CITY OF BRANTFORD

2020 BRANTFORD TRANSPORTATION MASTER PLAN UPDATE

November 2020

FINAL

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Background

As part of the 2017 budget process, Brantford City Council approved the review of the 2014 update to the 2007 Transportation Master Plan (TMP). This update occurred at the same time as the review of the City of Brantford's Master Servicing Plan (MSP) and Official Plan (OP). The 2020 Transportation Master Plan (TMP) update includes the Boundary Expansion Lands (approximately 460 ha in the North and Tutela Heights Expansion Areas) that were transferred from Brant County to the City on January 1, 2017. Recommendations from the TMP will be considered for inclusion in the 10-year capital forecast and future Development Charges studies, and the strategic objectives have been incorporated into the OP.

Updating the 2014 TMP has provided an opportunity to review, reconfirm, or change the City's main transportation infrastructure and service plans. The update has also addressed newer issues involving changing economic and associated growth conditions, changes in the regional transportation context around Brantford (i.e., Highway 24, Highway 403, provision of GO Transit service), changing travel patterns, and evolving public priorities for the transportation system, for example dealing with the new Complete Streets philosophy, expanding the emphasis on Active Transportation, and new traffic management and calming measures (i.e. potential for roundabouts).

Study Objectives

The following study objectives were set by the City for this TMP Update:

1. Plan to accommodate city growth to 2041, including the urban boundary expansion of the City of Brantford, the intensification target for development within the Built-Up Area, and density targets within the Designated Greenfield Area as set out in the new Official Plan;
2. Provide transportation infrastructure project and cost input into the Development Charges update;
3. Follow the Master Planning process and key principles of the Municipal Class EA to satisfy EA requirements for Schedule 'B' undertakings, and Phase 1 and 2 for Schedule 'C' projects; and
4. Consult with First Nations, agencies, stakeholders and the public early and continuously throughout the Master Planning process, using various techniques and materials.

Study Approach

The approach used in this TMP Update was organized into five (5) distinct project phases:

- Phase 1: Develop a Study Foundation – Set the stage and boundaries for the City of Brantford's transportation system.
- Phase 2: Integrated Transportation Strategy – Determine integrated strategies for developing networks, programs, and policies for all travel modes in a manner that supports community building objectives.

- Phase 3: Street Network Capacity Needs – Define problems and opportunities for the transportation system.
- Phase 4: Review of Key Transportation Issues – Review and assess the relationship between regional and local needs of the transportation network and identify a plan and role for the local system.
- Phase 5: Implementation Plan – Bring the elements of the TMP together and develop a practical approach to implement and monitor the TMP transportation network and guide the City forward to the 2041 horizon year.

The approach and methodology are designed to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process and follow a Master Planning Process Approach. The integration of technical and consultation activities is a core element of the process.

Foundations

Public Consultation

The City recognizes that the choices the community makes today with respect to growth and development and long-term needs for transportation infrastructure will shape the community for years to come. Therefore, a key factor influencing the development of the TMP Update, as well as the associated Master Servicing Plan (MSP) and Official Plan Review (OPR), has been the input received from the various stakeholders and the general public on the future of transportation service in the City to address demands by 2041.

The formal public consultation program for the three projects was integrated due to the parallel nature of the three studies. The specific stakeholder and public consultation sessions that were conducted as part of the TMP are as follows:

- External Agency Notification: October 2017;
- Notice of Study Commencement: October 19 and 26, 2017;
- Public Meeting #1: Envisioning Our City: 2041 – November 16, 2017;
- Active Transportation Workshop - April 5, 2018;
- Public Meeting #2: Foundations and Strategies - May 17, 2018;
- Public Meeting #3: Constraints and Opportunities - February 10, 2020; and
- Virtual Public Open House – Meeting #4: Preferred Future Network and Service Recommendations – June 9 to June 23, 2020.

In addition to the stakeholder and public consultation sessions, The City of Brantford's Council was kept informed of the study progress and findings through formal reports. These contact points include the following:

- TMP Project Update, May 2020 prior to Public Information Centre #4 (Briefing Note PWIR2020-006 May 4, 2020: Water, Wastewater and Stormwater Master Servicing Plan (MSP) and Transportation Master Plan (TMP) – Project Update); and

- TMP Update presentation of recommended plan, October, 2020; prior to the Public Review Period (Council report October 2020: Transportation Master Plan (TMP) update 2020-427).

Existing Conditions

The following is a summary of observations pertaining to Brantford's existing arterial/collector road network performance during typical weekday, peak hour conditions:

- The PM peak hour vehicle demands are higher than the AM peak hour;
- Highway 403 interchanges with King George Road and Wayne Gretzky Parkway experience approaching capacity conditions during the PM peak hour due to high demands accessing/returning to the city;
- Highway 403 access to/from the downtown core are experiencing mild congestion during the PM peak hour:
  - King George Road Interchange via King George Road and Brant Avenue; and
  - Wayne Gretzky Parkway Interchange via the Parkway and Colborne Street / Dalhousie Street one-way couplet;
- North of Highway 403, King George Road and Wayne Gretzky Parkway serve as the primary north-south corridors accessing east-west facilities, such as Fairview Drive, Powerline Road, and Dunsdon Street. They are experiencing mild congestion and/or approaching capacity during the PM peak hour;
- The West Street corridor has high north-south vehicle demands and traverses Highway 403 (without access to Highway 403);
- The two bridge crossings of the Grand River, Colborne Street (4 lanes) and Veterans Memorial Parkway (2 lanes) provide the primary connections between the downtown core and southwest Brantford. They are experiencing mild congestion and/or approaching capacity in both peak hours;
- Blackburn Drive in the vicinity of Veterans Memorial Parkway is approaching capacity in both peak hours; and
- Erie Avenue is approaching capacity in both peak hours in the vicinity of Veterans Memorial Parkway.

The daily travel mode share in Brantford has remained relatively static over the past decade (2006 - 2016), as displayed in ***Table ES-1*** and ***Table ES-2***. There has been modest growth (as a proportion of travel) in the use of active modes (cycle/walk) and transit but the largest growth has been to auto driver. The only mode that decreased its mode share was auto passenger. It is worth noting that the combined auto passenger and auto driver share has decreased slightly, with a swing towards active modes. Overall, these trends are not surprising given Brantford's characteristics (location, size, geography, etc.) and investment in active modes of transportation and transit.

Table ES-1: Brantford Travel Mode Share: Internal Trips (Brantford to Brantford)

Mode \ Year	2006	2011	2016
Auto Driver	69.5%	68.8%	70.8%
Auto Passenger	18.3%	18.7%	14.6%
Transit	2.3%	2.6%	2.8%
Cycle/walk	6.6%	6.9%	7.8%
Other	3.3%	3.0%	4.0%
	100.0%	100.0%	100.0%

Source: Transportation Tomorrow Survey (TTS)

Table ES-2: Brantford Travel Mode Share: Trips Originating in Brantford (Brantford to All)

Mode \ Year	2006	2011	2016
Auto Driver	71.7%	71.4%	74.2%
Auto Passenger	17.9%	18.1%	14.2%
Transit	2.0%	2.3%	2.3%
Cycle/walk	5.3%	5.4%	5.8%
Other	3.2%	2.9%	3.4%
	100.0%	100.0%	100.0%

Source: Transportation Tomorrow Survey (TTS)

Impacts of Growth

The Growth Plan for the Greater Golden Horseshoe identifies the growth directions for population and employment growth within the City.

Ultimately the City's population is expected to grow from 101,700 people in 2016 to 163,000 people by 2041. Employment is expected to grow from 44,890 in 2016 to 79,000 people by 2041, as shown in ***Table ES-3***.

Table ES-3: Population and Employment Growth - Brant and Brantford

Demographic Area	2016	2041	Growth
Population			
County of Brant	36,700	57,000	55%
City of Brantford	101,700	163,000	60%
Total	**138,400**	**220,000**	**59%**
Employment			
County of Brant	22,100	26,000	18%
City of Brantford	44,900	79,000	76%
Total	**66,990**	**104,000**	**55%**

Source: A Place to Grow: Growth Plan for the Greater Golden Horseshoe, 2019

The new growth of 61,300 people and 34,110 jobs is anticipated to be distributed throughout the City, in a combination of intensification within the Built-up Area and growth in the City's new and existing Designated Greenfield and Employment Areas.

A growth to 2041 was assessed for a 'Do Minimal' network scenario (reflecting no changes to mode shares or roadway network capacity with the exception of the proposed arterial/collector road network for the expansion lands in Tutela Heights and North Brantford to facilitate access to future lands).

The following 2041 capacity issues are consistent with 2014 TMP model findings for the 2031 horizon:

- Wayne Gretzky Parkway between Henry Street and Highway 403;
- King George Road crossing Highway 403;
- Veterans Memorial Parkway between Mt. Pleasant Street and Market Street South;
- Colborne Street crossing the Grand River;
- Paris Road between Highway 403 and Powerline Road;
- Brant Avenue between St Paul Avenue and Colborne Street; and
- West Street between Charing Cross Street and Henry Street.

However, there are a few notable capacity issues that have emerged in 2041, most notably as a result of the settlement boundary expansion, that were not present in the 2014 TMP findings for the 2031 horizon:

- Powerline Road between Paris Road and Wayne Gretzky Parkway;
- Wayne Gretzky Parkway north of Highway 403;
- Hardy Road between Ferrero Boulevard and Paris Road;
- Paris Road south of Highway 403; and
- Erie Avenue between Veterans Memorial Parkway and Birkett Lane.

Integrated Transportation Strategy

Complete Streets Framework

Complete Streets are streets that are designed to be safe for everyone: people who walk, bicycle, take transit, or drive, and people of all ages and abilities. A Complete Streets policy ensures that transportation planners and engineers consistently design and operate the entire street network for all road users, not only motorists. Complete Streets offer wide ranging benefits; they are cost effective, sustainable, safe, and encourage the continuation of the shift from auto to non-auto based travel.

The purpose of the City-Wide Complete Streets Planning Principles and Design Guidelines is to provide planning and design directions for the network in the City of Brantford. These principles and guidelines provide direction for new development, public realm investments and future planning studies along the City's major and minor road network.

These principles and guidelines should be used:

- In the evaluation of any Planning Act applications for development;
- In the preparation of secondary plans, strategies or initiatives that relate to an urban transportation corridor;
- In the preparation of any implementation tools, including Zoning By-laws, infrastructure projects, master plans, design standards, or other City projects or initiatives that impact the transportation network; and
- To communicate the important elements of transportation planning and infrastructure design to citizens and the development community.

Existing Policies and Plans

Land use and transportation infrastructure and service are mutually dependent. Policies help to shape the way that the transportation networks can support the principles of good land use planning. Therefore, a review was undertaken of the current transportation infrastructure planning and design policies for context.

Draft Official Plan (2020)

The Official Plan is a comprehensive framework of goals and objectives statements, land use designations and policies which will guide the future development of the City of Brantford. This planning framework will also assist Council, staff, and other public agencies in their consideration of public and private development proposals.

Chapter 7 in the Draft Official Plan includes policies for an integrated transportation system to complement the TMP and related direction on active transportation, public transit, parking, transportation demand management, goods movement and the road network.

Transportation Master Plan (2014)

In 2014, an update to the 2007 Transportation Master Plan provided an opportunity to review and reconfirm the City's main transportation infrastructure and service plans. The update also addressed emerging issues involving changing economic and associated growth conditions, changes in the regional transportation context around Brantford (i.e., Highway 24, Highway 403, and GO Transit service), travel behaviour, and evolving public priorities for the transportation system, for example dealing with the new Complete Streets philosophy, expanding the emphasis on Active Transportation and new traffic management and calming measures (i.e., roundabouts).

Specific objectives and considerations carried forward from the 2014 TMP include:

- Make this a "made for Brantford" master plan reflecting the unique characteristics of Brantford and its context while still learning from successes in other similar-sized cities;
- Show the impacts of not making system improvements in terms of deficiencies, level-of-service and ability to meet planning targets;

- Coordinate TMP preparation with the City's concurrent Master Servicing Plan study in terms of growth forecasting, consultation activities and planning of cost efficiencies in the development of new transportation, sewer and water infrastructure;
- Integrate transportation and land use planning. Transportation and land use planning has been coordinated to identify bold transportation strategies that will be required to support an overall sustainability plan for transportation to 2031, and translate these strategies into Official Plan policy;
- Define the future role of public transit. Reduce the City's environmental footprint by increasing transit use through improved service levels, by effectively serving newly developing areas, meeting the accessibility needs of residents, and by considering inter-municipal and inter-regional links. Incremental fixes have become increasingly limited in meeting Brantford's future transit needs; and
- The Complete Streets philosophy has been applied to this TMP Update so that streets are planned, built and maintained for all users.

This document is being prepared to support the update of the 2014 TMP. The 2020 TMP will address the updated land use forecasts to 2041 resulting from the new Official Plan land use allocations, including expansion.

Linear Municipal Infrastructure Standards

With regard to Design, the Linear Municipal Infrastructure Standards outline the minimum Right of Way requirements in achieving the City's policies regarding Complete Streets and Healthy communities, as set out by its latest Transportation Master Plan Update. The purpose of the policies is to focus on designing, maintaining and operating public streets in a manner that promotes active transportation.

The document further identifies cross-section, geometric, and traffic control requirements on above and below grade infrastructure for local, minor collector, major collector, minor arterial, and major arterial roads.

Network Design Elements

A complete transportation network for Brantford will include many complete streets, but those streets will not be uniform in design. Street design should change according to the transportation context (where the street is located in the transportation network for each mode of travel) and the land use context (what the lands along the street are used for).

A complete transportation network for Brantford will also make use of off-street paths and trails to provide connections and close gaps in the walking and cycling networks. Paths and trails can also allow the walking and cycling networks to serve recreational trips, in addition to utilitarian (for example, commuter) trips.

Goals and objectives were established for each mode of travel, based on a technical review and based on input from stakeholders and the public:

- Walking
  - GOAL: Be a complete, pedestrian-friendly community with networks that integrate with transit, paths and trails, neighbourhood amenities, parks, open space, and schools.
  - OBJECTIVES:
    - Facilities provide a high level of pedestrian connectivity;
    - Walking environment is safe for users; and
    - Pedestrian accessibility, comfort, and mobility levels support walking as a preferred mode.
- Cycling
  - GOAL: Provide safe and convenient bicycle routes suitable for all user types: utilitarian (commuting), recreational (personal or family discretionary), and sport (advanced, high level recreational).
  - OBJECTIVES:
    - There is a continuous network of safe and direct bicycle routes;
    - There is an ability to navigate the bicycle network with ease;
    - End-of-trip facilities support cycling as a preferred mode of transportation;
    - The bicycling environment is safe; and
    - Provide unique and specific design environments appropriate for the different types of users.
- Public Transit
  - GOAL: Foster an efficient, affordable, safe, and accessible transit system that is an attractive alternative to the private vehicle and integrates with all other elements of the transportation system.
  - OBJECTIVES:
    - Transit contributes to a more environmentally sustainable community;
    - Transit is well integrated with all other transportation modes;
    - A robust frequent transit network serves the community;
    - There are high levels of bus stop accessibility and safety;
    - There is public awareness that transit is an attractive alternative to the private vehicle; and
    - Design of the system must not neglect the design of the vehicle and the design of facilities, remembering that transit needs to provide the rider with a great experience to develop and maintain strong ridership levels.
- Goods Movement
  - GOAL: Maintain and enhance the efficient movement of goods and service (including emergency and municipal services).
  - OBJECTIVES:
    - Truck traffic (excepting delivery service) avoids areas designated for high-density residential, mixed use, and pedestrian- and transit-oriented development;
    - There is a high level of goods and emergency services mobility on major regional routes;
    - Goods and municipal and emergency services are being delivered at a local level;
    - High level of accessibility and mobility for emergency services; and

    - While there is a focus on street design for placemaking, must continue to accommodate appropriate design vehicles, including local deliveries and long-distance freight trips.
- Automobile
    - GOAL: Provide for responsible planning and development of roads, and transportation connections to facilitate the efficient movement of people. Ensure that traffic control is considered that places emphasis on safe, efficient, and sustainable for all modes.
    - OBJECTIVES:
        - Provide a road network connectivity that supports local and regional mobility;
        - There is a balance between traffic congestion and mobility performance;
        - All systems integrate and work together to move people, goods, and services; and
        - Roads adapt to accommodate the future, including appropriate traffic controls.

Transportation System Review

Approach

The performance of the transportation system was assessed using the city's strategic travel demand forecasting model. This model accounts for land-use (at a traffic zone level of detail, as provided by the Municipal Comprehensive review process) trip generation, trip distribution, and mode split in assigning travel demands to the transportation network. The assigned vehicle volumes are then compared to the capacity of the infrastructure at a corridor and roadway link level (i.e. volume to capacity assessment). This analysis tool also allows for the detailed evaluation of the origins and destinations for trips using specific infrastructure.

Travel demands were then used to identify the impacts of the alternative strategies on the corridor performance and assist in the identification of the impact of alternatives considered to address the identified roadway constraint.

It is important to understand that that infrastructure and service provisions in one corridor can have impacts, positive and negative, in other corridors. Problems identified and solutions assessed during the transportation analysis are mindful of this interdependency between corridors.

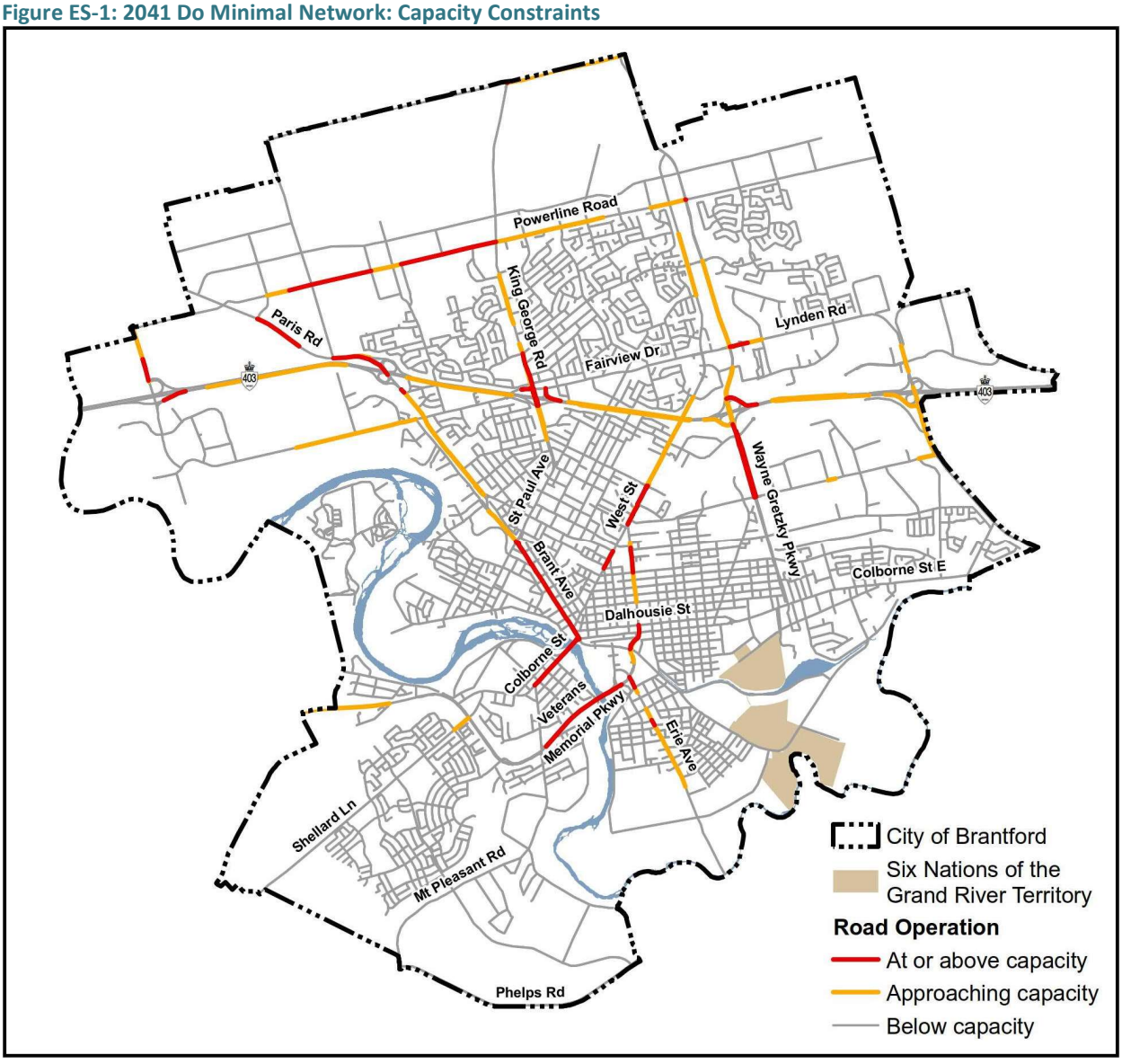
Do Minimal

The capacity constraints by 2041, accounting for proposed growth under a transportation network scenario with minimal improvements over today's condition, were identified. The changes to the road network include only short term committed projects (e.g. The Oak Park Road/Highway 403 interchange upgrade) and collector roads required to support the expansion growth areas (required to provide access to future development)

By 2041, the do-minimal network assessment shows that many of the arterial roads will be operating at or above capacity in the afternoon peak hour. Existing issues crossing Highway 403 and the Grand River

are exacerbated by growth, and new issues have emerged (as a result of boundary expansion) along the north-south roadways connecting the downtown area to Highway 403. ***Figure ES-1*** provides a summary of the Do Minimal capacity constraints.

Figure ES-1: 2041 Do Minimal Network: Capacity Constraints



The following critical deficiencies were identified in the road network:

- Inter-regional (significant number of trips in the corridor are to/from areas outside of Brantford):
  - Brant Avenue - St Paul Avenue to Colborne Street;
  - Wayne Gretzky Parkway - Henry Street to Highway 403;
  - Wayne Gretzky Parkway - North of Highway 403;
  - King George Road - Crossing Highway 403; and
  - Paris Road - Highway 403 to Powerline Road.

- Intra-regional (significant number of trips in the corridor are to/from areas within Brantford):
  - Lorne Bridge - Grand River Crossing;
  - West Street - Charing Cross Street to Henry Street;
  - Veterans Memorial Parkway - Mt. Pleasant Street to Market Street;
  - Paris Road - South of Highway 403;
  - Powerline Road - Paris Road to Wayne Gretzky Parkway;
  - Hardy Road - Ferrero Boulevard to Paris Road; and
  - Erie Avenue - Veterans Memorial Parkway to Birkett Lane.
- Local System (trips primarily local in nature):
  - Clarence Street/Clarence Street South – Dalhousie Street to Icomm Drive; and
  - Colborne Street West – County Road 7 (Pleasant Ridge Road) to D'Aubigny Road.

Alternative Strategies

The 2020 TMP's strategic transportation direction follows the previous 2007 and 2014 TMP's closely. The 2007 and 2014 strategies were built on two principle themes:

- Increase the supply of transportation infrastructure (optimize, expand and new facilities); and
- Manage travel demand (cost, behaviour, land use).

The 2020 TMP update refines these themes as follows:

- **Travel Demand Management (TDM)** - Manage travel demand (cost, travel behaviour [including mode choice], land use);
- **Transportation System Management (TSM)** - Manage the transportation infrastructure to optimize efficiency and safety for all modes (provide space and operating environment for all modes); and
- **Infrastructure Enhancements** - Increase the supply of transportation infrastructure (expand existing and add new facilities).

The impacts of these strategies have been updated to reflect the new growth forecasts and network capacity improvements to the 2041 horizon year. Ultimately when implementing these strategies, minimizing impacts to properties is a significant consideration.

TDM Max Assessment

Travel Demand Management (TDM) relies heavily on the use of transit. While the use of transit is growing, today approximately 3% of weekday peak hour trips are made by transit. The success of transit depends on the availability of service and the proximity of that service to people and jobs. The more people that have good access to transit, the higher the potential for transit ridership.

Achieving these increases requires significant expansion of existing service (new routes) and service frequency (more buses, shorter headways between buses).

A review of existing mode splits was undertaken to establish the penetration of the transit market. Population and employment densities in the 2041 condition were reviewed to identify areas where transit service would have the most impact. New mode share targets were identified and applied to future trip generation to establish new transit ridership levels and make corresponding adjustments to the auto trip making.

The effect of the target of 5.9% transit mode share (more than double the current 2.8% transit mode share), in combination with a 10% mode share (almost 30% increase from existing 7.8 % share) to Active Modes (walking and cycling) will significantly reduce the 2041 vehicle demand on the network from the current 85.4% modal share to 79.5% for drivers and passengers. This TDM scenario, as assigned to the Do Minimal network, results in a noticeable improvement in network operations across the city compared with the 2041 Do Minimal forecasts. ***Figure ES-2*** illustrates an overview of the link capacity constraints in the 2041 TDM network.

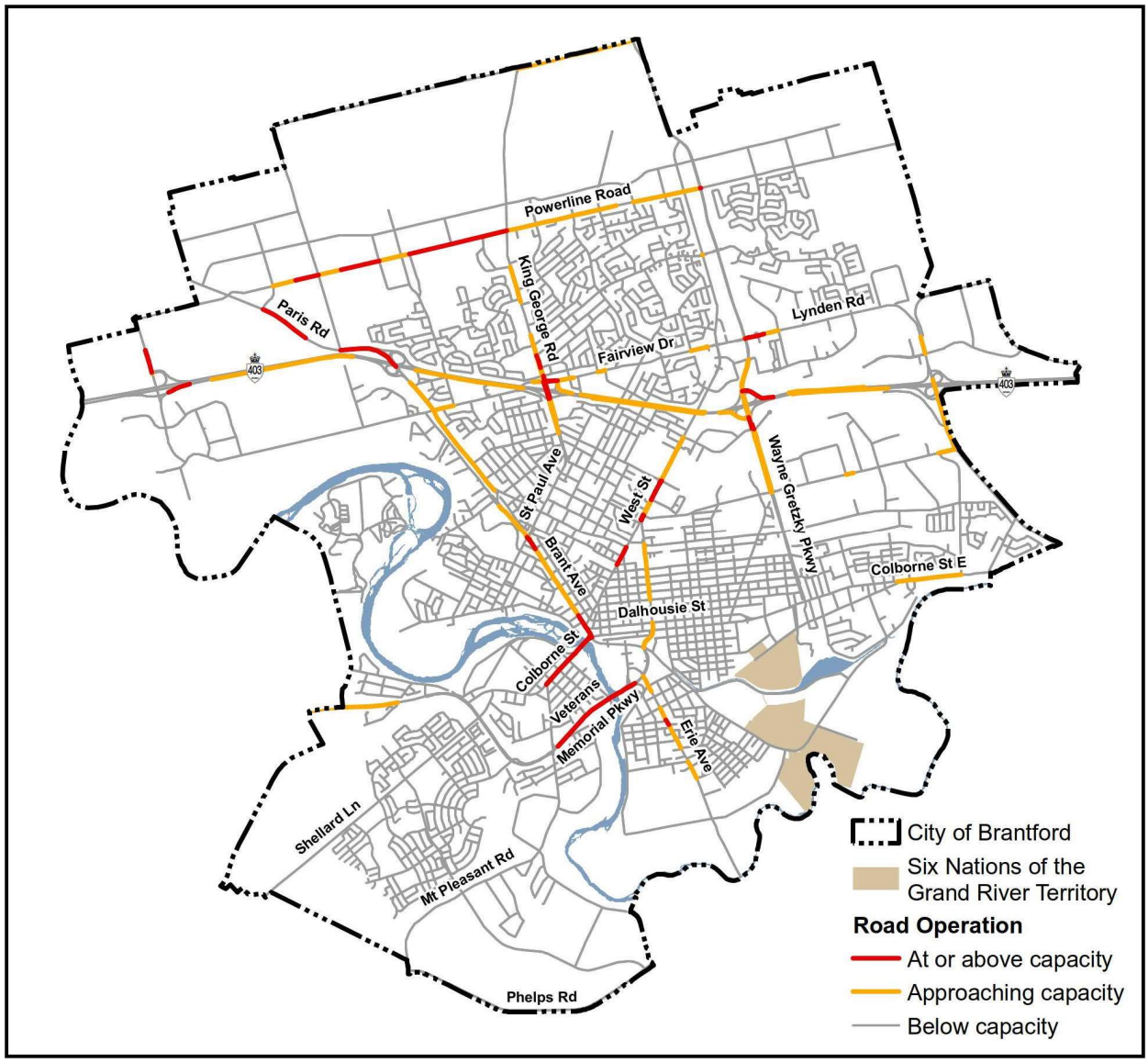
The TDM network is forecast to work much more reliably in the downtown area and crossing Highway 403. However, specific problem areas still remain: Paris Road between Highway 403 and Golf Road, King George Road crossing Highway 403, and the Colborne Street and Veterans Memorial Parkway crossings of the Grand River.

In addition to the Brantford-to-Brantford transit service, there are opportunities to partner with other agencies to connect communities outside the City limits by public transit. Providing transit connectivity will result in benefits to the City's road system performance. Travel markets to/from the County, the Greater Toronto Area (GTA), and the Cambridge/Kitchener/Waterloo area are significant. Not all of these trips are divertible to transit but even achieving 2%-5% market penetration could result in significant auto trip reduction on critical roadways.

The development of such service has the potential to reduce auto volumes on the critical north-south arterials in the City but will require inter-agency collaboration to implement (e.g. planning and funding).

A TDM strategy alone does not address all of the transportation network system constraints. Transportation issues remain in the north along Powerline Road and on two of the bridge crossings of the Grand River (Lorne Bridge on Colborne Street and Veterans Memorial Parkway).

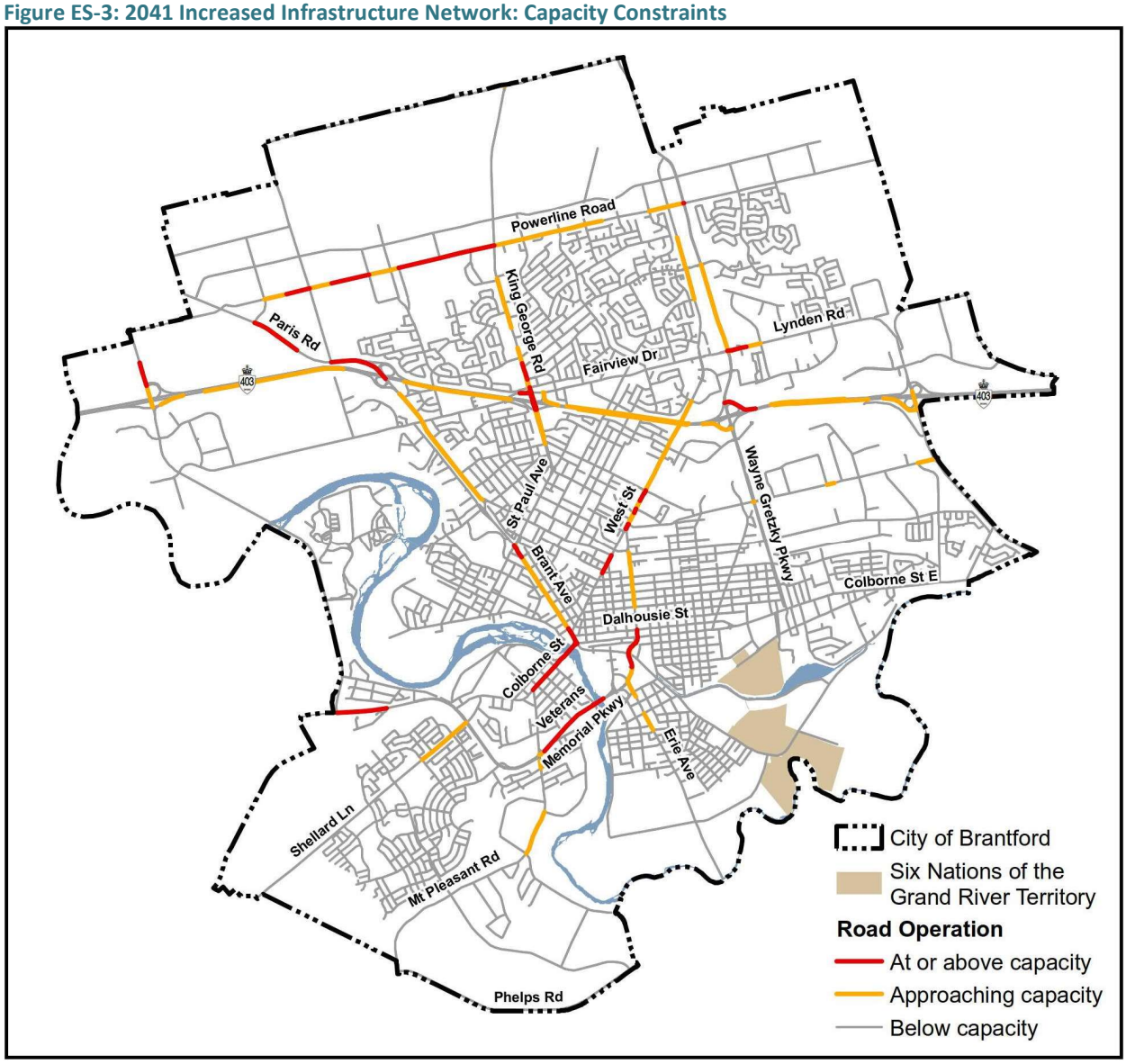
Figure ES-2: 2041 Manage Travel Demand Network: Capacity Constraints



Infrastructure Max Assessment

The Increase Infrastructure strategy addresses travel demands on the City's road network by enhancing the carrying capacity of the network through strategic road widenings and extensions. The main impact of this strategy is the ability to maintain an acceptable and efficient Level-of-Service on Brantford roads over the next 20 years. ***Figure ES-3*** illustrates an overview of the link capacity constraints in the 2041 Increased Infrastructure network. The Increase Infrastructure strategy includes short-term committed improvements, as well as a full program of infrastructure projects as was identified in the 2014 Transportation Master Plan (excluding the Veteran's Memorial Parkway extension, due to the August 2019 Council resolution restricting use of the Six Nations of the Grand River lands (Report 2019-453), known as Glebe Farm Lands as a transportation corridor).

Figure ES-3: 2041 Increased Infrastructure Network: Capacity Constraints



The increased infrastructure network will operate significantly better than the 2041 Do Minimal network in the following areas:

- Reducing congestion along Hardy Road and Brant Avenue as a result of the Oak Park Road extension; and
- Eliminating congestion on Wayne Gretzky Parkway, a result of a widening to six lanes.

However, the two main crossings of the Grand River are still anticipated to be significantly over capacity even with the addition of the Oak Park Road Grand River crossing (4 lanes) and a widening of the Veteran's Memorial Parkway Grand River crossing (from 2 to 4 lanes).

In short, the network will still experience some residual capacity issues under the new 2041 growth scenario even with significant investment in infrastructure improvements (as recommended in the 2014 TMP).

Network Constraints and Solutions

While the TDM and Increased Network Infrastructure scenarios show significant potential to reduce congestion and delay in the network, neither strategy completely addresses the needs of the 2041 condition in isolation.

The next step in the transportation analysis was to assess the need for improvements in each of the constrained corridors, and consider the impact of each strategy (TDM, TSM, Increased Supply) on the constraint. This was done by assessing the 2041 Do Minimal scenario network performance to determine the magnitude performance issue (volume to capacity) and the travel characteristics of the demand in the corridor (origin and destination markets for future users).

Based on the critical deficiencies in the 2041 Do Minimal network alternative, an assessment of the impact of each strategy on each deficiency was undertaken.

Brant Avenue - St Paul Avenue to Colborne Street

Brant Avenue between St Paul Avenue and Colborne Street has significant auto demand in both directions, however southbound is the critical direction during the PM peak hour. Overall, the volumes forecast do not significantly exceed capacity, as much of the over flow demand for the corridor uses the adjacent and parallel one-way pair of William Street and Albion Street.

The capacity issue on Brant Avenue is strategic in nature. The lack of a direct connection between Northwest Brantford (commercial/industrial use) and Southwest Brantford (residential use) appears to be one of the main issues. A considerable amount of traffic traveling between these two areas is forced to travel east towards downtown in order to cross the Grand River to travel back to the west to reach their destination. The City recently implemented more stringent parking restrictions on Brant Avenue, and other traffic signal system measures to improve its operation.

Brant Avenue between St. Paul Avenue and the Lorne Bridge is part of the Brant Avenue Heritage Conservation District. A widening of the road to provide 6 lanes (three in each direction) or to provide 5-lanes (the addition of a center left turn lane) would have a significant property impact, thereby contradicting the Heritage Conservation District designation.

The potential Oak Park Road extension over the Grand River has potential to divert 300-500 peak hour vehicles in the peak direction from Brant Ave. This facility is currently the subject of a Municipal Class EA study.

Wayne Gretzky Parkway - Henry Street to Highway 403

Wayne Gretzky Parkway between Henry Street and Highway 403 is forecast to have significant auto demand in both directions, reaching highs of 2,000 to 2,200 vehicle trips. Both directions (northbound and southbound) have similar volumes and would appear to be equally critical during the PM peak hour. Overall, Wayne Gretzky Parkway is expected to operate just over capacity throughout this area, with the exception of the short section between Morton Avenue/Holiday Drive and Highway 403 where the volume exceeds its capacity by 10%.

The capacity issues on Wayne Gretzky Parkway between Henry Street and Highway 403 are strategic in nature, focusing on the immediate corridor, i.e. the demand south of Highway 403 originates or is destined to areas within the corridor and not related to pass through traffic.

Widening Wayne Gretzky Parkway from 4 lanes to 6 lanes between Henry Street and Highway 403 would provide the additional capacity required to meet 2041 demands.

As a majority of the demands on Wayne Gretzky Parkway are focused on accessing land use in the corridor primarily to/from Highway 403, improving a parallel roadway like Garden Avenue would have little impact on the future volume demand on Wayne Gretzky Parkway.

Wayne Gretzky Parkway - North of Highway 403

Volumes on Wayne Gretzky Parkway north of Highway 403 are forecast to reach highs of 1,800 to 1,900 vehicle trips in the PM peak hour, which reflects full capacity conditions. Both directions (northbound and southbound) have similar volumes and would appear to be equally critical during the PM peak hour.

Wayne Gretzky Parkway serves as a major north-south connection for development in the north expansion areas.

A road widening across the Highway 403 Bridge and north of Lynden Road is not considered a necessity to accommodate adequate levels of service in 2041. However, protection for future widening and interchange (ramp) improvements is advisable depending on the future potential/opportunity for a provincial corridor (Highway 24).

As a majority of the demands on Wayne Gretzky Parkway are focused on accessing land use in the corridor primarily to/from Highway 403, improving a parallel roadway like Garden Avenue would have little impact on the future volume demand on Wayne Gretzky Parkway.

King George Road - Crossing Highway 403

The King George Road crossing Highway 403 is forecast to have significant auto demand in both directions, reaching highs of roughly 1,700 to 1,800 vehicle trips in the PM peak hour. Both directions (northbound and southbound) have similar volumes and would appear to be equally critical during the PM peak hour.

More than 60% of the traffic using King George Road to cross Highway 403 does so as a result of regional travel on Highway 403 or Highway 24.

Providing an additional lane in each direction on King George Road would have significant property impacts. The preferred solution would be to divert long distance trips from King George Road to a parallel route. This would provide relief to the forecast capacity issue in the area of Highway 403. The Wayne Gretzky Parkway extension north of Powerline Road has the potential to provide this alternative capacity.

Paris Road - Highway 403 to Powerline Road

The capacity issues on Paris Road between Highway 403 and Powerline Road are strategic in nature. The 2-lane, from 500 m north of Golf Road to beyond Powerline Road, will be insufficient to accommodate the demand in 2041.

The PM peak hour, peak direction demands on this section of Paris Road can be broken down as follows: 25% of vehicles are destined to south of the Grand River via Lorne Bridge; 50% of vehicles are destined to Highway 403 eastbound, and 25% of the vehicles are destined for downtown/central.

A widened Paris Road, from 500m north of Golf Road to Oak Park Road, would provide capacity to alleviate a portion of the capacity constraint.

Approximately 350 vehicles in the PM peak hour use Paris Road for north-south travel to connect across the river into Southwest Brantford. The extension of Oak Park Road (currently in EA stage) to Colborne Street West would provide a north-south connection in west Brantford and an additional crossing of the Grand River. This would alleviate the remaining capacity constraint on Paris Road.

Lorne Bridge - Grand River Crossing

Lorne Bridge has significant auto demand in both directions, however, during the PM peak hour, westbound is the critical direction. The volume in the westbound direction is forecast to reach almost 2,700 vehicle trips in the PM peak hour, which will exceed capacity by 68%.

The distribution of trips shows that a significant amount of traffic originating in/destined the southwest area of Brantford is destined to/originating in areas north of Highway 403 in the west and central areas.

A widening of the bridge to 6-lanes would address the issue but operational constraints on either side of the bridge would limit the effectiveness of the widening. It is noted that there are seasonal load restrictions on the bridge and that there is an ongoing EA for the three bridges (including the two pedestrian bridge crossings in close proximity) to evaluate options for rehabilitation (including the feasibility of removing load restrictions) and to provide sustainable modes of travel over the Grand River.

A widening of the Veterans Memorial Parkway, while it provides some river crossing capacity relief, does not address the primary origin-destination pattern for Lorne Bridge users (i.e. to the northwest and north central areas of Brantford).

An Oak Park Road extension has the potential to divert some 300 to 500 trips in the PM peak hour from Lorne Bridge, relieving a significant part of the capacity constraint on the bridge.

West Street - Charing Cross Street to Henry Street

West Street between Charing Cross Street and Henry Street has significant auto demand in both directions, however the critical direction during the PM peak hour is northbound. The West Street capacity issue is confined to the short 500m section between Charing Cross Street and Harris Street.

There are approximately 130 southbound vehicle trips and 150 northbound vehicle trips in the PM peak hour that could be diverted from West Street between Charing Cross Street and Henry Street with the provision of a continuous east-west connection in the vicinity. It is noted that there is an EA for the intersection improvement at the intersection of Charing Cross and West Street that would add additional northbound left turn lanes.

A widening of West Street would address the capacity shortfall between Charing Cross Street and Henry Street, but there would be significant property impacts on West Street, as well as property and secondary infrastructure impacts on Henry Street and Harris Street that would also require mitigation.

There are approximately 200-300 peak hour trips in the peak direction (150 trips from Harris Street alone) that are using West Street to facilitate a broader east-west trip. The extension of Charing Cross Street from West Street to Henry Street (approximately 850m; with a crossing of CN rail main line) would provide that continuous east-west connection and would also provide additional capacity across the rail corridor for all modes. The diversion of 200-300 trips in the peak direction would reduce the volume to capacity on West Street to less than 1.00.

Veterans Memorial Parkway - Mt. Pleasant Street to Market Street

The Veterans Memorial Parkway crossing of the Grand River has significant auto demand in both directions, however during the PM peak hour, westbound is the critical direction. The volume in the westbound direction is forecast to surpass 1,350 vehicle trips in the PM peak hour which will exceed capacity by over 35%.

The distribution of PM peak hour trips on the bridge reveals the following: 15% of trips originate from the east (Hamilton/GTA) via Highway 403; 20% of trips originate from north of Highway 403; and 65% originate from Central / Downtown Brantford. Travel markets to the northwest Brantford and Paris and west (Woodstock-London) markets are not served by this crossing.

Providing additional width on the bridge to accommodate an additional lane (such that both directions have 2 vehicle lanes) while providing adequate design space for the shoulder and any future active mode considerations would require either an extension or replacement of the bridge deck.

Alternative crossings of the Grand River that would serve the origin-destination patterns observed for the Veterans Memorial Parkway are limited.

Paris Road - South of Highway 403 to Hardy Road

Paris Road south of Highway 403 has significant auto demand in both directions, however southbound is the critical direction during the PM peak hour. While the forecast volume does not exceed capacity, they are approaching capacity.

The lack of a direct connection between Northwest Brantford (commercial/industrial) and Southwest Brantford (residential) results in a significant number of vehicles traveling between these two areas using Paris Road towards downtown in order to cross the Grand River. Hardy Road is also an alternative but is constrained by its Right of Way and the at grade rail crossing west of Paris Road.

The roadway is only just approaching capacity in 2041, therefore there is not a compelling reason to add an additional lane of capacity in each direction. Such a widening would have significant impacts on utilities (i.e. relocation).

As an alternative, the potential Oak Park Road extension has the potential to divert some 300 to 500 trips from the Paris Road corridor.

Powerline Road - Paris Road to Wayne Gretzky Parkway

Powerline Road between Paris Road and Wayne Gretzky Parkway is forecast to experience significant growth in traffic as a result of the urban expansion to the north. Powerline Road has considerable auto demand in both directions, however the critical direction during the PM peak hour is eastbound.

The trip distribution patterns demonstrate the corridor specific nature of the demand issues on Powerline Road.

Widening Powerline Road from 2 lanes to 4 lanes between Paris Road and Wayne Gretzky Parkway would provide the additional capacity that is required to meet the remaining 2041 demands. Given the classification of the roadway (major arterial), the growth in residential and commercial/industrial development, and the anticipated truck traffic associated with commercial/industrial development, the widening of Powerline Road is critical.

As the growth in auto trips (volume) on Powerline Road is directly related to the adjacent future development, alternative corridors would not address the basic transportation need fulfilled by Powerline Road.

Hardy Road - Ferrero Boulevard to Paris Road

Hardy Road between Ferrero Boulevard to Paris Road is forecast to experience significant growth in traffic by 2041. The increases in traffic volumes are a result of the planned development within the Oak Park Road corridor and Northwest Business Park.

The lack of a direct connection between Northwest Brantford (commercial/industrial) and Southwest Brantford (residential) is the main reason for growth in traffic as it provides a connection to Paris Road.

A widening of Hardy Road to 2-lanes in each direction would address the emerging long-term capacity issue. However, this widening would have significant impacts on property, utilities (i.e. relocation), and the adjacent natural heritage system. As well, the CN rail crossing is a potential constraint.

As an alternative, the potential Oak Park Road extension has the potential to divert some 300 to 500 trips from Hardy Road, and would avoid the need to the widen Hardy Road

Erie Avenue - Veterans Memorial Parkway to Birkett Lane

Erie Avenue between Veterans Memorial Parkway and Birkett Lane is forecast to have modest auto demand in both directions, reaching highs of roughly 600 to 800 vehicle trips in the PM peak hour. However, the critical direction during the PM peak hour is southbound. Overall, the capacity constraints forecast for Erie Avenue are only indicative of an emerging (potential) issue, as 2041 PM peak hour volume does not generally exceed capacity, and tend to decrease to the south towards Brant County.

Erie Avenue provides both a local and regional function. Locally, Erie Avenue is the main north-south corridor in south Brantford, providing a connection between Eagle Place and the rest of Brantford, while regionally it provides a connection to/from Brant County as one of only three roadways that cross the Grand River.

Providing an additional lane in each direction would address the emerging capacity issue. However, this widening would have significant impacts on property and utilities (i.e. relocation). As the roadway is only just approaching capacity by 2041, it is considered a marginal issue. As such, there is not a compelling reason to add a lane of capacity in each direction.

The Veterans Memorial Parkway widening and partial extension (to Murray Street) would provide additional river crossing capacity and alternative east-west connectivity to Murray Street and Wayne Gretzky Parkway. From a review of the volume market (auto trips) for Erie Avenue it was identified that there are relatively few trips that would divert to this facility (approximately 50-100 vehicles, to/from the southwest). Trips destined for central Brantford could easily divert from Erie Avenue to Murray Street or Wayne Gretzky Parkway today by using Mohawk Street. The analysis of long-term volume forecasts suggests that the Veterans Memorial Parkway widening and extension has limited potential to reduce volumes on Erie Avenue.

Clarence Street/Clarence Street South – Dalhousie Street to Icomm Drive

Clarence Street/Clarence Street South is forecast to be operating at approximately 5-10% over capacity by 2041. The critical direction in the PM peak hour is southbound.

A majority of trips on Clarence Street/Clarence Street South are travelling from north-central Brantford (i.e. north of Highway 403) to the south side of the river via West Street.

A widening of Clarence Street/Clarence Street South would result in significant property impacts, and would be constrained by the railway spur line on the east side (limiting widening options to the west side).

The Veterans Memorial Parkway partial extension (to Murray Street) provides an opportunity for an alternative route out of downtown via Murray Street. The TDM and TSM initiatives are expected to resolve the prevailing future capacity concern. However, this situation should be monitored. A partial extension of the Veterans Memorial Parkway could be considered beyond 2041 to address potential long-term issues and should be protected for as an alternative to Clarence Street/Clarence Street South.

Colborne Street West – County Road 7 to D'Aubigny Road

Colborne Street West between County Road 7 and the existing 4-lane section is forecast to be an emerging issue in 2041. The nature of this section's 2 lanes westbound and 1 lane eastbound results in poorer operating conditions in the morning peak hour than the evening peak hour.

Colborne Street West plays a significant role in moving trips from the west into Brantford downtown. As Colborne Street connects to the Lorne Bridge, effective opportunities to provide parallel capacity are limited. A majority of trips using Colborne Street are to/from the west via Rest Acres Road (in the County of Brant) to access the downtown.

With growth, capacity issues are forecast for Rest Acres Road and Colborne Street accessing the City, requiring the widening of Colborne Street West. With the potential for an Oak Park Road Extension connection and an additional influx of approximately 300-500 peak hour peak direction volumes, the widening of Colborne Street would accommodate the forecast volumes.

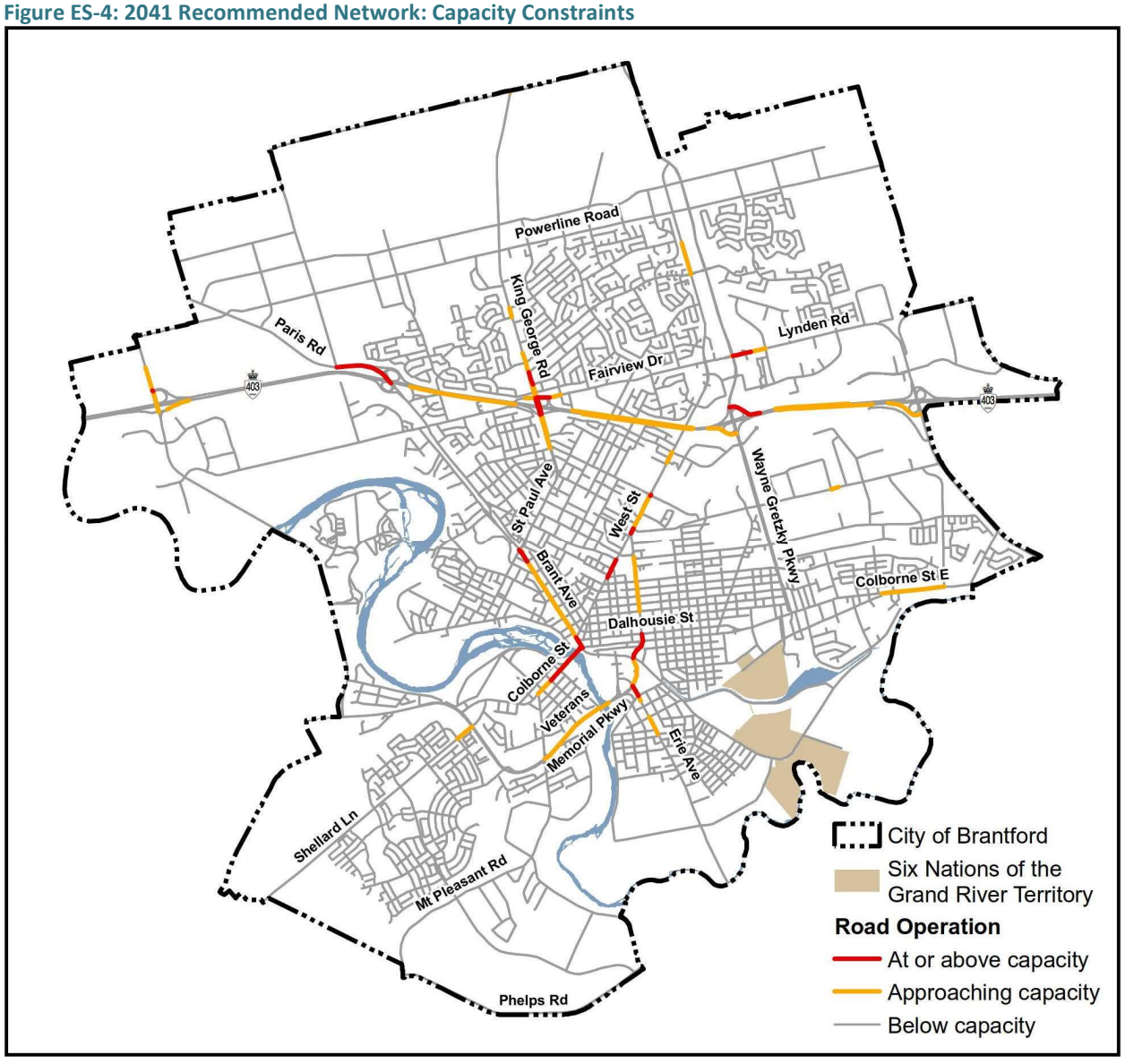
Recommended Network

The preferred solution to address the forecast growth of the City to 2041 is a combined scenario that includes the following elements: transit service improvement/enhancements to promote increased transit use; the provision of active mode infrastructure to promote increased cycling and walking; and network infrastructure improvements to address the capacity constraints in the network. This solution results in a network and demand solution that addresses the identified long-term network deficiencies.

The performance of this combined scenario 2041 Recommended Plan shows that almost all of the anticipated roadway capacity issues identified for 2041 Do-Minimal condition (where no long-term investment was made in transit service, active transportation, or infrastructure) are resolved.

Figure ES-4 identifies the few remaining capacity/operational issues in the 2041 Recommended Network. The remaining capacity/operational issues include the Lorne Bridge, Clarence Street/Clarence Street South between Icomm Drive and Colborne Street East, and Paris Road. The transportation assessment suggests that while these are identified as capacity constraints in the long term, the magnitude of the issue has been significantly reduced. These issues are now forecast to be marginal and can be successfully managed in the near- and mid-term. These locations should continue to be monitored to identify the significance of any emerging issue.

Figure ES-4: 2041 Recommended Network: Capacity Constraints



Recommended Plan

Active Transportation

A key objective of the TMP is to work towards becoming a Bicycle Friendly Community by providing a clear, concise roadmap towards a more bicycle friendly future. Achieving this goal is dependent on providing full connectivity and the right environment to promote use and foster confidence in the system. This means addressing the needs of both recreational and utilitarian users. Full connectivity makes active transportation a feasible choice for any trip in the City. Providing the right space allows users of all skill levels to feel comfortable and choose routes that satisfy their safety and efficiency concerns by removing barriers to use.

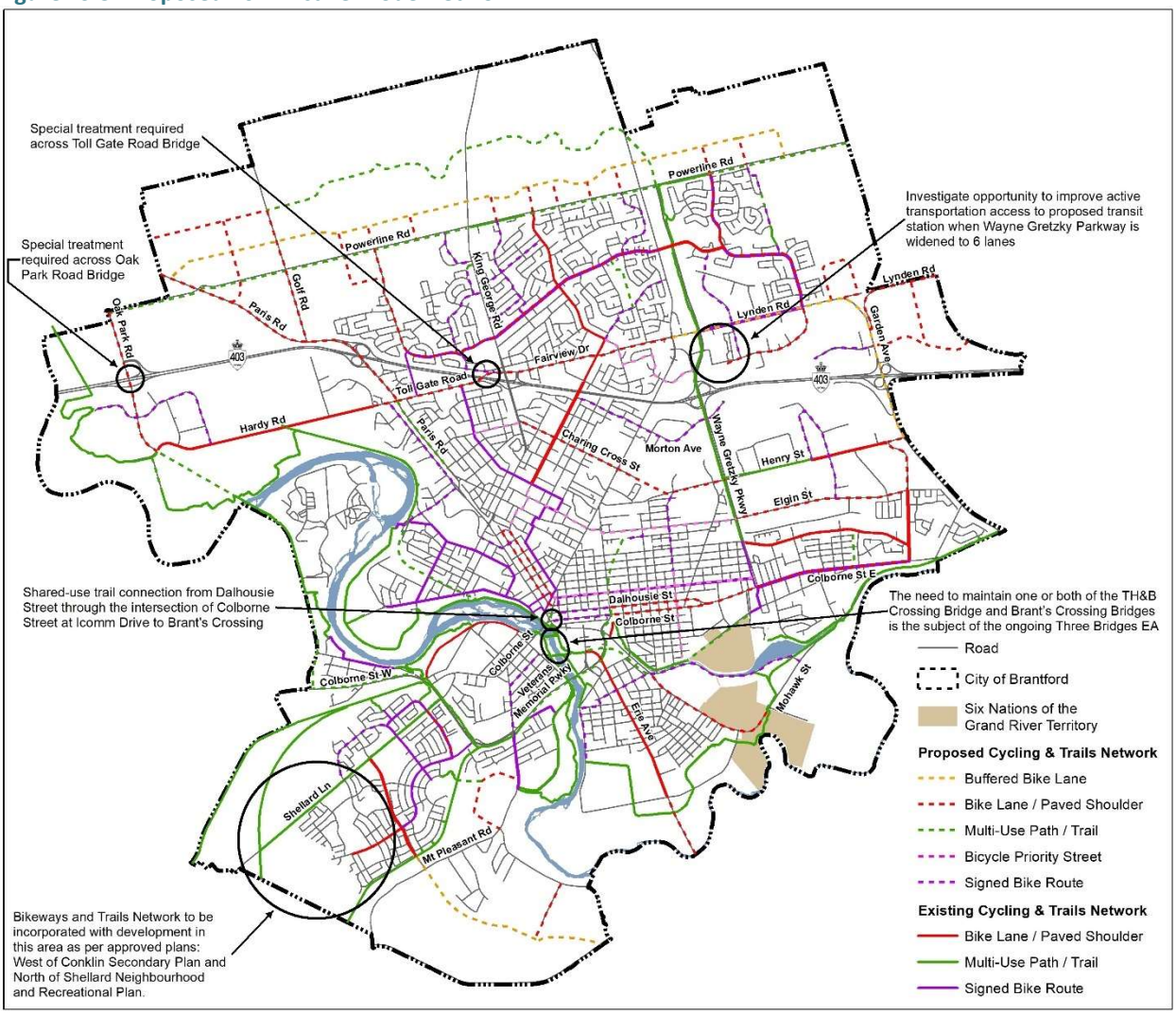
Barriers to active transportation modes include highway crossings, traversing large urban intersections, travelling in close proximity to high volumes of fast-moving vehicles, and the lack of user amenities (bike racks, lockers, shower facilities, rest areas).

The active transportation network identified (reflecting approximately 145 km of additional improvements over today's condition) provides a mix of on-road (cycle track, bike lanes and shared facilities) and off- road (multi-use paths and trails) that provide full connectivity for a full range of origins and destinations, and full range of user types/skills.

Sidewalks and multi-use paths are incorporated into specific road design, where the cross- section elements have been defined for each roadway functional class to address the needs of all users. These design elements are part of the City's Linear Infrastructure Design Guidelines and have been updated to reflect the enhanced focus on active transportation.

The proposed cycling infrastructure is shown in ***Figure ES-5***. The implementation of this plan will increase the current 67.4 km of on road cycling to 141 km by adding 74 center-line kilometres of bike lanes; 30 km of multi-use paths and trails and a program for encouraging more AT as the city expands.

Figure ES-5: Proposed 2041 Active Mode Network

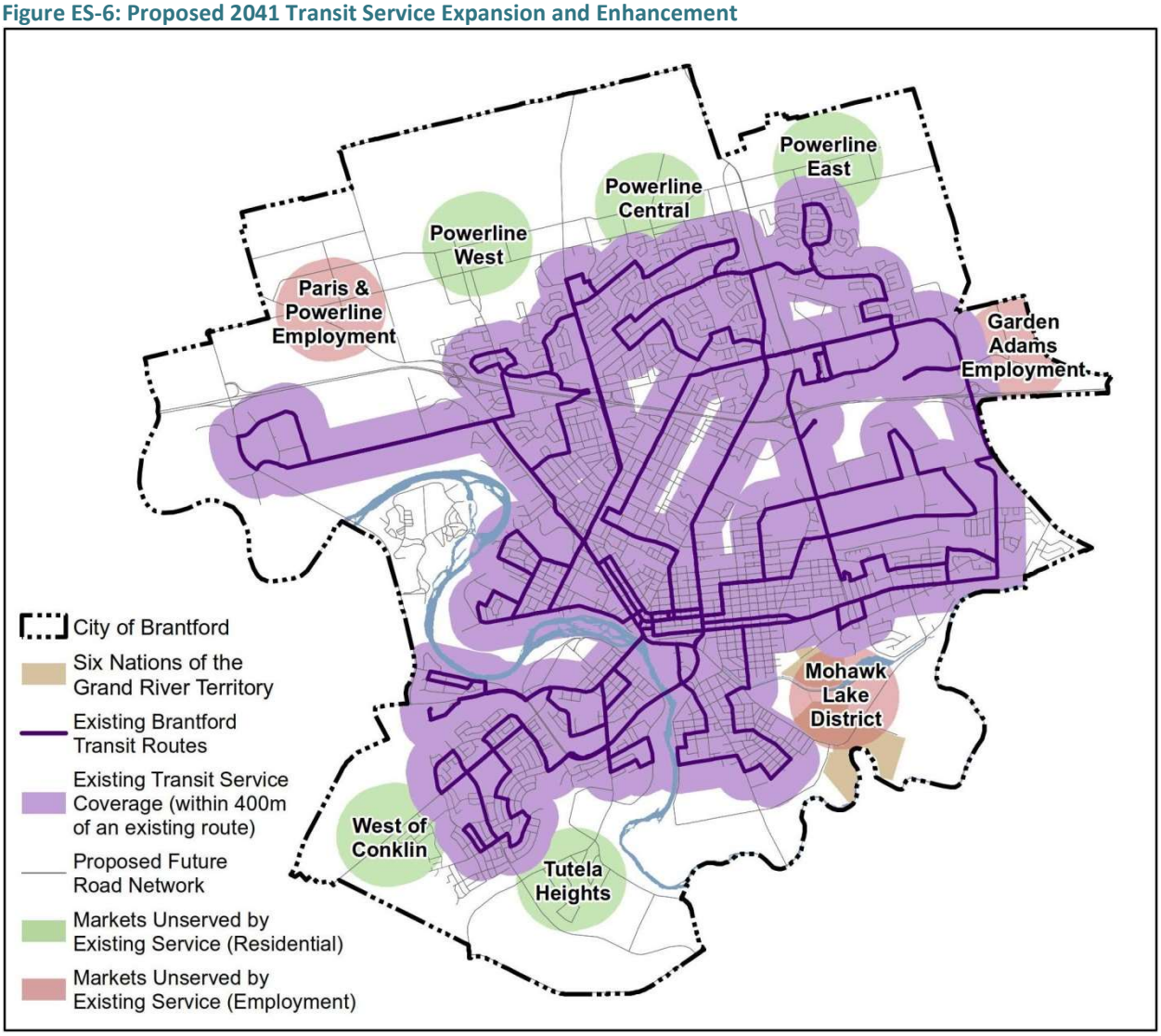


Transit

The scope of the Transportation Master Plan is to identify the role, need, and potential impact of the transit system in accommodating growth and moving people. The assessment has quantified the potential for ridership at the City wide and corridor levels.

The objectives with respect to the system coverage and expansion requirements for transit system are identified in ***Figure ES-6***.

Figure ES-6: Proposed 2041 Transit Service Expansion and Enhancement



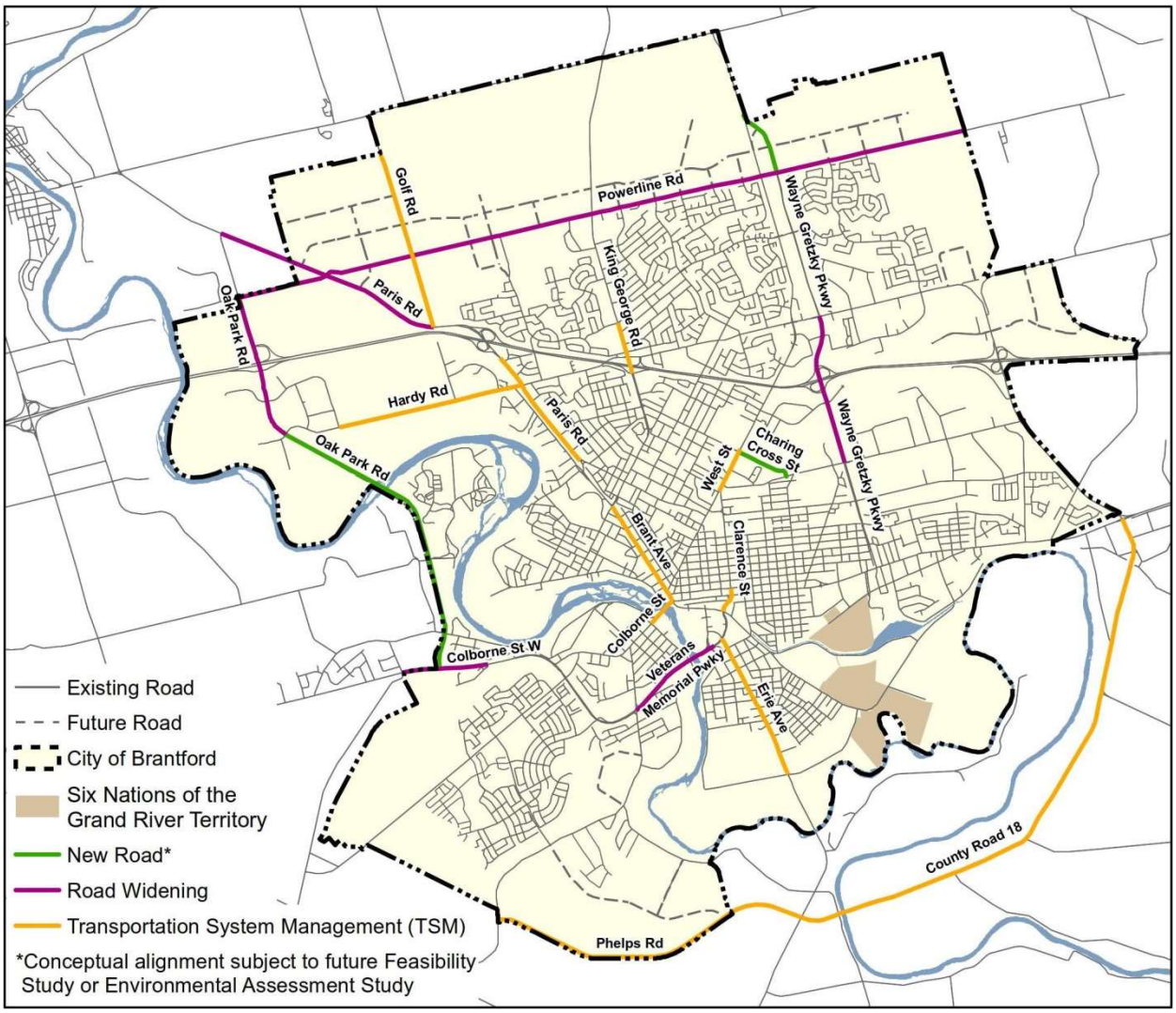
The specific implementation plan for transit is provided in the next phase of the TMP (Implementation Plan). The implementation plan will identify the high-level service expansion and strategic service needs. However, with the expansion of transit service it is anticipated that the city fleet will be expanded to approximately 57 vehicles (40 conventional and 17 specialized), representing an increase of 25% in equipment alone.

The future transit service, routes and operational characteristics will be identified by future studies, i.e. a Transit Master Plan or Transit Operational Study.

Road Infrastructure

From the transportation assessment, the road infrastructure improvements for the 2041 horizon year have been identified as shown on ***Figure ES-7***.

Figure ES-7: Proposed 2041 Road Network



The enhancements include infrastructure widening on:

- Wayne Gretzky Parkway between Henry Street and Lynden Road;
- Veterans Memorial Parkway between Mount Pleasant and Market Street South;
- Colborne Street West from County Road 7 to the existing 4-lane section;
- Paris Road from Golf Road to Oak Park Road;
- Oak Park Road from Hardy Road to Powerline Road; and
- Powerline Road from Oak Park Road to the City east limits.

New road additions include:

- Oak Park Road extension to Colborne Street West;
- Wayne Gretzky Parkway extension to connect with Park Road; and
- Charing Cross Street extension to Henry Street.

TSM improvements to enhance the existing capacity (through urbanization, parking restrictions, and operational improvements) are proposed for several corridors including:

- Golf Road;
- Paris Road;
- Brant Ave;
- Hardy Road;
- West Street;
- King George Road;
- Erie Avenue;
- Clarence Street; and
- County Road 18 (note that this is a County Road. The City will work with the County to determine potential for improvements to the corridor).

All of the projects identified will require a Schedule B or C MCEA to be completed, which would include significant public/stakeholder consultation, before they can be implemented.

Implementation Plan

Active Transportation Plan

The 2020 TMP Update includes an expansion of the City Cycling and Trails Network, building on the 2014 TMP plan, to include the extension of multi-use paths and trails into the Tutela Heights and North Expansion lands. In addition, enhancements have been made to conform to new provincial guidance now in place (OTM Book 18 – Cycling Facilities – 2020).

The capital cost to provide these facilities is estimated at $31.7 Million to year 2041. ***Table ES-4*** summarizes the recommendations for the short, medium and long term to 2041.

Table ES-4: Active Transportation Network Recommendations

Facility Type	Length (centre line km)	Cost ($000)*
Short Term [2021 – 2025]		
Signed Bike Route	7.6	$10
Bike Priority Street	3.0	$380
Bike Lanes / Paved Shoulders	16.6	$1,640
Multi-Use Paths	4.7	$529
Programs (Studies, Initiatives, Events)	-	$820
Sub Total	**31.9**	**$3,379**

Table ES-4: Active Transportation Network Recommendations, Continued

Facility Type	Length (centre line km)	Cost ($000)*
Mid Term [2026 – 2031]		
Signed Bike Route	7.6	$10
Bike Priority Street	3.1	$392
Bike Lanes / Paved Shoulders	22.4	$7,146
Multi-Use Paths	10.1	$845
Programs (Studies, Initiatives, Events)	-	$690
Sub Total	**43.2**	**$9,084**
Long Term [2032 – 2041]		
Signed Bike Route	15.2	$21
Bike Priority Street	3.9	$493
Bike Lanes / Paved Shoulders	35.4	$12,891
Multi-Use Paths	15.4	$4,476
Programs (Studies, Initiatives, Events)	-	$1,375
Sub Total	**69.9**	**$19,257**
TOTAL	**145.0**	**$31,720**

* All costs stated in 2020 dollars & Contingency of 30% for Engineering assumed (excludes Programs).

Transit Service Plan

The Short and Mid-Term transit improvements for the transit system build on the 2016 Transit Service Review, specifically Report 2, *TRANSformation2021, Brantford Transit and Brantford Lift*. Further expansion and improvement of the service is required to support future expansion areas to 2041.

The capital cost to provide this system is estimated at $32.3 Million to year 2041. ***Table ES-5*** summarizes the recommendations for the short, medium and long term to 2041.

Table ES-5: Transit Service Recommendations

Capital Item	Description	Cost ($000)*
Short Term [2021 – 2025]		
Fleet	1 new vehicle, 13 replacement vehicles	$15,400
Building	-	$ -
Transfer Points	Lynden Mall, Brantford Commons - Upgrades	$500
Route Infrastructure	Signage and Shelters Upgrade, ITS	$561
Studies	Transit TMP, Fleet Electrification Feasibility	$375
Specialized	Vehicle Replacement, Telecom Software	$1,570
	Sub Total	**$18,406**

Table ES-5: Transit Service Recommendations, Continued

Capital Item	Description	Cost ($000)*
Mid Term [2026 – 2031]		
Fleet	2 new vehicles, 10 replacement vehicles	$13,200
Building	Transit Center	$1,100
Transfer Points	-	$ -
Route Infrastructure	New Stops/ Shelters Expansion Routes/ITS	$651
Studies	Transit Master Plan Update	$100
Specialized	Vehicle Replacement	$3,750
	Sub Total	**$18,801**
Long Term [2032 – 2041]		
Fleet	5 new vehicles, 12 replacement vehicles	$18,700
Building	New/Upgrade Transit Terminal	$7,500
Transfer Points	-	$ -
Route Infrastructure	New Stops/ Shelters Expansion Routes/ITS	$1,620
Studies	-	$ -
Specialized	Vehicle Replacement, Software Upgrade	$5,800
	Sub Total	**$33,620**
	TOTAL	**$70,827**

* All costs stated in 2020 dollars

Road Infrastructure Plan

For Road Infrastructure, estimates of interim year population and employment, 2026 and 2031, and the 2041 network performance assessment were used to generate a timeline for emerging constraints. The performance constraints were compared with the 2041 network recommendations to determine the likely need for infrastructure improvement for the interim years.

The capital cost to provide this infrastructure (some 80 lane kilometres of network) is estimated at $293 Million to the year 2041. ***Table ES-6*** summarizes the recommendations for the short, medium and long term to 2041.

Table ES-6: Road Infrastructure Recommendations

Project	Description	Cost ($000)***
Short Term [2021 – 2025]		
Veterans Memorial Parkway Widening	4 lanes – Mount Pleasant Street to Erie Avenue*	$40,500
Oak Park Road Widening	4 lanes – Powerline Road to Hwy 403 & Fen Ridge Court/Savannah Oaks Drive to Hardy Road	$6,400
Colborne Street West Widening	4 lanes – CR7 to D'Aubigny Road	$3,500
Wayne Gretzky Parkway Extension	4 lanes - Powerline Road to Park Road North	$4,100
	Sub-Total	**$54,500**

Table ES-6: Road Infrastructure Recommendations, Continued

Project	Description	Cost ($000)***
Mid Term [2026 – 2031]		
Oak Park Road Extension	4 Lanes – Hardy Road to Colborne Street **	$98,900
Paris Road Widening	4 lanes – Oak Park Road to Golf Road	$10,800
Powerline Road Widening	4 lanes – Oak Park Road to King George Road	$19,900
Charing Cross Extension	4 Lanes – West Street to Henry Street	$19,000
Golf Road TSM	Paris Road to Proposed Development Limit	$4,100
	Sub-Total	**$152,700**
Long Term [2032 – 2041]		
Wayne Gretzky Parkway Widening	6 Lane – Lynden Road to Henry Street	$29,100
Powerline Road Widening	4 lanes – King George Road to East City Boundary	$21,000
Conklin Road Extension	2 lanes - Mt. Pleasant Road to Phelps Road	$10,200
New East/West Road	2 lanes – Oak Park Road to King George Road	$15,300
New East/West Road	2 lanes – King George Road to East City Boundary	$16,400
	Sub-Total	**$92,000**
	TOTAL	**$299,200**

* Reference Costs Source: Veterans Memorial Parkway Widening and Extension, CIMA+, October 2018 - [Assume: Mt Pleasant to Bridge = 950 m (from feasibility study) and Bridge to existing 4-lane cross section west of Erie = 240 m]

** Reference Costs Source: Oak Park Road Extension Feasibility Study, Parsons, July 2019

*** *All costs stated in 2020 dollars* & Contingency of 20% for Construction and 30% for Engineering assumed unless stated specifically in reference reports (i.e. feasibility reports).

Monitoring

The TMP is intended to be reviewed every five years and updated if necessary. It also addresses only the Phase 1 and 2 requirements of the Municipal Class EA planning process for specific road extension, widening and intersection improvements, providing an assessment of the problem or opportunity and assessment of alternative planning solutions. It is not intended to address planning and design details that will be further addressed in Phases 3 and 4 of the complete process.

Many of the TMP policy recommendations are being incorporated into the new Official Plan (e.g. requirements for expansion, functional classification, design elements for category and functionality of road), and will be implemented through processing of land use applications under the Planning Act. The City may also choose to implement the recommended projects in a different order or phasing that has been suggested in the TMP Update to accommodate Council priorities, the need to coordinate with other infrastructure works (i.e. sewer work), planned developments in the area, or other considerations beyond the scope of this project to consider.

The TMP should also be monitored by maintaining the traffic demand forecasting model, including continued participation in the Transportation Tomorrow Survey. TMP monitoring may contain recommendations on updated traffic calming, parking management and truck route management. It is

recommended that the TMP be monitored on an annual basis, taking into consideration new traffic counts, trends, private sector initiatives, performance targets, provincial initiatives and city growth.

1.0 Study Foundation

1.1 Background

As part of the 2017 budget process, Brantford City Council approved the review of the 2014 update to the 2007 Transportation Master Plan. This update occurred at the same time as the review of the City of Brantford's Master Servicing Plan (MSP) and Official Plan (OP). The 2020 Transportation Master Plan (TMP) update includes the Boundary Expansion Lands (approximately 460 ha in the North and Tutela Heights Expansion Areas) that were transferred from Brant County to the City on January 1, 2017. Recommendations from the TMP will be considered for inclusion in the 10-year capital forecast and future Development Charges studies, and the strategic objectives will be incorporated into the OP. The TMP was undertaken using Approach 1 of the Master Planning Process, where the Master Plan document is prepared at the conclusion of Phases 1 and 2 of the Municipal Class EA process. The Master Plan would therefore become the basis for, and be used in support of, future investigations for the specific Schedule B and C projects identified within it. Schedule B projects would require the filing of the Project file for public review while Schedule C projects would have to fulfill Phases 3 and 4 prior to filing an Environmental Study Report (ESR) for public review.

The previous TMP Update for the City of Brantford was adopted in August 2014. Since then, a few changes in the transportation infrastructure have taken place in and around the community which were recommended in the 2014 TMP Update to be implemented in the period 2014 to 2019. These include:

- Widen Shellard Lane with in boulevard multi-use path and intersection improvements from Veterans Memorial Parkway to the vicinity of the T. H. & B. Rail Trail; and
- Widen Oak Park Road overpass (over Highway 403) to accommodate left turn lanes and paved shoulder / bike lanes.

According to Brantford's Municipal Comprehensive Review (MCR), the City's population was 93,650 in 2011 and 101,700 in 2016, representing an 8.6% change over the 5-year period. The City's new population and employment forecasts now reflect the planning horizon of 2041, consistent with the Province's *Places to Grow* policies as amended in May 2019. The population growth currently forecast for the 2041 horizon year is 163,000, representing a 60% increase over the 2016 MCR population figure.

Furthermore, a number of transportation infrastructure projects recommended in the 2014 to 2019 period have not been implemented, nor have Environmental Assessment studies been undertaken due to funding constraints and/or reduced transportation demand. These projects include:

2014-2019 Recommended Projects Not Implemented

- Widen Clarence Street to include two-way left turn lane and signals from Colborne Street to West Street. Potential trail may be added if the abandoned privately owned rail line is available;

- Conversion of Colborne/Dalhousie Streets to two-way operation from Brant Avenue to the intersection of Colborne Street and Dalhousie Street (EA approved but expired);
- Widen Oak Park Road from Highway 403 to Hardy Road (Partially completed as only widened from westbound on/off ramp to Fen Ridge/Savannah Oaks);
- Widen Veterans Memorial Parkway to four lanes from Mount Pleasant Street to Erie Street including widening the Grand River crossing; and
- Downtown Intersection Improvements at the intersections of Colborne Street & Icomm Drive and Dalhousie Street & Brant Avenue.

Updating the 2014 TMP has provided an opportunity to review, reconfirm, or change the City's main transportation infrastructure and service plans. The update has also addressed newer issues involving changing economic and associated growth conditions, changes in the regional transportation context around Brantford (i.e., Highway 24, Highway 403, provision of GO Transit service), changing travel patterns, and evolving public priorities for the transportation system, for example dealing with the new Complete Streets philosophy, expanding the emphasis on Active Transportation and new traffic management and calming measures (i.e. potential for roundabouts).

The basic transportation issues and needs facing Brantford to 2041 are similar to those in other smaller Canadian cities. They include responding to growth, funding constraints, auto-dominated travel, core area revitalization, cost-effective transit operation, and maximizing the capacity of the existing road network. In the context of south-central Ontario, Brantford has growth potential that requires plans that will effectively serve growing transportation demands.

1.2 Study Objectives

The following study objectives were set by the City for this TMP Update:

1. Plan to accommodate city growth to 2041, including the urban boundary expansion of the City of Brantford, the intensification target for development within the Built-Up Area, and density targets within the Designated Greenfield Area as set out in the new Official Plan;
2. Provide transportation infrastructure project and cost input into the Development Charges update;
3. Follow the Master Planning process and key principles of the Municipal Class EA to satisfy EA requirements for Schedule 'B' undertakings, and Phase 1 and 2 for Schedule 'C' projects; and
4. Consult with First Nations, agencies, stakeholders and the public early and continuously throughout the Master Planning process, using various techniques and materials.

Other objectives, constraints and limitations that influenced the development of this TMP Update include:

- **Continue to strive for a "made for Brantford" Master Plan** reflecting the unique characteristics of Brantford and its context while still learning from successes in other similar-sized cities.
- **Show the impacts of "Status Quo" approach to system management,** in terms of addressing deficiencies, level-of-service, and ability to meet planning targets.

- **Coordinate TMP preparation with the City's concurrent Municipal Comprehensive Review (OP) and the Master Servicing Plan (MSP) study** in terms of growth forecasting, consultation activities, and planning of cost efficiencies in the development of new transportation, sewer and water infrastructure.
- **Integrate transportation and land use planning.** Transportation and land use planning has been coordinated to identify bold transportation strategies that will be required to support an overall sustainability plan for transportation up to 2041, and translate these strategies into Official Plan policy.
- **Work towards becoming a Bicycle Friendly Community** and receiving a designation by Share the Road Cycling Coalition by providing a clear, concise pathway towards a more bicycle friendly future.
- **Define the future role of public transit.** Reduce the City's environmental footprint by increasing transit use through improved service levels, by effectively serving newly developing areas, meeting the accessibility needs of residents, by considering inter-municipal and inter-regional links, and by considering new micro-transit technologies in support of first/last mile solutions.
- **A Complete Streets philosophy** has been applied to this TMP Update so that streets are planned, built, and maintained for all users.
- **Preparation for Connected and Autonomous Vehicles (CAVs).** Consider how the emergence of CAVs will impact small-sized cities, such as Brantford, and how to strategically prepare for them.

1.3 Study Approach

The approach used in this TMP Update was organized into five (5) distinct project phases:

- **Phase 1: Develop a Study Foundation** – Set the stage and boundaries for the City of Brantford's transportation system.
- **Phase 2: Integrated Transportation Strategy** – Determine integrated strategies for developing networks, programs, and policies for all travel modes in a manner that supports community-building objectives.
- **Phase 3: Street Network Capacity Needs** – Define problems and opportunities for the transportation system.
- **Phase 4: Review of Key Transportation Issues** – Review and assess the relationship between regional and local needs of the transportation network and identify a plan and role for the local system.
- **Phase 5: Implementation Plan** – Bring the elements of the TMP together and develop a practical approach to implement and monitor the TMP transportation network and guide the City forward to the 2041 horizon year.

Our approach and methodology is designed to satisfy Phases 1 and 2 of the Municipal Class Environmental Assessment (EA) process and follows Master Planning Process Approach #1. The integration of technical and consultation activities is a core element of the process.

1.4 Stakeholder Agency Consultation

Several stakeholders were consulted with over the duration of the TMP. Their input informed the direction and recommendations in the study.

In accordance with the Ontario government's process for Indigenous and First Nations consultation, communities were contacted at multiple points throughout the study process. Specifically, the study team contacted the Indigenous and First Nations communities at the point of the Notice of Commencement, the in-person and virtual Public Information Centers, and Notice of Study Completion for the TMP. The communities contacted are listed below:

- Mississaugas of the New Credit First Nation;
- Six Nations of the Grand River; and
- Métis Nation of Ontario.

Agencies who have jurisdiction in the area of the study and whose feedback is vital in guiding the study's direction were consulted through correspondence and face-to-face/virtual meetings throughout the TMP. These agencies included:

- The County of Brant; and
- The Ministry of Transportation

The following external agencies were provided notification of the project start and public information centers, and provided opportunities to provide comment on the project:

- Active Grand;
- Bell Homestead;
- Boys & Girls Club of Brantford;
- Brant County Health Unit;
- Brant Food Coalition;
- Brant Haldimand Norfolk Catholic;
- District School Board;
- Brant Museum & Archives;
- Brantford YMCA-YWCA;
- Brantford/Brant Chamber of Commerce;
- Brantford-Brant Roundtable on Poverty;
- Canadian Hearing Society;
- Canadian Mental Health Association-Brant;
- Canadian Military Heritage Museum;
- Community Living Brant;
- Conestoga College;
- Contact Brant;
- Family Counselling Centre of Brant;
- Grand Erie District School Board;
- Grand River Community Health Care;
- Grand River Conservation Authority;
- Grand Valley Trails Association;
- St. Leonard's Community Services;
- Wilfrid Laurier University;
- YMCA Employment, Training and Settlement Services; and
- Brantford Town Crier.

1.5 Public Consultation

The City recognizes that the choices the community makes today with respect to growth and development and long-term needs for transportation infrastructure will shape the community for years to come. Therefore, a key factor influencing the development of the TMP Update, as well as the associated Master Servicing Plan (MSP) and Official Plan Review (OPR), has been, and will be, the input received from the various stakeholders and the general public on the future of transportation service in the City to address demands by 2041.

The formal public consultation program for the three projects was, and will be, integrated due to the parallel nature of the three studies. The specific stakeholder and public consultation sessions that were conducted as part of the TMP are as follows:

- External Agency Notification: October, 2017;
- Notice of Study Commencement: October 19 and 26, 2017;
- Public Meeting #1: Envisioning Our City: 2041 – November 16, 2017;
- Active Transportation Workshop - April 5, 2018;
- Public Meeting #2: Foundations and Strategies - May 17, 2018;
- Public Meeting #3: Constraints and Opportunities - February 10, 2020; and
- Virtual Public Open House – Meeting #4: Preferred Future Network and Service Recommendations – June 9 to June 23, 2020.

The notices, presentation material, and public comments for the aforementioned consultation events are included in ***Appendix A***.

In addition to the stakeholder and public consultation sessions, The City of Brantford's Council was, and will be, kept informed of the study progress and findings through formal reports and findings. These contact points included/will include the following:

- TMP Project Update, May 2020 prior to Public Information Centre #4 (Briefing Note PWIR2020-006 May 4, 2020: Water, Wastewater and Stormwater Master Servicing Plan (MSP) and Transportation Master Plan (TMP) – Project Update); and
- TMP Update presentation of recommended plan, October, 2020; prior to the 30-day Public Review (Council report October 2020: Transportation Master Plan (TMP) update 2020-427).

1.5.1 Public Information Center – Meeting #1: Envisioning Our City: 2041

The Public Information Center took place on Thursday, November 16, 2017 from 6:00-8:30 PM at the North Park Collegiate & Vocational School. Approximately 80 people attended.

The purpose of the Public Information Center was to provide information about the Official Plan Review, Master Servicing Plan, and Transportation Master Plan. Input and feedback was received from the public on the growth options under consideration through the Municipal Comprehensive Review, and issues and ideas relating to the City's servicing and transportation systems.

After providing an introduction to each of the studies, participants were invited to join one of five Discussion Groups: Official Plan; Housing, Intensification and Growth Options; Employment; Transportation Master Plan update; and Master Servicing Plan update.

A summary of the TMP Update discussion is as follows:

- Used to have public transit, but don't have it now. It is needed and wanted;
- Need the transportation system solutions to be cognizant of Regional needs, particularly for rural area access to transit into the urban/downtown area;
- Brantford Southern Access Road - 25 year plan;
- There is poor network performance now. Consider how to address future issues. The Plan needs to be implementable;
- Traffic on West Brant Avenue and Colborne Street. Consider access to hospital;
- Nobody is using the bike routes;
- Have Grand River crossing at Oak Street and St. Paul Avenue;
- Show the Brantford Southern Access Road extending east to the Glebe Lands, into the southern terminus of Wayne Gretzky Parkway;
- Extend Conklin Road to County Road 18;
- Consider the form of development, role and function of the street and ability to achieve intensification;
- Does walking and cycling fit with the idea of the 'suburban dream'? The sub-urban dream is why people moved to Brantford;
- City structure is not conducive to street oriented development;
- Some benefit to the bulk of the growth occurring to the north;
- People drive because they commute to work in Toronto, Hamilton and Cambridge; and
- Transportation Master Plan must look at trends and future impacts of distribution.

1.5.2 Active Transportation Workshop

The Share the Road Cycling Coalition facilitated a Bicycle Friendly Communities Workshop (from 9:00 AM – 3:00 PM) and a Community-based World Café (from 6:00-8:00 PM) on Thursday, April 5, 2018 at the Brantford & District Civic Centre. The purpose of this Workshop was to help identify a path forward for the City to become more bicycle friendly through the development of new programs, projects and partnerships to make cycling more comfortable and accessible to all residents and visitors to the area. More than 70 community members, key stakeholders, Municipal staff, and City Councillors heard new ideas and contributed their local expertise about how Brantford can become a better place for cycling.

The Bicycle Friendly Communities Workshop focused the efforts of attendees on developing strategies to advance new programs to support cycling in addition to creating innovative strategies for creating a stronger network of cycling infrastructure throughout the City and surrounding region.

During the workshop, participants helped to:

- Identify the existing cycling assets and some of the challenges faced within their community;
- Discuss opportunities for developing new programs, projects and partnerships to foster a stronger culture of cycling in Brantford;
- Articulate a five-year vision for cycling in Brantford; and
- Develop a two-year work plan for making progress toward that vision.

We are confident that Brantford can achieve meaningful progress towards these goals, especially if undertaken in tandem with infrastructure improvement. The essential programmatic elements of a more Bicycle Friendly Brantford by 2023 are:

- **Education** – A more coordinated effort will be made by the various agencies and stakeholders working on cycling to ensure that education about cycling – both teaching people how to ride bikes safely and teaching people how to share the road with cyclists when driving, is made more available to the community. Brantford will have several trained cycling instructors, and will offer courses to new and experienced riders to help encourage safe, legal cycling practices. All schools in Brantford will have access to Bike Rodeos and other cycling education programs, and all schools will have an Active School Travel Plan to help students get to school actively and safely where possible. Educational efforts will also include public awareness campaigns designed to create better interactions between people driving and people cycling, as well as a focused campaign discussing the value of active transportation to the community.
- **Encouragement** – introducing new programs designed to get residents excited about cycling again is key to creating a culture of cycling. Brantford will host a variety of different events during Bike Month which will make it easy and fun for residents to get back on their bikes. Bike Valet will be provided at popular community events and high-demand locations to ease the burden on parking spaces, and more information about cycling will be available online. Community rides, signature cycling events and Open Streets events will be regular features in Brantford, and will help to grow the culture of cycling in the community.
- **Enforcement** – Brantford Police and local bylaw officers will patrol Brantford's trails and roads by bike more often, making cycling a more visible part of the City's identity. Brantford will have bylaws relating to cycling that will reflect best practices across the province, and will engage community partners, including the Brantford Police, in educating the public about changes to the Highway Traffic Act.
- **Evaluation & Planning** – Brantford will be a leader in Ontario in the field of data collection as it relates to cycling, including cataloguing near-misses, gathering trip to school data and utilizing technology to count active transportation users, including permanent counters and video detection. More information about active transportation in Brantford will be collected and shared publicly, including trail user surveys and economic impact assessments. Bike counters and GIS data will be collected regularly to assess the success of Brantford's cycling programs.

The Summary Report and Recommendations (included as ***Appendix B***) are organized under the 5 E's of the Bicycle Friendly Community Program (with the exception of Engineering), outlines recommended actions Brantford could take in the next two to three years to help it work towards achieving this 5 year vision. With more than 70 attendees between the workshop and World Café, it was not surprising that the initial list of potential actions was quite long and varied, and contained far more than would be realistic to achieve in a short time as outlined within the work plan. The initial list of brainstormed actions has been refined to include a number of high-impact activities, many of which are proven to be best practices in communities across North America.

It is important to remember that there are many ways to build a more bicycle-friendly community. The work plan contains suggestions for one path that could be followed to get there, however, it may be possible for Brantford to substitute other actions that are not included in this plan and still achieve this five year vision for increasing bicycling.

1.5.3 Public Information Center – Meeting #2: Foundations and Strategies

The Public Information Center took place on Thursday, May 17, 2018 from 6:00-8:30 PM at the Brantford & District Civic Centre. Approximately 80 people attended.

The purpose of this Public Information Center was to provide an update on the Official Plan Review, Master Servicing Plan, and Transportation Master Plan. Specifically, the PIC presented:

- The results of the draft Land Needs Assessment which will determine the amount of land to be added to the City's urban settlement area;
- The potential location of the future urban lands in the Boundary Expansion Lands based on the draft land needs;
- Proposed alternative targets for intensification in the City's Built-up Area;
- Proposed alternative density target in the City's Designated Greenfield Area; and
- Updates on the Master Servicing Plan and the Transportation Master Plan.

After the presentations, participants were invited to join one of five Discussion Groups: Land Use Planning; Transportation Master Plan Update; Master Servicing Plan Update; Natural Features; Agriculture; and Archaeology.

A summary of the TMP Update discussion is as follows:

- Cycling:
  - There are lots of north/south bike routes, need more east/west routes;
  - Need an east/west bike route in the north end, like North Park Street;
  - The transportation hierarchy should be pedestrians, active transportation and then transit;
  - Sharrows are not effective. Need to have separate bike lanes. Green corridors (a trail or linear park that is frequently created out of a disused railway, utility or similar right of way) would be even better;

  - Need to have secure bike parking (lockers, bike cage/room with secure entry);
  - What percentage of the capital budget will be designated to active modes of transportation?;
  - Active transportation needs to be encouraged to help fight climate change;
- Transit:
  - Need transit in Tutela Heights;
  - Connect transit to Six Nations Reserve;
- Downtown Transit Station:
  - Coordinate with VIA Rail;
  - Connect inter-city transit and create a hub;
  - Encourage transit connections (BIA shuttle between the VIA/GO hub and downtown);
- Intensification:
  - Like intensification projects;
  - Implementation timelines need to be accelerated;
  - Columbia Street in Waterloo is a good example for intensification;
- Other:
  - Like that the Transportation Master Plan is building on land use;
  - Make sure to coordinate with the Master Servicing Plan;
  - There should be a connection between the Official Plan and the Transportation Master Plan;
  - Traffic signal at Mount Pleasant and Conklin Roads;
  - Consider identifying priorities and creating an implementation plan for improvements;
  - Do not support the two-way conversion. Need to meet with EMS regarding requirements. Keep one way, reduce to one lane and add bike lanes and wider sidewalks;
  - Scatter the intersection;
  - Country Road 18 should be seen as a ring road. Avoid a single point of failure (flooding);
  - Wayne Gretzky Parkway needs alignment north of Powerline Road; and
  - Support the extension of Conklin Road.

1.5.4 Public Information Center – Meeting #3: Constraints and Opportunities

The Public Information Center took place on Monday, February 10, 2020 from 6:30-8:00 PM at the Brantford & District Civic Centre. Approximately 80 people attended.

The purpose of the Public Information Center was to provide an update on the Master Servicing Plan and Transportation Master Plan. Future servicing and transportation problems were identified and various solutions under consideration were presented. Input and feedback (including additional solutions) were received from the public related to the various servicing and transportation options under consideration.

A summary of the input and feedback received on the issue of transportation is as follows:

- Further consideration of the following problem areas (traffic flow) is required:
  - Erie Avenue;

- Clarence Street; and
- Eagle Avenue\Alfred Street.

- To aid "Manage Travel Demand" scenario right away:
  - ensure that Brantford Transit and schedules show up correctly on Google maps, Apple Maps, City Mapping and the Brantford Transit App; and
  - make it possible to track next bus in real time to allow for shorter waits and to encourage motorists to take the bus instead. At present, it's frustrating as no one ever knows when the bus might show up (10-15 minute range/margin).

1.5.5 Virtual Public Open House – Meeting #4: Preferred Future Network and Service Recommendations

This event was held as a Virtual Public Open House (with health officials advising that the best way to prevent the spread of COVID-19 is by practicing physical distancing and limiting gatherings to groups of ten people, engagement for this project was conducted online) to present the Preferred Future Network and Service Recommendations. Information slides and an accompanying video presentation were available online from June 9 to June 23, 2020.

This public consultation event presented the preferred and preliminary future recommendations for the public transit strategy, active transportation system (that includes cycling and walking), and the road network infrastructure requirements for the 2041 horizon. It provided an overview of the foundations chapter (existing conditions and growth), the complete streets chapter (the vision and design elements for each travel mode), and the transportation assessment.

1.6 Existing Road Network

The existing roadway network within the City of Brantford in ***Figure 1-1***, while ***Figure 1-2*** illustrates the County roadway network for the surrounding County of Brant under existing conditions (2016).

The major east-west route in the City is Highway 403 (under Provincial jurisdiction), which provides connections across the northern part of the City, connecting Brantford the GTA to the east and to Woodstock and London to the west. The City is presently served by five (5) interchanges with Highway 403: Garden Avenue, Wayne Gretzky Parkway, King George Road (Highway 24), Paris Road, and Oak Park Road. Highway flyovers exist at West Street, North Park Street, Tollgate Road, and Ewing Drive.

Other significant east-west arterials in the City include:

- Colbourne Street East (1-way eastbound from Brant Avenue to just east of Stanley Street);
- Dalhousie Street (1-way westbound from Brant Avenue to just east of Stanley Street);
- Colbourne Street West, with crossing of Grand River (Lorne Bridge);
- Veterans Memorial Parkway, with crossing of Grand River;
- Grey Street;
- Elgin Street;

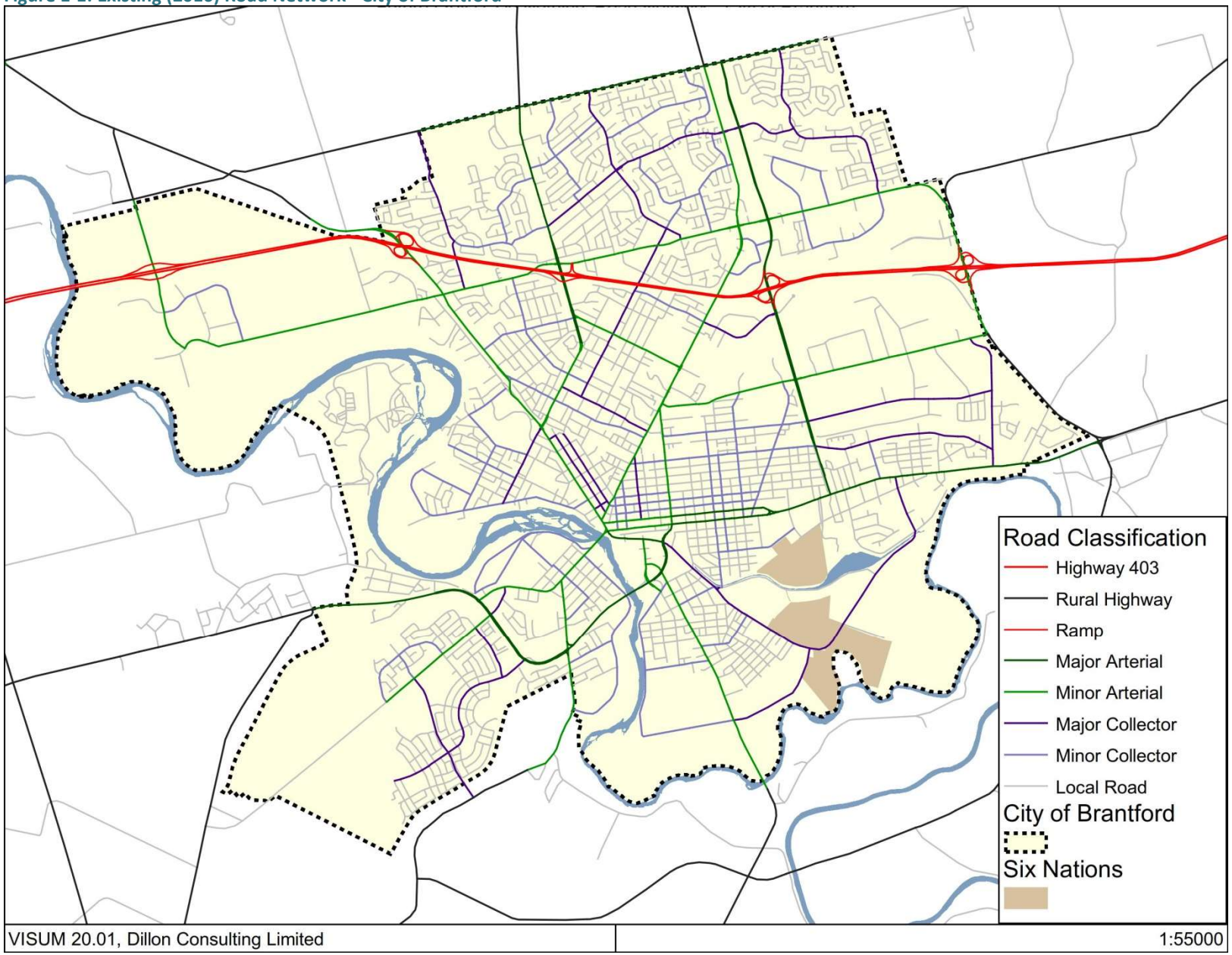
- Henry Street;
- Lynden Road/ Fairview Drive/Tollgate Road/Hardy Road;
- Dunsdon Street; and
- Powerline Road.

The major north-south routes in the City are:

- St. Paul Avenue/King George Road/Highway 24 which connects downtown Brantford to Highway 401 and to the Cambridge/Kitchener/Waterloo area;
- Wayne Gretzky Parkway which connects downtown Brantford to Highway 403;
- Paris Road/Brant Avenue which connects downtown Brantford to Highway 403 and to the Town of Paris;
- West Street which connects downtown Brantford to the City's commercial and residential areas north of Highway 403;
- Clarence Street;
- Mount Pleasant Road; and
- Erie Avenue, with crossing of the Grand River.

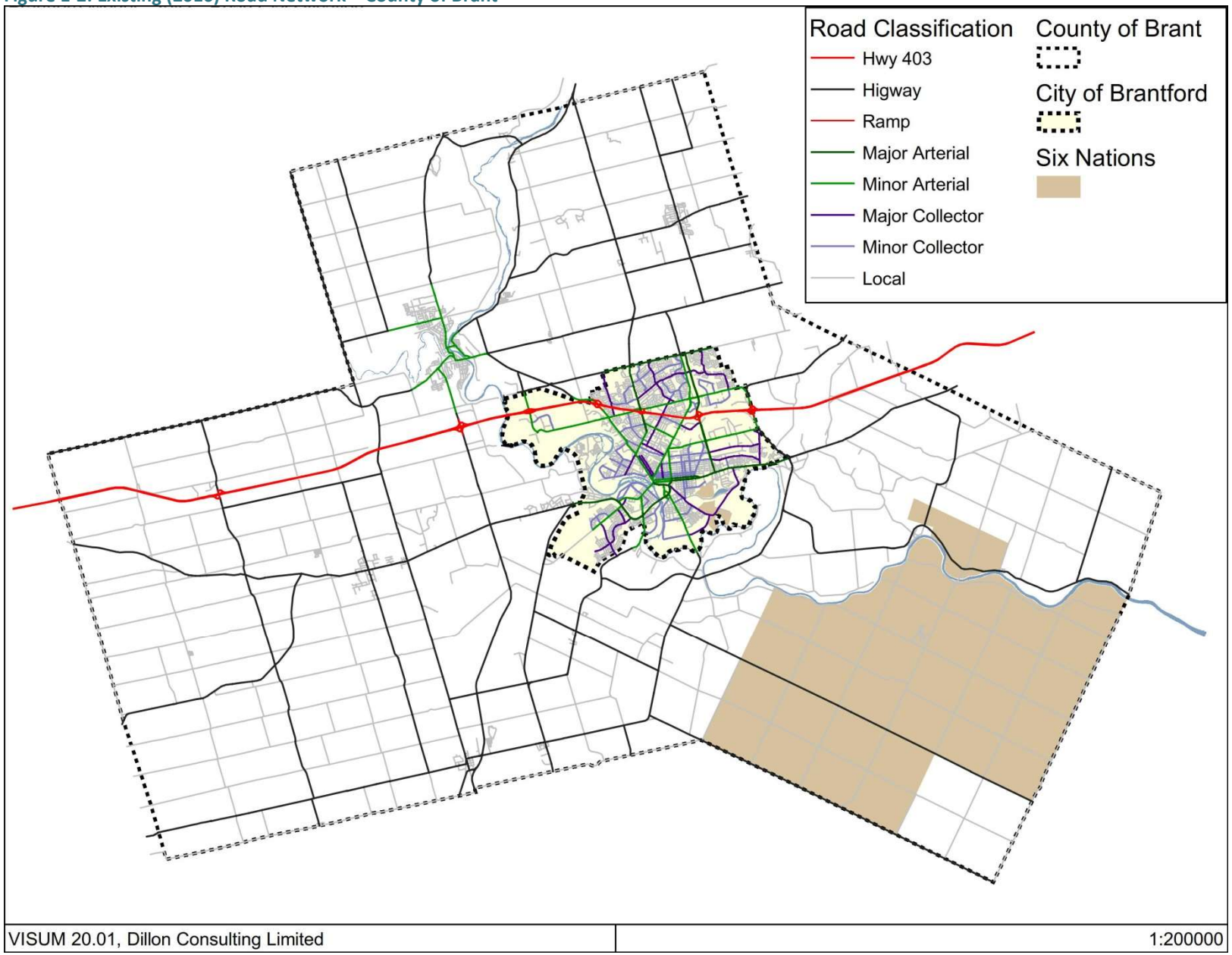
These roads provide integral service across the City, and connect into County and Provincial systems both within the City boundaries and beyond.

Figure 1-1: Existing (2016) Road Network - City of Brantford



Note: This figure displays the City of Brantford boundary is at it existed in 2016, prior to the municipal boundary adjustment that came into effect on January 1 2017.

Figure 1-2: Existing (2016) Road Network – County of Brant



Note: This figure displays the City of Brantford boundary is at it existed in 2016, prior to the municipal boundary adjustment that came into effect on January 1 2017.

1.7 Existing Local Roadway Travel Demands

1.7.1 Approach

Existing data was collected for critical screenlines within the City in June of 2018. Screenlines are imaginary lines, in which the locations are chosen strategically to capture traffic that crosses major arterial roads, rivers, or other major physical boundaries in an area. This traffic data was used to establish existing flows and to calibrate the transportation model. The transportation model was used to generate network wide traffic volume forecasts for the existing conditions and future horizon years.

For the new, current iteration of the City's travel demand model, the previous TransCAD model was migrated to PTV's Visum software platform. During this process, the model network was reviewed for accuracy and consistency against recent aerial photography imagery and other data (County of Brant Transportation Master Plan Update & City of Brantford Transportation Master Plan Update) provided by the City. The current road network contains nearly identical coverage and the same Transportation Analysis Zone (TAZ) system as the previous model iteration.

The new Visum platform provides additional enhancements to the model, which includes the ability to:

- Easily extract sub-areas of the model along with localized origin-destination trip tables (i.e. travel matrices) corresponding to the extracted sub-area;
- Add intersection detail representing geometric conditions (i.e. lane adds/drops, channelized turns, etc.) and traffic signal / detector placement; and
- Enhance the model through link geometry detail and intersection detail (described above) to make it "microsimulation-ready" or multi-resolution, meaning that an extracted Visum sub-area model can be exported through PTV's Abstract Network Model (ANM) process and easily imported into Vissim for additional microsimulation analysis.

The Transportation Tomorrow Survey (TTS) remains as the cornerstone of the model. Its findings were primarily used in the development of the transportation model (AM and PM peak hour auto assignment), and include the identification of peak travel periods, the development of trip generation rates, the identification of travel mode share (peak hour and daily auto, auto passenger, transit, walk and cycle), and the estimation of automobile occupancy, etc.

Appendix C provides more specific details related to the transportation models development and application.

The updated travel demand forecasting model was used to measure the following generalized traffic condition on the City's road network in the AM and PM peak hour, where PM peak hour is typical the worst-case/most congested condition. This condition is measured as the Volume-to-Capacity (V/C) ratio

on major roads and the associated Level of Service (LOS) conditions. ***Table 1-1*** displays the thresholds for V/C ratios and LOS along with a general description of the corresponding traffic condition.

Table 1-1: Volume-to-Capacity (V/C) Ratios and Level of Service (LOS) Thresholds

V/C Ratio	LOS	General Traffic Condition
0.00 – 0.20	A	Excellent to Good
0.20 – 0.40	B	
0.40 – 0.60	C	
0.60 – 0.80	D	Fair
0.80 – 1.00	E	Poor – Mitigation Required
>1.00	F	Failure – Significant Mitigation Required

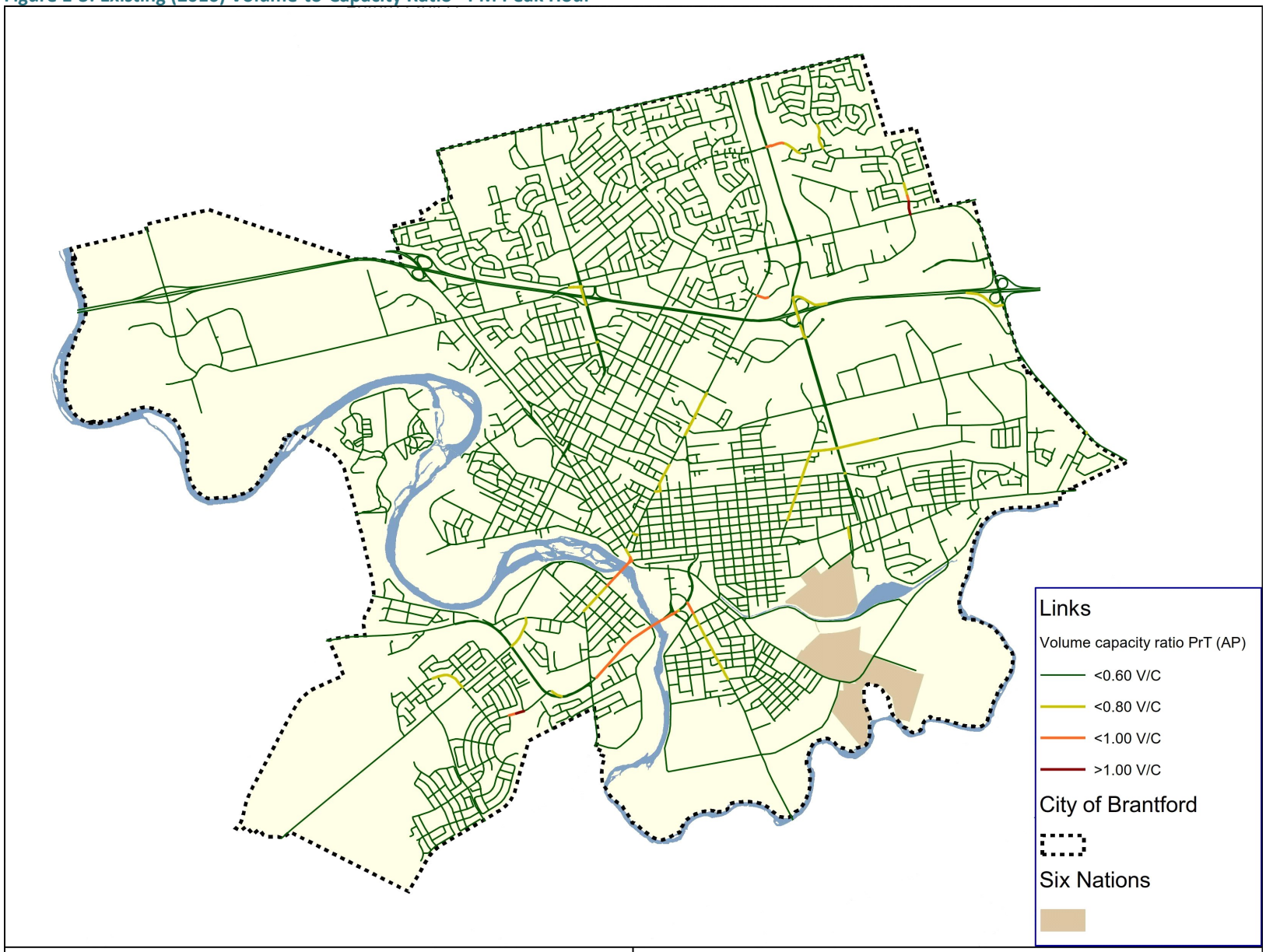
1.7.2 Existing Automobile Traffic Level of Service (LOS)

It is generally accepted that the goal of most communities is to maintain LOS A to D conditions on their road networks, address LOS E conditions on their roads and avoid any LOS F conditions in the long term through capacity enhancement and Transportation Demand Management (TDM) actions.

Brantford's existing (2016) V/C ratios during the PM peak hour are shown on ***Figure 1-3.*** The following is a summary of observations pertaining to Brantford's existing arterial/collector road network Level of Service (LOS):

- The PM peak hour vehicle demands are higher than the AM peak hour;
- Highway 403 interchanges with King George Road and Wayne Gretzky Parkway experience approaching capacity conditions during the PM peak hour due to high demands accessing/returning to the city;
- Highway 403 accesses to/from the downtown core are experiencing mild congestion during the PM peak hour:
  - King George Road Interchange via King George Road and Brant Avenue; and
  - Wayne Gretzky Parkway Interchange via the Parkway and Colborne Street / Dalhousie Street couplet;
- North of Highway 403, King George Road and Wayne Gretzky Parkway serve as the primary north-south corridors accessing east-west facilities, such as Lynden Road, Powerline Road, and Dunsdon Street. They are experiencing mild congestion and/or approaching capacity during the PM peak hour;
- The West Street corridor has high north-south vehicle demands and traverses Highway 403 (no access);
- The two bridge crossings of the Grand River, Colborne Street and Veterans Memorial Parkway provide the primary connections between the downtown core and southwest Brantford. They are experiencing mild congestion and/or approaching capacity in both peak hours;

Figure 1-3: Existing (2016) Volume-to-Capacity Ratio - PM Peak Hour



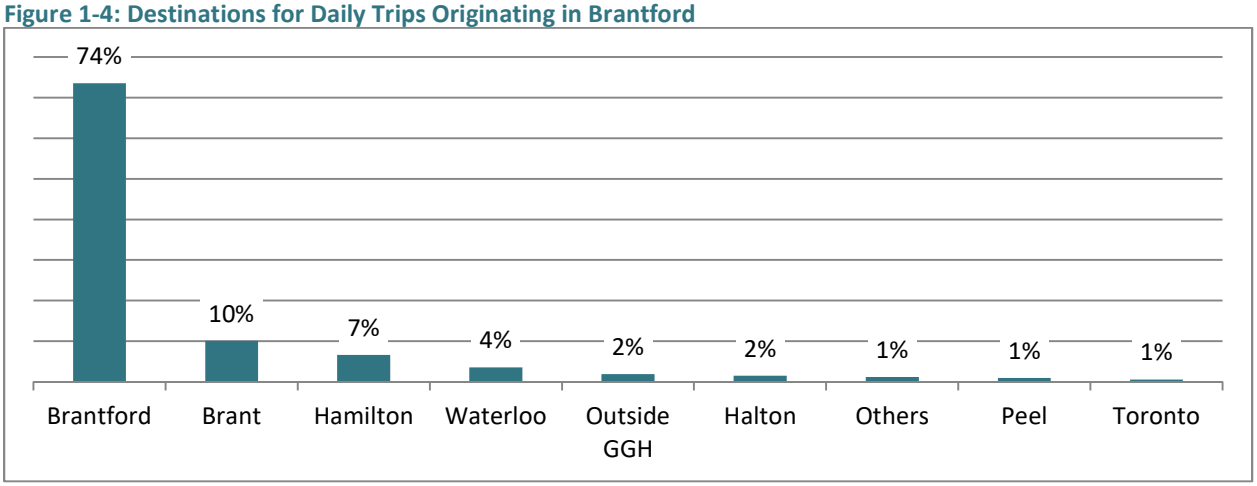
Note: This figure displays the City of Brantford boundary is at it existed in 2016, prior to the municipal boundary adjustment that came into effect on January 1 2017.

- Blackburn Drive in the vicinity of Veterans Memorial Parkway is approaching capacity in both peak hours; and
- Erie Avenue is approaching capacity in both peak hours in the vicinity of Veterans Memorial Parkway

1.7.3 Primary Trip Markets

Figure 1-4 illustrates the destinations and proportion of all daily trips that originated from within the City of Brantford based on the 2016 Transportation Tomorrow Survey (TTS)[1]. Not surprisingly, the vast majority of trips originated from within Brantford were also destined to locations within Brantford (74%). The remaining 26% of trips were destined for various locations outside of the City.

Figure 1-4: Destinations for Daily Trips Originating in Brantford



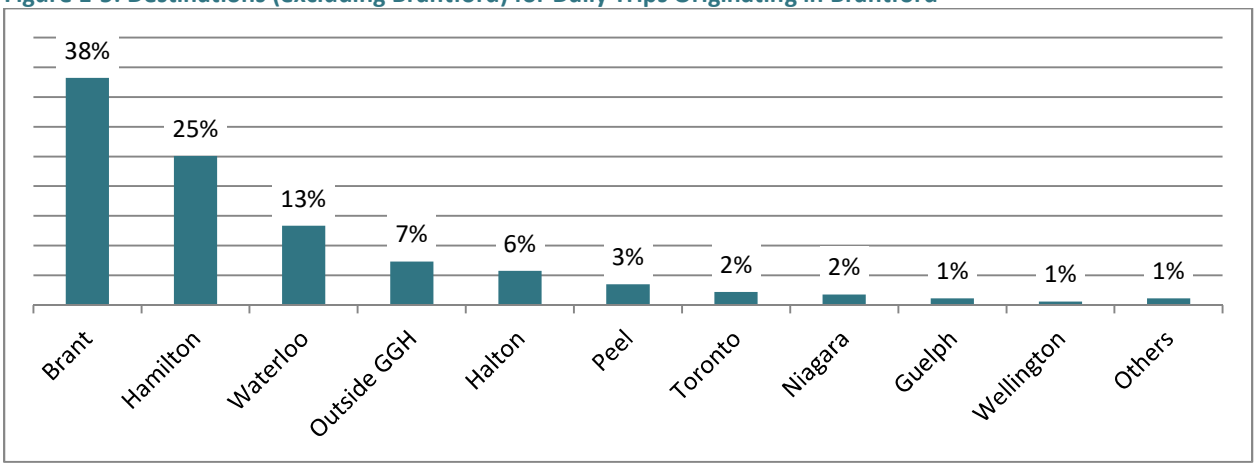
Source: 2016 Transportation Tomorrow Survey (TTS)

Figure 1-5 illustrates the destinations and proportion of all daily trips that originated from within the City of Brantford that were destined to locations outside of the City. Clearly, Brant County, Hamilton and Waterloo Region represent the three largest trip markets outside of Brantford, attracting 38%, 25% and 13% of Brantford's external trips respectively. Additionally, regions outside of the Greater Golden Horseshoe (GGH) and Halton Region attracted the majority, but a smaller individual share, of the remainder. However, Toronto attracted more transit trips from Brantford than any other municipality due to its size and existing transit connections.

In terms of actual trips (by all modes), Brant County attracts about 19,000 daily round trips, Hamilton about 12,500 daily round trips, and Waterloo Region about 6,650 daily round trips compared to about 1,100 daily round trips to/from Toronto.

[1] The Transportation Tomorrow Survey (TTS) is a cooperative effort by local and provincial government agencies to collect information about urban travel behaviour in the Greater Toronto and surround area. The survey has been undertaken every five years since 1986.

Figure 1-5: Destinations (excluding Brantford) for Daily Trips Originating in Brantford



Source: 2016 Transportation Tomorrow Survey (TTS)

1.8 Existing Transit Network Use

The Brantford Transit (BT) fleet comprises 31 conventional buses and 14 specialized transit vehicles. Service consists of 9 daytime and 5 evening and Sunday fixed routes including peak hour services. Brantford Transit's existing daytime routes are displayed in ***Figure 1-6***. A total of 77,400 revenue-hours of service are operated annually with over 1.435 million trips taken in 2017. Service is provided from 6:00 AM to 1:00 AM Monday to Saturday and 8:00 AM to 8:00 PM on Sundays and selected statutory holidays. Routes operate every 30 minutes during daytime hours Monday to Saturday, then hourly in the evenings and on Sundays and selected statutory holidays. Extra service is provided on certain routes in peak hours to handle high ridership levels.

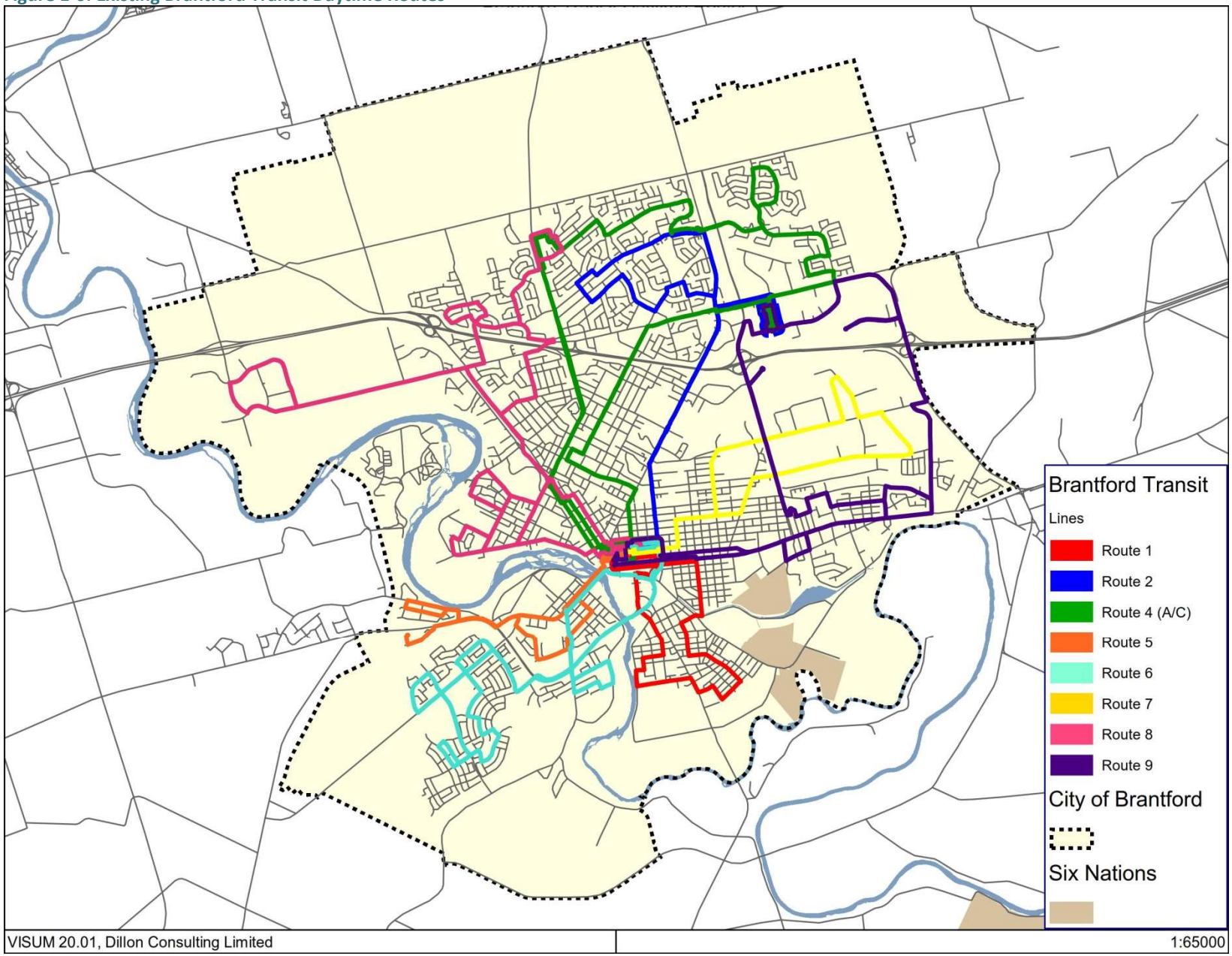
According to the 2016 Report: *Overview of Conventional and Specialized Transit Services*, the following route conditions were noted about Brantford's transit ridership:

- In both peak periods, Transit Routes 1, 2, 4A, 4C, 7, 8 and 9 showed good utilization with more than 100 riders on each route;
- Route 9 Echo Place is the best performing route, carrying about 20% of total daily ridership;
- Taken together, the Mall Link routes (4A and 4C) carry almost a third of weekday riders; and
- Routes 5 and 6, serving South West Brantford have poor utilization / the lowest ridership among weekday routes with less than 100 people riding on each route in each peak period. Together, the two routes only carry an average of slightly over 14 riders per trip.

In July of 2019, the federal and provincial government announced a $5 million public infrastructure funding grant. The funding is to be used to provide:

- New equipment to replace 21 buses – 13 conventional and 8 paratransit;
- New fare boxes and smart card technology;
- New bus pads and shelters; and
- Upgrade to the City's maintenance facility.

Figure 1-6: Existing Brantford Transit Daytime Routes



1.9 Existing Active Transportation

Brantford is very receptive to walking and recreational cycling as a result of the abundance of parks, open space, and off-road trails. Brantford's urban core provides attractive historic features and a compact street network with many route options for walking and cycling trips. With the recent addition of several high-quality bike facilities, such as bike lanes on sections of North Park Street, Dunsdon Street and Memorial Drive as the result of Road Diets and utilizing space within the existing right-of-way Brantford is taking strides to enhance Active Transportation (AT) within the City. Brantford's existing cycling and trails network is displayed in ***Figure 1-7***.

In addition to Brantford's existing AT infrastructure, Brantford has the unique opportunity to create additional multi-use paths as a result of the many abandoned rail corridors. Furthermore, Brantford has several proposed intensification corridors located along arterial roads (such as: King George Road, Wayne Gretzky Parkway and Colborne Street) with commercial, mixed use and more dense residential areas. These corridors provide the appropriate land use patterns that facilitate more short trips that are within the reach of walking and cycling.

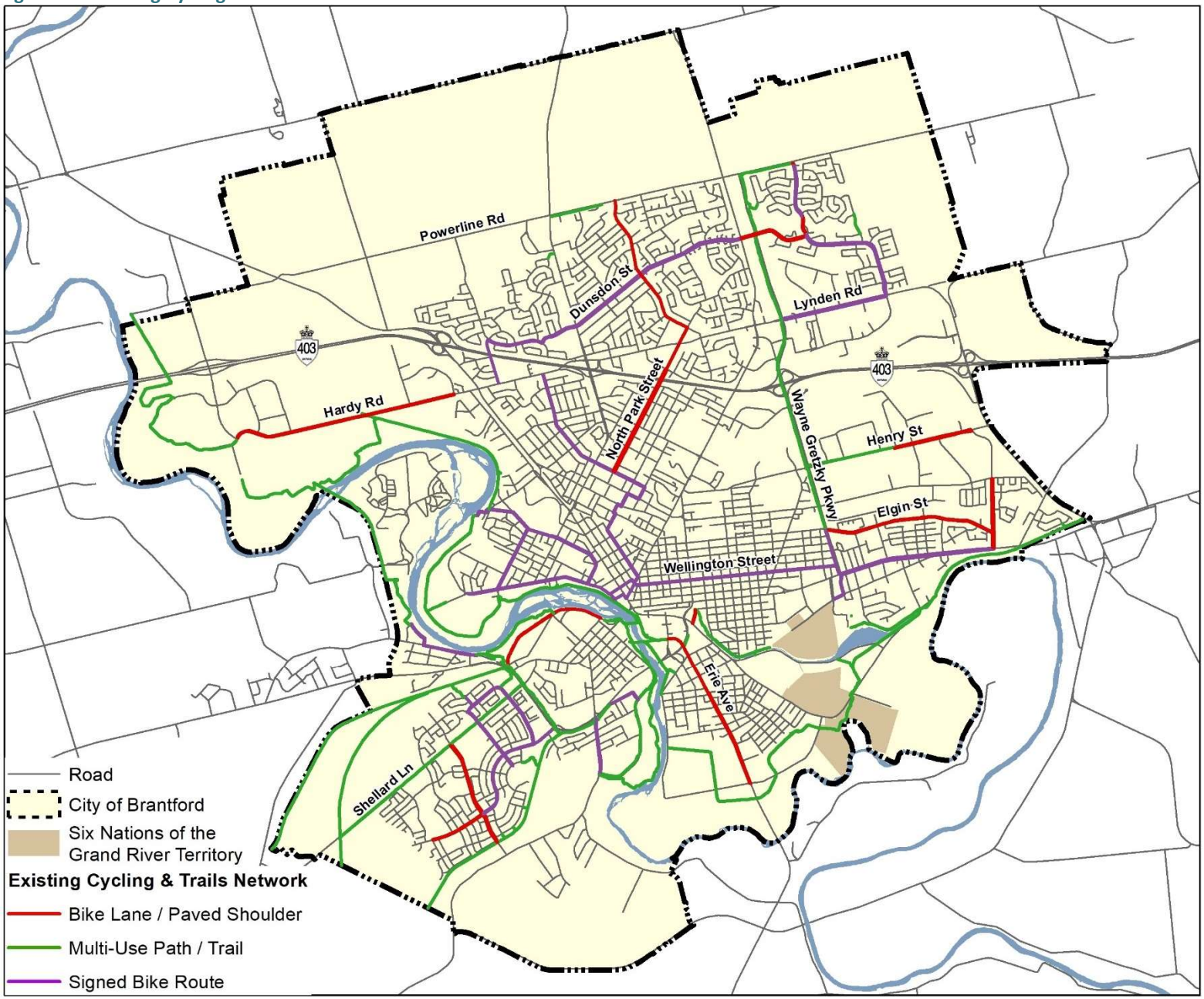
However, some specific characteristics challenge the appeal of AT in Brantford. Perhaps most notable is the need for better infrastructure within the roadway system. In general, suburban residential neighbourhoods built in the 1950's and 1960's (such as Green Brier and Fairview) have fewer sidewalks compared to urban neighbourhoods located closer to the urban core. While signed bike routes exist throughout the city, there are currently no on-street bike exclusive facilities (i.e. bike lanes, cycle tracks, etc.) in Brantford's core, high-activity areas.

Between 2007 and 2014 Brantford made good progress towards implementing additional AT infrastructure. Brantford constructed: 46.7 km of new sidewalks (including new development and reconstruction); 12.0 km of new multi-use paths; 4.2 km of bike lanes; and 30.4 km of signed bike routes. This increased Brantford's total centreline kilometrage of on-road cycling facilities to 43.5 km and total kilometrage of off-road trails to 89.3 km. Overall, Brantford constructed approximately 76% (of the total length) of proposed facilities in the 2007 Cycling and Trails network. Unfortunately, the majority of these new facilities were signed bike routes, which have a low implementation cost, but given the current cycling mode share (shown in ***Table 2-4*** and ***Table 2-5***) the evidence suggests that additional signed routes did not sufficiently encouraged more cycling at a City-wide level.

Since 2014 Brantford has continued to make good progress towards implementing additional AT infrastructure. However, unlike the period between 2007 and 2014, the majority of recent infrastructure additions have been dedicated active transportation facilities within the road right-of-way. This has been an intentional strategy as dedicated active transportation facilities within the road right-of-way were lacking and there is already a strong presence of multi-use paths on non-roadway corridors throughout Brantford. Examples of recently built (since 2014) dedicated active transportation facilities within road

right-of-way include: a multi-use path on Shellard Lane and bike lanes on sections of Erie Avenue, North Park Street, Dunsdon Street, Memorial Drive, Blackburn Drive and Garden Avenue. This increased Brantford's total centreline kilometres of on-road cycling facilities by 7.3 km to 50.8 km, and off-road trails facilities by 6.2 km to 95.5 km representing a 17% and 7% increase respectively over the 2014 totals.

Figure 1-7: Existing Cycling and Trails Network



DILLON CONSULTING

2.0 Transportation Impacts of Growth

2.1 Population and Employment Growth

The most recent *Places to Grow* (May 2019) policies include growth forecasts for the City of Brantford with a residential population of 163,000 and an employment level of 79,000 by 2041.

As part of the City of Brantford's Official Plan Review process, the Ministry growth forecasts were incorporated into a Municipal Comprehensive Review (MCR) as input to the City's new Official Plan (undertaken by SGL Planning and Design Inc. (SGL)). The MCR Part 1 Report, identified an alternative intensification target for the delineated Built-up Area and an alternative Designated Greenfield Area (DGA) density target appropriate for the City of Brantford as well as lands to convert from employment use and whether there was a need for a settlement area boundary expansion and the quantum of that need. The MCR Part 2 Report identified what part of the Boundary Adjustment Lands will be included in the settlement area boundary expansion to accommodate the identified need for urban lands. A majority of the work for the MCR predates the Mohawk Lake District Plan.

The 2041 population and employment forecasts were disaggregated by SGL to match the Traffic Analysis Zone (TAZ) structure within the City's strategic transportation model. The allocations were based on intensification policies and targets, Schedule 1: Growth Management in the City's draft Official Plan, land use designations, and sites with known development potential.

At a summary level, the growth forecasts used in this TMP growth analysis are shown in ***Table 2-1*** and ***Table 2-2*** below for the City of Brantford and County of Brant respectively. Detailed TAZ level population and employment data for Brantford and Brant County (2016 and 2041) can be found in ***Appendix C***.

Table 2-1: City of Brantford Population and Employment to 2041

Horizon Year	Population (Persons)	Employment (Jobs)
2016	101,700	44,900
2021	111,300	53,600
2026	125,200	60,300
2031	139,000	67,000
2036	152,000	72,000
2041	163,000	79,000

Source: *Envisioning Brantford* -MCR Part 1 Report, SGL Planning and Design et al.

Table 2-2: County of Brant Population and Employment to 2041

Horizon Year	Population (Persons)	Employment (Jobs)
2016	36,700	22,100
2021 Est	39,000	22,000
2026 Est	44,000	22,000
2031	49,000	22,000
2036	53,000	24,000
2041	57,000	26,000

Source: *A Place to Grow: Growth Plan for the Greater Golden Horseshoe*, 2019

Applying updated growth forecasts, disaggregated to the TAZ level-of-detail, the City's model was utilized to forecast future travel demands (i.e. Future Conditions) resulting from population growth, employment growth, and future land use patterns and densities as provided by the City. These were further enhanced using output from the ongoing Official Plan Update. Forecasted Future Conditions and various alternative transportation strategies were subsequently assessed based on the strategic direction criteria are identified in ***Section 2.4*** and in ***Chapter 4.0***.

The population and employment forecasts for the City of Brantford and County of Brant indicate significant growth in the period from 2016 to 2041. The population and employment are expected to grow by 59% and 55% respectively during this 25-year period as shown on ***Table 2-3***.

Table 2-3: Population and Employment Growth - Brant and Brantford

Demographic Area	2016	2041	Growth
Population			
County of Brant	36,700	57,000	55%
City of Brantford	101,700	163,000	60%
Total	**138,400**	**220,000**	**59%**
Employment			
County of Brant	22,100	26,000	18%
City of Brantford	44,900	79,000	76%
Total	**66,990**	**104,000**	**55%**

Source: *A Place to Grow: Growth Plan for the Greater Golden Horseshoe*, 2019

Figure 2-1 and ***Figure 2-2*** present the pattern of population and employment growth by TAZ between 2016 and 2041. These figures include an expansion of the current urban boundary (Settlement Area) and assign population and employment growth to these areas in conjunction with the parallel Brantford Expansion Area study developed by Dillon in consultation with the City of Brantford. Based on current growth and growth anticipated in the expanded urban boundary, the following trends to the 2041 horizon year are noted:

- High employment growth in the Oak Park Road & Hardy Road (Northwest Industrial Park) and Henry Street/Wayne Gretzky (Braneida Industrial Park) areas;
- High employment growth in the expansion lands east of Garden Avenue at Highway 403 and north of Powerline Road just east of Paris Road;
- High population growth in the southern zones surrounding Shellard Lane, Mt Pleasant Road and Erie Avenue;
- High population growth in the northern expansion zones (north of Powerline Road) from Balmoral Drive in the west to Coulbeck Road in the east;
- High population and employment growth along the King George Road corridor; and
- High population and employment growth in the downtown core.

Intensification within downtown Brantford and along the King George Road corridor will increase the densities within these areas of the city. Denser, more urban areas contribute to modal shifts away from the single occupancy vehicle as the distance to many amenities will decrease, making them more bikeable and walkable, while transit service will increase, as higher densities support higher service frequency.

Figure 2-1: Population Growth by TAZ, 2016 to 2041

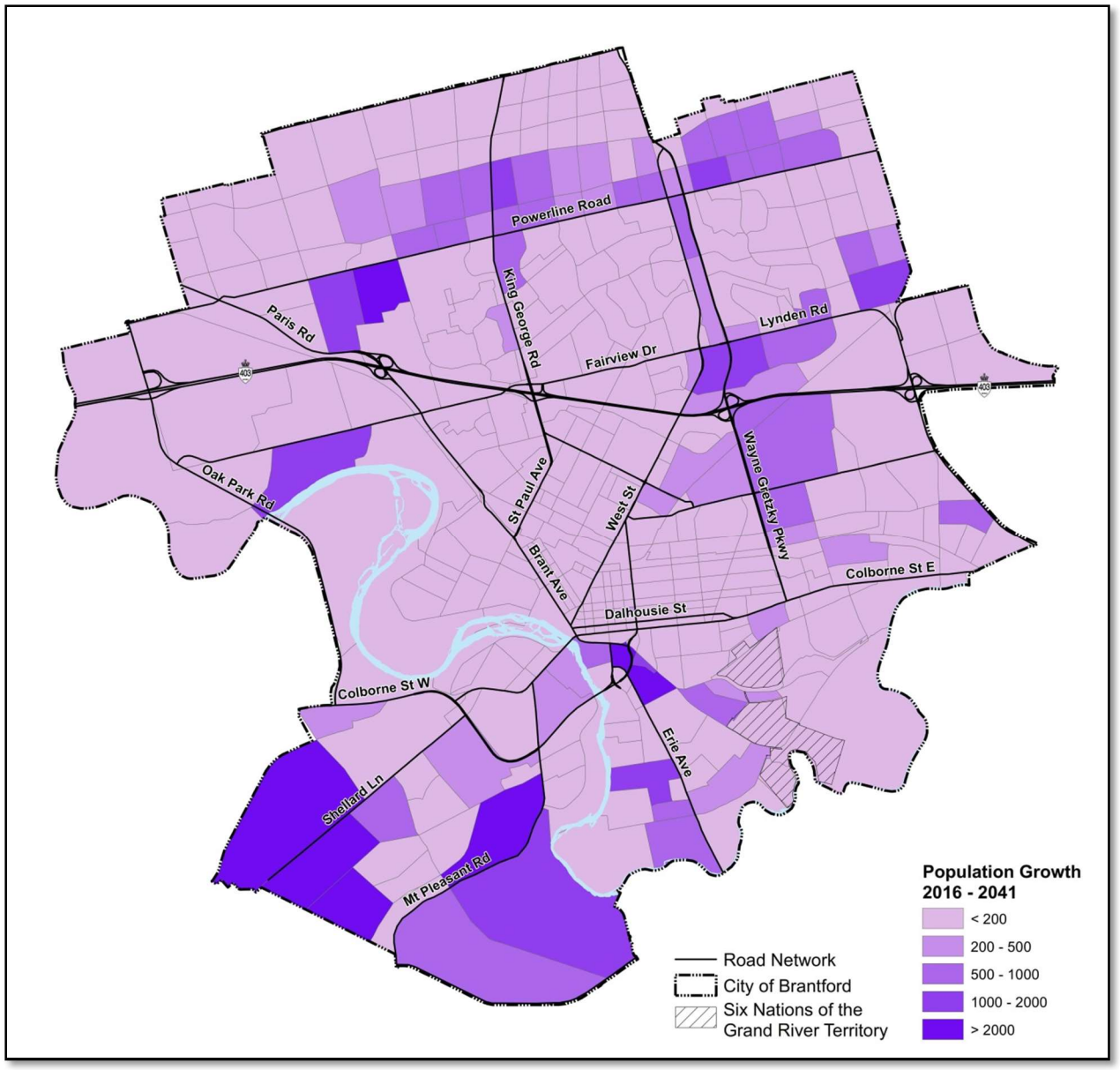
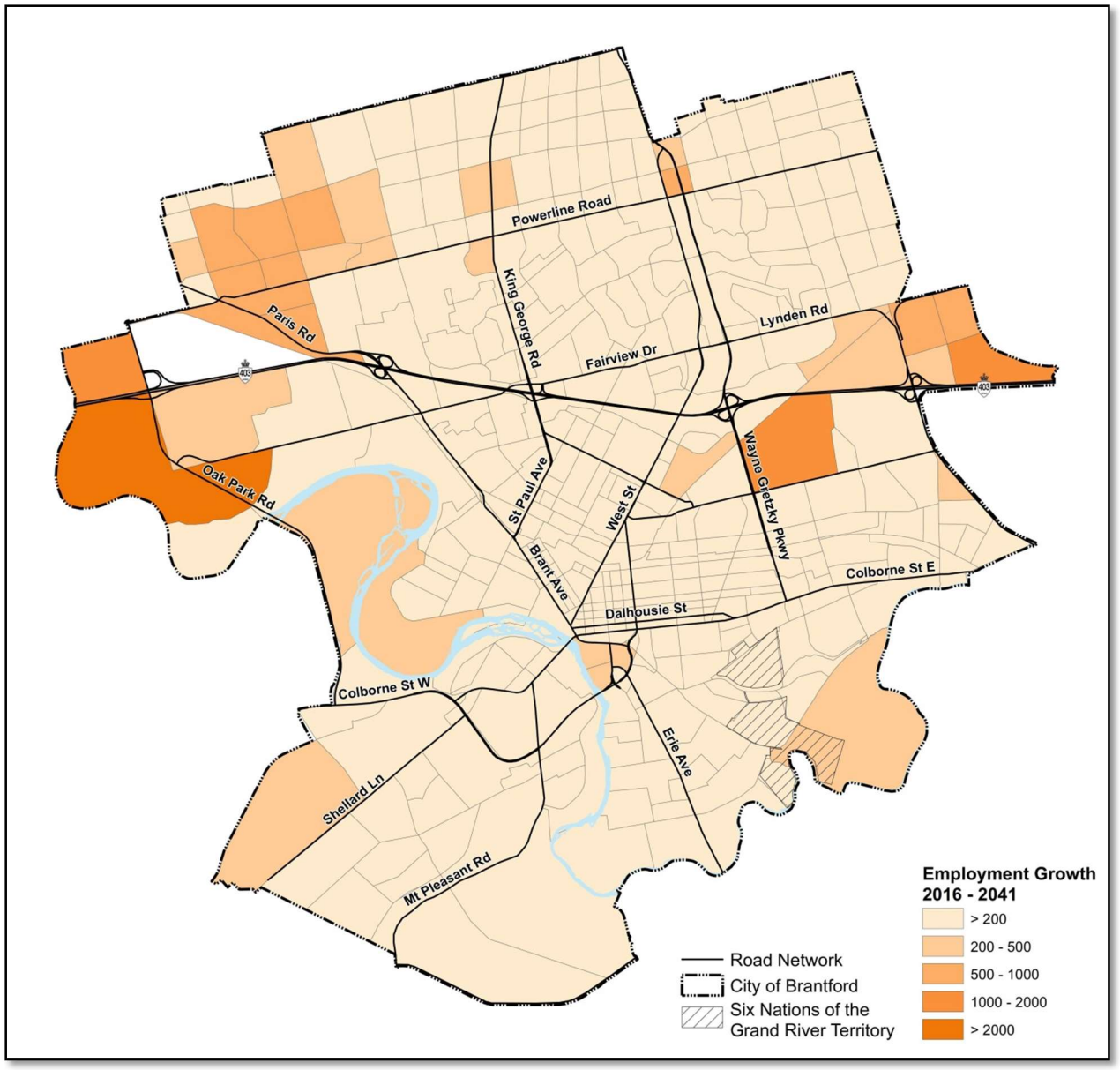


Figure 2-2: Employment Growth by TAZ, 2016 to 2041



2.2 Change in Travel Mode Choice

The daily travel mode share in Brantford has remained relatively static over the past decade (2006 - 2016) according to TTS, as displayed in ***Table 2-4*** and ***Table 2-5***. There has been modest growth (as a proportion of travel) in the use of active modes (cycle/walk) and transit but the largest growth has been to auto driver. The only mode that decreased its mode share was auto passenger. It is worth noting that the combined auto driver and auto passenger share has decreased slightly, with a swing towards active modes. Overall these trends are not surprising given Brantford's characteristics (location, size, geography, etc.) and investment in active modes of transportation and transit.

Table 2-4: Brantford Travel Mode Share: Internal Trips (Brantford to Brantford)

Mode \ Year	2006	2011	2016
Auto Driver	69.5%	68.8%	70.8%
Auto Passenger	18.3%	18.7%	14.6%
Transit	2.3%	2.6%	2.8%
Cycle/walk	6.6%	6.9%	7.8%
Other	3.3%	3.0%	4.0%
	100.0%	**100.0%**	**100.0%**

Source: 2006, 2011 & 2016 Transportation Tomorrow Survey (TTS)

Table 2-5: Brantford Travel Mode Share: Trips Originating in Brantford (Brantford to All)

Mode \ Year	2006	2011	2016
Auto Driver	71.7%	71.4%	74.2%
Auto Passenger	17.9%	18.1%	14.2%
Transit	2.0%	2.3%	2.3%
Cycle/walk	5.3%	5.4%	5.8%
Other	3.2%	2.9%	3.4%
	100.0%	**100.0%**	**100.0%**

Source: 2006, 2011 & 2016 Transportation Tomorrow Survey (TTS)

2.3 Local Travel Growth to 2041

The updated travel forecasting model forecasts travel in the City of Brantford and County of Brant in 2041 first under a "Do Minimal" scenario. In this case, the travel mode choices are unchanged from 2016, and no further capacity improvements (i.e. road widenings, extensions) are included in the model. However, a small number of infrastructure modifications that have been completed since 2016 were included along with the proposed arterial/collector road network for the expansion lands (Tutela Heights & North Brantford). As a result of the Tutela Heights Slope Stability EA, the closure of Tutela Heights Road in the vicinity of Davern Road is also incorporated.

Brantford's forecasted growth will significantly alter the local travel demands within the City. ***Table 2-6*** displays the existing (2016) and forecast (2041) trips by mode that originate in Brantford during the AM peak period. By 2041 Brantford is forecast to generate more than 83,600 AM peak period person trips on an average weekday. That's an increase of nearly 68% over 2016 person trips.

Table 2-6: Total trips by mode: Trips Originating in Brantford (Brantford to All) - AM Peak Period

Mode \ Year	2016		2041	
	Trips	%	Trips	%
Auto Driver	36,520	73.2%	61,680	73.8%
Auto Passenger	5,370	10.8%	9,080	10.9%
Transit	1,350	2.7%	1,880	2.2%
Bicycle	330	0.7%	470	0.6%
Walk	3,190	6.4%	5,040	6.0%
Other	3,130	6.3%	5,460	6.5%
Total	**49,890**	**100.0%**	**83,620**	**100.0%**

The total existing (49,890) and forecast (83,620) person trips can be further broken down based on where the trips are destined to. This is displayed in ***Table 2-7***.

Table 2-7: Total trips by destination: Trips Originating in Brantford - AM Peak Period

Destination \ Year	2016		2041	
	Trips	%	Trips	%
Brantford to Brantford	36,980	74.1%	64,810	77.5%
Brantford to Brant County	5,250	10.5%	8,450	10.1%
Brantford to External East (Hwy 403 east)	4,310	8.6%	5,800	6.9%
Brantford to External West (Hwy 403 west)	490	1.0%	700	0.8%
Brantford to External North (Hwy 24 north)	1,440	2.9%	1,930	2.3%
Brantford to External Other	1,420	2.8%	1,930	2.3%
Total (Brantford to All)	**49,890**	**100.0%**	**83,620**	**100.0%**

Table 2-7 indicates that in the 2041 forecasted scenario there is higher proportion (3.4 percentage points) of internal (Brantford to Brantford) trip making, while conversely an equal reduction of the proportion of Brantford to External trip making. The increase in local trips is likely the result of the significant increase in employment and participation rate that is forecast for Brantford.

2.4 2041 Local Travel Assignment and Network

The updated population and employment forecasts for the horizon year, travel mode choice, and trips distribution information, as described in Sections 2.1 through 2.3 above, were incorporated into the City's travel demand model and assigned to the horizon year network to produce future base year volume forecasts on the road network. This process and the resultant forecasts are described in the following sections.

2.4.1 Updated Mobility Model for Transportation

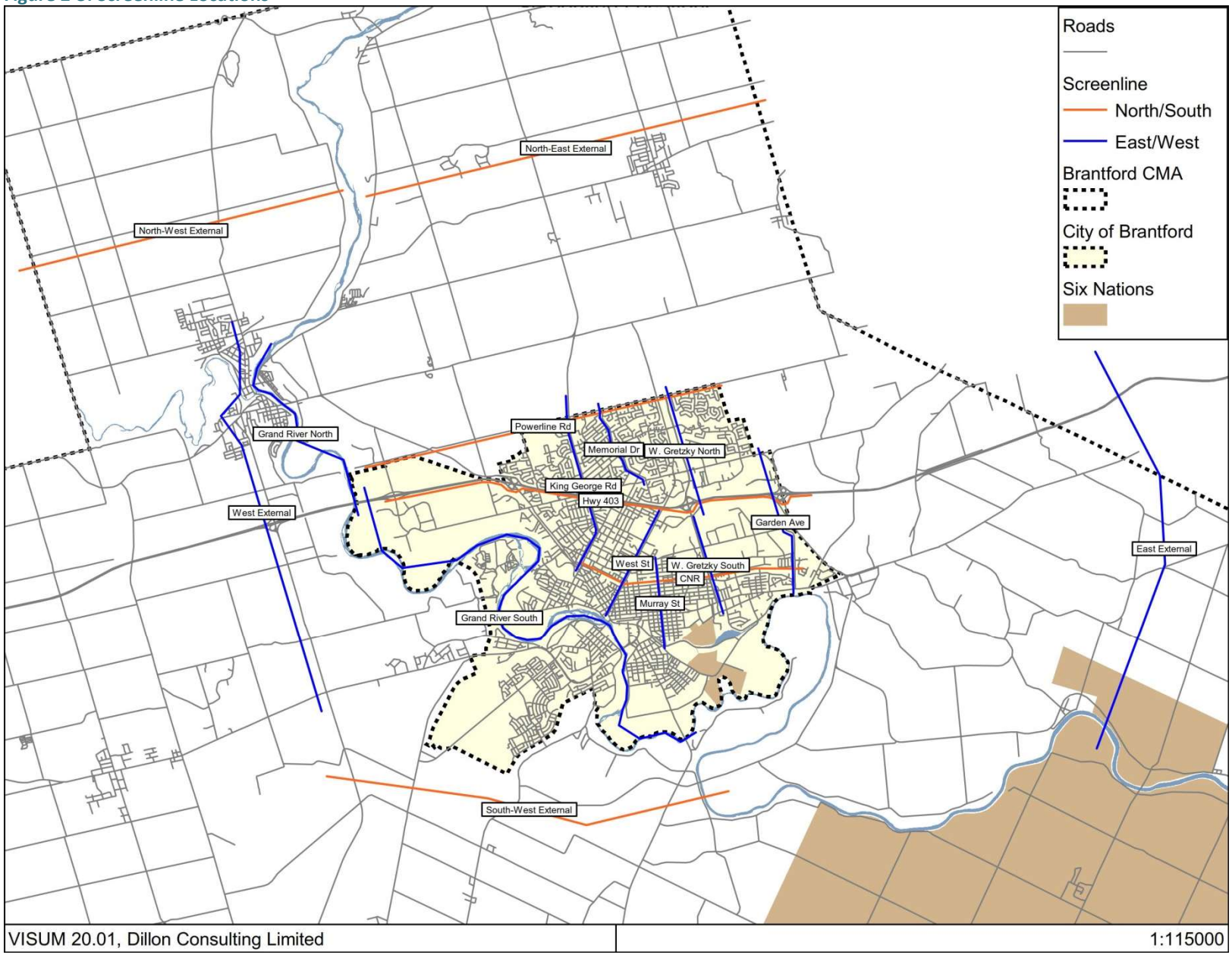
The City of Brantford's TransCAD travel demand model used for forecasting auto trips in the 2014 TMP was migrated to Visum and updated for this TMP Update. Visum is multi-resolution, making the model "microsimulation-ready" for operational analysis in Vissim. The model update included new 2016 base population and employment data for Brantford that was obtained from Statistics Canada and was disaggregated by SGL Planning & Design Inc. to match the Traffic Analysis Zone (TAZ) structure within the model. This land use data was used in conjunction with updated traffic counts and information on recent infrastructure changes to update the strategic transportation model to a 2016 base condition. The updates are detailed in the Transportation Model Update Report which is included in ***Appendix C*** of this TMP. Detailed in this report include:

- Foundational elements were reviewed and verified. The model foundations are reflective of 2016 TTS data;
- A 2016 base year, incorporating verified population and employment data and traffic counts;
- An updated road layer, incorporating all infrastructure and roadway classification changes;
- Implementation of Visum's "TFlowFuzzy" algorithm to provide parameter adjustments that improve base year validation and refine future year forecasts; and
- A range of model network or parameter adjustments to improve base-year validation and refine future-year forecasts.

Screenline analysis was used to validate AM and PM peak hour auto travel within the model. A screenline is an imaginary line that usually follows a linear feature such as a road, a river, a rail line or a municipal boundary that is used for the purpose of assessing the performance of the model. Screenline analysis provides a means of comparing the results of a traffic assignment with traffic count data. This is facilitated by comparing the directional sum of traffic count volumes across a screenline with the directional sum of the assigned traffic volumes across the same screenline. The locations of the 17 screenlines within the Brantford Model are presented in ***Figure 2-3***.

For transit, the model was validated against overall ridership and on individual routes against data in the City of Brantford 2016 Report: *Overview of Conventional and Specialized Transit Services*. The model is limited in forecasting stop-by-stop boarding and alighting due to the layout of centroid connectors that are shared with both the transit and auto assignments. However, many of the routes were consistently modelled with trends observed.

Figure 2-3: Screenline Locations



Note: This figure displays the City of Brantford boundary is at it existed in 2016, prior to the municipal boundary adjustment that came into effect on January 1 2017.

2.4.2 Private Auto Traffic

As previously reported in Section 2.1 of this TMP, population and employment forecasts for the City of Brantford are expected to grow by 59% and 55%, respectively, between 2016 and 2041. A 2041 'Do Minimal' scenario reflects no changes to peak hour mode shares and only short term committed projects (e.g. The 2020 Oak Park Road/Highway 403 interchange upgrade) and the arterial/collector roads required to support the expansion lands (Tutela Heights & North Brantford). ***Figure 2-4*** displays the 2041 'Do Minimal' road network. The proposed additional roads in Tutela Heights (Conklin Road Extension) and North Brantford (New East/West Road, etc.) are illustrated in this figure. ***Figure 2-5*** illustrates the assignment of private auto vehicles on the 2041 network in the PM peak hour and ***Figure 2-6*** illustrates the same assignment of private auto vehicles on the 2041 network measured against roadway capacity as a volume/capacity (V/C) ratio. ***Table 2-8*** provides an overview of the AM and PM screenline summaries, using the same screenlines defined for the model validation (illustrated previously in ***Figure 2-3***). Unlike the screenline analysis used to validate the auto travel within the model, the screenline summaries in ***Table 2-8*** evaluate the cumulative travel demand on the roadways crossing the screenline. The cumulative travel demand crossing the screenline is compared to the cumulative capacity crossing the screenline in order to establish V/C ratio, which provides an indication of how well a specific corridor/screenline is operating. It is important to note that while some screenlines are operating within capacity, there may be links on the screenline that have operating deficiencies, as identified in ***Figure 2-6***. Detailed link summary tables for each screenline can be found in ***Appendix C***.

The aforementioned figures and table illustrate the following 2041 PM peak hour capacity issues that are consistent with 2014 TMP model findings for the 2031 horizon:

- Wayne Gretzky Parkway between Henry Street and Highway 403;
- King George Road crossing Highway 403;
- Veterans Memorial Parkway between Mt. Pleasant Street and Market Street South;
- Colborne Street crossing the Grand River;
- Paris Road between Highway 403 and Powerline Road;
- Brant Avenue between St Paul Avenue and Colborne Street; and
- West Street between Charing Cross Street and Henry Street.

However, there are a few notable capacity issues that have emerged in 2041, most notably as a result of the settlement boundary expansion, that were not present in the 2014 TMP model findings for the 2031 horizon:

- Powerline Road between Paris Road and Wayne Gretzky Parkway;
- Wayne Gretzky Parkway north of Highway 403;
- Hardy Road between Ferrero Boulevard and Paris Road;
- Paris Road south of Highway 403; and
- Erie Avenue between Veterans Memorial Parkway and Birkett Lane.

Figure 2-4: Future (2041) 'Do Minimal' Road Network

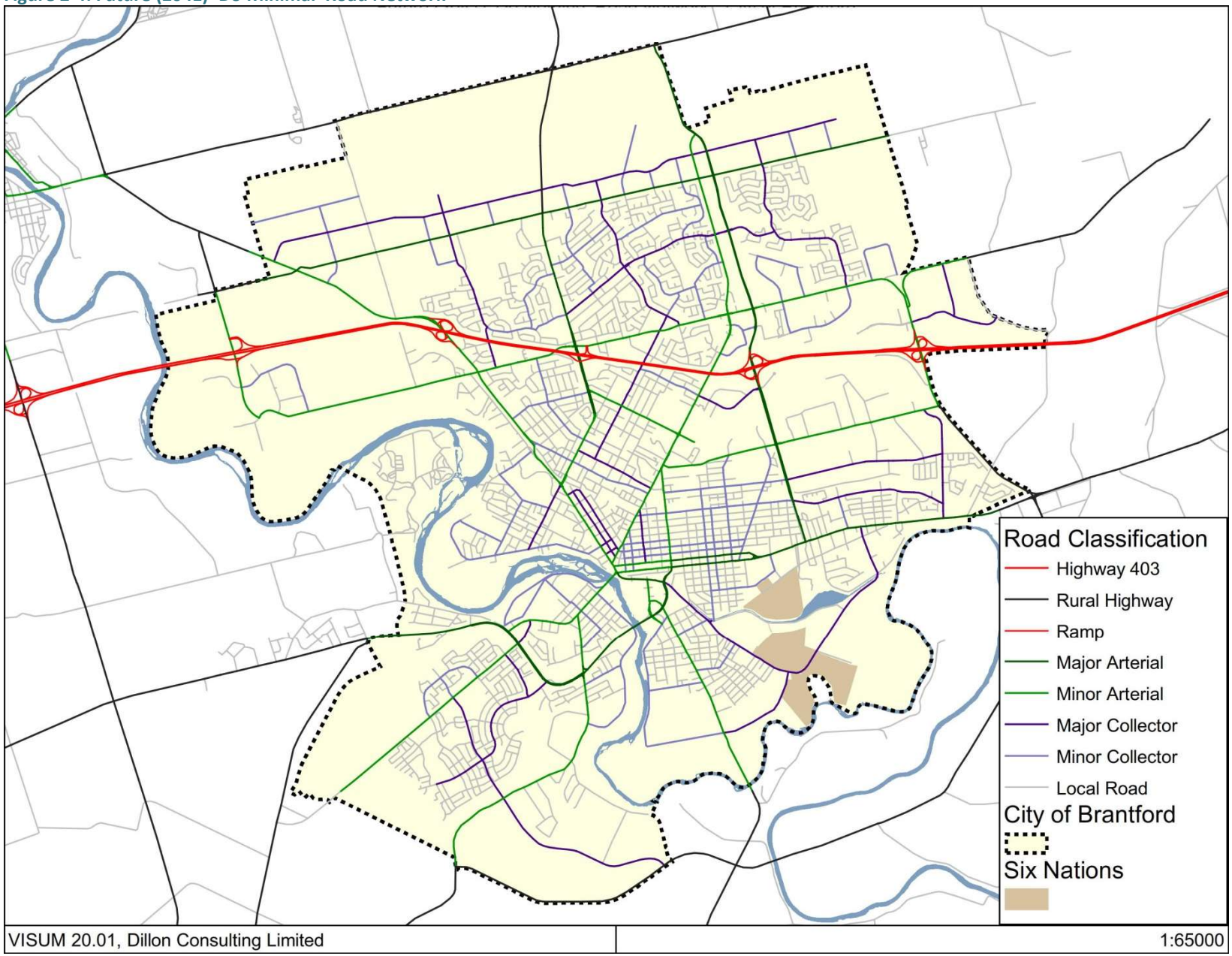


Figure 2-5: Future (2041) 'Do Minimal' Traffic Volumes- PM Peak Hour

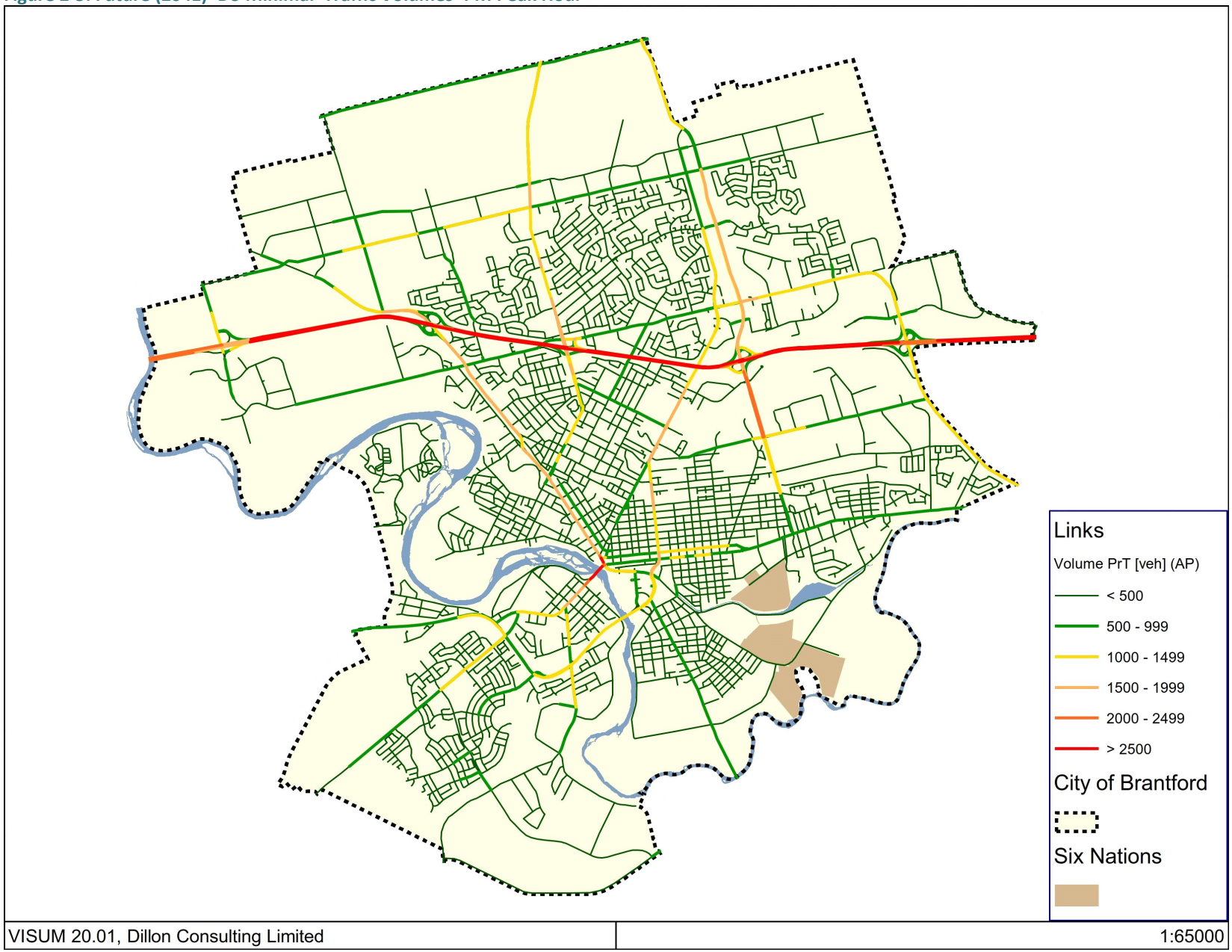


Figure 2-6: Future (2041) 'Do Minimal' Volume-to-Capacity Ratio - PM Peak Hour

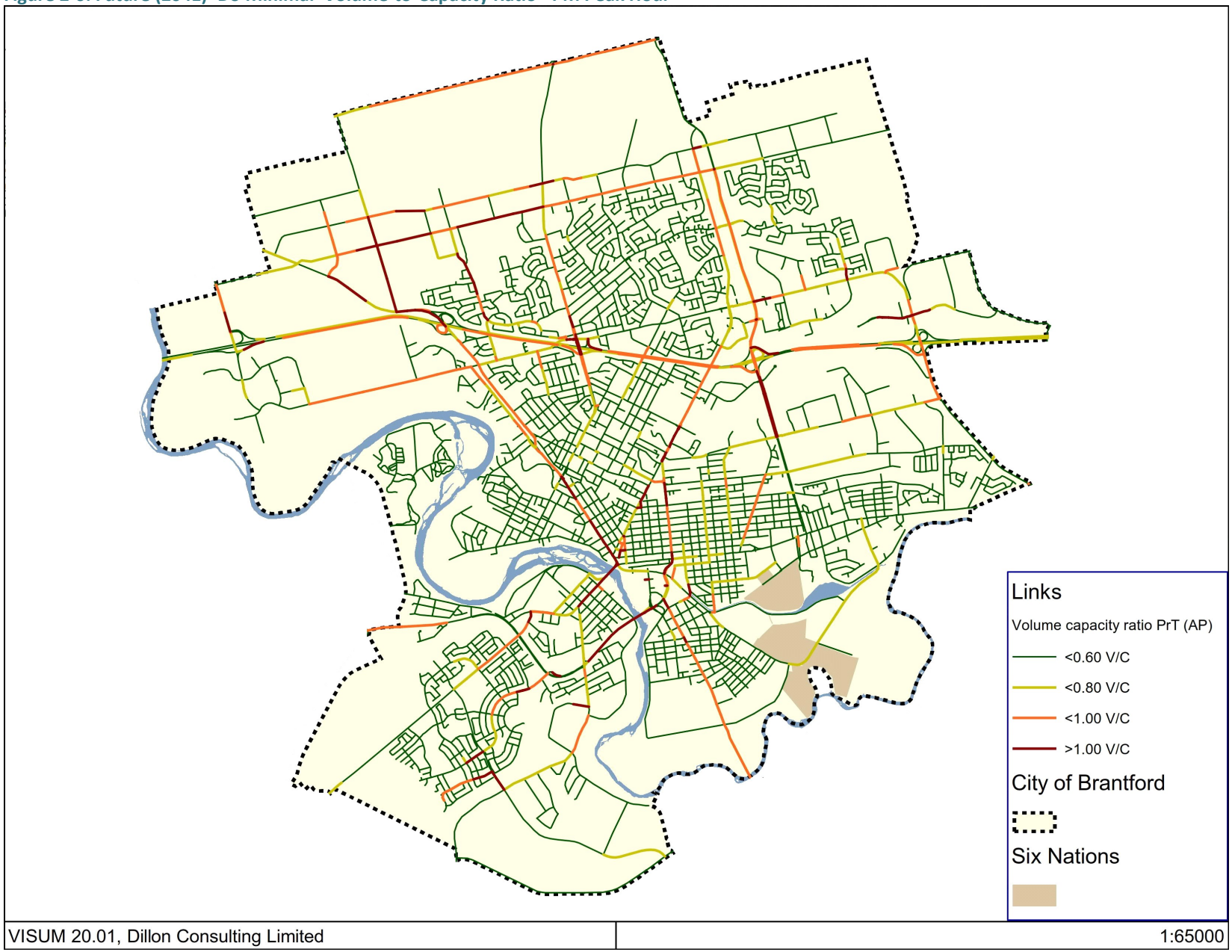


Table 2-8: Future (2041) 'Do Minimal' Screenline Summary

#	Name	Direction	Capacity		AM Peak Hour		PM Peak Hour	
			Lanes	Total	Volume	V/C	Volume	V/C
1	Grand River South	EB	7	8,100	6,696	0.83	6,073	0.75
1	Grand River South	WB	7	8,100	4,404	0.54	7,450	0.92
2	Grand River North	EB	4	5,200	3,096	0.60	4,113	0.79
2	Grand River North	WB	5	6,000	2,756	0.46	3,822	0.64
3	Highway 403	NB	13	10,800	6,908	0.64	9,039	0.84
3	Highway 403	SB	13	10,800	7,296	0.68	9,254	0.86
4	King George Road	EB	11	9,600	5,201	0.54	8,413	0.88
4	King George Road	WB	11	9,600	6,792	0.71	7,269	0.76
5	Wayne Gretzky Parkway (North)	EB	7	7,600	4,399	0.58	6,210	0.82
5	Wayne Gretzky Parkway (North)	WB	7	7,600	5,312	0.70	5,827	0.77
6	Wayne Gretzky Parkway (South)	EB	7	4,900	1,986	0.41	2,302	0.47
6	Wayne Gretzky Parkway (South)	WB	7	4,900	1,600	0.33	2,822	0.58
7	Memorial Drive	EB	9	6,100	1,687	0.28	3,025	0.50
7	Memorial Drive	WB	9	6,100	2,339	0.38	2,599	0.43
8	West Street	EB	6	4,300	2,074	0.48	3,041	0.71
8	West Street	WB	6	4,300	2,671	0.62	3,032	0.71
9	CNR Corridor	NB	11	7,900	4,369	0.55	4,986	0.63
9	CNR Corridor	SB	11	7,900	4,231	0.54	6,068	0.77
10	Garden Avenue	EB	9	8,800	4,571	0.52	5,701	0.65
10	Garden Avenue	WB	9	8,800	4,389	0.50	6,052	0.69
11	Powerline Road	NB	13	9,400	4,158	0.44	5,843	0.62
11	Powerline Road	SB	13	9,400	4,671	0.50	6,092	0.65
12	Murray Street	EB	7	4,400	1,932	0.44	1,860	0.42
12	Murray Street	WB	8	5,200	1,589	0.31	2,381	0.46
13	West External	EB	7	7,300	1,711	0.23	2,241	0.31
13	West External	WB	7	7,300	1,664	0.23	2,190	0.30
14	South-West External	NB	4	4,300	1,560	0.36	1,168	0.27
14	South-West External	SB	4	4,300	949	0.22	1,632	0.38
15	East External	EB	5	6,900	2,931	0.42	3,448	0.50
15	East External	WB	5	6,900	2,996	0.43	3,634	0.53
16	North-East External	NB	3	3,200	1,355	0.42	1,614	0.50
16	North-East External	SB	3	3,200	1,168	0.37	2,281	0.71
17	North-West External	NB	3	3,300	780	0.24	929	0.28
17	North-West External	SB	3	3,300	791	0.24	978	0.30

Legned:		*V/C Range*	*From*	*To*
X	Good Capacity Conditions		0.00	0.70
X	Approaching Capacity Conditions		0.70	0.85
X	Over Capacity Conditions		0.85	-

Note: i) Screenlines are illustrated in **Figure 2-3**.

ii) Total (capacity) = the total roadway vehicle capacity of all lanes that cross a particular screenline in a particular direction.

iii) Volume = the total number of vehicles that cross a particular screenline in a particular direction during a particular peak hour.

Additional analysis on the system behaviour was also extracted from the model. With population and employment growth, there will be an increase in demand on the road network. This means an increase in VKT, VHT, average travel time, and the percent of the network that is at or approaching capacity. The results of the system performance metrics for 2016 and 2014 'Do Minimal' road networks are summarized in ***Table 2-9***, which shows significant increases in travels times, due to the network congestion.

Table 2-9: Brantford Modeled System Performance - PM Peak Period

Network performance measure \ Year	2016	2041 (Do Minimal)
Vehicle Kilometres Travelled (VKT)	183,200	322,000
Vehicle Hours Travelled (VHT)	2,880	6,165
Average Trip Travel Time (minutes: seconds)	05:35	07:31
Percent of network approaching or over capacity	0.31%	6.03%

Note: All trips originating from or destined to Brantford

2.4.3 Transit Ridership

Overall transit person trips in Brantford are projected to grow significantly, between 2016 and 2041, as illustrated in ***Table 2-10***. This can be attributed to strong population and employment growth that is projected for Brantford over the same time period.

Table 2-10: Projected Transit Person Trip Growth, 2016 to 2041

Transit Service	AM Peak Period (6:00 – 9:00 AM)			PM Peak Period (3:00 – 6:00 PM)		
	Person Trips		Growth	Person Trips		Growth
	2016	2041		2016	2041	
Local (Brantford Transit)	1,188	1,617	36%	1,625	2,289	41%
Regional (GO Transit, VIA Rail, Greyhound, etc.)	241	352	46%	249	431	73%
Total	**1,429**	**1,969**	**38%**	**1,874**	**2,720**	**45%**

Likewise, transit ridership by route is also projected to grow significantly between 2016 and 2041, as illustrated in ***Table 2-11***. Transit route growth is directly related to the growth in population and/or employment that is planned in the immediate vicinity of the transit route. For example, significant population growth, illustrated previously in ***Figure 2-1***, is planned for the Shellard Lane area of Southwest Brantford and as a result ridership on Route 6 – West Brant/Shellard is expected to increase by 82% during the AM peak period and 102% during the PM peak period. Significant employment growth, illustrated previously in ***Figure 2-2***, is planned for the Northwest Industrial Area and as a result ridership on Route 8 – Holmedale/Mayfair is expected to increase by 74% during the AM peak period and 89% during the PM peak period.

Table 2-11: Projected Local Transit Route Ridership Growth, 2016 to 2041

Route	AM Peak Period (6:00 – 9:00 AM)			PM Peak Period (3:00 – 6:00 PM)		
	Ridership		Growth	Ridership		Growth
	2016	2041		2016	2041	
1 - Eagle Place	205	290	42%	228	357	56%
2 - West Street/Brier Park	216	281	30%	409	514	26%
4A - Mall Link	264	353	34%	372	485	30%
4C - Mall Link	217	295	36%	318	426	34%
5 - West Brant/Oakhill	84	96	14%	116	152	31%
6 - West Brant/Shellard	289	526	82%	215	433	102%
7 - East Ward/Braneida	197	219	11%	280	405	45%
8 - Holmedale/Mayfair	195	340	74%	239	451	89%
9 - Echo Place	230	309	34%	349	519	49%
Total	**1,897**	**2,708**	**43%**	**2,526**	**3,743**	**48%**

Note: i) Route ridership numbers are based on model assignments; and
ii) Total route ridership numbers exceed local transit persons trips (Table 2-10) because route ridership numbers include transfers.

Figure 2-7 and ***Figure 2-8*** illustrate the 2041 AM transit origin trips and the 2041 AM transit destination trips respectively. Collectively, these figures provide a high-level summary of where transit users are coming from and going to during the AM Peak Period.

Figure 2-7: Future (2041) Origin Transit Trips (per km^2) by TAZ – AM Peak Period

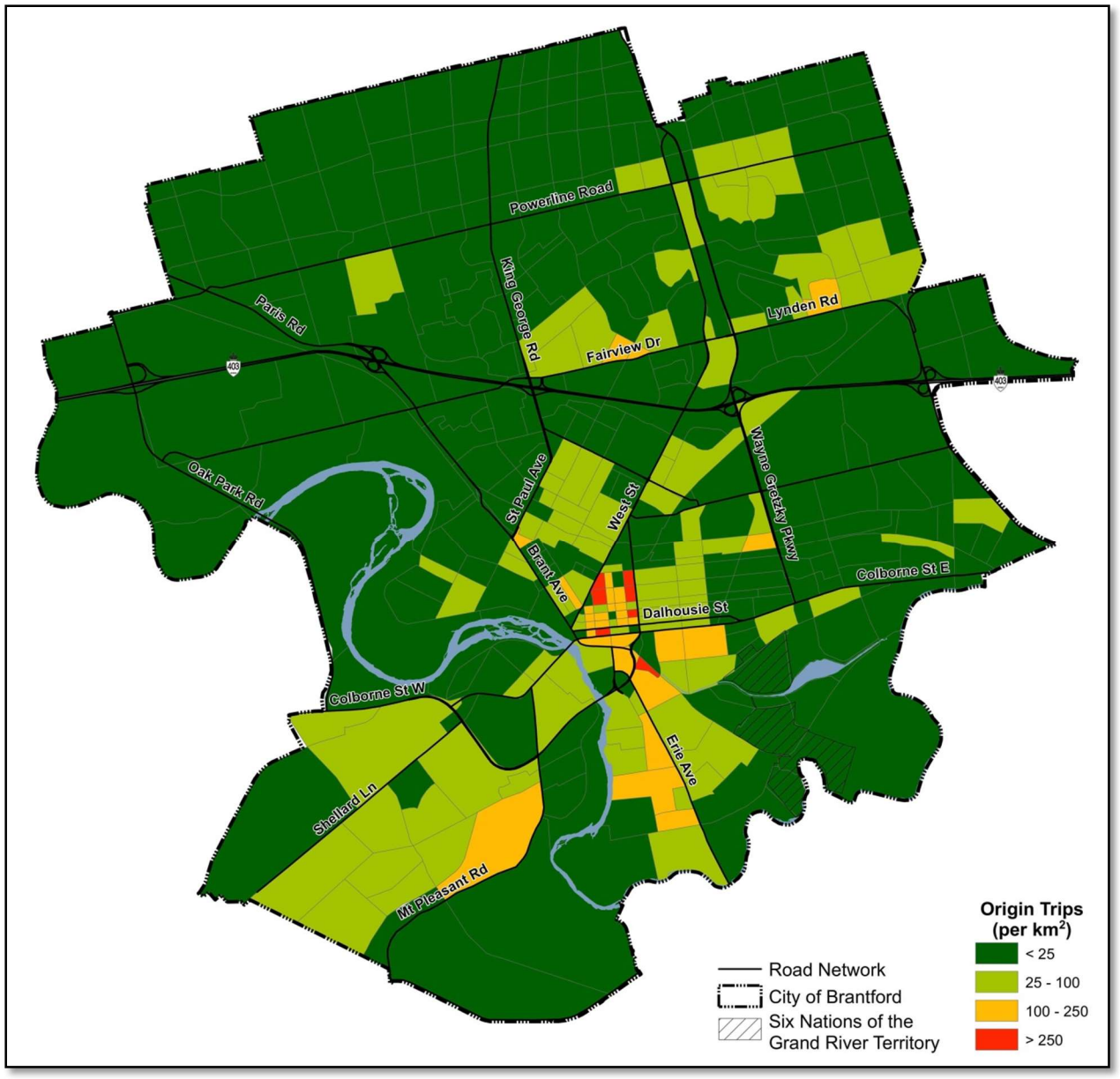
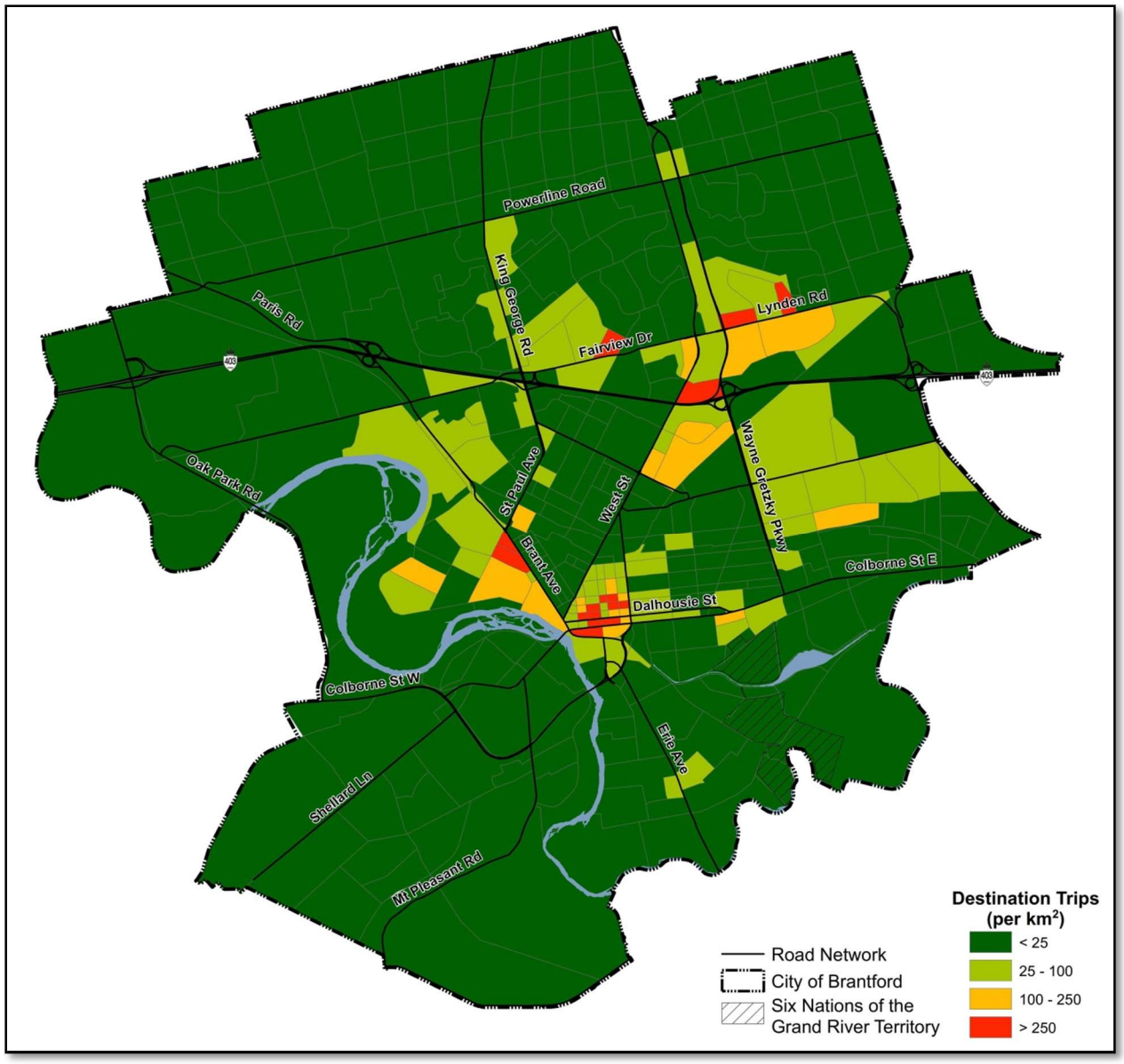


Figure 2-8: Future (2041) Destination Transit Trips (per km^2) by TAZ – AM Peak Period



3.0 Complete Streets Framework

3.1 Introduction

This chapter provides decision-makers with a reference for transportation network planning and functional design as it relates to the City of Brantford transportation network. Ultimately decisions made in accordance with the framework in this chapter will help to advance the goals set out in the overall 2020 Transportation Master Plan Update and some of the guiding principles contained in the new City of Brantford Official Plan (2020 Draft).

This chapter includes the following sections:

Existing Policies and Plans: Provides an overview of the current transportation and infrastructure and design policies and planning for context.

Network Philosophy: Presents the complete streets approach taken to planning, designing, and constructing networks for all modes. It includes the logic for why streets should be designed to serve all modes of travel.

Network Elements: Describes the physical elements (such as sidewalks, bike lanes, etc.) of Brantford's transportation network. It outlines the modes of travel and types of trips that are considered in the transportation strategy.

Network Planning Guidelines: Presents guidance for how networks should be planned and designed to provide the required Levels of Service for their travellers. This includes a review of the street typology characteristics and roles within the context of complete streets.

Network Assessment: Outlines the goals and objectives for each network element that will allow the successful implementation of the complete streets approach to achieve a sustainable transportation network. Ultimately it compares the proposed transportation network against the network planning guidelines, to align the proposed network elements with the Network Philosophy.

3.1.1 Objective

The purpose of the City-Wide Complete Streets Planning Principles and Design Framework is to provide planning and design directions for the network in the City of Brantford. These principles and guidelines provide direction for new development, public realm investments and future planning studies along the City's major and minor road network.

These principles and guidelines should be used:

- In the evaluation of any Planning Act applications for development;
- In the preparation of secondary plans, strategies or initiatives that relate to an urban transportation corridor;
- In the preparation of any implementation tools, including Zoning By-laws, infrastructure projects, master plans, design standards, or other City projects or initiatives that impact the transportation network; and

- To communicate the important elements of transportation planning and infrastructure design to citizens and the development community.

3.1.2 Complete Streets

Key to achieving the City's vision for a transportation network to serve all modes, and understanding the design elements that facilitate this objective, is the concept of Complete Streets. Complete Streets are streets that are designed to be safe and comfortable for everyone: people who walk, bicycle, take transit, or drive, and people of all ages and abilities. A Complete Streets policy ensures that transportation planners and engineers consistently design and operate the entire street network for all road users, not only motorists. Complete Streets offer wide ranging benefits; they are cost effective, sustainable, safe, and encourage the continuation of the shift from auto to non-auto based travel.

3.2 Existing Policies and Plans

Land use and transportation infrastructure and service are mutually dependent. Policies help to shape the way that the transportation networks can support the principles of good land use planning. Therefore, a review was undertaken of the current transportation and infrastructure planning and design policies for context.

3.2.1 Draft Official Plan (2020)

The Official Plan is a comprehensive framework with a vision and guiding principles with which land use designations and policies will guide the future development of the City of Brantford. This planning framework will also assist Council, staff, and other public agencies in their consideration of public and private development proposals.

Chapter 7 in the Draft Official Plan includes policies for an integrated transportation system to complement the TMP and related direction on active transportation, public transit, parking, transportation demand management, goods movement and the road network.

3.2.2 Transportation Master Plan (2014)

A Transportation Master Plan (TMP) is a strategic planning document that establishes the vision for transportation services, assesses existing transportation system performance, forecasts future travel demand, and defines actions and policies to address road, transit, and active transportation needs within a community.

In 2014, an update to the 2007 Transportation Master Plan provided an opportunity to review and reconfirm the City's main transportation infrastructure and service plans. The update also addressed emerging issues involving changing economic and associated growth conditions, changes in the regional transportation context around Brantford (i.e., Highway 24, Highway 403, and GO Transit service), travel behaviour, and evolving public priorities for the transportation system, for example dealing with the

new Complete Streets philosophy, expanding the emphasis on Active Transportation and new traffic management and calming measures (i.e., roundabouts).

Specific objectives and considerations carried forward from the 2014 TMP include:

- Make this a "made for Brantford" master plan reflecting the unique characteristics of Brantford and its context while still learning from successes in other similar-sized cities;
- Show the impacts of not making system improvements in terms of deficiencies, level-of-service and ability to meet planning targets;
- Coordinate TMP preparation with the City's concurrent Master Servicing Plan study in terms of growth forecasting, consultation activities and planning of cost efficiencies in the development of new transportation, sewer and water infrastructure;
- Integrate transportation and land use planning. Transportation and land use planning has been coordinated to identify bold transportation strategies that will be required to support an overall sustainability plan for transportation over the next 20 years, and translate these strategies into Official Plan policy;
- Define the future role of public transit. Reduce the City's environmental footprint by increasing transit use through improved service levels, by effectively serving newly developing areas, meeting the accessibility needs of residents, and by considering inter-municipal and inter-regional links. Incremental fixes have become increasingly limited in meeting Brantford's future transit needs; and
- The Complete Streets philosophy has been applied to this TMP Update so that streets are planned, built and maintained for all users.

This document is being prepared to support the update of the 2014 TMP. The revised TMP will address the updated land use forecasts to 2041 resulting from the new Official Plan land use allocations, including expansion.

3.2.3 Linear Municipal Infrastructure Standards

The Roads and Transportation, Design and Construction Manual, Linear Municipal Infrastructure Standards, (May 2020) provides the City, consulting engineers, contractors, developers and the general public with a common reference to ensure the consistent application of design and construction practices of road and related infrastructure within the City.

With regard to Design, the document outlines the minimum Right of Way requirements in achieving the City's policies regarding Complete Streets and Healthy communities, as set out by its latest Transportation Master Plan Update. The purpose of the policies is to focus on designing, maintaining and operating public streets in a manner that promotes active transportation. ***Table 3-1*** presents the characteristics used as a guide in the determination of street classification.

Table 3-1: Street Classifications

	Laneway	Local Streets (Up to 18.5 m ROW)	Minor Collector Streets (Up to 24.5 m ROW)	Major Collector Streets (Up to 30.5 m ROW)	Arterial Streets (Up to 40.0 m ROW)
Number of Through Lanes per Direction*	1	1	1	2	2
Typical Traffic Volumes (AADT)	Less than 1,000 vehicles per day	Less than 2,000 vehicles per day	2,000 to 8,000 vehicles per day	8,000 to 12,000 vehicles per day	8,000 to 12,000 vehicles per day
Posted Speed Range (km/h)	Preferred 30, up to 50	Preferred 40, up to 50	Preferred range of 40 to 50, up to 60	As low as 40, to a typical range of 50 to 60	Preferred 60, up to 80
Minimum Design Speed (km/h)	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed
Primary Design Vehicles (No Turning Encroachment)**	Passenger Car	Passenger Car	Passenger Car, Transit Bus, HSU	Passenger Car, Transit Bus, HSU, Snow Plow, Fire Truck	Passenger Car, Transit Bus, HSU, Snow Plow, Fire Truck, WB-20
Low Frequency Design Vehicle (Turning Encroachment Permitted)**	HSU, Snowplow	HSU, Snow Plow, Fire Truck	Snow Plow, Fire Truck	WB-20 for non-truck routes, non-commercial/ industrial zones	N/A
Optional Design Vehicle (No Turning Encroachment)**	Fire Truck	N / A	WB-20 for truck routes, commercial / industrial zones	WB-20 for truck routes, commercial/ industrial zones	Long Combination Vehicles (LCVs)

HSU = Heavy Single Unit Truck
WB-20 = Tractor-Semitrailer with standard 53 foot trailer
* Does not include turning lane requirements
** Minimum intersection curb radius to be determined in conjunction with design vehicle of intersecting road using turning templates.
Minimize over design by using design vehicles from the lower road class.

Source: Table 1, Roads and Transportation, Design and Construction Manual, *Linear Municipal Infrastructure Standards*, 4-May-2020.

The chapter further identifies cross-section, geometric, and traffic control requirements on above and below grade infrastructure for local, minor collector, major collector and arterial (minor and major) roads.

3.3 Network Philosophy

The majority of travel in Brantford occurs on the City's streets, with the balance of travel occurring on off-street paths and trails, i.e. outside the street right of way. In order for the transportation network to serve all modes of travel, many of Brantford's streets will need to serve multiple, in some cases, all modes of travel. The "Complete Streets" approach to street planning and design seeks to create streets that provide safe mobility for users of all modes of travel, regardless of their age and ability. The Complete Streets approach is recommended to confirm that all mobility needs are being met, and to provide guidance for design retrofits to existing streets in Brantford, if needed, as well as for new streets in Brantford.

A complete transportation network for Brantford will include many complete streets, but those streets will not be uniform in design. Street design should change according to the transportation context (where the street is located in the transportation network for each mode of travel) and the land use context (what the lands along the street are used for). For example, ***Figure 3-1*** shows a complete street in a rural context, ***Figure 3-2*** shows a complete street in a suburban context, and ***Figure 3-3*** shows a complete street in an urban context.

Figure 3-1: Complete Street – Rural: Arundel Street Thunder Bay, ON

Image Credit: Google Maps

Figure 3-2: Complete Street – Suburban: Shellard Lane Brantford, ON

Image Credit: *Complete Street Transformations in the Greater Golden Horseshoe Region*, 2016

Figure 3-3: Complete Street – Urban: Bay Street Hamilton, ON

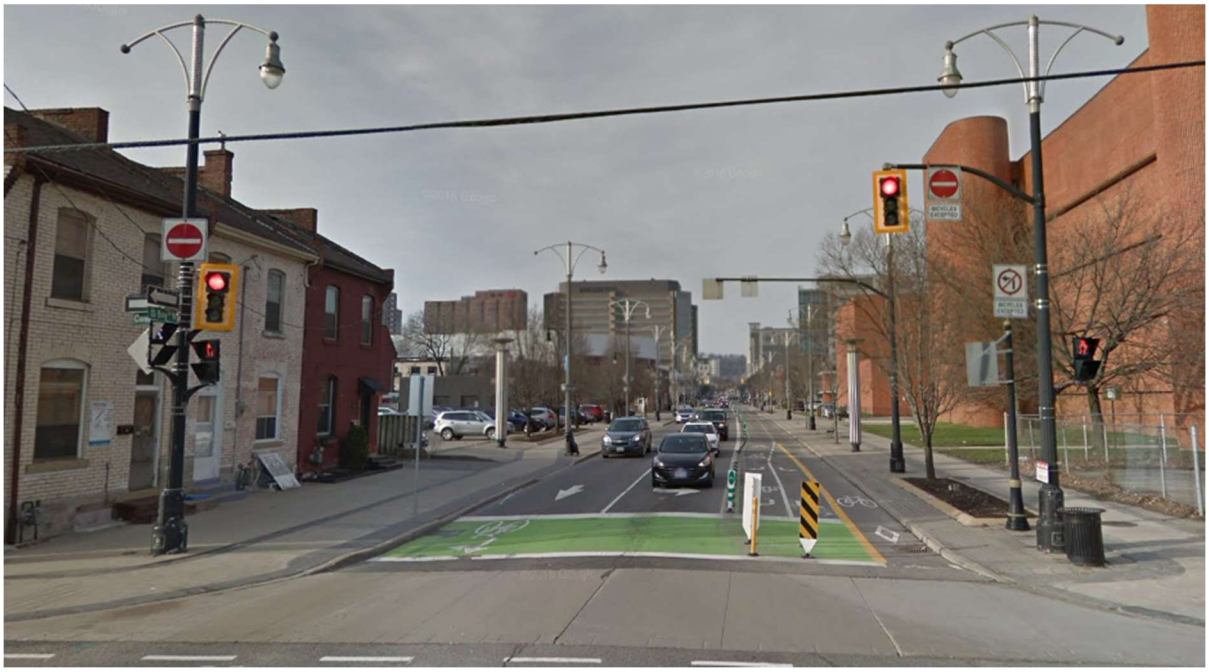


Image Credit: Google Maps

A complete transportation network for Brantford will also make use of off-street paths and trails to provide connections and close gaps in the walking and cycling networks. Paths and trails can also allow the walking and cycling networks to serve recreational trips, in addition to utilitarian trips.

A practitioner following a Complete Streets approach will consider the following questions when designing a retrofit to an existing street, or when designing a new street:

- What is the function of the street with respect to each mode of transportation?
- What features are required to provide safe mobility for all users, given the transportation functions of the street?
- What is the adjacent land use context?
- What features are appropriate for each mode of travel in this context?
- Does the available right-of-way allow for these features to be provided?
- If not, which modes should be prioritized?
- What are the trade-offs of deprioritizing the other modes?
- How can the trade-offs be addressed such that the transportation network still provides safe mobility for the modes that were deprioritized on the street in question?

The following sections provide information intended to help practitioners and decision-makers answer these questions.

3.4 Network Elements

Brantford's transportation network should serve the following modes of travel:

- Walking
  - Including mobility devices or wheelchairs, skateboards, roller blades and scooters
- Cycling
  - For both utilitarian and recreational trips
- Public Transit
  - Including Brantford Transit, Brantford Lift, regional bus service, and inter-regional train service
- Goods Movement
  - Including local deliveries and long-distance freight trips
- Automobile

In this chapter, references to "all modes of travel" or "all modes" refer to the modes of travel listed above. "All users" refers to all people using any of the modes listed above.

The following sections outline specific elements of Brantford's transportation network that provide safe mobility for each mode of travel. Each element is described in terms of its physical characteristics, the types of trips that it serves, and the context in which it is most appropriate.

3.4.1 Walking

3.4.1.1 Sidewalks

Sidewalks are dedicated paths for walking within street rights-of-way, usually parallel to the travel lanes. They are found on most of Brantford's streets, and they allow people to walk for utilitarian purposes, connect to local transit network, and for recreation. Cycling on sidewalks is prohibited. Where buildings line the street, sidewalks provide building access, in addition to mobility. ***Figure 3-4*** shows a typical sidewalk.

Figure 3-4: Sidewalk – Gaitwin Street and Hallmark Street Brantford, ON

Image Credit: Google Maps

3.4.1.2 Multi-Use Paths

Multi-Use Paths (MUP) provide a shared space for people walking and cycling. They are typically paved and provided within street rights-of-way (classified as "on-road"), typically offset from the curb by a grass or planted buffer space. They are also found outside of the road right of way (i.e. "off road") in parks and public reserves. Multi-use paths serve utilitarian and recreational walking and cycling purposes. Multi-use paths can be a solution to provide safe mobility for people walking and cycling when right-of-way constraints preclude separate facilities for those modes. Multi-use paths can also be used on streets with high traffic speeds and volumes, provided they are set back from the curb or shoulder. ***Figure 3-5*** and ***Figure 3-6*** illustrate examples of a typical multi-use path.

Figure 3-5: Multi-Use Path – Shellard Lane Brantford, ON

Image Credit: Google Maps

Figure 3-6: Multi-Use Path – Wayne Gretzky Parkway Brantford, ON

Image Credit: City of Brantford

3.4.1.3 Trails

Trails are paths located in public reserves (parks, open spaces and some natural areas), and are not found within the street right-of-way. They can be surfaced in crushed aggregate in rural areas and possibly paved with asphalt in high use or urban areas. The difference between a multi-use path and an off-road trail is that the trail may be designed for only a single user type, either pedestrians or cyclists, or they may be multiuse. Since trails are found off-street and are often intended primarily for recreational travel, they are best applied in contexts where the natural environment is attractive, such as along the Grand River, or in other non-road corridors, such as abandoned railway lines, hydro corridors, or industrial areas. They can also provide direct walking and cycling connections in rural areas where the

street network is dispersed or in urban areas to provide connectivity within communities. ***Figure 3-7*** provides an example of a typical paved off-road trail.

Figure 3-7: Off-Road Trail (Paved) – Fordview Trail Brantford, ON

Image Credit: Google Maps

3.4.1.4 Crossings

Crossings can be classified as two types: uncontrolled and controlled. Ontario Traffic Manual (OTM) Book 15 provides practical guidance and application information on the planning, design, and operation of pedestrian roadway crossings treatments. The design and implementation of design standards should apply to all potential crossing in the City.

Uncontrolled locations are where pedestrians cross without any control measures or dedicated pedestrian right of way. Drivers are not required to yield right of way, meaning the onus is on the pedestrian to ensure that the way is clear to cross the roadway or intersection. In these conditions, signage can be provided to generate awareness for drivers and pedestrians that potential conflicts may arise. These conditions are generally found on low speed, low volume roadways where pedestrian use is also low, or in rural areas. ***Figure 3-8*** shows an uncontrolled pedestrian crossing with signage.

Figure 3-8: Uncontrolled Crossing (with Signage) – Erie Avenue at Dorothy Street Brantford, ON

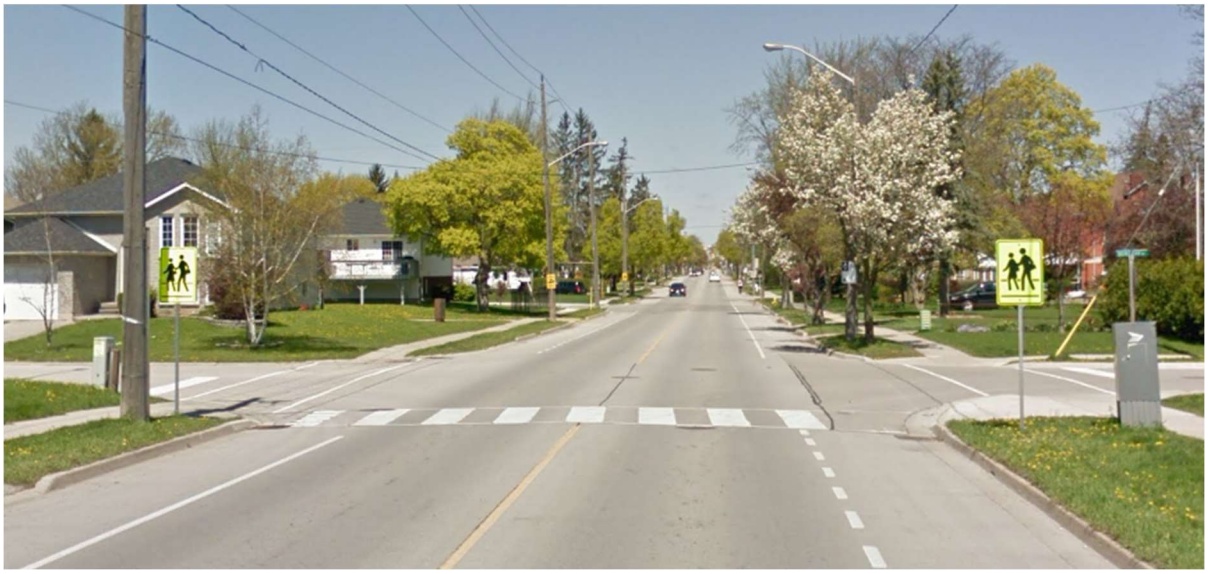


Image Credit: Google Maps

Controlled crossings provide protection to pedestrians through controlled and dedicated space environments. The alternative crossing treatments include:

- Supervised School Crossing
- Stop Controlled or Yield Controlled Intersections (Crosswalk)
- Pedestrian Crossovers (PXO)
  - Level 1 Type A
  - Level 2 Type B
  - Level 2 Type C
  - Level 2 Type D
- Traffic Signals
  - Full Traffic Control Signals (Crosswalk)
  - Intersection Pedestrian Signals (IPS or half signals)
  - Mid-block Pedestrian Signals (MPS)

Supervised school crossings are locations close to schools where school children have to cross on route between home and school. School crossings are supervised by school crossing guards during specified hours and during regular school periods.

Stop Controlled or Yield Controlled Intersections use signs as a form of traffic control to assign and regulate right-of-way at intersections with the potential for conflict. Vehicles approaching a STOP / YEILD sign in advance of a crosswalk are required to stop / slow down or stop when necessary to yield the right-of-way to vehicular traffic and pedestrians whose arrival preceded theirs before proceeding.

Pedestrian Crossovers are designated locations for people to cross a roadway on foot. They can consist of as little as regulatory and warning signs, and pavement markings (Level 2 Type D) to regulatory signs, illuminated overhead warning signs, flashing amber beacons, and pavement markings (Level 1 Type A). The type of PXO is determined predominately by traffic speeds, vehicle volumes and pedestrian volumes. As traffic speeds and vehicle and/or pedestrian volumes increase, so too does level and type of PXO that would be required.

Traffic Signals alternate right-of-way between conflicting streams of vehicular traffic (Full Traffic Control Signals) or conflicting movements between vehicular traffic and pedestrians crossing a road (Pedestrian Signals) by displaying instructions through light emitted indications. Traffic Signals can be located in intersections or at mid-block locations.

Figure 3-9 shows pedestrian crosswalks at a stop controlled intersection, ***Figure 3-10*** shows the pedestrian crossover and ***Figure 3-11*** shows an Intersection Pedestrian Signal (IPS).

Figure 3-9: Stop Controlled Crossing – Darling Street at George Street Brantford, ON

Image Credit: Google Maps

Figure 3-10: Pedestrian Crossover – Hollybush Drive Waterdown, ON

Image Credit: Google Maps

Figure 3-11: Intersection Pedestrian Signal – Shellard Lane at Assumption College Brantford, ON

Image Credit: Google Maps

3.4.2 Cycling

The multi-use paths, and trails described in the "Walking" section can serve cycling trips in addition to walking trips. The cycling network also includes the following elements.

3.4.2.1 Signed Bike Route

A signed bike route or shared roadway is a road where both motorists and cyclists share the same vehicular travel lane. Facilities include signage indicating the designation as a signed bike route, and may include shared use lane (sharrow) pavement markings. ***Figure 3-12*** shows an example of a signed bike route.

Figure 3-12: Signed Bike Route – Dufferin Avenue Brantford, ON

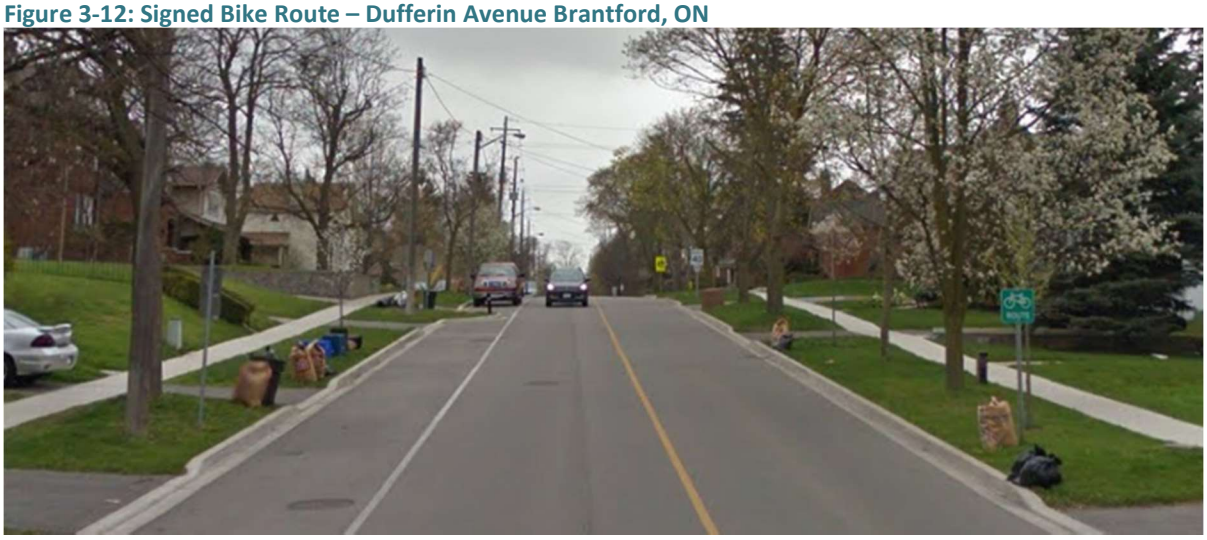


Image Credit: Google Maps

3.4.2.2 Bicycle Priority Street

Bicycle priority street or bicycle boulevards are streets where traffic volumes and speeds are limited to the extent that the entire roadbed provides safe cycling mobility. They may include traffic calming features to limit traffic speeds and volumes, and signage indicating the designation as a bicycle priority street. They serve utilitarian and recreational cycling trips. ***Figure 3-13*** shows an example of a bicycle priority street.

Figure 3-13: Bicycle Priority Street – Hay Street Winnipeg, MB

Image Credit: Google Maps

3.4.2.3 Paved Shoulders

Where a street has paved shoulders, instead of curbs and gutters, cycling trips can sometimes be safely accommodated on the shoulder. Paved shoulders can provide safe cycling mobility in low to moderate

traffic speed and volume environments. Streets with shoulders are more common in rural areas with dispersed street networks than in urban or suburban areas. Rural areas often have more dispersed street networks, so paved shoulders may be the only cycling facility for some distance, and thus they may serve both utilitarian and recreational cycling trips. ***Figure 3-14*** shows typical paved shoulders.

Figure 3-14: Paved Shoulders – Centre Road Waterdown, ON

Image Credit: Google Maps

3.4.2.4 Bike Lanes

Bike lanes are spaces reserved for cyclists, delineated by painted lines and pavement markings. They typically are located within the street rights-of-way, on the road bed. Bike lanes are appropriate for streets with low to moderate traffic speeds and volumes. They can serve both utilitarian and recreational cycling trips. ***Figure 3-15*** shows conventional bike lanes.

Figure 3-15: Bike Lanes – North Park Street Brantford, ON

Image Credit: Google Maps

3.4.2.5 Buffered Bike Lanes

Buffered bike lanes are bike lanes separated from vehicular traffic by a painted buffer space. They are located within street rights-of-way, on the road bed. Buffered bike lanes are appropriate for streets with moderate traffic volumes and speeds. They can serve both utilitarian and recreational cycling trips. ***Figure 3-16*** shows buffered bike lanes.

Figure 3-16: Buffered Bike Lanes – York Boulevard Hamilton, ON

Image Credit: Google Maps

3.4.2.6 Cycle Tracks

Cycle tracks are bike lanes protected from vehicular traffic by physical barriers. These barriers can be bollards, purpose-built concrete, jersey barriers, planters, or other physical impediments. Cycle tracks can also be created by placing a bike lane near the curb, and dedicating space to parking between the bike lane and travel lanes. Cycle tracks can be used in pairs of single-direction cycle tracks, or as wider, two-way cycle tracks. Cycle tracks are located within street rights-of-way, either on the road bed or outside of the curb, at sidewalk level. They are appropriate on streets with moderate to high traffic speeds and volumes. ***Figure 3-17*** shows a one-way parking protected cycle track, ***Figure 3-18*** shows a two-way cycle track and ***Figure 3-19*** shows a one-way raised cycle track.

Figure 3-17: One-way Parking Protected Cycle Track – Herkimer Street Hamilton, ON

Image Credit: Google Maps

Figure 3-18: Two-Way Cycle Track – Cannon Street East Hamilton, ON

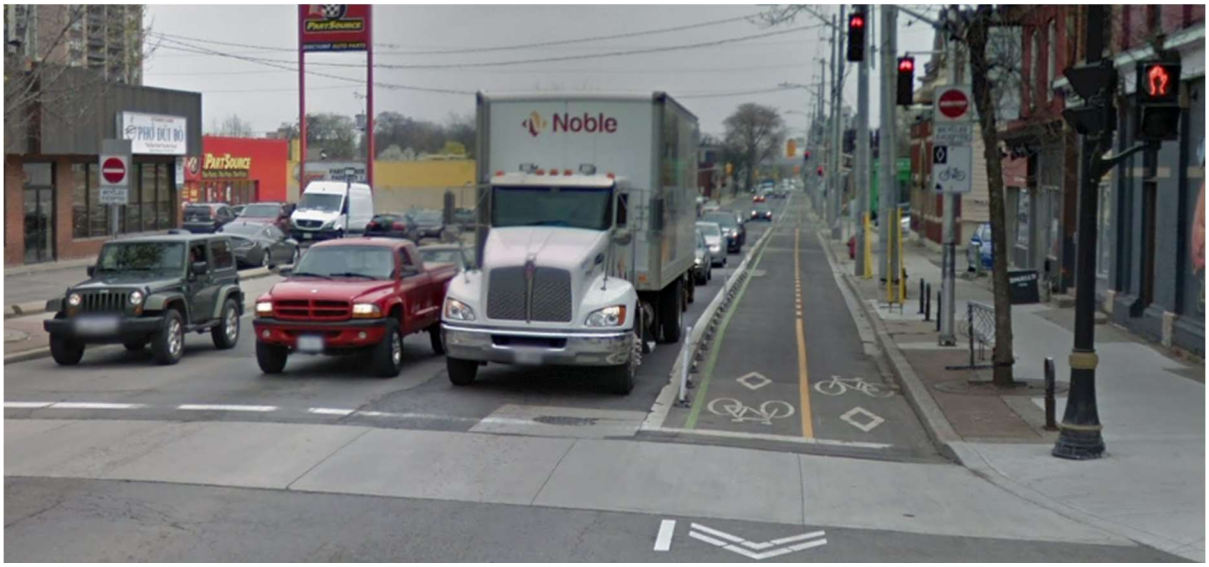


Image Credit: Google Maps

Figure 3-19: One-way Raised Cycle Track – Main Street Ottawa, ON

Image Credit: Google Maps

3.4.2.7 Crossrides

Crossrides are the equivalent of crosswalks, but for cyclists. They allow cyclists to cross intersections without dismounting. They are typically used at intersections on streets with cycle tracks or multi-use paths, and they can allow one or two-way crossings. They are distinguished by painted block tracks (known as Elephant's Feet) through the crossing, and they can include painted bicycle icons and/or coloured paint. Cross-rides can be designed to provide; separate, combined or mixed crossing spaces for cyclists and pedestrians. ***Figure 3-20*** shows an example of a separate crossride, ***Figure 3-21*** shows an example of a combined crossride and ***Figure 3-22*** shows an example of a mixed crossride.

Figure 3-20: Separate Crossride – Dundas Street West at Third Line in Oakville, ON

Image Credit: Google Maps

Figure 3-21: Combined Crossride – Shellard Lane at McGuiness Drive (east) Brantford, ON

Image Credit: Google Maps

Figure 3-22: Mixed Crossride – Shellard Lane at McGuiness Drive (west) Brantford, ON

Image Credit: Google Maps

3.4.3 Transit

Transit service in Brantford includes local service in the form of Brantford Transit and Brantford Lift, and regional service in the form of the GO Bus service, Greyhound regional transit, and Via Train Service. Elements of the transit networks include the following.

3.4.3.1 Streets

Brantford's streets allow Brantford Transit and Brantford Lift to provide local transit service. They also serve regional service for Greyhound regional transit and GO Bus service.

3.4.3.2 Terminals

Terminals are end or transfer points for transit service. They typically include space for transit vehicles to circulate and wait, as well as facilities for people waiting to board transit service. The lone transit terminal in Brantford is the shared Brantford Transit/Greyhound/GO Bus terminal at 64 Darling Street. ***Figure 3-23*** shows the transit terminal at 64 Darling Street.

Figure 3-23: Darling Street Transit Terminal

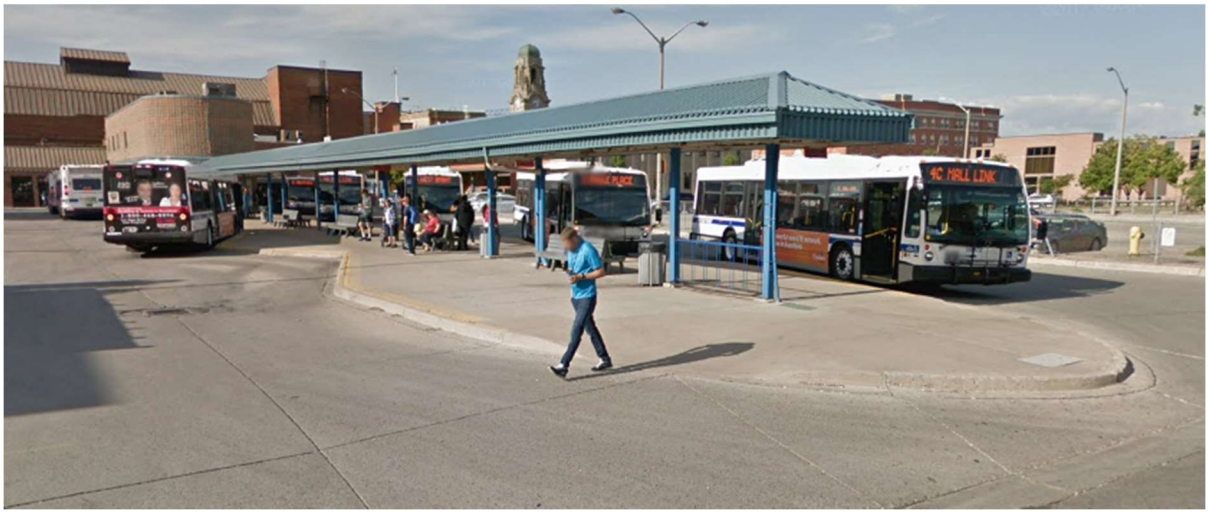


Image Credit: Google Maps

3.4.3.3 Stops

Transit stops are designated locations where Brantford Transit buses stop to allow people to board or disembark from buses. At a minimum, stops include signs indicating the routes that service the stop, and curbside concrete pads for people to board or disembark from buses. These pads should be connected to the sidewalk network. Stops can include benches and/or shelter structures. Stops serve people travelling on Brantford Transit service.

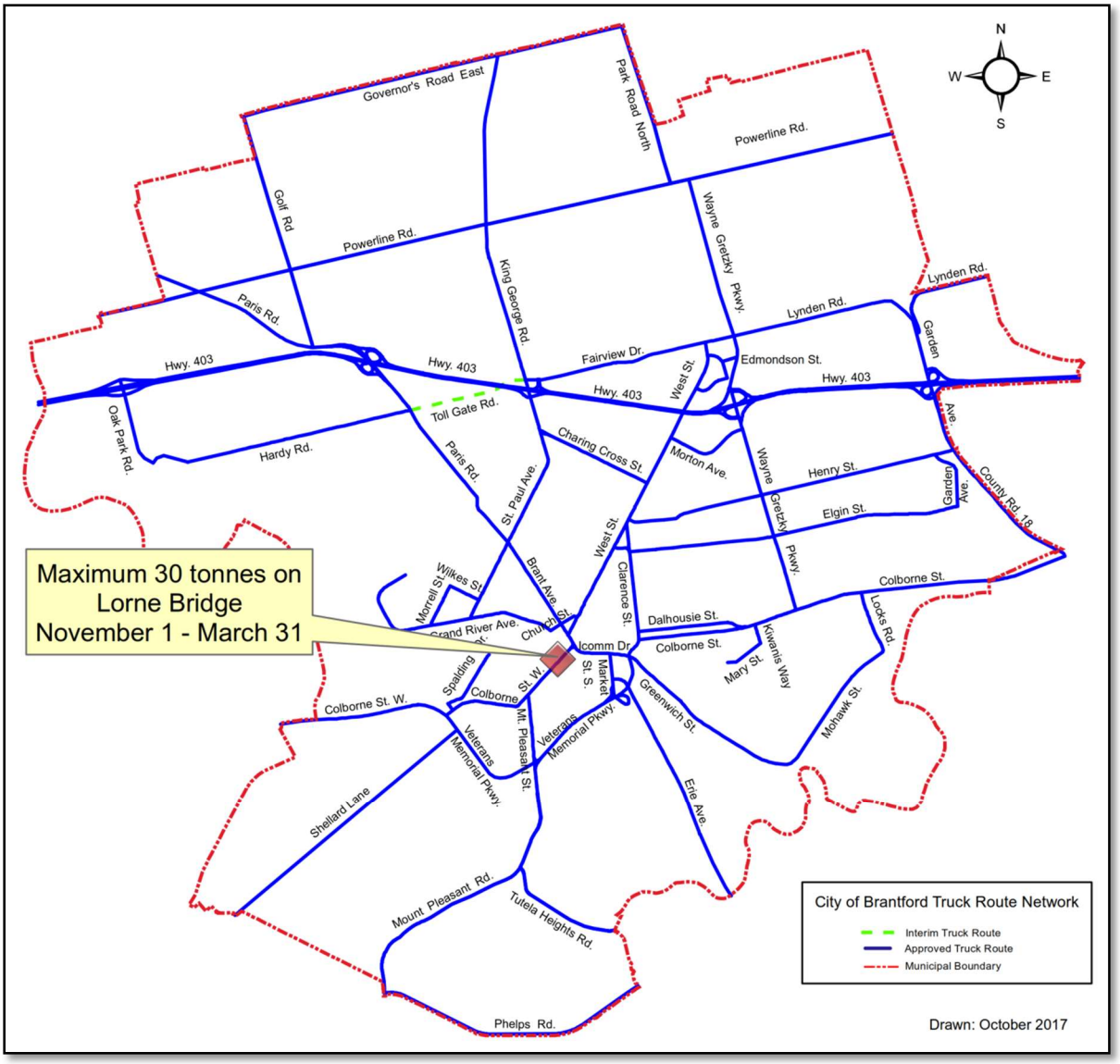
3.4.4 Goods Movement

3.4.4.1 Truck Routes

Brantford's streets generally permit delivery of goods to and from endpoints. Some streets are designated as truck routes, which serve regional goods movement and local activity centres for truck traffic. Truck routes are indicated by signage. Truck routes are appropriate in areas where land use is predominantly industrial, and they can be appropriate in commercial areas. Truck routes are less

appropriate but sometimes required on lower-order streets with fronting residences. ***Figure 3-24*** illustrates Brantford's approved Truck Routes.

Figure 3-24: Brantford Truck Routes



3.4.5 Automobiles

3.4.5.1 Streets

Brantford's street network serves trips by automobile. Streets have varying characteristics depending on their role and function, as outlines in ***Table 3-1***. Classes of street vary in the number of lanes provided, speed limits, and forms of traffic control at intersections depending on their role and function, whether for mobility or for access.

Design and control measures are integral to mitigating the impacts of automobile use depending on the nature of the vehicles using the street and the land use adjacent to the street. As much as possible automobile speeds should be limited to low to moderate speeds in residential areas and in the Downtown, moderate speeds in commercial areas, and moderate to high speed where posted limits allow on higher classification roadways (e.g. Wayne Gretzky Parkway).

3.4.5.2 Intersections

An intersection is an at-grade junction where two or more streets meet. These locations have significant potential for conflicts (vehicle-vehicle and or vehicle-bike/pedestrian movements) and delay (reduction in the capacity of a road segment due to these conflicts). To manage these issues, where warranted by volume and safety considerations, traffic control measure are implemented to designate priority to specific movements.

Based on the concept of volumes and priorities, intersections can be divided into traffic control categories according to whether they are uncontrolled, stop/yield control (unsignalized, simple priority), signal control (time sharing), roundabout (space sharing), or grade separated (interchanges, with or without signal control).

The Roads and Transportation, Design and Construction Manual, Linear Municipal Infrastructure Standards (4-May-2020), provides the general requirements and assessment tools to be used in the assessment of the most appropriate traffic control to be implemented.

Over the course of the last three to four years, a specific vision for intersections has been developed which promotes the application of roundabouts as the preferred method of traffic, where volumes, types of activity, land availability, and cost permit. Specifically, on March 21, 2017 Council directed through a Resolution, for:

- Staff to INVESTIGATE and report back to Council with a process to develop a policy, standards and appropriate traffic control/parking by-law amendments to support the implementation of modern roundabouts in the City of Brantford, considering the policies in adjacent communities, such as the Region of Waterloo; and
- Staff to DEVELOP these policies and report back to Council with candidate locations for roundabouts in the community where a feasibility study can be implemented in conjunction with approved road construction projects in the City's ten-year capital forecast.

Further to this Council Resolution, staff investigated and developed policy positions toolkits for calming and roundabout implementation, as is documented in the following staff reports:

- April 16, 2019 (Report No. 2019-164), Roundabout Installation Policy Development;
- October 8, 2019 (Report No. 2019-377), Roundabout Installation Policy Development Update; and
- March 2, 2020 Vision Zero Road Safety Committee – Traffic Calming Update [Financial Impact – None], 2020-159 and Traffic Calming Policy – Amendment [Financial Impact – None], 2020-160.

The culmination of these investigations was Policy Number: Public Works-021, Roundabout Installation Policy. To summarize:

- Policy Statement: To provide a guideline for the City of Brantford to determine if a roundabout is the appropriate intersection control for arterial or collector roadways in new subdivisions, and provide for a standardized procedure for the planning, design and implementation of such.
- Objective: Roundabouts should be considered the default intersection control for new developments unless all way stop or signal control is proven to be a superior choice, particularly at two-lane road intersections. As such, the goal of this policy is to develop a set of procedures to screen and assess whether subject intersections should be roundabout controlled: define a roundabout and its core elements, in comparison to other types of circular intersections; discuss principles of considerations (advantages vs. disadvantages); lay out the initiation, planning (screening and assessment phases), review and approval process.

This procedural and analysis tool kit to achieve this objective relative to intersection control has now been incorporated into the Linear Design Manual and the City's Roundabout Installation Guidelines.

3.5 Network Planning Guidelines

Brantford's transportation network for each mode of travel should allow people to access all of Brantford on safe and convenient transportation facilities that are in harmony with the adjacent land use context. This is a "complete" transportation network.

3.5.1 Principles

The following principles should guide the planning and design of Brantford's transportation network:

- Create complete, continuous, networks for each mode of travel.
- Balance the needs of users travelling along the street with the needs of people living, working, and playing adjacent to the street.
- Protect and enhance natural features and ecological systems.
- Maximize social and economic activities.
- Manage vehicle speeds to create more hospitable environments for pedestrians, cyclists, and transit users.

3.5.2 Guidelines

The following guidelines can be used to help plan and design Brantford's transportation network according to the principles listed above:

- Provide appropriately spaced, connected, high-quality facilities for each mode of travel:
  - Walking: include sidewalks on both sides of all streets. Sidewalk design should include tactile plates and ramping to improve accessibility and should avoid curb-faced sidewalks wherever possible;

  - Cycling: cycling facilities (paths, lanes) should be spaced every 200 m (or less). Refer to the Cycling Street Types (**Section 3.5.4.2**) for the types of cycling facilities appropriate for each street type. Cross-rides (intersection control treatments) should be used where any of these facilities cross collector or arterial streets;
  - Transit: space transit routes a maximum of 800 m apart (i.e. maximum of 400 m walking distance);
  - Goods Movement: space truck routes 1,600 m (or less) apart where the road network permits; and
  - Automobiles: include collector streets at 800 m (or less) spacing, and arterial streets at 1,600 m (or less) spacing, where the road network permits, while maintaining Transportation Association of Canada (TAC) recommended minimum spacing.
- Limit street block lengths. Blocks should be 150 to 175 m in length. Where blocks exceed these lengths, use alleys, multi-use paths, and trails to create pedestrian and cyclist crossings at these intervals;
- Improve pedestrian accessibility within blocks. Provide connections via alleys, service courts, and other access connections;
- Provide multiple street connections between neighborhoods. Rather than forcing inter-neighborhood travel out onto major collector and arterial streets, connect lower order streets between neighborhoods;
- Provide multiple community access points, minimize use of cul-de-sacs to ensure that communities are accessible and connected at all times (maximum 250 m dead end distance to be observed).;
- Maintain pedestrian and cyclist connections across barriers. Provide separate, dedicated pedestrian and cyclist connections over or under freeways and geographic barriers such as rivers;
- Maintain network quality and growth. Allow the network to grow and expand through development, revitalization, intensification, and redevelopment. Avoid increasing street widths or the number of travel lanes;
- Provide on-street curbside parking on the local and minor collector streets where possible. Parking restrictions should be considered on high volume, high speed roads, or locations where the right-of-way is constrained resulting in limited space and that space is required to accommodate alternative active travel mode(s).;
- Limit design speeds. All local and collector streets should have their design speed match the desired operating speed. To control speeds on long, straight streets, reduce driver comfort at high speeds by using context appropriate traffic controls, narrow lane widths, traffic calming, and boulevard features.;
- Discourage poor-performing features. Maintain a highly functioning network by discouraging:
  - On-street parking in areas with constrained right of way, allowing for better active mode allocations (wider sidewalks, enhanced streetscapes, bike lanes, or other means that enhance the public realm);
  - Gated streets and communities;
  - Widening of streets;

- Conversion of city streets to limited access facilities; and
- Streets lacking street trees.

- Create streets that increase network "completeness". The "completeness" index is described below; and
- Roundabouts should be considered the default intersection control for new developments unless all way stop or signal control is proven to be a superior choice.

3.5.3 Performance Measures

3.5.3.1 Completeness

A "complete" transportation network for Brantford will allow people to use each mode of travel to access all of Brantford via safe, convenient transportation facilities that are in harmony with the adjacent land use context. In order to evaluate how complete Brantford's transportation network is for a given mode of travel it is helpful to ask: "how much of Brantford can I get to by this mode of travel, using only safe (low risk for collisions or injury, comfortable environment), convenient transportation facilities that are in harmony with the adjacent land use?"

The answer to that question will be a percentage value representing the portion of Brantford that you can access. That percentage will vary depending on the mode of travel, and the starting location. If that question were asked and answered for every property in Brantford, and the results averaged, the result would be a percentage value indicating how complete Brantford's transportation network is for that mode of travel. The process could be completed for each mode of travel, giving a percentage value indicating how complete Brantford's transportation network is for each mode of travel.

It is unrealistic to expect every street to serve every mode at a high level, and some travel on less than optimal facilities is to be expected at the start and end of most trips. To account for this, each mode of travel has an acceptable "buffer distance" at the start and end of trips. Properties within the straight-line buffer distance from a high-quality facility are considered to have access to that facility, any other facilities that it is directly connected to, and any properties within the buffer distance of those facilities.

Buffer distances are consistent with the spacing guidelines from the preceding section. Buffer distances are:

- Walking: 1m, in order to be considered connected, properties must have a sidewalk/multi-use path on the street directly in front of the property;
- Cycling: 100 m;
- Transit: 400 m;
- Goods Movement: 800 m; and
- Automobile: 400 m from a collector street or 800 m from an arterial street.

3.5.4 Street Types

The City of Brantford's Roads and Transportation Design and Construction Manual (May 2020) presents five main types of streets, each having different right-of-way widths and intended functions. ***Table 3-1*** in ***Section 3.2.3*** provides description of the street classification characteristics.

Local streets have a single lane in each direction, and carry low volumes of traffic at low to moderate speeds. These streets are primarily for access to neighbourhoods / individual properties. Minor collector streets carry low to moderate traffic volumes at low to moderate speeds, and can be designed to accommodate transit buses. Major collector streets have two travel lanes in each direction, and carry moderate traffic volumes at low to moderate speeds. Collector streets have a balanced role between land access and mobility. Arterial streets carry moderate traffic volumes at high speeds, and can be designed for tractor-trailers. These streets primarily serve a mobility function (limited access).

Collector and arterials streets can be designed with varying design speeds and design vehicles, and can utilize a range of design speeds. The appropriate selection of design speed, posted speed, and design vehicle depends on three main factors:

- Adjacent land use context, particularly building orientation;
- Presence or absence of on-street parking; and
- Existing or expected heavy vehicle traffic.

Where buildings are placed close to the street right-of-way and on-street parking is permitted, the street may be considered a "main street", and lower design speed and posted speeds should be used.

Each of the street types serves different functions, and prioritizes the travel modes differently. ***Table 3-2*** outlines the prioritization for each mode of travel on each street type.

Table 3-2: Mode Priority by Street Type

Street Type	Walking	Cycling	Transit	Goods Movement	Automobile
Arterial	🟡	🟢	🟢	🟢	🟢
Major Collector	🟢	🟢	🟢	🟡	🟡
Minor Collector	🟢	🟢	🟡	🟡	🟡
Local	🟢	🟡	🟡	🔴	🟡

🟢 Accommodated at a high level of service
🟡 Accommodated with variable standards
🔴 Not required, or poor performance is acceptable

The functional categories and characteristics, as detailed in ***Table 3-1***, can be overlaid with the modal priority characteristics in ***Table 3-2***, to provide an enhanced Street Mobility Characteristic as shown on ***Table 3-3***.

Table 3-3: Street Classifications Update

	Laneway	Local Streets (Up to 18.5 m ROW)	Minor Collector Streets (Up to 24.5 m ROW)	Major Collector Streets (Up to 30.5 m ROW)	Arterial Streets (Up to 40.0 m ROW)
Number of Through Lanes per Direction*	1	1	1	1-2	1-3
Typical Traffic Volumes (AADT)	Less than 1,000 vehicles per day	Less than 2,000 vehicles per day	2,000 to 8,000 vehicles per day	8,000 to 12,000 vehicles per day	8,000 to 20,000 vehicles per day
Posted Speed Range (km/h)	Preferred 30, up to 50	Preferred 40, up to 50	Preferred range of 40 to 50, up to 60	As low as 40, to a typical range of 50 to 60	Preferred 60, up to 80
Minimum Design Speed (km/h)	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed	0-10 km/h > Posted Speed
Primary Design Vehicles (No Turning Encroachment)**	Passenger Car	Passenger Car	Passenger Car, Transit Bus, HSU	Passenger Car, Transit Bus, HSU, Snow plow, Fire Truck	Passenger Car, Transit Bus, HSU, Snow plow, Fire Truck, WB-20
Low Frequency Design Vehicle (Turning Encroachment Permitted)**	HSU, Snowplow	HSU, Snow plow, Fire Truck	Snow plow, Fire Truck	WB-20 for non-truck routes, non-commercial / industrial zones	N/A
Optional Design Vehicle (No Turning Encroachment)**	Fire Truck	N / A	WB-20 for truck routes, commercial / industrial zones	WB-20 for truck routes, commercial / industrial zones	Long Combination Vehicles (LCVs)
Mobility Function vs Land Access	Access primary role	Access primary role	Equal role in mobility and access role	Equal role in mobility and access role	Mobility movement primary role
Flow Type	Interrupted flow	Interrupted flow	Interrupted flow	Moderate interruption to flow	Minimal interruption to flow
Accommodation for pedestrians	Sidewalk on one or both sides	Sidewalk both sides	Sidewalk both sides	Sidewalk both sides OR MUP both sides	Sidewalk both sides OR Sidewalk one side with MUP the other
Accommodation for cyclists	Shared in road	Shared in road	On road bike lane both sides	On road bike lane both sides OR MUP both sides	On road buffered / protected bike lane both sides OR MUP one side
Parking	On street parking both sides	On street parking both sides	On street parking one or both sides	Parking restricted or prohibited	Parking prohibited

HSU = Heavy Single Unit Truck
WB-20 = Tractor-Semitrailer with standard 53 foot trailer
* Does not include turning lane requirements
** Minimum intersection curb radius to be determined in conjunction with design vehicle of intersecting road using turning templates. Minimize over design by using design vehicles from the lower road class.

The following sections provide detail on how each mode of travel can be accommodated on each of the street types.

3.5.4.1 Walking

Sidewalks can accommodate walking on all street types. Where design and posted speeds are greater than 50 km/h, sidewalks should be buffered from the travel lanes by at least 2.0 m. Since walking should be accommodated at high levels of service on local streets and collector streets, those streets should have sidewalks on both sides. Arterial streets should include sidewalks or one of sidewalk and MUP, on each side of the road, and sidewalks should be included on both sides where buildings are set close to the street right-of-way.

Pedestrian crosswalks should be provided at all signalized intersections, on all legs, involving collector or arterial streets (except under special circumstances, i.e. where intersection is under jurisdiction of the Ministry of Transportation of Ontario). Mid-block signals or guard-controlled crossovers should be provided in order to provide safe and efficient pedestrian environments at the spacing outlined in the network planning guidelines, where pedestrian activity warrants. Tactile plates and ramping should be used at all pedestrian crossing locations in order to improve accessibility.

3.5.4.2 Cycling

Appropriate cycling facilities vary based on the street type. Local streets can be designated as bicycle priority streets, where the only infrastructure required is measures to maintain low vehicle speeds and volumes. For minor collector streets, lanes, buffered lanes, cycle tracks, and multi-use paths are appropriate. For major collector and arterial streets, cycle tracks or multi-use paths are appropriate.

Cross-rides are appropriate for intersections between bicycle priority streets and collector or arterial streets, and for intersections along streets with cycle tracks or multi-use paths.

3.5.4.3 Transit

Transit routes are typically not included on local streets. Collector and arterial streets serve transit routes, and as such, transit stops can be included along each of these types of streets. Stops can be included close to intersections with local streets to provide convenient access to the local streets.

3.5.4.4 Goods Movement

Truck routes are inappropriate for local streets, although local streets do provide basic access for deliveries. Minor collector streets are normally not designated as truck routes. Major collector streets and arterial streets typically make up the truck route network to allow for through movement of trucks.

3.5.4.5 Automobiles

Table 3-1 presents some of the key features for automobiles, including design and posted speeds and number of travel lanes.

3.6 Network Assessment

Goals and objectives were established for each mode of travel, based on a technical review and based on input from stakeholders and the public. The following sections describe these goals/objectives.

3.6.1 Walking

3.6.1.1 Goals and Objectives

GOAL: Be a complete, accessible, and pedestrian-friendly community with networks that integrate with transit, paths and trails, neighbourhood amenities, parks, open space, and schools.

OBJECTIVES:

1. Facilities provide a high level of pedestrian connectivity.
2. Walking environment is safe for users.
3. Pedestrian accessibility, comfort, and mobility levels of user support walking as a preferred mode.

3.6.1.2 Projects

The provision of walking infrastructure should conform to the Linear Municipal Infrastructure Standards. The typical right of way cross sections identified in the standards provide reasonable guidance related to horizontal design elements for the allocation of space in the right of way, by street classification. ***Table 3-4*** provides an overview of the right of way by road type, and the associated requirement for pedestrian space.

Table 3-4: Cross Section Design Elements – Walk

Road Type	R.O.W. (m)	Road Width (m)	Sidewalk (m)	M.U.P. (m)
Local	18.5	10.2	1.5 – both sides	-
Minor Collector	24.5	12.9 to 15	1.8 – both sides	-
Major Collector	27.5	18.8	1.8 – both sides	-
Major Collector	30.5	18.0	-	3.0 - both sides
Arterial	40	21.4	1.8 – both sides	-
Arterial	40	22.7	1.8 – one side	3.0 - one side

Consideration might be given to providing 2 m sidewalk widths in areas of high student pedestrian traffic or with high mobility device use such as hospitals or retirement homes and the like. With vulnerable users, especially those of primary school age where bicycle use maybe prevalent, consideration might also be given to the provision of multi-use paths on minor collector type streets.

3.6.2 Cycling

3.6.2.1 Goals and Objectives

GOAL: Provide safe and convenient bicycle routes suitable for all user types: utilitarian (commuting), recreational (personal or family discretionary), and sport (advanced, high level recreational).

OBJECTIVES:

1. There is a continuous network of safe and direct bicycle routes.
2. There is an ability to navigate the bicycle network with ease.
3. End-of-trip facilities support cycling as a preferred mode of transportation.
4. The bicycling environment is safe.
5. Provide unique and specific design environments appropriate for the different types of users.

3.6.2.2 Projects

The provision of cycling infrastructure should conform to the Linear Municipal Infrastructure Standards. The typical right of way cross sections identified in the standards provide reasonable guidance related to horizontal design elements for the allocation of space in the right of way, by street classification. ***Table 3-5*** provides an overview of the right of way by road type, and the associate requirement for cyclist space.

Table 3-5: Cross Section Design Elements – Cycle

Road Type	R.O.W. (m)	Road Width (m)	Bike Lane (m)	M.U.P. (m)
Local	18.5	10.2	-	-
Minor Collector	24.5	12.9 to 15	1.9 – both sides	-
Major Collector	27.5	18.8	1.9 – both sides	-
Major Collector	30.5	18.0	-	3.0 - both sides
Arterial	40	21.4	1.9 – both sides (buffered)	-
Arterial	40	22.7	1.9 – one side	3.0 - one side

Again, areas with vulnerable users, especially those of primary school age where bicycle use maybe prevalent, consideration might also be given to the provision of MUP on minor collector type streets.

3.6.3 Transit

3.6.3.1 Goals and Objectives

GOAL: Foster an efficient, affordable, safe, and accessible transit system that is an attractive alternative to the private vehicle and integrates with all other elements of the transportation system.

OBJECTIVES:

1. Transit contributes to a more environmentally sustainable community.
2. Transit is well integrated with all other transportation modes.
3. A robust frequent transit network serves the community.
4. There are high levels of bus stop accessibility and safety.
5. There is public awareness that transit is an attractive alternative to the private vehicle.
6. Design of the system must not neglect the design of the vehicle and the design of facilities, remembering that transit needs to provide the rider with a great experience to develop and maintain strong ridership levels.

3.6.3.2 Projects

The short- and medium-term service elements for transit have been identified in the City's 2016 Transit Service Plan (TRANSformation2021). To maintain the current mode share of transit at a minimum and to further expand service into new development areas, significant investment is required in the transit system. A long-term transit strategy is required to achieve the objectives noted above. To that end, a transit specific master plan study is required to lay out the infrastructure, equipment, and operational needs of the City's transit service.

3.6.4 Goods and Services Movement

3.6.4.1 Goals and Objectives

GOAL: Maintain and enhance the efficient movement of goods and service (including emergency and municipal services).

OBJECTIVES:

1. Truck traffic (except delivery service) avoids areas designated for high-density residential, mixed use, and pedestrian- and transit-oriented development.
2. There is a high level of goods and emergency services mobility on major regional routes.
3. Goods and municipal and emergency services are being delivered at a local level.
4. High level of accessibility and mobility for emergency services.
5. While there is a focus on street design for placemaking, continued accommodation of appropriate design vehicles, including local deliveries and long-distance freight trips, is necessary.

3.6.4.2 Projects

Provisions for goods movement in the City needs to be reflected in the design of the transportation network. In order to ensure that streets can be designed for placemaking, it is important that major destinations for truck traffic be connected via major corridors. Truck infiltration to roadways that are not designed for truck traffic occurs when destinations are not connected appropriately or consistently.

Road network design is vital to defining a comprehensive and effective goods movement plan.

3.6.5 Road Network

3.6.5.1 Goals and Objectives

GOAL: Provide for responsible planning and development of roads, and transportation connections to facilitate the efficient movement of people. Ensure that traffic control is considered that places emphasis on safe, efficient, and sustainable for all modes.

OBJECTIVES:

1. Provide road network connectivity that supports local and regional mobility.
2. There is a balance between traffic congestion and mobility performance.
3. All systems integrate and work together to move people, goods, and services.
4. Roads adapt to accommodate the future, including appropriate traffic controls.

3.6.5.2 Projects

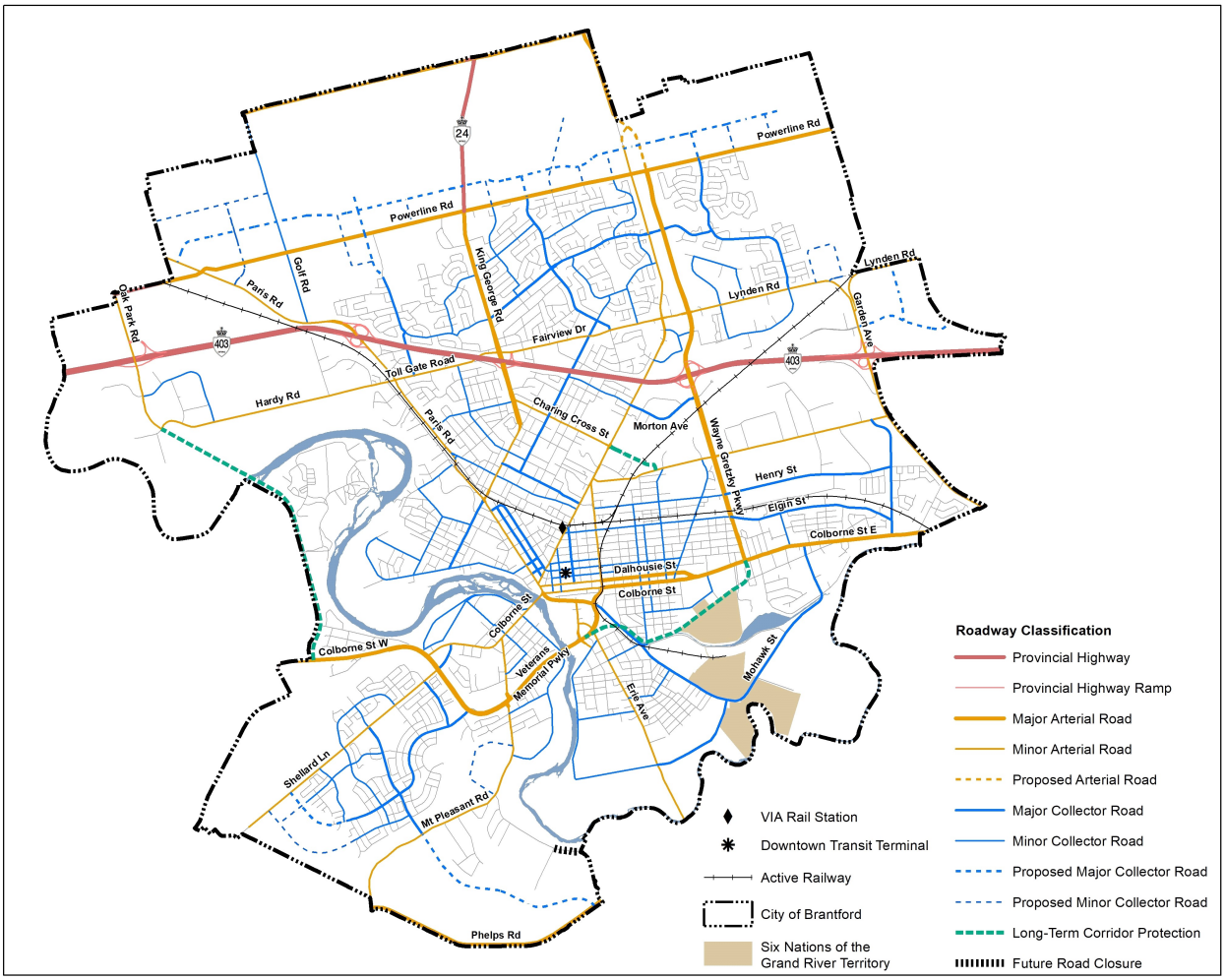
The provision of vehicle (auto, transit, truck) infrastructure should conform to the Linear Municipal Infrastructure Standards. The typical right of way cross sections identified in the standards provide reasonable guidance related to horizontal design elements for the allocation of space in the right of way, by street classification. ***Table 3-6*** provides an overview of the right of way by road type, and the associated requirement for vehicle space.

Table 3-6: Cross Section Design Elements – Private / Public Vehicle

Road Type	R.O.W. (m)	Road Width (m)	Travel Lane	Permitted Vehicle
Local	18.5	10.2	3.5 m – 1 lane per direction	auto / some transit / local truck
Minor Collector	24.5	12.9 to 15	3.5 m – 1-2 lanes per direction	auto / some transit / local truck
Major Collector	27.5 to 30.5	18.8	3.5 m – 1-2 lanes per direction	transit / truck
Arterial	40	21.4 to 22.7	3.7 m – 1-3 lanes per direction	transit / truck

A review of the City's roadway network was undertaken in consideration of these design elements, and the functional classification confirmed as shown in ***Figure 3-25.***

Figure 3-25: Roadway Classification



4.0 Transportation Assessment

This chapter describes the process of assessing the future 2041 travel conditions, evaluating alternative strategies for addressing identified issue, and selecting a strategic recommended plan for transportation planning in Brantford to 2041. The assessment builds on the data and analysis approach identified in the ***Study Foundation*** (Chapter 1) and ***Complete Streets Framework*** (Chapter 3).

The performance of the transportation system was assessed using the City's strategic travel demand forecasting model. This model accounts for land-use (at a traffic zone level of detail, as provided by the Municipal Comprehensive review process) trip generation, trip distribution, and mode split in assigning travel demands to the transportation network. The assigned vehicle volumes are then compared to the capacity of the infrastructure at a corridor and roadway link level (i.e. volume to capacity assessment). This analysis tool also allows for the detailed evaluation of the origins and destinations for trips using specific infrastructure.

Travel demands were then used to identify the impacts of the alternative strategies on the corridor performance and assist in the identification of the impact of alternatives considered to address the identified roadway constraint.

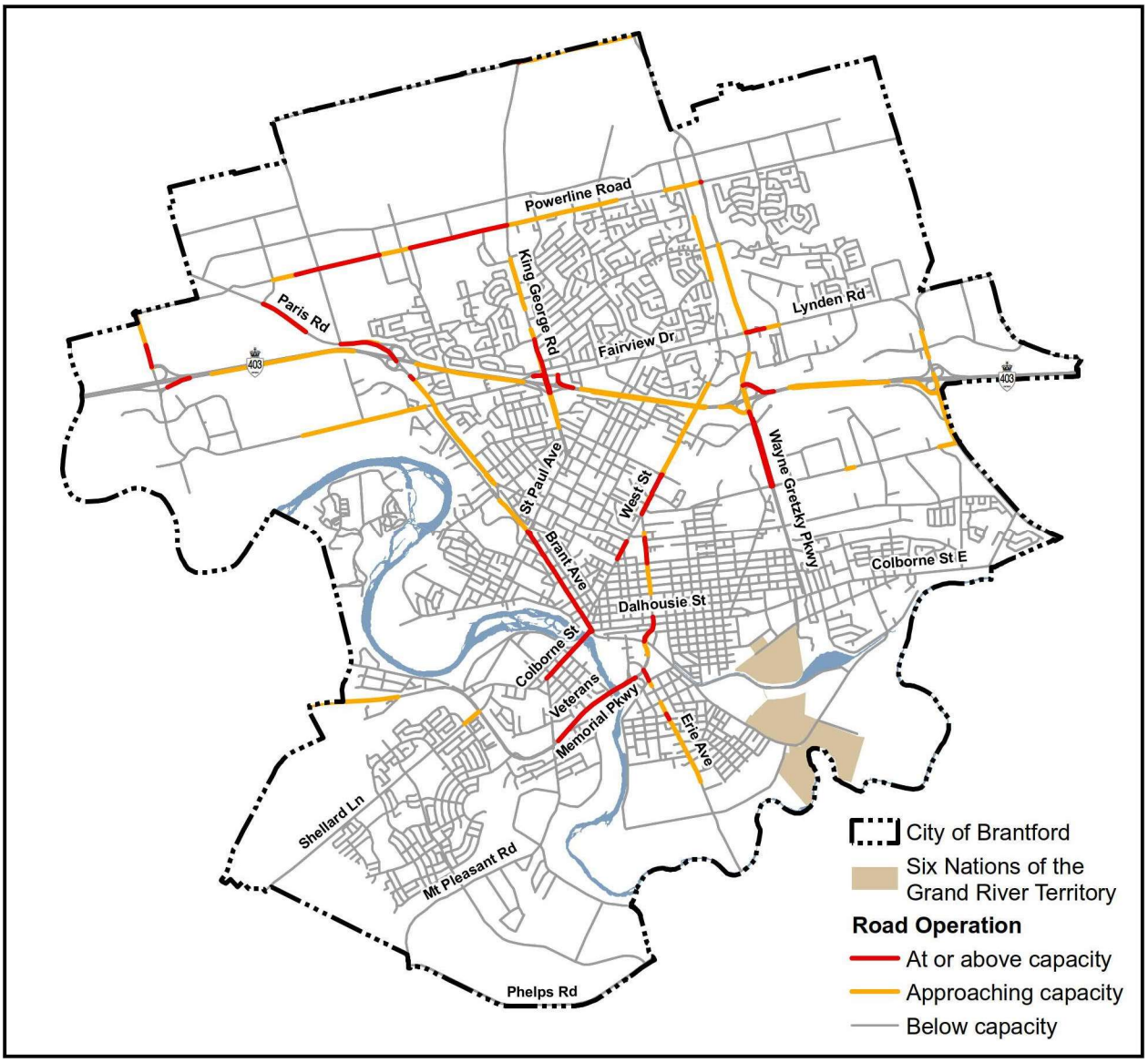
It is important to understand that infrastructure and service provisions in one corridor can have impacts, positive and negative, in other corridors. Problems identified and solutions assessed during the transportation analysis are mindful of this interdependency between corridors.

The resulting recommended plan includes a combination of: optimising existing transportation infrastructure, adding additional transportation infrastructure, and managing travel demand.

4.1 Do Minimal

The capacity constraints by 2041, accounting for proposed growth under a transportation network scenario with minimal improvements over today's condition, were identified. The changes to the road network include only short term committed projects (e.g. The Oak Park Road/Highway 403 interchange upgrade), collector roads required to support the expansion growth areas (required to provide access to future development), and the closure of Tutela Heights Road in the vicinity of Davern Road (as a result of the Tutela Heights Slope Stability EA). An overview of the link and screenline capacity and performance in the PM peak hour for the 2041 Do Minimal network are illustrated ***Figure 4-1*** and ***Table 4-1*** respectively.

Figure 4-1: 2041 Do Minimal Network: Capacity Constraints



Overall, the 2041 Do Minimal network assessment shows that many of the arterial roads will be operating at or above capacity in the PM peak hour. Growth in travel has resulted in a significant decrease in network performance. Existing issues crossing Highway 403 and the Grand River are exacerbated by growth, and new issues have emerged (as a result of boundary expansion) along the north-south roadways connecting the downtown and growth areas to Highway 403.

Table 4-1: 2041 Do Minimal: Screenline Assessment

#	Name	Direction	Capacity		AM Peak Hour		PM Peak Hour	
			Lanes	Total	Volume	V/C	Volume	V/C
1	Grand River South	EB	7	8,100	6,696	0.83	6,073	0.75
1	Grand River South	WB	7	8,100	4,404	0.54	7,450	0.92
2	Grand River North	EB	4	5,200	3,096	0.60	4,113	0.79
2	Grand River North	WB	5	6,000	2,756	0.46	3,822	0.64
3	Highway 403	NB	13	10,800	6,908	0.64	9,039	0.84
3	Highway 403	SB	13	10,800	7,296	0.68	9,254	0.86
4	King George Road	EB	11	9,600	5,201	0.54	8,413	0.88
4	King George Road	WB	11	9,600	6,792	0.71	7,269	0.76
5	Wayne Gretzky Parkway (North)	EB	7	7,600	4,399	0.58	6,210	0.82
5	Wayne Gretzky Parkway (North)	WB	7	7,600	5,312	0.70	5,827	0.77
6	Wayne Gretzky Parkway (South)	EB	7	4,900	1,986	0.41	2,302	0.47
6	Wayne Gretzky Parkway (South)	WB	7	4,900	1,600	0.33	2,822	0.58
7	Memorial Drive	EB	9	6,100	1,687	0.28	3,025	0.50
7	Memorial Drive	WB	9	6,100	2,339	0.38	2,599	0.43
8	West Street	EB	6	4,300	2,074	0.48	3,041	0.71
8	West Street	WB	6	4,300	2,671	0.62	3,032	0.71
9	CNR Corridor	NB	11	7,900	4,369	0.55	4,986	0.63
9	CNR Corridor	SB	11	7,900	4,231	0.54	6,068	0.77
10	Garden Avenue	EB	9	8,800	4,571	0.52	5,701	0.65
10	Garden Avenue	WB	9	8,800	4,389	0.50	6,052	0.69
11	Powerline Road	NB	13	9,400	4,158	0.44	5,843	0.62
11	Powerline Road	SB	13	9,400	4,671	0.50	6,092	0.65
12	Murray Street	EB	7	4,400	1,932	0.44	1,860	0.42
12	Murray Street	WB	8	5,200	1,589	0.31	2,381	0.46
13	West External	EB	7	7,300	1,711	0.23	2,241	0.31
13	West External	WB	7	7,300	1,664	0.23	2,190	0.30
14	South-West External	NB	4	4,300	1,560	0.36	1,168	0.27
14	South-West External	SB	4	4,300	949	0.22	1,632	0.38
15	East External	EB	5	6,900	2,931	0.42	3,448	0.50
15	East External	WB	5	6,900	2,996	0.43	3,634	0.53
16	North-East External	NB	3	3,200	1,355	0.42	1,614	0.50
16	North-East External	SB	3	3,200	1,168	0.37	2,281	0.71
17	North-West External	NB	3	3,300	780	0.24	929	0.28
17	North-West External	SB	3	3,300	791	0.24	978	0.30

Legned:		*V/C Range*	*From*	*To*
X	Good Capacity Conditions		0.00	0.70
X	Approaching Capacity Conditions		0.70	0.85
X	Over Capacity Conditions		0.85	-

Notes: i) For more details on sreeenlines in general please see ***Chapter 2.0.Transportation Impacts of Growth***.

ii) Screenlines are illustrated in ***Figure 2-3*** .

iii) Total (capacity) = the total roadway vehicle capacity of all lanes that cross a particular screenline in a particular direction.

iv) Volume = the total number of vehicles that cross a particular screenline in a particular direction during a particular peak hour.

The following critical deficiencies were identified in the road network for the PM peak hour:

- Inter-regional (significant number of trips in the corridor are to/from areas outside of Brantford)
  - Brant Avenue - St Paul Avenue to Colborne Street
  - Wayne Gretzky Parkway - Henry Street to Highway 403
  - Wayne Gretzky Parkway - North of Highway 403
  - King George Road - Crossing Highway 403
  - Paris Road - Highway 403 to Powerline Road
- Intra-regional (significant number of trips in the corridor are to/from areas within Brantford)
  - Lorne Bridge (Colborne Street) - Grand River Crossing
  - West Street - Charing Cross Street to Henry Street
  - Veterans Memorial Parkway - Mt. Pleasant Street to Market Street
  - Paris Road - South of Highway 403
  - Powerline Road - Paris Road to Wayne Gretzky Parkway
  - Hardy Road - Ferrero Boulevard to Paris Road
  - Erie Avenue - Veterans Memorial Parkway to Birkett Lane
- Local System (trips primarily local in nature)
  - Clarence Street/Clarence Street South – Dalhousie Street to Icomm Drive
  - Colborne Street West – County Road 7 (Pleasant Ridge Road) to D'Aubigny Road

4.2 Alternative Transportation Strategies

The 2020 TMP's strategic transportation direction follows the previous 2007 and 2014 TMP's closely. The 2007 and 2014 strategies were built on two principle themes:

- Increase the supply of transportation infrastructure (optimize, expand and new facilities); and
- Manage travel demand (cost, behaviour, land use).

The 2020 TMP update refines these themes as follows:

- **Travel Demand Management** (TDM) - Manage travel demand (cost, behaviour [including mode choice], land use);
- **Transportation System Management (TSM)** - Manage the transportation infrastructure to optimize efficiency and safety for all modes (provide space and operating environment for all modes); and
- **Infrastructure Enhancements** - Increase the supply of transportation infrastructure (expand existing and add new facilities).

The impacts of these strategies have been updated to reflect the new growth forecasts and network capacity improvements to the 2041 horizon year. Ultimately when implementing these strategies, minimizing impacts to the environment, including properties, and City finances are significant considerations.

4.2.1 Travel Demand Management

Travel Demand Management (TDM) is a wide range of policies, programs, services and products that influence how, why, when, and where people travel to create a more sustainable transportation network. The objectives are to encourage individuals to:

- utilize alternate modes of transportation (walk, cycle, take transit or carpool instead of driving alone);
- travel less (telework, link several purposes in one trip); or
- change trip times or routes (choose off-peak hours or less congested roads).

Ultimately, a TDM strategy focuses on the modification of travel behaviour by encouraging people to use sustainable modes of transportation, rather than driving alone, or making fewer trips by car. For example: increased use of transit, increased cycling and walking for shorter distance trips, and taking advantage of ride sharing opportunities would address the growth of traffic in the City by achieving new mode share targets in 2041 (as illustrated in ***Table 4-2***). They include a reduction in the auto driver/passenger mode share from 85% in 2016 to 0% in 2041, a significant increase in the transit mode share from 2.8% today to 5.8% in 2041 and an increase in the Active Transportation mode share from 7.8% today to 10% in 2041.

Table 4-2: Brantford Travel Mode Share Targets: Internal Trips (Brantford to Brantford)

Mode \ Year	2016	2041	Difference
Auto Driver	70.8%	67.1%	- 3.7%
Auto Passenger	14.6%	12.7%	- 1.9%
Transit	2.8%	5.8%	+ 3.0%
Cycle/walk	7.8%	10.0%	+ 2.2%
Other	4.0%	4.4%	+ 0.4%
	100.0%	**100.0%**	**0.0%**

This TDM strategy does not include any increases to the roadway network capacity that would be provided by roadway widening, extensions and/or additions. However, improvements (expansion, higher frequency) to the transit system would be required to facilitate the penetration of new or underserved markets in the City.

Travel Demand Management initiatives do not completely replace the need for road improvements or system expansion. They are, however, effective in deferring costly infrastructure improvements or expansion. In deferring the need for infrastructure improvements and supporting alternative modes of travel, TDM provides for health and environmental benefits, consistent to OP goals.

Active Transportation

Active Transportation includes walking and cycling modes of travel. For these modes to reach their full potential, the network and user environment must be planned and implemented with specific goals and objectives in place.

The principles of Complete Streets have been applied to define the goals and objectives for each mode.

The established goal for the Walk mode is as follows:

Be a complete, pedestrian-friendly community with networks that integrate with transit, paths and trails, neighbourhood amenities, parks, open space, and schools. This will be achieved through providing high level of connectivity, ensuring a safe environment, and supporting accessibility.

The established goal for the Cycling mode is as follows:

Provide safe and convenient bicycle routes suitable for all user types: utilitarian (commuting), recreational (personal or family discretionary), and sport (advanced, high level recreational). This will be achieved through facility continuity, ensuring ease of navigation, providing end of trip facilities, ensuring a safe environment, provide appropriate environments for different user types.

Transit

Travel Demand Management relies heavily on the use of transit. While the use of transit is growing, today approximately 3% of weekday peak hour trips are made by transit. The success of transit depends on the availability, convenience and reliability of service, and the proximity of that service to residences, jobs, and schools. The greater the access to transit for people and jobs, the higher the potential for transit ridership.

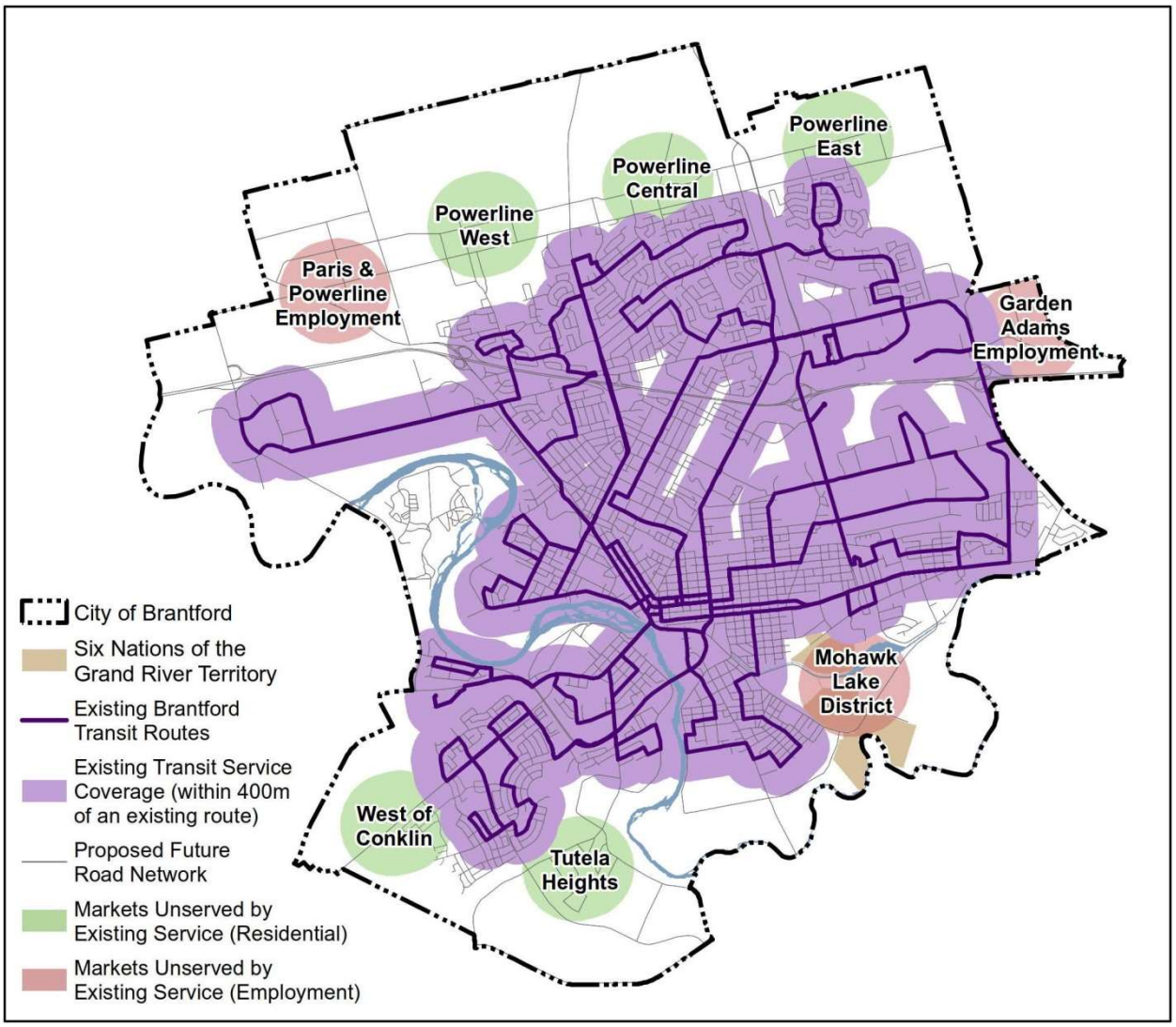
The approach to determining the future potential for transit in Brantford was as follows:

- Assess existing transit system coverage;
- Review existing mode splits to transit for traffic zones;
- Set appropriate targets for land use type and density, and in consideration of available transit;
- Apply targets to 2041 trip ends;
- Adjust total travel demands for vehicles;
- Assign transit trips to enhanced/expanded transit service coverage; and
- Outcome:
  - Overall system improvement in transit use results in reduction of vehicle trips;
  - Corridor transit use increase;
  - Increase in transit use, decreases auto trips; and
  - Capacity analysis reassessed using reduced auto demand scenario (TDM).

Achieving these increases requires significant expansion of existing service (new routes) and service frequency (more buses, smaller headways between buses) to serve existing areas more efficiently and to

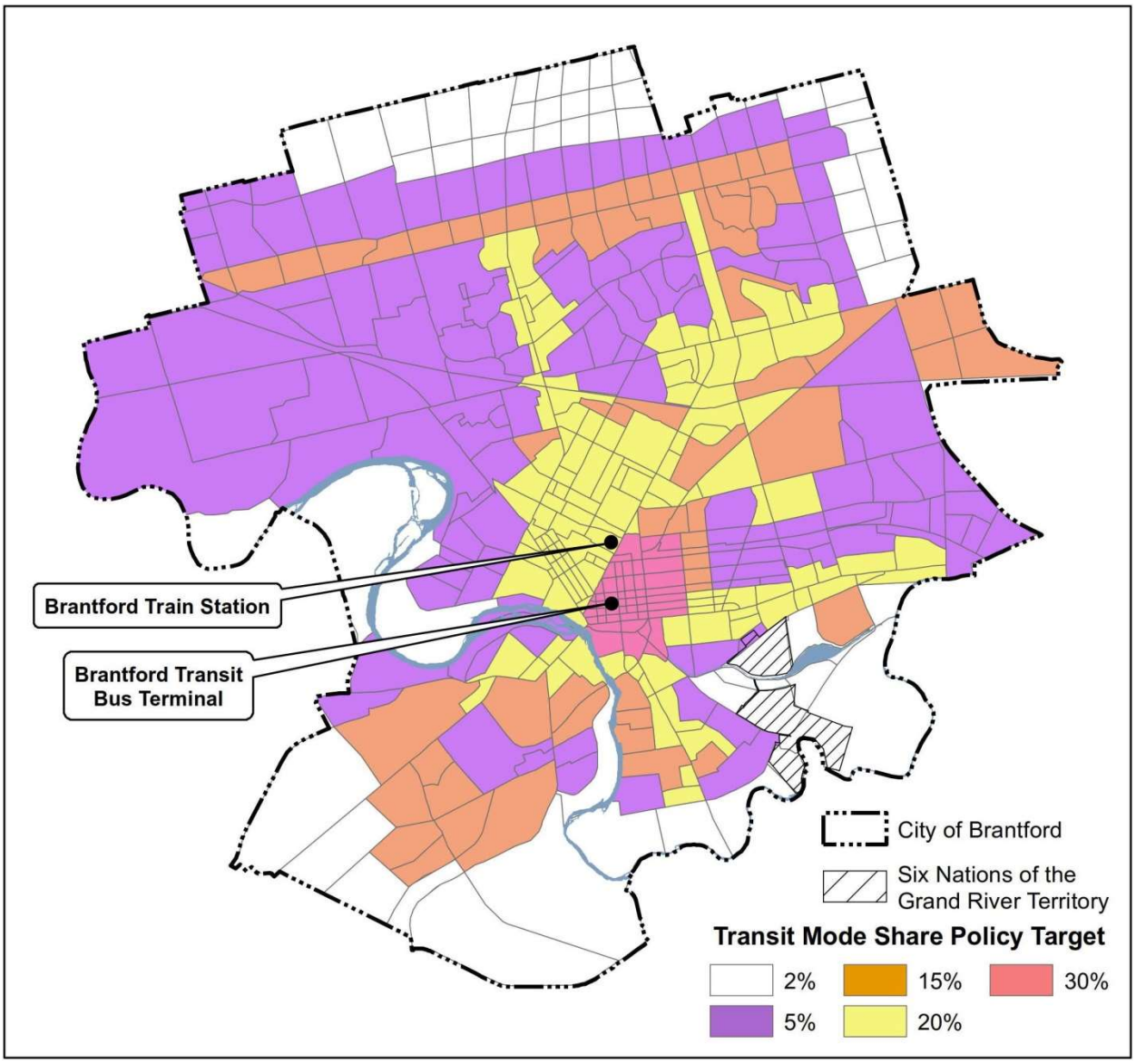
provide service in new areas. ***Figure 4-2*** identifies the existing transit system coverage and future market opportunities.

Figure 4-2: Existing Transit System Coverage and Future Market Opportunities



A review of existing mode splits was undertaken to establish the penetration of the transit market. Population and employment densities in the 2041 condition were reviewed to identify areas where transit service would have the most impact. New mode share targets were identified and applied to future trip generation to establish new transit ridership levels and make corresponding adjustments to the auto trip making. ***Figure 4-3*** identifies the 2041 mode split targets for transit.

Figure 4-3: 2041 Transit Mode Split – Zone Policy Targets



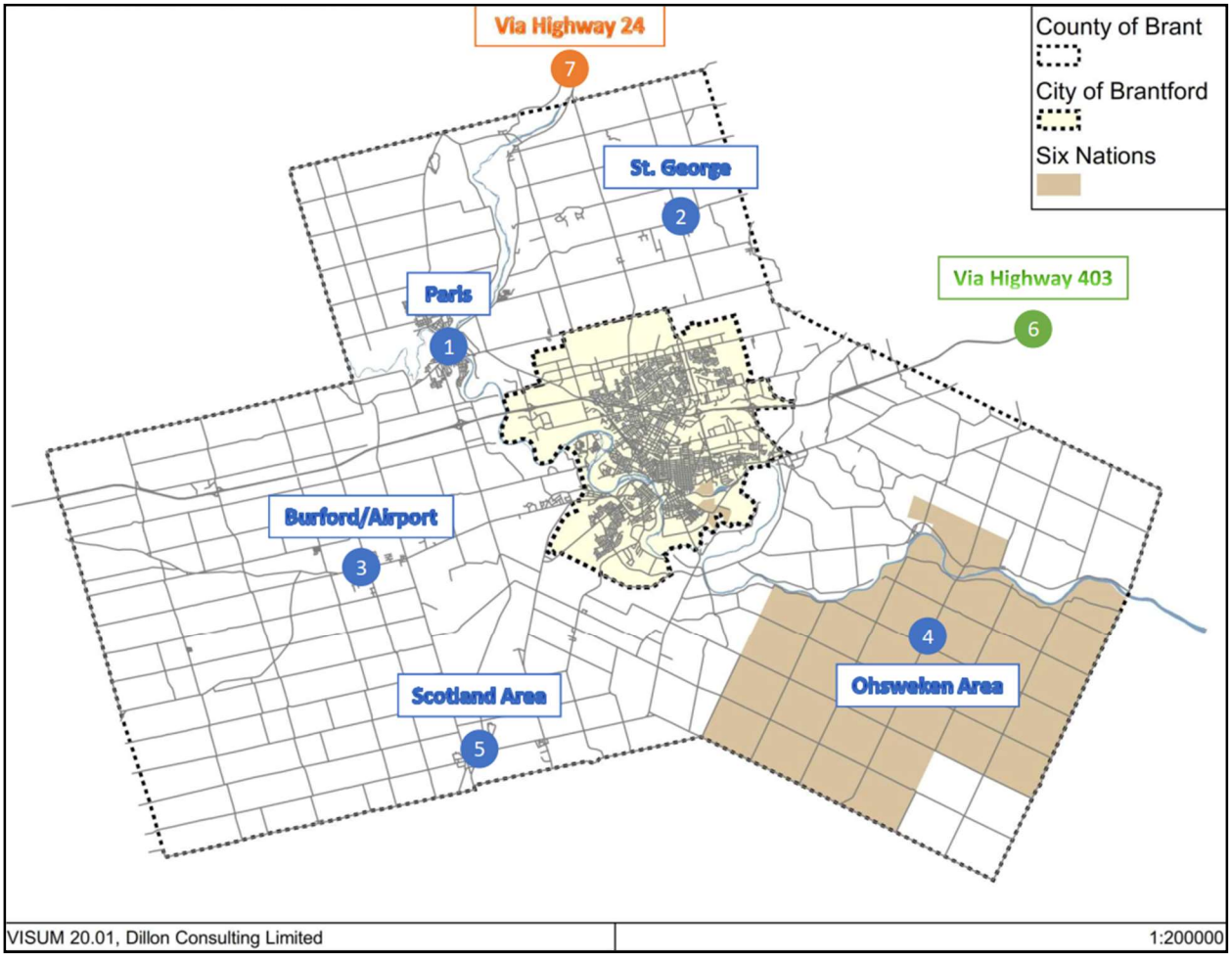
The application of the new transit mode share targets results in a significant increase in transit ridership. Overall, the city-wide transit mode share is forecast to increase from 2.8% in 2016 to 5.8% in 2041. This mode share target is aggressive (more than double the current share) but achievable if married to land use intensification strategies identified in the OP and if a commitment is made to transit service improvements and expansion as identified in the City's 2016 transit service plan.

The impact of this increased focus on transit is a tripling of route ridership (remembering that route ridership includes transfers between multiple routes by a single rider to facilitate their trip). Such a service expansion will require significant investment in capital and operating costs. The current transit system comprises approximately 175 km of linear routes, which would need to expand to over 220 km

of linear routes to access the growth areas. This reflects a 25% increase in transit coverage in the City that will also require additional vehicle hours to maintain the required service levels to meet demand.

In addition to the local Brantford to Brantford transit service, there are opportunities to partner with other agencies to connect communities outside the City limits by public transit. While there is some existing regional transit via GO Transit to Hamilton, McMaster University, and Aldershot GO Station (Burlington), these markets are under served, and the County connections are very limited. Providing more consistent transit connectivity will reduce the vehicle travel demands resulting in benefits to the City's road system performance. Travel markets to/from Brant County, the GTA, and the Tri-Cities (Cambridge/Kitchener/Waterloo) are significant. They are displayed in ***Figure 4-4.***

Figure 4-4: Inter-Regional Transit Opportunities



A review of the forecasted 2041 PM peak period person trips identified the following market potentials:

- From Brantford to Brant:
  - (1) Paris - 5,000 person trips (all modes)
  - (2) St. George - 1,000 person trips (all modes)
  - (3) Burford/Airport - 250 person trips (all modes)
  - (4) Ohsweken area - 200 person trips (all modes)
  - (5) Scotland area - 650 person trips (all modes)
- From Brantford to GTA:
  - (6) Via Hwy 403 - 4,500 person trips (all modes)
- From Brantford to Cambridge/Kitchener/Waterloo
  - (7) Via Hwy 24 - 1,300 person trips (all modes)

Not all of these trips are divertible to transit, but even achieving 2%-5% market penetration could result in significant auto trip reduction on critical roadways. This inter-regional potential would also be beneficial to captive ridership (i.e. seniors, students, and mobility challenged users).

The development of such service has the potential to reduce auto volumes on the critical north-south arterials within the City but will require inter-agency collaboration (at both ends of trip) to implement (e.g. planning and funding).

Manage Travel Demand Assessment

The effect of the 5.8% transit mode share, in combination with a 10% mode share to active modes (walking and cycling) significantly reduces the 2041 vehicle demand on the network. This TDM scenario, as assigned to the Do Minimal network, results in a noticeable improvement in network operations across the city compared with the 2041 Do Minimal forecasts. ***Figure 4-5*** illustrates an overview of the link capacity constraints in the 2041 TDM network, while ***Table 4-3*** displays the screenline capacity results in the 2041 TDM network.

The TDM network is forecast to work much more reliably in the downtown area and crossing Highway 403. However, specific problem areas still remain: Paris Road between Highway 403 and Golf Road, King George Road crossing Highway 403, and the Grand River Crossings.

A TDM strategy alone does not address all of the transportation network system constraints. Transportation issues remain in the north along Powerline Road and on the two Grand River vehicle bridge crossings (Lorne Bridge [Colborne Street] and Veterans Memorial Parkway).

Figure 4-5: 2041 Manage Travel Demand Network: Capacity Constraints

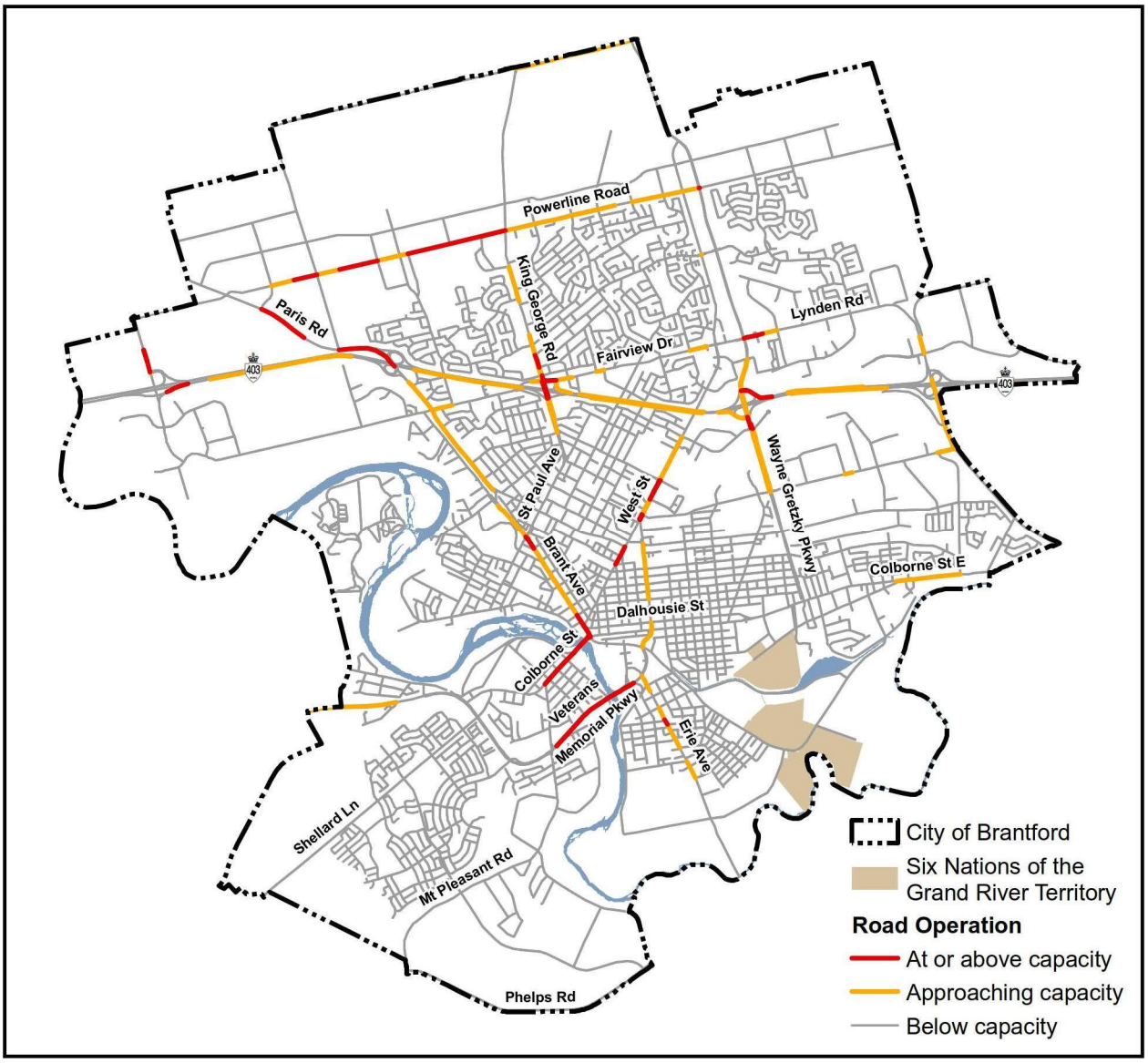


Table 4-3: 2041 Manage Travel Demand: Screenline Assessment

#	Name	Direction	Capacity		AM Peak Hour		PM Peak Hour	
			Lanes	Total	Volume	V/C	Volume	V/C
1	Grand River South	EB	7	8,100	6,367	0.79	5,794	0.72
1	Grand River South	WB	7	8,100	4,035	0.50	6,973	0.86
2	Grand River North	EB	4	5,200	2,941	0.57	3,977	0.76
2	Grand River North	WB	5	6,000	2,565	0.43	3,587	0.60
3	Highway 403	NB	13	10,800	6,422	0.59	8,432	0.78
3	Highway 403	SB	13	10,800	6,994	0.65	8,736	0.81
4	King George Road	EB	11	9,600	4,996	0.52	8,046	0.84
4	King George Road	WB	11	9,600	6,415	0.67	6,743	0.70
5	Wayne Gretzky Parkway (North)	EB	7	7,600	4,264	0.56	5,965	0.78
5	Wayne Gretzky Parkway (North)	WB	7	7,600	5,147	0.68	5,624	0.74
6	Wayne Gretzky Parkway (South)	EB	6	4,100	1,911	0.47	2,146	0.52
6	Wayne Gretzky Parkway (South)	WB	6	4,100	1,467	0.36	2,650	0.65
7	Memorial Drive	EB	7	4,900	1,594	0.33	2,775	0.57
7	Memorial Drive	WB	7	4,900	2,181	0.45	2,374	0.48
8	West Street	EB	6	4,300	1,916	0.45	2,951	0.69
8	West Street	WB	6	4,300	2,579	0.60	2,952	0.69
9	CNR Corridor	NB	11	7,900	4,080	0.52	4,694	0.59
9	CNR Corridor	SB	11	7,900	3,935	0.50	5,748	0.73
10	Garden Avenue	EB	8	8,000	4,462	0.56	5,421	0.68
10	Garden Avenue	WB	8	8,000	4,317	0.54	5,807	0.73
11	Powerline Road	NB	12	9,000	3,965	0.44	5,521	0.61
11	Powerline Road	SB	12	9,000	4,487	0.50	5,740	0.64
12	Murray Street	EB	7	4,400	1,916	0.44	1,734	0.39
12	Murray Street	WB	8	5,200	1,528	0.29	2,326	0.45
13	West External	EB	7	7,300	1,664	0.23	2,211	0.30
13	West External	WB	7	7,300	1,602	0.22	2,141	0.29
14	South-West External	NB	4	4,300	1,548	0.36	1,161	0.27
14	South-West External	SB	4	4,300	935	0.22	1,637	0.38
15	East External	EB	5	6,900	2,940	0.43	3,444	0.50
15	East External	WB	5	6,900	3,007	0.44	3,648	0.53
16	North-East External	NB	3	3,200	1,341	0.42	1,599	0.50
16	North-East External	SB	3	3,200	1,161	0.36	2,253	0.70
17	North-West External	NB	3	3,300	755	0.23	912	0.28
17	North-West External	SB	3	3,300	788	0.24	937	0.28

Legned:		*V/C Range*	*From*	*To*
X	Good Capacity Conditions		0.00	0.70
X	Approaching Capacity Conditions		0.70	0.85
X	Over Capacity Conditions		0.85	-

Notes: i) For more details on sreeenlines in general please see ***Chapter 2.0.Transportation Impacts of Growth***.

ii) Screenlines are illustrated in ***Figure 2-3*** .

iii) Total (capacity) = the total roadway vehicle capacity of all lanes that cross a particular screenline in a particular direction.

iv) Volume = the total number of vehicles that cross a particular screenline in a particular direction during a particular peak hour.

4.2.2 Transportation System Management

A Transportation Systems Management (TSM) is a set of techniques used to increase the capacity / improve the performance of a piece of transportation infrastructure while maximizing the safety and mobility of people and goods without increasing its physical size. In the context of the Brantford TMP this would include re-allocating / providing space and amenities within transportation corridors to safely separate and control active modes of transportation, as well as implementing operational improvements along corridors to optimize efficiency. Examples of transportation system management include: providing auxiliary lanes at key intersections, signalizing intersections to improve flow, coordinating traffic signal control along a corridor during critical time periods to benefit peak flows, or introducing roundabout intersection control where feasible.

4.2.3 Increase Infrastructure

The Increase Infrastructure strategy addresses travel demands on the City's road network by enhancing the carrying capacity of the network through strategic road widenings and extensions. The main impact of this strategy is the ability to maintain an acceptable and efficient Level-of-Service on Brantford roads over the next 20 years. ***Figure 4-6*** illustrates an overview of the link performance with respect to capacity in the 2041 Increased Infrastructure network, while ***Table 4-4*** displays the screenline demand to capacity results in the 2041 Increased Infrastructure network. The Increase Infrastructure strategy includes short-term committed improvements, as well as a full program of infrastructure projects as was identified in the 2014 Transportation Master Plan (excluding a Veteran's Memorial Parkway extension, due to recent Council Resolution regarding use of lands under the jurisdiction of Six Nations of the Grand River (i.e. Glebe Farm Lands) for a transportation corridor.

The increased infrastructure network will operate significantly better than the 2041 Do Minimal network in the following ways:

- Reducing congestion along Hardy Road and Brant Avenue as a result of the Oak Park Road extension; and
- Eliminating congestion on Wayne Gretzky Parkway as a result of a widening to six lanes.

However, the two main crossings of the Grand River are still anticipated to be significantly over capacity even with the addition of the Oak Park Road Grand River crossing (4 lanes) and a widening of the Veteran's Memorial Parkway Grand River crossing (2 to 4 lanes).
It is noted that improvements to the network required to support development in the expansion areas have not been specifically identified as strategic network needs, as they are driven by local development needs.

In short, the network will still experience some residual capacity issues under the 2041 growth scenario even with significant investment in infrastructure improvements (as recommended in the 2014 TMP).

Figure 4-6: 2041 Increased Infrastructure Network: Capacity Constraints

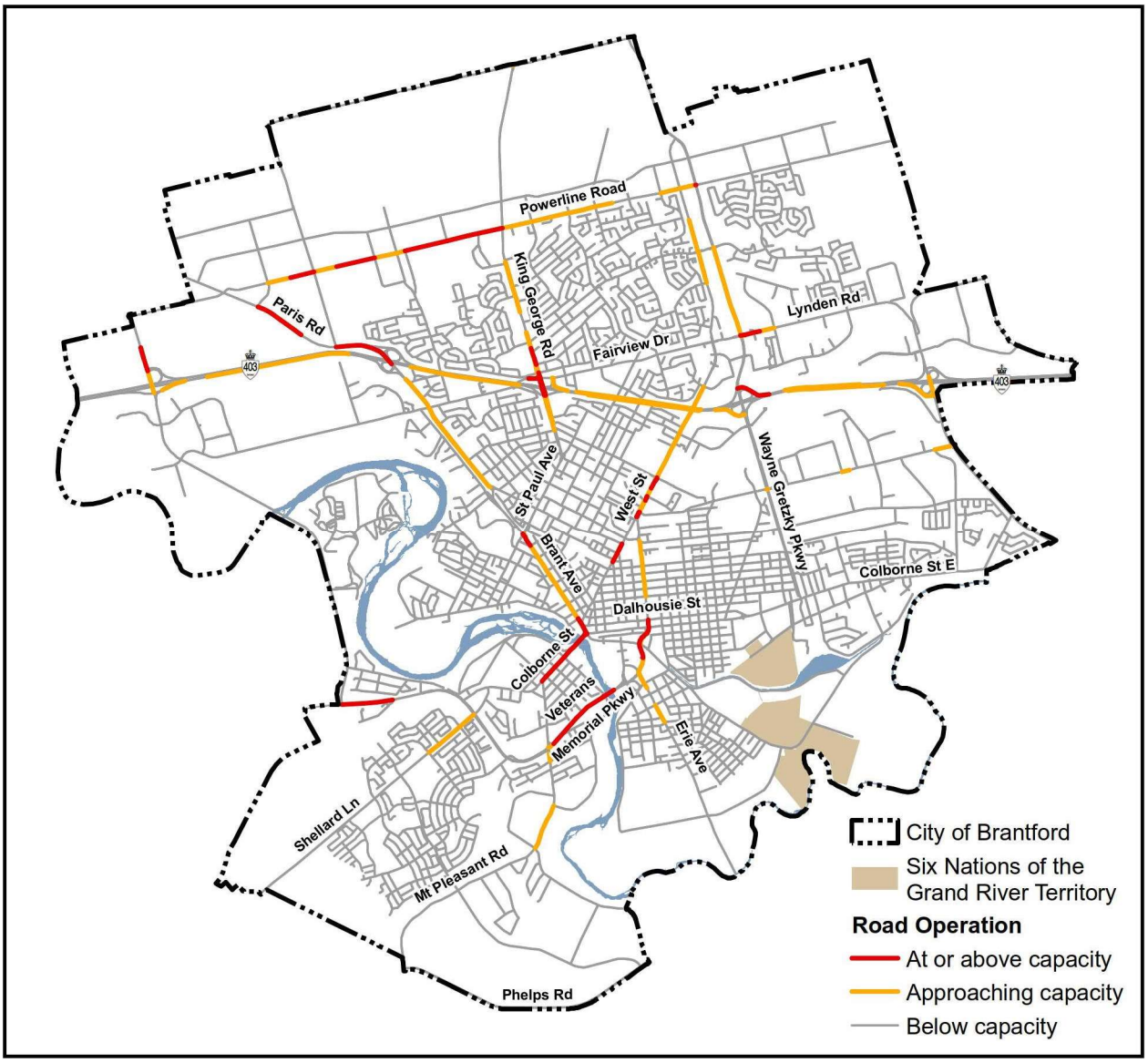


Table 4-4: 2041 Increase Infrastructure: Screenline Assessment

#	Name	Direction	Capacity		AM Peak Hour		PM Peak Hour	
			Lanes	Total	Volume	V/C	Volume	V/C
1	Grand River South	EB	10	11,100	6,261	0.56	7,118	0.64
1	Grand River South	WB	10	11,100	5,359	0.48	7,336	0.66
2	Grand River North	EB	4	5,200	2,872	0.55	4,232	0.81
2	Grand River North	WB	5	6,000	2,819	0.47	3,652	0.61
3	Highway 403	NB	14	11,800	7,192	0.61	9,095	0.77
3	Highway 403	SB	14	11,800	7,291	0.62	9,712	0.82
4	King George Road	EB	11	9,600	5,167	0.54	8,054	0.84
4	King George Road	WB	11	9,600	6,409	0.67	7,125	0.74
5	Wayne Gretzky Parkway (North)	EB	7	7,600	4,496	0.59	6,279	0.83
5	Wayne Gretzky Parkway (North)	WB	7	7,600	5,281	0.69	5,910	0.78
6	Wayne Gretzky Parkway (South)	EB	7	4,900	1,991	0.41	2,298	0.47
6	Wayne Gretzky Parkway (South)	WB	7	4,900	1,656	0.34	2,957	0.60
7	Memorial Drive	EB	9	6,100	1,700	0.28	2,989	0.49
7	Memorial Drive	WB	9	6,100	2,302	0.38	2,577	0.42
8	West Street	EB	6	4,300	2,032	0.47	3,005	0.70
8	West Street	WB	6	4,300	2,513	0.58	3,063	0.71
9	CNR Corridor	NB	12	8,800	4,362	0.50	5,143	0.58
9	CNR Corridor	SB	12	8,800	4,225	0.48	6,085	0.69
10	Garden Avenue	EB	9	8,800	4,717	0.54	5,601	0.64
10	Garden Avenue	WB	9	8,800	4,378	0.50	6,081	0.69
11	Powerline Road	NB	13	9,400	4,145	0.44	5,828	0.62
11	Powerline Road	SB	13	9,400	4,689	0.50	6,125	0.65
12	Murray Street	EB	7	4,400	1,989	0.45	1,800	0.41
12	Murray Street	WB	8	5,200	1,635	0.31	2,681	0.52
13	West External	EB	7	7,300	1,716	0.24	2,249	0.31
13	West External	WB	7	7,300	1,666	0.23	2,155	0.30
14	South-West External	NB	4	4,300	1,597	0.37	1,208	0.28
14	South-West External	SB	4	4,300	965	0.22	1,727	0.40
15	East External	EB	5	6,900	2,929	0.42	3,447	0.50
15	East External	WB	5	6,900	2,996	0.43	3,635	0.53
16	North-East External	NB	3	3,200	1,355	0.42	1,616	0.51
16	North-East External	SB	3	3,200	1,168	0.37	2,278	0.71
17	North-West External	NB	3	3,300	779	0.24	929	0.28
17	North-West External	SB	3	3,300	791	0.24	978	0.30

Legned:		*V/C Range*	*From*	*To*
X	Good Capacity Conditions		0.00	0.70
X	Approaching Capacity Conditions		0.70	0.85
X	Over Capacity Conditions		0.85	-

Notes: i) For more details on sreeenlines in general please see *C**hapter 2.0.Transportation Impacts of Growth***.

ii) Screenlines are illustrated in ***Figure 2-3*** .

iii) Total (capacity) = the total roadway vehicle capacity of all lanes that cross a particular screenline in a particular direction.

iv) Volume = the total number of vehicles that cross a particular screenline in a particular direction during a particular peak hour.

4.3 Network Constraints and Solutions

While the TDM and Increased Network Infrastructure scenarios show significant potential to reduce congestion and delay in the network, neither strategy completely addresses the needs of the 2041 condition in isolation.

The next step in the transportation analysis was to assess the need for improvements in each of the constrained corridors, and consider the impact of each strategy (TDM, TSM, Increased Supply) on the constraint. This was done by assessing the 2041 Do Minimal scenario network performance to determine the magnitude performance issue (volume to capacity) and the travel characteristics of the demand in the corridor (select link analysis: origin and destination markets for future users).

Based on the critical deficiencies in the 2041 Do Minimal network alternative, an assessment of the impact of each strategy on each deficiency was undertaken, as well as an assessment of the alternatives for remediation. This analysis was primarily conducted for the PM peak hour which is considered the critical time period as it has the highest travel demands, unless otherwise noted.

4.3.1 Brant Avenue - St Paul Avenue to Colborne Street

4.3.1.1 Problem

Brant Avenue between St Paul Avenue and Colborne Street is a particularly busy stretch of roadway as it is just south of the convergence of two major roadways, Brant Avenue / Paris Road and St Paul Avenue / King George Road. These intersecting roadways provide significant routes into the downtown area from Highway 403 (Paris Road connecting to Paris and further west), and St Paul Avenue / King George Road (connecting to Cambridge, via Highway 24, and further north). Brant Avenue between St Paul Avenue to Colborne Street (Lorne Bridge) is forecast to experience significant volumes and to be at or over capacity in 2041, as illustrated in ***Figure 4-7*** and ***Figure 4-8*** respectively.

Brant Avenue between St Paul Avenue to Colborne Street has significant auto demand in both directions, however southbound is the critical direction during the PM peak hour. Overall, the volumes forecast do not significantly exceed capacity (V/C ratio fluctuates around 1.00), as much of the over flow demand for the corridor uses the adjacent, parallel one-way pair of William Street and Albion Street. However, there are more considerable capacity constraints on the short sections of Brant Avenue in the vicinity of the roads that connect to the aforementioned parallel routes. These include Brant Avenue between:

- St Paul Avenue and Bedford Street (V/C ratio of 1.13); and
- Church Street and Colborne Street (V/C ratio of 1.06 – 1.84).

Figure 4-7: Brant Avenue – St Paul Avenue to Colborne Street: 2041 PM Peak Hour Volumes

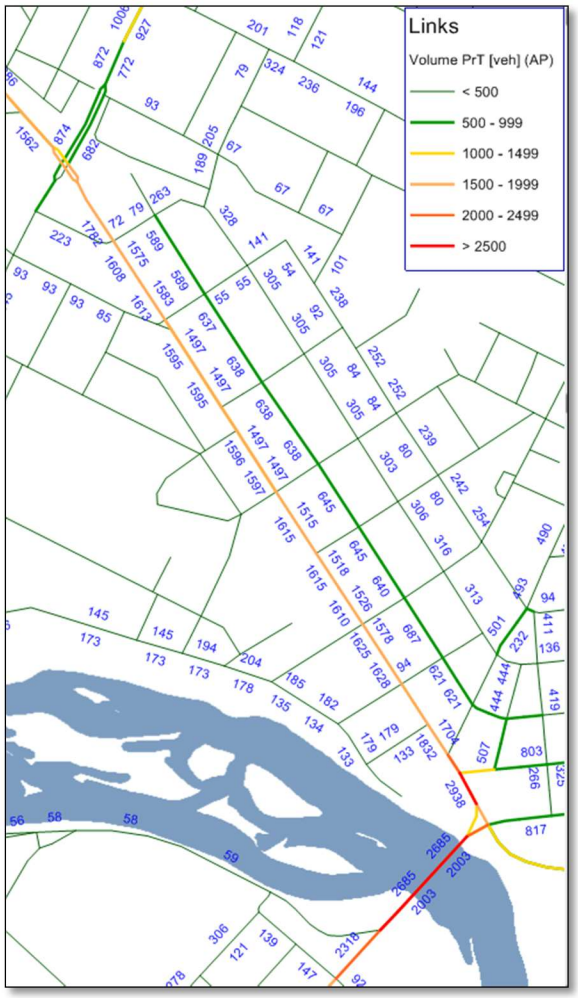
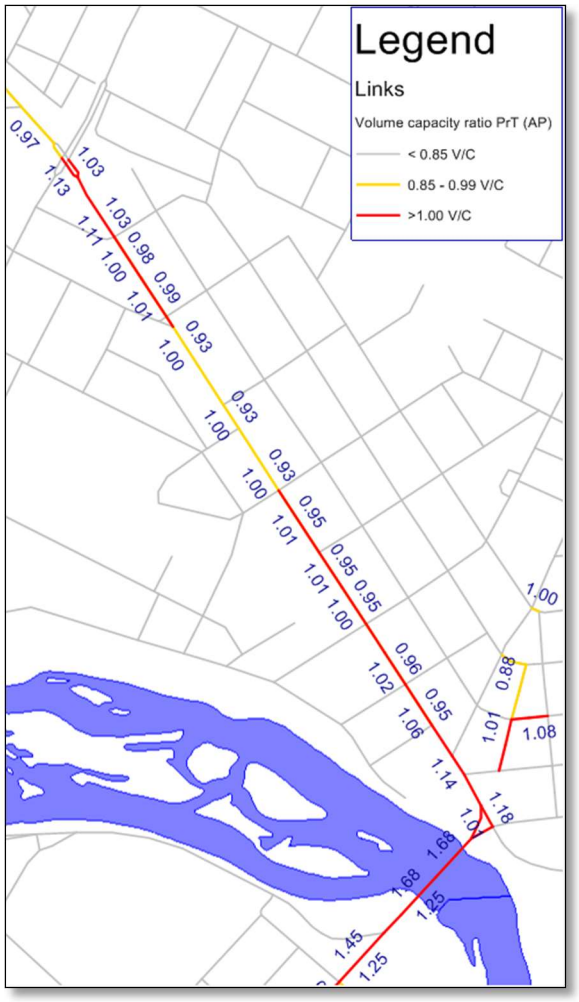


Figure 4-8: Brant Avenue – St Paul Avenue to Colborne Street: 2041 PM Peak Hour V/C Ratios



4.3.1.2 Assessment

The capacity issue on Brant Avenue is strategic in nature. The lack of a direct connection between Northwest Brantford (commercial/industrial) and Southwest Brantford (residential) appears to be one of the main issues as a considerable amount of traffic is traveling between these two areas is forced to travel east towards downtown in order to cross the Grand River only to travel back to the west to reach their destination. ***Figure 4-9*** and ***Figure 4-10*** (southbound and northbound respectively) illustrate the number and distribution of vehicle trips in the PM peak hour that are using Brant Avenue to travel between Northwest Brantford and Southwest Brantford. Approximately 600 southbound PM peak hour vehicle trips travel from north of St Paul Avenue and cross over the Lorne Bridge on Colborne Street. It is estimated that between 50-80% of these trips could be diverted away from Brant Avenue and the Lorne Bridge if there were an alternative north-south connection that crossed the river in west Brantford.

Figure 4-9: Brant Avenue PM Peak Hour Trip Distribution - NW Brantford to SW Brantford – Southbound

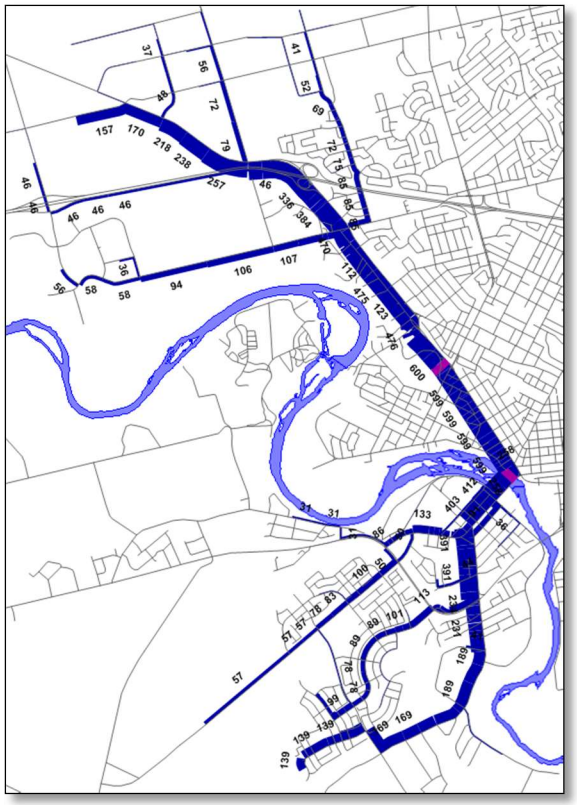
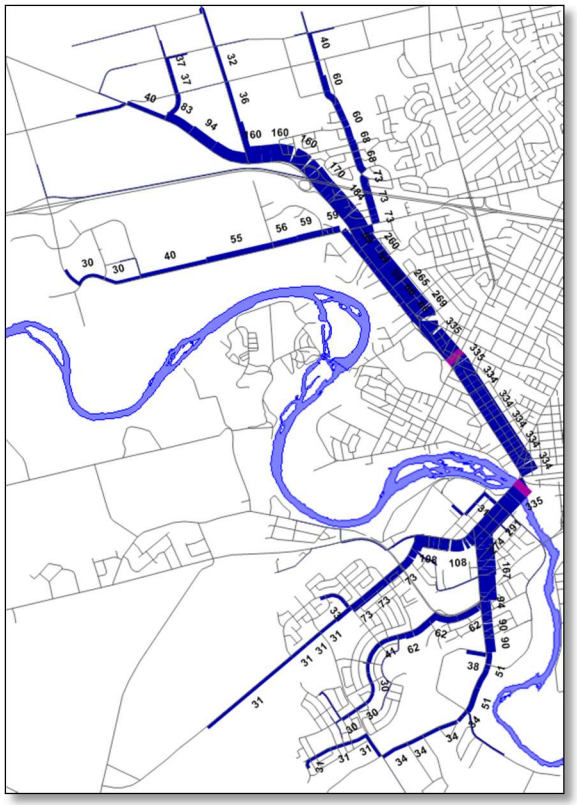


Figure 4-10: Brant Avenue PM Peak Hour Trip Distribution - SW Brantford to NW Brantford – Northbound



There was 2 hour on-street parking permitted on the section of Brant Avenue between St Paul Avenue and West Street. The time periods when on-street parking is permitted vary block by block and by side of the street. On the east side of the street (northbound), on-street parking is consistently permitted for 2 hours from 9:00 AM – 6:00 PM Monday to Saturday. On the west side of the street (southbound) on-street parking varies from being totally prohibited (between Lorne Crescent/Richmond Street and Waterloo Street) to being permitted for 2 hours from 9:00 AM – 3:30 PM Monday to Saturday (between St Paul Avenue and Lorne Crescent/Richmond Street).

The on-street parking that occurs during the peak hours and the peak hour shoulders, coupled with turning movements, can create impediments to the continuous flow of the two lanes in each direction. It is noted that this segment of the road is of heritage value and therefore not designed or intended to carry long distance travel and through movement of heavy vehicles. It is also noted that as a result of the congestion during the peak hours, there is a high potential for traffic infiltration to the neighbourhoods along the William/Albion one way-pair.

4.3.1.3 Alternatives

The alternative solutions to the identified capacity constraints on Brant Avenue between St Paul Avenue and Colborne Street are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

The existing design of Brant Avenue is a basic 4-lane roadway with the allowance of curb lane parking in both directions, and sidewalks with small boulevard buffer between the travelled lanes and the sidewalk. There are no specific allocations (i.e. a signed bike route) or dedication space (i.e. a bike lane) to cycle. The nature of the parking allowance impedes the logical flow of bicycles along the curb lane and forces cyclists to travel in the "door zone". This makes cycling on Brant Avenue very uncomfortable for even experienced cyclists.

Opportunities to dedicate cycling space on the one-way pair of William Street and Albion Street parallel to Brant Avenue would provide excellent opportunities for increased mode share to cycling in the Brant Avenue corridor.

Transit

There are several Brantford transit routes that service the residential and employment areas in the vicinity of Brant Avenue: Route 4A/4C (Mall Link) and Route 8 (Holmedale Mayfair).

St Paul Avenue/King George Road is identified as an intensification corridor in the future. With higher densities, increased service frequency will be required to promote and facilitate high transit use. Development in Northwest Brantford will also provide an additional market for Route 8 with significant employment planned along Hardy Road and into the north expansion area.

Service enhancement in the form of additional routes or route modifications (including increase frequency, reduced headways) has the potential to improve the Brant Avenue corridor transit mode share from 9% today to 26% in the future. This increase in mode share would result in an approximate vehicle reduction of 175-350 vehicles on Brant Avenue during the peak hours.

While this alternative results in increased travel by transit within the corridor, the effective automobile volume reduction is not significant and congestion will remain, as the vehicles currently diverting away from the corridor through area collector roads would divert back to fill the released capacity. This alternative should be carried forward as a supplement solution but not as a stand-alone initiative.

Transportation System Management

Brant Avenue is classified as a Minor Arterial Roadway yet it carries peak hour traffic volumes similar to many of the major arterial roadways in Brantford. Providing a character and design consistent with a Major Arterial is not feasible because of the access considerations in the corridor, the space constraints, and the designation of Brant Avenue between St Paul Avenue and the Lorne Bridge as part of the Brant Avenue Heritage Conservation District.

However, the roadway's traffic flow could be optimized through a combination of non-infrastructure improvements. This efficiency could be achieved through the use of expanded on-street parking restriction/prohibitions and additional restriction/prohibitions on left turns at all but critical roadways.

Consideration of implementing additional on-street parking restrictions during the peak travel periods would provide optimal traffic flow during critical periods. Prohibiting parking completely would be more consistent with the roadway's arterial classification, providing consistent capacity along the entire length of the street, as well as providing an opportunity to incorporate a dedicated or shared bicycle facility along the corridor. Per Council direction, the City recently implemented more stringent parking restrictions on Brant Avenue and other measures to improve its operation.

With regard for turn prohibitions, currently northbound left turns are prohibited onto Scarfe Avenue, Palmerston Avenue, and Ada Avenue. There are no left turn prohibitions in the southbound direction which is the peak direction of travel. Prohibiting left turns along this section of Brant Avenue (with the exception of Bedford Street to allow access to William Street) would ensure continuous travel flow southbound.

Another way to minimize delay and maximize vehicle flow is to coordinate the signals along the corridor. This would provide a continuous flow or 'green wave' in the peak direction of travel. The City currently monitors the signal coordination along major corridors. As growth in corridor travel occurs over time, modifications to the corridor signal timings can be implemented. Initiatives to achieve this are being implemented by the City and should the impacts on and needs of the corridor should continue to be monitored.

These policy changes to manage the system performance during critical time periods will improve traffic operations and will slightly increase the overall carrying capacity of the roadway. However, on their own, these measures will not increase roadway capacity enough to mitigate delays and improve the level of service to an acceptable level.

Increase Infrastructure

Oak Park Road Extension

This facility is currently the subject of a Municipal Class EA study. It is estimate that there are 300-500 vehicle trips in the PM peak hour using Brant Avenue as there is no closer alternative roadway for north-

south travel that crosses the river in West Brantford. The extension of Oak Park Road to Colborne Street would provide a north-south connection in West Brantford and an additional vehicle crossing over the Grand River. As described in ***section 4.3.1.2***, peak hour traffic traveling between Northwest Brantford and Southwest Brantford is forced to travel east towards downtown in order to cross the Grand River only to travel back to the west to reach their destination. The diversion of these trips to an alternative route will decrease the demand on Brant Avenue.

Although this alternative will not increase the capacity of Brant Avenue, it will reduce the demand on the corridor through market diversion. This diversion has the benefit of protecting the heritage nature of the corridor by minimizing the exposure to excess traffic in the peak periods.

The reduction in demand will likely be offset in part by demand that that may divert back to Brant Avenue that is currently using parallel routes. As such, this alternative should be coupled with TDM and TSM initiatives.

Conclusion

The preferred alternatives for addressing the 2041 capacity issue on Brant Avenue between St Paul Avenue and Lorne Bridge are as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the Brant Avenue corridor by reducing vehicle travel demands.
- Corridor TSM – expanded recently implemented parking restrictions, additional left turn prohibitions and enforcement, and monitoring recently implemented traffic signal coordination will improve the efficiency of the available travel lanes.
- Increase Infrastructure – provide additional transportation capacity for all modes and Grand River crossing connecting Oak Park Road to Colborne Street West.

4.3.2 Wayne Gretzky Parkway - Henry Street to Highway 403

4.3.2.1 Problem

Wayne Gretzky Parkway (WGP) between Henry Street and Highway 403 is forecast to have significant 2041 traffic volumes, as illustrated in ***Figure 4-11.*** WGP is the main access form the City to / from Highway 403 and the section between Henry Street and Highway 403 is forecast to be at or over capacity in 2041, as illustrated in ***Figure 4-12***.

Wayne Gretzky Parkway between Henry Street and Highway 403 is forecast to have significant auto demand in both directions, reaching highs of roughly 2,000 to 2,200 vehicle trips. Both directions (northbound and southbound) have similar volumes and would appear to be equally critical during the PM peak hour. Overall, WGP is expected to operate just over capacity throughout this area, with the exception of the short section between Morton Avenue/Holiday Drive and Highway 403 where the volume to capacity ratios equal or exceed 1.10.

Figure 4-11: Wayne Gretzky Parkway – Henry Street to Highway 403: 2041 PM Peak Hour Volumes

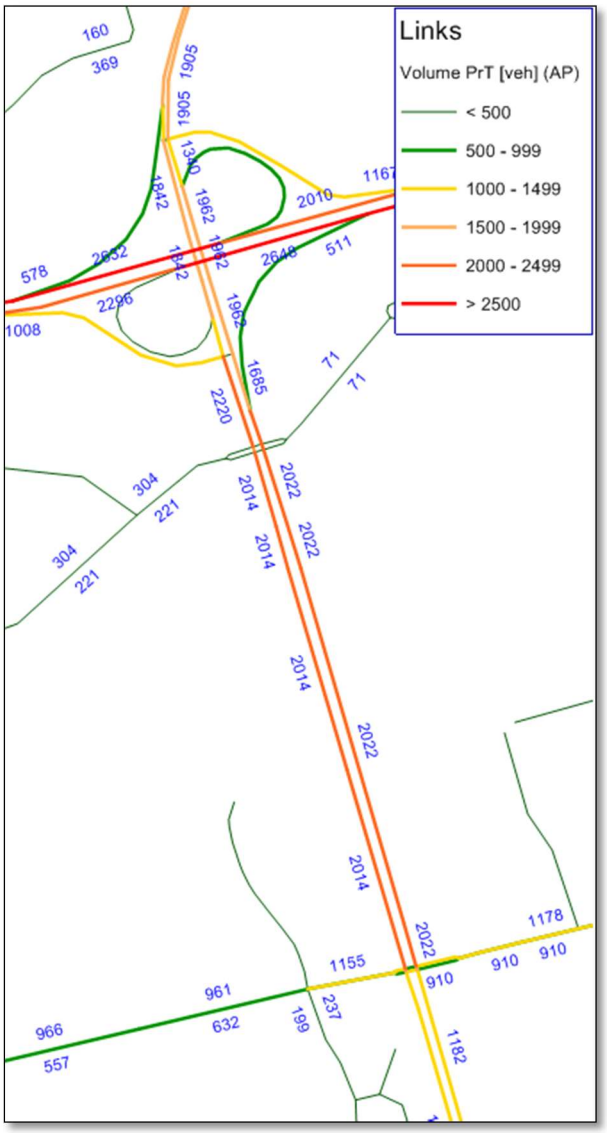
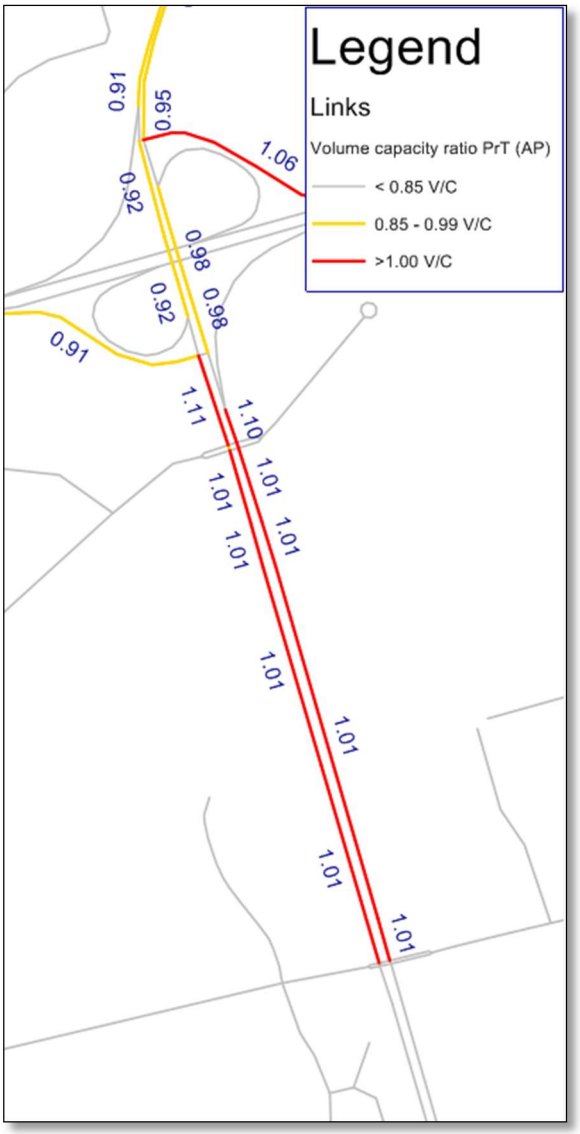


Figure 4-12: Wayne Gretzky Parkway – Henry Street to Highway 403: 2041 PM Peak Hour V/C Ratios



4.3.2.2 Assessment

The capacity issues on Wayne Gretzky Parkway between Henry Street and Highway 403 are strategic in nature, focusing on the immediate corridor. I.e. the demand on WGP south of Highway 403 originates or is destined to areas within the corridor and not related to pass through traffic. WGP is a limited-access major arterial roadway that provides access to and from Highway 403 and is one of the major north-south roadways in Brantford. As a result of the growth that is forecast for Brantford, more and more trips that originate or are destined to areas adjacent to WGP require the use of the roadway. Specifically, there is significant employment growth planned for the Braneida Industrial Park, with the

most significant growth happening in the lands surrounding the intersection of Henry Street and Wayne Gretzky Parkway. ***Figure 4-13*** and ***Figure 4-14*** (southbound and northbound respectively) illustrate the number and distribution of PM peak hour vehicle trips that are using busiest portion of WGP (just south of Highway 403). The trip distribution patterns confirm the corridor specific nature of the capacity issues on WGP and highlight the significant demands originating from and destined to the Braneida Industrial Park.

Figure 4-13: Wayne Gretzky Parkway (just South of Highway 403) PM Peak Hour Trip Distribution – Southbound

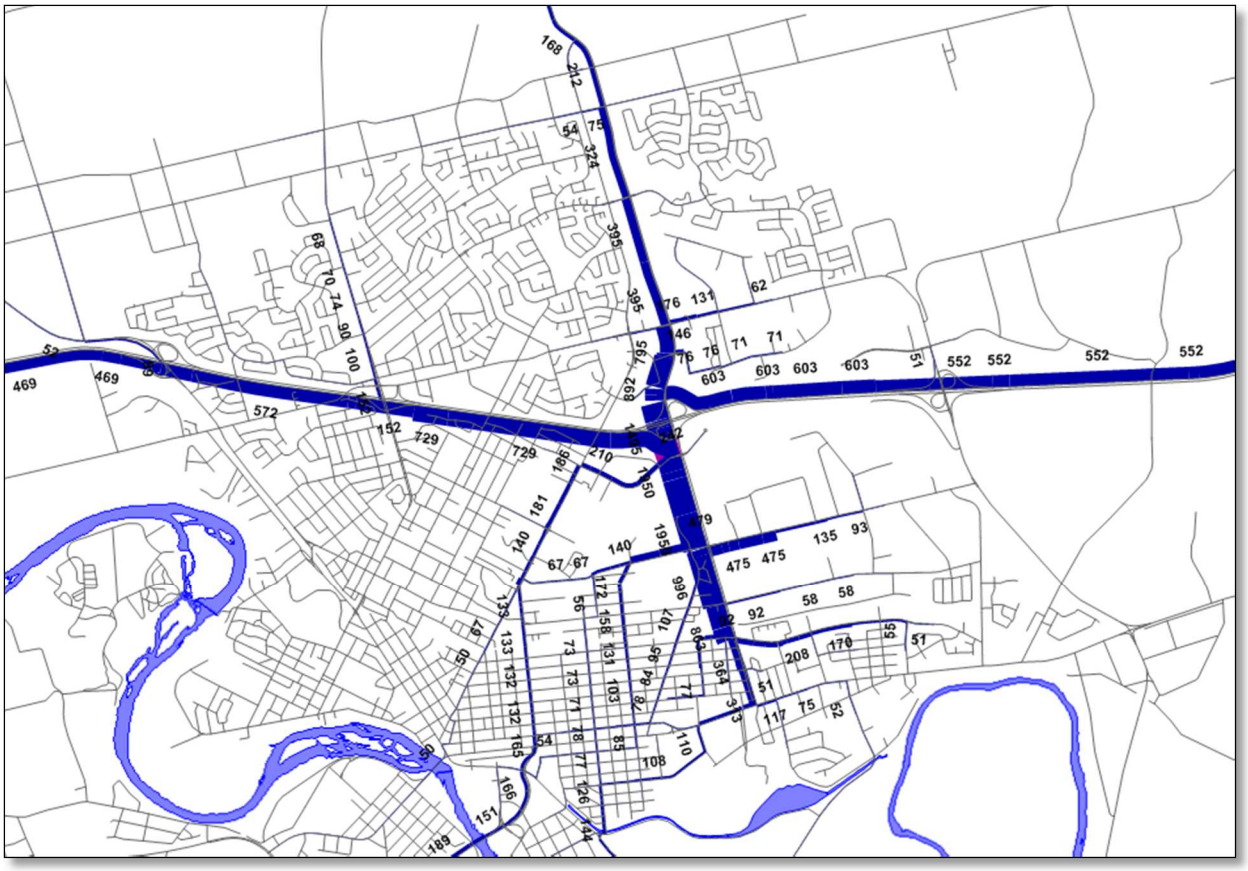
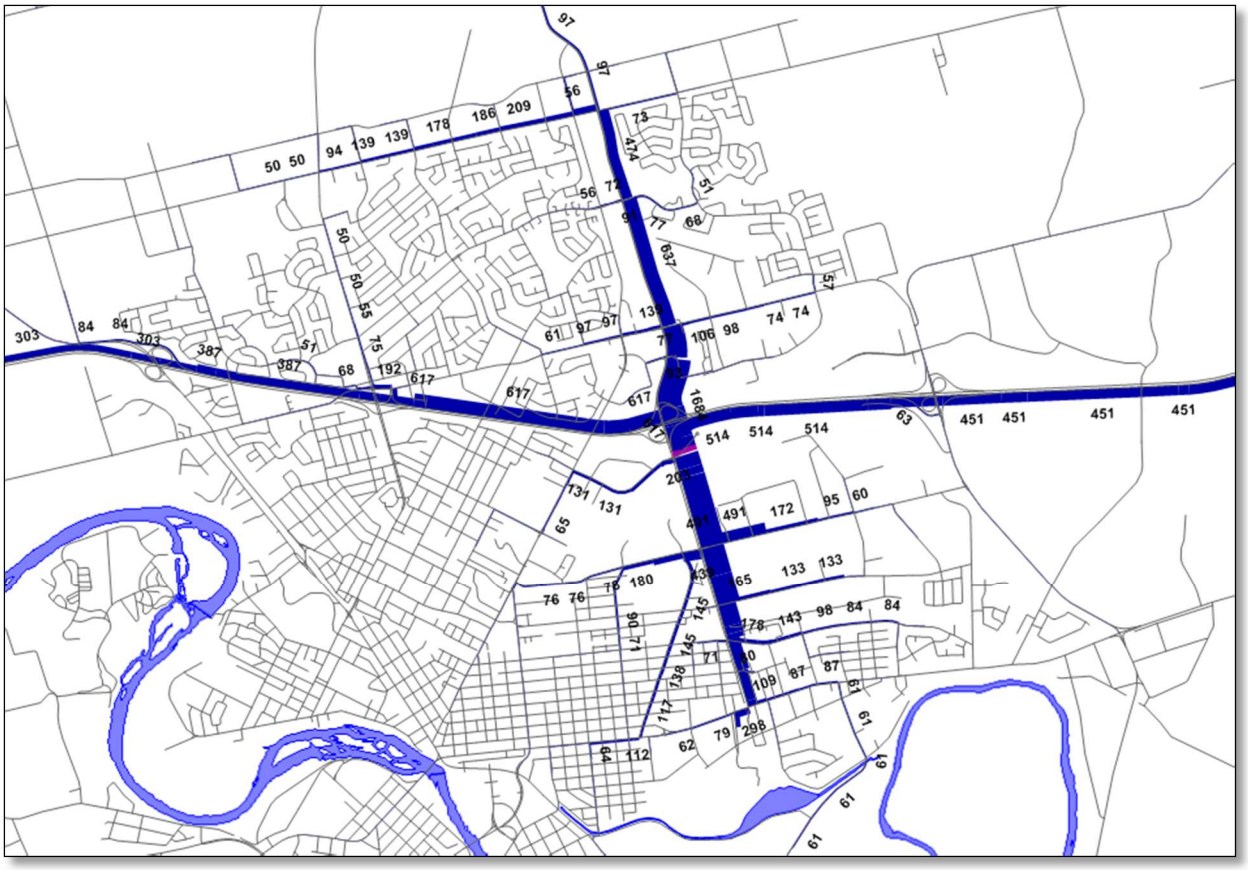


Figure 4-14: Wayne Gretzky Parkway (just South of Highway 403) PM Peak Hour Trip Distribution – Northbound



4.3.2.3 Alternatives

The alternative solutions to the identified capacity constraints on Wayne Gretzky Parkway (south of Highway 403) are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Based on the narrow distribution patterns for trips on Wayne Gretzky Parkway that originate and are destined to the corridor there is opportunity for implementing/increasing Transportation Demand Management (TDM) measures within the WGP corridor. Increasing TDM in the WGP corridor would reduce auto demand on WGP and could potentially alleviate the need for infrastructure investments.

Active Transportation

Wayne Gretzky Parkway has an existing in-boulevard multi-use path from Grey Street to Powerline Road. This All Ages and Abilities (AAA) trail could be further enhanced by provided additional priority and amenities to active transportation users, thus encouraging more trips to be made by bicycle and on foot. Specific enhancement could include: additional and/or enhanced (covered) bike parking at major destinations and transit stops, a bicycle repair station on the Wayne Gretzky Parkway Trail, and Cross-

rides at all signalised intersections on the Wayne Gretzky Parkway Trail. Large employers should also be encouraged / incentivised to provide end of trip facilities. This could include secure bicycle parking, change rooms with showers and lockers, and other amenities like air pumps for servicing bicycles. A combination of some, or all of these TDM measures could increase Active Transpiration use along the WGP corridor and help to reduce auto demand.

Transit

There are two Brantford transit routes that service the residential and employment areas in the vicinity of WGP: Route 7 (East Ward Braneida) and Route 9 (Echo Place). However, these routes are ineffective in reducing vehicle travel demands on WGP, as they do not connect directly where people are coming from and going to outside of connecting to downtown. Providing a north-south transit route that connects the Braneida Industrial Park to Lynden Park Mall, and the northern neighbourhoods surrounding WGP, would encourage transit use along the WGP corridor. Any increase in transit use on WGP would help reduce auto demand.

Service enhancement in the form of route additions or modifications has the potential to improve the corridor transit mode share from 5% today to 14% in the future. This increase in mode share would result in an approximate vehicle reduction of 100-200 vehicles on WGP during the peak hours.

Transportation System Management

As a major arterial roadway, the network provisions, (i.e. limited access, intersection configurations, traffic control), are significant / maximized already. Traffic signal coordination could be considered to maximized the efficiency of peak hour, peak direction flow, however, given the duality of the peak conditions (peak direction is only marginally higher than the off-peak direction) this may not achieve the desired efficiency in the off-peak direction. Future intersection control review should include review of potential for roundabout implementation.

Increase Infrastructure

Wayne Gretzky Parkway Widening

Widening Wayne Gretzky Parkway from 4 lanes to 6 lanes between Henry Street and Highway 403 would provide the additional capacity required to meet 2041 demands. The majority of WGP (Henry Street to Morton Avenue/Holiday Drive) is forecast to be over capacity, with the busiest section of WGP, a 150 metre section between Morton Avenue/Holiday Drive to Highway 403, forecast to be over capacity by 225 vehicles.

Improve Parallel Road Capacity

As a majority of the demands on WGP are focussed on accessing land use in the corridor, primarily to and from Highway 403, improving a parallel roadway such as Garden Avenue would have little impact on the future demands on WGP.

Conclusion

The preferred alternatives for addressing the 2041 capacity issue on Wayne Gretzky Parkway between Henry Street and Highway 403 are as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the WGP corridor;
- Review TSM opportunities (including the potential for roundabout implementation); and
- Increase Infrastructure – Widen WGP to provide basic 6-lane cross section from Henry Street to Highway 403.

4.3.3 Wayne Gretzky Parkway - North of Highway 403

4.3.3.1 Problem

Wayne Gretzky Parkway (WGP) north of Highway 403 is forecast to experience considerable PM peak hour traffic volumes (***Figure 4-15***) but delays are expected to be minor. The high volumes on WGP are consistent with its role as a major arterial roadway that provides access to/from Highway 403. The PM peak hour vehicle travel demands on sections of WGP immediately north of Highway 403 are forecast to be approaching capacity in 2041, as illustrated in ***Figure 4-16***.

Volumes on WGP north of Highway 403 are forecast to reach highs of roughly 1,800 to 1,900 vehicle trips in the PM peak hour, which reflects full capacity conditions. Both directions (northbound and southbound) have similar volumes and would appear to be equally critical during the PM peak hour. Overall, the capacity constraints forecast for WGP north of Highway 403 are less of an issue farther north of Highway 403.

Figure 4-15: Wayne Gretzky Parkway – North of Highway 403: 2041 PM Peak Hour Volumes

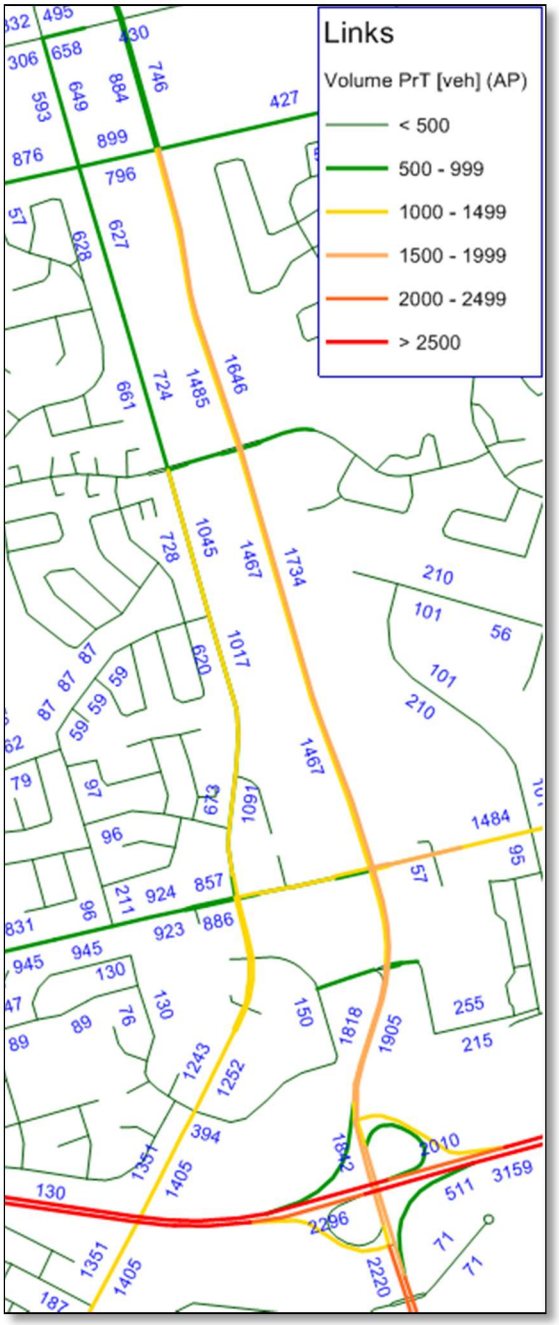


Figure 4-16: Wayne Gretzky Parkway – North of Highway 403: 2041 PM Peak Hour V/C Ratios

4.3.3.2 Assessment

WGP is a limited-access major arterial roadway that provides access to and from Highway 403 and is one of the major north-south roadways in Brantford. As a result of the growth that is forecast for Brantford,

more and more trips that originate or are destined to areas adjacent to WGP or major perpendicular roadways require the use of the roadway. Specifically, there is significant population growth planned for the North Brantford, with the most significant growth happening in the lands north of Powerline Road between Balmoral Drive and Coulbeck Road. ***Figure 4-17*** and ***Figure 4-18*** (northbound and southbound respectively) illustrate the number and distribution of PM peak hour vehicle trips that are using WGP north of Highway 403. The trip distribution patterns confirm the corridor specific nature of the capacity issues on WGP and highlight the significant demands originating from and destined to the boundary expansion lands in North Brantford.

Figure 4-17: Wayne Gretzky Parkway (North of Highway 403) PM Peak Hour Trip Distribution – Northbound

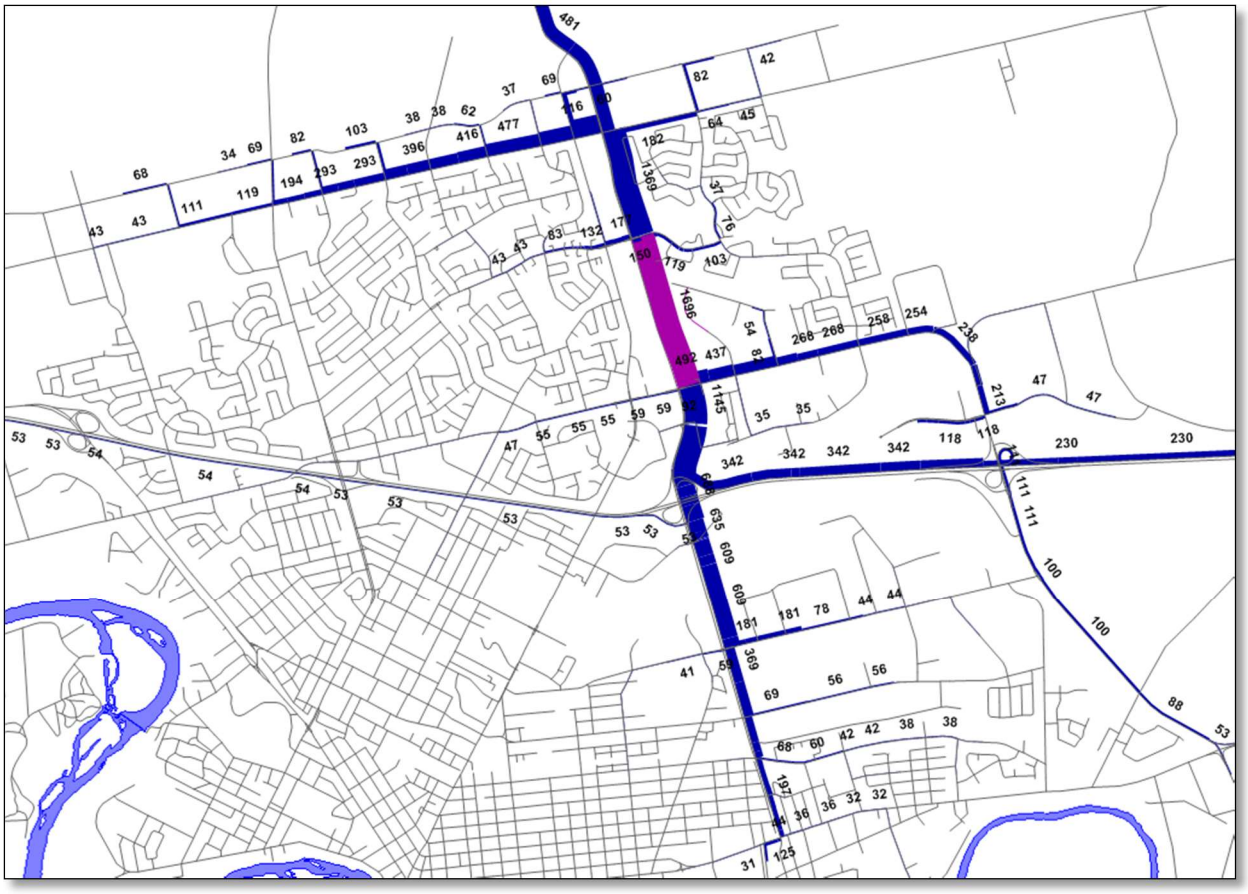
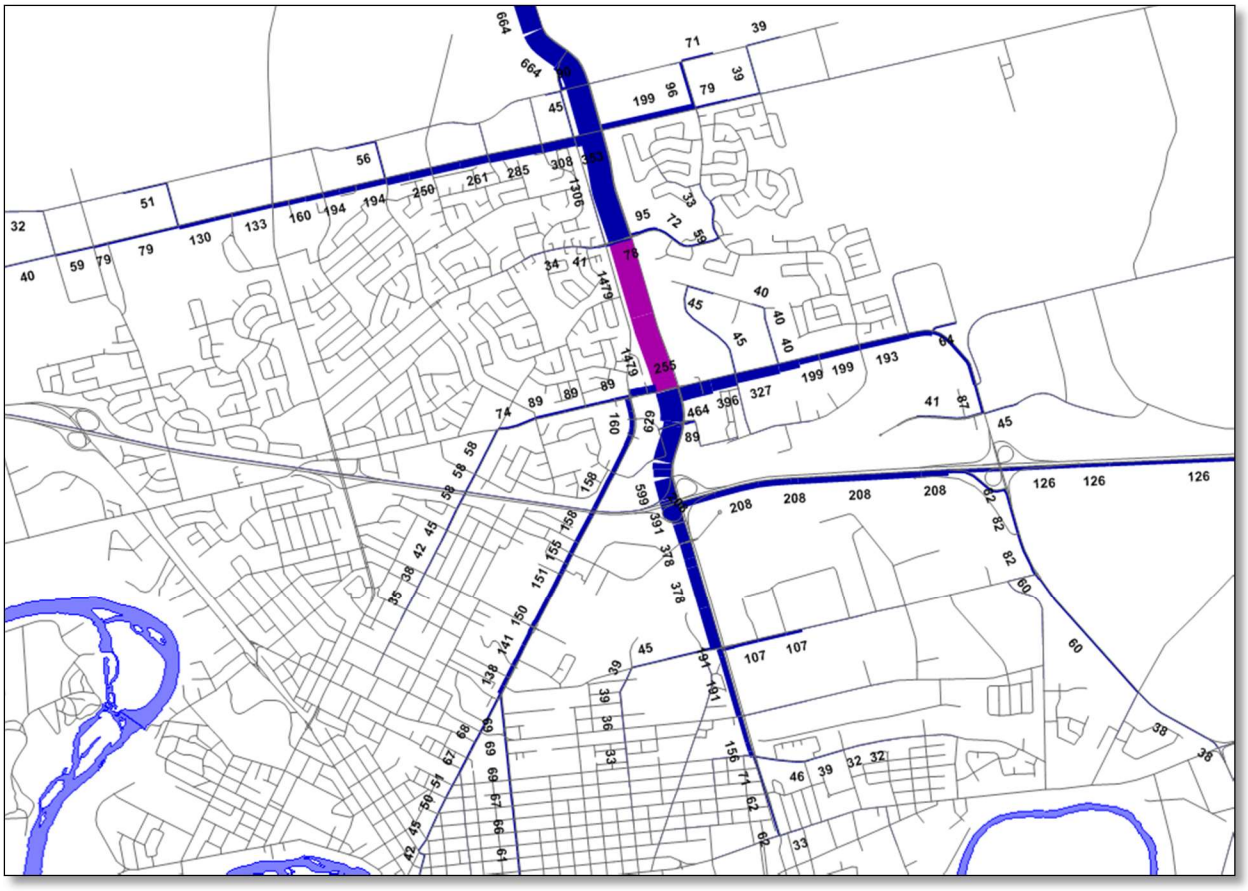


Figure 4-18: Wayne Gretzky Parkway (North of Highway 403) PM Peak Hour Trip Distribution – Southbound



The capacity issues on Wayne Gretzky Parkway north of Highway 403 appear to be operational in nature related to access to/from Highway 403. The actual corridor specific capacity although approaching capacity is adequate from a strategic capacity perspective.

4.3.3.3 Alternatives

The alternative solutions to the identified capacity constraints for Wayne Gretzky Parkway (north of Highway 403) are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Based on the narrow distribution patterns for trips on Wayne Gretzky Parkway that originate and are destined to the corridor, there is opportunity for implementing/increasing Transportation Demand Management (TDM) measures within the WGP corridor. Increasing TDM in the WGP corridor would reduce auto demand on WGP and could potentially alleviate the need for infrastructure interventions.

Active Transportation

As described in ***Section 4.3.2.3***, Wayne Gretzky Parkway has an existing in-boulevard multi-use path from Grey Street to Powerline Road. This All Ages and Abilities (AAA) trail could be further enhanced to provide additional priority and amenities to active transportation users, thus encouraging more trips to be made by bicycle and on foot. Specific enhancement could include: additional and/or enhanced (covered) bike parking at major destinations and transit stops, a bicycle repair station on the Wayne Gretzky Parkway Trail, and Cross-rides at all signalised intersections on the Wayne Gretzky Parkway Trail. Large employers should also be encouraged / incentivised to provide end of trip facilities. This could include secure bicycle parking, change rooms with showers and lockers, and other amenities like air pumps for servicing bicycles. A combination of some, or all of these TDM measures could increase Active Transpiration use along the WGP corridor and help to reduce auto demand.

Transit

There are several Brantford Transit routes that service the residential and employment areas in the vicinity of WGP north of Highway 403: Routes 2 (West Street Brier Park), Route 4A/4C (Mall Link), and Route 9 (Echo Place). While these routes provide good collecting ridership from the residential areas destined to the downtown, they are less effective in terms of providing connections to commercial activity nodes north of Highway 403. Providing a north-south transit route that connected the Braneida Industrial Park to Lynden Park Mall, and the northern neighbourhoods surrounding WGP, would encourage transit use along the WGP corridor. Any increase in transit use on WGP would help reduce auto demand.

Service enhancement in the form of route additions or modifications has the potential to improve the WGP corridor transit mode share from 0% today to 8% in the future. This increase in mode share would result in an approximate vehicle reduction of 80-160 vehicles on WGP during the PM peak hour.

Transportation System Management

As a major arterial roadway the network provisions, i.e. limited access, intersection configurations, traffic control, are significant / maximized already. Traffic signal coordination could be considered to maximized the efficiency of peak hour, peak direction flow, however, given the duality of the peak conditions (peak direction is only marginally higher than the off-peak direction) this may not achieve the desired efficiency in the off-peak direction. Future intersection control review should include review of potential for roundabout implementation.

The most congested area of this corridor is between the Highway 403 interchange to Fairview Road. This is due to the nature of the intersection operations. Alternative signal timing and lane arrangements would help prioritize poorly performing movements, particularly at the E-NS ramp terminal (i.e. widen ramp to reflect dual westbound left turn and a direct E-N movement).

Increase Infrastructure

Wayne Gretzky Parkway Widening

Widening Wayne Gretzky Parkway from 4 lanes to 6 lanes across Highway 403 bridge and north of Lynden Road is not considered a necessity to accommodate adequate levels of service in 2041. An additional lane in each direction between Fairview and the E-NS ramp terminal and the N-W direct ramp would allow for improved flow in the critical sections of WGP. In the long-term, consideration may be required for upgrades to the interchange ramp terminal (this will require review with and study by MTO).

Conclusion

The preferred alternatives for addressing the 2041 capacity issue on Wayne Gretzky Parkway north of Highway 403 are as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the WGP corridor;
- Corridor TSM – modify lane arrangements on the E-NS ramp from Highway 403 to accommodate dual left turns and a direct, free-flow E-N movement; and
- Increase Infrastructure – Widen WGP to provide an additional lane in each direction between Fairview and the E-NS ramp terminal and the N-W direct ramp.

4.3.4 King George Road - Crossing Highway 403 to Dunsdon Street

4.3.4.1 Problem

King George Road (Highway 24 north of Highway 403) is the main highway commercial corridor in Brantford. It also provides access to and egress from Highway 403 and provides a significant regional connection to the north. The King George Road Bridge over Highway 403 has a 5-lane cross-section (2 northbound through lanes, 2 southbound through lanes and a southbound left turn lane) that including a 1 m median. Between Fairview Drive/Toll Gate Road and Dunsdon Road, King George Road also has a 5-lane cross section with 2 northbound though lanes, 2 southbound through lanes and a 2-way left turn lane. The King George Road crossing Highway 403 and the section of road immediately north of the bridge are forecast to experience significant volumes and to be at or over capacity in 2041, as illustrated in ***Figure 4-19*** and ***Figure 4-20*** respectively.

King George Road crossing Highway 403 is forecast to have significant auto demand in both directions, reaching highs of roughly 1,700 to 1,800 vehicle trips in the PM peak hour. Both directions (northbound and southbound) have similar volumes and would appear to be equally critical during the PM peak hour. More than 60% of the traffic using King George Road to cross Highway 403 does so as a result of regional travel on Highway 403 or Highway 24. Overall, the capacity constraints forecast for King George Road are moderately high as the volume to capacity ratios equal or exceed 1.08 on the bridge and exceed 1.00 south of Dunsdon Street.

Figure 4-19: King George Road – Crossing Highway 403 to Dunsdon Street: 2041 PM Peak Hour Volumes

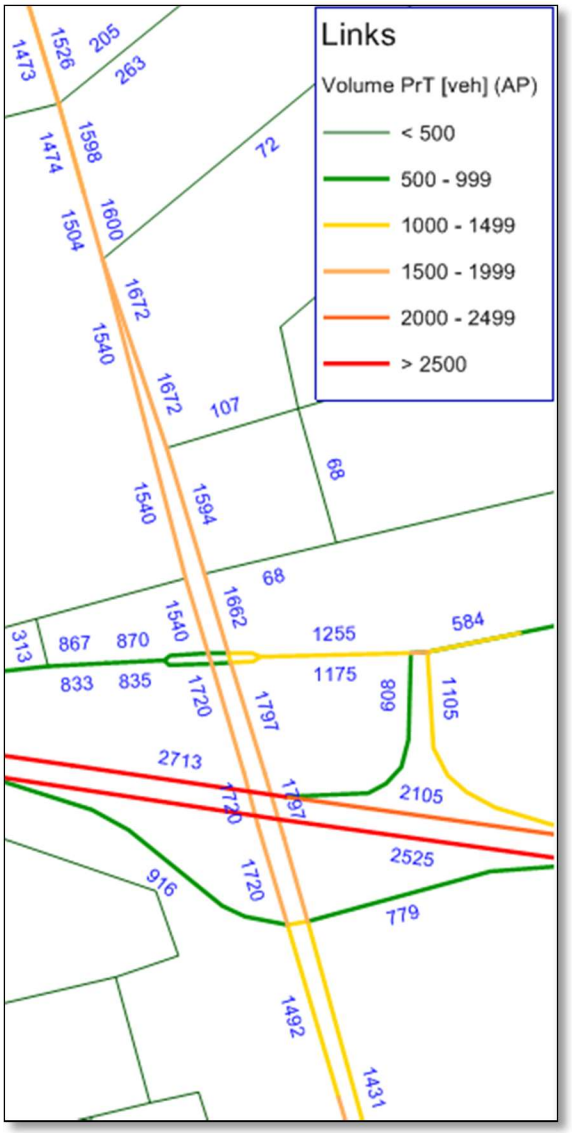
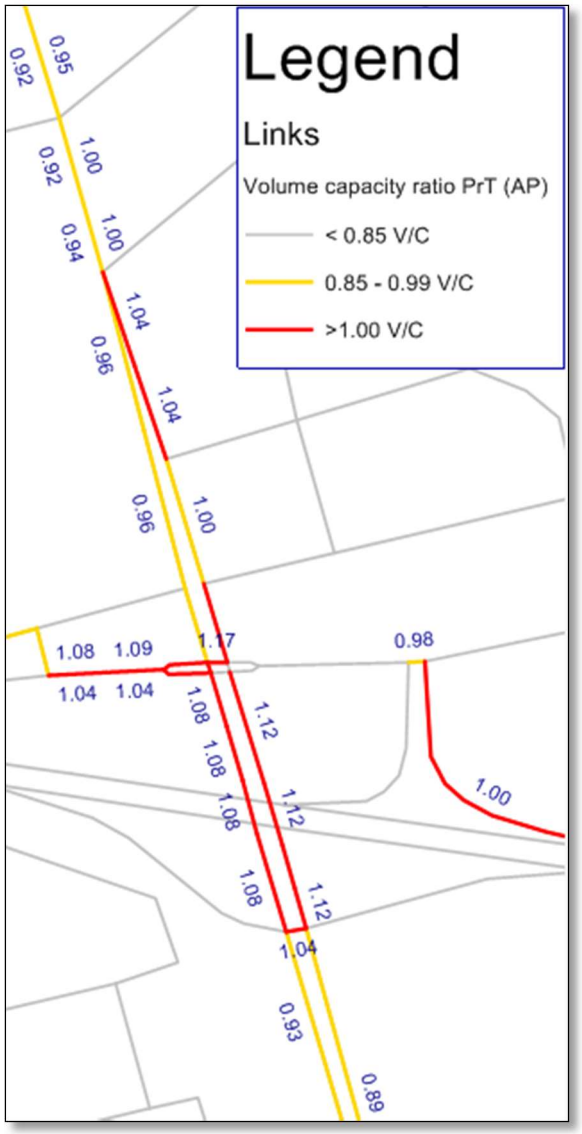


Figure 4-20: King George Road – Crossing Highway 403 to Dunsdon Street: 2041 PM Peak Hour V/C Ratios



4.3.4.2 Assessment

King George Road is a major arterial roadway that provides access to and from Highway 403 and is the main highway commercial corridor in Brantford. Regionally, King George Road is considered an MTO connecting link between Highway 24 (north of Powerline Road) and Highway 403 and provides a regional connection to Cambridge/Kitchener/Waterloo and Highway 401. As a result of these multiple roles, the King George Road capacity issue is a complex blend of strategic (local and regional) and operational concerns.

Approximately 45% of the demand on the King George Road Bridge over Highway 403 originates or is destined to areas adjacent to the roadway. ***Figure 4-21*** and ***Figure 4-22*** (Southbound and Northbound respectively) illustrate the number and distribution of local (internal to Brantford) vehicle trips that are using busiest portion of King George Road (the Highway 403 overpass). The trip distribution patterns confirm the corridor specific nature of the capacity issues on King George Road and highlight the significant demands originating from and destined to the commercial area adjacent to King George Road, particularly between Highway 403 and Powerline Road.

Figure 4-21: King George Road Local PM Peak Hour Trip Distribution – Southbound

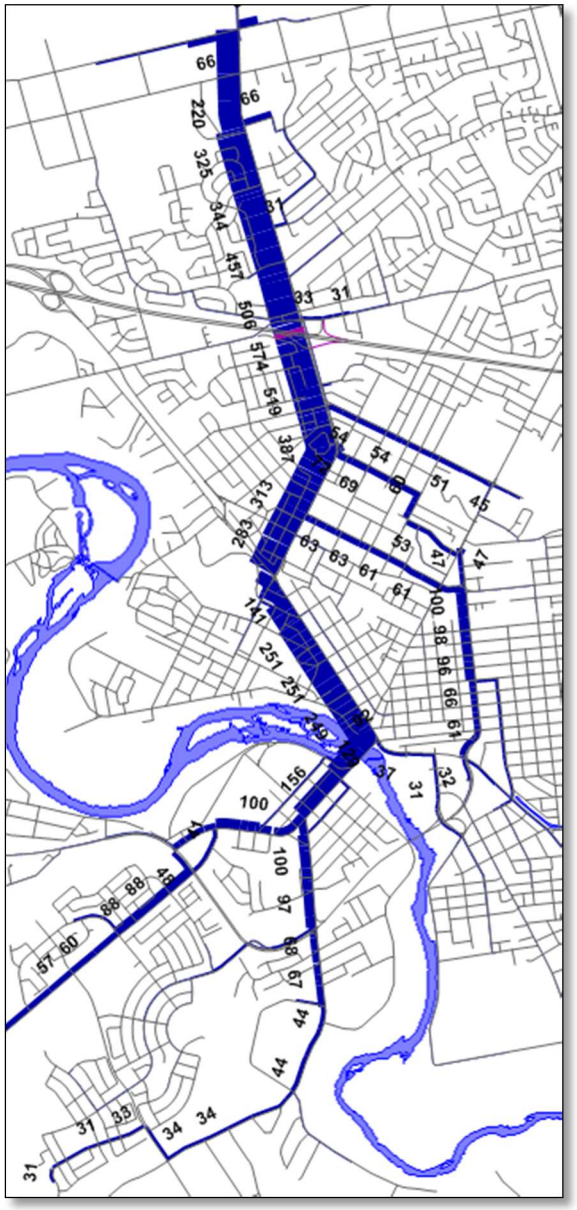
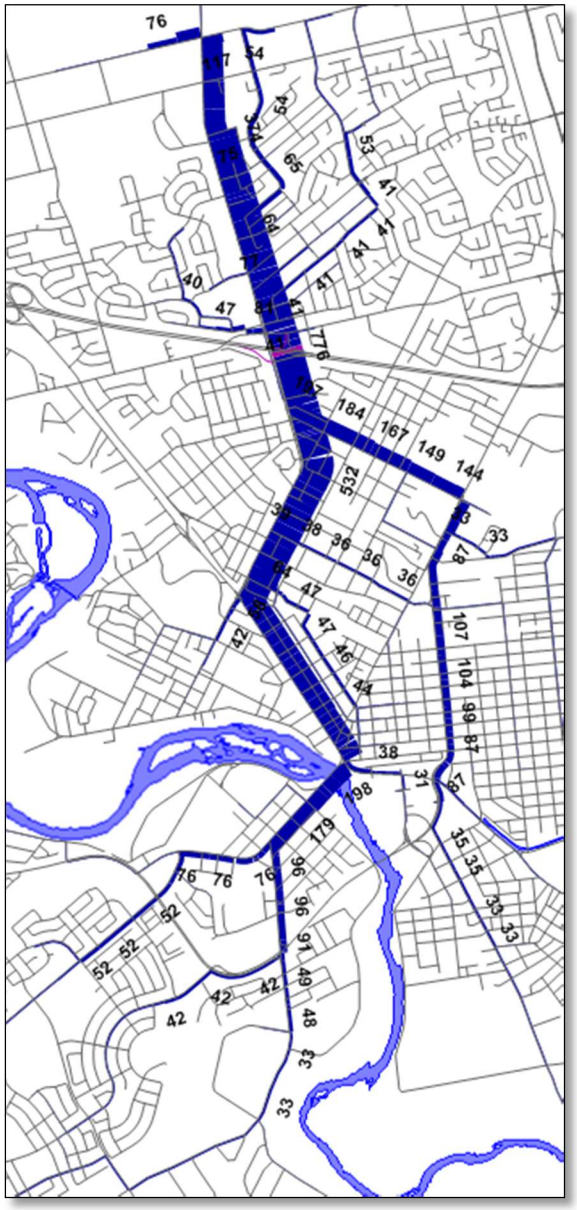


Figure 4-22: King George Road Local PM Peak Hour Trip Distribution – Northbound



The remaining 55% of the volume is destined to and from Highway 403, resulting in significant volume exchange on the King George Road Bridge over the highway. Also, the intersection spacing between Fairview Drive/Toll Gate Road and the W-NS/NS-E ramp terminals is relatively short, approximately 225 m. This high, mixed purpose volume in a relatively short space with traffic signal control results in reduced efficiency of the travel lanes on the bridge, and in the vicinity of the two intersections.

4.3.4.3 Alternatives

The alternative solutions to the identified capacity constraints for King George Road are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Given the narrow distribution patterns and the short length of trips of 45% of the volume in this King George Road corridor, there is opportunity for the implementation of Transportation Demand Management (TDM) measures to have a significant impact on traffic volumes. Increasing TDM in the King George Road corridor would reduce auto demand and could alleviate some of the forecasted congestion.

Active Transportation

Currently, there are sidewalks on both sides of King George Road but there is no cycling infrastructure. Given its 5-lane cross section and heavy vehicle volumes it is unlikely that cyclists would consider traveling on King George Road. From an active transportation perspective, the road could be significantly improved by providing an in-boulevard multi-use path. This would provide an All Ages and Abilities (AAA) two-way cycling and walking facility that would encourage more trips to be made by bicycle and on foot. Additional enhancement could include: additional and/or enhanced (covered) bike parking at major destinations and transit stops, a bicycle repair station and Cross-rides at all signalised intersections on the multi-use path. Commercial business should also be encouraged to provide bike racks and larger employers should also be encouraged / incentivised to provide end of trip facilities. This could include secure bicycle parking, change rooms with showers and lockers and other amenities like pumps. A combination of some, or all of these TDM measures could increase Active Transpiration use along the King George Road corridor and help to reduce auto demand.

However, the in-boulevard multi-use path would be difficult to implement on the bridge given the existing space constraints. Improvements to the bridge deck would be required to facilitate significant improvements to the active transportation conditions.

Transit

Brantford transit Route 4A/C (Mall Link) currently runs on King George Road to service the commercial nature of King George Road and to connect the northern residential areas to downtown. This route does a good job of directly connecting between from where people are coming, to where they are going.

Increased service frequency on these routes would encourage additional transit use along the King George Road corridor. Initiative to improve this service on King George Road would result in reduced auto demand.

Service enhancements in the form of route additions or modifications have the potential to improve the King George Road corridor transit mode share from 5% today to 12% in the future. This increase in mode share would result in an approximate 75-150 vehicle reduction on King George Road during the peak hours.

Transportation System Management

As King George Road is a major arterial and connecting link between Highway 403 and Highway 24, north of Powerline Road, it should have limited access, optimized intersection configurations and traffic control.

Traffic signal coordination could be considered to maximized the efficiency of peak hour, peak direction flow, however, given the duality of the peak conditions (peak direction is only marginally higher than the off-peak direction) this may not achieve the desired efficiency in the off-peak direction.

The most congested area of this corridor is between the Highway 403 interchange to Fairview Street/Toll Gate Road. This is likely due to the nature of the intersection operations and the effect of the short intersection spacing has on the capacity efficiency of the travel lanes.

Between Fairview Street and Dunsdon Street the principles of limited access/access control have been difficult to enforce due to the commercial activity and legacy access. There are several opportunities, especially on the west side, to eliminate/combine accesses to reduce the number of turning locations and minimize the turning movement conflicts. Consideration should be given to undertaking an access management study in the corridor.

Increase Infrastructure

King George Road Widening

Providing an additional lane in each direction between Dunsdon Street and the W-NS/NS-E ramp terminal would allow for significantly improved flow in the critical sections of King George Road. Between Fairview Street and Dunsdon Street this could be done in one of two ways:

- Adjust lane and boulevard allocations within the existing sidewalks - To accommodate an additional lane in each direction, existing lane widths would have to be narrowed and the boulevard separation between the sidewalk and the travel lanes would be lost. This would require relocation of utilities and acceptance of narrower lane dimensions than prescribed in the City's Linear Infrastructure Design Manual.
- Expand beyond existing sidewalks - This would have significant impacts on property on both sides of the road.

Wayne Gretzky Parkway Extension

Diverting long distance trips from King George to a parallel route would provide relief to the forecast capacity issue in the area of Highway 403. A 4-lane Wayne Gretzky Parkway extension north of Powerline Road has the potential to provide this alternative capacity. The connection of travel demand back to the Highway 24 corridor using Governors Road would relive the congested sections of King George Road.

Conclusion

The preferred alternatives for addressing the 2041 capacity issue on WGP crossing Highway 403 to Dunsdon Street are as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the King George corridor;
- Corridor TSM – Undertake an access management plan for the King George Corridor north of Highway 403; and
- Increase Infrastructure – Construct 4-lane extension of WGP north from Powerline Road to connect with Park Road North.

With improved transit service, good access management, and the extension of WGP, a general road widening of King George Road across Highway 403 and north to Dunsdon Street is not considered a necessity to accommodate adequate levels of service in 2041.

4.3.5 Paris Road - Highway 403 to Powerline Road

4.3.5.1 Problem

Paris Road between Highway 403 and Powerline Road is forecast to experience significant growth in traffic (***Figure 4-23***) as a result of the commercial/industrial developments planned for the area. It will provide the main accesses to Highway 403 (along with the Oak Park Road) for the development. As well, it will continue to serve as the main connection between Paris and Highway 403 and Paris and Downtown Brantford. The majority of Paris Road between Highway 403 and Powerline Road is forecast to be approaching capacity or over capacity in 2041, as illustrated in ***Figure 4-24***.

Paris Road between Highway 403 and Powerline Road has significant auto demand in both directions, however during the PM peak hour, southbound is the critical direction. Southbound between Golf Road and Highway 403, volumes are forecast to surpass 1,800 vehicle trips in the PM peak hour, which will exceed capacity by 15% (V/C ratio of 1.15). The northbound volumes on Paris Road are not forecast to exceed capacity, but some sections come very close to reaching capacity.

Figure 4-23: Paris Road – Highway 403 to Powerline Road: 2041 PM Peak Hour Volumes

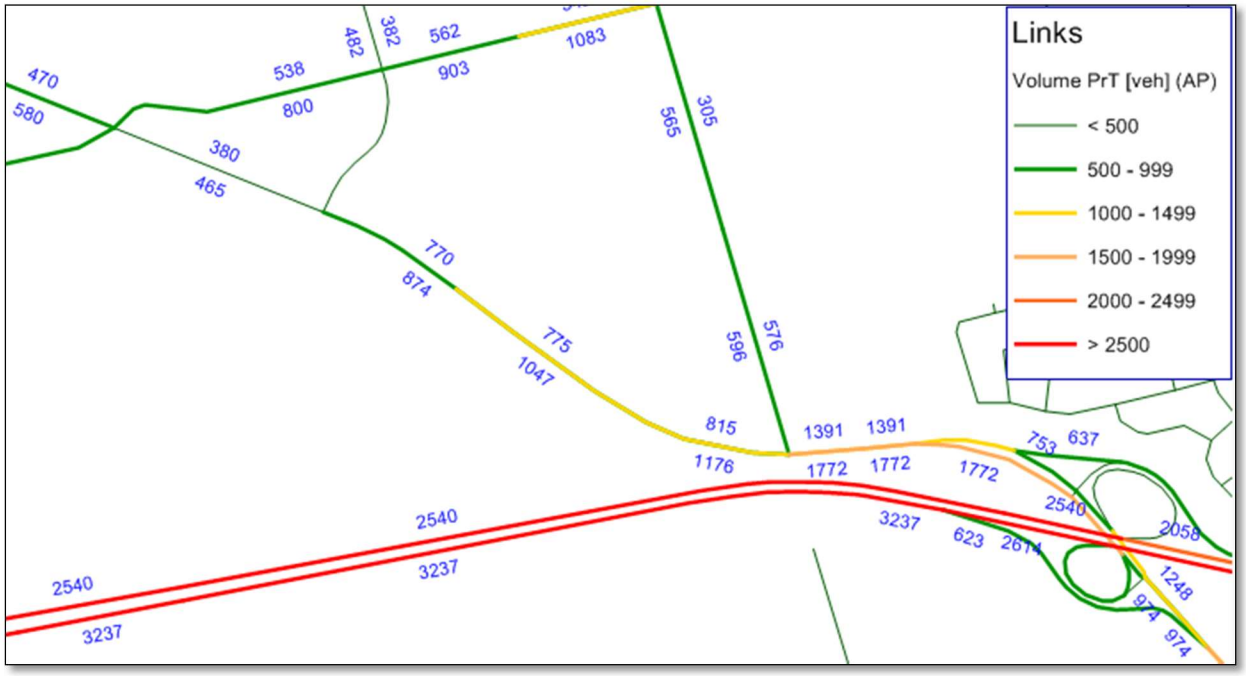
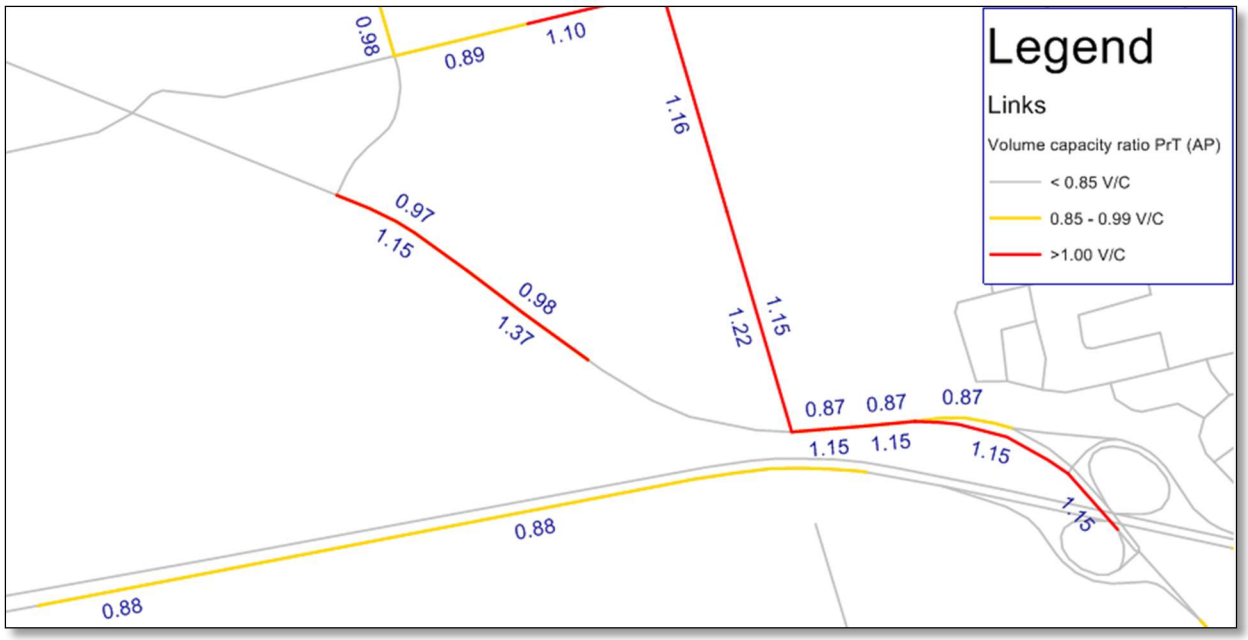


Figure 4-24: Paris Road – Highway 403 to Powerline Road: 2041 PM Peak Hour V/C Ratios



4.3.5.2 Assessment

The capacity issue on Paris Road between Highway 403 and Powerline Road is strategic in nature. The 2-lanes, from 500 m north of Golf Road to beyond Powerline Road, will be insufficient to accommodate the demand in 2041.

The PM peak hour, peak direction demands on this section of Paris Road can be broken down as follows: 25% of vehicles are destined to south of the Grand River via Lorne Bridge; 50% of vehicles are destined to Highway 403 eastbound, and 25% of the vehicles are destined for downtown/central Brantford. This trip distribution patterns is illustrated in ***Figure 4-25.***

Figure 4-25: Paris Road (north of Highway 403) PM Peak Hour Trip Distribution – Southbound

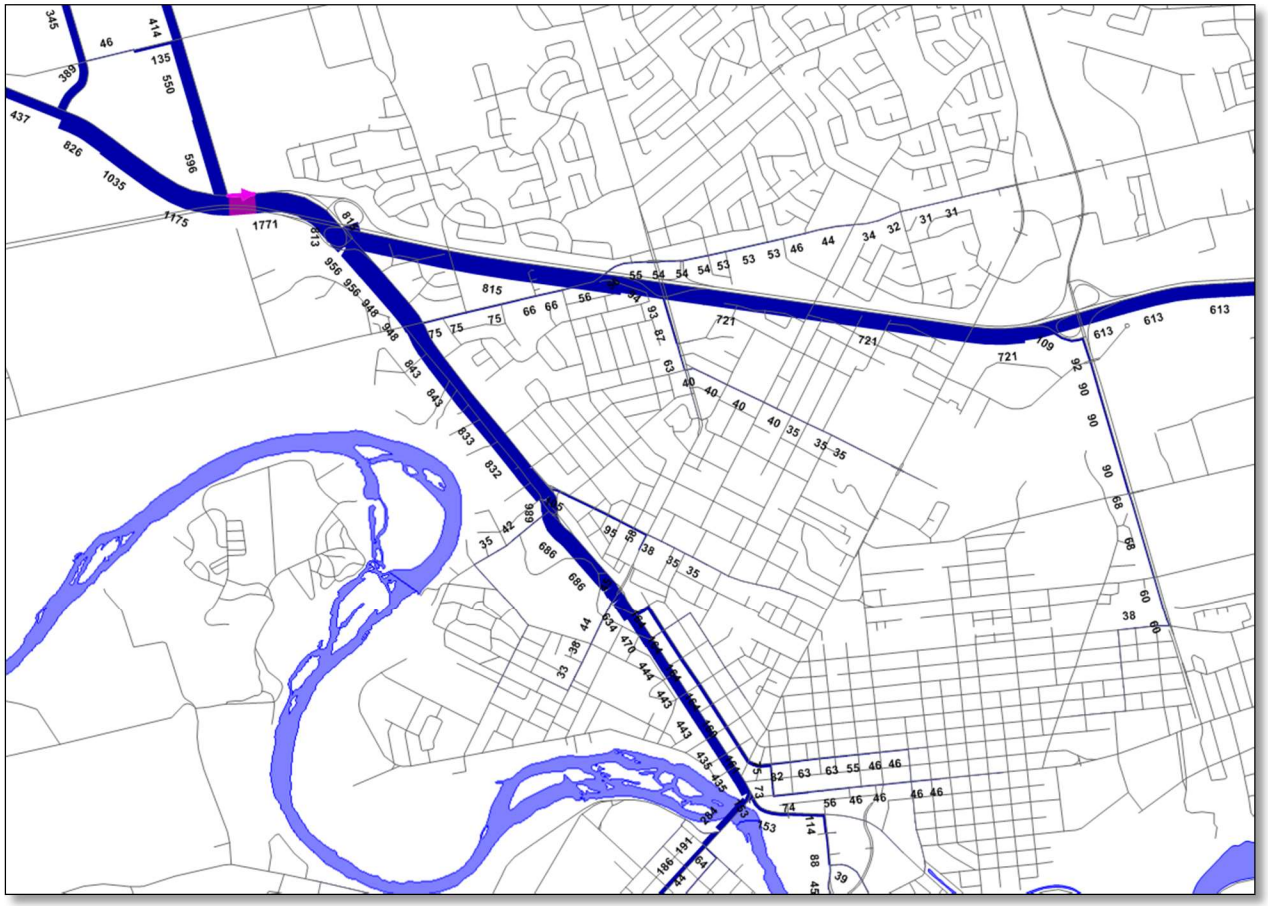


Figure 4-26 and ***Figure 4-27*** (southbound and northbound respectively) illustrate the number and distribution of vehicle trips in the PM peak hour that are using Paris Road (from north of Highway 403) to travel between Northwest Brantford and Southwest Brantford.

The order of magnitude volume problem is approximately 300 vehicles, i.e. a reduction or removal of 300 vehicles from Paris Road would result in satisfactory traffic operations.

Figure 4-26: Paris Road (north of Highway 403) PM Peak Hour Trip Distribution - NW Brantford to SW Brantford – Southbound

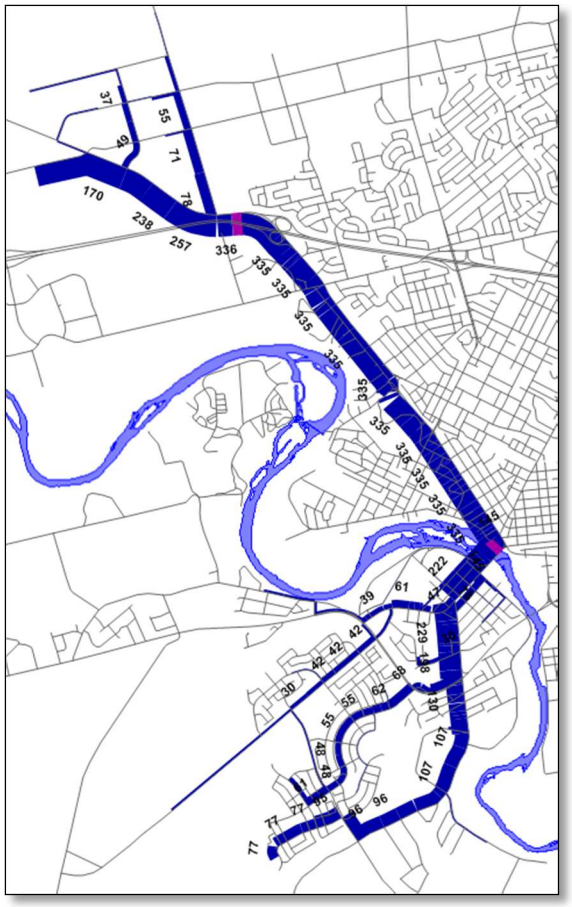
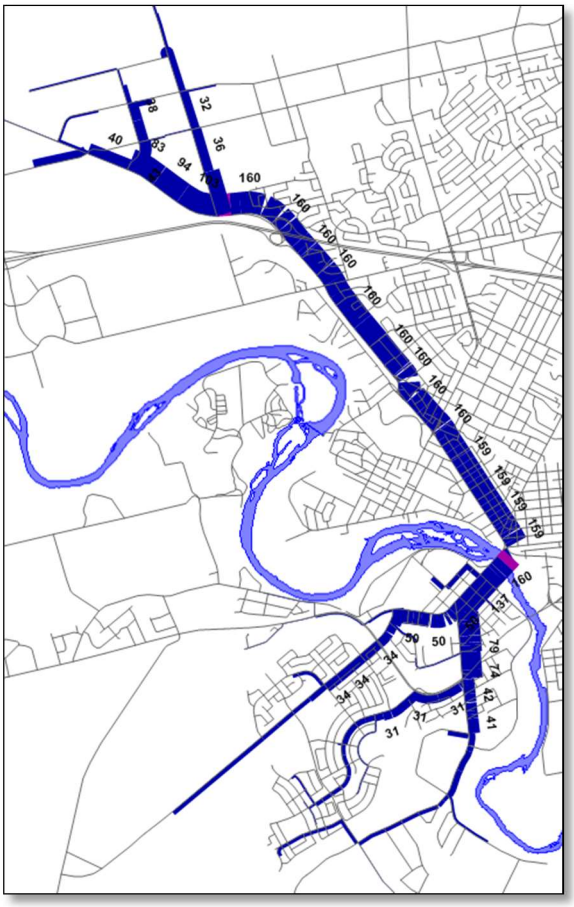


Figure 4-27: Paris Road (north of Highway 403) PM Peak Hour Trip Distribution - SW Brantford to NW Brantford – Northbound



4.3.5.3 Alternatives

The alternative solutions to the identified capacity constraint for Paris Road (north of Highway 403) are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

Currently, Paris Road north of Highway 403 provides no dedicated space for pedestrian or cycling activity. As a rural cross section, gravel shoulders are provided, therefore any pedestrian activity would have to occur on this soft shoulder and any cycling would have to occur within the travel lanes.

With growth in area employment and population, this section of Paris Road will become urbanized. As an urban arterial it should be designed using Complete Streets principles providing dedicated space for all modes. The design of the cross section should include sidewalks, multi-use path(s) and on-road cycling accommodation that falls within the City's design standards.

These provisions are unlikely to significantly reduce the number of vehicles on the roadway as a significant proportion of trips will continue to be longer distance in nature (to / from outside the City). This alternative is not a standalone solution to the capacity need, but it is important that the future infrastructure accommodate the safe and efficient operation of all modes.

Transit

Currently, there is no regular local transit service on Paris Road north of Highway 403. With significant employment growth forecasted in the area, there is an opportunity to extend local transit into the north expansion area.

The provision of new transit service to connect the future employment areas with the residential areas south of Highway 403, as well as to commercial areas, approaching and within downtown, has the potential to improve the Paris Road corridor transit mode share from 0% today to 25% in the future. This increase in mode share would result in an approximate 175-350 vehicle reduction on Paris Road during the peak hours.

Transportation System Management

Both the area surrounding Paris Road north of Highway 403 and the roadway itself are currently rural in nature. As development occurs, the area will transition to an urban environment. Signalization of the intersections of Paris Road and Golf Road and Paris Road and Oak Park Road may be required. Lane allocation at the current signalized intersection of Paris Road and Powerline Road may also have to be revisited to provide a separate northbound left turn lane.

Before the area surrounding Paris Road north of Highway 403 is urbanization, the paving of the shoulders could be considered as it increases the existing capacity of the roadway by increasing driver comfort, and also provides a dedicated space for cyclists. This alternative by itself will only provide a minor increase to the roadways capacity and should be coupled with other alternatives.

Increase Infrastructure

Paris Road Widening

Paris Road from about 500 m north of Golf Road to Brant Avenue has a 4-lane cross section. However, from about 500 m north of Golf Road to beyond Powerline Road, Paris Road only has a 2-lane cross section. Widening this constrained section of Paris Road would provide some much need capacity as a result of the development in the area.

A widened Paris Road from 500 m north of Golf Road to Oak Park Road would alleviate the capacity constrains forecast for this section of Paris Road. It would not however alleviate the capacity constraints approaching Highway 403.

Oak Park Road Extension

As identified in ***Figure 4-26***, approximately 350 vehicles in the PM peak hour use Paris Road for north-south travel to connect across the river into Southwest Brantford. The extension of Oak Park Road (currently in EA stage) to Colborne Street West would provide a north-south connection in West Brantford and an additional vehicle crossing of the Grand River. As described in previous sections, the traffic in the north-south corridor is traveling between Northwest Brantford / Paris area and Southwest Brantford is forced to travel east towards Downtown Brantford in order to cross the Grand River only to travel back to the west to reach their destination. The diversion of these trips from Paris Road would alleviate the capacity problem on Paris Road north Highway 403.

Conclusion

The preferred alternatives for addressing the 2041 capacity issue on Paris Road north of Highway 403 are as follows:

- City Wide TDM – improved transit service in the City will not significantly impact the demands on Paris Road north of Highway 403;
- Corridor TSM – in the short term, pave the Paris Road shoulders to improve the driver level of comfort and to provide opportunities for cycling in the corridor; in the longer term (by 2041) signalize major intersection at Golf Road and Oak Park Road and provide appropriate auxiliary lanes;
- Increase Infrastructure – widen Paris Road from 500 m north of Golf Road to Oak Park Road to address development related pressures on the road; and
- Increase Infrastructure – provide new multi-modal facilities and river crossing connecting Oak Park Road to Colborne Street West.

4.3.6 Colborne Street (Lorne Bridge) - Crossing the Grand River

4.3.6.1 Problem

The Colborne Street crossing of the Grand River (Gilkison Street to Brant Avenue / Icomm Drive) is forecast to have a significant capacity deficiency. It is one of only two existing vehicle crossings of the Grand River (the other being Veterans Memorial Parkway) connecting South and West Brantford to the rest of the city. The 2041 PM peak hour volume and volume-to-capacity conditions in 2041 are illustrated in ***Figure 4-28*** and ***Figure 4-29*** respectively.

Figure 4-28: Colborne Street (Lorne Bridge) – Crossing the Grand River: 2041 PM Peak Hour Volumes

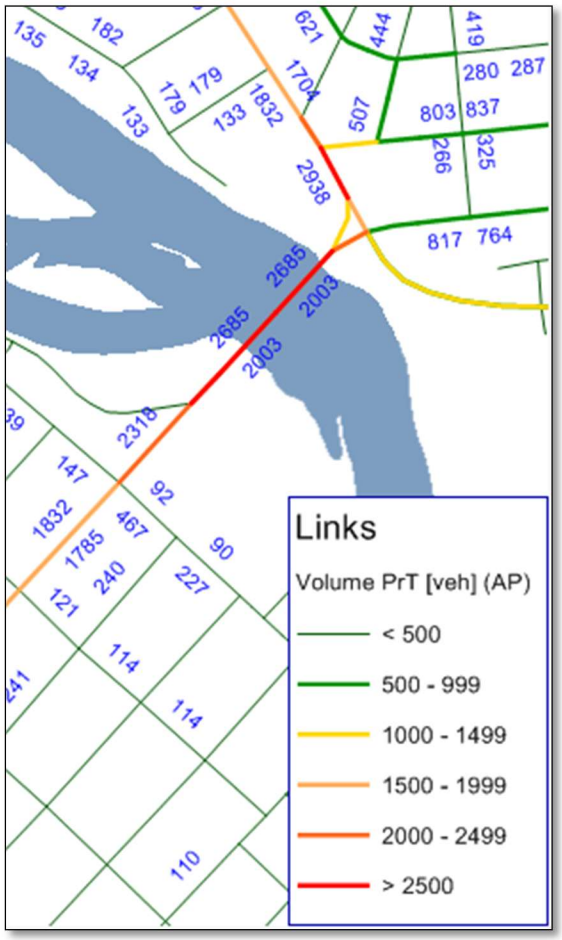
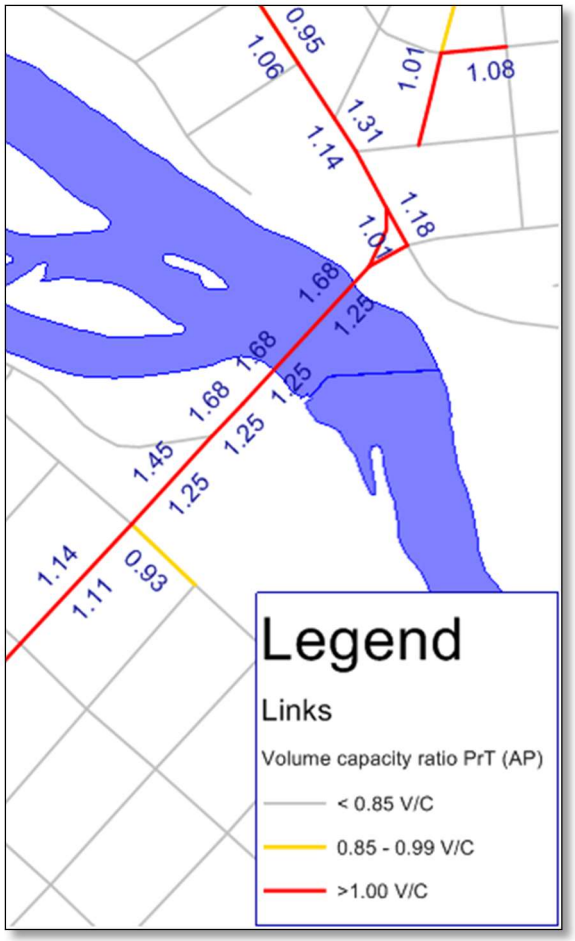


Figure 4-29: Colborne Street (Lorne Bridge) – Crossing the Grand River: 2041 PM Peak Hour V/C Ratios



The Lorne Bridge has significant auto demand in both directions, however during the PM peak hour, westbound is the critical direction. The peak hour volume in the westbound direction is forecast to reach almost 2,700 vehicle trips which will exceed capacity by over 65% (V/C ratio of 1.68). The westbound congestion is significant enough to result in considerable downstream neighbourhood infiltration onto parallel routes in an attempt to avoid Colborne Street. Ballantyne Drive to Sherwood Drive and Gilkison Street to Balfour Street are the two routes that are anticipated to see considerable "cut-through" traffic volumes.

4.3.6.2 Assessment

The capacity issue on the Lorne Bridge is strategic in nature. There is a significant lack of a capacity crossing the Grand River, specifically connecting Southwest Brantford (West Brant and Tutela Heights) to the rest of Brantford. ***Figure 4-30*** and ***Figure 4-31*** (westbound and eastbound respectively) illustrate the distribution patterns of vehicle trips that are using Colborne Street to cross the Grand River.

Figure 4-30: Colborne Street (Lorne Bridge) PM Peak Hour Trip Distribution – Westbound

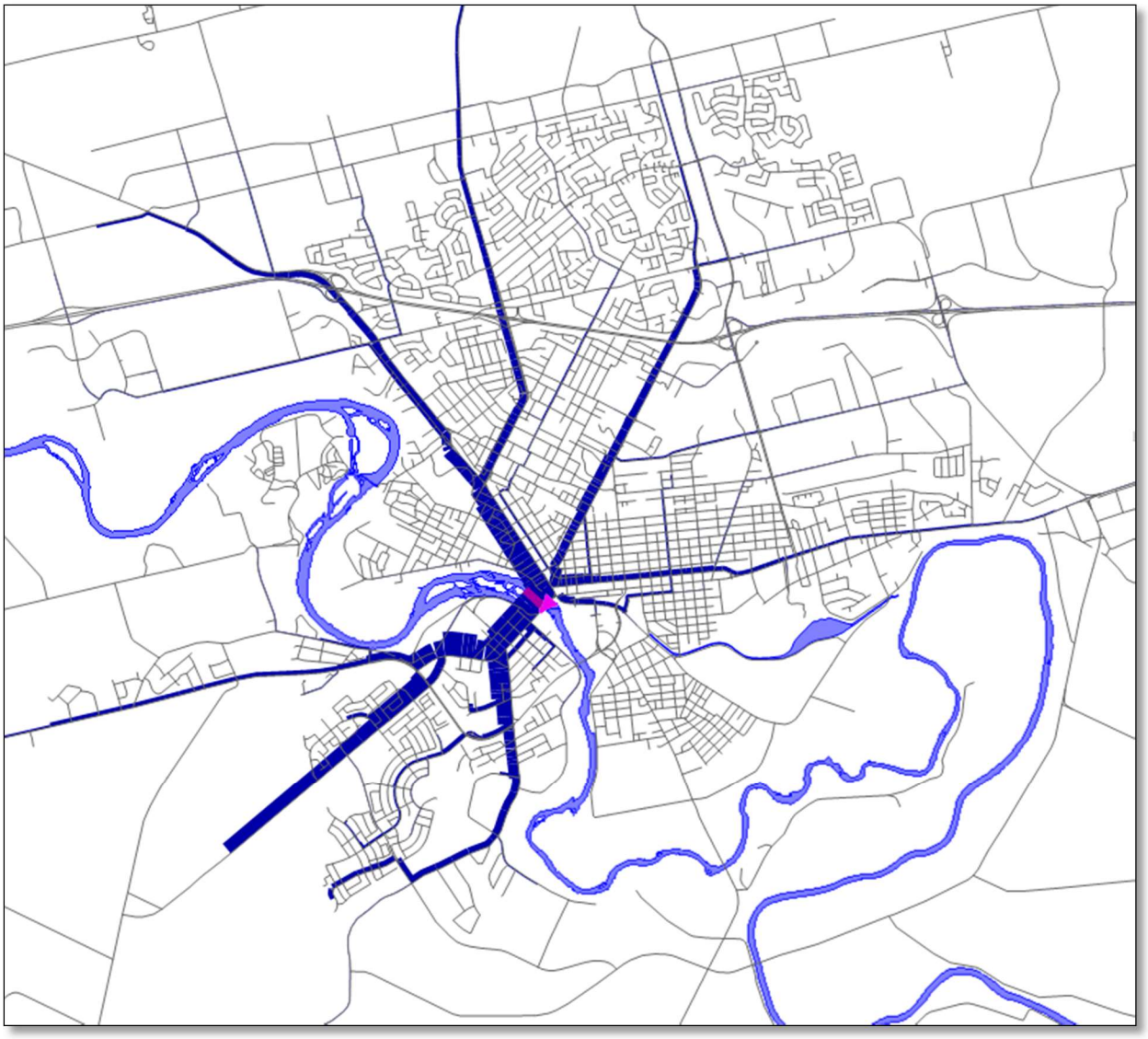
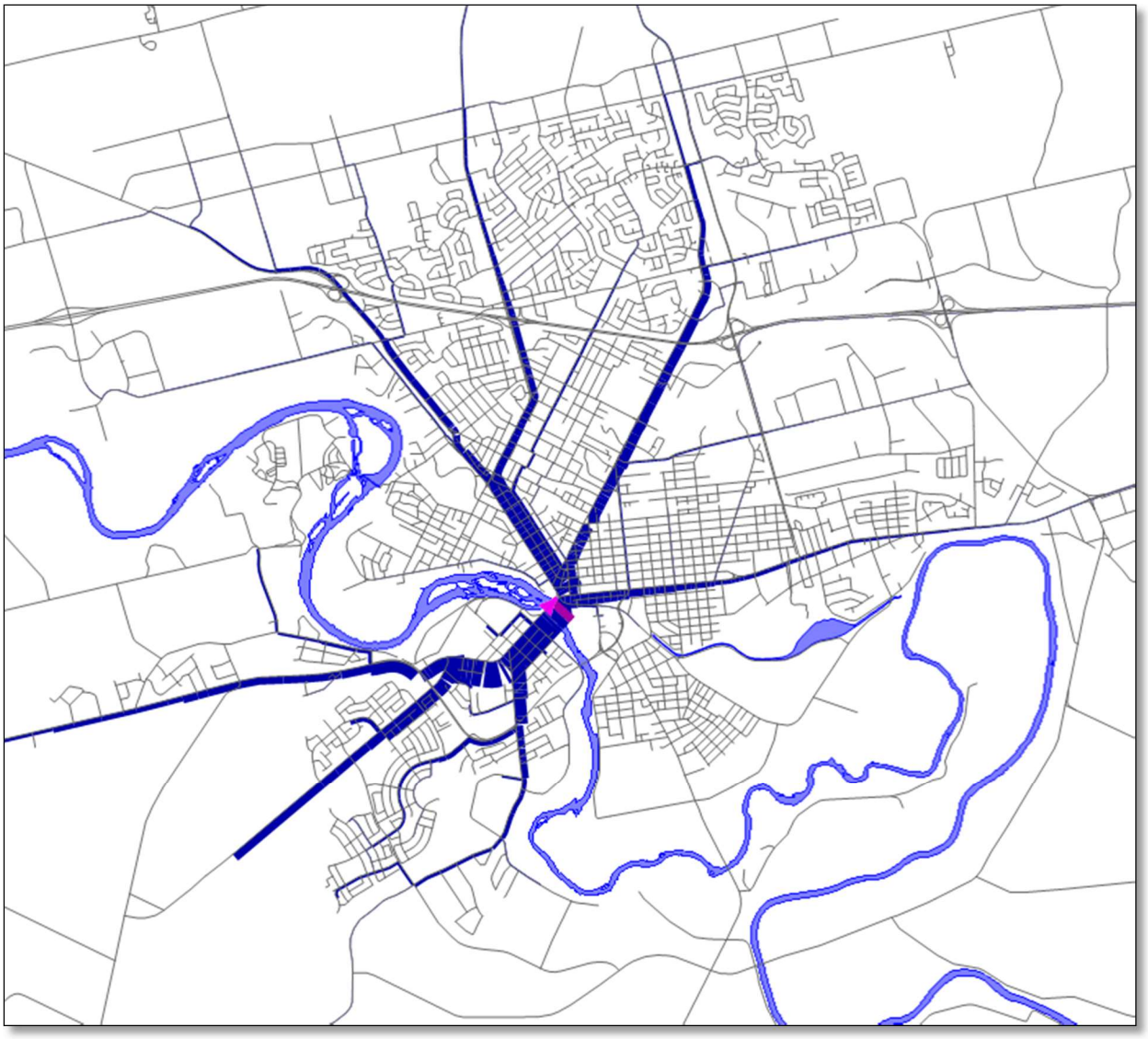


Figure 4-31: Colborne Street (Lorne Bridge) PM Peak Hour Trip Distribution – Eastbound



Both the westbound and eastbound trip distribution patterns are noticeably similar and seem to reach all corners of the city. The distribution of trips indicates that a significant amount of traffic is traveling between the southwest area of Brantford and areas north of Highway 403 using the Lorne Bridge.

4.3.6.3 Alternatives

The alternative solutions to the identified capacity constraint for Colborne Street crossing the Grand River are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

The Colborne Street crossing the Grand River (Lorne Bridge) provides protected (by barrier) sidewalks on both sides of the bridge. There is little opportunity to provide additional separated space for cyclists.

At best, shared lanes could be signed but this would not provide the desired environment for recreational and novice level riders. Reconfiguration of the laneways on the bridge deck would be required to facilitate significant improvements to the active transportation conditions.

Transit

There are two Brantford Transit routes that service the residential areas in the vicinity of the Lorne Bridge: Route 5 (West Brant Oakhill) and Route 6 (West Brant Shellard). These routes effectively target residential travel to/from the downtown.

Service enhancements in the form of route additions or modifications have the potential to improve the Lorne Bridge transit mode share from 3% today to 16% in the future. This increase in mode share would result in an approximate 75-150 vehicle reduction on Lorne Bridge during the peak hours.

Transportation System Management

Given the strategic nature of the demand, i.e. crossing the river and the order of magnitude of the deficiency, minor tweaks in the system operation will not significantly improve the actual carrying capacity of the bridge.

That said, alternative intersection control, in the form of a roundabout, at the intersection of Colborne Street East/Colborne Street West/Brant Avenue/Icomm Drive could improve the efficiency of the intersection such that the significant eastbound left turn lane length could be reduced, allowing for alternative lane allocation across the bridge.

Increase Infrastructure

Widen Lorne Bridge

A widening of the bridge to 6-lanes would address the issue but operational constraints on either side of the bridge would limit the effectiveness of the widening. It is noted that there are seasonal load restrictions on the bridge and that there is an ongoing EA for the three bridges (including two pedestrian crossings of the Grand River) to improve all modes of travel and address improvements for load restrictions.

Veterans Memorial Parkway Extension and Bridge Improvements

A large number of trips, about 30% of the peak hour demand on the Lorne Bridge, are traveling to and from the east (via the Colborne Street / Dalhousie Street parallel one-way pair). The diversion of these trips to an improved Veterans Memorial Parkway would result in an improved Level of Service on Lorne

Bridge (bringing the V/C down to 1.13 from 1.68 in the peak direction). While the VMP is also forecast to experience capacity issues, there is more potential to improve the lane allocation across the VMP bridge to gain a lane of capacity.

While a widening of the Veterans Memorial Parkway provides some river crossing capacity relief, it does not address the primary origin-destination pattern for Lorne Bridge users (i.e. to the northwest and north central areas of Brantford).

Oak Park Road Extension

As described in ***section 4.3.1.2***, some 300 to 500 vehicle trips in the PM peak hour are estimated to use the Lorne Bridge to cross the Grand River as there is no alternative roadway for north-south travel that crosses the river in West Brantford. The extension of Oak Park Road to Colborne Street would provide an alternative route for these 300-500 trips. This improvement alone would result in a decrease in the V/C ratio on the bridge from 1.68 to 1.38 (if 500 trips were removed).

Alone, this alternative will only solve a portion of the problem and will need to be coupled with other alternatives that address the capacity shortage across the Grand River.

Conclusion

The preferred alternatives for addressing the 2041 capacity issue on the Lorne Bridge are as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the Grand River crossings;
- Corridor TSM – the potential for a roundabout at the east end of the bridge should be considered. This might improve delays to the critical movements and allow the opportunity to re-designate the lane allocation on Lorne Bridge;
- Increase Infrastructure – provide new facility and river crossing connecting Oak Park Road to Colborne Street West; and
- Increase Infrastructure – subject to the preferred solution for the VMP crossing capacity issue, these additional capacity improvements when coupled with the Oak Park Road extension will provide the strategic capacity to address the Lorne Bridge capacity shortfall.

4.3.7 West Street - Charing Cross Street to Henry Street

4.3.7.1 Problem

West Street between Charing Cross Street and Henry Street is identified as a pinch point in the north-south network. The majority of West Street between Charing Cross Street and Henry Street is forecast to experience significant volumes and to be approaching capacity or over capacity in 2041, as illustrated in ***Figure 4-32*** and ***Figure 4-33*** respectively.

Figure 4-32: West Street – Charing Cross Street to Henry Street: 2041 PM Peak Hour Volumes

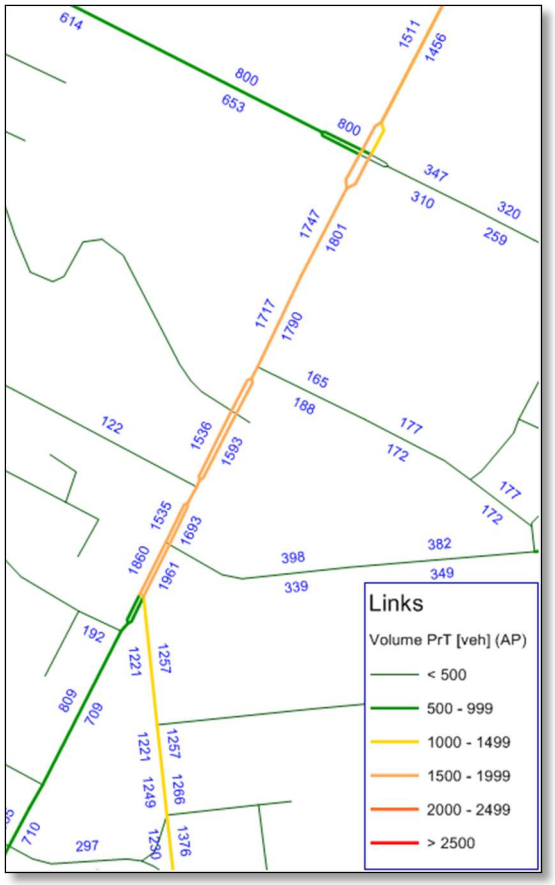
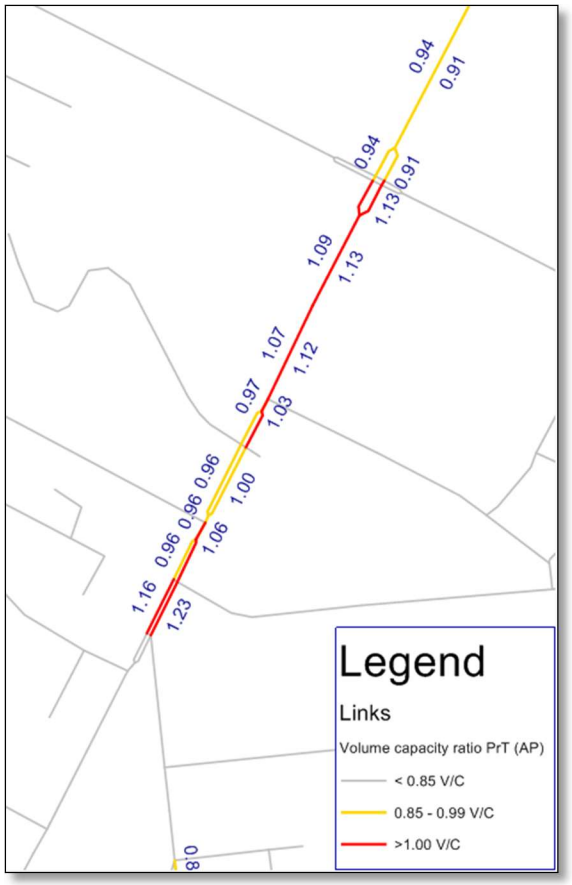


Figure 4-33: West Street – Charing Cross Street to Henry Street: 2041 PM Peak Hour V/C Ratios



West Street between Charing Cross Street and Henry Street has significant auto demand in both directions, however the critical direction during the PM peak hour is northbound. Overall, the capacity constraints forecast for West Street are quite significant but they do vary considerably block by block. West Street between Charing Cross Street and Harris Avenue is the section of West Street that is forecast to experience the most significant volumes / delays.

4.3.7.2 Assessment

The capacity issues on West Street are both strategic and operational in nature. Due to a lack of continuous east-west capacity south of Highway 403, a significant amount of east-west traffic to/from Charing Cross Road is using West Street to connect from/to Henry Street. ***Figure 4-34*** and ***Figure 4-35*** (southbound and northbound respectively) illustrate the number and distribution of PM peak hour vehicle trips that are using West Street (and Harris Street within the forecasting model) to travel between Henry Street and Charing Cross Street. There are approximately 130 southbound vehicle trips and 150 northbound vehicle trips that could be removed from West Street between Charing Cross and Henry Street during the peak hour with the provision of a continuous east-west connection in the vicinity that crossed West Street.

Figure 4-34: East – West PM Peak Hour Trips using West Street – Southbound

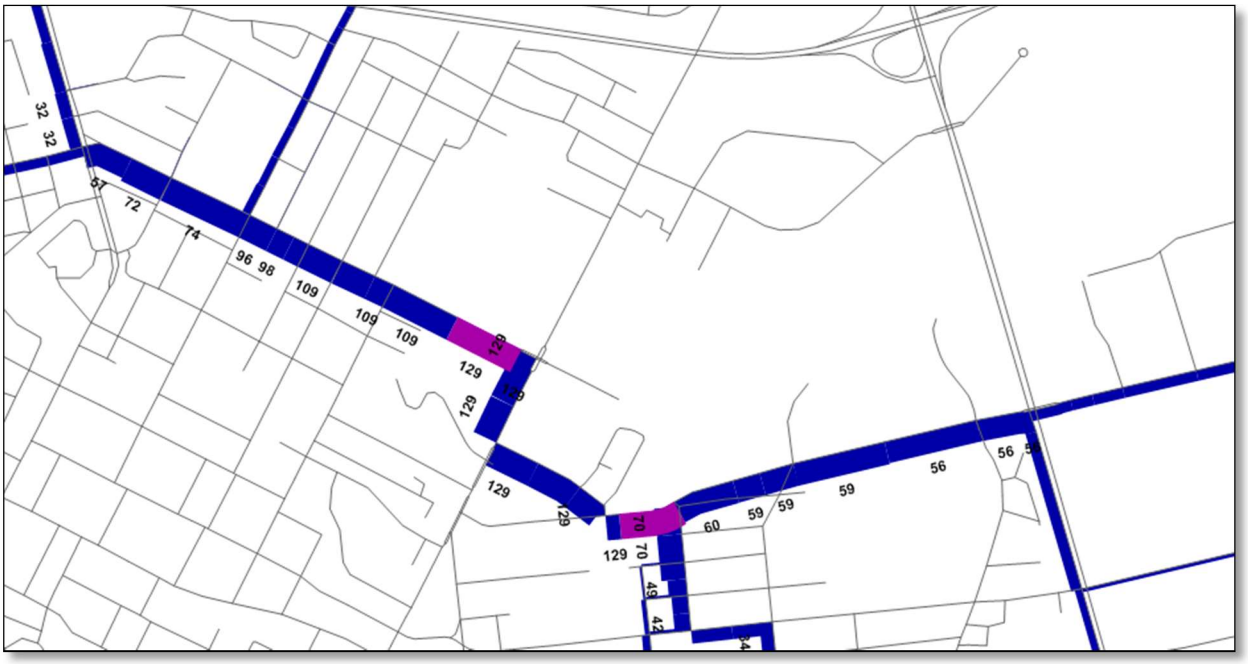
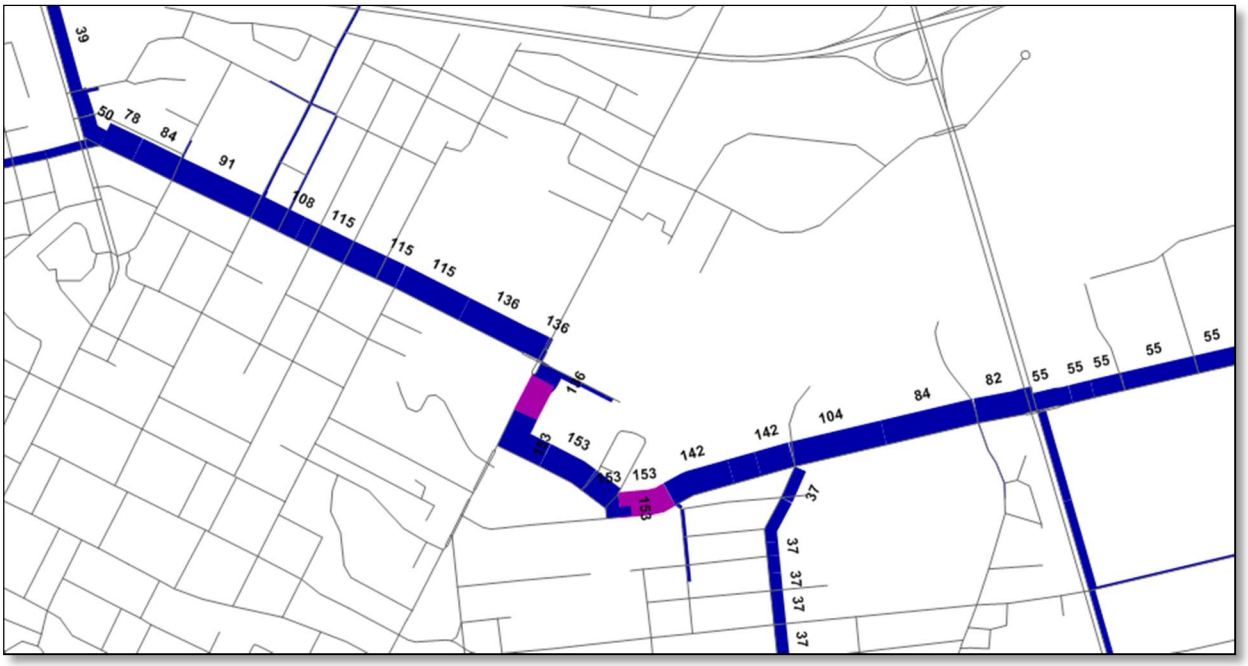


Figure 4-35: East – West PM Peak Hour Trips using West Street – Northbound



In addition to this strategic east-west traffic flow issue, the resultant southbound left turning movements from West Street onto Harris Avenue and Henry Street are significant and the auxiliary lanes, if provided, do have sufficient storage to protect the queues from the through lane. The

southbound left turn lane at Harris Street can accommodate 2 vehicles without impeding the travel lane and Henry Street does not have a separated left turn lane.

4.3.7.3 Alternatives

The alternative solutions to the identified capacity constraint for West Street are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

West Street, between Henry Street and Charing Cross Road, provides sidewalks on both sides of the road. Because of the right of way constraints, the sidewalks abut the curb (i.e. no boulevard/buffer) and there is no specific accommodation for cycling.

West Street is a busy secondary north-south route used by trucks and vehicles as an alternative route to avoid WGP or King George Road when connecting between North Brantford and downtown. As such it would be a good multimodal connection. To do so would require a widening of the cross section to provide the road design requirements for a minor arterial that accommodates all modes.

Transit

The West Street corridor is served by one Brantford Transit route: Route 2 (West Street Brier Park). This route provides significant connections between downtown and neighbourhoods north of Highway 403. West Street connects intensification areas and has good potential to provide enhanced transit connectivity in the future.

Service enhancements in the form of route additions or modifications have the potential to improve the West Street transit mode share from 6% today to 14% in the future. This increase in mode share would result in an approximate 75-150 vehicle reduction on West Street during the peak hours.

Transportation System Management

West Street is classified as a minor arterial road, however, it is forecasted to have high future volumes and the longer distance nature of these trips (connecting from north of Highway 403 to downtown) suggests a role and function more aligned with a major arterial. While its basic cross section is limited by the right of way and the adjacent land use, there are some design features could be enhanced to more closely align with its role and function.

Currently there are no prohibited turns on West Street between Henry Street and Charing Cross Street. Consideration could be given to prohibiting left turns where left turn storage is not provided during the peak periods. This could include the northbound left from West Street to Kennedy Street and the southbound left from West Street to Henry Street.

In addition, traffic signal coordination would minimize delay and maximise vehicle flow. This would provide a continuous flow or 'green wave' in the peak direction of travel.
This alternative will improve traffic operations and will slightly increase the overall carrying capacity of the roadway. However, on its own, this alternative will not increase roadway capacity enough to mitigate delays and improve the level of service to an acceptable level.

Increase Infrastructure

West Street Widening

The West Street capacity issue is confined to the short (approximately 500 m) section between Charing Cross Street. A widening of the road from 4 lanes to 6 lanes would address the capacity issue but this would have significant property impacts.

Providing left turn lanes with adequate storage in both directions at all intersections, would effectively be providing a 5-lane cross section. This would slightly improve the effective capacity of each travel lane. Assuming a 10% increase in efficiency would bring West Street to an 'at capacity' condition. However, this would also have significant property impacts for a very small advantage.

There are approximately 130 southbound vehicle trips and 150 northbound vehicle trips in the PM peak hour that could be diverted from West Street between Charing Cross Street and Henry Street with the provision of a continuous east-west connection in the vicinity. It is noted that there is an EA for the intersection improvement at this intersection.

It is also noted that any such improvements to West Street would continue to facilitate the current east-west travel patterns. These existing travel patterns result in two issues that are not strictly capacity based:

- Role and Function of Harris Street – Harris Street is a minor collector road that serves as access for commercial and industrial property, as well as residential property on the north. It was not intended to function as a by-pass of the West Street / Henry Street intersection as it does today. In addition to the high volume, the diversion places pressure on its unsignalized intersections with West Street and Henry Street; and
- Henry Street Underpass – Henry Street is a 2-lane minor arterial road west of Brock Street that includes the narrow rail underpass. In 2041 Henry Street at the underpass is expected to be operating at approaching capacity conditions (V/C ratio of 0.87). With an improved West Street, volume flows on Henry Street would potentially increase and the capacity under the bridge would become a constraint. As well, the current underpass with its narrow lane widths and sidewalk on one side does not provide an environment that aligns with the multi-modal vision for the community. There are no good opportunities for on-road cycling facilities or improved pedestrian space without reconstructing the rail bridge

A road widening of West Street would address the capacity shortfall between Charing Cross Street and Henry Street, but there would be significant property impacts and secondary infrastructure impacts that would also require mitigation.

Charing Cross Street Extension

There are approximately 200-300 peak hour trips in the peak direction (150 trips from Harris Street alone) that are using West Street to facilitate a broader east-west trip. The extension of Charing Cross Street from West Street to Henry Street (approximately 850 m) would provide that continuous east-west connection and would also provide additional capacity across the rail corridor for all modes. The diversion of 200-300 trips in the peak direction would reduce the volume to capacity on West Street to less than 1.00.

This 2-lane extension alternative will relieve capacity West Street to below full capacity levels. The reductions in demand are modest but should be enough to bring West Street between Charing Cross Street and Henry Street under capacity. However, this alternative includes potentially significant costs (New CNR crossing) and property impacts (City yard).

Conclusion

The preferred alternative for addressing the 2041 capacity issue on West Street between Charing Cross Street and Henry Street is as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the West Street corridor;
- Corridor TSM – provision of left turn auxiliary lane at the West Street/Henry Street intersection; and
- Increase Infrastructure – provide new facility connecting Charing Cross Street at West Street to Henry Street (including rail overpass). A new extension will provide new opportunities for active mode provisions and connections in the network.

4.3.8 Veterans Memorial Parkway - Mt. Pleasant Street to Market Street

4.3.8.1 Problem

The Veterans Memorial Parkway (VMP) crossing of the Grand River (Mt. Pleasant Street to Market Street) is forecast to be one of the more congested links in the City by 2041. It is one of two existing crossings of the Grand River connecting South and West Brantford to the rest of the city. The VMP forecast volume and volume-to-capacity performance is illustrated in ***Figure 4-36*** and ***Figure 4-37*** respectively.

The VMP crossing of the Grand River has significant auto demand in both directions, however during the PM peak hour, westbound is the critical direction. The volume in the westbound direction is forecast to surpass 1,350 vehicle trips which will exceed capacity by over 35% (V/C ratio of 1.35).

Figure 4-36: Veterans Memorial Parkway – 2041 PM Peak Hour Volumes

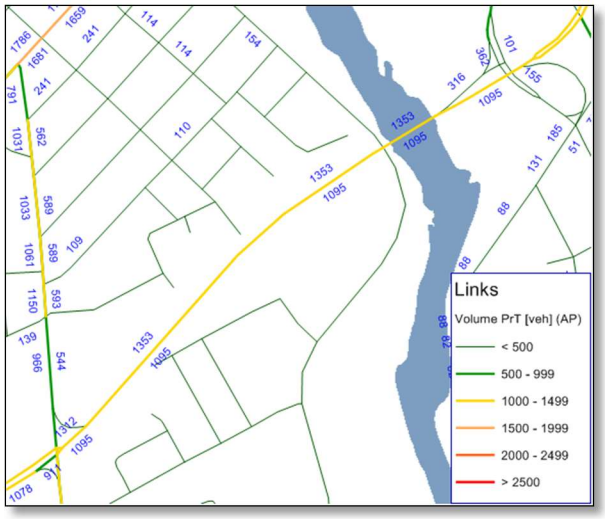
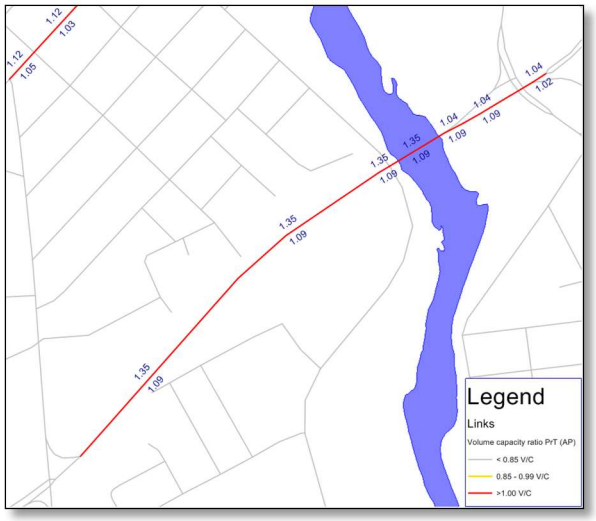


Figure 4-37: Veterans Memorial Parkway – 2041 PM Peak Hour V/C Ratios



4.3.8.2 Assessment

The capacity issue on VMP (crossing of the Grand River) is strategic in nature. There is a significant lack of capacity crossing the Grand River, specifically connecting Southwest Brantford (West Brant and Tutela Heights) to East Brantford. ***Figure 4-38*** and ***Figure 4-39*** (westbound and eastbound respectively) illustrate the distribution patterns of vehicle trips that are using VMP to cross the Grand River.

The distribution of PM peak hour trips reveals the following:

- 15% of trips originate from the east (Hamilton/GTA) via Highway 403;
- 20% of trips originate from north of Highway 403; and
- 65% originate from Central / Downton Brantford.

Travel markets to the Northwest Brantford and Paris and west (Woodstock-London) markets are not served by this crossing.

VMP west of Mt Pleasant Road has a 4-lane cross section (2 lanes in each direction) while VMP between Mt. Pleasant Street and Erie Street has predominantly a 2-lane cross section. The bridge crossing itself is a complicated mix of lane adds and drops. Westbound from Erie Street, VMP is 2 lanes until the overpass crossing of Market Street where 1-lane drops. The second lane is picked up again as the N-W Market Street direct ramp joins to cross the river. The second lane drops again at the end of the structure and 1-lane continues on the Mt Pleasant Street. Eastbound from Mt. Pleasant Street, VMP carries 1 lane onto and across the river crossing. A right turn slip lane is provided at the end of the bridge to access the ramp to Market Street/Eagle Street. From this Market Street/Eagle Street ramp

VMP opens up into 2 through lanes, a separate right turn lane and separate left turn lane at the Erie Street/Clarence Street intersection.

The problem is that consistent capacity is needed for 1,300 vehicles in the peak direction (eastbound in the AM peak hour and westbound in the PM peak hour, from Market Street to Mt Pleasant Street. The current capacity on the bridge is 2,000 vehicles per hour westbound and 1,000 vehicles eastbound, while on the section between the bridge and Mt Pleasant Street is 1,000 vehicles per hour in each direction.

Figure 4-38: Veterans Memorial Parkway Bridge PM Peak Hour Trip Distribution – Westbound

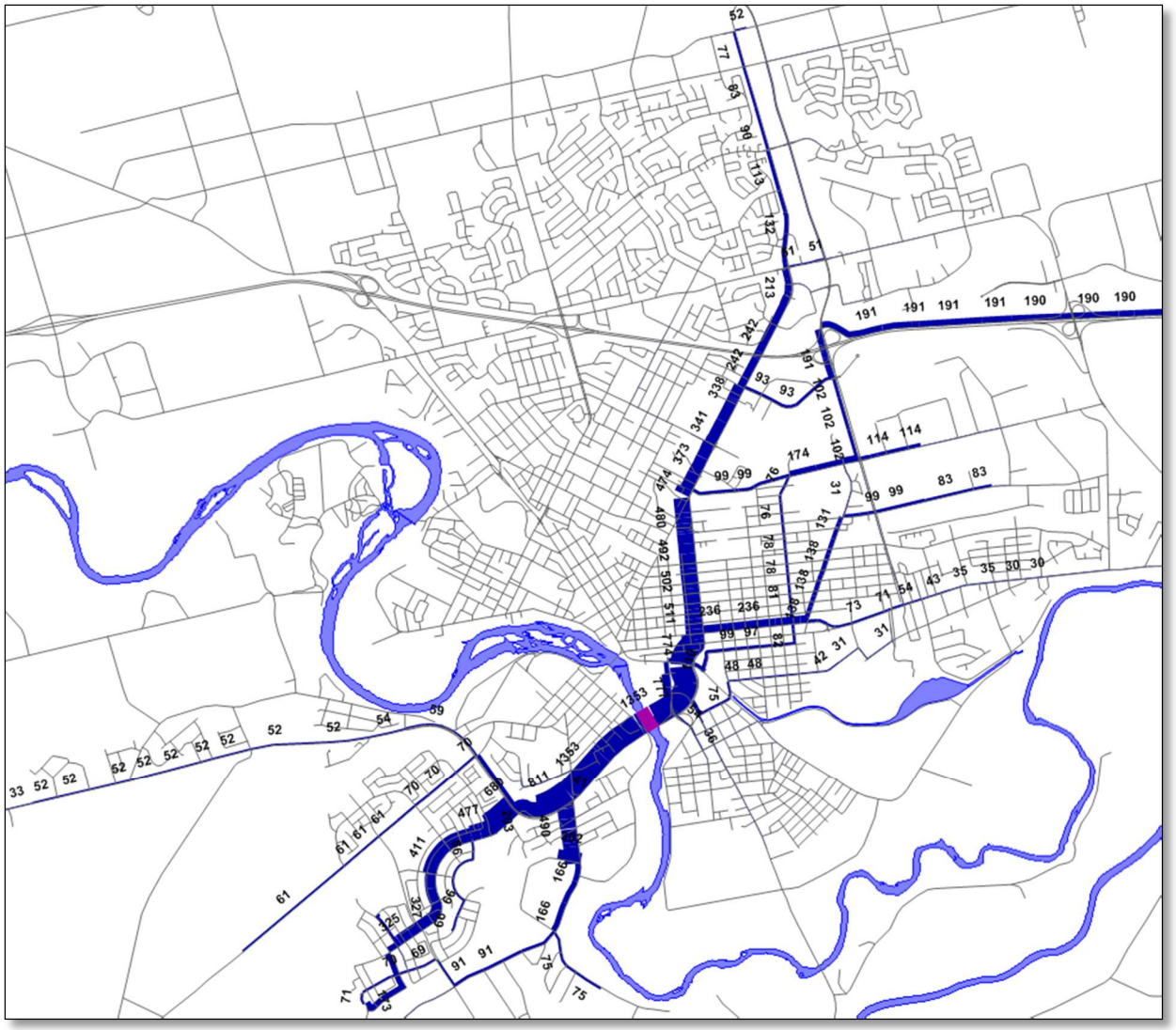
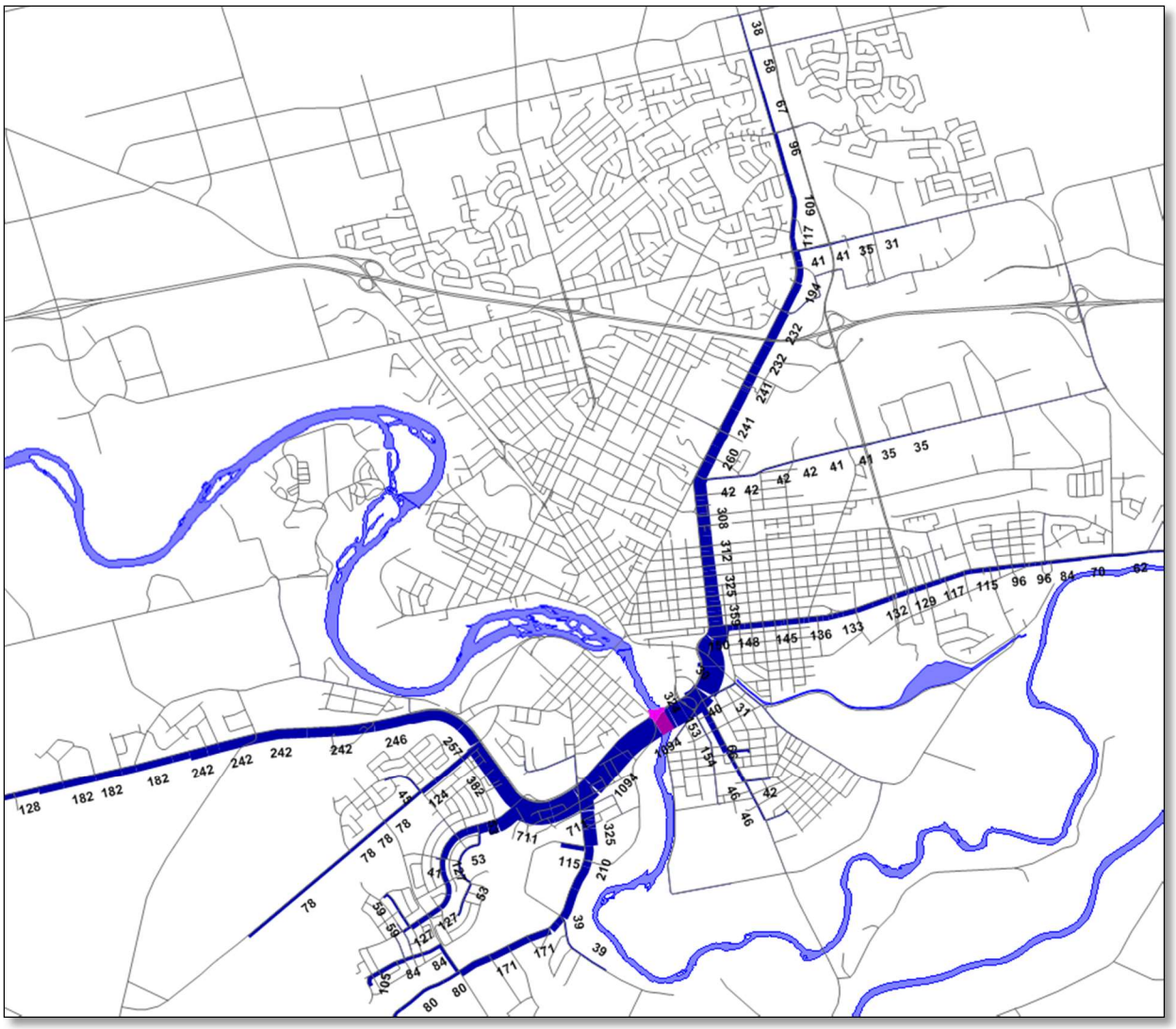


Figure 4-39: Veterans Memorial Parkway Bridge PM Peak Hour Trip Distribution – Eastbound



4.3.8.3 Alternatives

The alternative solutions to the identified capacity constraint for VMP are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

Currently there are no provisions for active transportation along this section of VMP. With a bridge widening, protections for on-road cycling could be provided. With respect to pedestrian activity, the roadway function and adjacent land use access restrictions do suggest the need for pedestrian space allocation. A multi-use path would satisfy both cyclists and pedestrians.

Transit

The VMP corridor is served by one Brantford Transit route: Route 6 (West Brant Shellard). Transit service enhancements in the form of bus route additions or modifications have the potential to improve the Veterans Memorial Parkway crossing transit mode share from 8% today to 23% in the future. This increase in mode share would result in an approximate 150-300 vehicle reduction on the VMP Bridge during the peak hours.

Transportation System Management

The VMP bridge deck is approximately 15 m wide. It is possible to restructure the lane allocations to provide 2 lanes in each direction which would address the capacity deficiency on the bridge. The issues with this potential would be:

- The reduction of the 1 m shoulder on each side of the roadway to 0.5 m on each side (design minimums would have to be considered;
- Carrying 2 westbound through lanes from Market Street will eliminate the merge lane from the Market Street ramp; and
- There is no opportunity for adding space for any active modes across the bridge.

Increase Infrastructure

Veterans Memorial Parkway Widening

Providing additional width on the bridge to accommodate an additional lane (such that both directions have 2 carrying lanes[2]) while providing adequate design space for the shoulders and active mode considerations would require either an extension or replacement of the bridge deck. The full replacement is possible but would potentially have a very high cost, environmental impacts and a high impact on traffic during construction. The expansion of the deck, while still expensive, would be less impactful from both perspectives.

Adding a lane in each direction from the bridge to Mt. Pleasant appears to be feasible in terms of right of way space and limited impacts to utilities and property. However, alternative crossings of the Grand River that would serve the origin-destination patterns observed for the Veterans Memorial Parkway are limited.

Brant County Road 18 (Phelps Road) Upgrades

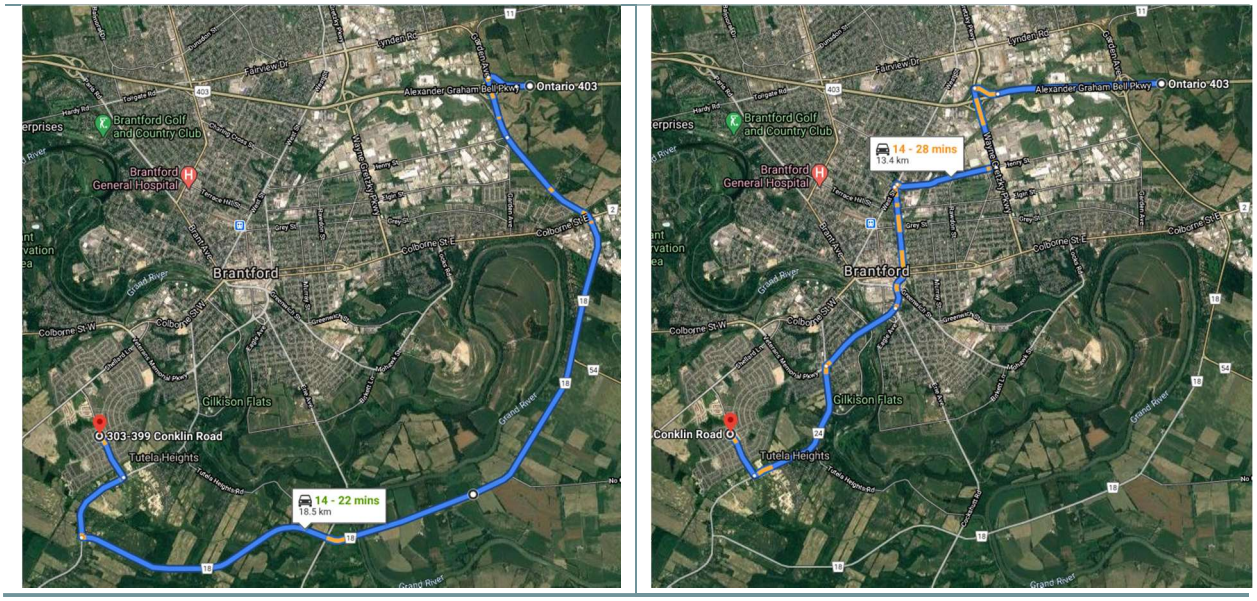
Brant County Road 18 is rural arterial roadway within Brant County that connects Mt. Pleasant Road in the south to Highway 403 (via Garden Avenue) in the east. It also intersects with Cockshutt Road / Erie Avenue and Colborne Street East, to provide an alternative route to/from the city and to/from the east for trips from/to southwest Brantford and County of Brant. The Brant County Road 18 route effectively

[2] A six lane cross section (or 3 carrying lanes per direction) on the VMP bridge was not considered as a result of upstream / downstream roadway capacity constraints, though it can be investigated further as part of a future EA study.

provides a by-pass function around the southern and eastern portions of Brantford and another crossing of the Grand River.

Of the 1,350 westbound vehicles in the PM peak hour that are forecast to cross the VMP Bridge, approximately 200 originate from Highway 403 east of Brant County Road 18 (Garden Avenue) as illustrated previously in ***Figure 4-38***. With appropriate signage and modest route upgrades, these vehicles could be encouraged to divert to the Garden Avenue/County Road 18 route from the current Wayne Gretzky Parkway route to reach Southwest Brantford. As illustrated in ***Figure 4-40***, the current PM peak hour travel time comparison between the Garden Avenue/County Road 18 route and the WGP/VMP route shows that while the County Road 18 route is 5.1 km longer but the travel time difference is negligible or favours County Road 18 (6 minutes faster in a worst case scenario). This advantage will be even more pronounced in the long term as the VMP bridge becomes more congested, while traffic flow on County Road 18 should remain uninterrupted. With the potential diversion of 200 vehicles to this route were to be realized, this would address 50% of the volume that is creating the overcapacity condition on VMP crossing the Grand River.

Figure 4-40: Existing Travel Time Comparison (5 pm): Highway 403 (east of Brantford) to Southwest Brantford



Source: Google Maps

Note: These figures depict existing conditions for trip starting at Hwy 403 east of Garden Avenue at 5PM destined to Conklin Road. With higher volumes and increased congestion, travel times through downtown Brantford and across the downtown bridges would be significantly higher in a 2041 condition.

The Brant Country Road 18 upgrades that could encourage the aforementioned volume diversion could include, but are not be limited to, the following:

- Improved signage and lighting;
- Roadway improvements:
  - Paved shoulders – increases existing capacity by increasing driver comfort;

  - Easterly extension of Conklin Road from Mt. Pleasant to County Road 18 (recommended as part of the Tutela Heights Urban expansion area);
  - Widening of Mt. Pleasant Road to 3 or 4 lanes from Tutela Heights Road to County Road 18;
- Intersection specific improvements:
  - Addition of turning lanes – reduces delay on through traffic; and
  - Signal timing modifications – reduces delay by prioritising Brant County Road 18.

While the estimated diversion would only be in the order of 200 vehicles in the PM peak hour, a capacity deficiency would remain on VMP. However, the County Road 18 route provides broader network benefits beyond the easterly river crossing and access to Highway 403, i.e. potential to reduce volumes on WGP, Clarence Street/Clarence Street South, Dalhousie Street, Colborne Street East and West, including Lorne Bridge.

It is acknowledged that this alternative relies significantly on the use of infrastructure under the jurisdiction of the County of Brant. However, the benefits of implementing relatively easy TSM initiatives would provide broad reaching benefits to both City and County travel. A partnership would be required to coordinate and implement a suitable plan to achieve these benefits.

Conclusion

The preferred alternative for addressing the 2041 capacity issue on the VMP between Mt. Pleasant Road and Market Street South is as follows:

- City Wide TDM – improved transit service from the Southwest to the downtown will benefit the VMP corridor;
- Corridor TSM – limited opportunities to improve the efficiency without sacrificing city geometric design guidelines;
- Increase Infrastructure – Widen VMP bridge to facilitate additional lane of carrying capacity in eastbound direction;
- Increase Infrastructure – Widen VMP from Mt. Pleasant to Grand River crossing to 2 lanes in each direction;
- Increase Infrastructure – Improve signage and design elements of County Road 18 between Mt. Pleasant Road and Colborne Street East to encourage it as a route to Highway 403 from southwest Brantford. This will include planning and coordination between the City and County to successfully implement;
- Increase Infrastructure – Extend Conklin Road east of Mt. Pleasant Road to County Road 18; and
- Increase Infrastructure – Widen Mt. Pleasant Road from Tutela Heights to County Road 18.

4.3.9 Paris Road - South of Highway 403 to Hardy Road

4.3.9.1 Problem

Like Paris Road north of Highway 403, Paris Road south of Highway 403 is forecast to be experience significant growth in traffic volumes (***Figure 4-41***) as a result of employment and population growth north of Highway 403. South of Highway 403, it will continue to serve as the main connection between Paris and downtown Brantford, and vehicles entering the City from the west on Highway 403. The majority of Paris Road south of Highway 403 is forecast to be approaching capacity in 2041, as illustrated in ***Figure 4-42***.

Figure 4-41: Paris Road – South of Highway 403: 2041 PM Peak Hour Volumes

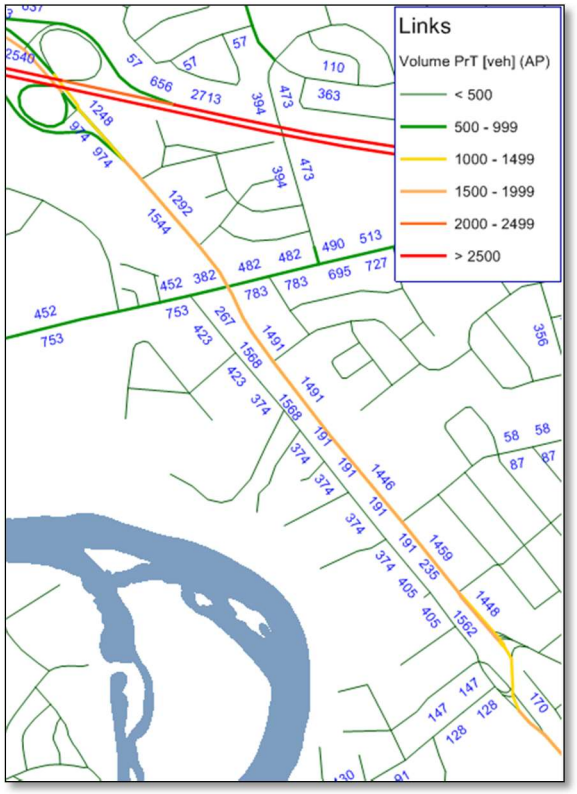
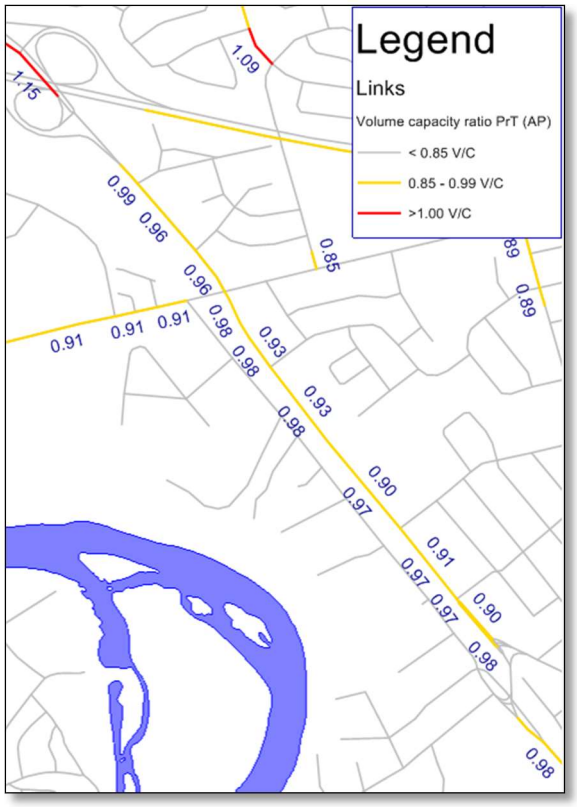


Figure 4-42: Paris Road – South of Highway 403: 2041 PM Peak Hour V/C Ratios



Paris Road south of Highway 403 has significant auto demand in both directions, however southbound is the critical direction during the PM peak hour. While V/C ratios do not exceed capacity, they are approaching capacity. This near capacity condition will result in a considerable number of vehicles using Ava Road, the collector road immediately west of and parallel to Paris Road, in order to avoid delays on Paris Road.

4.3.9.2 Assessment

The capacity issue on Paris Road south of Highway 403 is strategic in nature. The lack of a direct connection between Northwest Brantford (commercial/industrial) and Southwest Brantford (residential) results in a significant number of vehicles traveling between these two areas using Paris Road towards downtown in order to cross the Grand River. ***Figure 4-43*** and ***Figure 4-44*** (southbound and northbound respectively) illustrate the number and distribution of vehicle trips that are using Paris Road travel between Northwest Brantford and Southwest Brantford. There are more than 350 southbound vehicle trips and 150 northbound vehicle trips that could be potentially diverted from Paris Road south of Highway 403, during the peak hour, if there were an alternative north-south connection that crossed the river in west Brantford.

Figure 4-43: Paris Road (south of Highway 403) PM Peak Hour Trip Distribution - NW Brantford to SW Brantford – Southbound

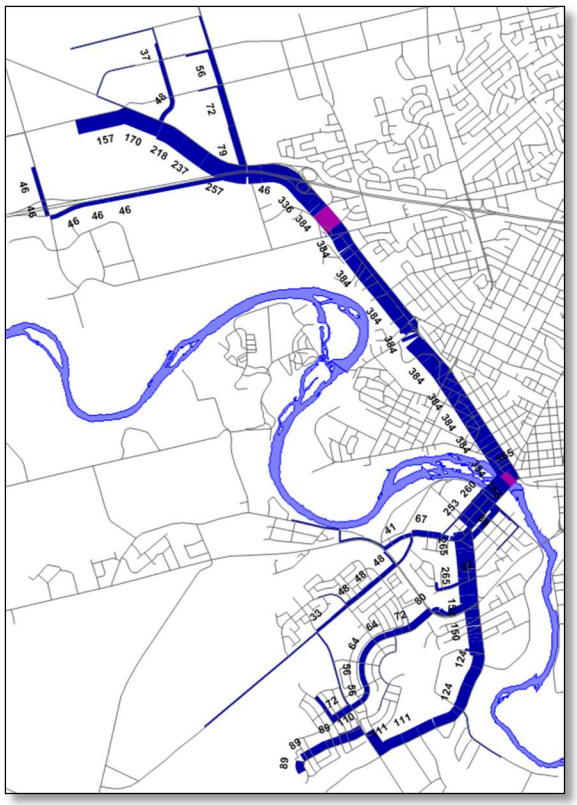
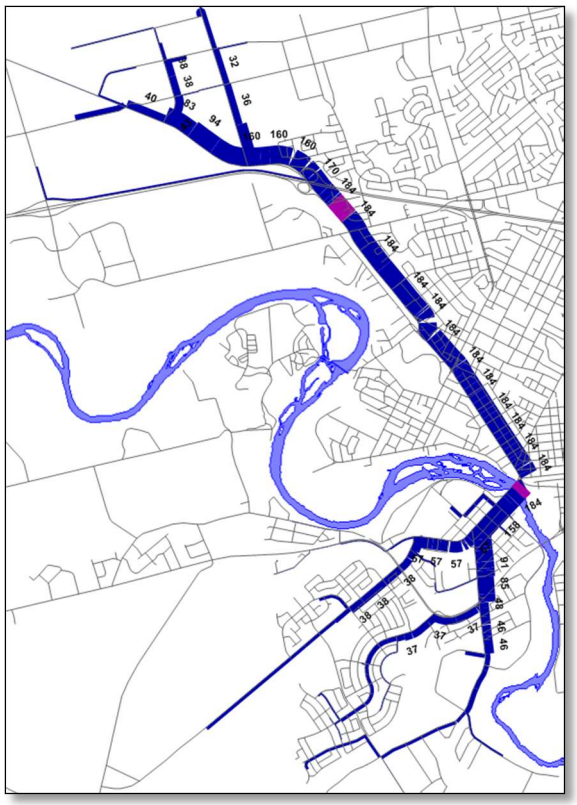


Figure 4-44: Paris Road (south of Highway 403) PM Peak Hour Trip Distribution - SW Brantford to NW Brantford – Northbound



The lack of a direct connection between Northwest Brantford (commercial/industrial) and Southwest Brantford (residential) results in a significant number of vehicles traveling between these two areas using Paris Road towards downtown in order to cross the Grand River. Hardy Road is also an alternative but is constrained by its Right of Way and the at grade rail crossing west of Paris Road.

4.3.9.3 Alternatives

The alternative solutions to the identified capacity constraint for Paris Road south of Highway 403 are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

Currently there is an existing sidewalk on the east side of Paris Road from Terrace Hill Street to Hardy Road / Tollgate Road. From Hardy Road /Toll Gate Road to approximately 230 m north of the intersection, sidewalks are available on both sides of the road. From that point north to a point 50 m south of Seneca Crescent the sidewalk is provided on the west side only.

There are no current provisions on this section of roadway for cyclists. It should be acknowledged that Ava Avenue, which run parallel to Paris Road between Hardy Road and Brant Avenue, is a signed bike route but is separated from Paris Road by a railway corridor. This physical barrier between the two roadways limits opportunity for active transportation demand on Paris Road to use Ava Avenue as an alternative.

Consistency in the active mode provisions through the corridor would enhance the user experience and provide better connectivity for pedestrians and cyclists. The provision of sidewalks or multi-use path on each side of the roadway, with logical start and end points, would be more efficient. A multi-use path on the west side from Hardy Road / Toll Gate Road to Terrace Hill and Brant Avenue would provide a significantly improved active mode environment.

A combination of some, or all of these TDM measures could increase Active Transpiration use along the Paris Road corridor and help to reduce auto demand.

Transit

Paris Road south of Highway 403 is served by one Brantford transit route: Route 8 (Holmedale Mayfair). Transit service enhancement in the form of bus route additions or modifications has the potential to improve the Paris Road transit share from 12% today to 40% in the future. This increase in mode share would result in an approximate 300 vehicle reduction on Paris Road during the peak hours.

Transportation System Management

Paris Road south of Highway 403 is a 4-lane roadway to St Paul Avenue (a distance of 3 km) with only one signalized intersection, at Hardy Road/Toll Gate Road. Auxiliary lanes are provided at key intersections with the NS-E Highway 403 ramp, Hardy Road/Toll Gate Road, Terrace Hill Street, and St Paul Avenue. As Paris Road parallels the rail corridor for most of this section, access to and from Paris Road is from the east side only. The overpass just south of Terrace Hill Street provides uninterrupted

flow across the rail line. Given these conditions, Paris Road is an extremely attractive road for travel with very little more than can be done from a TSM perspective.

The best TSM option is for a continuous southbound left turn lane to be provided between Hardy Road /Toll Gate Road and the Terrace Hill Street. With the rail corridor on the west side of the road there is available space for the 4 m widening that would be required, without impacting utilities.

Increase Infrastructure

Paris Road Widening

As Paris Road south of Highway 403 is only just approaching capacity, there is not a compelling reason to add an additional lane of capacity in each direction. Such a widening would have significant impacts in on utilities (i.e. relocation).

Oak Park Road Extension

As identified in ***Figure 4-43***, approximately 350 vehicles use Paris Road in the PM peak hour for north-south travel to connect across the river into Southwest Brantford. The extension of Oak Park Road to Colborne Street West would provide a north-south connection in West Brantford and an additional crossing of the Grand River. As described in previous sections, the traffic in the north-south corridor is traveling between northwest Brantford / Paris area and southwest Brantford is forced to travel east towards downtown Brantford in order to cross the Grand River only to travel back to the west to reach their destination. The diversion of these trips from Paris Road would provide relief to Paris Road south of Highway 403.

This alternative will reduce demand on Paris Road. However, the reduction in demand will likely be offset (at least be partially) by demand that is using Ava Road and others local routes that may be impacted by Paris Road congestion.

Conclusion

The preferred alternative for addressing the 2041 capacity issue on Paris Road south of Highway 403 is as follows:

- City Wide TDM – improved transit service in the City will result in some benefit to Paris Road, especially south of Hardy Road/Toll Gate Road;
- Corridor TDM - Provide improved active mode environment (sidewalk / MUP) on each side of the road with logical start and end points;
- Corridor TSM – provide a center southbound left turn lane to provide a safe environment for vehicles accessing/egressing Paris road to/from the residential areas to the east; and
- Increase Infrastructure – provide new facility and river crossing connecting Oak Park Road to Colborne Street West.

4.3.10 Powerline Road - Paris Road to Wayne Gretzky Parkway

4.3.10.1 Problem

Powerline Road between Paris Road and Wayne Gretzky Parkway is forecast to experience significant growth in traffic volumes (***Figure 4-45***) as a result of the urban expansion to the north, with the section west of King George Road expected to see the highest traffic volumes (due to mix of residential and employment lands). Overall, the majority of Powerline Road, in the PM peak hour, is forecast to be approaching capacity or over capacity in 2041, as illustrated in ***Figure 4-46***.

Figure 4-45: Powerline Road – Paris Road to Wayne Gretzky Parkway: 2041 PM Peak Hour Volumes

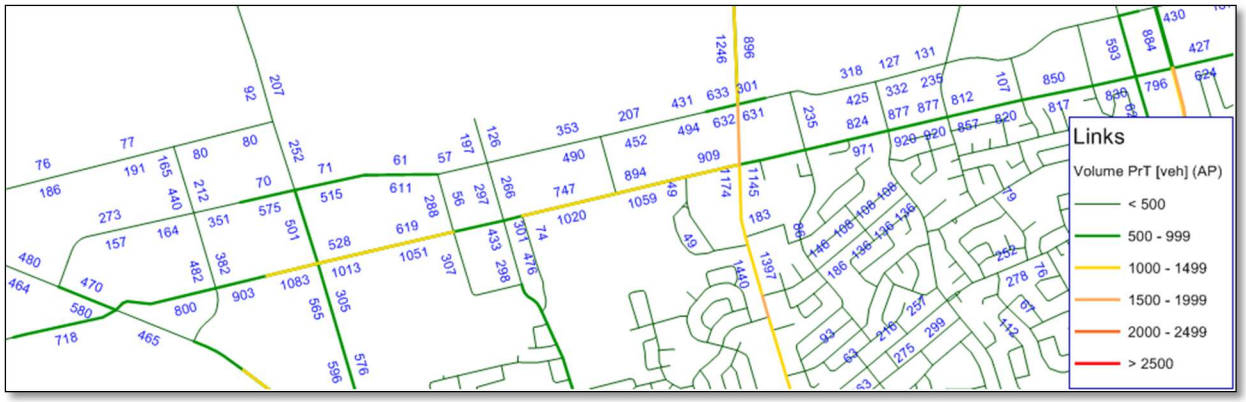
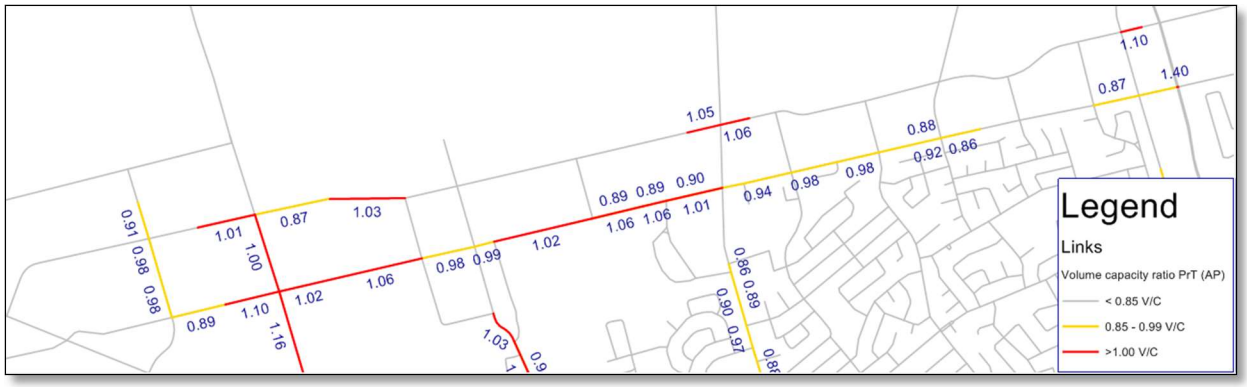


Figure 4-46: Powerline Road – Paris Road to Wayne Gretzky Parkway: 2041 PM Peak Hour V/C Ratios



Powerline Road between Paris Road and Wayne Gretzky Parkway has considerable auto demand in both directions, however the critical direction during the PM peak hour is eastbound. The eastbound capacity constraints on Powerline Road are indicative of an emerging issue and fluctuate between intersections. Westbound volumes on Powerline Road are not forecast to exceed capacity, but some sections will experience delays.

4.3.10.2 Assessment

The capacity issues on Powerline Road appear to be strategic and operational in nature.

From a strategic perspective, there are significant residential and commercial/industrial developments forecast for the lands north of Powerline Road that are generating significant traffic volumes. These trips are originating from / destined to the north and south. Powerline Road provides the east-west connectivity to the major north-south routes that connect to Cambridge, Paris, Downtown Brantford, and Highway 403 (for more interregional connections to the GTA and London areas).

Figure 4-47 and ***Figure 4-48*** (eastbound and westbound respectively) illustrate the trip distribution patterns that demonstrate the corridor specific nature of the demand issues on Powerline Road. ***Figure 4-47*** highlights the significant demands originating from commercial/industrial developments. While ***Figure 4-48*** highlights the significant demands destined to the residential developments.

Figure 4-47: Powerline Road PM Peak Hour Trip Distribution – Eastbound

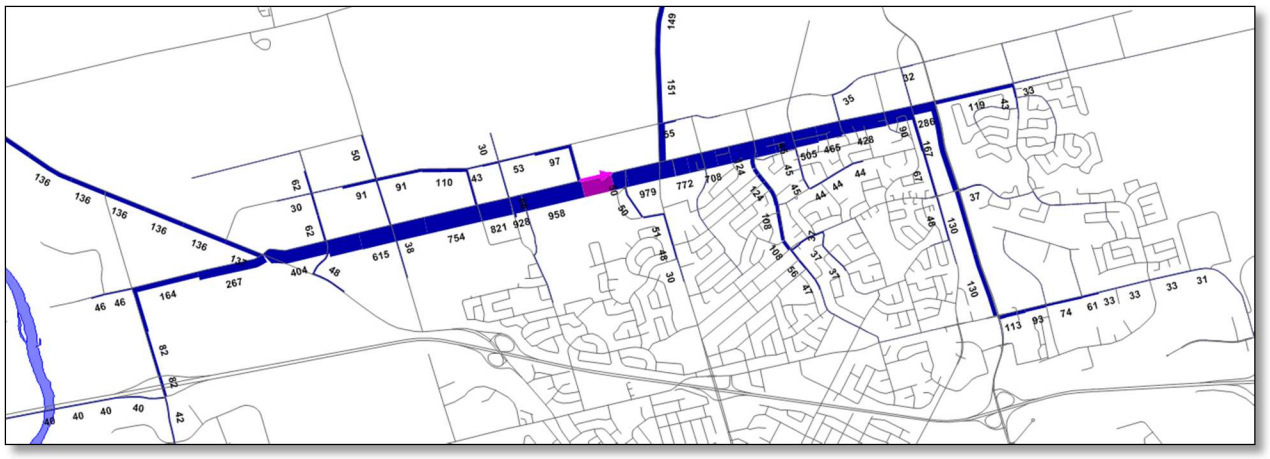
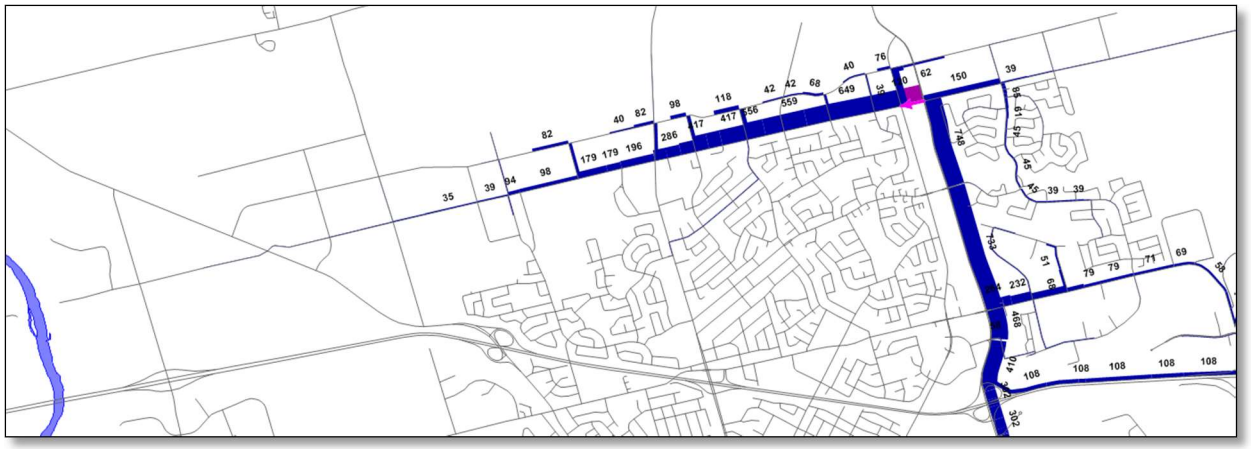


Figure 4-48: Powerline Road PM Peak Hour Trip Distribution – Westbound



4.3.10.3 Alternatives

The alternative solutions to the identified capacity constraint for Powerline Road are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Based on the distribution patterns and the short length of trips that are internal to Brantford, there is opportunity for implementing/increasing Transportation Demand Management (TDM) measures within the Powerline Road corridor. Increasing TDM in the Powerline Road corridor would reduce auto demand and could alleviate some of the forecasted congestion.

Active Transportation

Currently Powerline Road is a rural roadway that is predominantly void of pedestrian and/or cycling infrastructure. It does, however, have two sections with an in-boulevard multi-use path (the Powerline Trail) on the south side of the road. One section is between King George Road and Rosedale Estates (422 Powerline Road) and the other is between Wayne Gretzky Parkway (where it connects to the Wayne Gretzky Parkway Trail) and Brantwood Park Road (where it connects to a bicycle route and sidewalks).

Given the anticipated cross section, classification of the roadway (major arterial) and the anticipated truck traffic, it is unlikely that cyclists would consider traveling on Powerline Road. Completing the missing sections of the existing Powerline Trail would provide a safe active transportation facility that would significantly improve the corridor from an active transportation perspective. This trail would provide a safe All Ages and Abilities (AAA) east-west cycling and walking corridor that would connect to the Wayne Gretzky Parkway Trail, an AAA north-south cycling and walking corridor. This significant addition in continuous kilometrage of AAA Trail will encourage more trips to be made by bicycle and on foot. Coordination between transportation and utility agencies will be require to overcome corridor constraints.

Additional enhancement could include: additional and/or enhanced (covered) bike parking at major destinations and transit stops, a bicycle repair station and Cross-rides at all signalised intersections on the multi-use path. Commercial business should also be encouraged to provide bike racks and larger employers should also be encouraged / incentivised to provide end of trip facilities. This could include secure bicycle parking, change rooms with showers and lockers and other amenities like pumps.

A combination of some, or all of these TDM measures could increase Active Transpiration use along the Powerline Road corridor and help to reduce auto demand.

Transit

Transit service enhancement in the form of bus route additions has the potential to improve the Powerline Road transit share from 0% today to 25% in the future. This increase in mode share would result in an approximate 200-300 vehicle reduction on Powerline Road during the peak hours.

Currently there are no Brantford Transit routes that service the planned residential and employment areas on the north of Powerline Road as they do not currently exist. However, the 2041 'Do-Minimal' model assumes the equivalent of basic transit service mode shares equal to comparable residential and employment zones south of Powerline Road. These mode shares, coupled with the existing route structure do not directly connect where people are coming from and going to. Providing an east-west transit route that connected the planned development commercial/industrial development to Brantford Commons and the existing neighbourhoods south of Powerline Road would encourage transit use along the Powerline Road corridor. Any increase in transit within the Powerline Road corridor would help reduce auto demand.

Transportation System Management

Currently Powerline Road is a two-lane rural road. Upgrades to the road are required to urbanize and provide appropriate traffic control at mid-block locations between major arterials (signalized today). With the move to an urban cross section, appropriate auxiliary lanes, or use of roundabouts as per current policy should be provided to maximize the efficiency of the basic lanes.

Increase Infrastructure

Powerline Road Widening

Widening Powerline Road from 2 lanes to 4 lanes between Paris Road and Wayne Gretzky Parkway would provide the additional capacity that is required to meet 2041 demands. Given the classification of the roadway (major arterial), the growth in residential and commercial/industrial development, and the anticipated truck traffic associated with commercial/industrial development, the widening of Powerline Road is critical.

As the growth in auto trips (volume) on Powerline Road is directly related to the adjacent future development, alternative corridors would not address the basic transportation need fulfilled by Powerline Road.

Conclusion

The preferred alternative for addressing the 2041 capacity issue on Powerline Road between Paris Road and Wayne Gretzky Parkway is as follows:

- City Wide TDM – new transit routes are need to extend transit service into the urban expansion area;

- Corridor TSM – TSM initiatives need to be incorporated into the redesign of the road to an urban cross section (intersection control, auxiliary lane provisions, traffic signal coordination, roundabouts where feasible); and
- Increase Infrastructure – widen and urbanize Powerline Road to provide a basic 4-lane cross section from Paris Road to Coulbeck Road.

4.3.11 Hardy Road - Ferrero Boulevard to Paris Road

4.3.11.1 Problem

Hardy Road between Ferrero Boulevard to Paris Road is forecast to experience significant growth in traffic volumes by 2041 (***Figure 4-49***). The increases in peak hour traffic volumes are a result of the planned development within the Oak Park Road corridor and Northwest Business Park. Overall, the eastern section of Hardy Road is forecast to be approaching capacity in 2041, as illustrated in ***Figure 4-50***.

Figure 4-49: Hardy Road – Ferrero Boulevard to Paris Road: 2041 PM Peak Hour Volumes

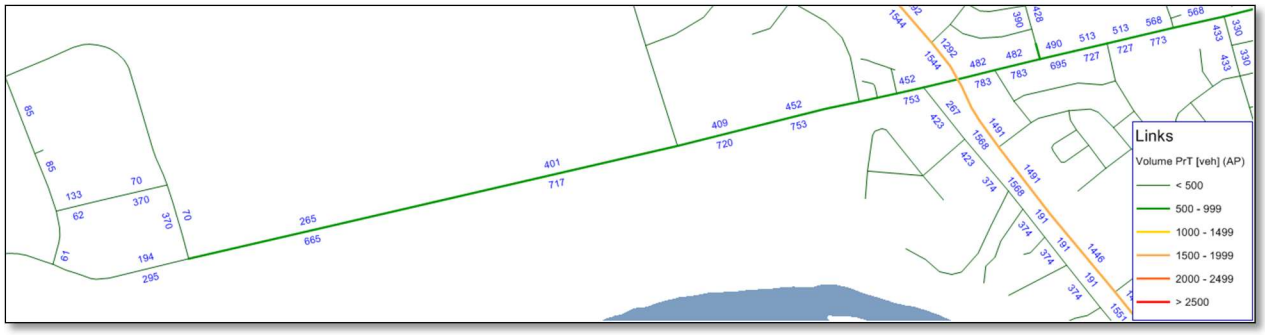
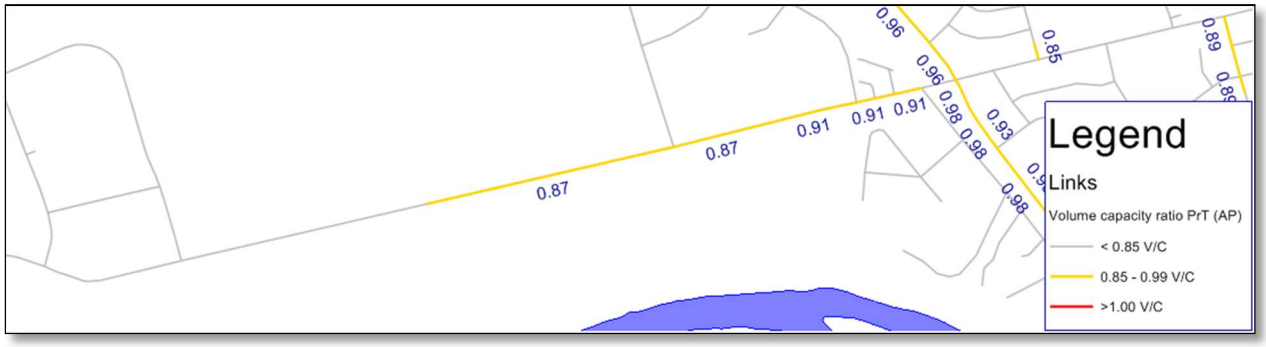


Figure 4-50: Hardy Road – Ferrero Boulevard to Paris Road: 2041 PM Peak Hour V/C Ratios



Hardy Road between Ferrero Boulevard to Paris Road has considerable auto demands in the eastbound direction with peak hour volume to capacity ratios reaching 0.91. Westbound volumes on Hardy Road are not forecast to approach capacity, with the busiest section (east of Golf Road) using less than 60% of the available capacity.

4.3.11.2 Assessment

The capacity issues on Hardy Road between Ferrero Boulevard to Paris Road are strategic in nature. The lack of a direct connection between Northwest Brantford (commercial/industrial) and Southwest Brantford (residential) is the main generator of growth in traffic as it provides a connection to Paris Road/Brant Avenue to connect the two areas. ***Figure 4-51*** and ***Figure 4-52*** (eastbound and westbound respectively) illustrate the number and distribution of vehicle trips that are using Hardy Road to get to Paris Road in order to travel between Northwest Brantford and Southwest Brantford. Approximately 100 eastbound vehicle trips and 50 westbound vehicle trips in the PM peak hour could be diverted away from Hardy Road if there were an alternative north-south connection that crossed the river in West Brantford.

Figure 4-51: Hardy Road PM Peak Hour Trip Distribution - NW Brantford to SW Brantford – Eastbound

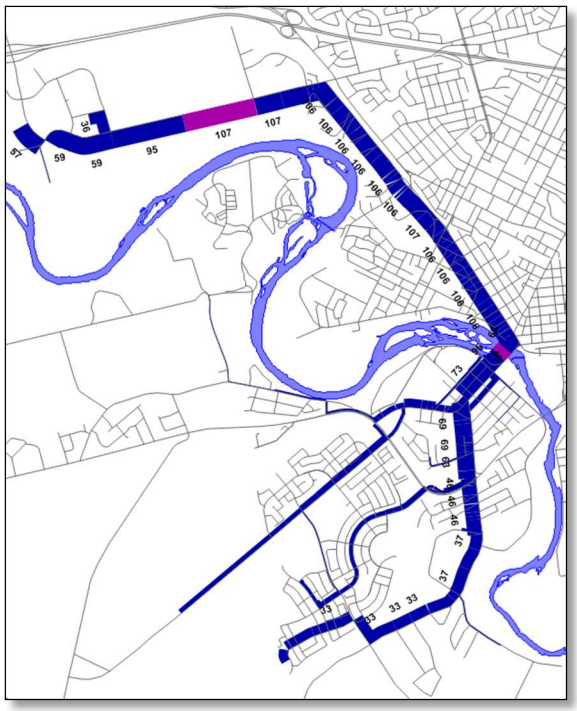
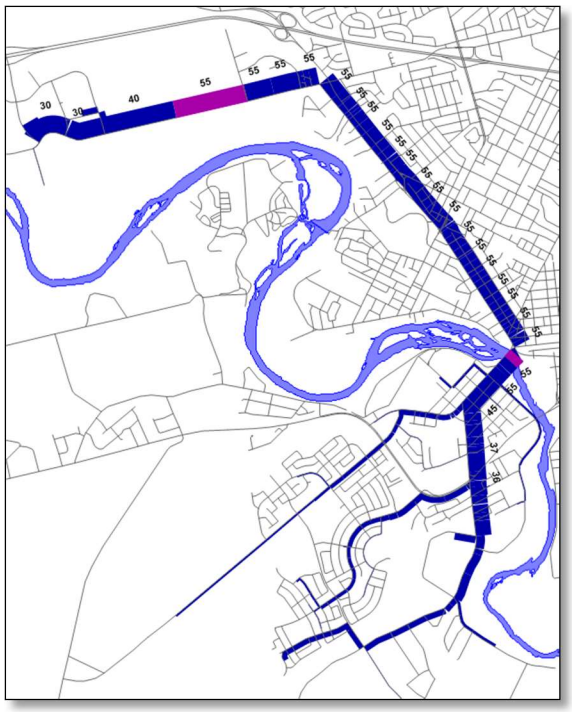


Figure 4-52: Hardy Road PM Peak Hour Trip Distribution - SW Brantford to NW Brantford – Westbound



4.3.11.3 Alternatives

The alternative solutions to the identified capacity constraint for Hardy Road are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

Currently there is an existing sidewalk on the north and south side of the short section of Hardy Road from Paris Road to Ava Road. Westerly from Ava Road to St. Andrews Drive there is a sidewalk on the north side. West of St. Andrews Drive to Oak Park Road, no sidewalk is provided.

A 1.8 m bike lane is provided on each side of the road between St. Andrews Drive and Oak Park Road. There are areas along this rural stretch of road where the width of these lanes varies and the quality of the pavement is below standard.

Hardy Road volumes are expected to increase significantly in the long term and while it may remain a rural cross section, its role in connecting the Northwest Industrial Park Area to the existing residential areas to the east will magnify. The provision of improved facilities (wider bike lane with improved buffer and pavement) will enhance the user experience and promote/facilitate increased use by active modes.

Transit

Hardy Road is currently served by one Brantford transit route: Route 8 (Holmedale Mayfair). Transit service enhancement in the form of bus route additions or enhancement has the potential to improve the transit mode share from 18% today to 55% in the future. While 55% is a very high mode share, this is based on future ridership targets that would conceivably be split over two corridors (i.e. Hardy Road and future Oak Park Road extension). This increase in mode share would result in an approximate 200-300 vehicle reduction on Hardy Road during the peak hours.

Transportation System Management

Hardy Road from Paris Road to Ferrero Boulevard is approximately 2.5 km of uninterrupted arterial flow. On-road bike lanes are provided in both directions, adjacent to intermittent paved and unpaved, narrow shoulders.

An upgrade of the road to provide wider bikes lanes and wider formal paved shoulders throughout would provide for a more comfortable user experience for all modes. This would also improve the efficiency of the existing two vehicle lanes.

Increase Infrastructure

Hardy Road Widening

Widening Hardy Road to 2-lanes in each direction would address the emerging long-term capacity issue. However, this widening would have significant impacts on property, utilities (i.e. relocation), and the adjacent natural heritage system. As well, the CN rail crossing is a potential constraint to capacity and costs for improvements (as grade separation may be required at the crossing).

As the roadway is only just approaching capacity (marginal issue), there is not a compelling reason to add an additional lane of capacity in each direction. In addition, the capacity of Hardy Road is constrained by the capacity of the intersection with Paris Road.

Oak Park Road Extension

From the forecasts, it is estimated that approximately 15-20% of the future volume on Hardy Road originates from or is destined to southwest Brantford via Paris Road/Brant Avenue/Lorne Bridge. The extension of Oak Park Road to Colborne Street West would provide a north-south connection in West Brantford and an additional crossing of the Grand River. This route would have the potential to reduce the volume on Hardy Road to an extent that would mitigate the emerging long term capacity issue.

Conclusion

The preferred alternative for addressing the 2041 capacity issue on Hardy Road between Ferrero Boulevard and Paris Road is as follows:

- City Wide TDM – improved transit service in the City to promote transit mode will benefit the Hardy Road Corridor;
- Corridor TDM – widened / improve bike lanes;
- Corridor TSM – wider formal paved shoulders will improve the safety and efficiency of the available travel lanes; and
- Increase Infrastructure – provide new facilities for all travel modes and Grand River crossing connecting Oak Park Road to Colborne Street West.

4.3.12 Erie Avenue - Veterans Memorial Parkway/Clarence Street South to Birkett Lane

4.3.12.1 Problem

Erie Avenue provides both a local and regional function. Locally, Erie Avenue is the main north-south corridor in South Brantford, providing a connection between Eagle Place and the rest of Brantford, while regionally it provides a connection to/from Brant County as one of only three roadways within the City of Brantford that cross the Grand River. Many sections of Erie Avenue between Veterans Memorial Parkway and Birkett Lane are forecast to have significant auto volumes and to be approaching capacity in 2041, as illustrated in ***Figure 4-53*** and ***Figure 4-54*** respectively.

Erie Avenue between Veterans Memorial Parkway and Birkett Lane is forecast to have modest auto demand in both directions, reaching highs of roughly 600 to 800 vehicle trips, however the critical direction during the PM peak hour is southbound. Overall, the capacity constraints forecast for Erie Avenue are only indicative of an emerging issue (potential), as 2041 forecast volumes do not generally exceed capacity, and tend to decrease to the south towards Brant County.

Figure 4-53: Erie Avenue – Veterans Memorial Parkway/Clarence Street to Birkett Lane: 2041 PM Peak Hour Volumes

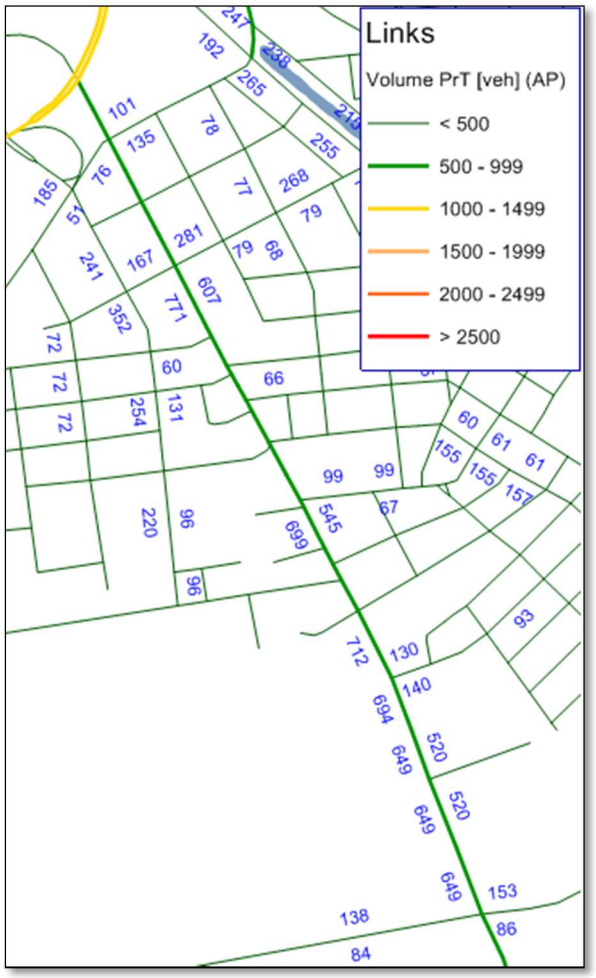
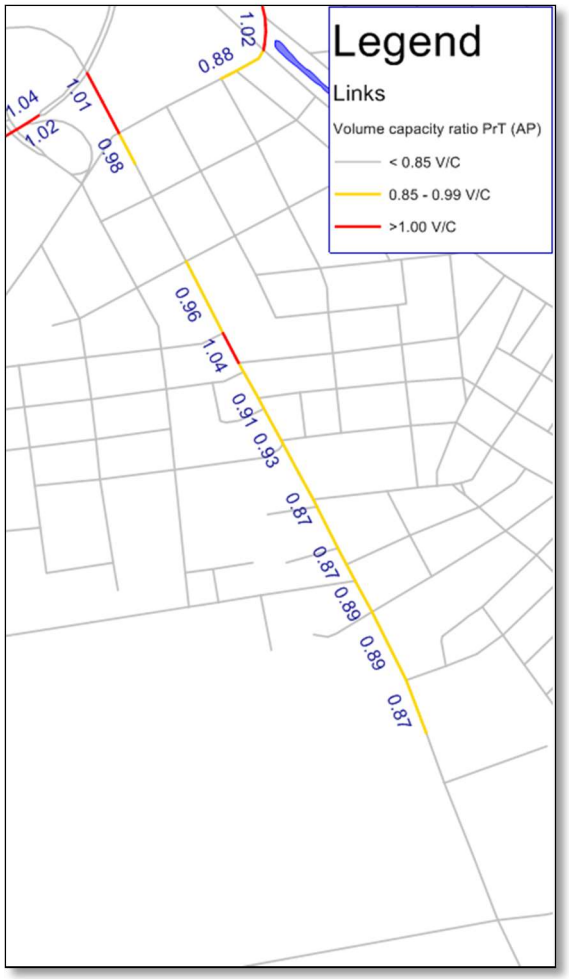


Figure 4-54: Erie Avenue – Veterans Memorial Parkway/Clarence Street to Birkett Lane: 2041 PM Peak Hour V/C Ratios



4.3.12.2 Assessment

The capacity issues on Erie Avenue between Veterans Memorial Parkway and Birkett Lane appear to be both strategic and localized in nature. Strategically, there is a lack of both the number of crossings and overall capacity crossing the Grand River. This has put significant demand pressures (i.e. delay) on the two main river crossings; Colborne Street (Lorne Bridge) and Veterans Memorial Parkway. As a result, Erie Avenue has become the fastest way for many trips to cross the river, even if this adds length to the overall trip, especially in the long-term growth scenario to 2041. ***Figure 4-55*** and ***Figure 4-56*** (southbound and northbound respectively) illustrate the distribution patterns of vehicle trips that are using Erie Avenue between Veterans Memorial Parkway and Birkett Lane simply to cross the Grand River. Approximately 50% of the volume on Erie Avenue is longer distance travel to/from the south of

the City from/to downtown and central Brantford (Wayne Gretzky Parkway corridor via Clarence Street and West Street).

Figure 4-55: Erie Avenue – Veterans Memorial Parkway/Clarence Street South to Birkett Lane: PM Peak Hour Trip Distribution – Southbound

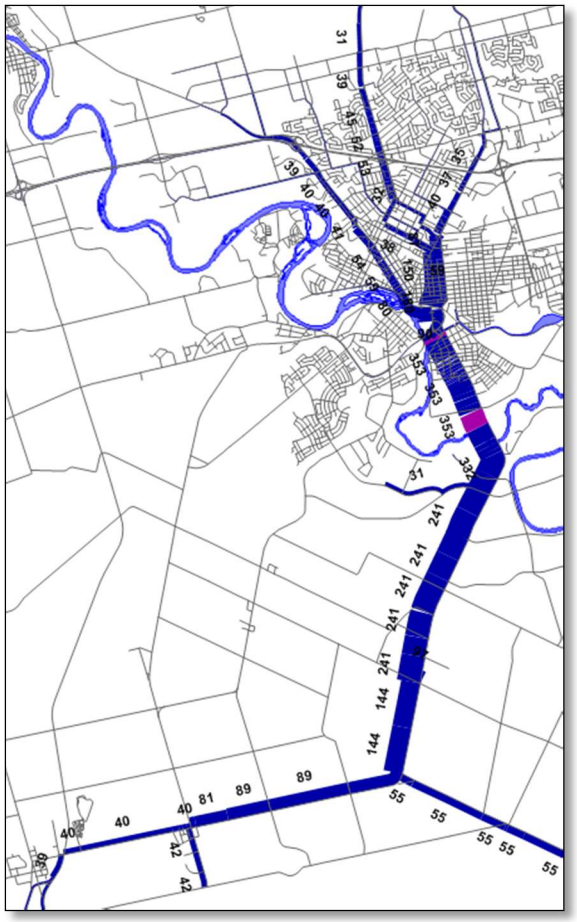
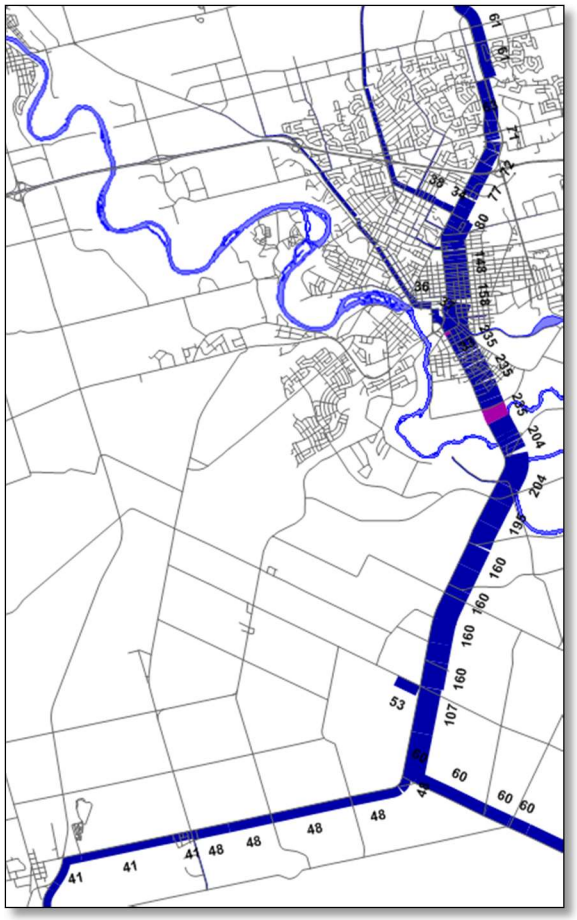


Figure 4-56: Erie Avenue – Veterans Memorial Parkway/Clarence Street South to Birkett Lane: PM Peak Hour Trip Distribution – Northbound



The remaining 50% of the demand is local Eagle Place travel. Erie Avenue is the main north-south corridor in south Brantford, providing the connection between Eagle Place and the rest of Brantford via Clarence Street South. Eagle Place is planned to experience significant population growth, particularly in the Erie Avenue corridor. This growth will generate and attract additional trips and as Eagle Place is predominantly residential, most of these trips will be southbound (during the PM peak hour) as many residents are returning home at the end of the work day.

4.3.12.3 Alternatives

The alternative solutions to the identified capacity constraint for Erie Avenue are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Based on the distribution patterns and the short length of trips that are internal to Brantford, there is opportunity for implementing/increasing Transportation Demand Management (TDM) measures within the Erie Avenue corridor. Increasing TDM in the Erie Avenue corridor would reduce auto demand and could alleviate some of the forecasted congestion.

Active Transportation

Currently Erie Avenue has sidewalks on both sides of the street between Birkett Lane and Market Street, bike lanes from Birkett Lane to Strathcona Avenue and is signed as a Bike Route from Cayuga Street to Market Street. Given the classification of the roadway (minor arterial) and the anticipated truck traffic, the current active transportation infrastructure does a good job accommodating all pedestrians but the cycling facilities on Erie Avenue only accommodates strong and confident cyclists.

Completing the missing section of the existing Erie Avenue bike lanes (sections of which are currently underway) and upgrading the entire corridor to a protected facility would provide a safe active transportation facility that would significantly improve the corridor from an active transportation perspective. The addition of protected cycling infrastructure would provide a safe All Ages and Abilities (AAA) north-south cycling corridor that would connect two sections of the Dike Trail, an AAA off-road recreation trail, that are currently joined by an “on road connection” that has no formal cycling infrastructure.

This significant addition in continuous kilometrage of AAA cycling infrastructure will encourage more trips to be made by bicycle. Additional enhancement could include: additional and/or enhanced (covered) bike parking at major destinations and transit stops and a bicycle repair station. Commercial business should also be encouraged to provide bike racks and larger employers should also be encouraged / incentivised to provide end of trip facilities. This could include secure bicycle parking, change rooms with showers and lockers and other amenities like pumps. A combination of some, or all of these TDM measures could increase Active Transpiration use along the Erie Avenue corridor and help to reduce auto demand.

Transit

The Erie Avenue corridor is served by one Brantford Transit route: Route 1 (Eagle Place). Transit service enhancement in the form of bus route additions or enhancement has the potential to improve transit mode share from 24% today to 52% in the future (note that this is based on area trip generation rather that link share, as service on Erie Avenue is limited to short section where service crosses over the road). This increase in mode share would result in an approximate 300-400 vehicle reduction from the area during the peak hours.

Transportation System Management

Erie Avenue is classified as a minor arterial road. There are opportunities to enhance its design features to align with the high vehicle demand expected in the long-term future. Currently there are no prohibited turns on Erie Avenue between Veterans Memorial Parkway/Clarence Street South and Birkett Lane. Consideration should be given prohibiting left turns where left turn storage is not provided during the peak periods.

As well, traffic signal coordination could be considered to minimise delay and maximise vehicle flow. This would provide a continuous flow or 'green wave' in the peak direction of travel.

This alternative will improve traffic operations and will slightly increase the overall carrying capacity of the roadway. However, on its own, this alternative will not increase roadway capacity enough to mitigate delays and improve the level of service to an acceptable level.

Increase Infrastructure

Erie Avenue Widening

Providing an additional lane in each direction would address the emerging capacity issue. However, this widening would have significant impacts on property and utilities (i.e. relocation).

As the roadway is only just approaching capacity (marginal issue), there is not a compelling reason to add an additional lane of capacity in each direction.

Veterans Memorial Parkway Widening

The Veterans Memorial Parkway widening and extension (to Murray Street) would provide additional Grand River crossing capacity and alternative east-west connectivity to Murray Street and Wayne Gretzky Parkway. From a review of the volume market (auto trips) for Erie Avenue it was identified that there are relatively few trips that would divert to this facility (approximately 50-100 vehicles, to/from the southwest). Trips destined for central Brantford could easily divert from Erie Avenue to Murray Street or Wayne Gretzky Parkway today by using Mohawk Street. The analysis of long-term volume forecasts suggests that the Veterans Memorial Parkway widening and extension has limited potential to reduce volumes on Erie Avenue.

Conclusion

The preferred alternative for addressing the 2041 capacity issue on Erie Avenue south of VMP/Clarence Street South is as follows:

- City Wide TDM – improved transit service into Eagle Place with connectivity into Central Brantford will provide opportunities for reduction in local vehicle volume on Erie Avenue;
- Corridor TSM – consider peak hour turning movement restrictions at minor roadways and provide auxiliary left turn lanes at significant intersections to improve the efficiency of the available travel lanes;

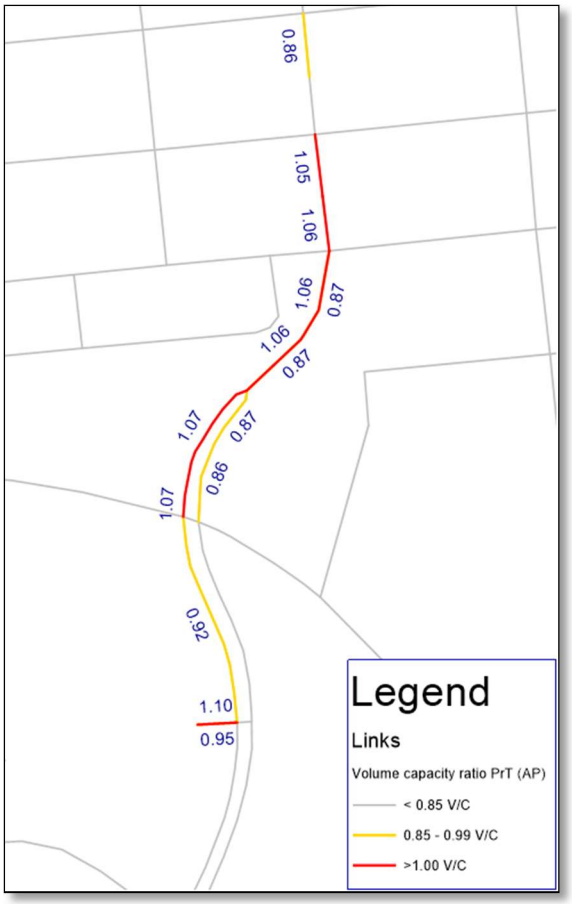
- Increase Infrastructure – widening of Erie Street has significant impacts to property and utilities to address what is considered to be a marginal capacity issue, and is therefore not considered necessary in the 2041 condition; and
- Increase Infrastructure – widening VMP would have system benefits, including a minor benefit to Erie Avenue, however, it is not justified based solely on benefits to Erie Avenue.

4.3.13 Clarence Street/Clarence Street South – Dalhousie Street to Icomm Drive

4.3.13.1 Problem

Clarence Street/Clarence Street South is forecast to be operating at approximately 5-10% over capacity by 2041, as illustrated in ***Figure 4-57***. The critical direction in the PM peak hour is southbound.

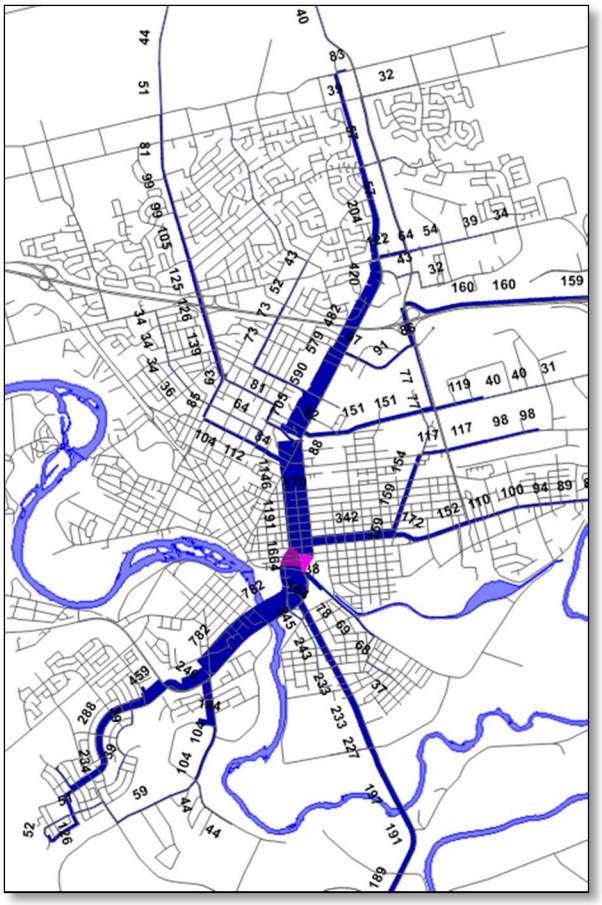
Figure 4-57: Clarence Street/Clarence Street South – Dalhousie Street to Icomm Drive: 2041 PM Peak Hour V/C Ratios



4.3.13.2 Assessment

A majority of trips on Clarence Street/Clarence Street South are travelling from north-central Brantford (i.e. north of Highway 403) to the south side of the river via West Street, as illustrated in ***Figure 4-58***.

Figure 4-58: Clarence Street/Clarence Street South PM Peak Hour Trip Distribution – Southbound



4.3.13.3 Alternatives

The alternative solutions to the identified capacity constraint for Clarence Street are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

Clarence Street, between Icomm Drive and West Street, provides sidewalks on both sides of the road north of Nelson Street. South of Nelson Street sidewalk is only provided on the west side, as rail siding occupies the east side.

West Street is a busy secondary north-south route used by trucks and vehicles as an alternative route to avoid WGP or King George Road when connecting in/out of the downtown. As such it would be a good multimodal connection. To do so would require an improvement of the cross section to provide the road design requirements for a minor arterial that accommodates all modes.

Transit

The Clarence Street corridor is served by one Brantford Transit route: Route 2 (West Street Brier Park). This route provides significant connections between downtown and neighbourhoods north of Highway 403. Clarence Street connect to West Street and the intensification areas, and has good potential to provide enhanced transit connectivity in the future.

Service enhancements in the form of route additions or modifications have the potential to improve the Clarence Street transit mode share from 6% today to 14% in the future. This increase in mode share would result in an approximate 75-100 vehicle reduction on West Street during the peak hours.

Transportation System Management

Clarence Street is classified as a minor arterial road, however, it is forecasted to have high future volumes and the longer distance nature of these trips (connecting from north of Highway 403 to downtown) suggests a role and function more aligned with a major arterial. While its basic cross section is limited by the right of way and the adjacent land use, there are some design features could be enhanced to more closely align with its role and function.

Currently there are few provisions for auxiliary turn lanes. Consideration could be given to either prohibiting specific left turns or providing left turn storage in the form of an auxiliary left turn lane at key intersections.

In addition, traffic signal coordination would minimize delay and maximise vehicle flow. This would provide a continuous flow or 'green wave' in the peak direction of travel.
This alternative will improve traffic operations and will slightly increase the overall carrying capacity of the roadway. This alternative, in combination is likely to provide the required roadway capacity enough to mitigate delays and improve the level of service to an acceptable level to the long term.

Increase Infrastructure

A widening of Clarence Street/Clarence Street South would result in significant property impacts, and would be constrained by the railway spur line on the east side (limiting widening options to the west side).

The Veterans Memorial Parkway extension (to Murray Street) provides an opportunity for an alternative route out of downtown via Murray Street. The TDM and TSM initiatives are expected to resolve the prevailing future capacity concern. However, this situation should be monitored. An extension of the Veterans Memorial Parkway could be considered beyond 2041 to address potential long-term issues and should be protected for as an alternative to Clarence Street/Clarence Street South.

4.3.13.4 Conclusion

The preferred alternative for addressing the 2041 capacity issue on Clarence Street is as follows:

- City Wide TDM – improved transit service on Route 2 will provide opportunities for reduction in local vehicle volume on Clarence Street; and
- Corridor TSM – consider peak hour turning movement restrictions at minor roadways and provide auxiliary left turn lanes at significant intersections to improve the efficiency of the available travel lanes. This condition should be monitored over time to ensure that emerging issue are identified.

4.3.14 Colborne Street West – County Road 7 to D'Aubigny Road

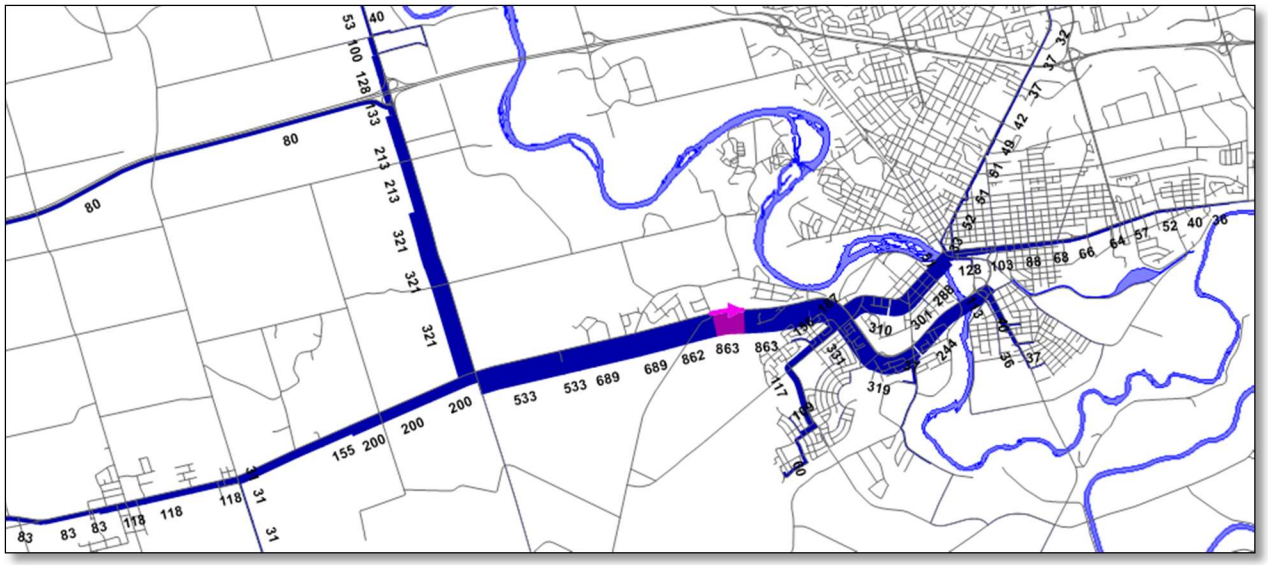
4.3.14.1 Problem

Colborne Street West between County Road 7 and the existing 4-lane section is forecast to be an emerging issue in 2041. The nature of this section's 2 lanes westbound and 1 lane eastbound results in poorer operating conditions in the morning peak hour than the evening peak hour.

4.3.14.2 Assessment

Colborne Street West plays a significant role in moving trips from the west into Downtown Brantford. As Colborne Street connects to the Lorne Bridge, effective opportunities to provide parallel capacity are limited. A majority of trips using Colborne Street are to/from the west via Rest Acres Road to access the downtown, as illustrated in ***Figure 4-59***.

Figure 4-59: Colborne Street West PM Peak Hour Trip Distribution – Eastbound



4.3.14.3 Alternatives

The alternative solutions to the identified capacity constraint for Colborne Street West are described below. They range from small scale policy changes to large scale infrastructure projects. The following describes each alternative.

Travel Demand Management

Active Transportation

Colborne Street West between County Road 7 and D'Aubigny Road is a 3-lane road section with narrow gravel shoulders and no provisions for pedestrians and cyclists. East of D'Aubigny Road the road widens to 2-lanes in each direction and a sidewalk is provided on the south side.

The land use adjacent to the subject section of road is very rural and is likely to continue into the longer term. Pedestrian traffic is likely to continue to be very limited. Provision of a better cycling environment (hard shoulders) would increase the potential for cycling mode in this corridor but is unlikely to significantly affect the auto level of service.

Transit

There are two Brantford Transit routes that service the residential areas in the vicinity of Colborne Street West: Route 5 (West Brant Oakhill) and Route 6 (West Brant Shellard). These routes effectively target residential travel to/from the downtown.

Service enhancements in the form of route additions or modifications have the potential to improve transit mode share from 3% today to 16% in the future. This increase in mode share would result in an approximate 50-75 vehicle reduction on Colborne Street West during the peak hours.

Transportation System Management

The current rural cross section is relatively short within the City limits, with few side street accesses. In the future, the Oak Park Road Extension will potentially access Colborne Street from the north within the subject section. With increased volume, consideration should be given too good intersection control at the new intersection (signalization or roundabout).

Increase Infrastructure

With growth, capacity issues are forecast for Rest Acres Road and Colborne Street accessing the City, requiring the widening of Colborne Street West. With the potential for an Oak Park Road Extension connection and an additional influx of approximately 300-500 peak hour peak direction volumes, the widening of Colborne Street would accommodate the forecast volumes.

4.3.14.4 Conclusion

The preferred alternative for addressing the 2041 capacity issue on Clarence Street is as follows:

- City Wide TDM – improved transit service in southwest Brantford will provide opportunities for reduction in local vehicle volume, and provide cycling facilities (paved shoulder row widen lanes);
- Corridor TSM – consider intersection control (signals or roundabout) at the future intersection with Oak Park Road extension;
- Provide additional eastbound lane to align with 4 lane section east of D'Aubigny Road, The rod should be designed to be consistent with the Complete Street design criteria for a major arterial, including provisions for all modes (including cycling and pedestrian design features).

4.3.15 Overall Combined Improvement Scenario Assessment

The preferred solution network to address the forecast growth of the City to 2041 is a combined scenario that includes the following elements: transit service improvement/enhancements to promote increased transit use; the provision of active mode infrastructure to promote increased cycling and walking; and network infrastructure improvements to address the capacity constraints in the network. This solution results in a network and demand solution that addresses the identified long-term network deficiencies.

The performance of this combined scenario 2041 Recommended Plan shows that almost all of the anticipated roadway capacity issues identified for 2041 Do-Minimal condition (where no long-term investment was made in transit service, active transportation, or infrastructure) are resolved.

Figure 4-60 identifies the few remaining capacity/operational issues in the 2041 Recommended Network while ***Table 4-5*** displays the screenline capacity results in the 2041 Recommended Network. The remaining capacity/operational issues include the Lorne Bridge, Clarence Street South between Icomm Drive and Colborne Street East, and Paris Road. The transportation assessment suggests that while these are identified as capacity constraints in the long term, the magnitude of the issue has been significantly reduced. These issues are now forecast to be marginal and can be successfully managed in the near- and mid-term. These locations should continue to be monitored to identify the significance of any emerging issue.

Figure 4-60: 2041 Recommended Network: Capacity Constraints

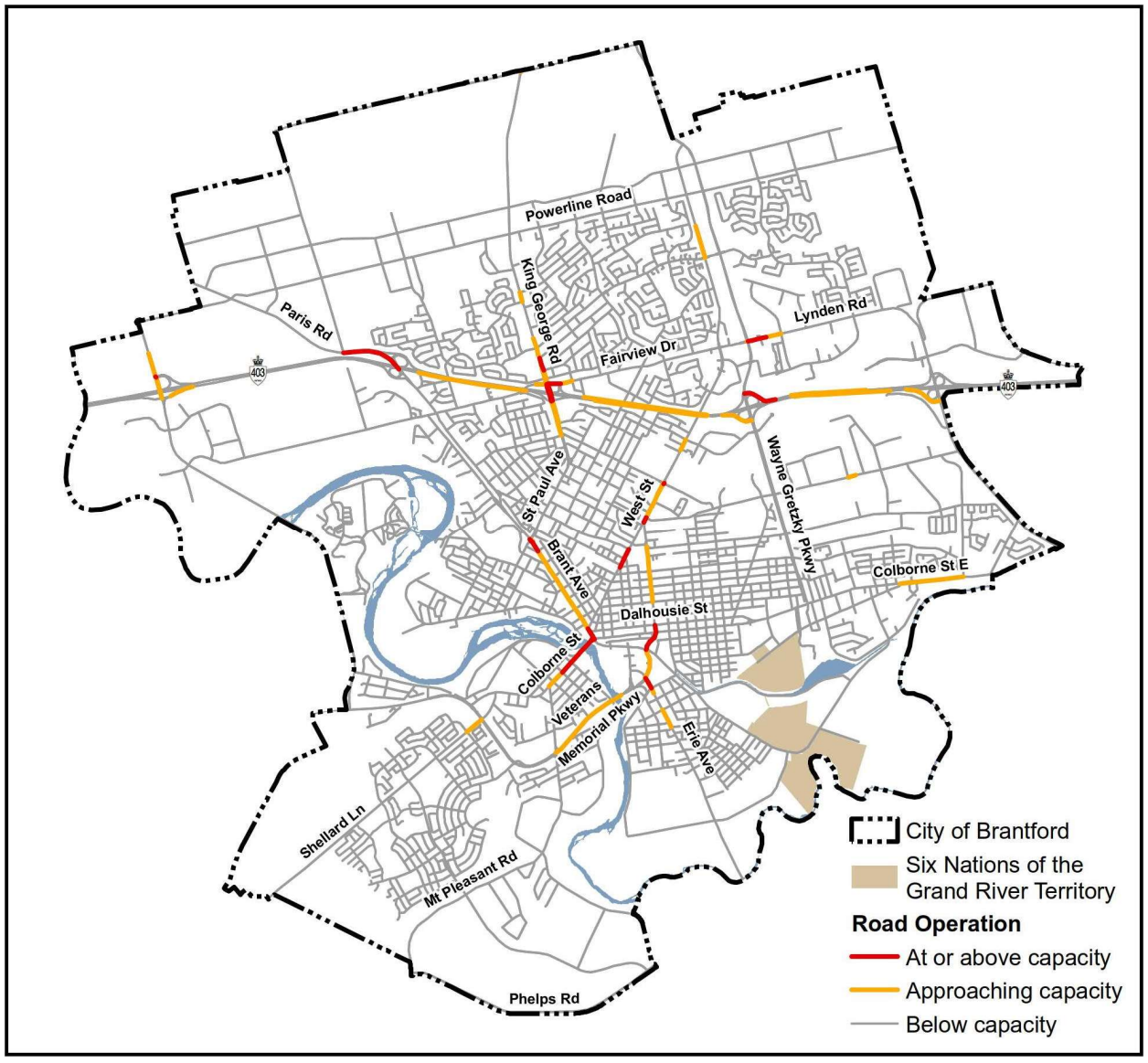


Table 4-5: 2041 Recommended: Screenline Assessment

#	Name	Direction	Capacity		AM Peak Hour		PM Peak Hour	
			Lanes	Total	Volume	V/C	Volume	V/C
1	Grand River South	EB	10	11,100	6,628	0.60	6,199	0.56
1	Grand River South	WB	10	11,100	4,235	0.38	7,408	0.67
2	Grand River North	EB	4	5,200	2,770	0.53	4,114	0.79
2	Grand River North	WB	5	6,000	2,672	0.45	3,524	0.59
3	Highway 403	NB	14	11,800	6,709	0.57	8,565	0.73
3	Highway 403	SB	14	11,800	6,987	0.59	9,137	0.77
4	King George Road	EB	12	10,600	4,961	0.47	7,958	0.75
4	King George Road	WB	12	10,600	6,231	0.59	6,832	0.64
5	Wayne Gretzky Parkway (North)	EB	8	8,600	4,322	0.50	6,035	0.70
5	Wayne Gretzky Parkway (North)	WB	8	8,600	5,117	0.60	5,728	0.67
6	Wayne Gretzky Parkway (South)	EB	6	4,100	1,904	0.46	2,144	0.52
6	Wayne Gretzky Parkway (South)	WB	6	4,100	1,515	0.37	2,765	0.67
7	Memorial Drive	EB	8	5,900	1,635	0.28	3,004	0.51
7	Memorial Drive	WB	8	5,900	2,290	0.39	2,460	0.42
8	West Street	EB	6	4,300	1,875	0.44	2,786	0.65
8	West Street	WB	6	4,300	2,391	0.56	2,913	0.68
9	CNR Corridor	NB	11	7,900	4,109	0.52	4,812	0.61
9	CNR Corridor	SB	11	7,900	3,923	0.50	5,696	0.72
10	Garden Avenue	EB	8	8,000	4,562	0.57	5,349	0.67
10	Garden Avenue	WB	8	8,000	4,291	0.54	5,859	0.73
11	Powerline Road	NB	14	10,700	4,170	0.39	5,834	0.55
11	Powerline Road	SB	14	10,700	4,577	0.43	6,099	0.57
12	Murray Street	EB	7	4,400	1,968	0.45	1,664	0.38
12	Murray Street	WB	8	5,200	1,603	0.31	2,522	0.49
13	West External	EB	7	7,300	1,668	0.23	2,250	0.31
13	West External	WB	7	7,300	1,634	0.22	2,124	0.29
14	South-West External	NB	4	4,300	1,583	0.37	1,157	0.27
14	South-West External	SB	4	4,300	933	0.22	1,713	0.40
15	East External	EB	5	6,900	2,938	0.43	3,444	0.50
15	East External	WB	5	6,900	3,007	0.44	3,643	0.53
16	North-East External	NB	3	3,200	1,340	0.42	1,601	0.50
16	North-East External	SB	3	3,200	1,161	0.36	2,258	0.71
17	North-West External	NB	3	3,300	754	0.23	912	0.28
17	North-West External	SB	3	3,300	785	0.24	933	0.28

Legned:		*V/C Range*	*From*	*To*
X	Good Capacity Conditions		0.00	0.70
X	Approaching Capacity Conditions		0.70	0.85
X	Over Capacity Conditions		0.85	-

Notes: i) For more details on sreeenlines in general please see ***Chapter 2.0.Transportation Impacts of Growth***.

ii) Screenlines are illustrated in ***Figure 2-3*** .

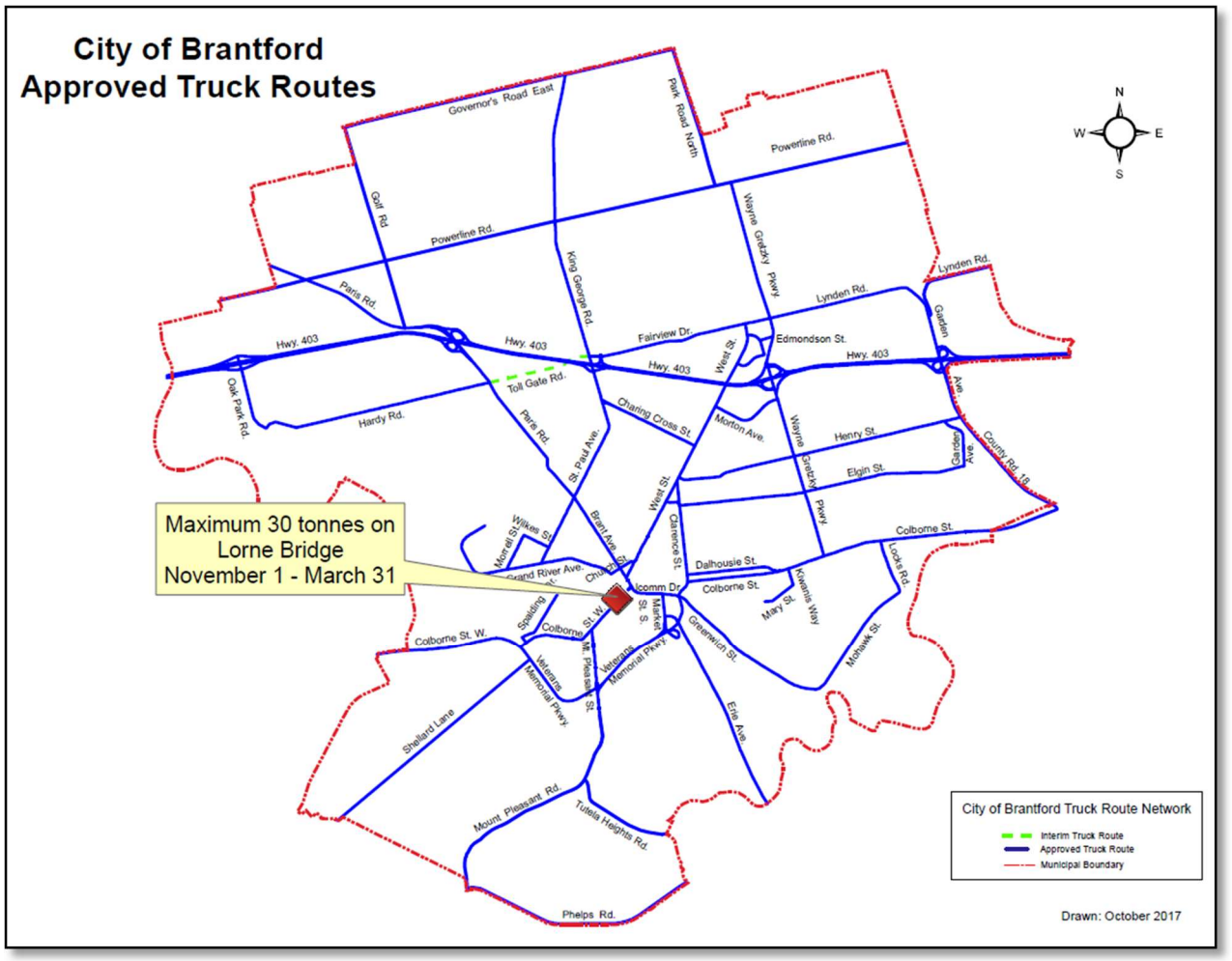
iii) Total (capacity) = the total roadway vehicle capacity of all lanes that cross a particular screenline in a particular direction.

iv) Volume = the total number of vehicles that cross a particular screenline in a particular direction during a particular peak hour.

4.3.16 Goods Movement

The transportation system is not only used for moving people but also for moving goods. It is important that access and mobility for trucks be accommodated in appropriate environments. This means restricting truck movements to roadways and places that are design for them, while still providing access to businesses that require trucking. ***Figure 4-61*** highlights the existing truck route designations. The existing truck routes identified in the City's Traffic By-Law are comprehensive.

Figure 4-61: Existing Truck Routes



4.4 Recommended Plan

4.4.1 Active Transportation

A key objective of the TMP is to work towards becoming a Bicycle Friendly Community by providing a clear, concise roadmap towards a more bicycle friendly future. Achieving this goal is dependent on providing full connectivity and the right environment to promote use and foster confidence in the

system. This means addressing the needs of both recreational and utilitarian users. Full connectivity makes active transportation a feasible choice for any trip in the City. Providing the right space allows users of all skill to feel comfortable and choose routes that satisfy their safety and efficiency concerns by removing barriers to use.

Barriers to active transportation modes include highway crossings, traversing large urban intersections, travelling in close proximity to high volumes of fast moving vehicles, and the lack of user amenities (bike racks, lockers, shower facilities, rest areas).

The existing and proposed cycling and trails network is shown in ***Figure 4-62***. The implementation of this network will add 145 km of additional cycling and trails facilities on to the existing 51 km of on road facilities and 96 km of off road facilities. This network will provide a mix of on-road facilities (bike lanes and shared facilities) and off- road facilities (multi-use path and trails) that provide full connectivity for a full range of origins and destinations, and full range of user types/skills. ***Table 4-6*** summarizes the existing and proposed cycling and trails network by facility type.

As ***Table 4-6*** indicates, the majority of proposed Active Transportation Network changes are focused on on-road facilities. There are a few new multi-use paths / trails as a number of key roads are widened or extended. Overall, this strategy is taken because there is already a strong presence of multi-use paths / trails on non-roadway corridors and few additional corridors are available for exclusive use by Active Transportation use. A decided expansion of the Cycling and Trails Network along the road network is necessary to connect each community.

Sidewalks are incorporated into specific road design, where the cross- section elements have been defined for each roadway functional class to address the needs of all users. These design elements are part of the City's Linear Infrastructure Design Guidelines and have been updated to reflect the enhanced focus on active transportation and allow connection to the City Transit network.

Figure 4-62: Proposed 2041 Cycling and Trails Network

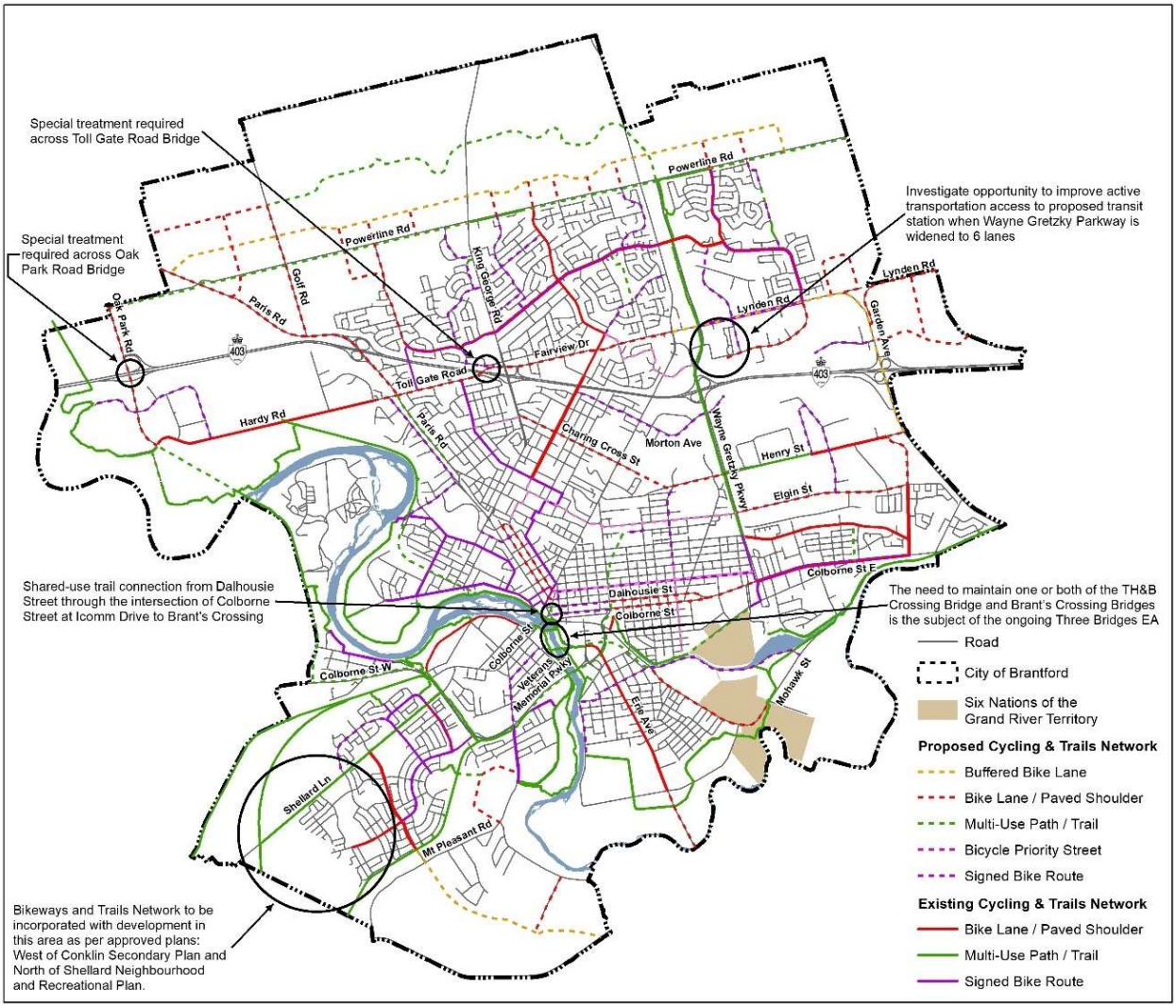


Table 4-6: Proposed 2041 Cycling and Trails Network Summary

Facility Type	Existing Length (centre line km)*	Proposed Length (centre line km)	Future Length (centre line km)
	On-Road		
Buffered Bike Lane	0.0	13.2	13.2
Bike Lane / Paved Shoulder	20.2	61.2	81.4
Bike Priority Street	0.0	10.0	10.0
Signed Bike Route	30.7	30.4	61.1
Sub Total	**50.9**	**114.8**	**165.7**
	Off-Road		
Multi-Use Path / Trail	95.5	30.2	125.7
Sub Total	**95.5**	**30.2**	**125.7**
TOTAL	**146.4**	**145.0**	**291.4**

* Existing lengths were calculated based on available information.

4.4.2 Transit

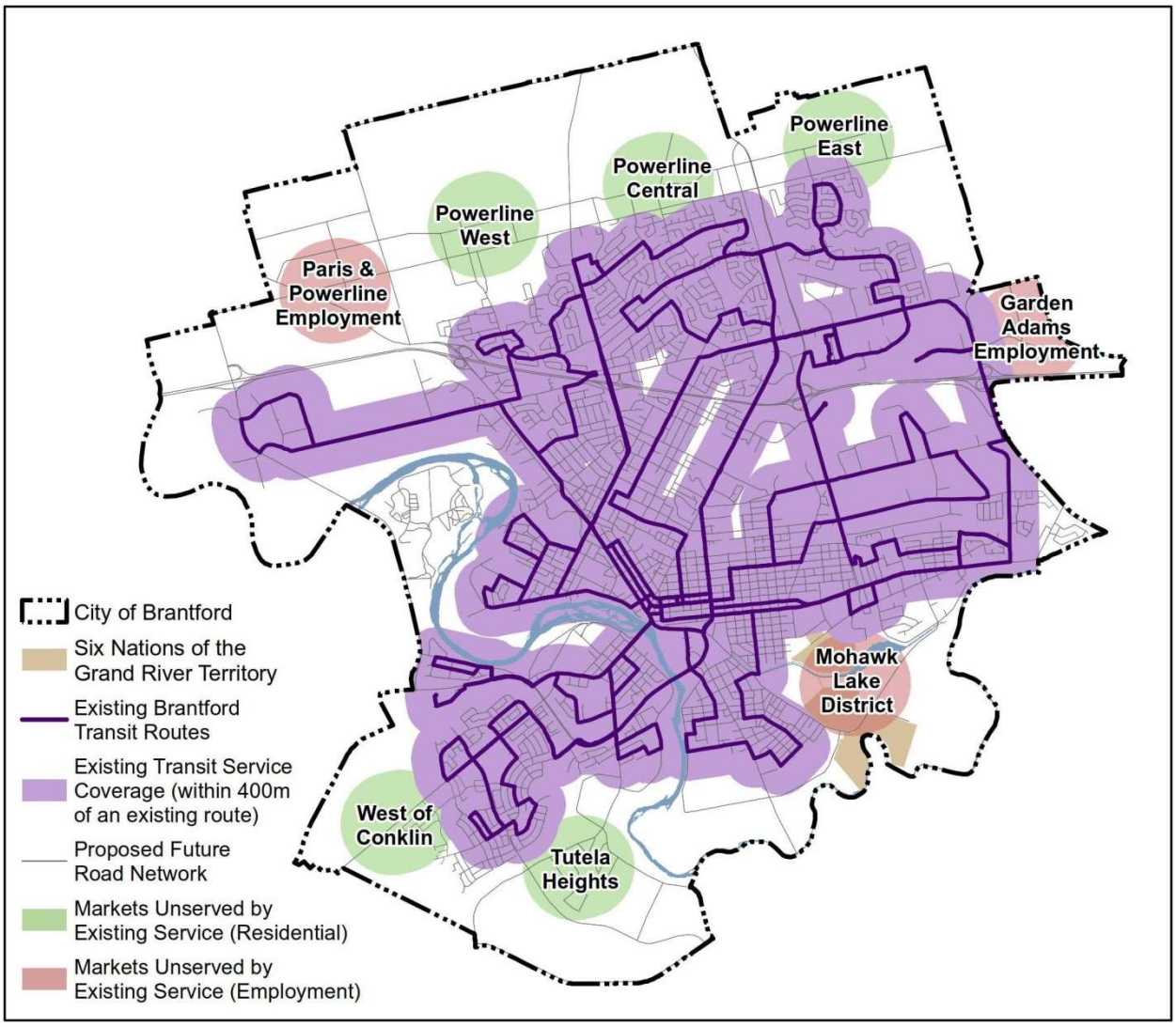
The scope of the Transportation Master Plan is to identify the role, need, and potential impact of the transit system in accommodating growth and moving people. The assessment has quantified the potential for ridership at the City wide and corridor levels.

The objectives with respect to the system coverage and expansion requirements for transit system are identified in ***Figure 4-63***.

The specific implementation plan for transit is provided in the next phase of the TMP (Implementation Plan). The implementation plan will identify the high-level service expansion and strategic service needs. However, with the expansion of transit service it is anticipated that the city fleet will be expanded to approximately 57 vehicles (40 conventional and 17 specialized), representing an increase of 25% in equipment.

The future transit service, routes and operational characteristics will be identified by future studies, i.e. a Transit Master Plan or Transit Operational Study that will provide estimates of the operational hours of services required to maintain the desired level of services throughout the network.

Figure 4-63: Proposed 2041 Transit Service Expansion and Enhancement



4.4.3 Road Network

From the transportation assessment, the roadway classifications and the infrastructure improvements for the 2041 horizon year have been identified as shown on ***Figure 4-64*** and ***Figure 4-65*** respectively.

The enhancements include infrastructure widening on:

- Wayne Gretzky Parkway between Henry Street and Lynden Road;
- Veterans Memorial Parkway between Mount Pleasant and Market Street South;
- Colborne Street West from County Road 7 to the existing 4-lane section;
- Paris Road from Golf Road to Oak Park Road;
- Oak Park Road from Hardy Road to Powerline Road; and
- Powerline Road from Oak Park Road to the City east limits.

New road additions include:

- Oak Park Road extension to Colborne Road West;
- Wayne Gretzky Parkway extension to connect with Park Road; and
- Charing Cross Street extension to Henry Street.

All of the projects identified will require a Schedule B or C MCEA to be completed, which would include significant public/stakeholder consultation, before they can be implemented.

TSM improvements to enhance the existing capacity (through urbanization, parking restrictions, and operational improvements, including roundabout implementation) are proposed for several corridors including:

- Golf Road;
- Paris Road;
- Brant Ave;
- Hardy Road;
- West Street;
- King George Road;
- Erie Avenue;
- Clarence Street/Clarence Street South; and
- County Road 18 (note that this is a County Road. The City will be required to work with the County in determining potential for improvements to the corridor, impacts, and costs).

TSM projects do not require Schedule B/C EA, but this TMP forms the basis for phase 1 and 2 of an EA for individual projects.

Figure 4-64: Roadway Classification

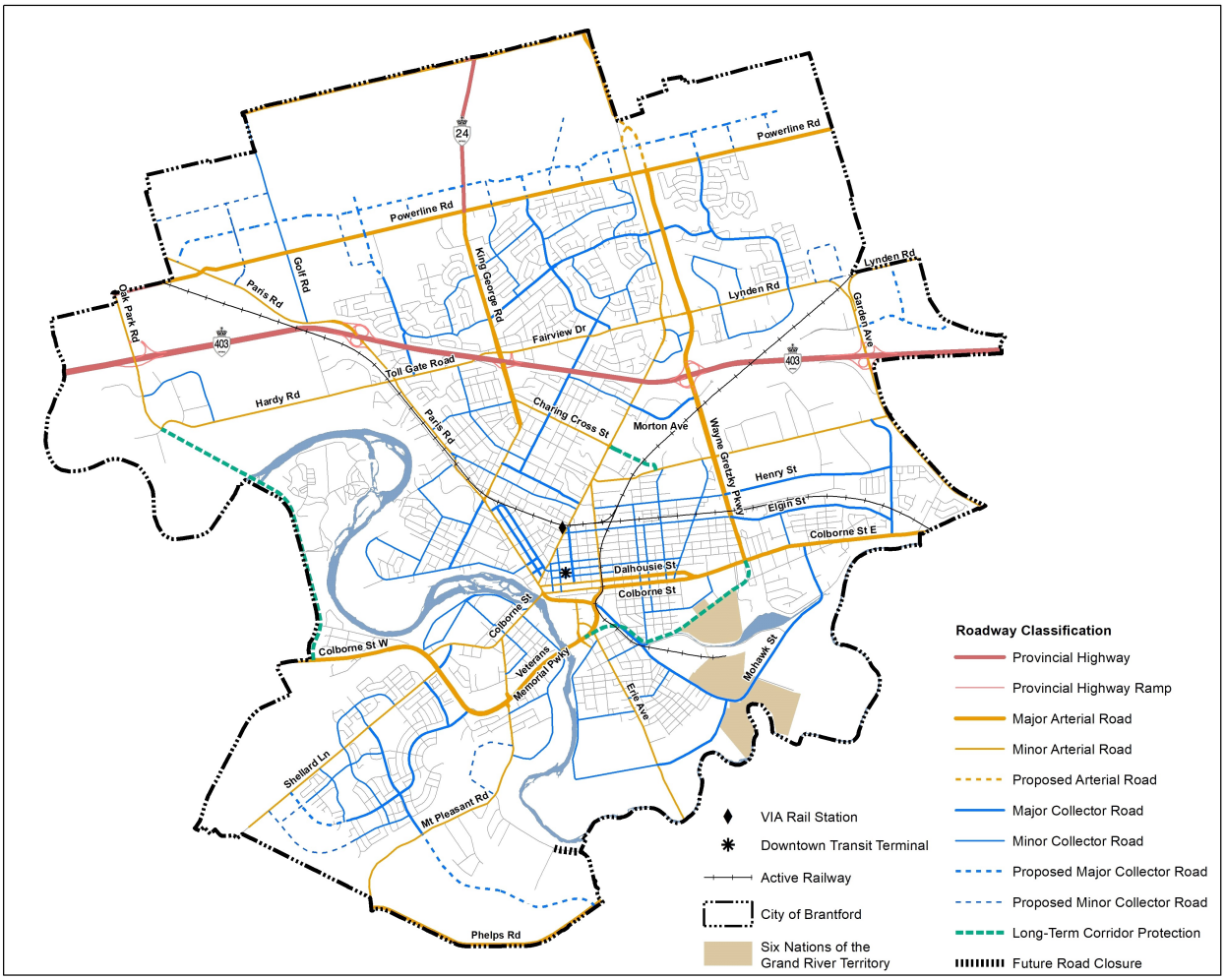
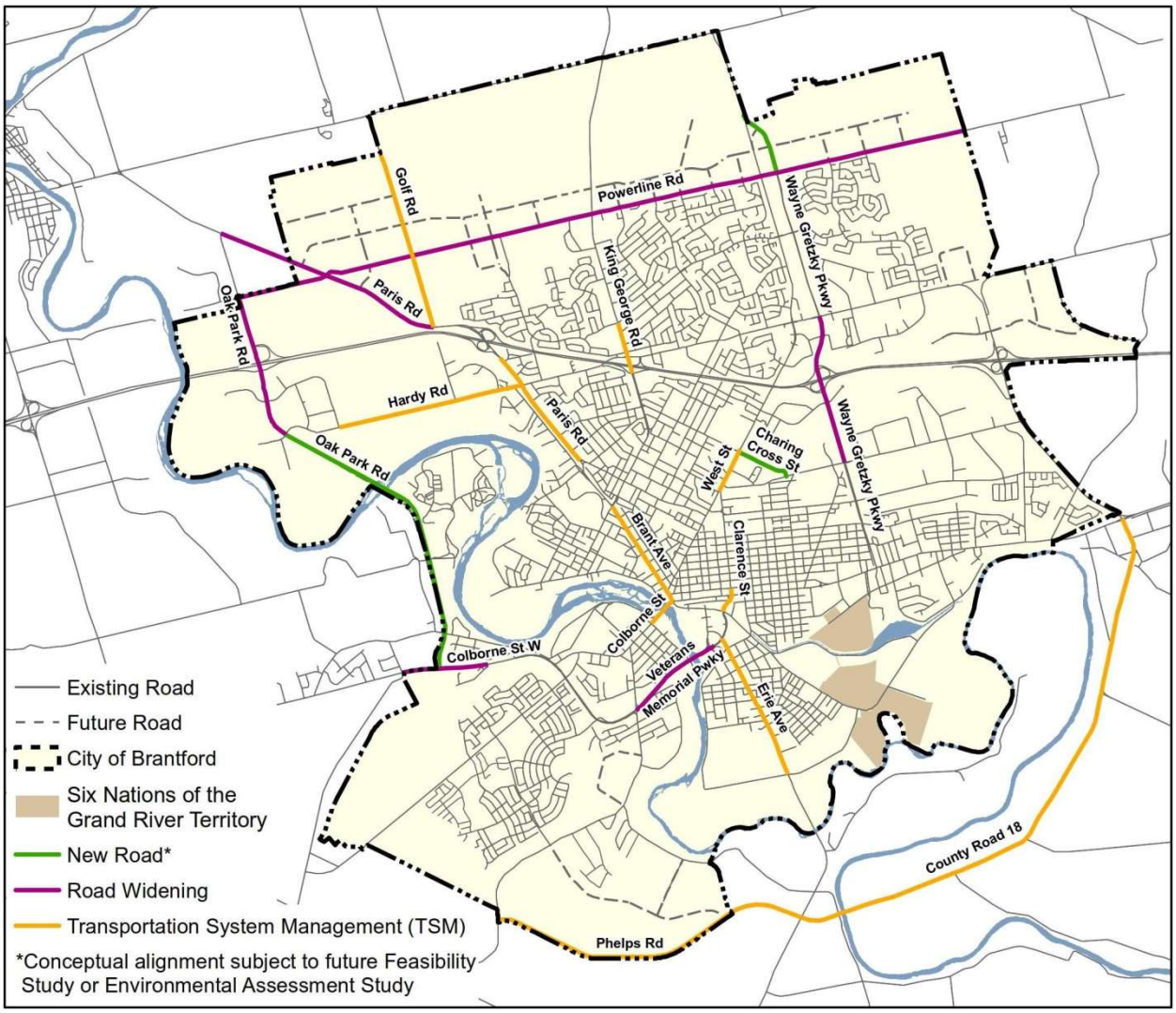


Figure 4-65: Proposed 2041 Road Network

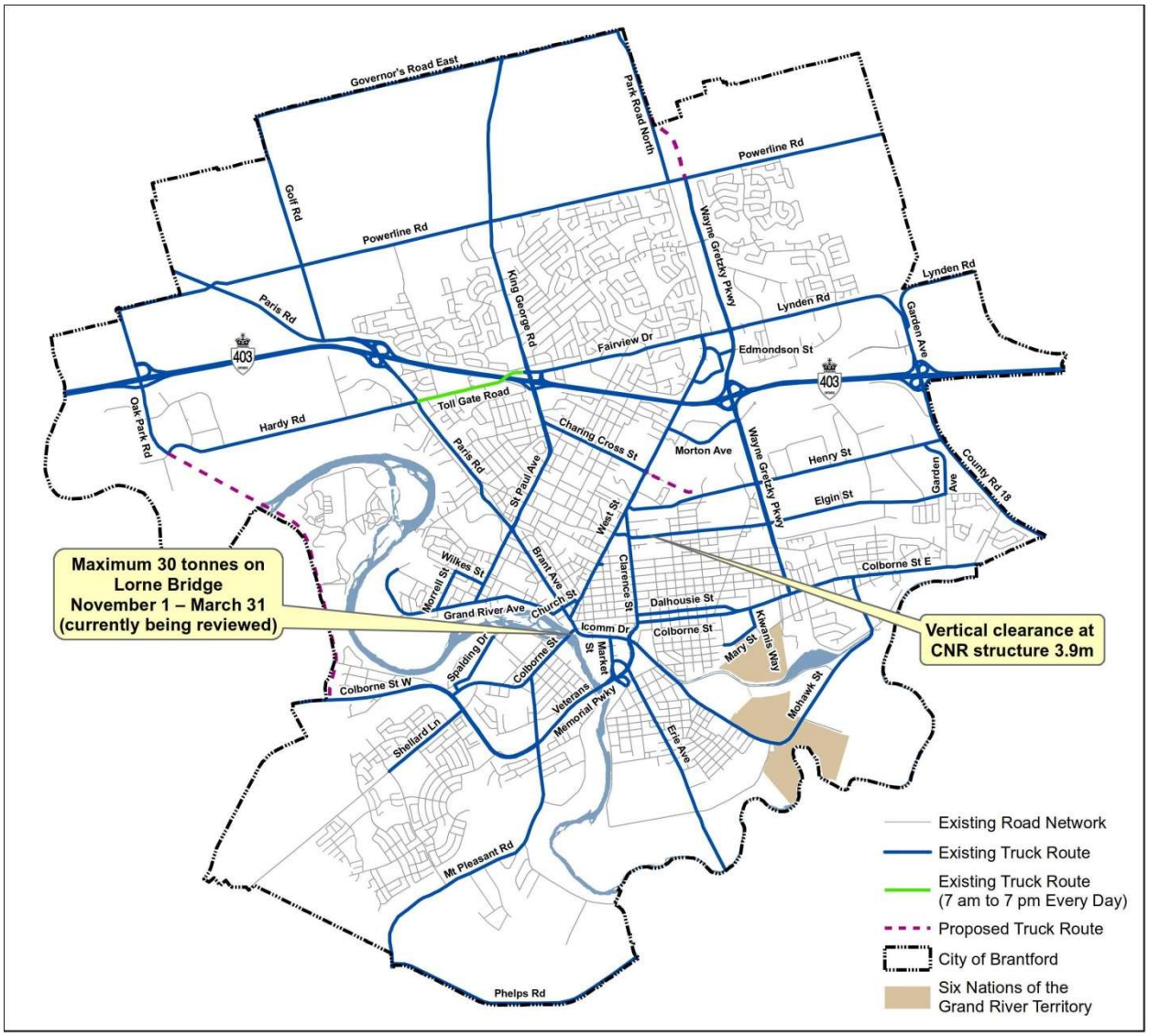


4.4.4 Goods Movement

Figure 4-66 highlights the existing truck route designations with modifications to reflect future potential changes. Specific changes include:

- Addition of the future Charing Cross Street Extension; and
- Additions of the future Oak Park Road Extension.

Figure 4-66: Proposed 2041 Truck Routes



5.0 Implementation Plan

5.1 Active Transportation

5.1.1 Strategy

The 2020 TMP Update includes an expansion of the City Cycling and Trails Network, building on the 2014 TMP plan, to include the extension of multi-use paths and trails into the Tutela Heights and North Expansion lands. In addition, enhancements have been made to conform to new initiatives and policies now in place (OTM Book 18 revisions since 2014).

The capital cost to provide these facilities is estimated at $31.7 Million to the year 2041. This includes ***Table 5-1*** summarizes the total length and estimated costs of the proposed facilities in the Cycling and Trails Network.

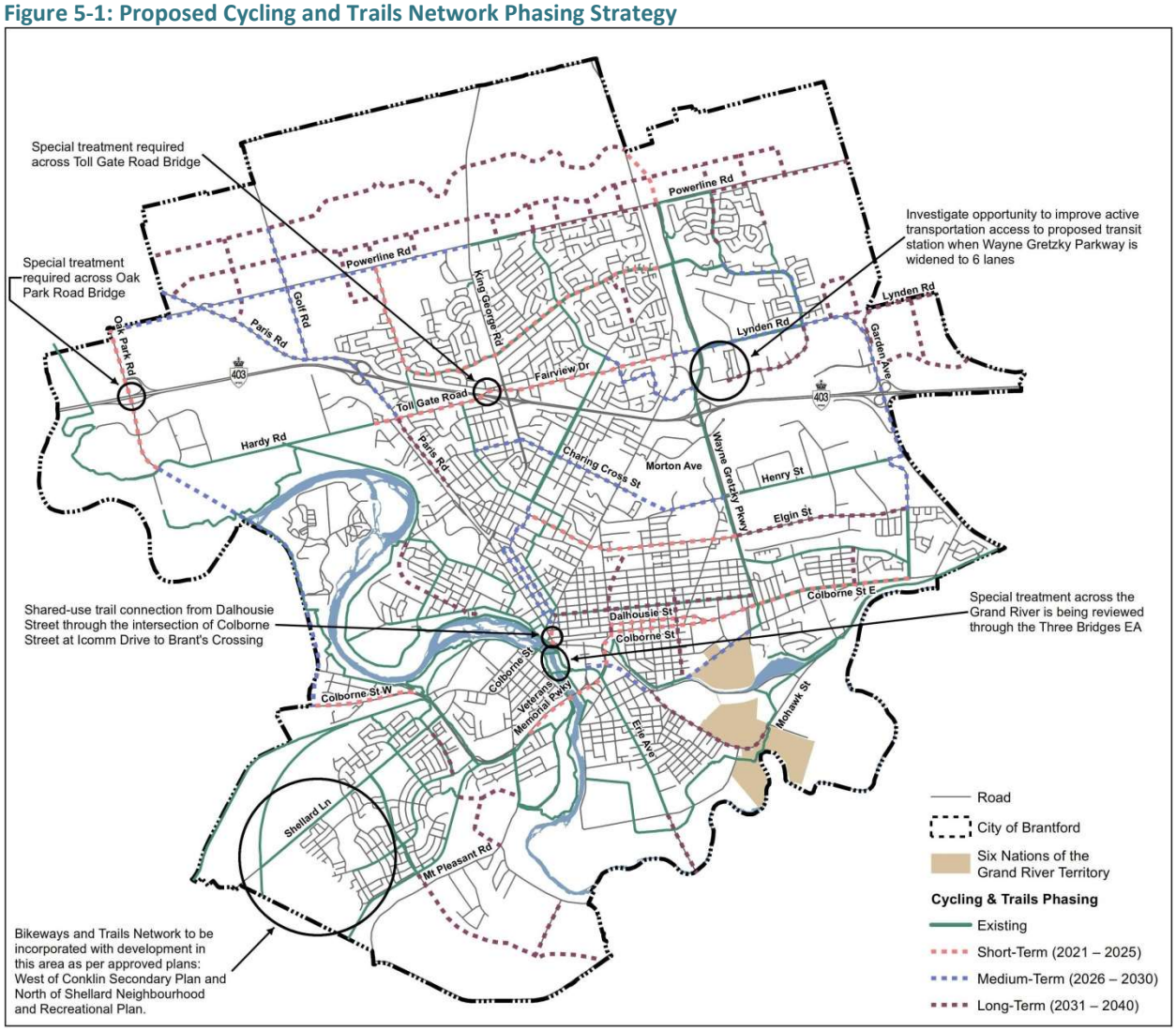
Table 5-1: Proposed 2041 Cycling and Trails Network Summary

Facility Type	Length (centre line km)	Cost ($000)*
On-Road		
Buffered Bike Lane	13.2	$4,244
Bike Lane / Paved Shoulder	61.2	$17,434
Bike Priority Street	10.0	$1,265
Signed Bike Route	30.4	$42
Sub Total	**114.8**	**$22,984**
Off-Road		
Multi-Use Path / Trail	30.2	$5,851
Sub Total	**30.2**	**$5,851**
Other		
Programs (Studies, Initiatives, Events)	-	$2,885
Sub Total	-	**$2,885**
TOTAL	**145.0**	**$31,720**

* All costs stated in 2020 dollars.

Figure 5-1 illustrates the recommended phasing and implementation plan for the Cycling and Trails Network. Several factors were critical in developing the phasing and implementation. Priority of the proposed routes were assessed based on: the timing of new roadways / roadway upgrades, the lack of safe and comfortable routes for cycling in surrounding area, its ability to connect isolated communities, its ability to attract a wider range of the potential cyclists, project complexity, estimated costs and timing of related road improvement projects.

Figure 5-1: Proposed Cycling and Trails Network Phasing Strategy



5.1.2 Implementation

5.1.2.1 Short Term (2021-2026)

Routes in this phase represent those that complement the core network of existing / short-term routes. It may also include other critical links that are higher costs or require a more detailed analysis to implement. Examples are routes that require widening or road reconfiguration on arterial roads to accommodate on-street facilities. Projects related to a road improvement were phased according to the proposed road improvement project.

5.1.2.2 Medium Term (2026-2031)

Routes in this phase represent those that complement the core network of existing / short-term routes. It may also include other critical links that are higher costs or require a more detailed analysis to implement. Examples are routes that require widening or road reconfiguration on arterial roads to

accommodate on-street facilities. Projects related to a road improvement were phased according to the proposed road improvement project.

5.1.2.3 Long Term (beyond 2031)

Routes in this phase represent remaining links that will enhance the Cycling and Trails Network. Some routes may represent a lower priority; however some routes are anticipated over the long-term due to other restrictions such as necessary coordination with other municipalities, project complexity, and estimated costs. Projects related to a road improvement were phased according to the proposed road improvement project.

5.1.2.4 Cost

The capital cost to provide the proposed Cycling and Trails Network is estimated at $31.7 Million to year 2041. ***Table 5-2*** summarizes the recommendations for the short, medium and long term to 2041.

Table 5-2: Cycling and Trails Recommendations by Time Frame

Facility Type	Length (centre line km)	Cost ($000)*
Short Term [2021 – 2025]		
Signed Bike Route	7.6	$10
Bike Priority Street	3.0	$380
Bike Lanes / Paved Shoulders	16.6	$1,640
Multi-Use Paths	4.7	$529
Programs (Studies, Initiatives, Events)	-	$820
Sub Total	**31.9**	**$3,379**
Mid Term [2026 – 2031]		
Signed Bike Route	7.6	$10
Bike Priority Street	3.1	$392
Bike Lanes / Paved Shoulders	22.4	$7,146
Multi-Use Paths	10.1	$845
Programs (Studies, Initiatives, Events)	-	$690
Sub Total	**43.2**	**$9,084**
Long Term [2032 – 2041]		
Signed Bike Route	15.2	$21
Bike Priority Street	3.9	$493
Bike Lanes / Paved Shoulders	35.4	$12,891
Multi-Use Paths	15.4	$4,476
Programs (Studies, Initiatives, Events)	-	$1,375
Sub Total	**69.9**	**$19,257**
TOTAL	**145.0**	**$31,720**

* All costs stated in 2020 dollars & Contingency of 30% for Engineering assumed (excludes Programs).

The proposed projects by time frame and estimated cost can be found in ***Appendix D.***

5.1.1 Monitoring

Implementation does not end with construction. Monitoring and assessment of the City's active transportation usage should continue on an ongoing basis and the network should be assessed every 5-10 year via a stand-alone Active Transportation Master Plan that will engage the participation of local cycling interest groups and committees.

Evaluating and documenting what is achieved through the use of performance measures will help assess the progress of Brantford's Active Transportation implementation Plan. The type of performance measures applied by municipalities can vary depending on desired outcomes and available data. However, in general performance measures can:

- Help to prioritize projects;
- Track project progress and gauge user interest;
- Demonstrate the value of pedestrian and bicycle projects to citizens and elected officials;
- Inform smarter investments through data-driven measures of success;
- Comply with funding requirements at varying levels of government; and
- Provide information to engage a broad set of stakeholders in project identification and prioritization.

Mode share data from the Statistics Canada Journey to Work Dataset and the Transportation Tomorrow Survey (TTS) can provide insight into Brantford's utilitarian usage while a bike and pedestrian count programme (either manual counts or automated counters) can provide data regarding recreational and/or commuter trips.

Identifying and applying a set of performance measures can help staff assess the level of impact that new facilities and routes have on active transportation usage. Data collected to quantify and measure performance targets to inform future priorities and justify capital investments that support future active transportation developments in Brantford.

5.2 Transit

5.2.1 Strategy

The preferred strategic direction for the 2020 TMP Update is to provide enhanced focus on transit by 2041. The TMP transit policies have been structured to provide an incremental approach to achieving these levels.

In the short to medium term, improvements to key performing transit routes will be provided through marketing, route changes and the addition of new routes as recommended in the 2016 Transit Service Plan *TRANSFormation 2021* study. The objective of these changes is to increase transit ridership through the improvement of service efficiency and comfort.

Between 2031 and 2041, the City will pursue the more aggressive "Transit Focus" approach in conjunction with continued population growth and growth in new areas of the city. The 'Transit Focus' will target improvements to key routes, increased service levels and frequencies and introduction of express routes between key residential and employment areas. It is envisioned that by 2041, this strategy will improve the transit mode share to 6% as a result of growth and increased use of transit.

Achieving an increase in ridership of this magnitude will require increased financial investment by the City, supported by strong transit-supportive policies related to the supply and cost of parking, Transportation Demand Management, land use planning and development, and transit priority measures on Brantford streets so that the conventional transit service is convenient, attractive to potential users, and competitive with the private automobile.

The following recommended policies to encourage increased transit use include a number of polices related to Transportation Demand Management, Parking, and Active Transportation. These transit-specific policies outline specific transit service improvements to achieve the ridership increases outlined in the preferred strategy.

5.2.2 Implementation

5.2.2.1 Short Term (2021-2026)

In the short term, the transit service improvement strategy should focus on the following recommended actions:

- Implement the recommendations of the 2016 Transit Service Plan, including adjustments to existing routes and schedules to improve schedule adherence and travel times;
- Increase the number of shelters at stops towards a coverage rate of 25% to increase the attractiveness and convenience of using transit;
- Make monthly passes more convenient to purchase and re-charge including on-line options;
- Prepare a marketing and communications plan and promotional materials to encourage and maintain transit ridership including a new transit route, schedule/information brochure;
- Investigate opportunities to implement transit priority on key corridors;
- Apply transit-supportive urban design guidelines to assist in making new developments easier to serve with transit;
- Work with County to extend and improve GO Transit service to key destinations (GTA, Cambridge/Kitchener/Waterloo);
- In conjunction with the County of Brant, explore the re-introduction of transit service to Paris;
- Enhance suburban transfer facilities. The facilities (i.e. bus circulation and shelters) at the major malls in the east and north ends of the City (Lynden Park Mall and Brantford Commons respectively) need to be improved to provide passenger amenities for transit users destined to these malls, as well as for transit users transferring between routes. Transit routes would link to these facilities with the objective of reducing travel times and to improve service coverage in future growth areas; and

- Initiate Transit Master Plan Study to assess next level strategies and implementation, and identify performance metrics and operational details if the transit system. The transit master plan would identify the key policies required to achieve an improved transit focus for travel in the City.

5.2.2.2 Medium Term (2026-2031)

In the medium term, the transit service improvement strategy should focus on the following recommended actions:

- Implement transit service in new development areas to build ridership early;
- Continued investment in conventional and specialized buses;
- Continued investment in additional transit shelters;
- Continue restructuring routes to shorten travel times; and
- Increase core and peak hour service frequencies on key routes.

5.2.2.3 Long Term (beyond 2031)

In the long term, the transit service improvement strategy should focus on the following recommended actions:

- Implement and expand transit service in new development areas;
- Continued investment in conventional and specialized buses;
- Continued investment in additional transit shelters;
- Continue restructuring routes to shorten travel times;
- Introduce transit priority measure;
- Introduce express routes linking key residential and employment areas; and
- Build new / upgrade existing downtown transit terminal.

5.2.2.4 Cost

The capital cost to provide this system is estimated at $32.3 Million to year 2041. ***Table 5-3*** summarizes the recommendations for the short, medium and long term to 2041.

Table 5-3: Transit Service Recommendations by Time Frame

Capital Item	Description	Cost ($000)*
Short Term [2021 – 2025]		
Fleet	1 new vehicle, 13 replacement vehicles	$15,400
Building	-	$ -
Transfer Points	Lynden Mall, Brantford Commons - Upgrades	$500
Route Infrastructure	Signage and Shelters Upgrade, ITS	$561
Studies	Transit TMP, Fleet Electrification Feasibility	$375
Specialized	Vehicle Replacement, Telecom Software	$1,570
	Sub Total	**$18,406**

Table 5-3: Transit Service Recommendations by Time Frame, Continued

Capital Item	Description	Cost ($000)*
Mid Term [2026 – 2031]		
Fleet	2 new vehicles, 10 replacement vehicles	$13,200
Building	Transit Center	$1,100
Transfer Points	-	$ -
Route Infrastructure	New Stops/ Shelters Expansion Routes/ITS	$651
Studies	Transit Master Plan Update	$100
Specialized	Vehicle Replacement	$3,750
	Sub Total	**$18,801**
Long Term [2032 – 2041]		
Fleet	5 new vehicles, 12 replacement vehicles	$18,700
Building	New/Upgrade Transit Terminal	$7,500
Transfer Points	-	$ -
Route Infrastructure	New Stops/ Shelters Expansion Routes/ITS	$1,620
Studies	-	$ -
Specialized	Vehicle Replacement, Software Upgrade	$5,800
	Sub Total	**$33,620**
	TOTAL	**$70,827**

* All costs stated in 2020 dollars.

The proposed projects by time frame and estimated cost can be found in ***Appendix D*.**

5.2.3 Monitoring

Monitoring and assessment of the City's transit services (conventional and specialized) should continue on a periodic (e.g., 5-year) interval using the TTS data, rider surveys, boarding counts, statistical data from the electronic fareboxes and schedule adherence data from the AVL (Automated Vehicle Location) system to assess specific route performance. Monitoring of the transit services involves three activities:

- On-going monitoring of the performance of each transit service against performance indicators such as total ridership, rides per capita and modal split, ridership per revenue-hour of service, rides per trip (specialized only), registrants (specialized only), average age of fleet, and revenue-hours per capita.
- Performance should be monitored and evaluated on an annual basis, with adjustments made as required to maximize the efficiency of the service.
- Completion of periodic (i.e., every 5 years) comprehensive transit service reviews of both the conventional and specialized transit services to define changing needs and demand, assess the performance of each service and preparation of multi-year service plans with projected operating and capital budget requirements.

5.3 Road Network

5.3.1 Strategy

For Road Infrastructure, estimates of interim year population and employment, 2026 and 2031, and the 2041 network performance assessment were used to generate a timeline for emerging constraints. The performance constraints were compared with the 2041 network recommendations to determine the likely need for infrastructure improvement for the interim years.

These network improvements have been combined with the TDM and TSM strategies to provide solutions that leverage the benefits of non-structural improvement to defer, as much as possible, the costs of required infrastructure.

5.3.2 Implementation

5.3.2.1 Travel Demand Management (TDM) Strategy

A TDM strategy is required for the City of Brantford with the objective of reducing single occupant vehicle travel and achieving the vehicle reduction targets identified in the transportation assessment. While based on the principles of this plan, the TDM strategy would be a separate exercise that could be done internally (i.e. with a TDM Coordinator) or by contracting it out to an external TDM expert if internal resources are not in place.

With the recent update to the City's Official Plan, the first priority for the overall TDM strategy would be to incorporate the TDM policies the City's planning documents. This stresses the importance of land use in helping manage transportation demand and meet single occupant vehicle reduction targets. A key component of the Official Plan is to identify policies that promote intensification, mixed use development, and pedestrian friendly design, which are supportive of the TDM strategy. The recommended TDM implementation Plan is provided in ***Table 5-4*****.**

For all of the elements identified, the City must consult and engage: special interest groups, stakeholders, business community, accessibility agencies, community / senior centres, MTO, GO Transit, in the development of the program and plans. This includes projects initiated by others.

Table 5-4: TDM Recommended Implementation Plan

Proposed Action	1-5 years	6-10 years	11-20 years	Next Steps
Adopt a TDM Policy	x			Based on the Guiding Principles of this plan. Included in the Official Plan update.
Develop Trip Reduction Program for the Town Municipal Offices/Facilities	x	x	x	Internal Strategy developed by TDM Coordinator
Engage major employers and institutions to participate in trip reduction initiatives		x	x	Internal Strategy developed by TDM Coordinator
Encourage development of Activity Hubs	x	x	x	Include policies in Official Plan and Secondary Plans as appropriate
Include TDM in the development process	x	x	x	Include in Secondary Plans as well as approval of large development applications as appropriate

5.3.2.2 Transportation System Management (TSM) Strategy

A TSM Strategy should be developed for the City of Brantford. The objective of TSM is to maximize the use of the existing roadway infrastructure before expanding existing or constructing new facilities. Particular areas of concern in the longer term have been identified in the transportation assessment as: the existing bridge crossings of the Grand River; the Paris Road/ Brant Avenue corridor, and the King George Road Corridor. The recommended TSM implementation Plan is provided in ***Table 5-5*****.**

Table 5-5: TSM Recommended Implementation Plan

Proposed Action	1-5 years	6-10 years	11-20 years	Next Steps
Prepare Access Management Guidelines	x			Initiate Separate Study. Include policies in Official Plan and Secondary Plans as appropriate.
Refine Right-of-Way Requirements to include Multi-Modal consideration for all roadway classifications	x			Per Complete Streets section of this TMP and ensure that objective are incorporated into City Design Guidelines Manual
Adopt Roundabout Implementation Strategy	x			Per Complete Streets section of this TMP, and City's Roundabout Installation Policy and Guideline toolbox.

With regard to the adoption of a roundabout strategy, the City has recently approved an installation Policy and developed guidelines for roundabout use and an analysis toolkit for their implementation. These elements include:

- Policy Direction (PW-022 Roundabout Installation Policy)
- Technical process checklist

The decision making process relies primarily on the technical elements: Initial screening criteria identified (which only confirms feasibility, not rationale for implementation); and Evaluation which identifies the criteria, weighting process, and scoring process for where a roundabout is preferred over traditional intersection control. The analysis toolkit still does not address the "role, desire, and overall rationale" for an implementation strategy.

The City's policy recognizes that not all intersections are going to suit roundabout implementation. There are typically four reasons for implementing roundabouts, which answer the question "What are we trying to achieve with roundabout implementation?":

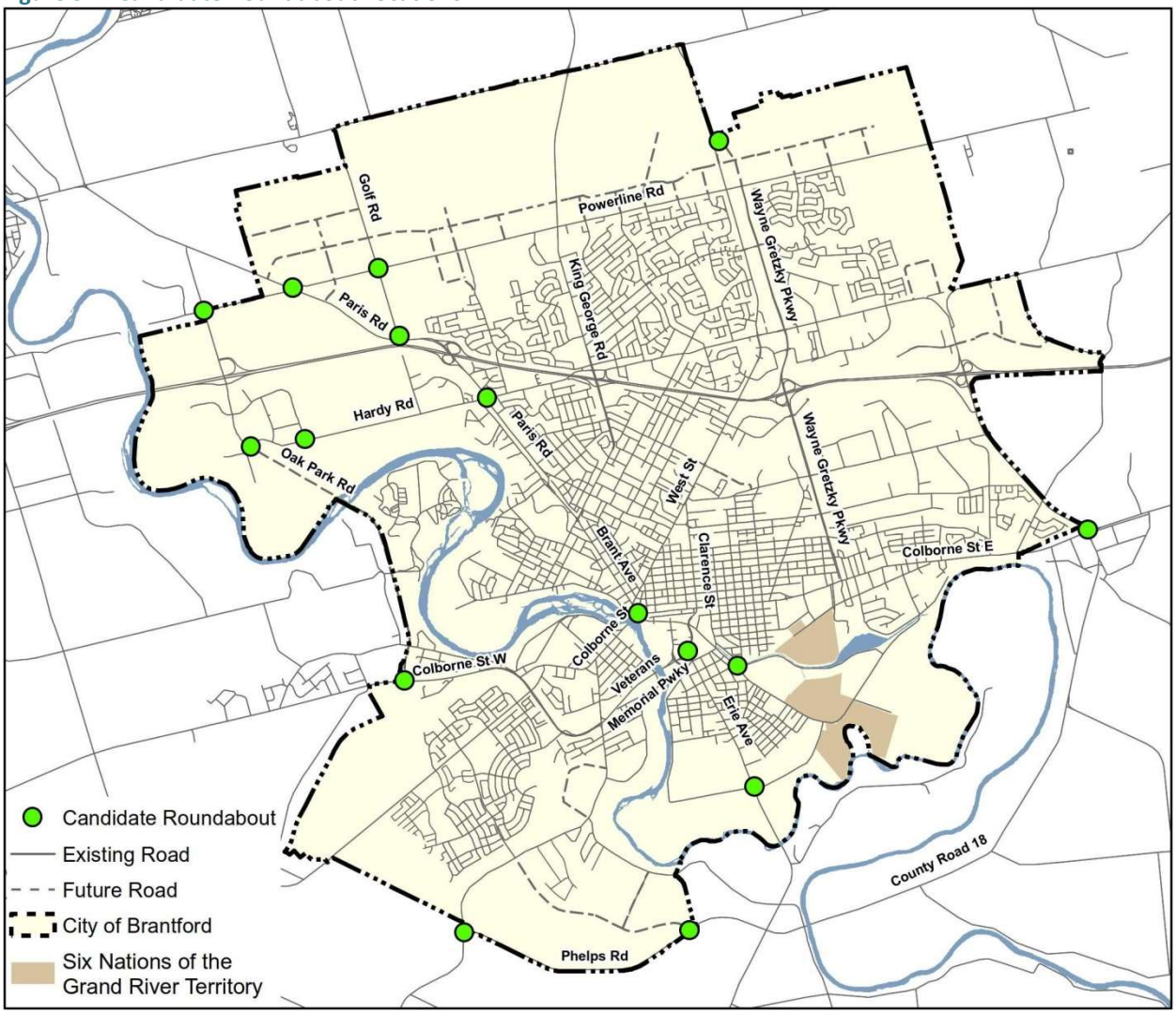
- Improve Operations – reduce delay for high volume turning movements
- Traffic Calming – reduce speed
- Improve Safety – reduce conflicts
- Gateway – visual cue re: changing environment

It is necessary to set goals, objectives, and direction for specific locations prior to undertaking technical analysis to justify / trade off against signalization.

With several corridors identified for consideration of TSM applications, it seems appropriate to target these corridors for potential roundabout implementation. In addition to having specific operational issues, several corridors transition from rural to suburban or suburban to urban environments making the good candidates for gateway treatments. Using the TSM findings as a guide, a list of candidate roundabout locations have been identified for this TMP, as shown in ***Figure 5-2***.

These are only meant to be candidate locations to be subject of future analysis using the City's roundabout guidelines. Through the development of a roundabout strategy, the City can expand the scope of this work to address local operational and safety issues. As well, any future Environmental Assessment or Traffic Impact Study will assess the need and feasibility of traffic control (including signalization versus roundabout implementation)

Figure 5-2: Candidate Roundabout Locations



5.3.2.3 Short Term (2021-2026)

In the short-term, the road infrastructure improvement strategy should focus on the following recommended projects:

- Veterans Memorial Parkway (MCEA Schedule C): Widening to 4 lanes from Mount Pleasant Street to Erie Avenue. To increase Grand River crossing capacity to serve ongoing planned growth in Southwest Brantford;
- Oak Park Road (MCEA Schedule C): Widening to 4 lanes from Powerline Road to Hwy 403 and Fen Ridge Court/Savannah Oaks Drive to Hardy Road. To serve growing business access needs in the northwest Brantford industrial area to/from Highway 403;
- Colborne Street West (MCEA Schedule C): Widening to 4 lanes from County Road 7 (Pleasant Ridge) to D'Aubigny Road. To serve trips travelling from the north and west into Downtown Brantford and for trips travelling between southwest Brantford and northwest Brantford / Brant County; and

- Wayne Gretzky Parkway (MCEA Schedule C): 4-lane extension from Powerline Road to Park Road North. To provide continuous and consistent arterial capacity between Highway 403 and Governors Road, serving both new development trips and longer distance trips from the congested King George corridor.

5.3.2.4 Medium Term (2026-2031)

In the medium-term, the road infrastructure improvement strategy should focus on the following recommended projects:

- Oak Park Road (MCEA Schedule C): 4-lane extension from Hardy Road to Colborne Street West. To address projected road network capacity deficiencies across the Grand River, and significantly relieve the Paris Road/Brant Avenue corridors to and from the central part of the city and the downtown. It will also connect the southwest development area with the northwest industrial area and Highway 403;
- Paris Road (MCEA Schedule C): Widening to 4 lanes from Oak Park Road to Golf Road. To address capacity needs for the northwest industrial are access to Highway 401 and for longer distance trips into Downtown Brantford;
- Powerline Road (MCEA Schedule C): Widening to 4 lanes (including urbanization) from Oak Park Road to King George Road. To address projected east-west road network capacity deficiencies along the south edge of the future north expansion area. It will connect the northwest industrial area to the north Brantford residential base;
- Charing Cross Street (MCEA Schedule C): 4-lane extension from West Street to Henry Street, with grade separation at CN Rail crossing. To address projected capacity deficiencies on West St. due to the jog between Charing Cross Street and Henry Street, and to provide a new continuous east-west arterial road in central Brantford between King George Rd. and Garden Avenue; and
- Golf Road TSM (MCEA Schedule B): Paris Road to Proposed Development Limit north of Powerline Road. Widen roadway bed and urbanize road to provide multi-modal environment consistent with urban arterial (including appropriate traffic control and auxiliary turn lanes and/or roundabouts).

5.3.2.5 Long Term (beyond 2031)

In the long-term, the road infrastructure improvement strategy should focus on the following recommended projects:

- Wayne Gretzky Parkway (MCEA Schedule C): Widening to 6 lanes from Lynden Road to Henry Street. To address long term city growth and associated capacity deficiencies on Wayne Gretzky Parkway, especially across the Highway 403 and CN Rail screenlines.;
- Powerline Road (MCEA Schedule C): Widening to 4 lanes from King George Road to East City Boundary. To address projected east-west road network capacity deficiencies along the south edge of the future north expansion area. It will connect the northwest industrial area to the north Brantford residential base;

- Conklin Road (MCEA Schedule C): 2-lane extension from Mt. Pleasant Road to Phelps Road. Addresses traffic generated by build out of the Shellard Lane and Tutela Heights development areas. Provides alternate access to the east and north via Phelps Road/County Road 18;
- New East/West Collector Road (north extension area) (MCEA Schedule B): New 2 lane collector road from Oak Park Road to King George Road. Addresses traffic generated by build out of the north expansion development area. Relieves traffic volumes on Powerline Road and provide collector function for all travel modes; and
- New East/West Collector Road (MCEA Schedule B): New 2 lane collector road from King George Road to East City Boundary. Addresses traffic generated by build out of the north expansion development area. Relieves traffic volumes on Powerline Road and provide collector function for all travel modes.

The result is that fourteen (14) main roadway network improvement projects are recommended for Brantford by 2041, as previously identified in ***Figure 4-65***. Most projects will require further public consultation, Environmental Assessment and Council approval prior to implementation.

5.3.2.6 Cost

The capital cost to provide this infrastructure (some 80 lane kilometres of network) is estimated at $293 Million to year 2041. ***Table 5-6*** summarizes the recommendations for the short, medium and long term to 2041.

Table 5-6: Road Infrastructure Recommendations by Time Frame

Project	Description	Cost ($000)***
Short Term [2021 – 2025]		
Veterans Memorial Parkway Widening	4 lanes – Mount Pleasant Street to Erie Avenue*	$40,500
Oak Park Road Widening	4 lanes – Powerline Road to Hwy 403 & Fen Ridge Court/Savannah Oaks Drive to Hardy Road	$6,400
Colborne Street West Widening	4 lanes – CR7 to D'Aubigny Road	$3,500
Wayne Gretzky Parkway Extension	4 lanes - Powerline Road to Park Road North	$4,100
	Sub-Total	**$54,500**
Mid Term [2026 – 2031]		
Oak Park Road Extension	4 Lanes – Hardy Road to Colborne Street **	$98,900
Paris Road Widening	4 lanes – Oak Park Road to Golf Road	$10,800
Powerline Road Widening	4 lanes – Oak Park Road to King George Road	$19,900
Charing Cross Extension	4 Lanes – West Street to Henry Street	$19,000
Golf Road TSM	Paris Road to Proposed Development Limit	$4,100
	Sub-Total	**$152,700**

Table 5-6: Road Infrastructure Recommendations by Time Frame, Continued

Project	Description	Cost ($000)***
Long Term [2032 – 2041]		
Wayne Gretzky Parkway Widening	6 Lane – Lynden Road to Henry Street	$29,100
Powerline Road Widening	4 lanes – King George Road to East City Boundary	$21,000
Conklin Road Extension	2 lanes - Mt. Pleasant Road to Phelps Road	$10,200
New East/West Road	2 lanes – Oak Park Road to King George Road	$15,300
New East/West Road	2 lanes – King George Road to East City Boundary	$16,400
	Sub-Total	**$92,000**
	TOTAL	**$299,200**

* Reference Costs Source: Veterans Memorial Parkway Widening and Extension, CIMA+, October 2018 - [Assume: Mt Pleasant to Bridge = 950 m (from feasibility study) and Bridge to existing 4-lane cross section west of Erie = 240 m]

** Reference Costs Source: Oak Park Road Extension Feasibility Study, Parsons, July 2019

*** All costs stated in 2020 dollars & Contingency of 20% for Construction and 30% for Engineering assumed unless stated specifically in reference reports (i.e. feasibility reports).

The proposed projects by time frame and estimated cost can be found in ***Appendix D.***

5.3.3 Monitoring

The TMP is intended to be reviewed every five years and updated if necessary. It also addresses only the Phases 1 and 2 requirements of the Municipal Class EA planning process for specific road extension, widening and intersection improvements, providing an assessment of the problem or opportunity and assessment of alternative planning solutions. It is not intended to address planning and design details that will be further addressed in Phases 3 and 4 of the complete process.

Many of the TMP policy recommendations are being incorporated into the new Official Plan (e.g. requirements for expansion, functional classification, design elements for category and functionality of road), and will be implemented through processing of land use applications under the Planning Act. The City may also choose to implement the recommended projects in a different order or phasing that has been suggested in the TMP Update to accommodate Council priorities, the need to coordinate with other infrastructure works (i.e. sewer work), planned developments in the area, or other considerations beyond the scope of this project to consider.

The TMP should also be monitored by maintaining the traffic demand forecasting model, including continued participation in the Transportation Tomorrow Survey. TMP monitoring may contain recommendations on updated traffic calming, parking management and truck route management. It is recommended that the TMP be monitored on an annual basis, taking into consideration new traffic counts, trends, private sector initiatives, performance targets, provincial initiatives and city growth.