3. THE TRANSPORTATION AND TRANSIT MASTER PLAN

3.1 The Strategy

Through the technical and consultation processes "A Balanced Road and Transit System" has been defined as the preferred direction for the TTMP. Currently, the system is heavily road or auto-dependent. To right the balance, a strong program of transit improvements, policies and initiatives is needed. Continued expansion of the road network will be necessary to accommodate new growth areas, address deficiencies and facilitate reliable and accessible transit service. However, the emphasis must turn to greater investment in the transit network and infrastructure, recognizing the limits for road network expansion. Also, restructuring of the transit concept is needed, to support higher-order transit in a few key corridors or "spines" of the system, and to provide the direct, effective connections Brampton residents are asking for. It should be noted that in Brampton, transit refers to local bus, GO train and “train-bus” services. Buses need an effective network of arterial and collector roads on which to run, a network that supports a cost-effective transit system.

At the core of the Transportation and Transit Master Plan, a strategic framework is needed to provide a context for the preferred alternative. This framework defines the "big moves" which set the context for development and travel patterns within the City, for linkages and mode of travel to adjacent municipalities.

The strategic framework is detailed in the “Options for the Strategic Transportation Direction” discussion paper (**Appendix C**). For the urban areas of the City, the focus is on public transit: most of the potential road improvements are intended to implement a reliable transit grid system.

Transit improvements are prominent elements within Brampton and for linkages to adjacent municipalities. The move to a Bus Rapid Transit (BRT) system on key corridors is a significant shift for the City and is fundamental to providing links into the broader GTA rapid transit network.

Highway and other road improvements are also needed, and here too, transit will assume increasing prominence - for example, through High Occupancy Vehicle (HOV) lanes on Highway 410. This is a step in the evolution of a sustainable transportation system in the long term.

3.2 The Transportation System

3.2.1 Options

A number of options for the Transportation Strategy have been considered. At the Mayor's Second Town Hall Meeting on Transportation/Public Information Centre 2, these options were reviewed with the public. As noted, the preferred option is the Balanced Road and Transit Strategy.

The other options are discussed below at a strategic level, to provide a frame of reference for the preferred option.

3.2.1.1 Alternate "Road Dominated" Transportation Strategy

One alternative to a balanced road/transit system is a road dominated strategy. As a way of expressing this option, the idea of providing sufficient road capacity on all screenlines without benefit of additional transit has been explored. This assumes that demands are accommodated primarily by private auto travel, without significant changes to the transportation network designed to shift excess travel demand to transit.

This plan is not realistic due to the lack of sufficient right-of-way. Physical constraints limit the inclusion of the additional lanes required. In fully developed communities especially the high cost of the land acquisition would not allow the realization of this alternate strategy.

Even if it was implemented, this strategy will not solve the problem in the long-term due to the lack of the transit component. The service level on the roads would improve in the short-term, but then it would decrease again. This would result in widespread gridlock since delays and congestion levels would increase exponentially.

Table 3.1 is set up to show the additional number of lanes required to achieve a v/c ratio of 0.90 on all screenlines across the City. The number of lanes is based on the v/c ratios calculated through the model results for each horizon. The total screenline demand divided by an average capacity of 800 vehicles per lane gives the total required number of lanes.

Table 3.1 - Road Lane Requirements (Road Based Strategy [not recommended])

Screenlines (1)	Existing Lanes 2001	Proposed – 10 Year Capital Plan	Number of Additional Lanes Required					
			2011		2021		2031	
			Needed	Addition to Existing	Needed	Addition to Existing	Needed	Addition to Existing
Brampton / Mississauga	61	73	107	**46**	117	**56**	105	**44**
North of Steeles Avenue	70	89	123	**53**	145	**75**	153	**83**
North of Queen Street	82	100	126	**44**	148	**66**	154	**72**
North of Bovaird Drive	58	76	94	**36**	110	**52**	122	**64**
Caledon / Brampton	42	56	56	**14**	62	**20**	72	**30**
Brampton / Halton	16	24	30	**14**	30	**14**	32	**16**
Credit River	16	16	24	**8**	24	**8**	26	**10**
East of Highway 10	40	42	64	**24**	72	**32**	74	**34**
East of Highway 410	48	58	72	**24**	80	**32**	82	**34**
East of Airport Road	28	46	46	**18**	54	**26**	56	**28**
West of Highway 50	28	42	52	**24**	54	**26**	58	**28**

Note: Number of lanes indicates the figures in both directions

(1): Screenlines include major roadways only. Please see the detailed screenline table.

The number of lanes required would be extremely difficult and costly to implement. Substantial disruption to development would also occur.

3.2.1.2 Alternate "Transit Dominated" Transportation Strategy

A "transit dominated" strategy could mean many things. For this example, it has been assumed that the goal would be to effectively switch the roles that transit and private vehicles play in accommodating demand the City, by the horizon of 2031. Elements in that potential alternative would likely include:

- Significantly increased investment in transit, switching the proportions currently allocated to roads and transit
- Transit lanes on Highway 410
- Highway 407 Transitway
- Enhanced hourly all day two-way rail service on the Georgetown and Milton GO Rail services, and more frequent peak period service
- Aggressive land-use planning support for transit
- Aggressive transportation demand management support for HOV/RBL (Reserved Bus Lane) corridors
- Higher frequencies and higher capacity vehicles in all corridors (e.g. 5 to 7.5 minutes)
- All N/S and E/W arterials would likely have strictly controlled HOV or RBL. It is assumed that no road widenings would be completed, except for those needed to ensure reliable transit service
- Less than 3 minutes frequency transit in the Main Line & BY Line[1] corridors. The technology for this higher order transit would depend on the degree of intensification in these corridors, relative to other parallel transit corridors. Depending on the level of development intensity, this could range from a Light Rail Transit system to more advanced rapid transit technologies. Grade separation would be needed, given the limited right-of-way.

3.2.1.3 Alternate "No Growth" Solution

Stopping growth has been suggested in some quarters as the solution to the City's transportation issues. This alternative is assumed to include only permitting the currently approved developments. However, traffic passing through the City would

[1] Main-Line & BY Line are the primary corridors defined in the AcceleRide Bus Rapid Transit plan.

continue to grow since the adjacent municipalities would not freeze development. The restriction on new development would also eliminate future Development Charge funds, limiting the City's ability to make network improvements. The road and transit levels of service would decrease. Transit services would be unreliable due to operation in mixed traffic. Introducing transit into new development areas would be extremely difficult. Therefore, decrease in access for employment and commercial areas would occur.

Through the Growth Management Program, the City has recently taken proactive steps to better manage growth. However, the current legislative framework does not allow the City to categorically halt growth and development.

3.2.2 The Preferred Option: Balancing Roads and Transit

The public participation process undertaken as part of the TTMP development was intended to assist the project team in defining the strategic direction for the Brampton transportation network. The results of this process indicated a preference for the "Balanced Option" between road and transit needs and strategy components.

The balanced roads and transit approach is preferred, as it maintains needed accessibility for commercial, transit and other essential vehicular trips, while providing enhanced transit accessibility for all residents and workers in Brampton, improved air quality, and a healthier, more active and involved community.

3.2.2.1 Transit Mode Share

A critical travel demand parameter is the transit modal share. The future transit shares for key linkages are shown in **Figure 3.1**. These include:

- 15 percent, for internal trips across the City;
- Over 30 percent on key corridors such as Queen and Main Streets, linking to the rapid transit network;
- 70 to 80 percent from the GO Rail corridor nodes; and
- 30 percent between downtown Brampton/Bramalea, and the Pearson Airport industrial area.

These discrete targets are useful in monitoring system performance and planning for improvements. An overall modal split "target" for the City is not believed to be a very meaningful or useful statistic.

The TTMP technical analysis has confirmed that the City's future travel needs cannot be accommodated by road improvements alone. A major increase in the percentage of travel by public transit is essential – a doubling or tripling of the current level, depending on the O-D pair. To achieve this significant shift in modal split, major improvements to transit service will be required, including provision of rapid transit east/west and north/south into Mississauga and York Region, linking into the GTA rapid transit network. Of equal importance are the support systems for transit – re-focusing land use intensity along transit corridors; creation of mixed-use corridors and nodes to generate the all-day, two-way ridership needed for transit to be cost-effective; design of supportive streets and development, and transit-oriented policies and programs.

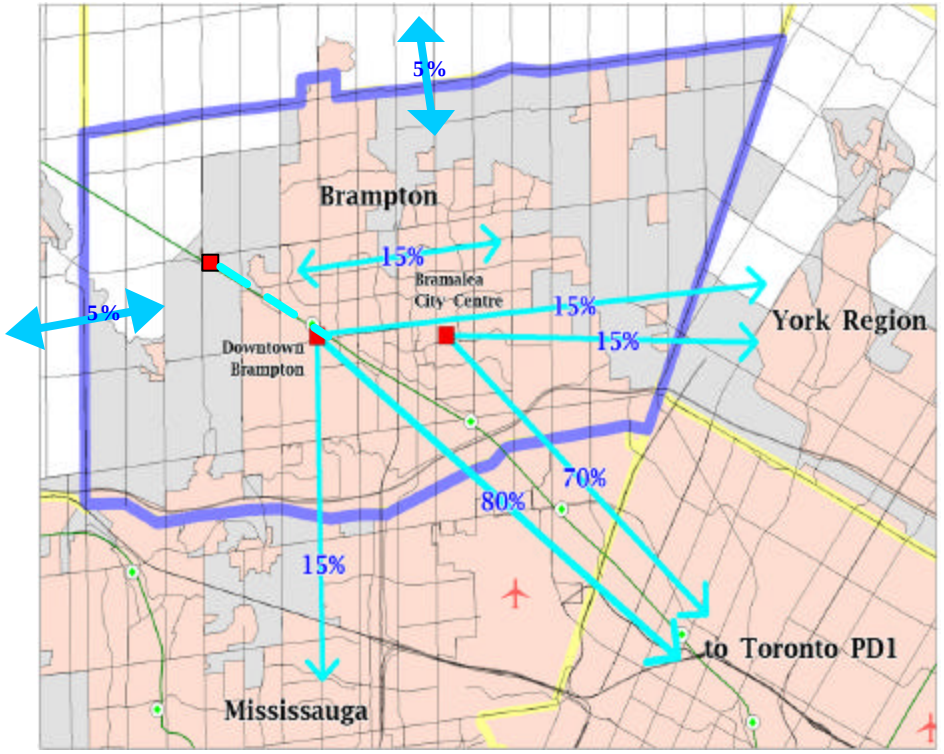
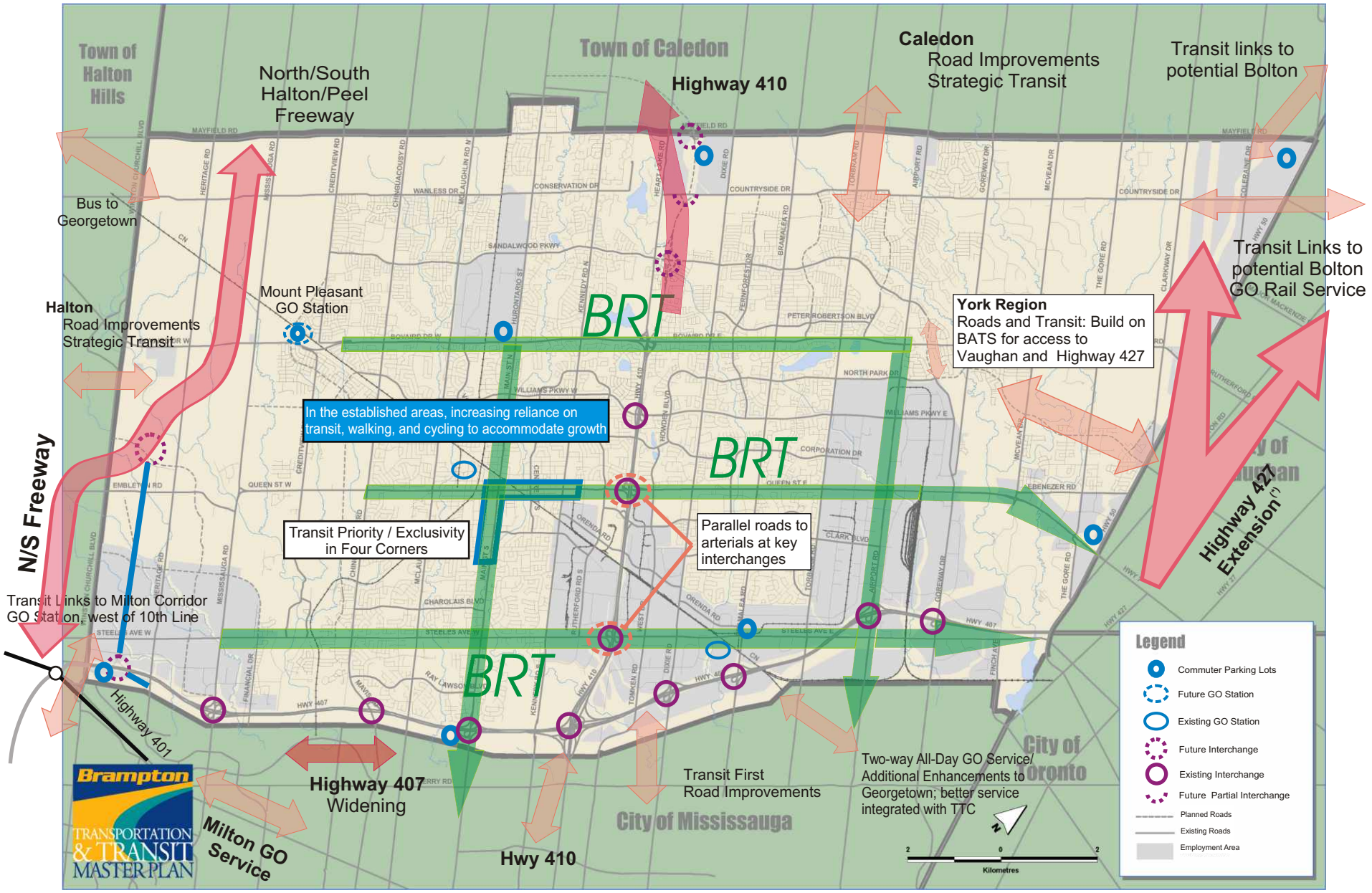


Figure 3.1: 2021 Selected Modal Split Targets for Key O-D Pairs

3.2.2.2 Strategic Framework

The complete strategic framework is shown in **Figure 3.2**. This framework represents the "big moves" that the City should undertake to create the balanced transportation system. These strategic elements need to be supported by a comprehensive slate of specific initiatives and programs.



(*) Alternative alignments of the extension are shown on a strategic level; there has been no decision made up to date.

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Figure 3.2: Balanced Strategy: Strategic Framework Elements

J:\2002jobs\16-02083.jwg\Reports\Final Report\Figures\Figure 3.2 - Balanced Strategy - Strategic Framework.cdr

Elements of the Strategy

The strategy elements can be summarized in terms of major groups, as follows:

- Transit:
  - The Main Street and Queen Street BRT lines will be the transit spines within Brampton, linking the City to York Region and to the City of Mississauga. In the long-term, BRT services would be expanded to Bovaird Drive, Steeles Avenue, and Airport Road;
  - The Mount Pleasant GO station will serve as a gateway for Northwest Brampton and Town of Halton Hills trips;
  - Transit links to the potential Bolton GO Rail line;
  - Transit links to the GO Station on the Milton Rail Corridor, west of 10th Line in Mississauga, serving the new developments at the southwest corners of the City;
  - All-day two-way GO service on the Georgetown line and the Milton line will create the all-day transit service needed to attract riders on a consistent basis;
  - Expanding GO bus services along Highway 407 will provide a major east/west inter-regional transit link; and
  - GO Transit service on the expressways.

- Multi-modalism: Promotion of increasing reliance on transit, walking and cycling within the older established areas of Brampton. This is in recognition of the very limited opportunities for road network expansion in this area;

- Highway linkages: two highway linkages (Highways 410 and 427), incorporated with expressway bus services, are needed to accommodate development already planned. The Highway 427 extension is needed to accommodate traffic in the Brampton/Vaughan boundary area. The Highway 410 extension into the Town of Caledon through Brampton is needed to relieve pressure in the north central area of Brampton. Also, the north/south (Peel/Halton) freeway would be warranted by 2021 to accommodate traffic related to the North West Brampton development area;

- Roads:
  - New roads such as the Bram West Arterial, Cottrelle Parkway, and the extension of Major Mackenzie Drive will serve as links to other municipalities; and
  - Improvements to existing roads will help link City of Brampton to adjacent municipalities, and support the grid of transit services.

Short-Term Elements of the Strategic Framework

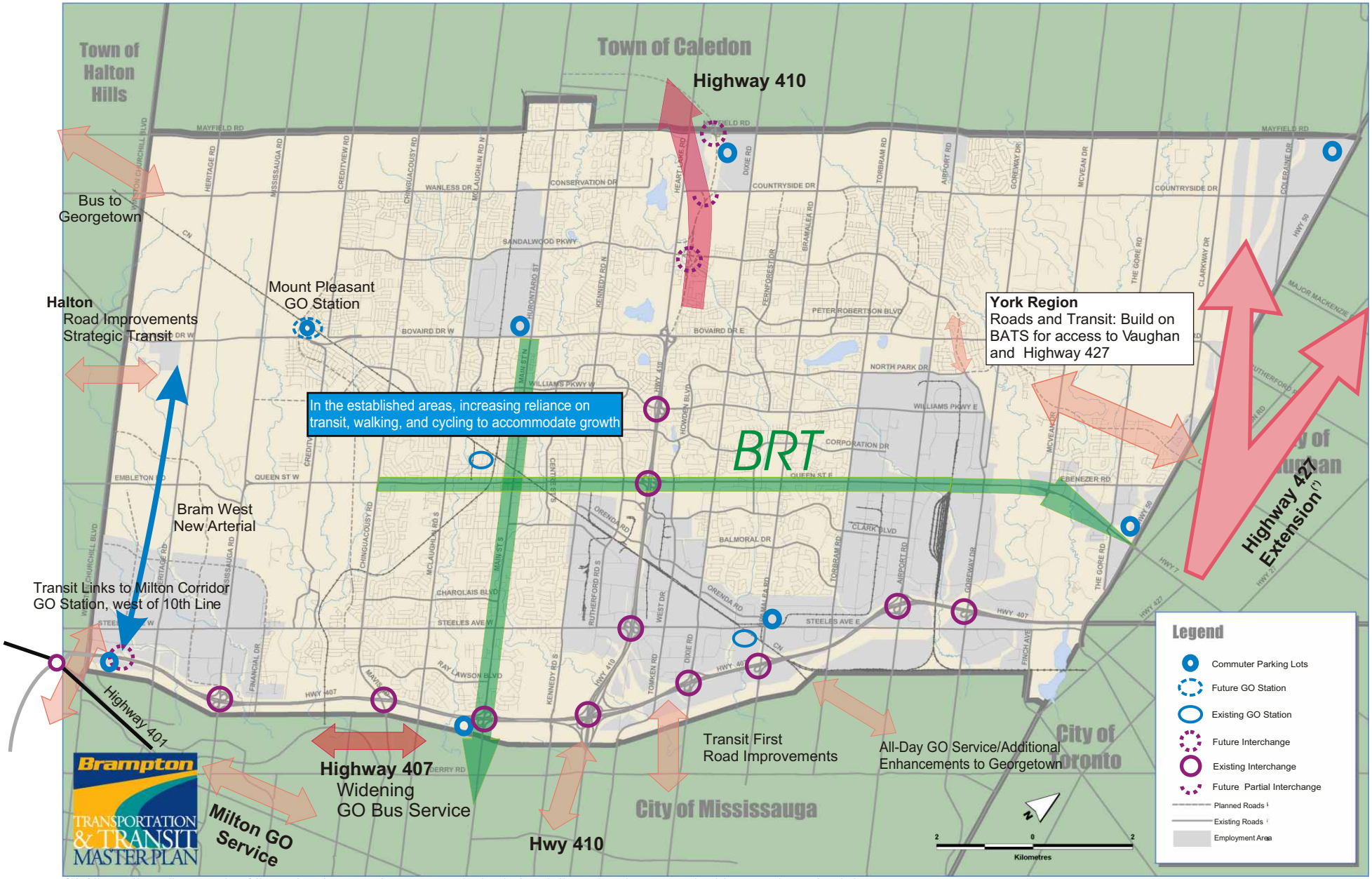
Strategic initiatives that will form the core of the short-term approach place a strong emphasis on transit (shown in **Figure 3.3)**. The Short-Term Framework introduces rapid transit service on the key "spines" of Main Street/Hurontario Street and Queen Street, linking Brampton into the broader GTA rapid transit network. The north/south spine will link to the GO Bus service on Highway 407 and to the Mississauga City Centre Transit Terminal. The east/west spine will link to the proposed York Region rapid transit system, and to the emerging York/Toronto Transit Commission transit hub at York University. These bus spines need to be bolstered by increased service on the Georgetown GO Rail line – all-day service is needed to build a true transit orientation for these inter-municipal trips.

Rapid transit links to other communities will be supplemented by other bus services as well, internally and externally. Internal service will include improved connections from emerging residential areas to the GO stations. Establishing commuter parking lots around the edge of the City will further support transit, and assist in improving vehicle occupancy levels generally.

The Four Corners will begin to evolve into a more transit and pedestrian oriented area, forming a more intensified urban core of the City.

Specific short-term strategic elements include the following, listed in terms of their expected delivery (if already programmed) or their priority based on the expectation of need:

- Mount Pleasant GO Station, with commuter 'gateway' parking;
- Reconfiguration of the Brampton Transit network to provide more corridor-based services;



(*) Alternative alignments of the extension are shown on a strategic level; there has been no decision made up to date.

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Figure 3.3: Balanced Strategy: Short-term Strategic Framework Elements

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- Implementation of a Bus Rapid Transit (BRT) system along Queen Street and Main Street, linking to York Region and Mississauga, respectively;
- Extension of Highway 410;
- Improved connections to Mississauga destinations, including Pearson Airport and closer integration with Mississauga Transit;
- Improvement of road links to Halton Region. Development will continue to the west of the City, and planning for effective access will facilitate employment and residential development in Brampton;
- Introduction of transit links to the proposed GO Station on the Milton Rail Corridor, west of 10th Line in Mississauga, from the southwest quadrant of the City as it develops;
- Highway 427 extension to Rutherford Road or beyond;
- Establishment of improved transit connections to York Region, in conjunction with the recommended road improvements in the York-Peel Boundary Area Transportation Study (BATS);
- Implementation of Bram West Parkway from Embleton Road to Highway 407, together with a new interchange at Highway 407;
- Implementation of a network of commuter parking lots at gateways to the City;
- Introduction of express transit services on Highway 410 (together with widening);
- Provision of all day GO Rail service on the Georgetown GO line;
- A bus service to Georgetown;
- Continued expansion of the arterial and collector road network; and
- Express GO bus service on the Highway 407 transitway and provincial freeways.

Long-Term Elements of the Strategic Framework

The longer term strategy will build on the results of the short-term initiatives over the 10-to-20 year horizon, to achieve the ultimate vision. These elements will continue balancing transit and road-based mobility. It is difficult to ascribe relative priorities to these initiatives, because they depend on the results of the shorter term and because they are seen as progressing more or less concurrently. Strategic initiatives that will form the core of the long-term approach are already shown in **Figure 3.4.** These are:

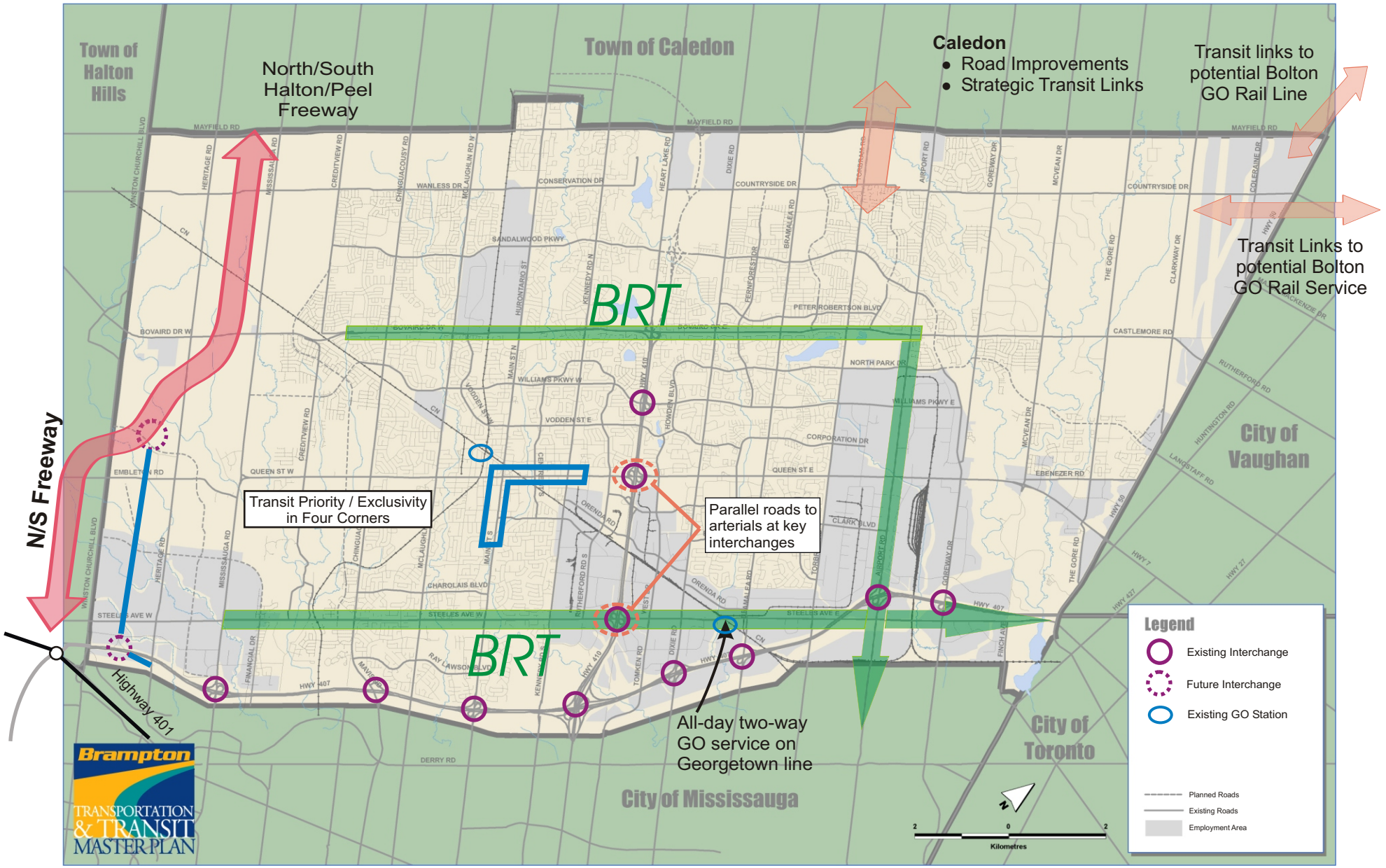

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Figure 3.4: Balanced Strategy: Long-Term Strategic Framework Elements

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- Enhanced transit service in numerous priority corridors across the City, together with continued reconfiguration to a grid-based overlay on community services;
- Expansion of the BRT network in other key corridors to enhance the grid of high capacity services (Steeles Avenue, Bovaird Drive, Torbram Road, Kennedy Road, Dixie Road, McLaughlin Road and Airport Road);
- Expanded transit priority / exclusivity in the Four Corners (discussed further below);
- Increased reliance on transit, walking and cycling for travel in the core established areas of Brampton (i.e. Steeles to Bovaird, Kennedy to McLaughlin);
- Introduction of a multi-modal transportation corridor in west Brampton (completion of Bram West Parkway);
- Express bus to Bolton, to provide an alternative to private vehicles for commuting;
- If a Bolton GO Rail service is implemented, bus links to the stations;
- Implementation of parallel roads around key freeway interchanges – i.e. Queen Street and Steeles Avenue at Highway 410. These are expected to be needed to off-load some of the local traffic from these keys through routes. Interchanges are often the focus for both development and for traffic congestion. Parallel collector roads can serve to facilitate intensification of development and improve distribution of traffic;
- Continued expansion of the arterial and collector road network.

3.2.3 Expanding the Road System

This Section documents the plan for expanding the City's road network, to the horizons of 2011, 2021, and 2031.

3.2.3.1 Analysis Methodology

The analysis of needs, deficiencies and alternatives has been based on the screenline assessment documented above, and on a detailed computer model of future demands. This model includes all arterial and collector roads, and all freeway links. The model represents Brampton within a broader GTA road network. There are 97 transportation zones in the Brampton segment of the model, representing existing and future development zones.

Model Enhancement

The EMME/2 base network and the origin-destination (O-D) trip table used to forecast the future demands for Brampton were initially provided by the Region of Peel. The initial network reflected the 1996 road network and was calibrated to the 1996

TTS results. In order to simulate the actual road network, an updating process was carried out. Major activities undertaken during this process were:

- Checking the coding of the road links;
- Revising link features such as link lengths, capacities, volume-delay functions (vdf);
- Adding missing links (to incorporate major road links); and
- Revising the intersection/interchange coding (especially along Highway 407)

Further to these updates/revisions, the Region's modelling staff fine tuned the calibration based on the 2001 TTS results.

Land Use

The initial land use data used for future demand forecasts were provided by the City's Planning, Design and Development Department. The population, employment and housing forecasts by secondary plan areas (SPA) and small geographic units (SGU) were revised by the City in August 2003.

The land use data incorporate all proposed development areas, including Bram West and Northwest Brampton. The land use scenario assumes that the current urban boundary of the City would be exhausted of low-density residential developable area before Northwest Brampton would begin to show any occupied units. Some development in Northwest Brampton is assumed to begin in 2023, in areas north of Fletcher's Meadow.

Beyond 2031, growth is expected to be primarily high-density development in areas such as Northwest Brampton, Downtown Brampton and the Queen Street corridor.

It is important to note that the land use forecasts by the City differ from the forecasts completed by the Region. Detailed land use data forecasted by the City's Planning, Design and Development Department is provided in **Appendix D**.

Modal Split

The TTMP transportation model uses post trip distribution modal split factors, based on relative levels of service.

Currently, the residents of Brampton rely heavily on private vehicles. The inter-regional transit service is significantly used for trips from downtown Brampton to downtown Toronto, Mississauga and along Queen Street to York Region. Intra-municipal trips (self containment) are not significant.

A core component of the strategy development has been to focus on realistically achievable goals for transit networks and loadings within the City and connections to adjacent municipalities. Rather than defining a single "target" value for the municipality, which is a simplistic approach, we have focused on defining realistic expectations for various transit linkages, based on the current mode split in existing linkages which are expected to be comparable to Brampton in its mature state.

In order to better reflect the corridor based modal split shares, a city-wide modal split matrix was used. The matrix consists of 27 zone groups representing the ensemble of traffic zones in the EMME/2 model. For the interim horizons and ultimate horizon year, the transit modal splits were projected through the analysis process, using judgment based on a full understanding of transit modal split in other areas of the GTA where transit service is similar to what can be expected in Brampton.

The modal split matrices were applied during the trip distribution phase of the modelling process. The figures provided in the matrices for each horizon were applied to associated zonal pairs to obtain auto trips.

The base and horizon year modal split matrices are shown in **Figures 3.5, 3.6, 3.7** and **3.8**.

	ge01	ge02	ge03	ge04	ge05	ge06	ge07	ge08	ge09	ge10	ge11	ge12	ge13	ge14	ge15	ge16	ge17	ge18	ge19	ge20	ge21	ge22	ge23	ge24	ge25	ge26	ge27	
ge01	0.10	0.00	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Mississauga City Centre
ge02	0.17	0.10	0.06	0.07	0.05	0.09	0.02	0.04	0.00	0.00	0.00	0.09	0.10	0.07	0.16	0.58	0.12	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Mississauga Central
ge03	0.23	0.06	0.04	0.03	0.15	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.10	0.59	0.07	0.18	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	Mississauga-S
ge04	0.05	0.50	0.04	0.05	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.15	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.00	Mississauga-W
ge05	0.06	0.06	0.06	0.06	0.06	0.11	0.00	0.06	0.06	0.00	0.00	0.09	0.09	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	Mississauga-N
ge06	0.07	0.07	0.00	0.00	0.00	0.04	0.04	0.09	0.09	0.04	0.00	0.04	0.05	0.12	0.09	0.57	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	Mississauga-NE
ge07	0.09	0.00	0.12	0.00	0.09	0.05	0.02	0.09	0.13	0.10	0.00	0.03	0.00	0.02	0.11	0.55	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	Brampton-NE
ge08	0.22	0.00	0.00	0.00	0.00	0.01	0.03	0.06	0.11	0.09	0.00	0.00	0.00	0.00	0.16	0.53	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.03	Brampton-NW
ge09	0.00	0.07	0.00	0.00	0.12	0.00	0.07	0.05	0.01	0.00	0.00	0.06	0.06	0.09	0.33	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	Brampton-SW
ge10	0.09	0.00	0.00	0.00	0.04	0.04	0.10	0.05	0.15	0.11	0.00	0.00	0.00	0.09	0.43	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.05	0.05	Brampton-SE
ge11	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	0.06	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Caledon
ge12	0.00	0.05	0.00	0.00	0.25	0.05	0.00	0.00	0.00	0.00	0.00	0.16	0.11	0.16	0.18	0.53	0.08	0.09	0.00	0.09	0.00	0.06	0.00	0.00	0.00	0.00	0.00	Etobicoke N
ge13	0.00	0.05	0.15	0.02	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.13	0.13	0.11	0.23	0.56	0.10	0.09	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	Etobicoke-S
ge14	0.08	0.00	0.00	0.00	0.14	0.03	0.02	0.07	0.00	0.02	0.00	0.13	0.13	0.17	0.29	0.68	0.14	0.16	0.00	0.04	0.00	0.11	0.00	0.00	0.00	0.00	0.02	Toronto-N
ge15	0.24	0.18	0.14	0.00	0.13	0.12	0.04	0.03	0.08	0.52	0.00	0.13	0.26	0.24	0.31	0.63	0.23	0.14	0.00	0.09	0.08	0.10	0.03	0.03	0.00	0.03	0.04	Toronto Central
ge16	0.00	0.19	0.14	0.09	0.00	0.11	0.00	0.09	0.09	0.09	0.00	0.16	0.36	0.44	0.43	0.54	0.30	0.29	0.00	0.19	0.23	0.26	0.19	0.17	0.00	0.00	0.00	Toronto-PD1
ge17	0.00	0.00	0.00	0.05	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.07	0.15	0.16	0.25	0.06	0.14	0.05	0.00	0.05	0.00	0.01	0.02	0.00	0.00	0.00	0.00	Toronto-E
ge18	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.07	0.06	0.14	0.54	0.00	0.02	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	York Region-SW
ge19	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	0.04	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	York Region-NW
ge20	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	0.04	0.15	0.51	0.04	0.01	0.00	0.04	0.03	0.04	0.00	0.00	0.00	0.00	0.00	Aurora-Newmarket
ge21	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	0.03	0.04	0.37	0.04	0.00	0.17	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	York Region-NE
ge22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.16	0.05	0.13	0.52	0.02	0.08	0.00	0.05	0.00	0.03	0.00	0.14	0.00	0.00	0.00	York Region-SE
ge23	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	0.02	0.08	0.57	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	Durham Region
ge24	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.03	0.03	0.23	0.57	0.05	0.00	0.00	0.00	0.00	0.12	0.11	0.07	0.00	0.00	0.00	Milton-Oakville
ge25	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.07	0.11	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.00	Halton Hills
ge26	0.00	0.00	0.00	0.05	0.05	0.00	0.09	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.16	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	Brampton-East
ge27	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.09	0.09	0.10	0.00	0.00	0.00	0.02	0.11	0.55	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	Brampton-West
	Mississauga City Centre	Mississauga Central	Mississauga-S	Mississauga-W	Mississauga-N	Mississauga-NE	Brampton-NE	Brampton-NW	Brampton-SW	Brampton-SE	Caledon	Etobicoke-N	Etobicoke-S	Toronto-N	Toronto Central	Toronto-PD1	Toronto-E	York Region-SW	York Region-NW	Aurora-Newmarket	York Region-NE	York Region-SE	Durham Region	Milton-Oakville	Halton Hills	Brampton-East	Brampton-West	

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Figure 3.5: 2001 Modal Split Matrix (1996 Policy Modal Split)

J:\2002jobs\16-02083.jwg\Reports\Final Report\Figures\Figure 3.5 - 2001 Modal Split Matrix.cdr

	ge01	ge02	ge03	ge04	ge05	ge06	ge07	ge08	ge09	ge10	ge11	ge12	ge13	ge14	ge15	ge16	ge17	ge18	ge19	ge20	ge21	ge22	ge23	ge24	ge25	ge26	ge27	
ge01	0.18	0.15	0.16	0.09	0.16	0.09	0.03	0.03	0.03	0.15	0.01	0.06	0.06	0.06	0.09	0.67	0.15	0.04	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.03	0.00	Mississauga City Centre
ge02	0.22	0.10	0.08	0.08	0.05	0.10	0.04	0.05	0.05	0.06	0.01	0.13	0.15	0.10	0.27	0.64	0.15	0.12	0.02	0.04	0.03	0.04	0.10	0.00	0.00	0.03	0.00	Mississauga Central
ge03	0.24	0.08	0.08	0.04	0.05	0.05	0.03	0.03	0.03	0.06	0.00	0.04	0.08	0.03	0.17	0.66	0.12	0.22	0.03	0.06	0.04	0.06	0.15	0.20	0.00	0.03	0.00	Mississauga-S
ge04	0.17	0.08	0.08	0.05	0.05	0.03	0.04	0.03	0.04	0.06	0.00	0.03	0.06	0.04	0.18	0.51	0.03	0.10	0.01	0.01	0.00	0.00	0.00	0.03	0.12	0.09	0.00	Mississauga-W
ge05	0.17	0.08	0.08	0.04	0.04	0.04	0.05	0.04	0.08	0.06	0.00	0.13	0.13	0.03	0.19	0.50	0.06	0.07	0.01	0.03	0.01	0.01	0.02	0.01	0.03	0.08	0.00	Mississauga-N
ge06	0.18	0.09	0.07	0.03	0.03	0.05	0.05	0.05	0.08	0.08	0.00	0.11	0.11	0.17	0.15	0.63	0.06	0.15	0.01	0.03	0.00	0.03	0.06	0.00	0.00	0.03	0.08	Mississauga-NE
ge07	0.05	0.03	0.05	0.03	0.04	0.06	0.10	0.10	0.05	0.13	0.03	0.04	0.03	0.05	0.07	0.61	0.01	0.10	0.01	0.01	0.00	0.05	0.00	0.00	0.01	0.01	0.10	Brampton-NE
ge08	0.05	0.03	0.03	0.03	0.04	0.03	0.10	0.08	0.09	0.13	0.03	0.01	0.01	0.04	0.11	0.59	0.01	0.10	0.01	0.01	0.00	0.03	0.00	0.00	0.01	0.10	0.04	Brampton-NW
ge09	0.03	0.03	0.03	0.03	0.08	0.03	0.05	0.08	0.15	0.09	0.01	0.02	0.01	0.01	0.05	0.34	0.01	0.03	0.00	0.03	0.00	0.01	0.00	0.01	0.01	0.03	0.03	Brampton-SW
ge10	0.20	0.06	0.06	0.03	0.08	0.08	0.19	0.17	0.20	0.25	0.03	0.03	0.03	0.13	0.13	0.69	0.06	0.03	0.00	0.06	0.00	0.01	0.00	0.01	0.02	0.05	0.10	Brampton-SE
ge11	0.03	0.00	0.03	0.01	0.02	0.02	0.06	0.06	0.03	0.06	0.03	0.02	0.01	0.01	0.08	0.42	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.03	0.06	Caledon
ge12	0.00	0.07	0.00	0.00	0.10	0.07	0.03	0.04	0.05	0.06	0.00	0.15	0.10	0.12	0.20	0.34	0.12	0.03	0.02	0.12	0.02	0.16	0.02	0.03	0.03	0.03	0.04	Etobicoke N
ge13	0.00	0.07	0.21	0.03	0.00	0.10	0.02	0.03	0.05	0.05	0.00	0.14	0.11	0.13	0.21	0.34	0.13	0.03	0.02	0.08	0.05	0.17	0.02	0.03	0.03	0.03	0.03	Etobicoke-S
ge14	0.11	0.00	0.00	0.00	0.20	0.04	0.04	0.14	0.00	0.04	0.00	0.15	0.15	0.13	0.12	0.30	0.16	0.21	0.04	0.12	0.05	0.15	0.01	0.04	0.04	0.04	0.04	Toronto-N
ge15	0.10	0.01	0.01	0.00	0.00	0.05	0.01	0.02	0.05	0.22	0.00	0.17	0.15	0.11	0.12	0.27	0.18	0.21	0.02	0.12	0.03	0.16	0.04	0.04	0.03	0.05	0.01	Toronto Central
ge16	0.00	0.03	0.02	0.01	0.00	0.04	0.00	0.11	0.11	0.11	0.00	0.17	0.14	0.10	0.03	0.54	0.12	0.12	0.00	0.00	0.09	0.27	0.08	0.07	0.00	0.01	0.00	Toronto-PD1
ge17	0.00	0.00	0.00	0.05	0.00	0.05	0.02	0.01	0.06	0.05	0.06	0.12	0.15	0.12	0.19	0.29	0.15	0.06	0.02	0.08	0.02	0.15	0.02	0.03	0.03	0.00	0.04	Toronto-E
ge18	0.01	0.03	0.03	0.00	0.01	0.07	0.04	0.03	0.07	0.15	0.00	0.04	0.04	0.02	0.06	0.57	0.03	0.04	0.00	0.06	0.00	0.03	0.00	0.00	0.00	0.01	0.12	York Region-SW
ge19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.36	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	York Region-NW
ge20	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04	0.14	0.55	0.04	0.00	0.00	0.05	0.01	0.02	0.00	0.00	0.00	0.00	0.00	Aurora-New Market
ge21	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.37	0.02	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	York Region-NE
ge22	0.02	0.00	0.00	0.00	0.01	0.03	0.03	0.01	0.00	0.06	0.00	0.02	0.11	0.06	0.11	0.47	0.03	0.18	0.00	0.03	0.00	0.03	0.00	0.06	0.00	0.00	0.04	York Region-SE
ge23	0.01	0.02	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.01	0.04	0.56	0.03	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	Durham Region
ge24	0.00	0.06	0.15	0.06	0.00	0.00	0.00	0.08	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.51	0.02	0.00	0.00	0.00	0.00	0.05	0.04	0.03	0.02	0.01	0.00	Milton-Oakville
ge25	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.03	0.11	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.10	0.00	Halton Hills
ge26	0.10	0.06	0.06	0.08	0.08	0.03	0.10	0.06	0.10	0.16	0.02	0.03	0.03	0.06	0.11	0.59	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.05	0.21	0.05	Brampton-East
ge27	0.06	0.06	0.06	0.00	0.03	0.08	0.06	0.10	0.01	0.16	0.03	0.06	0.06	0.05	0.07	0.61	0.03	0.10	0.06	0.05	0.06	0.11	0.00	0.00	0.00	0.06	0.06	Brampton-West
	Mississauga City Centre	Mississauga Central	Mississauga-S	Mississauga-W	Mississauga-N	Mississauga-NE	Brampton-NE	Brampton-NW	Brampton-SW	Brampton-SE	Caledon	Etobicoke-N	Etobicoke-S	Toronto-N	Toronto Central	Toronto-PD1	Toronto-E	York Region-SW	York Region-NW	Aurora-Newmarket	York Region-NE	York Region-SE	Durham Region	Milton-Oakville	Halton Hills	Brampton-East	Brampton-West	

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Figure 3.6: 2011 Modal Split Matrix

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	ge01	ge02	ge03	ge04	ge05	ge06	ge07	ge08	ge09	ge10	ge11	ge12	ge13	ge14	ge15	ge16	ge17	ge18	ge19	ge20	ge21	ge22	ge23	ge24	ge25	ge26	ge27	
ge01	0.50	0.20	0.20	0.15	0.20	0.15	0.05	0.05	0.05	0.20	0.01	0.10	0.10	0.10	0.15	0.71	0.27	0.07	0.00	0.02	0.00	0.02	0.05	0.00	0.00	0.05	0.00	Mississauga City Centre
ge02	0.25	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.01	0.15	0.19	0.12	0.35	0.69	0.27	0.15	0.03	0.07	0.05	0.07	0.17	0.00	0.00	0.05	0.00	Mississauga Central
ge03	0.25	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.00	0.05	0.09	0.05	0.22	0.70	0.15	0.25	0.05	0.10	0.07	0.10	0.25	0.20	0.00	0.05	0.00	Mississauga-S
ge04	0.25	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.00	0.05	0.08	0.05	0.32	0.54	0.05	0.17	0.01	0.02	0.00	0.00	0.00	0.04	0.20	0.10	0.00	Mississauga-W
ge05	0.25	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.00	0.15	0.15	0.05	0.32	0.53	0.10	0.12	0.02	0.05	0.01	0.02	0.03	0.02	0.05	0.10	0.00	Mississauga-N
ge06	0.25	0.10	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.00	0.15	0.15	0.20	0.19	0.67	0.10	0.22	0.01	0.05	0.00	0.05	0.10	0.00	0.00	0.05	0.10	Mississauga-NE
ge07	0.05	0.05	0.05	0.05	0.05	0.07	0.10	0.10	0.05	0.15	0.05	0.05	0.05	0.07	0.09	0.65	0.02	0.15	0.01	0.02	0.00	0.08	0.00	0.00	0.01	0.05	0.10	Brampton-NE
ge08	0.05	0.05	0.05	0.05	0.07	0.05	0.10	0.10	0.10	0.15	0.05	0.02	0.02	0.07	0.13	0.63	0.02	0.15	0.01	0.02	0.00	0.05	0.00	0.00	0.01	0.10	0.05	Brampton-NW
ge09	0.05	0.05	0.05	0.05	0.10	0.05	0.05	0.10	0.20	0.15	0.02	0.02	0.02	0.05	0.05	0.37	0.02	0.05	0.00	0.05	0.00	0.02	0.00	0.02	0.02	0.05	0.05	Brampton-SW
ge10	0.59	0.10	0.10	0.05	0.10	0.10	0.25	0.25	0.35	0.50	0.05	0.05	0.05	0.15	0.15	0.73	0.10	0.05	0.00	0.10	0.00	0.02	0.00	0.02	0.02	0.05	0.05	Brampton-SE
ge11	0.05	0.00	0.05	0.02	0.02	0.04	0.10	0.10	0.05	0.10	0.05	0.04	0.01	0.01	0.10	0.48	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.05	0.10	Caledon
ge12	0.00	0.08	0.00	0.00	0.42	0.08	0.05	0.06	0.08	0.10	0.00	0.15	0.15	0.14	0.21	0.43	0.15	0.06	0.03	0.14	0.03	0.23	0.03	0.05	0.05	0.05	0.06	Etobicoke N
ge13	0.00	0.08	0.25	0.03	0.00	0.12	0.04	0.05	0.07	0.08	0.00	0.15	0.15	0.14	0.22	0.45	0.15	0.06	0.03	0.14	0.03	0.23	0.03	0.05	0.05	0.05	0.05	Etobicoke-S
ge14	0.13	0.00	0.00	0.00	0.24	0.05	0.06	0.19	0.00	0.06	0.00	0.17	0.17	0.15	0.20	0.49	0.17	0.24	0.07	0.18	0.07	0.18	0.01	0.07	0.07	0.07	0.06	Toronto-N
ge15	0.12	0.09	0.07	0.00	0.07	0.06	0.02	0.02	0.05	0.30	0.00	0.20	0.20	0.17	0.22	0.45	0.20	0.26	0.04	0.36	0.04	0.20	0.04	0.05	0.05	0.07	0.02	Toronto Central
ge16	0.00	0.11	0.08	0.05	0.00	0.06	0.00	0.12	0.12	0.12	0.00	0.18	0.25	0.12	0.23	0.54	0.21	0.20	0.00	0.00	0.16	0.28	0.13	0.12	0.00	0.01	0.00	Toronto-PD1
ge17	0.00	0.00	0.00	0.27	0.00	0.21	0.00	0.02	0.05	0.08	0.10	0.15	0.15	0.14	0.22	0.45	0.15	0.06	0.03	0.10	0.03	0.23	0.03	0.05	0.05	0.00	0.07	Toronto-E
ge18	0.02	0.05	0.05	0.00	0.02	0.10	0.07	0.05	0.12	0.25	0.00	0.05	0.05	0.04	0.10	0.60	0.05	0.05	0.00	0.08	0.00	0.04	0.00	0.00	0.00	0.02	0.20	York Region-SW
ge19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.02	0.37	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	York Region-NW
ge20	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.15	0.57	0.04	0.01	0.00	0.06	0.02	0.03	0.00	0.00	0.00	0.00	0.00	Aurora-Newmarket
ge21	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.37	0.03	0.00	0.12	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	York Region-NE
ge22	0.03	0.00	0.00	0.00	0.02	0.05	0.05	0.02	0.00	0.10	0.00	0.04	0.11	0.07	0.12	0.50	0.04	0.25	0.00	0.04	0.00	0.04	0.00	0.10	0.00	0.00	0.07	York Region-SE
ge23	0.02	0.04	0.04	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.02	0.06	0.57	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	Durham Region
ge24	0.00	0.09	0.18	0.09	0.00	0.00	0.00	0.10	0.02	0.00	0.00	0.02	0.02	0.02	0.12	0.54	0.04	0.00	0.00	0.00	0.00	0.08	0.08	0.05	0.03	0.02	0.00	Milton-Oakville
ge25	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.05	0.12	0.27	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.30	0.00	Halton Hills
ge26	0.20	0.10	0.10	0.10	0.10	0.05	0.10	0.10	0.15	0.20	0.04	0.05	0.05	0.10	0.13	0.63	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.25	0.28	0.00	Brampton-East
ge27	0.10	0.10	0.10	0.00	0.05	0.10	0.10	0.10	0.05	0.20	0.05	0.10	0.10	0.07	0.09	0.65	0.05	0.15	0.10	0.09	0.10	0.18	0.00	0.00	0.00	0.08	0.08	Brampton-West
	Mississauga City Centre	Mississauga Central	Mississauga-S	Mississauga-W	Mississauga-N	Mississauga-NE	Brampton-NE	Brampton-NW	Brampton-SW	Brampton-SE	Caledon	Etobicoke-N	Etobicoke-S	Toronto-N	Toronto Central	Toronto-PD1	Toronto-E	York Region-SW	York Region-NW	Aurora-Newmarket	York Region-NE	York Region-SE	Durham Region	Milton-Oakville	Halton Hills	Brampton-East	Brampton-West	

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Figure 3.7: 2021 Modal Split Matrix

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	ge01	ge02	ge03	ge04	ge05	ge06	ge07	ge08	ge09	ge10	ge11	ge12	ge13	ge14	ge15	ge16	ge17	ge18	ge19	ge20	ge21	ge22	ge23	ge24	ge25	ge26	ge27	
ge01	0.55	0.40	0.26	0.19	0.24	0.20	0.20	0.15	0.20	0.26	0.07	0.15	0.20	0.15	0.25	0.71	0.30	0.10	0.05	0.04	0.00	0.03	0.07	0.10	0.05	0.10	0.13	Mississauga City Centre
ge02	0.35	0.20	0.20	0.15	0.10	0.20	0.06	0.05	0.15	0.12	0.05	0.17	0.30	0.18	0.40	0.72	0.31	0.17	0.04	0.09	0.06	0.09	0.18	0.05	0.00	0.05	0.10	Mississauga Central
ge03	0.30	0.20	0.10	0.10	0.10	0.16	0.08	0.07	0.15	0.13	0.05	0.10	0.25	0.10	0.25	0.72	0.20	0.27	0.06	0.10	0.07	0.10	0.30	0.25	0.00	0.06	0.07	Mississauga-S
ge04	0.35	0.20	0.12	0.10	0.10	0.10	0.06	0.06	0.15	0.13	0.05	0.08	0.10	0.07	0.37	0.57	0.06	0.22	0.01	0.03	0.00	0.00	0.00	0.15	0.26	0.11	0.00	Mississauga-W
ge05	0.30	0.11	0.11	0.05	0.05	0.03	0.06	0.05	0.11	0.13	0.00	0.17	0.17	0.06	0.41	0.56	0.13	0.15	0.03	0.06	0.01	0.03	0.04	0.04	0.06	0.10	0.03	Mississauga-N
ge06	0.30	0.20	0.15	0.06	0.12	0.15	0.05	0.05	0.10	0.15	0.05	0.20	0.20	0.25	0.25	0.70	0.15	0.25	0.01	0.06	0.00	0.06	0.10	0.05	0.00	0.08	0.15	Mississauga-NE
ge07	0.30	0.07	0.05	0.06	0.10	0.15	0.25	0.22	0.15	0.40	0.10	0.10	0.08	0.10	0.15	0.68	0.05	0.22	0.05	0.05	0.00	0.10	0.00	0.05	0.05	0.10	0.25	Brampton-NE
ge08	0.30	0.15	0.10	0.10	0.12	0.10	0.20	0.25	0.20	0.32	0.05	0.05	0.10	0.10	0.15	0.66	0.05	0.20	0.01	0.03	0.00	0.06	0.00	0.10	0.07	0.25	0.12	Brampton-NW
ge09	0.40	0.20	0.10	0.15	0.15	0.10	0.10	0.15	0.25	0.50	0.05	0.07	0.07	0.04	0.25	0.45	0.05	0.10	0.00	0.06	0.00	0.03	0.00	0.05	0.10	0.30	0.10	Brampton-SW
ge10	0.65	0.25	0.13	0.15	0.17	0.25	0.29	0.15	0.25	0.50	0.07	0.15	0.06	0.17	0.20	0.75	0.13	0.07	0.00	0.13	0.00	0.03	0.00	0.03	0.07	0.12	0.15	Brampton-SE
ge11	0.09	0.07	0.06	0.03	0.03	0.05	0.13	0.13	0.06	0.15	0.05	0.05	0.01	0.03	0.11	0.46	0.01	0.07	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.07	0.13	Caledon
ge12	0.15	0.09	0.07	0.05	0.25	0.30	0.10	0.05	0.10	0.25	0.00	0.20	0.20	0.14	0.22	0.50	0.17	0.08	0.03	0.15	0.04	0.28	0.03	0.07	0.07	0.06	0.10	Etobicoke N
ge13	0.20	0.18	0.25	0.04	0.07	0.15	0.05	0.06	0.10	0.15	0.00	0.18	0.20	0.15	0.22	0.50	0.17	0.07	0.04	0.15	0.04	0.25	0.03	0.07	0.07	0.08	0.10	Etobicoke-S
ge14	0.17	0.05	0.03	0.00	0.26	0.08	0.07	0.20	0.07	0.12	0.00	0.08	0.18	0.18	0.18	0.51	0.18	0.26	0.09	0.22	0.09	0.20	0.02	0.09	0.09	0.09	0.11	Toronto-N
ge15	0.20	0.12	0.09	0.01	0.08	0.08	0.07	0.05	0.06	0.35	0.02	0.25	0.25	0.20	0.25	0.40	0.20	0.30	0.05	0.40	0.05	0.23	0.05	0.06	0.07	0.08	0.05	Toronto Central
ge16	0.22	0.10	0.08	0.06	0.02	0.07	0.02	0.13	0.13	0.20	0.00	0.19	0.26	0.15	0.30	0.59	0.25	0.22	0.00	0.05	0.17	0.28	0.15	0.15	0.00	0.01	0.00	Toronto-PD1
ge17	0.10	0.08	0.08	0.15	0.05	0.22	0.02	0.05	0.08	0.12	0.05	0.18	0.15	0.20	0.27	0.56	0.16	0.07	0.04	0.11	0.04	0.30	0.03	0.07	0.07	0.05	0.07	Toronto-E
ge18	0.03	0.06	0.06	0.00	0.03	0.12	0.09	0.06	0.15	0.32	0.00	0.06	0.05	0.04	0.12	0.61	0.07	0.06	0.00	0.09	0.00	0.05	0.00	0.00	0.00	0.03	0.26	York Region-SW
ge19	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.07	0.00	0.01	0.01	0.04	0.05	0.40	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.09	York Region-NW
ge20	0.02	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.06	0.06	0.05	0.15	0.59	0.05	0.01	0.00	0.10	0.05	0.04	0.00	0.00	0.00	0.00	0.00	Aurora-New Market
ge21	0.00	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.39	0.02	0.00	0.15	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	York Region-NE
ge22	0.04	0.00	0.00	0.00	0.03	0.06	0.06	0.03	0.00	0.13	0.00	0.05	0.15	0.09	0.15	0.55	0.04	0.30	0.00	0.04	0.00	0.04	0.00	0.12	0.00	0.00	0.09	York Region-SE
ge23	0.03	0.05	0.05	0.01	0.04	0.03	0.02	0.00	0.02	0.03	0.00	0.05	0.05	0.01	0.06	0.57	0.05	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.03	Durham Region
ge24	0.08	0.11	0.23	0.11	0.00	0.00	0.00	0.12	0.03	0.06	0.00	0.03	0.02	0.02	0.15	0.55	0.05	0.00	0.00	0.00	0.00	0.08	0.08	0.10	0.04	0.03	0.05	Milton-Oakville
ge25	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.07	0.06	0.08	0.00	0.01	0.03	0.04	0.15	0.30	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.30	0.05	Halton Hills
ge26	0.26	0.13	0.13	0.11	0.11	0.06	0.10	0.13	0.19	0.23	0.05	0.06	0.06	0.13	0.13	0.63	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.09	0.32	0.30	0.05	Brampton-East
ge27	0.15	0.14	0.12	0.00	0.06	0.11	0.15	0.12	0.09	0.23	0.06	0.13	0.13	0.09	0.20	0.68	0.06	0.18	0.13	0.12	0.13	0.23	0.00	0.05	0.05	0.10	0.18	Brampton-West
	Mississauga City Centre	Mississauga Central	Mississauga-S	Mississauga-W	Mississauga-N	Mississauga-NE	Brampton-NE	Brampton-NW	Brampton-SW	Brampton-SE	Caledon	Etobicoke-N	Etobicoke-S	Toronto-N	Toronto Central	Toronto-PD1	Toronto-E	York Region-SW	York Region-NW	Aurora-Newmarket	York Region-NE	York Region-SE	Durham Region	Milton-Oakville	Halton Hills	Brampton-East	Brampton-West	

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Figure 3.8: 2031 Modal Split Matrix

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Analysis of Network Needs

The starting point for this analysis was the City's 10-Year Capital Plan programmed improvements together with the Region's improvements for the same horizon.

The recommended road improvements resulting from the analysis of modeling exercises are incorporated into each horizon year: 2011, 2021, and 2031. The existing right-of-way provisions were taken into account in defining the "possible" road widenings. It is important to note that a maximum cross-section of six lanes has been used as the guideline in planning the network. Roads with cross-sections greater than six lanes become increasingly difficult for many pedestrian to cross; they do not support urbanized streetscapes or communities, and they foster heavy reliance on the private auto.

To address road needs, the following analysis steps were undertaken (details are provided in **Appendix E**):

1) Volume projections were taken from the EMME/2 model for all road improvements that were outlined in the City of Brampton 10-Year Capital Works Plan (2002-2012);
2) Truck percentages were added to the demands, based on an average (12%) percentage assumption. This percentage was based on the potential future trend in truck traffic across the City. As the city develops, lower intensity, lower revenue heavy industry with high trucking activity is expected to be replaced by lighter industry with lower trucking activity. The additional truck volume was added on top of the link volumes provided by the EMME/2 model for each road on the screenlines;
3) Transit buses were added to the demands, based on the assumption of 12 per hour on the major arterials and six per hour on minor arterials;
4) Next, the volume to capacity (v/c) ratios along the screenlines were calculated based on the link capacities used in the model (see **Appendix E** for details);
5) The v/c ratios were used to determine whether the widenings and new links outlined in the 10-Year Capital Works Plan would be sufficient;
6) Opportunities for further road network enhancement were investigated, taking into consideration right-of-way limits and issues of network connectivity;
7) The recommended transit components were incorporated into the v/c table to outline the capacity contribution.

3.2.3.2 Deficiency Analysis and Strategic Choices

In keeping with the principles of the Master Plan Environmental Assessment process, the first step in the analysis was to identify road and transit network deficiencies. The deficiency analysis was based on the analysis of existing conditions, the (adjusted and reviewed) results of the EMME/2 model and strategic planning relative to the City's and Region's Official Plans.

Screenlines

A screenline is an imaginary line strategically located to assess travel demand and capacity on a group of parallel transportation facilities where it is important to measure travel demand. For example, the Steeles Avenue screenline encompasses all the major roads crossing it. Screenlines are often located along natural or man-made barriers to travel, such as rivers or freeways, which allow crossing in only a limited number of locations. Demands may be measured in these locations because they offer the opportunity to measure demand using limited resources, or because they represent a location where provision of additional crossing capacity may be difficult or costly.

The screenline locations are shown in **Figure 3.9**. They reflect the locations used in the Cordon Count program, and include City boundaries and major highways. Road and transit deficiencies were identified and analyzed on a corridor basis across screenlines. This entails factoring the peak period (6:00 a.m. to 9:00 a.m.) road and transit demands/counts to represent peak hour values (a factor of 0.52 was used to convert peak period to peak hour) so that they could be compared with capacity estimates, which are expressed in vehicles or in persons (in the case of transit) per hour. Auto and transit demands and potential capacities across screenlines were analyzed together, taking into consideration the potential for shifts to transit.

Figure 3.10 outlines the v/c ratios with all planned improvements (the recommended road widenings were not incorporated). This figure shows the v/c ratios resulted from the model assignment. The figures outline that the service level across screenlines is worsening over the 30-year timeframe. The improvements within the 10-Year Capital work Plan along with the recommendations would just help the current service level to remain the same.

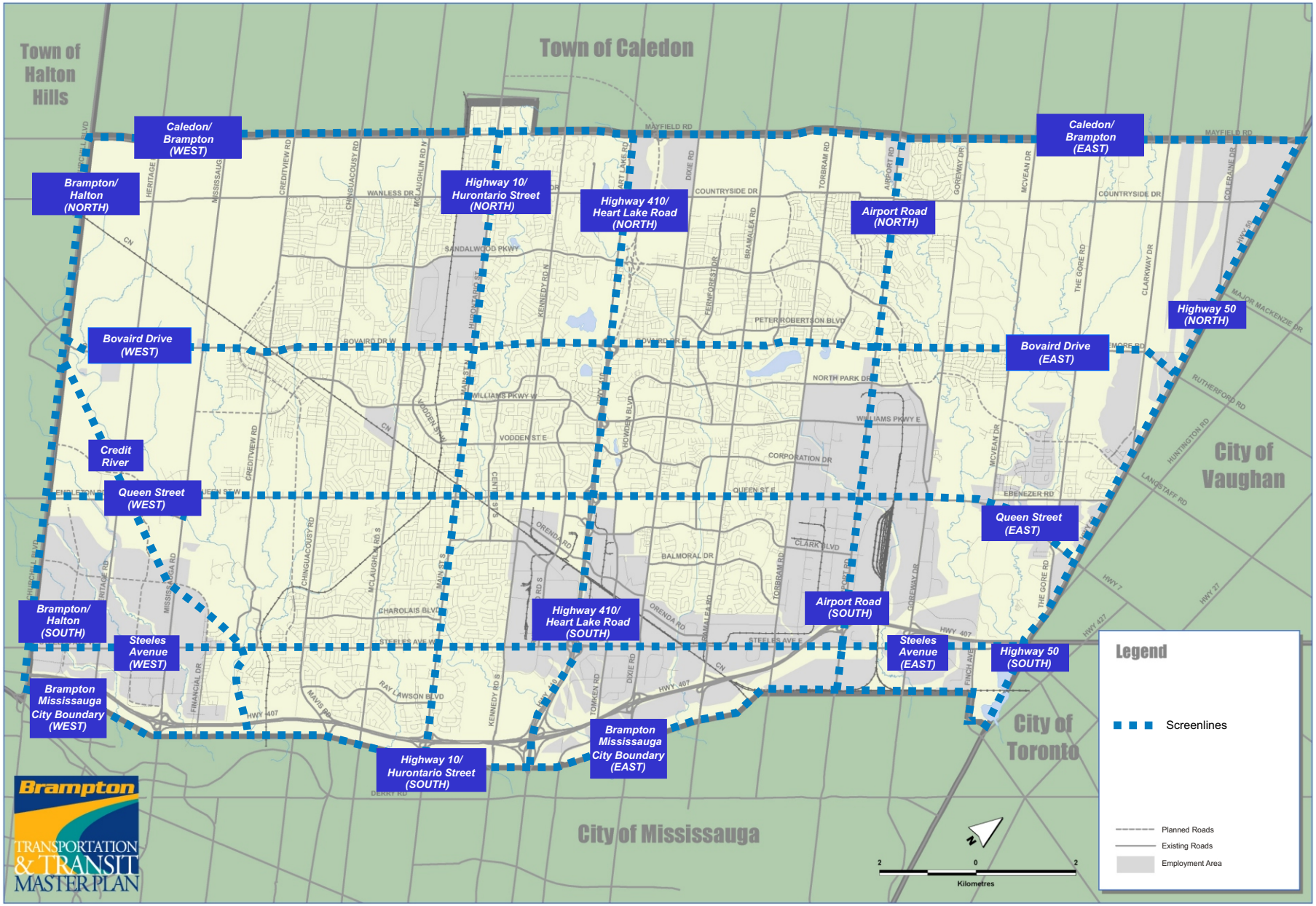

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Figure 3.9: Screenline Locations Across the City

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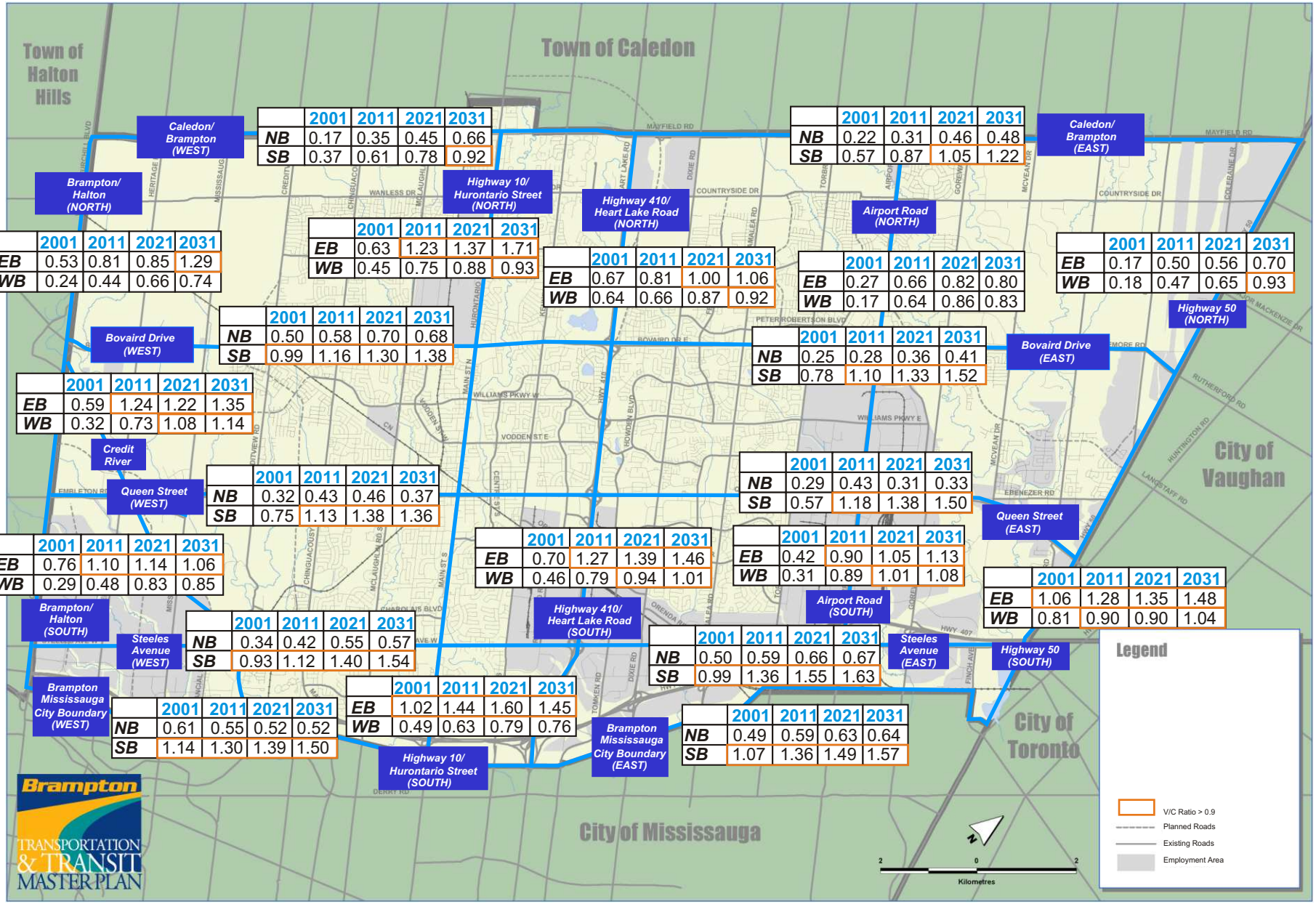

	2001	2011	2021	2031
NB	0.17	0.35	0.45	0.66
SB	0.37	0.61	0.78	0.92

	2001	2011	2021	2031
NB	0.22	0.31	0.46	0.48
SB	0.57	0.87	1.05	1.22

	2001	2011	2021	2031
EB	0.53	0.81	0.85	1.29
WB	0.24	0.44	0.66	0.74

	2001	2011	2021	2031
EB	0.63	1.23	1.37	1.71
WB	0.45	0.75	0.88	0.93

	2001	2011	2021	2031
EB	0.67	0.81	1.00	1.06
WB	0.64	0.66	0.87	0.92

	2001	2011	2021	2031
EB	0.27	0.66	0.82	0.80
WB	0.17	0.64	0.86	0.83

	2001	2011	2021	2031
EB	0.17	0.50	0.56	0.70
WB	0.18	0.47	0.65	0.93

	2001	2011	2021	2031
NB	0.50	0.58	0.70	0.68
SB	0.99	1.16	1.30	1.38

	2001	2011	2021	2031
NB	0.25	0.28	0.36	0.41
SB	0.78	1.10	1.33	1.52

	2001	2011	2021	2031
EB	0.59	1.24	1.22	1.35
WB	0.32	0.73	1.08	1.14

	2001	2011	2021	2031
NB	0.32	0.43	0.46	0.37
SB	0.75	1.13	1.38	1.36

	2001	2011	2021	2031
NB	0.29	0.43	0.31	0.33
SB	0.57	1.18	1.38	1.50

	2001	2011	2021	2031
EB	0.76	1.10	1.14	1.06
WB	0.29	0.48	0.83	0.85

	2001	2011	2021	2031
EB	0.70	1.27	1.39	1.46
WB	0.46	0.79	0.94	1.01

	2001	2011	2021	2031
EB	0.42	0.90	1.05	1.13
WB	0.31	0.89	1.01	1.08

	2001	2011	2021	2031
EB	1.06	1.28	1.35	1.48
WB	0.81	0.90	0.90	1.04

	2001	2011	2021	2031
NB	0.34	0.42	0.55	0.57
SB	0.93	1.12	1.40	1.54

	2001	2011	2021	2031
NB	0.50	0.59	0.66	0.67
SB	0.99	1.36	1.55	1.63

	2001	2011	2021	2031
NB	0.61	0.55	0.52	0.52
SB	1.14	1.30	1.39	1.50

	2001	2011	2021	2031
EB	1.02	1.44	1.60	1.45
WB	0.49	0.63	0.79	0.76

	2001	2011	2021	2031
NB	0.49	0.59	0.63	0.64
SB	1.07	1.36	1.49	1.57

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Figure 3.10: V/C Ratios with 10-Year Capital Plan Improvements Only

Note: includes both the City & Regional roads, based on A.M. peak hour model results

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Overall, southbound traffic volumes are significantly higher than the northbound volumes crossing all the east-west screenlines during the a.m. peak hour. Highway 410 volumes are high throughout the City; this serves as a major link to other areas of the GTA via highways 401, 403, and 407.

At the 2011 horizon, road capacity deficiencies are generally concentrated in the west and south end of the City. They are heavily related to travel to and from the adjacent municipalities of Mississauga and York Region; however, internal growth in the north end along Bovaird Drive has created the need to address the road network in that area.

Few major arterials are to be widened in the eastern part of the City; Torbram Road, Airport Road, and Goreway Drive. Due to the limits on right-of-way (ROW) widths, Main Street / Highway 10 and McLaughlin Road could not be widened to accommodate future demand. Widening Highway 410 to eight lanes, south of Bovaird Drive, would help off load the arterials throughout the City core.

Traffic across the Mayfield Road screenline to the north is relatively light at both edges of the City. This reflects the low level of development in this timeframe.

At horizon 2021, further widenings are expected to be needed in the same areas of the City. Additionally, road capacity deficiencies appear in the northwest and northeast quadrants of the City due to the new developments starting to be an important attraction zones.

At the east boundary of the City, Highway 50 – still carrying a significant amount of traffic – could not be widened beyond six lanes due to the ROW restrictions. The extension of Highway 427 further north is expected to help Highway 50 when it is in place between Highway 7 and Rutherford Road.

At horizon 2031, to accommodate the demand generated by the fully developed northwest and northeast quadrants of the City, road capacities had to be addressed. Road links at the northern boundary of the City, are planned to be widened in order to implement an appropriate grid network providing the necessary road capacities.

Further extension of Highway 427, beyond Rutherford Road is expected to be in place.

Corridors

In keeping with the transit focus of the TTMP, the analysis of the major transit corridors has been a major element. All relatively transit-intense corridors and potential transit corridors have been investigated.

Transit planning has been based on factors including both **needs** (across screenlines where adding sufficient road capacity would be difficult, for example) and **opportunities** (on corridors where there is already a transit orientation to trip-making, or where the land use mix and intensity suggests potential support for more transit service). Opportunities also relate to existing or potential connections. The major opportunities afforded by the adjacent transit systems or development include:

- The Mississauga City Centre terminal, to the south in the Hurontario Street corridor. The Terminal is the major hub for Mississauga transit routes;

- Highway 407 transit. GO Transit operates bus service on Highway 407. There is an opportunity to link into this service, and (building on the Transitway planning to date by the Province) to begin development of a network of transit terminals/commuter parking lots along Highway 407;

- The emerging York Region Transit proposal for Bus Rapid Transit on Highway 7, and the potential connection to the emerging York University hub at Keele Street and Steeles Avenue. Brampton Transit is already interlined with York services in this corridor;

- Torbram Road service. Brampton Transit already provides high frequency service in this corridor – this is an example of the successes to build on.

Also, the Georgetown GO Rail Service is identified as an opportunity to build upon – in terms of a focus for supporting services within Brampton. By implementing express bus services to the GO stations from residential areas, Brampton Transit can replace auto trips with transit trips. The two existing stations in Brampton will be joined by a third (Mount Pleasant, at the intersection of Bovaird Drive and Creditview Road) by 2005.

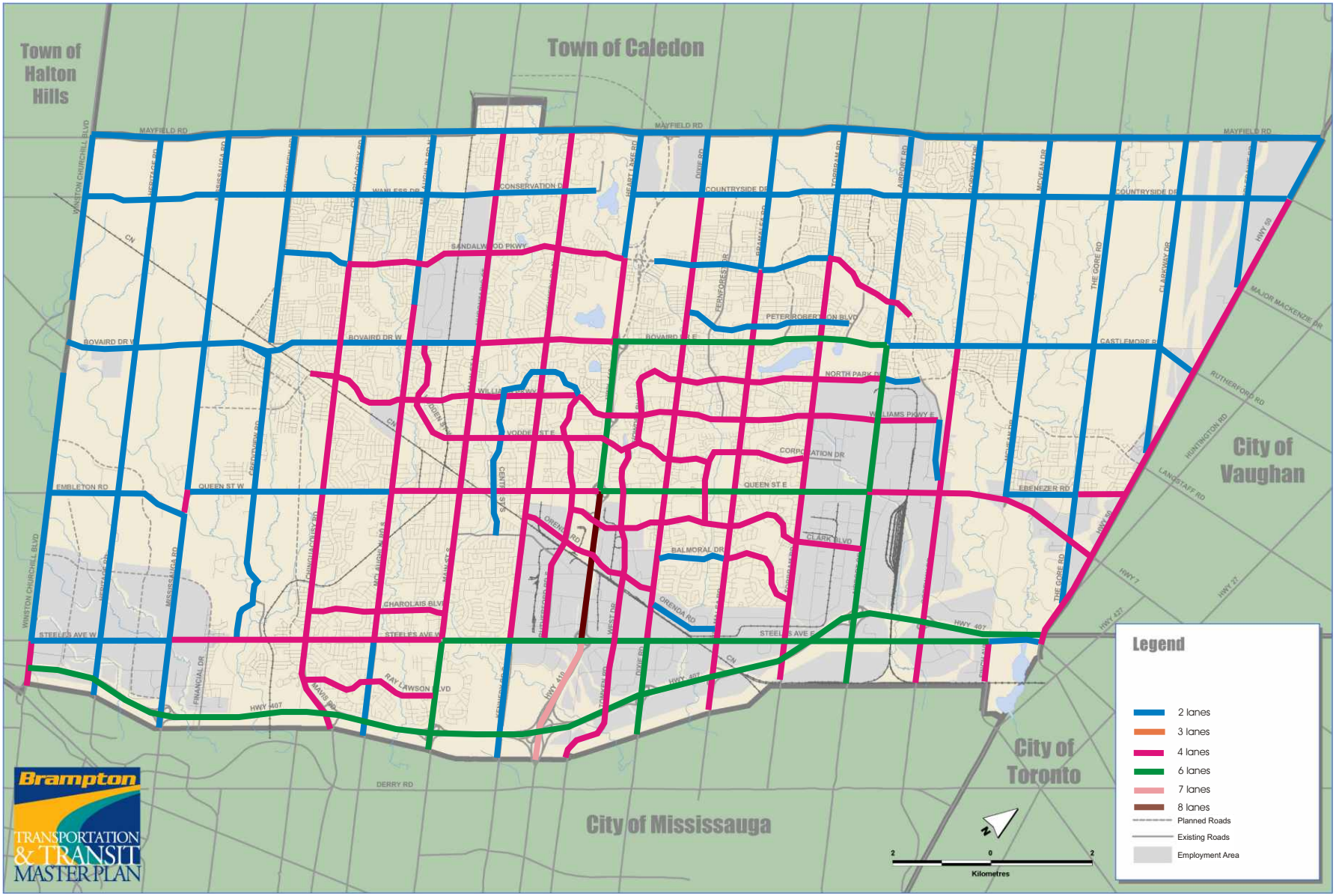
3.2.3.3 The Road Network Plan

The road network has been planned based on the strategic framework outlined above, and also taking into account the expected evolution of the network from the current state to the ultimate 2031 proposal. The interim horizons have been modeled in detail as well, as stages towards the ultimate needs in 2031. The horizons of 2011, 2021, and 2031 were used to reflect the industry standards, relating to timing of census and TTS data collection. The available data across the GTA were recently updated in 2001 (Transportation Tomorrow Survey and other relevant data). Since the on-going Development Charges By-Law Update study refers to the 2004-2013 timeframe, it is recommended that the modelling results be used as a guideline and adjusted for ±2 years.

The City's existing (2003) major road network is shown in **Figure 3.11**. The City's 10-Year Capital Works Plan improvements are shown in **Figure 3.12,** together with the Region's improvements for the same horizon. In addition to the improvements already planned by the City and the Region, additional road works are needed to cope with growth projected to the 2011 horizon:

- 407ETR widening to eight lanes;
- The Ministry of Transportation (MTO) - extension of Highway 410 beyond Bovaird Drive into the Town of Caledon and the widening of Highway 410 to eight lanes between Bovaird Drive and the southern City boundary; and
- The TTMP recommendations in terms of City and Regional widenings and new links.

The extension of Highway 427 does not have a definitive associated timeline; the TTMP proposes timeframes for implementation.



** The transportation demand model was validated based on the 2001 network.*

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Figure 3.11: Brampton Major Road Network - 2003

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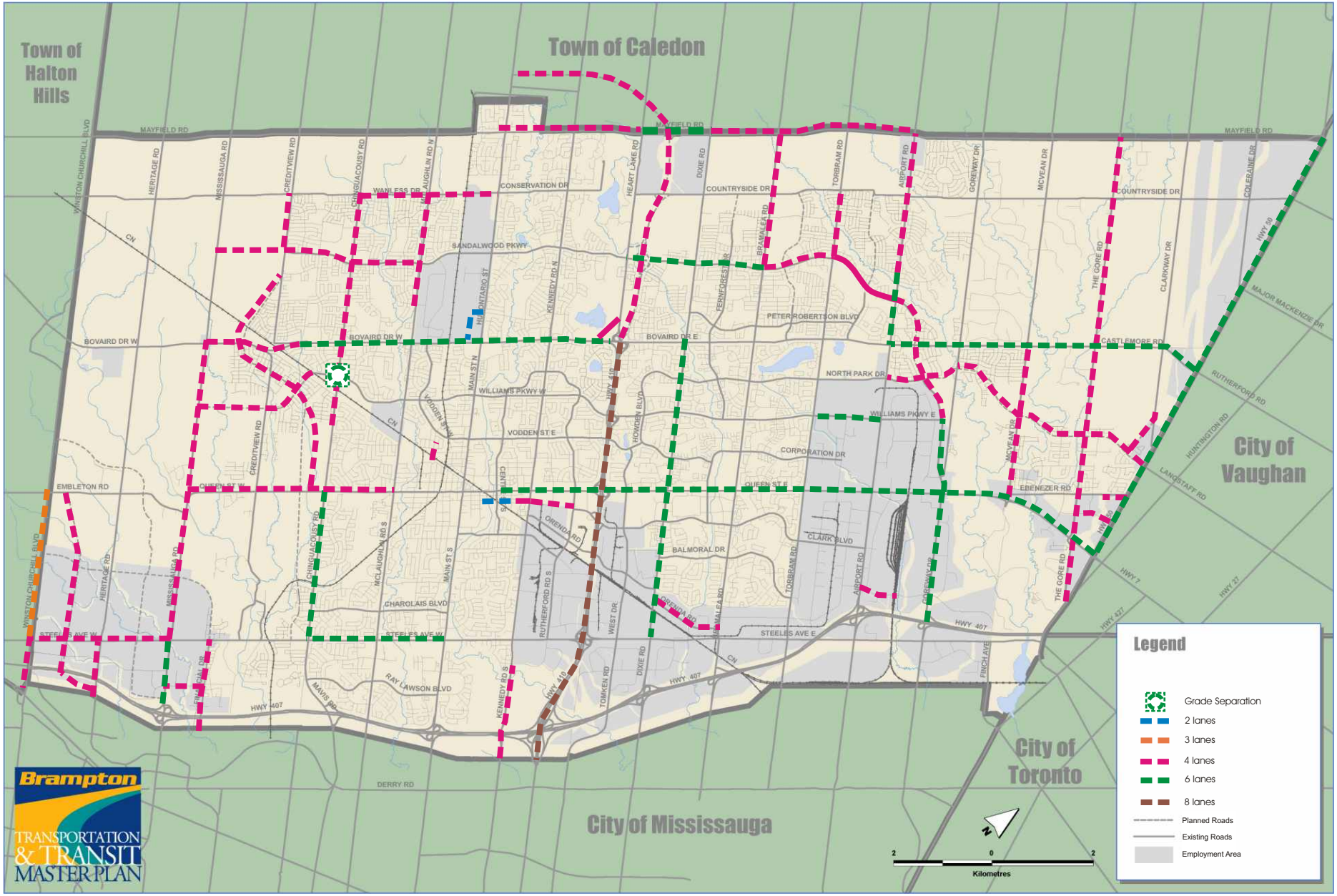

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Future road widenings are subject to Environmental Assessment.

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Figure 3.12: 10-Year Capital Works Program

As noted above, the detailed screenline analysis for each future horizon is shown in Appendix E. The tables in that appendix document the screenline and link v/c ratios, reflecting the effects of the proposed improvements. It should be noted that the values shown in Appendix E demonstrate that the roads improvement program cannot address all projected deficiencies; the Level of Service across the City is projected to remain at its current level or decline over time, due to a combination of the limits on road improvements (re: existing right-of-way widths and limited opportunities for new roads in the established areas of the City) and growth in and around the City. That will provide an incentive for greater use of the transit system, and is therefore an appropriate end-point for the program of improvements. The screenline v/c ratios including all road improvements are shown in **Figure 3.13**. **Figure 3.14** illustrates the effect of the additional transit priority improvements such as HOV/RBL links. These result in some improvement relative to the "auto-only" improvements documented in Figure 3.13, but overall, the level of Service is still projected to decline over time.

It is important to note that all improvements are subject to further analysis and Environmental Assessments.

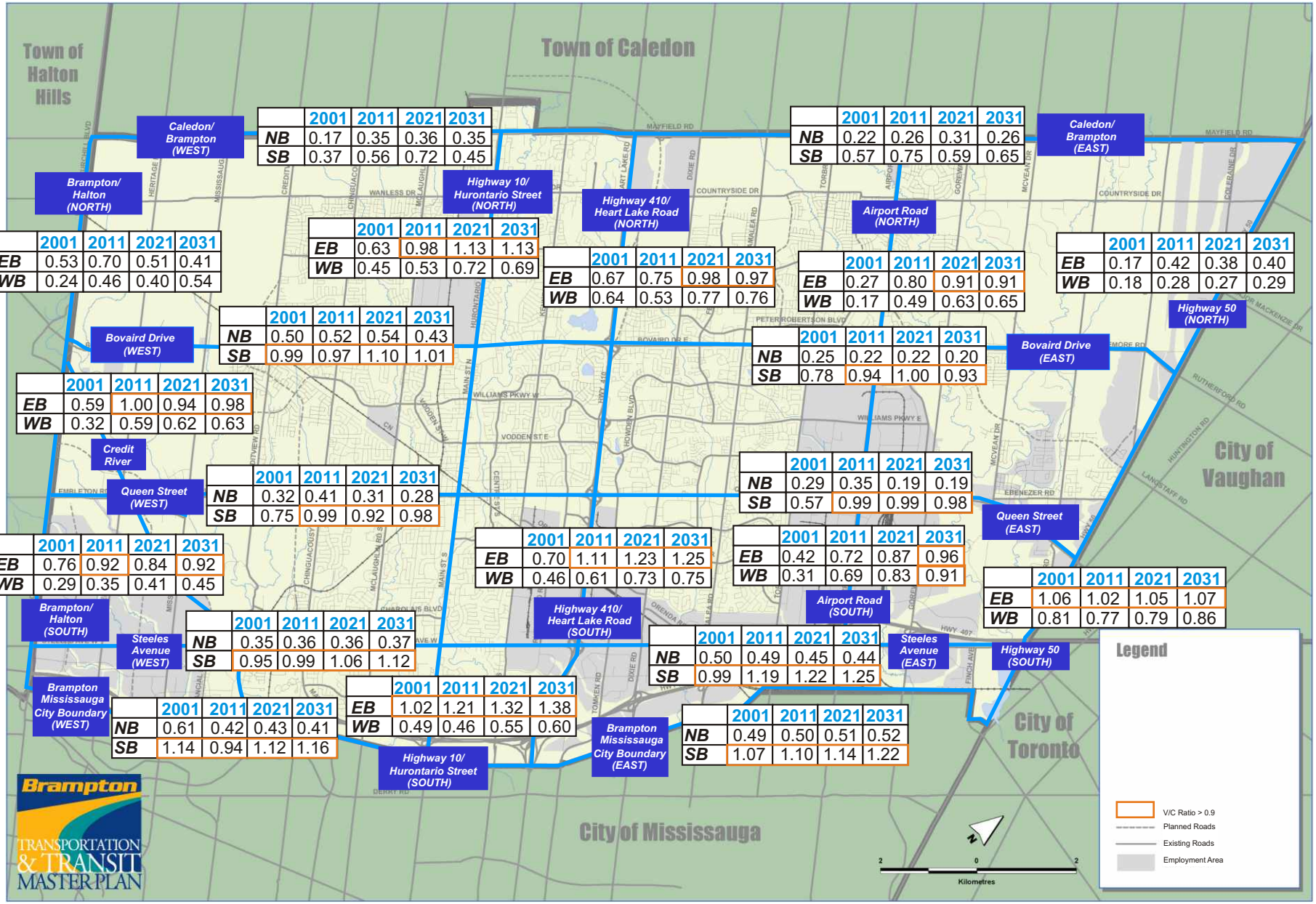
The proposed evolution of the road network is presented below, by horizon year.

Horizon 2011

Figure 3.15 shows the horizon 2011 recommended improvements, including those confirmed from the City and Region Capital Works Programs, and the additional improvements recommended through the TTMP (these latter changes are shown as dashed lines).

The additional road improvements are recommended for implementation on the basis of the detailed computerized travel demand modeling analyses were incorporated into the road network. The dashed lines show additional recommended improvements for the horizon years. Road improvements are generally concentrated in the west and south end of the City.

It is noted that Torbram Road, Goreway Drive, and Kennedy Road are not proposed to be widened in the City of Mississauga. Therefore, the City of Brampton may wish to taper the widenings of these links at an appropriate southern limit (Highway 407 or Steeles Avenue, as appropriate). These issues should be fully canvassed in consultation with the City of Mississauga and the Region of Peel through the subsequent EA process.



	2001	2011	2021	2031
NB	0.17	0.35	0.36	0.35
SB	0.37	0.56	0.72	0.45

	2001	2011	2021	2031
NB	0.22	0.26	0.31	0.26
SB	0.57	0.75	0.59	0.65

	2001	2011	2021	2031
EB	0.53	0.70	0.51	0.41
WB	0.24	0.46	0.40	0.54

	2001	2011	2021	2031
EB	0.63	0.98	1.13	1.13
WB	0.45	0.53	0.72	0.69

	2001	2011	2021	2031
EB	0.67	0.75	0.98	0.97
WB	0.64	0.53	0.77	0.76

	2001	2011	2021	2031
EB	0.27	0.80	0.91	0.91
WB	0.17	0.49	0.63	0.65

	2001	2011	2021	2031
EB	0.17	0.42	0.38	0.40
WB	0.18	0.28	0.27	0.29

	2001	2011	2021	2031
NB	0.50	0.52	0.54	0.43
SB	0.99	0.97	1.10	1.01

	2001	2011	2021	2031
NB	0.25	0.22	0.22	0.20
SB	0.78	0.94	1.00	0.93

	2001	2011	2021	2031
EB	0.59	1.00	0.94	0.98
WB	0.32	0.59	0.62	0.63

	2001	2011	2021	2031
NB	0.32	0.41	0.31	0.28
SB	0.75	0.99	0.92	0.98

	2001	2011	2021	2031
NB	0.29	0.35	0.19	0.19
SB	0.57	0.99	0.99	0.98

	2001	2011	2021	2031
EB	0.76	0.92	0.84	0.92
WB	0.29	0.35	0.41	0.45

	2001	2011	2021	2031
EB	0.70	1.11	1.23	1.25
WB	0.46	0.61	0.73	0.75

	2001	2011	2021	2031
EB	0.42	0.72	0.87	0.96
WB	0.31	0.69	0.83	0.91

	2001	2011	2021	2031
EB	1.06	1.02	1.05	1.07
WB	0.81	0.77	0.79	0.86

	2001	2011	2021	2031
NB	0.35	0.36	0.36	0.37
SB	0.95	0.99	1.06	1.12

	2001	2011	2021	2031
NB	0.50	0.49	0.45	0.44
SB	0.99	1.19	1.22	1.25

	2001	2011	2021	2031
NB	0.61	0.42	0.43	0.41
SB	1.14	0.94	1.12	1.16

	2001	2011	2021	2031
EB	1.02	1.21	1.32	1.38
WB	0.49	0.46	0.55	0.60

	2001	2011	2021	2031
NB	0.49	0.50	0.51	0.52
SB	1.07	1.10	1.14	1.22

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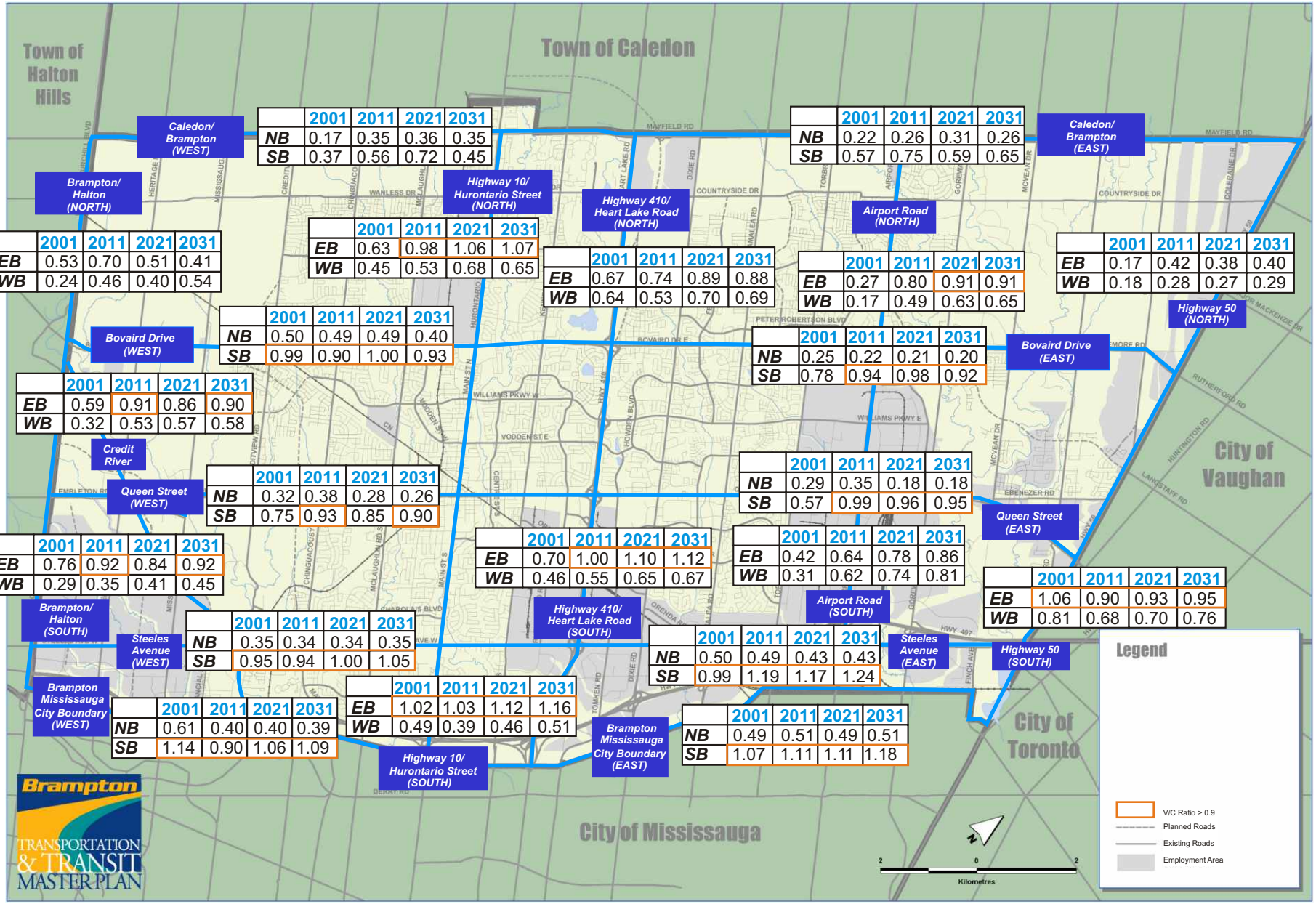
Figure 3.13: V/C Ratios with All Road Improvements
Note: includes both the City & Regional roads, based on A.M. peak hour model results

J:\2002jobs\16-02083.jwg\Reports\Final Report\Figures\Figure 3.13a - VC ratio incl road imp.cdr



	2001	2011	2021	2031
NB	0.17	0.35	0.36	0.35
SB	0.37	0.56	0.72	0.45

	2001	2011	2021	2031
NB	0.22	0.26	0.31	0.26
SB	0.57	0.75	0.59	0.65

	2001	2011	2021	2031
EB	0.53	0.70	0.51	0.41
WB	0.24	0.46	0.40	0.54

	2001	2011	2021	2031
EB	0.63	0.98	1.06	1.07
WB	0.45	0.53	0.68	0.65

	2001	2011	2021	2031
EB	0.67	0.74	0.89	0.88
WB	0.64	0.53	0.70	0.69

	2001	2011	2021	2031
EB	0.27	0.80	0.91	0.91
WB	0.17	0.49	0.63	0.65

	2001	2011	2021	2031
EB	0.17	0.42	0.38	0.40
WB	0.18	0.28	0.27	0.29

	2001	2011	2021	2031
NB	0.50	0.49	0.49	0.40
SB	0.99	0.90	1.00	0.93

	2001	2011	2021	2031
NB	0.25	0.22	0.21	0.20
SB	0.78	0.94	0.98	0.92

	2001	2011	2021	2031
EB	0.59	0.91	0.86	0.90
WB	0.32	0.53	0.57	0.58

	2001	2011	2021	2031
NB	0.32	0.38	0.28	0.26
SB	0.75	0.93	0.85	0.90

	2001	2011	2021	2031
NB	0.29	0.35	0.18	0.18
SB	0.57	0.99	0.96	0.95

	2001	2011	2021	2031
EB	0.76	0.92	0.84	0.92
WB	0.29	0.35	0.41	0.45

	2001	2011	2021	2031
EB	0.70	1.00	1.10	1.12
WB	0.46	0.55	0.65	0.67

	2001	2011	2021	2031
EB	0.42	0.64	0.78	0.86
WB	0.31	0.62	0.74	0.81

	2001	2011	2021	2031
EB	1.06	0.90	0.93	0.95
WB	0.81	0.68	0.70	0.76

	2001	2011	2021	2031
NB	0.35	0.34	0.34	0.35
SB	0.95	0.94	1.00	1.05

	2001	2011	2021	2031
NB	0.50	0.49	0.43	0.43
SB	0.99	1.19	1.17	1.24

	2001	2011	2021	2031
NB	0.61	0.40	0.40	0.39
SB	1.14	0.90	1.06	1.09

	2001	2011	2021	2031
EB	1.02	1.03	1.12	1.16
WB	0.49	0.39	0.46	0.51

	2001	2011	2021	2031
NB	0.49	0.51	0.49	0.51
SB	1.07	1.11	1.11	1.18

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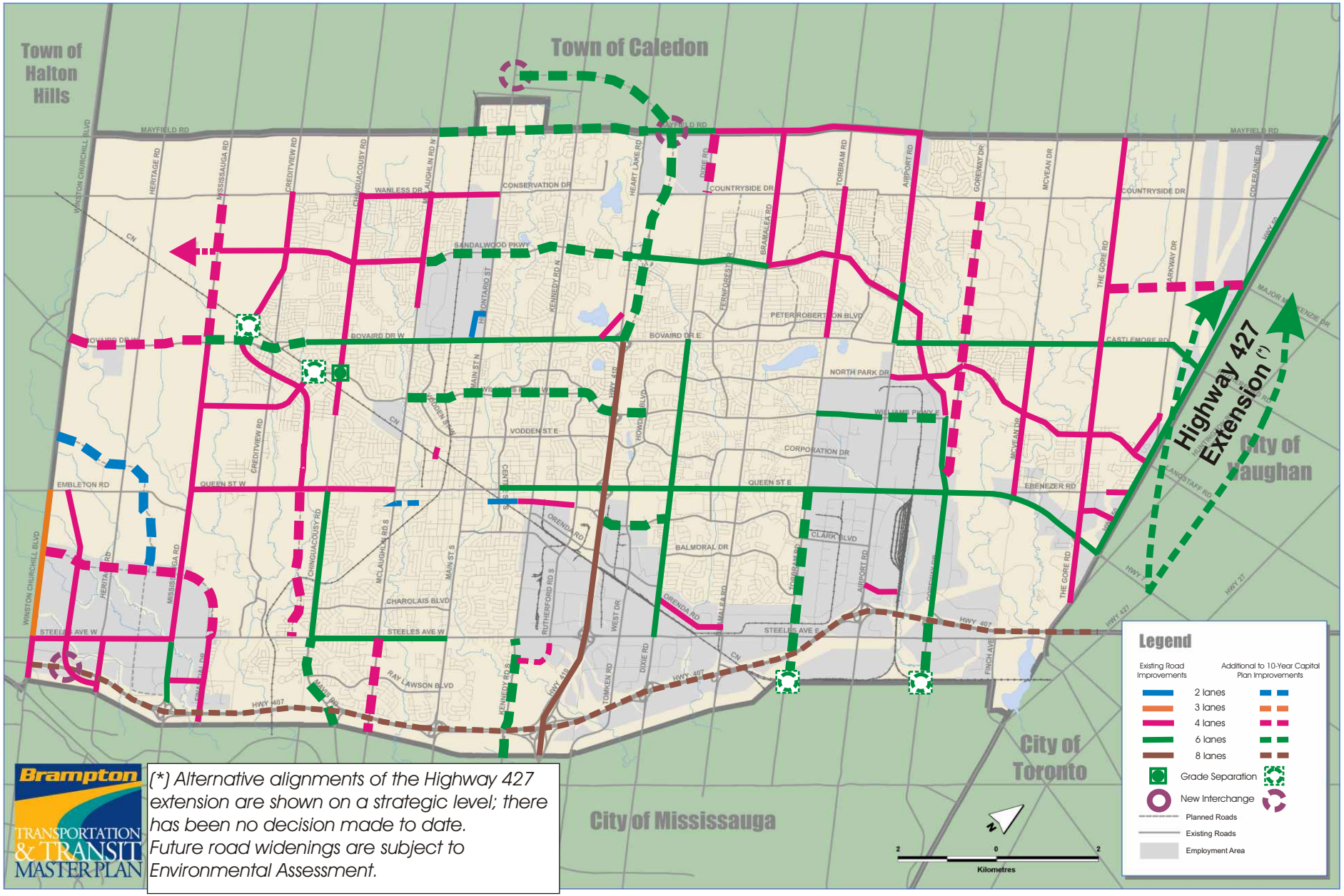
Figure 3.14: V/C Ratios with Road and Transit Improvements

Note: includes both the City & Regional roads, based on A.M. peak hour model results

J:\2002jobs\16-02083.jwg\Reports\Final Report\Figures\Figure 3.14 - VC ratio incl road HOV imp.cdr



(*) Alternative alignments of the Highway 427 extension are shown on a strategic level; there has been no decision made to date. Future road widenings are subject to Environmental Assessment.

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Figure 3.15: 2011 Road Network

As the City of Mississauga has already included in their Official Plan the extension of the eastbound off-ramp of Highway 407 to Edwards Boulevard, the City of Brampton could consider this improvement. The configuration is subject to a detailed study.

Horizon 2021

Figure 3.16 shows the horizon 2021 recommended improvements. The additional improvements recommended through the TTMP for the 2011-2021 period were incorporated into the network, and these additions are shown as dashed lines.

The travel demand modeling analyses provided link volumes based on the 2021 land use data. The additional road improvements are recommended for implementation based on assessing the v/c ratios and network connectivity. The right-of-way restrictions were taken into account throughout the City.

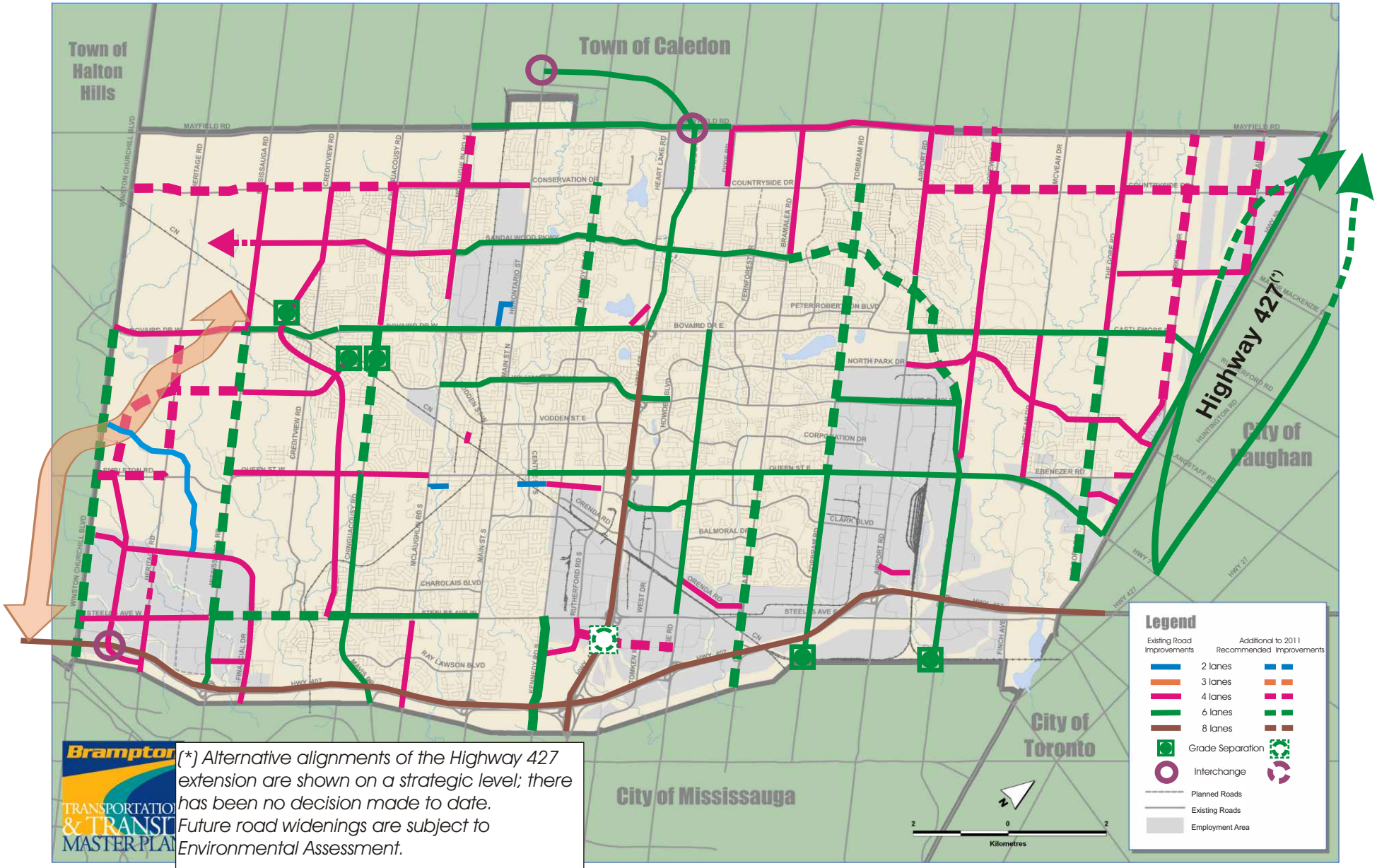
In the 2021 horizon, road network improvements are concentrated in the west and in the northeast quadrant of the City.

It is also noted that Bramalea Road is not proposed to be widened in the City of Mississauga. The widening of this link could be tapered accordingly at an appropriate southern limit (Highway 407 or Steeles Avenue) in consultation with Mississauga and Peel Region through the subsequent EA process.

Ultimate Horizon 2031

In addition to defining needs based on the v/c ratio analysis, the future strategic developments were analyzed and additional road improvement recommendations were provided for 2031. One of the important measures is to complete the grid network in order to disperse the traffic in the vicinity of new development areas. **Figure 3.17** shows the horizon 2031 recommended improvements.

The dashed lines show additional improvements recommended for implementation between 2021 and 2031. The improvements are focused in the northwest and northeast quadrants of the City, reflecting build-out of edge area greenfields.



(*) Alternative alignments of the Highway 427 extension are shown on a strategic level; there has been no decision made to date. Future road widenings are subject to Environmental Assessment.

** N/S Peel-Halton Transportation Corridor is shown conceptually

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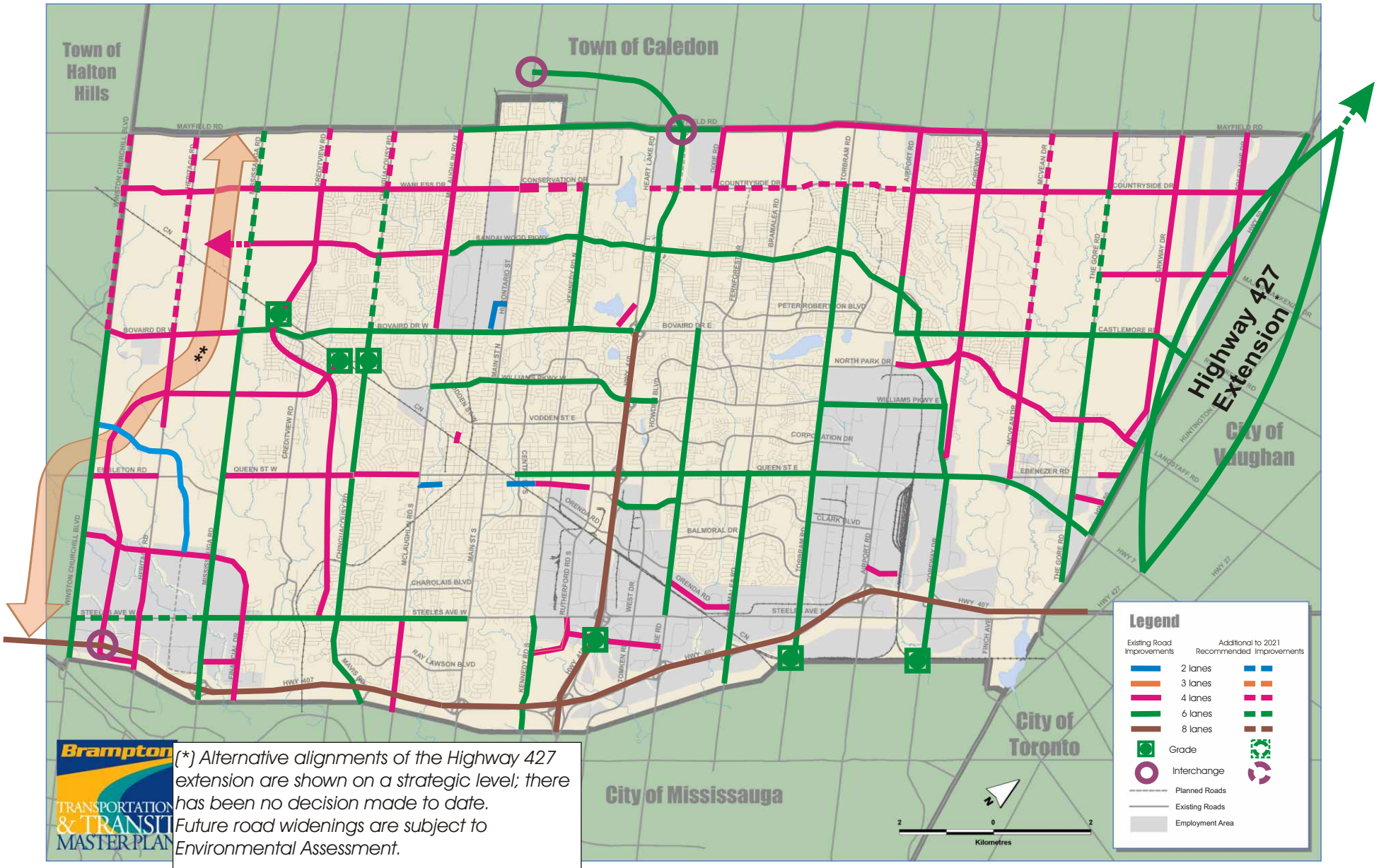
Figure 3.16: 2021 Road Network

16-02083.jwg\Reports\Final Report\Figures\Figure 3.16 - 2021 Road Network.cdr



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(*) Alternative alignments of the Highway 427 extension are shown on a strategic level; there has been no decision made to date. Future road widenings are subject to Environmental Assessment.

*** N/S Peel-Halton Transportation Corridor is shown conceptually*

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Figure 3.17: 2031 Road Network

16-02083.jwg\Reports\Final Report\Figures\Figure 3.17 - 2031 Road Network.cdr

3.2.4 Specific Issues of Concern

This section provides conclusions and recommendations related to key road network issues.

3.2.4.1 Clark / Eastern / Wellington Connection

The project involves the provision of the missing connection of Clark Boulevard between Rutherford and Hansen Roads along with the crossing of Eastern Avenue over Etobicoke Creek via Centre Street.

The EMME/2 model provided link volume data for these segments. The decision has been based first on interpretation of the Queen Street demands and capacity.

Queen Street is already overloaded during in the a.m. peak hour. Current volume to capacity (v/c) ratios are 0.92 just east of Highway 10 and 1.11 east of Highway 410. These figures indicate that the road link operates at capacity and remedial measures are needed. A six lane cross-section is planned east of Highway 410 to Centre Street in the 10-Year Capital Plan. Even with this improvement, the model results for future horizons show the v/c ratios will worsen over the years. The v/c values are expected to be over 1.50 for the 2011, 2021, and 2031 horizons.

The proposal for Bus Rapid Transit on Queen Street must also be considered. The Clark Boulevard / Eastern Avenue / Wellington Street is proposed as an alternative corridor for local traffic, parallel to Queen Street, and accommodation of development intensification.

The recommended timeline for these connections based on the TTMP analysis is within the 10-year horizon. However, the costs and benefits of this connection must be carefully considered, since the property and construction costs for the Clark / Eastern connection are expected to be very high. In fact, the City is completing a detailed benefit/cost assessment of the various segments of this overall Clark / Eastern corridor. The ongoing Central Area Review should also contribute significantly to the recommendation for this connection, taking into consideration traffic and transit effects at a finer geographic level.

If this connection cannot be constructed cost effectively, alternatives including an improved connection across Harold and Clarence Streets should be pursued, to create a parallel route to Queen Street.

3.2.4.2 Highway 410 Extension

Initially, the modelling exercise included the Highway 410 extension from Bovaird Drive / Heart Lake Road to Highway 10 in the Town of Caledon. Based on the 10-Year Capital Improvements Program of the City, this extension was considered as an MTO project and would be in place by 2003 as a four-lane road.

The model results showed that the extension is definitely needed. By 2011, the combined a.m. peak hour demand on the Heart Lake Road / Highway 410 corridor north of Bovaird Drive would reach 6,800 vehicles southbound and 2,500 northbound. This demand converts to an equivalent of 9 arterial road lanes, assuming an average capacity of 800 vehicles per lanes per hour. The peak demand will increase to 7,500 by 2021. The recommendation is to build the Highway 410 extension as a six-lane facility by 2011.

A possible delay of the Highway 410 extension would result in additional pressure on Heart Lake Road and numerous parallel roads. Current demand already exceeds capacity on this segment of Heart Lake Road, resulting a volume to capacity (v/c) ratio of over 1.0 on both southbound and northbound. Inter-municipal and inter-regional through traffic is obviously the major driver of this need. The existing parallel arterials would not be able to accommodate the demand on Heart Lake Road in the absence of the Highway 410 extension; demand on Kennedy Road is projected to almost reach capacity in the peak direction and Dixie Road's capacity will be constrained, as it is being considered as the one of the primary Reserved Bus Lane (RBL) corridors.

3.2.4.3 Highway 427 Extension

Highway 427 was not included in the model, due to the uncertainty regarding timing and location. The screenline analysis shows that the demand on Highway 50 is over capacity; the v/c ratio is already 1.50. The Highway 427 extension is expected to provide capacity needed to relieve the burden on Highway 50.

The model shows that the absence of the Highway 427 extension will result in overloading first Highway 50, then The Gore Road and Clarkway Drive as development proceeds. Even the planned six-lane cross-section of Highway 50 will not be able to

accommodate the demand. On Highway 50, north of Queen Street, the v/c ratios are expected to be 1.79 by 2011 and 1.96 by 2021 (with future six-lane configuration).

In the light of the screenline analysis results, the Highway 427 extension to Rutherford Road needs to be implemented as soon as possible (i.e. definitely by 2011). The extension to Major Mackenzie Drive is needed by 2021.

3.2.4.4 New Peel / Halton North-South Freeway

Projected demands in the Brampton/Halton Hills boundary area by 2021 suggest the need for a high-order north/south transportation facility between Highway 407 and Bovaird Drive, crossing Winston Churchill Boulevard and Heritage Road. The section north of Bovaird Drive, to Mayfield Road, is expected to be needed by 2031. While the province's "Strategic Directions" plan corroborates the need for a freeway in this location, there is currently no certainty as to when/whether this project will materialize. Based on the v/c ratios generated by the screenline analysis, it is recommended that priority be given to protecting for all possible improvements on the neighbouring major arterials, namely the widening of Winston Churchill Boulevard and Mississauga Road, and the construction of Bram West Parkway and Financial Drive. A new north/south high-order facility to Mayfield Road, however, will be required to accommodate the ultimate projected development of Northwest Brampton. The location of such a facility is subject to further study. Furthermore, broader planning/development decisions will also play a role in defining long-term highway needs.

3.2.4.5 Potential New East/West Highway North of Brampton

The planned improvements on Mayfield Road and Countryside Drive, and the additional recommended improvements for 2021 and 2031 provide enough east-west capacity for the corridor at the northern edge of the city. The east/west highway facility is not projected to be needed by 2031, based on the study results, from a limited Brampton capacity perspective. However, it is up to the Province to examine Provincial interregional and trade route transportation corridor needs, which may result in a different conclusion.

3.2.4.6 Trinity Common

Trinity Common serves as a commercial and transit hub at the Heart Lake Road/ Bovaird Drive intersection. Its significant transit role will continue. The increased capacity of the Highway 410 extension and the Sandalwood Parkway extension would

provide a better distribution of traffic around Trinity Common and along Bovaird Drive. In the short term, the congestion surrounding Trinity Common would be reduced due to these initiatives.

In the longer term, the potential BRT services on Bovaird Drive would help promote transit as a more feasible means of transportation to reach Trinity Common. The facility would become a grid terminal. Transit priority is expected to be needed to facilitate transit access into and out of the site.

It is also important to note that an adjustment to future land-use in the north end of the City would assist in managing congestion at Trinity Common in the long term. New development areas need more dispersed commercial uses, to lessen the dependence on this one centre. This highlights the disbenefits of development of large exclusively residential zones. Long distances to commercial zones discourage walking and cycling trips.

3.2.4.7 Norval By-pass

In the western boundary of the City, the intersection between Highway 7 and Adamson Street causes a capacity problem due to the physical constraints. In order to provide better level of service it is important to rehabilitate this intersection by providing a by-pass.

Since the TTMP was focused within the City boundaries, the Norval by-pass was not examined in detail. As noted above, the inclusion of the new Peel / Halton north-south freeway as a by-pass would provide easier access to new development area in the northwest portion of the City. It would provide the needed Credit River crossing and would act in some ways as a by-pass of Norval.

In order to set the priority between the Norval by-pass and north-south freeway, an Environmental Assessment (EA) would be needed focusing specifically on this corridor and alternatives. It is assumed that the Province would be the proponent of that study.

3.2.5 Road / Rail Grade Separations

The recommended grade separations are located on both rail corridors. They are shown in the future road network figures displaying the road network staging (Figure 3.14, 3.15, 3.16). The recommended grade separations and associated timeframes are:

- Chinguacousy Road at CN Rail corridor 2003/2004
- Torbram Road at CN Rail corridor 2005
- Goreway Drive at CN Rail corridor 2011
- Williams Parkway at CN Rail corridor 2010
- New Creditview Road at CN Rail corridor 2008
- Highway 410 at Westcreek Boulevard/Biscayne Crescent 2021
- Bram West Parkway at Highway 407 2013
- Heritage Road at CN Rail corridor 2031

The volumes on railway corridors are expected to continue to grow. Given the recommendations for road needs on the road links where there are railway crossings, it is important for the City to take protective measures for the locations of grade separations.

Although there is a safety aspect to the requirement for rail grade separations, related to the combination of rail traffic and road traffic volumes, it should be clearly understood that these grade separations are all required from a strict peak hour road capacity perspective. A major arterial road cannot provide the planned peak hour traffic capacity if several trains per hour will block the traffic and create long queues for many minutes at a time.

3.2.6 Hierarchy and Design of the Road System

The existing right-of-way provisions were taken into account in defining the road widenings. It is important to note that in planning the road network, a maximum cross-section of six lanes has been assumed. Cross-sections beyond six lanes are not conducive to pedestrian crossings or good urban design, they tend to divide communities adjacent to the roadway, and they are not transit-supportive in an environment such as Brampton's. This is an important principle to adopt within the TTMP. Six-

lane mid-block cross-sections tend to expand to 8-lane or larger cross-sections at intersections. To avoid these problematic designs, principles are outlined below in Section 4.2.4.2, for road spacing.

Table 3.2 summarizes the road classifications described in Brampton's Official Plan.

Table 3.2: Road Classifications

Road Classification	Description
Provincial Freeways / Tollways	Accommodate high volumes of long distance and inter-regional traffic travelling at high speeds together with the transit service through HOV lane
Provincial Highways	Accommodate medium to high volumes of long distance and inter-regional traffic travelling at medium to high speeds together with the transit service through HOV lane
Major Arterials	Accommodate medium to high volumes of medium distance and intra-regional traffic at medium speeds together with the transit service through HOV lane
Minor Arterials	Continuous roads to inter-connect major arterials to help them accommodate moderate volumes of medium distance and intra-municipal traffic at medium speeds together with the transit service through HOV lane
Collectors	Accommodate moderate volumes of short to medium distance traffic travelling at moderate speeds between residential, business, and employment areas
Local	Accommodate low to moderate volumes of traffic travelling at low speeds

Based on the road recommendations the classification of some road links should be changed over the 30-year timeframe. Potential road links where this change would occur are:

- Sandalwood Parkway between Castlemore Road and McLaughlin Road (from minor arterial to major arterial);
- Goreway Drive between Queen Street and Castlemore Road (from collector to minor arterial).

3.3 The Transit System

The key to transit's success in managing the growth of Brampton through 2021 and beyond will be providing fast, reliable service directly to key destinations.

The objective in the development of the long-term plans for Brampton Transit is to provide a real and attractive alternative to the auto for trips within Brampton and linking to external destinations. There are three key elements in achieving this objective:

- Create strategic links to adjacent municipalities (and working effectively to share costs of these services);
- Establish grid-based services in Brampton corridors to provide direct and effective access within the City; and
- Enhance these grid services by local feeder routes to ensure good local access. Network growth into new development areas in the north and west areas of the city will continue based on these principles.

Continued growth of the Brampton Transit network and the level of transit mode share in Brampton will also depend on integration with the GO Rail and Bus services as they expand. Enhancement of the service on the Georgetown and Milton GO Rail corridors is essential. Introduction of GO Rail service on the Bolton corridor would also assist in balancing mode share in Brampton.

It should also be noted that the programs of road and transit improvements are inter-dependent. On the arterials defined below for high frequency service and requiring high occupancy vehicle or reserved bus lanes, road improvements have been proposed to accommodate these needs. Those inter-related changes are reflected in the costing as well. Thus the transit plan is entirely

dependent on the roads plan - explicitly on the high frequency arterials, and implicitly on the supporting routes, where sufficient road capacity and appropriate design are needed to ensure reliable transit service.

3.3.1 The Current Transit System

Figure 3.18 shows the levels of service currently being provided by Brampton Transit on selected links in the existing road network. This figure (as well as the other transit related 2011 and 2021 figures) shows the planned levels of service measured by transit service frequency on the key parts of the road network where transit operates. **These figures are NOT intended to specify separate transit routes and services as shown on a typical transit service map.**

3.3.2 Options for the Transit System

Two options have been considered for the Brampton Transit system. These are shown in the following figures.

The first option, *Option 1: Comprehensive Corridor Services* (shown in **Figure 3.19**) is a fixed route based network comprising a hierarchy of transit service levels. The BRT, primary and secondary corridors (less than 15 minutes service) are supplemented by the community services at headways of less then 30 minutes.

The advantage of this option is superior coverage with fixed routes and higher frequencies. As growth occurs, these services would be extended into these areas. However, the disadvantages are that outside the fully developed corridor areas there would be an oversupply of services. This “oversupply” translates into higher vehicle requirements, higher capital and operational costs. As well, because of the grid nature of routes, an increased level of transfers for customers would be experienced.

The second option, *Option 2 – Major Corridor Grid* (shown in **Figure 3.20**) also comprises the BRT, primary and secondary corridor hierarchy as described in *Option 1.* However, the primary and secondary corridors are less dense and are shorter to allow the community level services to operate on either a fixed or flexible basis. In this way, some corridor services could branch out at the end of a corridor to service an adjacent neighbourhood.

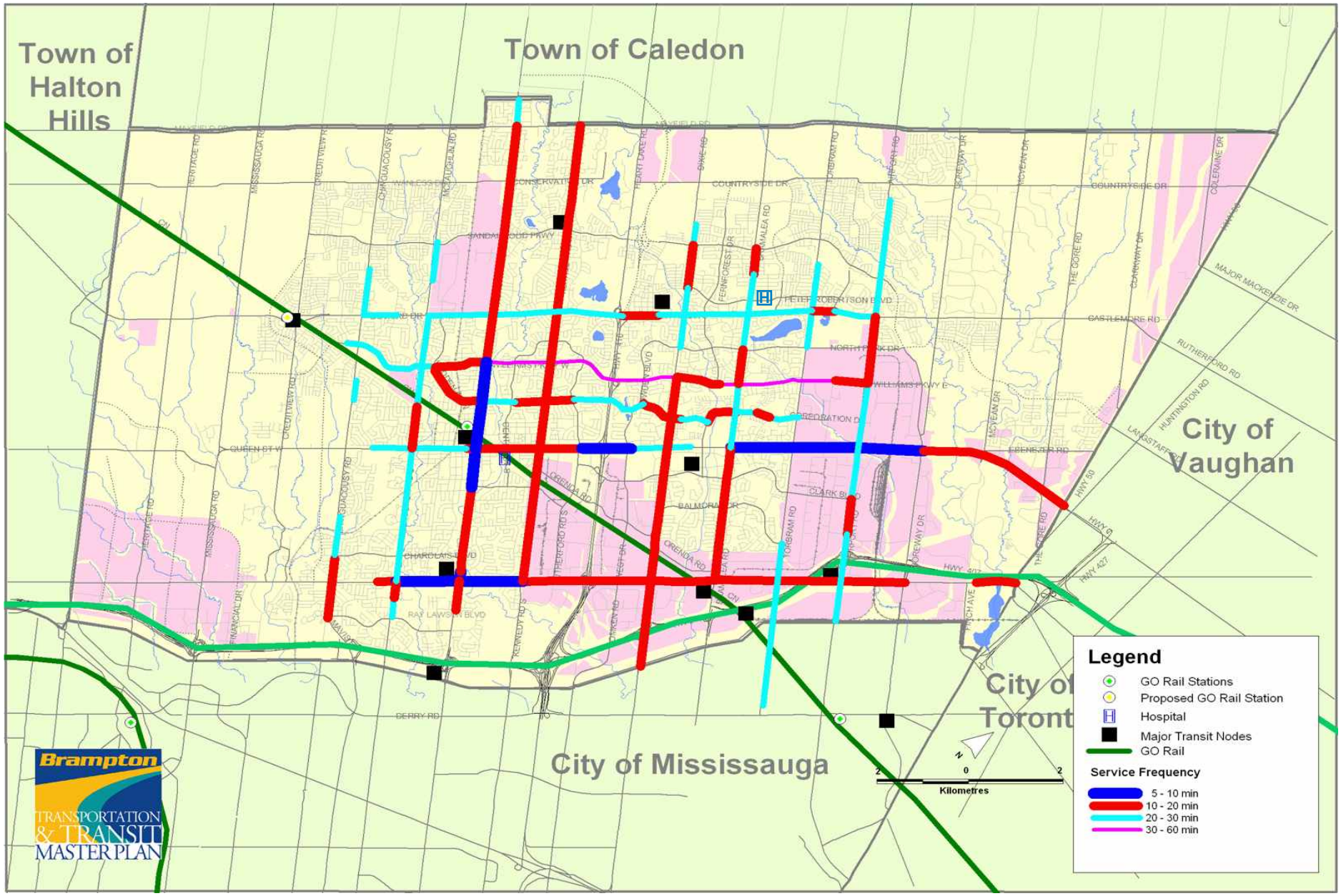

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Figure 3.18: Existing Levels of Transit Service

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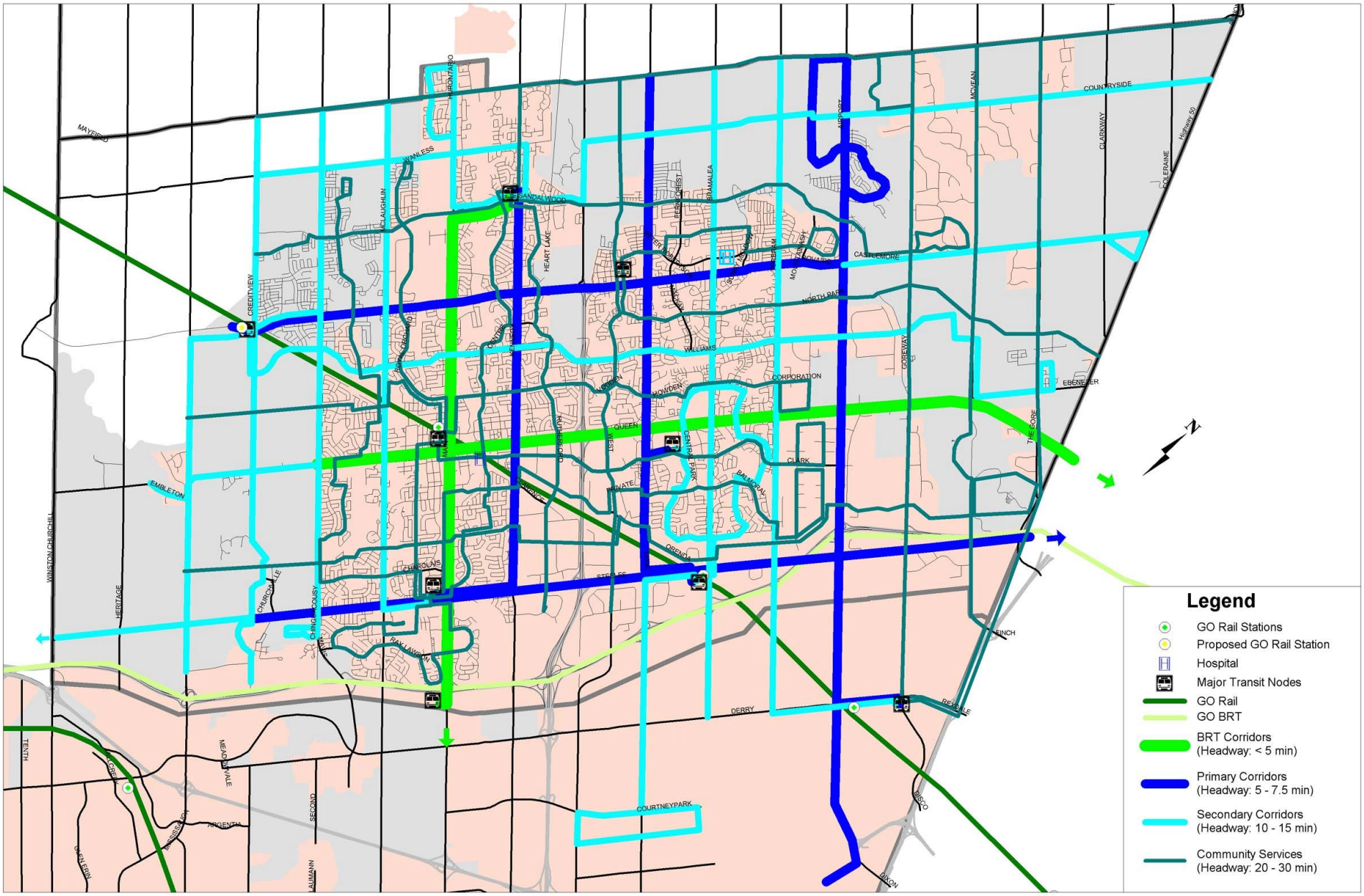

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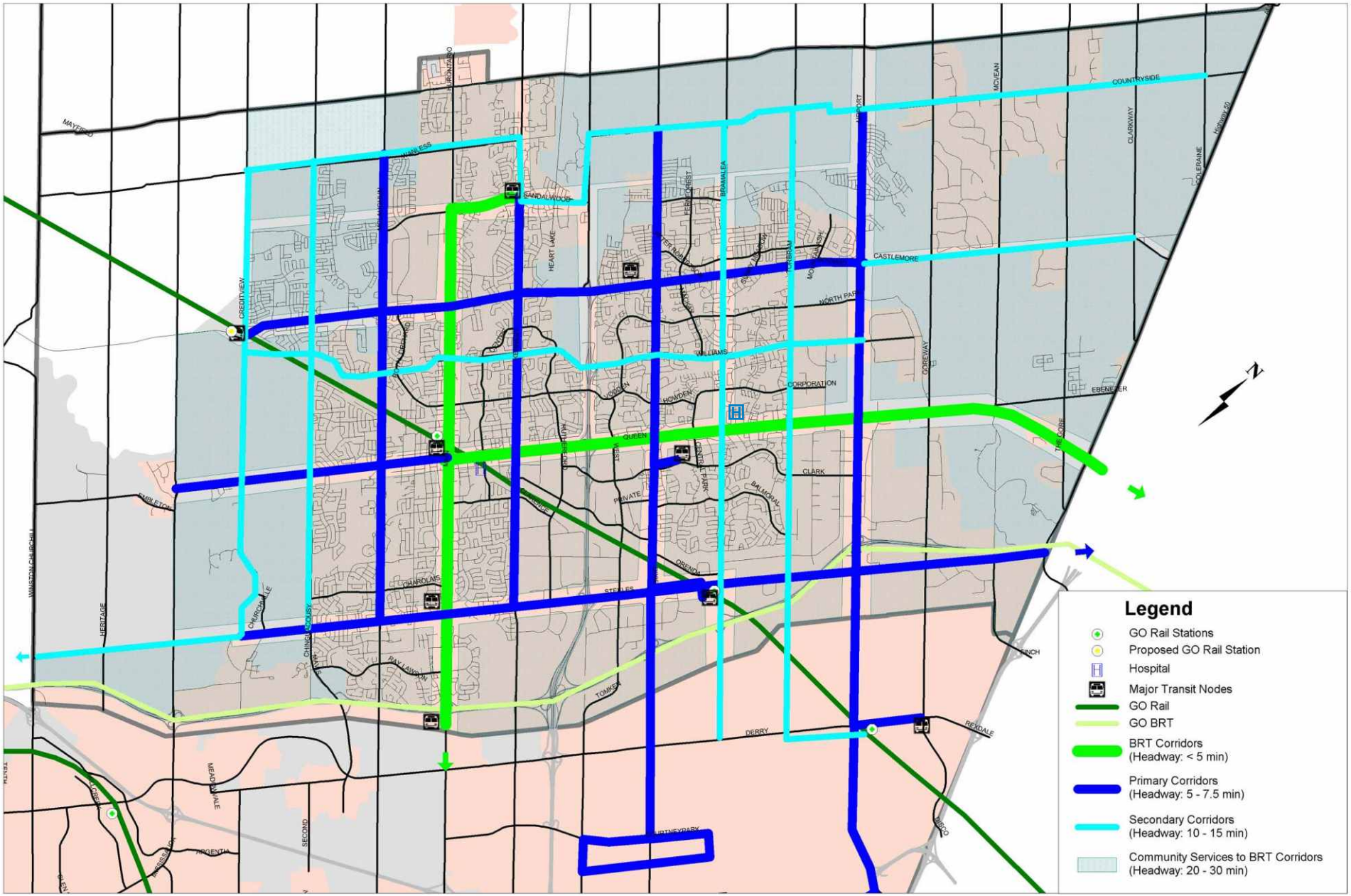
Figure 3.19: Transit Option 1 (2021) Comprehensive Corridor Services

16-02083.jwg\Reports\Final Report\Figures\Figure 3.19 - Transit Option 1 (2021).cdr



Brampton TRANSPORTATION & TRANSIT MASTER PLAN

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Figure 3.20: Transit Option 2 (2021) Major Corridor Grid

The advantages of this option are that the service and service levels are better tailored to the demand generated and the flexible services could be introduced to the community much earlier in the development. This option also has lower vehicle requirements and thus capital and operating costs as compared to *Option 1*. The disadvantage of this option is the added complexity of the community routing.

3.3.3 Transit Strategy and System Concept

The transit strategy developed in detail for the balanced transportation system was based on *Option 2*.

3.3.3.1 Transit Strategy

The transit strategy can be summarized in terms of these principles and actions:

- Provide attractive service to riders: get them where they need to go in as direct a means as possible. This means using a combination of "corridor" services and more community-oriented services where appropriate;
- Continue to focus on providing direct service from residential areas to the GO terminals, meeting GO train and bus times;
- Use a mix of express and local services as appropriate;
- Focus on cooperation with adjacent service providers, to enhance service to the customer and maximize efficiencies;
- Stage transit priority measures as needed, to give transit a travel time advantage over the auto. These will include queue jump lanes and signal system priority;
- Implement and support Bus Rapid Transit on key corridors, as a means of focusing transit orientation and transit investment. Consider alternative delivery mechanisms in the creation of and implementation of the rapid transit network;
- Implement High Occupancy Vehicle and/or Reserved Bus Lanes as required, to provide the transit service needed to attract "choice" riders;
- Strive to continually increase the accessibility of the Brampton Transit system, to provide accessible service in stations and on vehicles (thus reducing the increasingly escalating demands on the Transhelp service);
- Continue to rely on Peel Transhelp for the very specialized transit services; and
- Continue to implement transit service early into new development areas, so as to build a transit orientation from the start in commuting and discretionary trips.

Transit Service Delivery Vehicles

The recommended vehicle types for the hierarchy of services are as follows:

- BRT Corridors: Specialized BRT vehicles
  - Specialized vehicles with more comfortable amenities and advanced technology than currently provided
  - Low-floor accessibility

- Primary and Secondary Corridors: High capacity vehicles
  - Articulated and standard 40-foot buses with increased passenger
  - Low-floor accessibility
  - Tailored to service and customer needs

- Circulation Routes: Smaller, accessible vehicles
  - 30 and 40-foot buses
  - 20-foot community buses
  - Tailored to service demands

Peel TransHelp: Door-to-door accessibility

3.3.3.2 Transit System Concept

The transit system concept is illustrated in **Figure 3.21**, for horizon 2011. The growth and intensification of the transit system to 2021 is illustrated in **Figure 3.22**.

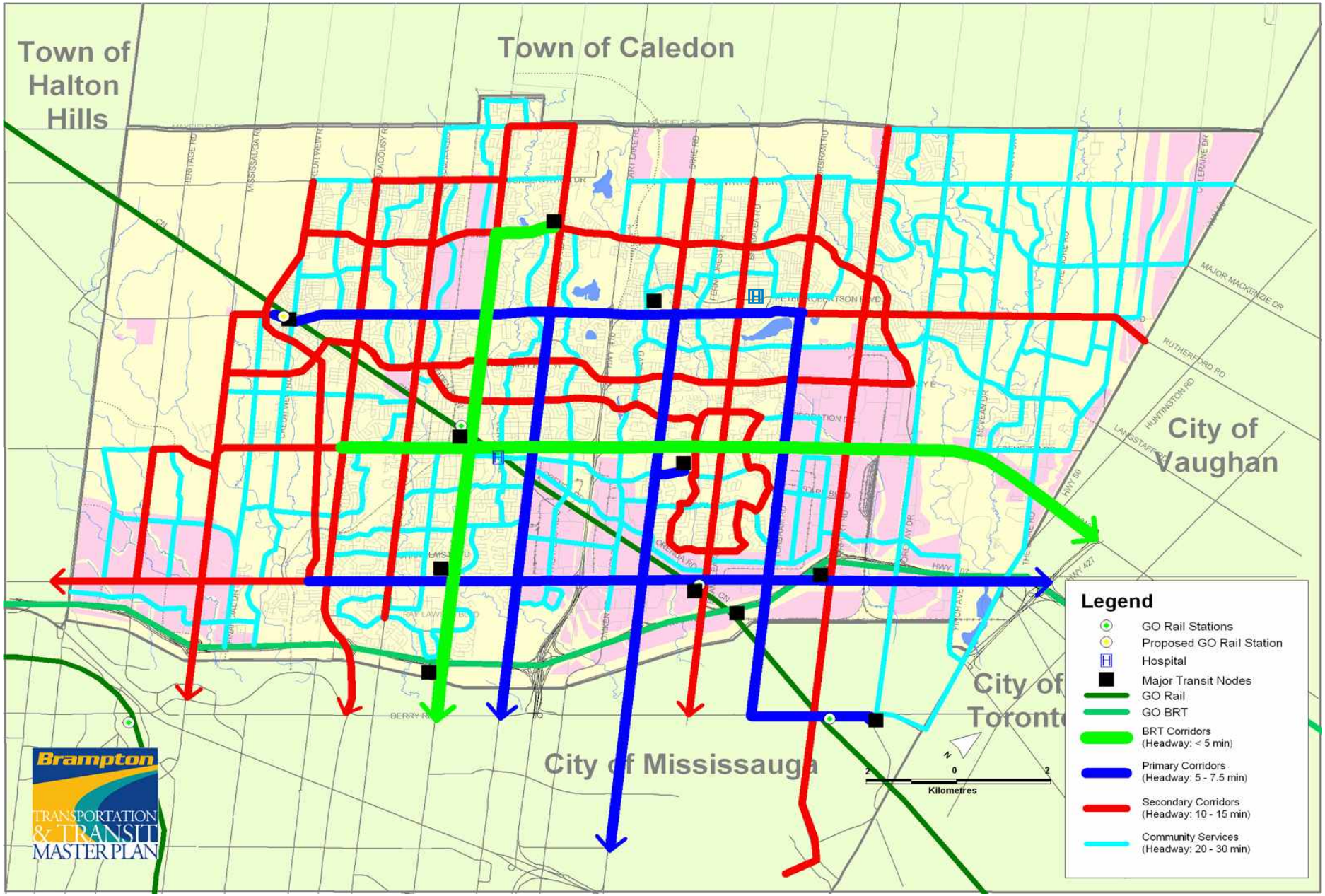

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Figure 3.21: 2011 Strategic Transit Framework

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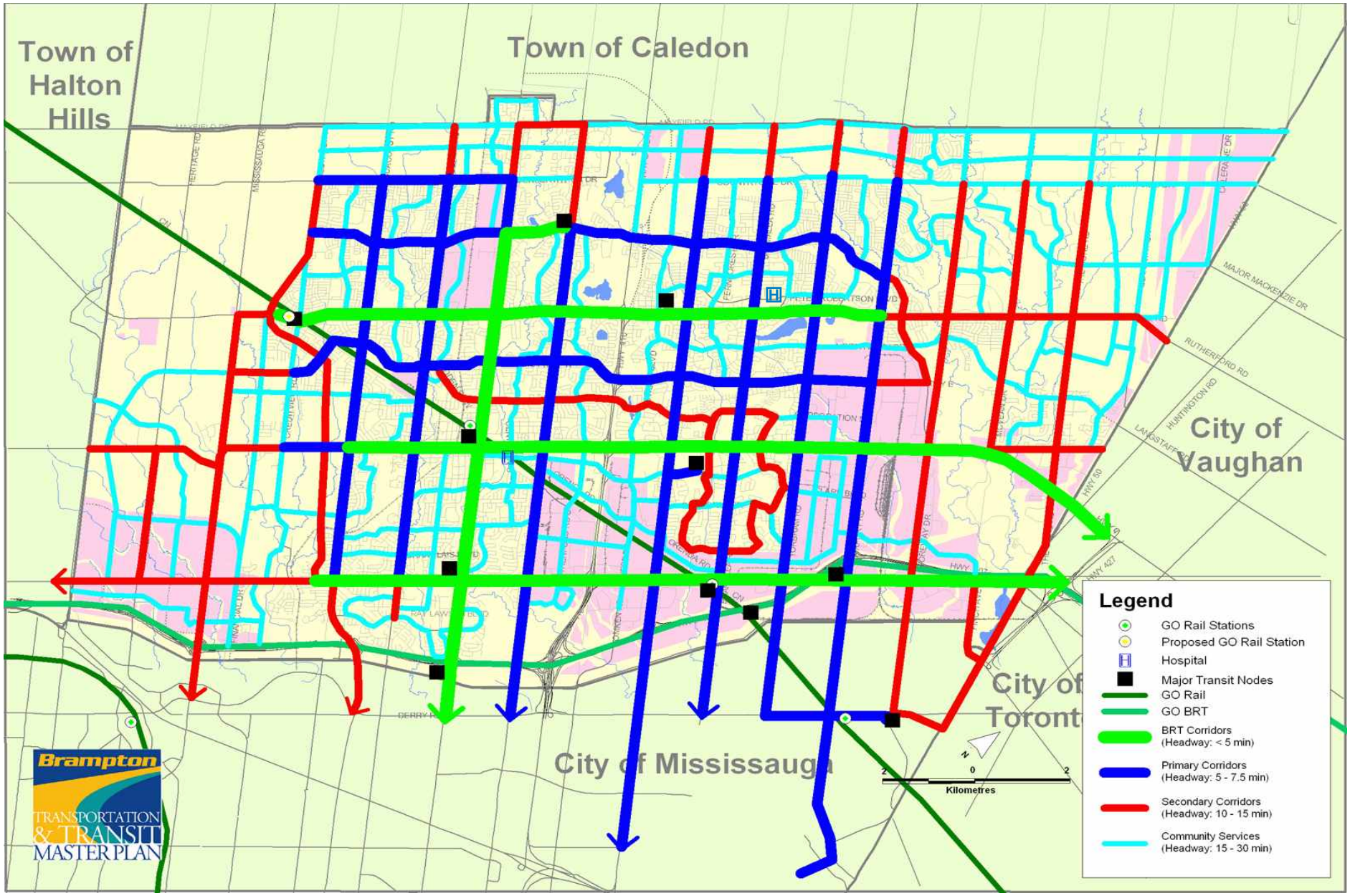

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Figure 3.22: 2021 Strategic Transit Framework

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The concept involves the following elements:

- BRT corridors: high-frequency services operate along major spines of the system, linking major destinations both within the City and externally – major transit terminals on the broader GTA rapid transit network, employment and commercial nodes. Headways are envisaged as being 5 minutes or less, and transit priority is ensured via design and signal systems, to guarantee schedule adherence and reliability;

- Primary corridors: these are still high-frequency corridors, but at slightly higher headways of 5.0 to 7.5 minutes. They are major grid services linking destinations primarily within the City, but also linking to Mississauga destinations;

- Secondary corridors: in some cases, these are the extreme ends of the primary corridors, with less service to reflect lower needs while the City expands. In other areas (such as east Brampton), the lower headways of 10 to 15 minutes reflect a lower projection of need (related to land use projections); and

- Community services: these will operate in neighbourhoods, delivering riders to the corridors or to specific destinations with frequencies of 15 to 30 minutes.

This concept will deliver excellent service coverage across the entire developed City. Growth in the transit network between 2011 and 2021 will focus on expanding the coverage areas of the higher frequency services, to keep pace with (and indeed, lead) expansion of the road and transit networks to developing areas.

To accomplish these goals will require a significant increase in Brampton Transit's bus fleet, a revised routing structure, and supporting infrastructure in the transportation network including signal and transit priority, high occupancy vehicle lanes (HOV) and/or reserved bus lanes (RBL), and supporting policies and travel management programs. HOV lane would operate at "two plus" (2+) riders from the start and as the lane becomes more utilized to the point that affects transit travel time then move to "three plus" (3+) riders.

The increase in fleet requirements will require additional funding including support from upper tier governments. The plans as presented are for 2011, 2021 and beyond. Short-term needs, however, are immediate, and a staged program towards longer term objectives is required. This will require stable and sustained funding support beginning in the short-term.

A second key issue is ensuring the necessary support for network and policy elements outside of transit's specific area of influence. This includes:

- Support for roadway infrastructure enhancements on both City and Regional roads, including signal priority, intersection modifications, and dedication of roadway infrastructure to high-occupancy vehicles and dedicated transit;

- Roadway connectivity and continuity in new developments, to ensure that new services can continue to enhance the corridor grid network, and support local feeder services;

Ability to integrate with adjacent and inter-regional systems including coordinated services, schedules and with streamlined fare structures and payment methods that are designed from the customer's perspective; and

Supportive policies in the areas of land use development, transportation demand management, parking pricing and supply.

Overview of Options for Rapid Transit in Brampton

The study has considered a range of options for rapid transit networks in Brampton. Given the projected demands for transit, the existing and planned networks in adjacent municipalities, and the opportunities and constraints within the City, Bus Rapid Transit (BRT) is the preferred technology/service delivery mechanism for rapid transit. Bus Rapid Transit is the umbrella name for a range of bus service concepts. Core elements are transit priority (through signals and geometric design), enhanced passenger information and amenities, and "branding" of services to raise the profile of BRT beyond the unfortunate image that bus transit has in the minds of "choice" riders. The overall concept is one of enhanced service designed to compete effectively with the private auto for those riders.

The key advantages of BRT are its flexibility in terms of service routes, and the ability to stage service improvements as funds permit. Fixed route technology such as light rail or subway do not offer these advantages. (These technologies also do not appear to be warranted within the study timeline. Also, the lack of planned connectivity for these modes across Brampton's boundaries to the east or south shows that these would not be practical alternatives at this point.) BRT can be regarded as a precursor to light rail, however.

BRT services can operate in high occupancy vehicle lanes, reserved bus lanes or on reserved rights-of-way. This depends on the demands and service requirements.

Again, these various operational strategies can serve as steps in the evolution of BRT, which in its "ultimate" form, can be regarded as buses operating in their own right-of-way. Examples of BRT services are shown in the photos below.

Within downtown Brampton eventual grade separation of bus services is foreseen. This is discussed further in Section 3.3.5 of this report. The details of the BRT system will be discussed in Section 3.3.6.

2011 System Plan

In the case of transit, it is logical to present the 2011 plan first. There is a much greater degree of certainty attached to this shorter horizon, because of the nature of the way transit systems evolve, and at that horizon, the structure is defined for carrying on to 2021. **Figure 3.21** illustrates the 2011 system plan. The key features are:

- High frequency BRT/AcceleRide components on Main Street connecting to Mississauga, and on Queen Street connecting to York Region, and the TTC. Both will link to the proposed GO BRT system;
- An established grid of major corridor services with service headways of five to seven and half minutes in corridors such as Bovaird Drive, Steeles Avenue, Dixie Road, Kennedy Road, and Torbram Road, with High Occupancy Vehicle (HOV) lane designations;
- An established grid of secondary corridors with service frequencies ranging from 10 to 15 minutes in the remaining east-west and north-south corridors where continuity is possible;
- A supporting network of local or "community" services that provide a high degree of neighbourhood access;
- Expanded services into the new developing areas;
- Less emphasis on the existing terminals as key destinations, though these still play an important role in the network interface and community destinations; and
- New focal points at Mount Pleasant GO Station, Mississauga Road/Steeles Avenue, and a nodal facility at Hurontario Street/Highway 407.

It should be noted that the Official Plan identifies a potential GO rail station in the vicinity of Rutherford Road. Given that the surrounding land use is industrial, and access is somewhat indirect, it is recommended that this designation be deleted.

The transition to this 2011 plan begins in the immediate term, as Brampton Transit staff work to implement more corridor-based services, establish new routes in developing areas and ensure reliable connection throughout the system. The short-term challenge is to begin this transition and building phase with limited resources and latent demand for service.

2021 System Plan

The 2021 system plan (see **Figure 3.22)** is an extension of the 2011 plan. The 2011 plan establishes most elements of the grid. Beyond 2011 services continue to grow in response to demand and service levels increase. As service levels increase, additional support is required to maintain the reliability of the system. Portions of Steeles Avenue and Bovaird Drive are identified as high frequency BRT corridors, with associated transit priority signal systems and infrastructure improvements necessary to support these services (i.e. queue jump lanes at intersections).

By 2021, the major corridor grid has grown to include most east-west and north-south corridors, meaning that service on these corridors has increased to headways of five to 7.5 minutes. This ensures effective transfers throughout the entire grid network, coordinated with the comprehensive system of neighbourhood routes providing local access.

At these levels of service, most HOV lanes will be converted to reserved bus lanes, at least during peak periods, and priority systems will need to be prevalent throughout the network.

The effect of introducing HOV or RBL links has been taken into account in the screenline analysis of capacity, in order to accurately reflect the overall outcome projected as a result of the TTMP initiatives.

Five-Year Transit Plan

The five-year transit plan should also be noted. The five key elements of the five-year transit plan would include:

- AcceleRide transit priority bus services on Main Street and Queen Street;
- North-south extensions of primary grid services to serve new developing areas north of Bovaird Drive;

- Expansion of services west of Chinguacousy Road;
- Higher service frequencies on primary east-west and north-south grid services;
- Completion of missing grid elements on Rutherford, Torbram, Sandalwood and Chinguacousy.

3.3.4 Policies for Support of Transit and Other Sustainable Modes

3.3.4.1 Recommended Initiatives

The recommended transit network provides the framework for development of competitive transit services. However, infrastructure improvements alone will not be sufficient to achieve a major shift in transit modal split. A comprehensive supportive policy framework is also needed, incorporating:

- Integration of fares and services with GO and other bordering operators;
- Expanded accessibility;
- Development should be focused at nodes (intersections of high capacity transit services, terminals) and along transit corridors. This includes the four Corners, Bramalea GO Station, Mississauga/Steeles, and Steeles/Highway 410;
- Land use mix and design should support creation of transit corridors and nodes:
  - Include a new policy in the Official Plan to require transit accessibility to be addressed in all site selection processes for government buildings and services
  - Provide continuous sidewalks and shelters along all municipal and Region of Peel roads with transit routes
- Rigorous application of Transit Supportive Urban Design Guidelines for use at all levels of community building and development to ensure transit and pedestrian oriented forms of developments;
- Application of a Transit Supportive Development Review Checklist to aid reviewers in ensuring that the Official Plan policies are translated into practice;
- Implement commuter parking plan to provide commuter lots at all transit gateways and strategically located stations;

- Develop and implement parking supply and pricing strategy to regulate the supply of excess on and off-street parking in designated Nodes and Corridors;
- As service levels increase, transit will require additional degrees of accessibility in the road right-of-way to ensure reliability of service:

  Peak Period Service Frequency Treatment

  - > 10 minutes : Bottleneck priority treatments
  - 5-10 minutes : HOV
  - 3-5 minutes : RBL
  - < 3 minutes : Dedicated facility
- Application of standards for persons with disabilities. The "Study of Transportation For Persons With Disabilities - Recommended Plan & Implementation Strategy" report prepared by the Region of Peel, in October 2003 is the guideline to follow. A copy of the report is in **Appendix F**.

3.3.4.2 Discussion

The implementation of the BRT system influences the shaping of development. There are examples of BRT systems all around the world to prove the positive impacts of the system. The impacts could be outlined in three levels:

- BRT station impact and around stations
- Busway corridor impact
- Broad influence on area development; throughout service areas

Like any major transit investment, BRT can influence amount, type, and density of development. The impacts can be felt throughout the service area. Some concentrated impacts can be seen near stations. It is important to express that BRT stations may have impacts contributing to attractiveness / property value in areas where the development is concentrated. Stations can be directly integrated within new developments.

The following examples had either positive impacts, or they were the catalyst for new development or fully integrated developments:

- BRT in Town of Orleans, (Ottawa)
- Brisbane Busway, Australia
- Pittsburgh's East Busway, USA
- Carnegie BRT station, Pittsburgh, USA
- Lincoln Fields, Baseline, Pleasant Park, and St. Laurent BRT stations, Ottawa
- Buranda, South Bank, Mater Hill, and Garden City BRT stations, Brisbane, Australia

3.3.5 Transit Priority in Downtown Brampton

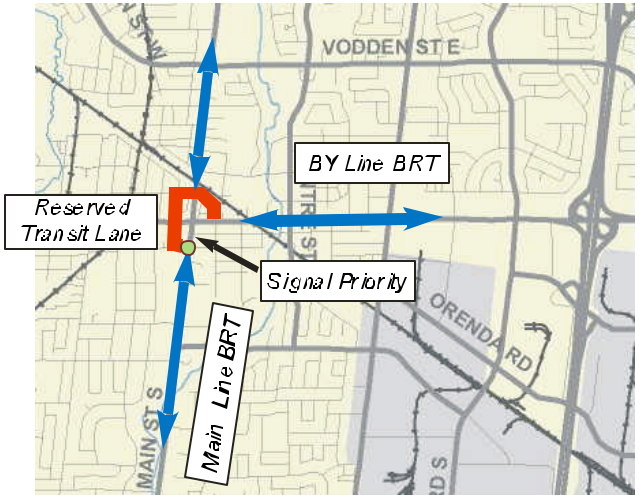
Downtown Brampton is the cornerstone of the transit network. The Downtown Transit Terminal is the meeting place for east/west and north/south services on the two key corridors: Main Street and Queen Street. Both of these streets have limited right-of-way widths, and both streets serve local access and circulation needs, as well as through traffic.

For the transit strategy to succeed, transit priority will be needed in downtown Brampton. Both the east/west and north/south service directions will require these measures.

There are competing interests in this area. The business owners and operators are justifiably concerned about their ability to survive, and see on-street parking and loading as essential. The City is planning to expand off-street parking considerably in the Four Corners, and that should address some of these concerns. That program is valuable because it will create the opportunity to begin introducing transit priority in a staged, incremental approach that balances local concerns with the broader needs of the City.

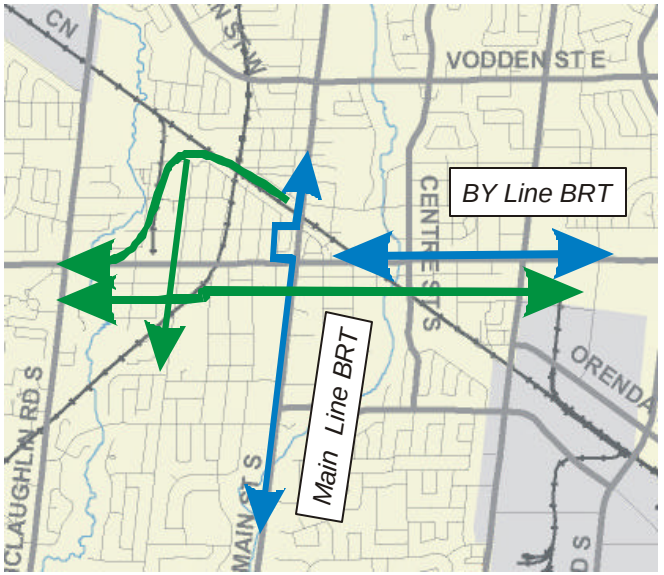
The following figures show the further evolution of transit priority in the downtown area, in terms of discreet steps over 30-year planning horizon.

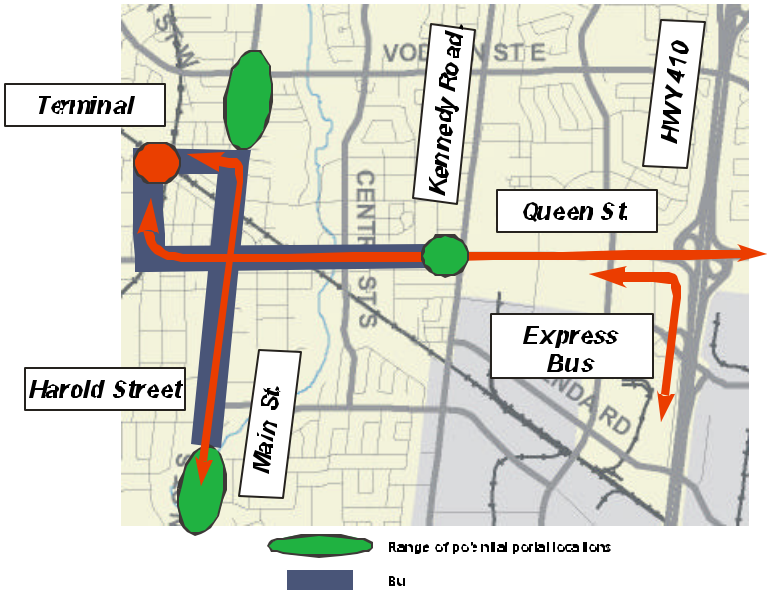
The first step (as shown at right) would be to remove some on-street parking, either on Queen and Main Streets, or on George and Nelson Streets. This would permit the introduction of bus-only lanes on these streets in the Four Corners.



Step 2 would involve providing transit-only streets for short blocks as needed. Transit Priority is expanded within the Four Corners, together with implementation of BRT. Alternatives could include a one-way street system on George and Nelson which would facilitate circulation of traffic and buses around the Four Corners with more capacity (in a clockwise orientation), or reserved transit lanes on Queen and Main. Timing is projected to be within 5 years.

Step 3 would involve creating bypasses around the Four Corners, to divert growing auto demands. Transit Priority continues to be enhanced. Due to the limited lane widths and difficult turning radii in this area, early consideration of street terminal expansion on Main Street at Queen Street may wish to be considered. A combination of the traffic ring road through the downtown core for regular vehicle movements and the closure of Main Street between Nelson Street and Queen Street as a combination pedestrian/transit area could be beneficial to the increased movement of people and transit vehicles on the Main Line. Alternatives for this road on the south could include the Wellington / Royce / Clark / Eastern connection, or a re-aligned intersection of Harold an Clearance Streets at Main Street to provide a continuous connection.





Step 4 would involve the strict separation of transit and auto, via a bus tunnel and expansion of the existing terminal underground.

The bus tunnel is a concept that serves other cities well – including Seattle (the precedent: Seattle tunnel is discussed below). Ottawa has indicated that a bus tunnel would be the logical next step in development of its bus system.

This TTMP cannot address the feasibility of the tunnel in detail. It is recognized that there would be constraints to overcome, including crossing under the Etobicoke Creek West Branch. The cost of the tunnel and terminal expansion is estimated as ranging from $150 to $200 million, based on a unit cost per km.

The alternative to a tunnel would be exclusivity for transit at the surface. This is expected to involve bus-only lanes on Queen Street and Main Street.

It would be prudent to expand on the preliminary investigations of portal locations completed to date, in order to protect for the bus tunnel.

The Precedent: The Seattle Bus Tunnel

The Seattle bus tunnel is a 2.1 km long facility with 5 stations. The capital cost totaled to $479 million (US) including the land, design, construction, start-up planning, community involvement, environmental impact mitigation, surface street/sidewalk/park improvements, waterfront trolley extension and enhanced Central Business District (CBD) circulation, and $41.5 million for the art component. It should be noted that this is a very high-end, high capacity design, featuring elaborate station finishes and ancillary works.

Vehicle Information

The cost of 236 dual-power buses (gas/electric) and two tow vehicles amounted to $124 million. The seating capacity is 63 plus driver with two wheelchair tie-downs. These 60 feet buses have three doorways with wheelchair lift in front.

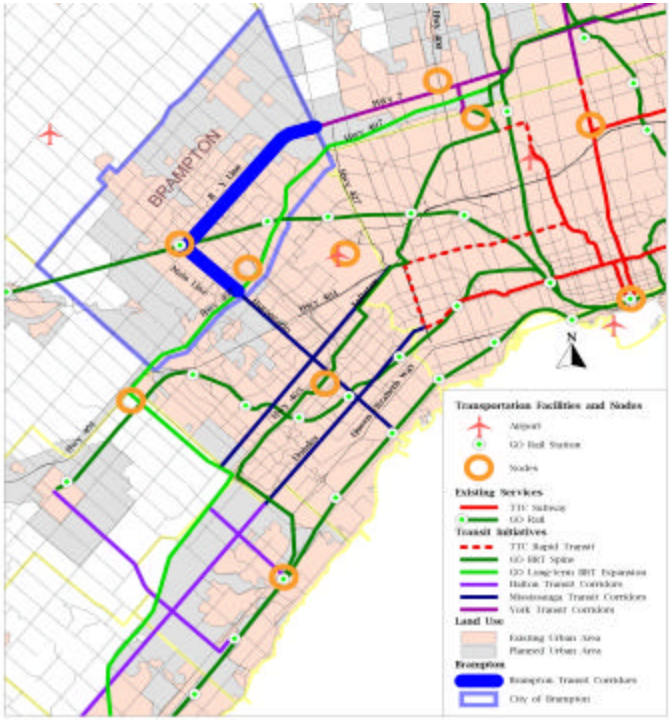
Tunnel Operations

As per 2003 budget figures, the annual operating and maintenance costs amounted to $4.69 million. This figure represents 14 hours of weekday operation (5 AM to 7 PM) and 8 hours of Saturday operation (10 AM to 6 PM). The system is not used on Sundays and Holidays.

Ridership and Service Levels (As of Spring 2003)

- 23 weekday and 10 Saturday routes
- 42,100 weekday and 12,000 Saturday daily ridership (includes Ride Free Area passengers)
- 1,063 coach trips per weekday and 342 coach trips per Saturday
- 138 weekday peak hour bus trips
- A theoretical capacity of 290 buses per hour

3.3.6 The AcceleRIDE Program



A significant component to emerge from the long-term plan development was the AcceleRide concept – a precursor to higher order transit on key east-west and north-south corridors, to be implemented in the short-term. The AcceleRide program of transit network services builds on the principles of smart growth, and forms a comprehensive rapid transit network that:

- Builds on the existing system strengths;
- Complements the existing and emerging inter-regional transit network;
- Promotes effective and efficient travel throughout Brampton and the region;
- Expands opportunities for development in key corridors; and
- Builds on short-term initiatives with the flexibility to develop major corridor services, using a variety of technologies.

This program identifies a concept including high frequency branded services on Main Street from downtown to Mississauga (the Main Line) and on Queen Street from Brampton to York Region (the BY Line).

These streets are proposed to be designated as transit priority corridors in the City's Official Plan.

In the short and medium terms, the plan includes Bus Rapid Transit (BRT) service in the two major corridors, supported by the emerging grid of connecting corridor services. The BRT elements included priority running ways, enhanced station facilities, high frequency service, layered service levels in the corridor, simple fare collection systems and enhanced intelligent transportation technology.

The program identifies intersection modification requirements in the Queen Street reconstruction project from West Drive to Airport Road, identifies longer term protection requirements in other potential corridors such as Bovaird Drive and Steeles Avenue, and begins to work with GO Transit, Mississauga and York Region staff on inter-regional integration issues.

The AcceleRide concept of high frequency corridor services, supported by a comprehensive network of corridor and neighbourhood services, frames the development of the 2011 and 2021 transit networks. In the short-term, Brampton Transit need to identify initial route and service modifications within the framework, and routes will begin to evolve towards the longer term vision.

3.4 Optimizing the Road System: Policies & Programs

The road system is more than just a series of links and intersections. It is a system which can and should be managed both in terms of demand and capacity. This section addresses policies and programs which are designed to be the components of a road management system which optimizes the use of this costly resource and also the transit system which relies on it.

3.4.1 Intelligent Transportation Systems and Transportation System Management

Technology will play an increasing role in the system over the next 30 years. Some of the aspects of technology which will play a role have likely not even been dreamed of yet. Nonetheless, the City needs to develop and maintain a plan which permits it to benefit from technology as it evolves.

3.4.1.1 Summary of Recommended Initiatives

TSM refers to a set of techniques intended to optimize the use derived from the transportation system. This may relate to capacity, operations of particular vehicle groups, and priority for specific groups. ITS is a specific set of initiatives intended to assist in this optimization, through technological enhancements of the system controls. ITS and TSM are also intended to enhance the safety, efficiency and cost effectiveness of these systems for the movement of people, goods and services, while also reducing adverse impacts on the environment.

- Review the City's signal systems infrastructure, to ensure it can cope with emerging needs such as transit priority;
- Introduce wireless transit vehicle locators to improve schedule adherence, tracking, and system performance;
- Implement Transit Priority Signals as part of the *AcceleRide* Bus Rapid Transit Program;
- Work with MTO and 407ETR to extend the COMPASS Freeway Traffic Management System into the City to monitor Highways 410, 407, and 427;
- Implement Traffic Responsive Area and Critical Intersection Controls along freeways and key intersections.

3.4.1.2 Discussion

Even with infrastructure and service improvements to the City's road and transit networks, the road network will become more heavily used over time with increasing congestion, delays and travel times. There is a growing need to manage this congestion and to utilize traffic management techniques as a means of gaining the greatest benefit from the available infrastructure. As a result, Transportation System Management (TSM) and Intelligent Transportation Systems (ITS) will become increasingly important components of the system as it matures.

TSM can involve a combination of the following measures:

- Operational improvements such as high-occupancy vehicle (HOV) lanes, transit signal priority, and the signal pre-emption for emergency vehicles;
- Maintenance improvements such as the repair and enhancement of key communications and computer infrastructure;

- Minor physical improvements such as the construction of turning lanes and bus bays; and
- Technological improvements such as the use of high order traffic control and monitoring systems.

ITS is one component of TSM that involves the use of information and communication technologies to better manage and improve the services which transportation providers offer to the public. Urban area ITS can be characterized as a combination of several key elements:

- *Traffic Signal Control Systems* that are automatically adjusted to optimize traffic flow;
- *Freeway Management Systems* that provide information to motorists, detect problems for increased capacity and flow, and minimize congestion from collisions;
- *Transit Management Systems* that allow new ways of monitoring and maintaining transit fleets through advanced locating devices and equipment monitoring systems;
- *Electronic Toll Collection* that provides both drivers and transportation agencies with convenient and reliable automated transactions, dramatically improving traffic flow and increasing operational efficiency in toll collection;
- *Electronic Fare Payment Systems* that enable a person to use a single smart card to pay for parking, bus and train fares, as well as tolls;
- *Railroad Crossings* that are coordinated with traffic signals and train movements;
- *Emergency Response Coordination* that ensures the closest available and most appropriate emergency unit can be dispatched to a collision;
- *Parking Control and Management*, to
  - Improve management capabilities of parking facilities through monitoring and collection of information with respect to occupancy, turnover, equipment operation, revenues, etc.;
  - Reduce search time for parking in the Four Corners;
  - Improve public safety in parking facilities; and
  - Minimize staff requirements without impacting customer service.

- *Regional Multimodal Traveller Information* systems that provide road and transit information to travellers, businesses and motor carriers, so they can adjust travel plans when necessary;
- *Intermodal Freight Management* systems tracks and monitors freight in the transport system. This helps in traffic routing and control, container tracking, and security of site and freight;
- *Fleet Management of City vehicles;* and
- *Data Collection and Management,* to
  - Improve operational efficiencies through frequent updating of databases and electronic sharing of data between agencies;
  - Find efficiencies in data collection and archiving; and
  - Improve access to historical fleet records (vehicle maintenance, inspections, driver records, etc.) by regulatory and inspection personnel to improve enforcement and safety.

Creation of a detailed ITS strategy for the City is a project for further detailed study. In addition to developing an ITS strategy, the following programs and actions are recommended for the City of Brampton to pursue (due to their clear benefit):

- Wireless vehicle location can be implemented for buses in the City to improve schedule adherence tracking and system performance. This will support effective transit operations. Automatic Vehicle Location (AVL) has been implemented in a number of transit systems in the Greater Toronto Area
- As part of the *AcceleRide* Bus Rapid Transit program, introduce transit priority signal systems;
- The MTO COMPASS project can and should be extended into the City on Highways 410, 407 and 427, to improve the operational effectiveness of the expressway system;
- Implementation of Traffic Responsive Area (TR1) and Critical Intersection (TR2) controls along freeway corridors and key intersections throughout the City. This would enable the central traffic control system to respond to freeway incidents and unforeseen changes in traffic patterns in a dynamic and effective manner.
- Consolidation of all traffic signals under the control of one agency is also desirable, for effective co-ordination of signal operations. The implementation of Traffic Adaptive Control such as SCOOT should be a longer-term initiative, once TR1

and TR2 controls are well established. As much as possible, the City/Region should learn from the efforts of other jurisdictions in the GTA, especially the City of Toronto. This will preclude the need to develop and test technology that has already been well researched elsewhere. This will minimize costs and speed the installation of enhanced control algorithms to the benefit of City taxpayers and the travelling public. The City should review whether the City or Region should have sole responsibility.

- With respect to intermodality, the rail-truck intermodal terminal operators are likely maintaining currency in terms of updates to freight management tools. The City should monitor truck activity in terms of its impacts on City streets, to determine if special signal control systems or operational strategies should be introduced.

3.4.2 Transportation demand management

Transportation demand management (TDM) is a program of measures intended to modify the time and mode of travel, so as to reduce peaking of demands on the road network and to spread trips across a broader time span.

3.4.2.1 Recommended Initiatives

- Develop and implement a parking management strategy for transit nodes and corridors to support "transit first". The strategy should address parking fee levels and structures, in order to provide for short-term parking, while minimizing all-day parking;

- Encourage require developments of a certain size (e.g. 200 employees) to implement TDM programs through the site plan approval process;

- Support car-sharing programs;

- Facilitate Transportation Management Associations (TMA) in areas of high commercial/industrial activity. This will involve providing materials and advice to assist TMAs in getting set up and creating programs that are appropriate to the members;

- Implement a social marketing program for residents and business, to reinforce the need for TDM as part of the Growth Management Program.

3.4.2.2 Discussion

A significant contributor to congestion on roads is the predominance of single occupant vehicle trips - vehicle occupancies in the City are very close to 1.0. This is particularly problematic during weekday peak travel periods for commuters. Transportation demand management (TDM) is a set of practices designed to influence travel decisions by providing options to all types of travellers. A combination of financial incentives, cost savings, education, pricing, and travel services, as an integrated TDM program aims to give drivers reasons to utilize a different way to travel than driving alone. A successful TDM policy and practice would improve the efficiency of the transportation system by:

- Increasing the number of people per vehicle;
- Maximizing the use of underutilized travel times and travel modes; and
- Reducing trip frequency and distance, and eliminating unnecessary trips.

Action Plans

The Workplace Initiative. The City can provide incentives to employers who implement TDM. Measures can include carpools through a rider matching service, preferred parking for high occupancy vehicles, subsidized transit passes for employees, permitting transit pass purchase through payroll deduction, allowing flexible work hours, work from home facilities, and providing cash equivalent to employees for parking space savings. A guaranteed ride home program can provide taxi vouchers or free car rental to carpool participants and transit riders who must miss their ride home due to scheduling conflicts. Actions:

a) Define detailed program and incentives;
b) Implement measures for trial period of one year, and monitor changes in travel behaviour;
c) Make TDM a requirement in Transportation Impact Study guidelines;
d) Encourage incorporation of TDM measures in site plan applications for major developments.

Further detail is provided in the Region of Peel's June 2004 "Transportation Demand Management Guide".

It should be noted that the City is a participant in the Urban Transportation Showcase Program proposal for the GTA TDM initiative called "Smart Commute", which is being headed by the City of Toronto (in cooperation with all the GTA Regional municipalities, Hamilton, and several area municipalities).

Provision of City support for car-sharing programs. Car sharing is one service amongst all the TDM programs. Car Sharing means easy, cost-effective access to a car without needing to own one. Transportation costs are reduced by using a car only when it is the most effective means of transportation, or in those cases when public transit does not take one where one needs to go. Car Sharing increases mobility options without causing pollution. The City could provide subsidized space for a trial program until it becomes established. This would include a small one-person office for the car-sharing co-ordinator and a number of parking spaces. The City can also coordinate with the GTA on developing a rideshare program for the entire Toronto area. This can include an on-line, real-time database, guaranteed ride home, and marketing and promotion. Car-sharing programs in other Ontario cities have been quite successful. Actions:

a) Review concept with Senior Management;
b) Advertise for interested parties, noting provision of subsidized spaces;
c) Implement program on subsidized space basis for one year.

Set up Transportation Management Associations (TMAs) in areas of high commercial/industrial activity. The TMA can act as joint public-private forum for development and implementation of programs that are locally appropriate. For example, they can arrange carpools among neighbouring businesses. A feasibility analysis is necessary before implementation of the TMA strategy in a particular area. Actions:

a) Review with Stakeholders Advisory Committee (e.g. Board of Trade, etc.) and Council;
b) Implement on trial basis for three years in Kennedy/Highway410/Steeles area, facilitated by City staff (in terms of monthly meetings, and action plans).

City staff are currently working with Peel, under the "Smart Commute" initiative to set up a TMA in southwest Brampton/northwest Mississauga.

A Joint Effort With The Region And Other Jurisdictions

The City should work with Peel Region and other jurisdictions for joint TDM implementation programs. Projects include:

- A Regional TDM working group and Regional TDM Coordinator. The City can assist with the Regional TDM program coordinator for overseeing policy development, implementation of the work plans, managing contracts or grants, facilitating TDM working group meetings, conducting necessary training and workshops, and performing regional evaluation and monitoring;

- Coordination with the GTA Smart Commute Association which is receiving federal funding for a program encompassing the entire Toronto region. The Smart Commute Association would develop TDM strategies, pilot projects, and a regional marketing and education campaign;

- Participation in the Five-Year TDM Action Plan. The Regional TDM working group plans to develop a five-year TDM action plan outlining investment priorities, timing of projects, and implementation strategies with specific evaluation and measurement targets. We recommend a joint City and Region TDM action plan that can help in seamless integration of TDM related projects with wider acceptance and minimal user discomfort.

3.4.3 Pedestrians and Cyclists

3.4.3.1 Key Recommendations

- Implement sidewalk warrant evaluation process;

- Policy directions, depending on location in the City:

- Option 1 – Walking and cycling as a priority in the planning and design of communities and transportation systems (more urban areas)
- Option 2 – Walking and cycling to support more dominant modes of transportation for utilitarian purposes, and promoted for recreational purposes (less urban areas)

- Implement the PathWays Plan.

3.4.3.2 Discussion

Walking is an integral component of almost all trips, and the relative importance of cycling is on the rise. However, the largest proportion of all travel is still made first by the private automobile and second by public transportation. To develop a Transportation and Transit Master Plan that maximizes the opportunities for mobility by all modes, it is important to include a workable plan for the promotion, enhancement and design of walking and cycling facilities, building on the City's past and current successes in this area. Brampton residents already make a substantial proportion of their trips on foot or by bicycle.

The promotion of cycling has significant individual, societal, environmental and economic benefits. Cycling provides an enjoyable, convenient and affordable means of exercise and recreation. Cycling and walking can contribute to reduced urban and suburban dependence on the automobile, which is a target for a healthy city.

For distances up to 10 km in urban areas, cycling is the fastest mode from door to door. The National Bicycle and Walking Study: Final Report (1994) shows that 25% of all trips are 1.5 km long or less, and over two-thirds are 8 km long or less in U.S. cities. Approximately 20% of all cycling trips involve travel to and from work in the U.S. This demonstrates the potential for increasing the number of trips by bicycle.

Cycling is an energy-efficient, non-polluting mode of travel. Shifting to walking and cycling modes can mitigate ozone depletion, the greenhouse effect, ground-level air pollution, photochemical smog, acid rain and noise pollution.

There is ample evidence that trails provide significant economic benefits for adjacent landowners and local businesses. Trails provide benefits to the local economy during both construction and operation. Trail construction results in direct benefits such

as jobs, including the supply and installation of materials. Following construction, benefits emerge in the form of expenditures by trail users.

3.4.3.3 Brampton's PathWays Master Plan

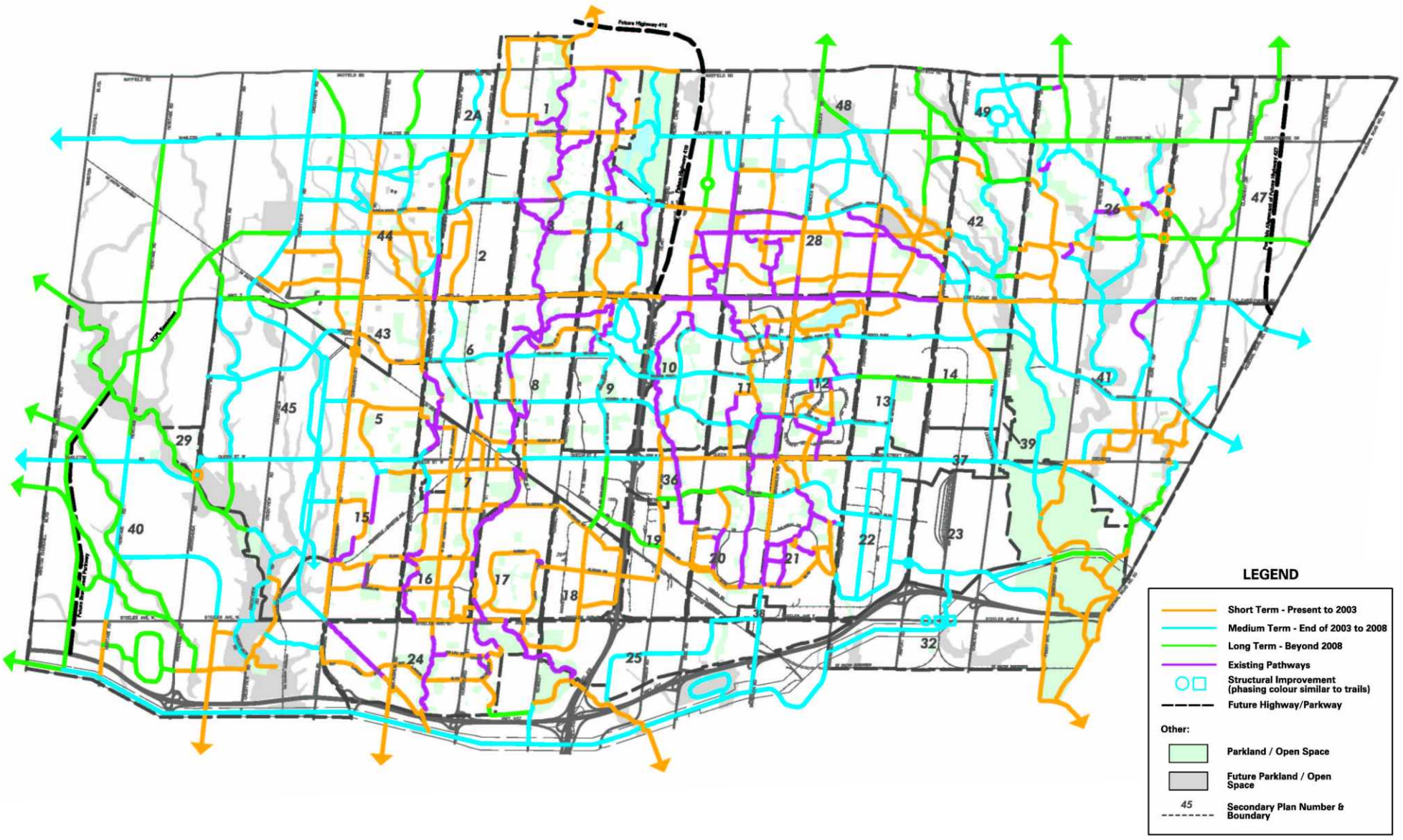
Brampton's PathWays Master Plan builds upon the guidelines and objectives of the Official Plan to provide a more detailed analysis pertaining to a proposed pathway system.

The PathWays Plan outlines a detailed pathway network, outlining the orientation and specific type of route proposed along each corridor. The proposed system builds upon the existing network, satisfying utility and recreational concerns. It gives consideration to the key staging areas within the city (i.e. parks, community centres, schools, and commercial areas) and links to neighbouring municipalities. **Figure 2.13** illustrates the recommended pathway network. Preferred corridors were located to connect and extend existing pathway segments, so as to ensure a seamless system and overcome the major barriers of Highway 410 and railway links. In addition, the routes are visible, so as to ensure that residents are aware of the system. A staging process, with this in mind, is expected to have a full build-out period of 20 years. **Figure 3.23** shows the proposed phasing process.

3.4.3.4 Implementation of Brampton's PathWays Master Plan

The PathWays Master Plan was approved by City Council in 2002. In order to incorporate the key aspects of the Plan's policies, it is recommended that amendments be made to the Official Plan to incorporate revised objectives and policies that include the key directions outlined within the PathWays Master Plan. In addition to the refinement of the design of the proposed pathways, the adaptation of the plan should encompass the following policy additions/amendments:

- The City shall require all proposed developments and infrastructure undertakings to provide facilities for PathWays wherever appropriate, in keeping with the provisions of this Plan and the Brampton PathWays Plan;



Brampton TRANSPORTATION & TRANSIT MASTER PLAN

Marshall Macklin Monaghan
PROJECT MANAGERS • ENGINEERS • SURVEYORS • PLANNERS

ENTRA CONSULTANTS

Figure 3.23: Recommended Pathways Phasing Program

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- The City shall provide for the development of PathWays by:
  - (i) Designating PathWays on a new Schedule in the Official Plan and in secondary plans, where appropriate;
  - (ii) Implementing, monitoring and updating the Brampton PathWays Plan;
  - (iii) Providing for the development and maintenance of PathWays facilities;
  - (iv) Ensuring that the design of PathWays complement and connect with the City's open space infrastructure, key destinations and transit stations, where feasible; and
  - (v) Ensuring that all new development proposals and infrastructure undertakings include extensions and improvements to PathWays as part of the up-front stages of construction wherever appropriate.

- The City may require the installation of PathWays features, elements and supportive facilities, such as bicycle racks, as part of a residential, commercial and industrial developments;

- The City shall co-ordinate the development and expansion of PathWays with adjacent municipalities and other agencies as appropriate;

- The City shall minimize the risk to pedestrians, cyclists and motorists through the appropriate design of PathWays facilities, the provision of signage and support of educational activities and programs.

Walking and cycling are important elements of an integrated, intermodal transportation system and have a significant bearing on a city's vision for urban street design. The City of Brampton must be more aggressive in promoting, requiring and constructing facilities for pedestrians and bicycles to increase the safety and number of trips being made by these modes. An effective pedestrian network is an essential component of a transit-supportive transportation plan.

3.4.3.5 City of Brampton Sidewalk Policy

There are no formal detailed City guidelines that can be used to determine whether or not a sidewalk is warranted. A new Sidewalk Priority Evaluation Warrant has been designed in order to formalize this decision making process. The Evaluation Warrant is based on pedestrian and vehicular traffic volumes, physical characteristics of the roadway, and whether or not the proposed sidewalk represents the completion of a sidewalk route. Each factor is assigned a specific rating. If the site satisfies

the required rating, then the sidewalk is warranted for installation. The City of Brampton hopes to have this Sidewalk Warrant Evaluation process officially approved and implemented as early as 2004.

There is currently no standard evaluation process available to determine whether or not the installation of a sidewalk within the City of Brampton is warranted. It is recommended that the Sidewalk Priority Evaluation Warrant be incorporated into official City of Brampton policy. The policy should state that, outside of extenuating circumstances, any sidewalk warranted under this evaluation should be installed. This will provide a more standard and definitive means for determining whether or not a sidewalk should be developed along a given stretch of roadway.

Regardless of whether or not they are warranted under the proposed Sidewalk Priority Evaluation Warrant, sidewalks should be provided on both sides of all arterial and collector roads and on at least one side of all local roads, excluding cul-de-sacs, in both new and existing areas.

The developed sidewalks and walkways should be viewed as “pedestrian lanes”, providing people with space to travel within a public right-of-way that is separated from roadway vehicles. The Institute of Transportation Engineers (ITE) recommends a minimum sidewalk width of 1.5 m (5ft.). Wider sidewalks should be installed near schools, at transit stops, in downtown areas and any other areas where there are high concentrations of pedestrians. Bicycle parking racks, water fountains, benches and other urban design elements should be provided in areas with high pedestrian traffic, but should be carefully placed so that they do not obstruct the path for pedestrians. Sidewalks should form a continuous network, and be part of a system that provides access to goods, services, transit and homes.

Sidewalks should be kept clear of poles, signposts, newspaper racks, and other obstacles that could block the path, become a tripping hazard, or obscure a driver’s view. According to the U.S. Federal Highway Administration (2002), a “buffer” zone should also be provided where applicable to separate pedestrians from the street. Buffer zones may vary depending on the nature of the area they serve. In downtown areas, parked cars, bicycle lanes or street furniture can act as an acceptable buffer zone. In suburban areas, a buffer zone may consist of trees or shrubs or a landscaped strip.

3.4.4 Goods Movement

Peel Region is currently leading a Goods Movement Study. The City of Brampton should supplement this fairly generalized study by working with the Region to define an actual system of Goods Movement routes, and work within that project, to achieve municipal goals within the regional framework. This is in recognition of the importance of the Regional road network in Brampton.

The City and Region should work together to collect data needed to track goods movement activity. The key transportation data item would be truck traffic on screenlines, classified by light/heavy trucks. This can be collected as part of a coordinated cordon count program. Data should be collected annually.

The City and Region should also work with industry stakeholders to identify public-private data collection initiatives, which can support safe and efficient goods movement.

One option would be via the system created for the Transportation Tomorrow Survey (TTS), a comprehensive travel survey conducted in the GTA once every five years. For a GTA wide exhaustive goods movement and travel survey needs, the City, the Region and private stakeholders can provide/increase the funding support to the TTS conducting agency for data collection and analysis. A public-private relationship is needed for this initiative. Similar to the TTS, this survey could be conducted once every five years. These data programs can then lead to further co-operative ventures, building on the findings of the data analyses.

3.4.4.1 Summary of Recommended Initiatives

- Work with the Region and industry stakeholders to define a specific truck route network and collect traffic data necessary to support safe and efficient goods movement, while minimizing effects on residential areas. This should lead to definition of pavement structure requirements, decisions with respect to truck route systems, and identification of needs to be passed on to the federal government with respect to dangerous goods movement and other federal issues;

- Work with the Region and the Province to improve connections among arterials, expressways, and intermodal freight facilities;

- Work with MTO and 407ETR to introduce incremental goods movement initiatives on the expressway network;
- Improve traffic management and incident response systems;
- Define a truck route network for the City.

3.4.4.2 Discussion

Given the economic importance of commercial transportation, the safe and efficient movement of goods and services within and through the city of Brampton must be a key element of the TTMP.

The 1997 *Strategic Goods Movement Corridor Analysis* (SGMC) study, prepared for the Ministry of Transportation, found that daily commercial vehicle volumes on the 400-series highways are substantial and increasing. On each of the major freeway links, the two-way flow exceeds 8,000 trucks per day. At some points on the GTA freeway network, there is an average annual increase of more than 10 percent in truck movements. Truck volumes along Highway 401 in the GTA exceed 35,000 per day (carrying 460,000 tonnes of goods), near Highway 400 and Weston Road; on Highway 427 they range from 8,000 to 26,000.

Ontario is forecast to lead all provinces in growth in trucking during the period 1994 to 2010. Ontario's intra-provincial truck traffic is expected to grow by an average annual rate of 2.5% and its market share by 10%. Similarly, Ontario is expected to continue to lead in terms of its share of inter-provincial trucking. Total Ontario trucking of exports is expected to grow by an average annual rate of 3.7% over the forecast period. Given the predominance of travel, development and road infrastructure in the GTA, these forecast increases are likely to be focussed within the GTA. As such, the growth in truck travel within and through the City of Brampton is expected to be slightly higher than the growth rates predicted for the province.

Goods Movement Data Collection

The City and Region should work together to collect data needed to track goods movement activity. The key transportation factor would be truck traffic on screenlines. The City and Region should work with industry stakeholders to identify public-private data collection initiatives, which can support safe and efficient goods movement. These programs can then lead to further co-operative ventures.

Big Picture Initiatives

The former Greater Toronto Services Board (GTSB, 2000) has outlined several opportunities for more efficient access for goods movement that should be considered within the City of Brampton. These include:

a. Improve connections between arterials and expressways;
b. Protect connections to intermodal freight facilities;
c. Rationalize rail lines to consolidate key freight rail facilities on some lines; and
d. Intensify public transit and intercity rail services on other lines (thus shifting demand from the private automobile to public transit).

A variety of infrastructure and technological improvements have also been recommended to support goods movement across the GTA. These measures, outlined as follows, can promote more efficient traffic flow, and in turn improve access and movement of goods:

e. Priority lanes for commercial truck traffic;
f. Improved off-street loading and parking facilities;
g. Efficient incident management systems;
h. ITS initiatives aimed at disseminating road information to drivers;
i. Improved freeway networks;
j. Traffic management systems; and
k. Streamlined activities for improved goods movement.

A new development is the Orangeville-Streetville railway corridor operation, which is based on a 2-day per week operation delivering resource materials to local manufacturers. The local customers have established the Orangeville-Brampton Rail Access Group (OBRAG) to support maintenance of the track to enhance the safety and operating efficiency of the railway. This operation could be the first step in developing a potential commuter connection to GO lines in Downtown Brampton and Streetsville.

The Region of Peel and the City of Brampton are at the forefront in serving the region's economic vitality through its extensive goods movement system. Yet the City and Region are not deriving any direct benefit from these services. The province and the federal government gain direct benefit from the existing road and fuel taxes and licensing fees. A range of policies thus need to be developed at the provincial and/or federal level so that a portion of these roads and goods movement generated funds can be distributed among the municipal and regional government for the development of infrastructure in the municipal and regional level. But any new tax system for the existing goods industry in the City has to be extensively studied before its imposition so that the balance between this employment sector and the development funds generated from it is not destabilized.

3.4.5 Parking Policy

The importance of parking is often under-estimated, however drivers always need a place to park. The availability and cost of parking can be powerful determinants of whether someone drives to a specific location or chooses an alternative mode.

The recommended strategic actions are as follows:

- Review parking policies in the City Centre (both on and off-street together) and define a staged plan for the adjustment of rates and rate structures to encourage transit use and discourage long-term parking on-street. This could include limiting the permitted parking duration in metered spaces to one hour. They could also include promoting shared-use of parking, which would limit parking over-supply, a key factor in auto dependence.

- Complete a focused downtown parking operations strategy, to ensure that parking policy is consistent with the overall direction of the TTMP. In September 2000, iTRANS completed a Downtown Brampton Parking Standards Study to recommend new parking standards for the downtown area. This plan recommended a moratorium on parking requirements for new development downtown, and formulae for shared parking. The moratorium was passed by Council and was effective until December 31, 2003. The moratorium and shared parking policy are expected to be supportive of transit, walking and cycling. Further extension of the moratorium should be considered.

The report also indicated that there is significant surplus parking supply in the downtown area, even during peak times. For the proposed Bus Rapid Transit service, unimpeded access along Queen Street and Main Street will be required. Therefore, the issue of whether parking should be permitted on Main Street and Queen Street should be studied. Given the surplus parking

supply, there is a possibility to re-arrange, relocate or further restrict parking on Main Street and Queen Street, in order to accommodate BRT. The iTRANS on-street parking usage data should be reviewed/subdivided by area, in order to define the potential for relocating existing parking demand elsewhere, such as other streets in the downtown area. A parking operational strategy should be defined to balance transit needs and business needs along Main Street and Queen Street.

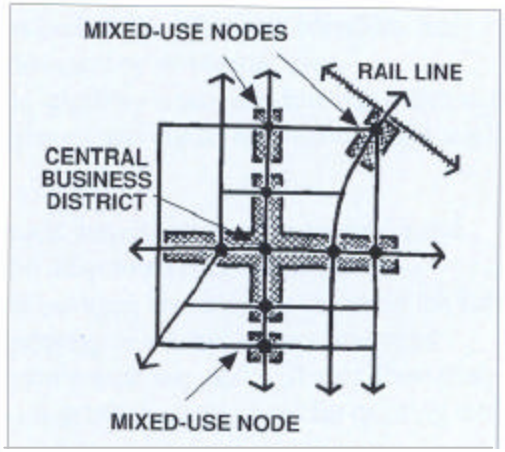

Figure 3.24: Grid System

- Consider further potential changes for parking in the downtown area:
  - Adding metered parking on additional side streets;
  - Retaining "first hour free" provision in the municipal parking garages, to support business, but increase hourly rates to discourage day-long parking, and thereby encourage transit use;
  - Review parking rates in the downtown area relative to other similar downtown areas, and increase these through a staged program. Relate stages to implementation of BRT/transit priority on Queen and Main Streets;
  - Review loading times with area businesses: consider limiting on-street loading/unloading to off-peak times.

3.5 Additional Principles for Road Network Development

3.5.1 Collector Road Network Expansion

As a principle in developing the road network, the City should continue to plan for implementation of a continuous network of collector roads which can provide improved continuity across the City, and accommodate additional development-related demands away from the arterial network. It is recommended to protect opportunities for providing additional road connections across freeways and for creating "bypasses" of key nodal intersections (see **Figure 3.24** for a schematic example).

Additional road crossings of freeways parallel to the arterial network can enhance the potential for intensification at major highway nodes (see **Figure 3.25** for illustration). The example of the Vaughan City Centre along Highway 7 is one case where this principle is being applied. This can be a strategy that supports transit access as well as private vehicular access.

In general, collector roads should be developed at a spacing of 300 metres, to provide for adequate vehicular circulation and transit access. This principle should be reflected in any Secondary Plans or Tertiary Plans.

3.5.2 Planning for Improved Road Connections through Redevelopment

As a principle with respect to any major redevelopment applications (e.g. Brownfield sites), the City should continue to plan for implementation of additional local or collector road connections where these would assist in distributing traffic and improving pedestrian and/or transit access. Safety and efficiency of traffic operations should be maintained, however.

The principles of continuous collectors at maximum 300-m spacing and introduction of new road connections should be reflected in Secondary Plans.

3.5.3 Planning Roads that work for Alternate Modes and a Safe and Involved Community

Roads and streets have a role beyond merely conveying people and goods. The design of access and frontage also plays a role in community development. Where possible, direct access should be provided on collector roads.

The city's 2003 Street Corridor Master Plan provides the context for street design. In the case of low-density housing on these roads, designs exist which can limit the number of accesses while maintaining frontage on the street, such as service road concepts (see **Figure 3.26a** and **3.26b** for illustration).

Reverse frontage along arterial roads should be avoided where possible. Reverse frontage tends to create communities which "turn their back on the street", decreasing the involvement of residents in the civic life of the Brampton. This means a less safe

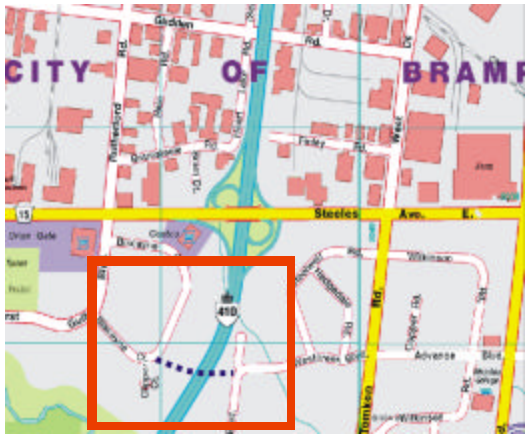

Figure 3.25: Highway 410 Crossing Westcreek Boulevard to Biscayne Crescent

and secure environment for pedestrians, transit riders and cyclists, which in turn discourages use of these modes and creates an

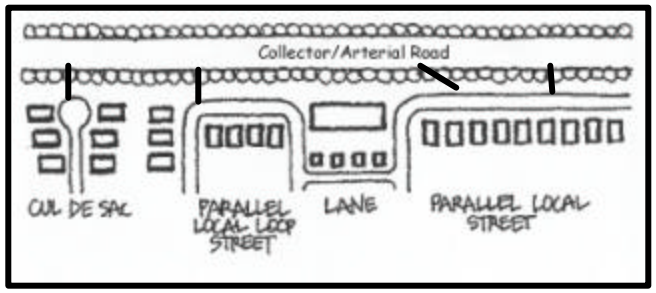

Figure 3.26a – Streetfront Design Concepts

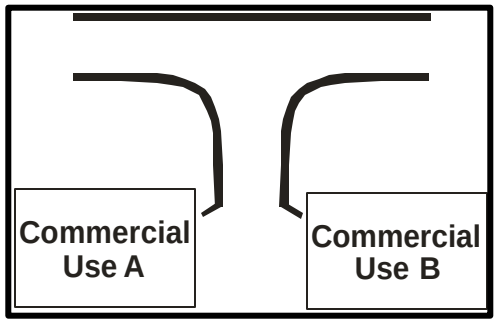

Figure 3.26b – Joint Access to minimize driveways

increased cycle of auto dependence and reduced involvement in the City. Cities need to be interactive at the basic level to encourage residents to feel a sense of ownership and responsibility. "Eyes on the street", as this type of development is known, will in turn support initiatives such as the Brampton Safe City Program.

3.6 Land Use Form and Management

The integration of transportation and land use is a fundamental premise of a master plan. Land use plans are key to develop a reliable, fast, and effective transit system. By increasing densities and mixed-use development along designated corridors and within specific nodes, TDM-supportive land use plans can support alternatives to the automobile (see **Figure 3.27**)[2].

Creating compact urban form that utilizes land efficiently helps to minimize the need for costly infrastructure expansion and service extensions. This form of development makes better use of previous investments in facilities and services, and poses less impact on the environment.

[2] Source: Canadian Institute of Planners

The land use and growth management framework needs to promote:

- Creating self-contained urban areas which are linked together by a transit system;
- Encouraging a better mix of uses in urban areas, and discouraging large areas zoned for single uses;
- Encouraging higher density mixed-use development adjacent to transit routes, in industrial districts;
- Developing major transit routes as medium density, mixed-use activity corridors;
- Coordinating the pattern of nodes and corridors with the evolving transit network;
- Locating retail shopping centres and office uses within transit-oriented activity nodes or corridors;
- Locating trip generators and facilities frequented by transit-dependents around transit stops;
- A grid system of arterial and collector roads where necessary, to provide for a transit-supportive road pattern;
- Increased density and intensity in urban areas (through infill and redevelopment) to support transit before expanding the interim urban boundary.

While the Official Plan policies are supportive of these directions, more detailed guidelines are needed to define the implementation aspects of a TDM-supportive development.

Figure 3.27: TDM-Supportive Development

3.7 Effects of the Plan

3.7.1 Mobility

Implementation of the policies, programs, and infrastructure improvements identified in the TTMP will have limited impacts on the road service level. The overall level of service in the City is currently estimated as “D” (volume over capacity is between 0.80 and 0.89). Over time, this is expected to worsen, despite the City’s efforts to keep up with the pace of development through road construction. In order to increase mobility it is imperative to invest aggressively on transit.

Implementation of the TTMP strategy will help to manage growth in congestion. The Plan provides a framework for increasing transit use and for optimizing and expanding the current system through continued infrastructure investment. Achieving the 15% City wide internal transit modal share is the main focus of the recommended transit framework.

The Plan offers other mobility benefits beyond congestion relief. The public transportation and TDM initiatives will provide more choice for users and will improve the relative competitiveness of non-auto modes. This will help to attract people who desire a choice of travel methods.

3.7.2 Natural Environment

Achieving the TTMP objective of increasing the transit modal share will benefit air quality, although the expected growth in population, employment and traffic can be expected to modestly increase most vehicle emissions. On a per capita basis, emissions are expected to decline over the years as a result of improvements in vehicle technology and fuels. Further evolution of vehicle emission standards will continue to help. Greenhouse gas emissions are likely to be higher than current levels given the increase in vehicle-kilometers of travel predicted. Vehicle technologies or travel behaviour changes would be needed to significantly reduce fuel consumption and/or vehicle use.

The TTMP recognizes the importance of predicting and conserving the City's natural features in delivering transportation services. The Plan encourages optimization of the existing system and reduced reliance on the automobile to minimize the need for expansion.

3.7.3 Community

Increased transit modal share, as expected through this Plan, will help to minimize auto usage. Completing missing links and improving connectivity will help to reach this goal. The improved transit grid system together with the local shuttle-bus services will help reduce auto traffic growth. The negative noise impacts of introducing more roads would be mitigated by these services.

By keeping major system expansion primarily to existing corridors and right-of-way limits, community severance impacts will be minimized.

In the areas where transportation facilities are expanded, community severance effects will be addressed through the implementation phases. All attempts will be made to maintain pedestrian and transit connectivity. Aesthetic measures and techniques will also be applied to diminish any visual aspects of community impact.

Some of the recommendations of the Plan will result in the need to acquire property to implement the proposals. As detailed functional plans have not yet been prepared, precise estimates of the number and location of affected properties cannot be provided.

It is important to acquire needed properties in a reasonable and fair-minded manner, based on fair market value of properties in question.

Implementation of the TTMP is anticipated to provide economic benefits to a range of users and society as a whole. The benefits will be in the form of reductions in the operating, time, and air pollution costs associated with automobile and transit travel. Indirect economic benefits in the form of increased mobility and enhanced connectivity may also occur.

3.7.4 Capital Costs

The current 10-Year Capital Works Program allocates approximately $500 million for roads. The projected costs for the TTMP are shown in **Table 3.3**. The figures in the table are based on the preliminary results of the Development Charges By-law Update study. The costs include City road costs.

It is important to note that even with these improvements, the level of service on the city road network is projected to decrease from the current level. Maintaining or improving the level of service would extremely costly, and would not provide the "stick" needed to accompany the "carrot" of improved transit service required to accommodate the projected growth in demand in a sustainable manner.

The majority of the costs are in the earlier horizons, reflecting the urgency of the need to address Brampton's growing transportation needs. The Development Charge process will be able to recover some of the cost of this construction, but there will be a shortfall for transit if the traditional method and interpretation for calculating Development Charges is applied. Monies would have to be sought and secured from alternative sources. This is not sustainable through property taxes. It is

recommended that the City use the TTMP report to highlight the concerns relating to the current system to the provincial government, to identify the need for structural reform. Alternative funding strategy evolution is ongoing to provide options.

Table 3.3 summarizes these costs by horizon.

Table 3.3: The Projected Costs for the TTMP

Description	Infrastructure Costs
10-Year Capital Works Program	$539 million
Improvements Recommended by 2011	$315 million
Improvements Recommended by 2021	$443 million
Improvements Recommended by 2031	$ 63 million
TOTAL	**$1,360 million**

(1) Costs associated with AcceleRide infrastructure are included. The cost of rolling stocks and contingencies are excluded. By 2011 other than the AcceleRide, HOV lanes, transit signal priority, and queue jump lanes are assumed on Kennedy Road, Dixie Road, Torbram Road, Bovaird Drive, and Steeles Avenue. By 2021, McLaughlin Road and Airport Road are added as HOV corridors
(2) All figures are rounded to the nearest thousand and include 3% GST
(3) Preliminary cost for Clark Boulevard improvement is included in the figures

Brampton's current capital estimates to 2011 for transit include approximately $82 million for vehicle purchases and $57 million for other non-vehicle costs. To achieve the 2011 transit plan, an additional $36 million for vehicle purchases are required. Additional non-vehicle costs, which include new garage expansion, maintenance facilities are estimated at approximately $9 million over and above the projected $57 million, for a total investment for 2011 of $184 million.

Assuming that the improvements in transit-related roadway infrastructure, including transit priority, HOV and reserved bus lanes are achieved in this time frame to create the necessary network efficiencies, this current estimate for vehicles will be sufficient to meet the needs of the 2011 plan. Without the related improvements, additional bus purchases will be required.

To the 2021 horizon, new bus purchases will require a capital investment of approximately $122 million, with non-vehicle costs of approximately $20 million, for a total of $142 million.