Section 5
Future Travel Demand

Brampton is a fast growing community with large areas of land available for development in the west and east. Healthy growth within the City is expected to continue over the next 23 years. Between 2006, the base year of the current transportation assessment, and the 2031 planning horizon, the City will increase its population by 68% or an additional 307,000 residents. During the same time the employment inventory in Brampton will more than double to 320,000. **Table 5-1** summarizes 2006 and 2031 population and employment for specific areas within the City of Brampton.

Table 5-1: Brampton Population and Employment Forecast, 2006-2031

	2006		2031	
Area in Brampton	**Population**	**Employment**	**Population**	**Employment**
SP41 - BramEast	18,460	2,660	47,270	9,190
SP40 - BramWest	6,490	3,960	47,770	33,870
SP47 - Highway 427 Industrial	500	270	34,490	17,030
SP51 - Mount Pleasant	240	10	51,740	2,740
SP52 - Huttonville North	150	10	18,230	6,330
SP53 - Mount Pleasant West	100	70	20,020	11,310
Rest of Brampton	425,650	147,850	538,790	239,530
Total	**451,590**	**154,830**	**758,310**	**320,000**

Source: Spring 2008 City of Brampton Land Use Forecasts

The above population and employment projections are the June 2008 preliminary forecasts developed for the City's Growth Plan studies. An updated land use forecast was released in June 2009, with citywide totals of 730,000 population (including census undercount) and 319,000 employment. A screenline sensitivity analysis of the TTMP road network has been conducted with these revised forecasts, and the results suggest that the key TTMP recommendations will not change. A comparison of the 2008 and the preliminary 2009 forecasts, and the screenline sensitivity analysis results are provided in **Appendix I**.

The City of Brampton will be updating the TTMP forecasts once the final population and employment projections for the City are approved. The forecast update will include revised population and employment forecasts for the City of Mississauga and the Region of Halton.

Given the significant growth in population and employment in the City, travel demand is increasing accordingly. Using the City of Brampton's transportation model, future travel demand is estimated based upon the City's population and employment forecasts and currently planned future road and transit networks. **Table 5-2** summarizes 2006 and 2031 peak hour auto driver and transit trips.

Table 5-2: Existing and Future Travel Demand

	2006	**2031**
Peak Hour Autos	72,700	161,500
Peak Hour Transit	6,600	24,500
Total	79,300	186,000
Transit Modal Split	8.3%	13.2%

Note: 2006 numbers based upon 2006 Transportation Tomorrow Survey; 2031 based on City of Brampton EMME/2 Transportation Model and 2004 Brampton TTMP 2031 road and transit networks

Up-to-date traffic zone based land use forecasts for each respective Regional Municipality were obtained directly from the respective Regions, except Durham 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.

The 2031 land use forecasts for the TTMP analysis are based on the sources listed in **Table 5-3**.

Table 5-3: 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 5-4.**

Table 5-4: Municipal and Regional Population and Employment Forecast, 2031

Municipality	**2031 Population**	**2031 Employment**
Brampton	758,310	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

New growth areas within the City will also result in a changing distribution of travel leaving, coming to, and staying within the City. **Exhibit 5-1** and **Exhibit 5-2** illustrate future trip distribution patterns predicted by the transportation model.

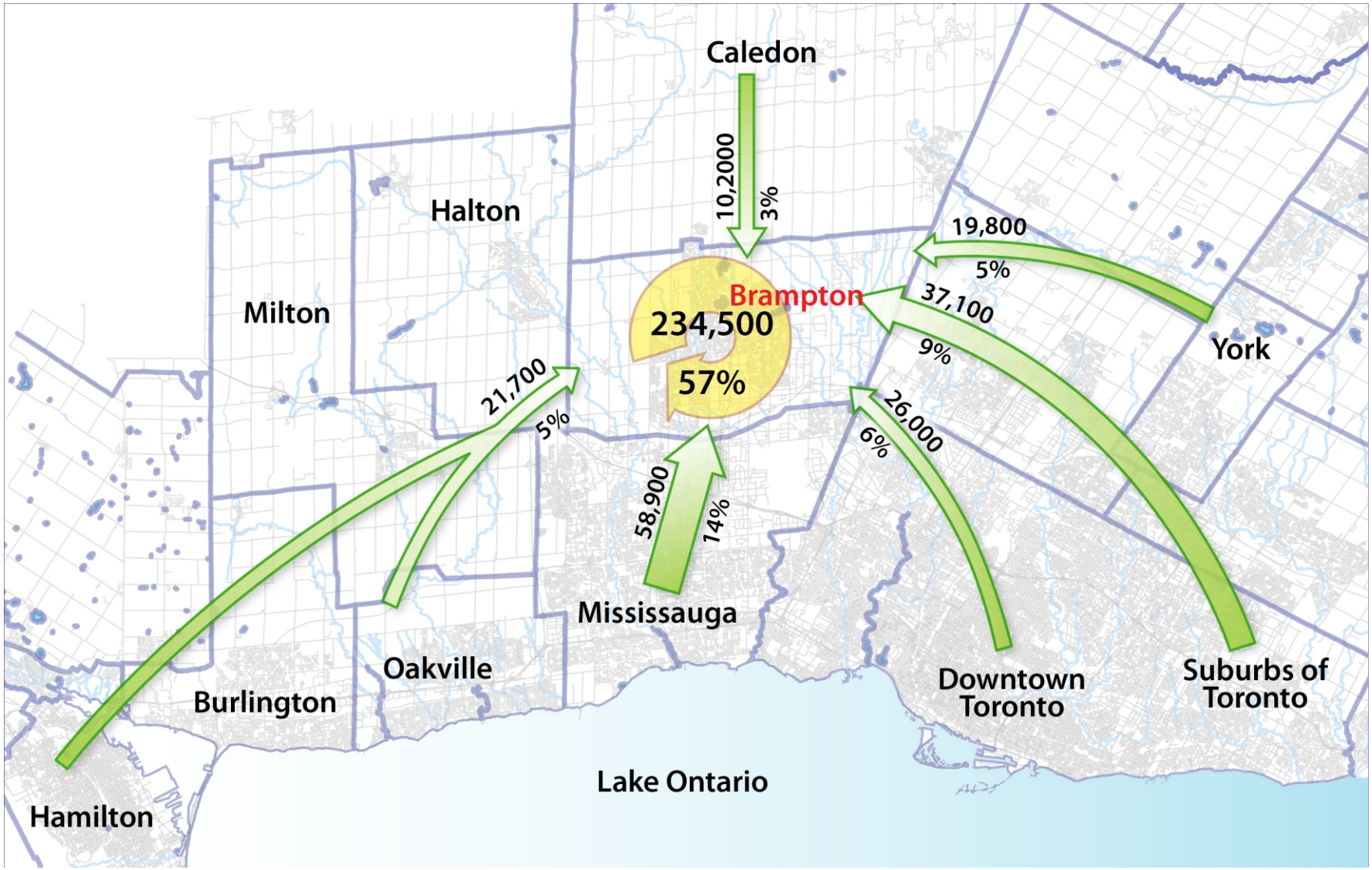


Exhibit 5-1

2031 Travel to Brampton - PM Peak Period

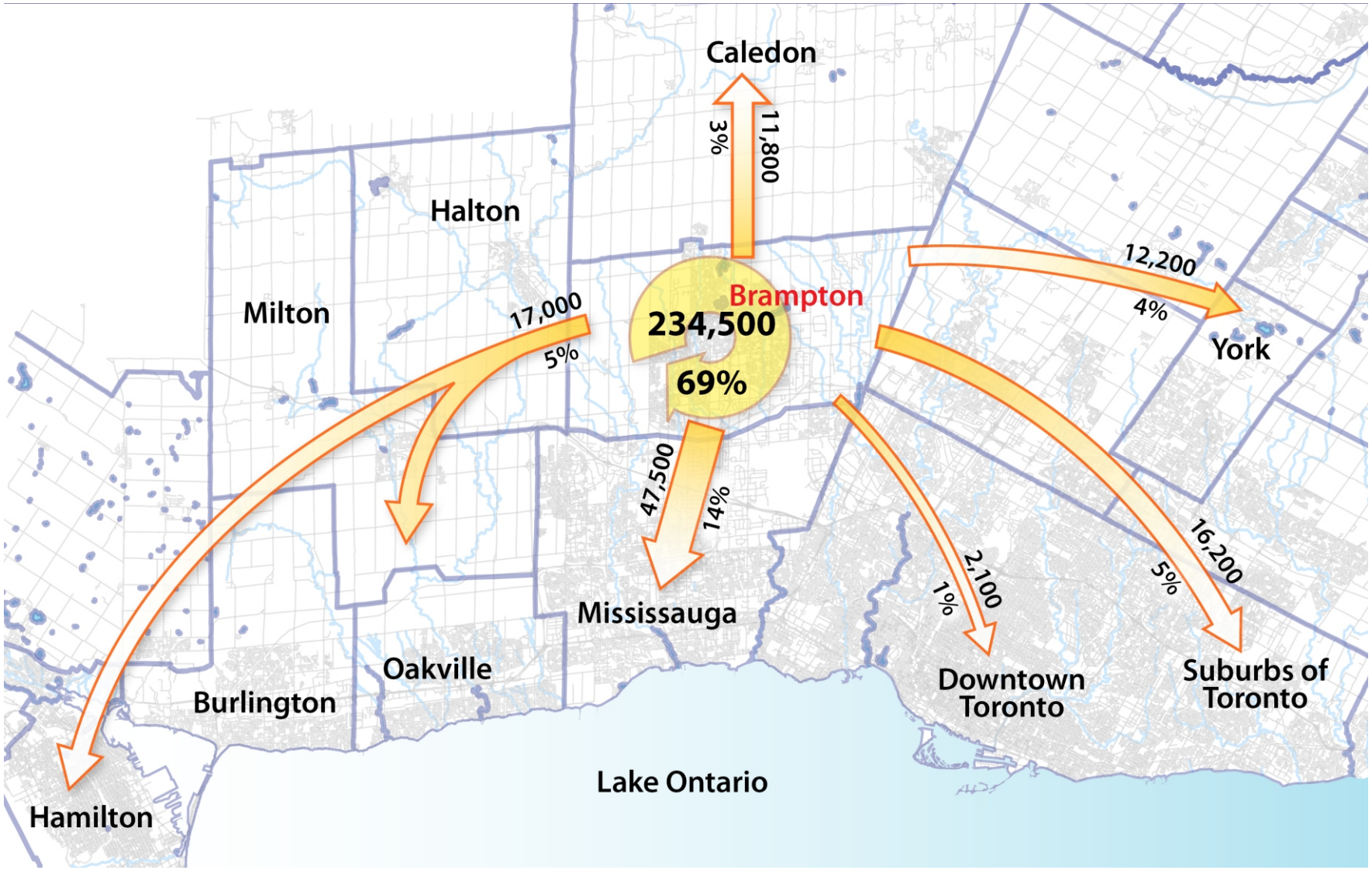


Exhibit 5-2

2031 Travel from Brampton - PM Peak Period

Section 6
Alternative Strategies

6.1 ALTERNATIVE STRATEGIES

The following four alternative strategies are analyzed and evaluated across a broad spectrum of performance measures, outlined in the following section. **Table 6-1** summarizes each alternative strategy considered.

Table 6-1: Alternative Strategies

Alternative #	**2031 Transit Improvements**	**2031 Road Improvements**
1 – No road or transit improvements	No change from existing	No change from existing
2 – Transit improvements only	Transit improvements recommended in 2004 TTMP	No change from existing
3 – Road and transit improvements from 2004 TTMP	Transit improvements recommended in 2004 TTMP	Road improvements recommended in 2004 TTMP
4 – Enhanced Transportation Network	Preliminary transit improvements recommended in the 2009 TTMP	Preliminary road improvements recommended in the 2009 TTMP

6.2 EVALUATION PROCESS

Evaluation methodologies for the performance measures are outlined in this section.

6.2.1 Network Performance

Each alternative is analysed on a network basis including all road facilities in the City of Brampton. Network performance measures include:

- Percent network congested by lane-kilometre
- Total travel time in vehicle-hours
- Total vehicle-kilometres travelled
- Annual greenhouse gas emissions in tonnes
- Annual hours of congestion

6.2.2 Screenline Performance

A more detailed appraisal of the alternative road networks ability to handle future travel demand is undertaken through the use of screenlines. A **screenline** is an imaginary line crossing a number of roads and placed at strategic locations, usually across municipal boundaries or major physical boundaries such as a freeway or river. Analysis screenlines are illustrated in **Exhibit 6-1**.

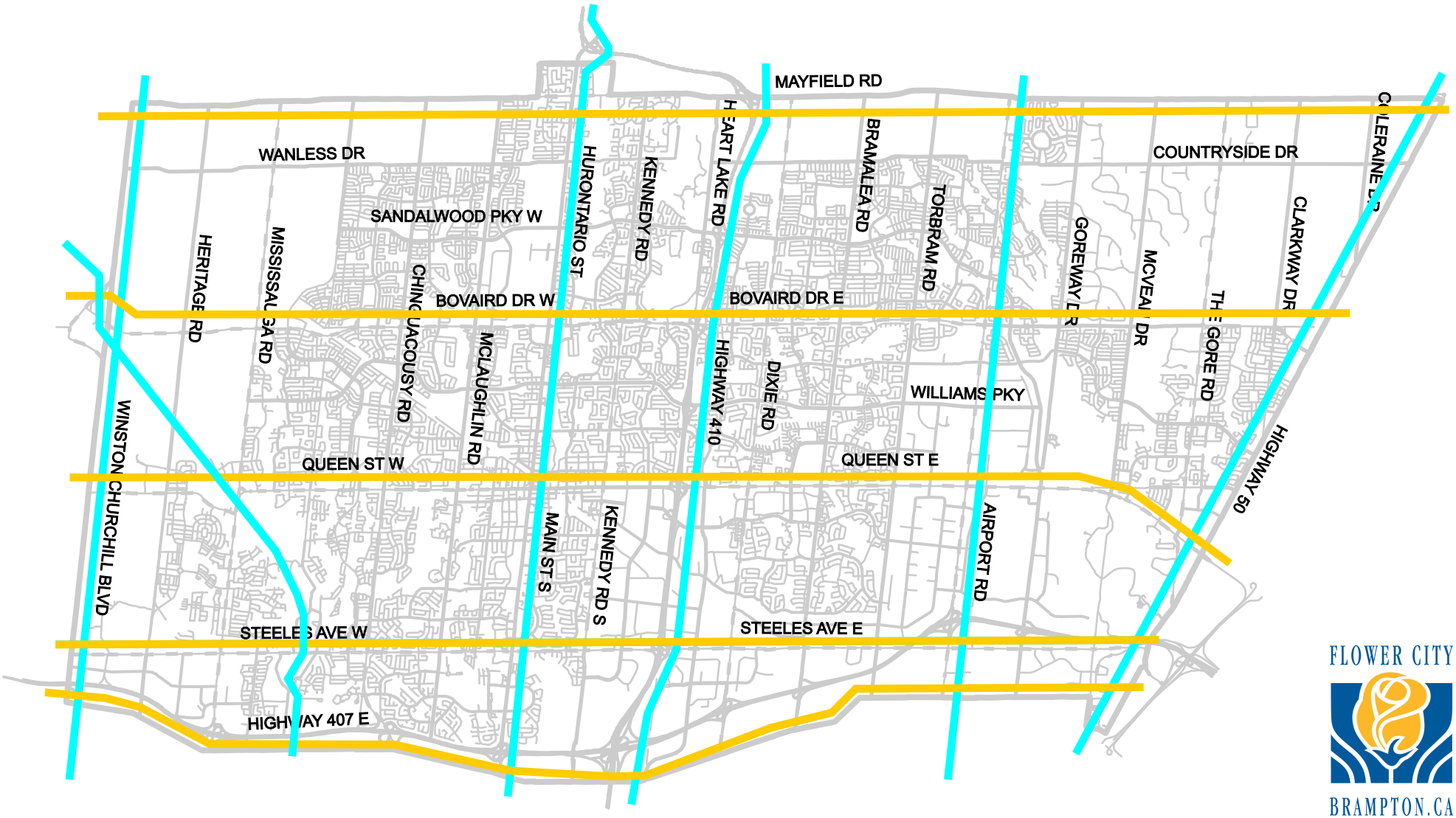
The ratio of travel demand versus travel supply (commonly referred to as volume to capacity ratio) is measured across these screenlines – the higher the volume to capacity ratio, the more congestion there is. This volume to capacity ratio on road and freeway links can also be described in terms of level of service. These definitions are summarized in **Table 6-2.**

Table 6-2: Link Volume to Capacity Ratio Definitions

v/c Ratio	Level of Service	Operating Condition
Less than 0.80	LOS A-C	Free-flow, very little, to moderate delay
Between 0.81 and 0.90	LOS D	Congested conditions, users experience delays and queuing
Between 0.91 and 0.99	LOS E	Approaching or at capacity, significant delays and queuing
Greater than 1.00	LOS F	Over capacity, severe delays and queuing

For a particular road link or section, a v/c ratio of less than 0.80 represents flow conditions in which little delay is experienced. Between 0.81 and .90, as the link reaches capacity, congestion and a high amount of delay is experienced. At v/c ratios between 0.91 and 0.99, the link is approaching capacity and major delays and queuing are occurring consistently during the peak periods. At a v/c ratio of 1.00 or higher, there are stop-and-go conditions and traffic flow breaks down.

The per lane capacities coded into the City of Brampton EMME/2 model provide a foundation for the assessment of existing and future road network operations and needs. Professional judgment and knowledge of the study area assisted in determining an accurate value for per-lane capacity to be used in link and screenline calculations.



FLOWER CITY
BRAMPTON.CA

Not To Scale

Exhibit 6-1
Screenline Analysis Locations

6.3 PLANNING ALTERNATIVES

Alternative 1
is a test of the transportation conditions in 2031 assuming that no road or transit improvements are made beyond the existing network. This test is also known as the "Do Nothing" scenario. The results of screenline analysis show that without any investments into road or transit networks all major roads within Brampton roads would be significantly over-capacity by 2031. This test illustrates that improvements to the transportation network are necessary in support of the planned growth. **Exhibit 6-2** and **Exhibit 6-3** summarize the screenline analysis for Alternative 1.

Alternative 2
analyzes 2031 transportation network performance assuming that the transit network improvements recommended in the 2004 TTMP are carried forward while making no improvements to the road network. This hypothetical scenario was designed to test the effect of increased modal split on the overall travel. The scenario is hypothetical since improvements into transit operation, coverage and performance cannot be achieved without parallel investments into the road network.

Similar to Alternative 1, the City of Brampton road network is congested across all screenlines. It is evident that a combination of both road and transit improvements are required to move people and goods efficiently in the future. **Exhibit 6-4** and **Exhibit 6-5** demonstrate the screenline analysis.

Alternative 3
tests the elasticity of 2004 TTMP recommendations subjected to higher travel demand resulting from increased population and employment densities imposed on the City and adjacent municipalities by the Ontario Growth Plan and other recent planning initiatives. When compared to the previously discussed alternatives (Alternatives 1 and 2) this scenario produces visible improvements in the overall network performance. However, despite the improvements, 62% of all screenlines, (13 out of 21) are congested, with a volume to capacity ratio greater than 0.9. **Exhibit 6-6** and **Exhibit 6-7** demonstrate the screenline analysis.

Alternative 4,
or the "Enhanced Transportation Network", builds on the vision of the 2004 TTMP and supplements it by additional strategic improvements to the road and transit network. The Enhanced Transportation Network scenario resulted in a decrease in the number of congested screenlines to 43% or nine out of 21. **Exhibit 6-8** and **Exhibit 6-9** demonstrate the screenline analysis.

Exhibit 6-2
Alternative 1 Screenline V/C Ratios
PM Peak Hour, East-West Traffic, Peak Direction

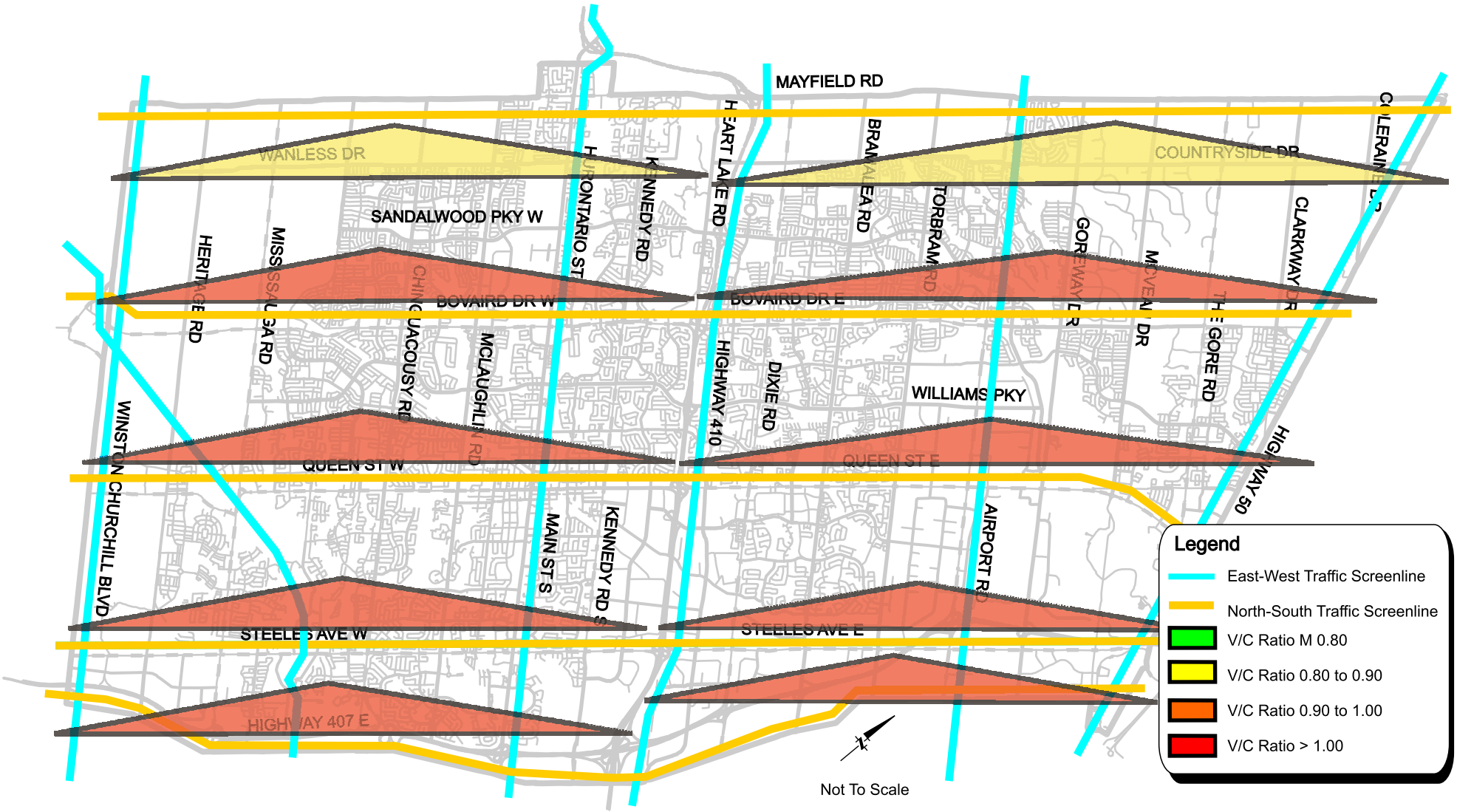


Exhibit 6-3
Alternative 1 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

Exhibit 6-4
Alternative 2 Screenline V/C Ratios
PM Peak Hour, East-West Traffic, Peak Direction

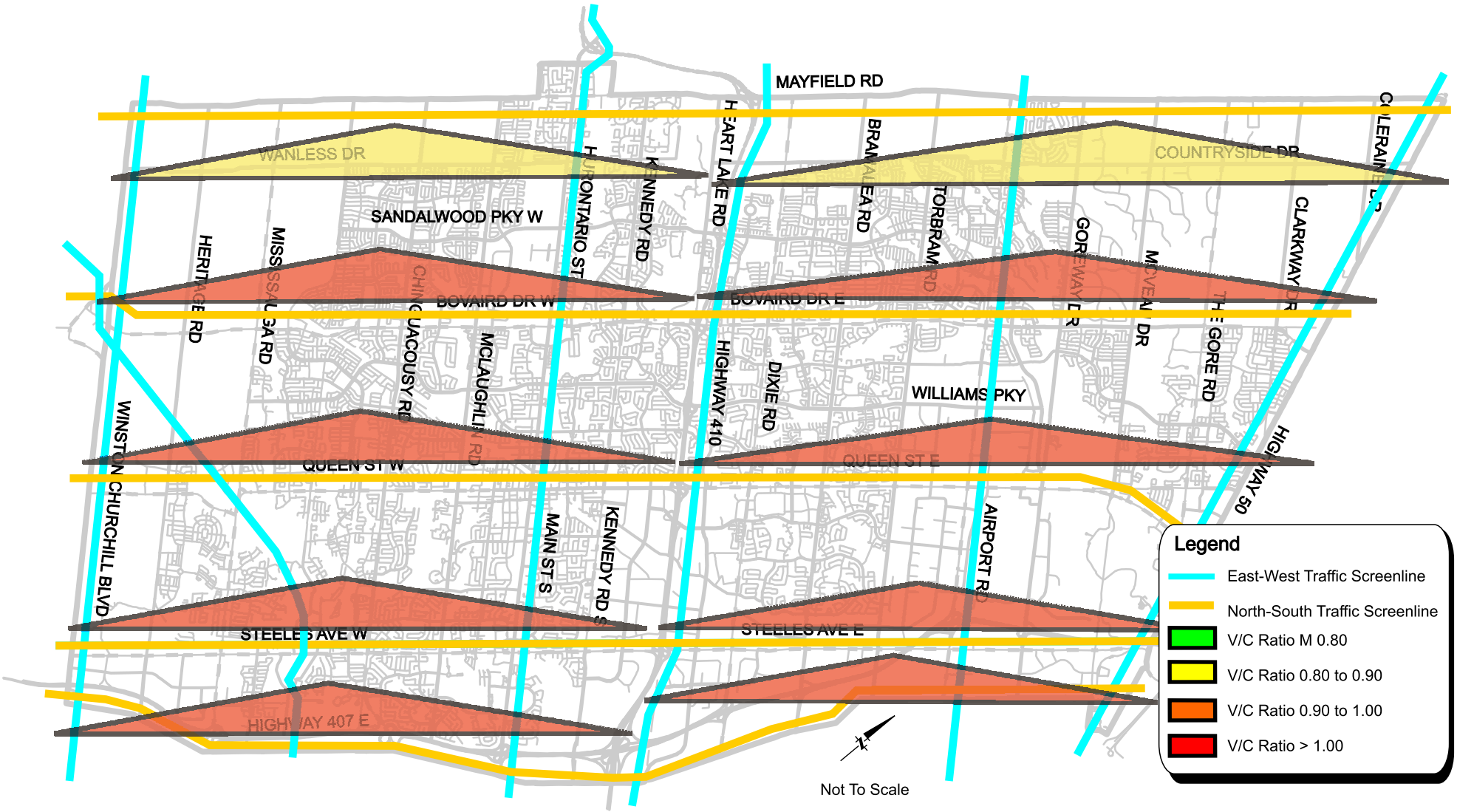


Exhibit 6-5
Alternative 2 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

Exhibit 6-6
Alternative 3 Screenline V/C Ratios
PM Peak Hour, East-West Traffic, Peak Direction

Exhibit 6-7
Alternative 3 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

Exhibit 6-8
Alternative 4 Screenline V/C Ratios
PM Peak Hour, East-West Traffic, Peak Direction

Exhibit 6-9
Alternative 4 Screenline V/C Ratios
PM Peak Hour, North-South Traffic, Peak Direction

6.4 EVALUATION OF ALTERNATIVE STRATEGIES

The alternative strategies are evaluated on a network basis consisting of all roads in the City of Brampton. The results are summarized in **Table 6-3**.

Table 6-3: Network Performance for Alternative Strategies

Performance Measure	2006 Model	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Peak hour % Network congested (lane km)	9%	58%	56%	21%	16%
Peak hour total travel time (hours)	12,800	58,200	52,900	28,300	26,900
Peak hour vehicle-kilometres travelled	931,000	1,808,400	1,754,500	1,862,800	1,839,600
Peak hour overall transit modal split	8.3%	8.3%	13.2%	13.2%	16.6%
Annual GHG per capita (tonnes/weekday peak periods auto travel)*	0.42	0.56	0.53	0.4	0.38
Annual hours of congestion	5,081,900	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).

Given that Alternative 1 and 2 do not incorporate any road network improvements, it is evident that road network capacity improvements are essential to maintain efficient movement of people and goods despite the anticipated shift towards transit travel. Over 50% of arterial roads within the City of Brampton are congested in these scenarios. While the total travel time of all trips doubles from Alternatives 3 and 4 to Alternatives 1 and 2, total vehicle kilometres traveled actually increases slightly with the improved road networks, indicating that average travel time per trip is improved by a factor of more than two. Fuelled by low travel speeds and high levels of delay, greenhouse gas emissions produced by auto travel during weekday 6-hours of peak periods and annual hours of congestion also see drastic increases without any road network improvements.

Alternative 3, representing the 2004 TTMP recommended transit and road network, makes significant improvements upon the do-nothing scenarios. Its vision for a balanced transit and road network results in improved network performance in the 2031 horizon year. Alternative 4, building upon Alternative 3, incorporates further road and transit improvements in new growth areas, considers improved transit service city wide, accounts for new provincial, regional, and municipal planning initiatives, and results in an even better overall network performance in all measures of effectiveness.

Results from the 2006 model, simulating current road and transit conditions, were incorporated for comparative purposes. It is important to recognize that significant population and employment growth will occur between 2006 and 2031. To better capture the impacts of Alternatives, some of the performance measures are provided on a per capita basis.

Using population estimates of 452,000 and 758,000 (**Table 5-1** and **Table 5-4**), the per capita performance measures comparing 2006 model and Alternative 4 are summarized in **Table 6-4.**

Table 6-4: Network Performance per Capita, 2006 vs. Alternative 4

Performance Measure (Per Capita)	2006 Model	Alternative 4
Peak hour vehicle-kilometres travelled	2.1	2.4
Annual GHG per capita* (tonnes/ weekday peak periods auto travel)	0.42	0.38
Annual hours of congestion	11.2	17.5

*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).

Comparing the recommended Alternative 4 scenario with existing (2006) conditions, the performance of the two transportation network measures (vkt and annual hours of congestion) on a per-person basis appears to decline slightly between 2006 and 2031. With the City's population expected to grow by over 300,000 (67%) and employment expected to grow by over 165,000 (106%) over this time period, the reality is that the transportation level of service will continue to deteriorate. The sustainable improvements proposed in this 2009 TTMP however, will help manage this growth so that in the future the City has a well utilized, but not overly congested, balanced transportation system.