation to need and timing of NSTC; and, documents the impacts of GTA West and the travel patterns on the NSTC itself.

Other Road Network Alternatives (Chapter 8): In this section the reader will find the discussion and documentation of network need and timing assessments for roads in north-east Brampton, Central Area and other.

Recommendations and Implementation (Chapter 9): This chapter presents a summary of road and transit recommendations and a discussion on the implementation timing and strategy.

1.2 Relation to the TTMP Report

While written as a stand-alone report, this document also serves as a Technical Appendix to the TTMP Sustainable Update 2009. The recommendations, implementation staging and policy directions presented in the 2009 TTMP Report are all based on the technical inquiries presented in this report.

2. TRAVEL DEMAND FORECASTING

2.1 Method

Travel demand forecasts serve as the primary tool for estimating future travel demands and assessing the alternative development scenarios. The forecasts were based upon the City of Brampton's EMME/2 PM Peak Hour travel demand forecasting model, which simulates travel for a typical weekday PM peak hour throughout the Greater Toronto Area, including the City of Brampton and Region of Peel. The model uses the following traditional four-step demand modelling approach:

1) Trip generation, in which the total number of trips that start and end in each zone are calculated, as a function of the different land-uses in each zone. Non-motorized trips are calculated as well, but are not accounted for in the remaining three steps of the modelling process.
2) Modal split, in which the trips are allocated to the different available travel modes. The allocation within the motorized trip group is between autos, transit, and GO. The modal split module uses the observed auto-transit mode split relationships.
3) Trip distribution, in which the generated trips are distributed among all zones in origin-destination pairs. The distribution is conducted as a function of the zonal land-uses, the characteristics of the transportation network and the cost (i.e., travel time, congestion, fuel and parking cost, transit fares, tolls cost, etc.).
4) Trip assignment, in which the trips for each mode are loaded onto, or assigned to, the respective transportation network(s). The model uses the EMME/2 "equilibrium assignment" technique. This process allocates traffic to links so as to minimize the "cost" of the vehicle or transit passenger between his / her origin and destination; where "cost" is commonly defined as travel time with a monetary cost expressed in terms of time.

The City's model is a customised version of the "Simplified GTA Model" developed by Peter Dalton. The model has been calibrated to 2006 Transportation Tomorrow Survey and validated against 2006 Cordon Counts. A detailed discussion of the City's Model, authored by Peter Dalton and entitled "***Brampton 2006 P.M. Peak Hour Model – Documentation and User's Guide***", is provided in **Appendix B** of the 2009 TTMP report. Further information is available from the City upon request.

2.2 2006 Model Validation

The model was calibrated using origin-destination patterns from the 2006 Transportation Tomorrow Survey (TTS) and validated against the 2006 Cordon Counts. Project-specific validation of the 2006 model results (based on 2006 TTS based population and employment numbers) were compared with observed traffic volumes on specific roads. The 2006 validation results are presented in **Table 2-1**. 2006 served as the base year for the Brampton TTMP update.

Table 2-1: Model Validation Results, Base Year, PM Peak Hour

	West Totals (Winston Churchill to west of Hwy 410)			East Totals (Hwy 410 to Highway 50)		
NORTHBOUND	**Observed**	**Model**	**Model / Obs.**	**Observed**	**Model**	**Model / Obs.**
Caledon / Brampton	3,162	2,571	0.81	5,330	5,037	0.95
North of Bovaird Drive / Castlemore Road	7,721	9,075	1.18	9,595	11,717	1.22
North of Queen Street / Embleton Road	10,203	10,175	1	19,945	21,173	1.06
North of Steeles Avenue	9,576	9,405	0.98	17,034	18,279	1.07
Brampton / Mississauga	9,316	10,187	1.09	13,141	14,407	1.1
SOUTHBOUND	**Observed**	**Model**	**Model / Obs.**	**Observed**	**Model**	**Model / Obs.**
Caledon / Brampton	1,825	1,410	0.77	2,202	2,302	1.05
North of Bovaird Drive / Castlemore Road	5,023	4,651	0.93	5,414	4,349	0.8
North of Queen Street / Embleton Road	5,143	3,741	0.73	8,547	8,704	1.02
North of Steeles Avenue	5,571	4,933	0.89	9,225	9,418	1.02
Brampton / Mississauga	6,078	5,423	0.89	8,762	6,852	0.78
	North Totals (Mayfield to North of Queen)			**South Totals (Queen to Bram.-Miss. Boundary)**		
WESTBOUND	**Observed**	**Model**	**Model / Obs.**	**Observed**	**Model**	**Model / Obs.**
Brampton / Halton	1,453	1,200	0.83	5,599	5,243	0.94
Credit River*				7,790	7,776	1
East of Highway 10	7,063	6,205	0.88	8,986	8,687	0.97
East of Highway 410 / Heartlake Road	5,164	5,686	1.1	13,042	12,130	0.93
East of Airport Road	3,393	4,131	1.22	9,288	7,629	0.82

West of Highway 50	1,692	2,020	1.19	8,896	6,957	0.78
EASTBOUND	**Observed**	**Model**	**Model / Obs.**	**Observed**	**Model**	**Model / Obs.**
Brampton / Halton	1,016	1,203	1.18	3,149	2,587	0.82
Credit River*				5,065	4,995	0.99
East of Highway 10	5,262	4,443	0.84	5,606	4,357	0.78
East of Highway 410 / Heartlake Road	4,350	4,742	1.09	8,385	6,809	0.81
East of Airport Road	1,867	2,826	1.51	7,457	6,607	0.89
West of Highway 50	1,396	1,448	1.04	7,252	5,698	0.79

*Credit River Screenline from Bovaird to Bram.-Miss. Boundary

Based on the validation results presented above, the model has been accepted as a suitable tool to forecast future travel demand within the City of Brampton for the population and employment quotas estimated for the 2011, 2016, 2021, 2026 and 2031 horizon years.

2.3 General Forecasting Assumptions

This section provides an overview of the forecasting methodology and assumptions used in this study. Detailed discussions of the model structure, modelling parameters and procedures are provided in the ***Brampton 2006 PM Peak Model, Documentation and Users Guide, July 2008, prepared by Peter Dalton,*** available in **Appendix B** of the TTMP Final Report.

2.3.1 Trip Generation Rates

Trip rates per population and employment are based on 2006 data obtained from the Transportation Tomorrow Survey. The Transportation Tomorrow Survey (TTS) is a comprehensive travel survey conducted in the Greater Toronto Hamilton Area (GTHA) once every five years and is used to collect information about the travel patterns of GTHA residents, including trip origins and destinations as well as travel modes. For this study, the 2006 TTS data was aggregated to a "superzone" system that is less detailed than the GTA traffic zone system but more detailed than the Planning District level. For each superzone, different rates for various trip purposes were extracted and applied to population and employment forecasts. The model is forecasting trips made for the purpose of traveling to and from work, traveling to and from home, trips that cannot be associated with neither work nor home and so called discretionary travel, or trips with purpose such as shopping, entertainment or personal.

Table 2-2 below summarizes the total trips for each trip purpose used in the model.

Table 2-2: Trip Generation Categories

	Trip Rates	Total
Employment Based Trip Rates		
Work trip origins - all modes	0.45	69,730
Population Based Trip Rates		
Work to home destinations - all modes	0.20	89,838
Non work to home destinations -auto mode	0.09	42,673
Non work to home destinations - transit mode	0.01	4,416
Home origins – auto mode	0.08	34,761
Home origins - transit mode	0.002	1,115
Composite Trip Rates (applied to employment plus 50% population)		
Work to non-home destinations - all modes	0.03	13,150
Non-home non-work origins - auto mode	0.06	23,800
Non-home destinations with non-work origins - auto mode	0.06	21,926

Population and employment forecasts are discussed in detail in **Chapter 4**.

2.3.2 Distribution

The trip distributions assumed in the Brampton model were based on the 2006 TTS trip tables for the trip purposes listed in **Table 2-2**. Each of the "base" trip matrices from TTS were modified, and balanced to the appropriate trip ends. Areas with no trip activities in 2006 were "seeded" or provided with infinitesimal non-zero values to allow trip distributions to occur once the area develops.

When compared to the base TTS matrices, the Brampton model matrices have trip patterns comparable to TTS, with uniform distribution at the traffic zone level. In addition, trip length distributions are similar to the observed distributions.

2.3.3 Peak Hour Factors (Auto & Transit)

The three-hour peak period matrices used for trip generation and trip distribution processes were factored down using peak hour factors for traffic and transit assignments. The factors used in the model are summarized below.

Table 2-3: Peak Hour Factor by Trip Purpose

Trip Purpose	Peak Hour Factor
Auto-work trips from Brampton	0.44
Auto-work trips from Halton	0.44
Auto-work trips from all other origins	0.4
Non-work	0.35
GO Rail egress	0.4

2.3.4 Speeds and Capacities

Posted speeds and per lane capacity assumptions were based on the GTHA Coding Standards, coded to the model by City staff for the area of Peel Region and by HDR | iTRANS staff for the remaining area of the GTA, with a particular focus on neighbouring regions. The 2011 to 2031 road networks are reflective of road improvements identified by road authorities across the GTA. **Table 2-4** lists the speed and capacity assumptions coded for each road type in the City of Brampton. Coding of the future proposed roads followed the speed and capacity values identified for each road class. More discussion about the road network and road network coding is provided in **Chapters 5, 7,** and **8**.

Table 2-4: Model Speeds and Capacities

	ID	Speed (km / h)	Lane Capacity (vph)	Example
Provincial freeway	12	100	1800	Highway 410, Highway 401
Private toll road	15	100	1800	Highway 407
Provincial ramp	22	70	1400	Highway 410 off / on ramp
Private ramp	25	70	1400	Highway 407 off / on ramp
Peel Regional Highway	33	60-80	800-900	Dixie Rd, Steeles Ave
Brampton Highway	34	50-80	800-900	Sandalwood Pkwy, Chinguacousy Rd
Brampton Arterial	44	50-80	600-800	Goreway Dr, Clark Blvd
Brampton Minor Arterial	54	50	500	Vodden St, Financial Dr
Brampton Collector	64	50	500	Railroad St

2.3.5 Transit Lines and Stations

All existing transit lines were coded into the EMME/2 model within Peel and Highway 7 through York Region. All GO rail corridors as well as GO bus services in Brampton as well as Highway 407 were checked and updated. The future proposed major transit services were added to the model. Considerable attention was given to accurately reflect future transit services in Brampton (as recommended by 2004 TTMP and BRT plans) and services recommended in Metrolinx Regional Transportation Plans. Additional major service expansion in Mississauga and York as well as connectivity details with Mississauga Transit, TTC and YRT were also considered. More discussion about transit network coding is provided in **Chapter 6**.

3. TRANSIT MODE SPLIT CALCULATION

The "Simplified GTA Model", although a highly capable forecasting tool, is not sensitive to modal split changes resulting from higher land use densities and improvements in connectivity and level of transit services. To overcome this limitation, the project team devised a method to allow for changes to be made to the transit mode split based on population and employment density and transit level of service. The method is documented in this section.

3.1 Methodology

In order to assess future changes in travel demand resulting from increased population densities and the implementation of higher order transit (Bus Rapid Transit or BRT), Brampton traffic zones were compared to "proxy" zones, or the 2006 traffic zones located in other parts of the GTA with similar densities and transit systems parallel to future BRT and GO networks. Traffic zones such as those located along the Yonge Street corridor in southern York Region between Steeles Avenue and Highway 7, with high-frequency VIVA bus rapid transit (BRT) were chosen as probable proxies. Other proxy zones were taken from the northeast and northwest corners of Toronto (North Etobicoke and Scarborough), as these represented areas with intermediate population / employment densities and regular transit service, but without direct access to subway lines.

To model appropriate modal-shares in the PM peak period, the origins and destinations of work trips were considered and related to zone population or employment density. Density was defined as population per hectare for trip destinations and employment per hectare for trip origins. The mode share prediction was obtained for each Brampton traffic zone by comparing the horizon year population densities against proxy zones with similar densities and transit services using the following formula:

New zone mode share = 2006 zone mode share + [(2006 proxy share – 2006 zone share) * 0.6 * 2031 zone density / 2006 proxy density]

Or

If the new mode share is less than the original mode share (i.e. the original mode share is greater than that for the proxy zone), the original value is used so that no zones decrease in mode share.

Or

If the new mode share is greater than the highest mode share recorded for any of the proxy zones in that density range, the highest proxy mode share is used instead.

Or

If the density in a new zone is very high, the mode share is increased by one percent over the value that would otherwise be used for every 400 people or jobs / sq km above 7500 people / sq km. For example, a destination mode share of 10% would increase to 15% if the population density of that zone is 9500 / sq km.

Or

Where the density in the new zone is very low, mode share is capped at one percent of the density, so a zone with only five people / sq km, for example, will have a maximum transit destination mode share of 5 / 100 = five percent.

In the "New Zone Mode Share" formula, 0.6 represents the approximate rate of mode share increase in relation to the increase in population density. For example, if density increases by 100%, the transit mode share increases 60%. This is calculated by averaging all the zones and comparing their mode shares and densities. The 0.6 rate reflects the transit increase rate derived from 1986-2006 TTS data.

The proxy zones are broken down into three categories for trip destinations. For trip origins, only one category is used due to the low overall numbers of trips, with an average mode share determined for all proxy zones.

Destination Categories:
Category 1: Density of 0-2,500 / sq km OR not in close proximity to a BRT line
Category 2: Density of 2,500-5,000 / sq km AND in close proximity to a BRT line
Category 3: Density over 5,000 / sq km AND in close proximity to a BRT line

All Brampton zones that are not located within 1 km of a BRT route are automatically set to Category 1, irrespective of the density of that zone. These zones are mainly located in the northwest and northeast corners of the city and this method avoids comparing them against any zones that are near higher-order transit such as VIVA lines in York Region. This applies for all of the BRT corridors proposed- Steeles, Queen, Main, Bovaird, Mississauga Rd and Airport Rd.

For zones forecasted to have zero population in 2031, the existing (2006) mode share for that zone is preserved.

Similar calculations were carried out for the other horizon years (2011, 2016, and 2021).

From these calculations, an estimation of expected transit mode share, based on the average proxy zone value for each density range, can be obtained. A 2031 plot of the work trip transit mode shares for Brampton traffic by destination is shown below, along with the existing (2006) shares. The legend for each plot is shown in **Table 3-1**.

Table 3-1: Local Transit Mode Share Legend

Transit mode share	Colour
0-10%	Green
10-20%	Blue
20-30%	Yellow
30-40%	Orange
> 40%	Red

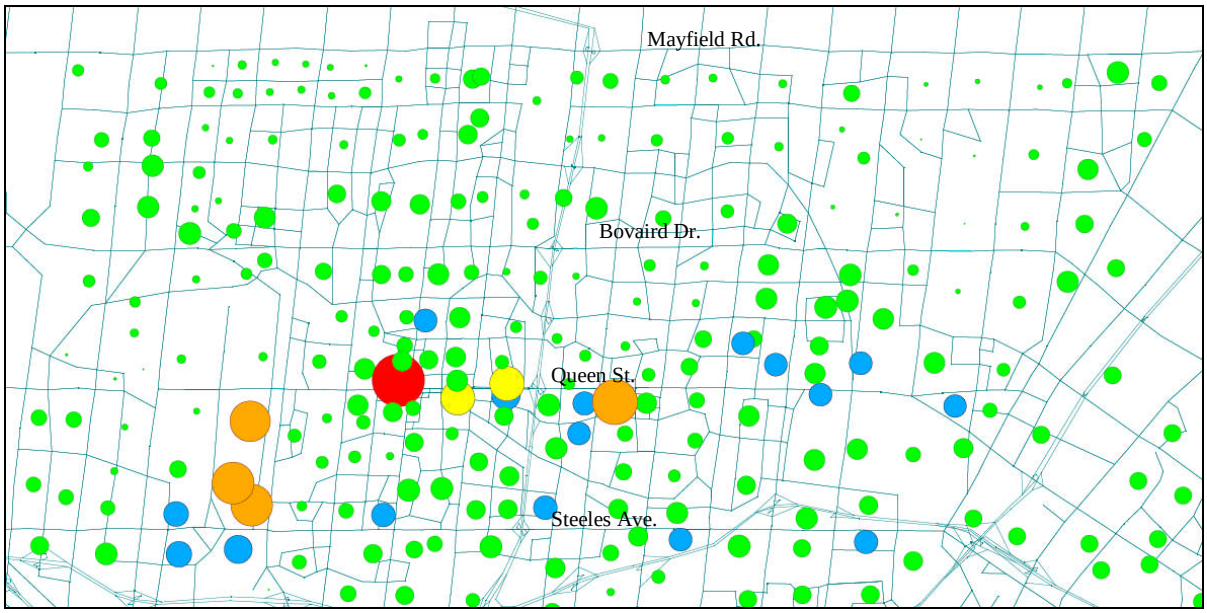


Exhibit 3-1: Local Transit Mode Share for Trip Origins, 2031 PM Peak Period

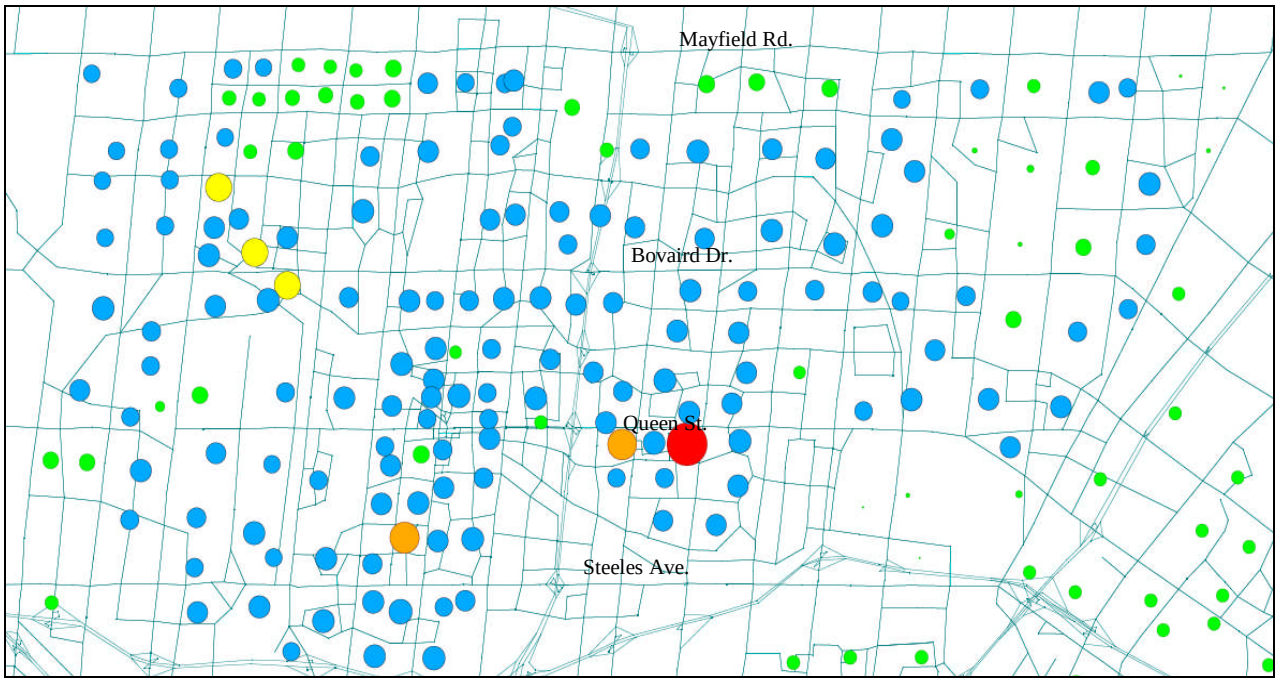


Exhibit 3-2: Local Transit Mode Share for Trip Destinations, 2031 PM Peak Period

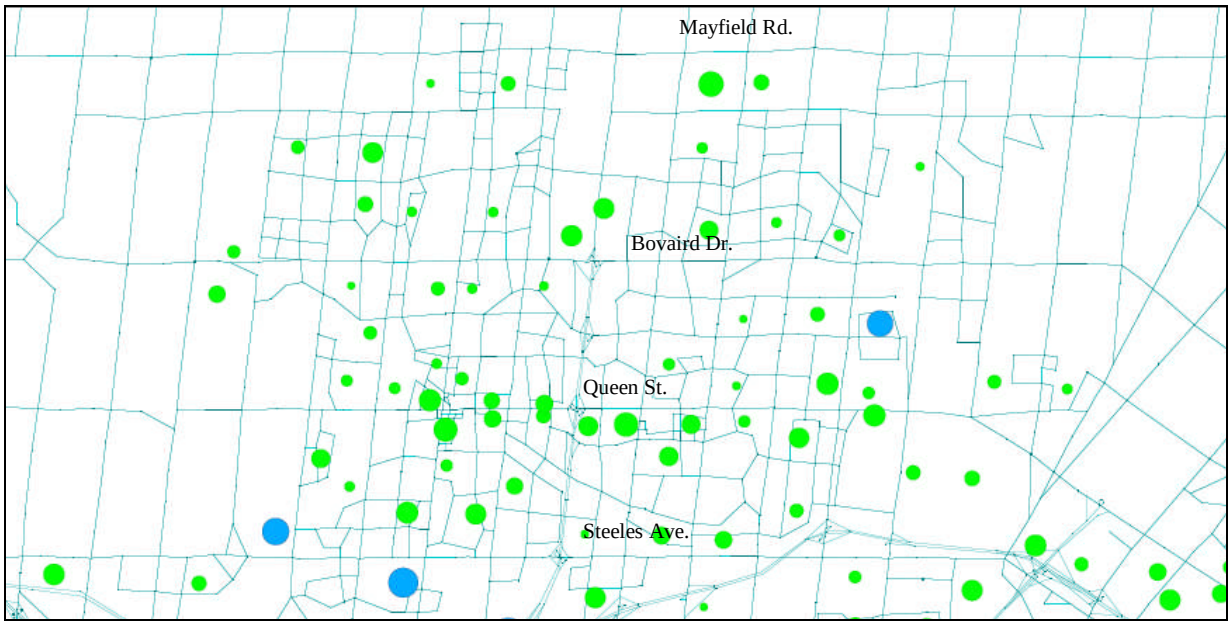


Exhibit 3-3: Local Transit Mode Share for Trip Origin, 2006 PM Peak Period

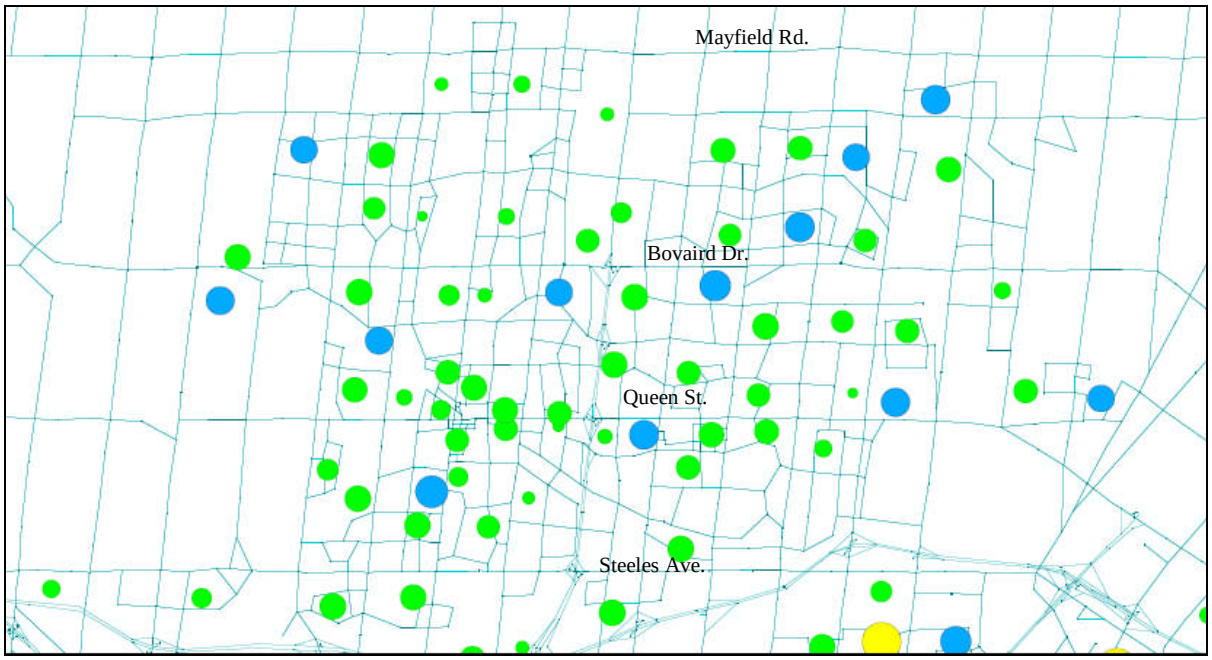


Exhibit 3-4: Local Transit ModeShare for Trip Destinations, 2006 PM Peak Period

Planned 2031 transit investments combined with higher land use densities along Bus Rapid Transit corridors, expanded GO rail service and improved transit connectivity between cities and regions in the GTA planned by the City of Brampton, GO Transit, Metrolinx, City of Mississauga and York Region will, most likely, produce much higher modal splits than those observed in 2006. The transit coverage will also improve, providing many zones that did not previously have any transit service planned for, particularly in the northeast and the northwest, with coverage by primary, secondary, and local services.

3.2 Application and Results

The methodology described above was applied to the 2011-2031 horizon years' models. This chapter documents the resulting transit modal splits for trips to and from the City of Brampton along with the "existing" transit mode splits extracted from the 2006 TTS. This section reports on mode splits as calculated for 2006 base year and Alternatives 3 and 4 of the TTMP. The specifics on each Alternative are described in **Chapter 5**.

3.2.1 2006 Base Year Transit Mode Split

The split between peak hour auto drivers and peak hour transit users was extracted from the 2006 TTS to assess the current competitiveness of transit versus auto drivers. Auto passengers and other modes are not included in the calculation because the EMME/2 transportation model does not model these other modes. All trip purposes are considered in the data as well. **Table 3-2** below summarizes the transit mode splits for all Brampton-related trips.

Table 3-2: City of Brampton Transit Mode Splits, TTS 2006

Trips	From Brampton	To Brampton	Bram-Bram	All Bram Trips
Peak Hour Autos	43,800	55,100	26,200	72,700
Peak Hour Transit	2,600	5,700	1,700	6,600
Total	46,400	60,800	27,900	79,300
Transit MS %	**5.6%**	**9.4%**	**6.1%**	**8.3%**

According to the 2006 TTS, transit mode split, when compared only with auto drivers, accounts for 8.3% of travel to, from, and within the City of Brampton. This number increases for trips destined to Brampton, as these are the primarily home-based work trips (commuter trips) in the PM.

3.2.2 2031 Transit Mode Split, Alternative 3

The mode split methodology described in **Section 3.1** was applied to the proposed 2031 road and transit network as recommended by 2004 TTMP (Alternative 3). The resulting auto and transit matrices produced the mode splits listed in **Table 3-3**.

Table 3-3: City of Brampton PM Transit Mode Splits, 2004 TTMP 2031

Trips	From Brampton	To Brampton	Bram-Bram	All Bram Trips
Peak Hour Autos	112,400	119,600	70,400	161,500
Peak Hour Transit	7,900	23,100	6,500	24,500
Total	120,300	142,700	76,900	186,000
Transit MS %	**6.6%**	**16.2%**	**8.5%**	**13.2%**

Based on the 2004 TTMP recommended road and transit network, the overall Brampton transit mode split is 13.2%.

Detailed transit mode splits for specific O-D pairs, similar to those identified in the 2004 TTMP, are provided in **Table 3-4**. Traffic zone aggregation for the mode split table is provided in **Exhibit 3-5**.

Table 3-4: City of Brampton PM Transit Mode Splits, 2004 TTMP 2031 – Detailed Table

	Toronto CBD	Rest of Toronto	Etobicoke	York U	Durham	Other York Region	Richmond Hill & Markham	Vaughan	Caledon	NW Bram	BramWest	South Central Brampton	Queen St Corridor	North Central Brampton	Northeast Brampton	East Brampton	Southeast Brampton	Mississauga South	Hurontario St Corridor	Mississauga West	Mississauga East	Halton Hills	Malton	Other Halton	Hamilton	External	TOTAL
Toronto CBD	0.63	0.81	0.81	0.88	0.88	0.86	0.85	0.79	0.95	0.95	0.69	0.81	0.98	0.73	0.67	0.70	0.99	0.91	0.67	0.91	0.92	0.92	0.94	0.92	0.75	0.38	0.82
Rest of Toronto	0.57	0.29	0.33	0.37	0.10	0.15	0.12	0.13	0.21	0.49	0.23	0.33	0.58	0.41	0.31	0.35	0.45	0.35	0.31	0.32	0.20	0.08	0.30	0.30	0.10	0.04	0.28
Etobicoke	0.50	0.33	0.15	0.35	0.04	0.11	0.05	0.06	0.00	0.14	0.27	0.36	0.14	0.16	0.12	0.15	0.10	0.13	0.12	0.10	0.09	0.00	0.02	0.06	0.05	0.00	0.17
York U	0.67	0.41	0.28	0.29	0.21	0.12	0.22	0.24	0.00	0.20	0.42	0.46	0.20	0.19	0.18	0.21	0.13	0.31	0.26	0.19	0.06	0.00	0.44	0.00	0.00	0.01	0.29
Durham	0.12	0.05	0.09	0.37	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.04
Other York Region	0.09	0.04	0.08	0.00	0.03	0.06	0.05	0.01	0.00	0.20	0.00	0.00	0.00	0.12	0.00	0.01	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05
Richmond Hill & Markham	0.24	0.12	0.00	0.19	0.02	0.06	0.04	0.06	0.00	0.13	0.27	0.45	0.42	0.21	0.00	0.01	0.40	0.00	0.00	0.00	0.05	0.00	0.00	0.02	0.01	0.00	0.06
Vaughan	0.25	0.14	0.09	0.14	0.01	0.01	0.05	0.07	0.00	0.11	0.05	0.08	0.26	0.13	0.10	0.12	0.15	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.01	0.01	0.08
Caledon	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.11	0.05	0.13	0.23	0.10	0.06	0.04	0.06	0.03	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
NW Bram	0.09	0.01	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.09	0.03	0.04	0.06	0.04	0.00	0.07	0.02	0.00	0.06	0.00	0.01	0.00	0.00	0.03
BramWest	0.14	0.04	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.07	0.03	0.10	0.17	0.08	0.05	0.07	0.09	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.05
South Central Brampton	0.11	0.02	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.13	0.10	0.12	0.14	0.12	0.12	0.13	0.09	0.12	0.05	0.03	0.01	0.00	0.17	0.00	0.00	0.00	0.09
Queen St Corridor	0.33	0.09	0.08	0.18	0.00	0.00	0.04	0.00	0.00	0.21	0.24	0.26	0.17	0.20	0.24	0.24	0.12	0.06	0.04	0.02	0.10	0.04	0.05	0.00	0.00	0.04	0.16
North Central Brampton	0.11	0.01	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.07	0.06	0.02	0.10	0.11	0.04	0.01	0.05	0.01	0.00	0.07	0.01	0.00	0.00	0.00	0.04
Northeast Brampton	0.23	0.07	0.13	0.09	0.00	0.00	0.00	0.01	0.00	0.05	0.02	0.14	0.12	0.08	0.04	0.09	0.04	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.05
East Brampton	0.24	0.06	0.10	0.06	0.00	0.00	0.00	0.01	0.00	0.05	0.01	0.11	0.09	0.08	0.06	0.07	0.03	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.05
Southeast Brampton	0.43	0.02	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.06	0.03	0.05	0.11	0.07	0.04	0.08	0.11	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.05
Mississauga South	0.20	0.12	0.05	0.10	0.00	0.02	0.09	0.00	0.00	0.05	0.09	0.13	0.17	0.08	0.19	0.22	0.12	0.14	0.17	0.10	0.08	0.00	0.04	0.04	0.01	0.00	0.12
Hurontario Corridor	0.19	0.13	0.11	0.21	0.00	0.00	0.00	0.00	0.00	0.16	0.14	0.21	0.26	0.16	0.08	0.09	0.14	0.11	0.09	0.08	0.04	0.00	0.00	0.01	0.03	0.00	0.09
Mississauga West	0.16	0.07	0.06	0.08	0.00	0.00	0.02	0.00	0.00	0.15	0.03	0.10	0.20	0.17	0.06	0.09	0.09	0.07	0.07	0.05	0.04	0.00	0.05	0.01	0.00	0.00	0.06
Mississauga East	0.23	0.08	0.07	0.07	0.01	0.00	0.01	0.02	0.00	0.15	0.12	0.16	0.27	0.17	0.15	0.19	0.10	0.10	0.12	0.05	0.04	0.01	0.00	0.00	0.00	0.00	0.08
Halton Hills	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Milton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.00	0.02
Other Halton	0.06	0.03	0.04	0.00	0.02	0.00	0.00	0.00	0.15	0.04	0.00	0.00	0.05	0.01	0.02	0.03	0.02	0.06	0.05	0.04	0.01	0.00	0.00	0.04	0.03	0.00	0.03
Hamilton	0.26	0.19	0.05	0.09	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.07	0.01	0.23	0.35	0.00	0.16	0.23	0.13	0.00	0.00	0.12	0.04	0.17	0.00	0.15
External	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
TOTAL	0.54	0.36	0.23	0.32	0.09	0.10	0.14	0.13	0.13	0.22	0.09	0.16	0.33	0.12	0.11	0.14	0.32	0.23	0.13	0.15	0.17	0.05	0.07	0.11	0.15	0.01	0.20

Table 3-5: City of Brampton PM Transit Mode Splits, TTMP Update 2031 – Detailed Table

	Toronto CBD	Rest of Toronto	Etobicoke	York U	Durham	Other York Region	Richmond Hill & Markham	Vaughan	Caledon	NW Bram	BramWest	South Central Brampton	Queen St Corridor	North Central Brampton	Northeast Brampton	East Brampton	Southeast Brampton	Mississauga South	Hurontario St Corridor	Mississauga West	Mississauga East	Halton Hills	Malton	Other Halton	Hamilton	External	TOTAL
Toronto CBD	0.63	0.81	0.82	0.88	0.89	0.86	0.86	0.80	0.96	0.95	0.65	0.74	0.98	0.67	0.60	0.64	0.99	0.93	0.87	0.92	0.93	0.93	0.95	0.92	0.76	0.44	0.82
Rest of Toronto	0.57	0.28	0.33	0.37	0.10	0.15	0.12	0.13	0.21	0.41	0.17	0.23	0.54	0.33	0.25	0.29	0.42	0.42	0.61	0.43	0.18	0.09	0.39	0.39	0.08	0.05	0.28
Etobicoke	0.48	0.31	0.14	0.34	0.04	0.10	0.05	0.05	0.00	0.13	0.22	0.31	0.10	0.13	0.11	0.12	0.10	0.17	0.29	0.14	0.06	0.00	0.02	0.10	0.05	0.00	0.17
York U	0.67	0.40	0.28	0.29	0.21	0.12	0.21	0.24	0.00	0.18	0.34	0.45	0.19	0.16	0.17	0.18	0.13	0.35	0.41	0.21	0.07	0.00	0.66	0.00	0.00	0.01	0.29
Durham	0.12	0.05	0.07	0.36	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.04
Other York Region	0.08	0.03	0.08	0.00	0.03	0.06	0.05	0.01	0.00	0.13	0.00	0.00	0.06	0.12	0.00	0.00	0.00	0.03	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05
Richmond Hill & Markham	0.24	0.12	0.00	0.18	0.02	0.06	0.04	0.06	0.00	0.11	0.25	0.35	0.34	0.13	0.00	0.01	0.34	0.00	0.00	0.00	0.05	0.00	0.00	0.02	0.01	0.00	0.06
Vaughan	0.25	0.15	0.10	0.14	0.01	0.01	0.05	0.07	0.00	0.08	0.04	0.04	0.19	0.10	0.08	0.09	0.12	0.00	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.08
Caledon	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.01	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
NW Bram	0.19	0.00	0.03	0.09	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.10	0.09	0.03	0.09	0.10	0.05	0.03	0.14	0.01	0.00	0.06	0.01	0.01	0.00	0.00	0.04
BramWest	0.26	0.10	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.14	0.07	0.19	0.28	0.17	0.11	0.15	0.16	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.10
South Central Brampton	0.19	0.09	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.19	0.15	0.16	0.21	0.18	0.18	0.18	0.13	0.13	0.05	0.03	0.02	0.00	0.18	0.00	0.00	0.01	0.13
Queen St Corridor	0.40	0.15	0.11	0.30	0.00	0.00	0.08	0.00	0.00	0.24	0.28	0.27	0.19	0.23	0.28	0.27	0.12	0.13	0.22	0.05	0.12	0.05	0.05	0.00	0.00	0.04	0.19
North Central Brampton	0.18	0.02	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.11	0.08	0.03	0.13	0.14	0.04	0.02	0.14	0.01	0.00	0.08	0.01	0.00	0.00	0.00	0.05
Northeast Brampton	0.22	0.11	0.13	0.12	0.00	0.00	0.00	0.02	0.00	0.04	0.02	0.14	0.11	0.09	0.04	0.09	0.03	0.00	0.00	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.05
East Brampton	0.26	0.17	0.14	0.18	0.00	0.00	0.00	0.03	0.00	0.08	0.04	0.13	0.12	0.12	0.12	0.11	0.03	0.00	0.00	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.08
Southeast Brampton	0.49	0.07	0.06	0.10	0.00	0.00	0.04	0.00	0.00	0.22	0.16	0.17	0.23	0.24	0.13	0.17	0.13	0.07	0.12	0.05	0.08	0.00	0.00	0.00	0.00	0.03	0.13
Mississauga South	0.17	0.10	0.05	0.10	0.00	0.04	0.08	0.00	0.00	0.04	0.07	0.08	0.09	0.06	0.13	0.15	0.04	0.14	0.21	0.11	0.06	0.00	0.04	0.06	0.00	0.00	0.12
Hurontario Corridor	0.15	0.09	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.06	0.12	0.03	0.02	0.02	0.07	0.11	0.13	0.09	0.02	0.00	0.00	0.05	0.02	0.00	0.08
Mississauga West	0.16	0.06	0.05	0.05	0.00	0.00	0.03	0.00	0.00	0.12	0.02	0.05	0.14	0.11	0.04	0.06	0.05	0.10	0.12	0.07	0.04	0.00	0.07	0.01	0.00	0.00	0.07
Mississauga East	0.24	0.09	0.07	0.08	0.01	0.00	0.01	0.02	0.00	0.12	0.10	0.12	0.22	0.13	0.13	0.16	0.08	0.16	0.37	0.09	0.03	0.01	0.00	0.01	0.00	0.00	0.10
Halton Hills	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.04
Milton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.02	0.00	0.10	0.00	0.02
Other Halton	0.06	0.02	0.05	0.00	0.03	0.00	0.00	0.00	0.23	0.04	0.00	0.00	0.05	0.01	0.02	0.03	0.02	0.07	0.10	0.04	0.00	0.00	0.00	0.04	0.03	0.00	0.04
Hamilton	0.27	0.22	0.04	0.08	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.08	0.00	0.28	0.26	0.00	0.16	0.32	0.15	0.00	0.00	0.12	0.05	0.17	0.00	0.15
External	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
TOTAL	0.53	0.36	0.23	0.32	0.09	0.10	0.14	0.13	0.14	0.22	0.10	0.16	0.34	0.13	0.12	0.14	0.30	0.26	0.25	0.18	0.17	0.05	0.08	0.12	0.15	0.02	0.21

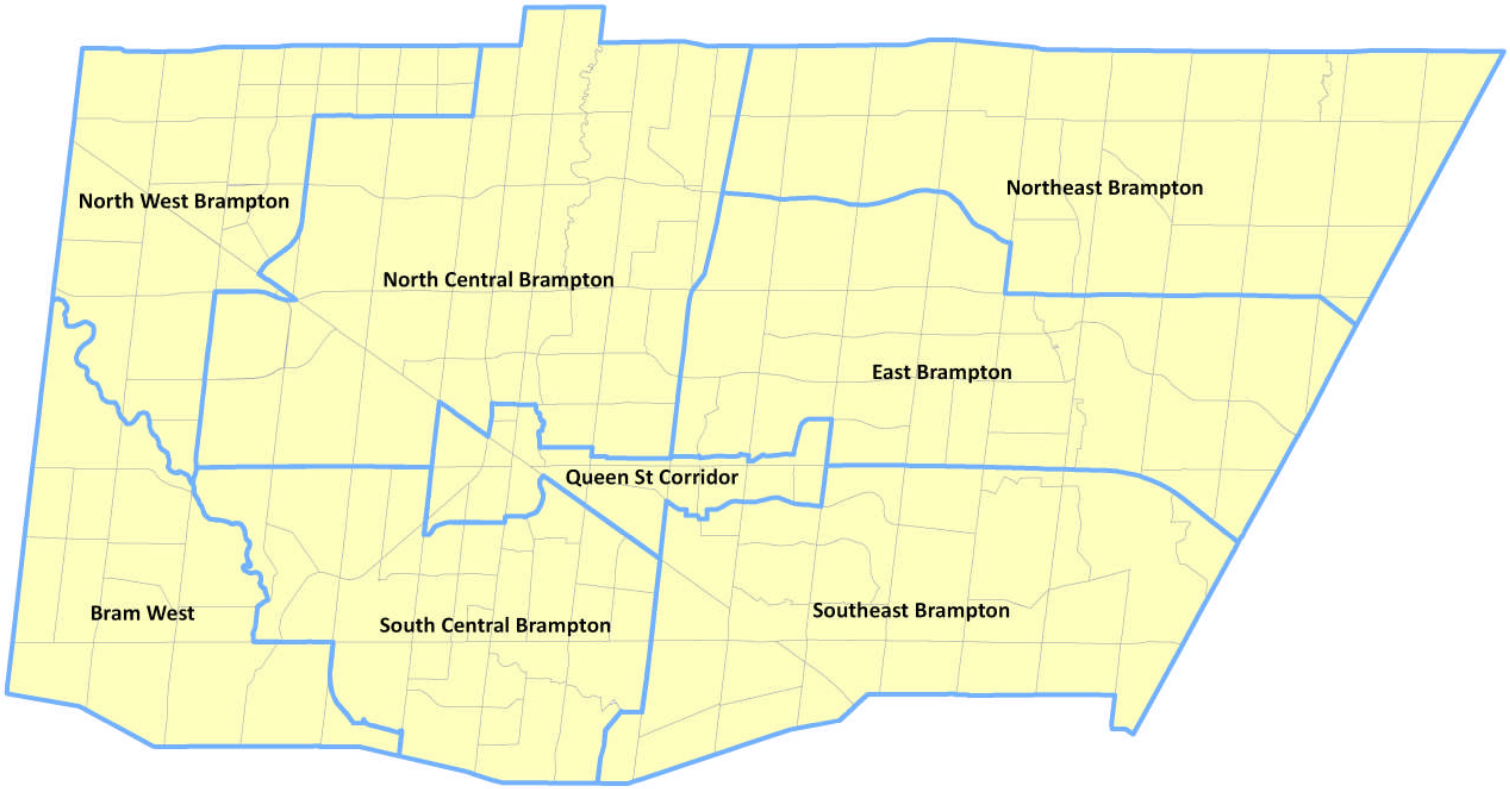


Exhibit 3-5: Transit Mode Split Aggregation

3.2.3 2031 Transit Mode Split, Alternative 4

The TTMP Sustainable Update 2009 proposes a number of improvements beyond the 2004 TTMP transit network, including:

- Extending Hurontario BRT north of Bovaird to Mayfield Road or beyond
- Extending Steeles BRT west of Mississauga Road to Lisgar GO Station
- New Mississauga Road BRT from Bovaird south into City of Mississauga
- Extending Queen BRT west of Chinguacousy to Mississauga Road
- Extending Bovaird BRT west of Mount Pleasant GO Station to meet new Mississauga Road BRT
- Identification of Primary and Secondary transit service and / or corridors.

These improvements were incorporated into the mode split model. The resulting transit mode splits are listed in **Table 3-6**.

Table 3-6: City of Brampton PM Transit Mode Splits, TTMP Update 2031

Trips	From Brampton	To Brampton	Bram-Bram	All Bram Trips
Peak Hour Auto Trips	107,300	110,600	66,000	151,900
Peak Hour Transit Trips	14,800	27,700	12,200	30,200
Total	122,100	138,300	78,200	182,100
Transit MS %	**12.1%**	**20.0%**	**15.6%**	**16.6%**

The detailed transit mode split table is provided in **Table 3-5**.

Comparing **Table 3-4** and **Table 3-5**, significant transit mode split increases are observed for trips originating in Bram-West, South Central Brampton, and South East Brampton, increasing from five, nine and five percent respectively to ten, 13, and 13 percent with the TTMP update. Trips destined to the Hurontario Street Corridor from all origins also see a significant increase from 13% in the 2004 TTMP to 26% in the TTMP update.

4. LAND USE FORECASTS AND TRIP DISTRIBUTION

4.1 Land Use

The 2031 land use forecasts for the TTMP analysis are based on the sources listed in **Table 4-1**:

Table 4-1: Population and Employment Forecast Sources

Population and Employment Forecasts for:	Source
Brampton	City of Brampton, June 2008
Caledon	Region of Peel, February 2007
Mississauga	Region of Peel, February 2007
Halton	Region of Halton, September 2008
York Region	York Region, February 2007
Toronto	City of Toronto, July 2008
Durham	City of Brampton EMME/2 Model
Hamilton	City of Hamilton, July 2008

The 2031 population and employment forecasts are summarized in **Table 4-2**.

Table 4-2: Population and Employment 2031 Forecast Totals

Municipality	2031 Population	2031 Employment
Brampton	758,000	320,000
Caledon	113,000	48,600
Mississauga	784,000	504,000
Peel Total	**1,590,000**	**863,000**
Halton	780,000	390,000
York Region	1,507,000	799,000
Toronto	2,881,500	1,834,300
Durham	1,000,000	434,000
Hamilton	660,000	301,000

Traffic zone based land use forecasts for each respective Regional Municipality were obtained directly from the respective Region. The forecasts incorporate intensification centres and corridors identified in the Province of Ontario's "Places to Grow" Provincial Growth Plan as incorporated by the agencies by June 2008.

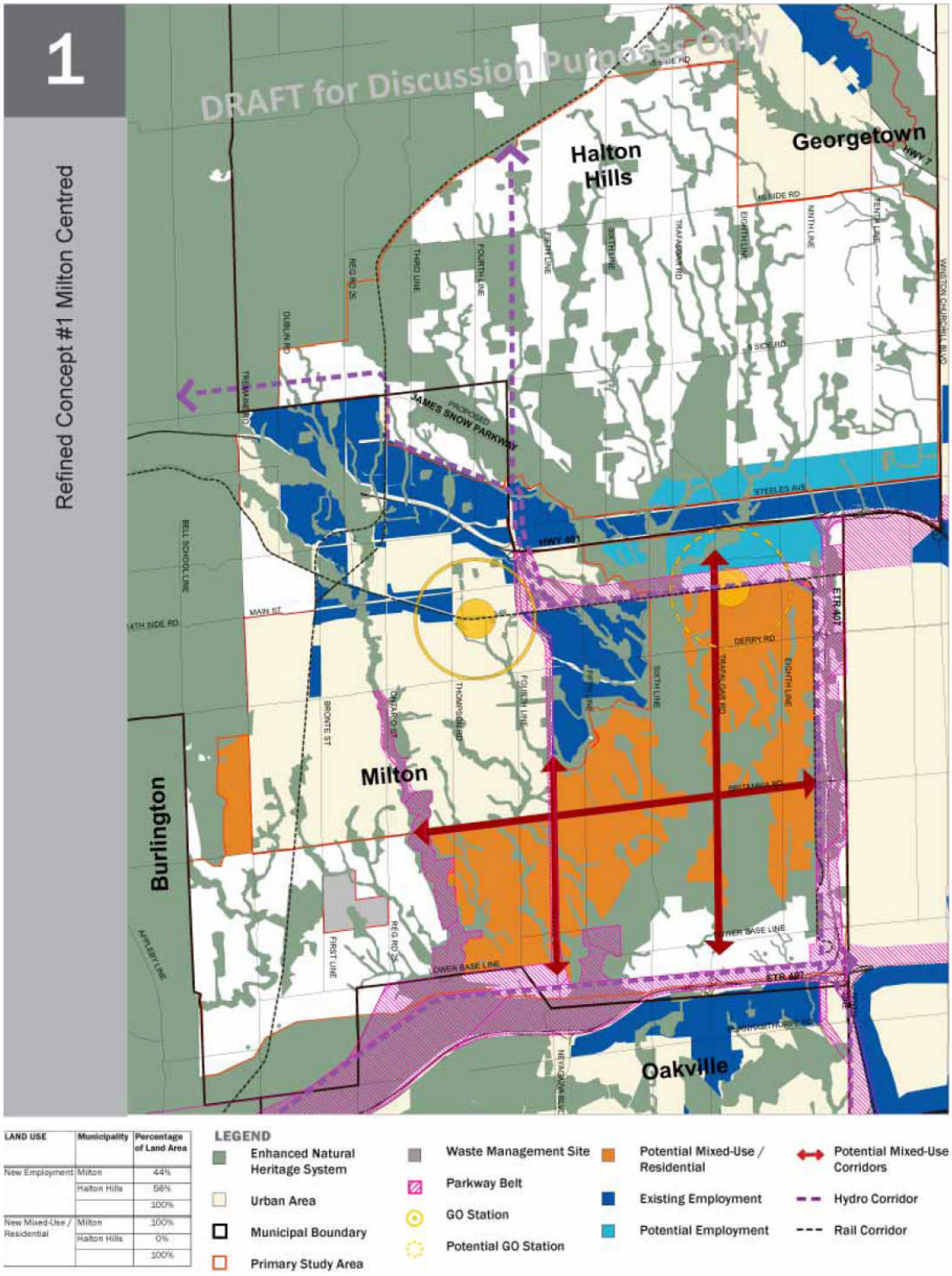
Land use forecast for the Region of Halton are derived from preliminary and unconfirmed employment and population estimates for the Sustainable Halton planning process. The Sustainable Halton process is an on-going Regional effort to establish potential new growth

and intensification areas in conformance to Places to Grow Plan and the directions set in the Regional Official Plan.

Phase II of the Sustainable Halton identified five preferable 2031 land use options. Land Use Concept 1 – "Milton Centred," illustrated in **Exhibit 4-1,** assumes all new residential growth is allocated within Milton and employment growth is located in the north-east areas of Milton and the Highway 401 corridor in Halton Hills. This concept assumes intensification occurring in each of the area municipalities except Halton Hills. Sustainable Halton Phase II Concept 1 has been adopted by the Brampton TTMP Update study as it represents the most conservative option for estimating cross boundary demand between the areas of Halton Hills and Brampton. The Brampton TTMP Update team used the preliminary, unconfirmed growth and intensification totals provided by Halton Region and Urban Strategies in September 2008 to allocate growth and intensification estimates to traffic zones in the study area.

It is recognized that this analysis is based on the June 2008 forecasts and that new population and employment forecasts are being developed for the City in accordance with Growth Plan compliance work based on City-wide totals of 738,000 people and 318,000 jobs by the year 2031. Given the sensitivity levels of the transportation modelling, the City wide nature of technical analysis undertaken and considering the distribution of the changes discussed with City staff, we are confident in the conclusions included in this report notwithstanding this evolution of the land use information. As part of finalizing TTMP documentation, the transportation model will be rerun with the most up to date land use information available from the City / Peel Region Growth Plan Compliance exercise

Land Use assumptions for areas within the City of Brampton for the horizon years 2006, 2011, 2016, 2021, and 2031 are presented in **Table 4-3**.



LAND USE	Municipality	Percentage of Land Area
New Employment	Milton	44%
	Halton Hills	56%
		100%
New Mixed-Use / Residential	Milton	100%
	Halton Hills	0%
		100%

Exhibit 4-1: Sustainable Halton Option 1 – Milton Centred

Table 4-3: Land Use Assumptions for the City of Brampton, 2006 - 2031

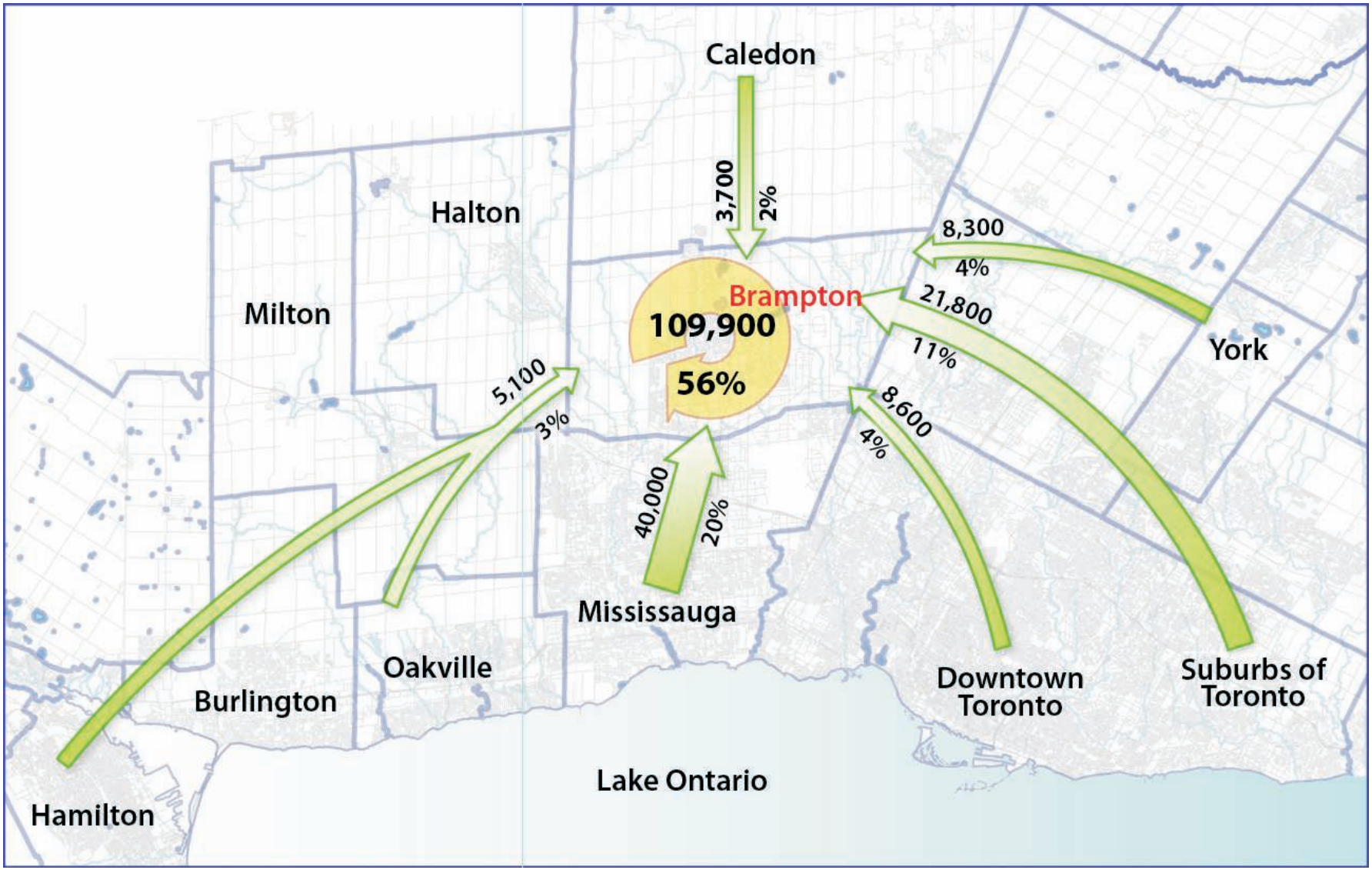
	2006		2011		2016		2021		2031	
Secondary Area	**Pop**	**Emp**	**Pop**	**Emp**	**Pop**	**Emp**	**Pop**	**Emp**	**Pop**	**Emp**
SP41 - BramEast	18,460	2,660	35,580	4,310	45,350	6,060	47,270	7,760	47,270	9,190
SP46 - BramWest	6,489	3,960	13,457	13,820	24,793	22,070	35,731	27,120	47,771	33,872
SP47 - Highway 427 Industrial	500	270	500	3,280	500	7,200	11,670	11,670	34,490	17,030
SP51 - Mount Pleasant	236	12	1,396	32	17,650	1,023	33,971	2,092	51,740	2,742
SP52 - Huttonville North	146	7	146	7	146	7	146	923	18,232	6,332
SP53 - Mount Pleasant West	104	73	104	73	104	73	4,107	2,447	20,017	11,309
Rest of Brampton	425,653	147,851	482,815	181,533	510,790	202,564	526,311	221,771	538,790	239,529
Total	451,588	154,833	53,3998	203,055	599,333	238,997	659,206	273,783	758,310	320,004

4.2 Trip Distribution

It is estimated that during the average weekday PM peak period in 2006 over 55% of travel originating in Brampton was internal to the City, approximately 20.2% of total trips originated in Mississauga, 14.4% in Toronto and 2.6% in Halton and Hamilton. By 2031 the percentage of internal travel with trip origins in Brampton is expected to increase to 57.2%. Mississauga will still remain the major origin of trips external to Brampton and will generate an estimated 14.3% of trips. Following the anticipated increase in employment in Milton and Halton Hills, travel from Halton is expected to increase to 5.3%. The overall contribution to Brampton's travel from Toronto will increase to over 15%. Trips from York Region will increase slightly to 4.8%. The 2006 and 2031 trip distribution patterns by trip origin are summarized in **Table 4-4**, **Exhibit 4-2,** and **Exhibit 4-3**.

Table 4-4: Travel to Brampton, All Purposes, Person Travel, 2006 and 2031 PM Peak Period

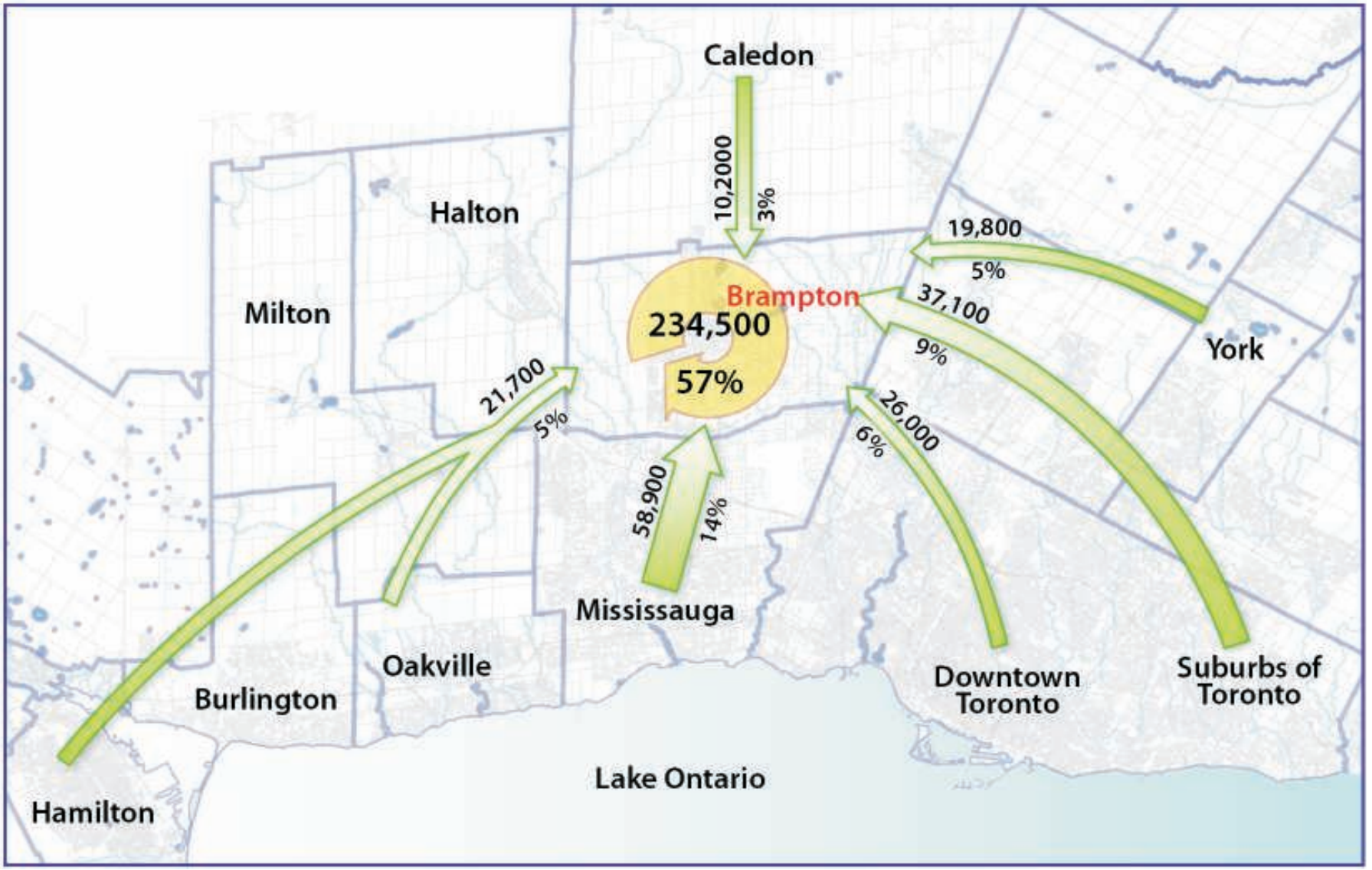
From	To	2006		2031	
Toronto CBD	Brampton	8612	4.4%	25998	6.3%
Rest of Toronto		21774	11.0%	37109	9.0%
Durham Region		450	0.2%	1369	0.3%
York Region		8288	4.2%	19760	4.8%
Caledon		3665	1.9%	10204	2.5%
Brampton		109912	55.6%	234504	57.2%
Mississauga		40048	20.2%	58890	14.3%
Halton		5108	2.6%	21684	5.3%
Total		197587	100.0%	409518	100.0%



Not To Scale

Exhibit 4-2

Travel to Brampton, PM Peak Period, 2006 TTS



Not To Scale

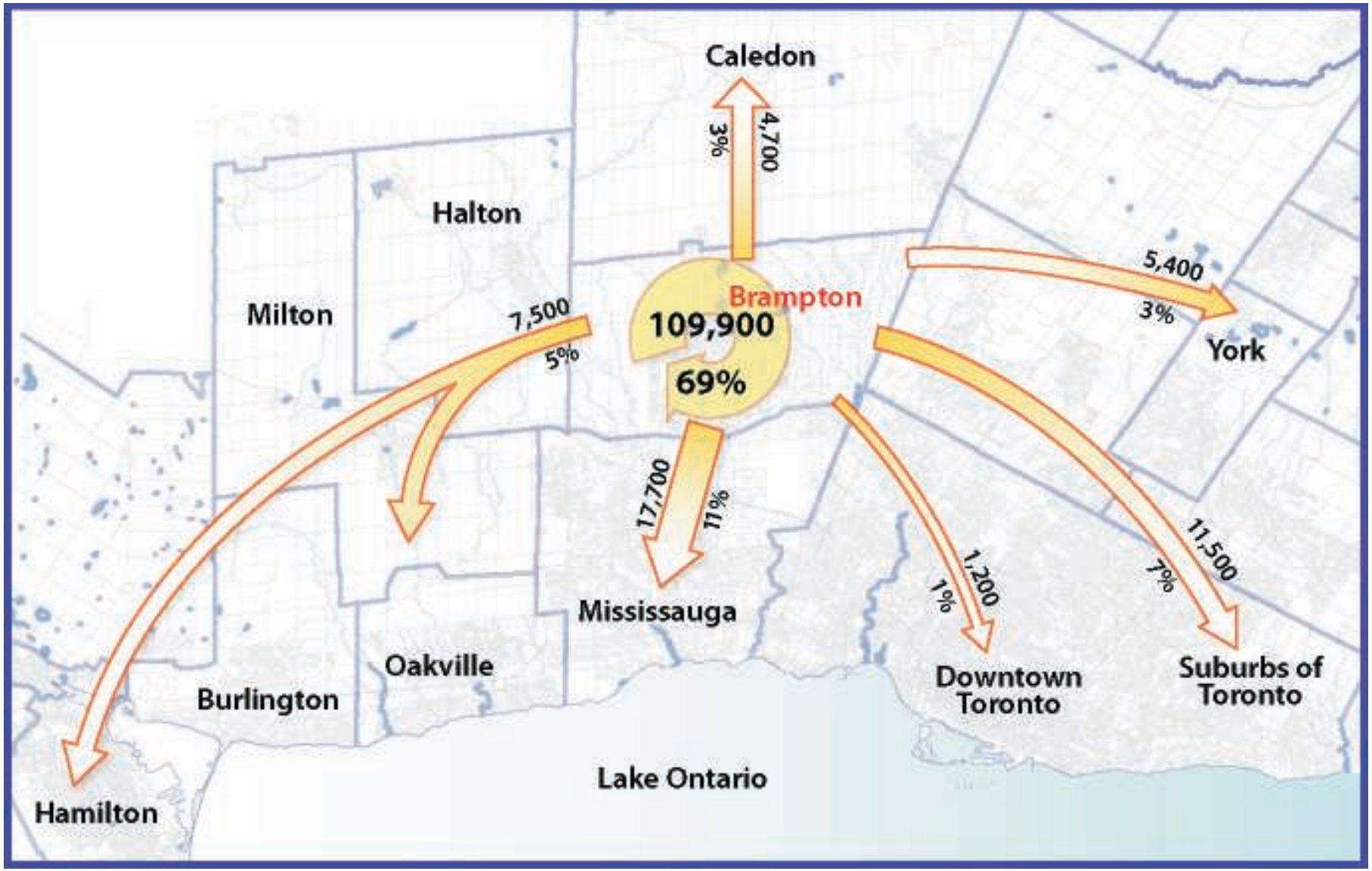
Exhibit 4-3

Travel to Brampton, PM Peak Period, 2031 TTMP Model

With respect to 2006 PM peak period person trips originating in Brampton, over 11.2% were destined to Mississauga, 8.0% to Toronto, 4.7% to Halton, and 3.4% in York Region. Although Mississauga will remain the major destination point for trips originating in Brampton, by 2031 the overall proportion of travel destined to Brampton's southern neighbour will decrease to 13.9%. More people will travel to Halton (5.0%) and York (3.6%). Fewer people will travel to Toronto (5.3%). The 2006 and 2031 trip patterns by trip destination are illustrated in **Table 4-5**, **Exhibit 4-4** and **Exhibit 4-5**.

Table 4-5: Travel from Brampton, All Purposes, Person Travel, 2006 and 2031 PM Peak Period

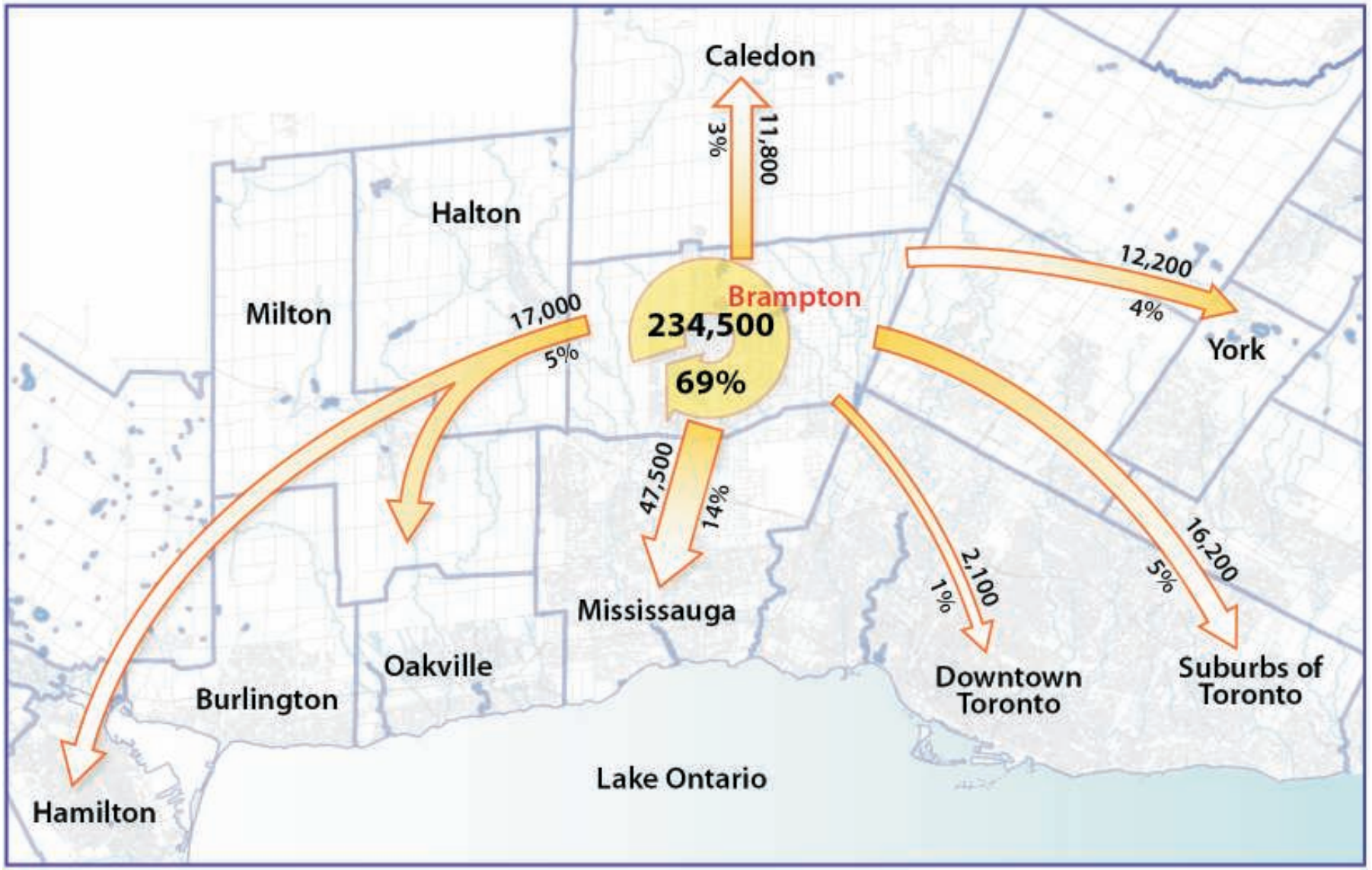
From	To	2006		2031	
Brampton	Toronto CBD	1220	0.8%	2107	0.6%
	Rest of Toronto	11478	7.2%	16204	4.7%
	Durham Region	664	0.4%	1394	0.4%
	York Region	5419	3.4%	12174	3.6%
	Caledon	4710	3.0%	11765	3.4%
	Brampton	109912	69.3%	234504	68.5%
	Mississauga	17692	11.2%	47478	13.9%
	Halton	7497	4.7%	16958	5.0%
Total:		158592	100.0%	342584	100.0%



Not To Scale

Exhibit 4-4

Travel from Brampton, PM Peak Period, 2006 TTS



Not To Scale

Exhibit 4-5

Travel from Brampton, PM Peak Period, 2031 TTMP Model

5. TTMP ALTERNATIVES

The purpose of the TTMP Sustainable Update 2009 is to reconfirm and enhance, if necessary the transportation vision developed in 2004. However, to meet the requirements of the Environmental Assessment process, the current TTMP Sustainable Update 2009 followed the requirements of Phases 1 and 2 of the Environmental Assessment process. The project team identified and evaluated four long-term, alternative transportation planning options. The transportation planning options were evaluated for 2031 travel demands against a set of Evaluation Criteria.

5.1 The Alternatives

The TTMP alternatives listed in **Table 5-1** are analyzed as part of Phase 2 of the Municipal Class EA process.

Table 5-1: Future Transportation Alternatives

Alternative #	2031 Transit Improvements	2031 Road Improvements
1	No change from existing	No change from existing
2	Transit improvements recommended in 2004 TTMP	No change from existing
3	Transit improvements recommended in 2004 TTMP	Road improvements recommended in 2004 TTMP
4	Preliminary transit improvements recommended in the 2009 TTMP	Preliminary road improvements recommended in the 2009 TTMP

5.1.1 Alternative 1: Do Nothing

To establish the need for transportation improvements, a "Do Nothing" alternative was assessed, by assigning projected 2031 travel demands to the existing transportation network. To assess the road network's ability to service travel demand, volume to capacity ratios across screenlines were calculated. These ratios are illustrated schematically over a map of the City in **Exhibit 5-1** and **Exhibit 5-2**

Exhibit 5-1

Alternative 1 Screenline V/C Ratios

PM Peak Hour, East-West Traffic, Peak Direction

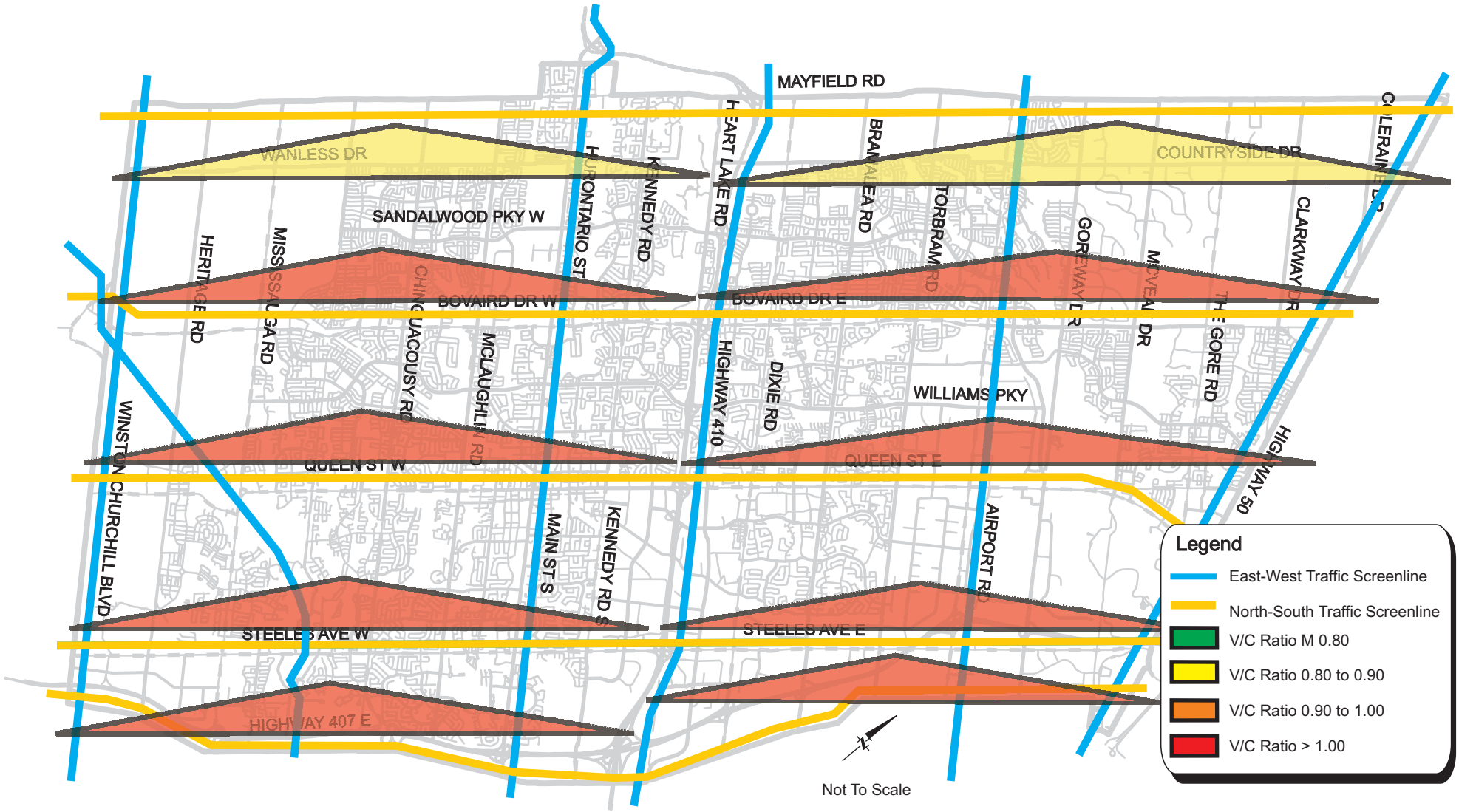


Exhibit 5-2
Alternative 1 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

Clearly, significant improvements to the transportation network are required by 2031 as 18 of 21 screenlines have a V/C ratio greater than one.

5.1.2 Alternative 2: Transit-Only

Alternative 2 assesses the 2031 travel demand assuming that the 2004 TTMP recommended transit network is implemented with no road network improvements.

The recommended 2021 transit network from the 2004 Brampton TTMP proposes specific BRT, primary and secondary corridors, illustrated below in **Exhibit 5-3**.
Analyses for potential enhancements to the above transit network are documented in **Chapter 6**.

Screenline volume-to-capacity ratios for Alternative 2 are illustrated in **Exhibit 5-4** and **Exhibit 5-5** below.

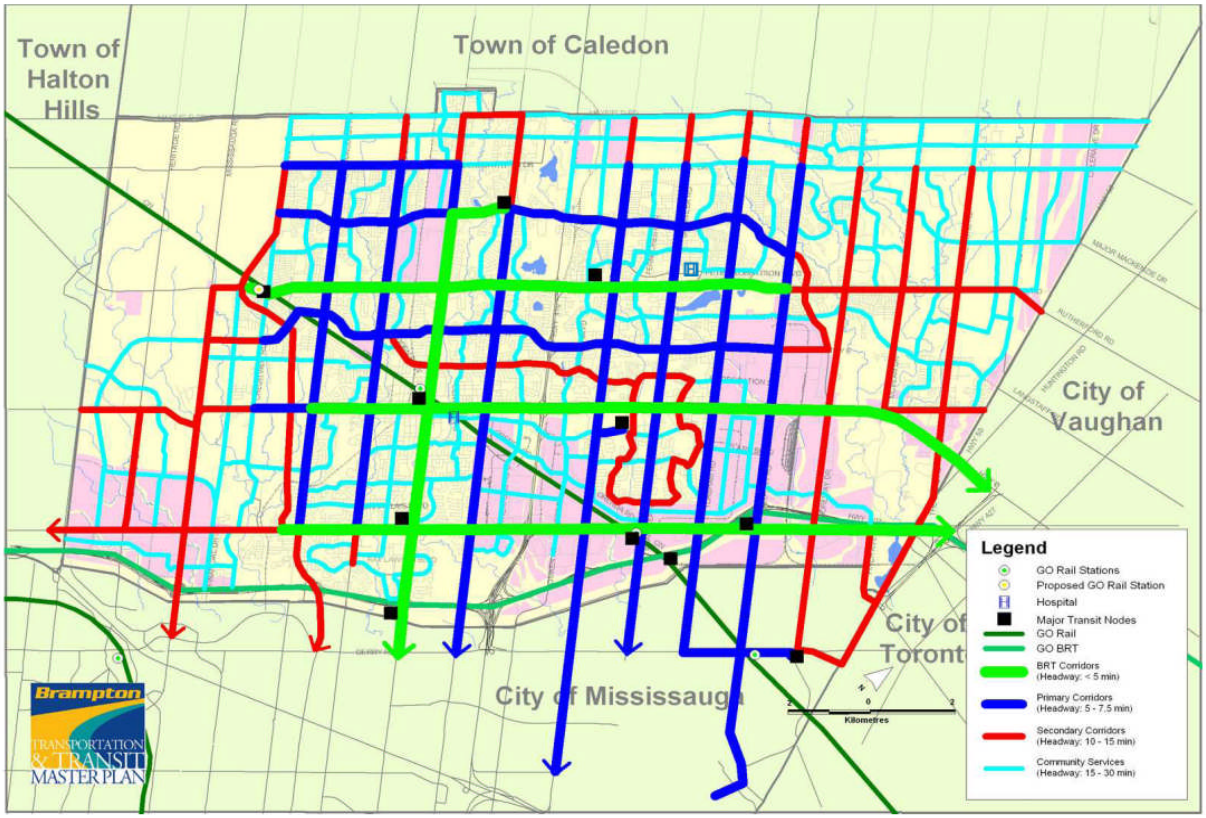


Exhibit 5-3: Recommended Transit Network for 2021, 2004 TTMP

Exhibit 5-4

Alternative 2 Screenline V/C Ratios

PM Peak Hour, East-West Traffic, Peak Direction

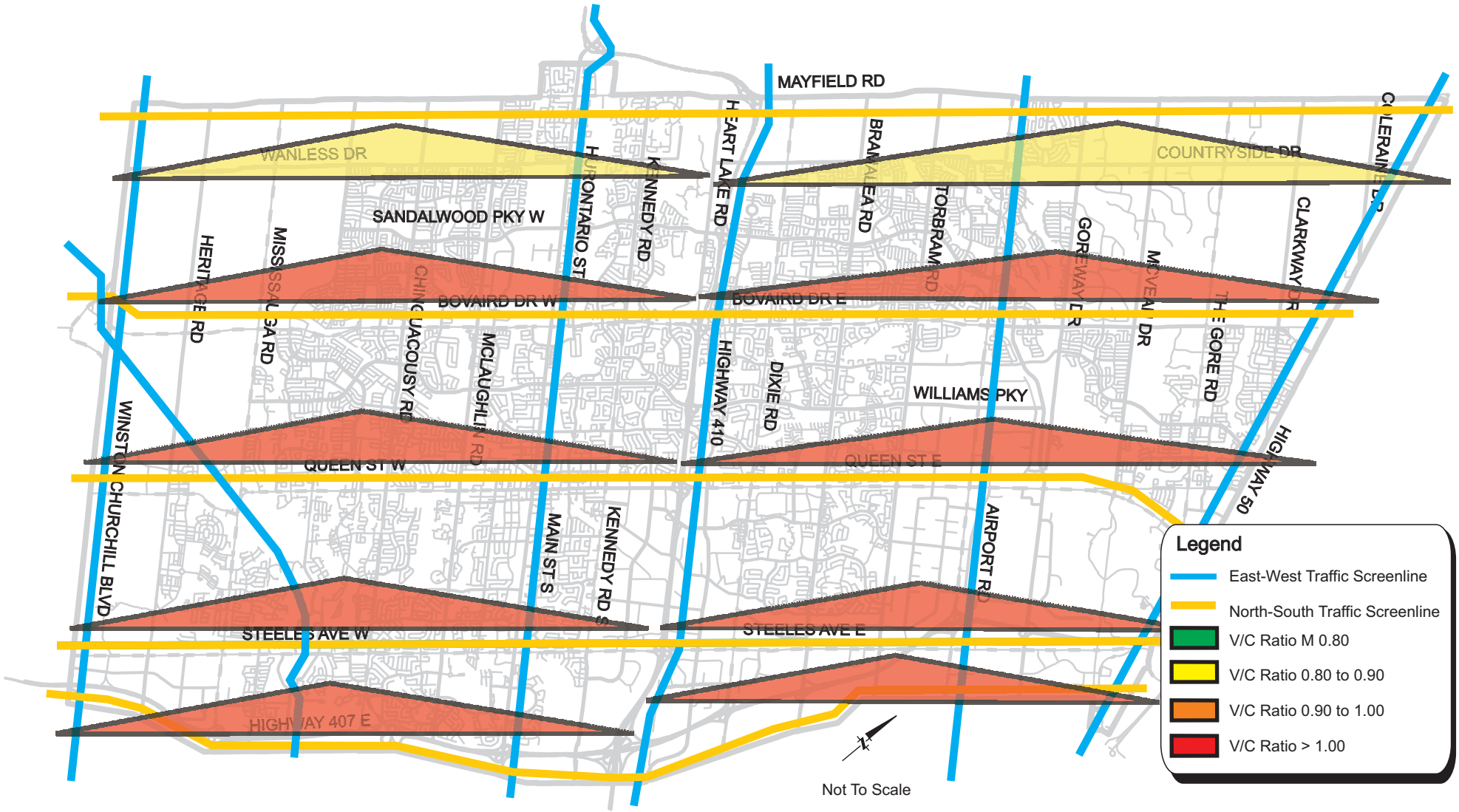


Exhibit 5-5
Alternative 2 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

With transit improvements only in Alternative 2, the screenline volume-to-capacity performance is almost exactly the same as Alternative 1, with only one screenline improving from over 1.0 to the 0.9 to 1.0 range. It is clear that improvements to both the transit and road networks are required to ensure an efficient transportation system.

5.1.3 Alternative 3: Currently Planned Transit and Road Network Improvements

The recommended transit (**Exhibit 5-3)** and road networks (**Exhibit 5-6**) from the 2004 TTMP serve as the base for the TTMP Sustainable Update 2009 and the analyses documented later on in the report are required to justify the recommended changes to this road network.

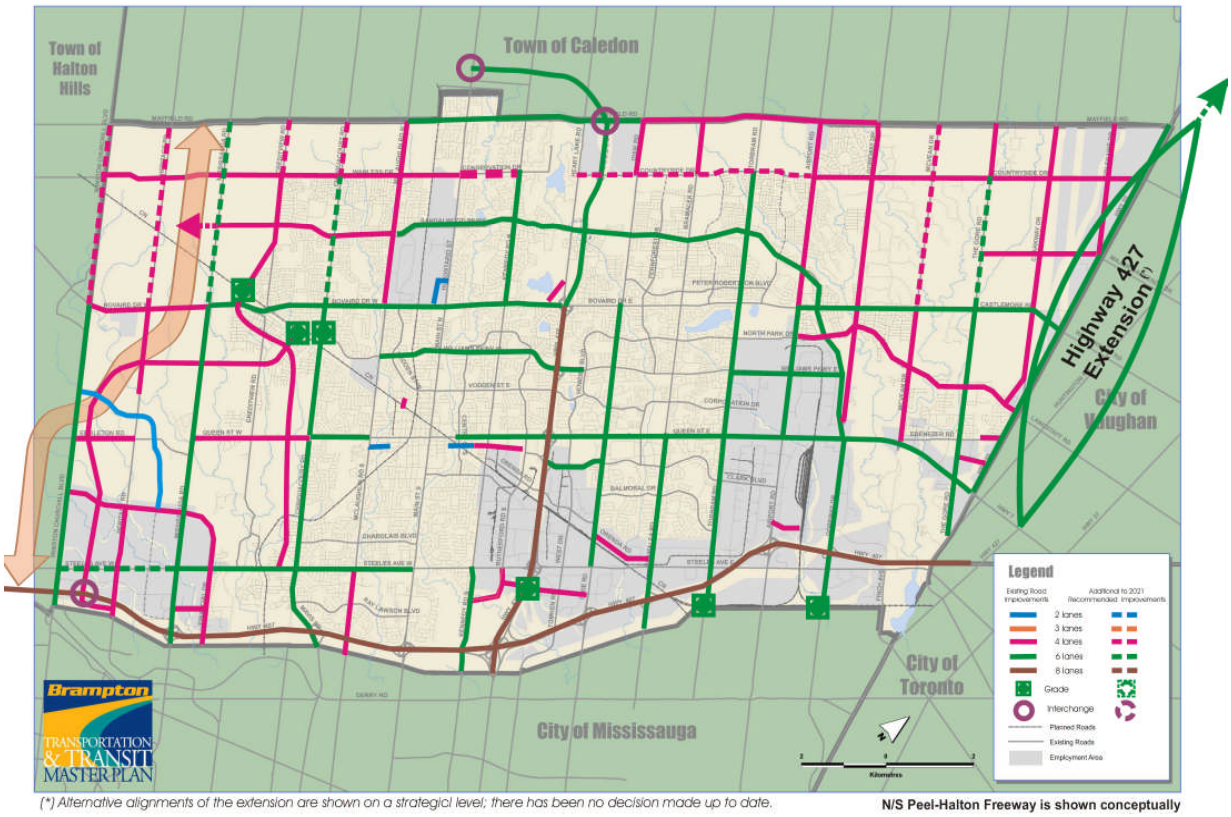


Exhibit 5-6: Recommended 2031 Road Network, 2004 TTMP

Exhibit 5-7

Alternative 3 Screenline V/C Ratios

PM Peak Hour, East-West Traffic, Peak Direction

Exhibit 5-8
Alternative 3 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

Improvements recommended in the 2004 TTMP have a positive effect on screenline V/C ratios. However, over half (13 out of 21) of the screenlines are significantly congested with a V/C ratio greater than 0.9.

Further improvements to the road network are required to improve the overall efficiency of the transportation network.

5.1.4 Alternative 4 – TTMP Update Transit and Road Network Improvements

The updated TTMP transit and road networks supersede the 2004 TTMP's recommended networks. Increased transit mode split, (as described in **Section 3.2**), enhanced transit service, and an enhanced auto network result in improved screenline volume-to-capacity ratio results, as illustrated in **Exhibit 5-9** and **Exhibit 5-10.** For reference, the TTMP update transit and road networks are illustrated in **Exhibit 9-4** and **Exhibit 9-9**, respectively in **Chapter 9**.

The modeling for alternative 4 also included the assumption of BRT lanes being widened for HOV and transit lanes. Thus, for all six lane roadways coinciding with BRT corridors, a simple capacity reduction was included to account for the presence of HOV and transit. The capacity reduction assumed 30% capacity in the HOV and transit lane only – i.e. if the roadway assumed 900 vehicle capacity per hour per lane, then the HOV was assumed to have a capacity of 270.

Exhibit 5-9
Alternative 4 Screenline V/C Ratios
PM Peak Hour, East-West Traffic, Peak Direction

Exhibit 5-10
Alternative 4 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

With the improvements recommended in the TTMP update, less than 50% of screenlines are congested.

5.2 Network Performance of Alternatives

The performance and impact of the transportation options were evaluated using a consistent set of evaluation criteria. They reflect broad community goals and objectives expressed in the Growth Management Plan, Regional and Provincial growth objectives.

The five evaluation criteria were:
- Supporting sustainable development
- Protecting the natural environment
- Supporting economic vitality
- Providing efficient and multimodal transportation for people and goods
- Maintaining cost effectiveness

Table 5-2 shows how each criterion relates to the goals of the Growth Management Plan and which performance indicators were used in the rating of each individual criterion. **Table 5-6** presents the performance of each of the transportation planning alternatives set against the evaluation criteria.

Table 5-2: Evaluation Criteria

Criteria	Relation to Problem Statement	Performance Indicators
1. Supporting sustainable development	Meets requirements of growth management strategies defined by the Town, Region and the Province. Supports land use intensification along transit corridors and other key areas.	Average transit modal split, 2031 PM peak hour.
2. Protecting natural environment	Minimizes impact on the natural environment by improving air quality and reducing land loss to roadway construction.	GHG weekday peak periods auto travel emissions 2031 tonnes / year.
3. Supporting economic vitality	Promotes economic viability and recognizes the transportation needs of local businesses. Improves quality of life by reducing congestion Promotes live-work communities.	Percent network congested, 2031 PM peak hour
4. Providing efficient and multimodal transportation for people and goods	Provides for safe and efficient mobility to transit vehicles, passenger cars and trucks, cyclists and walkers. Promotes modal integration, supports goals of travel demand management. Meets future travel demand at the acceptable level of service. Protects residential neighbourhoods from traffic infiltration and improves access safety.	Screenline V/C ratios, 2031 PM peak hour. Vehicle kilometres of travel by road type, 2031 PM peak hour.

Criteria	Relation to Problem Statement	Performance Indicators
5. Cost effectiveness	Is affordable and has acceptable cost-to-benefit ratio. Provides funding to all modes of travel including transit, carpooling, cycling and walking.	Estimated cost of the required infrastructure improvements ($). Cost allocation between motorized and non-motorized modes of transportation.

Each alternative is also evaluated for various network-wide performance measures, on arterial roads and major collectors only. The evaluation is presented in **Table 5-3.** A screenline summary compares the five alternatives in **Table 5-4.**

Table 5-3: Arterial Road Network Performance

Performance measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
% Network congested (by lane km)	58%	56%	21%	16%
Total travel time (hours)	58,200	52,900	28,300	26,900
Vehicle-kilometres travelled	1,808,400	1,754,500	1,862,800	1,839,600
Annual GHG (tonnes / weekday peak periods of auto travel)	422,788	404,548	303,316	292,296
Annual GHG (tonnes / weekday peak period of auto travel)*	0.56	0.53	0.4	0.38
Annual hours of congestion	58,711,700	51,646,100	14,897,800	13,234,300

*Note: Future GHG estimates account for improvements in vehicle emissions. The 24% GHG decrease by 2031 is based on the average 0.94% per annum decreased in GHG emissions observed in Canada in transportation sector (small and large cars only) between 1997 and 2006 and reported by Natural Resources Canada (http://oee.nrcan.gc.ca/corporate/statistics).

Improvements recommended in both the 2004 TTMP and the TTMP Sustainable Update 2009 show significant improvements over the "Do Nothing" scenarios presented in Alternatives 1 and 2. Alternative 4 clearly builds upon the improvements in Alternative 3, further decreasing the percentage of congested roads from 21% to 16%, decreasing total annual travel time by 1,400 hours, overall vehicle-kilometres travelled by 22,400, annual weekday peak periods auto travel GHG emissions by 11,020 tonnes, and annual hours of congestion by 1.66 million.

As discussed earlier, the two "Do Nothing" alternatives generate results which put many screenlines over capacity, while the other two alternatives significantly reduce congestion on Brampton roads. Alternative 4 has the lowest volume-to-capacity ratios due to the extra freeway facility north of Brampton.

Detailed evaluation is discussed in **Table 5-5** and **Table 5-6**.

Table 5-4: Screenline Summary Comparison for Five TTMP Alternatives

	Scenario 1 - 2031 Do Nothing (2031 LU on 2006 roads and transit)								Scenario 2 - 2031 Do-Nothing (2031 on 2006 roads and 2031 2004-TTMP transit)							
	West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)				West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	7,800	7,300	**1.07**	2,090	7,900	6,800	**1.16**	0	7,700	7,300	**1.05**	2,170	7,900	6,800	**1.16**	0
North of Bovaird Drive / Castlemore Road	18,900	11,800	**1.60**	5,190	22,200	13,600	**1.63**	4,020	19,300	11,800	**1.64**	4,370	22,100	13,600	**1.63**	3,450
North of Queen Street / Embleton Road	19,300	10,900	**1.77**	2,020	26,000	17,100	**1.52**	5,940	19,100	10,900	**1.75**	3,740	25,900	17,100	**1.51**	5,250
North of Steeles Avenue	19,300	12,500	**1.54**	8,650	18,600	12,500	**1.49**	5,970	18,800	12,500	**1.50**	8,070	18,300	12,500	**1.46**	4,430
Brampton / Mississauga	15,300	11,900	**1.29**	400	13,600	13,400	**1.01**	6,070	15,000	11,900	**1.26**	350	13,100	13,400	**0.98**	4,290
	North Totals (Mayfield to North of Queen)				**South Totals (Queen to Bram.-Miss. Boundary)**				**North Totals (Mayfield to North of Queen)**				**South Totals (Queen to Bram.-Miss. Boundary)**			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	1,900	2,300	**0.83**	0	8,800	7,000	**1.26**	0	1,900	2,300	**0.83**	0	8,600	7,000	**1.23**	0
Credit River (WB & NB)*					13,300	9,500	**1.40**	230					13,000	9,500	**1.37**	560
East of Highway 10	12,500	7,900	**1.58**	1,680	13,700	9,300	**1.47**	6,520	11,900	7,900	**1.51**	880	13,200	9,300	**1.42**	7,230
East of Highway 410 / Heartlake Road	11,900	9,300	**1.28**	1,830	19,100	13,600	**1.40**	2,280	11,500	9,300	**1.24**	1,130	18,600	13,600	**1.37**	2,590
East of Airport Road	7,900	5,700	**1.39**	680	6,000	4,600	**1.30**	3,740	7,600	5,700	**1.33**	420	5,900	4,600	**1.28**	3,940
West of Highway 50	4,700	5,300	**0.89**	20	6,100	5,100	**1.20**	1,210	4,600	5,300	**0.87**	0	6,000	5,100	**1.18**	1,770
	Scenario 3 - 2031 with 2004-TTMP improvements								**Scenario 4 - 2031 with 2009TTMP recommended roads and transit**							
	West Totals (Winston Churchill to west of Hwy 410)				**East Totals (Hwy 410 to Highway 50)**				**West Totals (Winston Churchill to west of Hwy 410)**				**East Totals (Hwy 410 to Highway 50)**			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	5,400	14,500	**0.37**	1,310	11,100	17,100	**0.65**	0	5,500	18,000	0.31	3,370	11,000	19,600	0.56	1,040
North of Bovaird Drive / Castlemore Road	15,500	17,300	**0.90**	3,310	21,800	23,600	**0.92**	3,420	15,900	20,600	0.77	8,270	21,300	24,500	0.87	6,350
North of Queen Street / Embleton Road	17,900	16,500	**1.08**	3,880	24,600	23,100	**1.06**	5,210	19,400	20,200	0.96	13,430	22,800	22,500	1.01	9,390
North of Steeles Avenue	19,600	21,200	**0.92**	6,610	18,400	16,700	**1.10**	4,440	19,200	23,600	0.81	13,680	16,700	16,100	1.04	7,170
Brampton / Mississauga	18,300	18,800	**0.97**	290	11,700	15,000	**0.78**	4,430	14,900	19,300	0.77	1,020	10,900	12,400	0.88	6,780

	North Totals (Mayfield to North of Queen)				South Totals (Queen to Bram.-Miss. Boundary)					North Totals (Mayfield to North of Queen)				South Totals (Queen to Bram.-Miss. Boundary)			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**		**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	2,500	6,100	**0.41**	0	11,000	13,500	**0.81**	0		2,400	6,800	0.35	110	2,600	4,900	0.53	60
Credit River (WB & NB)*					15,600	10,640	**1.45**	610						7,100	10,400	0.68	2460
East of Highway 10	11,600	12,700	**0.91**	810	14,500	12,900	**1.12**	4,880		8,100	11,800	0.69	3130	2,200	3,300	0.67	3460
East of Highway 410 / Heartlake Road	12,900	12,600	**1.02**	940	19,800	18,400	**1.08**	3,230		9,400	11,700	0.80	1660	5,500	9,100	0.60	4570
East of Airport Road	11,300	13,000	**0.87**	370	5,400	5,300	**1.02**	3,330		7,000	12,700	0.55	790	4,100	5,100	0.80	2630
West of Highway 50	8,000	9,900	**0.81**	40	6,500	7,200	**0.90**	1,720		5,900	12,900	0.46	300	4,100	6,600	0.62	470

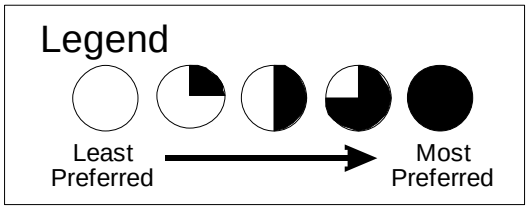
Table 5-5: Evaluation of Transportation Alternatives

Criterion	Transportation Planning Alternatives			
	Alternative 1 - Do Nothing	Alternative 2 – Transit Only	Alternative 3 – Currently Planned Transit and Road Network Improvements	Alternative 4 – TTMP Update Transit and Road Network Improvements
Supporting sustainable development	Not supportive, will shift the inevitable costs of growth to future generations; May prevent growth from occurring by lowering the attractiveness of the area to residential and industrial investors and the public. Total number of auto trips: 86,600 Total number of transit trips: 7,700 Average modal split: 8.2%	Supportive of sustainable development but not supportive of intensification targets. Unless transit service is improved to be competitive with the automobile for strong OD pairs across the entire GTA, traffic congestion will strangle the City of Brampton (unless roads are improved.) Total number of auto trips: 161,500 Total number of transit trips: 24,500 Average modal split: 13.2%	Supportive of sustainable development and intensification principles. Provides a balanced system that will allow for more choice without constraining auto travel. Recent policy initiatives require updating Alternative 3 plans. Total number of auto trips: 161,500 Total number of transit trips: 24,500 Average modal split: 13.2%	Fully supporting sustainable development in light of recent planning initiatives and policies. Supports intensification policies and provides an array of travel choices to Brampton residents. Average modal split at 16.6% a substantial increase over other Alternatives. Total number of auto trips: 151,900 Total number of transit trips: 30,200 Average modal split: 16.6%
Protecting natural environment	Adverse impact on natural environment due to congestion. Total annual GHG emissions produced during the peak periods of travel: 422,788 tonnes / year	Adverse impact on natural environment and air quality due to congestion. Total annual GHG emissions produced during the peak periods of travel: 404,548 tonnes / year	Total annual GHG emissions produced during the peak periods of travel: 303,316 tonnes / year	Total annual GHG emissions produced during the peak periods of travel: 292,296 tonnes / year
Supporting economic vitality	Does not support economic vitality of the City and undermines quality of living	Does not support economic vitality of the City and undermines quality of living, unless significant transit service improvements are made as stated above.	Supports economic vitality of the Town and maintains quality of living	Provides additional roadway capacity for goods movement by shifting person travel demand to transit and TDM. Economic vitality and quality of living is further maintained.
Providing efficient and multimodal transportation for people and goods	Percentage of screenlines at or approaching capacity during AM Peak Hour => 90% Total VKT at 1,808,400 Average percentage of congested network (peak direction of travel): 90%	Percentage of screenlines at or approaching capacity during AM Peak Hour => 90% Total VKT at: 1,754,500 Average percentage of congested network (peak direction of travel): 90%	Percentage of screenlines at or approaching capacity during AM Peak Hour => 62% Total VKT at: 1,862,800 Average percentage of congested network (peak direction of travel): 62%	Percentage of screenlines at or approaching capacity during AM Peak Hour => 38% Total VKT at: 1,828,300 Average percentage of congested network (peak direction of travel): 38%
Maintaining cost effectiveness	Limited costs of Capital Infrastructure Increased capital and operating costs necessary to meet planned service levels of Brampton transit and BRT. Expected fast deterioration of the existing roadways and intersections.	Cost effective transit investments to meet the goals and objectives of growth management strategies are easier to maintain in the long run.	Both road and transit improvements will require extensive infrastructure investment directed to support transit and other non-auto travel modes.	Will require extensive infrastructure investment directed to support transit and other non-auto travel modes.

Table 5-6 shows the preference rating and the results of the evaluation of the planning alternatives. Alternative 4, Towards a Sustainable Multi-Modal Network, clearly emerged as the "most preferred alternative" with high scores for each criterion.

Table 5-6 Evaluation of the Planning Alternatives

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Supporting Sustainable Development	○	◑	◕	●
Protecting Natural Environment	○	◑	◕	◕
Supporting Economic Vitality	○	◔	◕	●
Providing Efficient and Multi-modal Transportation for People and Goods	○	◔	◕	●
Maintaining Cost Effectiveness	○	◔	◑	◔
Overall	○	◔	◕	●



The key advantages of the preferred alternative are that it offers the best opportunity to:

- Address the issues at the root cause of the current and future transportation challenges
- Satisfy Provincial, Regional, and Municipal growth objectives
- Increase transit trips and reduce auto trips
- Minimize congestion and associated costs of congestion
- Promote alternative travel modes and choices
- Reduce emissions of green house gases (GHG)
- Support goods movement and access to employment areas
- Support Brampton's growth areas and provide a vision for the Downtown and Central Area

Although the most expensive strategy in terms of capital costs, Alternative 4 will reduce congestion costs and green house gas emissions. Both Alternatives 3 and 4 represent a sustainable, long-term transportation strategy for City of Brampton, with Alternative 4 building upon current plans to provide a solution for new growth objectives. The updated plan will manage and reduce the growth in traffic congestion by proactively encouraging travel by other modes and making these other modes, in particular public transit, more attractive.

6. TRANSIT NETWORK ALTERNATIVES

6.1 Methodology and Land Use Assumptions

The TTMP Sustainable Update 2009 builds on the road-network vision proposed above and extends the horizon from 2021 to 2031. The improvements include:

- Extending the Hurontario Street BRT further north
- Adding a BRT route along Mississauga Road that connects with an Erin Mills high order transit corridor in Mississauga and continues north to Bovaird Drive and the Mount Pleasant GO Station
- Adding a BRT route along the Airport Road corridor or another north-south corridor east of Highway 410, between Bovaird Drive and Pearson International Airport
- Extending the Bovaird Drive BRT line west to connect with BRT services on Mississauga Road
- Extending the Queen Street BRT west to connect to BRT services on Mississauga Road
- Extending the Steeles Avenue BRT west to connect to BRT on Mississauga Road and the Lisgar GO Station in the City of Mississauga
- Extending primary transit corridors to new growth areas such as Bram-West, North-West Brampton, and North-East Brampton

Land use assumptions provided by the City are generally supportive of the improved transit services listed above.

Various alternatives are analyzed for the improvements listed above, and are summarized in this Chapter.

6.2 Steeles Avenue BRT

The 2004 TTMP illustrated proposed BRT on Steeles Avenue terminating at James Potter Road / New Creditview Road. The TTMP Sustainable Update 2009 proposes a new terminus further west at either Mississauga Road or at the Lisgar GO Station at Argentia Road and 10th Line near the north-western boundary of the City of Mississauga.

The study team identifies Lisgar GO as the western terminus for BRT services on Steeles Avenue, and proposed the following two routing options:

- **Option 1**: Extend the Steeles BRT route west on Steeles Avenue to Winston Churchill Boulevard, continuing south on Winston Churchill Boulevard and accessing the Lisgar GO station via Argentia Road; or
- **Option 2**: Extend the Steeles BRT route west on Steeles Avenue to Mississauga Road, proceeding south on Mississauga Road to Derry Road, west on Derry Road to Argentia Road, and continuing west on Argentia Road to the Lisgar GO station.

The two proposed routing options are illustrated in **Exhibit 6-1**.

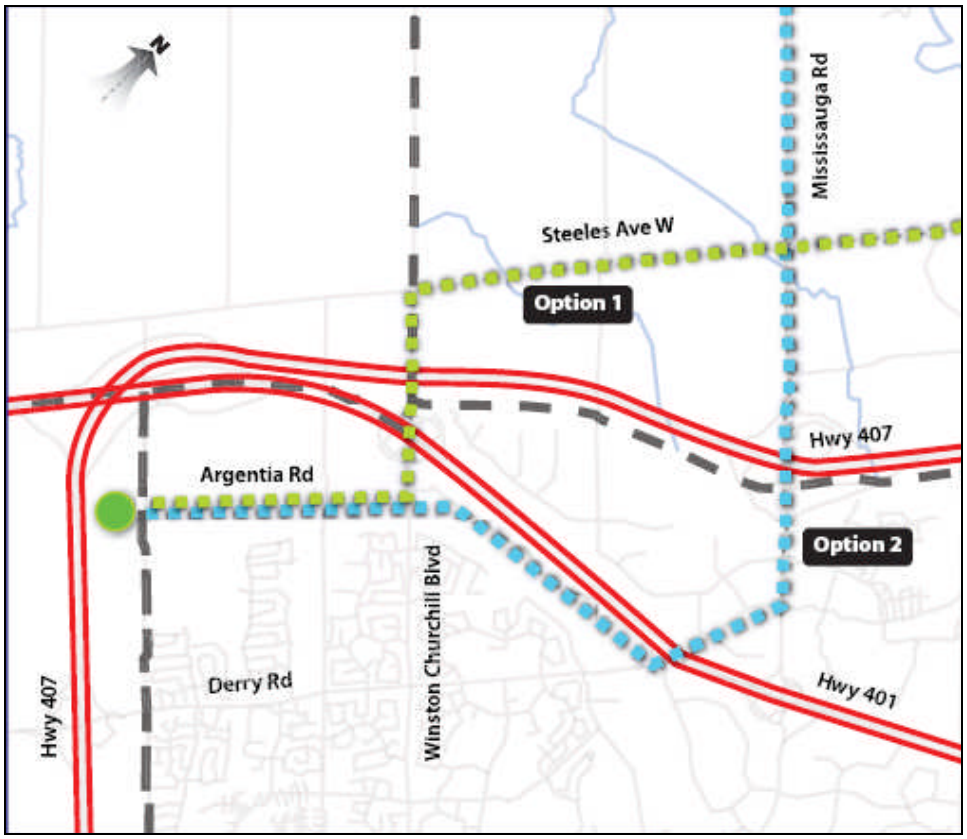


Exhibit 6-1: Steeles Avenue BRT Alternatives

Option 1 is more direct and two km shorter than Option 2. Option 1 better supports the potential for increased intensification along the route. The intensification corridor for Option 1 is 2.8 km while the second alternative has an intensification corridor of 1.2 km. Option 2 provides transfer opportunities with the proposed Erin Mills / Mississauga Road BRT in the City of Mississauga. However, neither alternative will serve high density development. Since Option 1 is considered more direct and supports a larger intensification corridor in Brampton, it is the preferred alternative. **Table 6-1** provides a summary of both options.

Table 6-1: Summary of Steeles BRT Alternatives

	Option 1 (via Steeles, WCB, Argentia)	**Option 2 (via Mississauga, Derry, Argentia)**
Support Transit Supportive Nodes	Yes	Yes
Support Intensification Corridors	Steeles Avenue (2.8 km)	Mississauga Road (1.2 km)
Directness of Route	Direct (6.4 km)	Indirect (8.4 km)
Connect with GO	Yes	Yes
Serve High Density Development	No	No
Connect with rapid transit outside of Brampton	No	Mississauga Road / Erin Mills BRT
Overall	Preferred	Not Preferred

6.3 Queen Street BRT

Improvements to the Queen Street BRT line include extending the western terminus from Chinguacousy Road identified in the 2004 TTMP to Mississauga Road, to connect to the proposed Mississauga BRT corridor. No alternatives were tested for this improvement.

6.4 Main Street / Hurontario Street BRT

Improvements to the Hurontario Street BRT line based on the original route identified in the 2004 TTMP include extending the Hurontario Street BRT's northern terminus from Sandalwood Parkway to Mayfield Road or beyond to connect with the primary transit corridor on Mayfield Road and to service neighbourhoods north of Mayfield Road. No alternatives were tested for this improvement.

6.5 Mississauga Road BRT

The proposed Mississauga Road BRT will connect with an Erin Mills high order transit corridor in Mississauga and continue north to Bovaird Drive and the Mount Pleasant GO Station. It will service development in Bram-West and North-West Brampton and will provide key connections to BRT in the City of Mississauga. No alternatives were tested for this improvement.

6.6 Brampton East BRT Corridor

Four different scenarios were tested for a north / south bus rapid transit corridor east of Hurontario Street to serve as a parallel service to the Hurontario BRT. Dixie Road, Bramalea Road, Torbram Road, and Airport Road were studied as potential corridors for this service. The southern terminus for all routes was Lester B. Pearson International Airport while the northern terminus for all routes was Bovaird Drive to connect with the Bovaird BRT (see **Section 6.7**). All four BRT lines were routed via Airport Road south of Steeles Avenue to access Lester B. Pearson International Airport and Steeles Avenue East to access the appropriate north-south corridor.

In all four cases, the respective transit mode shares were modified for traffic zones along each corridor to appropriately model the transit network and to better estimate potential ridership along all four corridors.

6.6.1 Dixie Road

This route will travel between Lester B. Pearson Airport and the intersection of Bovaird Drive and Dixie Road via Airport Road, Steeles Avenue, and Dixie Road. This route serves high employment industrial lands east of Highway 410 between Steeles Avenue and Queen Street, Bramalea City Centre, and residential neighbourhoods in Bramalea between Queen Street and Bovaird Drive. Note for all the following tables, the lightest shade of grey highlight indicates the BRT corridor, the darkest grey denotes the least favourable total amongst alternatives, and medium grey indicates the most favourable alternative.

Table 6-2: Northbound PM Transit Riders with BRT on Dixie Road

	DIXIE	BRAMALEA*	TORBRAM	AIRPORT	NB TOTAL
MAXIMUM LOAD	2,854	4,067	1,171	690	**8,781**
AVERAGE LOAD	2,270	2,215	828	535	**5,848**
BOARDINGS	2,496	1,659	207	364	**4,726**

6.6.2 Bramalea Road

This route travels between Lester B. Pearson Airport and the intersection of Bovaird Drive and Bramalea Road via Airport Road, Steeles Avenue, and Bramalea Road. This route connects with the Bramalea GO Station and serves residential neighbourhoods in Bramalea between Dearbourne Boulevard and Bovaird Drive. Advantages to this route include serving the North-South demand around the existing transit hub at Bramalea City Centre as well as the high density development surrounding the Bramalea City Centre shopping mall.

Table 6-3 Northbound PM Transit Riders with BRT on Bramalea Road

	DIXIE	BRAMALEA*	TORBRAM	AIRPORT	NB TOTAL
MAXIMUM LOAD	1,746	5,516	1,024	591	**8,876**
AVERAGE LOAD	1,265	3,672	682	444	**6,064**
BOARDINGS	905	4,184	187	247	**5,523**

6.6.3 Torbram Road

This route travels between Lester B. Pearson Airport and the intersection of Bovaird Drive and Torbram Road via Airport Road, Steeles Avenue, and Torbram Road. This route serves both high employment industrial areas on the east side of Torbram Road and residential areas on the west side of Torbram Road between Steeles Avenue and Bovaird Drive.

Table 6-4: Northbound PM Transit Riders with BRT on Torbram Road

	DIXIE	BRAMALEA*	TORBRAM	AIRPORT	NB TOTAL
MAXIMUM LOAD	2,272	4,389	1,658	585	**8,904**
AVERAGE LOAD	1,578	2,356	1,449	435	**5,818**
BOARDINGS	1,245	1,748	1,675	221	**4,889**

6.6.4 Airport Road

This route travels between Lester B. Pearson Airport and the intersection of Bovaird Drive and Airport Road via Airport Road. This route serves high employment industrial lands along Airport Road between Steeles Avenue and Bovaird Drive. A new shopping centre located at North Park Drive and Airport Road will also be served by this BRT route.

Table 6-5: Northbound PM Transit Riders with BRT on Airport Road

	DIXIE	BRAMALEA*	TORBRAM	AIRPORT	NB TOTAL
MAXIMUM LOAD	2,007	3,958	739	2,700	**9,404**
AVERAGE LOAD	1,418	2,128	483	2,120	**6,149**
BOARDINGS	1,147	1,561	243	2,704	**5,654**

6.6.5 Analysis of Alternatives

Based on ridership analysis, BRT on Airport Road and Bramalea Road will provide the largest gains in ridership. **Table 6-6** shows increases to PM Peak direction maximum load, average load, and boardings with bus rapid transit on each respective corridor. Light gray highlights represent the highest ridership while the dark gray highlighting represents the lowest ridership.

Table 6-6: Ridership Increase on Potential BRT Corridors

	DIXIE	BRAMALEA	TORBRAM	AIRPORT
MAXIMUM LOAD	846	1,378	680	2,079
AVERAGE LOAD	849	1,439	784	1,648
BOARDINGS	1,397	2,527	1,462	2,426

Airport Road BRT will clearly see the largest gain in transit trips for a few specific sections, but Bramalea Road BRT will have the highest total boardings at 2,500, slightly greater than the Airport Road route at 2,400. The Dixie Road and Torbram Road routes will capture significantly fewer transit riders than the Bramalea and Airport Road routes.

Northbound transit ridership across screenlines is summarized below in **Table 6-7**. Yellow highlights indicate volumes that include BRT, light gray highlights indicate the highest screenline total volume across all alternatives, while dark gray highlights indicate the lowest total volumes across all alternatives.

Table 6-7: Screenline Transit Ridership, PM Peak Northbound

SCREENLINE / BRT on:	Dixie	Bramalea	Torbram	Airport
North of Bovaird Drive / Castlemore Road				
Dixie Road North of Bovaird Drive	1,360	1,370	1,530	1,380
Fernforest Drive North of Bovaird Drive	410	340	230	430
Bramalea Road North of Bovaird Drive	1,090	1,550	1,120	1,040
Sunny Meadows Blvd. North of Bovaird Drive	20			
Torbram Road North of Bovaird Drive	930	760	1,190	1,130
Airport Road North of Bovaird Drive	520	510	520	600
TOTAL	**4,330**	**4,530**	**4,590**	**4,580**
TWO-WAY TOTAL	**4,970**	**5,160**	**5,200**	**5,220**
North of Queen Street / Embleton Road				
Dixie Road North of Queen Street	2,850	1,750	2,270	2,010
Central Park Drive North of Queen Street	460	290	470	480
Bramalea Road North of Queen Street	1,290	2,910	1,330	1,230
Glenvale Blvd. North of Queen Street	360	320	370	370
Torbram Road North of Queen Street	950	760	1,550	570
Airport Road North of Queen Street	590	530	520	1,970
TOTAL	**6,500**	**6,560**	**6,510**	**6,630**
TWO-WAY TOTAL	**7,350**	**7,390**	**7,370**	**7,720**
North of Steeles Avenue				
Dixie Road North of Steeles Avenue	1,680	740	890	840
Bramalea Road North of Steeles Avenue*	3,920	5,340	4,220	3,790
Torbram Road North of Steeles Avenue	520	400	1,220	240
Airport Road North of Steeles Avenue	540	420	420	2,110
TOTAL	6,660	6,900	6,750	6,980
TWO-WAY TOTAL	8,040	8,280	8,220	8,590
Brampton / Mississauga				
Dixie Road at Brampton / Mississauga Boundary	1,090	970	1,080	1,030
Bramalea Road at Brampton / Mississauga Boundary	1,820	1,770	1,800	1,770
Torbram Road at Brampton / Mississauga Boundary	180	140	180	130
Airport Road at Brampton / Mississauga Boundary	2,180	2,510	2,190	2,650
TOTAL	**5,270**	**5,390**	**5,250**	**5,580**
TWO-WAY TOTAL	**6,130**	**6,260**	**6,130**	**6,560**

The Airport Road BRT option captures the highest transit ridership across all screenlines.

The impacts of each alternative on road network operations are summarized in **Table 6-8** in the form of screenline auto volumes. Light gray highlights applied to volume and capacity

values indicate BRT corridors and HOV lanes, while the light, medium and dark gray highlights applied to V/C ratio statistics indicate ratios between 0.8 and 0.9, between 0.9 and 1.0, and greater than 1.0 respectively.

Table 6-8: Screenline Auto Volumes, BRT Alternatives

	DIXIE BRT			BRAMALEA BRT			TORBRAM BRT			AIRPORT BRT		
North of Bovaird Drive / Castlemore Road	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**
Great Lakes Drive	500	710	1.42	500	790	1.58	500	660	1.32	500	690	1.38
Dixie Road	2,700	2,450	0.91	2,700	2,450	0.91	2,700	2,620	0.97	2,700	2,530	0.94
Fernforest Drive	500	570	1.14	500	590	1.18	500	600	1.2	500	550	1.1
Bramalea Road	1,600	1,600	1	1,600	1,580	0.99	1,600	1,580	0.99	1,600	1,740	1.09
Sunny Meadows Blvd	1,000	670	0.67	1,000	650	0.65	1,000	610	0.61	1,000	640	0.64
Torbram Road	2,400	2,240	0.93	2,400	2,210	0.92	2,400	2,170	0.9	2,400	2,160	0.9
Airport Road	2,700	2,400	0.89	2,700	2,420	0.9	2,700	2,410	0.89	2,700	2,370	0.88
Totals	**11,400**	**10,640**	**0.93**	**11,400**	**10,690**	**0.94**	**11,400**	**10,650**	**0.93**	**11,400**	**10,680**	**0.94**

North of Queen Street / Embleton Road	Capacity	Volume	V/C	Capacity	Volume	V/C	Capacity	Volume	V/C	Capacity	Volume	V/C
Laurelcrest Street	1,000	860	0.86	1,000	840	0.84	1,000	860	0.86	1,000	930	0.93
Dixie Road	2,070	2,060	1	2,700	2,620	0.97	2,700	2,680	0.99	2,700	2,660	0.99
Central Park Drive	1,400	1,560	1.11	1,400	1,670	1.19	1,400	1,570	1.12	1,400	1,520	1.09
Bramalea Road	1,600	1,530	0.96	1,040	1,150	1.11	1,600	1,510	0.94	1,600	1,560	0.98
Glenvale Blvd	800	660	0.83	800	640	0.8	800	670	0.84	800	650	0.81
Torbram Road	2,400	2,250	0.94	2,400	2,350	0.98	1,840	1,750	0.95	2,400	2,300	0.96
Chrysler Drive	1,000	850	0.85	1,000	850	0.85	1,000	850	0.85	1,000	850	0.85
Airport Road	2,700	3,110	1.15	2,700	2,980	1.1	2,700	3,190	1.18	2,070	2,340	1.13
Totals	**12,970**	**12,880**	**0.99**	**13,040**	**13,100**	**1**	**13,040**	**13,080**	**1**	**12,970**	**12,810**	**0.99**

North of Steeles Ave.	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**
West Drive	1,400	1,300	0.93	1,400	1,300	0.93	1,400	1,290	0.92	1,400	1,300	0.93
Dixie Road	2,070	1,590	0.77	2,700	2,000	0.74	2,700	2,030	0.75	2,700	1,930	0.71
Bramalea Road	2,400	3,240	1.35	1,840	2,640	1.43	2,400	3,120	1.3	2,400	3,260	1.36
Torbram Road	2,400	2,390	1	2,400	2,460	1.03	1,840	1,990	1.08	2,400	2,400	1
Airport Road	2,700	2,680	0.99	2,700	2,670	0.99	2,700	2,720	1.01	2,070	2,310	1.12
Totals	**10,970**	**11,200**	**1.02**	**11,040**	**11,070**	**1**	**11,040**	**11,150**	**1.01**	**10,970**	**11,200**	**1.02**
Brampton / Mississauga	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**	**Capacity**	**Volume**	**V/C**
Tomken Road	1,400	990	0.71	1,400	1,000	0.71	1,400	990	0.71	1,400	1,000	0.71
Dixie Road	2,700	3,130	1.16	2,700	3,160	1.17	2,700	3,110	1.15	2,700	3,150	1.17
Bramalea Road	1,600	890	0.56	1,600	760	0.48	1,600	910	0.57	1,600	1,010	0.63
Torbram Road	1,600	1,470	0.92	1,600	1,480	0.93	1,600	1,420	0.89	1,600	1,460	0.91
Airport Road	2,070	1,650	0.8	2,070	1,580	0.76	2,070	1,640	0.79	2,070	1,540	0.74
Totals	**9,370**	**8,130**	**0.87**	**9370**	**7980**	**0.85**	**9,370**	**8,070**	**0.86**	**9,370**	**8,160**	**0.87**

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Based on **Table 6-8**, no clear conclusion can be made as the differences in screenline volumes are minimal in most cases. However, in the final Master Plan document, a recommended corridor will be identified based on land use, traffic, ridership and transit operational considerations.

6.7 Bovaird Drive BRT

Improvements to the Bovaird Drive BRTs include extending the western terminus from Mount Pleasant GO station, as recommended in the 2004 TTMP, to Mississauga Road, to connect to the proposed Mississauga BRT corridor. No alternatives were tested for this improvement.

6.8 Support Services

The network of support corridors to the proposed BRT services is similarly enhanced to match the improvement to BRT service.

6.9 Transit Nodes

Proposed transit nodes within the City are based on the following hierarchy:

- **Major Transit Station Area**: Identified in the Growth Plan as the area including and around any existing or planned higher order transit station within a settlement area, or a major bus depot in an urban core.
- **Mobility Hub (Anchor)**: Major transit station areas identified in the Metrolinx RTP that are particularly significant given the level of transit service that is planned for them and the development potential around them. They are places of connectivity where different modes of transportation – from walking to high-speed rail – come together seamlessly and where there is an attractive, intensive concentration of employment, living, shopping and recreation around a major transit station.
- **Mobility Hub (Gateway)**: Major transit station areas identified in the Metrolinx RTP that represent significant transfer points between rapid transit services.
- **Future Mobility Hub**: Major transit station areas that are being planned as Mobility Hubs by the City, but that have not yet been designated as such in the Metrolinx RTP.
- **407 Transitway Station**: Identified by MTO and are transit nodes that connect to the 407 Transitway.

6.10 Future HOT / LRT Corridors

While the high-order transit corridors identified throughout the TTMP documents call for BRT technology, the overall transit objectives as stated in the Brampton Official Plan support protecting for BRT corridors to be operated as LRT corridors in the future. This is important to serve Brampton's needs in coordination with other initiatives in the GTA to achieve convenient and appropriate transit service integration. As transit supportive land uses continue to be implemented, transit ridership grows and funding becomes available; the City

should aggressively move towards dedicated transit lanes in centre median right-of-ways and seriously consider LRT technology.

While all BRT corridors should be implemented in such a manner so as to be flexible for the potential future implementation of light rail, at a minimum those corridors identified in the Metrolinx RTP should be studied as candidates for LRT. Corridors identified in the Metrolinx RTP include Hurontario Street, Queen Street, and Steeles Avenue.

Of note is the on-going Hurontario / Main Street Study that is assessing the corridor's potential for higher-order transit, land use, and urban design. The results of this study will have an impact upon the City of Brampton's final vision and implementation of its high-order transit corridors.

6.11 Transit Service Level

DC cost calculations for transit assume the same level of service in the future as today. However if level of service for the overall transportation network deteriorates, more money will have to be spent to provide enough transit service to meet the level of service. This increase in spending is covered using a congestion factor that is applied where a future road network analysis shows congestion.

This is only a rough estimate for DC purposes – further detailed financial analysis is needed to determine the investment needs required to fully realize the transit vision.

Detailed discussion on development charge calculations is provided in the Development Charge Background Study.

7. WEST BRAMPTON ROAD NETWORK

7.1 Projected Growth in West Brampton

The City of Brampton is projected to grow from its current (2006) total of 452,000 people and 155,000 jobs to 760,000 people and 320,000 jobs by the year 2031 based on the projected growth listed in **Chapter 4**. As the City's urban envelope has "filled-out" over the years, the concentration of this projected growth between now and 2031 will occur in west and north east Brampton – but specifically in the areas known as Northwest Brampton and Bram-West. **Table 7-1** summarizes the projected growth for West Brampton and its surrounding area.

Table 7-1: Projected Growth in West Brampton and Surrounding Area

	Population		Employment	
Area	**2006**	**2031**	**2006**	**2031**
Mayfield West	4,200	32,800	1,100	10,600
North West Brampton	1,200	60,400	100	3,100
Bram-West	6,400	39,600	5,500	27,000
401-407 Employment Area	400	50,500	2,600	52,200
Total Area	**12,200**	**183,300**	**9,300**	**92,900**
Growth		**171,100**		**83,600**

Within Brampton itself (North-West Brampton, Bram-West), 92,400 new residents and 24,500 new jobs are projected for 2031. When including the Mayfield West development area in Caledon to the north, and the Hwy 401-407 Employment Area in Mississauga to the south, these totals rise to 171,100 new residents and 83,600 new jobs.

The future transportation challenges for this area are evident, and a number of studies have been undertaken in the past to address them. The most recent study, the Halton-Peel Boundary Area Transportation Study (HP BATS), is still on-going and has not produced recommendations yet. Numerous other studies completed up to this point have identified a North-South Transportation Corridor (NSTC) as a necessary prerequisite for development in the west part of the City.

7.2 North-South Transportation Corridor (NSTC) Alternatives

The Halton-Peel Boundary Area Transportation Study is a joint study between the Region of Peel, Halton Region, the City of Brampton, the Town of Caledon, and the Town of Halton Hills. The study has been initiated to identify the long-term (2021 and 2031) transportation network required to support provincial and inter-municipal planning goals, and to serve future transportation demands within the Study Area**.**

Specific goals and objectives of the Halton-Peel Boundary Area Transportation Study are to:

- Support current and future municipal planning objectives by providing transportation capacity to accommodate future travel demands generated by planned growth in west Brampton and Halton Hills.
- Develop a coordinated interconnected roadway network system along the Halton / Peel boundary.
- Identify opportunities for transportation mode choices, including public transit, carpooling / vanpooling, and High Occupancy Vehicle (HOV) lanes across the study area.
- Identify solutions to serve long-distance truck traffic travelling in the study area between Halton Region and Peel Region.
- Identify improvements that will serve inter-regional traffic including longer-distance, cross-boundary traffic from Halton Region (and areas west of Halton Region), travelling through west Brampton and southwest Caledon to destinations to the south and east in Peel Region, York Region, and Toronto.
- Review potential to improve connections with the existing Provincial 400-series highway network and possible future Provincial transportation facilities including the GTA West Corridor Planning and Environmental Assessment Study in support of the Province's growth objectives as set out in the Provincial Growth Plan for the Greater Golden Horseshoe.
- Explore opportunities to reduce dependency on the automobile through Travel Demand Management (TDM) / transit supportive measures.

The study is being conducted in accordance with the transportation master planning process in the Municipal Class EA guidelines.

However, since the HP BATS study has not arrived at its recommendations yet, the Brampton TTMP performed a number of study specific analyses to conceptualize the role, function, geographical limits, costs, and connectivity of the NSTC if located only within the limits of the City of Brampton and Peel Region. The authors of this report and the project team would like to stress that the TTMP analysis does not preclude the evaluations and recommendations of the HP BATS. It is our understanding that it is within the HP BATS scope and mandate to make further recommendations on the NTSC. Additionally, a corridor Environmental Assessment Study will be required to devise and recommend the corridor alignment.

The alternatives tested during the course of the TTMP Sustainable Update 2009 include:

- Brampton Super Arterial, eight to six lanes; with terminus at Sandalwood and Mayfield; with and without the connection to Hwy 401 via Winston Churchill Blvd; with and without the connection to future GTA West corridor
- Brampton-only Freeway, six lanes

Transit modal split applied to this exercise were discussed in **Chapter 3**. Major road improvements in the original 2031 base road network used in NSTC analyses included the following:

- Extension of Highway 410 from Bovaird Dr. to Mayfield Rd. and then continuing west to Hurontario St
- Widening of Highway 401 to 12 lanes east of Mississauga Rd and ten lanes from there to Trafalgar Rd
- Widening of Highway 407 to ten lanes to Hwy 407 / 401 interchange and to 6 lanes south to Hwy 403
- Connection of Creditview Rd. north of Bovaird Drive to James Potter Road south of Bovaird Drive
- Widening of Chinguacousy to six lanes from the Mississauga-Brampton boundary to Bovaird Drive
- Widening of Steeles to 6 lanes through west Brampton to the Halton boundary
- Widening of Winston Churchill to four lanes south of 10th Sideroad
- Widening of Bovaird Drive to six lanes east of the North-South corridor
- Addition of Bramwest Parkway south of the Credit River with a new interchange at the 407 ETR

7.2.1 Brampton Super Arterial

The Brampton Super Arterial concept envisions high speed and high capacity corridor located within Brampton. The corridor will serve the "new growth" areas of Bram-West and North-West Brampton, which includes the Secondary Plan Areas of Huttonville, Huttonville North, Mount Pleasant, and Mount Pleasant West. The corridor will require the "super arterial standard" which entails a lane capacity of 1000 vehicles per hour (vph) and a speed limit of 80 kilometres per hour (km / h). Such "super arterial" will provide eight lanes between Highway 407 and Bovaird Drive, and six lanes between Bovaird Drive and Sandalwood or Mayfield Road. Access is restricted via signal controlled, at-grade intersections.

The southern terminus of the NSTC will be at Heritage Road just south of Highway 407 and the road will veer to the north with a freeway to arterial interchange at Highway 407. The road will generally follow the proposed Bramwest Parkway alignment in between Winston Churchill Boulevard and Heritage Road. Just north of Embleton Road, the road will run north to connect with Williams Pkwy and Bovaird Drive. North of Bovaird Drive, it is anticipated that the NSTC will locate somewhere between Winston Churchill Blvd and Mississauga Rd. To expedite the evaluation process and decrease the number of sensitivity runs, the NSTC was placed between Heritage Rd and Mississauga Rd; however, this "intermittent" location

was not intended to preclude or in any way influence the HP BATS or the future Environmental Assessment process required for the corridor. All roads that cross the Brampton Super Arterial will have at grade intersections.

Previous studies done in 2006 by Northwest Brampton Landowners Group confirmed the need for the NSTC from Hwy 407 to Sandalwood Parkway for 2021 to 2026 and stated that no further extension of the corridor were required beyond 2031. This recommendation was subsequently adopted by Peel Region and included in the Regional Capital Plan and Development Charge. Since 2006 the vision for growth in the GTA West has changed. New and profound changes, spurred by the provincial "Places to Grow" legislation, will affect Halton and Peel and, from the perspective of travel demand forecasting, are visibly reverberating across Brampton and its road and transit networks. To be fair to previously completed efforts, the impact of the NSTC terminating at either Mayfield Road, Sandalwood Parkway, or the GTA West corridor was assessed by this study. The results of the evaluation are presented in the following sections.

The Brampton Super Arterial will also influence existing and proposed Highway 407 operations. The planned 407 Transitway will have to be shifted to the south to make room for the planned interchanges with Highway 407 and the NSTC facility. Traffic operations on Highway 407 between Highway 401 and Mississauga Road may be affected due to the extra demand placed along this stretch of highway. Another issue facing this alternative is the spacing of interchanges between Highway 401 and Mississauga Road due to the planned interchanges for Brampton Super Arterials. If interchanges are closely-spaced, they can create potentially dangerous conditions due to weaving patterns between lanes.

The viability of a Bramwest Parkway connection to the existing and planned provincial highway network was confirmed with results from the business case study for the Bram West Interchange at Highway 407. A preliminary feasibility analysis also concluded that a freeway to freeway interchange of the North-South Transportation Corridor with Highways 401 and 407 is technically feasible.

See Bramwest Parkway Interchange with Highway 407 Business Case / Traffic and Design Assessment, City of Brampton, August 2002 – Marshall Macklin Monaghan, for further information.

The feasibility of the Arterial Road option without a connection to Highway 407 ETR should be analyzed in HP BATS, a GTA West Corridor Study or a future EA.

The portion of the NSTC south of Highway 407 and connecting to Heritage Road is not heavily travelled in the TTMP model – however, details such as this small section should also be addressed in HP BATS, a GTA West Corridor Study or a future EA.

7.2.1.1 Evaluation Results

Screenline results from the model assignment for the NSTC terminating at Mayfield Road indicate a high degree of congestion and screenline volume-to-capacity ratios at or slightly over one for the northbound traffic. Credit River screenline is the most critical point within the network. It consistently maintains the V/C ratio of 0.98 to 1.0 regardless of the northern terminus being at Sandalwood Pkwy or Mayfield Rd. Besides the Credit River screenline, however, the rest of the road network in Brampton appears to be operating at a reasonable level of service.

Extending the NSTC to Mayfield Rd has positive effects across the entire network, providing some minor relief to east west roads across the City. The Mayfield Rd terminus provides more convenient access for the traffic destined to areas of Mt. Pleasant community and southern Caledon adjacent to Mayfield Rd.

Screenline V/C ratios for testing the link between the NSTC and the proposed GTA West Corridor are summarized below in **Table 7-2** (see also **sections 8.1.3** and **8.2** relating to GTA West Corridor).

Table 7-2: NB Screenline, NSTC 407 ETR to GTA West Corridor

Screenline	Volume	Capacity	V/C
Caldedon / Brampton	3,340	7,700	0.43
North of Bovaird Drive	5,520	6,800	0.81
North of Queen Street / Embleton Road	8,520	9,670	0.88
North of Steeles Avenue	8,610	9,670	0.89
Brampton / Mississauga	5,810	9,540	0.61

The NSTC option of connecting the corridor to Hwy 401 via Winston Curchill Blvd assumes that the corridor diverts to the west south of Embleton Ave and Maple Lodge Farms to link up with Winston Churchill Blvd just north of Steeles Avenue. The joined road then would continue to the south (eight lanes with 1000 / lane capacity) to connect to Highway 401 at the existing interchange. BramWest Parkwy would provide connectivity with Hwy 407.

This connection would allow for a direct high-capacity arterial connection to Highway 401 without requiring a diversion along Steeles Avenue. The alignment enables Highway 401 access without impacting employment land in Halton. However, it may affect Maple Lodge Farm lands and would require additional land and a realignment of Winston Churchill Blvd south of 5th Sideroad / Embleton Road.

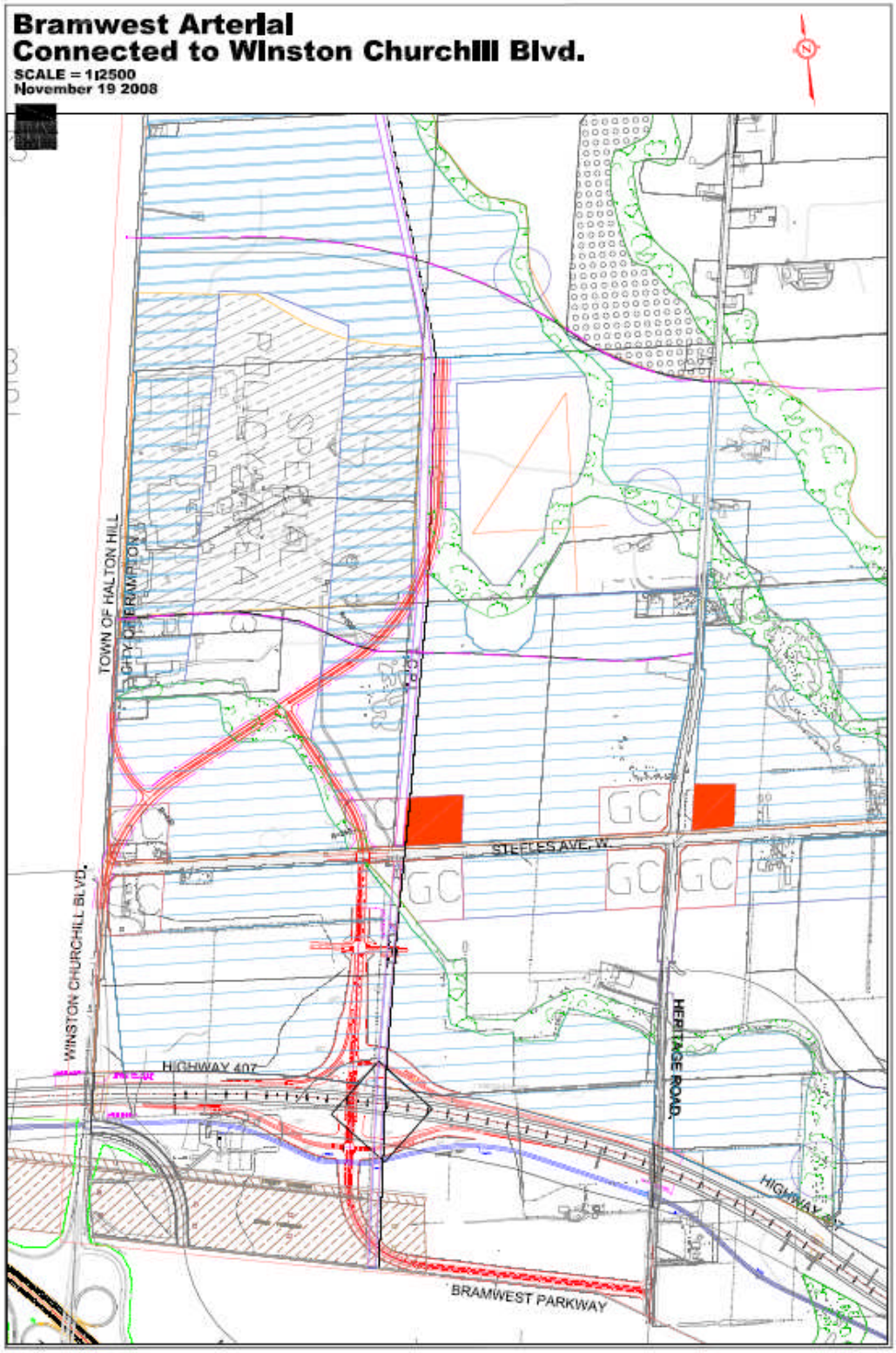

Exhibit 7-1: NSTC Connection to Hwy 401

Assuming that the GTA West Corridor is built, more NB traffic is attracted to the screenline, but the screenline maintains a satisfactory level of service. Looking at the plot however, congestion occurs on the NSTC and Heritage Road.

NSTC options were also evaluated for overall road network performance by examining arterial roads in the North West Brampton and Bram-West areas.

Table 7-3: Network Performance for NSTC Options

Performance measure	Mayfield	Sandalwood	WCB Link	GTA West
% Network congested (by lane km)	16%	18%	13%	17%
Total travel time (hours)	5,100	5,100	5,000	5,000
Vehicle-kilometres travelled	330,400	327,000	331,500	319,400
Annual GHG (tonnes/ weekday peak periods auto travel)	56,772	56,392	56,240	55,404
Annual hours of congestion	2,604,000	2,591,800	2,291,500	2,520,100

*Note: Future GHG estimates account for improvements in vehicle emissions. The 24% GHG decrease by 2031 is based on the average 0.94% per annum decreased in GHG emissions observed in Canada in transportation sector (small and large cars only) between 1997 and 2006 and reported by Natural Resources Canada (http://oee.nrcan.gc.ca/corporate/statistics).

Based on the previous discussion, it appears that the WCB Link option is preferred over the other NSTC arterial options. The case for including a WCB link is strengthened because it is the only alternative that provides a direct connection to both Highway 401 and Highway 407.

Further analysis is recommended through HP-BATS and a future GTA West corridor study.

7.2.2 Brampton-only Freeway

The Brampton-only Freeway is an eight lane freeway option with service roads following the same alignment as the super arterial alternative from Highway 407 to Mayfield Road. Since this is a freeway option, all roads crossing this freeway must be grade separated and access will be limited to interchanges only. The freeway's lane capacity is coded as 1800 vphpl and the freeway's speed is coded at 100 km/h in the EMME/2 model. A direct connection with Highway 401 is not possible due to inadequate interchange spacing between Winston Churchill Boulevard and Mississauga Road.

As with the Brampton Super Arterial option, traffic operations on Highway 407 between Highway 401 and Mississauga Road will be affected due to the installation of the new freeway-to-freeway interchange due to extra demand. The issue of interchange spacing, as discussed with the Brampton Super Arterial, remains an issue with this alternative. The 407 Transitway will also have to be shifted south to take the interchange into account.

Using base scenario trip rates and mode share the results from the model assignment, the resulting volume-to-capacity ratios for this alternative are listed in **Table 7-4**

Table 7-4: Northbound Traffic Volumes for Brampton-only Freeway

Screenline	Vol	Capacity	V/C
N. of Steeles Ave	4,058	5,400	0.75
Credit River	6,130	5,400	1.14
N. of Bovaird Dr	4,211	5,400	0.78
N. of Sandalwood Pkwy	3,516	5,400	0.65

Although the stretch over the Credit River appears to be congested, this is the only stretch of freeway where volume exceeds the roadway capacity. Compared to other alternatives, this alternative does not have the same effect on surrounding north / south arterials because of the extra capacity on the freeway compared to the super arterial, and therefore can accommodate increased demands should development in Caledon and Halton occur.
Despite the obvious capacity related to providing a freeway over an arterial, the Brampton-only freeway is not preferred due to impacts on the Bram West Secondary Plan Area, and the lack of a direct connection to Highway 401.

7.2.3 NSTC Connectivity Improvements

Improvements for NSTC connectivity are based on the results for the need and timing of the recommended NSTC alternative. The following improvements are considered:

- Sandalwood Parkway extension from Chinguacousy to Winston Churchill Boulevard
- Wanless Road and Mississauga Road widenings
- Heritage Road widening

Sandalwood Parkway Extension

The current terminus for Sandalwood Parkway is currently at Chinguacousy Rd; the Sandalwood extension will extend the road to the boundary shared with Halton Region at Winston Churchill Boulevard. This improvement will serve the needs for future Northwest Brampton development. With the addition of the NSTC, it will be necessary to construct a high-order east-west link through Northwest Brampton to relieve congestion on other east-west arterials such as Mayfield Road and Bovaird Drive. The timing for the extension of Sandalwood Parkway is recommended in **Table 7-5**.

Table 7-5: Timing of Sandalwood Parkway Extension

Western Terminus (Extend to)	Year
Mississauga Road	2016
Heritage Road	2021
Winston Churchill Boulevard	2031

Wanless Road and Mississauga Road Widenings

This improvement includes the widening of Wanless Road to four lanes between Mississauga Road and Winston Churchill Boulevard from its current configuration of two, as well as the widening of Mississauga Road from two to four lanes north of Bovaird Drive to Mayfield Road. These improvements will provide extra capacity to relieve the congestion created by

future traffic demand due to Northwest Brampton development and the NSTC. The Peel Region DC recommends the Wanless Road widening for 2016 and the Mississauga Road widening for 2013. However, the widening of this same section of Mississauga Road from four to six lanes by 2023 is not recommended by this Brampton TTMP. The inclusion of the NSTC will provide sufficient capacity such that Mississauga Road can operate as a four lane road. Beyond 2031, however, Mississauga Road should be protected for six lanes.

Heritage Road Widening

The planned widening of Heritage Road from two lanes to four lanes will increase capacity for the west Brampton road network and will relieve congestion on adjacent north-south arterial streets, including the NSTC. This improvement is recommended to be implemented in stages; the first stage will be between Bovaird Drive and Wanless Road and has a recommended timing of 2021. The second stage of widening between Wanless Road and Mayfield Road is recommended for 2031.

7.2.4 NSTC Conclusions

Based on this analysis, Brampton should at this time plan and protect for a minimum as presented in **Table 7-6**.

Table 7-6: NSTC Implementation Timing

Southern Terminus	Northern Terminus	Number of Lanes	Year
Heritage Road / Meadowvale Blvd	407 ETR	4	2012
407 ETR	Steeles Avenue	6	2012
Steeles Avenue	Embleton Road	6	2014
Embleton Road	Sandalwood Parkway	6	2016
407 ETR	Steeles Avenue	8	2018
Steeles Avenue	Embleton Road	8	2019
Embleton Road	Bovaird Drive	8	By 2031
Sandalwood Parkway	Mayfield Road	6	By 2031
Bovaird Drive	Mayfield Road	8	Beyond 2031

The above infrastructure performs a regional and even interregional function but should be protected for at a minimum to accommodate growth planned in Brampton. However, further study (HP BATS) should continue to look at all options on both sides of boundary including freeway options, and on this basis Brampton should also continue to protect for the NSTC north of Embleton Road at a width sufficient to accommodate a freeway.

Further to the above, this ongoing analysis looking at both Halton and Peel transportation network needs has identified positive advantages of a freeway option extending from North West Brampton southwest into Halton, and on an alignment likely north of Embleton Road to connect to Highway 401 and 407 ETR. On this basis the City of Brampton should continue to protect for freeway ROW north of Embleton Road going into Halton Region.

Potential future connections to a GTA West corridor, GTA freeway network and a goods movement corridor should also be protected for.

8. OTHER ROAD NETWORK ALTERNATIVES

8.1 North-East Brampton Network Alternatives

8.1.1 Base-case Option (Recommended Peel-Highway 427 TMP)

The base-case option for the Brampton TTMP Update adopts the recommendations of the Peel Highway 427 Transportation Master Plan Study, consisting of the extension of Highway 427 in York Region to at least Major Mackenzie Drive by 2021 and north of Major Mackenzie Drive by 2031. Major Mackenzie Drive will be extended into Brampton from its current terminus at Highway 50 as a four lane road from the intersection of Major Mackenzie and Highway 50 extending north to Mayfield Road between Coleraine Drive and Clarkway Drive. This link provides a direct link to both Mayfield Road and Countryside Drive, serving the new communities in the Northern part of Brampton who need access to Highway 427. This improvement is recommended to be implemented by 2016. As there has yet to be a North East Brampton / Highway 427 Industrial Area Secondary Plan, a collector road network was assumed in this area to help distribute traffic for the purposes of the TTMP study.

Exhibit 8-1 and **Exhibit 8-2** demonstrate the forecasted 2031 auto volumes and volume-to-capacity ratios in North-East Brampton and
Table 8-2 shows screenline summaries for the North-East Brampton area.

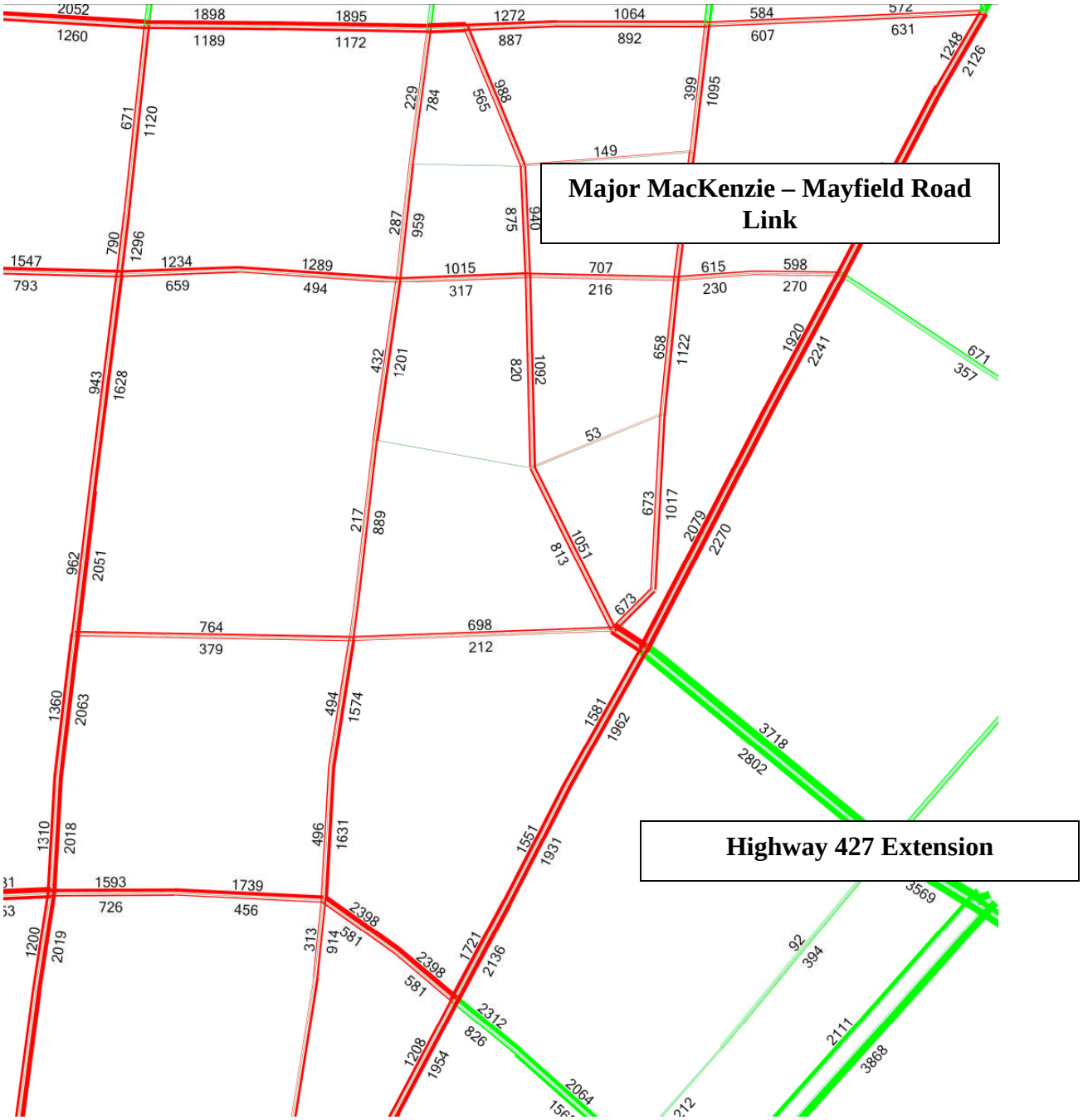

Exhibit 8-1: 2031 Auto Volumes in North East Brampton

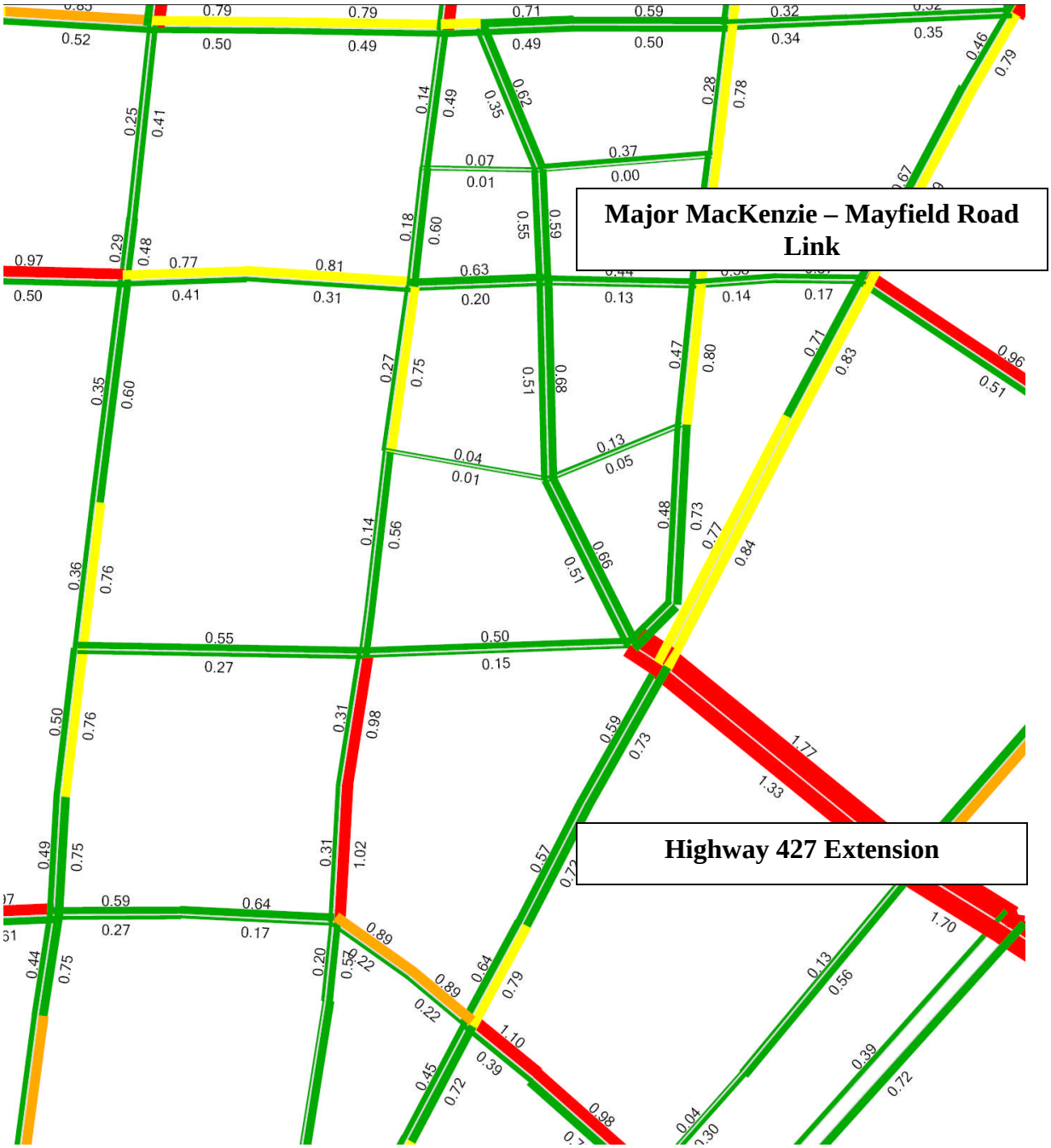

Exhibit 8-2: 2031 V/C Ratios in North East Brampton

Table 8-1: 2031 North-South Screenline Summary, North East Brampton

	East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	11,000	19,600	**0.56**	840
North of Bovaird Drive / Castlemore Road	21,300	24,500	**0.87**	1,040
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	5,000	19,600	**0.26**	1040
North of Bovaird Drive / Castlemore Road	9,100	24,500	**0.37**	3490

Table 8-2: 2031 East-West Screenline Summary, North East Brampton

	North Totals (Mayfield to North of Queen)			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
East of Airport Road	10,400	12,700	**0.82**	470
West of Highway 50	9,000	12,900	**0.70**	200
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
East of Airport Road	7,000	12,700	**0.55**	900
West of Highway 50	5,900	12,900	**0.46**	480

Under this scenario, the road network in North-East Brampton is not congested. With the exception of Clarkway Drive between Castlemore Road and the Major Mackenzie Drive extension, all roads under the jurisdiction of the City of Brampton have volume-to-capacity ratios of well under 1.00. However, in Vaughan, Major Mackenzie Drive is highly congested in both directions.

8.1.2 Triggers for Major Mackenzie - Mayfield Link

The link planned between Major Mackenzie Drive and Mayfield Road is recommended by the 2009 YP BATS to facilitate an increase in traffic in North-East Brampton due to the Highway 427 extension. This road will open up employment lands in North East Brampton by providing extra capacity in North-East Brampton and along with Major Mackenzie Drive, this link will serve as a continuous route from Highway 427 to the newly planned development.

To fully comprehend the impact that this link will have on the road network in North-East Brampton, a model run was performed with the 2009 YP BATS recommended network without the Major Mackenzie Drive – Mayfield Road link. Traffic assignment results are illustrated in **Exhibit 8-3**. Volume-to-capacity ratios for the North-East Brampton road network are shown in **Exhibit 8-4**.

Exhibit 8-3: 2031 Auto Volume Plot, North East Brampton - No Major Mackenzie Drive - Mayfield Road Link

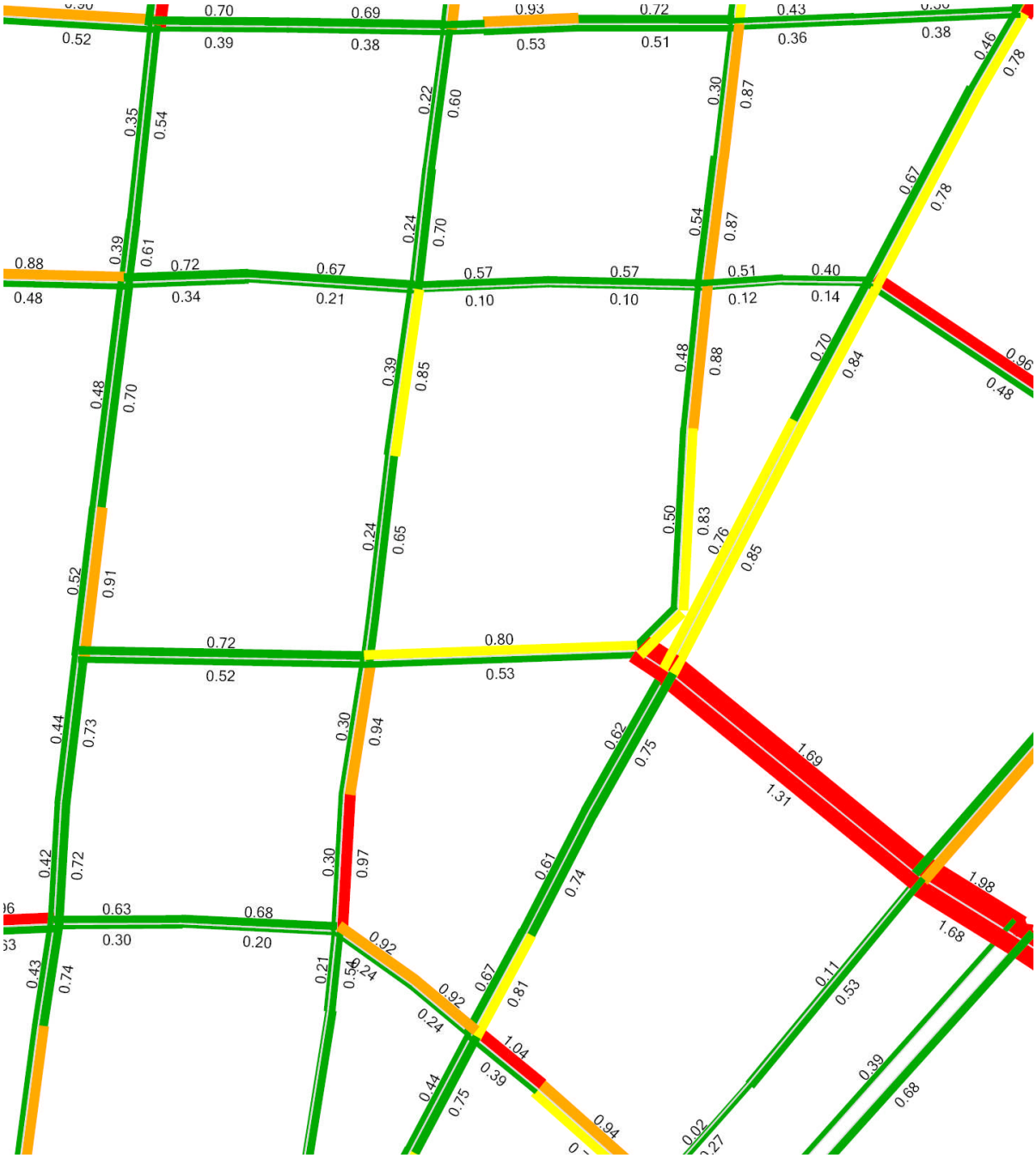

Exhibit 8-4: 2031 V/C Ratio Plot, North East Brampton - No Major Mackenzie Drive - Mayfield Road Link

Table 8-3: North-South Screenline Summary, North East Brampton - No Major Mackenzie Drive - Mayfield Road link

	East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	10,700	18,000	0.59	840
North of Bovaird Drive / Castlemore Road	21,300	24,500	0.87	1,040
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	5,000	18,000	0.28	1040
North of Bovaird Drive / Castlemore Road	9,100	24,500	0.37	3490

Table 8-4: East-West Screenline Summary for North East Brampton - No Major Mackenzie Drive - Mayfield Road link

	North Totals (Mayfield to North of Queen)			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
East of Airport Road	4,800	5,100	0.94	100
West of Highway 50	5,700	6,600	0.86	90
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
East of Airport Road	4,100	5,100	0.80	560
West of Highway 50	4,100	6,600	0.62	620

Compared to the 2009 YP BATS recommended scenario, the road network in North-East Brampton experiences higher volume-to-capacity ratios along all links. Coleraine Drive experiences the greatest difference in traffic volumes, while smaller sections of Clarkway Drive and The Gore Road experience increases as well. The east-west screenlines of Airport Road and Highway 50 begin to approach capacity due to traffic being forced to use alternate routes to reach North-East Brampton such as Mayfield Road, Countryside Drive, and Castlemore Road.

None of the roads in North-East Brampton are congested without this link; however, this link will provide opportunities to further develop areas in North-East Brampton.

8.1.3 Hwy 427 Extension to Mayfield / GTA West Corridor

This scenario consists of the extension of Highway 427 to Mayfield Road where it will terminate at the potential GTA West Corridor freeway. This freeway will stretch from Highway 427 to the City of Guelph north of Mayfield Road in Caledon and the Region of Halton. The GTA West corridor will have a six lane cross section from Highway 427 to Hurontario Street and then will be four lanes from Hurontario Street to Guelph. It will have interchanges at all major roads as well as an interchange with Highway 410. The Major Mackenzie extension to Clarkway Drive and the link from Major Mackenzie to Mayfield Road, as discussed in **Section 8.1.1**, will also be constructed to serve communities in North-East Brampton.

Exhibit 8-5 and **Exhibit 8-6** demonstrate the forecasted 2031 auto volumes and volume-to-capacity ratios in North-East Brampton. **Table 8-5** and **Table 8-6** summarize screenline performance for the North-East Brampton area.

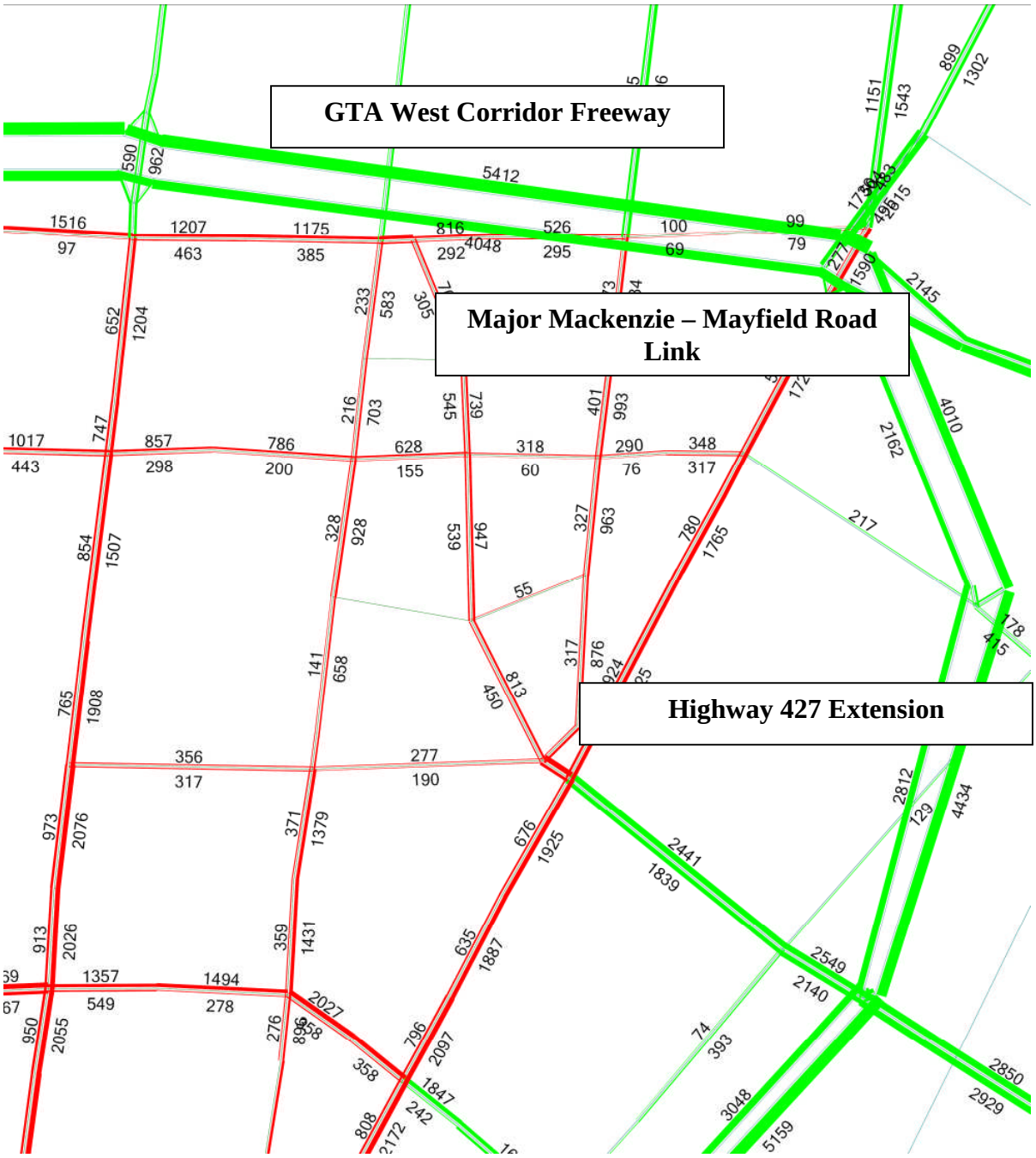

Exhibit 8-5: 2031 Auto Volume Plot, North East Brampton with Hwy 427 Extension and GTA West Corridor

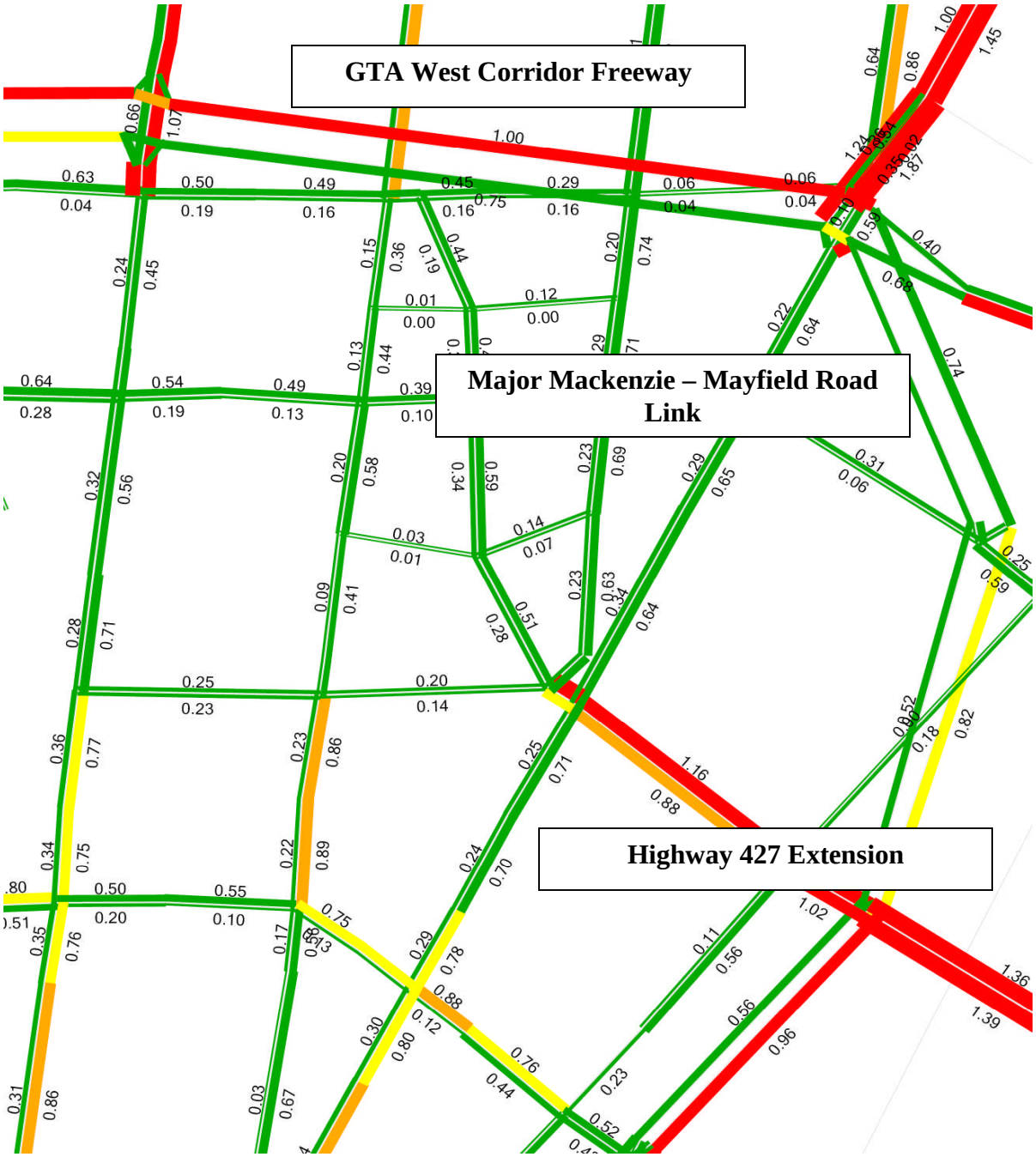

Exhibit 8-6: 2031 V/C Ratio Plot, North East Brampton with Hwy 427 Extension and GTA West Corridor

Table 8-5: 2031 North-South Screenline Summary for North East Brampton with Hwy 427 Extension and GTA West Corridor

	East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	10,300	19,600	**0.53**	840
North of Bovaird Drive / Castlemore Road	20,800	24,500	**0.85**	1,040
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	4,300	19,600	**0.22**	1040
North of Bovaird Drive / Castlemore Road	7,500	24,500	**0.31**	3490

Table 8-6: 2031 East-West Screenline Summary for North East Brampton with Hwy 427 Extension and GTA-West Corridor

	North Totals (Mayfield to North of Queen)			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
East of Airport Road	9,000	12,700	**0.71**	470
West of Highway 50	6,900	12,900	**0.53**	200
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
East of Airport Road	5,200	12,700	**0.41**	900
West of Highway 50	4,400	12,900	**0.34**	480

Like the scenario without the E-W corridor, this scenario will bring very little congestion to the road network in North-East Brampton. The stretch of Clarkway Drive between Castlemore Road and the Major Mackenzie extension is no longer congested. It should be noted that Major Mackenzie Drive in Vaughan is still very congested.

About 5250 trips will use the E-W corridor between Highway 427 and The Gore Road making this stretch freeway very congested. However, this will mean a large reduction of trips using Mayfield Road and Countryside Drive.

8.1.4 Recommended Alternative

The road network in North-East Brampton is not congested under the first scenario as there will be sufficient capacity with improvements that are already planned. Therefore, the construction of the GTA West corridor is not entirely necessary but would provide relief of truck traffic from Peel, Brampton, and Caledon arterial roads. The recommended alternative is the recommendation of the Peel-Highway 427 TMP study.

8.2 Impacts of the GTA West Corridor

As discussed previously, the GTA West corridor was coded in the model as a freeway north of Mayfield Road that begins at Highway 427 and ends in the City of Guelph. Between Highway 427 and Highway 10, the freeway will have a six lane cross-section. West of Highway 10, the freeway will be four lanes. This corridor was added to the 2031 horizon year road network to analyze its potential impacts.

Across the majority of screenlines, there is a significant reduction of traffic volumes inside the boundaries in the City of Brampton. As expected, the largest reductions in traffic volumes occur to east-west traffic screenlines between Queen Street and Mayfield Road: the results report a 13% diversion of peak direction westbound traffic. In the case of the westbound screenline to the east of Highway 410, the V/C ratio decreases from 1.00 in the base case to 0.86 with the Corridor.

The corridor, if approved, is expected to provide a choice route to heavy truck traffic, both to inter-provincial goods movement travel and more locally contained aggregate and construction industry travel. In all, the GTA West corridor, when completed, will provide clear benefits to the City by reducing congestion over certain screenlines, providing additional capacity and a more direct corridor for goods movement and accommodate growth in Brampton. The 2009 TTMP strongly supports the implementation of this strategic corridor.

8.2.1 Impacts on the City of Brampton

Table 8-7: Screenline Summary Comparison between Base Case Scenario and Scenario with GTA West Corridor

	Scenario 1 - Base Case Scenario - Base Network; Base LU								Scenario 2 - East - West Corridor Scenario - Base Network with E-W Corridor; Base LU							
	West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)				West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	5,536	17,700	0.31	25	10,974	19,600	0.56	841	6,629	17,700	0.37	25	10,258	19,600	0.52	841
North of Bovaird Drive / Castlemore Road	15,907	20,300	0.78	252	21,292	24,500	0.87	1,042	16,728	20,300	0.82	252	20,834	24,500	0.85	1,042
North of Queen Street / Embleton Road	19,374	19,870	0.98	164	22,828	22,470	1.02	579	19,364	19,870	0.97	164	22,640	22,470	1.01	579
North of Steeles Avenue	19,201	23,270	0.83	432	16,714	16,070	1.04	234	19,494	23,270	0.84	432	16,258	16,070	1.01	234
Brampton / Mississauga	14,909	19,340	0.77	273	10,942	12,350	0.89	342	15,006	19,340	0.78	273	11,000	12,350	0.89	342
	West Totals (Winston Churchill to west of Hwy 410)				**East Totals (Hwy 410 to Highway 50)**				**West Totals (Winston Churchill to west of Hwy 410)**				**East Totals (Hwy 410 to Highway 50)**			
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	4,341	17,700	**0.25**	1,823	4,972	19,600	**0.25**	1,040	4,464	17,700	**0.25**	1,823	4,323	19,600	**0.22**	1,040
North of Bovaird Drive / Castlemore Road	8,622	20,300	**0.42**	2,797	9,104	24,500	**0.37**	3,487	8,724	20,300	**0.43**	2,797	7,520	24,500	**0.31**	3,487
North of Queen Street / Embleton Road	9,521	19,870	**0.48**	1,066	9,105	22,470	**0.41**	4,180	9,399	19,870	**0.47**	1,066	8,346	22,470	**0.37**	4,180
North of Steeles Avenue	10,418	23,270	**0.45**	1,578	8,096	16,070	**0.50**	959	10,132	23,270	**0.44**	1,578	7,495	16,070	**0.47**	959
Brampton / Mississauga	9,565	19,340	**0.49**	203	4,728	12,350	**0.38**	1,486	9,580	19,340	**0.50**	203	4,595	12,350	**0.37**	1,486
	North Totals (Mayfield to North of Queen)				**South Totals (Queen to Bram.-Miss. Boundary)**				**North Totals (Mayfield to North of Queen)**				**South Totals (Queen to Bram.-Miss. Boundary)**			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	3,161	5,900	**0.54**	38	2,812	4,870	**0.58**	1	2,501	5,900	**0.42**	38	2,697	4,870	**0.55**	1
Credit River (WB & NB)*					10,397	10,140	**1.03**	546					10,382	10,140	**1.02**	546
East of Highway 10	9,909	11,770	**0.84**	348	3,653	3,270	**1.12**	242	10,032	11,770	**0.85**	348	3,578	3,270	**1.09**	242
East of Highway 410 / Heartlake Road	11,617	11,670	**1.00**	339	8,536	9,140	**0.93**	616	10,065	11,670	**0.86**	339	8,430	9,140	**0.92**	616
East of Airport Road	10,397	12,700	**0.82**	466	4,882	5,140	**0.95**	104	8,978	12,700	**0.71**	466	4,488	5,140	**0.87**	104
West of Highway 50	9,006	12,900	**0.70**	203	5,786	6,570	**0.88**	88	6,909	12,900	**0.54**	203	5,457	6,570	**0.83**	88

	North Totals (Mayfield to North of Queen)				South Totals (Queen to Bram.-Miss. Boundary)					North Totals (Mayfield to North of Queen)				South Totals (Queen to Bram.-Miss. Boundary)			
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**		**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	2,401	5,900	**0.41**	172	2,591	4,870	**0.53**	1		1,878	5,900	**0.32**	172	2,456	4,870	**0.50**	1
Credit River (EB & SB)*					7,107	10,140	**0.70**	960						6,911	10,140	**0.68**	960
East of Highway 10	8,059	11,770	**0.68**	478	2,190	3,270	**0.67**	3,637		6,880	11,770	**0.58**	478	2,108	3,270	**0.64**	3,637
East of Highway 410 / Heartlake Road	9,386	11,670	**0.80**	605	5,526	9,140	**0.60**	347		7,025	11,670	**0.60**	605	5,150	9,140	**0.56**	347
East of Airport Road	7,036	12,700	**0.55**	901	4,088	5,140	**0.80**	562		5,197	12,700	**0.41**	901	3,831	5,140	**0.75**	562
West of Highway 50	5,853	12,900	**0.45**	481	4,114	6,570	**0.63**	621		4,355	12,900	**0.34**	481	3,582	6,570	**0.55**	621

8.3 Brampton Central Analyses

Five potential network improvements have been tested to find opportunities to improve traffic flow and reduce congestion in Central Brampton. Specifically, these improvements aim to improve conditions along Queen Street between McLaughlin Road and Kennedy Road and Main Street north of Queen Street to Vodden Street. The five improvements are:

1. Clark Boulevard – Eastern Avenue Connection (see **section 8.3.1**)
2. John Street Transit, Cyclist and/or Pedestrian Extension (see **section 8.3.2**)
3. Ken Whillans Drive Extension (see **section 8.3.3**)
4. Denison Street – Mill Street Connection (see **section 8.3.4**)
5. Queen Street Access Management Improvements and Capital Improvements

For each improvement a select link analysis is performed in order to approximate the number of trips each improvement will serve. The select link analyses will also be able to distinguish the origin and destination of all trips making it possible to determine how many trips are local trips to Central Brampton or through trips. For these analyses, Central Brampton is defined by the area bounded by Vodden Street in the north, Clarence Street in the south, Kennedy Road in the east and McLaughlin Road in the west. These trips are also re-distributed into the model without the improvement to examine what links will be used by these trips if the improvement is not implemented. All improvements and the results of the select link analyses are described in greater detail below.

8.3.1 Clark-Eastern Connection

The Clark-Eastern Feasibility Study in 2004 recommended a new four lane road connection between Rutherford Road and Hansen Road and widening of Eastern Avenue between Kennedy Road and Hansen Road (shown below in **Exhibit 8-7**) based on detailed modelling, forecasting and benefit-cost analysis. The need for this improvement was also confirmed in the 2004 TTMP as well as the Brampton Central Area Plan Review. This connection is identified in the latest City of Brampton Capital Plan as an improvement for 2018.

Exhibit 8-7: Clark – Eastern Connection

The TTMP Sustainable Update has reconfirmed the need for this improvement, which will complete the missing link between Hansen Road and Rutherford Road and connect Eastern Avenue and Clark Boulevard in order to create a continuous route linking the Bramalea City Centre (east of Dixie Road) and the Hospital (west of Kennedy Road). Currently Eastern Avenue's eastern terminus is Hansen Road and Clark Boulevard terminates in the west at Rutherford Road. This leaves Orenda Road and Queen Street as the only two options for drivers when travelling between the Bramalea City Centre area and the Central Area.

As a parallel route to Queen Street, this improvement is expected to improve flow on heavily-congested Queen Street by providing an alternative choice for drivers and by providing additional capacity in the Central Area. The recommended timing for the connection should be coordinated with the implementation of the proposed BRT system on Queen Street which will be one of the key steps in achieving the long term vision for Queen Street. The Clark-Eastern connection will accommodate some of the traffic diversion off Queen Street when two lanes on Queen Street will be dedicated to future BRT service.

Forecasts for the year 2031 project about 760 users will be using this link in the PM peak direction (westbound). Most of these trips begin near the Bramalea City Centre. Only 15 trips are considered local traffic with a destination in Central Brampton. The other trips are considered through traffic. This connection will mean approximately 150 fewer trips using Queen Street and an additional 110 fewer trips using Orenda Road. As expected, users of this

Clark-Eastern connection will be forced to use Queen Street and Orenda Road if they need to travel between Central Brampton and Bramalea City Centre if no such improvement exists. See **Exhibit 8-8** and **Exhibit 8-9** for plots that represent auto volumes on streets near the Clark-Eastern connection.

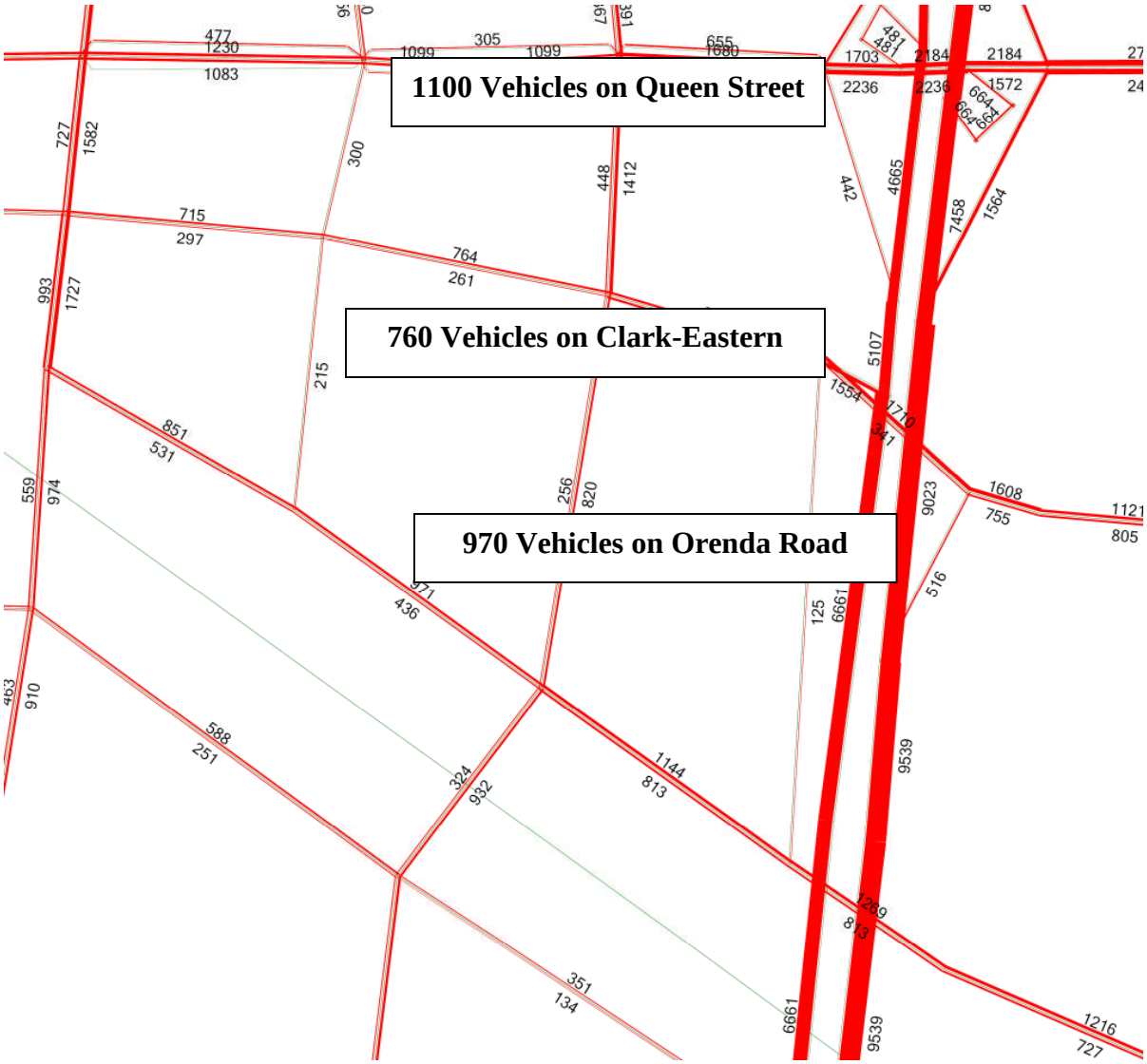

Exhibit 8-8: Auto Volumes with Clark-Eastern Connection

Exhibit 8-9: Auto Volumes without Clark-Eastern Connection

8.3.2 John Street Extension

The John Street extension from James Street to Centre Street, across the Etobicoke Creek, is not currently in the Official Plan. Although it has been recommended in the John Street Feasibility Study, Brampton City Council has directed that a John Street vehicular extension must not go forward. However, a John Street extension for public transit, bicycles or pedestrians is still a possibility. The alignment of this extension is illustrated in **Exhibit** 8-10**8-10**.

Exhibit 8-10: John Street Extension

This extension will improve access to the Peel Memorial Hospital, and will be in keeping with the planned vision for the PHM site to be developed into a pedestrian-friendly environment based on health care, education and complementary open space, residential and commercial land uses. The extension will provide an ideal opportunity to accommodate pedestrians and cyclists moving between the Downtown Core and the PMH lands. Because of the benefits of the John Street extension to PMH, the extension should continue to be protected and further studied with redevelopment plans for the Hospital Area.

A Wellington Street extension through a portion of the PMH site connecting Trueman Street and Wellington Street over the Etobicoke Creek and underneath the Georgetown GO Line was also studied as an alternative to the John Street extension; however, the John Street connection is preferred over the proposed Wellington Street extension based on a comparison of their impacts to the Downtown Core and Hospital Area, their construction costs, and the

results of a functional design and benefit-cost analysis study, which concluded that the expense of the Wellington Street extension (at approximately $37.6 million compared to $2.3 million required for the John Street Extension) would outweigh any direct or indirect benefits gained by the extension.

Although permitting vehicular traffic to use the John Street extension would have a positive impact on congestion, a vehicular connection is not supported by council. Several concerns about a vehicular John Street extension were expressed by the Brampton Downtown Development Corporation. Below is a list of their concerns, listed in their letter to City Council, September 30, 2008:

- John Street is not a viable alternative to Queen, since it is one-way eastbound between Main and Chapel Street
- Queen and James intersection would be too close to a John extension and James intersection
- Negative impact on other streets in the downtown area – especially potential doubling of traffic on Wellington Street and Mary Street
- Potential negative impact on desirability of new developments in the area
- Potential negative impact on attracting businesses both to the Downtown area and to the City as a whole

The John Street Extension for transit, cyclists and/or pedestrians is recommended for the year 2018.

8.3.3 Ken Whillans Extension

The proposed Ken Whillans extension provides an alternate route to Main Street for access to the northeast quadrant of the Downtown Core.

An Environmental Assessment is currently being undertaken for the proposed Ken Whillans extension from Church Street to the intersection of Union and Nelson Streets. The proposed extension is shown in **Exhibit 8-11**.

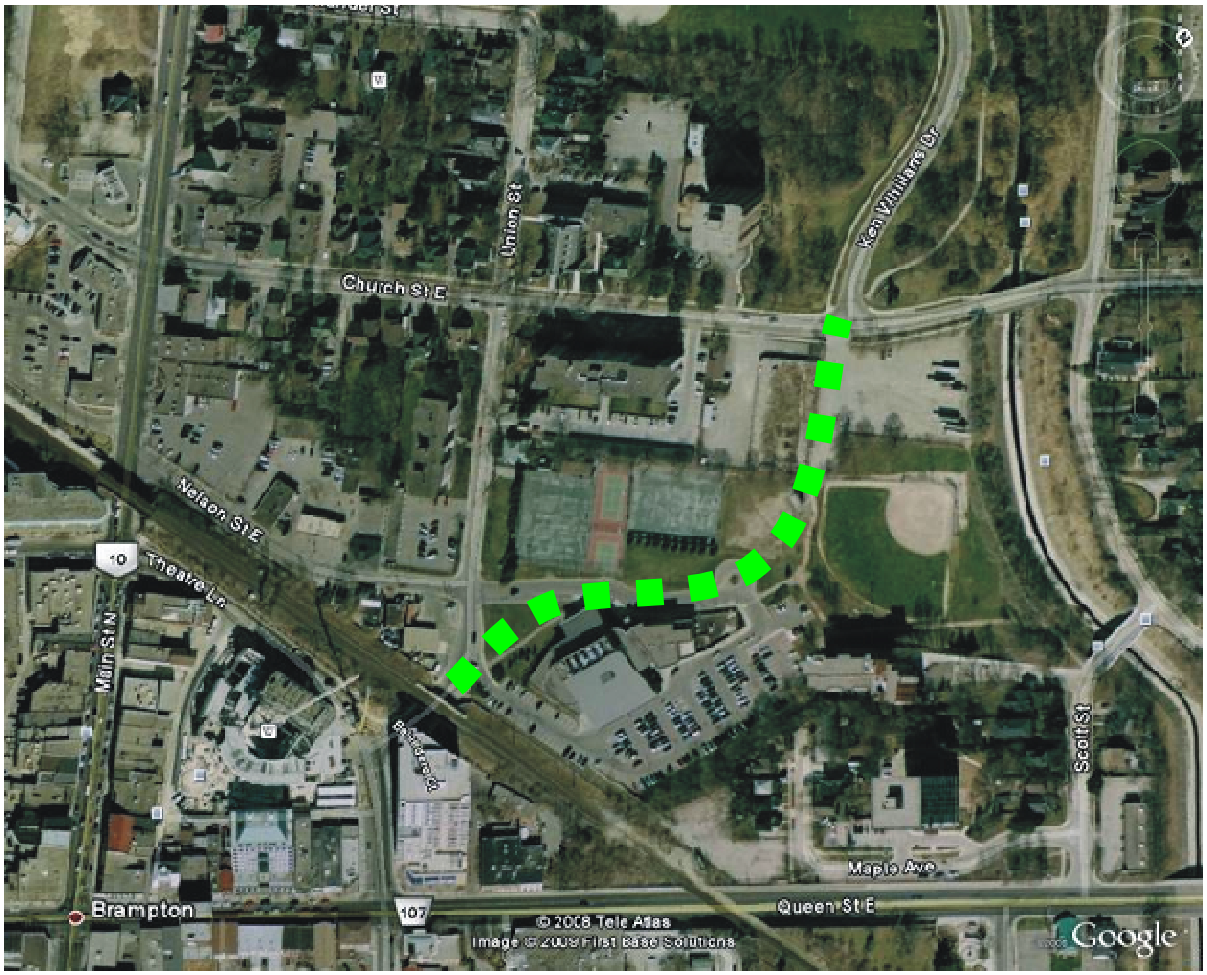

Exhibit 8-11: Ken Whillans Extension

The extension is identified in the Brampton 10-year Capital Programme for 2011 and includes drainage improvements. The Environmental Assessment process for this section is currently being undertaken by the City.

From a traffic operations perspective, the extension will accommodate peak demands during Theatre events and provide a more direct access between the Downtown and neighbourhoods to the north and west. The extension will also provide relief to Main Street during weekday peak commuting periods, as Main Street BRT Service is scheduled to begin in 2011.

The Brampton EMME/2 model for the year 2031 assigns 220 trips to Ken Whillans in the PM peak direction (northbound), where 181 trips are considered local trips. This extension will have its biggest effect on Main Street north of Nelson Street where there is a reduction of 99 trips. This improvement also relieves traffic levels on Church Street eastbound by approximately 90 users. More than half, or 116 trips, are destined for a traffic zone immediately north of Church Street and east of Etobicoke Creek. See **Exhibit 8-12** and **Exhibit 8-13** for plots that represent traffic volumes on streets around the Ken Whillans extension.

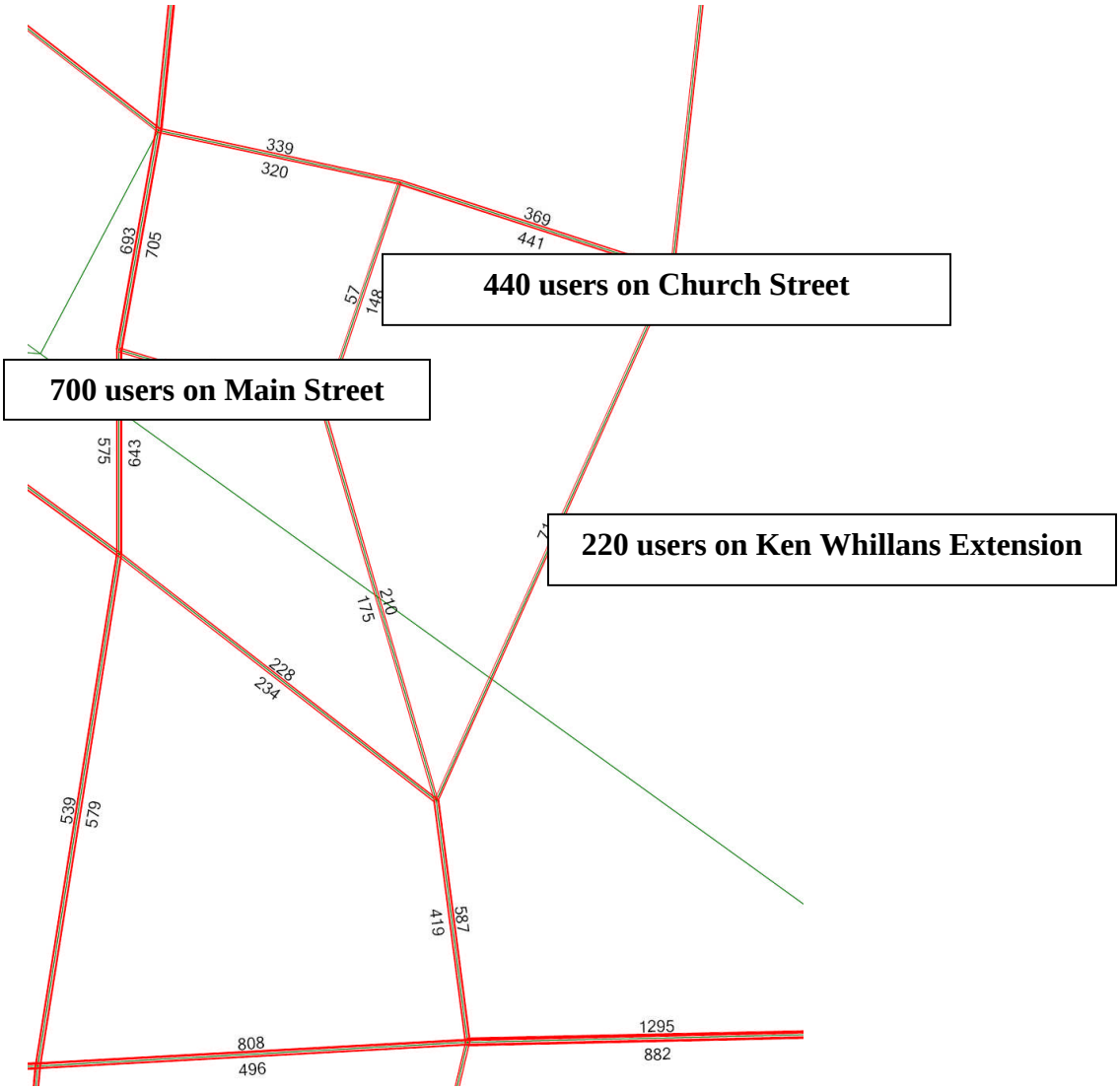

Exhibit 8-12: Auto Volumes with Ken Whillans Extension

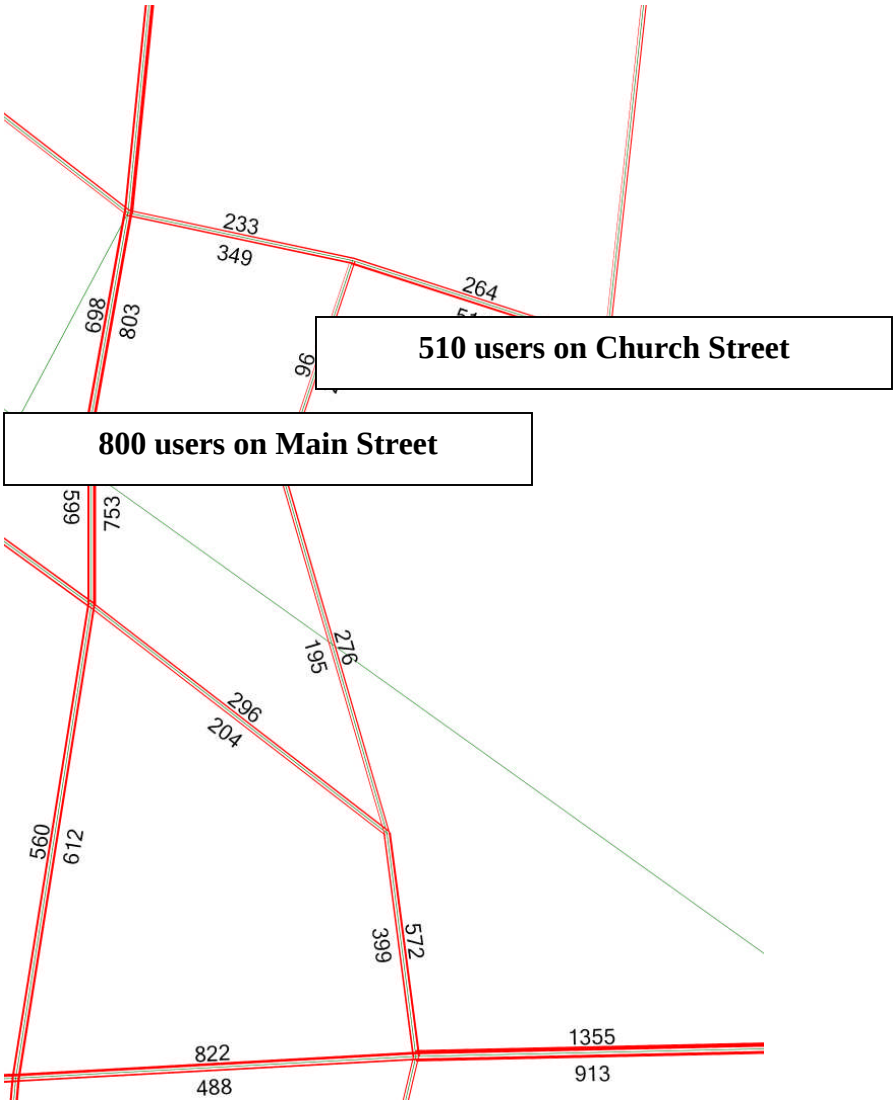

Exhibit 8-13: Auto Volumes without Ken Whillans Extension

8.3.4 Denison-Mill Connection

The potential Dension Avenue to Mill Street connection provides a continuous link for Denison Avenue and Church Street via Mill Street. This connection is advantageous to Railroad Street because the existing Railroad Street connection is less direct. Providing the Denison-Mill connection will draw traffic away from Queen Street, Railroad Street, Nelson Street, and McMurchy Avenue. The potential alignment of this connection, shown in **Exhibit 8-14**, below, will be located very close to an existing heritage structure (Dominion Skate). A current application for redevelopment of the property provides an opportunity for the alignment to be protected.

Exhibit 8-14: Potential Denison Avenue to Mill Street Connection

Construction for a connection between Haggert Avenue and McMurchy Avenue is underway, and is circled in green below in **Exhibit 8-15**. The proposed extension to Mill Street further facilitates Denison Avenue as a viable alternative route parallel to Queen Street, in providing more direct access to Church Street (via Mill Street) and the Brampton GO station. It is expected such a connection will reduce volumes on a busy section of Queen Street between Main Street and McMurchy Avenue.

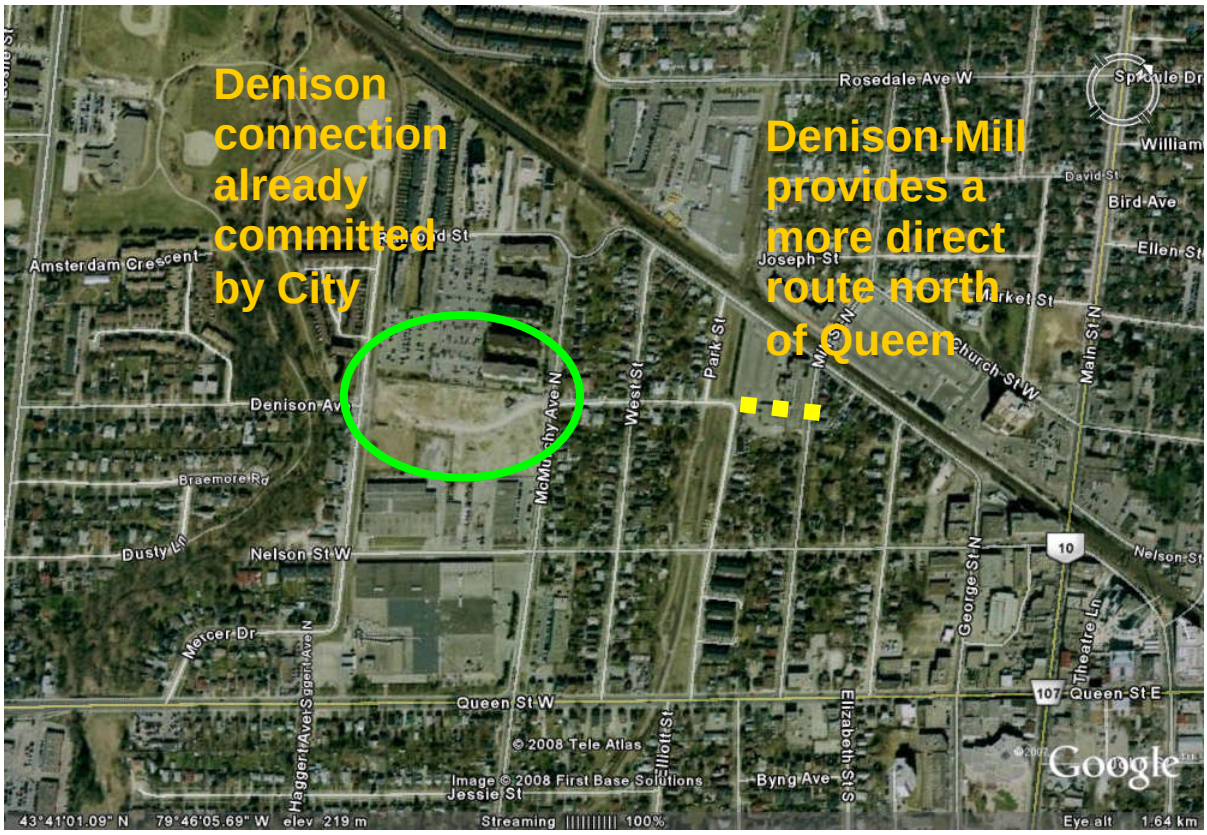

Exhibit 8-15: Denison-Mill Connection

Using the City's EMME/2 model, approximately 445 vehicles use the Denison improvement in the PM peak direction (westbound) with 280 trips considered local traffic. This extension will divert more than 220 users on Queen Street between Mill Street and McMurchy Avenue, as seen in **Exhibit 8-16** and **Exhibit 8-17** below. Without the improvement, the model assigns trips westbound via Queen Street, Railroad Street / McMurchy Avenue and Vodden Street.

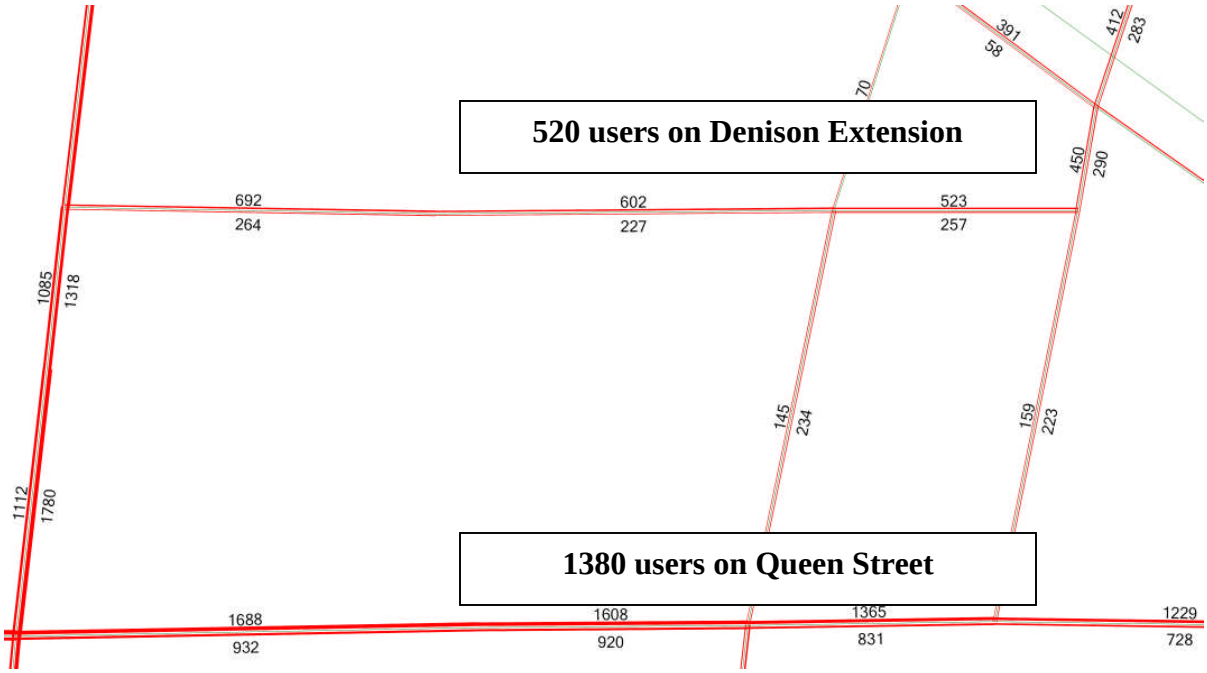

Exhibit 8-16: Auto Volumes with Denison Avenue Extension

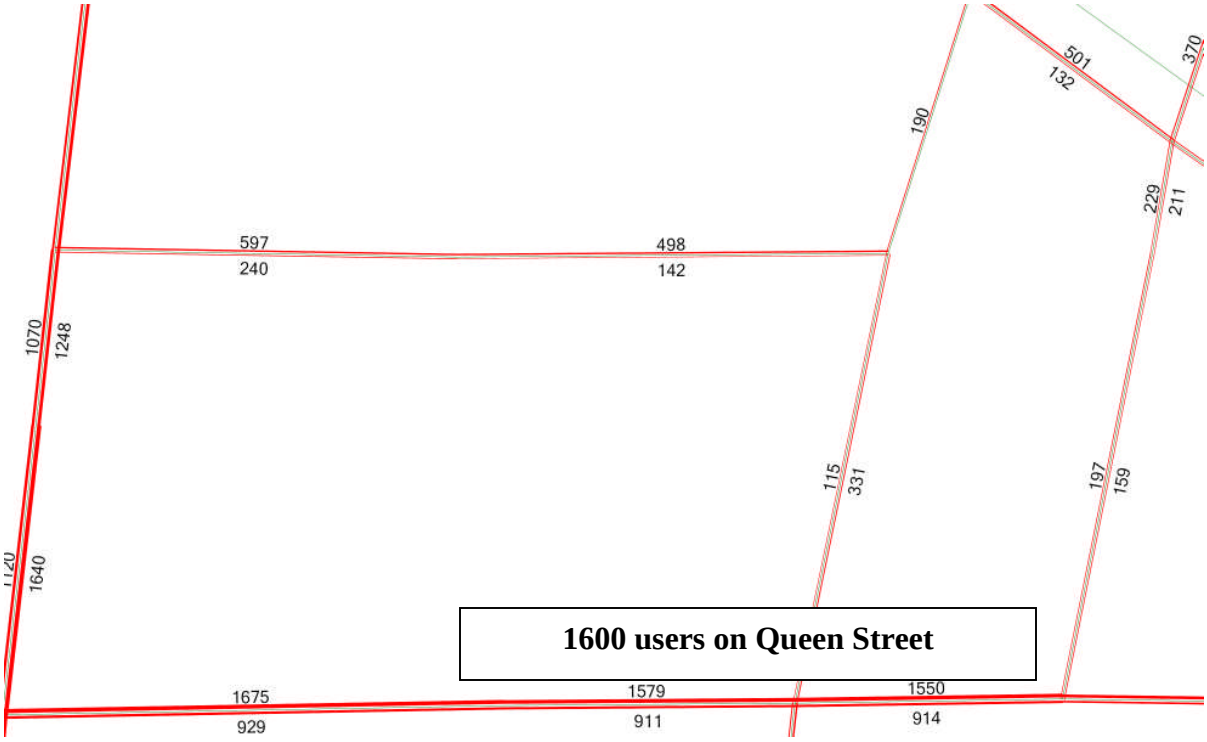

Exhibit 8-17: Auto Volumes without Denison Avenue Extension

The Denison Avenue to Mill Street Connection is recommended as a long-term improvement.

8.3.5 Queen Street EA and Capital Improvements

The Queen Street Class Environmental Assessment for Centre Street to Highway 410 recommended improvements necessary in the interim (2010) leading up to the ultimate long-term BRT / LRT objectives.

Between Centre and Kennedy, a minor widening will be provided, increasing lane and boulevard widths to accommodate increased bus service in the corridor. Widening of the Kennedy Road to Rutherford Road section is needed to accommodate future traffic growth and improve transit service for the planned BRT service, since the corridor has been designated as Transit Priority corridor and urban growth centre in various plans. The centre two-way left turn lane will be maintained to allow access to / from driveways / properties. From Rutherford Road to Highway 410, the existing 7-lane cross section is maintained while the existing lane widths would be reconfigured to provide an alignment and lane widths that are consistent with the widened section between Kennedy Road and Rutherford Road, and include HOV in the westbound curb lane

The need for the capacity improvement between Kennedy Road and Rutherford Road is reconfirmed in this Brampton TTMP update. **Exhibit 8-18** below illustrates 2031 traffic volumes on Queen Street.

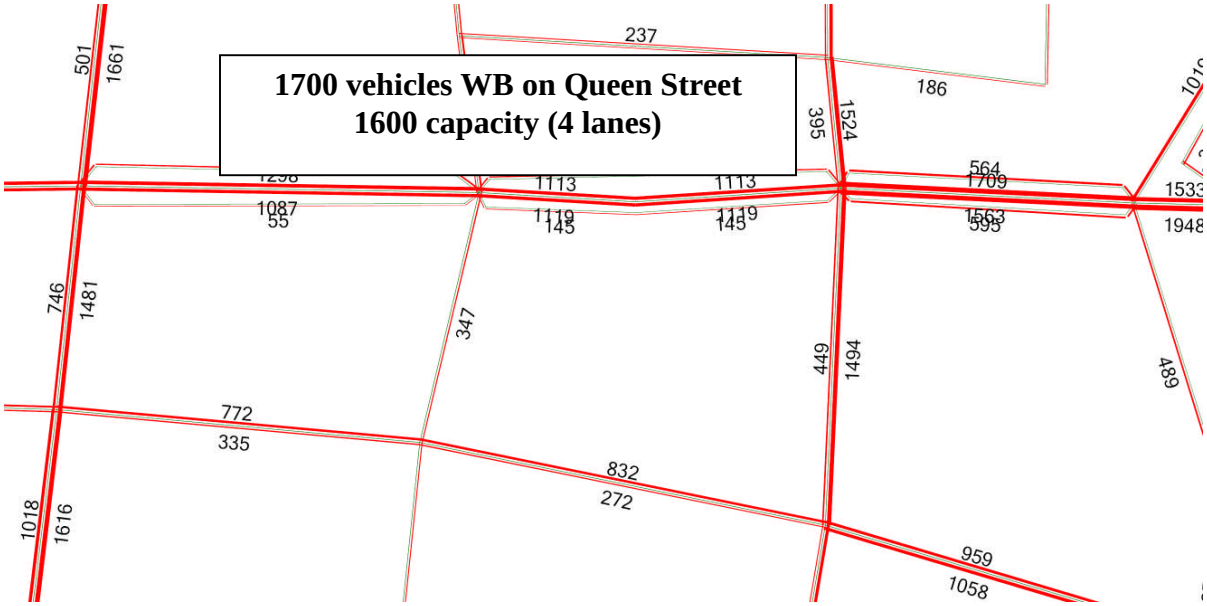

Exhibit 8-18: Queen Street 2031 Traffic Forecast, Kennedy to Rutherford

Traffic forecasts for 2031 show a demand greater than the four lane capacity of 1600 vehicles per hour, per lane. Despite being an interim solution, demand and transit service will definitely require a solution, and attempting to provide increased bus service in congested conditions would likely be ineffective. The widening for HOV and transit then will firstly alleviate the congestion experienced by auto users, will secondly allow for more reliable transit service and will thirdly promote high occupancy vehicular travel.

8.3.6 Queen Street Access Management Improvements

Further to the interim lane, boulevard, and capacity improvements discussed in the previous section, access management on Queen Street is identified as an important improvement in support of the ultimate vision of Queen Street and accommodation of future BRT or LRT. A conceptual interpretation of the vision for Queen Street is illustrated below in **Exhibit 8-19** where the BRT system would be operating in the median lanes along Queen Street. Access and travel across the BRT median lanes would not be permitted except at signalized public road intersections where there would be transit stops for the BRT. As such, all private driveways along Queen Street will be restricted to right turns only in the future.

Even if all existing private driveways were restricted to right turns only, there are too many driveways along Queen Street to effectively move traffic and to safely accommodate pedestrian / cycling movements. Accordingly, consolidations and relocations of driveways to sideroads / cross streets are recommended to minimize the number of conflict points along Queen Street.

Exhibit 8-19: Ultimate Vision for Queen Street

The existing situation on Queen Street between Centre Street and Highway 410 has also been identified as high-risk for collisions based on TAC guidelines for access points per kilometre. A summary of the existing access points is provided in **Table 8-8**.

Table 8-8: Queen Street Existing Access Points Summary Table

Midblock Segment	Segment Length (m)	Driveway Frequency		
		Driveways	Intersections	Accesses / km
Centre Street to Kennedy Road	545	33	6	72
Kennedy road to Hansen Road	460	23	0	50
Hansen Road to Rutherford Road	425	15	0	35
Rutherford Road to Highway 410 SB Off-ramp	470	11	1	26
TOTAL	1,900	82	7	47

While driveway consolidations were examined as part of the interim improvements to Queen Street, an Access Management Guidelines Study is recommended in the short to mid term. This study will identify a driveway elimination strategy for Queen Street, preliminary recommendations, and plans showing side or real lane access to local cross streets, as part of plans to achieve the ultimate vision for Queen Street.

An Environmental Assessment for Queen Street identified short term driveway consolidations as part of widening improvements for HOV and queue jumping. An Access Management Guidelines Study, recommended in the short to mid term, will identify appropriate driveway spacing for Queen Street, and preliminary recommendations and plans to show potential consolidated driveways and side or rear lane access to local cross streets as part of redevelopment along Queen Street.

8.3.7 Previously Considered Improvements

Seven other road improvements were previously considered but not recommended:

1. Wellington extension over Etobicoke Creek
2. Wellington - Fleming Connection (jog elimination and at grade CN crossing)
3. Royce Avenue extension over Fletchers Creek
4. Scott Street connection to Ken Whillans Drive
5. Harold Street / Clarence Street connection
6. McMurchy Avenue / Pleasantview Avenue grade separation
7. Church / Archdekin connection

8.3.8 Final Recommendations

The TTMP Sustainable Update 2009 confirms that the following transportation improvements should be carried forward in the Central Area:

- Coordinating the construction of the Clark-Eastern connection with the implementation of BRT and general purpose lane reductions on Queen Street that would occur at the same time.
- Include the John Street transit, cyclist and/or pedestrian extension between James Street and Centre Street in the DC / Capital Plan. Construct this extension after the implementation of the Clark-Eastern connection
- Include the Denison-Mill connection in the DC / Capital Plan and construct when redevelopment of the Dominion Skate property is undertaken by the private sector
- Construct Ken Whillans Extension between Church and Union Streets and associated drainage improvements
- Implement the Queen Street capacity improvements between Centre Street and Highway 410 recommended in the Environmental Assessment for the same section.

The implementation of these four improvements will accommodate and support redevelopment and intensification of the Downtown Core and improve local access between Downtown Core and adjacent neighbourhoods currently constrained by lack of north-south and east-west capacity. The improved road network will benefit emergency vehicle access to the Peel Memorial Hospital and generally support its redevelopment. The recommended improvements will also alleviate Queen Street of traffic congestion and assist in achieving its ultimate vision-improving the level of service for BRT and providing enhanced network flexibility and continuity.

The final recommendations for improvements in Central Brampton are summarized in **Table 8-9** and presented in **Exhibit 8-20**.

Table 8-9: Recommended Central Brampton Improvements

Improvement	From	To	Recommended Timing*
Ken Whillans Extension	Church Street	Nelson Street / Union Street	2011**
Clark – Eastern Connection	Kennedy Road	Rutherford Road	2016
John Street Extension	James Street	East of Centre Street	2018
Denison – Mill	Park Street	Mill Street	Long-term improvement
Queen Street EA and Capital Improvements	Centre Street	Highway 410	Capital Improvements Underway
Queen Street Access Management Improvements	Centre Street	Highway 410	Long-term improvement

* Recommended timing based on Brampton 10 year capital programme
** Timing may be deferred based on ongoing EA and current issues

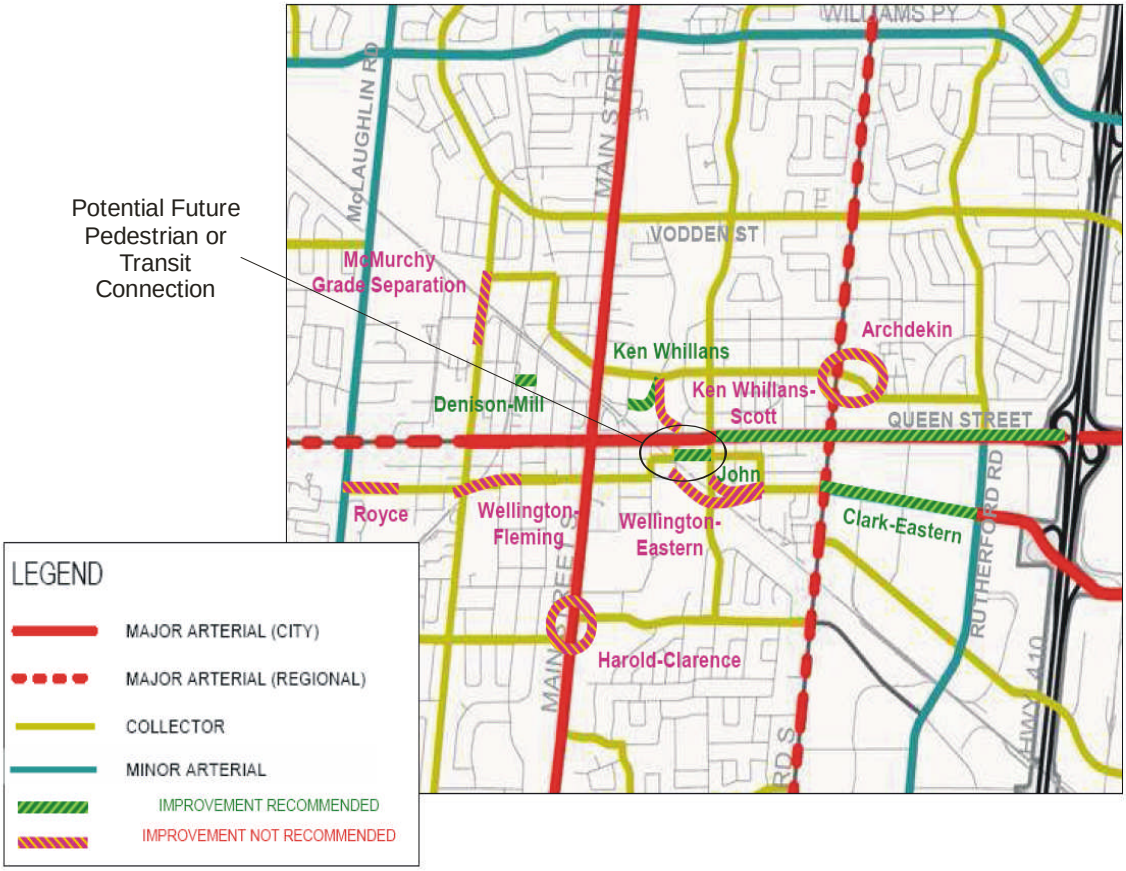

Exhibit 8-20: Recommended Central Brampton Road Improvements

9. RECOMMENDATIONS AND IMPLEMENTATION

Recommended transit and road networks resulting from the Brampton TTMP Sustainable Update for the years 2011, 2016, 2021, and 2031 are found within this chapter.

9.1 2009 TTMP Recommended Transit Networks

The recommended 2011, 2016, 2021, and 2031 transit networks are illustrated below in **Exhibit 9-1** through to **Exhibit 9-4**.

2011 and 2021 transit networks are based upon 2004 TTMP recommendations, but can vary based on timing of planned development. Timing of primary corridors and BRT improvements included in DC work are represented in these exhibits. As noted in **Section 6.10**, proposed BRT corridors should be protected for potential improvements to LRT in the future, pending demand and funding.

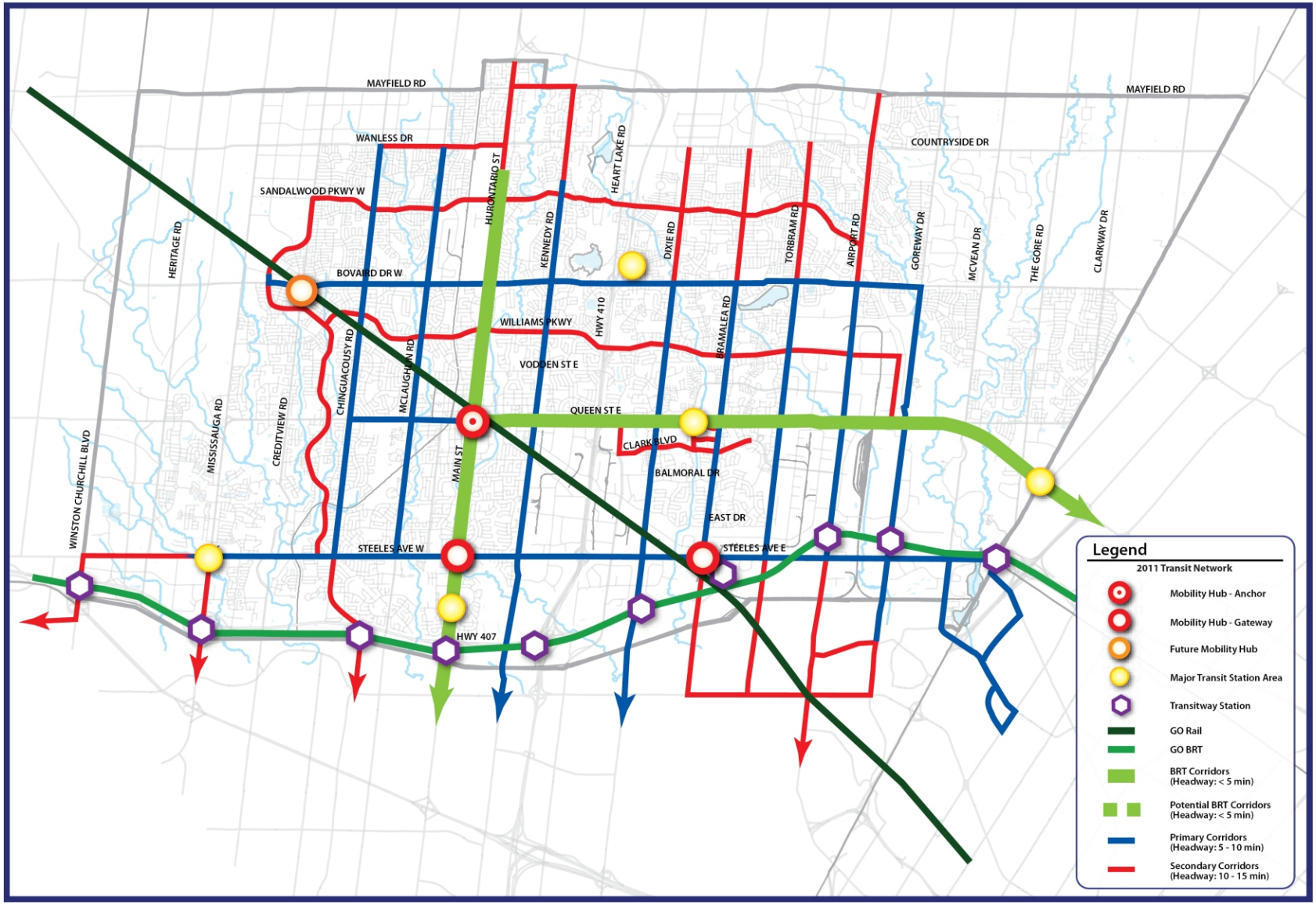

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Exhibit 9-1

Recommended 2011 Transit Network

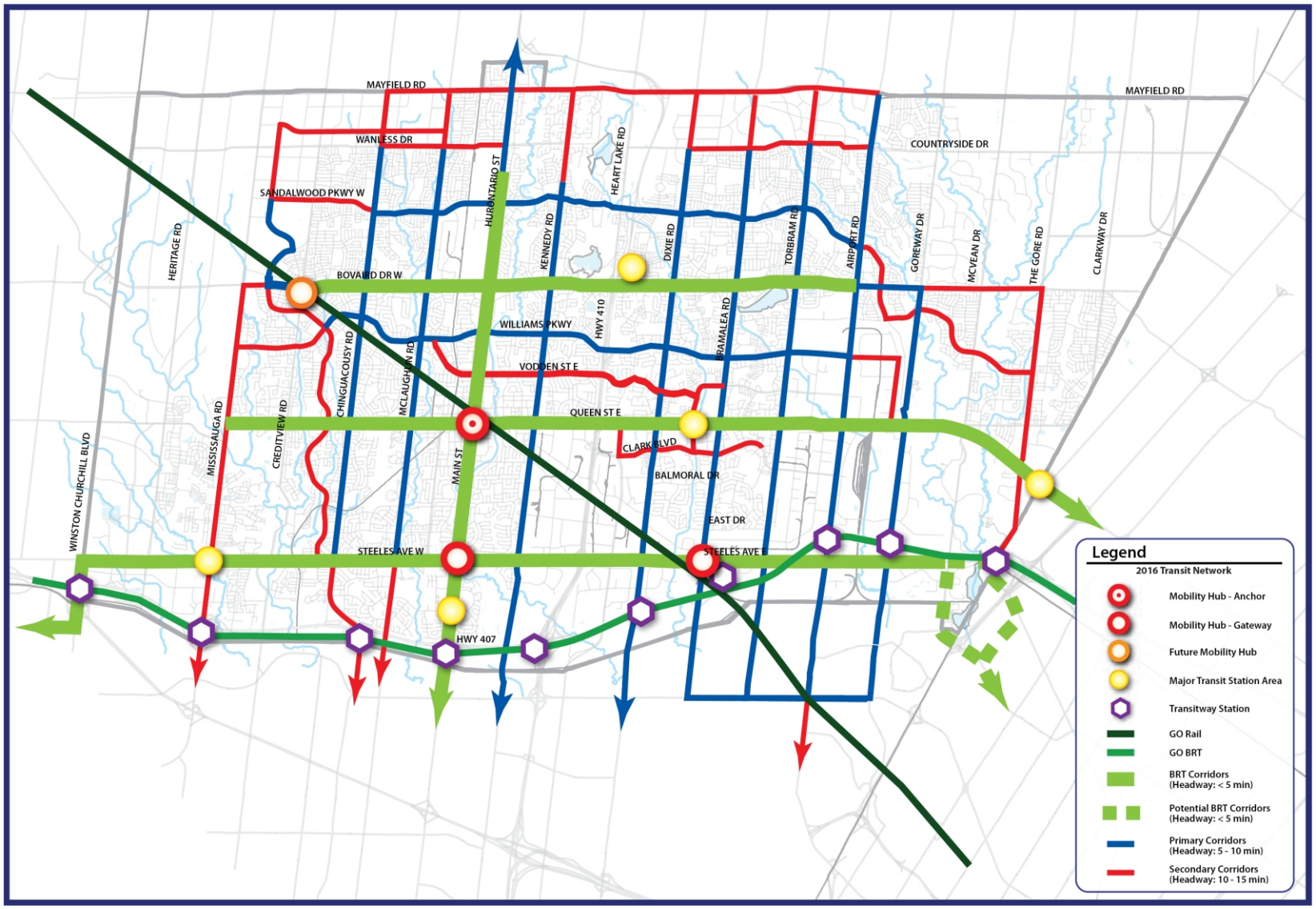

Exhibit 9-2
Recommended 2016 Transit Network

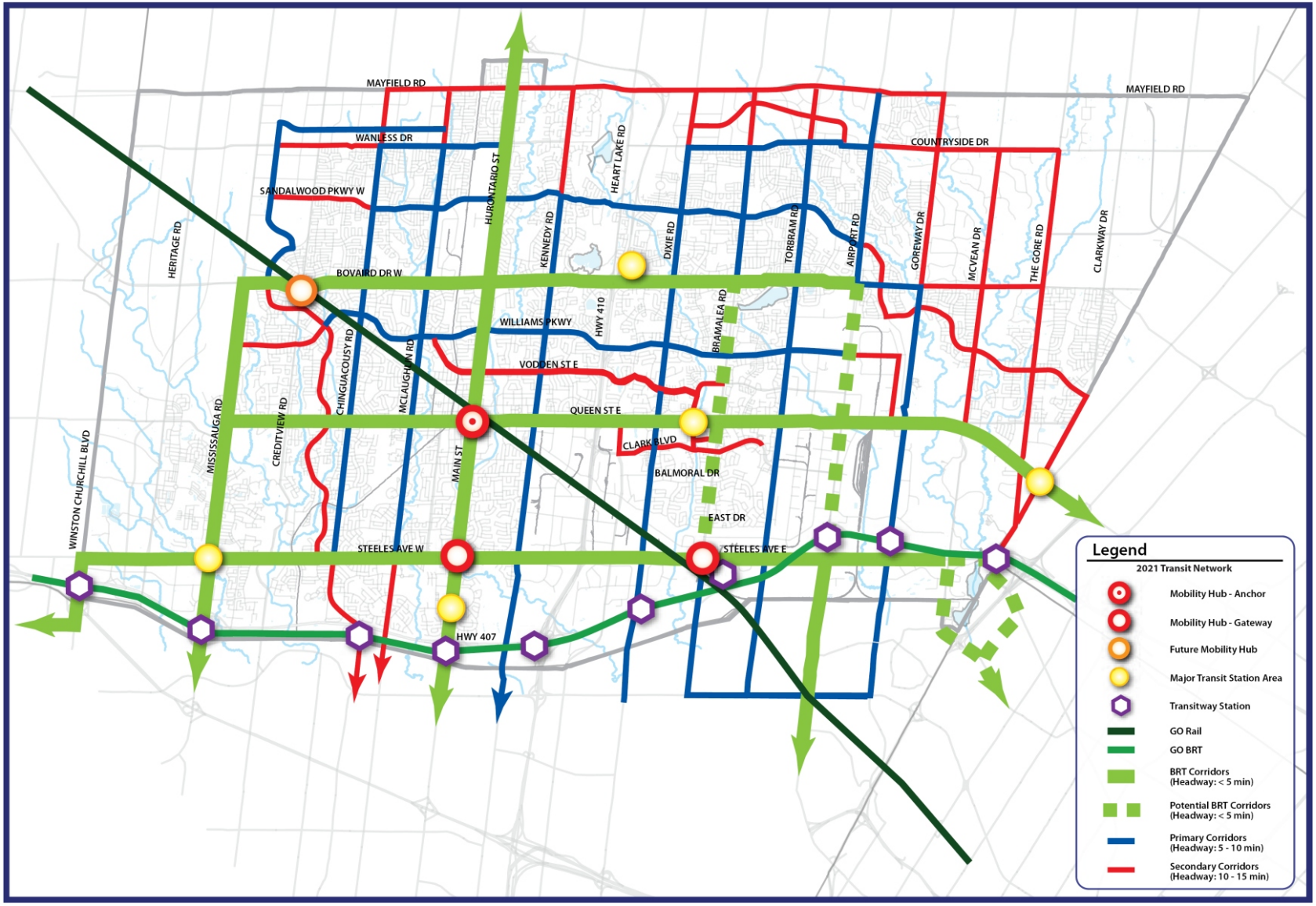

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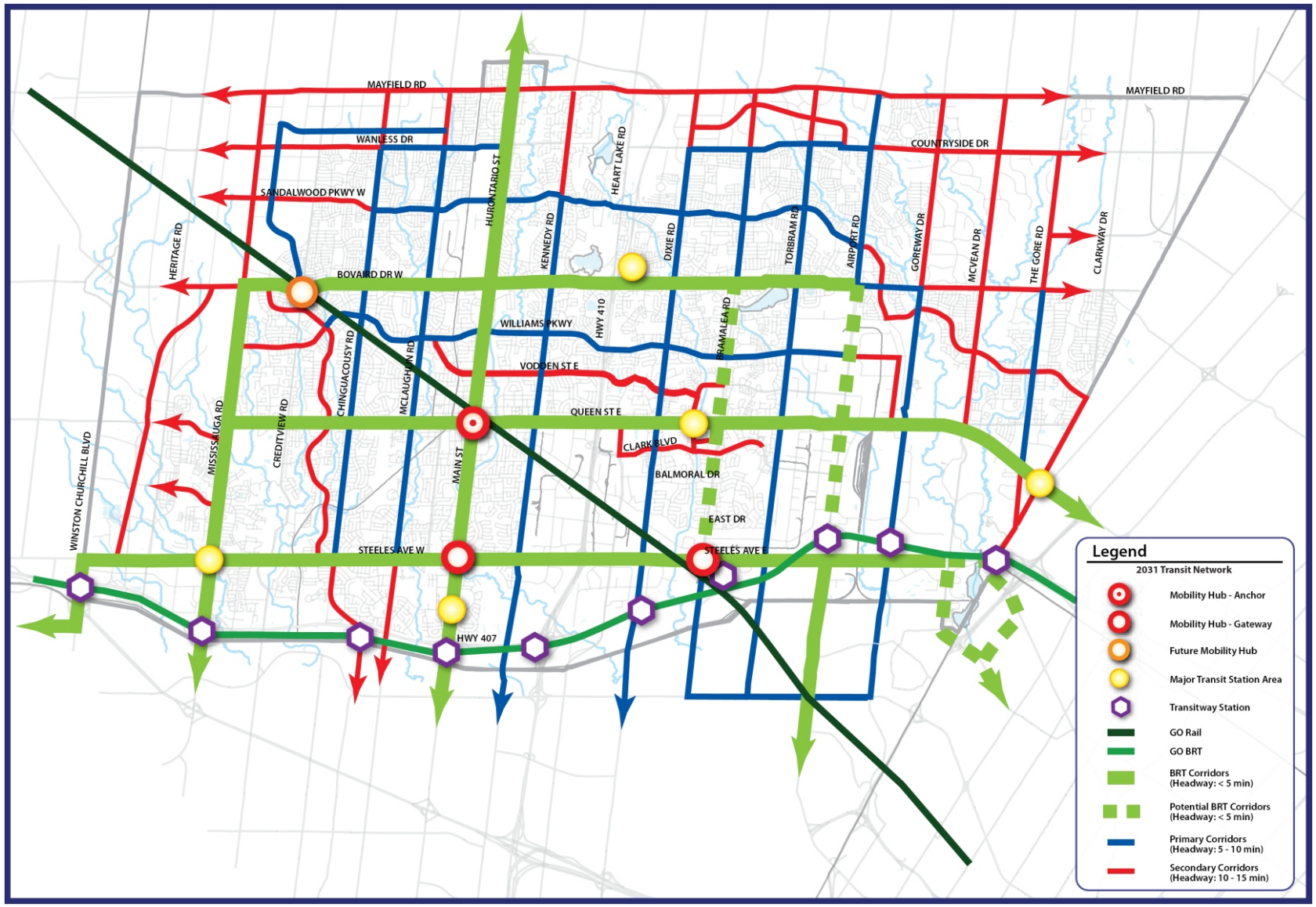
Exhibit 9-3

Recommended 2021 Transit Network



Note: Transit services will be provided to new growth areas in Bram West, Northwest Brampton, and Northeast Brampton. Determination of corridor types will be Established through the Secondary Planning Process. Connections to key future transit routes outside of Brampton should be provided as required.

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Exhibit 9-4

Ultimate Transit Network, 2031

9.2 2009 TTMP Recommended Road Networks

9.2.1 Projected Screenline Auto Demand

Detailed screenline auto demand versus capacity tables are provided below in **Table 9-1** through to **Table 9-4**, for 2011, 2016, 2021, and 2031. The road networks in these tables include the recommendations of the Development Charges program and the TTMP recommended road networks.

Table 9-1: 2011 Screenline V/C Ratios

	West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	2,700	9,000	**0.30**	30	6,000	11,000	**0.55**	330
North of Bovaird Drive / Castlemore Road	8,400	13,600	**0.62**	420	12,800	16,400	**0.78**	1,550
North of Queen Street / Embleton Road	11,700	13,400	**0.87**	400	19,200	20,500	**0.94**	600
North of Steeles Avenue	11,400	16,800	**0.68**	400	12,500	12,000	**1.04**	500
Brampton / Mississauga	11,100	14,400	**0.77**	300	10,000	13,400	**0.75**	550
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	1,400	9,000	**0.16**	510	2,700	11,000	**0.25**	0
North of Bovaird Drive / Castlemore Road	4,100	13,600	**0.30**	2,200	4,600	16,400	**0.28**	3,090
North of Queen Street / Embleton Road	4,100	13,400	**0.31**	1,740	6,600	20,500	**0.32**	5,050
North of Steeles Avenue	6,100	16,800	**0.36**	1,610	5,500	12,000	**0.46**	2,810
Brampton / Mississauga	7,000	14,400	**0.49**	850	3,900	13,400	**0.29**	5,220
	North Totals (Mayfield to North of Queen)				**South Totals (Queen to Bram.-Miss. Boundary)**			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	1,400	2,500	**0.56**	0	2,100	2,500	**0.84**	0
Credit River*					4,600	5,200	**0.88**	730
East of Highway 10	6,600	10,300	**0.64**	330	3,700	3,900	**0.95**	350
East of Highway 410 / Heartlake Road	8,300	11,500	**0.72**	420	7,400	7,600	**0.97**	620
East of Airport Road	6,500	9,500	**0.68**	180	4,400	5,800	**0.76**	370
West of Highway 50	2,200	6,600	**0.33**	270	4,700	5,700	**0.82**	120
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	1,400	2,500	**0.56**	0	1,400	2,500	**0.56**	0
Credit River*					3,500	5,200	**0.67**	280
East of Highway 10	5,600	10,300	**0.54**	1,220	1,800	3,900	**0.46**	560
East of Highway 410 / Heartlake Road	6,600	11,500	**0.57**	1,430	4,200	7,600	**0.55**	600
East of Airport Road	4,400	9,500	**0.46**	840	3,700	5,800	**0.64**	870
West of Highway 50	2,300	6,600	**0.35**	260	2,600	5,700	**0.46**	800

NB TOTAL	45,300	67,200	**0.67**	1,550	60,500	73,300	**0.83**	3,530
SB TOTAL	22,700	67,200	**0.34**	6,910	23,300	73,300	**0.32**	16,170
WB TOTAL	25,000	40,400	**0.62**	1,200	26,900	30,700	**0.88**	2,190
EB TOTAL	20,300	40,400	**0.50**	3,750	17,200	30,700	**0.56**	3,110
OVERALL	113,300	215,200	**0.53**	13,410	127,900	208,000	**0.61**	25,000

Table 9-2: 2016 Screenline V/C Ratios

	West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	4,100	10,600	**0.39**	10	8,400	14,800	**0.57**	100
North of Bovaird Drive / Castlemore Road	10,500	14,500	**0.72**	250	16,500	18,000	**0.92**	960
North of Queen Street / Embleton Road	13,100	13,800	**0.95**	280	21,200	21,400	**0.99**	500
North of Steeles Avenue	13,800	21,500	**0.64**	250	14,700	14,500	**1.01**	340
Brampton / Mississauga	11,300	14,400	**0.78**	300	10,700	13,400	**0.80**	470
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	2,300	10,600	**0.22**	620	3,200	14,800	**0.22**	0
North of Bovaird Drive / Castlemore Road	5,400	14,500	**0.37**	1450	6,600	18,000	**0.37**	1240
North of Queen Street / Embleton Road	5,300	13,800	**0.38**	1210	8,100	21,400	**0.38**	2430
North of Steeles Avenue	7,700	21,500	**0.36**	1060	7,600	14,500	**0.52**	1460
Brampton / Mississauga	8,400	14,400	**0.58**	430	5,300	13,400	**0.40**	5180
	North Totals (Mayfield to North of Queen)				**South Totals (Queen to Bram.-Miss. Boundary)**			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	1,800	4,000	**0.45**	0	2,300	3,600	**0.64**	0
Credit River*					6,100	7,300	**0.84**	350
East of Highway 10	8,900	11,900	**0.75**	140	3,700	3,900	**0.95**	240
East of Highway 410 / Heartlake Road	10,000	12,300	**0.81**	240	7,900	9,400	**0.84**	320
East of Airport Road	8,200	11,900	**0.69**	90	4,500	5,800	**0.78**	250
West of Highway 50	3,000	9,700	**0.31**	240	5,400	7,200	**0.75**	100
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	1,700	4,000	**0.43**	0	900	3,600	**0.25**	0
Credit River*					4,800	7,300	**0.66**	130
East of Highway 10	6,500	11,900	**0.55**	600	2,100	3,900	**0.54**	290
East of Highway 410 / Heartlake Road	7,400	12,300	**0.60**	630	5,000	9,400	**0.53**	260
East of Airport Road	5,600	11,900	**0.47**	330	4,100	5,800	**0.71**	430
West of Highway 50	2,100	9,700	**0.22**	210	4,000	7,200	**0.56**	560
NB TOTAL	52,800	74,800	**0.71**	1,090	71,500	82,100	**0.87**	2,370
SB TOTAL	29,100	74,800	**0.39**	4,770	30,800	82,100	**0.38**	10,310
WB TOTAL	31,900	49,800	**0.64**	710	29,900	37,200	**0.80**	1,260
EB TOTAL	23,300	49,800	**0.47**	1,770	20,900	37,200	**0.56**	1,670
OVERALL	137,100	249,200	**0.55**	8,340	153,100	238,600	**0.64**	15,610

Table 9-3: 2021 Screenline V/C Ratios

	West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	4,400	10,800	**0.41**	20	7,800	16,500	**0.47**	650
North of Bovaird Drive / Castlemore Road	12,100	16,700	**0.72**	100	16,000	20,300	**0.79**	980
North of Queen Street / Embleton Road	17,000	18,600	**0.91**	140	21,900	22,500	**0.97**	580
North of Steeles Avenue	17,300	22,000	**0.79**	390	16,300	16,100	**1.01**	240
Brampton / Mississauga	14,300	18,500	**0.77**	280	10,100	12,400	**0.81**	330
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	3,000	10,800	**0.28**	1,770	3,400	16,500	**0.21**	860
North of Bovaird Drive / Castlemore Road	6,200	16,700	**0.37**	2,640	6,400	20,300	**0.32**	3,170
North of Queen Street / Embleton Road	7,400	18,600	**0.40**	890	8,500	22,500	**0.38**	4,120
North of Steeles Avenue	9,300	22,000	**0.42**	1,310	8,700	16,100	**0.54**	980
Brampton / Mississauga	9,200	18,500	**0.50**	160	5,000	12,400	**0.40**	1,450
	North Totals (Mayfield to North of Queen)				**South Totals (Queen to Bram.-Miss. Boundary)**			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	2,600	5,600	**0.46**	30	3,000	4,200	**0.71**	0
Credit River*					7,700	10,300	**0.75**	450
East of Highway 10	9,500	11,300	**0.84**	340	3,900	3,300	**1.18**	230
East of Highway 410 / Heartlake Road	11,400	11,700	**0.97**	330	8,200	9,100	**0.90**	620
East of Airport Road	9,800	11,900	**0.82**	460	4,400	5,100	**0.86**	100
West of Highway 50	6,400	9,900	**0.65**	200	5,000	6,600	**0.76**	80
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	2,200	5,600	**0.39**	120	1,900	4,200	**0.45**	0
Credit River*					7,300	10,300	**0.71**	800
East of Highway 10	7,700	11,300	**0.68**	420	1,900	3,300	**0.58**	3,250
East of Highway 410 / Heartlake Road	8,600	11,700	**0.74**	550	5,700	9,100	**0.63**	350
East of Airport Road	6,500	11,900	**0.55**	910	3,900	5,100	**0.76**	540
West of Highway 50	3,300	9,900	**0.33**	470	3,800	6,600	**0.58**	610
NB TOTAL	65,100	86,600	**0.75**	930	72,100	87,800	**0.82**	2,780
SB TOTAL	35,100	86,600	**0.41**	6,770	32,000	87,800	**0.36**	10,580
WB TOTAL	39,700	50,400	**0.79**	1,360	32,200	38,600	**0.83**	1,480
EB TOTAL	28,300	50,400	**0.56**	2,470	24,500	38,600	**0.63**	5,550
OVERALL	168,200	274,000	**0.61**	11,530	160,800	252,800	**0.64**	20,390

Table 9-4: 2031 Screenline V/C Ratios

	West Totals (Winston Churchill to west of Hwy 410)				East Totals (Hwy 410 to Highway 50)			
NORTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	5,600	18,000	**0.31**	50	10,900	19,600	**0.56**	840
North of Bovaird Drive / Castlemore Road	14,800	20,600	**0.72**	100	25,900	24,500	**1.06**	1,010
North of Queen Street / Embleton Road	19,400	20,200	**0.96**	140	22,900	22,500	**1.02**	570
North of Steeles Avenue	19,200	23,600	**0.81**	400	16,900	16,100	**1.05**	250
Brampton / Mississauga	15,000	19,300	**0.78**	280	10,800	12,400	**0.87**	340
SOUTHBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Caledon / Brampton	4,300	18,000	**0.24**	1820	4,900	19,600	**0.25**	1030
North of Bovaird Drive / Castlemore Road	8,600	20,600	**0.42**	2820	13,000	24,500	**0.53**	3470
North of Queen Street / Embleton Road	9,600	20,200	**0.48**	900	9,300	22,500	**0.41**	4130
North of Steeles Avenue	10,600	23,600	**0.45**	1170	8,400	16,100	**0.52**	970
Brampton / Mississauga	9,900	19,300	**0.51**	170	5,000	12,400	**0.40**	1450
	North Totals (Mayfield to North of Queen)				**South Totals (Queen to Bram.-Miss. Boundary)**			
WESTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	3,200	6,800	**0.47**	30	2,800	4,900	**0.57**	0
Credit River*					8,900	10,400	**0.86**	400
East of Highway 10	9,900	11,800	**0.84**	820	3,600	3,300	**1.09**	230
East of Highway 410 / Heartlake Road	11,700	11,700	**1.00**	640	8,500	9,100	**0.93**	630
East of Airport Road	10,400	12,700	**0.82**	710	4,800	5,100	**0.94**	100
West of Highway 50	8,800	12,900	**0.68**	190	5,600	6,600	**0.85**	80
EASTBOUND	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**	**Volume**	**Capacity**	**V/C Ratio**	**Transit Vol**
Brampton / Halton	2,400	7,700	**0.31**	130	2,600	4,900	**0.53**	0
Credit River*					9,100	10,400	**0.88**	780
East of Highway 10	8,200	11,800	**0.69**	430	2,200	3,300	**0.67**	3180
East of Highway 410 / Heartlake Road	9,700	11,700	**0.83**	760	5,400	9,100	**0.59**	360
East of Airport Road	7,300	12,700	**0.57**	1120	4,300	5,100	**0.84**	540
West of Highway 50	5,800	12,900	**0.45**	570	4,400	6,600	**0.67**	600

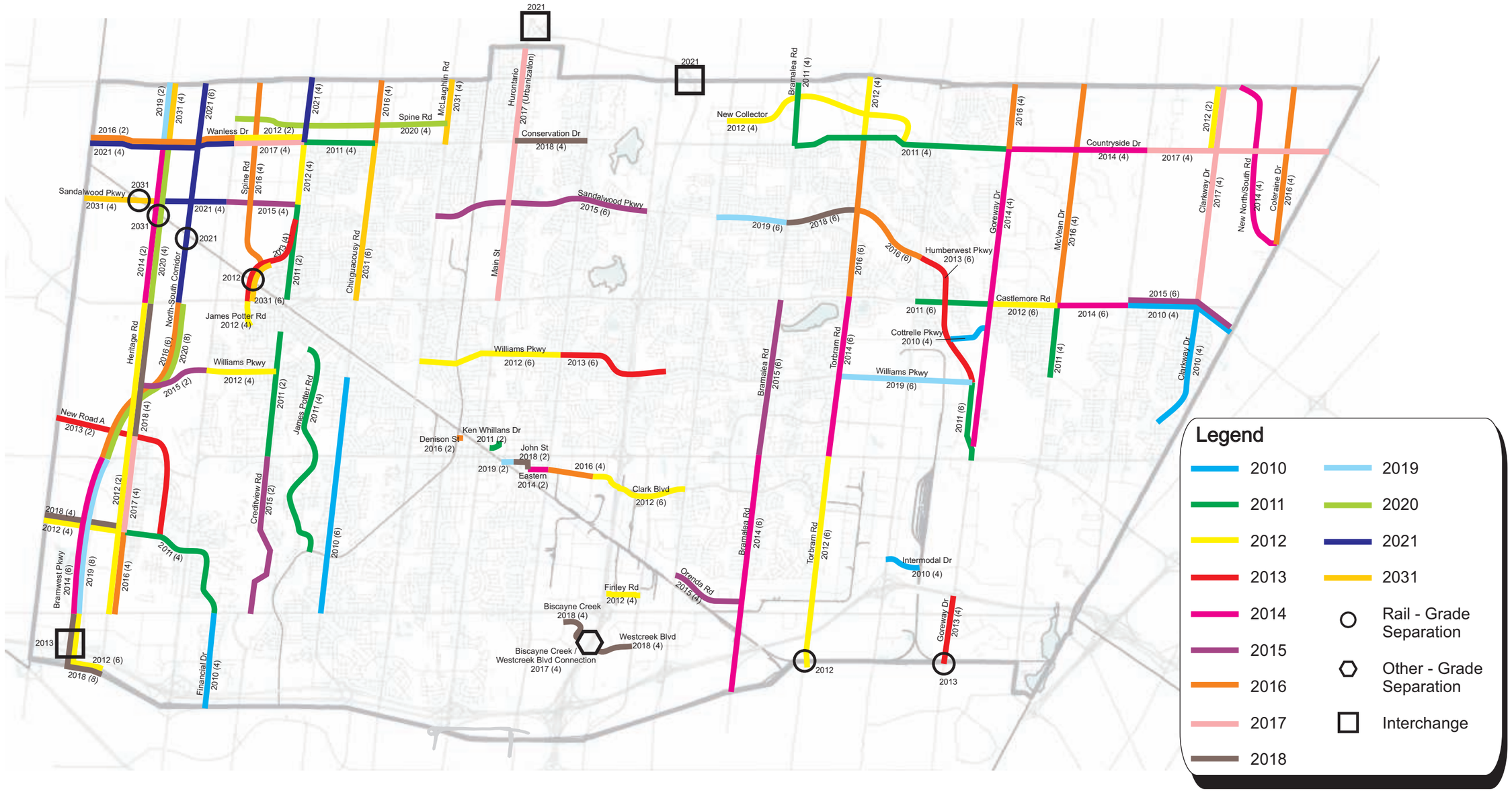
NB TOTAL	74,000	101,700	**0.73**	970	87,400	95,100	**0.92**	3,010
SB TOTAL	43,000	101,700	**0.42**	6,880	40,600	95,100	**0.43**	11,050
WB TOTAL	44,000	55,900	**0.79**	2,390	34,200	39,400	**0.87**	1,440
EB TOTAL	33,400	56,800	**0.59**	3,010	28,000	39,400	**0.71**	5,460
OVERALL	194,400	316,100	**0.61**	13,250	190,200	269,000	**0.71**	20,960

9.2.2 Development Charges Program, 2010 to 2031

The cost of the road program, inclusive of road widening, new construction, reconstruction, road related transit improvements, property acquisition, studies, and other investments will add up to approximately $1.68 billion. The cost of the road related transit program is expected to reach $116 million by 2018.

The overall estimated cost of capital improvements for road reconstruction and widenings is $723 million. To accommodate new growth, the City will have to construct new roads for the total cost of $255 million, reconstruct and erect interchanges, overpasses and rail grade separations at an estimated cost of $101 million, invest in transit, and upgrade traffic operations capabilities at intersections. The costs of constructing then widening the Bramwest Pkwy / NSTC from Heritage Road over to Hwy 407, north to Embleton Road at eight-lane cross-section, widening of NSTC from Embleton Road to Bovaird Drive from six to eight -lanes, as well as the extension of the facility from Sandalwood Parkway to Mayfield Road will account for an additional $70.3 million. The cost of land acquisition for BramWest Pkwy / NSTC, widening of the corridor to eight -lanes, and the extension to Mayfield Road is estimated to add up to $40.4 million.

The proposed improvements under the City's Development Charges program are illustrated in **Exhibit 9-5**, with a detailed listing provided in
Table 9-5.



Not To Scale

Exhibit 9-5
Road Network Projects 2010 - 2031

Table 9-5: City of Brampton Capital Road Projects, 2011 to 2031

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
By 2009					
McVean Drive	Queen Street	Cottrelle Parkway	Road Widening	2	4
Wanless Drive	McLaughlin Road	Chinguacousy Road	Road Widening	2	4
Cottrelle Parkway	McVean Drive	Mid concession	New Construction	0	4
Highway 410 Extension - MTO	-	-	New Construction	0	4
McLaughlin Road	Southern Boundary	Steeles Avenue	Road Widening	2	4
Countryside Drive	Dixie Road	Bramalea Road	Road Widening	2	4
Queen Street East	Kennedy Road	Highway 410	Road Widening	4	6
Fogal Road	Highway 50	The Gore Road	New Construction	0	4
Ebenezer Rd	The Gore Road	Clarkway valley	Road Widening	2	4
By 2010					
Castlemore Road	The Gore Road	Hwy 50	Road Widening	2	4
Chinguacousy Road	Steeles Avenue	Queen Street	Road Widening	4	6
Chinguacousy Road	Queen Street	Major William Sharpe	Road Widening	4	6
Intermodal Drive	Airport Road	CNR Bridge	Road Widening	2	4
Cottrelle Parkway	Humberwest Parkway	Goreway Drive	New Construction	0	4
Financial Drive	Southern Boundary	Steeles Avenue	Road Widening	2	4
Wexford Road - Extension	West of Hurontario Street	Bovaird Drive	New Construction	0	2
Clarkway Drive	N. of Cottrelle	Clarkway / Hwy 50	New Construction	0	4
Clarkway Drive	Cottrelle Blvd	Castlemore Road	Road Widening	2	4

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
Grade Separations					
Torbram Road & CN Halton Line			GS-Rail		
By 2011					
Ken Whillans Drive	Church Street	Nelson Street	New Construction	0	2
Countryside Drive	Bramalea Road	Torbram Road	Road Widening	2	4
Countryside Drive	Torbram Road	Goreway Drive	Road Widening	2	4
Bramalea Road	Countryside Drive	Mayfield Road	Road Widening	2	4
Castlemore Road	Airport Road	Goreway Drive	Road Widening	4	6
McVean Drive	Cottrelle Parkway	Castlemore Road	Road Widening	2	4
Humberwest Pkwy.	Williams Pkwy	Queen Street	Road Widening	4	6
Wanless Drive	Creditview Road	Chinguacousy Road	Road Widening	2	4
Financial Drive	Steeles Avenue	Mississauga Road	New Construction	0	4
Financial Drive	Mississauga Road	Heritage Rd	New Construction	0	4
Creditview Rd (Old)	Pleasant Rd / Creditview Rd	Sandalwood Pkwy.	Road Reconstruction	2	2
Creditview Rd (Old)	James Potter Road	Queen Street	Road Reconstruction	2	2
James Potter Rd	Steeles Avenue	South of Williams Pkwy	New Construction	0	4
Merging Lanes (Hwy 10 at Hwy 410)	-	-	New Construction	0	2
By 2012					
Bramwest Parkway / NSTC	Heritage Rd	South of Hwy 407	New Construction	0	4
Bramwest Parkway / NSTC	North of Highway 407	Steeles Avenue	New Construction	0	6
Clarkway Drive	Countryside Drive	Mayfield Road	Road	2	2

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
			Reconstruction		
Clark Boulevard	Rutherford Road	Dixie Road	Road Widening	4	6
Creditview Road	Sandalwood Parkway	Wanless Drive	Road Widening	2	4
James Potter Rd	Ashby Field Rd	Bovaird Drive	New Construction	0	4
Torbram Road	Countryside Drive	Mayfield Road	Road Widening	2	4
Torbram Road	Southern Boundary	Queen Street	Road Widening	4	6
Castlemore Road	Goreway Drive	McVean Drive	Road Widening	4	6
Financial Drive	Heritage Rd	Winston Churchill Blvd	New Construction	0	4
Williams Parkway	McLaughlin Road	North Park / Howden	Road Widening	4	6
Heritage Road	Steeles Avenue	New Road A	Road Reconstruction	2	2
Heritage Road	New Road A	Bovaird Drive	Road Reconstruction	2	2
Countryvillage collector	Dixie Road	Countryside Drive	New Construction	0	4
Wanless Drive	Creditview Road	Mississauga Road	Road Reconstruction	2	2
Williams Parkway	Creditview Road	Mississauga Road	New Construction	0	4
Finley Road	West Drive	Highway 410	Road Widening	2	4
Grade Separations					
New Creditview Road & CN Halton Line			GS-Rail		
By 2013					
New Road A	Steeles Avenue	Winston Churchill Blvd.	New Construction	0	4
Humberwest Pkwy.	Airport Road	Williams Pkwy	Road Widening	4	6

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
Williams Parkway	McLaughlin Road	Kennedy Road	Road Widening	4	6
New Creditview Rd	Bovaird Drive	Farhill Ave	New Construction	0	4
New Interchanges					
Bramwest Parkway / NSTC and Hwy 407			Interchange		
Grade Separations					
Goreway Drive & CN Halton Line	Rail grade separation & culvert replacement	EA Report, 2008	GS-Rail		
By 2014					
Eastern Avenue	Kennedy Road	Truman St	Road Reconstruction	2	2
Bramwest Parkway / NSTC	Steeles Avenue	South of Embleton Road	New Construction	0	6
Goreway Drive	Humberwest Parkway	Countryside Drive	Road Widening	2	4
Castlemore Road	McVean Drive	The Gore Road	Road Widening	4	6
Bramalea Road	Southern Boundary	Queen Street	Road Widening	4	6
Torbram Road	Queen Street	Bovaird Drive	Road Widening	4	6
Heritage Road	Hwy. #7	Wanless Drive	Road Reconstruction	2	2
Countryside Drive	The Gore Road	Goreway Drive	Road Widening	2	4
New North / South Road (Major Mackenzie extension)	New East / West Road	Mayfield Road	New Construction	0	4
New North / South Road (Major Mackenzie extension)	Highway 50	Coleraine	New Construction	0	6
Williams Parkway	Kennedy Road	North Park	Road Widening	4	6

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
By 2015					
Creditview Rd (old)	Steeles Avenue	Queen Street	Road Reconstruction	2	2
Orenda Road	Dixie Road	Bramalea Road	Road Widening	2	4
Castlemore Road	The Gore Road	Hwy 50	Road Widening	4	6
Sandalwood Parkway	Creditview Road	Mississauga Road	New Construction	0	4
Sandalwood Parkway	McLaughlin Road	Heart Lake Rd	Road Widening	4	6
Williams Parkway	Mississauga Road	Heritage Rd	New Construction	0	4
Bramalea Rd (for BRT)	Bovaird Drive	Queen Street	Road Widening	4	6
By 2016					
McVean Drive	Castlemore Road	Mayfield Road	Road Widening	2	4
Sandalwood Parkway	Torbram Road	Airport Road	4-6UAI-WS	4	6
Coleraine Drive	Highway 50	Mayfield Road	Road Widening	2	4
Goreway Drive	Countryside Drive	Mayfield Road	Road Widening	2	4
Chinguacousy Road	Wanless Drive	Mayfield Road	2-4UMA-WR	2	4
Torbram Road	Bovaird Drive	Countryside Drive	Road Widening	4	6
Wanless Drive	Mississauga Road	Winston Churchill Blvd.	2RRC_1-RR	2	2
North-South Spine Rd	New Creditview Rd	Mayfield Road	New Construction	0	4
Denison St Extension	Park St	Mill St N	New Construction	0	2
Clark Boulevard Extension	Rutherford Road	Hansen Road	New Construction	0	4
Eastern Avenue	Hansen Road	Kennedy Road	Road Widening	2	4
New East / West Road (Major Mackenzie extension)	New North / South Road (Major Mackenzie extension)	The Gore Road	New Construction	0	4

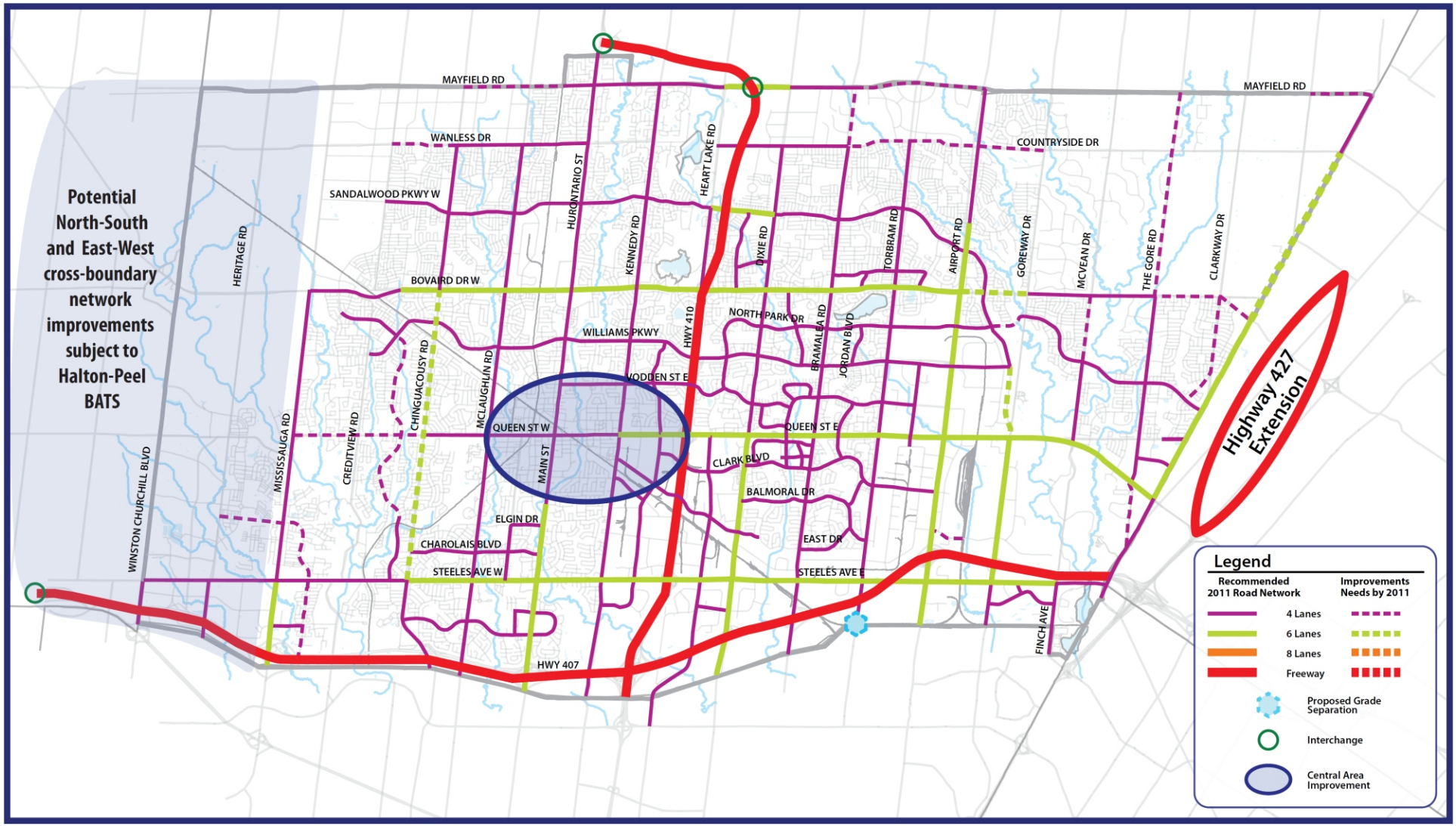
ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
By 2017					
Clarkway Drive	Countryside Drive	Mayfield Road	Road Widening	2	4
Heritage Road	Steeles Avenue	Financial Drive	Road Widening	2	4
Heritage Road	Financial Drive	New Road A	Road Widening	2	4
Clarkway Drive	Castlemore Road	Countryside Drive	Road Widening	2	4
Countryside Drive	The Gore Road	Hwy 50	Road Widening	2	4
Wanless Drive	Creditview Road	Mississauga Road	Road Widening	2	4
Biscayne Creek / Westcreek Blvd connection	Biscayne Crescent	Westcreek Blvd	Road Construction	0	4
Biscayne Creek / Westcreek Blvd connection	Biscayne Crescent	Westcreek Blvd	Road Construction	0	4
Grade Separations					
Highway 410 overpass	Biscayne Creek / Westcreek	0	Overpass	0	0
By 2018					
John Street	Truman St	Centre Street	Road Reconstruction	2	2
Heritage Road	New Road A	Bovaird Drive	Road Widening	2	4
Sandalwood Parkway	Bramalea Road	Torbram Road	Road Widening	4	6
Biscayne Creek / Westcreek Blvd connection	Biscayne Creek	First Gulf Blvd	Road Widening	2	4
Biscayne Creek / Westcreek Blvd connection	Westcreek Boulevard	Tomken Rd	Road Widening	2	4
Bramwest Parkway / NSTC	North of 407 ETR	South of Steeles Ave	Road Widening	6	8
Conservation Drive	Highway 10	Kennedy Road	Road Widening	2	4

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
By 2019					
Bramwest Parkway / NSTC	Steeles Avenue	Embleton Road	Road Widening	6	8
Sandalwood Parkway	Dixie Road	Bramalea Road	Road Widening	4	6
Williams Parkway	Torbram Road	Humberwest	Road Widening	4	6
Heritage Road	Wanless Drive	Mayfield Road	Road Reconstruction	2	2
By 2020					
Heritage Road	Hwy. #7 / Bovaird Rd	Wanless Drive	Road Widening	2	4
East-West Spine Rd	North-South Spine Rd	McLaughlin Rd	New Construction	0	4
By 2021					
Wanless Drive	Mississauga Road	Winston Churchill Blvd.	Road Widening	2	4
Creditview Road	Wanless Drive	Mayfield Road	Road Widening	2	4
Sandalwood Parkway	Mississauga Road	Heritage Rd	New Construction	0	4
McLaughlin Road	Wanless Drive	Mayfield Road	Road Widening	2	4
Interchanges					
Highway 410 & Mayfield Road			IC		
Highway 410 & Highway 10			IC		
by 2031					
Creditview Road	Bovaird Drive	Mt. Pleasant Transit Spine	Road Widening	4	6
Bramwest Parkway / NSTC	Embleton Road	Bovaird Drive	Road Widening	6	8
Bramwest Parkway / NSTC	Sandalwood Parkway	Mayfield Road	New Construction	0	6
Sandalwood Parkway (new project)	Heritage Rd	Winston Churchill Blvd.	New Construction	0	4
Heritage Road	Wanless Drive	Mayfield Road	Road Widening	2	4

ROAD NAME	DESCRIPTION		IMP TYPE	EXISTING No. LANES	FUTURE No. LANES
	FROM	TO			
Chinguacousy Road	Bovaird Drive	Wanless Drive	Road Widening	4	6
Grade Separations					
Heritage Rd & CN Halton Line			GS-Rail		
Sandalwood Rd & CN Halton Line			GS-Rail		

9.3 Recommended Horizon Year Road Networks

The recommended 2011, 2016, 2021, and 2031 road networks for the entire City of Brampton are also illustrated below in **Exhibit 9-6** through to **Exhibit 9-10**.



All improvement needs on all Regional Roads depicted in these exhibits are subject to confirmation by Peel's Long Range Transportation Plan Update (LRTP Update). The upcoming LRTP Update will confirm and further define the road improvement needs required on Regional Roads with respect to capacity requirements and timing. To develop formal plans for specific road improvements, environmental assessment studies will need to be carried out and approved through the EA process.

Exhibit 9-6

Recommended Road Network Needs by 2011

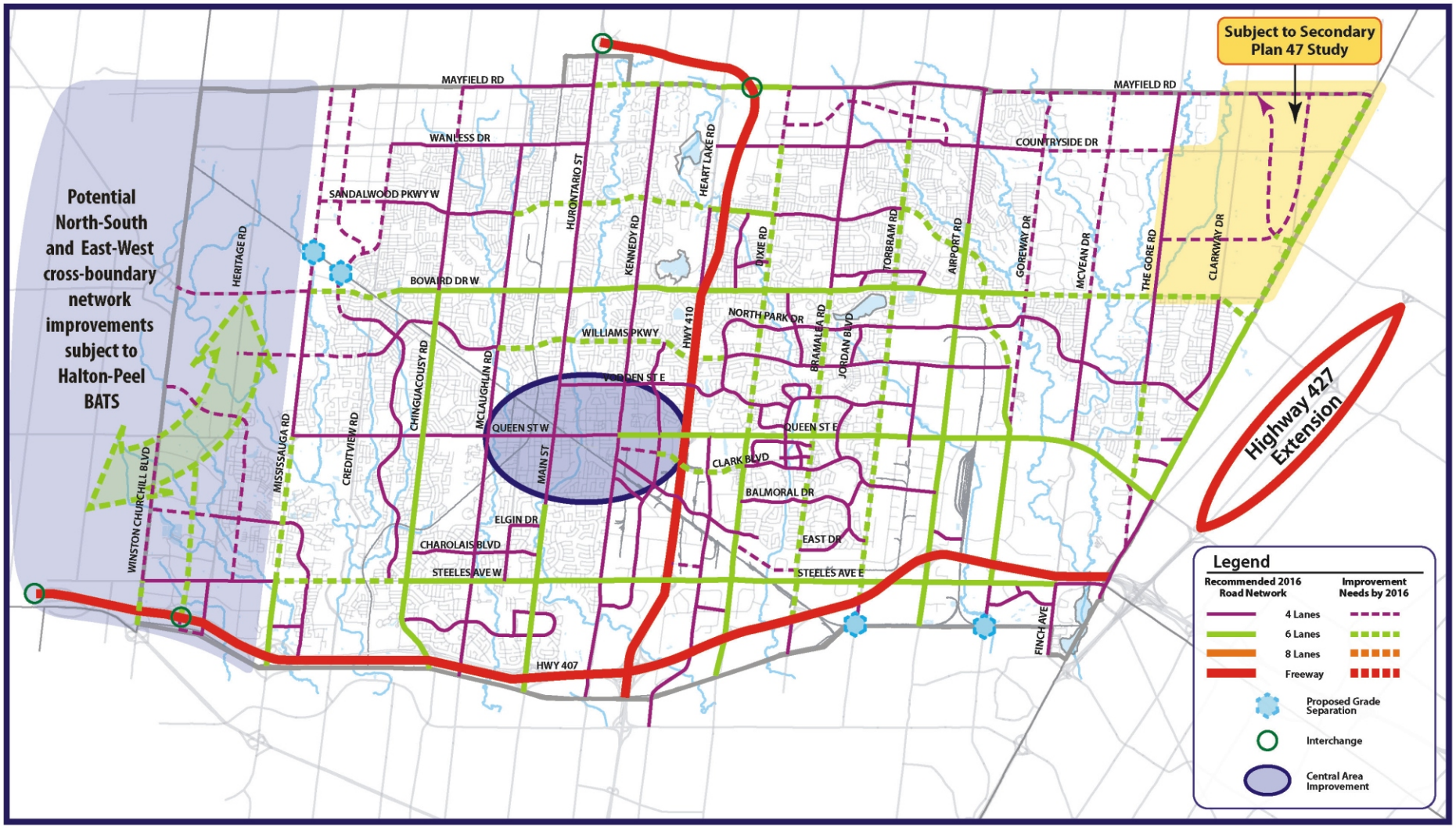


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Exhibit 9-7

Recommended Road Network Needs by 2016

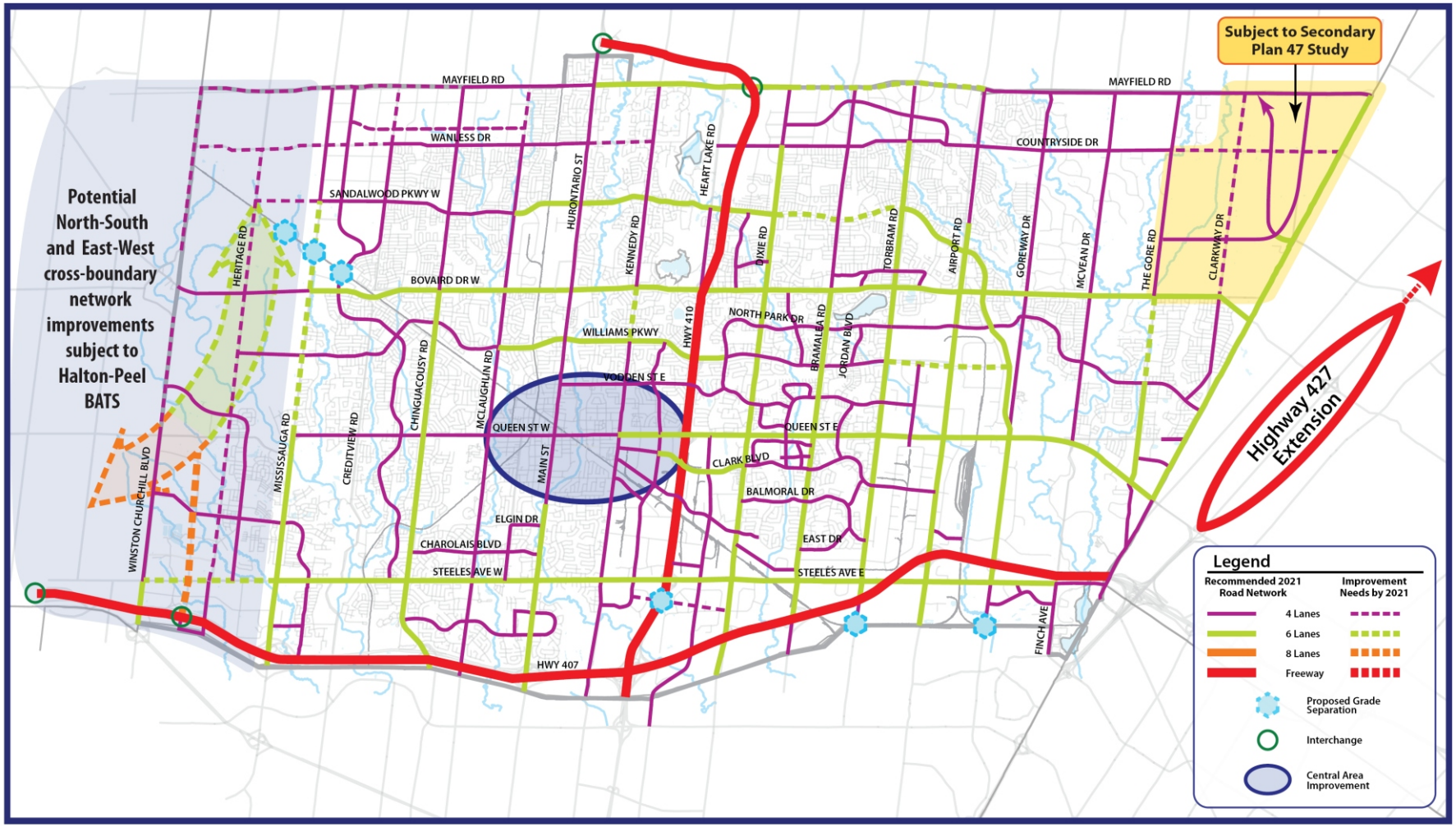

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Exhibit 9-8

Recommended Road Network by 2021

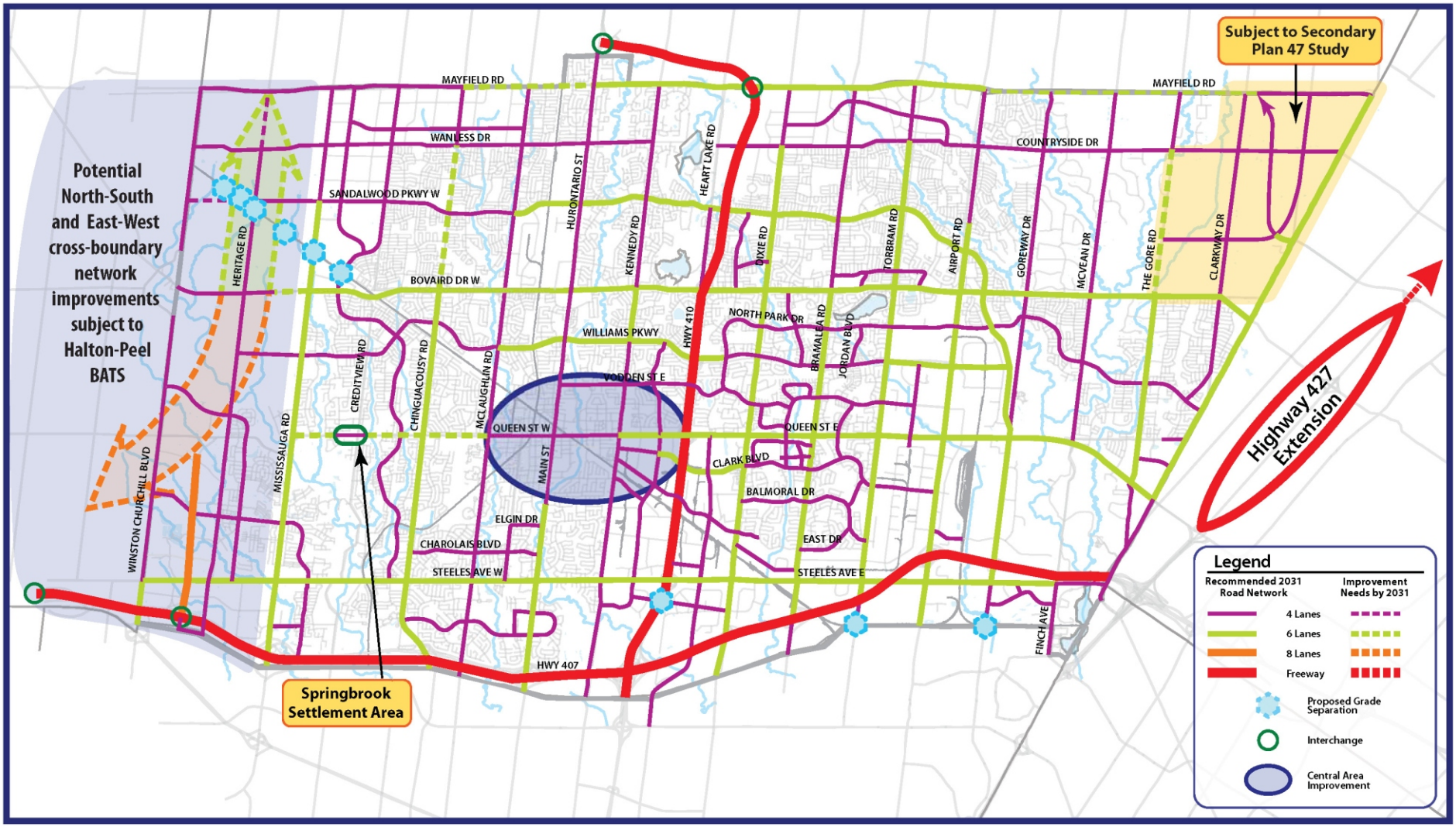

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Exhibit 9-9

Recommended Road Network Needs by 2031

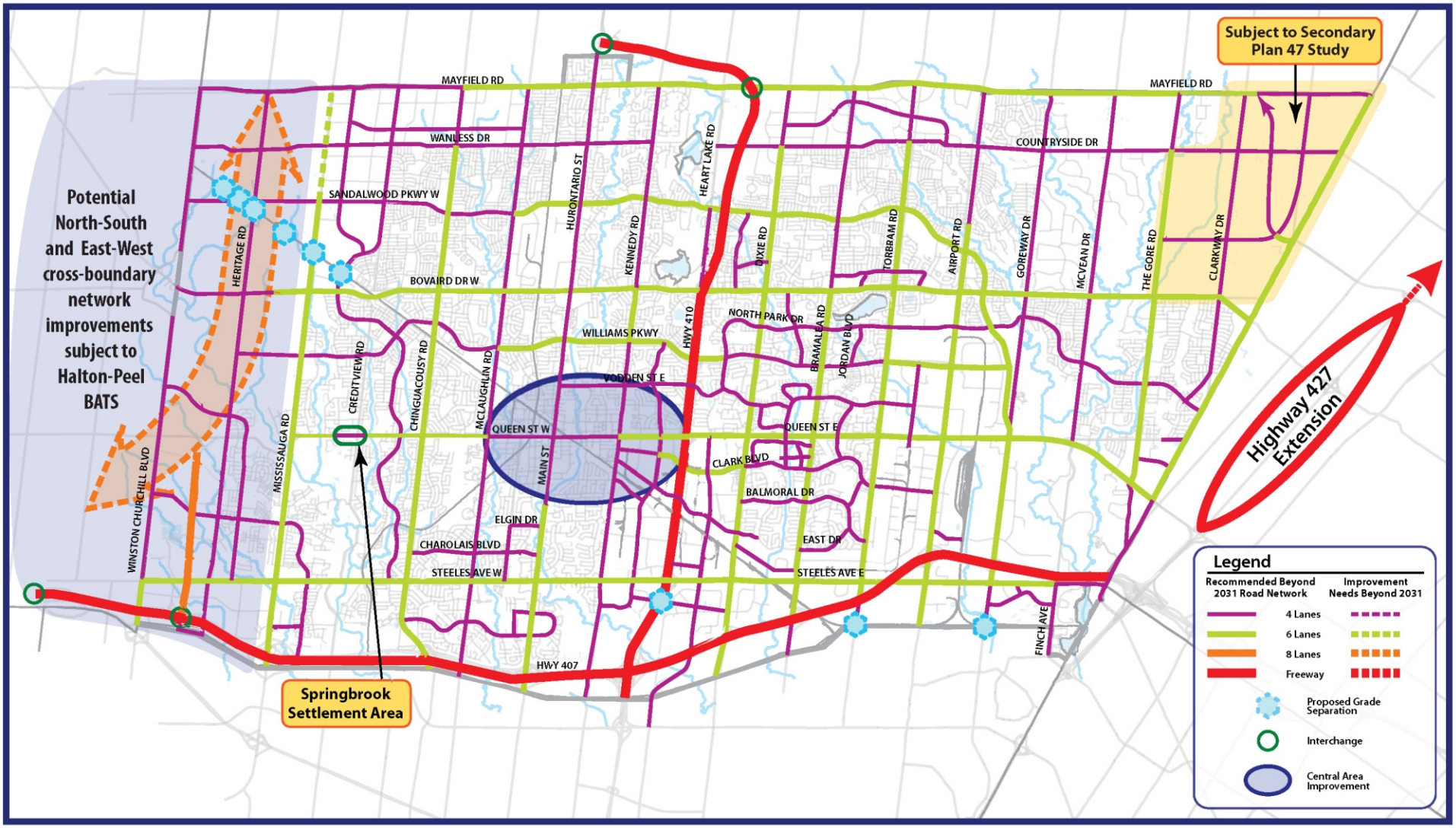

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Exhibit 9-10

Recommended Road Network Needs Beyond 2031