Brampton

Road & Transit Summary



Transportation & Transit Master Plan

March 2004

Marshall Macklin Monaghan
PROJECT MANAGERS • ENGINEERS • SURVEYORS • PLANNERS

in association with

ENTRA CONSULTANTS

CITY OF BRAMPTON
www.city.brampton.on.ca

1. PURPOSE OF THE TTMP STUDY

Brampton is a rapidly growing urban municipality, prominently located within the Greater Toronto Area. Because of the City's vitality, congestion is being increasingly experienced by Brampton residents, visitors and businesses. As with the rest of the GTA, this situation is expected to continue into the future.

In the summer of 2002, the City initiated the Transportation and Transit Master Plan Study (TTMP) to define a long-term multi-modal transportation strategy to manage the City's growth over the next 30 years. The overall goal of the TTMP is to establish a framework for guiding all future transportation decisions. The TTMP sets out policies and programs to support the long-term transportation vision for the City, and includes an implementation strategy based on targets established for 10-year horizon intervals. The TTMP also set outs a Short-Term Action Plan for the next five years, to address current needs and deficiencies, and to begin to work towards the long-term vision.

The fundamental strategy of the TTMP, and the long-term vision, is to plan for a balanced road and transit system. The current system is heavily reliant on the private vehicle, but such a reliance will be increasingly less feasible as Brampton continues to grow, and policies and programs are needed to establish a balance. It is not the goal of the TTMP or the long-term vision to eliminate transportation activity/congestion, but rather to provide the tools needed to effectively manage it as the City grows. The TTMP's recommendations have been developed in compliance with the strategic direction outlined by the City's Strategic Plan which includes a Modern Transportation system as the first of six pillars supporting our great City.

2. PURPOSE OF THIS DOCUMENT

The final Transportation and Transit Master Plan Study will include discussion of comprehensive programs and policies for all modes of transportation. This report provides a summary of the road and transit needs and recommendations, together with an overview of the key policies and programs. It documents the analysis completed and the available alternative solutions, along with the preferred solutions, and estimated costs. Specific issues of concern are highlighted. These are presented here for consultation prior to making final recommendations and completing the TTMP study report.

3. PLANNING PROCESS

Regard for Other Studies

The Official Plans of the City of Brampton and Region of Peel provide the primary context for this project. The City's Plan provides an appropriate policy foundation upon which to develop a multi-modal transportation system for the City. It is noted that the split of jurisdictional responsibilities, with the Region responsible for several of the major roads and the City responsible for public transit, creates a potential challenge in terms of developing effective multi-modal solutions.

The City's Growth Management Program has been a key consideration throughout the project. Management of growth, relating infrastructure and service delivery to proposed land use development, was identified by the City as a prime concern for Brampton residents and businesses.

Recognizing that Brampton is part of a much broader Toronto centered metropolis, this Master Plan reflects the strategic transportation planning efforts of the Province and the Greater Toronto Services Board; in particular, the GTSB's Strategic Transportation Plan (June 2000) and the series of background reports on Removing Roadblocks (2000). In addition, it reflects input from GO Transit, the City of Mississauga, Region of Peel, the Town of Caledon, the Region of Halton and the Region of York.

The TTMP will feed into numerous other initiatives. Some of these are ongoing - for example, the City's Development Charge Bylaw Update, and the Central Area Review - and others will begin based on the TTMP, including Environmental Assessments for roads and transit.

It is to be noted that planning for transportation and transit is based on principles of "universal accessibility", which comply with the Ontarians with Disabilities Act.

Master Plan Process

The TTMP study included a consultation program to involve the public. The study has followed the "Master Planning Process" as set out in Ontario legislation for Municipal Class Environmental Assessments. This process integrates the planning of municipal infrastructure requirements for existing and future land use, with the principles of Environmental Assessment Planning. The preparation of this TTMP

thus meets the requirements of both the Ontario Environmental Assessment (EA) Act and the Planning Act. The TTMP will be used to support future environmental assessments for specific transportation infrastructure improvements.

Consultation Results

Two public consultation sessions have been held. At the first, the public provided their concerns. These included challenges such as: traffic congestion and time of travel; public transit deficiencies; and travel on Highway 410 and Bovaird Drive. Needs expressed by the attendees included: roads widenings and extensions; Brampton Transit/GO Transit service improvements; traffic operational improvements (mostly in terms of signal coordination, access and traffic calming); development hold-backs and better relationship between planning of transportation infrastructure and development, and bike lane and carpool/bus lanes.

At the second session, the public were asked for their opinion on strategic choices for the Brampton transportation system, between the status quo (i.e. road-based planning); balanced multi-modal strategy, and a "transit-first" option. The public supported the balanced multi-modal strategy.

A third consultation meeting will be held to review the detailed elements of the preferred strategy with the public.

4. CURRENT TRANSPORTATION SYSTEM AND FUTURE CHALLENGES

The transportation system faces numerous challenges in realizing the balanced vision. A review of existing travel patterns provides the context for understanding these challenges. The existing travel patterns show that:

- Brampton has close ties to adjacent municipalities, including Mississauga, southern York Region and the City of Toronto. Residents of Brampton have a higher tendency than the average GTA resident to travel to work outside their city, and Pearson International Airport is a major employment zone;

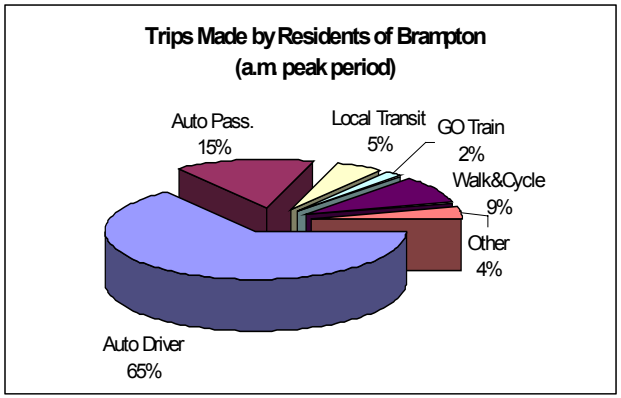


Figure 1: A.M. Modal Split Based On Trips Made by Residents of Brampton

- The jobs per capita ratio in the City of Brampton is 0.36, compared to the GTA average of 0.50. This indicates that effectively serving home-work trips by local transit will be a challenge that the City must address;

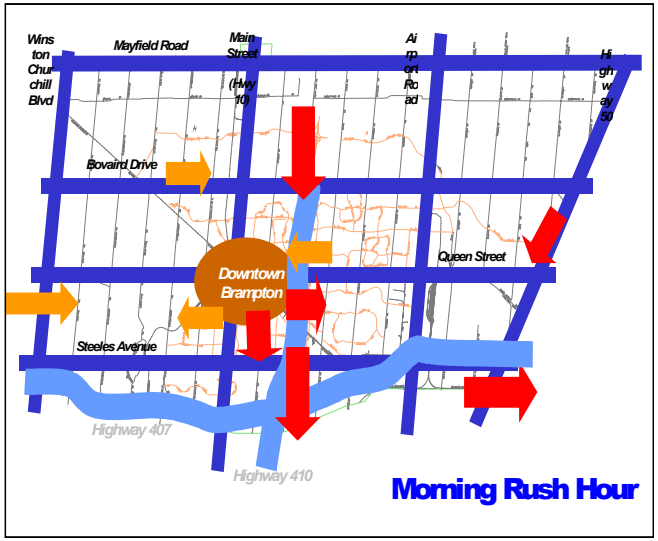


Figure 2: Morning Rush Hour Traffic Flow

- The vast majority (80 percent) rely on private vehicles for travel to work and other trips. Interestingly, Brampton has a high percentage of trips made on foot, by bicycle or other (13 percent); this is higher than many municipalities in the Greater Toronto Area, and is an achievement to build on (**Figure 1**);

- The tidal traffic flows are predominantly out of the City during the a.m. peak period, as illustrated in **Figure 2**;

- Many Brampton streets exhibit high levels of truck traffic (up to 20 percent or more). While this reflects the importance of goods movement in the City, it also raises unique challenges to managing congestion;

- Brampton's local transit system is circuitous to some extent. Also, compared to other similar municipalities, it has been under–funded, and thus there is the issue of catching up before beginning to pro-actively plan for the future. **Table 1** provides a comparison of transit shares across the GTA. This shows that smaller municipalities appear to be achieving higher transit shares. Brampton has an opportunity for improvement in this regard. Brampton is not well-served by rapid transit links. Only the GO Georgetown Rail Service links Brampton to Toronto. In established areas, there are constraints to introducing effective, continuous secondary road networks that can support transit and development intensification. These relate to existing development patterns and other barriers.

Table 1 – Existing Modal Split Comparison - A.M. Peak Period
(Based on the trips made by the residents of the relevant jurisdiction)

Jurisdiction	Population	Auto (%) (driver + passenger)	Transit (%) (Local + GO Train)	Other (%) (Walk, Cycle & Other)
City of Brampton	***255,700***	***80***	***7***	***13***
Town of Oakville	123,600	77	10	13
City of Vaughan	127,800	77	9	14
City of Oshawa	133,500	76	8	16
Town of Markham	163,500	78	10	12
City of Hamilton	320,600	72	9	18
City of Mississauga	518,700	76	11	12

Source: TTS 1996 Report

Roads also are an issue, for public transit linkages and private vehicle trips:

- The rapid pace of growth in the City has left gaps in road infrastructure in many locations. This is now posing a constraint to development in some planned areas;
- Some provincial highway initiatives previously factored into the City's development have not materialized;
- The Credit River poses a challenge for road network connections on the western side of the City, both north-south and east-west;
- The Claireville Conservation Area and Humber River valley lands pose a major constraint to the eastern section of the network;
- Rail lines and provincial freeway facilities also pose obstacles for municipal transportation linkages;
- Several intersections have major jogs, due to the presence of natural or man-made obstructions: Queen Street West / Mississauga Road / Embleton Road, and Creditview Road / Highway 7;
- Intersections of Brampton/Peel roads with Highway 50 and roads in the Regional Municipality of York occur at highly skewed angles, due to the different orientations of the two networks.

Transit

The City is served by Brampton Transit for local service, and by GO Transit for inter-regional trips. Brampton Transit operates a variety of surface routes throughout the City, and maintains important links with Mississauga Transit and York Region Transit. Several north-south routes serve destinations in Mississauga, and in several cases link to Mississauga Transit routes. Brampton Route 77 (Finch subway) is fully integrated with a similar service operated by York Region Transit.

Ridership has grown steadily since 1994 (60 percent through 2002) and per capita ridership has also increased (see **Figure 3**). Unlike many municipalities, Brampton Transit has been able to keep pace with development, increasing its riders per capita, at least until 2001. In 2002, riders per capita declined, as budget limitations restricted service increases to their lowest level in several years. This steady increase in service and ridership has also created a downward influence on economic performance, a result of increased peak and corridor services to accommodate and in some cases lead population growth. This decline should not be viewed in a negative light, and short-term increases are expected. The 2002 cost recovery ratio is still higher than the average of similar sized systems across Canada.

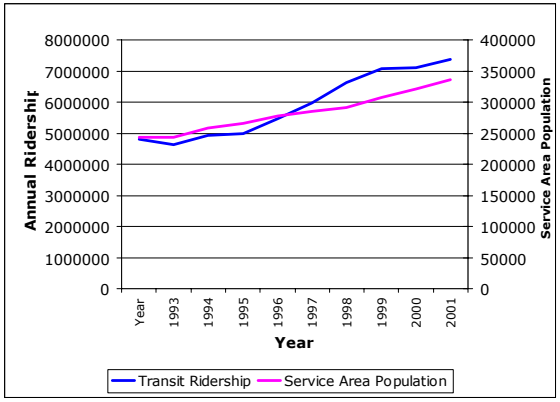


Figure 3: Comparison of Transit Ridership vs. Population Growth

The current Brampton Transit system is quite effective and efficient in serving its current customer base, with 68 percent of its routes representing 90 percent of the service hours operating at good or excellent performance levels. The full TTMP report documents a detailed review of Brampton Transit. Highlights are presented here. There are few routes that can be categorized as poor performers, and many of these are introductory services in newly developing areas.

The key deficiencies of the existing system lie in service coverage in developing areas, frequency and reliability of service, and directness of routing in meeting the needs of the travelling public. Service coverage deficiencies exist in newly developing areas in the north-west, south-west, north and north-east sections of the City, particularly north of Bovaird Drive and west of McLaughlin/Chinguacousy.

Frequency and reliability of service is a fundamental element of making the system attractive. During peak periods, many routes are experiencing crowded conditions and service reliability problems as traffic congestion increases. Evening services, reduced in the 1990s in response to budget pressures, are insufficient to promote and attract ridership.

From a routing perspective, Brampton Transit has historically operated on essentially a radial system, which is increasingly characterized by users and non-users as circuitous and slow. Major corridors have gaps in service, including gaps in key road links, and detours designed to accommodate small pockets of ridership are numerous.

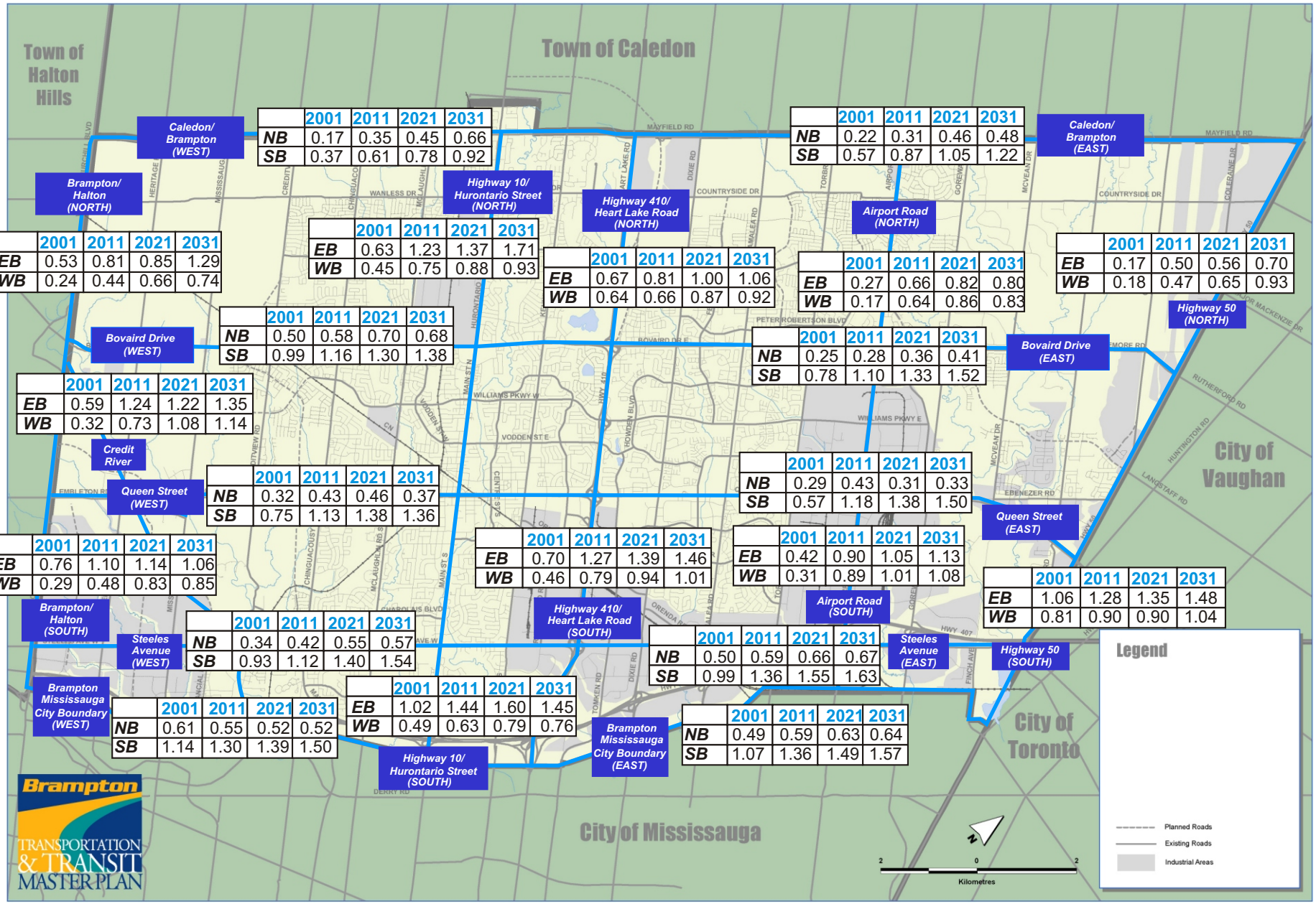
Current And Projected Road Conditions

To define current conditions, a comparison of demand to capacity has been completed for a number of screenlines within the City. Screenlines represent major cordons of movement (for example, across the Credit River); demand crossing the screenline divided by capacity is an accepted measure of the system's performance. The road capacities are differentiated by the various road classifications. The weekday a.m. peak hour has been the focus of the assessment. Key results of the comparison of volume to capacity (v/c) for each horizon year are shown in **Figure 4.** The comparison of v/c ratios based on what would result under implementation of the 10-Year Capital Works Program road improvements to the performance expected from all proposed TTMP road improvements is shown in **Figure 5** (The adjustment for high occupancy vehicle lanes is not reflected in this figure).

The projected demand on numerous screenlines exceeds theoretical capacity. Road capacity deficiencies are generally concentrated in the south end of the City, and are heavily related to travel to/from the adjacent municipalities of Mississauga, Toronto, 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, as well. In terms of the overall magnitude of trips and level of congestion, the Highway 50, Mississauga-Brampton boundary and Highway 410/Heart Lake Road screenlines are the most heavily loaded, relative to capacity. Eastbound traffic on Queen Street operates near capacity at Highway 50. Eastbound traffic on Steeles Avenue also operates in heavily congested conditions at Hurontario Street and Highway 410. Southbound traffic volumes are significantly higher than the northbound volumes crossing all the east-west screenlines during the a.m. peak hour.

It is important to note that the v/c ratio is not a physical barrier, but a mathematical figure used to define the operational constraints. Screenline volume to capacity ratios of greater than 0.9 represent locations where a congested level of service may occur on come of the

Figure 4: V/C Ratios with 10-Year Capital Plan (both the City & the Region) Improvements Only (Based on A.M. Peak Hour Model Results)



	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

	2001 Existing V/C Ratio		2011 Model Results Adjusted by Error Term		2011 V/C Ratio				2021 Model Results Adjusted by Error Term		2021 V/C Ratio				2031 Model Results Adjusted by Error Term		2031 V/C Ratio			
					Including Programmed Improvements		Including All Proposed Improvements				Including Programmed Improvements		Including All Proposed Improvements				Including Programmed Improvements		Including All Proposed Improvements	
Screenline Name	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*	*S/E*	*N/W*
Brampton / Mississauga																				
West Total	1.14	0.61	15350	6446	1.30	0.55	1.01	0.43	17393	6479	1.39	0.52	1.11	0.41	18819	6499	1.50	0.52	1.20	0.42
East Total	1.07	0.49	20898	10085	1.36	0.59	1.26	0.56	23029	10651	1.49	0.63	1.34	0.57	24164	10814	1.57	0.64	1.41	0.58
North of Steeles Avenue																				
West Total	0.93	0.34	16715	6005	1.12	0.42	1.06	0.40	20980	7843	1.40	0.55	1.16	0.44	23028	8104	1.54	0.57	1.28	0.45
East Total	0.99	0.50	23795	10375	1.36	0.59	1.27	0.56	27249	11560	1.55	0.66	1.41	0.60	28647	11730	1.63	0.67	1.48	0.61
North of Queen Street																				
West Total	0.75	0.32	13581	5064	1.13	0.43	1.13	0.43	16592	5415	1.38	0.46	1.15	0.38	18349	5038	1.36	0.37	1.13	0.31
East Total	0.57	0.29	25241	9132	1.18	0.43	1.14	0.41	29628	6535	1.38	0.31	1.19	0.26	30258	6447	1.50	0.33	1.29	0.29
North of Bovaird Drive																				
West Total	0.99	0.50	12245	6102	1.16	0.58	1.08	0.54	13698	7358	1.30	0.70	1.15	0.62	16432	8083	1.38	0.68	0.99	0.49
East Total	0.78	0.25	18510	4598	1.10	0.28	0.90	0.23	22431	5953	1.33	0.36	0.98	0.26	23885	5874	1.52	0.41	1.06	0.28
Caledon/Brampton																				
West Total	0.37	0.17	5087	2939	0.61	0.35	0.61	0.35	6572	3752	0.78	0.45	0.73	0.42	8755	6281	0.92	0.66	0.56	0.40
East Total	0.57	0.22	11746	4173	0.87	0.31	0.74	0.27	14209	6172	1.05	0.46	0.78	0.34	15452	5736	1.22	0.48	0.83	0.33
Brampton/Halton																				
South Total	0.76	0.29	8894	3862	1.10	0.48	0.92	0.40	9227	6726	1.14	0.83	0.89	0.65	9663	7718	1.06	0.85	0.79	0.63
North Total	0.53	0.24	2280	1239	0.81	0.44	0.63	0.35	2404	1868	0.85	0.66	0.54	0.42	2605	2304	1.29	0.74	0.83	0.47
Credit River																				
Screenline Total	0.59	0.32	9790	5764	1.24	0.73	0.95	0.56	9680	8527	1.22	1.08	0.84	0.74	10649	9039	1.35	1.14	0.92	0.78
East of Highway 10																				
South Total	1.02	0.49	11933	5204	1.44	0.63	1.21	0.53	13210	6534	1.60	0.79	1.34	0.66	13447	7042	1.45	0.76	1.21	0.63
North Total	0.63	0.45	9493	5791	1.23	0.75	0.91	0.56	10564	6774	1.37	0.88	1.02	0.65	11786	6369	1.71	0.93	1.20	0.65
East of Highway 410																				
South Total	0.70	0.46	15523	9663	1.27	0.79	1.08	0.67	16908	11501	1.39	0.94	1.18	0.80	17794	12280	1.46	1.01	1.24	0.85
North Total	0.67	0.64	7062	5769	0.81	0.66	0.76	0.62	8741	7608	1.00	0.87	0.94	0.82	9253	8001	1.06	0.92	0.93	0.81
East of Airport Road																				
South Total	0.42	0.31	8875	8832	0.90	0.89	0.77	0.77	10365	9951	1.05	1.01	0.87	0.83	11197	10649	1.13	1.08	0.94	0.89
North Total	0.27	0.17	4645	4474	0.66	0.64	0.66	0.64	5759	6040	0.82	0.86	0.68	0.72	5646	5832	0.80	0.83	0.67	0.69
West of Highway 50																				
South Total	1.06	0.81	11938	8397	1.28	0.90	1.09	0.77	12598	8358	1.35	0.90	1.09	0.73	13828	9724	1.48	1.04	1.20	0.84
North Total	0.17	0.18	3585	3397	0.50	0.47	0.45	0.42	4537	5306	0.56	0.65	0.44	0.51	5729	7632	0.70	0.93	0.51	0.68

Marshall Macklin Monaghan
PROJECT MANAGERS • ENGINEERS • SURVEYORS • PLANNERS

ENTRA CONSULTANTS

Figure 5: V/C Ratios Comparison (A.M. Peak Hour) Only 10-Year Capital Works Plan Improvements vs. All Improvements (including recommendations)

corridors that cross that screenline. While the TTMP cannot address conditions at the intersection level, the concerns seen at the screenline level are generally reflected or magnified when transportation operations are considered at intersections.

The TTMP analysis has shown that the 10-Year Capital Works program of road improvements is not sufficient to address these demands. Further enhancements will be needed.

Future Challenges

Specific future challenges are projected to be numerous. Key challenge areas are expected to include:

- Coping with projected growth - The City is experiencing high growth in population and employment. Over the next 30 years, population and employment levels are forecasted to double, based on the City's analysis. The 1999 Office of the Greater Toronto Area Population and Employment Forecast provides similar projections. By the year 2031, the population of Brampton is expected to double to 680,000 and employment is expected to approximately double, to 292,000;
- The Four Corners of downtown Brampton – crossroads for both major auto and transit movements, due to limited lane capacity and the inability to increase the number of lanes;
- Credit River crossings, as development proceeds west;
- North-south links to Mississauga and the Airport. Opportunities for road network expansion are limited, particularly in the highest demand area (Hurontario – Highway 410 – Airport Road). The Highway 407 corridor is a major constraint because of the costs associated with widening grade-separated structures;
- Travel along Steeles Avenue, especially in the vicinity of Highway 410 - challenges of accommodating high truck volumes in an increasingly urban corridor;
- Queen Street at Highway 410 and into downtown;
- Clark Boulevard and Royce Avenue extensions. Property issues here are reflective of the constraints on creation of effective networks of secondary roads throughout the established City; and
- Accommodation of north-south transportation demands in Bram West and Northwest Brampton.

Future challenges for transit in Brampton are both immediate and long-term. Immediate challenges include:

- Expanding service to newly developing areas, particularly in the southwest, north and north-east sections of the city;
- Improving service levels on key routes to accommodate peak demands;
- Improving service levels in off-peak service, particularly evening service, to continue to promote ridership growth;
- Improving transit service levels on a road network that is increasingly congested; and
- Ensuring adequate funding and procurement to accomplish these changes.

In the long-term, the key challenge is to improve modal split performance to accommodate anticipated growth. Population and employment forecasts for 2011, 2021 and beyond will tax the existing transportation system, both road and transit, beyond their capabilities. To manage this growth effectively, the City will need to provide adequate transit resources to promote the growth of effective, fast and reliable services. These changes must include:

- More direct corridor routings, supported by transit priority infrastructure;
- Expanded services, with higher levels of service; and
- Supportive policies and land uses.

5. BRAMPTON'S TRANSPORTATION VISION: BALANCING ROADS AND TRANSIT

As noted above, the preferred strategy is a Balanced Road and Transit system. This was confirmed through consultation with the public.

What are the Alternatives to the Balanced Road and Transit Strategy?

To provide some context for the further discussion of the preferred Balanced Road and Transit strategy underlying the City's long-term transportation vision, a number of alternative strategies considered in the study process are summarized below.

Road Dominated Strategy: This is effectively the status quo – an auto-dependent system, with minimal investment in transit or transit-supportive programs. This alternative will be problematic due to limited right-of-way widths on some roads, and limited opportunities for new roads in built-up areas. Consequently, it cannot provide a sustainable network without causing significant community disruption for provision of more roads. It would also have negative impacts on air quality and activity levels of Brampton residents.

Transit Dominated Strategy: Under this option, future demand would be met foremost by transit initiatives. This alternative would require transit priority on all arterials, and significant restrictions on auto access. Capital expenditures would focus on transit. Funding for this option would be problematic, given the deficiencies of the current Development Charge funding formula with respect to transit funding.

No Growth Strategy: Stopping growth has been suggested in some quarters as the solution to the City's transportation issues. This alternative assumes that currently approved development applications would be allowed to proceed. However, traffic passing through the City would 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. It should be noted that, although the City has recently taken proactive steps to better manage

growth through its Growth Management Program, the current legislative framework does not allow the City to categorically halt growth and development.

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.

A Prime Component of the Balanced System: Realistic Planning for Transit

A core component of the strategy development has been to focus on realistically achievable goals for transit networks and loadings within the City. The transit "targets" are based on comparisons with similar, mature origin-destination linkages across the GTA. Expected peak hour transit shares for selected key origin-destination (O-D) pairs are illustrated below.

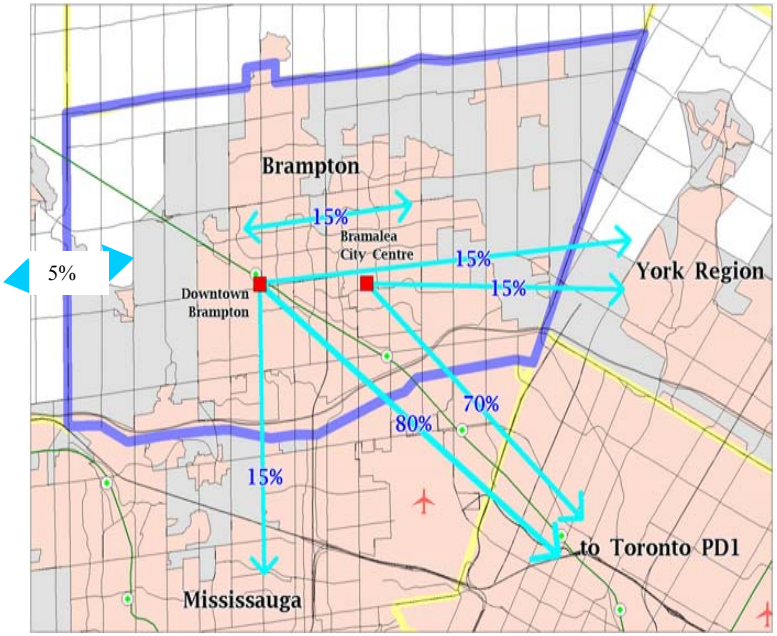


Figure 6: Selected Modal Split Targets for Key O-D Pairs

These discrete targets (as shown on the **Figure 6**) are useful in monitoring the 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.

Key Elements of the Approach: Strategic Framework

The recommended approach to the Balanced Road and Transit Strategy involves, first and foremost, redressing the imbalance between roads and transit. 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.

The complete strategic framework is shown in **Figure 7.** This framework represents the "big moves" that the City should undertake to create the balanced transportation system. The big moves will be supported by a comprehensive slate of specific initiatives and programs.

Staging of the strategic framework elements is proposed to be as follows.

Short-Term Elements

Strategic initiatives that will form the core of the short-term approach place a strong emphasis on transit. These are shown in **Figure 7a.** They 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;
- 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;

Figure 7: Balanced Strategy: Short & Long-Term Strategic Framework

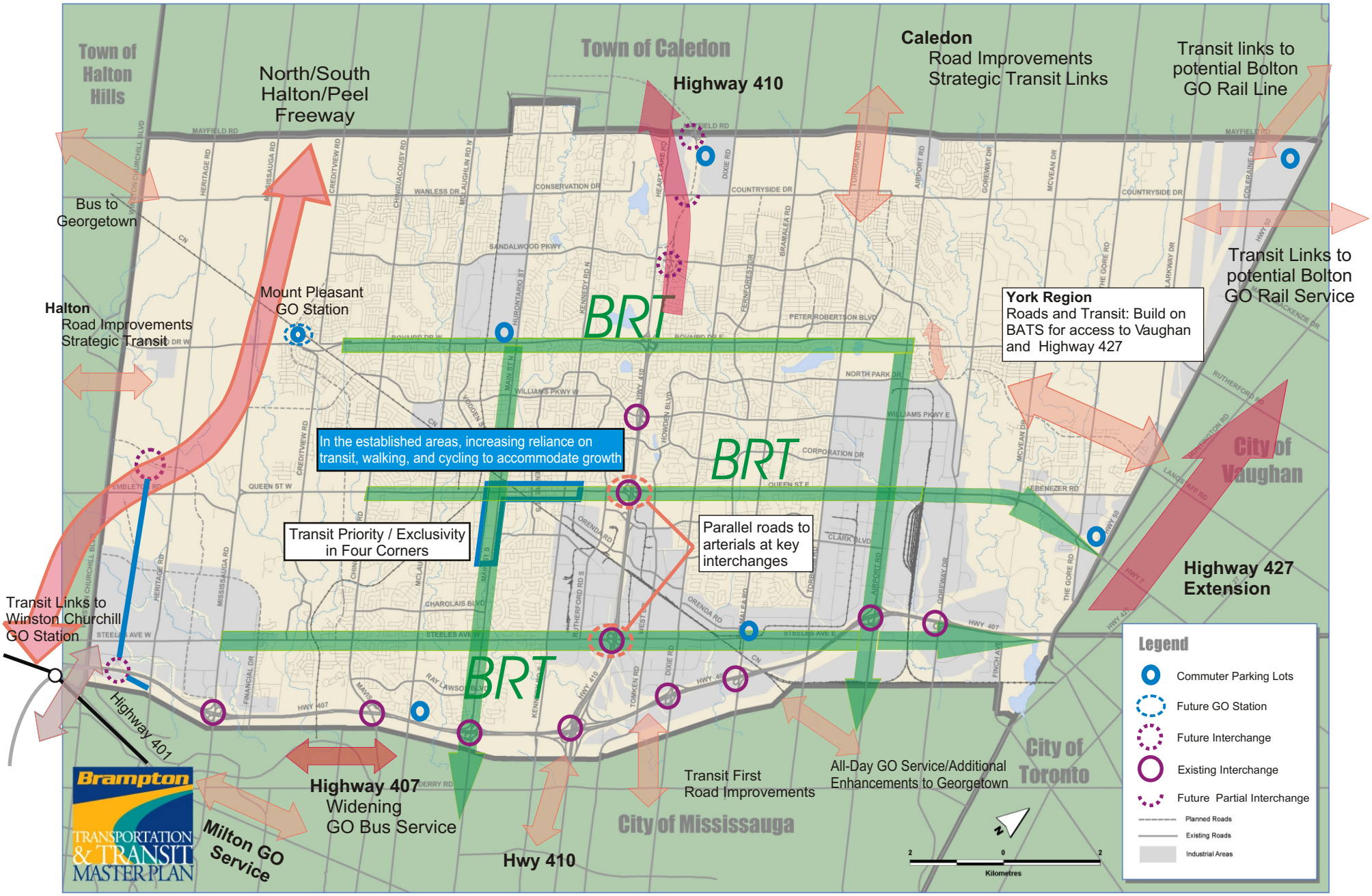
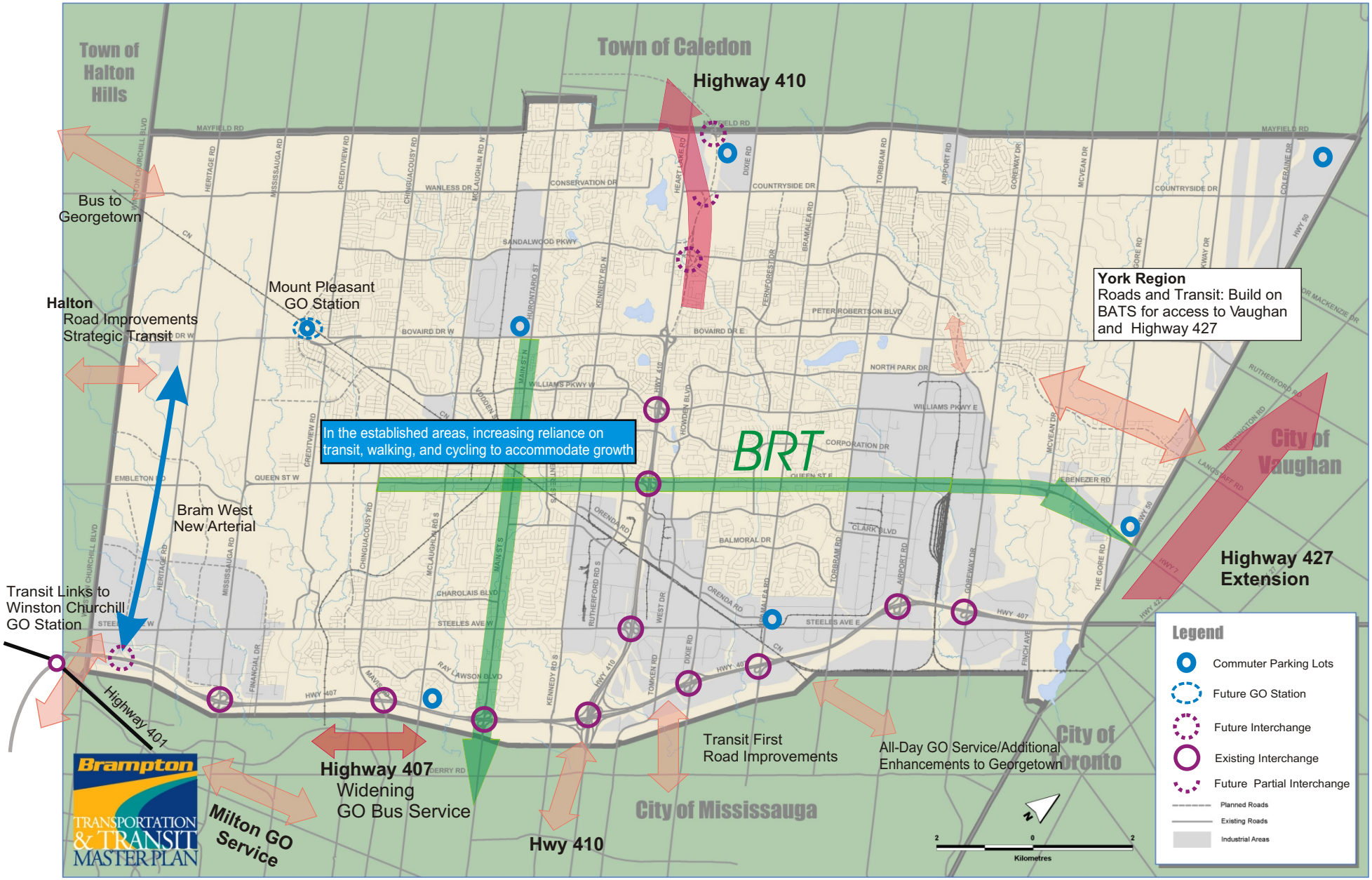


Figure 7a: Balanced Strategy: Short-term Strategic Framework



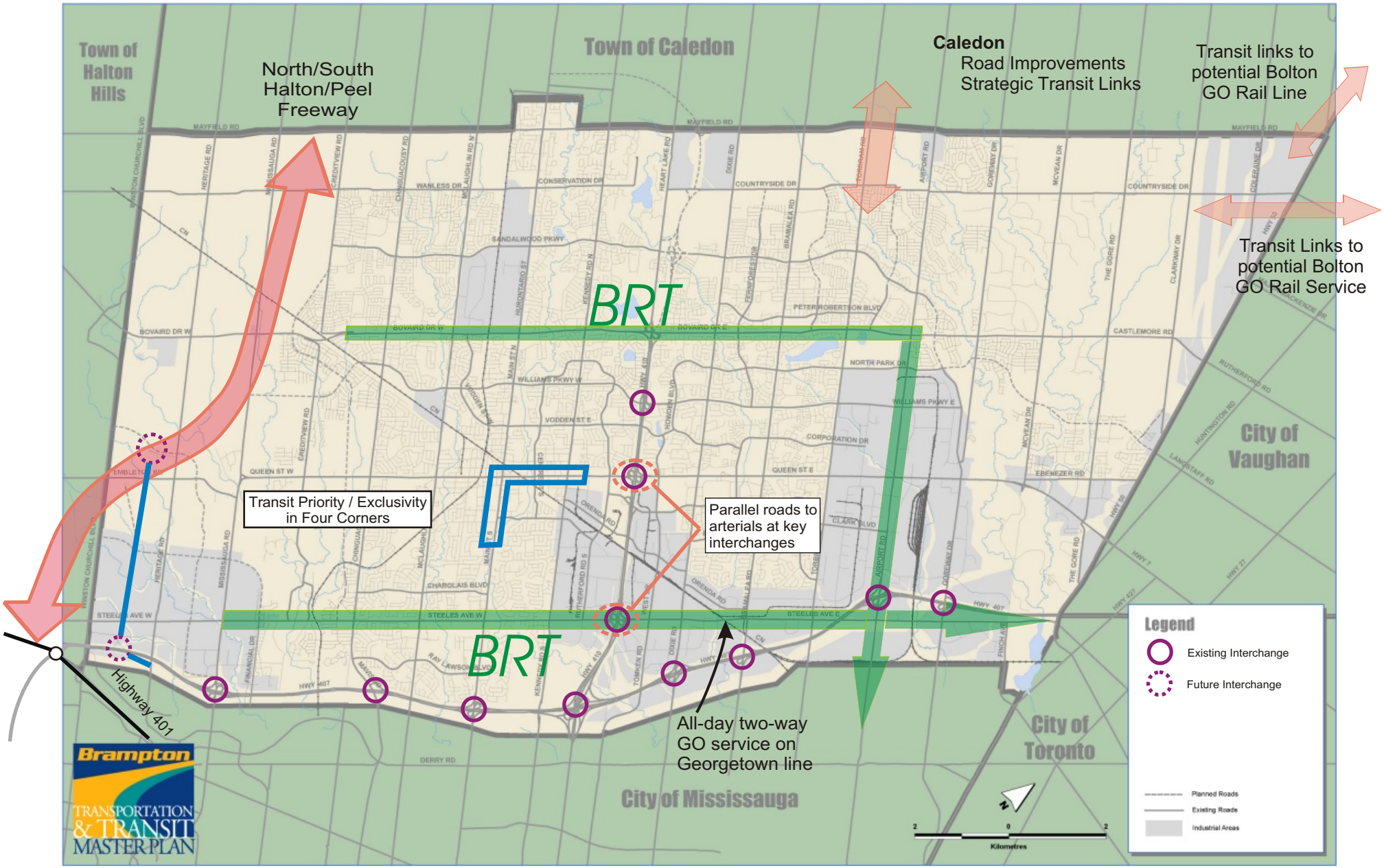
- Improvement of road links to Halton Region. Development will continue to the west, and planning for effective access will facilitate employment and residential development in Brampon;
- Introduction of transit links to the proposed Winston Churchill GO Station from the southwest quadrant of the City 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.

Long-Term Elements

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 shown in **Figure 7b.** These are:

- 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)**;**

Figure 7b: Balanced Strategy: Long-Term Strategic Framework



- 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;
- Continued expansion of the arterial and collector road network.

Urban Design

An important part of the network is the urban design quality of roads as well as major and minor gateways, and structures such as bridges. These are a subtle yet important means of enhancing the City's profile for visitors and business. A good existing example is the gateway feature on Hurontario Street north of Highway 407. Opportunities for urban design enhancement should always be considered as part of infrastructure planning projects.

Urban design will be an important element of the BRT corridors, in terms of creating a synergy between transit service, land use planning and design. Street furniture, streetscape amenities and transit shelters and stops should work in unison with site design and road planning to create streets that are pedestrian-focused, and hence transit-supportive. This is to be particularly emphasized on Queen and Main Streets, the major spines of the BRT network. Design and implementation of the BRT network on these streets is recommended to be accomplished via a multi-disciplinary corridor study which combines the three essential specialties of transit/traffic planning, land use planning and urban design.

6. EXPANDING THE ROAD SYSTEM

Continued expansion and extension of the road network is essential to provide for new growth areas, intensification of development and accommodation of high-capacity, reliable transit services. At the same time, Brampton Transit should continue to be pro-active in terms of servicing new areas as they develop, in order to build a transit orientation to trip-making.

Road Network and Staging Plans

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 existing road network is shown in **Figure 8**.

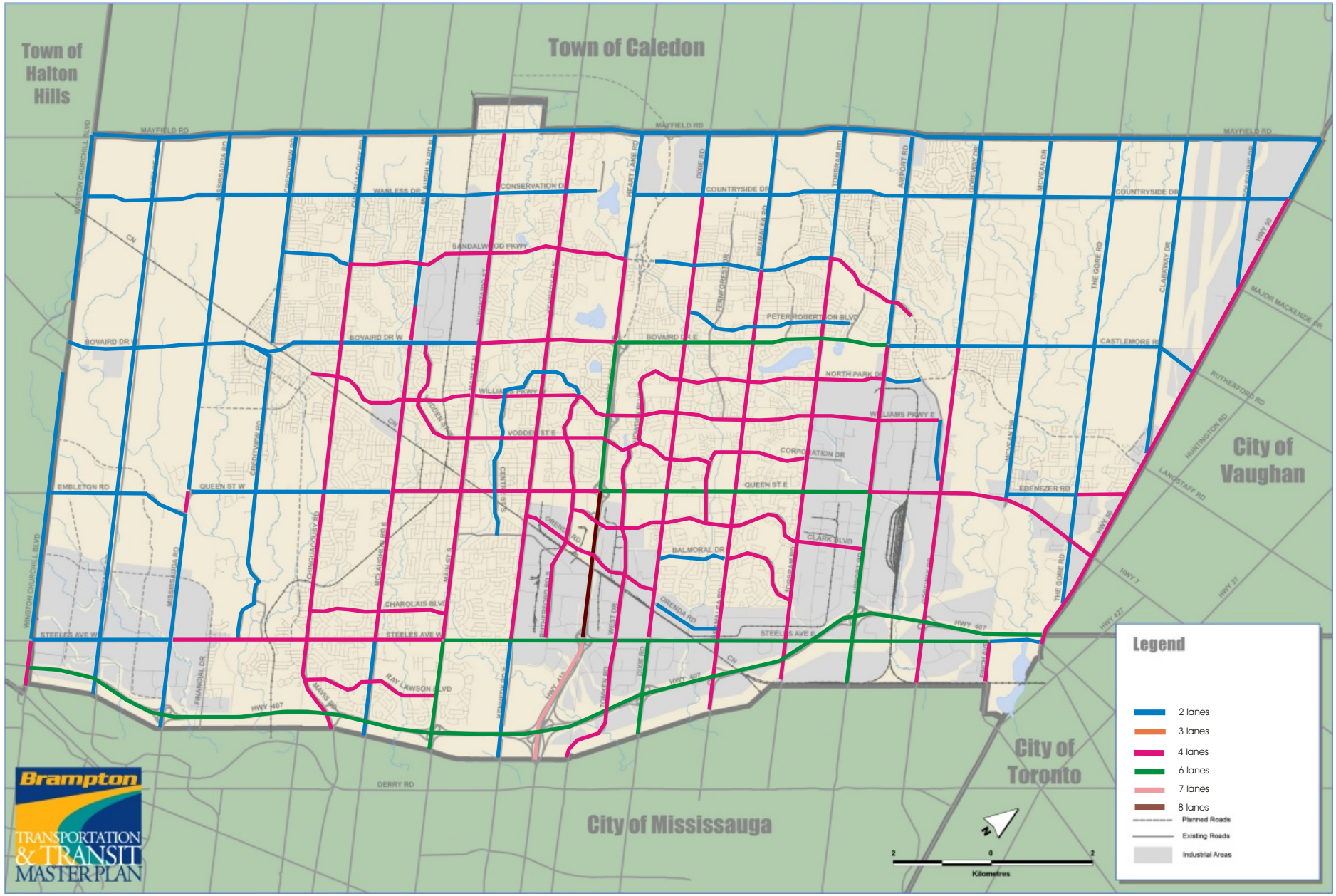
In addition to the improvements already planned by the City, the Region, 407ETR and the Ministry of Transportation (MTO), additional road works are needed to cope with growth projected to the 2011 horizon. The City's 10-Year Capital Works Plan improvements are shown in **Figure 9,** together with the Region's improvements for the same horizon. The extension of Highway 427 does not have a definitive associated timeline; the analysis proposes timeframes for implementation. It is understood that the Highway 410 extension is proposed to be completed by 2007.

The following figures show the additional road improvements recommended for implementation on the basis of the detailed computerized travel demand modeling analyses. The dashed lines show additional recommended improvements for each horizon years; 2011, 2021, and 2031.

Figure 10 shows the horizon 2011 additional recommended improvements; **Figure 11** shows the horizon 2021 additional improvements, and **Figure 12** defines the horizon 2031 recommended road improvements. The expansions represent a logical expansion of the road network, reflecting the growth of the City to the north, west and east. These figures also include road/rail grade separations projected to be required as development proceeds.

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**

Figure 8: Brampton Major Road Network - 2003



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

Figure 9: 10-Year Capital Plan Programmed Improvements

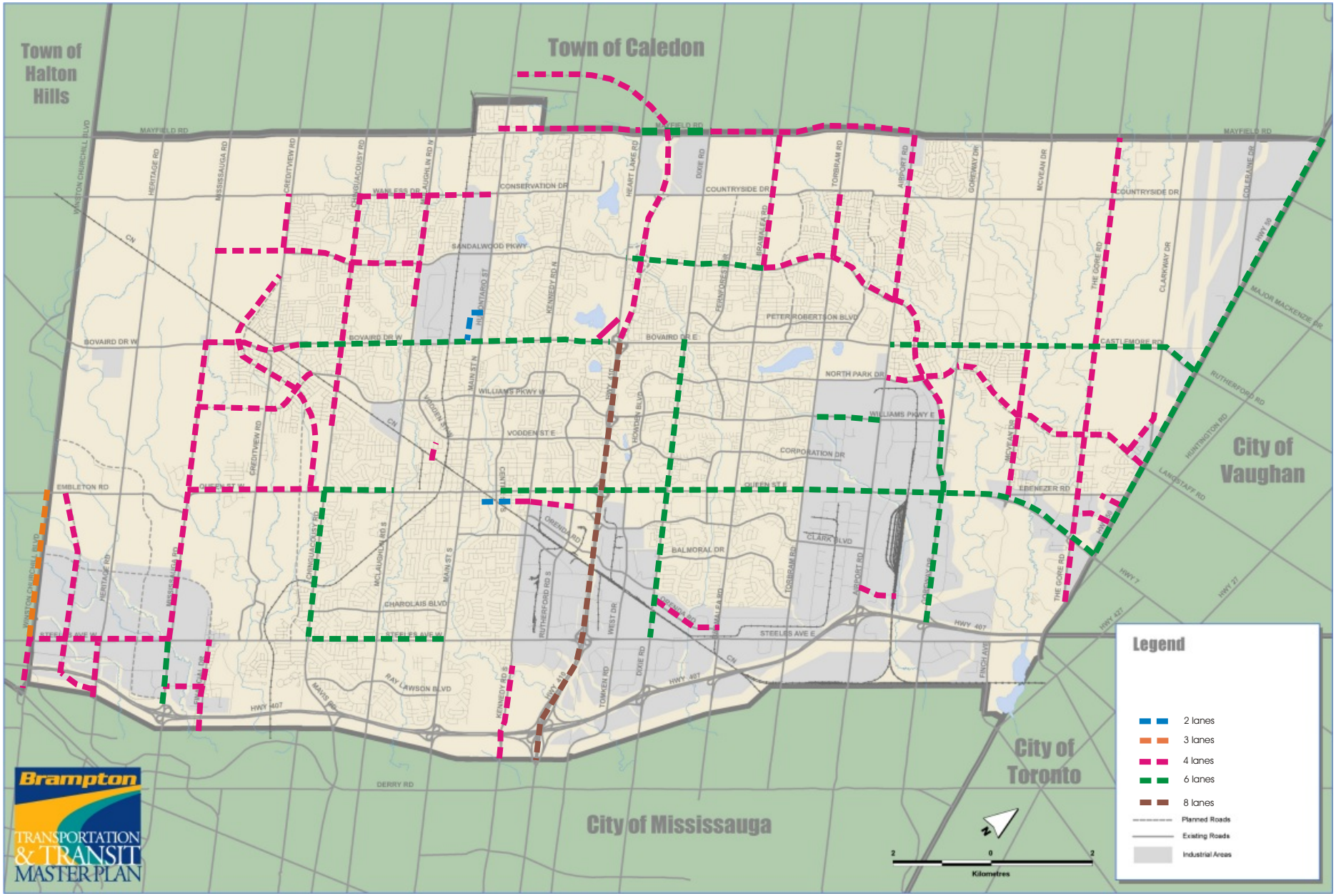


Figure 10: 2011 Road Network

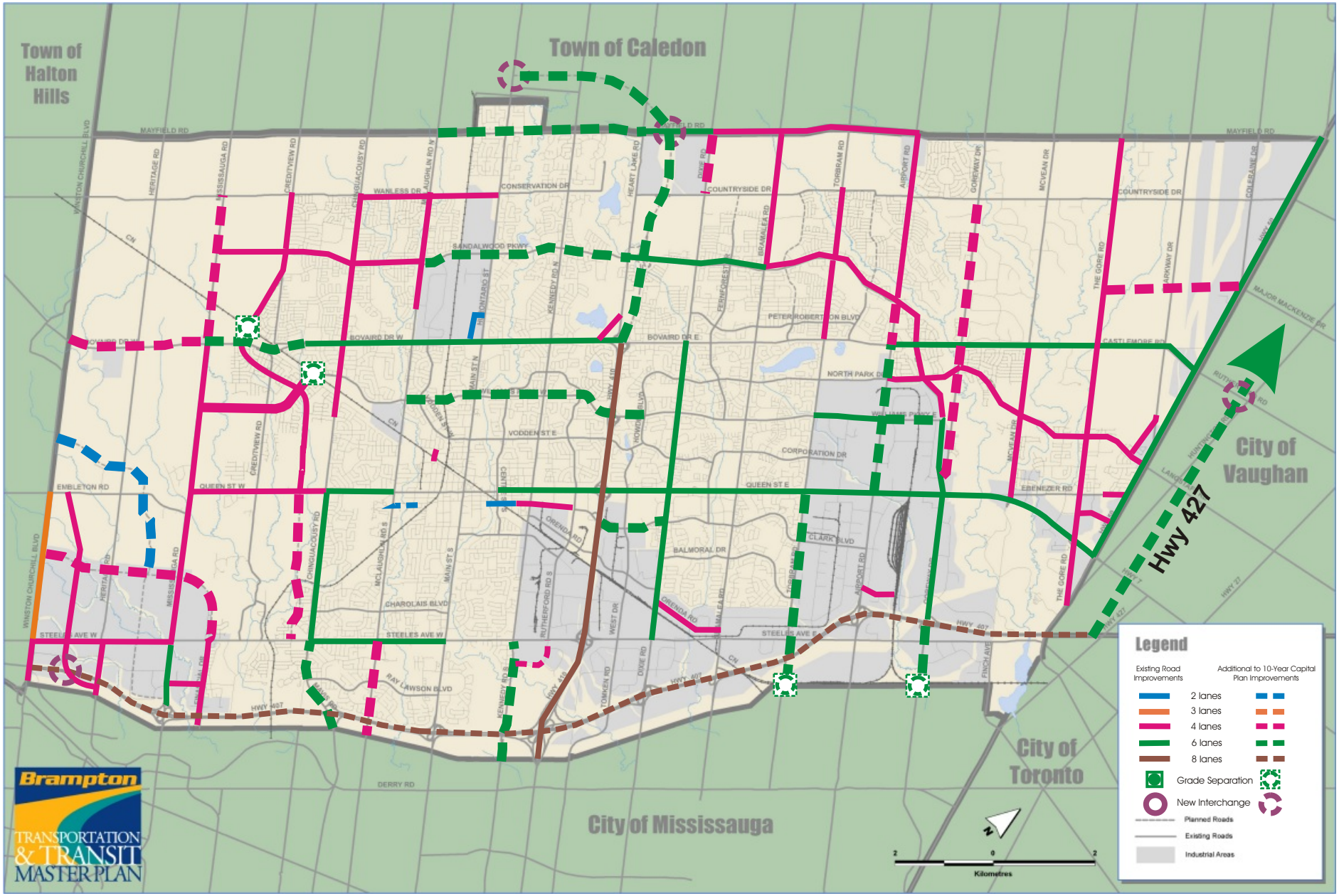


Figure 11: 2021 Road Network

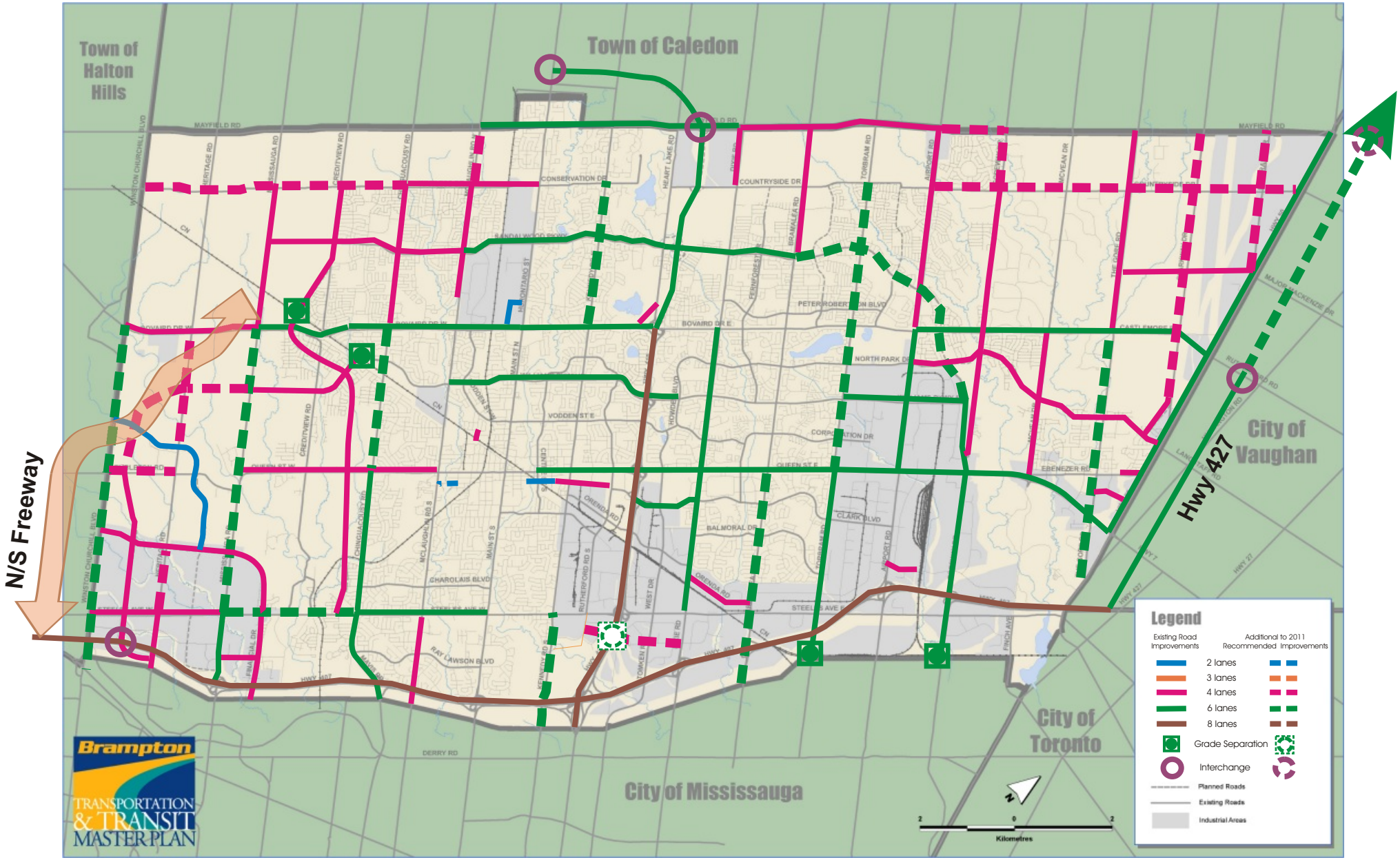
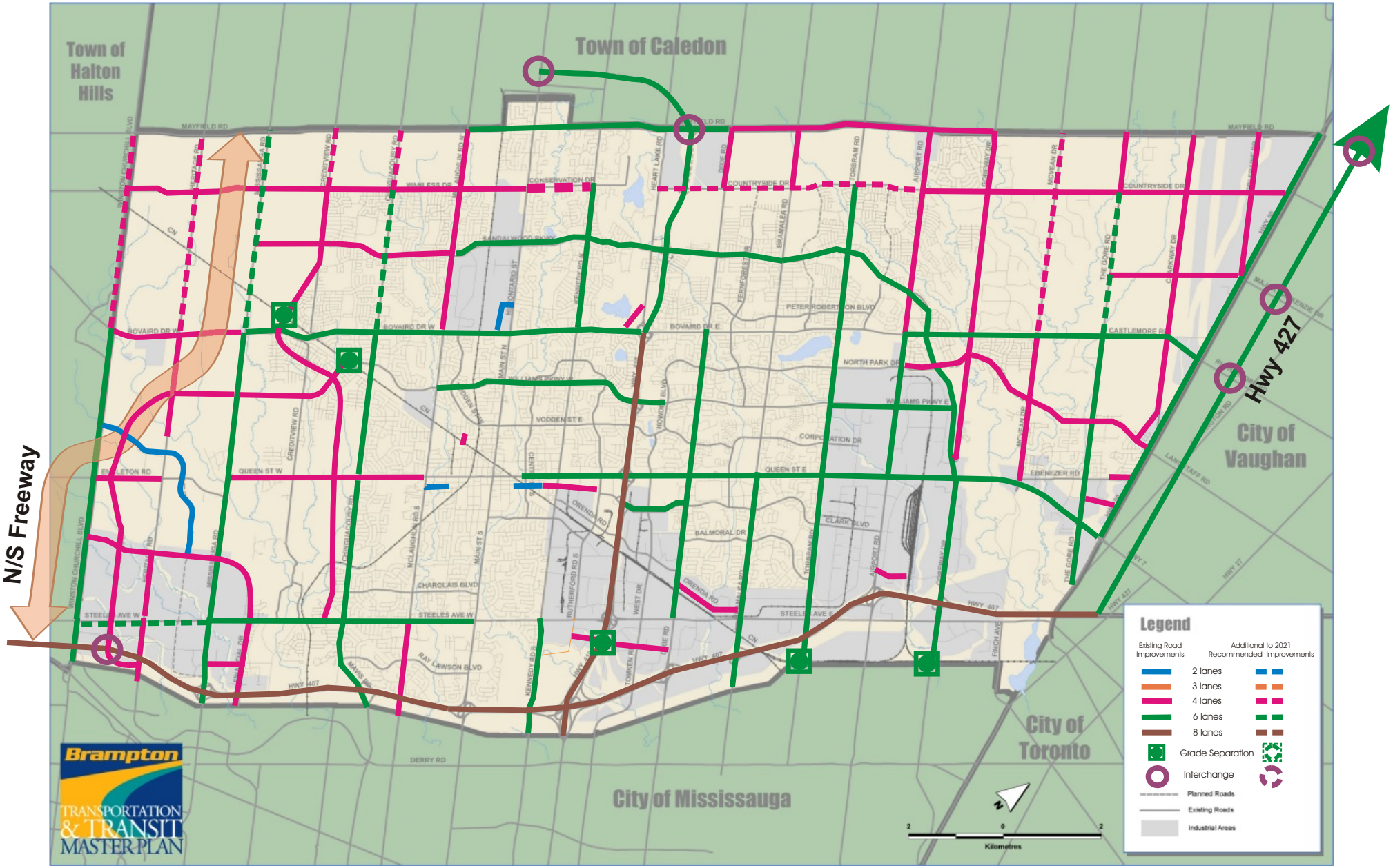


Figure 12: 2031 Road Network



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 in the TTMP for road spacing. These are outlined in Section 11 of this report.

Costs for the road and transit networks are discussed in Section 8.

7. TRANSIT SYSTEM

Figure 13 shows the levels of service in the existing system. Note that this plan, as well as the 2011 and 2021 plans, shows levels of service on the key streets on which transit operates – **it does not indicate specific separate routes**.

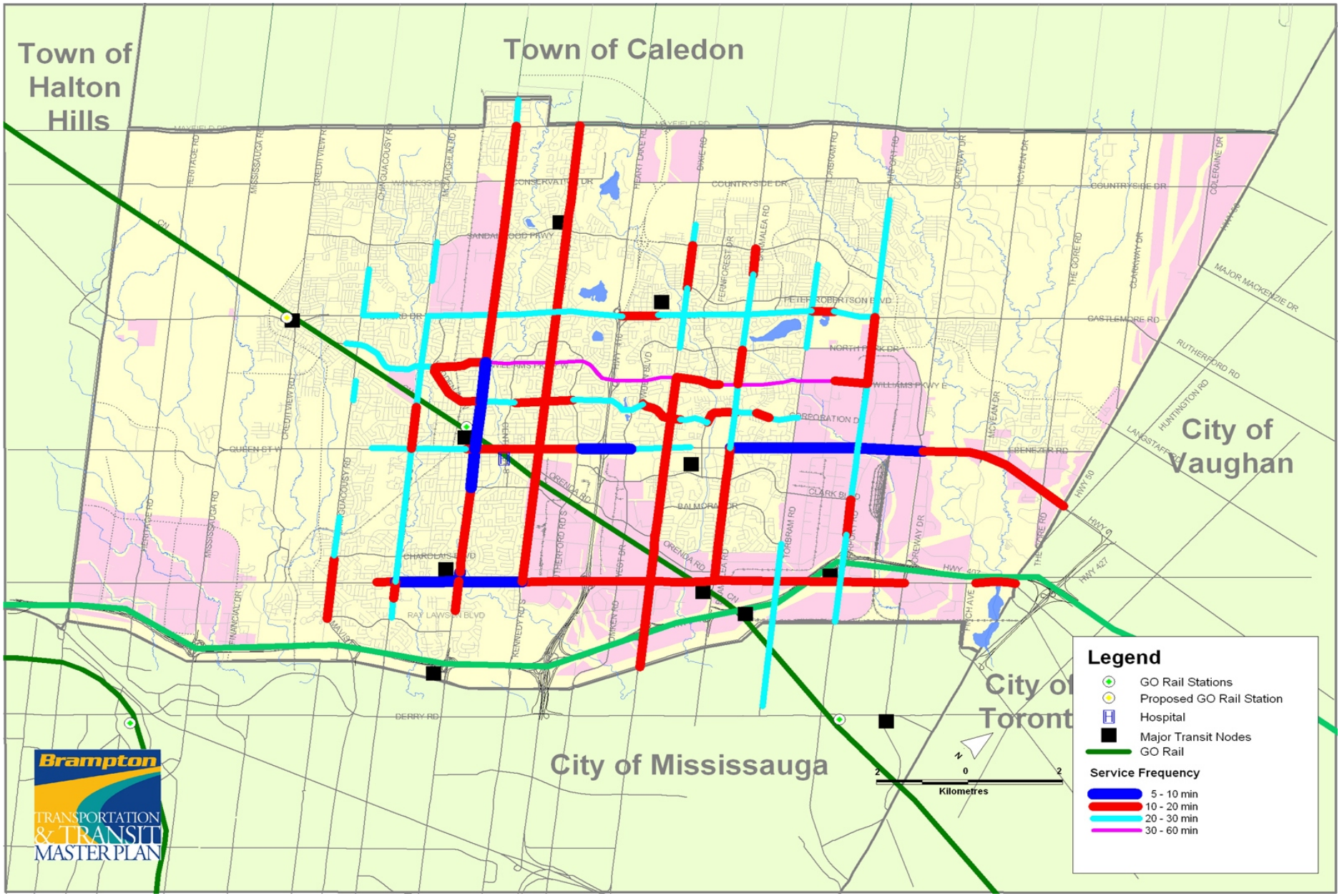
It should also be noted that the programs of road and transit improvements are inter-dependent. On the arterials defined below for high frequency service and requiring high occupancy vehicle or reserved bus lanes, road improvements have been proposed to accommodate these needs. Those inter-related changes 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 traffic capacity is needed to ensure reliable transit service.

Objectives for the System

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

The objective in the development of the long-term plans for Brampton Transit was 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:

Figure 13: Existing Transit Level of Service (LOS)



- Create strategic links to adjacent municipalities (and working effectively to share costs of these services) as shown on **Figure 14**;
- 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. Key initial proposed Brampton's linkages into the GTA rapid transit system are shown at right.

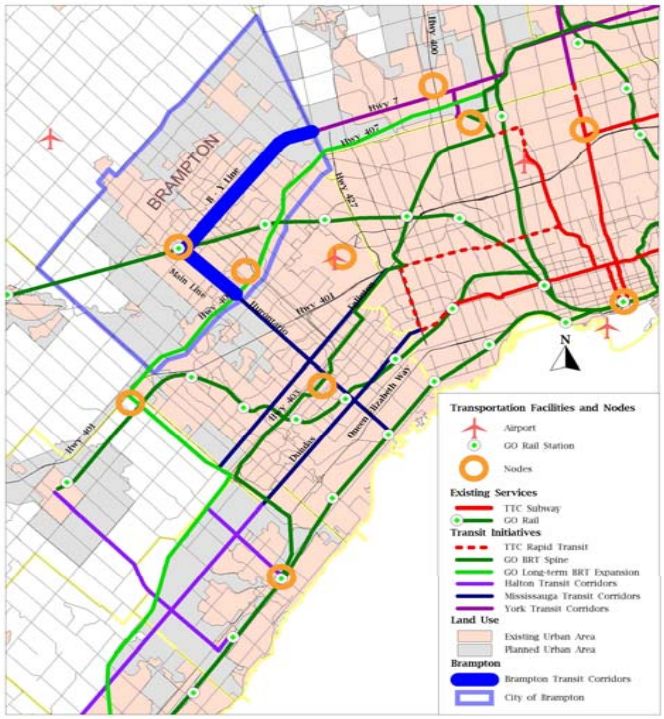


Figure 14: Strategic Transit Links to Connect Brampton into the GTA Rapid Transit Network

Changes Required to the Transit Support Systems

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.

The increase in fleet requirements will require additional funding including support from upper tier governments. While the plans as presented are for 2011, 2021 and beyond, short-term needs 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 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, travel 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. Separate busways are not envisaged. This is discussed further in Section 10 of this report.

Planned Evolution to Bus Rapid Transit

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 and services builds on the principles of smart growth, and forms a comprehensive network that:

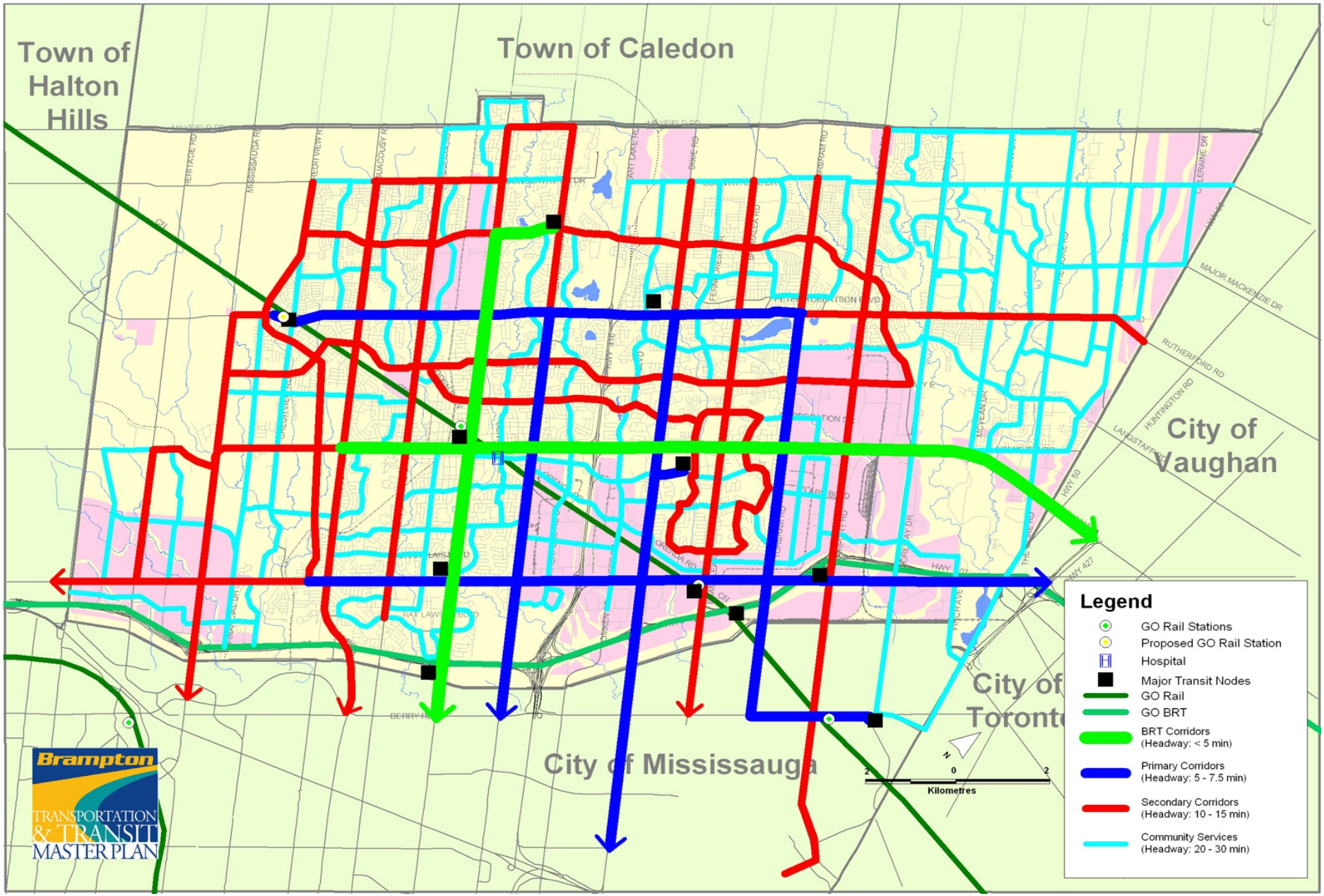
- Builds on the existing system strengths;
- Complements the existing and emerging inter-regional transit network;
- Promotes effective and efficient travel throughout Brampton and the region;
- Expands opportunities for development in key corridors; and
- Builds on short-term initiatives with the flexibility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

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 15** 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;

Figure 15: 2011 Strategic Transit Framework



- 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.

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

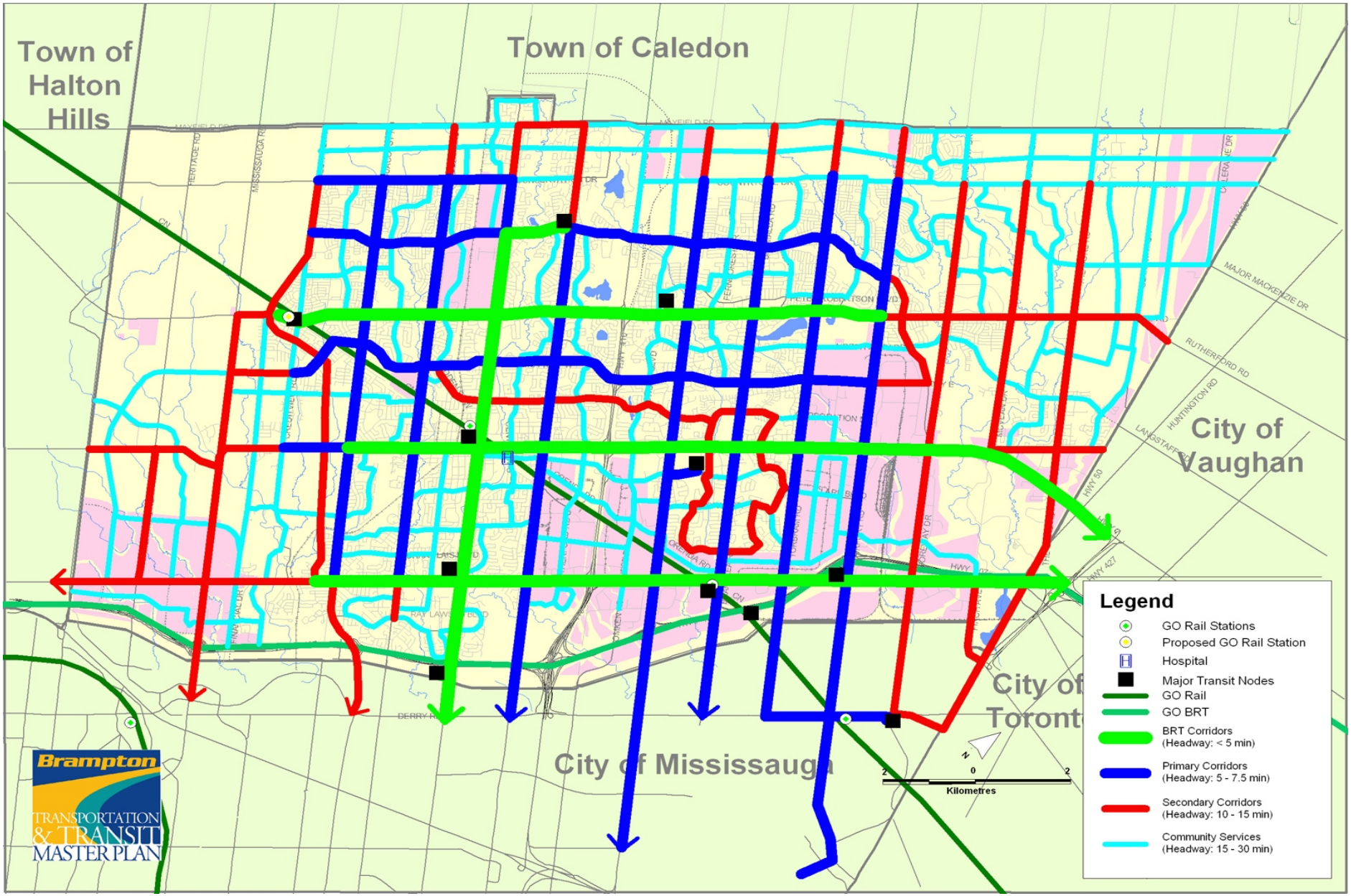
The 2021 system plan (see **Figure 16)** is an extension of the 2011 plan. The 2011 plan establishes most elements of the grid. Beyond 2011 services continue to grow in response to demand and service levels increase. As service levels increase, additional support is required to maintain the reliability 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.

Figure 16: 2021 Strategic Transit Framework



8. COSTS

The current 10-Year Capital Works Program allocates approximately $500 millions for roads (this value has been updated with the most recent costs). The projected costs for the TTMP are shown in **Table 2**. The figures in the table are based on the preliminary results of the Development Charges By-law Update study.

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.

Table 2: The Projected Costs for the TTMP

	Infrastructure Costs		
	City	Region	Total
10-Year Capital Works Program [1]	$331 million	$169 million	$ 500 million
Improvements Recommended by 2011	$205 million	$ 77 million	$ 282 million
Improvements Recommended by 2021	$213 million	$ 55 million	$ 268 million
Improvements Recommended by 2031	$ 61 million	$ 40 million	$ 101 million
TOTAL	$810 million	$ 341 million	$1,151 million

(*) 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.

(1) The total includes also the expenditures forecasted by the City for 2012 and 2013

(2) All figures are rounded to the nearest thousand and include 3% GST

(3) Preliminary cost for Clark Boulevard improvement is not included in the figures

Brampton's current capital estimates to 2011 for transit include approximately $85 million for vehicle purchases and $57 million for other non-vehicle costs. 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.

Additional non-vehicle costs are estimated at approximately $18 million over and above the projected $57 million, for a total investment for 2011 of $160 million.

To the 2021 horizon, new bus purchases will require a capital investment of approximately $80 million, with non-vehicle costs of approximately $20 million, for a total of $100 million.

9. SHORT-TERM ACTION PLAN

Roads

A short-term action plan has been identified in recognition of needs and opportunities. In defining the need for future improvements, the improvements currently programmed and/or identified by the City, the Region, the Province and 407ETR are taken into account. Increased capacity across the Highway 410, Steeles Avenue, Brampton/Vaughan and Brampton/Halton Hills screenlines is needed. These and other locations of congestion need to be addressed, primarily by road improvements in the short term. These include intersection improvements, and road expansions and extensions.

The Highway 410 extension should be considered as the highest priority road improvement in Brampton. It is of course recognized that this improvement lies within the Province's jurisdiction, but Brampton should continue to work with the Province to advance its implementation, through joint initiatives where appropriate. Together with the Sandalwood Parkway extension, the completion of Highway 410 will provide a better distribution of traffic around Trinity Common and along Bovaird Drive.

The western edge of the City (i.e. west of McLaughlin Road to Mississauga Road and beyond) is also a priority for road improvements. The City needs to move ahead with initiatives that can address north/south capacity constraints. An effective secondary arterial/collector

network is being planned through the Secondary Plan process. Implementation of those links is important in provision of capacity relief to the existing arterials.

AcceleRide Transit Program

The City is currently completing a five-year transit service review, independent of the TTMP. This review is identifying short-term expansion plans, particularly in the west and north-west, to take advantage of the Mount Pleasant GO Station, and in the north-east. The focus of these new services is to begin establishing the recommended 2011 grid pattern and supporting network of neighbourhood routes.

A significant component to emerge from the long-term plan development was the AcceleRide initiative – a precursor to higher order transit on key east-west and north-south corridors, to be implemented in the short-term. The concept includes 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 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.

In the first steps towards implementation, project team staff have worked with Peel Region staff to identify intersection modification requirements in the Queen Street reconstruction project from West Drive to Airport Road, identified longer term protection requirements in other potential corridors such as Bovaird Drive and Steeles Avenue, and begun to work with GO Transit, Mississauga and York Region staff on inter-regional integration issues. Plans for the overall concept have been well received by other levels of government and staff have begun to develop a comprehensive work plan for the next phase of work.

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 staff are identifying initial route and service modifications within this framework, and routes will begin to evolve towards the longer term vision beginning today.

10. RECOMMENDED ACTIONS FOR KEY ISSUES

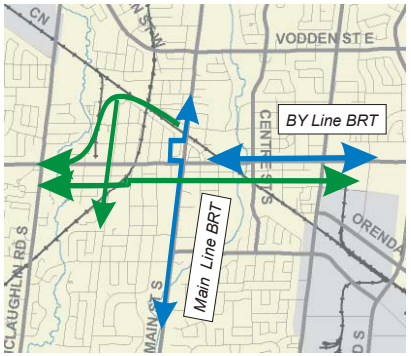
The TTMP addresses key issues relating to roads and transit. The first one; the most complex – Evolution of Downtown Brampton is outlined in some detail; the remainder are summarized in table format. It is recommended that, as an initial step in implementing the TTMP, the potential steps in the evolution of Downtown Brampton opportunity be evaluated in greater detail in conjunction with the relevant land use, urban design, and strategic issues important to the City.

Evolution of Downtown Brampton

The two key goals for downtown Brampton are: 1) replacing traffic passing through, with traffic destined to downtown; and 2) giving more priority to transit to achieve the transit objectives of the TTMP. A proposed evolution of the Four Corners is described below:

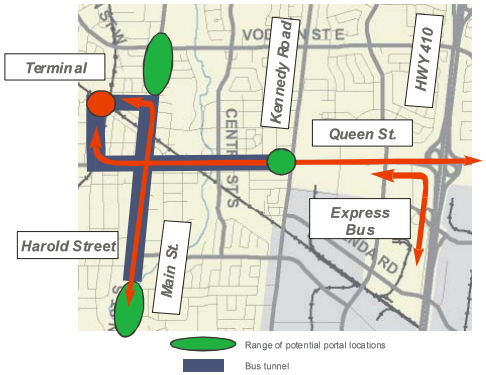
1. The City's proposed expansion of off-street parking is an opportunity. By eliminating on-street parking on either the minor or major streets (weekdays 7 a.m. to 7 p.m.), transit priority can be provided in the areas highlighted at left, in the immediate term;

2. 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;



3. Transit Priority continues to be enhanced, with a ring road around the Four Corners, to divert auto traffic. 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. Perhaps 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 would be beneficial to the increased movement of people and transit vehicles on the Main Line.

4. In the long-term, an underground bus tunnel is introduced, to provide the ultimate degree of transit priority (via grade separation). Options need to be considered for the portal locations. The terminal would be expanded underground. Bus tunnels have been introduced as positive network components in Seattle and other cities.



The feasibility of a bus tunnel would need to be determined by a more detailed investigation, addressing utilities, the structure of the bus terminal and many other factors. The cost would be dependent on the length of the tunnel, and its relationship to watercourses on Main and Queen Streets. Very preliminary investigations suggest that the cost could be in the range of $150 million.

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.

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

Other key issues are addressed in the following **Table 3**.

TABLE 3: Recommended Actions For Key Issues

Issues	Actions
Highway 410 Extension	• Extension of Highway 410 by 2006/2007 from Bovaird Drive to the City boundary, has been addressed in the EMME/2 model • Recommended to be built with a six-lane cross-section • Further delay would result in the need to expand Heart Lake Road and numerous parallel roads • The major issue of inter-municipal through traffic needs to be accommodated by Highway 410, to avoid overloading the City's arterials • Utility of parallel roads: Kennedy road is projected to approach capacity in the peak direction; Dixie Road's capacity will be constrained as it is being considered as one of the primary transit corridors that should have reserved bus lanes (RBL)
Highway 427 Extension	• Not included in the model due to uncertainty regarding timing and location • Screenline analysis shows that the demand on Highway 50 is over capacity; the extension of Highway 427 is expected to relieve the burden by providing the additional capacity needed • The absence of the extension would result in overloading first Highway 50, then The Gore Road and Clarkway Drive as development proceeds • Screenline analysis outlines that even the six-lane cross-section of Highway 50 will not be able to accommodate the demand by 2011 and 2021 if the extension is not provided • The extension could be in two stages; first being to Rutherford Road as soon as possible, second to Major Mackenzie Drive by 2021. This was also recommended previously in the York-Peel Boundary Area Transportation Study (BATS) • The extension of Highway 427 can also facilitate transit either on the highway itself or on Highway 50

Issues	Actions
Potential New East-West Highway North of Brampton	• The planned improvements on Mayfield Road / Wanless Drive and the additional recommended improvements for 2021 and 2031 provide enough east-west capacity for municipal demands in the corridor at the northern edge of the City • The conceptual "Highway 413" multi-modal transportation corridor does not appear to be needed to meet local traffic demands by 2031 • To address inter-regional or province-wide demands, which were not investigated in this study, a provincial modeling study is expected to be undertaken
New Peel / Halton North-South Freeway	• The north / south demand in the westerly part of the City could warrant the Peel/Halton Freeway in two stages: first, by 2021, being the section between Highway 407 and Bovaird Drive crossing Winston Churchill Boulevard and Heritage Road, and the second being the northern extension to Town of Caledon, after 2021, following the development of Northwest Brampton • In case of the freeway can not be achieved, other parallel road improvements need to be implemented: expansion of Winston Churchill Boulevard to six lanes, Heritage Road to four lanes (except the segment between future Financial Drive and Road "A', due to the physical environmental constraints), and Mississauga Road to six lanes. The new Bram West Parkway as a four-lane facility was also included in the analysis, along with Financial Drive as a four-lane arterial
Trinity Common	• Road Network improvements are expected to diminish congestion issues. The Highway 410 extension and the Sandalwood Parkway extension would provide a better distribution of the traffic around Trinity Common and Bovaird Drive • Role as a transit hub will begin to diminish in the short-term, as grid services are established. In longer term, the recommended BRT services on Bovaird Drive would make transit a more feasible means of transportation to reach Trinity Common; this would assist the transition of the facility • Future land use adjustment in the north end of the City would assist in managing congestion (i.e. more dispersed commercial uses)
Norval By-pass	• Since the TTMP was focused within the City boundaries, the Norval by-pass was not examined in detail • The potential Peel/Halton north-south freeway would act as a by-pass of Norval crossing the Credit River providing much expected infrastructure. An environmental Assessment (EA) would be needed to focus

Issues	Actions
	specifically on this corridor and alternatives
Clark / Eastern / Wellington / Royce Connections	• Since Queen Street is already heavily loaded, and the proposal for Bus Rapid Transit on Queen Street is under consideration, this connection is one alternative which could accommodate local traffic on a parallel route • If Clark / Eastern / Wellington / Royce connection is not feasible, other alternatives should be planned (e.g. improved Clarence / Harold connection across Main Street) • It is recognized that there are extenuating circumstances regarding property, costs and potential community effects; the final decision and protection of the corridor is subject to more micro-level review and comprehensive cost/benefit analysis. Costs may be very high for some elements; if this is the case, the cost/benefit analysis may show that investment in other TTMP projects should have a higher priority

11. POLICIES AND PROGRAMS

The full TTMP report will document the many recommended policies and programs. These address Transportation Systems Management, Intelligent Transportation Systems, Travel Demand Management, Bicycle and Pedestrian Access, and Goods Movement.

Because of their importance to the evolution of the Brampton transportation system, two programs are highlighted below.

Transit Supportive Policies in Downtown

The transit priority initiatives in the Four Corners must be supported by a strong policy/program framework. A review of parking policies in the downtown (both on and off-street) and definition of a staged plan for the adjustment of rates and rate structures to encourage transit use and discourage long-term parking on-street will be needed. This could include limiting the permitted parking duration in metered spaces to a certain limit. The policies should also include promoting shared-use of parking, which would limit parking over-supply, a key factor in auto dependence. A detailed study is needed to define this plan.

Principles for Road Network Enhancement

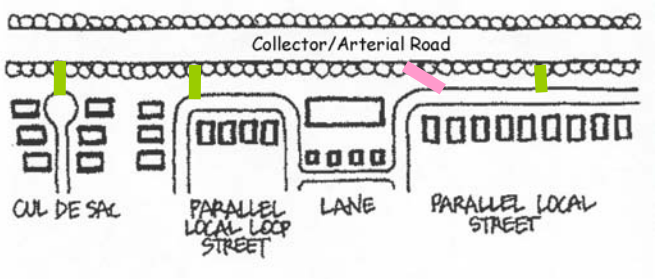
As a principle, the City should continue to plan for implementation of a robust **continuous network of arterial and collector roads** which can provide improved accessibility across the City, and accommodate additional development-related demands away from the major arterial network.

In particular, opportunities for providing **additional road connections across freeways and for creating "bypasses" of key nodal intersections** should be explored. Additional road crossings of freeways parallel to the arterial network can enhance the potential for intensification at major highway nodes. Specifically, a crossing of the Highway 410 corridor south of Steeles Avenue is proposed.

Secondly, the principle of **continuous collectors at (a preferred) 500 to (maximum) 1,000-m spacing** should be reflected in Secondary Plans. These roads should ideally be continuous across at least one concession block. This spacing is needed to provide effective transit service, in terms of sufficient accessibility based on walking distance. It also provides the flexibility in the road network needed to cope with incident management, emergency vehicle access and avoidance of extreme intersection designs (such as double left turn lanes).

Supplementary to this principle is the expected need for introduction of new road connections into existing communities as they evolve to a more transit-supportive form. (For example, consider the City of Mississauga City Centre District Plan, which features small, urban scale blocks for transit and pedestrian access.) As the City intensifies, there will likely be a need to retrofit such links into the network. A good example is the potential Royce Avenue connection.

Thirdly, 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. 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. This will support transit-supportive, involved, active and participatory communities, with "eyes on the street".



These two latter principles are based on the Transit Supportive Land Use Guidelines (MMAH/MTO, 1992), a still pertinent reference for municipal transportation planning.

12. MONITORING

A monitoring and master plan review process is an essential element of the implementation strategy. Monitoring of land use is assumed to be undertaken through the Growth Management Program. It will be essential for Transportation and Transit staff to work with Planning staff to coordinate transportation and land use plans. The transportation monitoring program should track changes in travel characteristics including trip generation rates, modal splits, trip lengths and auto occupancies, and road and transit system performance and utilization, addressing auto and commercial vehicle demand on screenlines and at key constraint points. A regular, well-defined program of counts is needed to achieve this goal. The data should be made available to the public and the consulting community through the Internet, to achieve inclusive decision-making and facilitate information exchange.

By monitoring program results in relation to objectives and targets, City staff will be able to assess whether existing policies and programs need to be strengthened, whether new policies and programs are needed, whether shifts are needed in road and transit capital and operating expenditures, and whether upgrades in rapid transit technology need to be considered.

The Master Plan should be reviewed and updated on a 5-year basis to take into account changing trends in demographics, development and travel patterns.

13. DEMAND MODELLING BASIS OF THE RECOMMENDED ROAD AND TRANSIT SYSTEM

A fundamental tool in the Master Plan analysis is the computerized travel demand forecasting model, which is used to calculate road demands on a link basis, and to project transit trip matrices for use in the transit planning analysis. (The model does not include a transit network component.) The primary model used was derived from the Region of Peel's EMME/2 Model. Enhancements made to customize this model to conditions in the City of Brampton included:

- Expansion of the number of traffic zones within the City to provide better representation of the land use aggregations and the road network
- Addition of numerous collector and arterial road links, to better simulate travel routes within the City
- Updates to the land use to reflect the City's Official Plan projections

The model is calibrated to replicate existing a.m. peak hour demands on screenlines across the City, within a margin of error of ±10%. This is a widely accepted "standard" for accuracy. Once the existing conditions model is adequately calibrated, future land use is input to project demands at the 2011, 2021 and 2031 horizons, and to test road network options

Outputs from the model were used in the more strategic assessment of transit needs and opportunities. "Best case" estimates for transit were used in the roads model, to isolate the auto demands. These are estimates of the realistic potential for transit mode shares, based on examples from across the Greater Toronto Area, where the transit system has matured to a state comparable to that which can be expected in Brampton. This is discussed in more detail above.