

Final Report

Transportation Master Plan
Town of Niagara-on-the-Lake

March 2022




Executive Summary

The Town of Niagara-on-the-Lake has commissioned Stantec to develop a transportation master plan (TMP) with the vision of evaluating the existing multi-modal transportation network and developing solutions to support and accommodate growth through the year 2031. The analysis is split into four phases that complement each other in an iterative process toward satisfying the Municipal Class Environmental Assessment Process.

Phase 1: Background Context / Existing Conditions

Phase 2: Future Needs and Opportunities

Phase 3: Alternatives Assessment and Preferred Solutions

Phase 4: Implementation / Costing

PURPOSE OF THE PLAN

This TMP is a long-range strategic plan for the entirety of Niagara-on-the-Lake that identifies transportation infrastructure requirements to address existing challenges and support growth, along with policies to guide transportation and land use decisions.

General requirements for the TMP include the following components:

- Identify future transportation needs and opportunities through the year 2031;
- Provide connectivity between transportation modes to move people and goods sustainably, efficiently, and safely;
- Establish a sustainably integrated multi-modal transportation system that reduces reliance upon any single mode and promotes walking, cycling, transit, and other forms of transportation that are alternatives to personal vehicles; and
- Define policies and long-term strategies that will result in the protection of transportation corridors for all modes of transportation to address current and projected population and employment growth.

CURRENT CONDITIONS

Niagara-on-the-Lake is comprised of a series of smaller communities including Old Town, Virgil, St. Davids, Queenston, and Glendale, with rural areas in between them. As a starting point, a review of current transportation conditions including road classification, truck network, transit network, cycling network, and pedestrian network was undertaken. This was supplemented by public engagement where feedback was gathered on the Town's transportation network and individual

travel preferences. Some key takeaways from the review of current conditions include (but are not limited to):

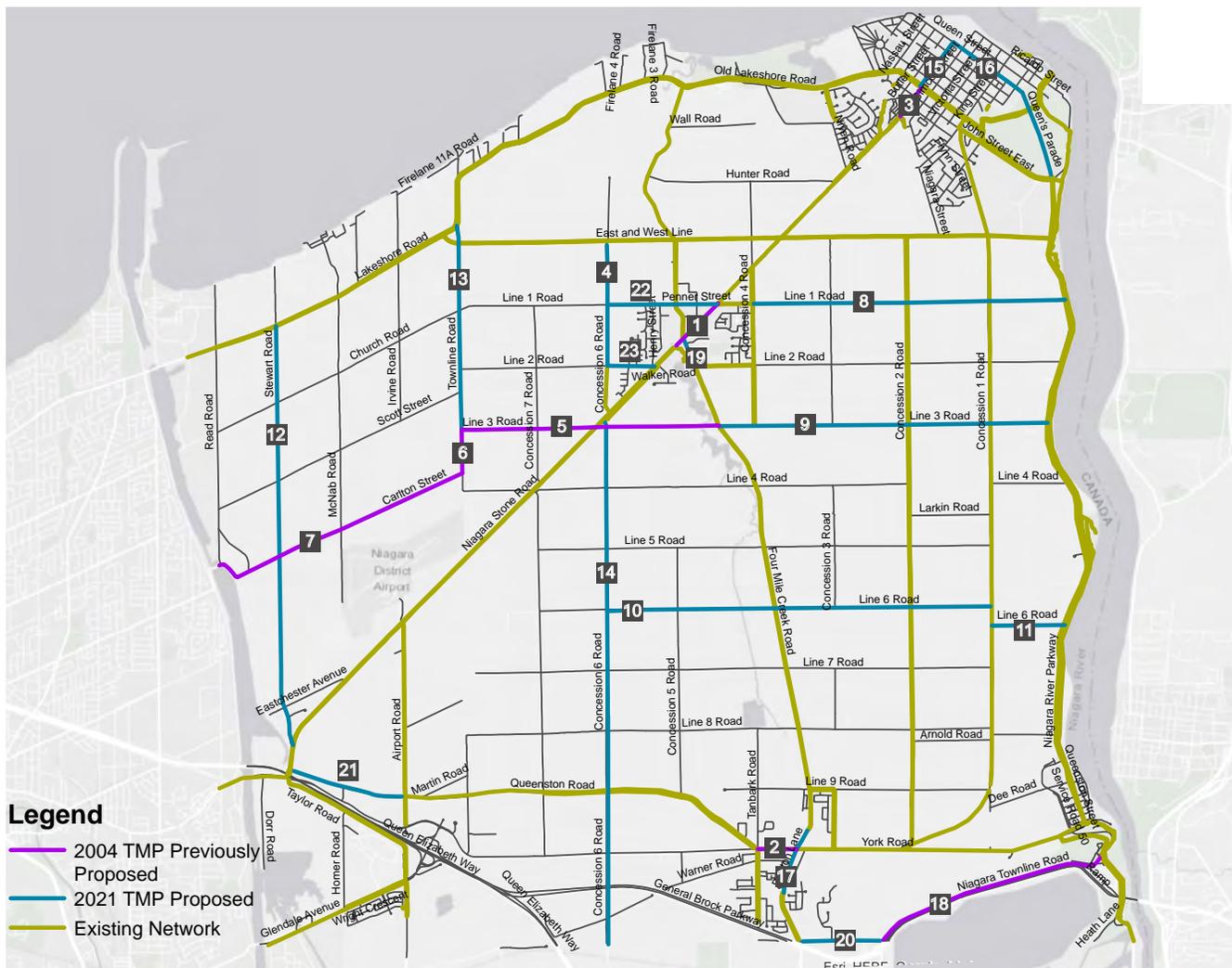
- The Niagara-on-the-Lake community is of low population and employment density, and the largest growth area is in Glendale
- The transportation network consists of a mix of provincial highways, regional roads, and municipal roads (collector roads and local roads)
- The former Niagara-on-the-Lake Transit system that operated on a fixed route and a fixed schedule was discontinued in favour of launching the NRT OnDemand system in the Town
- There are opportunities to make the cycling network safer and more connected throughout the Town
- Due to the high tourism demand in the summer months, summer weekends generally represent the time of year with the highest transportation demand
- Although some trips are internal within Niagara-on-the-Lake, the majority of trips taken in the Town either originate or terminate outside of the Town's boundaries
- Quality of life and preservation of neighbourhood character are very important to residents of Niagara-on-the-Lake

FUTURE RECOMMENDATIONS

Based on an evaluation of current and forecasted demand, taking into consideration future growth, anticipated mode split, and volume-to-capacity ratios across critical corridors in the Town, constraints and opportunities were identified and transportation network recommendations were prepared for Niagara-on-the-Lake.

RECOMMENDED CYCLING NETWORK

The short-term network focuses on filling in gaps in the network and creating critical north-south and east-west connections. The medium-term network looks to build upon the coverage of the network. These network recommendations will serve to achieve mode split objectives while further supporting and incentivizing active transportation and multi-modal trips for those trips that currently fall within a reasonable cycling distance. The proposed network is outlined in the figure below.



PEDESTRIAN IMPROVEMENTS

- **Old Town:** Given the historic character and tourist attractions located in Old Town, a connected and permeable pedestrian network will be critical for safe and efficient travel. The proposed sidewalk links will provide infill coverage across the network to strengthen connectivity. The proposed improvements will fill in gaps along Nassau Street, John Street West, Lakeshore Road and Niagara Street.
- **Virgil:** Sidewalk connections are proposed along Henry Street which provides connection between Line 1 Road and Niagara Stone Road.
- **Queenston:** An additional sidewalk segment along Queenston Street is proposed to fill in the gap in the network and allow pedestrians to safely connect to Niagara Parkway.
- **St Davids:** The pedestrian network in St. Davids is generally robust but contains several gaps along major arterial connections. As such, several infill connections are proposed to connect the existing network. Notably, connections are proposed along Four Mile Creek Road, York Road and Niagara Townline Road. This will provide a pedestrian connection for those who live in the Bevan Heights neighbourhood which currently does not connect to the existing pedestrian network.

- **Glendale:** The Glendale District Plan outlines a proposed redevelopment of the Glendale community, with significant growth via infill developments. With the Niagara College Niagara-on-the-Lake campus and the Outlet Mall, Glendale is a suitable location for this densification which will warrant increased pedestrian connectivity. The proposed pedestrian network is largely along major roadways that provide east-west and north-south connections. These roadways include Airport Road, Queenston Road, Concession 7 Road, York Road, Homer Road and Taylor Road.

ROADWAY IMPROVEMENTS

- **Old Town:**
 - It is recommended to improve the controlling approaches and safety at King Street and Queen Street, which is one of the main entrances to the Heritage District.
 - Concerns have also been raised regarding traffic related to the commercial district along Queen and Picton Streets between Wellington Street and Gate Street.
 - Consideration should be given to additional wayfinding signage as well as permanent geometric and traffic control measures at the Queen Street and Mississagua Street intersection.

- **Dock Area:** There is a concern for motorists seeking to make a three-point turn at the end of River Beach Drive; further study is needed.

King/John Area: It is recommended that Charlotte St. from Niagara St. to John St. be upgraded to a 'collector' road. By doing so, it is envisioned that through-traffic in the King/John area of Old Town would generally use Charlotte St. rather than the other residential streets (Rye St., Paffard St., Flynn St., Cottage St., Green St., etc.). This direct route through the residential area to reach the Heritage District would help with traffic flow and safety, while serving to minimize the total number of vehicle kilometres travelled through the neighbourhood, provided the route is made clear to motorists.

- **Virgil:**

- **Crossroads School Area:** It is recommended that the Town keep open communication channels with Niagara Region and with the District School Board of Niagara to ensure that local needs are being adequately met with respect to student transportation (school busing) and with sports teams, clubs, and after school programs, which may help to extend the window of drop-off and pick-up times and reduce congestion. At the same time, it is recommended that the Town maintain the Community Safety Zone (CSZ) at Crossroads School and extend it to include Line 2 Road between Niagara Stone Road and Pierpoint Drive (or Concession 6 Road).

- **Pleasant Manor Area:** For similar reasons as the Crossroads School Area, it is recommended that Four Mile Creek Road from Pleasant Lane to Line 1 Road be designated as a new CSZ.

- **St. Davids:**

- **York Rd / Four Mile Creek Rd:** This intersection can be considered to be the geographical centre of St. Davids, with residential areas located to each of the northeast, northwest, southeast, and southwest. As such, it sees a comparatively large volume of traffic, and it is noted that a roundabout is planned at this intersection to help improve safety and preserve efficient traffic flow along these corridors into the future. It is recommended that the Town in conjunction with the Region monitor traffic volumes along York Rd. and Four Mile Creek Rd. and ensure that the roundabout, when implemented, brings the desired benefits.

- **Glendale:**

- **Niagara College / Outlet Mall Area:** It is noted that many of the corridors in this area are Regional corridors, or Provincial in the case of the QEW. The Town is recommended to maintain open communication channels with the Region and the Province as appropriate to ensure it can proactively plan for the coming corridor changes such as the Diverging Diamond project and the twinning of the Skyway Bridge.

SUPPORTING STRATEGIES

FUTURE TRAFFIC FLOW MANAGEMENT

This following strategies are recommended to improve the efficiency of traffic flow including:

- Piloting a Flex Street along Queen St. in Old Town;
- Improving wayfinding coupled with geometric changes, especially in Old Town;
- Encourage mode shift;
- Goods movement considerations;
- Smart mobility and ITS; and
- Transportation system performance measures.

DEAD-END STREETS

It is recommended that the Town review development plans and evaluate opportunities to convert cul-de-sacs to through streets in the following locations:

- Ball St. (connect to River Beach Dr.)
- James St. (connect to Flynn St., Rye St., or Paffard St.)
- King St. (connect to Niagara St.)
- Loretta Dr. (by Rose Glen Cr., connect to the commercial plaza adjacent to Niagara Stone Rd.)
- Harvest Dr., Plantation Dr., and Homestead Dr. (connect to each other, as is currently planned)
- Paxton Ln. (connect to Paxton Ln.)
- Hickory Ave. (connect to Dyck Ln.)

QUEEN STREET HERITAGE DISTRICT

The Heritage District in Old Town is important to consider in the context of its unique transportation challenges due to its central location in Old Town and its draw as a tourist destination. Recommendations for the Queen Street Heritage District include:

- Converting Queen Street into a Flex Street, with a single grade or surface shared by people using all modes of travel at slow speeds.
- Coupling the flex street implementation with wayfinding signage and parking management, including parking in the periphery of Old Town, to help reduce vehicular traffic through the Heritage District
- Relocating the caleche stand
- Discouraging median parking by delivery vehicles and developing a goods movement strategy
- Improving the safety of pedestrians crossing Queen St., including the consideration of additional courtesy crosswalks
- Considering a speed limit of 30 km/h may be appropriate along Queen St.

RECOMMENDED ROAD CLASSIFICATION

The recommended road classification is presented in the table below and in the figure on the following page. In addition to these road classification changes, it is recommended that King St. in between John St. and Paffard St. be monitored for a potential downgrade from 'collector' to 'local'. Other related recommendations include:

- Official Plan Amendments to account for the updated road classifications and changes,
- Adopt the Niagara Region Complete Streets Design Guidelines and conduct a review to adapt the guidelines for local context, and
- Updated Municipal Design Standards for the Road, Classification categories to include transit, active transportation, and road safety parameters conducive of Complete Streets.

Roadway	Description	Recommended Classification	Justification
East and West Line	CR87 to Niagara Parkway	Collector	<ul style="list-style-type: none"> ○ Provides alternative route for E-W travel ○ Accommodates growing travel demand between new developments in northern Virgil and Old Town
Four Mile Creek Road	CR55 to CR87	Collector	<ul style="list-style-type: none"> ○ Relieves congestion along Niagara Stone Road ○ Relieves congestion on Lakehore Road
Charlotte Street	Niagara Street to John Street	Collector	<ul style="list-style-type: none"> ○ Accommodates travel demand to central Old Town ○ Serves projected residential growth in southern Old Town (Zone 4) ○ Relieves congestion along Niagara Stone Road
Concession Road 6	York Road to Line 3 Road	Collector	<ul style="list-style-type: none"> ○ Relieves congestion along Niagara Stone Road and Airport Road
Queen Street/Picton Street	Wellington Street to Gate Street	Flex	<ul style="list-style-type: none"> ○ Place-making within the Old Town ○ Accommodates high pedestrian and tourist activity

PARKING MANAGEMENT

The Niagara-on-the-Lake Functional Parking Analysis (2011) revealed that peak parking demand exceeds supply, notably during summer weekends, and most notably along Queen Street and Picton Street. Different parking management measures could be explored to manage parking demand. These measures include:

- Demand priced parking
- Increasing capacity and utilization of existing facilities
- Remote parking and park-and-rides
- Parking space sales and leasing
- Transferable parking rights and developer agreements
- Unbundled parking
- Land banking
- Wayfinding and signage
- Streetscaping and landscaping

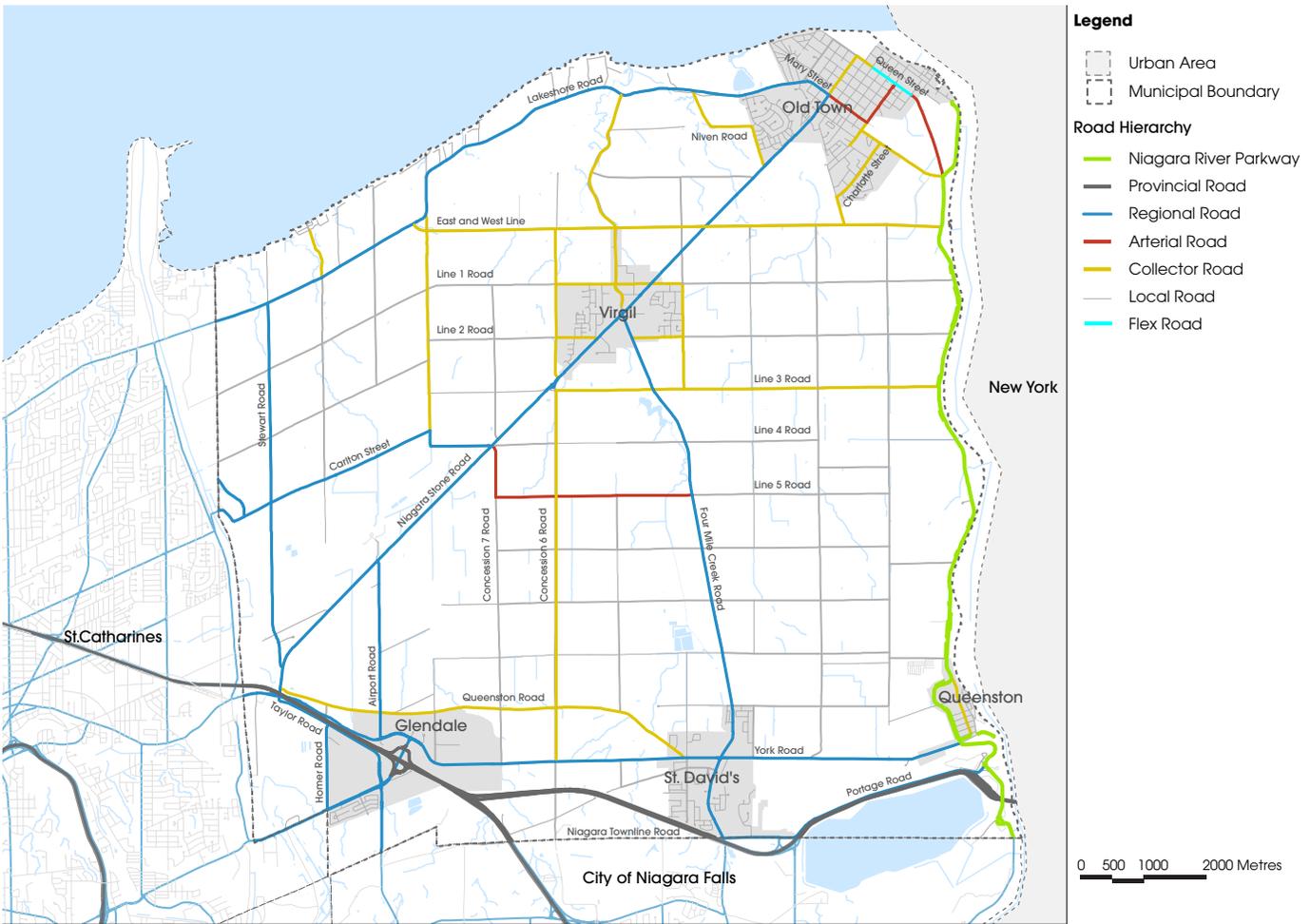
It is recommended that the Town of Niagara-on-the-Lake proactively consider the on and off-street parking needs today and into the future, with a more detailed consideration of future curbside demand usage and how parking lots on the periphery of Old Town may be better leveraged. The impacts of transit, active transportation, and wayfinding investments should also be considered, as should the potential impacts of emerging technology.

TRAVEL DEMAND MANAGEMENT RECOMMENDATIONS

The Town of Niagara-on-the-Lake should develop context specific TDM policies, including associated zoning by-law updates for parking policies. This will provide a mechanism by which the Town can use to collaborate with developers to encourage active transportation and transit, while also presenting opportunities for developers to mitigate their impact on the vehicular network as well as mitigating the spatial needs of parking on a site.

Recommendations include:

- Develop a Transportation Demand Management Checklist of applicable TDM measures for new developments based on land use;
- Context-sensitive amendments to zoning and parking by-laws including developing maximum and reduced vehicular parking rates for new developments based on the implementation of TDM measures; and
- Coordinate with local school boards to develop a School Travel Planning Program.



SUPPORTING POLICIES

TRAFFIC CALMING RECOMMENDATIONS

Niagara Region has implemented two Community Safety Zones to date in Niagara-on-the-Lake, at St. David's Public School and Crossroads Public Elementary School. Suggested locations for future CSZs are detailed in the table below.

Roadway	Description	CSZ Justification
Wellington Street	Picton Street to Ricardo Street	<ul style="list-style-type: none"> Niagara Long-Term Care Residence St Vincent de Paul Church Royal Oak Independent School
Four Mile Creek Road	Pleasant Lane to Line 1 Road	<ul style="list-style-type: none"> Radiant Care Long-Term Care Residence
Line 2 Road	Niagara Stone Road to Pierpoint Drive or Concession 6 Road	<ul style="list-style-type: none"> Adjacent to Crossroads Public Elementary School

The existing and draft traffic calming policies require additional changes so that the policy can be a tool between the Town and residents to identify and implement tailor-made safety solutions throughout Niagara-on-the-Lake's transportation network. As a result, it is recommended that the Town of Niagara-on-the-Lake develop a traffic calming policy that integrates the identified additional considerations within this TMP, as well as addresses the several issues and concerns raised within this section. It is further recommended that the Town of Niagara-on-the-Lake develop a traffic calming guide to accompany the traffic calming policy, and that the applicability of implementing town-wide speed limit reduction on local streets and the applicability of automated speed enforcement systems in school zones be evaluated further in relation to collision statistics and safety hot spots.

Recommendations include:

- Develop a Traffic Calming Policy;
- Develop a Traffic Calming Guide to accompany the policy, including appropriate measures and a clear procedural process for evaluation;
- Conduct a review of Town-wide collision data and evaluate the suitability of implementing reduced (30 km/h) speed limits on local streets and automated speed enforcement systems in school zones; and
- Conduct safety evaluations for the community identified areas using the Traffic Calming Policy framework.

PEDESTRIAN SAFETY AND CROSSWALKS

A policy for pedestrian infrastructure should encourage continuity and seek to fill gaps in the current network. Much like the road network, sidewalks should be installed between trip generators (residential areas, community centres, retail, schools, etc.) to encourage more trips to be taken on foot instead of by automobile. In rural areas where the construction of sidewalks may not be feasible, greater pedestrian safety may be achieved by painting defined shoulders, creating a visible buffer between vehicles and pedestrians. In addition to the implementation of new pedestrian infrastructure, the Town should seek to ensure that existing assets are kept in a state of good repair.

PLAN IMPLEMENTATION

POLICIES AND STRATEGIES

All of the roadways identified for future improvements are NOTL roads; therefore, it is expected that NOTL will have sole responsibility in their implementation. The policies and strategies summarized in the TMP are not reliant on specific timing for implementation, rather, they are intended as broader concepts that should be considered in the decision-making related to transportation planning and engineering activities going forward.

ACTIVE TRANSPORTATION

The recommended pedestrian and cycling corridors include the following types:

- **Signed Route (Sharrow):** A signed bike route with sharrow lane markings including route signs every 330m and sharrow stencil every 75m as per Ministry guidelines.
- **Conventional Bike Lane:** An on-road conventional cycling lane between 1.5m-1.8m wide on each side of the roadway. The lane is identified through pavement markings, including a 100mm white edge line, as well as signage every 400-800m at minimum.
- **Protected Bike Lane:** Similar to the conventional bike lane but with additional protection in the form of a physical barrier separating it from the rest of the roadway such as to offer additional protection to cyclists from motor vehicle traffic. The physical barrier can take many forms, such as a curb or a narrow median.
- **Sidewalk:** Along corridors with on-street parking, curbside pedestrian infrastructure of approximately 3.0m in width is recommended to ease mobility from parked vehicles to adjacent land uses. Along corridors with no on-street parking, a separated sidewalk with a boulevard space between the roadway travel lanes and sidewalk is recommended to provide a buffer space for pedestrians.
- **Two-Way Multi-Use Path:** Represents a separated path from the roadway where a 3.0m wide hard surface pathway (asphalt) is available for active modes (walking or cycling). These can be located within or outside of the road right of way.

ROADWAY NETWORK

The recommended roadway improvements have been staged into short term (<5 years), medium term (5-10 years) and long term (>10 years) horizons. The improvements consist mainly of road widenings which are required to improve capacity issues along the corridors, and transit priority measures.

COSTS OF THE PLAN

The capital cost of the recommended transportation strategy over the next 10+ years, inclusive of new road construction, intersection improvements, pedestrian routes, multi-use trails, and cycling facilities will total approximately \$35,301,957 for the Town and \$28,842,060 for the Region (\$64,144,017 in total). Of the total capital costs:

- \$6,967,092 is needed by the Town and \$22,957,420 is needed by the Region for short-term improvements (<5 years);
- \$28,332,800 is needed by the Town and \$2,963,640 is needed by the Region for medium-term improvements (5-10 years); and
- \$2,065 is needed by the Town and \$2,921,000 is needed by the Region for long-term improvements (10+ years).

Contents

1. INTRODUCTION	1	5. A PLAN FOR THE FUTURE	82
1.1 Building an Interconnected Network	1	5.1 Network Evaluation Principles	82
1.2 Purpose of the Plan	2	5.2 Vehicular Network Evaluation	83
1.3 Using the TMP	2	5.3 Cycling Network Evaluation	86
1.4 The Environmental Assessment (EA) Process	2	5.4 Transit Network Evaluation	93
1.5 Engagement	3	5.5 Focus Area Evaluation	97
1.6 Integration With Other Studies	3	5.6 Supporting Strategies	106
2. CURRENT CONDITIONS	6	5.7 Supporting Policies	132
2.1 The Community	6	6. PLAN IMPLEMENTATION	142
2.2 Multi-Modal Network	12	6.1 Categories	142
2.3 Travel Characteristics	29	6.2 Implementation Considerations	142
2.4 Collision Review	37	6.3 Costs of the Plan	144
2.5 What We Heard	39	6.4 Funding Mechanisms	146
3. FUTURE CONDITIONS	46	7. CONCLUSION	148
3.1 Internal Growth	46	APPENDIX A: Full Online Survey Results	
3.2 External Growth	49	APPENDIX B: Draft Traffic Calming Policy	
3.3 Applied Growth	51	APPENDIX C: Draft Pedestrian Safety and Crosswalks Policy	
3.4 Future Network Operations	54	APPENDIX D: Draft Commons Special Events Traffic Policy	
3.5 Planned Improvements	64	APPENDIX E: Draft Traffic Operations Policy	
3.6 Needs and Opportunities	68		
4. FOUNDATIONS	71		
4.1 Planning Context	71		
4.2 Guiding Themes	76		
4.3 Strategic Priorities	79		
4.4 Vision and Objectives	79		



1. INTRODUCTION

1. INTRODUCTION

1.1 BUILDING AN INTERCONNECTED NETWORK

Transportation networks are influenced and shaped by the communities they serve. Their role within the context of a municipality's quality of life can vary widely depending on how the community would like the network to serve them. Niagara-on-the-Lake is steeped in a rich history, serving as a natural frontier between the United States and Canada where the Niagara River meets Lake Ontario. The community has played a significant role not only within Niagara Region, but within the formation of our province and our nation through the establishment of many of the province's most enduring institutions.

Throughout the Town's history it has continually placed quality of life at the forefront of planning, resulting in what many consider to be one of the best communities across the country to live in. It's a feeling that many people describe as unique to the Town but is also one that is difficult to quantify. What makes Niagara-on-the-Lake so unique is a culmination of pieces that keeps the Town in such a prominent place within people's hearts and is something that this Transportation Master Plan (TMP) is intent on respecting so that it is moulded around the community's vision, as well as broader regional goals.

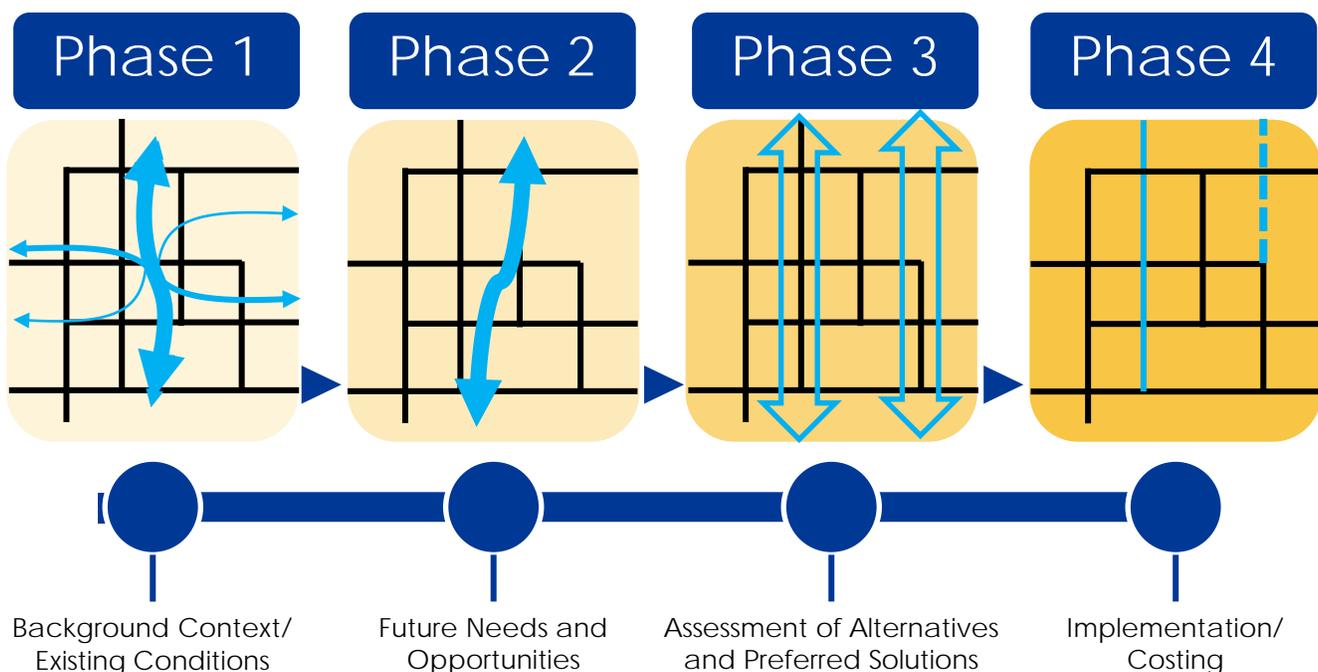
The Town of Niagara-on-the-Lake has commissioned Stantec to develop a transportation master plan (TMP) with the vision of evaluating the existing multi-modal transportation network and developing solutions to support and accommodate growth through the year 2031. In accordance with the requirements of the Environmental Assessment Act, this study will conform to Stages 1 and 2 of the Municipal Class Environmental Assessment Process including the identification of existing and future problems (deficiencies) or opportunities and the development of solutions to address them.

It is important to also consider that this study was undertaken during the COVID-19 pandemic, and appreciate that the pandemic can bring sustained impacts to transportation and travel habits that were difficult to anticipate at the time of this study's completion. As such, when implementing the TMP's findings, additional consideration should be given to current conditions at time of implementation.

As part of this study assignment our analysis is split into four phases that complement each other in an iterative process toward satisfying the Municipal Class Environmental Assessment Process and are visualized in **Figure 1.1**:

- Phase 1: Background Context
- Phase 2: Future Needs and Opportunities
- Phase 3: Alternatives Assessment and Preferred Solutions
- Phase 4: Implementation

Figure 1.1: The Transportation Master Plan Process and Phases



1.2 PURPOSE OF THE PLAN

This Transportation Master Plan (TMP) is a long-range strategic plan for the entirety of Niagara-on-the-Lake that identifies transportation infrastructure requirements to address existing challenges and support growth, along with policies to guide transportation and land use decisions. TMPs are integrated with environmental planning and sustainability principles and provide the framework and “blueprint” for implementing coordinated improvements on an area-wide or town-wide basis. A TMP avoids the pitfalls of piece-meal planning and “band-aid” solutions and provides a vision for the Town to strive for. This plan also provides the unique opportunity for proactive thinking, anticipating community needs, and preparing for emerging trends in transportation solutions. The Town of Niagara-on-the-Lake outlined general requirements for the TMP including the following components:

- Identify future transportation needs and opportunities through the year 2031;
- Provide connectivity between transportation modes to move people and goods sustainably, efficiently, and safely;
- Establish a sustainably integrated multi-modal transportation system that reduces reliance upon any single mode and promotes walking, cycling, transit, and other forms of transportation that are alternatives to personal vehicles; and
- Define policies and long-term strategies that will result in the protection of transportation corridors for all modes of transportation to address current and projected population and employment growth.

This plan expands upon previous planning work conducted by Niagara Region for the 2017 Regional Transportation Master Plan, as well as the Niagara-on-the-Lake Official Plan and other planning documents to re-evaluate previously planned improvements, as well as consider and respond to changes in growth, both within the Town and in adjacent municipalities since the development of previously planned solutions. This plan considers the unique characteristics of Niagara-on-the-Lake as a tourist destination and the impact this has on transportation throughout the Town, particularly during the months of high tourism. The purpose of this study is to create a town-wide multi-modal transportation plan that not only identifies improvements within the Town, but also considers opportunities to integrate the Town’s new and emerging areas within and beyond in a manner that preserves the quality of life and character of the community.

1.3 USING THE TMP

The TMP is meant to be used by several different transportation stakeholders as both a reference and a guiding document for developing strategies and making investment decisions. It may also be used as a starting point for developing more detailed plans and analyses for transportation-related studies, projects and initiatives. This is all underpinned by the Town’s

transportation vision, goals, strategy and initiatives to help Niagara-on-the-Lake grow into the future.

More specific examples illustrating how the TMP may be used include:

- The public may have an interest in following the development of transportation initiatives in the Town and in gaining a better understanding of how mobility choices will improve in the future. The TMP empowers the public to actively participate in the change.
- Elected Officials should use the TMP to assist in decision making. They can also use it to educate and engage their constituents about transportation-related changes that will impact their neighbourhoods and the Town as a whole.
- Town staff should use the TMP as a guide to making clear, balanced and fiscally prudent decisions on transportation initiatives, infrastructure investments and program administration. In general, TMPs can be used as the basis for implementing the Town’s Official Plan.
- Town engineers, designers and capital delivery programs staff should scope transportation capital programs and plans to implement the TMP.
- Town transportation professionals, planners and health practitioners will be able to use the transportation system performance targets to achieve modal-split aspirations and improve the reliability of travel by balancing the transportation network for all users, regardless of age, ability or income.
- The TMP can be used to position the Town into a “state-of-readiness” for partner-funded transportation initiatives (e.g. Federal, Provincial, Public-Private-Partnerships) as funding becomes available and partners are engaged.
- Prospective investors in the Town may use it to make development decisions based on transportation initiatives that result in new available transportation connections.

1.4 THE ENVIRONMENTAL ASSESSMENT (EA) PROCESS

This TMP study was developed according to the Municipal Class Environmental Assessment process (October 2000, as amended in 2007, 2011 and 2015) for Master Plans (Approach 1).

The Master Plan approach recognizes that there are benefits to using the EA process when comprehensive plans are undertaken for projects that have a relatively minor impact according to their environmental significance and the effects on the surrounding environment. The outputs of this TMP includes road and active transportation projects, as well as recommendations relating to public transit.

The Municipal Class EA process addresses Phases 1 and 2 of the EA process including the identification of problems and opportunities, as well as identifying and evaluating alternative solutions to address the problem and establish the preferred solution. Approach 1 for Master Plans involves the preparation of

a Master Plan document at the conclusion of the first two phases of the Municipal Class EA. This document is made available for public comment prior to being approved by the municipality.

Master Plans are typically done at a broad level of assessment thereby requiring more detailed analysis or investigations at the project-specific level in order to fulfill the requirements for specific Schedule B and C projects identified within the Master Plan. Certain projects (Schedule A+ and A) can be implemented upon approval of the TMP. Examples of transportation projects under each schedule of environmental assessment are summarised in **Table 1.1**.

We are preparing this TMP in a way that prioritizes investments, and empowers the Town of Niagara-on-the-Lake to undertake informed decisions going forward so the Town may adapt as change occurs. Despite this, Master Plans should be reviewed every five years to determine the need for a comprehensive formal review and/or update. Potential changes which may trigger the need for a detailed review include:

- Major changes in the original assumptions.
- Major changes to components of the master plan.
- Significant new environmental effects.
- Major changes in proposed timing of projects within the master plan.

Additionally, other changes including significant new health effects, funding opportunities, changes or updates to internal guiding documents (i.e. an Official Plan Update) and changes to external guiding documents should also be considered to trigger a review of this TMP.

Table 1.1: Examples of transportation projects associated with different EA Schedules

EA Schedule	Types of Road Projects*
Schedule A	Normal and emergency operations and maintenance projects (e.g. re-paving, local road improvements, re-designation of an existing General Purpose Lane)
Schedule A+	Smaller capital projects with minimal environmental impacts (e.g. construction of sidewalks or bicycle paths or lanes within the right-of-way)
Schedule B	Improvements and minor expansions to existing roads such as reconstruction or widening that may have some adverse environmental impact requiring environmental screening and notification of those affected (less than \$2.3M)
Schedule C	Construction of new facilities and major expansions requiring the full five-step EA process and public consultations

*Municipal transit projects follow the TPAP process

1.5 ENGAGEMENT

Stakeholder engagement is an important component of the EA process and there are requirements for notifications and consultation with public, agencies, and other stakeholders at key phases of the process. This allows stakeholder issues, ideas and priorities to be incorporated into the plan in a meaningful way. The following consultation sessions are either completed, ongoing, or planned throughout the study:

- Notice of Commencement | March 12, 2020
- Online Engagement Survey #1 | March 12, 2020 to July 1, 2020 (extended due to Covid-19)
- Public Information Centre #1 (Online) | October/November 2020
- Public Information Centre #2 | July 2021
- Notice of Completion | November 2021

The TMP study was initiated in January 2020 through a Notice of Commencement published on the Town's website, local newspaper, and sent directly to key community stakeholders by email. Throughout the entire study process stakeholders were able to provide their email or contact information to be directly informed of the study's progress and engagement sessions. Notably, consistent with the EA process, additional engagement will be required prior to implementation of many of the TMP's recommendations, as design details are further clarified.

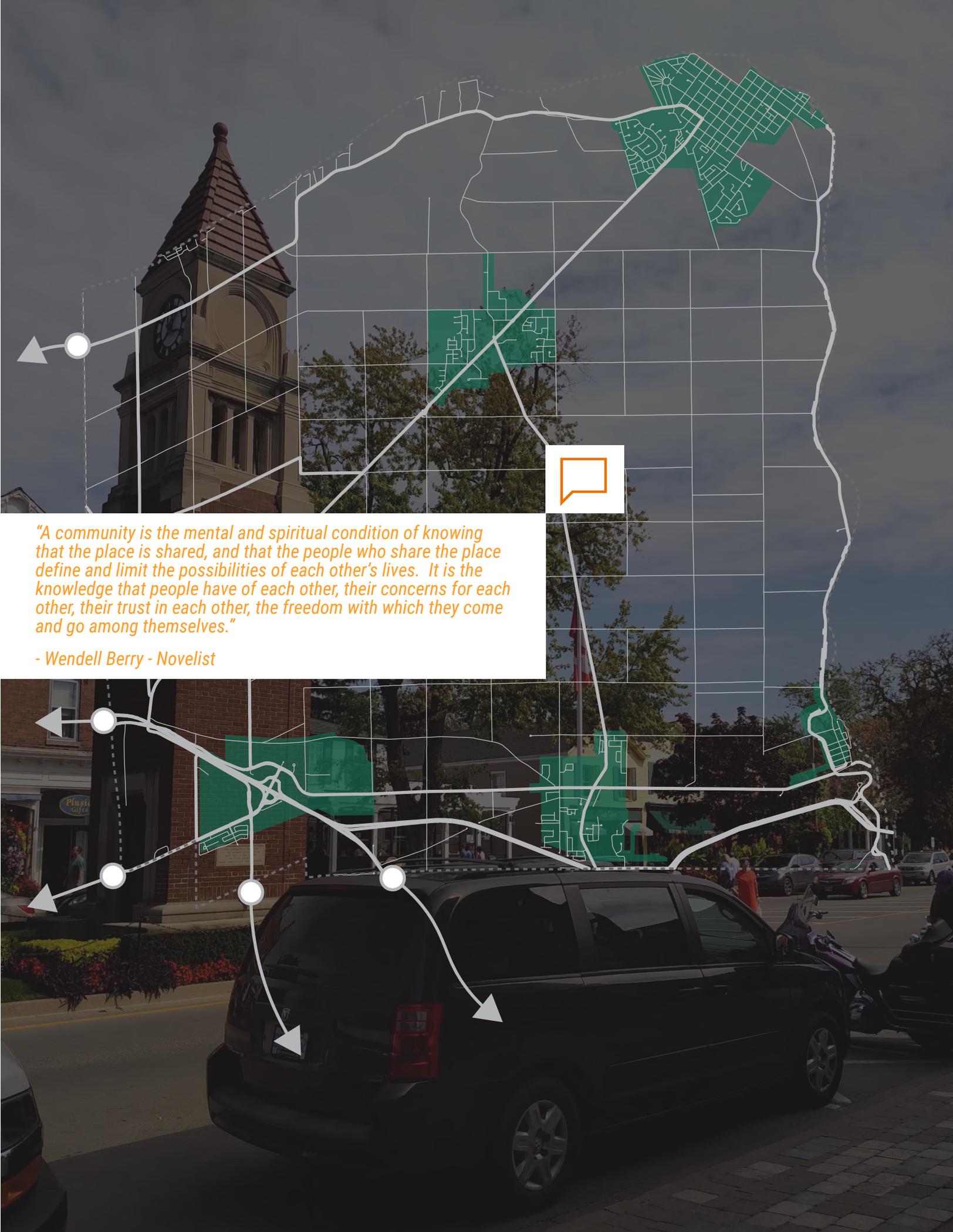
1.6 INTEGRATION WITH OTHER STUDIES

There are several Town initiatives, strategies, and plans that are related to the TMP that were considered in parallel to ongoing planning work conducted including:

- Official Plan Review;
- Downtown Master Streetscape Plan;
- Parks and Trails Master Plan;
- Transit Operational Review; and
- Development Charges Background Report.

Beyond these studies there were several other strategies, plans, and studies at the Provincial, Regional and Municipal levels that were considered, and which are further described in **section 4.1 Planning Context**.

Notably, the Transportation Master Plan will further inform the Town's draft Official Plan, and the draft Official Plan may require changes so that it is in harmony with the Transportation Master Plan if adopted.



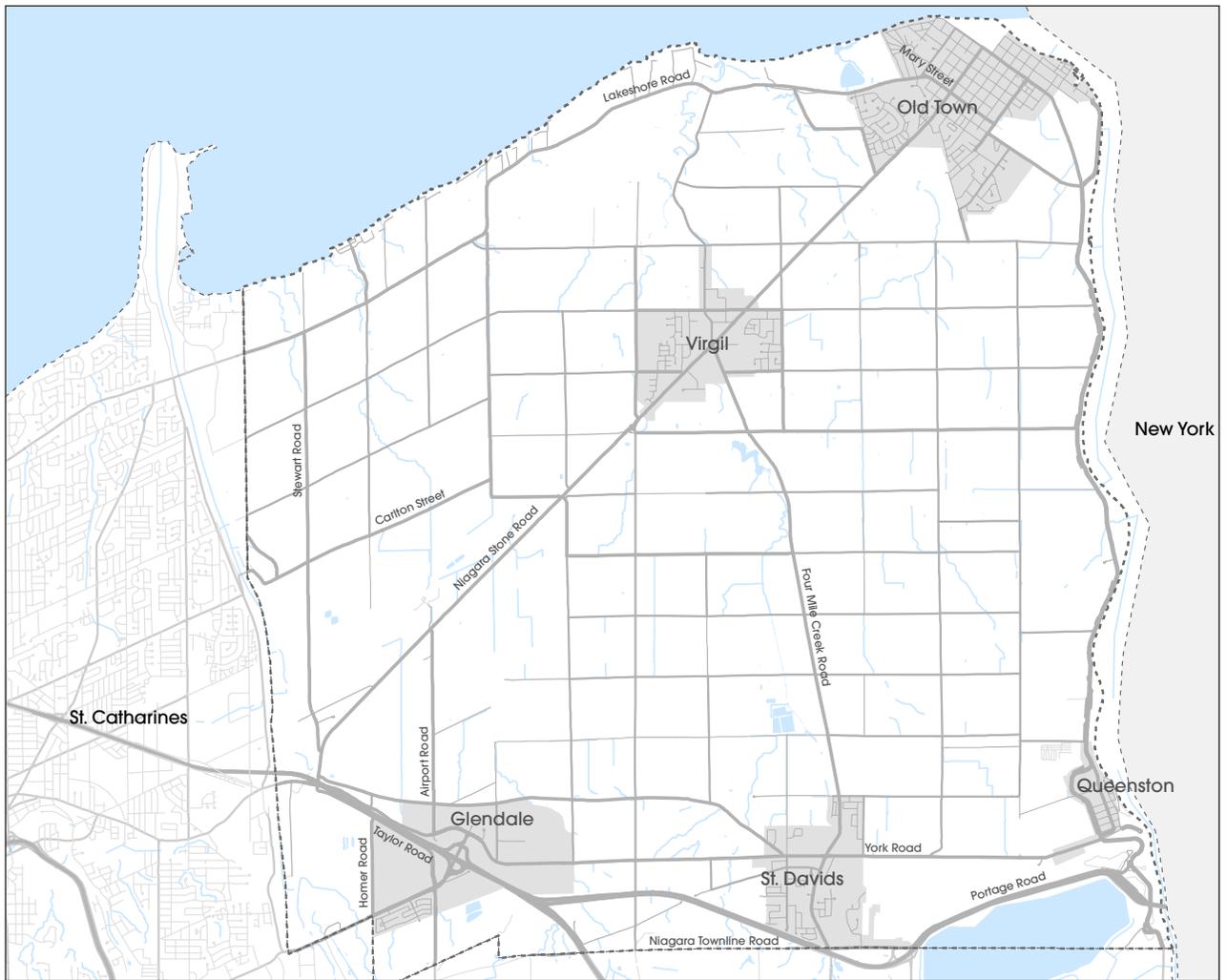
"A community is the mental and spiritual condition of knowing that the place is shared, and that the people who share the place define and limit the possibilities of each other's lives. It is the knowledge that people have of each other, their concerns for each other, their trust in each other, the freedom with which they come and go among themselves."

- Wendell Berry - Novelist



2. CURRENT CONDITIONS

Figure 2.1: Existing Road network and Urban Settlement Areas



2. CURRENT CONDITIONS

2.1 THE COMMUNITY

A multi-modal transportation network must be planned according to the local geography and demographics to best address and recommend solutions tailored for the local context. Understanding the correlation between shifting age groups or land uses is imperative in understanding why the town moves in a particular way as well as understanding where residents and businesses will need to go in the future.

The Town of Niagara-on-the-Lake is part of and located within Niagara Region, an area that extends from West Lincoln in the west to Fort Erie and Niagara Falls in the east. Niagara-on-the-Lake accounts for 4% or 17,511 of the 431,159 population of Niagara Region. The downtown, located in Old Town, is centred along Queen Street extending from Niagara Boulevard to King Street where it becomes Picton Street.

The region consists of various urban "centres" where density and population for the area are most concentrated. Traffic congestion, intersection density/frequency, interactions between various travel modes, collision/ safety concerns and

the majority of origin-destination zones are also concentrated in the urban centres, and therefore are a focal point in this analysis. The rural areas are also a significant consideration in this assessment, as they provide the network connectivity between the urban centres and can be impacted by land use, mobility and densification changes that occur within the urban centres.

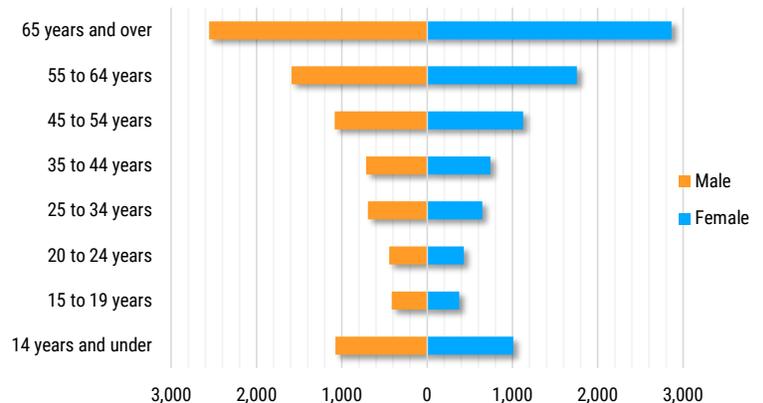


Figure 2.2: Niagara-on-the-Lake Population Pyramid | 2016
Source: Statistics Canada - Community Profile, 2016

The largest age demographic within the Town is the group of residents the age of 65 years and over that account for approximately 31% of the population as shown in **Figure 2.2** that illustrates the existing population pyramid of the community. The aging population is likely due to the influx of "Baby boomers" entering retirement age, with Niagara-on-the-Lake's median age being 55 as compared to the provincial median of 41. The age group has increased significantly by 55% since 2011 and is projected to continue growing in the future as outlined by broader regional trends within the Niagara Region. Despite a growing senior population, a younger cohort population between 14 years of age and younger are expected to enter the working-age bracket by 2036 presenting opportunities to guide and encourage transportation choices for the next-generation of working-age residents.

The Town is located in the northeast corner of Niagara Region at the tip of the Niagara Peninsula and along the coast of Lake Ontario. The Town's land use encompasses a mixture of uses throughout the municipal boundary. Niagara-on-the-Lake is comprised of a series of smaller communities scattered throughout the Town. To uniquely characterize and plan for these areas several secondary plans have been developed for the various communities which include the following as visualized in **Figure 2.1**:

- **Old Town:** located in the northeast tip of the Town, bordering Lake Ontario, representing the main town centre;
- **Virgil:** located southwest of Old Town;
- **St. Davids:** located in the southern end of the Town, bordering Niagara Falls;
- **Queenston:** located within the southeast corner of the Town, bordering Niagara Falls; and
- **Glendale:** located within the southwest corner of the Town, bordering Niagara Falls.

Within the designated communities noted above, there is a significant portion of established residential, with some medium density zoning observed in Old Town, as well as scattered industrial and commercial uses. Within these communities there are 3 commercial corridors including:

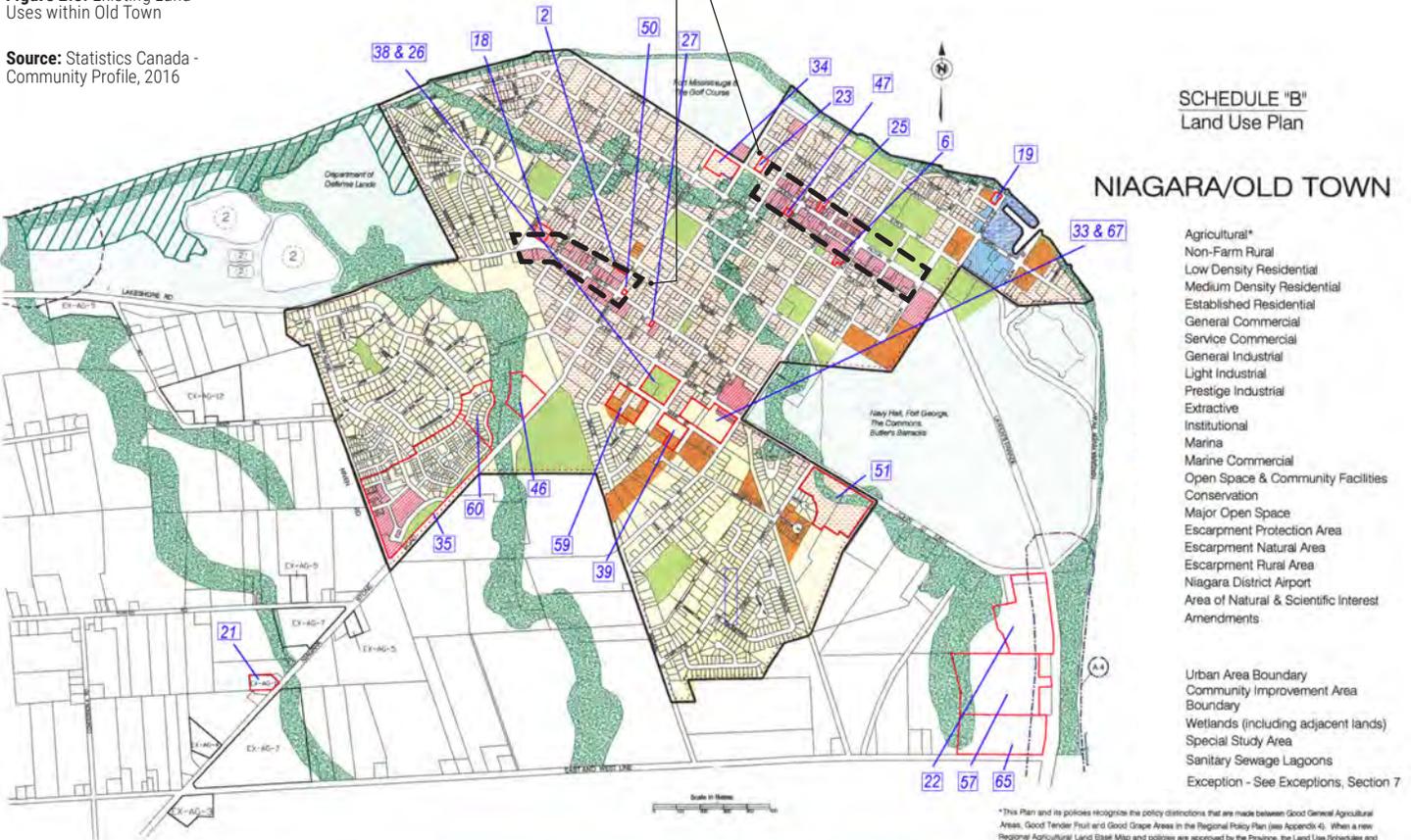
- **Picton/Queen Street** - between Gate Street and Wellington Street (Old Town - see **Figure 2.3**);
- **Mary Street** - between Nassau Street and Mississauga Street (Old Town - see **Figure 2.3**); and
- **Niagara Stone Road** - between Four Mile Creek Road and just north of Line 1 Road (Virgil - see **Figure 2.4**).

Old Town is the Town's largest settlement area and comprises a large portion of commercial retail, recreational, institutional, and residential land uses. The town centre is anchored along Picton/Queen Street between Mississauga Street and

Continued on page 9

Figure 2.3: Existing Land Uses within Old Town

Source: Statistics Canada - Community Profile, 2016



Consolidated Schedules as of July, 2017. In all instances, reference should be given to original plan and amendments as approved by Council.

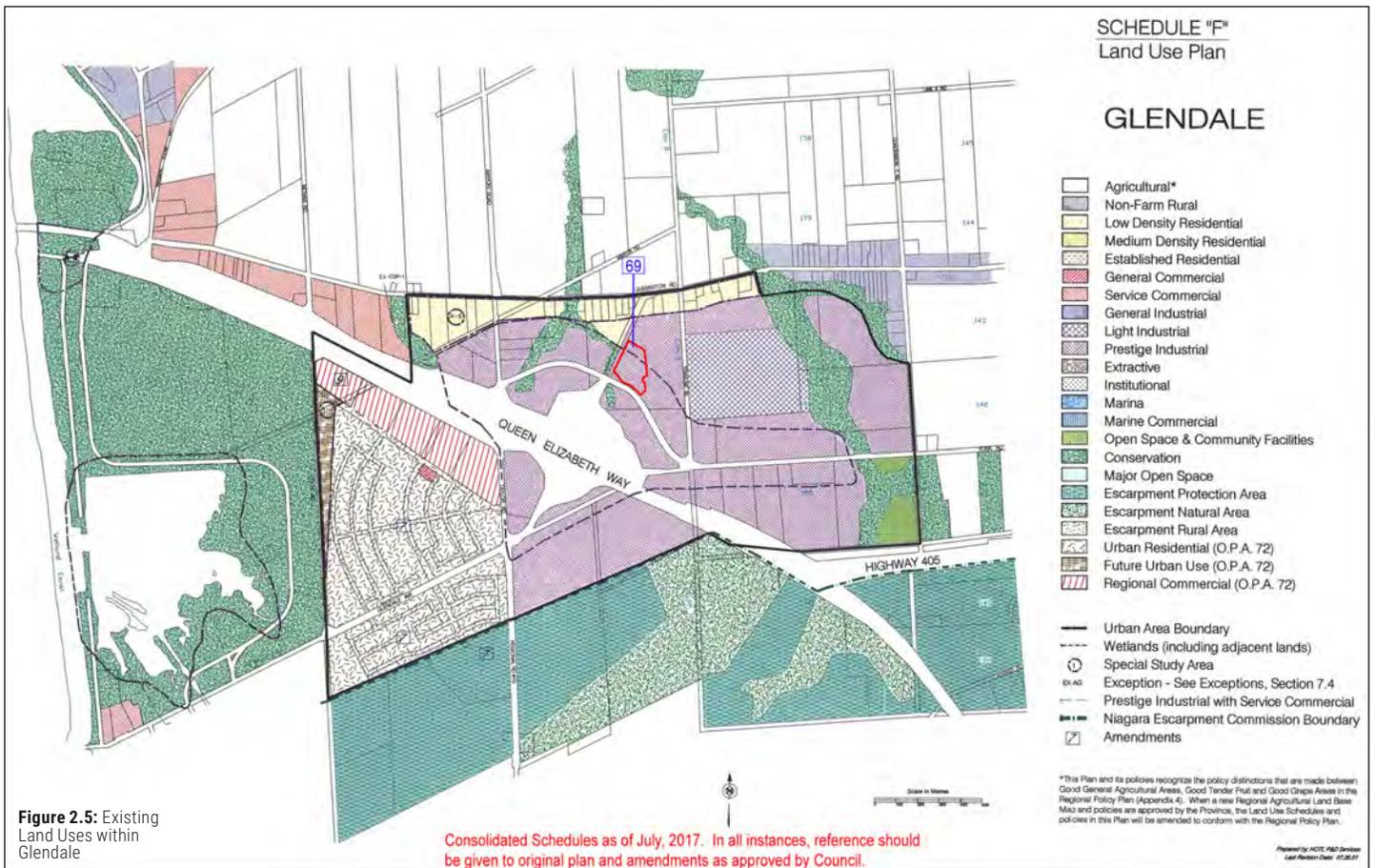
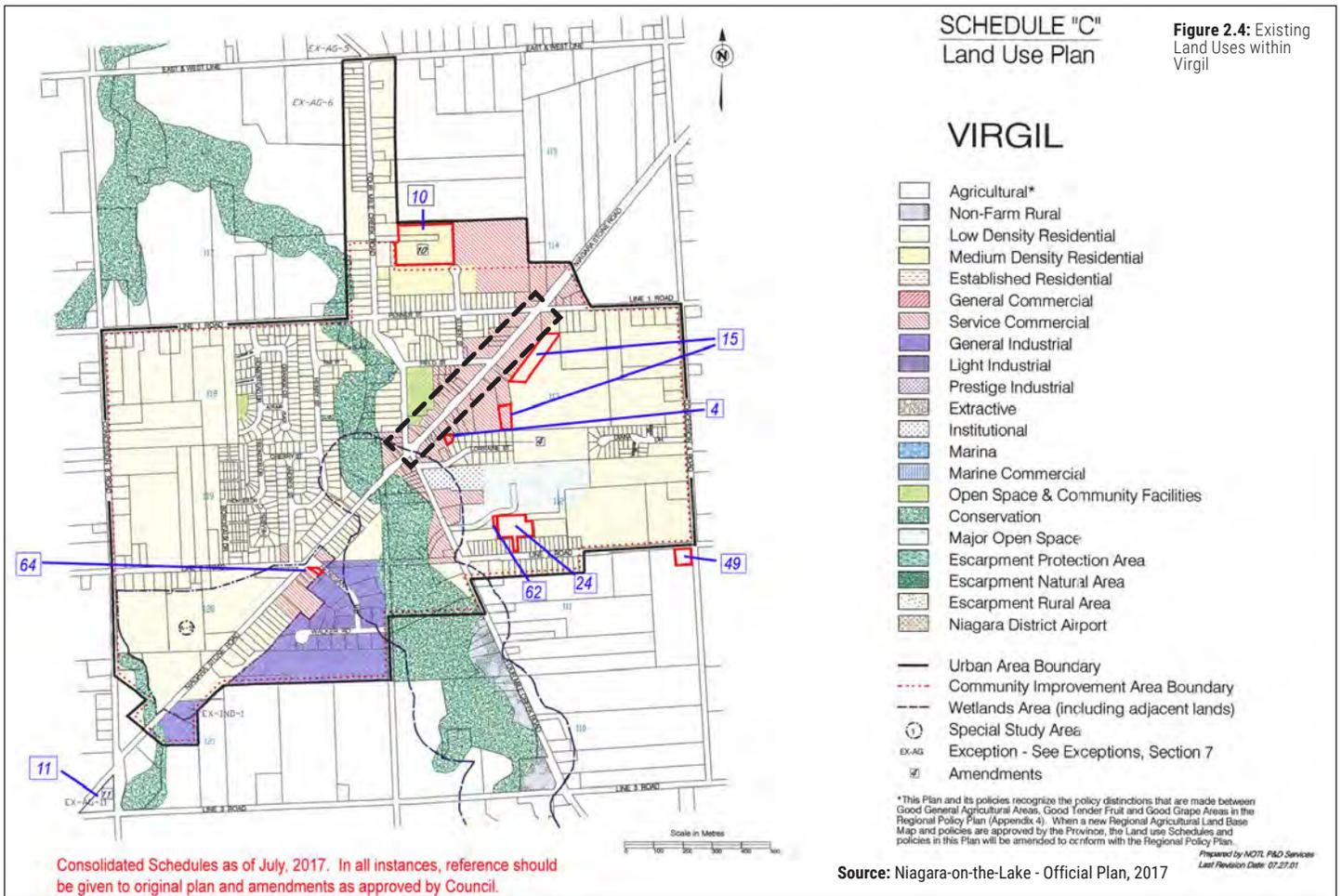
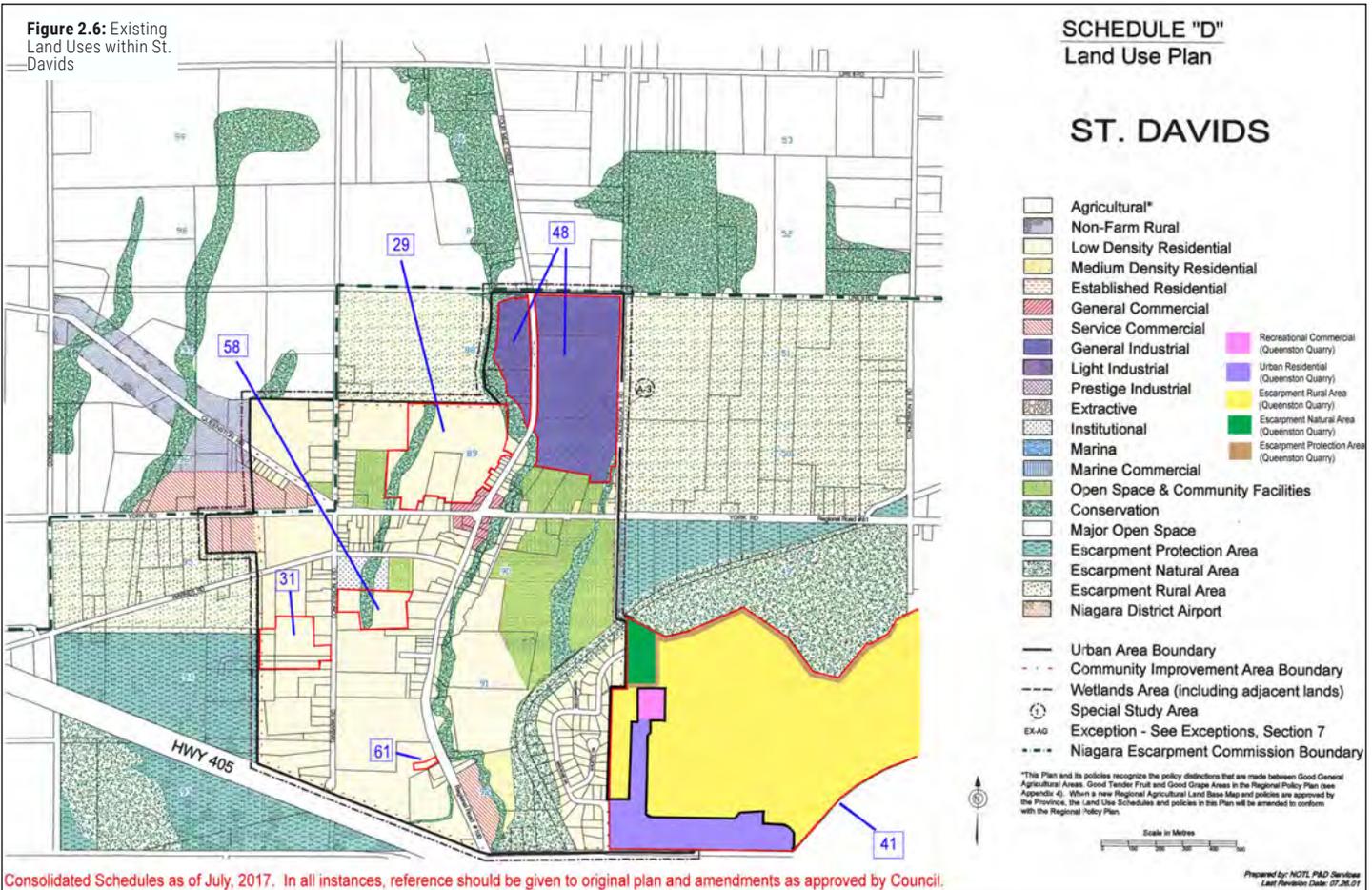


Figure 2.5: Existing Land Uses within Glendale

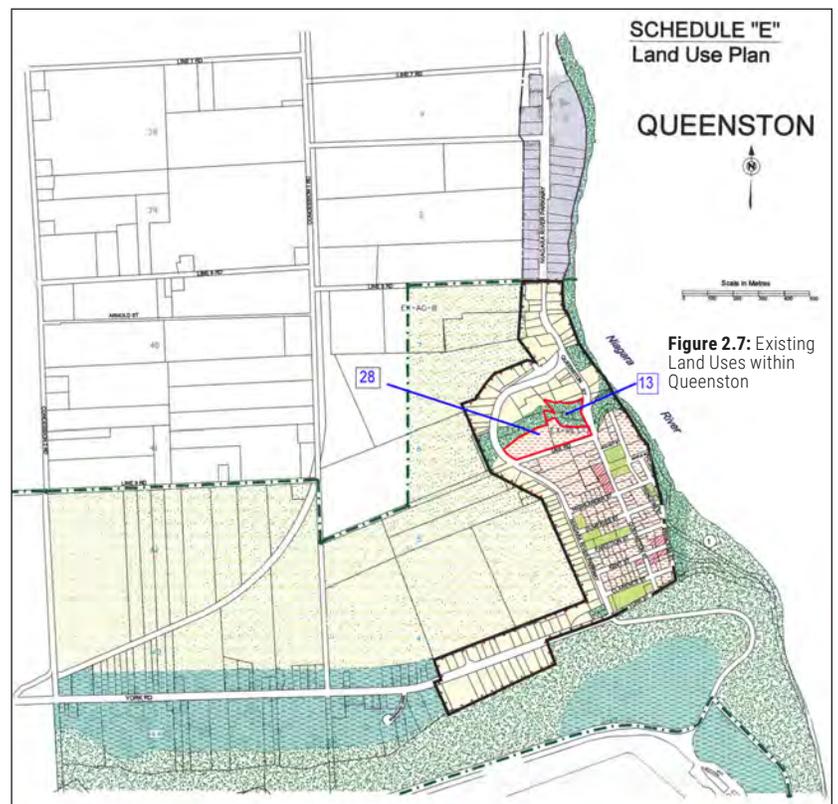


Source: Niagara-on-the-Lake - Official Plan, 2017

Wellington Street, and is home to major tourist attractions including the Shaw Festival theatre, Fort George, Butler's Barracks, and Fort Mississauga National Historic Sites, among a variety of other unique cultural shops and public parks.

Virgil acts as the central urban settlement of the community and serves as the Town's second largest settlement area after Old Town. Virgil generally has a traditional built form with commercial activity centred along Niagara Stone Road with low-rise residential and institutional land uses surrounding it. The community has a unique built form influenced by the natural geography that has resulted in a disjointed road network that is built around the conservation area that cuts through the area as shown in **Figure 2.4**.

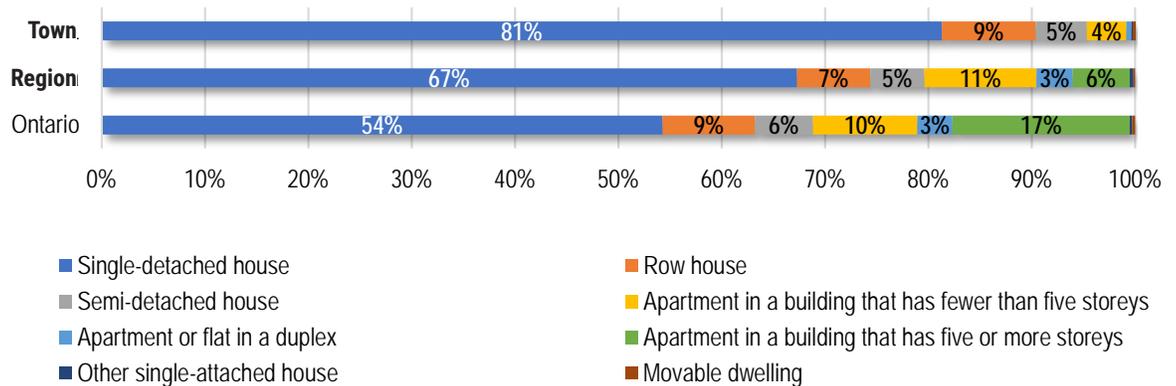
The urban settlement area of Glendale currently acts as the main gateway into the community due to the Queen Elizabeth Way (QEW) interchange. The area has also seen recent commercial and residential growth as a result of the opening of the Outlet Collection at Niagara in 2014, as well as expanded course offerings at Niagara College. The land surrounding the outlet mall is planned for future industrial and residential development and is anticipated to be one of the major growth areas for the community into the future as shown in **Figure 2.5**.



Source: Niagara-on-the-Lake - Official Plan, 2017

Occupied Private Dwellings by Type, 2016

Figure 2.8: Occupied Private Dwellings by Type | 2016



Source: Statistics Canada - Community Profile, 2016

Niagara Region commenced a Class Environmental Assessment study for the Glendale Community area that was completed in 2019. The study area was bounded approximately by the Welland Canal, Queenston Road, Four Mile Creek Road, and Mountain Road and includes interchanges between Glendale Avenue, and Highway 405. This study was meant to address the following needs:

- Safe and convenient access and mobility to, from, and within the Glendale Community area for pedestrians, cyclists, cars, trucks, and transit;
- Improvements to the transportation system in the study area in relation to the vision for future land use and urban design, with particular emphasis on the Glendale Community.
- Improved access to the rest of Niagara-on-the-Lake; and
- Alternate access to the highway system for heavy vehicles accessing and egressing the study area.

Subsequent to this study, the Ministry of Transportation for Ontario (MTO) completed a Class Environmental Assessment for interchange improvements at the Queen Elizabeth Way and Glendale Avenue resulting in a preferred recommendation to implement a Diverging Diamond Interchange (DDI) along with a realignment of the ramps to interline directly with Airport Road.

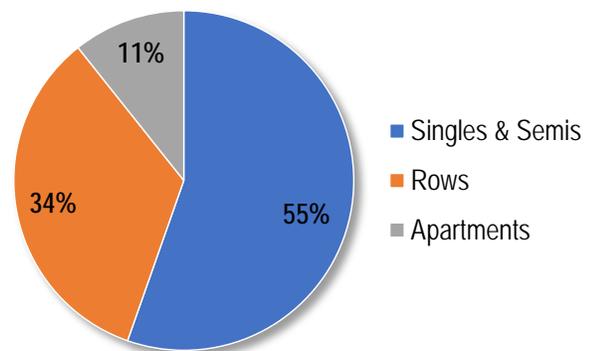
The urban settlement areas of St. Davids and Queenston are both stable residential communities primarily characterized by low-rise single-detached housing. According to the official plan, Queenston is not anticipated to experience significant population or employment growth, whereas St. Davids is expected to experience some future residential and employment growth on its southern fringes, adjacent to Provincial Highway 405 as visualized in **Figure 2.6**. Queenston's location along the Niagara River (as visualized in **Figure 2.7**) has made it an ideal location for launching boat tours which has resulted in an influx of tourists and large buses passing through the community. These will be important considerations for the development of context-sensitive mobility solutions that support the residents' and business needs, while retaining the unique cultural characteristics of the area.

A review of census dwelling data, comparing Niagara-on-the-Lake with Niagara Region and Provincial data further highlights the low-density composition of the community with over 90% of the current residential dwellings identified as low-rise housing (i.e. single-detached, rows, and semis) as visualized in **Figure 2.8**. This is compared to the broader Niagara Region dwelling make-up that sees a slightly lower proportion of single-detached housing types at 67% of the current housing supply, compared to 81% in Niagara-on-the-Lake.

A review of historical housing starts between 2007 and 2017 highlights the ongoing change toward denser building forms with rows and apartments accounting for 45% of recent developments as visualized in **Figure 2.9**. The Development Charges Background Study (2018) presents the Town's Development Charge (DC) policies, residential and non-residential growth forecasts, calculation of DCs, policy recommendations and by-law implementation. DCs are used to fund capital costs of new infrastructure to support future growth. The DC Background Study calculates DCs based on a net population increase of approximately 3,000 (to 2027) and 11,000 (to Buildout).

Housing Starts in the Town, 2007–2017

Figure 2.9: Housing Starts by Dwelling Type | 2007-2017



Source: Niagara-on-the-Lake Development Charges Background Study, 2018

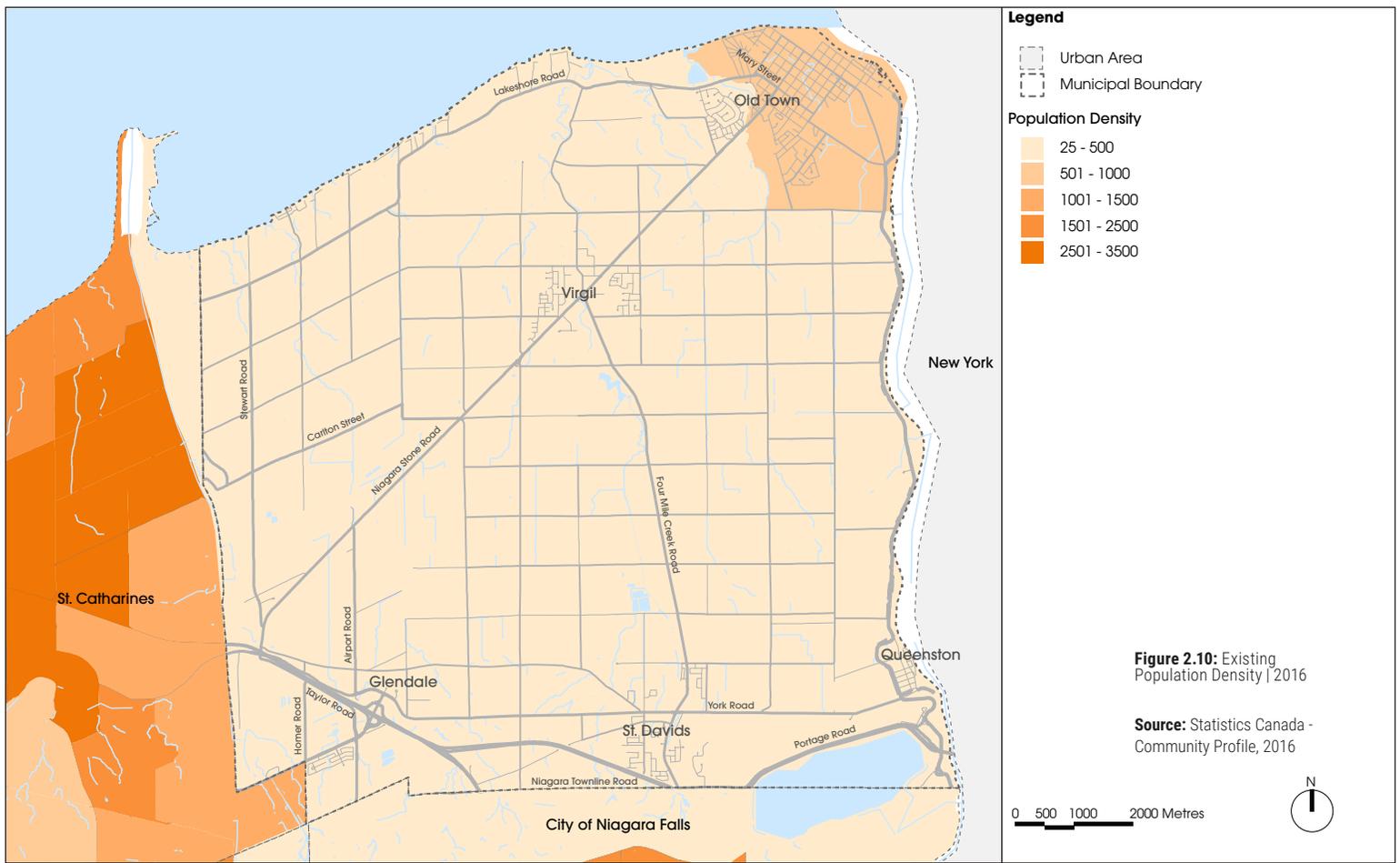


Figure 2.10: Existing Population Density | 2016

Source: Statistics Canada - Community Profile, 2016

These changes, along with future changes, will have implications for the multi-modal transportation network over time presenting new opportunities to better coordinate and integrate land use plans with multi-modal transportation improvements.

However, despite a shift toward denser built forms, low-density single-detached and semis are still anticipated to account for the majority of new dwellings which present their own mobility needs and challenges.

Outside of the urban settlement areas, a significant portion of the Town is made up of agricultural lands leading to an overall population density of 132 persons per square kilometres (based on the 2016 population of 17,511) as visualized in **Figure 2.10**. This aligns with the agriculture industry seen across the region as well as many wineries and popular scenic attractions within Town.

Employment distribution in the Town illustrates a high proportion in sales, service and management occupations (as summarised in **Table 2.1**). This aligns with the large amounts of tourism the Town sees with peaks observed in the summer months. A considerable percentage of the population is also employed in business, finance and administration occupations (13%), education, law, and social, community and government services (10%) as well as trades, transport, and equipment operators (10%).

Table 2.1: Municipal Occupation Split

Occupation	Employment	% Total
0 Management occupations	1,570	19%
1 Business, finance, and administration occupations	1,120	13%
2 Natural and applied sciences and related occupations	440	5%
3 Health occupations	510	6%
4 Education, Law and social, community and government services	830	10%
5 Art, culture, recreation, and sport	315	4%
6 Sales and service occupations	2,045	24%
7 Trades, transport and equipment operators and related occupations	855	10%
8 Natural resources, agriculture, and related production occupations	375	4%
9 Manufacturing and utilities	220	3%
Not Applicable	100	1%
Total	8,380	100%

Source: Statistics Canada - Commuter Profile, 2016

Through the twentieth century, Niagara-on-the-Lake's local economy was largely based off of fruit farming and tourism. Niagara-on-the-Lake was officially designated in 1970 where shortly after a flourishing wine industry began throughout the 1970s as a result of the unique climate in the region. Additionally, the creation of the Shaw Festival in the 1960s brought cultural institutions and further strengthened the Town's tourism industry. In the early 1990s several canning factories were opened to process the fruit harvest. Today, Niagara-on-the-Lake preserves much of its rich history with the Niagara Old Town declared a National Historic Site in 2004. This history contributes to many of the established residential neighbourhoods observed throughout the Town, with many historical economic drivers remaining including wineries, agriculture and tourism. Accessible via the Queen Elizabeth Way (QEW), Niagara-on-the-Lake draws in tourism from southern Ontario and New York State seeking recreational, historical, and cultural opportunities. Travel into the Town is accessible via Niagara Stone Road which connects the highway system to the Town. While largely surrounded by agricultural uses, Niagara Stone Road also provides connections to Virgil, Old Town and the Niagara District Airport. The preference for the private automobile within the Town coupled with the preservation of its historic character has resulted in the growth of low-density residential development. Further, with Niagara-on-the-Lake being a significant tourist destination, unique challenges are posed

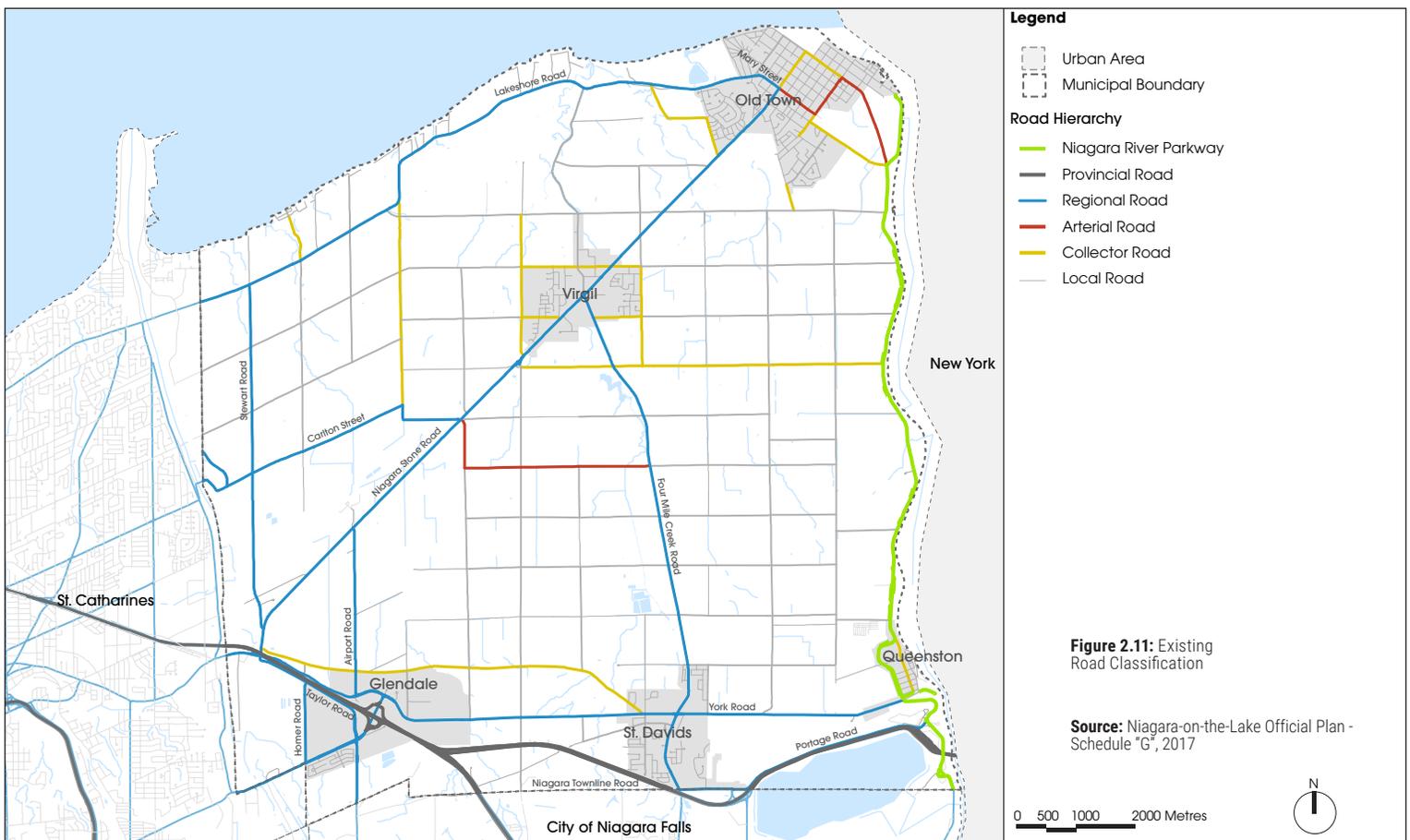
with respect to mode split objectives, recognizing that many visitors arrive in the Town by car or tour bus, and the promotion of arrival via other modes has limited feasibility.

2.2 MULTI-MODAL NETWORK

2.2.1 ROAD CLASSIFICATION

Per the Town of Niagara-on-the-Lake's Official Plan, as amended in 2017, the transportation infrastructure network consists of several different road types which are intended to serve and meet different objectives. The Town's road classification system is visualized in **Figure 2.11** and consists of the following:

- Provincial Highways:** are under the jurisdiction of the Ministry of Transportation and have restricted or controlled access routes to permit through traffic to move quickly and safely. Their function is to carry traffic at higher speeds and provide for longer trips in and outside the area. The design and location of access will be strictly controlled so that any service to adjacent land does not detract from the primary function of moving traffic, however combined access from service roads and/or adjoining Arterial, Collector and/or Local Roads should be encouraged. Specific provincial regulations apply in the vicinity of these highways, as set out by the Ministry of Transportation.





- Arterial Roads/Regional Roads:** are primarily transportation facilities, providing through routes for vehicles, pedestrians and cyclists traveling long distances within the region. Arterial roadways will provide access to highways including the Queen Elizabeth Way, regional roads and collector roads; connections to local roads are permitted, though should be minimized. With regards to adjacent land uses, residential uses that abut arterial roads may have reverse lotting where their front yard and driveway access faces an interior local road. Access to arterial roads are designed to ensure safe entry and exit; new accesses are not prohibited but are subject to approval by the road authority. Except where existing development or circumstance precludes it Arterial Roads will generally have a minimum right-of-way width in between 26.20 and 45.70 metres as per the Municipal/Region Road Section Table provided within the Official Plan and provided within this TMP in **Table 2.2** and **Table 2.3**. Sidewalks, where possible and practical, are required on both sides of Arterial Roads. For planning purposes within this TMP, Regional Roads are also considered Arterial Roads, however improvements and recommendations related to Regional Roadways requires Regional approval and support.
- Collector Roads:** carry traffic between Arterial Roads and the Local Roads. They are intended to be relatively continuous and carry lower traffic volumes than Arterial Roads. The right-of-way width, typically 26 metres, enables traffic flow and on-street parking. The construction and accommodation of all necessary services will be determined by the Town.
- Local Roads:** are designed to accommodate low volumes of traffic at low speeds and generally serve local area trips. Local Roads will generally have a minimum right-of-way width of 20.0 metres. Sidewalks are generally required on at least one side of all Local Roads unless otherwise identified as a Key Pedestrian Link in which case they are required on both sides of the street.
- Niagara Parkway:** is a roadway under the jurisdiction of the Niagara Parks Commission and offers scenic routes for tourist and recreational functions. To preserve and bolster

the scenic function of these roads speed limits, access and commercial traffic are more controlled and may be potentially restricted.

The existing road classification system stipulates general requirements for vehicular, and pedestrian facilities, depending on road class, however there are opportunities to expand upon the existing road classification to incorporate Complete Streets principles within road class requirements and specifications.

There is no singular design prescription for Complete Streets; each one is unique and responds to the community context. A complete street may include sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and more. The over-arching philosophy is that Complete Streets takes a holistic approach to equitably sharing the roadway for all road-users based on the contextual needs.

According to the Transportation Association of Canada (TAC) Manual of Geometric Design Standards for Canadian Roads, road classification is "the orderly grouping of roads into systems according to the type and degree of service they provide to the public". The road classification system is an important tool for urban development and road management. It allows the Town to collaborate and influence the implementation of roadway design measures as development occurs. It outlines the expectations of what facilities and specifications are expected when a roadway is built, or re-built so that developers and municipal staff know what is required to be included within the road design. Expanding to include specifications for sustainable modes of transportation could serve to normalize the inclusion of multi-modal transportation options, as well as encourage a more integrated multi-modal network that is expanded progressively, over time, as development occurs. This is conducive of the identified movement network changes within Section 4 of the Official Plan.

A list of municipal and regional road sections, and their associated right-of-way widths are provided in **Table 2.2**, and **Table 2.3**, respectively.

Table 2.2: Existing Municipal Road Section Classification and Right-of-Way Widths

Road	From	To	Classification	Designated Road Right-of-Way Width
Line 1/ Penner Street	• Four Mile Creek Road	• Concession 6 Road	• Collector	• 26 m (85.3 ft.)
Line 1 Road	• Niagara Stone Road	• Concession 4 Road	• Collector	• 26 m (85.3 ft.)
Line 2 Road	• Four Mile Creek Road • Niagara Stone Road	• Concession 4 Road • Concession 6 Road	• Collector • Collector	• 26 m (85.3 ft.) • 26 m (85.3 ft.)
Concession 4 Road	• Line 1 Road	• Line 2 Road	• Collector	• 26 m (85.3 ft.)
Concession 6 Road	• Line 1 Road	• Niagara Stone Road	• Collector	• 26 m (85.3 ft.)
Concession 7 Road	• Line 5 Road	• Niagara Stone Road	• Arterial	• 26 m (85.3 ft.)
Concession 2 Road	• East and West Line	• York Road	• Local	• 26 m (85.3 ft.)
East/West Line	• Townline Road	• Niagara Stone Road	• Local	• 26 m (85.3 ft.)
Four Mile Creek Road	• Niagara Stone Road	• Lakeshore Road	• Arterial	• 26 m (85.3 ft.)
Read Road	• Carlton Street • Lakeshore Road	• Lakeshore Road • Lake Ontario	• Local • Local	• 26 m (85.3 ft.) • 20 m (65.6 ft.)
Church Street	• Read Road	• Townline Road	• Local	• 20 m (65.6 ft.)
Scott Street	• Read Road	• Townline Road	• Local	• 20 m (65.6 ft.)
McNab Road	• Carlton Street	• Lake Ontario	• Collector	• 20 m (65.6 ft.)
Irvine Road	• Church Street	• Lake Ontario	• Local	• 20 m (65.6 ft.)
Warner Road	• Concession 4 Road	• Highway 405	• Local	
Townline Road	• Lakeshore Road	• Lake Ontario	• Arterial	• 20 m (65.6 ft.)
Townline Road (Niagara/Grantham)	• Lakeshore Road	• Carlton Road	• Collector	• 20 m to 35 m (65.6 ft.- 116.4 ft.) ¹
Townline Road	• Queenston Road	• York Road	• Local	• 26 m (85.3 ft.)
Concession 4 Road	• Line 3 Road	• Walker Road	• Local	• 26 m (85.3 ft.)
Niven Road	• Highway No. 55	• Village Road	• Collector	• 20 m (65.6 ft.)
Paffard Street			• Local	• 15.24 m (50 ft.)
Flynn Street			• Local	• 15.24 m (50 ft.)
Green Street			• Local	• 18 m (59 ft.)
Charlotte Street	• Niagara Street	• Bend	• Local	• 20 m (65.6 ft.) ²
Queen's Parade	• Wellington Street	• Niagara Parkway	• Arterial	• 26 m (85.3 ft.)
Rye Street			• Local	• 18.11 m (59.4 ft.)
Ricardo Street	• Nelson Street	• King Street	• Local	• 23 m (75.47 ft.)
Nelson Street	• Ricardo Street	• Queens Parade	• Local	• 23 m (75.4 ft.)
All Other Rural and Urban Road			• Various	• 20 m (65.6 ft.)

1. Requires 3.0 metre (9.8 ft.) widening along the existing westerly boundary.

2. Requires 6.0 metres (20 ft.) along south boundary

Table 2.3: Existing Regional Road Section Right-of-Way Widths

Road	From	To	Classification	Designated Road Right-of-Way Width
Regional Road 58, Homer Road	<ul style="list-style-type: none"> Glendale Avenue 	<ul style="list-style-type: none"> South Service Road 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 30.50 m (100 ft.)
Regional Road 61, Townline Road	<ul style="list-style-type: none"> Four Mile Creek Road 	<ul style="list-style-type: none"> Stanley Avenue 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.)
Regional Road 70, Taylor Road	<ul style="list-style-type: none"> South limit of the Town Glendale Avenue 	<ul style="list-style-type: none"> Glendale Avenue York Road 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.) 30.50 m (100 ft.)
Regional Road 81, York Road	<ul style="list-style-type: none"> East limit St. Catharines Taylor Road Coon Road Concession 7 Queenston Road Four Mile Creek Road 	<ul style="list-style-type: none"> Taylor Road Coon Road Concession 7 Queenston Road Four Mile Creek Road Niagara Parkway 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.)
Regional Road 83, Carlton Street	<ul style="list-style-type: none"> Read Road Stewart Road Niagara Stone Road 	<ul style="list-style-type: none"> Stewart Road Niagara Stone Road Concession 7 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.) 26.20 m (86 ft.) 26.20 m (86 ft.)
Regional Road 86, Stewart Road	<ul style="list-style-type: none"> Niagara Stone Road Carlton Street 	<ul style="list-style-type: none"> Carlton Street Lakeshore Road 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.) 26.20 m (86 ft.)
Regional Road 87, Lakeshore Road	<ul style="list-style-type: none"> Read Road McNab Road East/West Line Four Mile Creek Road Dorchester Street 	<ul style="list-style-type: none"> McNab Road East/West Line Four Mile Creek Road Dorchester Road Niagara Stone Road 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.)
Regional Road 88, Seaway Haulage Road	<ul style="list-style-type: none"> Glendale Avenue 	<ul style="list-style-type: none"> Carlton Street 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 26.20 m (86 ft.)
Regional Road 89, Glendale Ave.	<ul style="list-style-type: none"> Canal East Limit Coon Road 	<ul style="list-style-type: none"> Coon Road Taylor Road 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 45.70 m (150 ft.) 37.80 m (124 ft.)
Regional Road 100, Four Mile Creek Road	<ul style="list-style-type: none"> City Limit Niagara Falls York Road 	<ul style="list-style-type: none"> York Road Niagara Stone Road 	<ul style="list-style-type: none"> Regional Road 	<ul style="list-style-type: none"> 23.20 m (66 ft.) 23.20 m (66 ft.)

Source: Niagara-on-the-Lake Official Plan, 2017

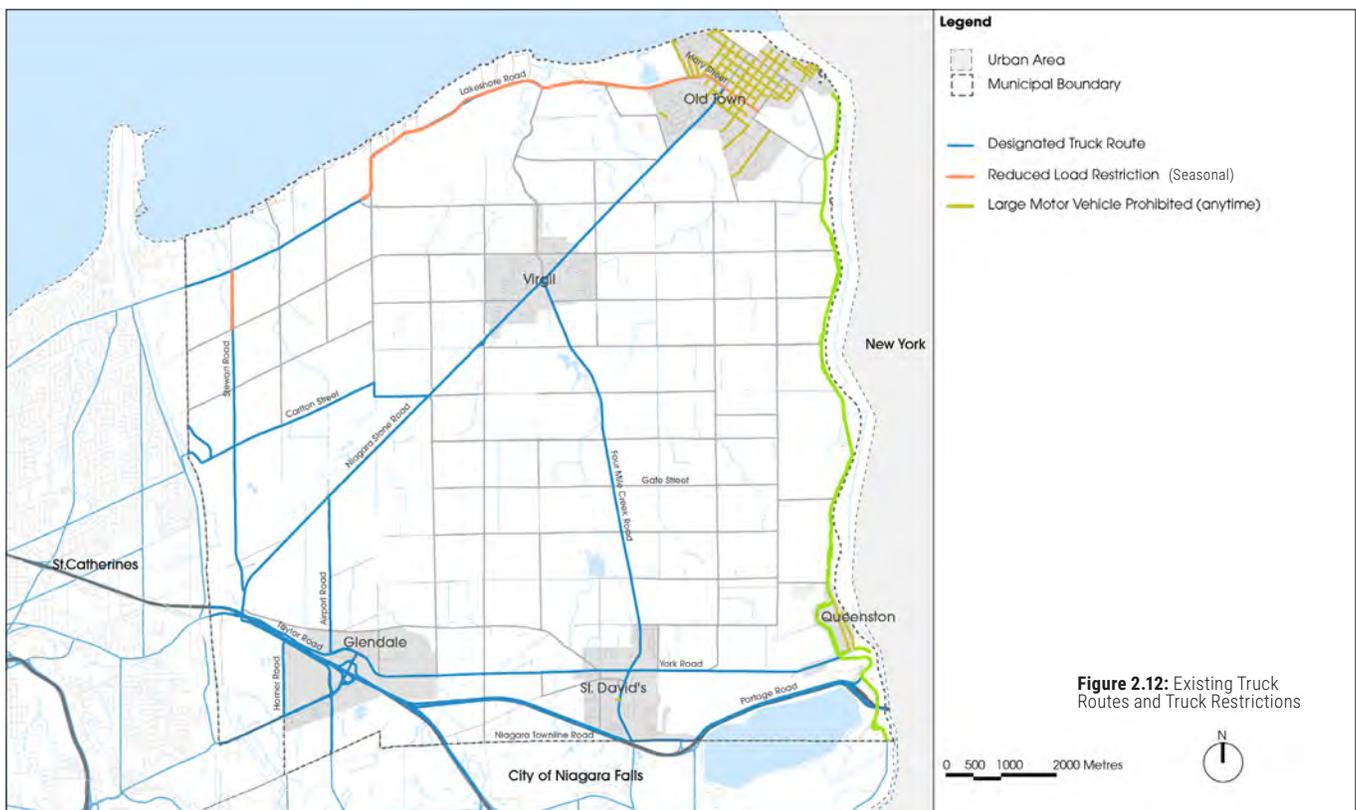


Figure 2.12: Existing Truck Routes and Truck Restrictions

2.2.2 TRUCK NETWORK

Movement of freight across the multi-modal transportation network is an important component to employment and economic activity across Canada with trucks often serving the last stretch of a product's trip to the shelf. However, the movement of commercial vehicles present safety and infrastructure concerns that limit the movement of trucks along the roadway system within the Town and periphery areas that are largely a mix of agricultural and industrial designated land based on the Town's land use designations.

Designated truck routes are permitted along the arterial road system as visualized in **Figure 2.12**. Truck and freight movement is generally not permitted on local Town roads, with heavy truck traffic also discouraged on collector and local streets within the Town's jurisdiction in residential areas. Beyond these restrictions Niagara-on-the-Lake currently places load restrictions where vehicles may only carry up to five tonnes per axle along the following road segments: Lakeshore Road (Regional Road 87) between East and West Line and King Street as well as Stewart Road (Regional Road 86) between Lakeshore Road and Church Road. These load restrictions are seasonal, with the restrictions in effect between March 1 and April 30. Otherwise, the Regional roads running through Niagara-on-the-Lake generally form the designated truck route network in the Town. Additionally, a number of roadway segments prohibit large motor vehicles, which are defined as any vehicle with a weight greater than 3,000 kg, as summarized in **Table 2.4**.

According to the Town's Official Plan, as amended in 2017, it stipulates general requirements for the management of truck traffic including:

- Directing it away from, or around, residential or sensitive land uses where the road capacities are inadequate or where there is a potential for noise and/or safety hazards, and, in particular, designate, establish and monitor truck routes in co-ordination with the Region;
- Encouraging the relocation of existing land uses (which generate volumes of truck traffic which contribute to current noise and safety hazards) to more suitable locations in the Town;
- Discouraging the movement of heavy truck traffic on collector and local streets in residential areas.

Oversize loads put physical strain on bridge and roadway infrastructure and require routes that can physically accommodate them. Several studies have been conducted across North America, including a study by the University of Texas that have found that most oversize/overweight permit fee structures are an important tool for maximizing infrastructure lifespan and for recovering costs associated with the impacts of oversize/overweight vehicles. Provincial Roadways require a provincial oversize/overweight load permit, while Niagara Region currently implements an oversize load permit system for regional roads with the following payment structure:

- \$165 - Use of Reduced Load/Restricted Roads;
- \$100 - Single Trip;
- \$330 - Annual Permit;
- \$600 - Project Permit.

The Town currently does not implement an oversize / overweight load permit system for municipal roads. While the Province's and Region's oversize / overweight load permits are generally issued for vehicles which cannot reduce their size or weight, the Town currently does not implement such a permit system for municipal roads.

Table 2.4: Truck and Load Restrictions and within Niagara-on-the-Lake

Roadway	Description	Restriction
Anne Street	Niagara Stone Road (reg rd 55) to King Street	Large Motor Vehicle Prohibited (anytime)
Ball Street	Ricardo Street to North Limit of Ball Street	Large Motor Vehicle Prohibited (anytime)
Butler Street	South limit of Butler Street to Gage Street	Large Motor Vehicle Prohibited (anytime)
Butler Street	Johnson Street to Queen Street	Large Motor Vehicle Prohibited (anytime)
Castlereagh Street	King Street to Wellington Street	Large Motor Vehicle Prohibited (anytime)
Centre Street	Dorchester Street to King Street	Large Motor Vehicle Prohibited (anytime)
Charlotte Street	Niagara Street to John Street	Large Motor Vehicle Prohibited (anytime)
Davy Street	Nelles Street to Picton Street	Large Motor Vehicle Prohibited (anytime)
Delater Street	King Street to Melville Street	Large Motor Vehicle Prohibited (anytime)
Dixie Avenue	Lakeshore road (reg rd 87) to Chautauqua Amphitheatre	Large Motor Vehicle Prohibited (anytime)
Dorchester Street	South limit of Dorchester Street to Queen Street	Large Motor Vehicle Prohibited (anytime)
Front Street (Queenston)	York Street to Partition Street	Large Motor Vehicle Prohibited (anytime)
Gage Street	Dorchester Street to King Street	Large Motor Vehicle Prohibited (anytime)
Garrison Village Drive	Samuel Street to Village Road	Large Motor Vehicle Prohibited (anytime)
Gate Street	South limit of Gate Street to Front Street	Large Motor Vehicle Prohibited (anytime)
Johanna Drive	Four Mile Creek Road (reg rd 100) to end of street	Large Motor Vehicle Prohibited (anytime)
John Street	Butler Street to Regent Street	Large Motor Vehicle Prohibited (anytime)
Johnson Street	Niagara Boulevard to King Street	Large Motor Vehicle Prohibited (anytime)
King Street	South limit of King Street to John Street	Large Motor Vehicle Prohibited (anytime)
King Street	Front-Ricardo Street to north limit of King Street	Large Motor Vehicle Prohibited (anytime)
Lockhart Street	Ball Street to Melville Street	Large Motor Vehicle Prohibited (anytime)
Nassau Street	Lakeshore Road (reg rd 87) to Queen Street	Large Motor Vehicle Prohibited (anytime)
Nelles Street	King Street to Davy Street	Large Motor Vehicle Prohibited (anytime)
Niagara Street	East West Line (reg rd 85) to Queen Street	Large Motor Vehicle Prohibited (anytime)
Oak Drive	Lakeshore Road (reg rd 87) to Chautauqua Amphitheatre	Large Motor Vehicle Prohibited (anytime)
Platoff Street	King Street to Wellington Street	Large Motor Vehicle Prohibited (anytime)
Prideaux Street	Simcoe Street to King Street	Large Motor Vehicle Prohibited (anytime)
Princess Street	Partition Street to north limit of Princess Street	Large Motor Vehicle Prohibited (anytime)
Queen Street	Niagara Boulevard to Mississagua Street	Large Motor Vehicle Prohibited (anytime)
Queenston Street	Niagara River Parkway to Clarence Street	Large Motor Vehicle Prohibited (anytime)
Regent Street	Anne Street to John Street	Large Motor Vehicle Prohibited (anytime)
Regent Street	Mary Street to Front Street	Large Motor Vehicle Prohibited (anytime)
Ricardo Street	King Street to Melville Street	Large Motor Vehicle Prohibited (anytime)
River Beach Road	Ball Street to Melville Street	Large Motor Vehicle Prohibited (anytime)
Shakespeare Avenue	Lakeshore Road to Niagara Boulevard	Large Motor Vehicle Prohibited (anytime)
Simcoe Street	Anne Street to Queen Street	Large Motor Vehicle Prohibited (anytime)
Victoria Street	South limit of Victoria Street to Front Street	Large Motor Vehicle Prohibited (anytime)
Wellington Street	Castlereagh Street to Picton Street	Large Motor Vehicle Prohibited (anytime)
Wellington Street	Byron Street to Ricardo Street	Large Motor Vehicle Prohibited (anytime)
William Street	Chautauqua Amphitheatre to Regent Street	Large Motor Vehicle Prohibited (anytime)

Note: Large Motor Vehicles are defined as trucks and other large commercial vehicles

Source: Schedule "S" from Traffic and Parking By-Law No. 4308-09 of the town of Niagara-on-the-Lake, 2014

2.2.3 TRANSIT NETWORK

Transit in Niagara-on-the-Lake is operated by Niagara Region Transit (NRT) through the NRT OnDemand system. This service is the successor to the former Niagara-on-the-Lake Transit system which provided fixed-route connectivity between common origins and destinations through two routes: the Heritage-Old Town route, which circulated through the historic town centre of Old Town, and the Old Town-Glendale route, which serviced Old Town, Virgil, Glendale, including Niagara College and the Niagara District Airport. Although Niagara-on-the-Lake Transit is no longer operational, it is important to review in the context of this TMP, as data on NRT OnDemand was limited at the time of writing and would not be illustrative of pre-pandemic ridership. The Niagara-on-the-Lake Transit network is visualized in **Figure 2.13**.

As additional background on the former Niagara-on-the-Lake Transit system, the bus fleet consisted of five cutaway buses which provided service across the two routes. All buses were fully accessible to provide transit access to passengers with disabilities. Headways were every 30 minutes on the Heritage-Old Town route and every 60 minutes on the Old Town-Glendale route. The Niagara-on-the-Lake Community Centre acted as a transfer and layover point.

The transit system provided connectivity with Niagara Region Transit (fixed route services), WEGO, and Niagara College Student Transit, making possible travel to other communities

such as Niagara Falls, St. Catharines, and Welland. Connections were made at the Outlet Collection shopping centre, which is located at the outlying border of the service area. The Outlet Collection continues to act as an important connection point by serving as the southwestern bound of NRT OnDemand service in Niagara-on-the-Lake, providing opportunity for transferring to NRT fixed route services for onward travel to elsewhere in Niagara Region.

Niagara-on-the-Lake faces unique challenges to developing an improved transit system. As a town with significant tourism, many residences in the densest areas of town are used as temporary lodging for tourists who most often arrive with their own vehicle. Further, the tourist dynamic creates peaks in travel demand, such as weekends in the summer, where conditions vary significantly from those of other off-peak hours. This can impact bus reliability and cause delays which inconvenience riders.

With limited resources, the former Niagara-on-the-Lake Transit opted to service a large number of destinations using two routes, with one vehicle per route. This coverage-focused approach to service came with the trade-off of causing circuitous and indirect routing. Even on the Old Town-Glendale route, which was relatively linear, the alignment included a significant one-way loop in Glendale, adding travel time for users that needed to wait until near the end of the loop to alight at their destination.

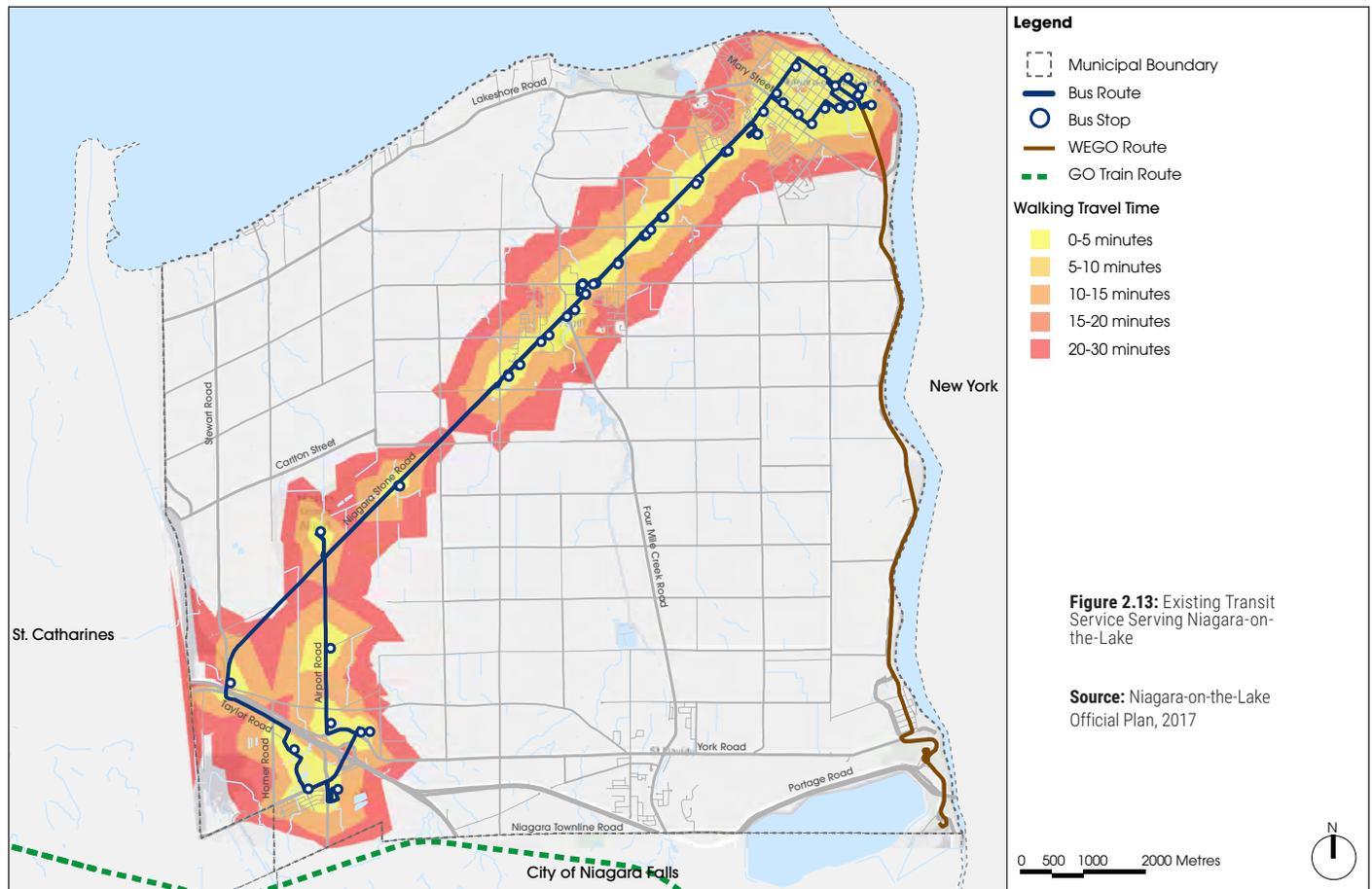


Figure 2.13: Existing Transit Service Serving Niagara-on-the-Lake

Source: Niagara-on-the-Lake Official Plan, 2017

Table 2.5: Percentage of Niagara-on-the-Lake within 15-min walk of a transit stop

Total Town Area	Within 15 min walk to transit stop		
	Rural Area	Urban Area	Total
132.81 Km ²	4.04 km ² 3%	7.73 km ² 6%	11.77 km ² 9%
	Old Town	2.60 km ² 46%	
	Virgil	2.17 km ² 42%	
	Glendale	2.96 km ² 26%	
	St. Davids	0 km ² 0%	
	Queenston	0 km ² 0%	

Source: Calculated by Stantec using GIS

Transit access was analyzed in Niagara-on-the-Lake in terms of the percentage of the town area that was located within a 15-minute walking distance of a physical transit stop as summarized in **Table 2.5**. This analysis identified that 9% of the town area in Niagara-on-the-Lake is within a 15-minute walk to transit, however urban areas such as Glendale, Virgil, and Old Town see 26-46% those areas within a 15-minute walk. Equivalent transit coverage exists today through NRT OnDemand, which services the same areas of the town that Niagara-on-the-Lake Transit used to serve.

2.2.3.1 Regional Considerations

Niagara-on-the-Lake Transit operated in a highly regional context, as one of the municipalities within the Niagara Region, and within the Greater Golden Horseshoe which surrounds the Toronto area. Thus, the transit service should be analyzed not just on how it serviced Niagara-on-the-Lake, but also with consideration to how it operated as a piece within a greater whole.

Niagara Region

The Niagara Region has many local transit systems operated by the municipalities of the region: Niagara Falls, St. Catharines, Welland, Fort Erie, Port Colborne, and Niagara-on-the-Lake. Historically, these agencies had varying levels of regional integration. This changed in 2011 with the creation of Niagara Region Transit, which operates regional service in addition to the local municipal services.

Niagara Region Transit has been studying a potential consolidation of local transit services to improve regional mobility. As many local services are contracted to private operators, the barriers to consolidation are low, and therefore it is a feasible possibility. A prior study recommended the consolidated approach, and further study is currently underway to produce more specific recommendations. Niagara-on-the-Lake has already taken steps in support of this consolidation, by restarting its local transit service as a regionally-operated endeavour, through NRT OnDemand. As far as fixed-route services go, Niagara-on-the-Lake is not within the service area of Niagara Region Transit, except for a route which services Niagara College's Niagara-on-the-Lake

campus, located in Glendale. Niagara Falls' tourist transit system, WEGO, also operates a shuttle route to Niagara-on-the-Lake. Relative to other municipalities within Niagara Region, there is potential to improve Niagara-on-the-Lake's regional connections.

Metrolinx

Metrolinx operates the regional GO Transit rail and bus services within the Greater Golden Horseshoe. There is minimal connection to Niagara-on-the-Lake using GO services. The bus system offers a lone connection from Niagara College in Niagara-on-the-Lake to downtown Niagara Falls, and Burlington (Route 12). Niagara-on-the-Lake's historic district is not directly accessible using GO Transit, although a transfer can be made at Niagara College using the Old Town-Glendale route.

The rail system is planned to be upgraded in the coming years, enabling all-day two-way service between Niagara Falls and Union Station in Toronto. This shift away from a commuter service into a regional rail service will improve accessibility to the Niagara Region for all Ontarians along the rail corridors, not just Torontonians. The potential of this service suggests a need for further connection between Niagara-on-the-Lake Transit and GO Transit, to allow for car-free visitors to access Niagara-on-the-Lake from a rail station, and to incentivize car owners to leave their cars at home.

2.2.3.2 Transit Peer Review

Peer Agencies

Ten peer transit agencies were selected to align with Niagara-on-the-Lake's status as a mid-sized town in Ontario. All peers are Ontario cities or towns with a service area population of 7,000-20,000 to allow for a reasonable operational comparison to be made. To reflect Niagara-on-the-Lake's unique environment as a tourist destination, other destinations with a swell in visitor populations such as Collingwood and Wasaga Beach were selected. All transit agency data was sourced from the 2018 Ontario Public Transit Association (OPTA) Fact Book, which is the most recent dataset available containing all of these agencies.

The peer transit agencies are mapped in **Figure 2.14** to display their geographic locations relative to Niagara-on-the-Lake. Port Colborne is the closest in proximity to Niagara-on-the-Lake, with the farthest jurisdiction being Kenora which is near the Manitoba border. Notably all communities are located adjacent to large bodies of water, and many are tourist destinations within Ontario which experience distinct peak and off-peak seasons. In the subsections below, the peer group was analyzed based on available operational and financial data to determine how Niagara-on-the-Lake Transit performed in comparison to similar agencies.

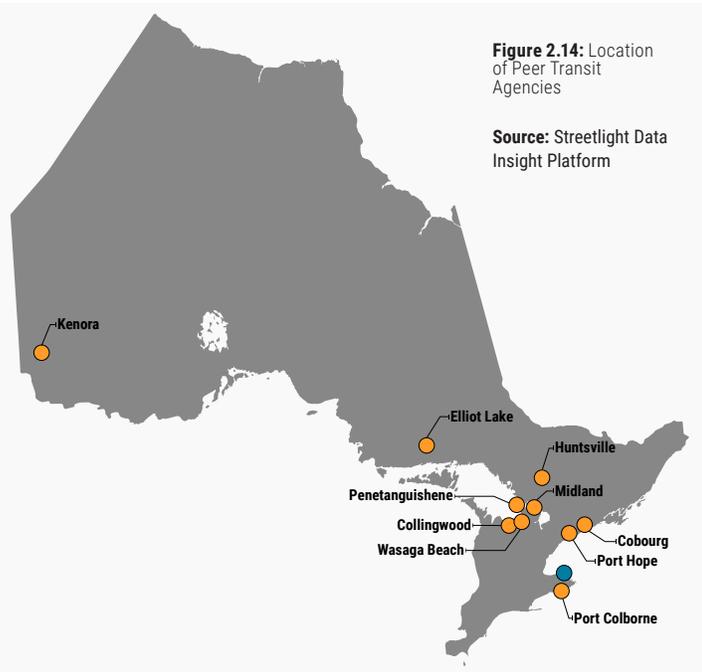


Table 2.6: Peer Transit Agency Population and Service Area Comparison

Transit Agency	Service Population	Service Area (sq. km)
Collingwood	19,000	27.1
Port Colborne	18,306	40.5
Midland	12,500	30.2
Port Hope	12,350	13.1
Wasaga Beach	11,560	18.4
Niagara-on-the-Lake	11,415	22.2
Huntsville	11,000	12
Cobourg	10,741	13
Elliot Lake	10,498	16
Penetanguishene	10,000	14
Kenora	7,000	16

Source: Ontario Public Transit Association Factbook, 2018

Operational Analysis

When comparing agencies, Niagara-on-the-Lake Transit performed similarly to its peers in many areas. Fleet size and number of routes were comparable to the peer average, in addition to the service-hours provided per capita (as summarized in **Table 2.7**). This suggests that Niagara-on-the-Lake Transit provided a similar level of transit service to its peers; by extension this also suggests that the level of investment into NRT OnDemand is in line with the peers. However, the comparable level of service provided by Niagara-on-the-Lake Transit did not translate into comparable levels of ridership. With a similar amount of resources, the peer average annual ridership is 74,882 while Niagara-on-the-Lake's ridership is 29,510. With a larger-than-average service area, combined with a decentralized population across Niagara-on-

the-Lake's five communities, and a higher average income / stronger car culture there are challenges in providing effective and efficient service for the Town. At the same time, low ridership suggests there may be opportunities to evolve the current transit system to improve linkages between trip generators (schools, tourist sites, offices, medical facilities, etc.) and better serve the communities. It is stemming from these observations that the NRT OnDemand system was launched to replace the former Niagara-on-the-Lake Transit system.

The historical service utilization of Niagara-on-the-Lake Transit is compared to the peers in using all available OPTA data from 2012-2018. While the graph within **Figure 2.15** doesn't indicate a distinct trend amongst the peer agencies, it is clear that Niagara-on-the-Lake's service utilization was below that of its peers. The peer average experienced a slight historical decrease from approximately twelve trips per service hour, to nine by 2018. Niagara-on-the-Lake's utilization mostly trended upwards, but was the lowest among any of the peer transit agencies. Recent route cuts combined with stagnant service levels as the population continues to grow likely hindered the potential growth in transit utilization. The graph within **Figure 2.16** compares the 2018 service-hours to linked trips, both on a per capita basis, to directly compare the relationship between transit investment to ridership amongst the peer agencies.

The clear trend shown here is an 'if you build it, they will come' effect with regard to transit ridership. Investment into operating more transit service is strongly correlated to increased ridership per capita. This is demonstrated with agencies operating above-average service levels, such as Collingwood, Wasaga Beach, Cobourg, and Elliot Lake, who all experience above-average ridership per capita. Niagara-on-the-Lake Transit operated 0.6 service-hours per capita, equivalent to the peer average, but per capita ridership, at 2.4 trips, is a fraction of the peer average of 6.1 trips. This pointed to a need to explore strategies to improve the overall effectiveness of the service.

Financial Analysis

Niagara-on-the-Lake Transit's financial outlook was relatively healthy compared to many of its peers. Rural transit systems typically have low cost recovery due to the lack of density around transit stops, and the difficulty of competing with the private automobile (abundant free parking, low traffic volumes, etc.). With a cost recovery ratio of 49%, Niagara-on-the-Lake performed nearly 25% better than the peer average, which helped with the system's financial sustainability as summarized in **Table 2.8**.

With an average fare of \$1.60, Niagara-on-the-Lake fares are slightly less than the average fare within the peer group per trip. At the same time, the operating cost per vehicle-hour, at \$74.71, was slightly above the \$70.59 peer average. Many

Table 2.7: Peer Transit Agency Operational Data Comparison

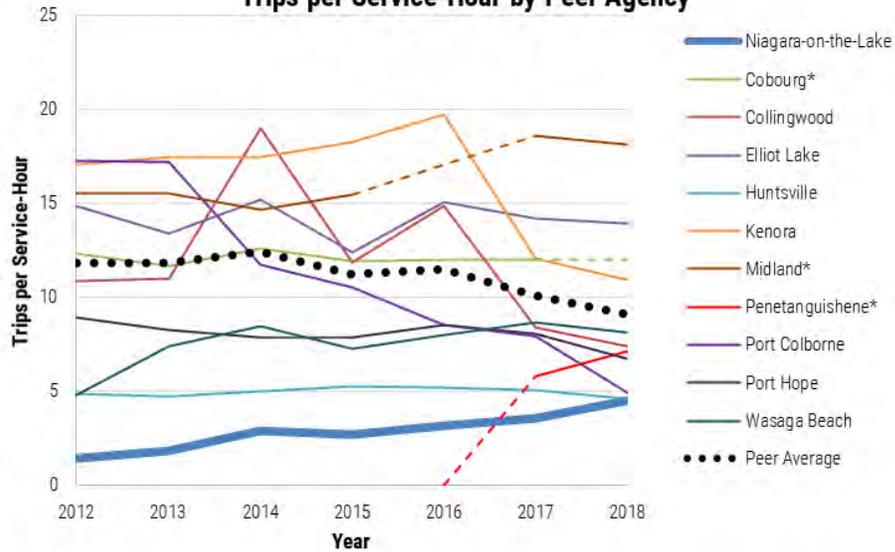
Transit Agency	Service Population	Service Area (sq-km)	Ridership	Number of Routes	Fleet Size	Service-Hours per Capita	Trips per Service-Hour
Niagara-on-the-Lake	11,415	22.2	29,510	2	5	0.6	4.5
Collingwood	19,000	27.1	225,189	5	6	1.5	7.4
Port Colborne	18,306	40.5	27,405	3	2	0.2	4.9
Midland	12,500	30.2	64,328	2	1	0.3	18.1
Port Hope	12,350	13.1	50,213	3	3	0.6	6.7
Wasaga Beach	11,560	18.4	83,060	2	4	0.9	8.1
Huntsville	11,000	12	26,754	2	7	0.5	4.6
Cobourg	10,741	13	101,172	2	5	0.8	12.0*
Elliot Lake	10,498	16	106,295	4	3	0.7	13.9
Penetanguishene	10,000	14	26,266	1	1	0.4	7.1
Kenora	7,000	16	38,138	3	3	0.5	10.9
Peer Average	12,296	20	74,882	3	4	0.6	9.4

* Not reported for 2018, data from 2017 used in place

Source: Ontario Public Transit Association Factbook, 2018

Trips per Service-Hour by Peer Agency

Figure 2.15: Trips per Service Hour by Peer Agency

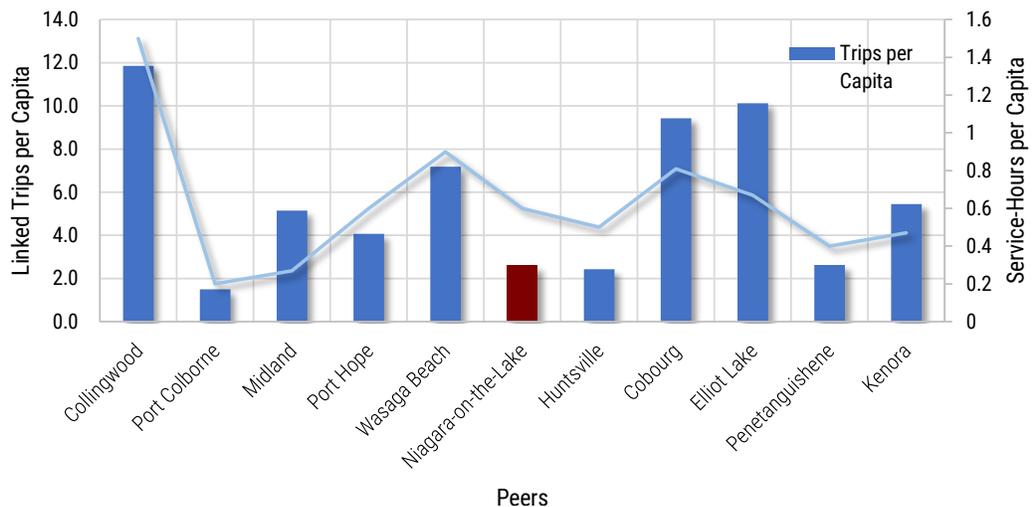


Source: Ontario Public Transit Association Factbook, 2018

Note: A dashed line within a solid line represents missing data points

Peer Comparison of Service-Hours and Linked Trips (per Capita)

Figure 2.16: Peer Comparison of Service-Hours and Linked Trips (per Capita)



Source: Ontario Public Transit Association Factbook, 2018

rural transit agencies privately contract out their service, contributing to the relatively similar operating costs for the majority of the transit agencies assessed. The graph within **Figure 2.17** compares the cost recovery ratio of each peer agency with the average fares paid by riders.

Generally speaking, a transit agency with a higher average fare should see a higher cost recovery ratio, as revenues are proportionately higher. However, variability in operating and administrative costs impact this correlation. The correlation is also impacted by ridership, as a system with more overall riders can have higher revenues despite a lower average fare paid. The data in the graph shows no clear trends in regard to a relationship between average fares and cost recovery ratio. Niagara-on-the-Lake Transit, with generally lower ridership, and an average fare near the peer average, has the highest cost recovery ratio at 49%. This suggests that Niagara-on-the-Lake Transit was effective at minimizing administrative costs. With Niagara Region Transit’s administrative resources being shared across the various fixed route and OnDemand options across Niagara Region, it is reasonable to expect that the allocation of administrative costs to Niagara-on-the-Lake for the operation of NRT OnDemand will also be fairly low.

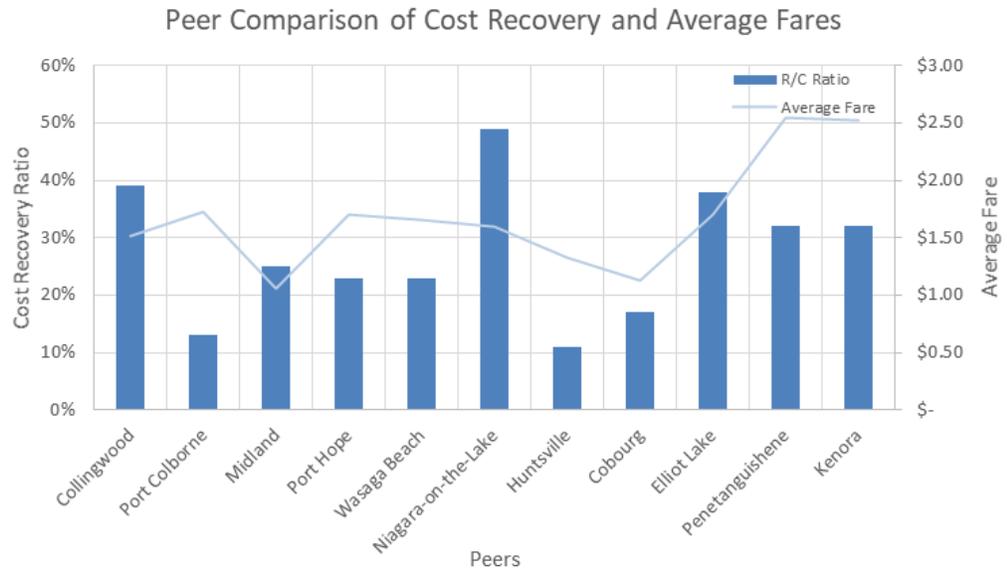
Table 2.8: Peer Transit Agency Financial Data Comparison

Transit Agency	Service Population	Service Area (sq-km)	Cost Recovery Ratio	Average Fare	Operating Cost per Vehicle Hour
Niagara-on-the-Lake	11,415	22.2	49%	\$1.60	\$74.71
Collingwood	19,000	27.1	39%	\$1.52	\$46.43
Port Colborne	18,306	40.5	13%	\$1.73	\$66.19
Midland	12,500	30.2	25%	\$1.06	\$118.72
Port Hope	12,350	13.1	23%	\$1.70	\$60.29
Wasaga Beach	11,560	18.4	23%	\$1.65	\$58.95
Huntsville	11,000	12.0	11%	\$1.33	\$57.18
Cobourg	10,741	13.0	17%	\$1.13	\$91.39
Elliot Lake	10,498	16.0	38%	\$1.70	\$63.00
Penetanguishene	10,000	14.0	32%	\$2.55	\$56.51
Kenora	7,000	16.0	32%	\$2.52	\$87.27
Peer Average	12,296	20.0	25%	\$1.69	\$70.59

Source: Ontario Public Transit Association Factbook, 2018

Figure 2.17: Trips per Service Hour by Peer Agency

Source: Ontario Public Transit Association Factbook, 2018



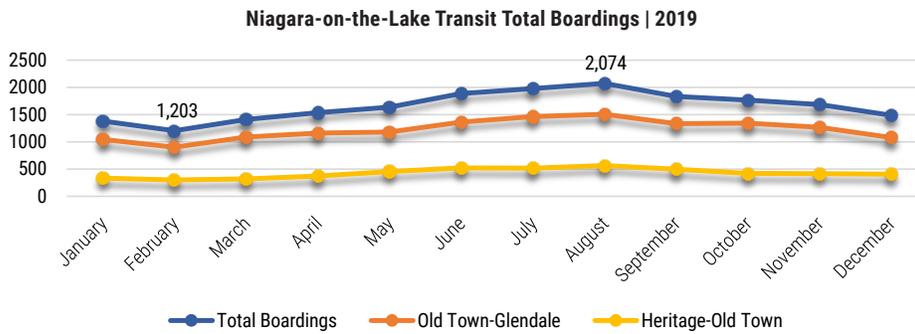


Figure 2.18: Niagara-on-the-Lake Transit Total Boardings, 2019

Source: Niagara-on-the-Lake Transit, 2019

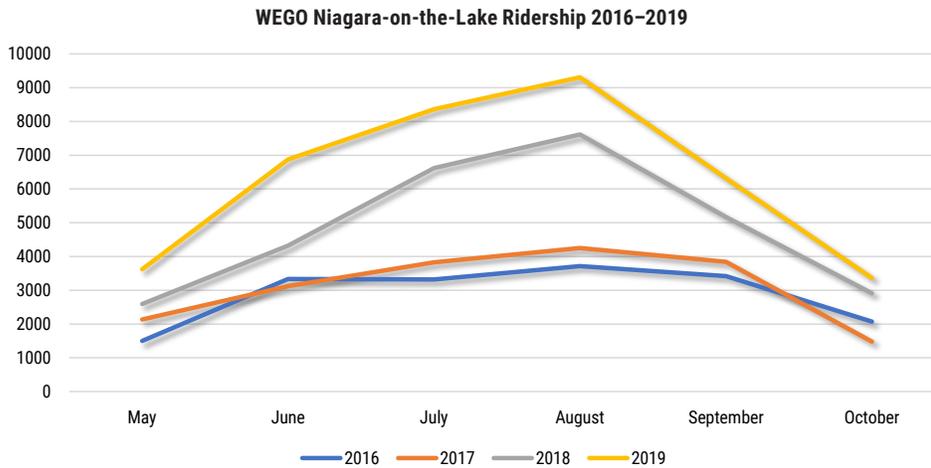


Figure 2.19: WEGO Niagara-on-the-Lake Ridership 2016-2019

Source: WEGO Transit, 2016-2019

2.2.3.3 Niagara-on-the-Lake Transit

Monthly ridership counts in 2019 were reviewed for both routes operated by Niagara-on-the-Lake Transit. Based on 2019 ridership data, monthly ridership was fairly consistent, with a slight peak observed during summer months (June to September) which may be due to additional tourism but also potentially residents making more recreational/discretionary trips on transit as shown in **Figure 2.18** and **Figure 2.19**. Additionally, the Old Town-Glendale route carried about 75% of the ridership, with the Heritage-Old Town route acting as more of a downtown circulator which experienced fairly consistent ridership throughout the year, suggesting that not many tourists used this route.

2.2.3.4 Tour Bus Ridership into Niagara-on-the-Lake

Given the large tourism seen in the summer months, a review of tourist bus ridership was reviewed during the summer months between April and June 2019 as shown in **Figure 2.20**. Similar to the Niagara-on-the-Lake Transit ridership, a greater number of passengers are observed to arrive during peak summer months. Due to limited data availability, trips beyond June are unknown, however based on the ridership trend and other visitor-oriented transportation services, the peak likely lasts throughout the summer.

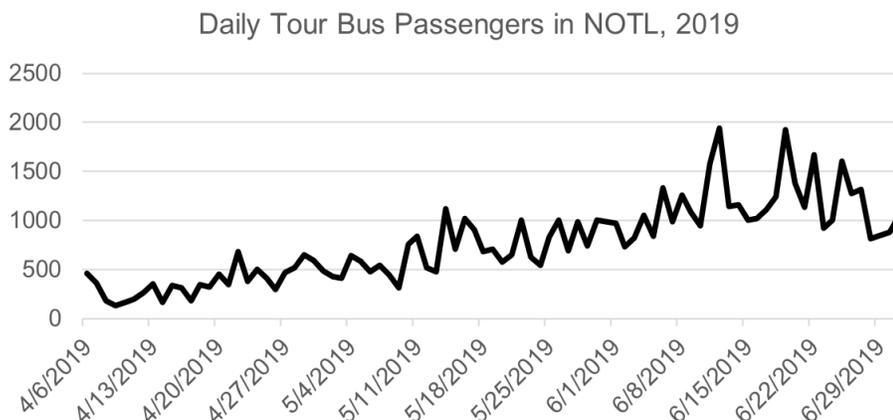


Figure 2.20: Daily Tour Bus Passengers in Niagara-on-the-Lake, 2019

Source: Niagara-on-the-Lake Transit, 2019

2.2.3.5 WEGO Transit

WEGO Transit provides connections between various accommodations and tourist areas within Niagara Falls, largely targeted towards visitors. The service is operated through a partnership between the City of Niagara Falls and the Niagara Parks Commission.

Orange Route to Niagara-on-the-Lake

WEGO provides a shuttle service to Niagara-on-the-Lake in the summer months, however there is a transfer at the Floral Clock for onward travel to/from Niagara Falls city centre. The Orange Route operates between mid-April and October from 10:30 AM to 6:30PM with hourly frequencies. The route operates from the Floral Clock in Queenston and makes stops at Queenston Heights Park, Laura Secord Homestead McFarland House, and terminates at Fort George.

Based on historic annual ridership, the Niagara-on-the-Lake shuttle has seen a continual increase in ridership between 2016 and 2019, with annual ridership increasing 118% between 2016 and 2019 as shown in **Figure 2.21**. Additionally, ridership increases throughout the summer months with peak ridership observed in August. This highlights the growing transportation demand for tourists and visitors in and around Niagara-on-the-Lake. In 2019, an express bus during peak hours between Friday and Sunday was added to deal with the increasing demand to Old Town.

Examining boardings throughout the day illustrates peak boardings occur around 12:30PM and 4:00PM, however a fairly consistent demand is sustained throughout the day, justifying the existing service hours.

GO Train Shuttle to Niagara-on-the-Lake

In addition to the Orange Route, Niagara Parks Commission operates a service during the summer months that transports visitors to Niagara-on-the-Lake from the Niagara Falls GO Train station on weekends. This direct shuttle runs in both directions to meet various train departure times. Many visitors using this shuttle are from the Greater Toronto Area, with many visitors making day trips by taking the train to Niagara Falls and riding their bikes into the Town and around to various wineries. A number of European visitors also use the WEGO service. The 11:20 AM GO train is the busiest shuttle to Niagara-on-the-Lake.

Figure 2.22 illustrates the average monthly ridership to and from the GO station, using ridership counts from 2018 and 2019. Greater ridership is observed traveling from the Town back to Niagara Falls GO Station.

Figure 2.21: WEGO Orange Route - Niagara-on-the-Lake Shuttle. Average Monthly Boardings per Run, 2019

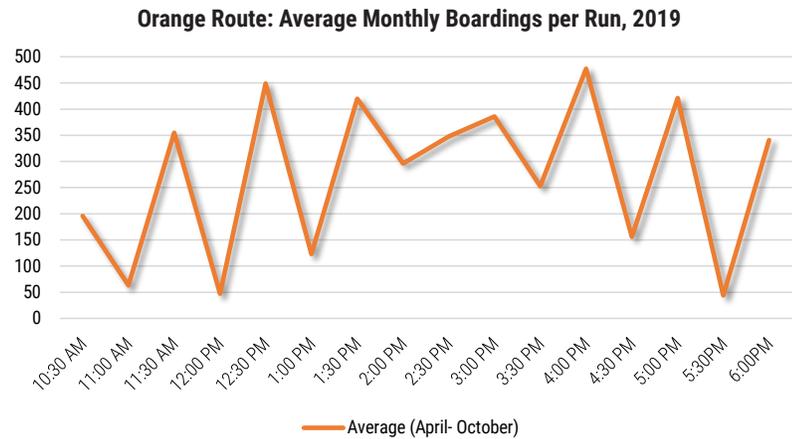
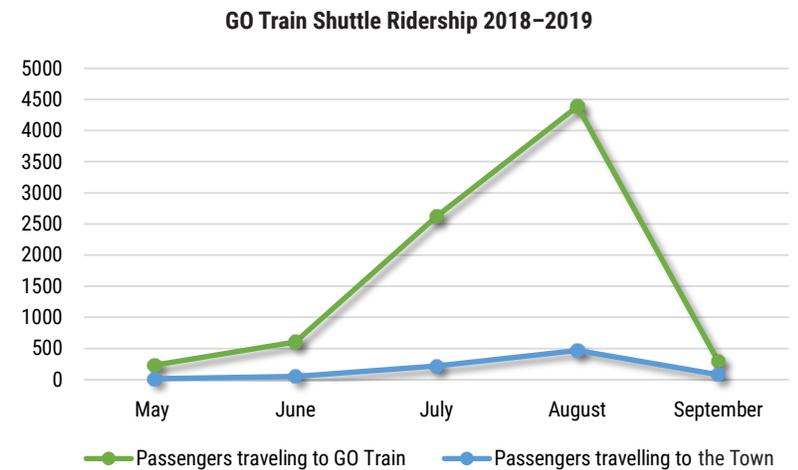


Figure 2.22: WEGO Shuttle from GO Train Station to Niagara-on-the-Lake, Ridership 2018-2019



2.2.3.6 Niagara Region Transit (fixed route)

Niagara Region Transit provides one fixed route, Route 40/45, which travels through Niagara-on-the-Lake. Route 40/45 begins in St. Catharines and terminates in Niagara Falls, with stops located at Niagara College Glendale Campus and the outlet mall in Niagara-on-the-Lake. The regional transit system aims to provide inter-municipal connectivity while the local transit systems (including the NRT OnDemand offerings in the Town and other jurisdictions within the Region) offer greater coverage within each municipality. The entire Niagara Region Transit map is illustrated in **Figure 2.23**.

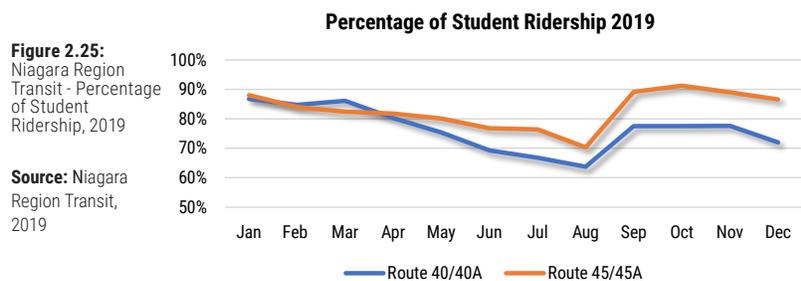
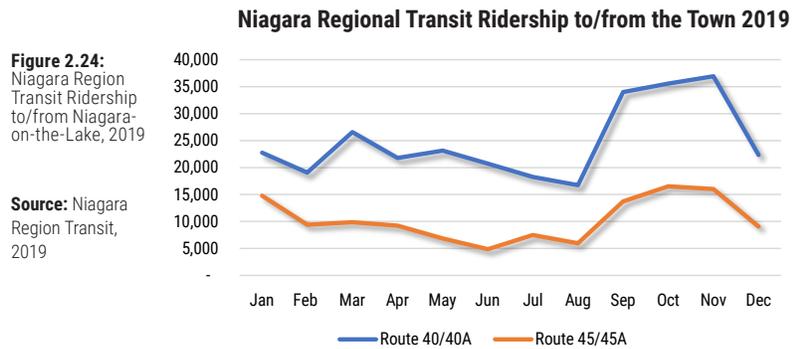
To provide a greater understanding of the usage of Route 40/45, the monthly ridership in 2019 was reviewed and supplemented with insights provided from Niagara Region Transit staff on service operations and performance. Notably, ridership along the express service, Route 40A/45A, which travels between Niagara-on-the-Lake and Niagara Falls, has been consolidated with the corresponding main routes. The monthly ridership along Route 40/40A and 45/45A in 2019 illustrate peak ridership in September, October and November with lower ridership observed in July and August (**Figure 2.24**). This is presumably due to the large student ridership along this route. However, monthly ridership illustrates a demand for year-round transit.

Furthermore, to garner a better understanding of who is using this route, the Niagara College student ridership is shown in **Figure 2.25** as a percentage of the total monthly ridership. This illustrates that majority of ridership seen along this route is from Niagara College students, averaging between 76% (Route 40/40A) and 83% (Route 45/45A). Notably, there is also some student ridership from Brock University students, though the majority of the student ridership is from Niagara College students. Reasons for high student ridership are due to limited vehicle access but also the heavy discount offered on the U-pass which is approximately 80% discounted according to Niagara Region Transit. Lastly, there are many international students at Niagara College who reside in Niagara Falls, making frequent trips between the two municipalities. Potential reasons for the lack of ridership among non-student populations are related to low frequencies up until recent increases (ran hourly up until September 2018) and the need for several transfers which are challenging without high service frequencies.

Figure 2.23: Existing Niagara Region Transit Network, 2020



Source: Niagara Region Transit, 2020



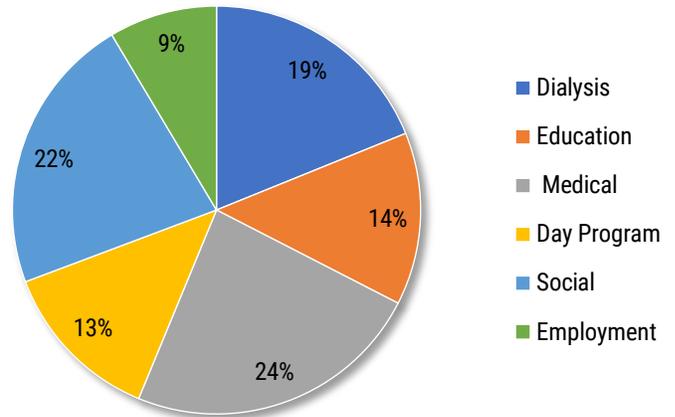
2.2.3.7 Niagara Region Paratransit

Niagara Region Transit provides a paratransit service across the region for inter-regional trips. Niagara Region paratransit ridership in 2019 with origins or destinations within Niagara-on-the-Lake were reviewed to understand trip patterns and characteristics. A variety of trip purposes are observed with medical and social trips representing the largest trip purposes, making up just under half of all trips. It is important to note that many of the medical trips are for passengers making frequent travel to/from their dialysis appointments on a regular schedule.

Trip destinations and origins were evaluated to better understand where riders were going. The largest trip destinations are within Niagara Falls and St. Catharines which makes sense as these are neighbouring municipalities which due to size, have a number of healthcare, social and educational institutions accessed by residents of Niagara-on-the-Lake. Similar results are seen for trip origins, presuming that most riders book round trips. There are slightly more trips that originate in St. Catharines suggesting that a significant number of riders are making trips from St. Catharines to Niagara-on-the-Lake. Nonetheless, trips in both directions between Niagara-on-the-Lake and neighbouring municipalities in the Region appear to be prevalent. Lastly, the average trip time and distance of trips that begin or end in Niagara-on-the-Lake is approximately 20 mins and 20 km respectively suggesting these trips are relatively long and far, on average.

Figure 2.26: Niagara Region Transit - Paratransit Trip Purposes

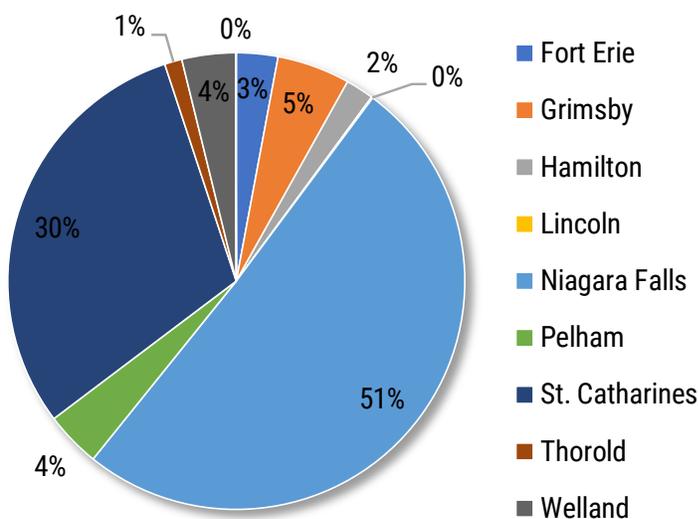
Trip Origins/Destinations in the Town: Trip Purpose



Source: Niagara Region Transit, 2019

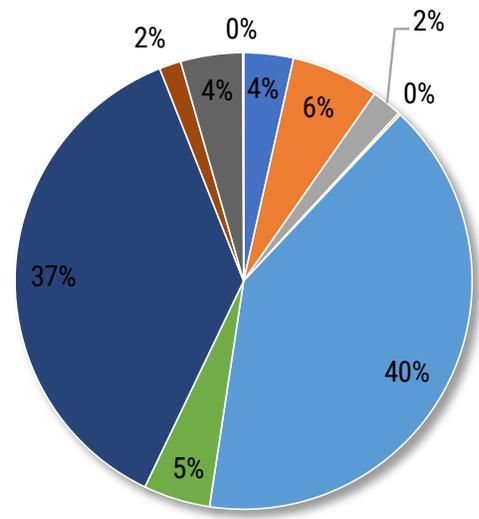
Figure 2.27: Niagara Region Transit - Paratransit Trip Origins (DO) and Destinations (PU) in Niagara-on-the-Lake

Paratransit Trip Origins (DO in the Town)



Source: Niagara Region Transit, 2019

Paratransit Trip Destinations (PU in the Town)



2.2.4 ACTIVE TRANSPORTATION

Cycling Network

Niagara-on-the-Lake’s cycling network infrastructure mostly comprises of on-road facilities with a few multi-use trails, primarily located along the waterfront as well as arterial and collector roadways as shown in **Figure 2.28**. These facilities provide approximately 207km of cycling infrastructure throughout the community as summarised in **Table 2.9**, however the network has a significant number of gaps and large areas that are disconnected.

During field visits, and in consultation with Town staff, a variety of rural roadway corridors were observed to be used by residents and migrant works to get between rural areas, as well as to access goods and services within urban areas emphasizing the need to consider not only how cyclists may move within urban areas, but also move between them.

Table 2.9: Existing Cycling Facilities by Type

Facility Type	Km	Key Corridors
Bike Lanes	5.1	<ul style="list-style-type: none"> Queenston Road
On Road Cycling	167.8	<ul style="list-style-type: none"> Lakeshore Road Mary Street / Niagara River Parkway Four Mile Creek Road Concession 2 Road Queenston Road
Multi-Use Trails	34.1	<ul style="list-style-type: none"> Niagara Parkway Recreational Trail Concession 1 Road
Total	206.9	

Source: Town of Niagara-on-the-Lake GIS shapefiles

Beyond the roadway cycling infrastructure the network of regional trails provide inter-community connections mostly free of high traffic volume. Within Niagara-on-the-Lake, the Niagara River Parkway Recreation Trail is part of the Trans Canada Trail Link, spanning 56 km and runs parallel to the Niagara River. The trail begins in Niagara-on-the-Lake at Fort George in and ends in Fort Erie at Anger Street. This trail is geared more towards tourism rather than commuting. Relatedly, it is important to acknowledge that there are many bike rental facilities available in the Town and many tourists rent bicycles during their visit.

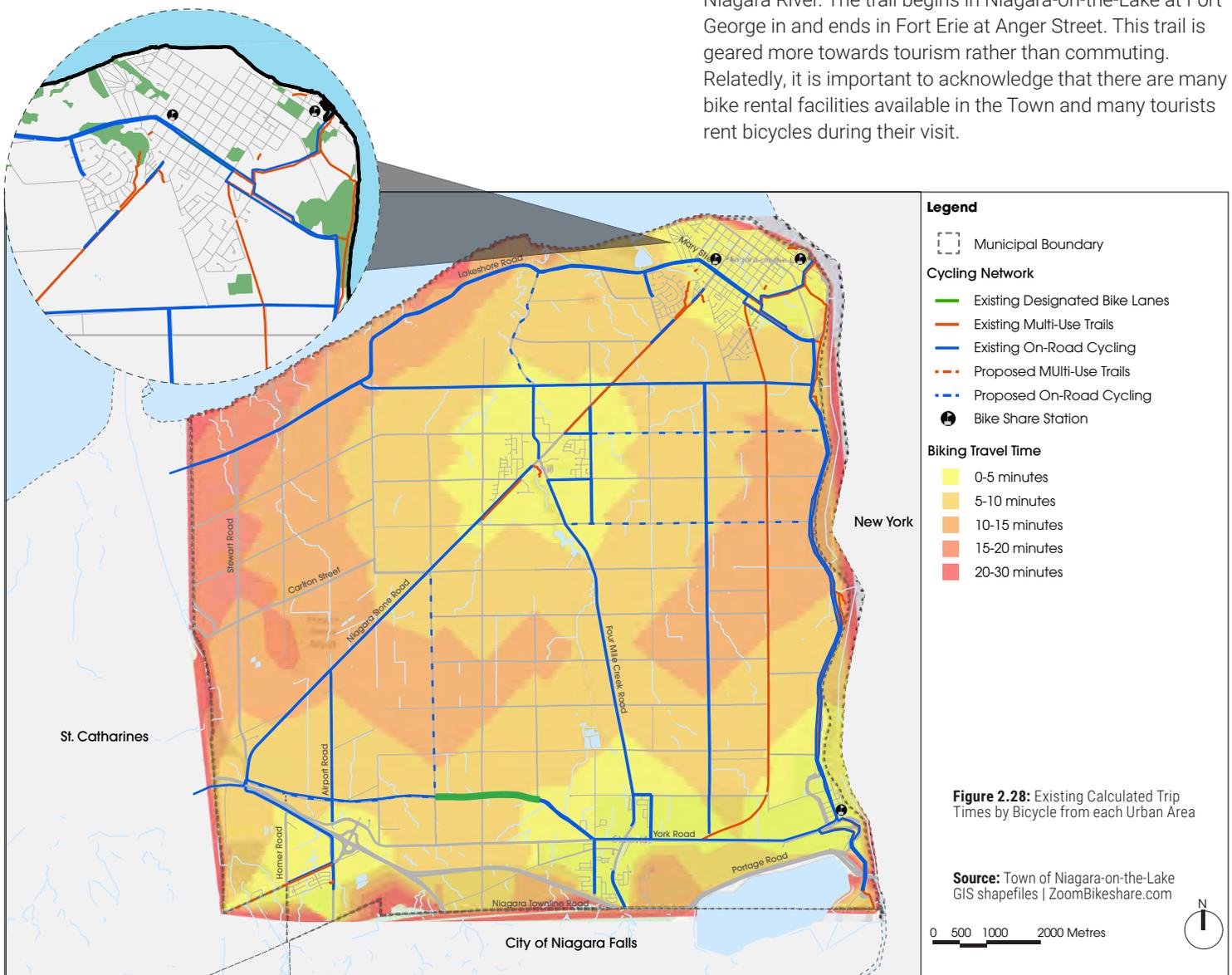
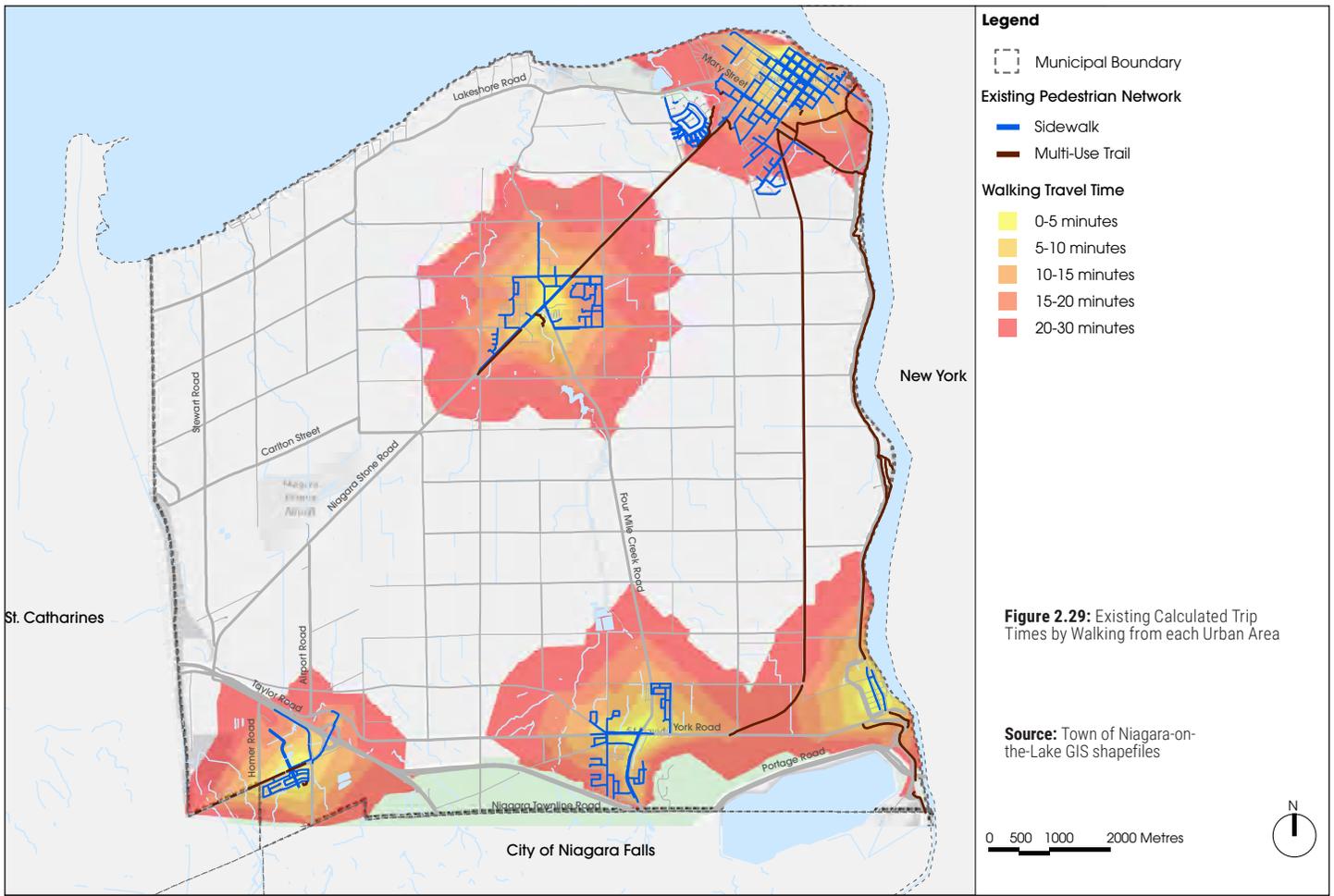


Figure 2.28: Existing Calculated Trip Times by Bicycle from each Urban Area

Source: Town of Niagara-on-the-Lake GIS shapefiles | ZoomBikeshare.com



Considering the cycling travel times from various communities within the Town reveals that most Urban Areas are accessible to rural areas via cycling with nearly most rural areas able to be accessed within a 20-minute trip. Higher travel times are seen along the peripheries of the Town and in more isolated rural areas.

Pedestrian Network

Niagara-on-the-Lake’s existing pedestrian network consists of a mixture of sidewalks and multi-use trails that are focused on providing links between and within local neighbourhoods, and connecting multi-use trails as shown in **Figure 2.29**.

Pedestrian sidewalks are located throughout the Downtown and residential neighbourhoods with connections to bike routes and other active transportation facilities that culminate in 109 km of pathways as summarised in **Table 2.10**.

The pedestrian network is complemented by the Town’s signalized intersections which provide protected crossing opportunities along most major corridors such as arterials and highways. While major roadways within the urban communities provide some form of pedestrian facility, there are few mid-block pedestrian crossings or sidewalks on local streets for easier and safer access to residential properties.

The urban form and layout of the road network within the Old Town community follows a traditional grid structure with permeable pedestrian network that allows for ample

connections. Within other communities such as Virgil, Glendale, St. Davids, there are fewer gridded networks and more circuitous routes, taking on a more suburban form which present more challenging conditions for direct pedestrian connections. Outside of the urban communities in the Town, there is no pedestrian infrastructure making these rural areas challenging to access on foot. Approximately 33% of rural areas are within a 30 minute walking distance from an urban community, while most urban communities themselves are within a 15-20 minute walk from one point to the other, as illustrated through **Figure 2.29**.

Table 2.10: Existing Pedestrian Facilities by Type

Pedestrian Pathways		
Sidewalks (Km)	Multi-Use Trails (Km)	Total (Km)
75.1	34.1	109.1

Source: Town of Niagara-on-the-Lake GIS shapefiles

2.3 TRAVEL CHARACTERISTICS

2.3.1 SEASONAL VARIATION

Current travel demand data was evaluated by leveraging anonymized mobile app data provided by a third-party data provider, Streetlight Data. This data is processed by applying proprietary algorithms, and trips are estimated by expanding anonymized cell tower and mobile app data based on permanent traffic counters within the region.

Fall weekday and summer weekend trips were evaluated and compared due to Niagara-on-the-Lake's unique nature as a major tourist destination with a variety of natural, agricultural, and cultural heritage destinations present within the community. Fall weekday was chosen based on an evaluation of seasonal trip variations within Niagara-on-the-Lake which identified the Fall weekday as the peak season for weekday trips, and summer weekend for the peak season for weekend trips. A comparison of Fall weekday and Summer weekend distribution volumes are compared in **Figure 2.30**. Weekday and weekend trips represent trips between the hours of 6:30am and 6:30pm to show a daily comparison between how mobility trends are influenced by tourism and employment between the weekday and weekend. It should be noted this data, including both volumes and travel patterns, are from 2019 and represent pre-pandemic conditions.

Generally, summer weekend trips are greater in quantity than fall weekday trips with the largest differences observed for internal and external trips seeing increases of +47% and +89% in the summer weekends, as opposed to fall weekdays, respectively. Whereas typical neighbouring employment centres near Niagara-on-the-Lake such as Thorold and St. Catharines see smaller increases in the range of +25% during the summer weekend compared to the fall weekday as summarized in **Table 2.11** in the next section.

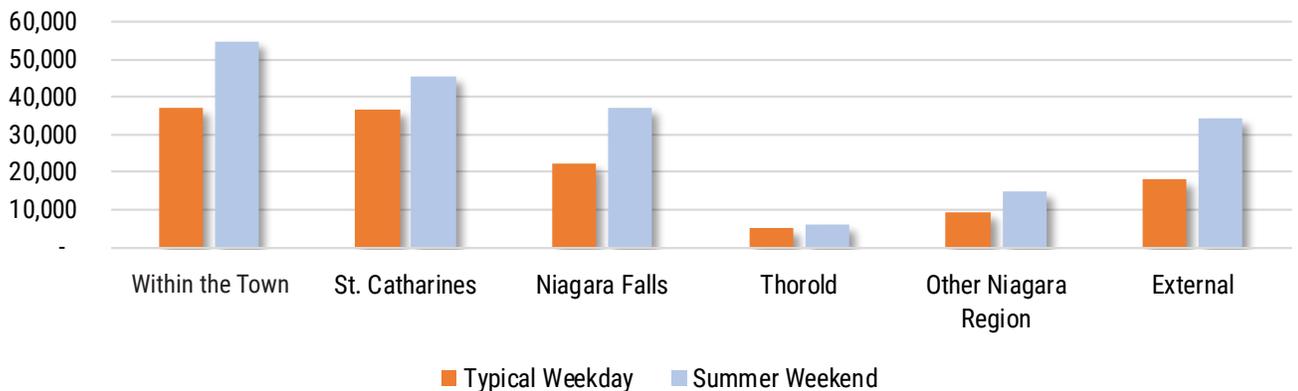
This presents unique challenges for the Town of Niagara-on-the-Lake as summer weekdays see an increase in demand along local and regional roadways. This is further affected by the different trip purposes that each season/period represents; with weekday trips typically focused around employment, and weekend trips typically focused around commercial uses.

Niagara-on-the-Lake's nature as a tourism destination contributes to the observed increase in trips and how often trips are made during the weekends. The variance between weekday and weekend trip quantities is primarily evident in the incremental short-distance trips within Old Town on the weekends. Visitors often make several short-distance trips between various points of interest in the Old Town. This is illustrated by the data summarized in **Table 2.13** in the next section.

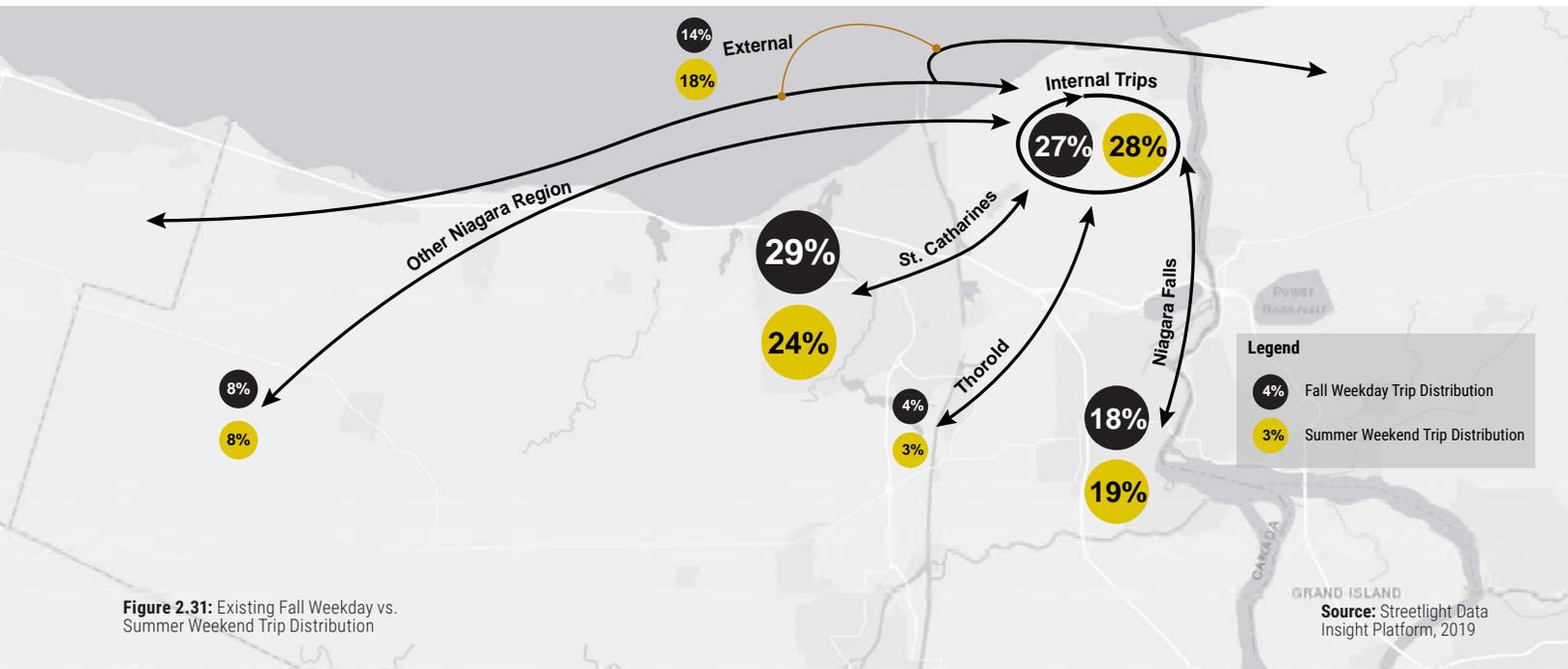
Another pocket of high active transportation activity is within Glendale. This may be explained by Niagara College and the residential community around it where students reside. Post-secondary education institutions typically have higher active transportation shares as they tend to attract students to live nearby also, students are less likely to own their own vehicle. Beyond the effect of Niagara College, the adjacent outlet mall at the QEW interchange likely generates a variety of internal capture trips within the outlet mall vicinity as people walk, bike, or drive around the mall between different areas or stores. This is further supported by additional analysis that was conducted that disaggregated the Glendale community into multiple zones, and it identified that the vast majority of these trips were occurring on the south side of the QEW.

Seasonal Trip Distribution | Typical Weekday vs. Summer Weekend | All Day

Figure 2.30:
Seasonal Trip
Distribution | Typical
Weekday vs.
Summer Weekend |
All Day



Source: Streetlight Data
Insight Platform



2.3.2 TRIP DISTRIBUTION

External Trips

Currently, a little over a quarter of weekday trips are internal to Niagara-on-the-Lake, meaning trips both start and end within the community, with the remaining ~75% of trips going and coming from areas beyond Niagara-on-the-Lake’s boundary as summarised in **Table 2.11**. Weekday trips to areas outside of the community are primarily linked to other municipalities within Niagara Region accounting for 59% of external trips. Generally, 86% of trips within/to/from Niagara-on-the-Lake stay within Niagara Region with only a minor subset of external trips (14%) headed to areas beyond the region as visualized in **Figure 2.31**.

Comparing weekday and weekend external trip distribution reveals that generally, the proportion and dispersment of trips during the weekend is similar to the weekday with minor increases in trips to/from outside of Niagara Region, and the City of Niagara Falls.

Internal Trips

An evaluation of internal trip distribution between fall weekday and summer weekend are summarised in **Table 2.13**, and **Table 2.14** highlights the unique make-up of the community where there are four main travel trends:

Table 2.11: Existing Summer Weekend Distribution | Fall Weekday vs. Summer Weekend

To/From	2019 ¹			
	Trips	Distribution	Variation Summer Weekend vs. Typical Weekday	
			Δ	%
Town (Internal)	53,596	28%	18,990	55%
St. Catharines	45,538	24%	8,972	25%
Niagara Falls	37,276	19%	14,784	66%
Thorold	6,164	3%	1,205	24%
Other Niagara Region	14,821	8%	5,352	57%
External	34,238	18%	16,097	89%
Total	191,633	100%	65,400	52%

1. Data obtained through Streetlight Data’s Insight Platform

NOTE: Fall Weekday Represents daily weekday trips between 6:30am-6:30pm, Summer Weekend represents weekend trips between 6:30am-6:30pm.

Table 2.12: Existing and Historical Fall Weekday Trip Distribution

To/From	2019 ¹		2017 ¹		Trip Variation 2016-2019	
	Trips	Distribution	Trips	Distribution	Δ	
					Δ	%
Town (Internal)	34,606	27%	40,363	29%	(5,757)	-14%
St. Catharines	36,566	29%	41,378	30%	(4,812)	-12%
Niagara Falls	22,492	18%	22,298	16%	194	1%
Thorold	4,959	4%	4,956	4%	3	0%
Other Niagara Region	9,469	8%	9,118	7%	351	4%
External	18,141	14%	19,907	14%	(1,766)	-9%
Total	126,233	100%	138,020	100%	(11,787)	-9%

1. Data obtained through Streetlight Data’s Insight Platform

NOTE: Fall Weekday Represents daily weekday trips between 6:30am-6:30pm, Summer Weekend represents weekend trips between 6:30am-6:30pm.

Table 2.13: Existing Fall Weekday | Internal Distribution

Origin Zone	Name	Destination Zone							Total
		1	2	3	4	5	6	7	
1	Old Town	6,029	1,493	506	210	74	1,865	5,846	16,023
2	Virgil	1,820	1,868	418	180	32	2,260	3,895	10,473
3	Glendale	402	364	3,298	272	95	603	19,157	24,191
4	St. Davids	257	325	212	469	46	483	3,342	5,134
5	Queenston	93	55	128	71	80	207	1,914	2,548
6	Rural	1,866	1,993	810	363	239	5,120	11,417	21,808
7	External	5,711	4,477	19,036	3,459	,841	11,532	1,420,316	1,466,372
Total		16,178	10,575	24,408	5,024	2,407	22,070	1,465,887	1,546,549

Table 2.14: Existing Summer Weekend | Internal Distribution

Origin Zone	Name	Destination Zone							Total
		1	2	3	4	5	6	7	
1	Old Town	10,929	2,455	1,118	225	383	3,736	10,362	29,208
2	Virgil	2,449	2,336	460	202	22	3,180	5,572	14,221
3	Glendale	999	458	2,714	317	183	1,025	24,296	29,992
4	St. Davids	280	234	167	343	18	418	4,112	5,572
5	Queenston	341	16	403	71	251	515	4,190	5,787
6	Rural	3,906	3,052	1,148	533	225	8,484	16,336	33,684
7	External	12,733	6,239	7,311	4,110	4,064	18,712	1,806,897	1,880,066
Total		31,637	4,790	33,321	5,801	5,146	36,070	1,871,765	1,998,530

Table 2.15: Existing Fall Weekday | Internal Truck Trip Distribution

Origin Zone	Name	Destination Zone							Total
		1	2	3	4	5	6	7	
1	Old Town	132	22	25	5	3	59	291	537
2	Virgil	29	18	25	5	1	38	190	306
3	Glendale	8	20	128	6	22	31	1,228	1,443
4	St. Davids	2	6	6	2	-	7	88	111
5	Queenston	-	1	26	1	7	5	342	382
6	Rural	38	41	62	5	2	84	691	923
7	External	348	206	1,046	92	373	664	70,842	73,571
Total		557	314	1,318	116	408	888	73,672	77,273

Table 2.16: Existing Summer Weekend | Internal Truck Trip Distribution

Origin Zone	Name	Destination Zone							Total
		1	2	3	4	5	6	7	
1	Old Town	188	46	14	4	8	221	522	1,003
2	Virgil	84	34	12	5	2	116	210	463
3	Glendale	8	11	91	3	20	22	863	1,018
4	St. Davids	5	3	4	4	1	8	91	116
5	Queenston	14	1	17	1	18	33	360	444
6	Rural	151	132	23	33	19	379	1,189	1,926
7	External	623	224	725	66	5,777	7,550	80,048	95,013
Total		1,073	451	886	116	5,845	8,329	83,283	99,983

- Glendale sees the most external demand, likely a result of the outlet mall and Niagara College, however trips between Glendale and Old Town are not significant highlighting the different visitors that each area serves.
- Dominant community-wide travel to/from external municipalities;
- Internal demand between rural areas serves agricultural and tourism needs highlighted by the increased demand during weekends and relatively high volumes during the week;
- Old Town experiences high internal demand, as well as external demand during all seasons highlighting the unique need to support tourism trips, but also balance local resident and business needs.

There are a variety of different people that use Niagara-on-the-Lake's roadways, each with unique needs that must balance the desire for efficiency with safety. Each of the four trends above are likely to require a mixture of solutions that consider how the different modes of transportation interact with each other.

One of the key challenges is the impact of seasonal congestion on modal choice. While a number of destinations are within biking distance of each other, during the peak season when roadways are congested with vehicular traffic, cyclists may experience discomfort on the primary cycling routes. As alternative routes may not be suitable for inexperienced cyclists, this can create a greater demand on the City's roadway network as these potential cyclists choose vehicular travel instead.

Commercial Vehicle Distribution

When we evaluate commercial truck activity within the community, as summarised in **Table 2.15** and **Table 2.16**, we see that a high number of truck trips originate and terminate within Glendale, likely to service the outlet mall that is located adjacent to the QEW interchange.

Whereas trips between rural areas were identified as a trend for total trips, this isn't necessarily true for commercial trips during the weekday; we only see this during the weekend along with an increase in trips between Old Town and Rural areas.

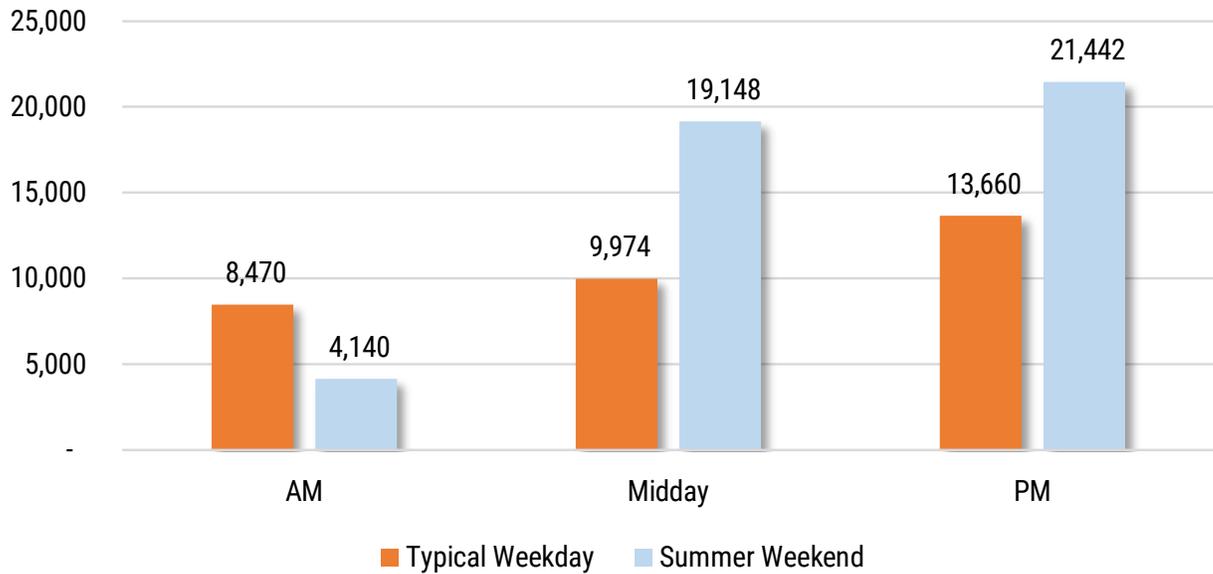
Generally, external commercial vehicle demand remains stable between weekday and weekend periods, however on weekends there is an observed increase in internal truck trips between areas within Niagara-on-the-Lake.

This will be an important consideration with regards to future multi-modal improvements as commercial vehicles have unique needs related to roadway loads, intersection design, and roadway safety to support the movement of goods while mitigating the impacts on the community.

Average Hourly Trip Volume | Fall Weekday vs. Summer Weekend

Figure 2.32:
Average Hourly Trip
Volume by Period
| Fall Weekday vs.
Summer Weeknight

Source: Streetlight
Data Insight Platform



Daily Period Distribution

Comparing the average hourly trip volumes by time period within Niagara-on-the-Lake between weekday and weekend highlights that weekday morning peak period demand is significantly greater (51%) than weekend morning demand, but lower than midday/afternoon weekend demand which are approximately 92% and 57% greater on the weekend, respectively (see **Figure 2.32**).

The daily trip volumes during summer weekends that see significantly more volume with midday trips blending into the PM peak period. This highlights how touristic day-trippers impact the local road network which is supported by general industry data that sees increases in commercial trips and considers weekend peak periods to occur during the early-to-late afternoon. These trends paint a picture of a community that retains these external day trippers, even during the weekday fall season; with volumes further increasing during the summer.

2.3.3 HISTORICAL TRIP GROWTH

Historical traffic data for fall weekday 2017 was obtained through Streetlight Data's Insight Platform to compare historical traffic growth in the community.

Between 2017 and 2019, traffic in the community saw a modest decrease by 8% in total trips to/from/within Niagara-on-the-Lake as summarised in **Table 2.12**. During that same time external trip distribution has shifted away from St. Catharines, which saw a 12% decrease in trips, as well as internal trips which saw a decrease of 14%, towards more external trips from other Municipalities in Niagara Region, including Niagara Falls. Despite this shift, St. Catharines still represents the single largest external origin/destination for trips along roadways within Niagara-on-the-Lake's boundaries.

St. Catharines is a significant population centre and employment hub within Niagara Region with a population of over 113,000. This aligns with the observed difference between weekday and weekend trips to St. Catharines emphasizing the employment nature of these external trips.

We note that although Streetlight Data's platform implements a processing algorithm that validates data results based on a sample of over 1,300 permanent traffic counters across Canada, the results underwent a further validation based on traffic counts provided by the Town of Niagara-on-the-Lake to further confirm the results.

2.3.4 TRIP MODE, PURPOSE AND LENGTH

Niagara-on-the-Lake's transportation network is impacted by the choices residents make every day in relation to moving around the Town. Conversely, the nature of where people need to go may restrict peoples' mobility options further adding strain on the road network. As a result, it is important to not only understand where people go, but how and why people move around town so as to add important context to the transportation network.

Existing mode shares data was derived from the 2016 Transportation Tomorrow Survey and as a result only reflects weekday trips, however it still provides useful insights into how people move around the community.

Since 2011 the automobile mode share has remained the same for internal trips, while external trips have experienced minor increases (see **Table 2.17**). Historical mode splits also show us that some alternative modes of transportation like cycling and walking have seen increases in mode share since 2011, while others such as transit have experienced decreases.

The overwhelming majority of trips are made via automobile comprising between 80-90% of all trips as summarised in **Figure 2.33**. During the morning peak period approximately 10% of trips are categorized as 'other' which encompasses school bus and taxi trips. In this case it is likely that the bulk of these trips are associated with children going to school in the morning. This is further supported when reviewing the associated trip purposes between the different periods as summarised in **Table 2.18**.

Niagara-on-the-Lake's peak period trip purpose is typical of a town its size with a defined spike in work and school trips in the morning (~70% of morning trips) and a work and discretionary spike in the midday and afternoons (43-54% of trips in the midday/afternoon).

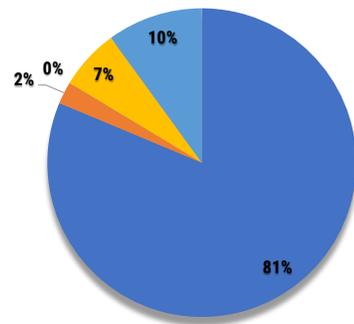
Current travel demand data indicates that the longer the trip, the more likely it is to be made by automobile as visualized in **Figure 2.34**. An analysis of the distribution of 2016 Transportation Tomorrow Survey (TTS) data by mode and by trip length yielded several important findings. The analysis reflected the AM peak period conditions, but its trends generally were considered applicable to other periods as well. The findings included:

- Shorter trips are more conducive to alternatives to the auto;
- Walking shares were the highest for work-related commutes, whereas Cycling shares were highest for school-related trips;
- Over 55% of school-related trips in the morning are made via automobile; and
- Transit is currently being used to service moderate to longer distance trips.

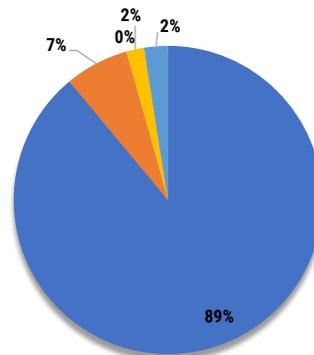
Currently >90% of walk/biking trips are made at distances of 1 Km or less, while transit is being used to serve medium-distance trips between 3-6 Km. While over 55% of auto trips are focused around trips that are 10 km or greater as summarized in **Figure 2.34**.

This is reflective of general travel trends within the community where the majority of trips are originating or ending in areas beyond Niagara-on-the-Lake's borders. These comparisons help to identify appropriate markets for alternatives to driving alone and appropriate future 10-year targets for these alternatives. For example, although mixed-use development may promote the localization of the home-based trip to the dentist (a trip in which the automobile could be left at home), the reality is that many trips are linked to other purposes over longer distances, which may mandate the use of the automobile. However, there are opportunities to carve a slice of the mode share pie toward active transportation and transit based on the distances and types of trip purposes that are most amenable to these modes.

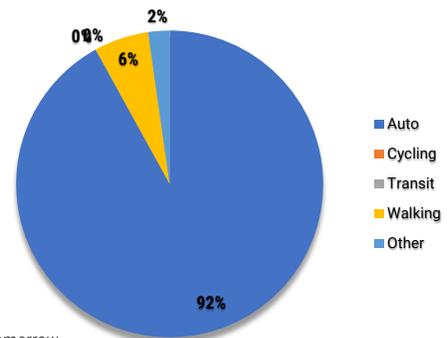
Figure 2.33: Daily Weekday Mode Share



Midday Period Mode Share



PM Peak Period Mode Share



Source: Transportation Tomorrow Survey, 2016

Table 2.17: Existing and Historical Weekday Mode Share | Internal vs. External Trips

Mode	Internal Trip Mode Share		External Trip Mode Share	
	2016	2011	2016	2011
Auto	88%	89%	97%	94%
Cycling	4%	4%	0%	0%
Transit	0%	0%	1%	2%
Walking	4%	4%	0%	0%
Other	4%	3%	2%	4%
Total	100%	100%	100%	100%

Source: Transportation Tomorrow Survey - University of Toronto, 2016

Table 2.18: Existing Trip Purpose for Trips to/from Niagara-on-the-Lake | AM, Midday, and PM Peak Period

AM Peak Period								
Trip Purpose	Internal		From Town		To Town		Total	
	Volume	%	Volume	%	Volume	%	Volume	%
Work-Related	978	46%	1,917	49%	4,220	61%	7,115	55%
School-Related	280	13%	861	22%	917	13%	2,058	16%
Discretionary	677	32%	1,001	25%	1,036	15%	2,714	21%
Non Home-Based	173	8%	165	4%	793	11%	1,131	9%
Total	2,108	100%	3,944	100%	6,966	100%	13,018	100%

MIDDAY Period								
Trip Purpose	Internal		From Town		To Town		Total	
	Volume	%	Volume	%	Volume	%	Volume	%
Work-Related	380	7%	1,328	15%	1,943	19%	3,651	15%
School-Related	193	4%	421	5%	834	8%	1,448	6%
Discretionary	3,387	62%	5,194	59%	4,713	45%	13,294	54%
Non Home-Based	1,541	28%	1,864	21%	2,879	28%	6,284	25%
Total	5,501	100%	8,807	100%	10,369	100%	24,677	100%

PM Peak Period								
Trip Purpose	Internal		From Town		To Town		Total	
	Volume	%	Volume	%	Volume	%	Volume	%
Work-Related	887	23%	3,919	43%	1,760	30%	6,566	35%
School-Related	113	3%	608	7%	250	4%	971	5%
Discretionary	2,225	58%	2,986	33%	2,902	49%	8,113	43%
Non Home-Based	594	16%	1,663	18%	974	17%	3,231	17%
Total	3,819	100%	9,176	100%	5,886	100%	18,881	100%

AM Peak Period Trips by Distance and by Mode

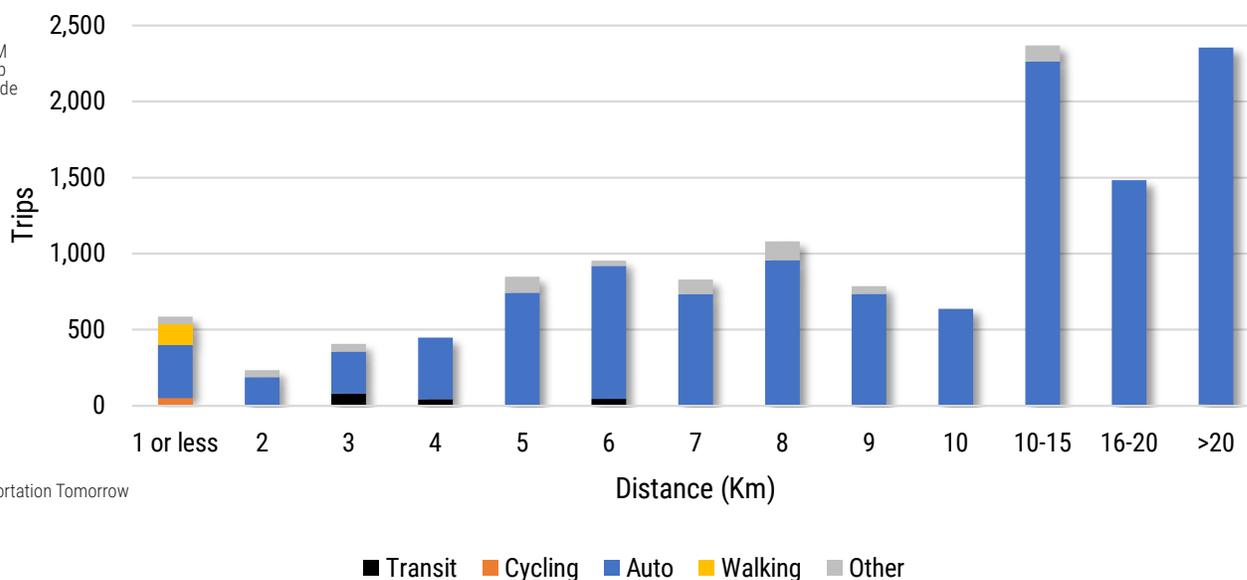
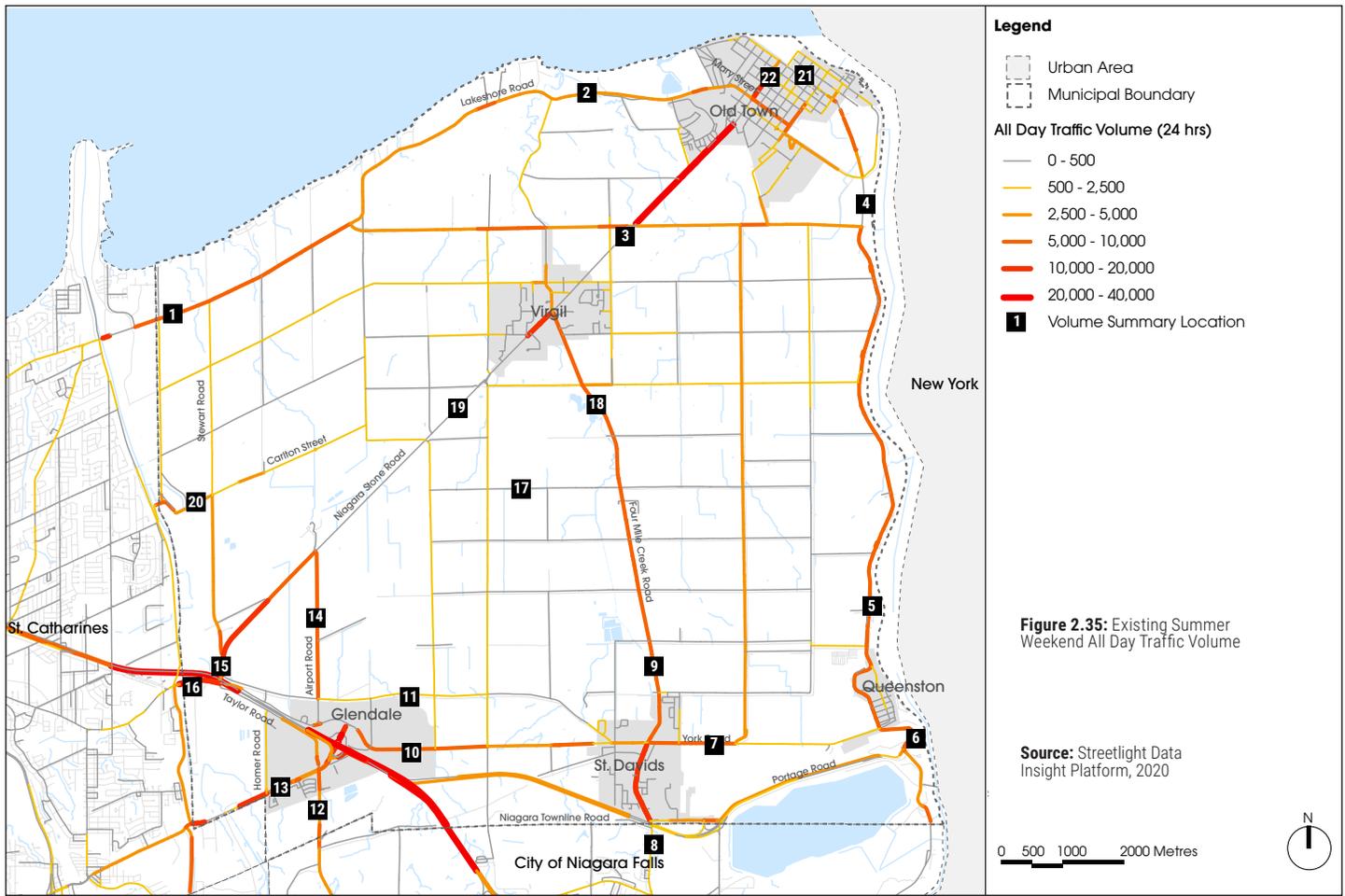


Figure 2.34: AM Peak Period Trip Distance by Mode

Source: Transportation Tomorrow Survey, 2016



2.3.5 TRIP VOLUMES

Summer weekend volumes were obtained through Streetlight Data's Insight Platform. A summary of peak period traffic volumes at key count locations are summarised in **Table 2.19** with the associated map of locations shown in **Figure 2.35** along with a visualization of all day summer weekend volumes (i.e. 12am-12am).

The largest traffic volumes during the AM peak period were observed on St. Catharines' Queenston Street (ID 16) with over 1,375 vehicles, York Road (ID 10) with over 740 vehicles, and along Niagara Stone Road (IDs 15, 19, 3) with between 875-960 vehicles traveling on the roadway within the three hour period. While these counts represent summer weekend volumes, it emphasizes the strong relationship that Niagara-on-the-Lake serves with the City of St. Catharines as weekend workers and travelers travel to/from the City using the Queenston/Niagara Stone combination. It is also important to note that the high volumes along Queenston Road are also a reflection of the access it provides to the Niagara Outlet Mall in Glendale, while volumes along York Road reflect the valuable connection it provides to the single QEW highway interchange at Glendale Avenue.

During the Midday six-hour peak period and PM three-hour period we see these same corridors play a prominent role in transporting vehicles across the community, however

additional corridors like the Niagara Parkway/Queen's Parade combination (IDs 4, 5, 6) see an uptick in usage as tours and general visitor traffic comes and goes between Niagara-on-the-Lake and the City of Niagara Falls. We also see how local collector streets in Old Town such as Queen Street (ID 21) and Mississagua Street (ID 22) start to increase in activity. There is an observed discrepancy between volumes on Mississagua Street and Queen Street, likely due to the fact that most parking lots within Old Town actually have entrances from side streets away from the main commercial strip.

These volumes confirm findings observed from the trip distribution data and trip purpose data where major corridors that provide outward connections to/from the community are the most utilized, particularly to areas with high commercial or tourism-related land uses. The existing road classification aligns with how the road network is used, however this TMP presents an opportunity to re-evaluate how residents would like their roadways to be used in the future.

Table 2.19: Existing Summer Weekend Period Two-Way Volumes

ID	Street	Class	Speed Limit	Lanes	Summer Weekend Period 2-Way Volume		
					AM	MID	PM
1	Lakeshore Road	Regional	60 km	2	367	3,066	1,945
2	Lakeshore Road	Regional	60 km	2	113	1,704	1,114
3	Niagara Stone Road	Regional	70 km	2	945	9,903	6,614
4	Niagara Parkway	Provincial	60 km	2	148	2,723	2,034
5	Niagara Parkway	Provincial	60 km	2	149	2,487	2,135
6	Niagara Parkway	Provincial	50 km	2	174	3,118	2,372
7	York Road	Regional	60 km	2	224	2,410	1,534
8	St. Paul Avenue	Regional	50 km	2	27	798	665
9	Four Mile Creek Road	Regional	80 km	2	406	3,898	2,457
10	York Road	Regional	60 km	2	747	3,820	1,950
11	Queenston Road	Collector	50 km	2	105	401	220
12	Taylor Road	Regional	60 km	2	452	1,580	1,174
13	Glendale Avenue	Regional	50 km	4	745	3,316	2,000
14	Airport Road	Regional	80 km	2	246	2,714	1,531
15	Niagara Stone Road	Regional	80 km	2	964	6,891	1,129
16	Queenston Street (St. Catharines)	Regional	50 km	2	1,377	7,340	3,522
17	Line 5 Road	Arterial	80 km	2	17	69	12
18	Four Mile Creek Road	Regional	80 km	2	439	3,848	2,239
19	Niagara Stone Road	Regional	80 km	2	875	9,391	5,429
20	Carlton Street	Regional	80 km	2	189	1,306	1,073
21	Queen Street	Collector	50 km	2	33	1,247	751
22	Mississagua Street	Collector	50 km	2	453	5,324	3,492

Source: Streetlight Data Insight Platform, 2020

2.4 COLLISION REVIEW

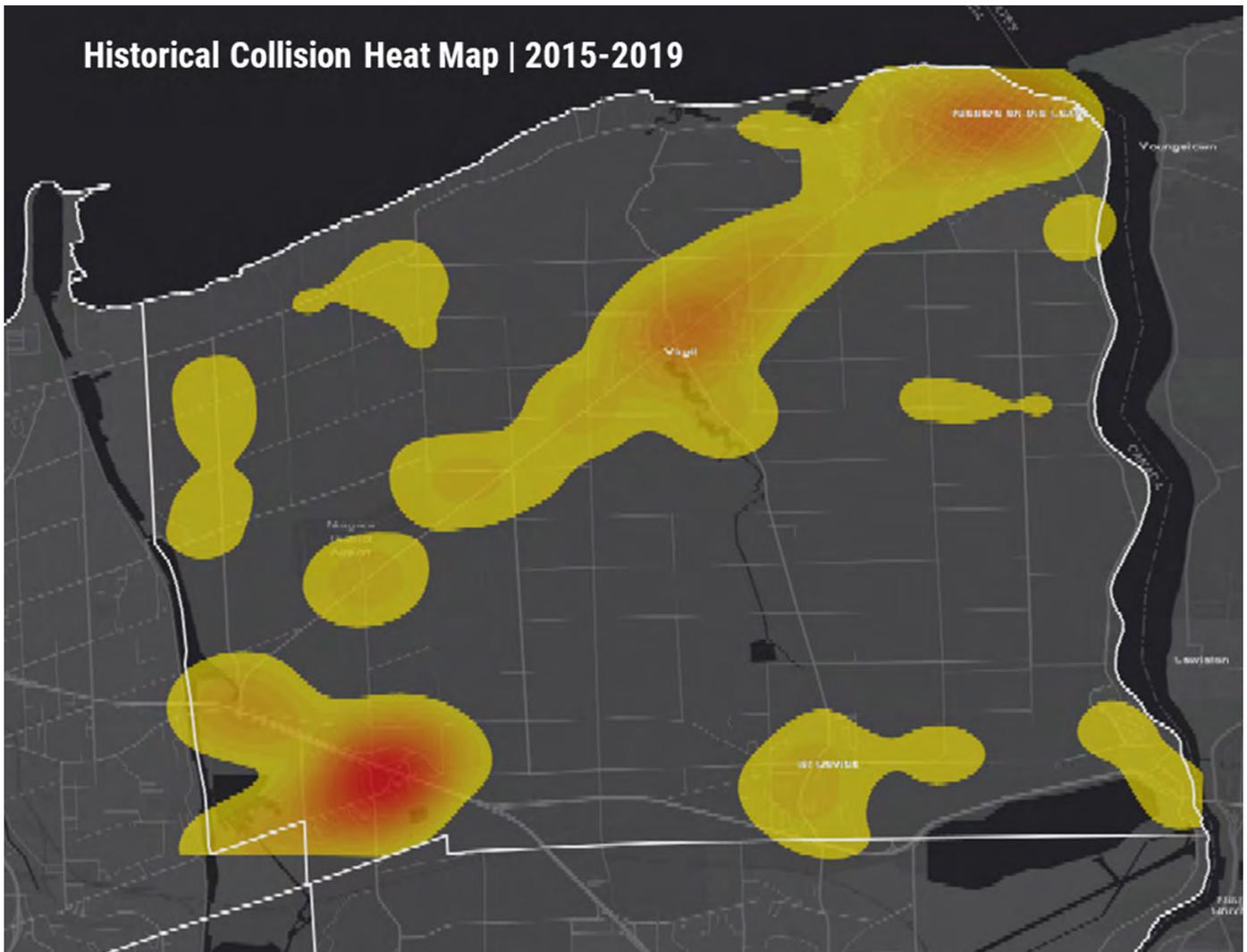
A review of historic collision data revealed an average of 257 collisions annually between 2015 and 2019. Collisions have generally increased until 2018 before experiencing a sharp decline in 2019 which was below average, but generally the trend has been flat. As illustrated in **Figure 2.36**, there were 2 fatal injuries and 199 non-fatal injuries, accounting for 16% of total collisions between 2015-2019. Property Damage (P.D.) represented over 57% of collisions – indicating the severity of the majority of collisions to be relatively low, as there were no reported injuries in these collisions.

Generally, intersections are associated more with turning movement, angle, and rear-end collisions due to the nature of junctions having more turning conflict points than mid-block portions of roadway and associated with stopping maneuvers.

Single Motor Vehicle (SMV) collisions, involving a single vehicle, are typically associated with mid-block sections. Examples include a car that runs off road, collision with animals, or collision with fallen rocks or debris on road.

Collisions tend to occur on high volume corridors like Niagara Stone Road and Glendale Avenue, as well as within Old Town. The biggest concentration of collisions within the vicinity of the Glendale Avenue highway interchange, due to the significant volume of conflicting movements. Notably, the Glendale District Plan proposes a diverging diamond interchange here. It will require further assessment to determine if the collision rates on these corridors is above typical collision rates, or a symptom of high volumes.

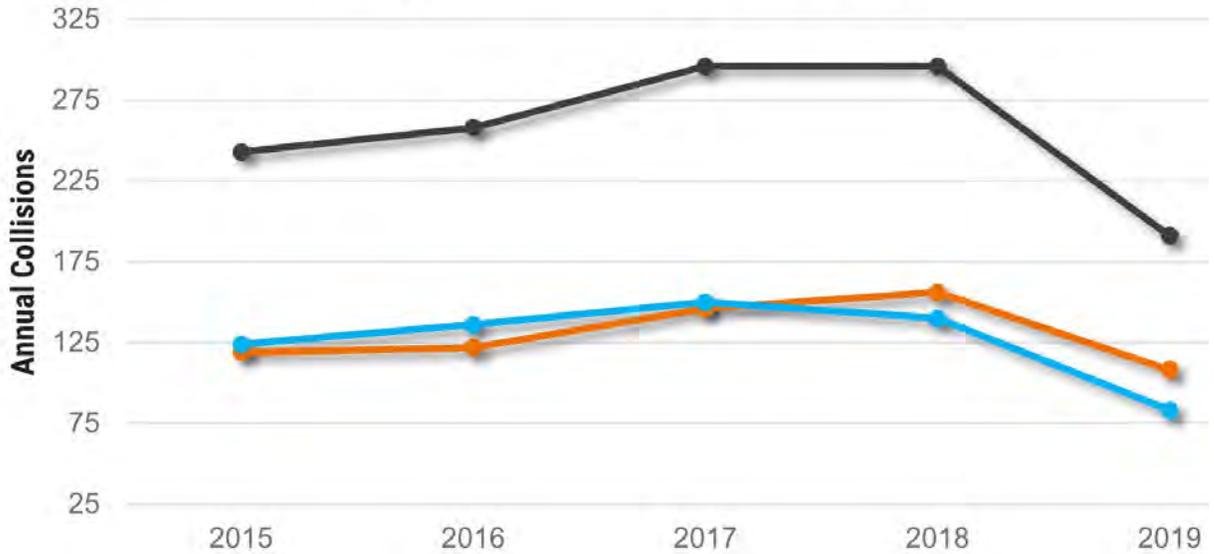
Figure 2.36: Collision heat map (2015-2019)



Source: Town of Niagara-on-the-Lake Collision Data, 2020

Yearly Collision Trends (2015-2019)

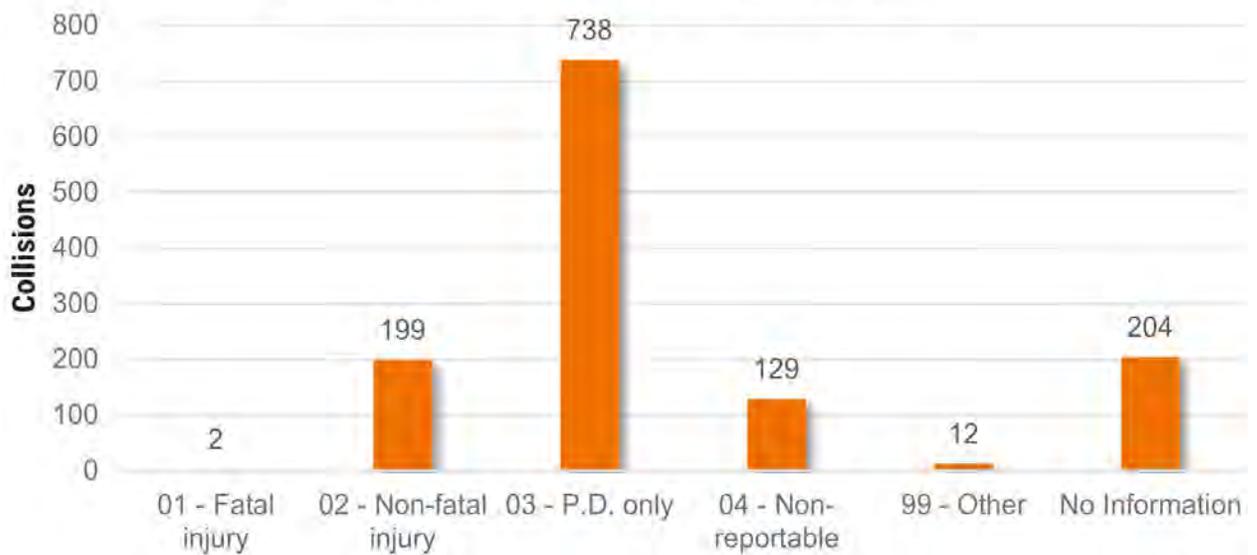
Figure 2.37: Yearly Collision Trends (2015-2019)



Source: Town of Niagara-on-the-Lake Collision Data, 2020

Classification of Accident (2015-2019)

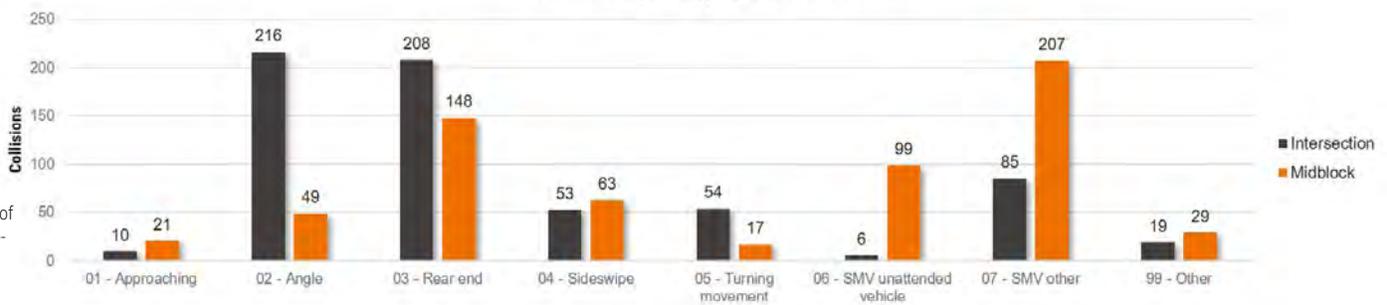
Figure 2.38: Classification of Accident (2015-2019)



Source: Town of Niagara-on-the-Lake Collision Data, 2020

Collision Impact Type | 2015-2019

Figure 2.39: Collision Impact Type (2015-2019)



Source: Town of Niagara-on-the-Lake Collision Data, 2020

2.5 WHAT WE HEARD

2.5.1 ONLINE SURVEY

An online survey was conducted on the Transportation Master Plan page of Niagara-on-the-Lake’s “Join the Conversation” site to obtain feedback on the existing transportation network, needs and opportunities, and vision for the future of transportation in the town. A total of 64 survey responses were collected by November 2020. Survey results are provided in **APPENDIX A: Full Online Survey Results**.

Survey Demographics

The majority of survey respondents are residents of Niagara-on-the-Lake (78%), and several business owners (17%) also completed the survey (**Figure 2.40**). Visitors of Niagara-on-the-Lake made up 1% and there were no surveys completed by students in Niagara-on-the-Lake.

The age breakdown of respondents is shown in **Figure 2.41**. The greatest age category is 65 and older (39%), followed by age 50-64 (33%), and age 35-49 (23%). None of the respondents were below the age of 25. The age distribution is similar to the overall population of Niagara-on-the-Lake, where residents the age of 65 and over account for approximately 31% of the population and the median age is 55 compared to the provincial median age of 41. Relatedly, the most common response to the question about occupation was ‘retired’ (39%), which is expected given Niagara-on-the-Lake’s appeal to people of retirement age (**Figure 2.42**).

Mode Choice

The majority of survey respondents indicated that their primary mode of travel is a personal vehicle (84%), followed by bicycle (6%), other (5%) and walking (3%). None of the respondents use taxis, ride share (e.g. Uber, Lyft, etc.) or public transit as their primary mode. This is consistent with the Transportation Tomorrow Survey (TTS) 2016 results, where the automobile mode share made up 80-90% of the total mode share depending on the time of day.

As expected from the mode share data, nearly all survey respondents (98%) answered that they had access to a car in their household. **Figure 2.45** shows the number of vehicles available per household, where the most common answer was 2 cars (29%), followed by 3 cars (25%) and 1 car (21%).

Despite only 7% of respondents answering that cycling is their primary mode of transportation, 83% of respondents answered that they do ride a bicycle either for recreation or as a means of transportation (**Figure 2.46**). This suggests an opportunity to increase the cycling mode share; if residents choose cycling for recreational and discretionary trips, they may be willing to cycle for more frequent trips such as for work or school.

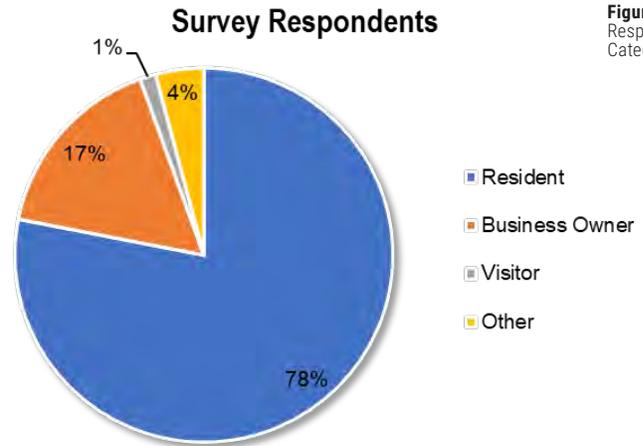


Figure 2.40: Survey Respondent Categories

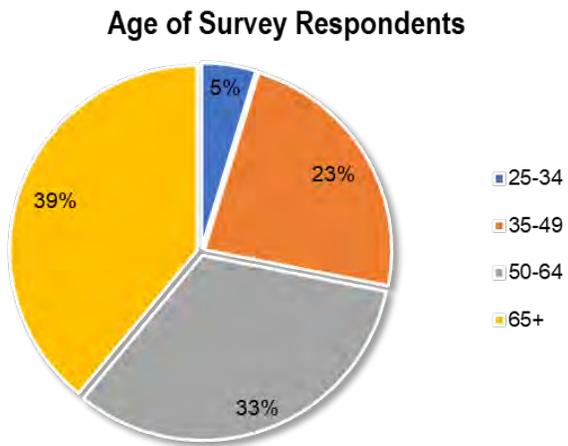


Figure 2.41: Age of Survey Respondents

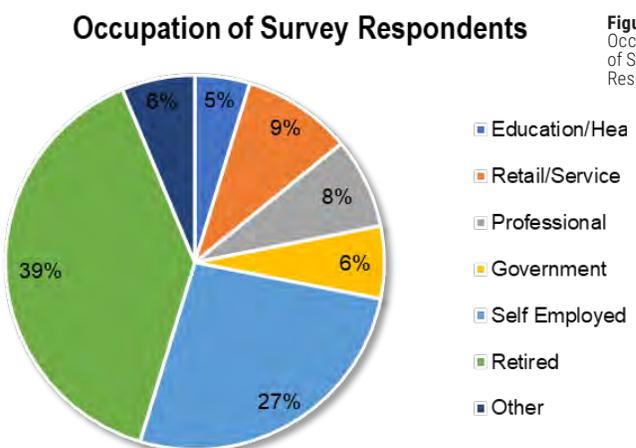


Figure 2.42: Occupation of Survey Respondents

Figure 2.43: Mode Choice of Survey Respondents

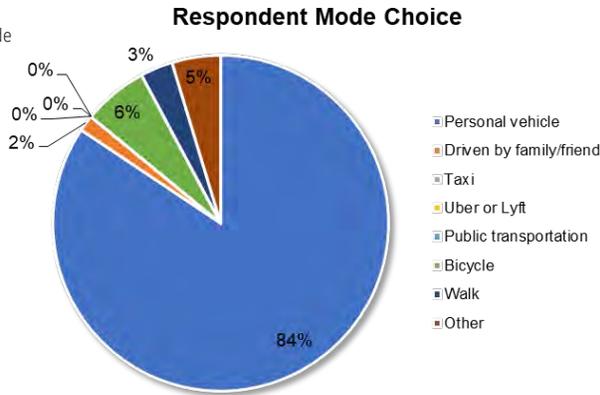


Figure 2.44: Household Car Ownership

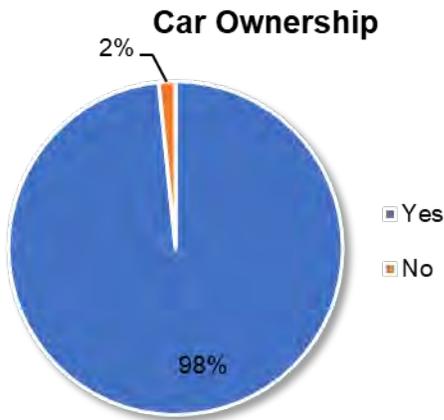


Figure 2.45: Number of Vehicles Available

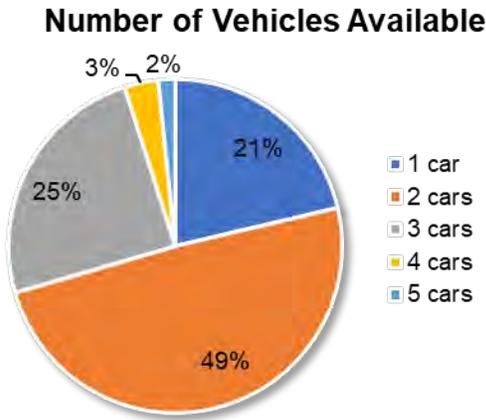
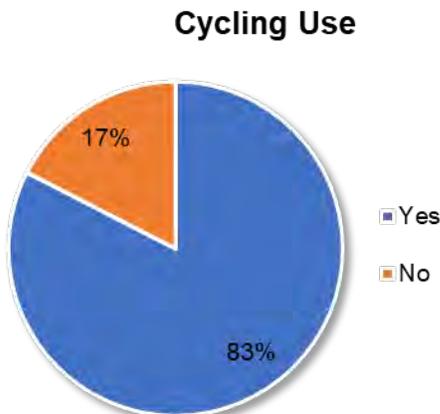


Figure 2.46: Use of a Bicycle for Transportation or Recreational Purposes



Over half of the survey participants (55%) do not use transit. Out of the transit services that are available in Niagara-on-the-Lake and the surrounding region, GO Transit is the most used (28%), followed by Niagara-on-the-Lake Transit (9%), as shown in **Figure 2.47**. Of the people who responded that they have used transit, most only use transit occasionally (less than once per month) and no respondents use transit more than once a week (**Figure 2.48**).

Travel time, reliability, and availability and accessibility of transport were the most important factors influencing respondents' mode choice as summarized in **Figure 2.49**. Travel time is overwhelmingly the main factor influencing mode choice, where 58% of respondents ranked travel time as their first choice and 83% ranked travel time in their top 3 factors. This differs from the top priorities that respondents identified for choosing cycling, which focused primarily on health benefits, safety/comfort, travel time and environmental benefits (**Figure 2.50**). This comparison shows that different modes have different needs and priorities when it comes to encouraging people to shift away from the private automobile. However, there is an overarching trend that revolves around travel time, as spending less time travelling equates to an elevated quality of life.

When asked what modes people are most interested in using, there was interest expressed in using a combination of modes but most respondents still want to use a personal vehicle either as the only mode they use or the mode they use for most trips (**Figure 2.52**). Bike share, e-scooters, and e-bikes are the modes that have the highest number of people disinterested in them, with over 50% of respondents indicating that they do not want to use these modes.

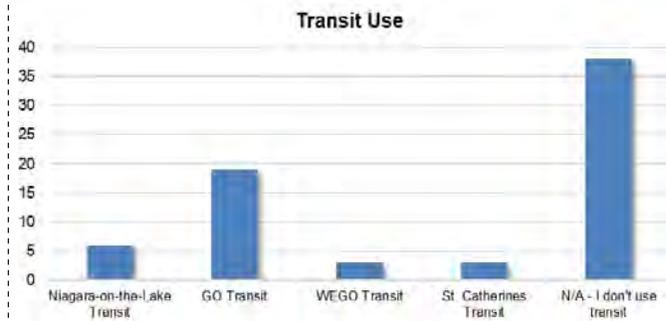


Figure 2.47: Transit Use

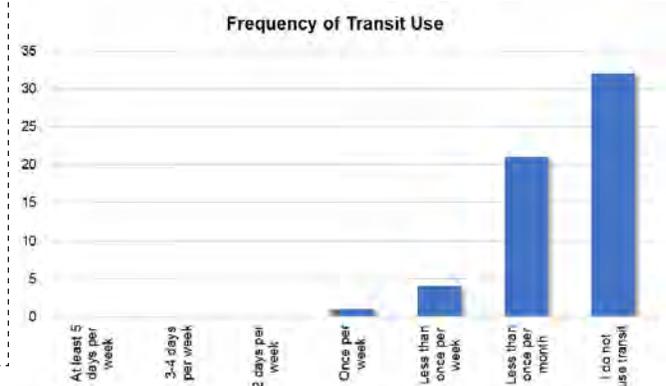


Figure 2.48: Frequency of Transit Use

Figure 2.49:
Factors Influencing
Mode Choice

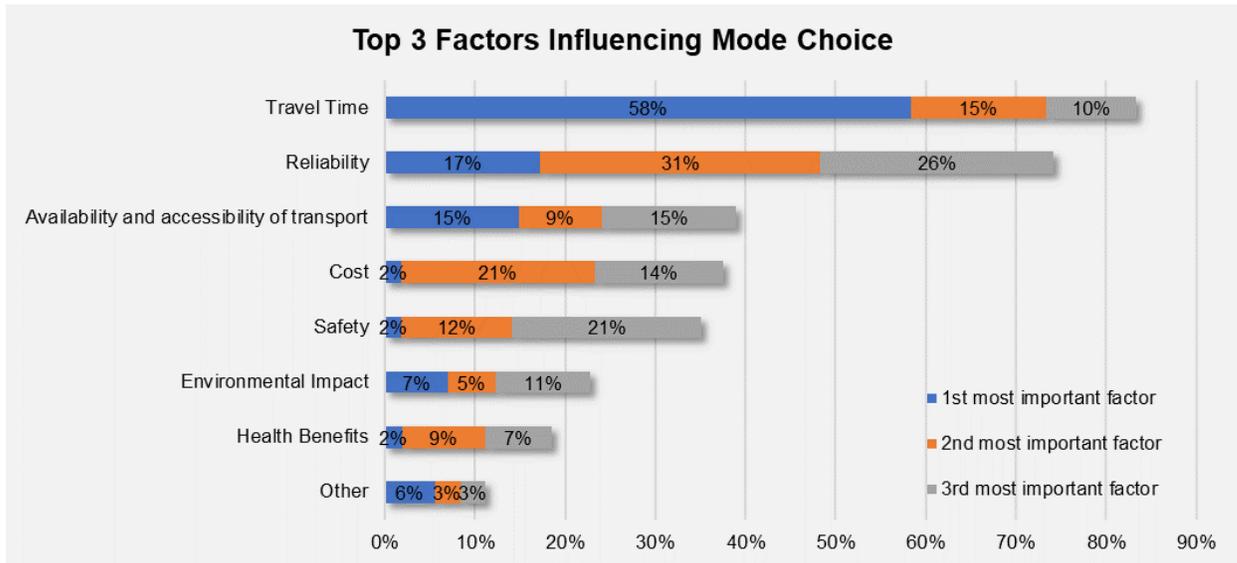
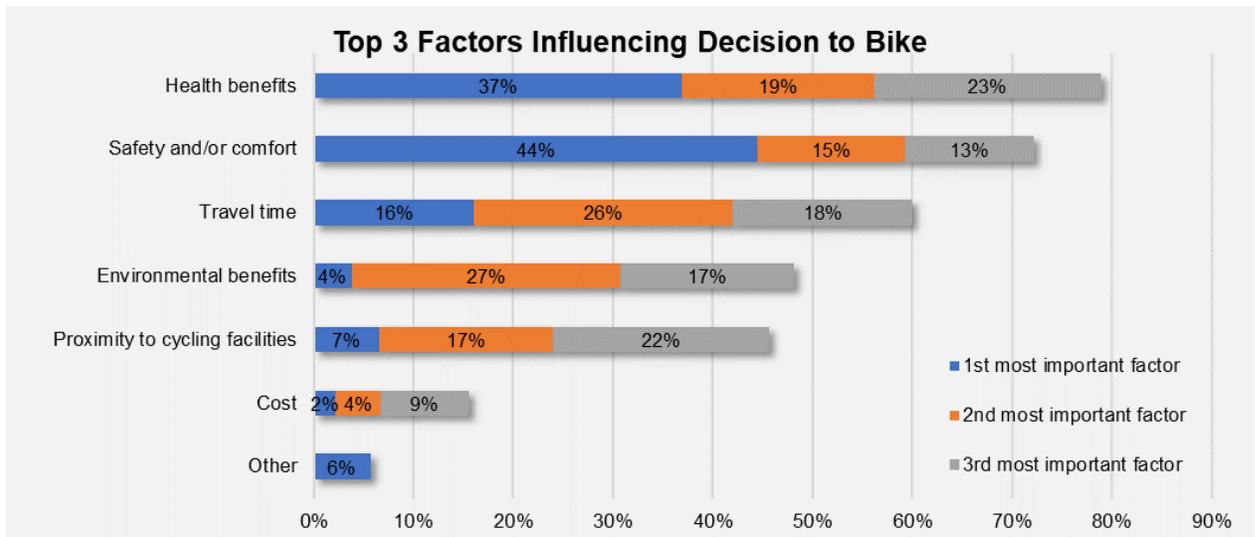


Figure 2.50:
Factors
Influencing
Decision to Bike



Interestingly, though bike share, e-bikes and e-scooters are the modes that people are least interested in using, they are the types of emerging modes that respondents have the most familiarity with (Figure 2.53). Participants are least familiar with autonomous aerial vehicles (AAV), followed by autonomous vehicles (AV) and aerial drone deliveries.

Transportation Master Plan Vision

Residents identified a need for the Niagara-on-the-Lake TMP to focus on active and sustainable modes of transportation such as walking and cycling (Figure 2.54). The most common response is that the TMP vision should develop trails that are integrated with streets and sidewalks to provide routes for active transportation and recreation (26%), followed by designing streets for walking and bicycling so residents can leave their cars at home (24%) and designing a multi-modal network of streets, sidewalks, and trails with safety as the first priority (21%). However, residents still acknowledge a need to plan for motor vehicles (11%).

This desire for an improved active transportation network was echoed by the write-in comments at the end of the online

survey, where comments about cycling, walking, and safety were repeated by many survey participants, as shown in Figure 2.51.

Figure 2.51: Key Words from Online Survey Comments



Figure 2.52: Interest in Using Different Modes of Transportation

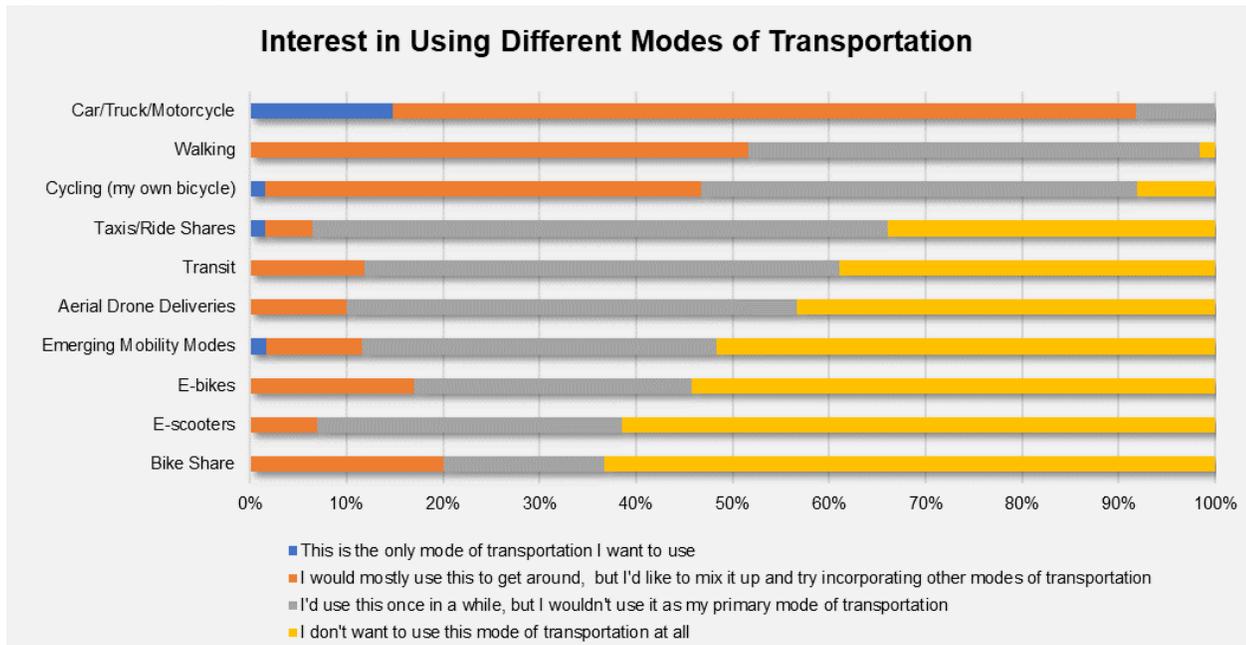


Figure 2.53: Familiarity with Emerging Modes

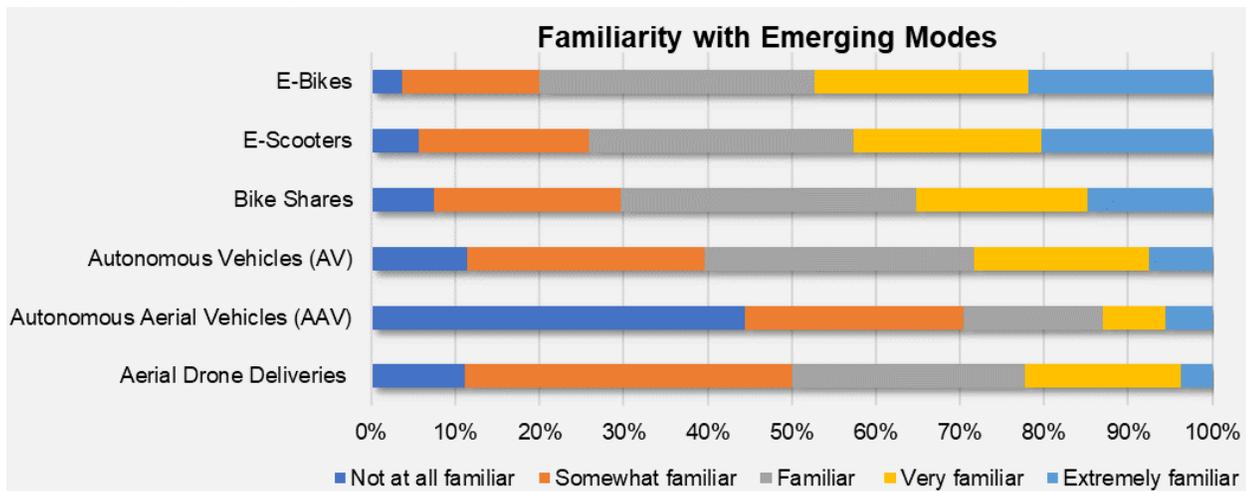
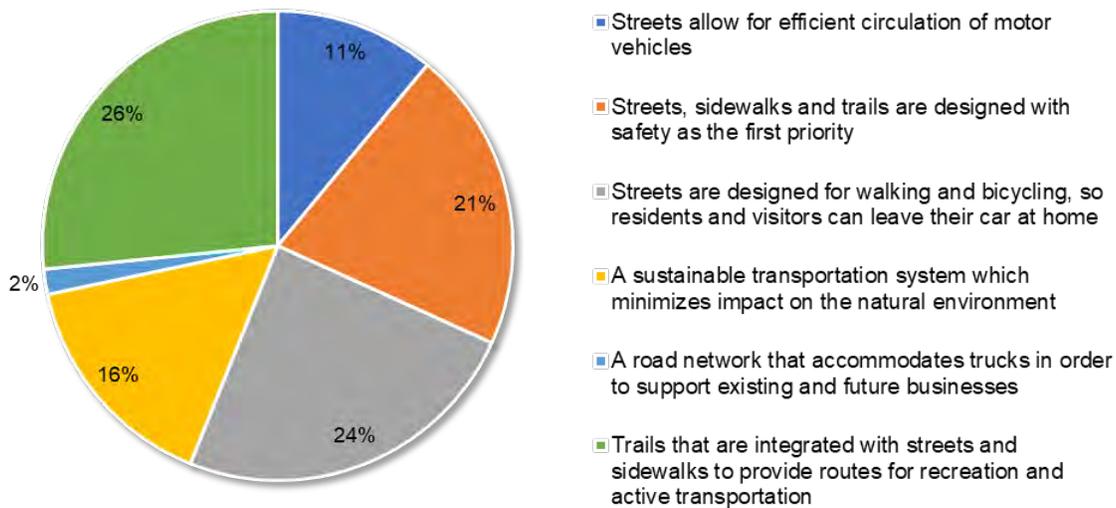


Figure 2.54: Niagara-on-the-Lake Transportation Master Plan Vision





"Niagara-on-the-Lake villages should be connected by pathways for walking or cycling."

"I like to see sidewalks on all residential streets as well as bike friendly streets."

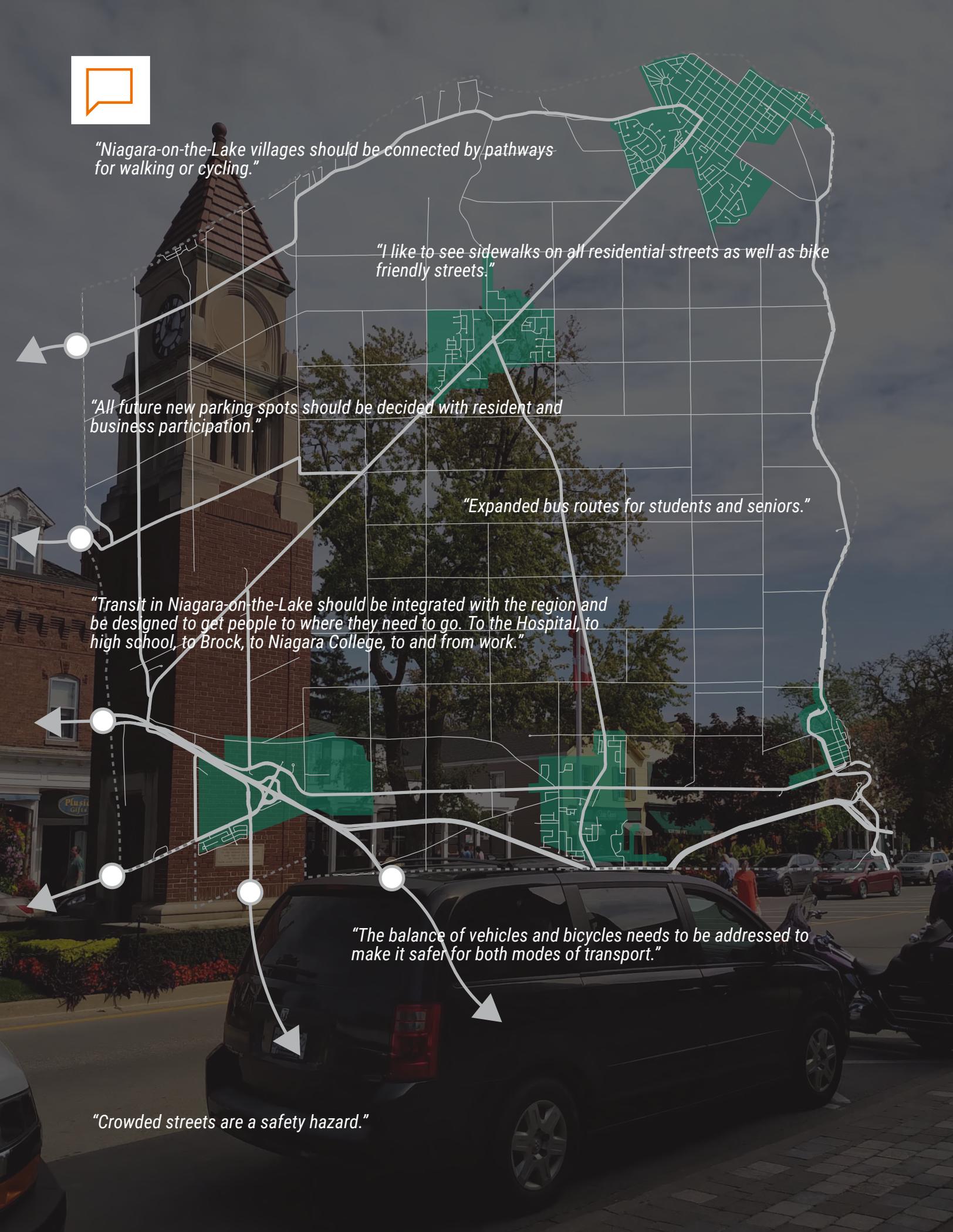
"All future new parking spots should be decided with resident and business participation."

"Expanded bus routes for students and seniors."

"Transit in Niagara-on-the-Lake should be integrated with the region and be designed to get people to where they need to go. To the Hospital, to high school, to Brock, to Niagara College, to and from work."

"The balance of vehicles and bicycles needs to be addressed to make it safer for both modes of transport."

"Crowded streets are a safety hazard."



2.5.2 PUBLIC INFORMATION CENTRES

Public Information Centre #1

During round one of public engagement, four public information centres (PICs) were held virtually through the "Join the Conversation" TMP page. The first round of PICs were held on October 27 and November 5, 2020, with two opportunities per day to participate (one during the day and one in the evening).

The purpose of the first round of public engagement was to present initial findings of the existing conditions, receive feedback on how Niagara-on-the-Lake's transportation network can be improved and to receive input on priorities and visions for Niagara-on-the-Lake.

Many themes and topics were brought up repeatedly, which helped reveal the greatest concerns from residents. Some of the key themes include:

- Network changes must respect and maintain the heritage and historic character of each unique neighbourhood.
- Active transportation safety improvements are required. In particular, cycling facilities that are physically separated from motor vehicles, access and interactions with other modes.
- Better transit service is needed to key destinations such as educational institutions, medical facilities and workplaces.
- Multi-modal transportation connections are needed throughout Niagara-on-the-Lake to get people out of their cars.
- Quality of life for Niagara-on-the-Lake's residents should be the top priority.
- Innovative parking solutions are required, such as shared parking between land uses with different demand periods or park-and-rides on the periphery to reduce traffic/parking demand in places like Queen St.
- The aging population requires transportation that meets their needs such as accessible transit and wide sidewalks.
- Considerations for innovative modes such as autonomous vehicles and on-demand transit can help solve first/

last-mile problems.

Public Information Centre #2

The second round of PICs was held on July 29, 2021, with daytime and evening meeting options through the virtual "Join the Conversation" platform. The purpose of the second round of consultation was to share the progress on the TMP and to receive public feedback on the evaluation of the transportation network and recommended solutions. A presentation was delivered by the project team and was followed by a live question and answer period.

The following comments and concerns were raised by members of the public during the second round of PICs:

- The Town should have a traffic calming policy that provides guidelines for speed limit reductions.
- Potential impact of roads on agriculture and the impact of agriculture on roads must be considered.
- Transit should be more convenient and accessible for the Niagara-on-the-Lake community.
- Motorized and non-motorized water transportation should also be included in conversations about multi-modal transportation.
- Cycling and pedestrian recommendations should be accompanied by speed limit reductions to make it safer for active transportation users.
- Safety is a top priority for the community.



3. FUTURE CONDITIONS



3. FUTURE CONDITIONS

3.1 INTERNAL GROWTH

3.1.1 FORECASTED GROWTH

Population and employment projections for the Town were retrieved from Niagara Region Municipal Comprehensive Review (MCR), completed for Niagara Region in 2018 and subsequently updated in 2019. In terms of historical growth, the population of Niagara-on-the-Lake increased by 2,900 between 2006 and 2016, which represents a 1.8% annual growth rate; higher than all other municipalities within Niagara Region. With respect to forecasted growth, according to the Regional MCR the Town of Niagara-on-the-Lake is forecasted to undergo an increase in population by 2041, which would yield a population of around 26,580 (8,610 new residents over existing levels) and an annual growth of 1.6% per year as shown in **Table 3.1**. Growth in population is also anticipated to be accompanied by employment growth at an annual growth rate of 0.8% per year which results in 3,010 new jobs by 2041 (see **Table 3.1**). This increase in employment will result in an increased travel demand both locally and across the region. The demands on the multi-modal transportation network will be heavily influenced by how these future developments are built in relation to transportation options. As new developments are built within the Town and increased volumes of traffic get added onto the transportation network, demand for roadway capacity as well as active transportation and transit will increase.

Table 3.1: Town Forecasted Population and Employment Growth (2016-2041)

	2016	2031	2041	Growth	%Annual Growth (2016-2031)
Population	17,950	23,240	26,580	8,630	1.6%
Employment	13,020	14,610	16,030	3,010	0.8%

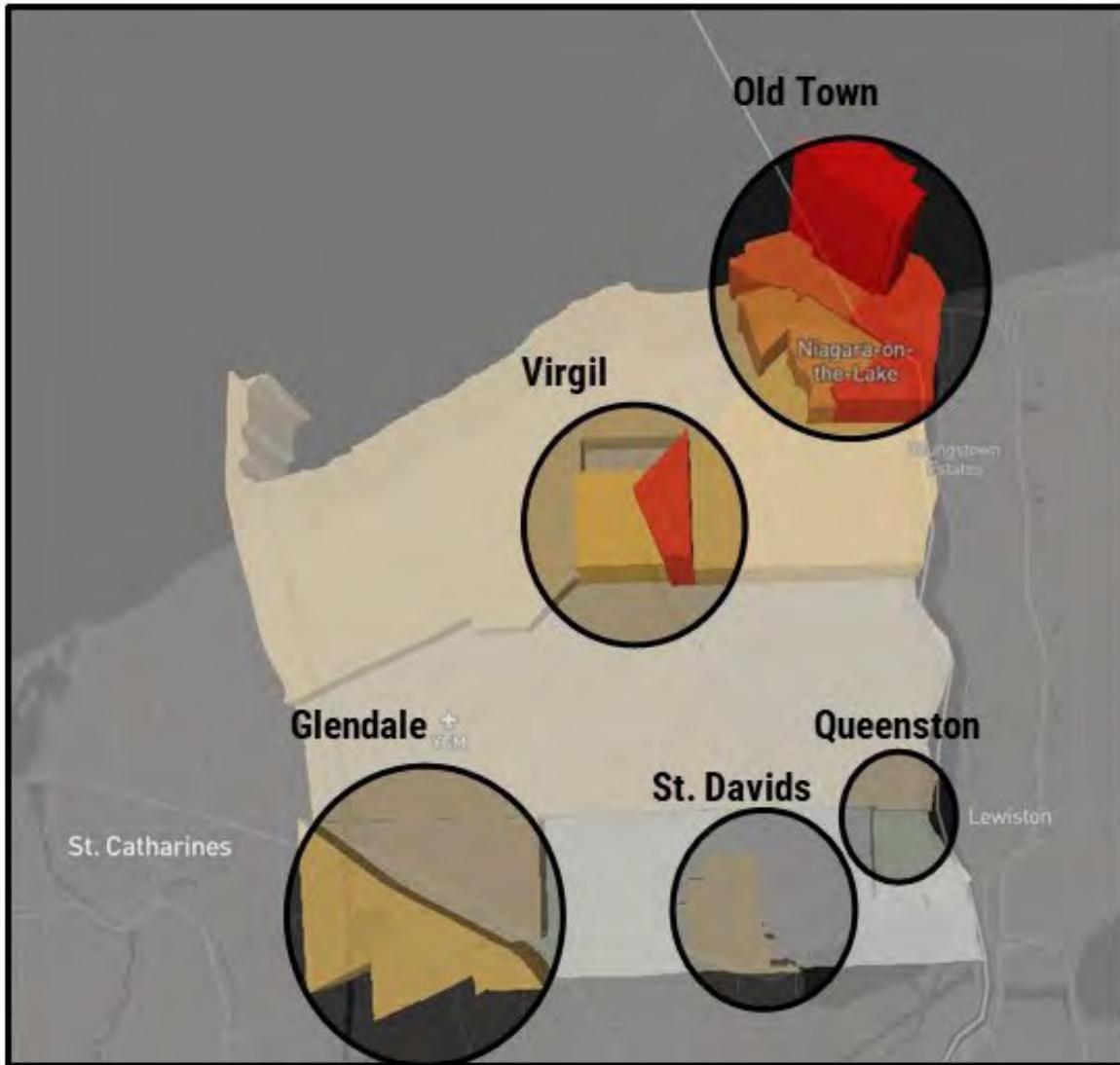
Source: Niagara Region Municipal Comprehensive Review, 2018

Table 3.2: Forecasted New Residential Housing Units by Dwelling Type (2018-2038)

	Singles and Semis	Multiple Dwelling	Apartments	Other	Total
2023-2028	456	217	82	0	755
2028-2038	814	676	216	0	1,706
Total	1,783	1,118	363	0	3,264
%	55%	34%	11%	0%	---

Source: Development Charges Background Study, 2018

Figure 3.1: Key growth areas: Old Town, Virgil, Glendale, St. Davids, Queenston



3.1.2 GROWTH AREAS

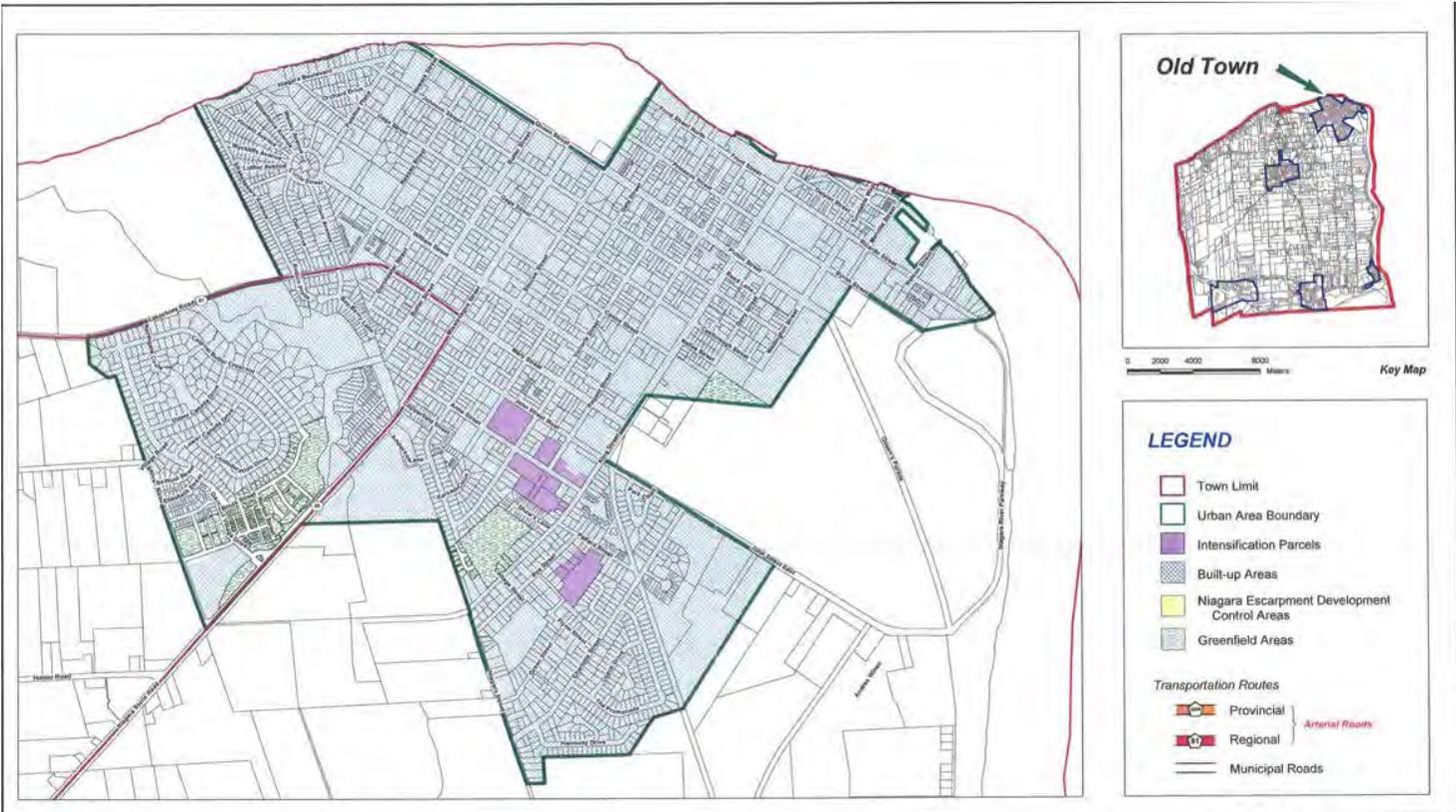
The Town's Official Plan (2017) identified areas in the communities of Old Town, Virgil and Glendale that could accommodate growth – as shown in **Figure 3.2**, **Figure 3.3** and **Figure 3.4**. Additionally, the remaining urbanized communities, St. Davids and Queenston, will be considered as focused areas for growth.

A significant amount of the new growth is expected to occur in Glendale, which is planned to accommodate high density, mixed-use urban growth according to the Region's Glendale District Plan (2020). The 700 ha study area of the Glendale District, bisected by the QEW, is expected to bring a total of 15,000 residents and 7,500 jobs at full build-out, which is expected to occur beyond the 2041 planning horizon. For the transportation analysis involved in this TMP, 11,875 residents and 6,096 jobs have been incorporated at the 2041 horizon, representing 79% of the total residents and 81% of the total jobs anticipated at build-out. The land use concept of the Region's Glendale District Plan (2020) is shown in **Figure 3.4**.

This work is reinforced by way of the Niagara Region Municipal Comprehensive Review (2018 and updated in 2019), which provided distribution of forecasted population and employment growth by land-use based categories. These distributions are provided in **section 3.4**.

Figure 3.2:
Planned Urban
Structure- Old
Town

Source: Town
of Niagara-
on-the-Lake
Official Plan
Schedule
'11' Growth
Management



0 2000 4000 6000 Meters **Key Map**

LEGEND

- Town Limit
- Urban Area Boundary
- Intensification Parcels
- Built-up Areas
- Niagara Escarpment Development Control Areas
- Greenfield Areas

Transportation Routes

- Provincial } *Arterial Roads*
- Regional }
- Municipal Roads

Note: These figures are the most current as of the timing of the TMP, however, they are subject to an update alongside the timing of new growth plan schedules.

Gary Burroughs
Lord Mayor
Gary Burroughs

Holly Dowd
Town Clerk
Holly Dowd

0 112.5 225 450 Meters

OFFICIAL PLAN AMENDMENT #43	
By-Law 4414-10	
Schedule I - 1	
Date:	July 26, 2010

Figure 3.3:
Planned
Urban
Structure-
Virgil

Source: Town
of Niagara-
on-the-Lake
Official Plan
Schedule
'11' Growth
Management



0 2000 4000 6000 Meters **Key Map**

LEGEND

- Town Limit
- Urban Area Boundary
- Intensification Parcels
- Built-up Areas
- Niagara Escarpment Development Control Areas
- Greenfield Areas

Transportation Routes

- Provincial } *Arterial Roads*
- Regional }
- Municipal Roads

Note: These figures are the most current as of the timing of the TMP, however, they are subject to an update alongside the timing of new growth plan schedules.

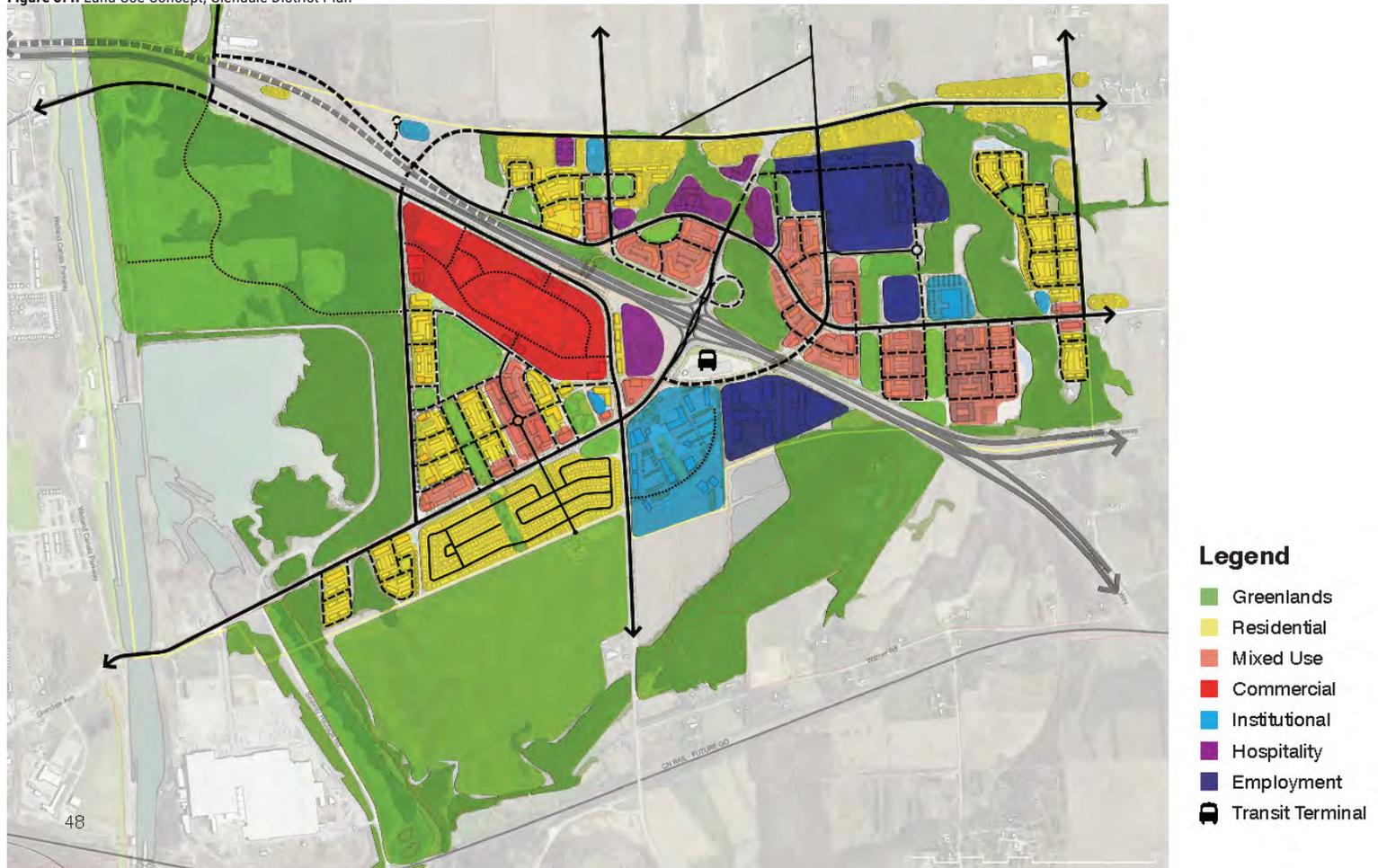
Gary Burroughs
Lord Mayor
Gary Burroughs

Holly Dowd
Town Clerk
Holly Dowd

0 100 200 400 Meters

OFFICIAL PLAN AMENDMENT #43	
By-Law 4414-10	
Schedule I - 2	
Date:	July 26, 2010

Figure 3.4: Land Use Concept, Glendale District Plan



3.2 EXTERNAL GROWTH

3.2.1 HISTORICAL GROWTH

Historically, the population in the ten-year period between 2006 and 2016, most municipalities within Niagara Region saw various levels of growth in population, apart from Port Colborne and the Township of Wainfleet with annual growth rates of -2.3% and -0.4% respectively. The population of Niagara-on-the-Lake saw the largest increase by 2,900 between 2006 and 2016, which represents a 1.8% annual growth rate. Overall Niagara-on-the-Lake has experienced growth that is higher than the provincial average. **Table 3.3** shows the historic growth in population across the region between 2006 and 2016.

Table 3.3: Niagara Region Historical Population Growth Comparison

Municipality	2006	2011	2016	Annual Growth
Town of Niagara-On-The-Lake	14,600	15,400	17,500	1.8%
City of St. Catharines	132,000	131,400	133,100	0.1%
Town of Lincoln	21,700	22,500	23,800	0.9%
Town of West Lincoln	13,200	13,800	14,500	1.0%
Town of Grimsby	23,900	25,300	27,300	1.3%
Town of Pelham	16,200	16,600	17,100	0.6%
City of Thorold	18,200	17,900	18,800	0.3%
City of Niagara Falls	82,200	83,000	88,100	0.7%
City of Welland	50,300	50,600	52,300	0.4%
Town of Fort Erie	29,900	30,000	30,700	0.3%
City of Port Colborne	2,000	1,400	1,600	-2.3%
Township of Wainfleet	6,600	6,400	6,400	-0.4%
Total	410,800	414,300	431,200	-
Ontario	12,160,300	12,851,800	13,448,500	1.0%

3.2.2 FORECASTED GROWTH

According to the Regional MCR the entire Region is forecasted to undergo an increase in population of 162,122 new residents by 2041, resulting in an annual average growth rate of 1.4%. All municipal growth rates across the Region are shown in **Table 3.4**. Furthermore, **Figure 3.5** illustrates that the Niagara-on-the-Lake population is anticipated to increase at a lower rate than the Region overall.

Additionally, employment growth is anticipated across the Region, with an addition of 74,070 jobs across the Region (see **Table 3.4**). Higher employment will be correlated with higher demand across the multi-modal transportation network. The annual growth in Niagara-on-the-Lake appears to be slightly less than other municipalities in the Region.

Figure 3.5: Growth Projections for Niagara Region and Niagara-on-the-Lake, 2016-2041

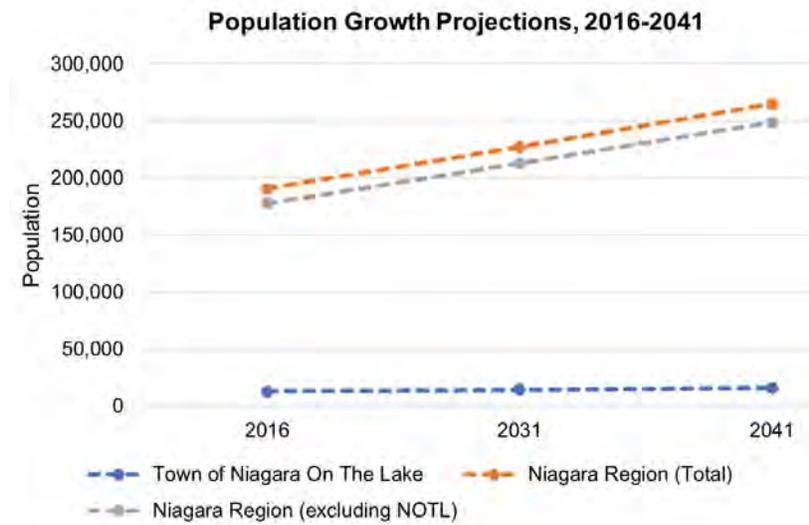


Table 3.4: Niagara Region Forecasted Population Growth (2016-2041)

Municipality	Population					Employment				
	2016	2031	2041	Growth	% Annual Growth	2016	2031	2041	Growth	% Annual Growth
Town of Niagara On The Lake	17,970	23,240	26,580	8,610	1.6%	13,020	14,610	16,030	3,010	0.8%
City of St. Catharines	136,620	150,910	168,010	31,390	0.8%	62,120	70,550	80,240	18,120	1.0%
Town of Lincoln	24,410	28,280	31,860	7,450	1.1%	11,070	12,780	14,600	3,530	1.1%
Town of West Lincoln	14,880	21,920	28,690	13,810	2.7%	4,350	6,640	9,560	5,210	3.2%
Town of Grimsby	28,030	33,420	37,050	9,020	1.1%	9,790	12,280	14,630	4,840	1.6%
Town of Pelham	17,560	22,480	25,380	7,820	1.5%	4,510	5,830	6,930	2,420	1.7%
City of Thorold	19,300	25,850	28,660	9,360	1.6%	8,400	9,680	10,660	2,260	1.0%
City of Niagara Falls	90,390	111,910	125,710	35,320	1.3%	41,970	50,290	57,710	15,740	1.3%
City of Welland	53,670	59,860	65,650	11,980	0.8%	17,740	22,890	28,760	11,020	2.0%
Town of Fort Erie	31,520	38,090	43,520	12,000	1.3%	10,350	13,700	17,230	6,880	2.1%
City of Port Colborne	18,790	20,140	21,570	2,780	0.6%	6,200	6,640	7,000	800	0.5%
Township of Wainfleet	6,540	6,890	7,330	790	0.5%	1,410	1,520	1,650	240	0.6%
Total County	459,680	542,990	610,010	162,122	-	190,930	227,410	265,000	74,070	-

3.3 APPLIED GROWTH

This population and employment growth projected within the Town were disseminated across the study traffic assessment zones (TAZ), illustrated in **Figure 3.6**. For both population and employment, the Fall 2019 weekday origin-destination trip volumes from Streetlight Data constituted the main source for distributing existing and future growth to Niagara-on-the-Lake TAZs. The volume and distribution of trips were used as proxies, as they reflect where population and employment are located within the municipality.

Under existing conditions, the population was disseminated to Niagara-on-the-Lake TAZs using the average of the following two distributions:

- Number of trips originated from each TAZ during the weekday AM peak period (6-9 a.m.); and
- Number of trips destined in each TAZ during the weekday PM peak period (3-6 p.m.).

Similarly, under existing conditions, the employment in Niagara-on-the-Lake was disseminated to Niagara-on-the-Lake TAZs using the average of the following two distributions:

- Number of trips destined in each TAZ during the weekday AM peak period (6-9 a.m.); and
- Number of trips originated in each TAZ during the weekday PM peak period (3-6 p.m.).
- The population and employment growth, projected to 2041, was informed by multiple sources, including but not limited to the following documents:
- Niagara Region MCR Forecast Update and Land Needs Assessment Results (2019);
- Niagara Region MCR Phase 4 Forecast Update (2018); and
- Glendale Niagara District Plan (2020).

The above listed documents were also utilized to distribute population and employment growth in the rest of Niagara Region. External to Niagara Region, the growth rate for the Greater Golden Horseshoe based on the Greater Golden Horseshoe Growth Outlook Report (2020) was used.

The population growth within Niagara-on-the-Lake was divided into the following two (2) land-use based categories:

- Built Up Area – 40% of future population growth in Niagara-on-the-Lake; and
- Designated Greenfield Area (DGA) – 60% of future population growth in Niagara-on-the-Lake.

Notably, the population growth in the built up and the DGA areas are only distributed to the southern end of Old Town, Virgil and Glendale.

The employment growth in Niagara-on-the-Lake was allocated to the following three (3) land-use based categories:

- Population-related – 61% of future employment growth in Niagara-on-the-Lake;
- Employment Land – 9% of future employment growth in Niagara-on-the-Lake; and
- Rural Area – 30% of future employment growth in Niagara-on-the-Lake.

Employment growth in population-related industries and in rural areas are distributed in the same proportions as existing employment. The employment growth in Employment Lands is assigned entirely to Glendale.

Residential and employment growth estimates for each TAZ are provided in **Table 3.5**; the table also includes the associated annual growth rates that will be used for the transportation analyses in subsequent sections. The results of this distribution show that within Niagara-on-the-Lake, the community of Glendale (i.e. TAZ 8 and 9), anchored by the proposed developments from the Glendale District Plan, is expected to experience the greatest population (+6,300) and employment growth (+1,240). The community of Virgil is also anticipated to experience considerable population growth (+1,622), with noticeable greenfield areas in the western part of the community that are expected to be developed by the 2041 horizon. Outside of Glendale, the employment growth is quite evenly-distributed across both urban and rural areas of the municipality, ranging from an annual growth rate of 0.7% to 0.9%.

Table 3.5: Distribution of Population and Employment Growth by TAZ

TAZ	Population			Employment		
	Land Use Base Year	Total Growth	Annual Growth % Applied	Land Use Base Year	Total Growth	Annual Growth % Applied
	2016	2016-2041	2019-2041	2016	2016-2041	2019-2041
1: Old Town	837	402	0.20%	469	108	0.16%
2: Old Town	631	303	0.15%	336	78	0.11%
3: Old Town	691	332	0.17%	632	146	0.21%
4: Old Town	875	421	0.21%	344	80	0.11%
5: Virgil	888	427	0.21%	552	127	0.18%
6: Virgil	980	471	0.24%	715	165	0.24%
7: Virgil	404	194	0.10%	264	61	0.09%
8: Glendale	1774	853	0.43%	1774	410	0.59%
9: Glendale	3801	1828	0.92%	3082	712	1.03%
10: St. Davids	1140	548	0.28%	754	174	0.25%
11: Queenston	318	153	0.08%	85	20	0.03%
12: Rural	590	283	0.14%	278	64	0.09%
13: Rural	612	294	0.15%	330	76	0.11%
14: Rural	2147	1032	0.52%	2040	471	0.68%
15: Rural	577	277	0.14%	233	54	0.08%
16: Rural	804	387	0.19%	683	158	0.23%
17: Rural	327	157	0.08%	157	36	0.05%
18: Queenston	392	188	0.09%	256	59	0.09%
19: Rural	165	79	0.04%	43	10	0.01%

3.4 FUTURE NETWORK OPERATIONS

3.4.1 FUTURE TRIP DISTRIBUTION

The distribution of travel demand growth to the traffic analysis zones are estimated using a doubly-constrained growth factor method, also known as the Fratar growth model. The model uses the existing baseline origin-destination travel pattern, for each of the following trip purposes, as a basis for forecasting future travel pattern as a result of the increased population and employment projections:

- Home-Based Work (HBW): Travel between home and work in either direction.
- Home-Based Other (HBO): Travel to or from home, to anywhere other than work.
- Non-Home Based (NHB): All travel not to or from home (i.e. all travel other than the two purposes above)

The methodology for developing the future origin-destination trip matrices for this analysis can be described as follows:

1. Determine the growth factors for the origin and destination trip totals. The basis of growth factors for the Niagara-on-the-Lake projection model is listed in **Table 3.7**. For example, for home-based work (HBW) trips in the weekday morning peak period, the population growth rate is used to generate the growth factor at the origin zone and the employment growth rate is used to generate the growth factor at the destination zone;
2. The generated growth factors are applied to the origin and destination trips totals;
3. Estimate the future trip matrices in an iterative process that alternates between balancing the origin totals and balancing the destination totals to the respective growth factors for each zone, using the equation on the right.

Given the impact of visitor traffic on the transportation network in Niagara-on-the-Lake – in particular during the summer season and during the weekends – origin-destination trip matrices were generated for both Summer and Fall 2019, and for both weekdays and weekends in those two seasons. A comparison of trip totals was then conducted between these datasets for the following time periods:

- AM Peak (6 a.m. to 9 a.m.)
- Mid-Day (9 a.m. to 3 p.m.)
- PM peak (3 p.m. to 6 p.m.)

The following three time periods generated the most trips that originated/destined in Niagara-on-the-Lake, and therefore were selected as governing periods to proceed with future traffic volume projections:

- Fall Weekday AM Peak Period
- Summer Weekend Mid-Day Period
- Summer Weekend PM Peak Period

The estimated 2041 origin-destination trip matrices were then developed for each of these travel periods. These matrices have been summarized by area and are exhibited in **Table 3.8** (Fall Weekday AM peak), **Table 3.9** (Summer Weekend Mid-Day), and **Table 3.10** (Summer Weekend PM Peak).

$$T_{ij} = t_{ij} \times a_i \times b_j$$

where T_{ij} = number of estimated trips between zone i and zone j

t_{ij} = number of base year trips between zone i and zone j

a_i = growth balancing factor for trips originating in zone i

b_j = growth balancing factor for trips destinating in zone j

Table 3.7: Basis of Zonal Trip Growth Factor

Trip End	Origin Zone			Destination Zone		
Periods / Purpose	HBW	HBO	NHB	HBW	HBO	NHB
Weekday AM Peak	Pop Growth	Average of Pop/Emp Growth		Emp Growth	Average of Pop/Emp Growth	
Weekend Mid Day	Average of Pop/Emp Growth			Average of Pop/Emp Growth		
Weekend PM Peak	Average of Pop/Emp Growth			Average of Pop/Emp Growth		

Table 3.8: Estimated 2041 Origin-Destination Trips – Fall Weekday AM Peak Period

Area		Destination							Total
		Old Town	Virgil	Glendale	St. Davids	Queenston	Rural	External	
Origin	Old Town	540	135	38	59	-	221	1,529	2,522
	Virgil	271	336	39	2	4	612	1,136	2,402
	Glendale	68	112	810	68	16	237	5,754	7,065
	St. Davids	32	72	57	105	-	48	739	1,053
	Queenston	44	32	23	8	9	26	582	724
	Rural	229	226	289	49	32	1,098	2,942	4,865
	External	1,727	1,326	5,663	904	586	3,502	n/a	13,707
	Total	2,912	2,238	6,919	1,195	647	5,745	12,682	32,338

Table 3.9: Estimated 2041 Origin-Destination Trips – Summer Weekend Mid-Day Period

Area		Destination							Total
		Old Town	Virgil	Glendale	St. Davids	Queenston	Rural	External	
Origin	Old Town	6,912	1,786	836	104	219	2,383	6,773	19,013
	Virgil	1,758	2,008	484	145	18	2,506	4,311	11,231
	Glendale	749	484	2,763	195	196	795	22,489	27,671
	St. Davids	192	174	135	135	9	226	2,696	3,567
	Queenston	221	-	166	32	138	270	2,673	3,499
	Rural	2,329	2,168	839	281	146	4,792	10,704	21,259
	External	8,924	5,940	24,969	3,152	2,304	13,228	n/a	58,517
	Total	21,084	12,560	30,193	4,043	3,030	24,201	49,646	144,757

Table 3.10: Estimated 2041 Origin-Destination Trips – Summer Weekend PM Peak Period

Area		Destination							Total
		Old Town	Virgil	Glendale	St. Davids	Queenston	Rural	External	
Origin	Old Town	4,101	1,322	667	133	153	1,337	4,579	12,292
	Virgil	1,180	1,213	205	73	4	1,150	2,999	6,824
	Glendale	559	278	1,368	101	34	565	11,248	14,154
	St. Davids	78	67	82	151	7	157	1,583	2,125
	Queenston	99	17	287	26	82	206	1,714	2,432
	Rural	1,400	1,411	534	214	57	3,052	6,675	13,342
	External	5,074	2,117	12,675	1,119	1,898	6,047	n/a	28,930
	Total	12,491	6,426	15,817	1,817	2,235	12,514	28,799	80,099

3.4.2 FUTURE CORRIDOR CONSTRAINTS

A future network operations analysis was completed to understand the capacity impacts if the Town continues to grow with no changes to the transportation network, known as a “Do Nothing” scenario.

The primary metric with which we assess network capacity constraints is through evaluating the volume-to-capacity (v/c) ratio which represents the amount of volume that travels along a roadway within the peak hour divided by the capacity of the roadway. The following lane capacities by road classification were assumed:

- Local: 300 vehicles per lane per hour
- Collector: 500 vehicles per lane per hour
- Arterial: 800 vehicles per lane per hour
- County: 800 vehicles per lane per hour
- Highway: 1,800 vehicles per lane per hour

The lane capacities above are based on the 2016 GTHA Emme Network Standards (2017), established by the University of Toronto Transportation Research Institute (UTTRI), and adopted by Niagara Region and other jurisdictions across the Greater Golden Horseshoes Area.

A screenline analysis was conducted to evaluate the road network performance through parallel roadway corridors locations that forms a screenline. This analysis is facilitated by comparing the sum of traffic volumes with the sum of the planning-level roadway capacity across a screenline, and then computing the associated volume-to-capacity (v/c) ratios. For the purpose of the analysis, 8 screenlines were setup to capture all major trip directions, illustrated in **Figure 3.7**.

A 10% to 28% increase in roadway volumes was noted across the screenlines between the transportation analysis base year (2019) and the 2041 horizon, which corresponds to an average increase of 0.4% to 1.1% per year. The associated existing and forecasted volume-to-capacity (v/c) ratios are provided in **Table 3.11**. A further breakdown is provided in the same table for select screenlines where one or more of the underlying locations exhibit volume-to-capacity ratios above 0.95.

At a high level, the analysis reveals that all screenlines remain within capacity in the future 2041 horizon, indicating potential to redistribute demand from busy corridors onto less busy ones. The highest volume-to-capacity ratio recorded is 0.62

Figure 3.7:
Screenlines
for Network
Performance
Analysis

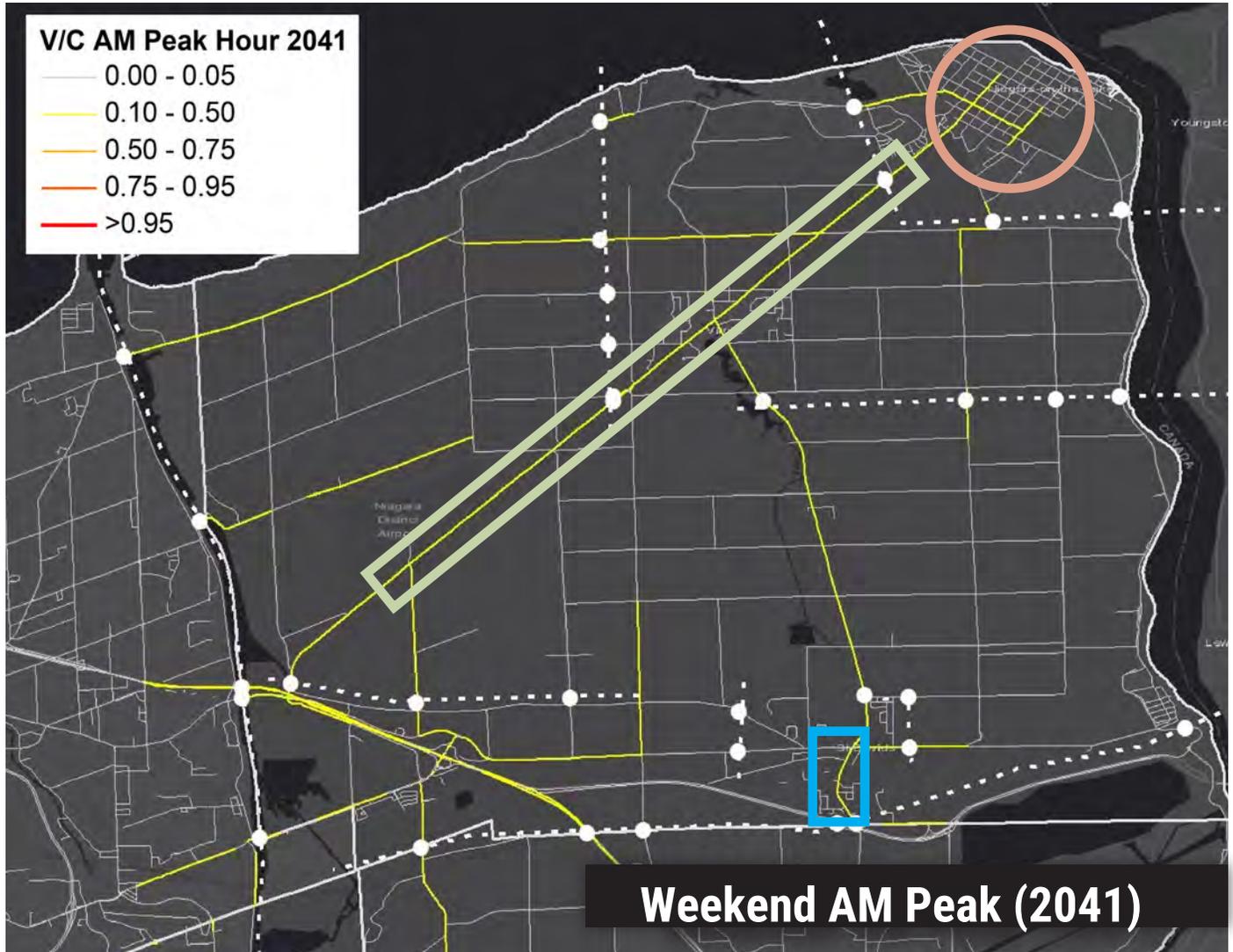


Table 3.11: Existing and Forecasted Volume-to-Capacity Ratios at Screenlines

Screenline	Existing V/C			Forecasted V/C		
	AM	Mid	PM	AM	Mid	PM
1: Just outside of Old Town	0.10	0.37	0.54	0.11	0.41	0.62
> Lakeshore Road	0.08	0.21	0.31	0.09	0.22	0.34
> Niagara Stone Road	0.23	0.94	1.32	0.26	1.08	1.55
> Niven Road	0.00	0.03	0.04	0.00	0.03	0.04
> Niagara Parkway	0.03	0.22	0.36	0.03	0.24	0.40
> Niagara Street	0.13	0.29	0.45	0.16	0.32	0.50
2: Just West of Concession 6, between Lakeshore Road and Niagara Stone Road	0.10	0.32	0.53	0.12	0.36	0.60
> Lakeshore Road	0.04	0.14	0.20	0.04	0.15	0.22
> East & West Line	0.14	0.35	0.71	0.17	0.37	0.76
> Line 1 Road	0.03	0.06	0.09	0.03	0.06	0.10
> Line 2 Road	0.03	0.22	0.36	0.03	0.24	0.40
> Line 3 Road	0.13	0.37	0.67	0.15	0.40	0.73
> Niagara Stone Road	0.27	0.79	1.33	0.32	0.90	1.56
3: Just South of Line 3	0.08	0.27	0.44	0.10	0.31	0.51
4: Just North of Queenston Rd, between Niagara Stone Road and Concession 6	0.09	0.27	0.46	0.11	0.30	0.51
> Niagara Stone Road	0.17	0.59	1.02	0.20	0.65	1.12
> Airport Road	0.08	0.28	0.40	0.10	0.31	0.45
> Concession 7 Road	0.03	0.06	0.09	0.03	0.06	0.10
> Concession 6 Road	0.10	0.12	0.23	0.11	0.13	0.25
5: Just East of Concession 5, between Queenston Road and York Road	0.03	0.18	0.24	0.04	0.22	0.30
6: Just East and North of St. Davids	0.09	0.26	0.41	0.11	0.31	0.48
7: South Town Boundary	0.07	0.20	0.33	0.08	0.23	0.37
> Taylor Road	0.14	0.35	0.71	0.17	0.37	0.76
> Queen Elizabeth Way	0.09	0.26	0.40	0.11	0.30	0.46
> Mewburn Road	0.05	0.04	0.04	0.05	0.04	0.04
> Highway 405	0.01	0.04	0.07	0.01	0.04	0.07
> Four Mile Creek Road	0.17	0.48	0.83	0.22	0.56	0.96
> Niagara Parkway	0.02	0.20	0.29	0.02	0.22	0.32
8: Welland Canal	0.11	0.33	0.57	0.12	0.36	0.62
> Lakeshore Road (Lock 1 Bridge)	0.21	0.76	1.26	0.23	0.83	1.38
> Carlton Street Bridge	0.15	0.31	0.52	0.17	0.33	0.55
> Queen Elizabeth Way	0.07	0.24	0.46	0.08	0.27	0.51
> Queenston Street (Homer Bridge)	0.30	1.06	1.73	0.33	1.14	1.85
> Glendale Avenue	0.13	0.37	0.67	0.15	0.40	0.73



Figure 3.8: Forecasted Growth Operational Analysis | Fall Weekday AM Peak Hour



across Screenline 1 – at the limits of the urban development of Old Town – and across Screenline 8 – which connects St. Catharines and Niagara-on-the-Lake – during the weekend PM peak hour.

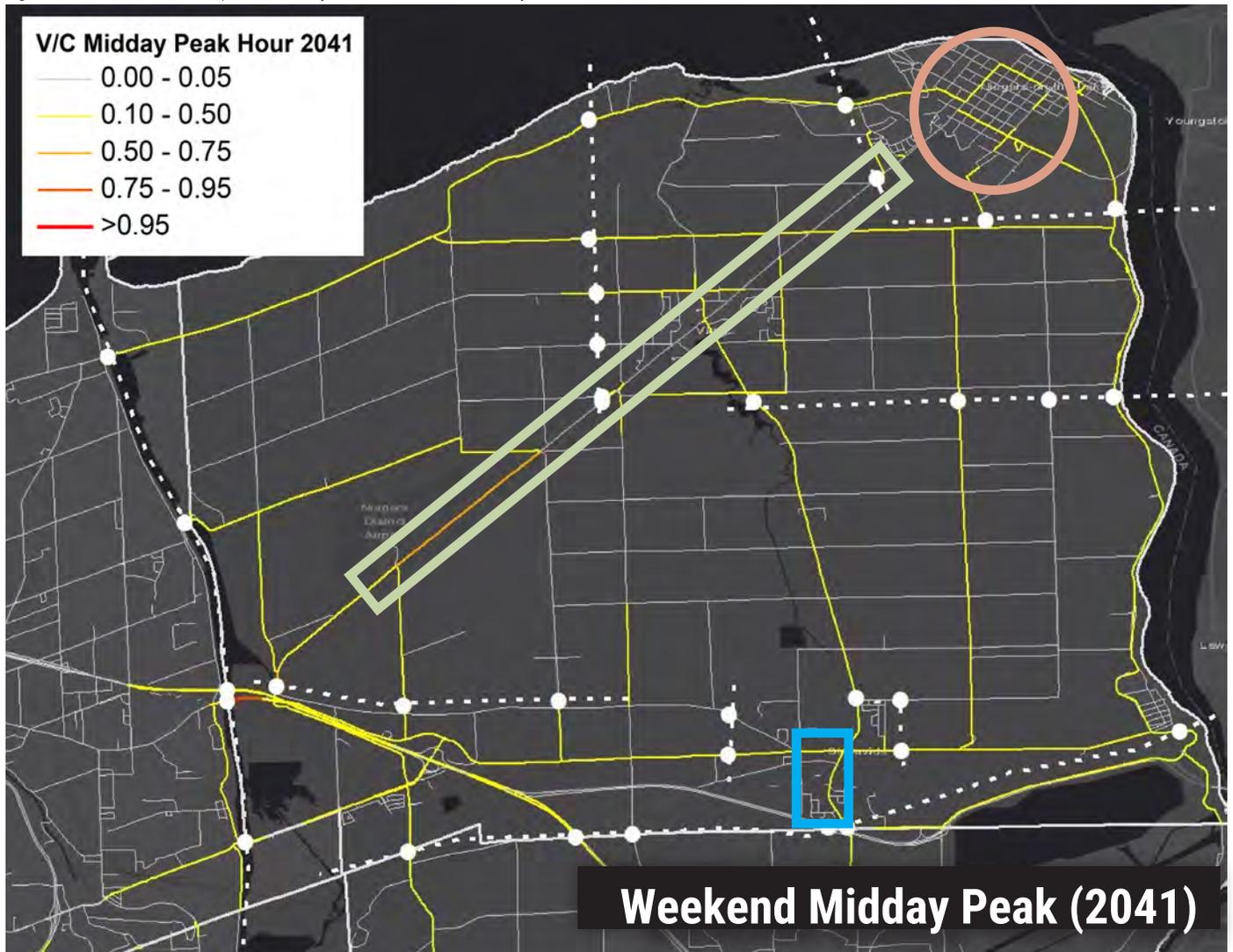
At the underlying screenline location level, it was revealed that four corridors are anticipated to experience congested traffic conditions in the 2041 horizon, with volume-to-capacity ratios exceeding 0.95:

- **Niagara Stone Road, between Old Town and Glendale:** The Niagara Stone Road connects the three biggest communities in Niagara-on-the-Lake – Old Town, Virgil and Glendale – with the Queen Elizabeth Way (QEW), and is therefore heavily used by residents and visitors of the Town. The strategic alignment of the roadway also result in traffic being funneled to it from various E-W and N-S corridors. Under the future ‘Do Nothing’ scenario, the corridor will continue to become further congested, exceeding available capacity in both the weekend PM and the weekend mid-day

peak hours. Land use also plays a role, as the planned infill and greenfield developments – including the high-density, mixed-use development at Glendale – lies along the corridor. The planned roadway, transit and active transportation improvements, along with potential traffic re-distribution measures, will be important to reduce the congestion levels in the future horizon.

- **Four Mile Creek Road, between Niagara Town Line and York Road:** The traffic conditions of Four Mile Creek Road in the community of St. Davids will deteriorate from current levels, approaching available capacity in the weekend PM peak hour. This shows that Four Mile Creek Road is increasingly supporting the developments of St. Davids, as well as being an important access roadway that connects Highway 405 with urban and rural communities further north, including Virgil and Old Town.
- **Queenston Street (Homer Bridge), across the Town’s western municipal boundary:** The Homer Bridge is one of five bridge connections between St. Catharines and

Figure 3.9: Forecasted Growth Operational Analysis | Summer Weekend Midday Peak Hour



Niagara-on-the-Lake, and one of two bridges between the two municipalities that revealed congestion issues in the 2041 horizon – the other being the Lock 1 Bridge along Lakeshore Road. The projected traffic volumes at this location exceed available capacity in both the weekend PM and the weekend mid-day peak hours. The Welland Canal plays a big role in creating traffic bottlenecks at various bridge crossings, and traffic conditions can further deteriorate during times when the bridge is lifted for larger water vessels to pass. Another factor that might contribute to the projected congestion at this location is the emerging residential, commercial, and institutional hub at the Glendale District and the projected trips generated. Homer Bridge serves as the most direct route between the Glendale District and Downtown St. Catharines, and is expected to be heavily used by road users between these two neighbourhoods.

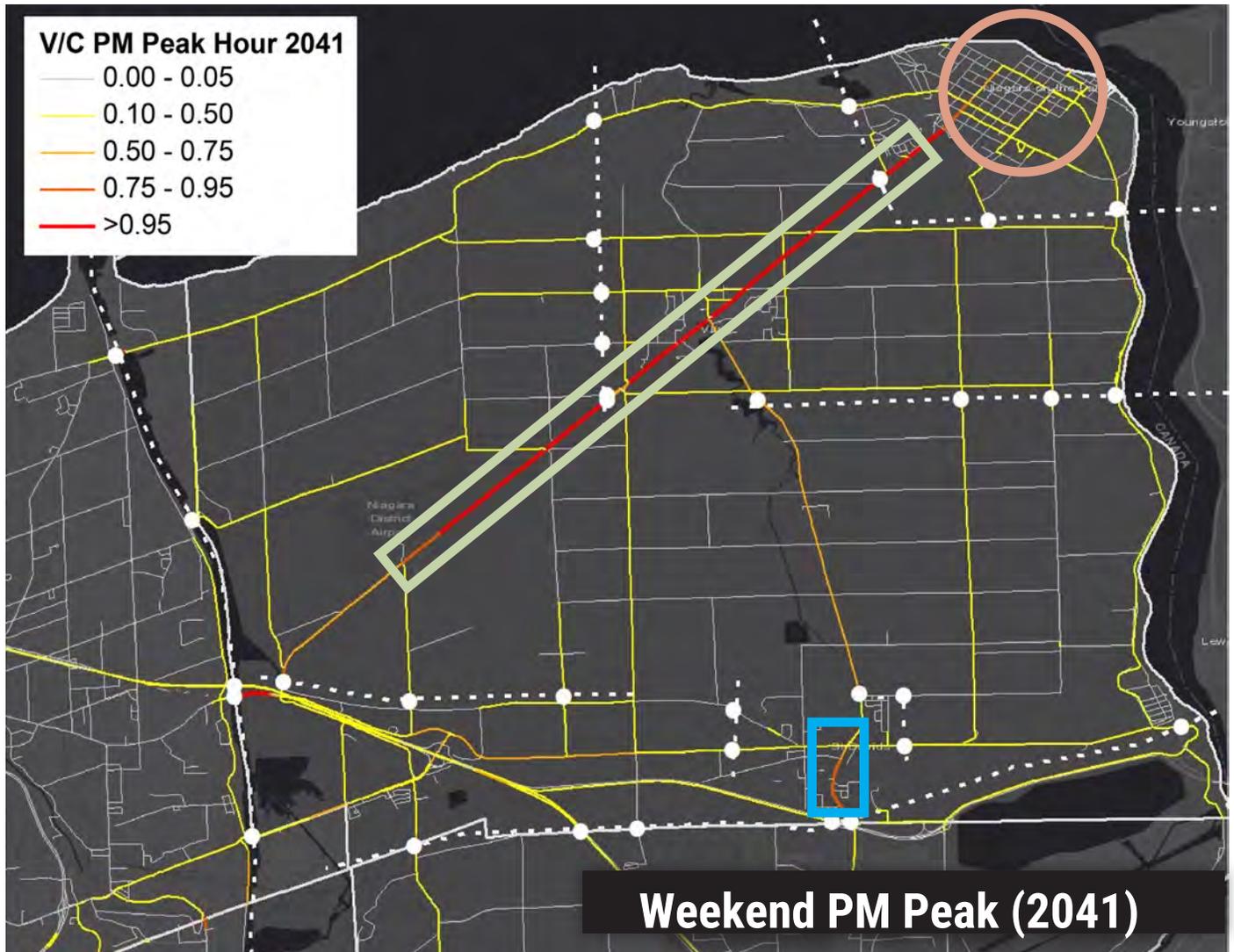
- **Lakeshore Road (Lock 1 Bridge), across the Town's western municipal boundary:** As mentioned, the Lock 1

Bridge is one of two bridge connections between St. Catharines and Niagara-on-the-Lake that showed significant traffic congestion levels in the 2041 horizon. The projected traffic volumes at this location exceed available capacity in both the weekend PM and the weekend mid-day peak hours. Similar to Homer Bridge, the Welland Canal plays a big role in congestion issues at this location, as the crossing serves as the most direct route between the northern part of St. Catharines and Old Town. Similar to Homer Bridge, traffic conditions at Lock 1 Bridge may further deteriorate during times when the bridge is lifted for larger water vessels to pass.

The operational network analysis for each peak hour is visualized in **Figure 3.8** to **Figure 3.9**.

Based on the network performance results, planned road and transit improvements, and active transportation opportunities, more detailed assessments were completed for the following focus corridors:

Figure 3.10: Forecasted Growth Operational Analysis | Summer Weekend PM Peak Hour



- **Niagara Stone Road**
- **Old Town transportation network** (including King Street, Queen Street, Mary Street, John Street, and Mississagua Street)
- **Glendale transportation network** (including York Road, Airport Road, and upgraded interchange with Queen Elizabeth Way)
- **Niagara Parkway**
- **Four Mile Creek Road**
- **Concession Road 6** and potential connection to Highway 405
- **Welland Canal bridge crossings**

3.4.3 FOCUS AREAS

To concentrate on the identified communities of growth, five key focus areas were selected to analyze, as illustrated in **Figure 3.11**. Notably, Old Town, Virgil and Glendale are positioned to be primary growth communities in Niagara-on-the-Lake with St. Davids and Queenston remaining significant urban communities however, they are not projected to experience substantial population or employment growth. To help set the stage for the proposed transportation network recommendations within each community, a summary of the transportation networks have been detailed below.

Old Town

Old Town, located in the northeast tip of the Town, serves as the Town's largest settlement area containing the highest population densities across the Town. Furthermore, the historic preservation, nature and attractions in the community make this a neighbourhood highly frequented by visitors. As such, Old Town contains a variety of residential, commercial and mixed uses.

Figure 3.11: Niagara-on-the-Lake Focus Areas of Growth



The main connection into Old Town is via Niagara Stone Road. Furthermore, Lakeshore Road (turning into Mary Street) connects Old Town with St. Catharines to the west. Similarly, Niagara Parkway connects southward to Niagara Falls. The neighbourhood centre is anchored along Picton/Queen Street between Mississagua Street and Wellington Street.

With respect to the future traffic projections, growth related to employment will be seen across the entire settlement area with population-related transportation growth largely applied in the southern end of the settlement area, south of Mary Street.

Virgil

Virgil is located to the southwest of Old Town, centered around Niagara Stone Road. Commercial activity is located along Niagara Stone Road with more low-density residential and industrial uses surrounding it. The placement of a forest area cuts across Virgil resulting in two segments of the settlement area. Virgil represents the second largest settlement area in the Town after Old Town and is anticipated to see continued growth into the future. Virgil may be accessed via Niagara Stone Road or Four Mile Creek Road.

Both population and employment related traffic growth will be observed in Virgil as summarized in **Section 3.3** Furthermore, the congestion observed along Niagara Stone Road, poses constraints into the future as the community densifies.

Glendale

Glendale serves as the main gateway into Niagara-on-the-Lake with connection to the Queen Elizabeth Way highway interchange. Queenston Road and Airport Road also serve as primary connections into Glendale within Niagara-on-the-Lake. The settlement area has seen recent commercial and residential growth as a result of the opening of the Outlet Collection at Niagara in 2014, as well as expanded course offerings at Niagara College. The land surrounding the outlet mall is planned for future industrial and residential development and is anticipated to be one of the major growth areas for the community into the future. The Glendale District Plan, a Class Environmental Assessment, was completed in 2019 and provides a blueprint to direct this growth. Furthermore, the Ministry of Transportation for Ontario (MTO) completed a Class Environmental Assessment for interchange improvements at the Queen Elizabeth Way and Glendale Avenue resulting in a preferred recommendation to implement a Diverging Diamond Interchange (DDI) along with a realignment of the ramps to interline directly with Airport Road.

With respect to projected employment and residential growth, the Glendale community has the largest percentage of growth applied within the capacity analyses to account for the planned development in the area.

Queenston

Queenston is located at the southeast corner of Niagara-on-the-Lake, bordering Niagara Falls, and is made up of primarily low-density residential uses. Situated adjacent to the Niagara River, Queenston serves as a popular location for launching boat tours resulting in an influx of tourists and large buses passing through the community. Queenston can be accessed off of Highway 405 located just south of the settlement area. Additionally, within the Town, York Road and Niagara Parkway provide access into the community.

Based on the official plan, Queenston is not anticipated to see significant population or employment growth and as such has been applied marginal growth in the future transportation scenarios.

St. Davids

St. Davids, similar to Queenston is primarily made up of low-density residential uses, situated in the south end of Niagara-on-the-Lake. St. Davids can be accessed via Highway 405 as well as York Road and Four Mile Creek Road within the Town.

St. Davids is expected to experience some future residential and employment growth on its southern fringes, adjacent to Provincial Highway 405. Similar to Queenston, marginal growth in the future transportation scenarios have been applied.

3.4.4 POTENTIAL MODE SPLITS

Although much of our work is technical in nature, and often requires looking at historical trends for an explanation of the present; there are also qualitative and human factors among several other considerations that represent the proverbial ‘Tomorrow’ we are heading toward. Within this vein, although the future is a continually moving target, it is also one that we must attempt to account for through our analysis; and one which is intimately connected to Niagara-on-the-Lake’s local context and existing mode splits. With the advent of autonomous vehicles and smart mobility solutions ‘Tomorrow’ has never had a more nebulous definition. A tomorrow that Niagara-on-the-Lake as a Town is challenged to address as the ways in which people interact with transportation will change. New ridesharing solutions such as Uber and Lyft are being introduced around North America, and locally in Niagara Region to service gaps in the transportation network, and new and emerging smart mobility solutions such as autonomous vehicles, micro-transit, e-scooters, and bike-shares are presenting new and creative ways to accommodate growth in ways that mitigate the need for continual roadway expansion.

In addition, Niagara-on-the-Lake’s increasing reputation as a premier tourist destination in Ontario has created seasonal strain on the transportation network. Future mode splits will

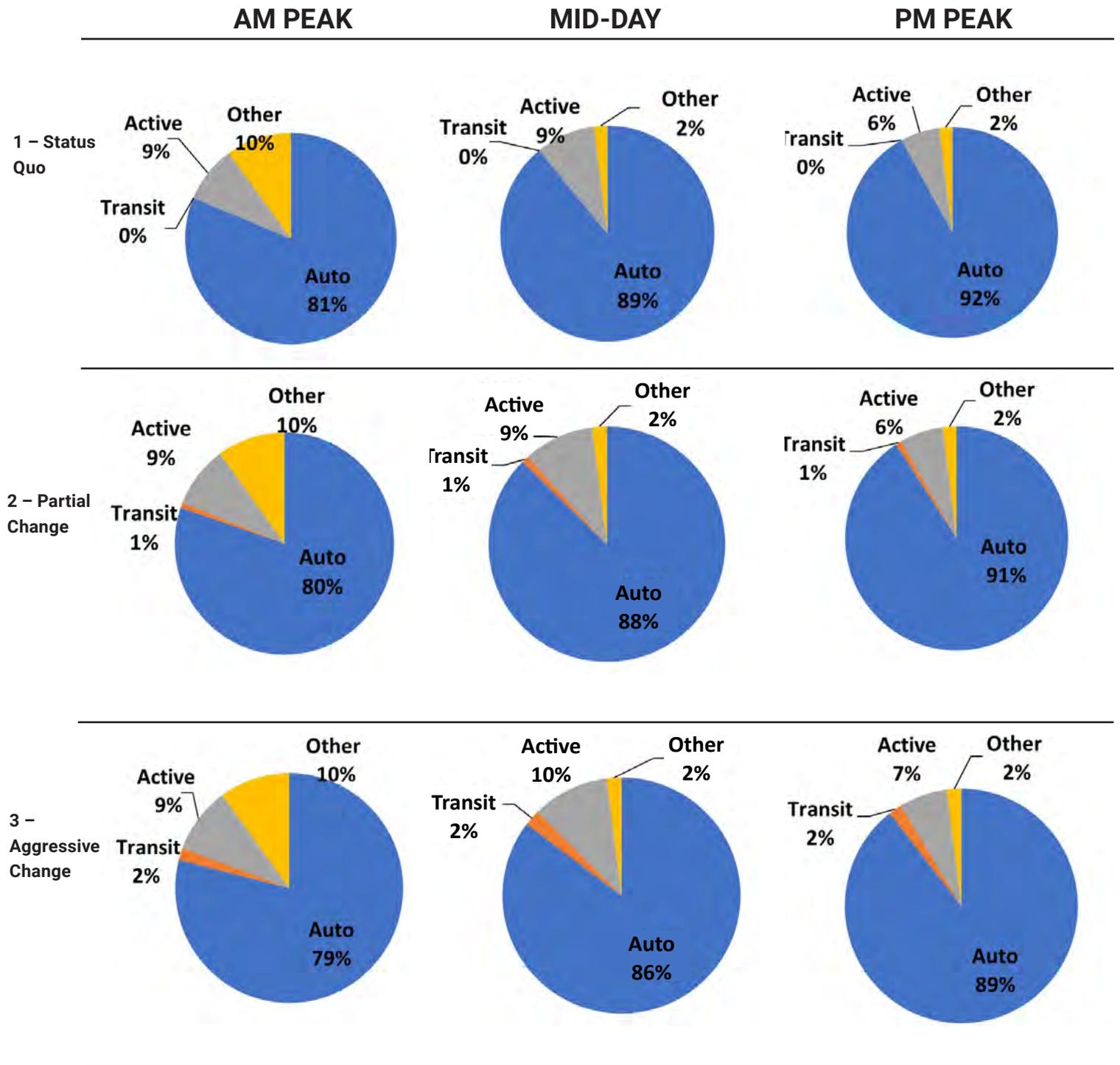
be greatly impacted by tourism trends, and influenced by actions that the Town takes to limit vehicle trips where possible. It is recognized that even into the future, the majority of tourist trips into Niagara-on-the-Lake will be made using their private vehicles. However, strategies and policies outlined in this TMP provide methods to replace tourist vehicle trips within the Town with active transportation or transit trips, leaving their vehicles in locations with available parking supply. We recognize that not all tourists, nor local residents even, will have the ability or desire to change modes to either active transportation or transit. Our goal is to make these alternatives as attractive as possible from a connectivity, safety and functionality perspective to encourage their use among potential future users. Removing any physical or perceived barriers is a key element towards inspiring modal shifts towards more sustainable solutions.

The future is difficult to predict entirely. As a result, it is important to compare a few scenarios so that the transportation network can be planned in a flexible manner that can pivot with changing demands over time. It also means planning for traditional transportation solutions as well, such as transit and active modes including pedestrians and cyclists. For this reason, we’ve identified three mode split scenarios that range from the status quo to a more aggressive (but achievable) mode split that would shift a considerable amount of people away from their vehicles and onto alternative modes of transportation. These scenarios were developed based on existing travel demand information that considers existing mode share, trip purposes, trip distance, and the planned future land uses and vision that are identified in Niagara-on-the-Lake’s Official Plan.

Table 3.12 illustrates the mode split scenarios- status quo, partial change, and aggressive change- for future operational analysis while considering three periods, AM Peak, Mid-Day, and PM Peak. Status quo maintains the existing mode splits as they are. The partial change scenario partially shifts auto drivers onto active transportation and micro-mobility for trips under 3 km, and transit for trips under 6km at a rate of 1% per year until 2041. The aggressive change scenario strives for a greater mode split change and shifts auto drivers onto active transportation and micro-mobility for trips under 3 km, and transit for trips under 6km at a rate of 2% per year until 2041. With regards to trip volumes, it is apparent that that mode share is based on the time of day.

Regardless of the scenario, the share of active modes is higher in the AM Peak and Mid-day periods, compared to the PM Peak period. Also, the share of other modes is significantly higher during the AM Peak period compared to Mid-day and PM Peak periods. The mode split in the AM Peak period and for the aggressive change scenario models a mode split of 79% of trips for auto, 10% for other, 9% for active, and 2% in favour of transit. Compared to the status quo scenario, the auto share is reduced by 2% that is

Table 3.12: Mode split scenarios for future (2041) operational analysis



dedicated for transit. The mode split in the Mid-day period and for the aggressive change scenario results in a mode split of 85% for auto, 2% for other, 10% for active, and 2% for transit. Compared to the status quo scenario, the auto share is reduced by 4% that is distributed on transit and active modes. Finally, the mode split in the PM Peak period and for the aggressive change scenario models a mode split of 89% of trips for auto, 2% for other, 7% for active, and 2% for transit. Compared to the status quo scenario, the auto share is reduced by 3% in favour of transit and active modes.

3.4.5 RECOMMENDED MODE SPLIT TARGETS

In the AM Peak period, transit trips would be 0, 4,979, 11,108 in the status quo, partial change and aggressive change scenarios, respectively, illustrating the modal shift impact under each scenario. In the AM Peak period, active transportation trips would increase by 1,883 and 4,202 in the partial and aggressive change scenarios, respectively, compared to the status quo scenario. Transit and active transportation trips in the aggressive change scenario are more than double the trips of the partial change scenario. To capitalize on the proposed developments that promote active transportation and transit mode and mitigate congestion on roadways, the aggressive mode change scenario is recommended. Based on **Table 3.12** of potential mode split scenarios for future operational analysis, the aggressive change scenario will result in an increase in the transit and active transportation mode share that is achievable and would improve the performance of the transportation network.

In the AM Peak, Mid-Day, and PM Peak time periods under the aggressive change scenario, the use of vehicles would be reduced by 2%, 4%, and 3%, respectively, compared to the status quo scenario. While this reduction in vehicular trips appears marginal, in reality these changes represent a substantial number of shifted trips. For instance, the 2% reduction in the auto mode share in the AM peak hour represents 15,310 vehicular trips. This reduction in vehicle trips is distributed onto active (4,202 trips) and public transit (11,108) modes. The 4% reduction in vehicular use in the Mid-Day peak hour represents 105,344 vehicular trips. This reduction in vehicle trips is distributed onto active (33,214 trips) and public transit (72,130 trips) modes. Finally, the 3% reduction in vehicular use in the PM peak hour represents a reduction of 64,914 vehicular trips. This reduction in vehicle trips is distributed onto active (17,609 trips) and public transit

(47,305) modes. It is worth mentioning that there are no transit trips in the AM Peak, Mid-Day, and PM Peak periods under the status quo scenario. This indicates that a significant uptake of transit would take place when the aggressive change scenario is applied. To conclude, the shift to transit and active transportation mode aims to alleviate congestion on critical corridors and improve the network performance.

3.5 PLANNED IMPROVEMENTS

3.5.1 ROAD IMPROVEMENTS

The Niagara Regional TMP, Niagara 2041 How We Go, outlines a number of roadway improvements broken down by different phasing periods aimed at increasing the existing roadway capacity to accommodate growth to 2041. Additionally, the previous Niagara-on-the-Lake TMP completed in 2004 identified relevant roadway improvements. While a number of improvements were scheduled to have already occurred, they have yet to be completed and are therefore still documented. Furthermore, any superseded improvements in the 2004 TMP that have been mentioned in the Niagara Regional TMP have been omitted. The improvements have been broken down into capital projects, additional projects and intersection improvements as summarized in **Table 3.13**.

3.5.2 ACTIVE TRANSPORTATION IMPROVEMENTS

The Niagara Regional TMP, outlines a strategic active transportation network for the entire Region, identifying infill corridors to build a connected network. Several facility types have been proposed throughout Niagara-on-the-Lake which will close current network gaps and provide stronger connections throughout the regional network. Additionally, these noted improvements have been supplemented with outstanding improvements from the previous Niagara-on-the-Lake TMP completed in 2004. The proposed improvements are summarized in **Table 3.14** with the whole Regional Strategic Cycling Network visualized in **Figure 3.12**.

Table 3.13: Planned Roadway Improvements

Corridor	Section	Improvement Type	Phasing	Source
Capital Projects				
Niagara Stone Rd	Concession 6 Rd to Line 2	Capacity	2017-2021	Niagara TMP
Niagara Stone Rd	Penner St (Line 1 Rd) to East and West Line	Capacity	2017-2021	Niagara TMP
Glendale Ave	Interchange at QEW (1/3 contribution)	Capacity	2022-2031	Niagara TMP
Concession 5 Rd	Walker Rd to Line 3 Rd	Road Extension	2015-2024	TMP (2004)
Concession 6 Rd	Niagara Stone Rd to East and West Line	Capacity	2015-2024	TMP (2004)
Concession 4 Rd	Niagara Stone Rd to Line 2 Rd	Capacity	2015-2024	TMP (2004)
Line 1 Rd	Concession 6 Rd to Concession 4 Rd	Capacity	2015-2024	TMP (2004)
Townline Rd	Line 3 Rd to East and West Line	Capacity	2015-2024	TMP (2004)
Line 3 Rd	Four Mile Creek Rd to Concession 3 Rd	Capacity	2010-2014	TMP (2004)
Concession 3 Rd	Line 3 Rd to East and West Line	Capacity	2010-2014	TMP (2004)
King St	Paffard St to Cottage St	Capacity	2010-2014	TMP (2004)
Cottage St	King St to Rye St	Capacity	2010-2014	TMP (2004)
Rye St	Niagara St to Cottage St	Capacity	2010-2014	TMP (2004)
Line 3 Rd	Townline Rd to Four Mile Creek Rd	Capacity	2004-2009	TMP (2004)
Queen's Parade	Wellington St to Otter Trail Crossing	Geometric Improvements	2004-2009	TMP (2004)
Carlton St	St. Catharine's Municipal Boundary to Townline Rd	Capacity	2004-2010	TMP (2004)
Townline Rd	Carlton St to Line 3 Rd	Capacity	2004-2010	TMP (2004)
Additional Projects				
Niagara Stone Rd	Airport Road to Conc. 6	Capacity	2022-2031	Niagara TMP
Glendale Ave	York Rd to Queenston Rd	New Road	2032-2041	Niagara TMP
Airport Road	Niagara Stone Rd to York Rd	Capacity	2022-2031	Niagara TMP
Intersection Improvements				
Four Mile Creek Rd @ York Rd	-	Signalization	2015-2024	TMP (2004)
Four Mile Creek Rd @ Warner Rd	-	NB left turn storage lane	2015-2024	TMP (2004)
Tankbark Rd @ York Rd	-	Signalization	2015-2024	TMP (2004)
Four Mile Creek Rd @ Line 3 Rd	-	Signalization	2010-2014	TMP (2004)
Concession 3 Rd @ Line 3 Rd	-	Signalization	2010-2014	TMP (2004)
Concession 3 Rd @ East and West Line	-	Signalization	2010-2014	TMP (2004)
Lakeshore Rd @ East and West Line	-	Intersection Improvement	2010-2014	TMP (2004)
Niagara Stone Rd @ York Rd/ Taylor Rd	-	Intersection Improvement	2004-2009	TMP (2004)
Niagara Stone Rd @ Concession 7 Rd	-	Intersection Improvement	2004-2010	TMP (2004)
Line 3 Rd @ Niagara Stone Rd	-	Signalization	2004-2010	TMP (2004)
Stewart Rd @ Church Rd	-	Intersection Improvement	2004-2010	TMP (2004)
East and West Line @ Niagara River Parkway	-	Signalization	2004-2011	TMP (2004)

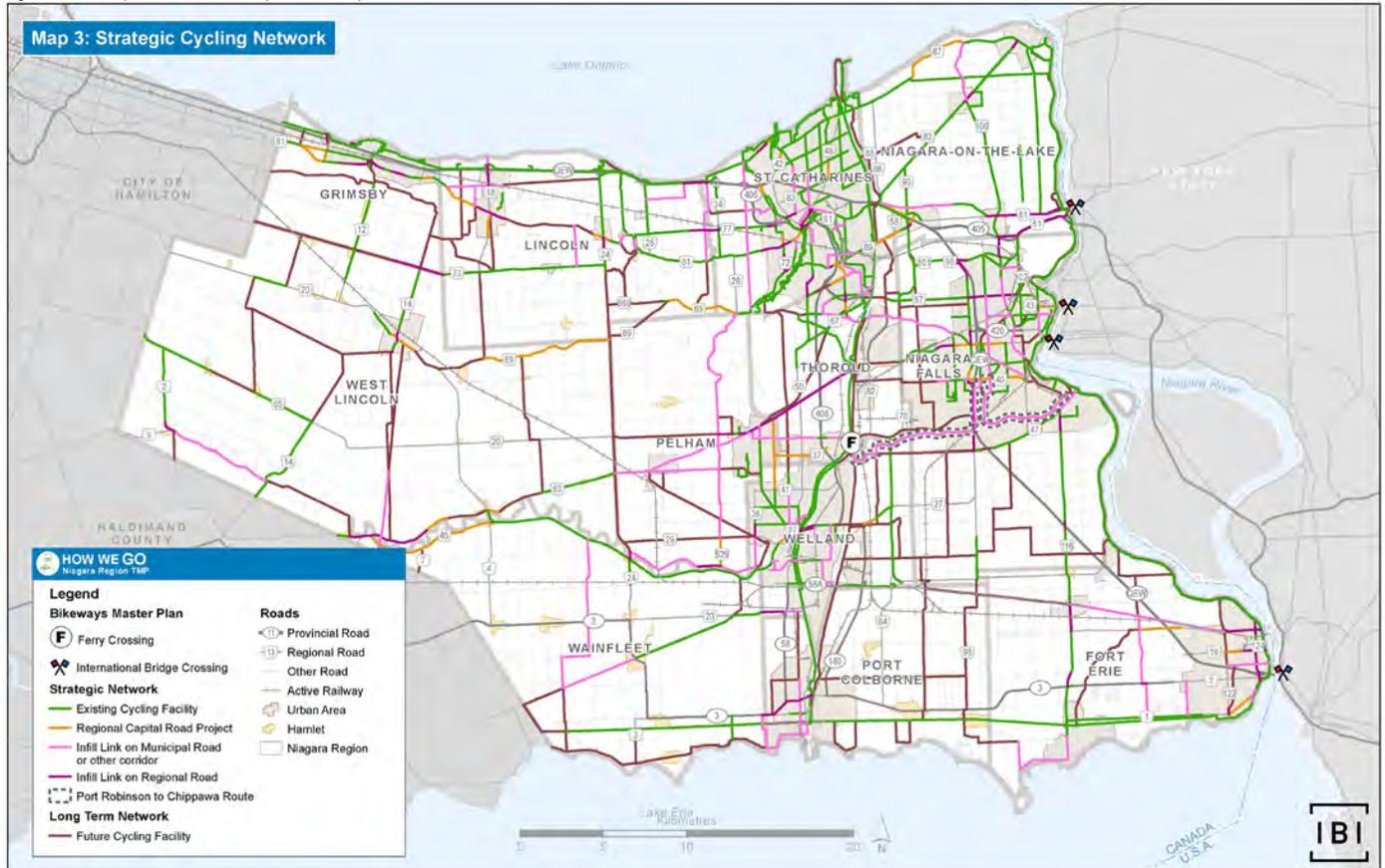
Source: Niagara TMP, (Niagara Region, 2017) Niagara-on-the-Lake TMP, (Town of Niagara-on-the-Lake, 2004)

Table 3.14: Proposed Active Transportation Improvements

Location	Facility Type	Segment Length (km)	Source
Niagara Stone Road from Line 1 Road to South of Four Mile Creek Road	Bike Lane	0.81	Niagara TMP
Queenston Road, Niagara Stone Road to Concession 6 Road	Signed Route	4.4	Niagara TMP
Glendale Avenue, Taylor Road to Proposed Capital Project (Interchange)	Multi-use Trail	0.37	Niagara TMP
York Road, Queenston Road to Four Mile Creek Road	Multi-use Trail	0.6	Niagara TMP
Portage Road, Stamford Townline Road to Niagara Parkway	Signed Route	4.43	Niagara TMP
York Road, Four Mile Creek Road to Concession 2	Signed Route	3.85	Niagara TMP
Niagara Stone Road, Anderson Lane to Mary Street	Multi-use Trail	0.52	Niagara TMP
Four Mile Creek Road, Niagara Stone Road to Lakeshore Road	Signed Route	3.74	Niagara TMP
Niagara Street, Charlotte St to Rye St	Sidewalk	0.42	Niagara TMP (2004)
Line 3 Road, Townline Rd to Four Mile Creek Rd	Paved Shoulder	3.5	Niagara TMP (2004)
Palatine Pl, Niagara Blvd to Queen St	Sidewalk	0.3	Niagara TMP (2004)
Queen's Parade, Wellington Street to Otter Trail Crossing	Sidewalk + Pedestrian Crossing	0.36	Niagara TMP (2004)
Queen St/ Picton St @ Post Office	Pedestrian Crossing	-	Niagara TMP (2004)
Townline Rd, Carlton St to Line 3 Road	Paved Shoulder	0.85	Niagara TMP (2004)
Carlton St, St. Catharines Boundary to Townline Rd	Paved Shoulder	3.37	Niagara-on-the-Lake TMP (2004)

Source: Niagara TMP, (Niagara Region, 2017) Niagara-on-the-Lake TMP, (Town of Niagara-on-the-Lake, 2004)

Figure 3.12: Proposed Active Transportation Improvements



Source: Niagara TMP, (Niagara Region, 2017) Niagara-on-the-Lake TMP, (Town of Niagara-on-the-Lake, 2004)

3.5.3 TRANSIT IMPROVEMENTS

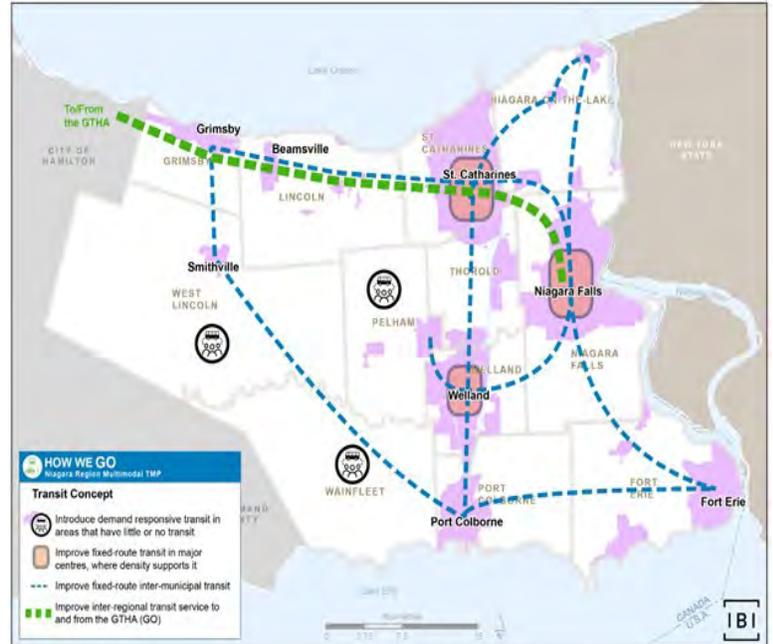
As part of the Niagara Region TMP a Transit Strategy was devised to define an aspirational network to put in place for 2041. The strategy aims to create a more efficient, effective and seamless transit system across the Region. The plan considered three transit types in the Region:

- Local service: which provides connection within a single municipality in the Region including St. Catharines Transit, Welland Transit, and Niagara-on-the-Lake Transit;
- Inter-municipal service: which provides service between municipalities throughout the Region including Niagara Region Transit and WEGO (Niagara Parks’ transit service); and
- Inter-regional transit: which connects Niagara Region with the GTHA including GO Transit.

The Strategy recommends short, medium and long-term actions to build out the long-term vision. **Table 3.14** summarizes the recommendations of the Transit Strategy.

To provide an example of how these strategies could be applied, a conceptual transit concept was outlined as part of the Transit Strategy which identifies improved fixed-route inter-municipal transit which connects Niagara-on-the-Lake to St. Catharines and Niagara Falls.

Figure 3.13: Proposed 2041 Transit Concept



Source: Niagara TMP, (Niagara Region, 2017) Niagara-on-the-Lake TMP, (Town of Niagara-on-the-Lake, 2004)

Table 3.15: Proposed Transit Improvements

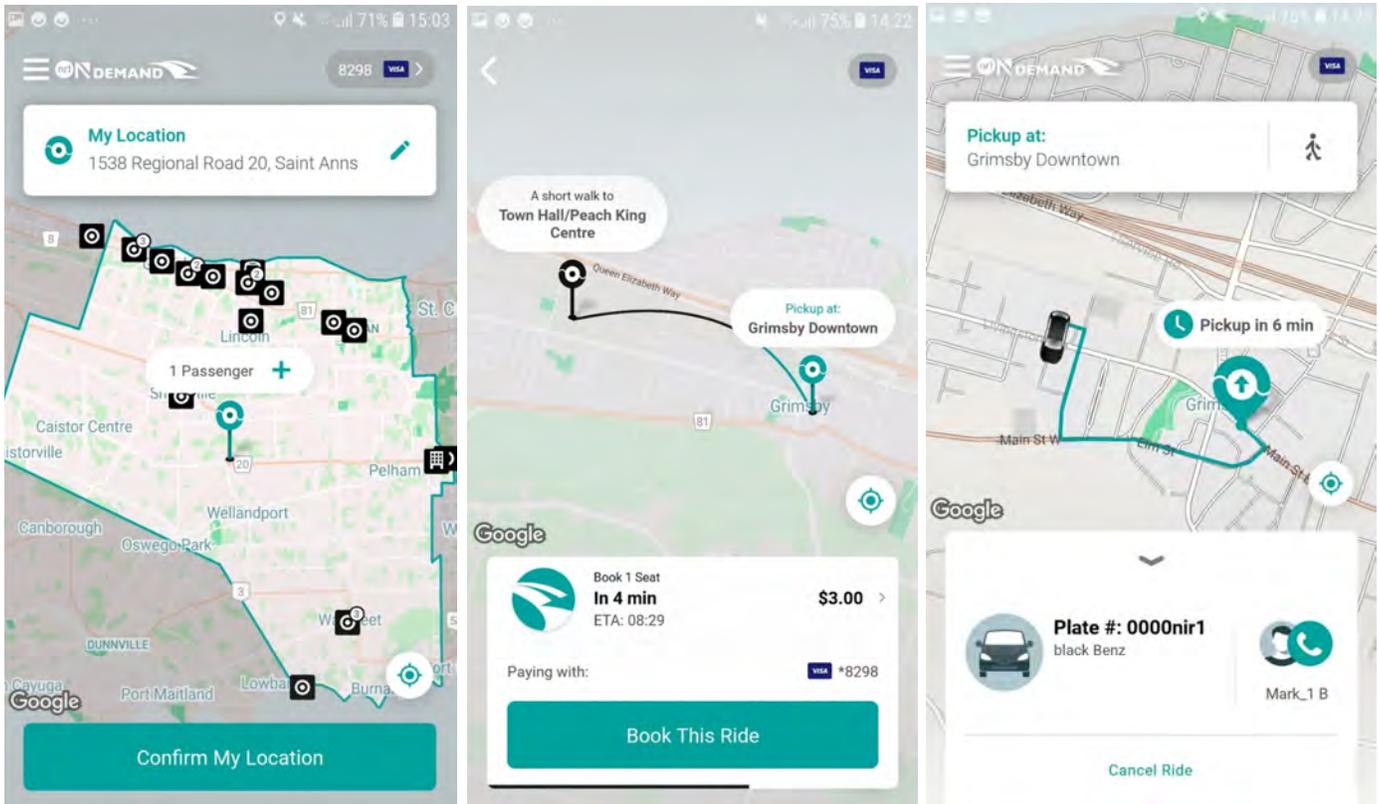
Proposed Timeline	Recommendations
Near Term (2021–2022)	<ul style="list-style-type: none"> • Initiate a demand-response pilot service in low-density areas with ride-hailing technology to investigate feasibility. • Support fare integration between local municipal transit agencies. • Investigate potential transit priority measures on regional roads. • Consolidate the operation of the largest transit agencies in the Region.
Medium Term (2022–2031)	<ul style="list-style-type: none"> • Establish frequent service (15 mins or less) along key corridors in St. Catharines, Niagara Falls, and Welland. • Subsidize co-fares between Niagara Region Transit and GO Transit. • Develop a service plan for demand-responsive transit. • Develop a policy regarding connected and autonomous transit vehicles. • Provide inter-municipal transit to all municipalities in the Region before 2041.
Long Term (2031–2041)	<ul style="list-style-type: none"> • Fully deploy demand-responsive transit in areas with poor performing fixed-route service. • Continue to improve fixed-route service.

In addition to the planned transit in the Region, as part of the Metrolinx 2041 Regional Transit Plan, the Niagara GO Train service expansion is planned. The GO Rail Niagara Service Extension business case notes future service between the future Confederation station and the Niagara Region starting in 2021 with improved service anticipated by 2023 to Niagara Falls. There is no direct GO train service to Niagara-on-the-Lake however, the Town is in close proximity to the St. Catharines and Niagara Falls GO stations. As outlined in the Niagara Region Transit Strategy, providing first and last mile connections between local municipalities and regional transit hubs is a key strategy to build more seamless and efficient transit connections.

NRT OnDemand

Niagara Region recently launched a ridesharing pilot, NRT OnDemand, which provides transit service for communities in Niagara-on-the-Lake and West Niagara. Effective November 1, 2021, the system has been expanded Town-wide. Within Niagara-on-the-Lake, this service replaces the fixed-route service where riders can now pre-book trips from specified pickup and drop-off locations. The Outlet Mall acts as a transfer point for onward travel past the Town's border. Two vehicles are dedicated to service Old Town, Virgil, and Glendale and there is a maximum wait time of 1 hour when booking. This service is envisioned to be an improvement for users while being more efficient on a cost-per-hour and passengers-per-hour basis. The outlook for future expansion is predicated on the success of the ongoing pilot.

Figure 3.14: NRT OnDemand Platform



Source: Niagara Region, 2020

3.6 NEEDS AND OPPORTUNITIES

3.6.1 NEEDS

The key needs have been documented below:

- Roadway safety.** Residents expressed concerns regarding the disconnected active transportation network and the desire for more separated cycling facilities or paved shoulders to avoid vehicle collisions. This will be partially addressed by the paved shoulders recently implemented along Four Mile Creek Road from Virgil up to Lakeshore Road, as well as by other considerations from the Regional Cycling Plan.
- Limited transit connectivity.** Survey responses revealed a very limited transit mode share with over half of the survey participants (55%) indicating they do not use transit. As both population and employment are anticipated to grow over the next 20 years, understanding commuting patterns and planning for various modes of trips will help to mitigate congestion and build greater network resiliency. With limited transit connections, driving is likely the main mode to serve these trips currently.
- Parking demand.** An overwhelming vehicular circulation and parking demand was noted as a concern among residents, particularly in Old Town. With a growing tourism demand, an even greater demand on parking will occur. Mitigation measures will need to be investigated including increased transit or active transportation or strategically placed Park and Rides.
- Limited mobility options for tourists.** With an already high and increasing tourism demand, additional mobility options will be required to reduce seasonal pressures on the road network. Currently, there are few convenient options of tourists to travel around Niagara-on-the-Lake with limited options beyond automobile for arriving in Town.
- Limited redundancies in the network.** Many north-south and east-west corridors funnel traffic to Niagara Stone Road which in turn funnels high-volumes of traffic through Virgil. The 2041 Do Nothing base traffic scenarios illustrate a growing constraint, especially during the Weekend PM Peak Hour which shows a significant portion of the corridor near or at capacity.

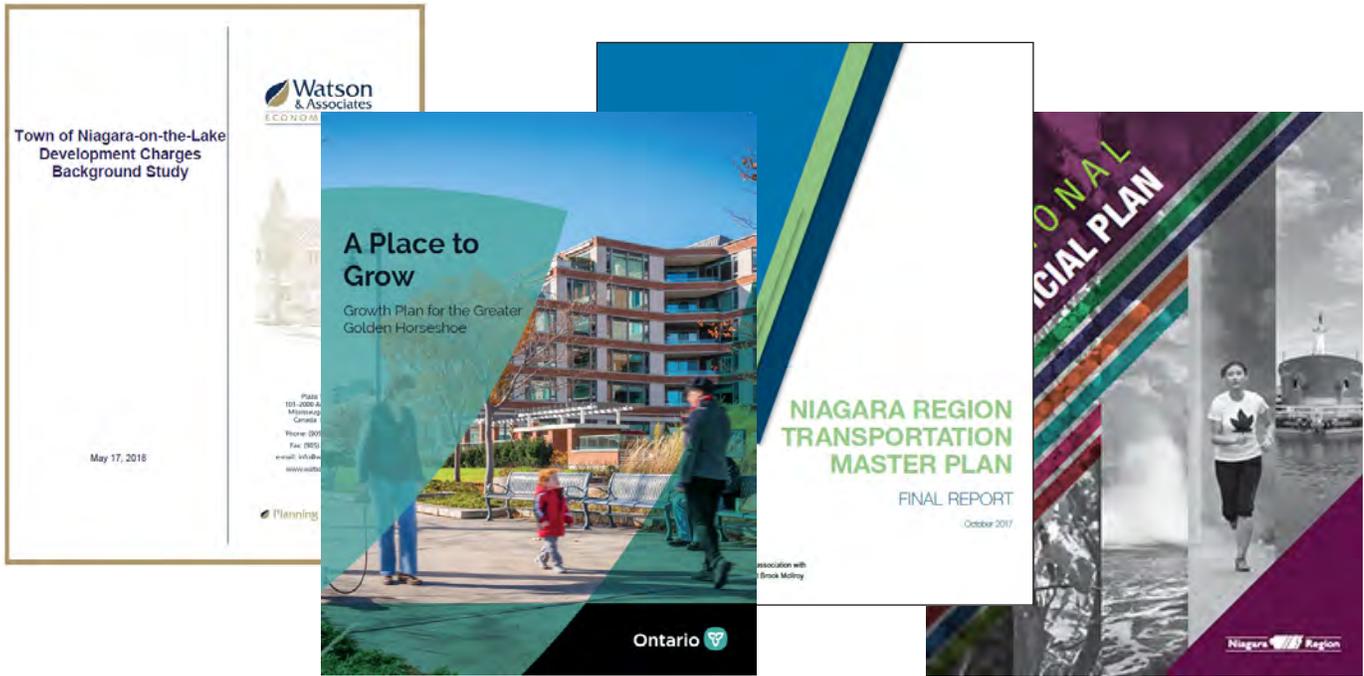
3.6.2 OPPORTUNITIES

Opportunities identified through technical analyses and stakeholder feedback have been detailed below:

- **Explore seasonal transport measures.** Specifically, the following items will be explored for improvement:
 - **Safety:** With higher demand on the road network during seasonal peaks, seasonal speed limit reductions in high visitor areas such as Old Town will be explored. Lessons learned and measured success from other municipalities in Southern Ontario will be reviewed, where available, to provide a stronger basis for any developed recommendations.
 - **Operations/Access:** As safety was noted as a concern for cyclists sharing the road with vehicles, a reallocation of space between vehicles and active transportation modes based on seasonal demands will be considered to increase access to active transportation during warmer weather months.
 - **Cultural Heritage Impacts:** To preserve the cultural elements and tourism experience within Niagara-on-the-Lake, increased mobility through the Town will be explored to allow for the road network to adapt to demand and avoid heavy congestion. As illustrated through the future traffic operations analysis, capacity constraints are anticipated based on the current levels of growth if no changes were made.
- **Enhance regional transit connections:** The population and employment projections indicate growth will be seen across the region, where people will be living and working across the region, requiring strong mobility connections between key growth areas. To provide an alternative for residents and tourists, opportunities for increased transit connectivity across the region will be explored. Possibilities to leverage the on-demand service recently implemented in Niagara-on-the-Lake will be considered, as this service offers increased flexibility and access to residents and visitors. Based on the 2016 Census mode shares and the TMP online survey data, a very small portion of Niagara-on-the-Lake residents use transit today, representing a big opportunity to shift the existing mode split if appropriate infrastructure and strategies were in place.
- **Leverage active transportation to mitigate vehicular trips:** Similar to transit, strengthening the active transportation network will help to reduce the forecasted network congestion through diversifying travel modes. Opportunities for seasonal enhancements of active transportation networks and filling in gaps will support a growth in this mode share. While no street closures or road diets are recommended at this stage, they may be considered in the future for further impact over and above what the TMP's recommended active transportation improvements can bring. Complete streets principles (discussed further in section 4.2.3) should also be considered. Pilot opportunities such as temporary or partial road closures, and temporary bike lanes and "quiet streets" might also be piloted in Niagara-on-the-Lake, in the interest of further fostering a safe, effective, and welcoming active transportation environment, prior to making more permanent infrastructure changes.
- **Explore strategically placed Park and Rides:** To help mitigate the parking demand in Old Town, the potential for Park and Rides with effective multi-modal connections to transit and active transportation will be considered. Potential partnerships with wineries and other businesses outside of Old Town will be considered as part of this strategy. Notably, the Park 'N' Pedal Program established in 2019 in Niagara-on-the-Lake will be a strong foundation to build off.
- **Consider the cost of the "curb":** The impacts of on-street parking spaces relative to the impact to other modes and congestion will be considered to balance how the different modes of transportation are funded/supported.



4. FOUNDATIONS



4. FOUNDATIONS

4.1 PLANNING CONTEXT

The TMP is directed by several key provincial, regional and local municipal policies that set a strong foundation to manage growth while building strong, healthy and sustainable communities.

4.1.1 PROVINCIAL

#CycleON Strategy, 2013: #CycleON is Ontario's 20-year vision through the year 2033 to have cycling recognized as a respected and valued mode of transportation within Ontario. This plan acknowledges Cycling's potential to bringing province-wide benefits in terms of personal and public health, the environment, tourism and traffic congestion. The guiding principles of this strategy are safety, partnership, accessibility and connectivity which culminate in five strategic directions including:

- Design healthy, active and prosperous communities;
- Improve cycling infrastructure;
- Make highways and streets safer;
- Promote awareness and behavioural shifts; and
- Increase cycling tourism opportunities

Provincial Policy Statement (PPS), 2014: These are the Province's policies on land use planning to promote strong communities, a strong economy and a clean and healthy environment. It requires transportation systems that are safe, energy efficient, facilitate the efficient movement of people and goods, and maximize the use of the existing

infrastructure. Niagara-on-the-Lake is required to plan to protect for future corridors and major goods movement facilities.

Growth Plan for the Greater Golden Horseshoe, 2017: The Growth Plan for the Greater Golden Horseshoe ("Growth Plan") was released by the Ministry of Municipal Affairs and Housing in 2006, as Ontario's growth strategy for the Greater Golden Horseshoe region to the year 2031. The Growth Plan is a "framework for implementing Ontario's vision for building stronger, prosperous communities by better managing growth in this region". The Growth Plan complements the Provincial Policy Statement and Places to Grow Act and has the objective to develop and optimize infrastructure while protecting and enhancing natural resources and heritage. The Growth Plan forecasts a population growth of 95,000 people within the entire Niagara Region, including Niagara-on-the-Lake by 2031 and requires the establishment of a minimum density target for all Town employment areas, in consultation with the Province and Niagara Region.

The Greenbelt Plan, 2017: The Greenbelt Plan, released by the Ministry of Municipal Affairs under the Greenbelt Act in 2005, identifies where urbanization should not occur in the Greater Golden Horseshoe region and complements the Growth Plan for the Greater Golden Horseshoe. The Greenbelt Plan is a band of permanently protected land with the objective of supporting agriculture as the dominant land use, protecting natural heritage and water systems while encouraging eco-tourism and recreation in protected areas.

The Greenbelt Plan details environmental protection and restoration of natural and open space connections surrounding Lake Ontario.

Greater Golden Horseshoe Transportation Plan, 2017:

With an expected growth of 13.5 million people over the next 25 years in the Greater Golden Horseshoe (GGH), a transportation plan is required to build a resilient, functional and connected transportation system. The Greater Golden Horseshoe Transportation Plan serves as a long-range transportation plan that is intended to inform policy development and investments that will support the government's goals of addressing climate change, supporting economic development and promoting new technology. The report will aid in collaboration across municipalities and transit agencies to improve transportation infrastructure across all modes. The plan consists of environmental, socio-economic and transportation profiles which provide background to inform the development of the plan.

The transportation profile reveals the GGH to be auto-centric with a mode split of 81% automobile, though an increase in transit has been seen as well as a stronger active mode share in urban growth centres. A shifting trend away from auto-dependency in the Niagara Region over the last 25 years can be inferred with an increase in the proportion of households owning 0 vehicles observed alongside a decrease in households with two or more vehicles. This may in part be correlated with the rise in GO Transit ridership over the same period which connects the Niagara Region with various locations in the GGH. Within the Niagara Region a consistent active mode share is observed over the last twenty years. Additionally, as the Region grows and greater employment becomes situated around the region, travel within and between inner-ring municipalities such as Hamilton and Toronto has increased. Furthermore, the Niagara Frontier provides four border crossings in the United States which serves as a critical path for goods movements and an economic gateway for Canada-US trade.

Southern Highways Program 2017-2021: The Southern Highways Program (SHP) details a five-year investment plan for highway construction in Ontario. Between 2017 and 2021 a number of transportation infrastructure improvements were completed or are planned for completion. Between 2017 and 2018 there were 60 new highways and bridges planned and 438 highway and bridge rehabilitations. A number of improvements are scheduled to begin or continue in 2020 in the Niagara Region including a highway resurfacing of 17.2 km along Highway 405 at Lewiston/Queenston Bridge to Niagara-on-the-Lake. Highway improvements in and around Niagara-on-the-Lake will enhance the connectivity around neighbouring and surrounding communities.

Metrolinx Niagara GO Rail Expansion: The initial business case GO Rail Niagara Service Extension was

completed in November 2015 which resulted in the announcement of GO train service between the future Confederation station and the Niagara Region starting in 2021 with improved service anticipated by 2023 to Niagara Falls. While this rail line does not directly service Niagara-on-the-Lake, the Town is in close proximity to both St. Catharines and Niagara Falls GO stations. Various track upgrades, signal improvements and drainage improvements have been identified in order to complete the planned expansion work.

Starting in January 2019, weekday GO trains began serving the Niagara Region with stops in St. Catharines and Niagara Falls. Additionally, in August 2019 the weekend service was implemented throughout the year rather than only through the summer season.

Metrolinx 2041 Regional Transportation Plan, 2018:

The population in the GTHA is anticipated to increase by 41% between 2016 and 2041- the complexities of future transportation needs warrant the cooperation and collaboration among various actors including the province, municipalities, transit agencies, the private sector, and residents. The 2041 Regional Transportation Plan (2041 RTP) aims to provide more people with access to fast, frequent and reliable transit service while also making it easier to make multimodal trips through a combination of transit, cycling and walking. To achieve the vision set out in the plan, a number of goals and strategies have been outlined. Various infrastructure upgrades will be leveraged including expanding the frequent rapid transit, cycling and HOV lane networks.

The 2041 RTP builds on The Big Move by improving people's access to fast and reliable transit, integrating services and fares, designing communities to support transit and active transportation, preparing for integrated mobility and the use of emerging technologies, leveraging parking demand strategies, addressing first-and-last mile challenges, and optimizing goods movement throughout the GTHA. As part of The Big Move, peak-period GO rail service linking Niagara Falls to Hamilton will be implemented in 2023.

Glendale/QEW Interchange Class Environmental Assessment, 2018: The Ministry of Transportation and Niagara Region are working on a design-build project for the Diverging Diamond Interchange at the QEW and Glendale Avenue. The project construction is beginning in 2020 and is anticipated to be completed in 2023. The project will occur in 5 stages and will include the conversion of the current QEW/ Glendale Avenue into a Diverging Diamond, including the conversion of the Glendale Avenue/ York Road intersection to a single lane roundabout. Additionally, a new Airport Road ramp and connecting road will be built from Glendale Avenue to the York Road/Airport Road intersection as well as a new commuter parking lot at the northwest corner of the intersection.

4.1.2 REGIONAL

Niagara Region Official Plan, 2014: The Niagara Region Official Plan is a long-range community planning document which is intended to guide social, physical and economic development throughout the Region. With regards to transportation, the study outlined needs and priorities for the provincial highway system in the study area including the consideration of goods movement and public transit.

The Official Plan outlined transportation objectives and policies which promote safe, convenient, and economical transportation systems among all mode choices, including:

- An arterial road system that works in connection with the provincial and local road networks to connect all parts of the Region;
- The promotion of efficient public transit services;
- The development of pleasing streetscapes; and
- Supportive active transportation facilities.

Specifically, the Official Plan establishes policies and objectives related to regional road allowances, corridor protections, public transport, active transportation, complete streets, goods movement, and transportation demand management measures throughout the Region.

Niagara Region Multi-Modal Transportation Master Plan, 2017: The Transportation Master Plan is a long-term planning document that defines policies, programs and infrastructure requirements to meet transportation and growth needs in the Region through to 2041. With rapid growth anticipated, Niagara Region will need to strengthen its connectivity between its municipalities and to the GTHA and provide better options for non-car travel. A number of needs and opportunities have been identified along with key recommendations which include:

- The use of a complete streets approach to plan and design all regional road projects identified in the Road Capital Plan;
- Investment in active transportation facilities and supporting infrastructure;
- Strengthen core transit services and provide transit connections to all of its local municipalities through a combination of fixed-route and demand-responsive transit;
- Accommodate future growth in vehicle travel through strategic network capacity increases and address operational improvements at key constraints;
- Fund and staff programs to adopt and lead TDM and TSM initiatives;
- Advocate with the provincial and federal governments to advance the Niagara-Hamilton Trade Corridor and NGTA East Corridor to support goods movement into 2041.

An implementation plan outlines a three-phase approach to achieve the recommendations made in the TMP.

Niagara Region Transit Service Delivery and Governance Strategy, 2017: The Niagara Region Transit Service Delivery and Governance Strategy assesses the existing inter-municipal transit service in Niagara Region and investigates potential options for the future. An assessment of options for service delivery, governance, fare integration, fare payment technology and trip planning are detailed in the report. The report recommends the following:

- Eliminating duplicate services to post-secondary institutions and the expansion of off-peak services on key inter-municipal corridors;
- Better integration with other municipal transit systems;
- New Niagara-West inter-municipal transit link; and
- New dynamic transit services for low demand areas (NRT OnDemand has since been implemented throughout Niagara-on-the-Lake).

The report recommends the implementation of a consolidated transit service delivery and governance structure within St. Catharines, Niagara Falls and Welland where local transit services outside of these areas may continue to be planned and delivered by the respective municipalities. Within Niagara-on-the-Lake it is recommended to expand the Dynamic Transit service concept and better integrate service with WEGO.

Glendale Niagara District Plan, 2018: The Glendale District Plan (Phase 1) was completed in 2018 and provides a long-term vision for strategic development in the Glendale community. There are two phases to the plan, a Visioning Exercise and Conceptual Plan followed by a Technical Review and preparation of the District Plan which is currently underway. Phase 1 consisted of interviews with landowners in the area, an analysis of the study area, meetings with Regional Staff and the Technical Advisory Group. Based on this work, a conceptual plan has been detailed. Several concepts were developed with the preferred vision including a community with diverse land uses where each quadrant containing a mix of existing and new uses including mixed uses which will support different uses of space. New roadways are proposed to increase connectivity and allow for a more permeable pedestrian network including three new crossings of the QEW with one a designated pedestrian crossing at the south end of Airport Road. The new QEW Glendale interchange will be a Diverging Diamond Interchange (DDI) which will use less space, be less expensive and allow traffic to flow more smoothly. Additionally, the trail network is proposed to build off the existing trail system including the Bruce Trail.

4.1.3 LOCAL

Town of Niagara-on-the-Lake Official Plan Review, 2019:

The Official Plan sets out policies to guide physical growth and address social, economic and environmental concerns. The Official Plan outlines both general and land use policies. For each land use the goals and objectives, land use designations, policies and exceptions are laid out. As part of the resources management policies a number of transportation policies have been outlined with the primary objective of providing optimal conditions for the movement of people and goods throughout Niagara-on-the-Lake. A critical goal is to support multiple modes of transport as reliable, safe and convenient travel choices. The functions of arterial, collector, and local roadways have been outlined with a summary of each street in the Town and their designated right-of-way. Lastly, an implementation strategy outlines the application of this plan.

Glendale Secondary Plan: Situated along the Queen Elizabeth Way, Glendale is located in the southwest end of the Town and serves as an emerging urban community with largely newer development. In alignment with Official Plan policies and urban design guidelines this document provides specific guidance on the development of the Glendale Community. The Secondary Plan for Glendale contains principles and policies related to transportation and other urban planning elements including built form, land use and public realm. Additionally, guidelines for site development and action items for implementation have been identified.

The plan is intended to be used by landowners and developers working in the Glendale community, Town staff and Council when reviewing development proposals, Niagara Region staff and Provincial staff when reviewing proposed infrastructure plans and various other planning authorities, residents, businesses and institutions who are interest in the long-term vision for the Glendale community.

Dock Area Secondary Plan: The Dock Area serves as a waterfront community within Niagara-on-the-Lake, referred to as the Old Town's doorstep. The Secondary Plan provides guidance on how the various land uses within the area should evolve in a way that respects the distinct character of the community and builds towards the overall vision for the Old Town's doorstep. The purpose of this plan is to:

- Provide development direction regarding land use, built form, movement patterns and the evolution of public space;
- Ensure the urban character of the Dock Area is connected and cohesive; and
- Identify priority investments and proposals in the area.

St. Davids Urban Design Guidelines: St Davids is located in the southern end of Niagara-on-the-Lake and is largely surrounded by orchards and vineyards that roll north-east towards the Niagara River. The Urban Design Guidelines

provide recommended design concepts that are based on an integrated approach to enhance and preserve the unique character of the area. The guidelines are based on key principles developed in collaboration with the public, Town staff and other community stakeholders. The design framework has been created based on open space, streets, village centre and built form whereby a number of policies and guidelines are outlined with respect to each element. The plan provides recommendations within both the public and private realm.

Queenston Secondary Plan: The Secondary Plan aims to expand on the Official Plan and provide more detailed policy and strategic direction for the Village of Queenston within Niagara-on-the-Lake. The plan includes a policy framework, urban design guidelines and implementation tools to be utilized by Town staff to guide development decisions over the next 20 years.

The Secondary Plan outlines policies which translate to the goals of the Village strategy and will guide future development and public infrastructure in Queenston. As part of the plan Urban Design Policies outline evaluation criteria for elements of the built environment to promote a high level of integration and cohesion with the overall vision for the community. This is followed by implementation tools to aid in decision making and development.

Old Town Functional Parking Analysis, 2011: The purpose of the parking analysis was to outline the parking supply, parking demand and parking management in the commercial area of the Queen-Picton Heritage Conservation District. The study considered on-street and off-street public parking as well as private lots. Key findings included peak parking demand for municipal parking observed on Saturday and Sunday afternoons during summer months exceeding their practical capacity of 85%. The study concludes that the findings do not warrant the municipal parking standard to be reduced. It is recommended that the existing parking standards be maintained with supporting strategies related to parking standards, parking supply, parking management and provision of user information. The study outlines an implementation plan to action the recommendations.

Rural Road Speed Limit Review, 2013: The study reviewed the posted and assumed speed limits along rural roads within Niagara-on-the-Lake. This reviewed followed the Rural Road Safety Review and Action Plan. The review found that compliance with the posted and assumed 80km/h speed limit is generally good, however a number of selected road segments have been recommended for specific speed limit revisions.

Rural Road Safety Review, 2012: The Town conducted a safety review of its rural road network with a goal of implementing low-cost and high-value improvements where

necessary to reduce the frequency and severity of collisions at rural intersections. Based on the study investigation a number of opportunities for improvement were identified including improved road name signage, intersection advance warning signs, stop ahead warning signs and posted speed limits.

Rural Road Widening Policy, 2012: Pedestrian and cycling activity on rural roads with narrow shoulders creates safety concerns for all road users. The Rural Road Widening Policy identifies which roads are required to include paved shoulders and prescribes shoulder widths for these roads. The 2012 policy identified the need for 1.0 metre paved shoulders on the following roads:

- Collector roads from the 2004 Transportation Master Plan Study
- Line 1 Road from Concession 4 Road to Niagara River Parkway
- Concession 2 Road from East and West Line to York Road
- Four Mile Creek Road from Lakeshore Road to East and West Line
- Concession 7 Road from Queenston Road to Niagara Stone Road

Niagara-on-the-Lake Transit Need Study, 2010: The study examined the need for a transit service in the Town including what transit service types were already available. The study considered the background context of the Town, a market and travel demand analysis, peer system review and demand forecasting which were ultimately used to develop four possible transit service options. Option 1 which consisted of a Taxi Token Program Enhancement was recommended to be considered as an interim step pending a final decision on the preferred transit service option. The remaining options propose various combinations of fixed-route transit service between Old Town, Virgil, Glendale and St. Davids using small accessible buses, a taxi feeder service and a supplemental on-demand service for riders with disabilities as required by the AODA.

Town of Niagara-on-the-Lake 2020 State of the Infrastructure and Asset Management Plan for Roads, 2020: This study used a road system survey to assess road conditions and provide recommendations for rehabilitation, resurfacing, and reconstruction. This road needs study identifies the physical and financial needs of the entire road system and will be used for budget and road asset programming. Findings demonstrate that the overall system condition is above the target measure for road assets. Improvement costs are estimated at approximately \$59 million, with \$18 million for roads identified as 'NOW' needs and \$41 million for maintenance or '1 to 10' year road work needs. This study and updated road inventory will be used to ensure the overall adequacy level of the system does not decrease over time.



4.2 GUIDING THEMES

Transportation networks are influenced and shaped by the communities they serve. Their role within the context of a municipality's quality of life can vary widely depending on how the community would like the network to serve them. Niagara-on-the-Lake is a modern town that elegantly balances its rural charm with urban vitality. It is also a diverse town comprised of several unique neighbourhoods and communities. The Town's transportation and active transportation systems must reflect the Town's vision to foster multi-modal transportation options that address the needs of people of all ages and abilities.

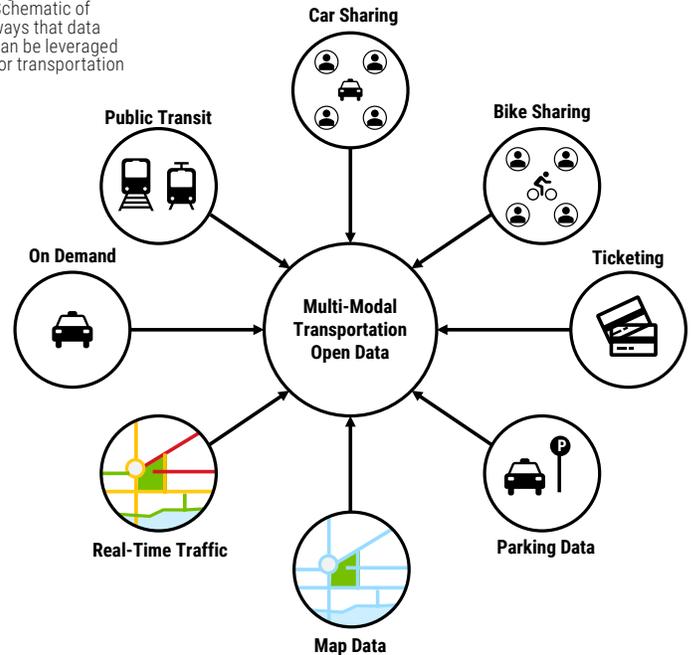
Not every trip can or should be served by alternative modes of transportation, but it must be recognized that private vehicles, transit, and active transportation are part of a larger multi-modal mobility network that works together to provide transportation for the community as a cohesive system. To that effect, it is important that the planning of multi-modal transportation services acknowledge the Town's role in a regional context and provides connections to both local and regional facilities. This must all be done with a delicate balance between a focus on the people that the multi-modal transportation network serves and the Town's fiscal and environmental responsibilities of maximizing the network's efficiency while reducing the dependence on private automobiles. The following section outlines some major mobility trends that are influencing (or will influence) the development of multi-modal transportation solutions for Niagara-on-the-Lake.

4.2.1 SMART CITIES AND OPEN DATA

Smart cities are a new trend gaining traction across Canada and the world, whereby municipalities are starting to leverage Big Data to assist in municipal planning. A smart city is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently. In terms of mobility, traditional methods of data collection use pneumatic tubes or manual counting for automatic traffic recording which are often costly to implement, prone to high maintenance costs, and difficult to leverage for alternative modes of transportation like transit, cycling and walking. As shown schematically in **Figure 4.1**, there are new ways to leverage information and communication technology to optimize the cost-effectiveness of data collection and the efficiency of city operations, and to promote a dialogue between city planners and the public and to better inform on travel patterns.

This TMP study is already assisting the Town of Niagara-on-the-Lake with taking an exciting step toward leveraging big data to enhance mobility planning. By leveraging third-party anonymized mobile app data provided by the company Streetlight Data, this study is able to provide a more accurate picture of travel trends within the community beyond the latest

Figure 4.1: Schematic of ways that data can be leveraged for transportation



iteration of the Transportation Tomorrow Survey (TTS) which is a household survey developed by the University of Toronto to quantify travel trends across the Greater Golden Horseshoe (GGH). The last iteration of this household survey was completed in 2016, since which a variety of emerging mobility trends, technologies, and demographic and industrial trends have occurred that impact how residents in Niagara-on-the-Lake move around. Leveraging anonymized mobile-app data allows this plan to provide a more robust picture of existing mobility trends within the community without the associated time and costs of developing and disseminating a household survey.

Hundreds of municipalities across Canada are leveraging open data to work with residents and businesses to develop cost-effective solutions to several issues. The expansion of open data, combined with advances in big data analytics, is freeing information that was once trapped inside the dusty pages of overlooked reports, enabling improved decision making, new product and service offerings, and greater accountability. This change comes at a time of heightened focus on data-driven knowledge and evidence-based decision making. Smart City technology and Open Data can help improve transportation demand forecasting, prioritize transport infrastructure improvements, and synchronize the ways different modes of transportation inter-operate. For example, in Toronto the local transit agency, the Toronto Transit Commission (TTC), was able to avoid having to build their own mobile application to identify next-bus arrival times, by making their real-time vehicle GPS data open through an application programming interface (API). This avoided the need to procure a developer and handle the continual maintenance of a mobile application.

4.2.2 MOBILITY AS A SERVICE (MAAS)

Mobility as a Service (MaaS) is the integration of various forms of transport services into a single mobility service accessible on demand. To meet a municipality's transportation demand, MaaS facilitates a diverse menu of transport options, be they Transport Network Company's (TNC), public transport, ride-, car-, scooter- or bike-sharing, taxi or private automobile, or a combination thereof. For residents this approach can offer added value through use of a single application or service to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations. At its most basic level, MaaS fits within a value proposition by helping residents meet their mobility needs and solve the inconvenient parts of individual journeys as well as the entire system of mobility services. The aim of MaaS is to provide an alternative to owning a vehicle that is as convenient, more sustainable, and cheaper to the user, while helping to reduce congestion and other constraints in transport capacity.

MaaS is a relatively new concept and approach to transportation planning, with elements primarily integrated in a piecemeal fashion in many jurisdictions across North America. The most abundant form of MaaS is via integrated ride-hailing mobility services such as Uber or Lyft and bikeshare services integrated into transit planning or maps applications such as Google Maps or the Transit App as visualized in **Figure 4.2**. In Europe and Asia various cities have managed to fundamentally change the way people search for, consume, and pay for transportation, much like how Netflix has changed video consumption. Since 2016, Helsinki residents have been able to use an app called Whim to plan and pay for all modes of public and private transportation within the city – be it by train, taxi, bus, carshare, or bikeshare. Anyone with the app can enter a destination, select his or her preferred mode of getting there-or, in cases where no single mode covers the door-to-door journey, a combination thereof-and go.

While there are obvious stark differences between the Town of Niagara-on-the-Lake and Helsinki, it is important to acknowledge that MaaS can be moulded to create a localized and tailored solution that works with the available transportation assets and is scaled to the Town of Niagara-on-the-Lake.

4.2.3 COMPLETE STREETS

Streets are vital places within the Town of Niagara-on-the-Lake. They are the common spaces where the town comes together, where children learn to ride bicycles, neighbours meet and couples stroll. They are the proverbial front door to our homes, businesses, parks, and institutions. They reflect the values of the town and, at their best, are a source of pride for residents and visitors alike. Understanding how our transportation network can equitably be shared between



“MaaS is a new concept of service, combining services from public and private transport providers through a unified gateway that creates and manages the trip, which users can pay for with a single account..”

- CIVITAS - Initiative co-financed by the European Union

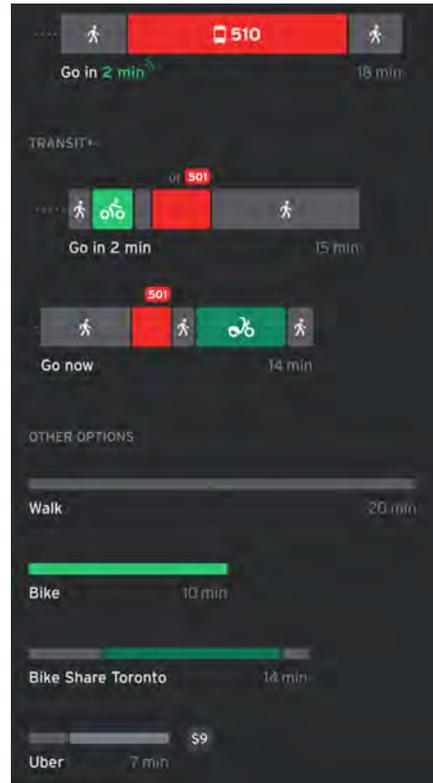


Figure 4.2: Screen of the Transit app and the integration it has with other modes

different road users such as automobile drivers, transit riders, cyclists, or pedestrians is imperative to promoting a multi-modal transportation network that provides a range of attractive choices for mobility by integrating all modes into a seamless network.

Complete Streets is an approach whereby streets are designed to be safe for everyone: people who walk, bicycle, take transit, or drive, and people of all ages and abilities. This ensures that transportation is planned and designed for all road users, not only motorists. There is no singular approach to Complete Streets, however, it acknowledges that a delicate balance needs to be struck between different road users and stakeholders regarding how transportation infrastructure is disseminated. The local context determines this based on the needs and opportunities that dictate the necessity for different infrastructure in different parts of the multi-modal transportation network as visualized in **Figure 4.3**. The link between Complete Streets and public health is well documented as it enhances human and environmental health by providing an environment that enables and encourages active transportation.

Figure 4.3: Complete Streets philosophy



Source: Toronto Complete Streets Guidelines, 2017

Since 2003, Complete Streets has seen over 1,200 policies adopted (as of July 2017) in the United States with a growing interest across Canada including Ottawa (2013).

More recently, the 2017 Niagara Region Multi-Modal Transportation Master Plan included a variety of complete streets recommendations, and currently the Region is developing updated Complete Streets Guidelines.

4.2.4 MOBILITY NETWORK RESILIENCY

The Covid-19 pandemic has raised a variety of questions around what the future impacts of mobility may be as a result of changing employment and travel trends. This TMP is being developed with a focus towards resiliency that considers how existing or planned infrastructure could flexibly adapt to changing trends. The residents of Niagara-on-the-Lake are no strangers to the annual changes between high and low tourism seasons. A lot of the same principles that apply to developing flexible mobility infrastructure can also be developed within the context of emergency planning, preparedness, and resiliency.

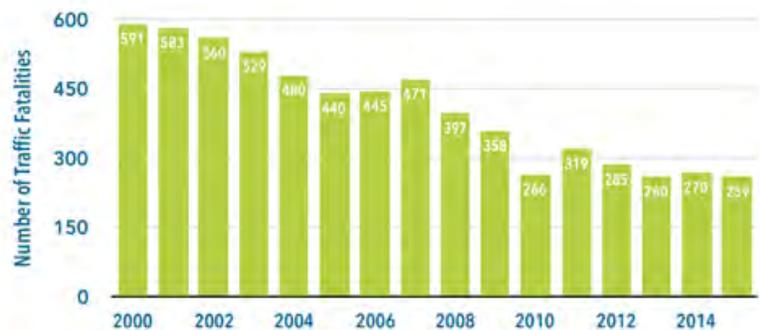
For instance, there may be a high-demand for on-street parking in Old Town during the summer months, but during off-peak seasons, there may be opportunities to leverage underutilized parking spaces for more public realm, or patio space to further support local businesses. Alternatively, leveraging flexible mobility infrastructure provides new opportunities and ways for residents and tourists to interact with the community. Maybe having the ability to dynamically re-allocate roadspace, as needed, could also provide future safety benefits for pedestrians during a pandemic. These are measures that are currently being developed and implemented across the world and can be integrated into broader multi-modal planning to support community resiliency.

4.2.5 VISION ZERO

Vision Zero is a multi-national road traffic safety project that aims to achieve a transportation network with no fatalities or serious injuries involving road traffic. This approach started in Sweden and was approved by their parliament in October 1997. A core principle of the vision is that 'Life and health can never be exchanged for other benefits within society' rather than the more conventional comparison between costs and benefits, where a monetary value is placed on life and health, and then that value is used to decide how much money to spend on a road network towards the benefit of decreasing how much risk. Sweden has made tremendous progress in road safety. For example, between 2000-2015 the number of traffic fatalities in Sweden decreased by over 50% as visualized in **Figure 4.4**.

Several municipalities across Canada are beginning to embrace the Vision Zero approach to road safety by implementing road safety plans and actions to reduce road-related fatalities and protect vulnerable road users. In 2015, Edmonton became the first major Canadian City to officially adopt Vision Zero with the City of Toronto soon following suit in 2017. Vision Zero is now a recognized approach toward planning for road safety with other cities including the City of Ottawa considering the potential for implementing Vision Zero.

Figure 4.4: Number of traffic fatalities in Sweden | 2000-2014



4.3 STRATEGIC PRIORITIES

The Town of Niagara-on-the-Lake is committed to the provision of municipal services in a sustainable manner to meet the present and future needs of the community. In 2018 a Strategic Plan to guide the Town through to 2022 was created focusing on five strategic pillars including:

Protect Distinctive Community Assets:

- Preserve unique community elements;
- Close gap on capital investments; and
- Recognize the importance of tourism in Niagara-on-the-Lake.

Deliver Smart Balanced Growth:

- Update and create master and secondary plans;
- Develop smart balanced growth criteria; and
- Identify smart balanced growth priorities.

Create a Culture of Customer Service Excellence:

- Define, support and acknowledge customer service excellence;
- Support staff by providing comprehensive training; and
- Use technology to improve levels of service.

Excel in a Positive Workplace:

- Strengthen staff and council partnerships;
- Increase departmental collaboration; and
- Acknowledge contributions to positive workplace culture.

Strengthen 2-Way Communications:

- Develop education plans to inform residents;
- Create a communications matrix; and
- Strengthen communications delivery methods.

While not every aspect of these five strategic pillars fit perfectly into the context of this TMP, they provide an overarching municipal strategy upon which this document's vision and objectives can link to. These five strategic pillars and their relation to the TMP vision and objectives are summarised on the following page.

4.4 VISION AND OBJECTIVES

A well-designed multi-modal transportation network can be a strong contributor to achieving the local goals that are articulated in various plans. Simplicity in design and functionality usually means establishing a simple and effective multi-modal transportation network that everyone can understand and use. Understanding why people may react to transportation options in different ways, based on their personal needs and circumstances, helps to create a multi-modal network that is intuitive and that reduces the barrier to use, potentially offering new and sustainable ways to travel for

many. The expectation of the network is captured and incorporated in its overall vision and the TMP articulates this vision by describing what that might look like in terms of service and infrastructure, and then outlines a plan to evolve towards that vision. The creation of a vision is necessary to inform other plans and create a sense of unity and cohesion amongst them.

Transportation plays an important role in the life of residents and visitors to Niagara-on-the-Lake, not only as a means to move around, but as a tool that enhances the Town's quality of life. With this consideration, it's imperative that transportation plays a role in empowering the community's residents, visitors and businesses by allowing more options for delicately balancing a multi-modal approach to transportation that addresses all different types of needs and users. A strain on the transportation network has negative ripple effects in other areas of the community, and even beyond to neighbouring communities. Often, improving conditions for one user group may create unfavourable conditions for another. An example of this may be increasing traffic speed limits to improve the throughput of a roadway. It may improve traffic flow, but it may diminish the safety of driving, as well as of other modes of transportation such as cycling and walking. It is important to acknowledge the interdependencies of the community's environment and make recommendations that balance benefits between all users. The following are some general objectives that were identified by Town staff through the development of the TMP study framework:

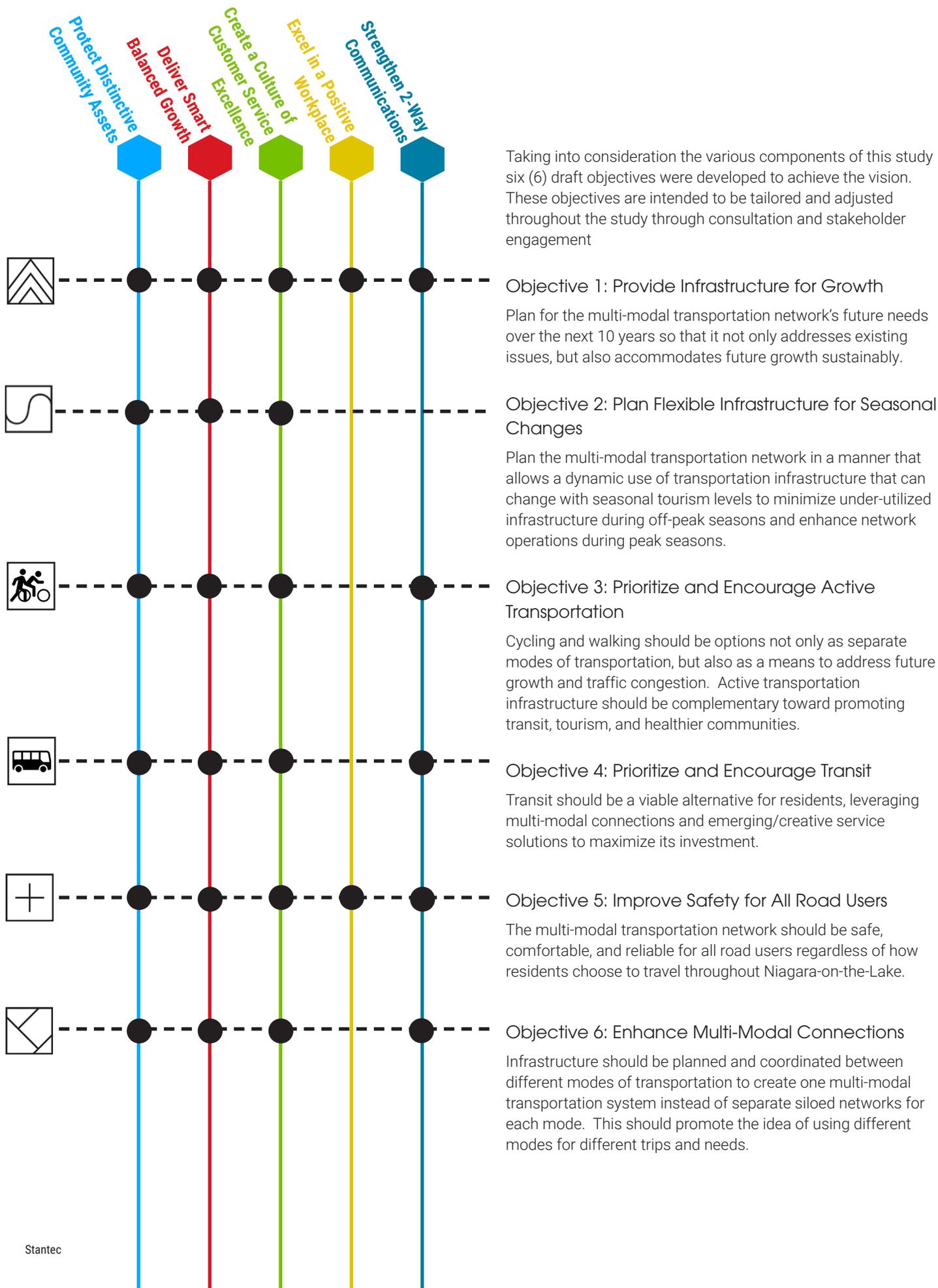
- Identify future transportation needs and opportunities of the Town through the year 2031;
- Provide connectivity between transportation modes to move people and goods sustainably, efficiently, and safely;
- Establish a sustainably integrated multi-modal transportation system that reduces reliance upon any single mode and promotes walking, cycling, and transit; and
- Define policies and long-term strategies that will result in the protection of transportation corridors for all modes of transportation to address current and projected population and employment growth.

The vision statement of this TMP is intended to describe the end state of the transportation network (the ideal outcome)—in the future when all the objectives have been achieved. By its nature, it is inspirational and idealistic.



Vision Statement: A multi-modal transportation network that facilitates connectivity for residents and visitors to jobs, services, recreation, and tourist destinations, providing options for traveling within and beyond the Town safely and efficiently.

The emphasis of the vision statement is on what the end will be like, and less on what Niagara-on-the-Lake needs to do to get there. Statements on how this is achieved are secondary and are stated as objectives and measures.





5.A PLAN FOR THE FUTURE

5. A PLAN FOR THE FUTURE

5.1 NETWORK EVALUATION PRINCIPLES

As a precursor to developing transportation network recommendations, evaluation criteria for the transportation network were developed. Criteria include the following:

- **Safety:** What degree will the improvement enhance safety? Consideration of whether improvement is in a collision hot spot, or there are significant conflicting multi-modal movements.
- **Mobility:** How much does the proposed improvement enhance multi-modal operations? Consideration of parking demand, roadway congestion mitigation; and, for active transportation/transit improvements, consideration of spatial measures such as connectivity.
- **Livability:** Does the improvement respect the cultural/natural heritage of the community, and does it balance business/resident needs? Consideration of qualitative measures linked to public feedback.
- **Connectivity:** How much does the proposed improvement enhance connectivity to various modes and regional connections? Consideration as to the improvement’s ability to adapt between high and low seasons.
- **Cost:** How feasible is the improvement given the current financial availability? While cost is not the primary factor, to ensure the recommendations developed are implementable, the associated costs of improvements will be weighted in the evaluation.

Each of these five criteria were considered when developing transportation network recommendations for Niagara-on-the-

Lake. It was important to consider these criteria in appreciation that a community’s transportation is more than just the sum of the traffic, cyclist, pedestrian, and transit rider counts. Rather, the pulse of the community itself needs consideration to ensure that the recommendations developed are well-aligned with the community’s unique attributes and are a good fit for the community overall.

As the recommendations included in this TMP are more strategic in nature, so too these criteria were considered from a strategic perspective. Safety is a central tenet behind many of the active transportation and policy recommendations. Mobility and connectivity were considered from both an intra- and multi-modal standpoint in the development of the recommended transportation networks. Livability was considered in the policy recommendations and in the neighbourhood-specific strategies that were identified to ensure that neighbourhood character and quality of life within Niagara-on-the-Lake will be preserved with the implementation of the TMP’s recommendations. And finally, cost was considered from the perspective of optimizing the return on investment for all recommendations.

As the Town seeks to implement this TMP’s recommendations and conducts more detailed implementation planning accordingly, it will be prudent to revisit these criteria as policy decisions, design details, and cost estimates are fleshed out, to ensure the projects remain in alignment with the network evaluation principles. At the appropriate time, it is suggested that the Town develop an evaluation framework using these criteria and assign a score to each project for each of safety, mobility, livability, connectivity, and cost. Based on preliminary analyses as well as stakeholder engagement findings, suggested criteria weights for use in an evaluation framework are summarized in **Table 5.1**.

Table 5.1: Evaluation Criteria and Weighting

Evaluation Criteria	Proposed Weighting	Comments
Safety	20%	Very important, especially from an active transportation perspective.
Mobility	25%	Operational effectiveness of transportation services, integration of modes, etc. including impacts to travel time, reliability and convenience.
Livability	30%	Natural/physical impact, heritage/culture/tourism impact, and socio-economic impact all form livability – they are all interrelated and stronger performance in one area is likely indicative of stronger performance in the other areas.
Connectivity/ Flexibility	15%	Effectiveness in enhancing multi-modal connections and choice. Also consideration for the benefit to regional mobility connections.
Cost	10%	How feasible is the improvement given the existing and planned funding?

5.2 VEHICULAR NETWORK EVALUATION

A screenline analysis was conducted to evaluate the road network performance through parallel roadway corridor locations to get a sense of where people are travelling to and from. This analysis is facilitated by comparing the sum of traffic volumes with the sum of the planning-level roadway capacity across a screenline, and then computing the associated volume-to-capacity (V/C) ratios. For the purpose of the analysis, 8 screenlines are set up to capture all major trip directions as illustrated in **Figure 3.7**. An increase of 9% to 13% in roadway volumes is noted across the screenlines between the transportation analysis base year (2019) and the

2041 horizon, which corresponds to an average increase of 0.4% to 0.57% per year. The associated existing, forecasted, partial change, and aggressive change volume-to-capacity (V/C) ratios for the considered screenlines are provided in **Table 5.2**. A further breakdown is provided in the same table for select screenlines where one or more of the underlying locations exhibit volume-to-capacity ratios above 0.95. **Figure 5.1** demonstrates the percentage change in V/C ratio for different scenarios with respect to the existing conditions on corridors such as Niagara Stone Road (screenlines 1, 2, and 4), Airport Road (screenline 4), Four Mile Creek Road (screenline 7), Lakeshore Road (screenline 8), and Queenston Street (screenline 8). The aforementioned figure presents the results of the segments with V/C ratios greater than or equal to 0.95.

Table 5.2: Existing, Forecasted, Partial Change, and Aggressive Change Volume-to-Capacity Ratios at Screenlines

Screenline	Existing (2019) V/C			Status quo (2041) V/C			Partial change (2041) V/C			Aggressive change (2041) V/C		
	AM Peak	Midday	PM Peak	AM Peak	Midday	PM Peak	AM Peak	Midday	PM Peak	AM Peak	Midday	PM Peak
1: Just outside of Old Town	0.10	0.37	0.54	0.11	0.41	0.60	0.10	0.39	0.57	0.10	0.36	0.54
> Lakeshore Road	0.08	0.21	0.31	0.09	0.22	0.33	0.08	0.21	0.32	0.07	0.20	0.30
> Niagara Stone Road	0.23	0.94	1.32	0.26	1.08	1.50	0.25	1.02	1.42	0.23	0.94	1.32
> Niven Road	0.00	0.03	0.04	0.00	0.03	0.04	0.00	0.03	0.03	0.00	0.02	0.03
> Niagara River Parkway	0.03	0.22	0.36	0.03	0.23	0.38	0.03	0.22	0.37	0.03	0.22	0.36
> Niagara Street	0.13	0.29	0.45	0.15	0.31	0.49	0.14	0.30	0.47	0.12	0.28	0.44
2: Just West of Concession 6, between Lakeshore Rd and Niagara Stone Rd	0.12	0.39	0.63	0.14	0.44	0.71	0.14	0.43	0.71	0.14	0.43	0.70
> Lakeshore Road	0.04	0.14	0.20	0.04	0.15	0.21	0.04	0.15	0.21	0.04	0.15	0.21
> East & West Line	0.14	0.35	0.71	0.17	0.37	0.77	0.16	0.37	0.76	0.16	0.37	0.76
> Line 1	0.03	0.06	0.09	0.03	0.06	0.10	0.03	0.06	0.10	0.03	0.06	0.09
> Line 2	0.03	0.22	0.36	0.03	0.23	0.38	0.03	0.22	0.37	0.03	0.22	0.36
> Line 3 Road	0.13	0.37	0.67	0.15	0.40	0.73	0.14	0.39	0.71	0.14	0.38	0.69
> Niagara Stone Road	0.72	2.10	3.56	0.83	2.41	4.10	0.83	2.40	4.08	0.82	2.38	4.04
3: Just South of Line 3	0.08	0.27	0.44	0.09	0.30	0.50	0.09	0.29	0.49	0.09	0.29	0.48
4: Just North of Queeston Rd, between Niagara Stone Rd and Concession 6	0.11	0.33	0.55	0.13	0.36	0.61	0.13	0.36	0.60	0.13	0.35	0.59
> Niagara Stone Road	0.17	0.59	1.02	0.19	0.64	1.12	0.19	0.64	1.10	0.19	0.63	1.09
> Airport Road	0.23	0.74	1.07	0.26	0.82	1.21	0.26	0.81	1.21	0.26	0.80	1.20
> Concession 7 Road	0.03	0.06	0.09	0.03	0.06	0.10	0.03	0.06	0.10	0.03	0.06	0.09
> Concession 6	0.10	0.12	0.23	0.11	0.13	0.25	0.11	0.13	0.25	0.11	0.12	0.24
5: Just East of Concession 5, between Queenston Rd and York Rd	0.03	0.18	0.24	0.04	0.20	0.27	0.04	0.20	0.27	0.04	0.19	0.26
6: Just East and North of St. Davids	0.09	0.26	0.41	0.11	0.29	0.46	0.11	0.29	0.46	0.11	0.29	0.46
7: South Town Boundary	0.07	0.20	0.33	0.08	0.23	0.37	0.08	0.23	0.37	0.08	0.23	0.37
> Taylor Road	0.14	0.35	0.71	0.17	0.37	0.77	0.16	0.37	0.76	0.16	0.37	0.76
> Queen Elizabeth Way	0.09	0.26	0.40	0.11	0.30	0.46	0.11	0.30	0.46	0.11	0.30	0.46
> Mewburn Road	0.05	0.04	0.04	0.05	0.04	0.04	0.05	0.04	0.04	0.05	0.04	0.04
> Highway 405	0.01	0.04	0.07	0.01	0.04	0.07	0.01	0.04	0.07	0.01	0.04	0.07
> 4 Mile Creek Road	0.17	0.48	0.83	0.20	0.56	0.95	0.20	0.56	0.95	0.20	0.56	0.95
> Niagara Parkway	0.02	0.20	0.29	0.02	0.21	0.31	0.02	0.21	0.31	0.02	0.21	0.31
8: Welland Canal	0.11	0.33	0.57	0.12	0.36	0.62	0.12	0.35	0.61	0.11	0.34	0.60
> Lakeshore Road	0.21	0.76	1.26	0.23	0.81	1.34	0.22	0.78	1.29	0.20	0.74	1.23
> Carlton Street	0.15	0.31	0.52	0.16	0.33	0.55	0.16	0.32	0.53	0.15	0.30	0.51
> Queen Elizabeth Way	0.07	0.24	0.46	0.08	0.27	0.51	0.08	0.26	0.51	0.08	0.26	0.50
> Queenston Street	0.30	1.06	1.73	0.34	1.15	1.87	0.33	1.13	1.82	0.32	1.10	1.76
> Glendale Avenue	0.13	0.37	0.67	0.15	0.40	0.73	0.14	0.39	0.71	0.14	0.38	0.69

The tagged percentages on the figure are for the aggressive change scenario of mode splits.

At a high level, the analysis reveals that all 8 major screenlines remain within capacity in the future 2041 horizon, indicating potential to redistribute demand from busy corridors onto less busy ones. The highest V/C ratios occur during the weekend PM peak hour and were recorded to be 0.71 across screenline 2 (just west of Concession 6, between Lakeshore Road and Niagara Stone Road); and 0.62 across screenline 8 (connecting St. Catharines and Niagara-on-the-Lake). At the underlying screenline location level, it is revealed that six corridors are anticipated to experience congested traffic conditions in the 2041 horizon, with volume-to-capacity ratios exceeding 0.95.

Across screenline 1, Niagara Stone Road is expected to realize the highest V/C ratio, which occurs during the weekend PM peak. Across the status quo, partial change, and aggressive change scenarios, the V/C ratio was calculated to be 1.50, 1.42, and 1.32 respectively.

Across screenline 2, Niagara Stone Road is again expected to realize the highest V/C ratio, also occurring during the

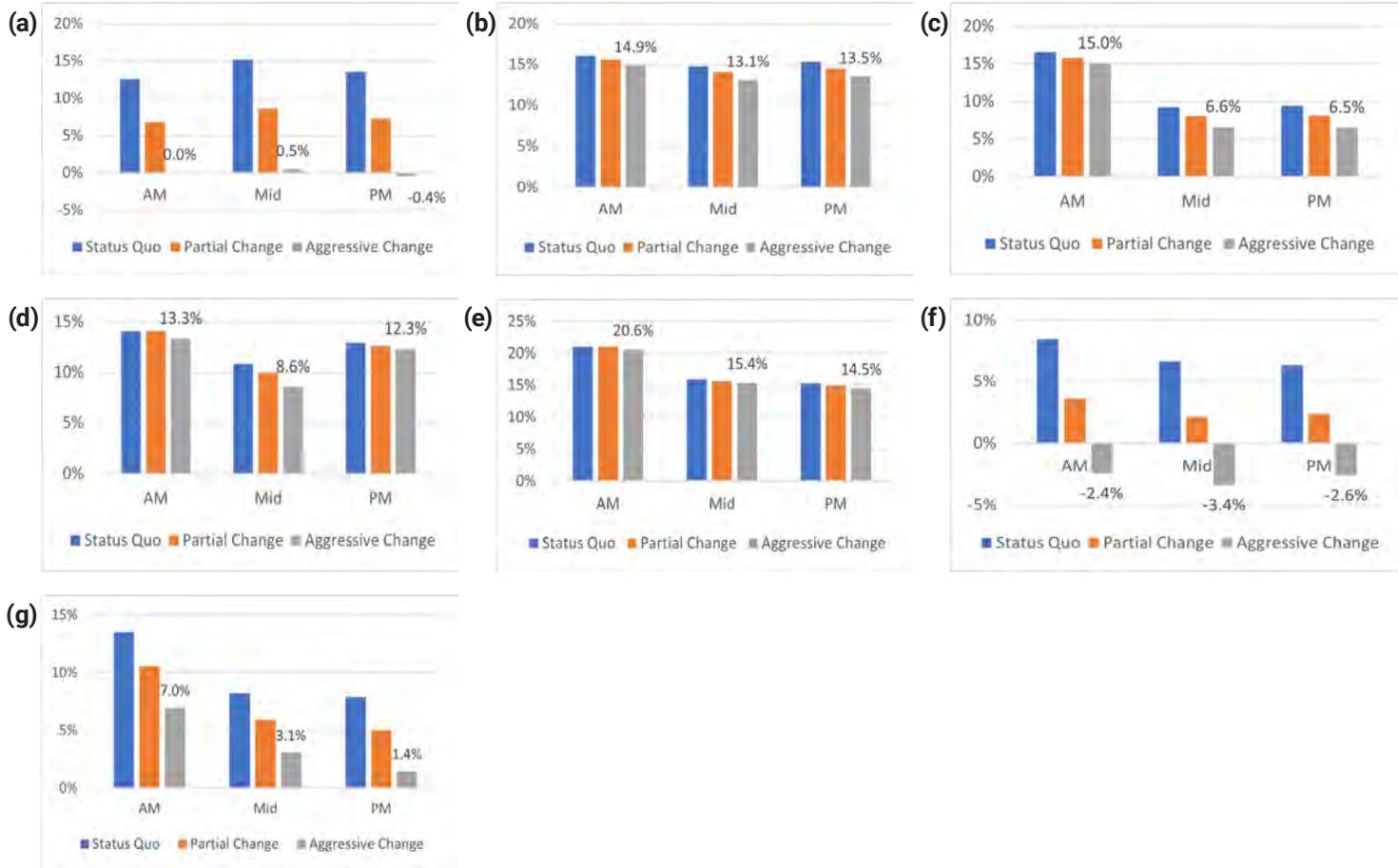
weekend PM peak. Across the status quo, partial change, and aggressive change scenarios, the V/C ratio was calculated to be 4.1, 4.08, and 4.04 respectively.

Niagara Stone Road connects the three biggest communities in Niagara-on-the-Lake - Old Town, Virgil, and Glendale - with the Queen Elizabeth Way (QEW) and is therefore heavily used by both residents and visitors of Niagara-on-the-Lake. The strategic alignment of this roadway also means traffic is funneled to it from various intersecting east/west and north/south corridors, which contributes to the significant V/C ratios.

Across screenlines 3, 5, and 6 no capacity issues have been noticed. Across screenline 4, Niagara Stone Road and Airport Road are expected to realize the highest V/C ratios (1.12 and 1.21 respectively in the status quo scenario), which occur during the weekend PM peak. In the aggressive change scenario these V/C ratios are as much as 3% lower.

Across screenline 7, Four Mile Creek Road is expected to realize the highest V/C ratio, which occurs during the weekend PM peak. Across the status quo, partial change, and aggressive change scenarios, the V/C ratio was calculated to be 0.95 in all. This corridor is increasingly supporting the

Figure 5.1: Percentage change in V/C ratio for different scenarios (status quo, partial change, and aggressive change) with respect to the existing conditions on a) Niagara Stone Road (screenline 1), b) Niagara Stone Road (screenline 2), c) Niagara Stone Road (screenline 4), d) Airport Road (screenline 4), e) Four Mile Creek Road (screenline 7), f) Lakeshore Road (screenline 8), and g) Queenston Street (screenline 8)



developments of St. Davids, as well as being an important connector between Highway 405 and neighbourhoods further north such as Virgil and Old Town.

Across screenline 8, both Lakeshore Road and Queenston Street are also expected to experience a high level of congestion during the weekend PM peak (1.34 and 1.87 V/C ratios respectively in the status quo scenario). In the aggressive change scenario these V/C ratios are up to 8% lower, though the corridors still remain significantly congested.

Queenston Street (Homer Bridge) across the Town's western municipal boundary is one of five bridge connections between St. Catharines and Niagara-on-the-Lake, and one of two connections that revealed congestion issues in the 2041 horizon, along with the Lock 1 Bridge along Lakeshore Road. The projected traffic volumes at this location exceed available capacity in both the weekend PM peak and the weekend mid-day peak hours. The Welland Canal contributes to traffic bottlenecks at various bridge crossings, and traffic challenges are further exacerbated during times when the bridges are lifted for larger water vessels to pass. Another factor contributing to the projected congestion at this location is the projected trips generated from the emerging residential, commercial, and institutional hub at Glendale. Homer Bridge serves as the most direct route between Glendale and Downtown St. Catharines, and is expected to be heavily used by road users between these two communities.

Lakeshore Road (Lock 1 Bridge), also along the Town's western municipal boundary, is expected to have a traffic volume exceeding available capacity in both the weekend PM peak and the weekend mid-day hours in the 2041 horizon. Similar to the Homer Bridge, the Welland Canal plays a big role in the congestion issues at this location, as the crossing serves as the most direct route between the northern part of St. Catharines and Old Town.

Based on the conducted screenline analysis that captures the performance of different corridors in Niagara-on-the-Lake, developments on Niagara Stone Road, Airport Road, Lakeshore Road, Four Mile Creek Road, and Queenston Road should be prioritized. Widening these roadways or upgrading their classification, when possible, to accommodate the increase in travel demand would help mitigating congestion and facilitating the movement of residents and tourists. Niagara Stone Road, Four Mile Creek Road, and Airport Road facilitate connectivity throughout Niagara-on-the-Lake and to corridors such as the Queen Elizabeth Way and Highway 405. Widening, improving, or promoting the use of alternative roadways, such as Concession Road 6, that connect the north of the Town with the Queen Elizabeth Way is also recommended. The Lakeshore Road and Queenston Road connect Niagara-on-the-Lake with St. Catharines and widening them would improve the traffic flow from and to the Town. In addition to enhancing capacity of the aforementioned critical

roadways, adopting one of the mode change scenarios, partial or aggressive, would contribute positively. Recommended roadway improvements along specific segments of these (and other) corridors are discussed further in **section 5.5**.

As illustrated in **Figure 5.1(a) to (g)**, application of the aggressive change is expected to reduce the respective V/C ratios along the critical corridors identified.

On Niagara Stone Road (screenline 1) in the PM peak hour, the status quo, partial, and aggressive change scenarios are associated with 13%, 7%, and 0% changes in V/C ratio, respectively, compared to the existing conditions.

On Niagara Stone Road (screenline 2) in the PM peak hour, the status quo, partial, and aggressive change scenarios are associated with 15%, 14%, and 13% changes in V/C ratio, respectively, compared to the existing conditions.

On Niagara Stone Road (screenline 4) in the PM Peak, the status quo, partial, and aggressive change scenarios are associated with 9%, 8%, and 6% changes in V/C ratio, respectively, compared to the existing conditions.

On Airport Road (screenline 4) in the PM peak hour, the status quo, partial, and aggressive change scenarios are associated with 13%, 13%, and 12% changes in V/C ratio, respectively, compared to the existing conditions.

On Four Mile Creek Road (screenline 7) in the PM peak hour, the status quo, partial, and aggressive change scenarios are associated with 15%, 15%, and 14% changes in V/C ratio, respectively, compared to the existing conditions.

Finally, on Lakeshore Road (screenline 8) in the PM peak hour, the status quo, partial, and aggressive change scenarios are associated with 6%, 2%, and -3% change in V/C ratio, respectively, compared to the existing conditions. This illustrates that partial and aggressive change scenarios have a positive impact on the performance of the investigated corridors.

To summarize, the forecasted changes in V/C ratios in the 2041 horizon year illustrate the positive impact the partial change, and especially the aggressive change, scenarios have on the performance of the investigated corridors.

Due to the critical role Niagara Stone Road plays in connecting the three major communities, Old Town, Virgil, and Glendale, with the QEW, distributing traffic during peak periods would enhance the performance of the transportation network. This can be achieved by using variable message signs (VMS), which is an application of Intelligent Transportation Systems (ITS) that would alleviate congestion and the negative impact on the environment. Travel time on alternative routes would be estimated and real-time information would be shared with drivers.

It is worth mentioning that shorter routes can be slightly longer in distance. For an example, if a driver is at Niagara Stone Road and Concession 6 Road and wants to go to the Memorial Clock Tower of Niagara-on-the-Lake, then an alternative route can be via Niagara Stone Road, East and West Line, Niagara Street, and King Street. It is longer by less than 1 kilometre and its travel time compared to the route via Niagara Stone Road is time dependent. Consultation with the Region and Town members and residents is encouraged to make the proper decision. If there is another fixed alternative route from QEW to other communities or between communities, it would be a good idea to use proper signage to promote for this alternative route. A real case of VMS utilization can be seen on the Gardiner Expressway for drivers travelling to Downtown Toronto from west. They have the option to choose what route to take (Gardiner Expressway or Lake Shore Blvd.) based on the VMS. Although drivers prefer to use the highway, the Lake Shore Blvd. is often chosen during the peak periods to avoid congestion. Collaborating with the Niagara Region to improve travel conditions and safety on Niagara Stone Road is crucial. For an example, if a left turn is permissive, considering a protected and permissive phase instead would be an added value. Concepts of ITS and signage are explored further in the Policies and Strategies section of this report.

5.3 CYCLING NETWORK EVALUATION

The Town of Niagara-on-the-Lake currently has a fairly connected network of cycling facilities, primarily located along major roadways through the Town. This TMP provides an opportunity to re-evaluate the previously planned cycling network and update it to consider new cycling best practices, research, updated growth trends and travel demand in

Niagara-on-the-Lake, as well as integrate it holistically with the broader multi-modal network. Our approach is one that considers linkages within the existing network, while proposing new connections to places that residents want to go.

5.3.1 FACILITY SELECTION

Research shows that one of the most effective measures for improving overall cyclist safety within a road network is increasing the number of cyclists using the system. However, in order to encourage cyclists of different ages and abilities, a variety of bicycle facilities with different degrees of separation between motorists and cyclists must be available. Separation of cyclists and motor vehicles becomes increasingly important as traffic volumes and operating speeds increase, and on corridors with a high propensity for incidents.

The selection of active transportation facility type focuses around:

- Vehicular speed;
- Vehicular volume;
- Number of accesses onto the roadway; and
- Availability of on-street parking.

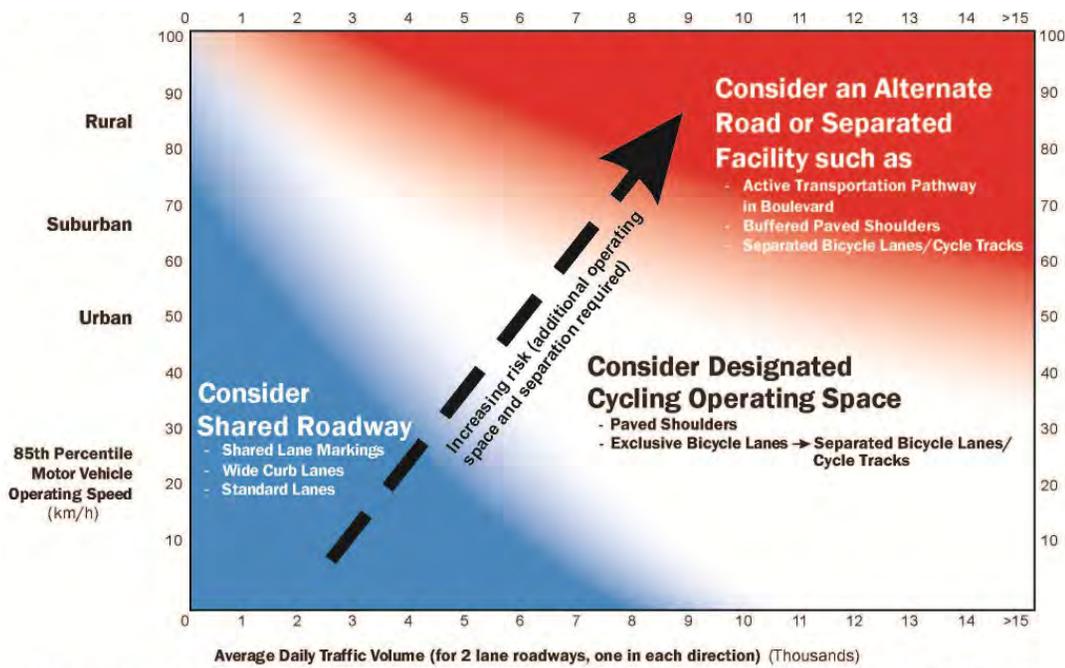
Bicycle facilities provide various levels of separation between cyclists and motorists. These range from shared travel lanes with no separation but with the option to provide sharrow markings, to bicycle lanes with a painted buffer or physical barrier. Other alternatives are in-boulevard bicycle facilities within the highway right-of-way, or off-road multi-use pathways outside of the highway right-of-way as summarized in **Table 5.3**.

A direct comparison of the relative safety of different types of bicycle facilities and degrees of separation is difficult. A bicycle facility with greater separation may appear to be 'safer'

Table 5.3: Types of cycling facilities and their desired and minimum widths according to OTM Book 18

Facility	Type	Desired Width	Suggested Minimum Width
Separated Bike Lane	Bike Lanes	<ul style="list-style-type: none"> • 2.0m lane • 1.2m buffer 	<ul style="list-style-type: none"> • 1.5m lane • 0.5m buffer
Painted Bike Lane		<ul style="list-style-type: none"> • 1.8m lane • 1.2m buffer (if on-street parking) 	<ul style="list-style-type: none"> • 1.5m lane • 0.5 buffer (if on-street parking)
Signed Route	Shared Roadways	• 4.0-4.5m shared lane	• 3.0-4.0m shared lane
Paved Shoulder		• 1.5-2.0m shoulder	• 1.2m shoulder
Raised Cycle Tracks		<ul style="list-style-type: none"> • 2.0m lane • up to 1.0m curb 	<ul style="list-style-type: none"> • 1.5m lane • up to 1.0m curb
Multi-Use Path	In-Boulevard Facilities	<ul style="list-style-type: none"> • 4.0m two-way operation • up to 1.0m curb 	<ul style="list-style-type: none"> • 3.0m two-way operations • up to 1.0m curb

Figure 5.2: Desirable Bicycle Facility Pre-Selection Nomograph (OTM Book 18)



but may result in more conflicts at intersections and driveways, especially if the separation makes the cyclist less visible to the motorist. The overarching cycling facility selection follows a 3-step process:

- **Step 1- Facility pre-selection:** Pre-select an appropriate facility type based on vehicular volume and speed using the Ontario Traffic Manual Book 18 Nomograph as shown in **Figure 5.2**.
- **Step 2- Consider corridor specific characteristics:** Consider design characteristics such as visibility of cyclists, number of driveway accesses and whether on-street parking is provided.
- **Step 3- Justify decision and identify design enhancements:** Document the rationale.

Generally, there are five types of cycling facilities that are distinguished based on their degree of separation from traffic and placement within the roadway right-of-way.

Separated Bike Lanes:

Bike lanes with flex bollards or planters are meant for roadways with a large number of trip generators, high volumes of traffic and on-street parking to provide an additional layer of safety for cyclists separating them from motorized vehicles. This mitigates the chances of getting hit by a door from a parked car or from vehicles stopped at the curb. According to the Ontario Traffic Manual, Book 18, for cycling facilities, it is recommended that this type of facility have between 1.5-2.0m of lane width and 0.5-1.2m buffer.

Painted Bike Lanes:

Painted bike lanes serve many of the same functions as separated bike lanes to service areas with high trip generation,

but do not need the same degree of protection due to lower traffic volumes and fewer roadway conflicts such as parked vehicles or pick-up and drop-off locations. Painted bike lanes often consist of painted lanes on the roadway with associated signage. According to the Ontario Traffic Manual, Book 18, for cycling facilities, it is recommended that this type of facility have between 1.5-1.8m of lane width and 0.5-1.2m buffer where bike lanes are adjacent to on-street parking between the parking lane and a general purpose lane.

Signed Routes:

Signed routes are shared roadway facilities recommended on low-volume roadways meant to connect to higher-order cycling facilities. Sharrows comprise primarily of road painting and signage that is intended to alert motorists to share the lane.

Paved Shoulders:

Paved shoulders are meant for rural areas with low cycling volumes. The shoulder is paved to allow for cyclists to travel separated from traffic when the shoulder is not being used for other purposes.

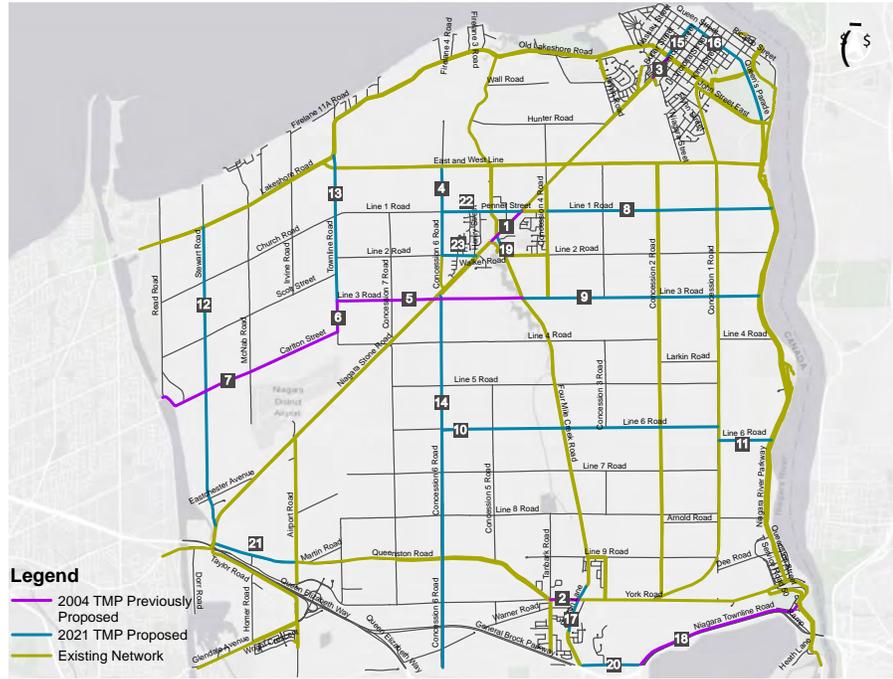
Multi-Use Paths:

Multi-use paths are shared pathways that can be used by pedestrians and cyclists that are separated from traffic and provide a much safer environment, particularly on roadways with high motor vehicle speeds and volumes. Multi-use paths are often 3m to 4m wide to allow for two-way movement and are often used as mid-block connections within and between parks and other recreational areas, but can also be used in boulevards to provide pedestrian and cyclist access to neighbourhoods.

Figure 5.3: Existing and proposed Niagara-on-the-Lake cycling network

5.3.2 PROPOSED CYCLING CORRIDORS

Proposed cycling corridors were selected using the facility selection criteria and guidelines outlined earlier in this chapter. As a starting point, the previously proposed cycling network was utilized and reviewed to see where modifications, additions or deletions were warranted based on transportation network analysis and stakeholder feedback. When developing proposed corridors, a focus on connectivity and access to important destinations throughout Niagara-on-the-Lake was prioritized. The existing, previously proposed cycling connections and new TMP proposed cycling connections are illustrated in **Figure 5.3**. It is important to also appreciate that the illustration of the 'Existing Network' is not to suggest that these corridors are all perfect as they are and should not be reviewed. Segments such as the south end of Concession 2 Road (Line 9 Road to York Road) should be evaluated to determine if the paved shoulder is sufficient, and Lakeshore Road and Concession 1 Road have notable limitations which the Town and Region are already evaluating for improvements. In the case of Lakeshore Road, the Region intends to explore an off-road bicycle trail in recognition that the existing facilities do not meet the standards of a dedicated bicycle lane (even though they are considered to be a part of the existing cycling network).



All proposed cycling improvements are highlighted in **Table 5.4**. In addition to these noted improvements, it is important to consider the additional QEW crossings proposed in the Glendale District Plan. These improvements can be expected to provide additional cycling connectivity between Glendale and the rest of Niagara-on-the-Lake, and potentially between Glendale and St. Catharines if the proposed cycling corridor along Stewart Road is implemented.

New roadways are proposed to increase connectivity and allow for a more permeable pedestrian network including three new crossings of the QEW with one a designated pedestrian crossing at the south end of Airport Road. Notably, several Town roadways operate at higher speed limits (i.e. 80km/h) and thus warrant some form of separated bike facility. Additionally, AADT volumes were not available for all Town roads and thus best practices, road conditions, surrounding land uses and speed limits were utilized to determine proposed corridors and facility types. The proposed corridors were then evaluated to determine what connections, if any should be removed as well as implementation priority as detailed in the next subsection.

Table 5.4: Proposed cycling corridors

ID	Proposed Corridor	Limits
1	Niagara Stone Road*	Line 1 Road to South of Four Mile Creek Road
2	York Road*	Queenston Road to Four Mile Creek Road
3	Niagara Stone Road*	Anderson Lane to Mary Street
4	Concession 6 Road	East and West Line to north of Niagara Stone Road
5	Line 3 Road	Townline Road to Four Mile Creek Road
6	Townline Road	Carlton Street to Line 3 Road
7	Carlton Street*	St. Catharines Boundary to Townline Road
8	Line 1 Road	Concession 4 Road to Niagara River Parkway
9	Line 3 Road	Four Mile Creek Road to Niagara River Parkway
10	Line 6 Road	Concession 6 Road to Concession 1 Road
11	Line 6 Road	Concession 1 Road to Niagara River Parkway
12	Stewart Road*	Lakeshore Road to Niagara Stone Road
13	Townline Road	Lakeshore Road to Line 3 Road
14	Concession 6 Road	Niagara Stone Road to southern Town boundary
15	Mississagua Street	Mary Street to Queen Street
16	Queen Street/Queen's Parade	Mississagua Street to John Street East
17	Four Mile Creek Road*	North of York Road to David Secord Drive
18	Niagara Townline Road*	Niagara Town Line to Niagara Parkway
19	Four Mile Creek Road*	Niagara Stone Rd to Line 2 Rd
20	Niagara Townline Road*	Four Mile Creek Road to Portage Road
21	Queenston Road	Niagara Stone Road to Airport Road
22	Line 1 Road	Concession 6 Road to Niagara Stone Road
23	Line 2 Road	Concession 6 Road to Niagara Stone Road

* denotes Regional corridor

5.3.3 EVALUATION CRITERIA

The proposed corridors were evaluated using a set of criteria developed based on best practices, stakeholder feedback and Town visioning established through background planning documents.

The evaluation criteria for active transportation improvements are focused around four criteria:

Grade



Table 5.5: Evaluation criteria for grade

Percent Grade	Description	Points
<1%	A flat road	15
1-3%	Slightly uphill but not particularly challenging	10
4-6%	A manageable gradient that can cause fatigue over long periods	5
7-9%	Starting to become uncomfortable for seasoned riders, and very challenging for casual riders	1
10%+	Difficult for all riders	0

Rationale: Roadway grade can present a significant challenge and deterrent for cyclists using available facilities. If a route is too challenging, cyclists will choose to use an alternate route to access their destination. A flat route provides the most comfortable ride, while grades of 1-3% present a slight impact on cycling effort, but are mostly manageable for casual riders. A 4-6% grade presents some challenge over extended lengths for casual users and grades greater than 7% present a challenge for all riders.

Analysis Approach: An average grade percentage was calculated for each segment of active transportation improvements leveraging GIS data and validating it with Google Maps data.

Evaluation: The criteria points that were assigned based on grade percentage thresholds are summarized in **Table 5.5**.

Access to Major Destinations

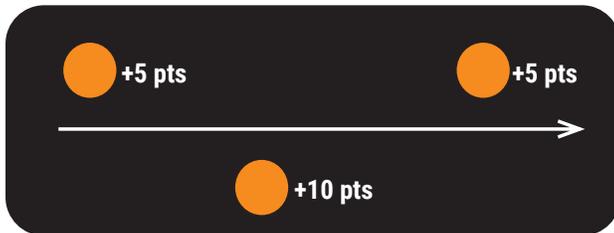


Table 5.6: Evaluation criteria for major destinations

Criteria	Points
Community destinations	5
Supporting active school travel	10
Key commercial areas	5
Last mile connections to transit	5
Maximum Points:	25

Rationale: Major destinations such as community centres, employment centres, and schools are all places that people typically travel to. Providing an active transportation network is as much about providing an available, and connected option, as well as creating a network that takes people where they want to go.

Analysis Approach: A 500m buffer was assigned around each candidate corridor and the number of trip generators within the buffer was used to determine its score for the criteria, up to a maximum of 25 points. The common points of interest were obtained through data available on Niagara-on-the-Lake's open data platform were used to determine the trip generators. Community destinations were classified as community centres, parks, libraries, hospitals, and arenas. Additionally, grocery stores, shopping centres/ retail were classified as key commercial destinations. The service areas of the current OnDemand transit were used to determine transit connections, where each connecting service area was assigned 5 points. Connections to schools was given a higher weighting as school trips represent a significant opportunity to enhance active transportation given the length, time period and nature of the trips, particularly for older students.

Evaluation: The criteria points that were assigned for each major destination type within a candidate route's buffer area are summarized in **Table 5.6**.

Network Connectivity

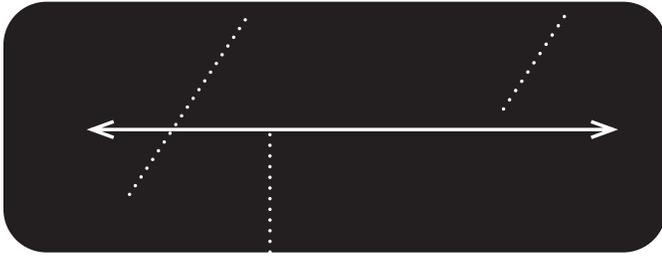


Table 5.7: Evaluation criteria for network connectivity

Criteria	Description	Points
Existing Facility	Connects to an existing active transportation facility.	10
Minor Additions	A future candidate corridor that would require minor cost/effort to implement.	10
Rehab Additions	A future candidate corridor that would be able to be implemented as part of a regular rehab or maintenance work, which would typically be more long-term.	5
Standalone Capital Infrastructure	A future candidate corridor that would require specific capital investment to implement, thus potentially being much longer-term.	2
Maximum Points:		25

Rationale: It is important that active transportation corridors create a connected network that doesn't leave users isolated or stranded. Greater connections improve the usability of active transportation infrastructure. This factor evaluates which candidate corridors will provide the best network connections between existing and future corridors.

Analysis Approach: The number of network connections for each candidate corridor were evaluated based on whether they are existing connections, thus requiring no additional investment and providing an immediate benefit once built, or whether it would connect to future corridors that would require varying degrees of investment to make a useful connection. Each of the different connection types were assigned points.

Evaluation: The criteria points that were assigned based on network connectivity attributes are summarized in **Table 5.7**.

Recreation and Tourism Opportunities

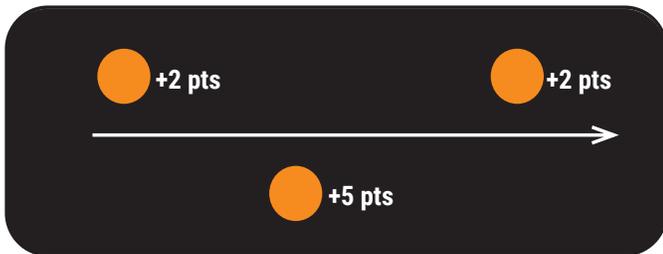


Table 5.8: Evaluation criteria for recreation and tourism opportunities

Criteria	Points
Breweries/ Wineries	5
Heritage Properties	2
Outdoor art/ Museums/ Theatres	5
Maximum Points:	25

Rationale: Niagara-on-the-Lake is a popular tourist destination, drawing visitors for its unique natural elements, heritage sites, theatre productions, wineries, breweries and more. Using available data, tourist destinations within a 500m buffer from a proposed corridor were measured to quantify the opportunities to strengthen tourism and recreation throughout the Town.

Analysis Approach: A 500m buffer was assigned around each candidate corridor and the number of tourist and recreational sites within the buffer was used to determine its score for the criteria, up to a maximum of 25 points. The applicable sites were obtained through data available on Niagara Region's open data platform. Tourist sites were considered to be sites designated as heritage properties, and while not all of these sites are tourist draws, they cumulatively contribute to the unique feel and culture sought out by visitors. Additionally, tourist sites were considered to be the breweries and wineries, within the Town which draw a significant number of visitors. Breweries, wineries, outdoor art exhibits, museums and theatres were all assigned 5 points; and each heritage property was assigned 2 points given that each single site is not likely to generate the same number of trips as the other destinations.

Evaluation: The criteria points that were assigned based on each candidate corridor's connection to recreation and tourism opportunities are summarized in **Table 5.8**.

5.3.4 NETWORK EVALUATION

Using the evaluation criteria, each network segment was scored based on the noted categories. The scoring was used to understand feasibility, priority and implementation timelines.

Generally, the infill segments on the network scored higher (i.e. segments on Niagara Stone Road, Four Mile Creek Road and Mississagua Street) as the proposed improvements offer high connectivity with minimal changes required. Additionally, connections within urban communities scored higher due to the connection to a number of destinations and tourist opportunities such as the segments within Old Town.

Corridors between urban communities which travel through largely rural areas scored lower due to the fewer surrounding destinations and higher costs associated with longer distances. For example, Carlton Street and Townline Road between Carlton Street and Line 3 Road both scored lower through the evaluation, however these connections help to build network connectivity in the western part of the Town. As detailed above, network connectivity is critical to the usability of the network and as the Town grows over the next 20 years, cycling connections throughout Niagara-on-the-Lake will help to support multi-modal connections.

Table 5.9: Proposed cycling corridor evaluation

ID	Proposed Network Modifications	Limits	Grade	Access to Major Destinations	Network Connectivity	Recreation and Tourism Opportunities	Total
1	Niagara Stone Rd	Line 1 Rd to South of Four Mile Creek Rd	10	25	25	5	65
2	York Rd	Queenston Rd to Four Mile Creek Rd	10	20	25	9	64
3	Niagara Stone Rd	Anderson Lane to Mary St	10	25	25	6	66
4	Concession 6 Rd	East and West Line to north of Niagara Stone Rd	10	20	10	25	65
5	Line 3 Rd	Townline Rd to Four Mile Creek Rd	10	10	25	10	55
6	Townline Rd	Carlton St to Line 3 Rd	10	0	2	0	12
7	Carlton St	St. Catharines Boundary to Townline Rd	10	5	2	0	17
8	Line 1 Rd	Concession 4 Rd to Niagara River Pkwy	10	15	25	10	60
9	Line 3 Rd	Four Mile Creek Rd to Niagara River Pkwy	10	0	25	10	45
10	Line 6 Rd	Concession 6 Rd to Concession 1 Rd	10	5	25	5	45
11	Line 6 Rd	Concession 1 Rd to Niagara River Pkwy	15	0	22	0	37
12	Stewart Rd	Lakeshore Rd to Niagara Stone Rd	10	10	22	0	42
13	Townline Rd	Lakeshore Rd to Line 3 Rd	10	0	22	0	32
14	Concession 6 Rd	Niagara Stone Rd to southern Town Boundary	10	10	25	25	70
15	Mississagua St	Mary St to Queen St	10	20	15	25	70
16	Queen St/Queen's Parade	Mississagua St to John St	10	25	25	25	85
17	Four Mile Creek Rd	North of York Rd to David Secord Dr	10	25	25	11	71
18	Niagara Townline Rd	Niagara Town Line to Niagara Pkwy	10	0	12	15	37
19	Four Mile Creek Rd	Niagara Stone Rd to Line 2 Rd	15	25	25	5	70
20	Niagara Townline Rd	Four Mile Creek Rd to Portage Rd	10	0	0	25	35
21	Queenston Road	Niagara Stone Road to Airport Road	10	5	25	5	45
22	Line 1 Road	Concession 6 Road to Niagara Stone Road	15	15	25	10	65
23	Line 2 Road	Concession 6 Road to Niagara Stone Road	15	15	25	10	65

Recommended Cycling Network

Based on the evaluation results, a recommended cycling network was developed. The higher scoring segments were selected for short-term improvements whereas lower scoring segments were flagged for medium to long-term additions to expand coverage along the network. The short-term network focuses on filling in gaps in the network and creating critical north-south and east-west connections. The medium-term network looks to build upon the coverage of the network. These network recommendations will serve to achieve the partial and aggressive mode split scenarios but further supporting and incentivizing active transportation and multi-modal trips for those trips that currently fall within a reasonable cycling distance.

The proposed facility type was based on posted speed limits and AADT volumes, where available. While this was used as a guide to proposed facility types, additional consideration was given based on connecting facility types and the surrounding environment. Notably, many roadways within the Town have posted speed limits around 70 - 80km/h making most corridors suitable for on-road cycling facilities or multi-use trails, as opposed to shared road facilities. On-road cycling facilities may include paved shoulders or separated bike lanes. A multi-use path uses an alternate roadway or separated facility from the vehicle roadway and is typically warranted with higher vehicle volumes and speed limits. While multi-use paths that are separated from the roadways are generally more desirable than on-road cycling facilities, prioritization should follow the framework laid out in Ontario Traffic Manual Book 18 - Cycling Facilities. Consideration should also be given to the Town's unique tourism attributes, particularly with respect to corridors adjacent to bike rental facility locations, which may be frequented by cyclists riding in large groups, as well as cyclists with minimal cycling experience or who are unfamiliar with the Town's roads. The proposed network is outlined in **Figure 5.4** with the recommended implementation timeline shown in **Figure 5.5**.

Figure 5.4: Proposed Niagara-on-the-Lake cycling network

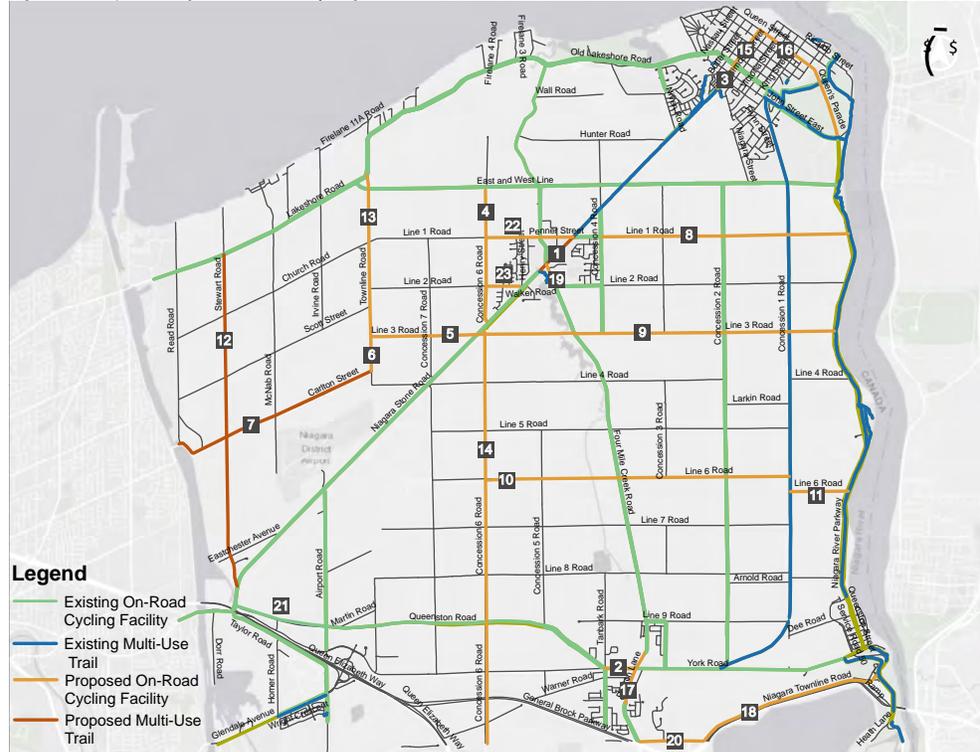
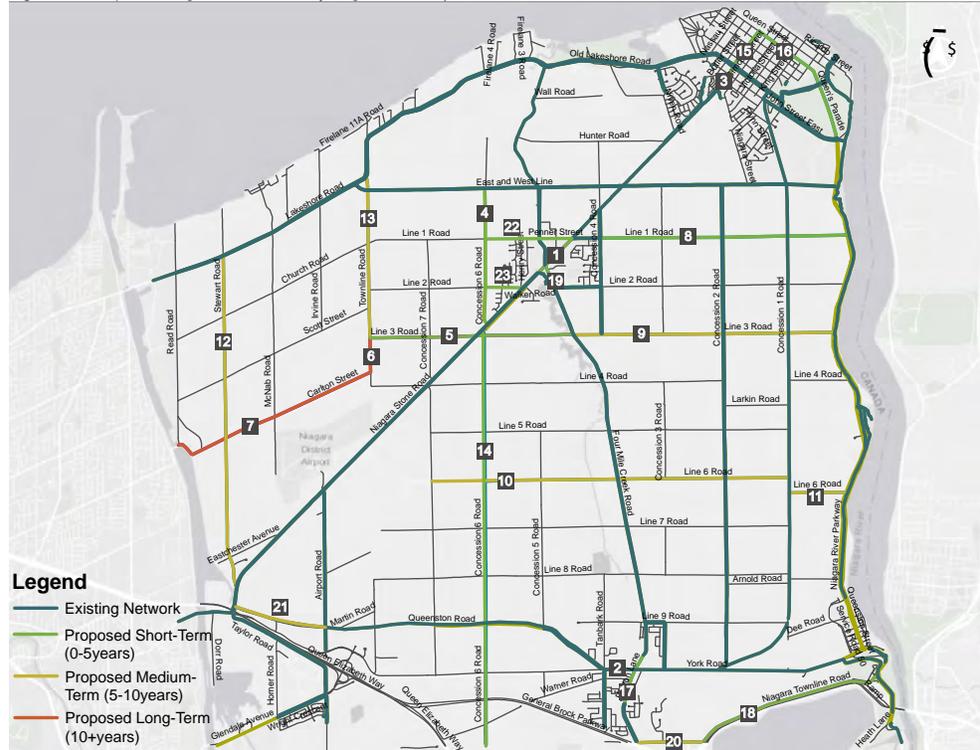


Figure 5.5: Proposed Niagara-on-the-Lake cycling network implementation timeline



5.4 TRANSIT NETWORK EVALUATION

5.4.1 TRANSIT ALTERNATIVE SERVICE DELIVERY

Alternative service delivery is a strategy deployed by various transit and municipal agencies across North America in the interest of providing right-sized service in communities for which conventional fixed-route services would be too costly and/or would not provide adequate service for the community. Most commonly, and as is the case with NRT OnDemand, alternative service delivery enables transit riders to pre-book trips at a particular time, noting a pick-up and drop-off destination within a set service boundary. This service is often enabled through dynamic scheduling technology where trips can be grouped and optimized, allowing riders to use a mobile application to book, track and pay for their trips.

While the NRT OnDemand service currently in operation in Niagara-on-the-Lake is a form of alternative service delivery, it is just one of many different types of alternative service, which generally refers more broadly to a form of transit that does not operate on a fixed route and fixed schedule. Some forms of alternative service will transport users between their homes and bus stop locations or designated mobility hubs, while others will only transport users between designated stop locations or mobility hubs. Others are less of a pure on-demand solution and are more of a deviated fixed-route model. Regardless of its form, different types of alternative service delivery generally integrate effectively within a MaaS platform where individuals can plan all components of their multi-modal trip via one resource, leveraging available technology for real-time updates. When establishing alternative service delivery in areas without prior transit service, it can be used to document travel patterns and build transit ridership to the extent where fixed-route service may eventually be introduced.

Benefits of alternative service delivery include:

- Flexible routing or scheduling to meet customer demand;
- Use of technology (mobile apps) to correlate supply and demand; and
- Optimized fleet deployment resulting from appropriate trip grouping.

In addition to Niagara-on-the-Lake, many municipalities across Ontario have been deploying some form of alternative service delivery. A notable example is Belleville Transit which launched a demand-response pilot in September 2018 where they replaced two fixed-route late night services with a demand-response service. The agency utilized a mobility app on their existing 40-foot conventional buses to provide dynamic routing and scheduling. This service was stop-to-stop as opposed to door-to-door, meaning users were transported to and from existing bus stops, rather to and from their homes.

Trips were booked via phone, mobile app, or web booking. A significant increase in ridership was observed, with the number of monthly trips tripling over the pilot period. This resulted in a growth in fleet from 2 to 5 buses with certain trips operating at full capacity. An average utilization of 30 people per vehicle in the evening (9pm to 12am) was observed where there used to be an average utilization of 3 people per vehicle during these hours.

The complexity of Niagara-on-the-Lake's geography with a spread-out population and low densities presents challenges for providing transit service that is cost-effective. In collaboration with Niagara Region Transit and its OnDemand offering, the parameters of alternative service delivery in Old Town, Virgil, and Glendale should be reviewed on a regular basis for their appropriateness and relevance in these ever-evolving communities. Expansion of the offering into St. Davids and Queenston may also be considered as needs grow, and if performance of NRT OnDemand in Old Town, Virgil, and Glendale is strong. Alternative service delivery options may also be evaluated in the context of providing synergies and opportunities to bolster or enhance local tourism and businesses through a means of public transit that may allow more people to visit and enjoy the community while mitigating parking and roadway congestion.

5.4.2 NIAGARA-ON-THE-LAKE ONDEMAND SERVICE

Conventional Transit

In August 2020, the Niagara-on-the-Lake Council approved a one-year OnDemand transit pilot to provide transit in both urban and rural areas of the Town. The fixed route service in Niagara-on-the-Lake was removed and replaced with this OnDemand service operated by Niagara Region Transit, utilizing two vehicles to serve Old Town, Virgil, and Glendale with future potential to expand. The service has since been fully rolled out Town-wide with two additional vehicles added to the service (four vehicles in total).

This ridesharing service allows riders to book trips using a smartphone technology within a defined service area boundary without fixed routing or schedules. For those without smartphones, fares may be pre-purchased at the Community Centre in the Town as well as other locations throughout the Region, where trips may be booked over phone. Niagara-on-the-Lake OnDemand service operates year-round with service from Monday to Saturday between 7am and 7pm, with no service on Sunday. There are two fare types depending on the service area of travel, for trips within a single municipality (for example, within Niagara-on-the-Lake), a single trip will cost \$3, and trips to other communities within the Region will cost \$6, where riders may transfer to the fixed-route service. This fare allows riders to transfer onto fixed route service at regional transit hubs to complete their trips.

Trips can be booked using a mobile app or by phone for those without smartphones. Riders can input their pick-up and drop-off locations and a ride proposal will be offered. Riders will be picked up within 1-2 blocks of their scheduled point and trips can be booked up to 15 minutes before departure for added flexibility. Maximum wait times are 1 hour with a maximum trip detour time of 20 minutes. Lastly, the transit hubs available for transfer in Niagara-on-the-Lake onto conventional transit include the Outlet Collection at Niagara and Niagara College Glendale Campus.

Paratransit

As part of the OnDemand transit pilot, accessible vehicles may be requested when booking trips, while the Niagara Region paratransit service is still available for riders traveling outside of the Town. This OnDemand service offers an integrated conventional and paratransit service within the Town. Benefits to this integration include service inclusivity, simplicity for customers to navigate a single service and resource efficiencies. Into the future if the NRT OnDemand service will continue to serve paratransit trips, via accessible vehicles, compliance with the AODA should be monitored, including appropriate eligibility criteria, service hour parity, fare parity, etc. Notably, given the integrated system, fare and service parity will automatically be fulfilled.

5.4.3 ALTERNATIVE SERVICE DELIVERY CASE STUDIES

To better understand the successes and challenges of OnDemand transit, comparable peer OnDemand transit systems in operation have been detailed below.

Okotoks, Alberta

The Town of Okotoks is situated just south of the City of Calgary in Alberta, with just under 30,000 people. The Town introduced OnDemand transit in late 2019, where there was no public transit service prior to this. A curb-to-curb ride service is offered where trips may be booked via an app or over the phone up to 3 weeks in advance. A single fare is set at \$3.00 which was updated at the beginning of 2021. Multiple trips can be purchased at once, anywhere from 10 to 100 trips. In the first month of operation (January 2020) which was prior to the pandemic, the Town saw a positive uptake with over 1600 rides taken. The service operates Monday- Saturday from 6:00AM to 11:30PM, which is a longer service span than many conventional fixed-route systems in communities of comparable size. In addition to longer service hours, a number of benefits have been cited from the OnDemand service including flexible and adaptable service including during a pandemic. The desired trip groupings, trip lengths and wait times can be customized to provide the appropriate level of service. Furthermore, this service can be more easily expanded into new areas or communities as demand increases.

Stratford, Ontario

Located northwest of Niagara-on-the-Lake within Southern Ontario, Stratford, while slightly larger in population, exhibits many comparable community features including a notable heritage and arts community. OnDemand transit began on Sundays on a trial basis during the summer of 2020 as a means to manage declining demand due to the pandemic while also providing enhanced service that allowed riders to make trips without transfers and significant wait times. In February 2021, due to its success, the OnDemand service was expanded into Saturdays as well due to the success observed from Sundays. Notably, fixed-route service continues to be run on weekdays. The OnDemand service runs from 6AM to 8PM on Saturdays and 10AM to 5PM on Sundays. Rides may be booked through an app, online or over the phone. The same fare prices apply for the fixed route and OnDemand service. In addition to the cost savings, the City has cited a reduction in emissions as vehicles are not operating on the road when there are no rides booked. Furthermore, City staff suggest that the Saturday OnDemand service may save up to \$90,000 annually through reduced fuel and maintenance costs.¹ Similar to Niagara-on-the-Lake, this OnDemand service replaces the previous fixed-route system on the weekends.

Chatham-Kent, Ontario

An evening on-request transit service is currently being piloted by Chatham-Kent Transit. Riders may book rides in the evening through a mobile app, web portal or by phone. The OnDemand service operates between 7:15PM and 12:30AM which provides service later into the evenings than previously offered with just fixed-route service. A trip can be requested 20 minutes in advance or up to 7 days in advance, allowing for both planned and more spontaneous trips. The service deployed is a stop-to-stop model where riders will be picked up at the nearest stop and dropped off at the closest stop to their destination with other riders picked up along the way. This eliminates the need for transfers which provides additional benefit in the evening when service is often less frequent resulting in longer wait times. The cost of the OnDemand service is the same as the fixed-route service operated throughout the day. Similar to the Niagara-on-the-Lake OnDemand transit, it is a full OnDemand network during the evening hours as opposed to having OnDemand service in certain pockets that connect to the fixed route system.

Case Study Take-Aways

The case studies illustrate the advantages of demand-response transit and the ability to scale up as required and offer both fixed-route and OnDemand transit in certain areas or times of the day/week. Additionally, the potential ridership gains which can be achieved by utilizing demand-response transit to serve low ridership areas or to use during lower demand periods. As noted in the case studies, OnDemand transit can be used as the only transit service like in Niagara-on-the-Lake and Okotoks, AB, or it can be used in combination

with fixed-route transit during lower demand periods (i.e., evenings or weekends) or within certain lower-demand areas. While Niagara-on-the-Lake may be serviced adequately with NRT OnDemand today, should conditions change catalyzing a growth in transit demand in the future, this illustrates that NRT OnDemand and fixed-route transit need not necessarily be mutually exclusive.

OnDemand transit has seen a larger up-take among small to medium sized transit systems across Canada throughout the pandemic. As many transit agencies look to regrow ridership to pre-COVID periods, the use of OnDemand transit can help to provide the right-sized service while demand grows. Furthermore, OnDemand transit, offers greater trip flexibility, particularly in areas where infrequent fixed-route service was offered, and it allows for appropriate social distancing based on trip grouping targets set. As noted in Stratford, the use of OnDemand transit on Sundays could save up to \$90,000 annually.

5.4.4 FUTURE TRANSIT RECOMMENDATIONS

5.4.4.1 Regional Considerations

Niagara Region Transit is currently offering an on-demand pilot in Niagara-on-the-Lake, Grimsby, Lincoln and Pelham. All communities represent small to medium sized municipalities which are well-suited for on-demand transit. Given that the on-demand service is operated by Niagara Region, this presents an opportunity to optimize resources across the Region based on demand. The trip patterns and demand across all pilot areas should be monitored and evaluated to understand where demand exists and during what times of day. Based on the results, service can be reallocated to best match demand. For instance, if there are more weekday commuting trips (i.e. AM and PM peak periods) seen in one community and more evening/ weekend trips observed in another, more vehicles can be allocated to each service area during their peaks. The collection of travel data during the pilot service will paint a clearer picture of demand. The ability to share and optimize resources across the Region will be contingent on a new integrated governance model.

5.4.4.2 Tourism Considerations

An effective transit system can be useful not only for local residents, but also tourists. Niagara-on-the-Lake sees seasonal peaks during the summer which can strain its transportation network and parking availability. As mentioned in the section above, the flexibility of the on-demand system provides the ability to easily allocate supply of transit vehicles to meet demand. For instance, given the high tourism typically seen in Niagara-on-the-Lake, particularly during summer months, weekend service may be more desirable relative to other areas in the Region and potentially warrant Sunday service over full weekday service (until 10pm). Additionally, it is important to consider the interplay between transit and

parking in terms of their convenience and their pricing. As transit becomes a more convenient transportation option, the demand for transit will increase and the demand for driving and parking will decrease (and vice versa). Similarly, as the user cost of parking increases, the demand for transit will increase (and vice versa). Transit use is typically also correlated with active transportation use, as transit users tend to walk the first and last legs of their journey, and between different destinations that are an easy walking distance apart.

Additionally, GO Transit has begun offering weekend rail service between Niagara Falls and Toronto, allowing tourists from the GTA to visit the Region without a vehicle. This, combined with a recent announcement that GO Transit will begin offering steeply discounted weekend fares, creates an opportunity to leverage GO Transit's services to reduce the number of tourists travelling by car to Niagara-on-the-Lake.

In collaboration with NRT, Niagara-on-the-Lake can explore a variety of service options to link with GO Transit to transport tourists. Expanded transit operations would not only reduce tourist traffic and parking demand, but also sustainably attract new tourism, such as those living in the GTA who choose or are unable to access a vehicle. The On-Demand service area could be extended to include St. Catharines GO and/or Niagara Falls GO stations on weekends. This would allow tourists to share a ride to/from the Town, and create a vital transit link between the Town and the larger urban centres in the Region. If demand for this service grows significantly, Niagara-on-the-Lake could explore a dedicated (fixed-route/scheduled) weekend shuttle service between the Old Town and regional GO stations. Such initiatives would require further discussion with the Region and would necessitate a collaborative implementation approach if they are to proceed.

5.4.4.3 Recommended Service Strategies

Short-Term (0-5 years)

In the short-term, a focus on monitoring the OnDemand transit service should be prioritized both within the Town and across all pilot areas in the Region. This can be done through the trip data collected from the third-party technology partner as well as rider feedback survey to capture more detailed trip information. Most importantly, it will be beneficial to understand if riders are traveling to the transit hub in Glendale as their final destination or transferring at the Glendale transit hub for onward travel. Additionally, other information will be useful to collect including:

- Where people are traveling both within Niagara-on-the-Lake and across the Region including frequently accessed destinations;
- What times of day peak travel is observed; and
- Average trip groupings, trip times and wait times to understand how closely these match the targets set for the OnDemand service.

Medium-Term (5-10 years)/ Long-Term (10+ years)

In the long-term, additional opportunities for transit service may be explored, building off of what is available currently and considering future growth projections across the Town and Region. Some items to explore include:

- **Future service area expansions or hubs/ park and rides.**

Based on the uptake of the existing OnDemand, areas for service expansion include Queenston and St. Davids. Additionally, in an effort to manage parking demand, particularly in highly visited areas such as Old Town, a park-and-ride service combined with an Old Town circulator / shuttle may be considered where appropriate parking locations may be identified throughout the Town. Importantly, the shuttle must be frequent, visible, and ready to depart, in order for prospective users to be motivated to use the park-and-ride.

- **Develop ridership metrics to help monitor OnDemand service.**

Through consultation with the OnDemand service provider and pilot results, a number of metrics and key performance indicators (KPIs) should be established to help proactively identify any service issues or opportunities, including a ridership metric that will identify if fixed-route service may be warranted in the future, along with indicators to identify if there are any naturally forming “routes” based on origin and destination patterns.

- **Evaluate service hours.** Based on pilot data and rider feedback, the current service hours can be evaluated to determine whether changes may be made to better accommodate riders and meet demand. Considering the high tourism levels observed in Niagara-on-the-Lake, Sunday service may be considered or piloted during summer months or a fixed-route service may be appropriate during summer months to serve residents, workers and visitors. If this were pursued, marketing efforts would be needed to ensure that tourists and seasonal workers are well aware of the service. Notably, establishing metrics will help to more definitively identify these needs.

- **Consider the use of autonomous vehicles (AVs) in Niagara-on-the-Lake.** As AVs continue to become more integrated within Canada, the long-term planning for AV uses, particularly for tourist purposes, may prove to be advantageous in Niagara-on-the-Lake. For instance, an AV used as a circulator within Old Town may help tourists to move through the Town without a personal vehicle, also helping to better manage parking.
- **Provide transit options to support regional tourism.** Based on estimated travel demand, Niagara-on-the-Lake should work with the Region to explore weekend extensions of the NRT OnDemand service area or a dedicated shuttle service, including to/from GO Transit stations, reducing reliance on automobiles for tourist activities.

5.5 FOCUS AREA EVALUATION

5.5.1 OLD TOWN

5.5.1.1 Roadway Improvements

The Niagara Region Transportation Master Plan (2017) and the Niagara-on-the-Lake Transportation Master Plan (2004) provide no roadway improvements to investigate in this report in Old Town. However, there is a strong recommendation to improve the controlling approaches and safety at King Street and Queen Street, which is one of the main entrances to the Old Town.

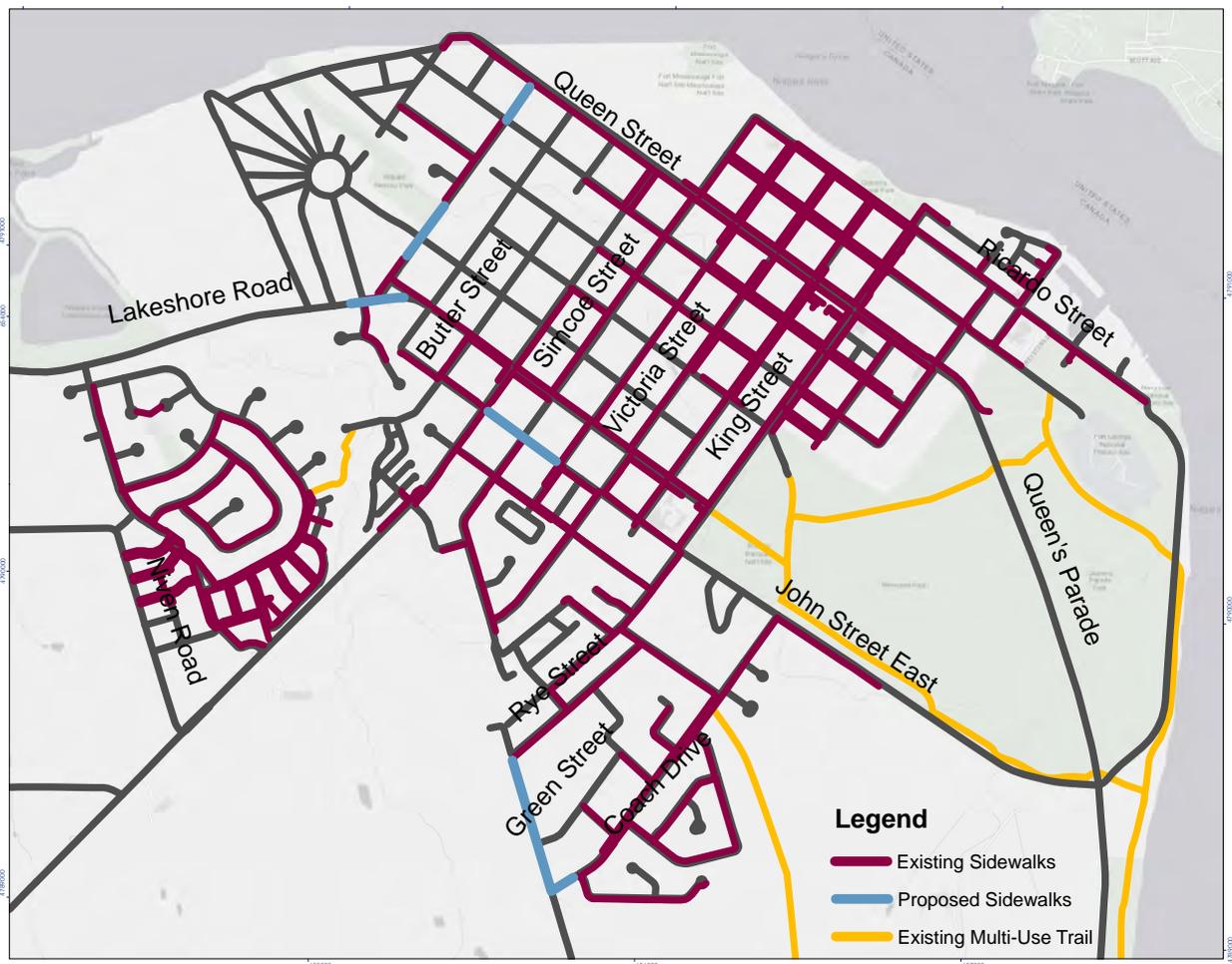
Concerns have also been raised regarding traffic related to the commercial district along Queen and Picton Streets between Wellington Street and Gate Street. In particular, vehicles departing from this area traveling northwest along Queen Street have been observed to repeatedly miss the turn onto Mississauga Street and travel into the residential Chautauqua area. The addition of wayfinding signage and other educational campaigns have been of limited success. The intersection is currently stop-controlled on the Mississauga Street and free-flow conditions along Queen Street. Therefore, consideration should be given to both additional wayfinding signage as well as geometric and traffic control changes to

the Queen Street and Mississauga Street intersection that includes an all-way stop control change. The intent of these changes is to alert drivers into a conscious decision-making process, with the reinforcing message to direct commercial-related traffic to turn onto Mississauga Street rather than continue northwest on Queen Street. Where feasible, consideration should be given to the implementation of interim / temporary measures to evaluate the effectiveness of the changes prior to permanent change to the intersection and roadway. A pilot project is currently underway at the Queen/ Mississauga intersection to evaluate the effectiveness of some of these measures.

5.5.1.2 Pedestrian Improvements

A more detailed investigation of the pedestrian facilities was completed for Old Town. Given the historic character and tourist attractions located in Old Town, a connected and permeable pedestrian network will be critical for safe and efficient travel. Furthermore, to support efforts to reduce parking demand in Old Town, a connected pedestrian network will be required. The existing network offers good coverage within the centre of Old Town, as the fine-grid network is supportive of pedestrian movement north of Mary Street and east of Nassau Street. The remaining portions of Old Town

Figure 5.6: Proposed sidewalk network - Old Town



follow a more traditional suburban type of development layout with longer, curvilinear streets and limited connectivity to the surrounding roadway network. The proposed sidewalk links will provide infill coverage across the network to strengthen connectivity. These improvements along will support the aggressive mode split scenario.

The proposed improvements are illustrated in **Figure 5.6** and will fill in gaps along Nassau Street, John Street West, Lakeshore Road and Niagara Street. Importantly, pedestrian network improvements proposed in Old Town and elsewhere across Niagara-on-the-Lake, will need to be further studied for their anticipated use and their contribution to the communities, and take into account factors in addition to connectivity.

5.5.1.3 Focus Areas

Heritage District

The Heritage District in Old Town is evaluated as a focus area of this TMP as it is a significant employment and leisure destination and therefore has high travel demand. Importantly, any transportation improvements to the Heritage District (and elsewhere throughout Niagara-on-the-Lake) should not compete with objectives of preserving the character of these neighbourhoods. Opportunities to improve safety and/or transportation flow are many and varied, and include improved wayfinding, parking management strategies, curbside demand management strategies, caleche relocation, additional pedestrian crossings, and the conversion of Queen Street to a 'flex street'. These concepts, as well as others, are discussed in more detail in **section 5.6.3 Queen Street Heritage District**. In tandem with implementing these strategies, it is recommended that the Town continue to monitor the intersection of King Street and Queen/Picton Streets for vehicle flow and pedestrian safety. The identified strategies can help to alleviate concerns about this intersection, and consequently there may be no need for future infrastructure improvements at this intersection.

Dock Area

In tandem with strategies such as additional parking opportunities on the periphery of Old Town (discussed further in **section 5.6.7 Parking Management**), there are expected to be fewer vehicles circulating through Ricardo St., Melville St., and King St. (north of Queen/Picton) looking for available parking spaces. In turn, the Dock Area should experience reduced traffic volumes through the neighbourhood, particularly in summer months, contributing to an increased quality of life. At the same time, the dead ends that currently exist at the west end of River Beach Dr. and the north end of Ball St. are not reflective of best urban design practices given that there is little room for a vehicle to turn around, which can also contribute to challenges with snow clearing and emergency vehicle access (discussed further in **section 5.6.2 Dead-End Streets**). There is a concern for motorists

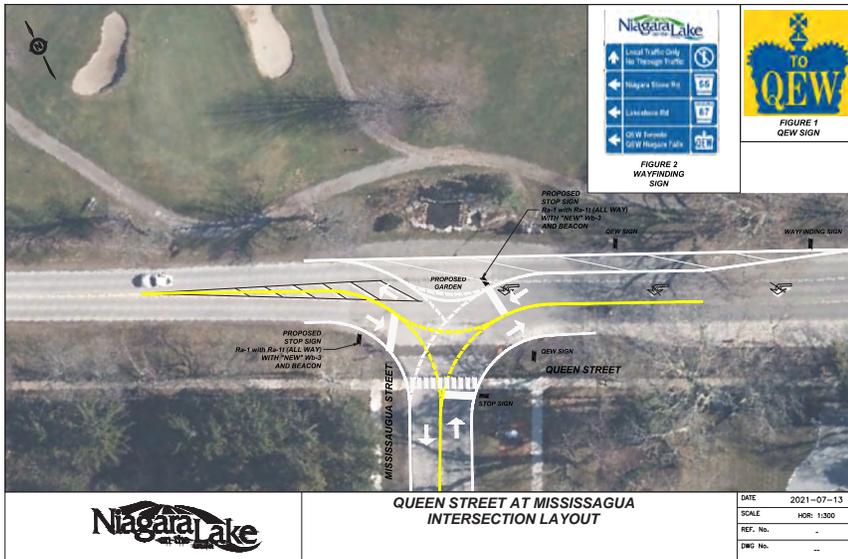
seeking to make a three-point turn at the end of River Beach Dr.

Chautauqua

Chautauqua is a residential neighbourhood located immediately to the west of the Heritage District. Despite its close proximity to Niagara-on-the-Lake's main tourist attractions, there are comparatively very few points of interest for non-residents. Mississagua St. is the main north/south artery that separates Chautauqua from the Heritage District, which can get busy during summer months as it is the primary means by which visitors access the Heritage District. Connectivity between Chautauqua and other parts of the Town is generally limited to Queen St. and Mary St., with Lakeshore Rd. being another option for residents heading west out of Chautauqua rather than east (though many of these residents would still use Mary St. as a means of accessing Mississagua St. / Niagara Stone Rd.). William St. and Johnson St. are other connectors, however, the lack of four-way stops at Mississagua St. can make them impractical for users wishing to make a left turn or travel straight through the intersection. Despite these challenges and the limited number of connectors, there does not appear to be a significant gap in terms of the ability for Chautauqua residents to access other parts of the Town.

For inbound traffic associated with visitors accessing the Heritage District, it is unlikely that there will be significant spillover onto the streets of Chautauqua. To ensure this continues to be the case, periphery parking lots as described further in **section 5.6.7 Parking Management** are not recommended to be deployed in Chautauqua. For outbound traffic associated with visitors leaving the Heritage District, however, many have been observed to miss the left turn off of Queen St. onto Mississagua St. This causes these individuals to end up in Chautauqua, and sometimes they make an impromptu decision to extend their visit upon noticing Mississagua Beach and/or Ryerson Park as they drive by. This can cause bottlenecks to traffic flow and general disturbances to the quiet lifestyle that Chautauqua residents are accustomed to. This is not to suggest that visitors should be discouraged from visiting Mississagua Beach and Ryerson Park, but rather that these public spaces should not see a disproportionately large number of visitors compared to other green spaces such as Mississagua Point, Queen's Royal Park, and the Niagara Parkway Trail.

Figure 5.7: Queen and Mississauga Infrastructure Updates



The goals of these intersection modifications is to reduce traffic to the Chautauqua area and re-direct more non-local traffic onto Mississauga Street.

The Town is exploring, and has recently implemented, measures at Queen and Mississauga Streets to make the left turn off of Queen St. more obvious to visitors departing the Heritage District. These measures are shown in **Figure 5.7** and include converting the intersection to a 3-way (all way) stop, with a bump-out on the north side of Queen St. and pavement markings to encourage traffic flow onto Mississauga St. Additional signage along Queen St. has also been implemented.

It is recommended that the Town conduct traffic counts at this intersection to provide some quantitative data that evaluates the extent to which these intersection modifications have been successful in mitigating excessive traffic flow into Chautauqua. A baseline traffic count (before modifications are implemented) should also be conducted to quantify existing traffic volumes. It is also recommended that the Town monitor this intersection more generally speaking to ensure that no additional challenges have unwittingly been created, such as:

- The potential for stopped vehicles to get clipped in the event of through-travel in the east/west direction. (Can be mitigated through flex bollards or a similar solution).
- The potential for Chautauqua residents to shift their travel onto other corridors such as Johnson St.
- The potential for inattentive drivers to miss the curve and make an unsafe driving maneuver.

Successful implementation should result in reduced traffic to the Chautauqua area and increased usage of Mississauga Street. If needed, more drastic infrastructure updates to this intersection may be considered. Such measures might include lane / right-of-way closures with the introduction of additional garden space, or the deployment of a mini-roundabout. Or alternatively, if it is deemed that the issues

might be adequately solved through signage and wayfinding, the Town might consider reverting back to the pre-2021 intersection design.

Garrison Village

Garrison Village is another residential neighbourhood in Old Town. While still close, it is farther from the Heritage District than Chautauqua and its destinations are mostly located adjacent to the neighbourhood, along Niagara Stone Rd., rather than within Garrison Village proper. Unlike in Chautauqua it is also difficult for visitors to accidentally enter Garrison Village as it requires a purposeful turn to be made off of Niagara Stone Rd.

Although there are no traffic flow concerns in Garrison Village, the abundance of dead-end streets can cause somewhat of a challenge in terms of emergency vehicle access, snow clearing, and the promotion of active transportation and transit as alternatives to driving. These concepts are explored further in **section 5.6.2 Dead-End Streets**. While Garrison Village’s cul-de-sacs are already generally designed in accordance with best practices to minimize the impact of these challenges, the Town is recommended to consider the dead-end street recommendations going forward as the neighbourhood continues to develop. There may be opportunity in locations such as Cooley Ln. and Westgate Dr., where turning around can be more challenging, to improve the cul-de-sac design if plans are not already in place to do so.

King/John Area

The intersection of King and John Streets in Old Town, and the surrounding neighbourhoods to the east, west, and south, are an additional focus area of this TMP. Generally the neighbourhood does not experience significant traffic concerns, although it was noted that there are presently no collector roads that provide a continuous means of connecting the Heritage District with East and West Line, in between Niagara Stone Rd. and the Niagara River Parkway. The implication of this is that the local roads in the King/John area can become over capacity in the event that motorists are seeking to access the Heritage District via Niagara St.

This TMP includes a recommendation that Charlotte St. from Niagara St. to John St. be upgraded to a ‘collector’ road, as discussed in **section 5.6.5 Complete Streets**. By doing so, it is envisioned that through-traffic in the King/John area of Old Town would generally use Charlotte St. rather than the other residential streets (Rye St., Paffard St., Flynn St., Cottage St., Green St., etc.). This direct route through the residential area

to reach the Heritage District would help with traffic flow and safety, while serving to minimize the total number of vehicle-kilometres travelled through the neighbourhood, provided the route is made clear to motorists. Given that there are residences along Charlotte St. as well, however, it is recommended that the Town evaluate traffic projections through the King/John area in more detail and undertake stakeholder engagement to ensure the residents living along Charlotte St. are not adversely affected by these changes. In doing so, it is recommended that the Town emphasize that a collector roadway does not equate to high traffic volumes and fast traffic flow, rather it equates to a corridor that is designated to connect neighbourhoods and strategic centres in an efficient, reliable, and, most importantly, safe manner.

5.5.2 VIRGIL

5.5.2.1 Roadway Improvements

The Niagara Region Transportation Master Plan (2017) and the Niagara-on-the-Lake Transportation Master Plan (2004) include the roadway improvements to assess as demonstrated in **Table 5.10**. The V/C ratios for the existing conditions, and the forecasted V/C ratios for the status quo and aggressive change scenarios are presented in the aforementioned table to illustrate the change in capacity under within the noted scenarios. It is essential to note that **Table 5.10** presents the values in the weekend PM peak hour, which is associated with the highest V/C ratios. The first roadway improvement is a road extension on Concession 5 Road corridor, while the other proposed improvements are intended to enhance the capacity on existing corridors as presented in **Table 5.10**.

Figure 5.8 demonstrates the percentage change in V/C ratio of the mentioned five roadway developments in **Table 5.10** for the existing, status quo, and aggressive change before and after improvement scenarios. As noted previously, status quo maintains the existing mode splits as they are, likely requiring minor adjustments to the already planned roadway improvements. The recommended aggressive change scenario strives for a greater modal split change and shifts auto drivers onto active transportation and micro-mobility for trips under 3 km, and transit for trips under 6km at a rate of 2% per year until 2041. It is noted that applying an aggressive modal shift target without any supportive roadway improvements would only slightly reduce the V/C ratios. However when combined with network improvements, a greater improvement to the anticipated V/C ratios can potentially be achieved. The potential improvement (reduction) in V/C ratios is estimated as much as 66% from the aggressive change scenario compared to the status quo scenario with the proposed capacity improvements.

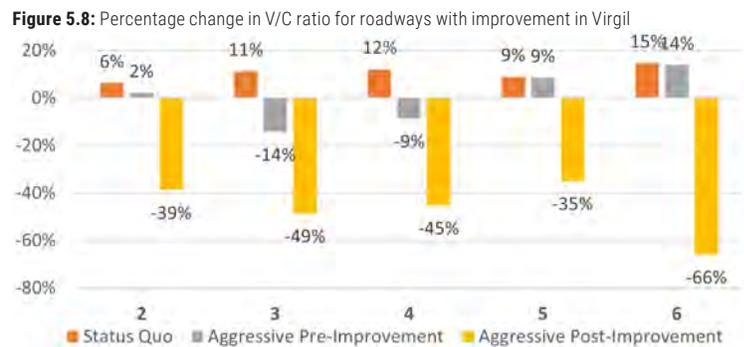
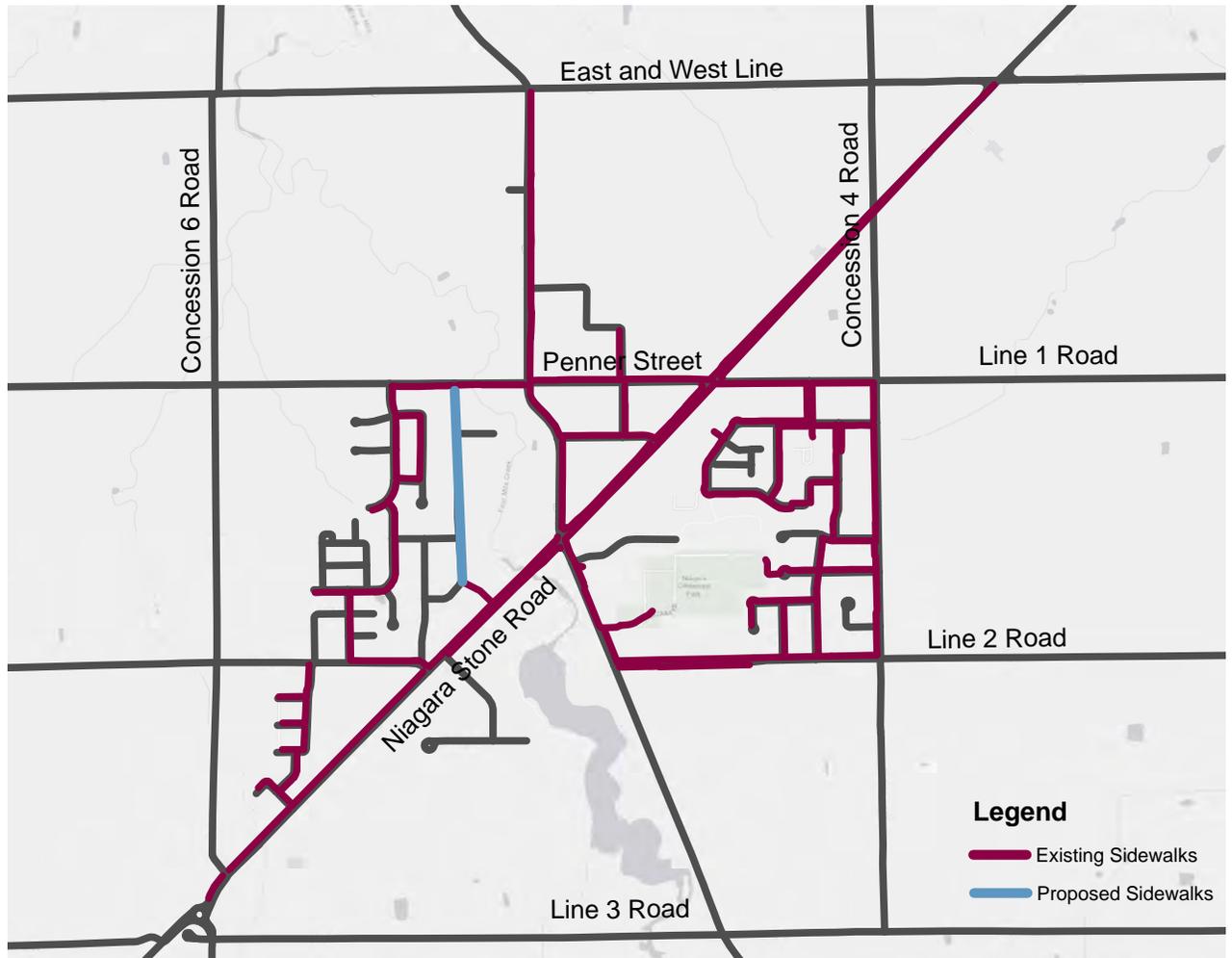


Table 5.10: Recommended Roadway Improvements in Virgil

ID	Corridor	Section	Phasing	Source	Existing	Proposed Development	Govern Period	Volume-to-Capacity Ratios			
								Existing	Status Quo	Aggressive Pre-Improvement	Aggressive Post-Improvement
1	Concession 5 Rd	Walker Rd to Line 3 Rd	2015-2024	TMP (2004)	-	Road extension	-	-	-	-	-
2	Concession 6 Rd	Niagara Stone Rd to East and West Line	2015-2024	TMP (2004)	2 lane rural road	Upgrade to 2 lane collector	PM	0.35	0.37	0.35	0.21
3	Concession 4 Rd	Niagara Stone Rd to Line 2 Rd	2015-2024	TMP (2004)	2 lane rural	Upgrade to 2 lane collector	PM	0.29	0.32	0.25	0.15
4	Line 1 Rd	Concession 6 Rd to Concession 4 Rd	2015-2024	TMP (2004)	2 lane rural	Upgrade to 2 lane collector	PM	0.39	0.44	0.36	0.21
5	Townline Rd	Line 3 Rd to East and West Line	2015-2024	TMP (2004)	2 lane rural	Upgrade to 2 lane collector	PM	0.10	0.11	0.11	0.07
6	Niagara Stone Rd*	Airport Road to Concession 6	2022-2031	Niagara TMP	2 lane rural	Upgrade to 4 lane collector	PM	3.13	3.59	3.56	1.07

* denotes Regional corridor

Figure 5.9:
Proposed
sidewalk
network - Virgil



5.5.2.2 Pedestrian Improvements

The pedestrian network in Virgil was reviewed to identify any gaps and opportunities specifically within the area. Similar to Old Town, a significant portion of the road network includes sidewalks. Unlike Old Town the road network is more circuitous, warranting the inclusion of additional east-west and north-south pedestrian connections. Sidewalk connections are proposed along Henry Street which provides connection between Line 1 Road and Niagara Stone Road.

The proposed sidewalk network in Virgil is shown in **Figure 5.9**.

5.5.2.3 Focus Areas

Crossroads School Area

The Crossroads School Area is a focus area due to the school's large Kindergarten-to-Grade-8 enrollment of 450 students. This can create congestion in and around the school's access and egress points with parents dropping off and picking up their children. In addition, although not noted to be a concern during the TMP's stakeholder engagement sessions, it must be appreciated that this can potentially create safety concerns if parents become frustrated with the volume of traffic and make more aggressive driving maneuvers in an area where a lot of children may be walking, running, or playing.

To address this, it is recommended that the Town keep open communication channels with Niagara Region and with the District School Board of Niagara to ensure that local needs are being adequately met with respect to student transportation (school busing) and with sports teams, clubs, and after school programs, which may help to extend the window of drop-off and pick-up times and reduce congestion. At the same time, it is recommended that the Town maintain the Community Safety Zone (CSZ) at Crossroads School and extend it to include Line 2 Road between Niagara Stone Road and Pierpoint Drive (or Concession 6 Road). The merits of CSZs are described in more detail in **section 5.7.1**.

Pleasant Manor Area

The Pleasant Manor Area houses a significant population in its campus of long-term care, convalescent care, and retirement residences, and is an important destination for the many employees who commute to/from the Pleasant Manor Area every day. For similar reasons as the Crossroads School Area, it is recommended that Four Mile Creek Road from Pleasant Lane to Line 1 Road be designated as a new CSZ. The merits of CSZs are described in more detail in **section 5.7.1**.

Perimeter Corridors and Virgil By-Pass

Although not a focus area in itself per se, consideration was given to Virgil as a whole, its perimeter corridors, and whether a Virgil By-Pass would be appropriate given the volume-to-capacity challenges experienced along Niagara Stone Road, particularly at screenline 2 (just west of Concession 6). Given the recommended upgrade of this corridor from 2-lane rural to 4-lane collector, this improvement is expected to cut the volume-to-capacity along Niagara Stone Road to be a fraction of what it currently is. If an upgrade of the corridor from 2-4 lanes proceeds consideration can also be given to widening the roundabout at Niagara Stone Road and Concession 6 Road as well. Although the volume-to-capacity is forecasted to remain slightly above 1 in the PM peak (1.07) even after this corridor upgrade is implemented, it is recommended that the Town pause discussions on a Virgil By-Pass for the time being to allow for implementation, monitoring, and evaluation of the Niagara Stone Road improvements, along with the other active transportation and road classification recommendations included in this TMP. It is possible that volume-to-capacity trending may end up being lower than 1.07 if the Town sees success with implementing complementary congestion mitigation strategies, resulting in a better balance of traffic volumes against capacity at the network level. This would negate the need for a purposeful Virgil By-Pass, although it is still important for the Town to monitor in consideration that the proposed upgrades to Niagara Stone Road in between Airport Road and Concession 6 have the possibility of pushing the capacity constraints into Virgil, where there are limited opportunities for roadway widening. Such challenges would warrant a closer look at Virgil By-Pass solutions.

At the same time, the Town is recommended to monitor traffic volumes along Line 3, Concession 2, East and West Line, Niagara Street, and Charlotte Street, as these corridors in and of themselves can act as a Virgil By-Pass, particularly given the upgrades to collector roads that are recommended along these corridors. These upgrades all serve to increase capacity and reduce V/C ratios, and generally speaking make the bypassing of Niagara Stone Road a more viable option, if congestion challenges persist. Additionally, consideration may be given to Concession 6 and East and West Line as an alternative By-Pass, particularly in the short term if it is determined those corridors are better equipped to handle the capacity before improvements to other corridors are made.

A further consideration for the Virgil By-Pass may be the potential increased traffic volumes resulting from the recently announced twinning of the Skyway Bridge, with construction scheduled to start in 2024. Even though the Skyway Bridge and Virgil are located in different parts of the Town, the twinning may ultimately attract more vehicular traffic to Niagara-on-the-Lake in the medium and long-term horizons. It is recommended that base line traffic volumes be collected prior to the start of construction, following completion of the twinning, and for several years after to measure traffic growth. These growth patterns should be compared to the assumed values within this TMP to assess if the Virgil By-Pass might be re-considered as part of the Town's long-term infrastructure planning. In addition, it is recommended that the Town

monitor closely the implementation of this TMP's recommendations and consider revisiting the possibility of additional Virgil By-Pass options in the medium term if the issues still persist.

5.5.3 QUEENSTON

5.5.3.1 Roadway Improvements

The Niagara Region Transportation Master Plan (2017) and the Niagara-on-the-Lake Transportation Master Plan (2004) provide no roadway improvements for assessment in this report.

5.5.3.2 Pedestrian Improvements

The sidewalk network was reviewed within Queenston. While smaller than Old Town and Virgil, the provision of a connected sidewalk network will be critical to support pedestrian activity and ensure safety throughout the community. A proposed segment along Queenston Street is proposed to fill in this gap in the sidewalk network and allow pedestrians to safely connect to Niagara Parkway. The proposed sidewalk connections are illustrated in **Figure 5.10**.

5.5.3.3 Focus Areas

River Frontage Road Area

Like much of Niagara-on-the-Lake, River Frontage Road sees higher volumes of traffic in summer months compared to the winter months. This is especially notable considering that much of the additional traffic is in the form of tour buses that transport visitors to and from the seasonal Jet Boat Tours. In addition to using River Frontage Road itself, the tour buses also need to drive along Queenston's residential streets to get from the Niagara Parkway to River Frontage Road. This can be a source of irritation for Queenston residents who are accustomed to quieter streets.

No actions are recommended to improve the road network in consideration of tour bus operations for a few reasons:

- Although tour buses may be a source of irritation for Queenston residents, no concerns were noted with respect to traffic flow or safety, so road network updates would likely prove ineffective at addressing the issue.
- There is no obvious route to River Frontage Road that minimizes the distance travelled along Queenston's residential streets, therefore there is no basis for designating a tour bus route. Taking Dumfries St., for example, would impact a similar number of residents to an alternative involving York St. and Princess St.
- The Town has no recourse to discourage tour buses from operating when there are no viable alternatives for patrons to reach the tour boat launch site.
- The potential of a "Queenston By-Pass" of sorts to access the tour boat launch site without going through the community would undoubtedly have a weak business case.

Figure 5.10: Proposed sidewalk network-Queenston

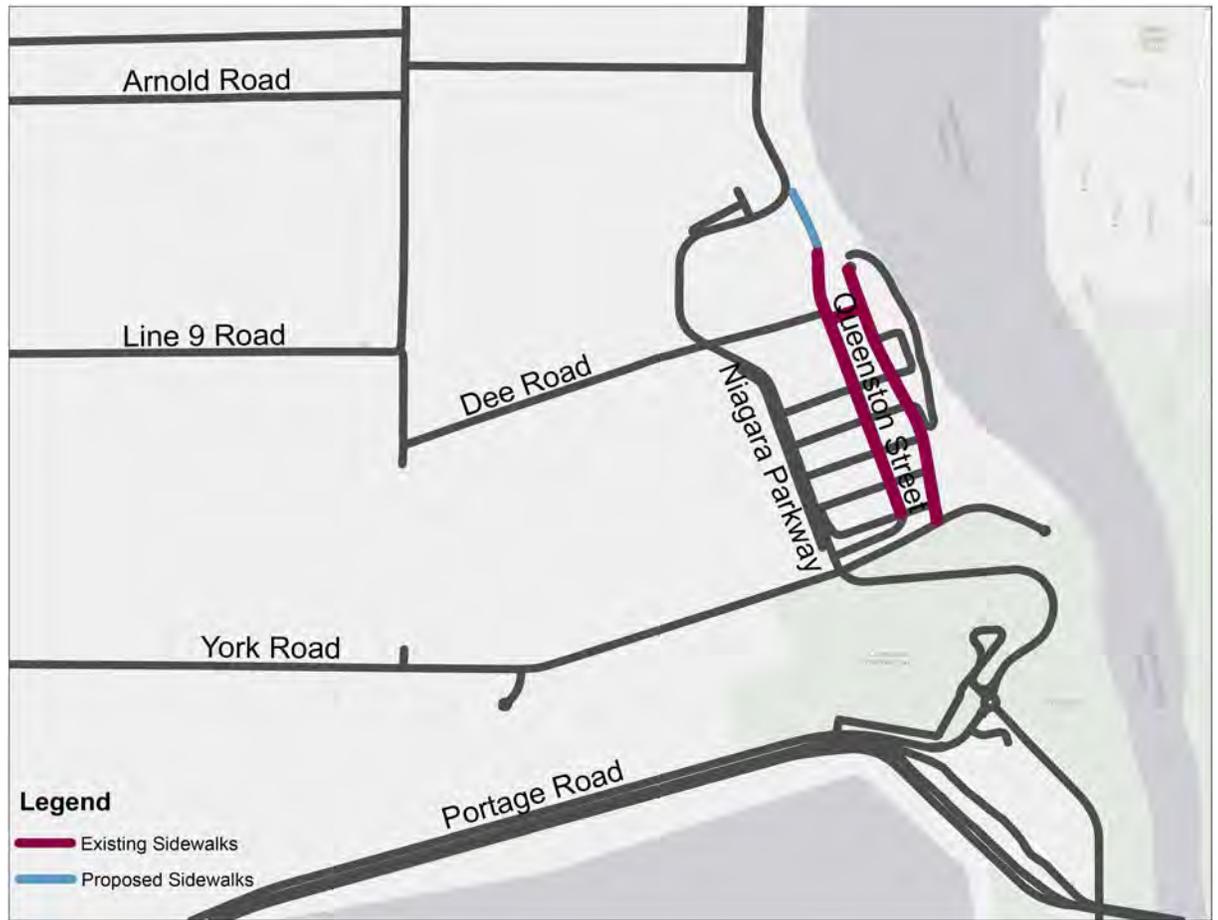


Figure 5.11: Proposed sidewalk network- St. Davids



5.5.4 ST. DAVIDS

5.5.4.1 Roadway Improvements

The Niagara Region Transportation Master Plan (2017) and the Niagara-on-the-Lake Transportation Master Plan (2004) provide roadway improvements are demonstrated in **Table 5.11**. The three roadway improvements are at the intersection level. Adding left turn lanes when possible and optimizing signalization would alleviate congestion and improve operational performance at intended intersections.

5.5.4.2 Pedestrian Improvements

The pedestrian network in St. Davids is generally robust but contains several gaps along major arterial connections. As such, several infill connections are proposed to connect the existing network. Notably, connections are proposed along Four Mile Creek Road, York Road and Niagara Townline Road. This will provide a pedestrian connection for those who live in the Bevan Heights neighbourhood which currently does not connect to the existing pedestrian network. Notably, as part of a completed Environmental Assessment, the Town has requested that the Region provide sidewalks at the Four Mile Creek Road and York Road intersection, therefore these proposed improvements are anticipated to be completed. The proposed pedestrian network is presented in **Figure 5.11**.

York Rd / Four Mile Creek Rd

This intersection can be considered to be the geographical centre of St. Davids, with residential areas located to each of the northeast, northwest, southeast, and southwest. As such, it sees a comparatively large volume of traffic, with some motorists using Line 9 and Concession 2 as a bypass for traffic east of York Rd. / Four Mile Creek Rd. It is also noted that a roundabout is planned at this intersection to help improve safety and preserve efficient traffic flow along these corridors into the future. For traffic west of York Rd. / Four Mile Creek Rd., there are more limited bypass options.

It is recommended that the Town in conjunction with the Region monitor traffic volumes along York Rd. and Four Mile Creek Rd. and ensure that the roundabout, when implemented, brings the desired benefits. It is also acknowledged that Tanbark Rd. and Line 8 Rd. might in theory be used as a bypass of the York Rd. / Four Mile Creek Rd. intersection, but that should this be needed, significant upgrades would be needed along Tanbark Rd. north of Line 9 Rd, which is not currently in the Town's long-term capital plan. The Town should ensure that adequate sightlines are maintained for motorists turning off of Stoneridge Cr. onto Tanbark Rd. No other specific infrastructure recommendations are recommended at this time, and traffic infiltration through the local subdivisions is not anticipated to be a significant concern.

5.5.5 GLENDALE

5.5.5.1 Roadway Improvements

The Niagara Region Transportation Master Plan (2017) and

the Niagara-on-the-Lake Transportation Master Plan (2004) provide roadway improvements for evaluation as demonstrated in **Table 5.12** alongside applicable V/C ratios. One of the developments is the interchange on Glendale Avenue that would contribute to increasing the capacity and facilitate movements from and to Niagara-on-the-Lake. The other improvement is a new roadway on Glendale Avenue from York Rd to Queenston Road. The last development is a capacity improvement on Airport Road.

Figure 5.12 demonstrates the change in V/C ratio between the status quo and aggressive change scenarios before and after implementation of the recommended improvement on Airport Road. While the aggressive change scenario is associated with a V/C ratio that is similar to the one of the status quo scenario, improving the capacity with aggressive change of mode split is expected to trigger a potential 66% reduction in V/C compared to the status quo scenario.

5.5.5.2 Pedestrian Improvements

The Glendale District Plan outlines a proposed redevelopment of the Glendale community, with significant growth via infill developments. With the Niagara College Niagara-on-the-Lake campus and the Outlet Mall, Glendale is a suitable location for this densification which will warrant increased pedestrian connectivity. The proposed pedestrian network is largely along major roadways that provide east-west and north-south connections. These roadways include Airport Road, Queenston Road, Concession 7 Road, York Road, Homer Road and Taylor Road as illustrated in **Figure 5.13**. In addition to these major connections, supporting pedestrian connections should be considered internally within residential and mixed-use developments as outlined in the Glendale District Plan. Finally, consideration should be given to the Glendale District Plan and the three new crossings of the QEW that are proposed (including a designated pedestrian crossing at the south end of Airport Road), and the Town should anticipate elevated levels of both pedestrian and cyclist activity across the QEW as a result.

5.5.5.3 Focus Areas

Niagara College / Outlet Mall Area

Niagara College's Niagara-on-the-Lake Campus and the Outlet Collection at Niagara are located adjacent to each other, as well as adjacent to a residential neighbourhood southwest of Glendale Ave. and Taylor Rd. in Glendale. It is noted that many of the corridors in this area are Regional corridors, or Provincial in the case of the QEW. The Town is recommended to maintain open communication channels with the Region and the Province as appropriate to ensure it can proactively plan for the coming corridor changes such as the Diverging Diamond project and the twinning of the Skyway Bridge. Details for these projects are still preliminary, so the impacts to Town roads, and to transportation in Niagara-on-the-Lake more generally speaking, are difficult to predict, although impacts to the current alignments of Queenston Rd. and York Rd. can be expected. If there are capacity improvements resulting from these projects, then traffic volumes may grow

proportionally, but much of the traffic will likely be pass-through traffic originating and terminating at locations outside of Niagara-on-the-Lake. Likewise, impacts to tourism in the Town due solely to these projects will be minimal as they will not make or break someone's decision to travel to Niagara-on-the-Lake. The most significant impacts may be increased traffic to the Outlet Collection originating from St. Catharines

or other nearby jurisdictions.

Table 5.11: Recommended Roadway Improvements in St. Davids

* denotes Regional corridor

ID	Corridor	Section	Phasing	Source	Existing	Proposed Development
7	Four Mile Creek Rd @ York Rd*	-	2015-2024	TMP (2004)	-	Roundabout
8	Four Mile Creek Rd @ Warner Rd*	-	2015-2024	TMP (2004)	-	NB left turn storage
9	Tanbark Rd @ York Rd	-	2015-2024	TMP (2004)	-	Signals and left turn lanes

Table 5.12: Recommended Roadway Improvements in Glendale

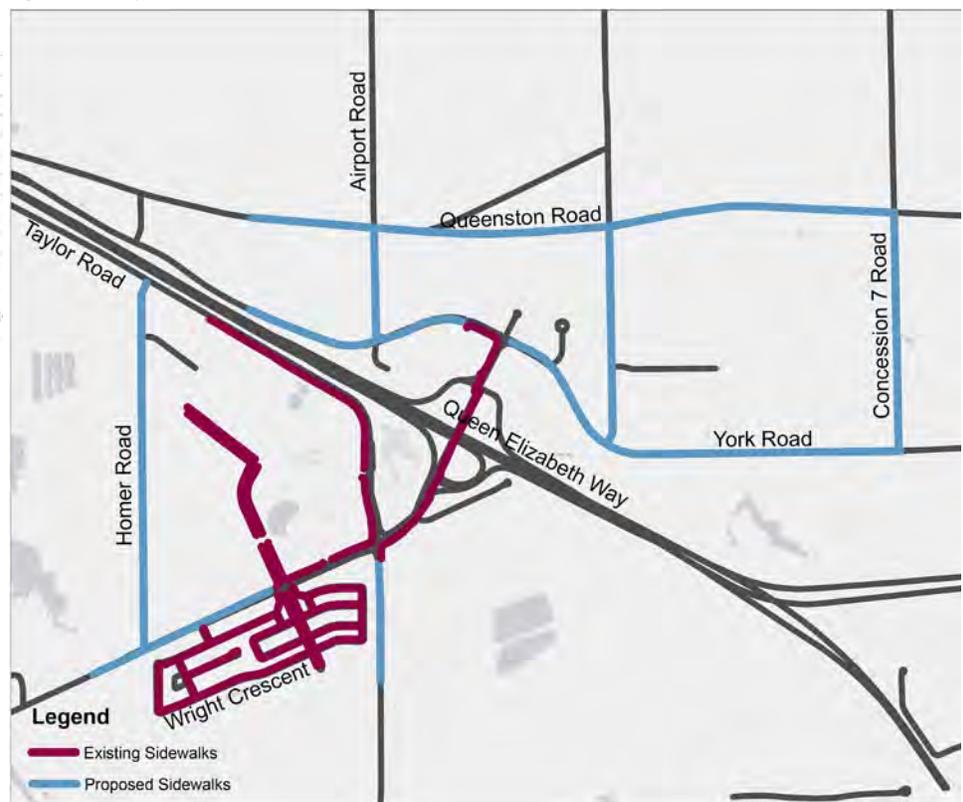
* denotes Regional corridor

ID	Corridor	Section	Phasing	Source	Existing	Proposed Development	Govern Period	Volume-to-Capacity Ratios			
								Existing	Status Quo	Aggressive Pre-Improvement	Aggressive Post-Improvement
10	Glendale Ave*	Interchange at QEW (1/3 contribution)	2022-2031	Niagara TMP	-	-	-	-	-	-	-
11	Glendale Ave*	York Rd to Queenston Rd	2032-2041	Niagara TMP	-	New road	-	-	-	-	-
12	Airport Road*	Niagara Stone Rd to York Rd	2022-2031	Niagara TMP	2 lane rural	Upgrade to 4 lane collector	PM	1.02	1.14	1.14	0.34

Figure 5.12: Percentage Change in V/C Ratio for one Roadway with Improvement in Glendale



Figure 5.13: Proposed sidewalk network- Glendale



5.6 SUPPORTING STRATEGIES

5.6.1 FUTURE TRAFFIC FLOW MANAGEMENT

Future traffic flow management can refer to a variety of strategies ranging from helping traffic to flow more efficiently to introducing traffic calming measures and improving safety. This subsection will review strategies to improve the efficiency of traffic flow, while traffic calming measures will be reviewed in **section 5.7.1**. Strategies to improve traffic flow include the following:

1. Piloting a Flex Street along Queen St. in Old Town. “Flex streets” are streets with a single grade or surface that is shared by people using all modes of travel at slow speeds. Curbs are removed and the sidewalk is blended with the roadway. Speeds are slow enough to allow pedestrians to intermingle with bicycles, motor vehicles, and transit. While this can be seen as a traffic calming measure that is in alignment with the aesthetic of the Heritage District while promoting safety, it can also be a means of improving traffic flow in Old Town more generally speaking by providing a deterrent for motorists to drive along Queen St. and instead make more use of under-capacity side streets. Piloting a flex street is envisioned as a medium-term objective, and will require significant stakeholder engagement most notably with the local businesses. Engagement efforts should begin in the short-term.

2. Improving wayfinding coupled with geometric changes, especially in Old Town. Challenges such as the one identified by Town staff where visitors leaving the Heritage District miss the left turn onto Mississagua St. from Queen St. contribute to

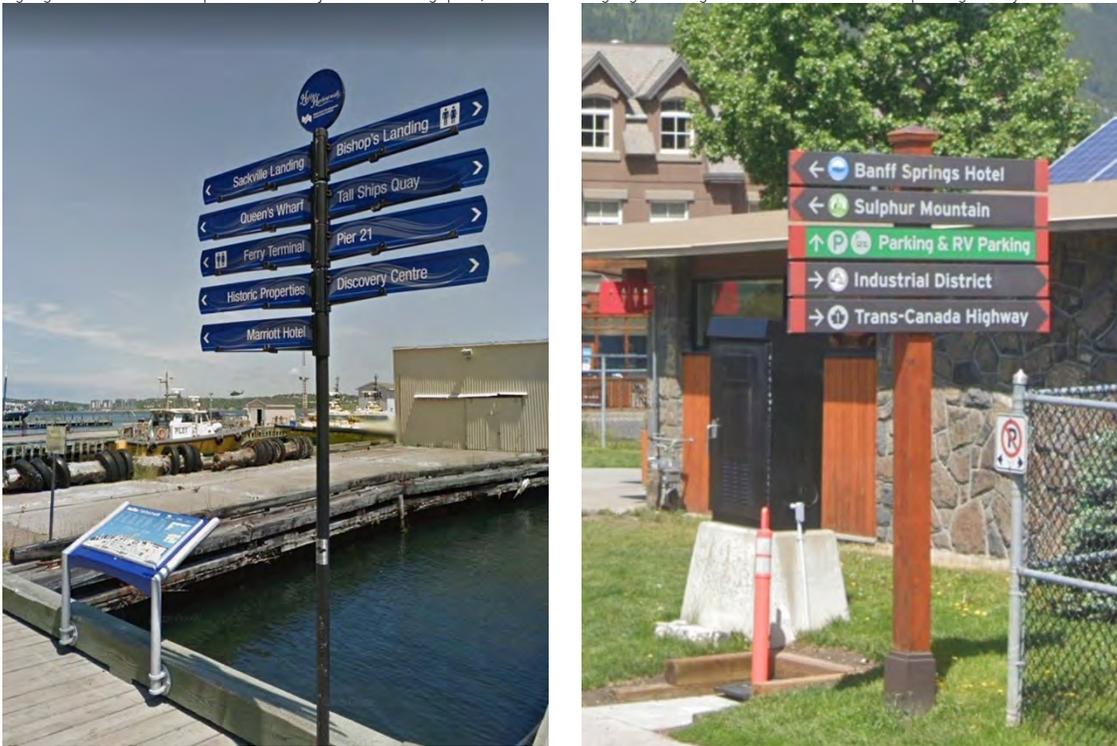
traffic flow inefficiencies in the Town as well as negative impacts to the residents within the Chautauqua area. Improved wayfinding in Old Town in particular that advises motorists of recommended routes to access various points of interest, as well as parking lots and the QEW will aid in traffic flow and can ensure an equitable utilization of the road network across Old Town as per the roadway classifications. Improved wayfinding in combination with additional parking options on the periphery of Old Town (discussed further under the Parking Management subheading) can bring further traffic flow benefits. In addition to providing directions to parking and points of interest, wayfinding signage might also include (but is not limited to) tourist information maps, signs for canal crossings, and dynamic signage to manage congestion based on real-time traffic data. It is also recommended that the Town collaborate with Niagara Region and the Niagara Parks Commission to ensure consistency in wayfinding signage throughout the Region, taking into consideration that many visitors to the Town also make stops at Niagara Falls and elsewhere in the Region.

Signage and wayfinding also need not only be limited to motorists; rather, signage should be deployed with all residents and visitors in mind, including those travelling by means other than a private automobile. While Niagara-on-the-Lake has already taken initial steps with respect to signage and wayfinding, the series of figures below illustrate various opportunities to make signage more informative and noticeable, without detracting from the aesthetic of the Heritage District or other local areas. In the short-term it is recommended that signage and wayfinding initiatives be focused on the Heritage District and along Niagara Stone Rd., as this is where they could bring the biggest value.

Figure 5.14: Niagara-on-the-Lake’s ‘more shops’ signage (left) is limited and nondescriptive. By comparison, Niagara Falls’ signage (right) is more descriptive, but it is also more difficult to read.



Figure 5.15: Halifax's wayfinding signage (left) and Banff's wayfinding signage (right) are both more detailed and easy to read and understand. Halifax's signage also includes a map of the area adjacent to the signpost, while Banff's signage is designed such that directions to parking clearly stand out.



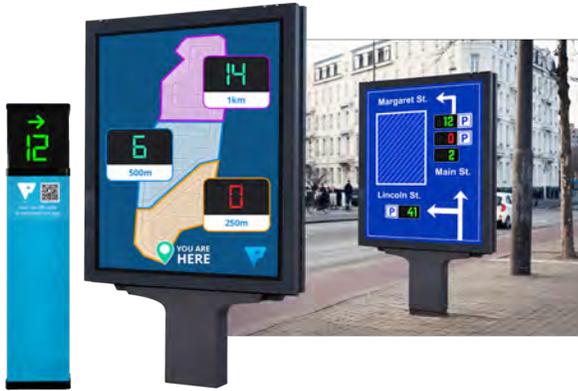
Source: Google Maps Street View

Figure 5.16: Public maps such as this one in Charlottetown can be effective in not only illustrating where points of interest are located but also in providing suggested walking routes and walk distances to help encourage active transportation



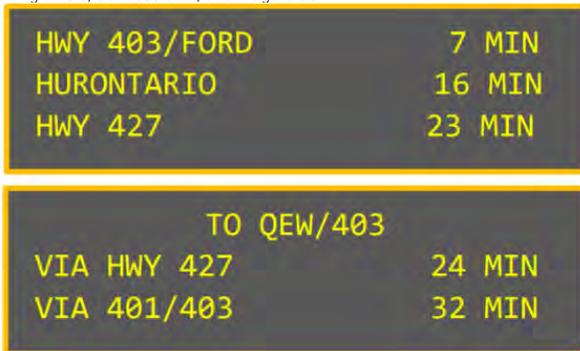
Source: https://cdn.shopify.com/s/files/1/0239/8194/8992/files/Charlottetown_1024x1024.jpg?v=1628529792

Figure 5.17: Dynamic signage can be valuable to illustrate the parking capacity at designated lots and at various locations throughout the Town



Source: https://www.parkam.com/wp-content/uploads/2018/06/vms_front.png

Figure 5.18: Pole mounted dynamic signage showing multiple destinations (top) or multiple routes (bottom) might be considered along Niagara Stone Rd. to show the travel time to parking (versus the Heritage District or Fort George for example) or to show the travel time of using Niagara Stone Rd. versus a bypass using Line 3, Concession 2, and Niagara St.



Source: <http://www.mto.gov.on.ca/english/publications/pdfs/its906-roadside-travel-time-information.pdf>

3. Encourage mode shift. The network analysis presented in this report assumes a mode shift with a greater % of trips being taken on transit and active transportation modes. These mode shifts are dependent on implementation of the concepts presented in this Transportation Master Plan – the Town cannot bank on this mode shift happening naturally without any intervention. It is noted that solutions like road widenings, new road construction, and new and/or reconfigured parking, etc. are good solutions in and of themselves to promote traffic flow, but if we are not also taking measures to address the underlying issues by encouraging mode shift, they will only be temporary solutions. Mode shift objectives can be achieved through a variety of strategies including:

- Ensuring that the public transit adequately meets the needs of residents and visitors, and working with Niagara Region to improve and/or expand the NRT OnDemand offering where and when appropriate.
- Implementing the active transportation recommendations included in this TMP – which will make walking and cycling more attractive possibilities.

- Implementing the parking management recommendations included in this TMP will help the avoid an overly car-centric transportation network, ensuring that the different modes of transportation are prioritized in an equitable manner.
- Promotion of the available transit and active transportation options in the Town, to both residents and visitors.
- Public health and environmental awareness campaigns such as a Town-organized “commuter challenge”, or the participation in future Province or Nationwide commuter challenges, can serve to educate people on the benefits of cycling, walking, and transit, and can motivate people to change their travel habits.

4. Goods movement considerations. It is important to keep in mind that a Town's transportation network serves a myriad of trip purposes, including goods movement trips which experience different challenges and constraints compared to personal automobile use. Best practice is to consider goods movement needs separately, while ensuring they are being addressed in a way that is harmonious with how other motorists are using the transportation network. While goods movement is touched on in the Town's Official Plan in designating the arterial road system as priority routes, there is opportunity to develop a more fulsome goods movement strategy that considers elements such as oversize load permits, curbside management, and MTO's freight supportive guidelines, and how these tools and resources may be best integrated into Niagara-on-the-Lake's goods movement strategy. It is therefore recommended that the Town move forward with developing a standalone goods movement strategy. In the context of this TMP, goods movement has been considered most notably in the V/C modeling, in growth forecasts, and in the curbside demand management strategies outlined in **section 5.6.7**.

5. Smart mobility and ITS. Discussion of smart mobility and ITS is included in more detail in **section 5.6.10**, but is also an important consideration in the context of future traffic flow management. ITS in particular uses vehicle detection technologies to optimize traffic flow at critical intersections. Critical intersections along Niagara Stone Rd. may be suited to early ITS pilots, for example the intersections at Mary St., East and West Line, and/or Four Mile Creek Rd.

6. Transportation system performance measures. Improved traffic flow will be an outcome of improved monitoring and evaluation of the transportation network. It is recommended that Niagara-on-the-Lake track its transportation network performance on a regular basis using a series of performance measures which might include AADT, mode split, transit accessibility, transit ridership, bicycle and pedestrian activity, and average vehicle occupancy. By better understanding the trending of performance measures along individual corridors, within individual neighbourhoods, and across the Town as a whole, more informed decision making will be fostered and

the Town can become increasingly proactive about traffic flow management.

5.6.2 DEAD-END STREETS

Niagara-on-the-Lake has a number of cul-de-sacs across the Town, most notably in Old Town and Virgil. The development of The Village at Garrison and similar subdivisions across the Town are in lockstep with emerging trends in urban development whereby communities are designed to maximize aesthetics, peace and quiet, and quality of life for residents. A product of this trend in urban design is a significant number of cul-de-sacs, which bring the aforementioned benefits, but they also present their own set of challenges that can be contradictory to other jurisdictional objectives. Cul-de-sacs, and limitations in connectivity to arterial roads more generally speaking, can contribute to a driving-centric culture and be counterproductive to mode split objectives while creating challenges for emergency vehicle access and causing operational barriers to snow clearing. In addition, cul-de-sacs can fragment the multi-modal network connectivity between communities and major destinations and limit the efficient transit routing through a community, thereby further reinforcing auto-centric behaviours, while potentially exacerbating challenges with respect to street parking supply.

Best practice is for land use planning and transportation planning to occur in consideration of each other. This is not to suggest that cul-de-sacs should be done away with entirely, rather that in their development, consideration should be given to all modes of transportation. This can include intentional breaks within cul-de-sacs to accommodate multi-use pathways that can interconnect with the surrounding network. In most cases, the cul-de-sacs in Niagara-on-the-Lake are appropriate as they are. The neighbourhoods within Niagara-on-the-Lake are small enough that cul-de-sacs remain in close proximity to arterial roads, so the barriers for on-demand transit and emergency vehicle access are minimal. Moreover, many of the cul-de-sacs are surrounded by private properties and extending them to create through streets would now be infeasible, or creating through streets might detract from the character of the neighbourhood.

However, that does not necessarily mean they should be left alone. There may be opportunities to improve some by installing a centre island with landscaping and potentially low maintenance design features such as a bench or a community mailbox, while ensuring there is adequate space for snow storage, or by adding pedestrian walkways to facilitate improved active transportation connections. To minimize ongoing maintenance expenses for centre islands, Niagara-on-the-Lake might consider designating a minimum

threshold in square-metres for an island to be actively maintained by the Town, or it may consider design features that aren't fully reliant on grass lawns. Further, Niagara-on-the-Lake might consider mowing the grass only to bylaw standards, and putting the onus on residents for more regular maintenance to preserve a manicured look. This is a practice employed by many jurisdictions across North America. It is also acknowledged that right-of-way limitations may impact the feasibility of some of these potential options, and should be carefully considered prior to implementation of measures.

Below we profile a few different cul-de-sacs in Niagara-on-the-Lake as illustrative examples of changes that might be made –

- **Mulberry Ln. (Virgil)** – A small island with some landscaping might be considered at the end where the road terminates.
- **Palatine Pl., off of Circle St. (Old Town)** – It is acknowledged that the Town is currently making road surface quality improvements, as well as a road extension to include a turning circle and allow for additional room for snow removal / winter maintenance.
- **Settlers Ct. (Old Town)** – This cul-de-sac is already designed well, but further improvements to the island might include gardens, benches, and/or a mailbox for further community placemaking benefits.

While many of the cul-de-sacs are best left as is (with minor improvements similar to those noted above), there also exist examples of cul-de-sacs which might be considered for extension to convert them into through streets to improve connectivity. It is recommended that the Town review development plans and evaluate opportunities to convert cul-de-sacs to through streets in locations which might include those listed below. Notably, each of these potential projects would require further analysis of the benefits and drawbacks, and additional targeted consultation to ensure net benefits are created.

Old Town:

- Ball St. (connect to River Beach Dr.)
- James St. (connect to Flynn St., Rye St., or Paffard St.)
- King St. (connect to Niagara St.)

Virgil:

- Loretta Dr. (by Rose Glen Cr., connect the commercial plaza adjacent to Niagara Stone Rd.)
- Harvest Dr., Plantation Dr., and Homestead Dr. (connect to each other, as is currently planned)

St. Davids:

- Paxton Ln. (connect to Paxton Ln.)
- Hickory Ave. (connect to Dyck Ln.)

5.6.3 QUEEN STREET HERITAGE DISTRICT

The Heritage District in Old Town is an important focus area for Niagara-on-the-Lake due to its central location in Old Town and its draw as a tourist destination. The stretch of Queen Street from King Street to Simcoe Street warrants some specialized transportation considerations to ensure the Old Town transportation network is optimized from the perspective of both safety and operations.

First, it is recommended that Queen Street be converted into a Flex Street, with a single grade or surface shared by people using all modes of travel at slow speeds. In flex streets, curbs are removed and the sidewalk is blended with the roadway. Speeds are slow enough to allow for pedestrians to intermingle with bicycles, motor vehicles, and transit. It is also envisioned that the aesthetic of the flex street will be in alignment with that of the Heritage District. Many flex street concepts in practice today use bollards in strategic locations to maintain delineation of areas for pedestrians and motorists, as illustrated in **Figure 5.19**.

Flex street coupled with wayfinding and parking management

The benefit of the flex street concept is that pedestrian/vehicle incidents and near misses can be reduced, and traffic flow can be improved throughout Old Town more broadly speaking. By

coupling the flex street implementation with wayfinding signage throughout Old Town, especially along the main corridors that provide access to the Heritage District such as Niagara Stone Rd. / Mississagua St., King St., and Niagara Pkwy. / Queen's Parade, traffic may be naturally diverted away from Queen St. and towards parking lots and other street parking. Total vehicle-kilometres travelled in the Heritage District can be reduced if road users do not have to circle around the Heritage District looking for an available parking space. This approach can be further enhanced through the implementation of parking lots on the periphery of Old Town, which will help with traffic flow and queuing throughout the Heritage District, while minimizing pedestrian/vehicle interactions. Finally, parking fees and parking windows might be tweaked to further encourage parking away from Queen St.

Caleche relocation

To further manage operational efficiency and safety in the Heritage District, if Niagara-on-the-Lake intends to maintain a caleche stand in the Heritage District, it is recommended that it consider the parking lot off of Market St. in between King St. and Region St., rather than directly at the adjacent intersection of King St. and Queen St. itself. This parking lot formerly acted as the layover point for Niagara-on-the-Lake Transit (fixed-route) while it was still operating, so the freed capacity in the parking lot might be re-purposed as the caleche stand.

Figure 5.19:
Image of
Dundas St.
in London,
Ontario



It is important to note that while many caleche operations across North America are still in service and operate successfully, several have shut down in recent years in cities such as Montreal and Philadelphia. In these cases, the shutdowns are most often due to concerns over animal welfare, rather than to other factors such as congestion. Niagara-on-the-Lake should continue to monitor caleche operations going forward to ensure they do not detract from broader mobility objectives, and should inspect the caleche operations to ensure the horses are treated appropriately. Any complaints that may arise related to animal welfare should be taken seriously.

Median parking by delivery vehicles

Delivery vehicles are in need of more options for extended ~10-15 minute loading/unloading time off-street, in private lots or in adjacent parking lots. The accessing of these lots by delivery vehicles may warrant the review of trucking load restrictions on intersecting streets, such as along Regent St. which is an access point to the parking lot at Market St. In combination with measures to encourage visitor parking on the periphery of Old Town rather than along Queen St., this is expected to benefit delivery vehicles in terms of freeing up parking option alternatives to the median along Queen St. It is also recommended that Niagara-on-the-Lake develop its own goods movement strategy. If there is a desire to not only encourage alternative parking locations, but also to discourage median parking, the islands can always be extended so median parking is no longer an option. However, this should not occur until it has first been evaluated in sufficient detail as a component of Niagara-on-the-Lake's goods movement strategy, and has been deemed feasible and appropriate.

Pedestrian crossings

The safety of pedestrians crossing Queen St. is a notable concern, especially considering the lack of designated crosswalks outside of the Queen St. / King St. intersection. All-way stops are worth considering at the Regent St. and Victoria St. intersections, with crosswalks painted on the road in a similar style to the King St. pedestrian crosswalk. However, all-way stops should only be implemented if there is justification for them in accordance with the Ontario Traffic Manual (Book 5) which describes thresholds of collision frequency and traffic volumes. It will be important for Niagara-on-the-Lake to first collect traffic volumes to help identify the need for all-way stops. As an alternative to all-way stops, and perhaps a more appropriate solution, Niagara-on-the-Lake might consider marked courtesy crosswalks with in-street pedestrian crossing signs to alert drivers of the upcoming crossings. These courtesy crosswalks are recommended to be implemented on both the near-side and far-side at Regent St. and Victoria St. As a lower priority than these courtesy crosswalks, mid-block crossings might be considered, however, these should be evaluated after the implemented of the flex street along Queen St. Further, if the island along

Queen St. is ultimately extended west of the clock tower as a strategy to discourage or eliminate median parking, this can also be used as a strategy to enhance the feasibility and safety of mid-block crossings, as the island will also act as a refuge for pedestrians mid-crossing.

Roadway width

Roadway width will be addressed indirectly through the implementation of the flex street. Depending on the success of the flex street during the pilot period, consideration may be given to relocating bollards and landscaping features to reallocate more of the roadway for pedestrians (and less for vehicles). However, this should be considered in the context of any measures which may be taken to extend the island along the median of Queen St., as pedestrian bump-outs could conflict with island extension initiatives, leaving a width of roadway that is insufficient to serve the forecasted vehicular traffic.

Speed limit

A speed limit of 30 km/h may be considered along Queen St. This would be consistent with the premise of the flex street that vehicles travel at slower speeds, and it would also be consistent with Vision Zero, which is a global movement being adopted by an increasing number of provinces and municipalities across Canada that is aimed at achieving zero fatalities and serious injuries on the roadways.³ Speed limit reduction would contribute to reduced collisions while improving the public realm and helping to preserve the "heritage" feel of the Heritage District. In the event that a year-round speed limit reduction to 30 km/h is not palatable, seasonal and event-based reductions might be considered instead. It is important to also consider reduced speed limit prospects alongside traffic data and the Transportation Association of Canada's Canadian Guidelines for Establishing Posted Speed Limits. Speed limits in general should be in alignment with roadway design, and if Queen St. is reclassified as a flex street, it will be important to review the posted speed limit regardless of whether or not changes are made in the end.

Additionally, it is important to recognize that the Town has approved Vision Zero at the municipal level. Vision Zero has also been discussed at a Regional level within Niagara Region, and the Regional team is hoping to go live with Vision Zero later in 2022. A coordinated Regional and Municipal effort is prudent to ensure that all corridors running through the Town are giving similar consideration with respect to Vision Zero principles and that we are not shifting road safety issues from municipal roads or regional roads, or vice versa. As such, it is recommended that the Town collaborate with the Region on matters related to the implementation of Vision Zero initiatives.

5.6.4 REGIONAL TMP ALIGNMENT AND INTEGRATION

The scopes of the Niagara Region TMP completed in 2017 and the current Niagara-on-the-Lake TMP (referred to in this subsection as “TMP” for this Transportation Master Plan) are notably different. The former focuses on connectivity between the Region’s cities, towns, and townships, and onward to Hamilton and to New York State, while the latter focuses on connectivity within the Town. However, there are some areas of overlap between the two studies and the analysis and recommendations resulting from the TMP are complementary with those described in the Niagara Region TMP. A few areas of note include the following:

1. Goals of the Regional TMP. Both the TMP and the Regional TMP share similar objectives including integrating transportation with land use, supporting economic development, enhancing multi-modal connectivity, and improving options for sustainable modes of transportation. Generally speaking, the improvements to the road network, active transportation network, and transit network described in this TMP, as well as the supporting policies and strategies, are inherently in support of Regional TMP goals as well.

2. Complete Streets. The Regional TMP is in support of the complete streets concept, which is a policy approach to transportation planning where roadways are designed to move people rather than cars and the focus is on safe and efficient travel for all transportation network users, regardless of their mode of transportation. The TMP also supports the complete streets concept and opportunities and strategies for deployment in Niagara-on-the-Lake are discussed in **section 5.6.5**.

3. Bicycle Network. The Regional TMP identifies an expanded and connected bicycle network with consistent wayfinding as a recommendation. Further, it describes the intention for there to be Bicycle Facilities Grant funding available to municipalities over a 10-year period for Regional Bikeways Network facilities on local roads. In implementation of the TMP’s bicycle network recommendations, Niagara-on-the-Lake should seek to tap into this funding if and where possible. In general, Niagara-on-the-Lake is encouraged to upgrade its informal bicycle network consisting primarily of paved shoulders to more formal bike lanes, in support of this Regional TMP objective and in consideration of the significant and continually increasing cycling activity in the Town.

4. Transit Network. The Regional TMP identifies improved inter-municipal transit as a core focus area, and describes an ambitious plan to expand the Niagara Region Transit service to cover the entire Region with fixed-route or OnDemand transit where appropriate, and consolidate existing transit services in the process. The Regional TMP shows a plan for NRT fixed-route service running from Old Town to Glendale (via Virgil) and also from Old Town to Niagara Falls (via St. Davids), in addition to today’s operating NRT service from St. Catharines to Niagara Falls (via Glendale). Naturally plans evolve over time and the Town and the Region have collaborated on OnDemand service to replace the former Niagara-on-the-Lake Transit, however, the Region’s aspirations

for expanded transit should be considered in the future to ensure Niagara-on-the-Lake does not enter a situation where transit demand outstrips supply. Further, the Regional TMP supports expanded GO rail service in the future – a development which the Town should monitor and consider in the context of future transportation planning decision-making.

5. Road Network. While the Regional TMP focuses mostly on corridors that are outside of the scope of the TMP, it describes a few road and interchange improvements of note, including the following:

- Capacity improvements along Niagara Stone Rd. (Airport Rd. to Concession 6) and along Airport Rd. (Niagara Stone Rd. to the QEW)
- QEW interchange improvement at Glendale, and a new interchange along Highway 405 at Concession 6

The traffic modeling undertaken in this TMP is commensurate of committed and planned roadway improvements and recommendations have been developed accordingly. Notably, the interchange along Highway 405 at Concession 6 is not currently a priority, however, the Town is upgrading the road to a Regional standard to facilitate discussions of a future upgrade of the road to the Region. In the future, this interchange might facilitate additional access routes to Old Town, potentially helping to further alleviate volume-to-capacity concerns along Niagara Stone Road. Further exploration of this opportunity would be reliant on interest and action on the parts of Niagara Region and the City of Niagara Falls in consultation with the Ministry of Transportation, so it is recommended that the Town advocate for these potential improvements during future conversations with the Region and the City of Niagara Falls as appropriate.

6. Policies and Strategies. Strategies described in the Regional TMP most notably include transportation demand management (TDM) and transportation systems management (TSM). The Region is supportive of investment in technologies such as traveler information systems, traffic control systems, and corridor management to help maximize the safety and efficiency of existing transportation infrastructure.

5.6.5 COMPLETE STREETS

What are Complete Streets?

Complete Streets are streets that are safe for everyone including people who walk, bike, 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.

Smaller communities face unique transportation challenges. Major roads that bring traffic through the Town can present significant safety barriers for residents on foot or on bike, and in Niagara-on-the-Lake’s case key roadways are controlled by a higher tier government. These major roads are not only strategic transportation routes but are also important to the economic vitality of the community. With a Complete Streets approach, Niagara-on-the-Lake is empowered to coordinate with outside agencies on new project designs to ensure that it will serve residents as well as visitors.

The Niagara Region 2017 Transportation Master Plan included the creation of a Complete Streets Design Guidelines document which outlined best practices for the application of complete street typologies to boulevards, roadways, and intersections. It is recommended that this document is adopted for use by the Town of Niagara-on-the-Lake, and that a review is undertaken to adapt the guidelines to the local context.

Notably, Niagara Region's definition of a complete street is "a public right-of-way where the transportation facilities and adjacent land uses are planned, designed, and constructed to accommodate users of all ages and abilities including pedestrians, bicyclists, transit vehicles, automobiles, and freight traffic". Given the more conceptual nature of a complete street, there is no single playbook to be followed in the planning and deployment of complete streets throughout Niagara-on-the-Lake. However, by recognizing the volume of pedestrians and cyclists throughout the Town today, there is room for Niagara-on-the-Lake to 'catch up' its roadway designs to be more reflective of the modes used. In earlier sections of this report, additional investments in active transportation infrastructure are recommended. Further, in later sections of this report, such as under the "Pedestrian Safety and Crosswalks" subheading, we note conceptually how areas of high active transportation demand (relative to the underlying roadway design) may be identified through the observation of phenomena such as 'desire lines'. By adopting the recommendations included in this TMP and considering these practices for equitable investment in transportation infrastructure across the transportation modes, the Town's transportation network will become increasingly reflective of Complete Streets practices over time.

What does a Complete Street look like?

There is no singular design prescription for Complete Streets; each one is unique and responds to the community context. A complete street may include sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and more. The over-arching philosophy is that Complete Streets takes a holistic approach to equitably sharing the roadway for all road-users based on the contextual needs.

Recommended Road Classification

The Town of Niagara-on-the-Lake is served by a mix of municipal and provincial roadways. While the existing road classification has a robust definition of motor vehicle requirements, there are opportunities to re-define the road network in a way that incorporates appropriate design parameters and considerations for active transportation and transit, as well as integrate the road classification to reflect work completed as part of the Complete Streets Toolkit.

The Classification Framework

A framework has been developed to define the function of the street network to inform the planning outcomes and investment decisions for the Town. The framework defines the

future function of the street network on the basis of overall land use and transportation objectives.

The roads within Niagara-on-the-Lake provide two primary functions:

- **Movement:** the ability to travel between places; and
- **Place:** the ability to access origins and destinations of travel.

An understanding of these two functions is especially important when the two functions compete, such as through increased movement requirements or improved place amenities. The movement/place function of the street environment informs planning for the level of access across each mode of transportation. The different road classifications based on the function they serve within the transportation network are as follows:

- **Arterial Roadways:** Dedicated to the quick and efficient movement of goods and people over long distances with Arterials playing a strategically significant function within the road network.
- **Collector Roadways:** Provide safe, reliable and efficient movement between neighbourhoods and strategic centres.
- **Flex Streets:** A "flex street" is a street with a single grade or surface that is shared by people using all modes of travel at slow speeds. Curbs are removed, and the sidewalk is blended with the roadway. Speeds are slow enough to allow for pedestrians to intermingle with bicycles, motor vehicles, and transit.
- **Local Streets:** Facilitates local access to communities.

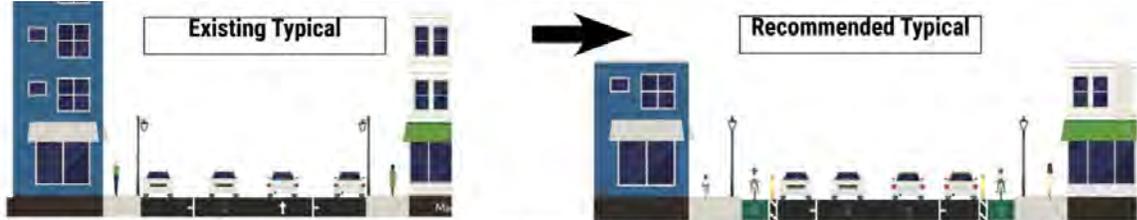
Typical cross sections for each road class are visualized in **Figure 5.20**.

The recommended road classification is presented in **Figure 5.21** and changes are summarized in **Table 5.13**. A comparison of current and recommended design standard for complete street cross-sections is also detailed below.

In addition to the road classification changes summarized below, it is recommended that King St. in between John St. and Paffard St. be monitored for a potential downgrade from 'collector' to 'local'. While we would not want to downgrade this corridor segment prematurely, we would envision that through traffic would generally use Charlotte St. rather than King St., as Charlotte St. is recommended to be 'collector'. To help encourage this travel pattern change, however, it may be prudent for Niagara-on-the-Lake to implement a pilot project to narrow the travel lane width along King St. to help foster this change.

Concession 2 Rd. from Line 3 Rd. to East and West Line may also be monitored for a possible upgrade to collector if it would help facilitate a Virgil Bypass as noted in **section 5.5.2.2**. The recommended changes to roadway classification are intimately connected with land use planning. As a result, the proposed changes to roadway classification should be amended in the next Official Plan Update. This should be done in coordination with specific parameters to account for transit, active transportation, and roadway safety for each road classification category so that municipal geometric design

Figure 5.20: Road Classification Descriptions



Arterial, Urban/Rural

Urban arterial roadways should connect to the provincial and regional road network as well as service major commercial or employment areas in the Town. They should accommodate designated pedestrian and cycling facilities, along with transit priority measures where applicable. The type of pedestrian or cycling facility is determined by vehicular volume and speed, where higher volume roadways will need greater safety measures. Preference should be for protected bike lanes, followed by painted bike lanes. Signed routes are not recommended on Arterial roadways. Where needed on-street parking should also be accommodated. Typical right-of-way width (property line to property line) should be 18m–30m depending on the configuration.

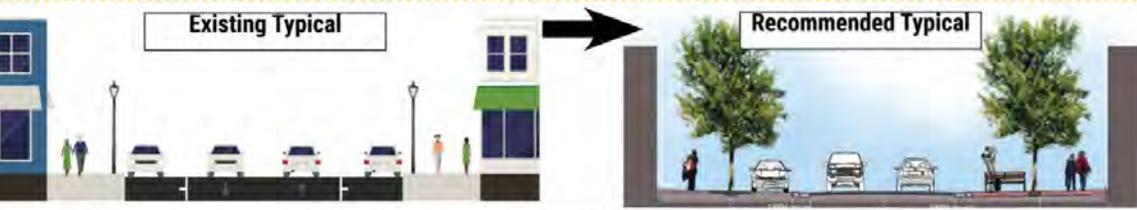
Rural Arterials are similar in function to Urban Arterials but typically feature off-road multi-use pathways and trails rather than in-road facilities for active transportation users. Rural Arterials have higher posted speed limits and feature greater intersection spacing than Urban Arterials. Side street stop-control measures are typically used rather than all-way stop signs or traffic signals. Shoulders are provided to allow for emergency stopping and winter snow clearing. Transit services are typically providing regional connectivity between urban centres with limited stops.



Collector, Urban/Rural

Urban collector roadways should service major neighbourhood nodes such as schools and community centres as well as provide a link to the broader Major collector roadway system. They should accommodate pedestrian sidewalks on at least one side of the roadway as well as allow for bicycle infrastructure such as protected or painted bike lanes, however a signed route may be appropriate based on vehicular volumes. On-street parking may be accommodated depending on the available space. Typical right-of-way width (property line to property line) should be 12m to 26m.

Rural Collectors are similar in function to Urban Collectors but typically feature off-road multi-use pathways and trails rather than in-road facilities for active transportation users. Rural Collectors have posted speed limits comparable to Urban Collectors or can be slightly higher. Intersection spacing and traffic control measures can be comparable to Urban Collectors. Shoulders are provided to allow for emergency stopping and winter snow clearing. Transit services can include rural stops that are spaced apart greater than along an Urban Collector.



Flex Street

Flex Streets allow roadway functions to change with time and with the seasons. By narrowing the roads to the appropriate width, it slows traffic allow for the pedestrian streetscape to be widened as much as possible, inviting everyone to enjoy this urban space together as pedestrians, cyclists and motorists. As the average speed inevitably drops, the enjoyment of the moment increases. Flex streets offer a diverse platform for varying activities along the street, supported by an integrated sustainable infrastructure of lighting, trees and furnishings. The flexible zone frames a mix of uses including cycling, sidewalk play, tree canopies, laneway greening, water play, performance areas, murals and art platforms.



Local Street

Local Streets facilitates local access to communities. Due to the low volumes of traffic that travel along Local Streets strategically located streets may accommodate pedestrian sidewalks on one or both sides of the street as well as signed bicycle routes to connected to the broader dedicated cycling systems (i.e. painted or protected bike lanes) on Collector and Arterial road ways. On-street parking may be accommodated depending on the available space and need. Typical right-of-way width (property line to property line) should be 14m to 18m.

Figure 5.21:
Recommended
Road
Classification

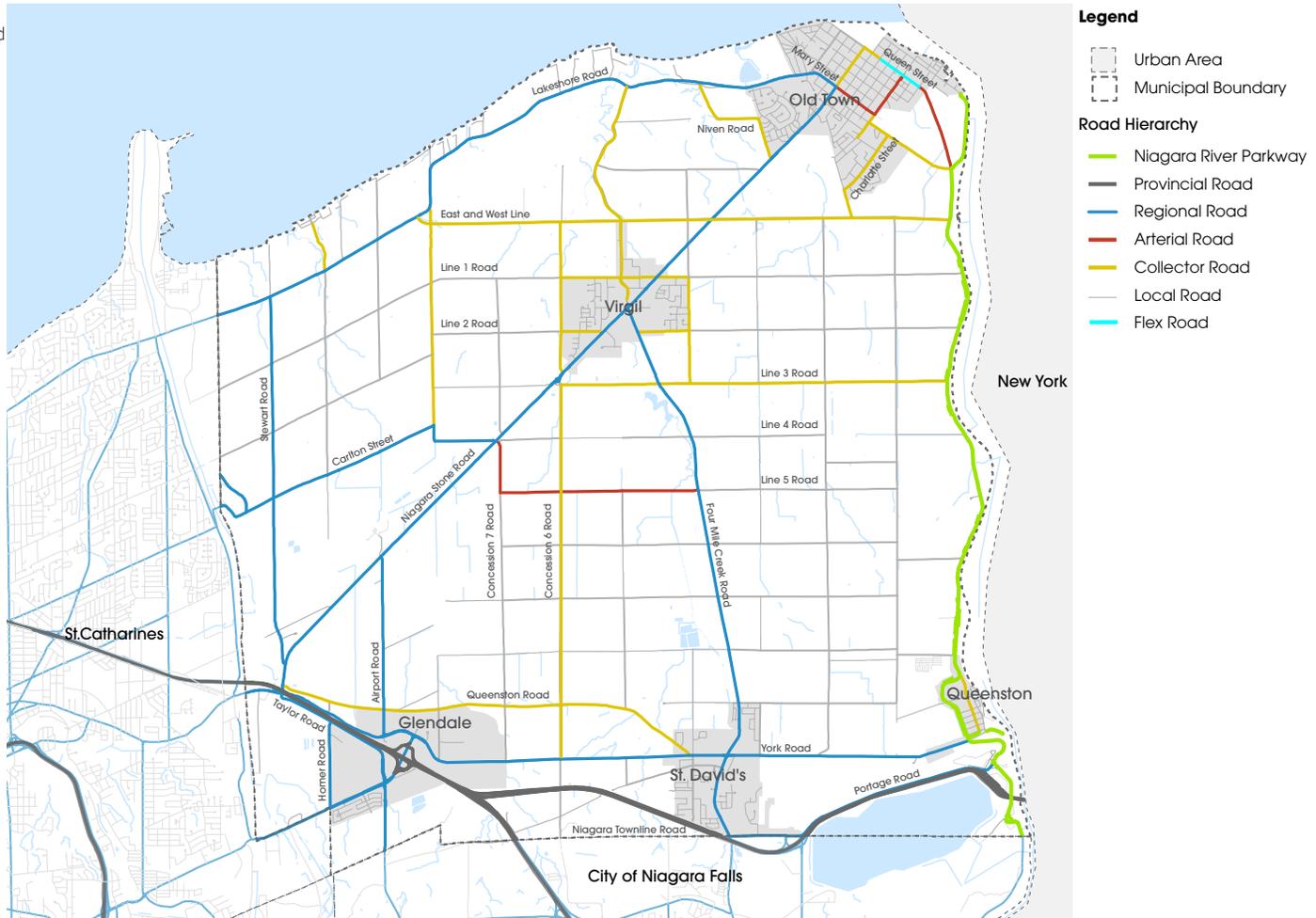


Table 5.13: Recommended Road Classification

Roadway	Description	Recommended Classification	Justification
East and West Line	CR87 to Niagara Parkway	Collector	<ul style="list-style-type: none"> Provides alternative route for E-W travel Accommodates growing travel demand between new developments in northern Virgil and Old Town
Four Mile Creek Road	CR55 to CR87	Collector	<ul style="list-style-type: none"> Relieves congestion along Niagara Stone Road Relieves congestion on Lakeshore Road
Charlotte Street	Niagara Street to John Street	Collector	<ul style="list-style-type: none"> Accommodates travel demand to central Old Town Serves projected residential growth in southern Old Town (Zone 4) Relieves congestion along Niagara Stone Road
Concession Road 6	York Road to Line 3 Road	Collector	<ul style="list-style-type: none"> Relieves congestion along Niagara Stone Road and Airport Road
Queen Street/Picton Street	Wellington Street to Gate Street	Flex	<ul style="list-style-type: none"> Place-making within the Old Town Accommodates high pedestrian and tourist activity

standards support the over-arching policy.

Recommended Policy Documents:

- Official Plan Amendments to account for the updated road classifications and changes;
- Adopt the Niagara Region Complete Streets Design Guidelines and conduct a review to adapt the guidelines for local context.
- Updated Municipal Design Standards for the Road Classification categories to include transit, active transportation, and road safety parameters conducive of Complete Streets.

5.6.6 ACTIVE TRANSPORTATION WINTER MAINTENANCE

In snowy cities across Canada, cycling volumes drastically decrease in the winter months. For instance, in the City of Ottawa, it was estimated that approximately 17% of yearly bike trip volumes along major routes occur during the period between December and March.

Previous public engagement in the Transportation Master Plan identified reliability as being one of the top three factors influencing mode choice in Niagara-on-the-Lake. Walking and cycling are mode choices that can be year-round options for getting around Niagara-on-the-Lake, particularly for short-distance trips within each of the neighbourhoods to community centres, schools, or nearby commercial areas.

In the early implementation of cycling facilities across North America design practices ignored winter operations and many agencies were unsure how to shift their roadway-focused maintenance experience to maintaining new infrastructure that has different considerations. All-seasons maintenance is critically important to provide people with a viable and safe travel option throughout the year. In colder climates, several communities have shown the ability to retain people walking and cycling through the winter if winter operational considerations are part of the design process and if they have predictable and consistent maintenance practices.

Niagara-on-the-Lake's Current Winter Maintenance Standards

Niagara-on-the-Lake's Snow Procedures suggest that snow is to be cleared from all roads within 24 hours after the snow has stopped falling. Plowing starts with the main roads, followed by secondary roads and finally residential roads. Residential roads are plowed to create one lane for vehicular traffic while main and secondary roads are plowed on both sides of the street.

Sidewalks take second priority after roads and get cleared provided that more than 75 millimetres of snow has accumulated. Similar to the roads, sidewalks are prioritized in accordance with their relative importance as active transportation links.

Roads and sidewalks are sanded to rid them of ice. Sanding

begins as the precipitation occurs, starting with main roads, sharp corners, and steep hills, and continues as long as the storm continues. While sanding is effective, it must be appreciated that leftover sand, once the snow melts, can present a safety concern for active transportation. The Town does not sand sidewalks.

Design and Operation Considerations

Maintenance techniques for active transportation facilities are different than those of roadways, the design treatments used for active transportation infrastructure must be sensitive to and enable good maintenance techniques so walking and bicycle riding in the winter months can occur with minimal impedance.

Key considerations for winter maintenance and operations include:

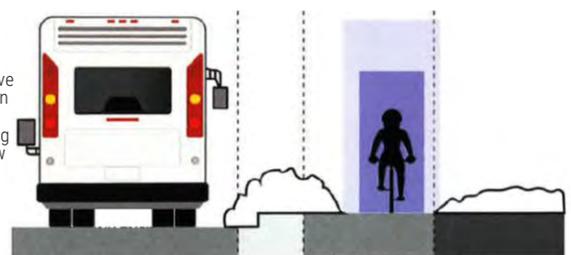
- Coordination of street/sidewalk/bikeway clearing to minimize the transfer of snow and debris between the various facilities and to reduce the level of effort required to perform maintenance operations;
- Snow clearance, storage, and removal practices to ensure clear travel paths are provided to all users;
- Facility dimensions consider equipment dimensions to allow for maneuverability around design elements and efficient clearing of streets; and
- Snow clearing, and ice-control practices are appropriate for pedestrians and cyclists, taking into account their unique movement weight, narrow tires, and lack of radiating heat

The buffer space between the travel lane and the protected bike lane can be used for snow storage and its width must consider the sufficient linear space to store the snow plowed from the sidewalk, bikeway, and/or vehicle travel lanes as shown in **Figure 5.22**.

In the absence of a buffer between the bike lane and the travel lane the buffer between the sidewalk and the vehicular/bike lanes can be used to store snow allowing the bike lanes to be cleared in conjunction with vehicular lanes. While Niagara-on-the-Lake presently has little in terms of specialized bicycle facilities, the Town should be cognizant that an "informal" cycling network consisting of paved shoulders may create barriers to active transportation use in winter months when there is accumulation of snow and ice.

Notably, where sidewalks are concerned, along many corridors there may be limited buffer space between the sidewalk and travel lanes. In these instances an organized snow removal method between the roadway and sidewalks can be

Figure 5.22: Example of buffer areas between active transportation and roadway facilities being used for snow



implemented to gradually shift the snow from vehicular, cycling, and pedestrian facilities. This can ensure that sidewalk clearing does not fall too far “behind” the road clearing during prolonged periods of snowfall. Considering also that snow blowers travel slower than the road snow plows, if significant barriers to active transportation arise, or if safety concerns arise, this may warrant a re-evaluation of snow clearing priorities or additional investment in sidewalk snow blowers (and person-hours to operate the snow blowers).

Provincial Minimum Maintenance Standards

As of May 3, 2018, substantive changes were made to the Minimum Maintenance Standards for Municipal Highways, O Reg 239/02 including:

- The introduction of winter maintenance standards for bicycle lanes;
- The introduction of winter maintenance standards, including patrol obligations, for sidewalks;
- The ability for municipalities to declare a “significant weather event” with implications for winter maintenance on roadways, bicycle lanes and sidewalks during the duration of the event; and
- Inspection standards for areas “adjacent to sidewalks.”

Bicycle Lanes

The Minimum Maintenance Standards (MMS) now provide a definition for a bicycle lane which includes a portion of the roadway with marked or buffered lanes, whether for the exclusive or preferential use of cyclists.

The MMS now includes specific sections outlining winter maintenance standards for snow accumulation in bicycle lanes. **Table 5.14** compares the new snow accumulation depth standards for bicycle lanes as compared to the existing standards for roadways.

The snow accumulation standards for bicycle lanes are lower than for the adjacent roadways in which they are contained, with the implication that where maintenance is performed on the roadway and bicycle lane in unison, both standards should be satisfied.

Similar to the sections dealing with roadways, the MMS provide that where the depth of snow accumulation on a bicycle lane is less than or equal to the depth set out in the table, the bicycle lane is deemed to be in a state of repair in respect of snow accumulation.

While there is no separate section dealing with ice formation on bicycle lanes, the section which sets out the standards for ice formation on roadways does note in section 5(5) that “this section applies in respect of ice formation on bicycle lanes on a roadway, but does not apply to other types of bicycle facilities.”

Sidewalks

Table 5.14: Provincial winter minimum maintenance standards for bicycle lanes and roadways

Class of Highway or Adjacent Highway	Snow Depth	Time for bicycle lanes	Time for roadways
1	2.5 cm	8 hours	4 hours
2	5 cm	12 hours	6 hours
3	8 cm	24 hours	12 hours
4	8 cm	24 hours	16 hours
5	10 cm	24 hours	24 hours

The MMS now contains specific sections dealing with sidewalk winter maintenance. Section 16.3 provides that snow accumulation on sidewalks shall be reduced to less than or equal to eight centimetres within 48 hours of the end of a snow event. The section further provides a standard of a minimum maintained width of one metre. This section appears to mirror the standards which many municipalities on their own initiative have had in place for some time. Notably, the section does not require clearing to bare pavement; rather, simply reducing the depth to less than or equal to eight centimetres (cm).

Sidewalks are deemed to be in a state of repair with respect to snow accumulation (a) where snow depth is less than or equal to eight centimetres; and (b) during ongoing snow accumulation, even where it exceeds eight cm, until 48 hours after the snow accumulation ends.

Section 16.5 sets out standards with respect to ice formation on sidewalks. It requires that municipalities monitor weather in accordance with section 3.1, and to “treat the sidewalk if practicable to prevent ice formation or improve traction within 48 hours if the municipality determines that there is a substantial probability of ice forming on a sidewalk, starting from the time that the municipality determines the appropriate time to deploy resources for that purpose”. This appears to be an effort to impose standards for sidewalk maintenance during ice formation events. Necessarily, this standard still leaves the municipality with considerable discretion in terms of the deployment of resources during such events.

Similar to the other “deeming” provisions found in the MMS, where ice forms on a sidewalk despite complying with the standard in subsection (1), the sidewalk is deemed to be in a state of repair in respect of ice until 48 hours after the municipality first becomes aware of the fact that the sidewalk is icy. Pursuant to subsection (3), an icy sidewalk is deemed to be in a state of repair for 48 hours after it has been treated.

The deeming provisions with respect to snow accumulation and ice ought to provide municipalities with more objective arguments in defending sidewalk slip-and-fall claims together with the gross negligence defence provided in section 44(9) of the Municipal Act, 2001.

Section 16.7 for the first time introduces standards for winter sidewalk patrols, which are to be conducted by the municipality where “the weather monitoring referred to in Section 3.1 indicates that there is a substantial probability of snow accumulation on sidewalks in excess of eight cm, ice formation on sidewalks or icy sidewalks.” The patrols are to be conducted on sidewalks that the municipality selects “as representative of its sidewalks at intervals deemed necessary by the municipality.” Accordingly, there is no expectation that all sidewalks are to be patrolled; rather, this section appears to reflect the practice already in place in many municipalities to inspect “representative” sidewalks for winter maintenance conditions.

Multi-Use Trails

There are no provincial minimum maintenance standards for multi-use trails. Standards are set at the municipal level. This presents a potential gap in winter maintenance requirements for communities such as Niagara-on-the-Lake where a significant portion of cycling infrastructure is provided as a multi-use trail.

Maintenance Service Best Practices

Setting maintenance policies, priorities, and service standards is important so agencies can avoid inconsistent levels of service across the active transportation network, fragmentation of the network, and/or uncoordinated efforts between off-street and on-street facility maintenance. To have a coherent, continuous winter active transportation network, the maintenance priority for facilities should be based on contiguous routes, independent of road maintenance priority.

Each municipality has its own needs and standards that are set to reflect changing priorities. **Table 5.15** summarizes some of the best-practices for active transportation snow clearing standards across Canada and Europe.

Generally, municipalities will create a priority or classification system for cycling facilities to distinguish varying levels of snow clearing priority (similar to what is currently done in Niagara-on-the-Lake for roadways and sidewalks).

Table 5.15: Best Practices for Active Transportation Snow Clearing in Canada and Abroad

Municipality	Standards
Ottawa, ON	Plowing: started after 2.5 to 5.0 cm of snow accumulation; Snow Removal: 50% windrow encroachment into cycling facility.
Montreal, QC	Sweeping: 3.0 to 5.0 cm of snow accumulation; Plowing: more than 5.0 cm of snow accumulation.
Calgary, AB	Priority 1 facilities: snow cleared within 24 hours of the start of snowfall; Priority 2 facilities: snow cleared within 72 hours of the start of snowfall
Oulu, Finland	Priority 1 facilities: snow clearing started after 3.0 cm snowfall, completed before 7 am the following day; Priority 2 facilities: snow cleared after the Priority 1 network maintenance is completed, only after 5.0 cm snowfall

Active Transportation Winter Maintenance Recommendations

Winter is an inevitable part of yearly life in Niagara-on-the-Lake. While active transportation certainly tends to drop during winter months, there are still residents who will need to walk to/from bus stops, retail stores, and other areas around the Town. The drop-off in active transportation may be less prevalent in neighbourhoods such as Glendale, for example, where school remains in session during winter months, compared to Old Town which experiences a significant decrease in tourism activity during the winter. Furthermore, as more cycling facilities are implemented, there may be a winter demand for better maintenance of these facilities to allow cyclists to ride around the Town safely.

Niagara-on-the-Lake should identify a classification system for cycling facilities and an associated winter maintenance standard for each to continue to maintain the high-quality of life and safety that residents currently enjoy. Notably, in Niagara-on-the-Lake there are cycling lanes, paved shoulders, signed routes, and multi-use trails, which will likely warrant similar standards with some subtle differences in terms of priorities. In the case of multi-use trails, snow plowing may not be feasible on non-asphalt surfaces.

With respect to patrolling for snow clearing, it is recommended that the Town identify roadways which see high pedestrian traffic during the winter months, such as roadways adjacent to

schools, shops, and community amenities, for prioritization. Roadways designated as Community Safety Zones or Flex Streets could be prioritized as these roadways are already observed to see high pedestrian use.

A re-evaluation of fleet requirements may be appropriate to determine if there are other needs beyond what the current fleet can provide to service the additional recommended infrastructure. Furthermore, while snow is typically the primary focus of winter maintenance, the Town should consider and make recommendations with regards to sand clearing in instances where sand is used, as the leftover sand that remains once snow melts also presents a safety concern.

5.6.7 PARKING MANAGEMENT

Parking management involves the application of various specific strategies in an integrated program. Not every strategy is appropriate in every situation. Actual impacts vary depending on geography, demography, implementation and other factors.

Context

The Town of Niagara-on-the-Lake has an extensive parking program in Old Town, with approximately 792 metered on-street and parking lot spaces located in and around the Heritage District. The locations of paid street parking are visualized in **Figure 5.23**, with additional free street parking located within a 10-minute walk of most attractions. In addition to public parking, there exists significant private parking at venues such as the Shaw Festival Theatre.

The metered parking consists of a mix of street parking and parking lots with access/egress from side streets away from the main strip. Parking generally costs \$2.75 per hour with an 8-hour maximum, in between the hours of 10am and 8pm, though some spaces in premium locations such as along Queen Street cost \$5.25 per hour with a 4-hour maximum.

The Niagara-on-the-Lake Functional Parking Analysis (2011) revealed that peak parking demand exceeds supply, notably during summer weekends, and most notably along Queen Street and Picton Street. The utilization of municipal parking lots, however, was seen to be less than 100% (although still significant, and in excess of the practical capacity of 85%

Figure 5.23: Location of parking in Niagara-on-the-Lake Old Town



during certain hours on Saturdays). These variances could be a product of the limited visibility of Old Town's parking lots, located on Market St., King St., Regent St., and Front St. rather than along Queen St. Since this completion of the Functional Parking Analysis, parking capacity has expanded, but tourism demand has also grown so the parking constraints remain.

Parking Management Measures

There are several parking measures that could be further explored to manage parking demand in Old Town over time so that the Town can support economic and tourism objectives while balancing land use and heritage preservation objectives. Importantly, these parking management measures can also serve to help ensure there is adequate parking supply for workers starting their shifts in the mid-afternoon and during other peak hours. These measures include:

Demand Priced Parking

A system could be developed whereby the Town compares the actual parking occupancy with the desired on/off-street parking occupancy and every few weeks nudge prices up or down accordingly based on demand. Prices can be set by block and time of day to produce one or two open spaces on every block and thus reduce demand and shift motorists to other modes of transportation. This could bring in additional revenue for the Town while also helping to reduce parking demand during the peak hours of 1-4pm (and also reduce congestion that occurs when motorists drive around looking for available parking).

Relatedly, Niagara-on-the-Lake might consider expanding its metered street parking to areas where parking is currently free, such as along Prideaux St./Byron St. and/or Johnson St./Platoff St. Applying a demand priced parking strategy might mean that at certain times the parking is free while at other times (such as during Saturday afternoons) there is a charge. While such a strategy in itself would likely not alleviate congestion in the Heritage District noticeably, the expansion of paid parking areas could act more generally as a deterrent for driving and encourage a shift to transit and active modes.

Increase capacity and utilization of existing facilities

Existing facilities could be optimized by using spaces that are currently wasted areas such as corners, edges, and undeveloped land to increase the parking supply. This can be particularly appropriate for compact car, motorcycle, and bicycle parking. Another method is to reduce parking stall widths from 9 feet wide to 8 feet wide in order to create compact car parking. One additional parking space for every eight can be created. It is not recommended to consolidate street parking in a similar fashion as this can add congestion due to the additional challenges of parallel parking.

In addition to increasing the parking supply within existing facilities, there may be opportunity to improve the utilization of existing facilities. Utilization could be increased if there is appetite among businesses to enter agreements with the

Town whereby unused capacity in privately-owned lots may be used for public parking. At the Shaw Festival Theatre parking lot, for example, the lot may be opened to the public during hours when there are no performances, and the Shaw Festival can be incentivized through revenue sharing agreements with the Town. It is noted that Saturday performances at the Shaw Festival Theatre often do not start until the evening, so spare capacity likely exists during hours of peak parking demand (early afternoon).

Remote Parking and Park-and-Rides

Remote parking, also called satellite parking, typically involves the use of parking facilities located at the periphery of a business district or other activity centers. Special shuttle buses, or transit service, may be provided to connect destinations with remote parking facilities, which would allow them to be farther apart than would otherwise be acceptable. Remote parking and shuttle deployments might be arranged in collaboration with local businesses such as Jackson-Triggs Niagara Estate which have ample parking spaces and are on the Old Town periphery but remain reasonably close to the Heritage District. There is incentive for local businesses for such an arrangement as it would encourage additional patronage at their establishments, so the costs for shuttle operation need not fall entirely on the Town. In order for this strategy to succeed in managing congestion and preserving the Heritage District's character, however, there would need to be ample signage along Niagara Stone Rd. as visitors enter Niagara-on-the-Lake directing them of where to park. Further afield, an additional satellite parking option could emerge upon the Diverging Diamond project's completion, which is understood to include a commuter parking lot in its design. As in the Jackson-Triggs example, shuttles running between this lot and the Heritage District would be required in order for this opportunity to be feasible, and a determination would need to be made as to whether the lot's capacity and potential as a satellite parking option are sufficient to justify shuttle operation across the relatively long distance between the Diverging Diamond Interchange and the Heritage District.

Remote parking is also possible in locations such as the Niagara-on-the-Lake Community Centre on Anderson Ln., which has even more parking available than at local businesses such as Jackson-Triggs, however, there would not be opportunity to benefit from a business partnership to share in some of the funding of shuttle operation.

Closer to the Heritage District, there may be opportunity to leverage the former Niagara-on-the-Lake Hospital site on Wellington St. as additional parking space. Recognizing that not all visitors to the Heritage District enter via Niagara Stone Rd., this parking opportunity can be valuable to capture the visitors approaching from Niagara Falls before they enter the Heritage District. To maximize the value of this potential parking site, it would be worthwhile to invest in signage along the Niagara Parkway and/or Queen's Parade so visitors are aware of the parking lot and where the turnoff is.

In Glendale, as the Taylor Rd. / Glendale Ave. area gets built out as a Transit and Community Hub, this would make a good opportunity to develop a remote parking lot as a park-and-ride, where visitors can arrive on the QEW, park at the transit hub, and then take transit in and around Niagara-on-the-Lake and Niagara Region and not have to worry about finding parking in Old Town or at Niagara Falls and other destinations. Notably, with the inclusion of a commuter parking lot in the Glendale Diverging Diamond project, this already-planned parking lot could serve as the park-and-ride location.

It will be important for park-and-rides to be planned in consideration of the availability of NRT and NRT OnDemand transit service, ensuring a balance of supply and demand across both park-and-rides and transit use. In the event of park-and-rides around the periphery of Old Town, however, it will also be important for a designated shuttle to transport park-and-ride users back and forth between the Heritage District and the park-and-rides as noted above. It would not be prudent to rely on NRT OnDemand in this instance because the additional fare and additional actions required on the users' part to book a ride would likely be off-putting given the proximity of the park-and-rides to the Heritage District – users would likely just drive the rest of the way and look for a centrally located parking spot. Pairing the park-and-rides with Niagara-on-the-Lake's Park 'N' Pedal locations would further enhance success by giving users the option of taking transit or using active modes (biking).

Parking Space Sales and Leasing

Niagara-on-the-Lake might consider a website which allows residents or workers to look for parking to rent on a daily, weekly, or monthly basis. Facilities or businesses with excess parking capacity can lease or trade it to others. Residents could also use such a platform to rent their parking spaces to interested parties, for example seasonal workers who would like a dedicated parking space but do not want to compete with visitors for parking spots. This prospect may also be attractive to some visitors, depending on where and how long they are staying.

Transferable Parking Rights and Developer Agreements

Developers can choose between constructing required parking spaces or transferring parking spaces to another development. This works best in areas where parking maximums limit the amount of parking that can be built. A transfer program could allow historic properties, low-income housing, and senior housing projects, where parking demand is lower, to transfer parking spaces to another development that would like additional spaces above the maximum allowed.

Developer agreements are a similar parking management strategy that can be successful in encouraging mode shift to alternative forms of transportation (transit and active transportation) if transit planning and land use planning are collaborative. One example is parking offsets, whereby developers provide residents with a transit pass in lieu of a

parking space. This strategy relies on the presence of effective transit service and prevalent active transportation infrastructure.

Unbundled Parking

Parking facilities and infrastructure can be unbundled from the rent or purchase price of residential and commercial units and sold or rented out as a premium add on service. Including the costs of parking in rents or purchases encourages automobile ownership and is a disincentive to active modes. Unbundling also allows a more equitable allocation of costs by allowing tenants and owners to pay only if they use the parking infrastructure. Unused parking spaces could be used for public parking at an hourly rate.

Land Banking

Land banking addresses the uncertainty of future parking demand. The strategy reserves unpaved space for anticipated future parking demands if they arise. Meanwhile, the space can be used for amenities such as playgrounds or parks. Land banking can be a useful tool for developments that occur in phases - since developers may be holding the land for future parking demand that will only be fulfilled when a project is complete. Land banking is best for low- to medium-density areas where land for future development is likely to remain fallow for some time.

Notably, the reverse is also possible (and preferable), where excess parking capacity can be converted into green spaces, gardens, public art, or other purposes. This possibility may be applicable to Glendale in particular, as the area develops and shared parking facilities between multiple properties combined with emerging trends in micromobility may decrease the gross parking needs. As noted in the Glendale District Plan, there is also opportunity for shared parking between the new developments and the Outlet Collection at Niagara, especially since the peak parking hours for different land uses (residential and commercial) do not overlap.

Wayfinding and Signage

A comprehensive and uniform wayfinding and signage (parking information) program for the Town's parking system can help guide drivers of parking options and reduce confusion about payment and restrictions. Improved signage can alleviate demand by providing directions to nearby destinations and other peripheral lots. Information can also be used to clearly identify lots that are available to the general public and those that are restricted to monthly pass-holders, providing information on fines and discouraging noncompliance. Improved wayfinding is a notable opportunity in Old Town by encouraging parking on the periphery and in the lots which may be underutilized at times relative to street parking in the Historic District. Dynamic parking signage might also be considered to provide real-time information on the number of parking spaces available. To further enhance the value of dynamic signage, it is best to integrate this with other dynamic wayfinding objectives, for instance to communicate to motorists where available parking capacity exists before

they arrive at parking lots that are already at capacity.

With improved wayfinding and signage, additional strategies such as designated parking spaces for carpoolers become possible. Carpool parking spaces are similar in concept to high-occupancy vehicle (HOV) lanes on highways, in that the more desirable parking spaces may be reserved for carpoolers who have registered in advance for a free carpool parking permit. At present, such strategies can be difficult to implement if there is limited wayfinding and signage, and by extension awareness, of the different parking options in Niagara-on-the-Lake. A wayfinding and signage strategy should also be considered in the development of a Tourism Strategy (discussed further in section 5.7.4), which can further consider traffic management signage, tourist information maps, canal crossing signage, and other wayfinding and signage opportunities.

Streetscaping and Landscaping

Making perimeter parking lots more appealing with shading (natural or artificial) and promoting cleanliness will encourage people to want to park there. In addition, making walks from distant parking lots desirable and shaded, will help people enjoy their walk to work. Improving walkability (the quality of walking conditions) expands the range of parking facilities that serve a destination. It increases the feasibility of sharing parking facilities and the use of remote parking facilities. Improving walkability also increases “park once” trips, that is, parking in one location and walking, rather than driving to other destinations, which reduces vehicle trips and the amount of parking required at each destination. In addition, walking and cycling improvements encourage transit use – since most transit trips involve walking or cycling links. An example of such a parking lot is shown in **Figure 5.24**.

Curbside Demand Management

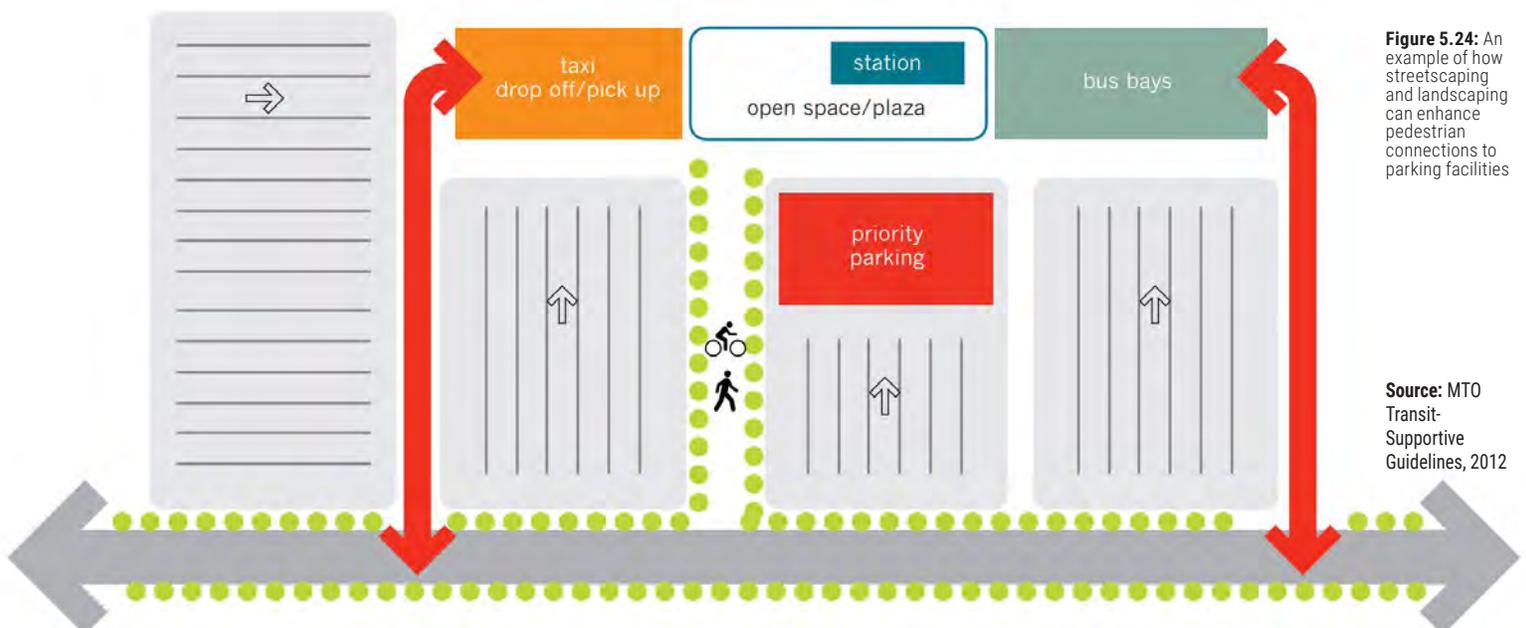
As the urban areas continue to intensify and grow, notably in

Glendale with the growing population and employment and in Old Town with the growing tourism interest, the demand on the road network, existing parking facilities, and curbside space can grow considerably. The public curbside—the space along the street between travel lanes and sidewalk—is precious real estate. The growth of transportation network companies (TNCs) like Lyft and Uber, as well as online shopping and associated deliveries has led to an increased demand for curbside pickups, drop-offs and dwell times. Potential users of the curbside include residents, workers, visitors, patrons, deliveries, transit users and travelers of all other modes. The needs and peak demands for curbside use are not uniform and will expectedly vary across the neighbourhoods.

The average dwell time for a vehicle picking up and dropping off a person is approximately 2 minutes 45 seconds, meaning a designated pick-up and drop-off spaces has a theoretical capacity of being able to serve 22 vehicles per hour. Commercial vehicle dwell times are closer to 10-15 minutes meaning curbside capacity for deliveries can only serve approximately 4-6 delivery vehicles per hour.

To maintain an equitable balance between competing users, urban jurisdictions need to take steps to shift from curbsides dominated by “on-street parking” to reliable bus lanes, safe bikeways, freight loading, and public space. **Figure 5.25** is perhaps more relevant for a larger urban area than Niagara-on-the-Lake but illustrates in concept what a managed curbside looks like.

Notably, some of these roadway design features may take away from the aesthetic of the Heritage District if they were to be implemented there. However, given Queen Street’s tendency to be at full parking capacity and the corresponding unlikelihood that there will be a suitable place to stop, Niagara-on-the-Lake might consider designating one or more side streets as pick-up / drop-off zones.



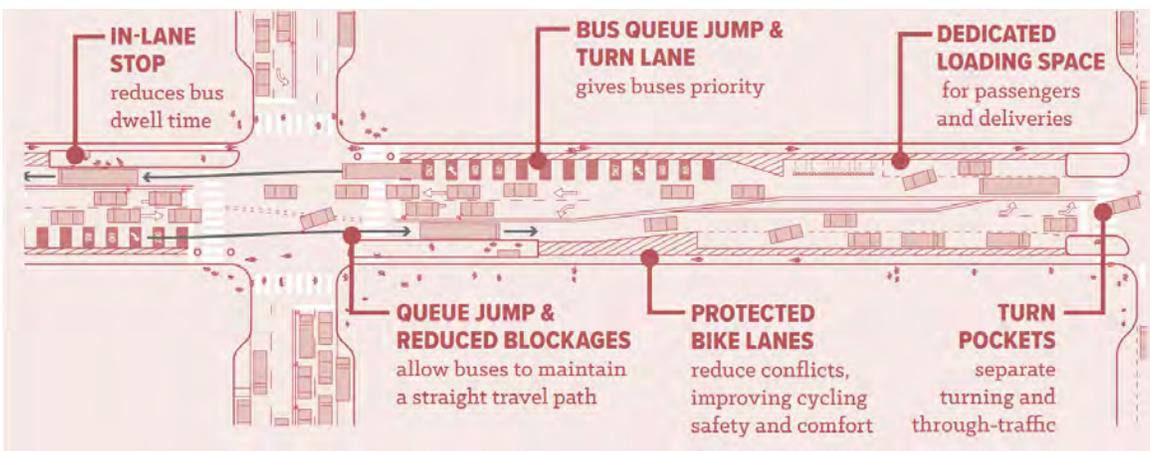


Figure 5.25: A reference of what a managed curbside looks like

Source: NACTO Curb Appeal, 2017

Summary of Downtown Parking Management Recommendations

It is recommended that the Town of Niagara-on-the-Lake proactively consider the on and off-street parking needs today and into the future, with a more detailed consideration of future curbside demand usage and how parking lots on the periphery of Old Town may be better leveraged. The impacts of transit, active transportation, and wayfinding investments should also be considered, as should the potential impacts of emerging technology.

5.6.8 TRAVEL DEMAND MANAGEMENT

Currently the Town of Niagara-on-the-Lake does not have its own defined Transportation Demand Management (TDM) process for new developments. Currently, the Niagara Region TIS Guidelines mandate a TDM plan if a reduction of site trips is proposed. As a result, when a trip reduction is proposed, it is difficult to develop a coordinated integration of development with active transportation investment.

This subsection outlines a summary and recommendations for how the Town of Niagara-on-the-Lake can incorporate TDM to leverage development in a way that supports and encourages alternative modes of transportation.

What is TDM and why is it important?

TDM focuses on understanding how people make their transportation decisions to help manage the demand placed on the transportation network. At its most basic level, TDM is a program of information, incentives and policies to help inform people about the available transportation options, as well as guide land use development to promote the use of sustainable transportation options to mitigate development impacts on the network.

There is also a deeper dimension of TDM that guides the design of transportation and physical infrastructure that underlies major objectives of this TMP such as providing infrastructure for growth, prioritizing and encouraging active modes and transit, and enhancing multi-modal connections.

TDM provides tools to help maximize recommended investments for active transportation, transit, and roadway infrastructure identified in this TMP to encourage sustainable travel choices by supporting alternative options over the

convention of frequently driving alone. Achieving these objectives encompasses a wide range of strategies including:

- Shifting travel modes (e.g. walking, cycling, taking transit or carpooling instead of driving alone);
- Reducing the number of trips people must make (e.g. destinations and activities such as work and shopping combined into multi-purpose trips); and
- Travelling more efficiently (e.g. making trips outside of peak hours)

TDM plays a vital role in the design of urban environments and its influence on travel choices. Some of the outcomes that the Town should aim to achieve by integrating TDM and development are:

- More attractive streetscapes that are inclusive and inviting for all road users (motorists, pedestrians, cyclists, transit riders);
- Preserving streets and public space for a more balanced transportation system with more and better active transportation infrastructure and better integration with transit; and
- Promoting public health and active lifestyles.

The development community has an important role and influence over the urban environment. There is a growing understanding that TDM can be more effectively pursued and implemented when it is incorporated into new developments during the initial planning and design stage, as well as during construction. By integrating TDM into development applications, both the development community and the Town can influence travel behaviour for all residents, employees and visitors.

Development-Based Measures

There are several TDM measures that can be leveraged through the development application process that have varying levels of effectiveness depending on the proposed land use and urban context. For instance, due to the nature of industrial land uses, and the associated shift work, there are fewer incentives that will be effective in shifting employees onto alternate modes of transportation. A factory may be difficult to serve during overnight shifts with transit fare incentives, however a measure such as promoting ridesharing or carpool spaces may provide opportunities for a

development to mitigate their spatial impact on the natural environment while also mitigating their impact on the transportation network. **Table 5.16** provides a matrix of TDM measures and their appropriate contexts that could be considered by developments. This is not an exhaustive list; however, it provides a toolbox of measures that can be used for inspiration during development site plan, or secondary planning applications. In turn, this encourages development to consider integrating multi-modal transportation into their designs to enhance and leverage available or planned transportation improvements.

Parking-Based Measures

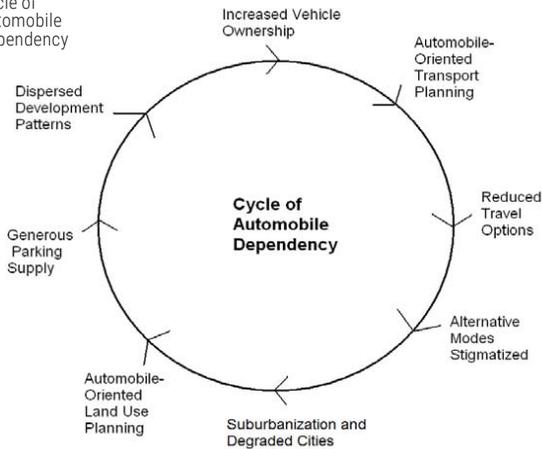
Parking is a key component of transportation demand management that has a direct correlation with automobile use. Historically, parking rates were developed to satisfy forecasted future parking demand, itself extrapolated from historical parking trends. This tends to create a self-fulfilling prophecy, since parking supply increases vehicle use and urban sprawl, causing parking demand and parking supply to ratchet further upward as illustrated in **Figure 5.26**.

This brings to light the question of the optimal parking supply for a given development. Conventional planning determines how much parking to provide at a particular site based on recommended minimum parking standards published by

Table 5.16: Transportation Demand Management Measure Matrix by Land Use and Urban Context

Measure	Land Uses			Urban Context		
	Residential	Commercial	Industrial	Urban	Suburban	Rural
Multi-Modal Information Packages: New residents and employees to a site should be given transit, cycling, and pedestrian maps when they move in or start to work on a site to help identify alternative transportation options and routes. There is also the option of utilizing an app or website-based interface to make trip planning convenient, especially for students and youth.	●	●		●	●	
Transit Fare Incentives: Subsidized transit fares to encourage residents or employees to try transit. Or, pre-arranging with NRT, or the Town on a bulk purchase agreement for new residents or employees, and entering into reciprocal discount agreements with interested local businesses.	●	●		●	●	
Alternative Transportation Amenities: Provide on-site amenities such as safe, attractive, and direct walkways for pedestrians, or bicycle repair stations, or employee showers to encourage cycling. If a site is adjacent to transit, there may opportunities to incorporate weather protected areas into the building design or display transit arrival information in the building lobby.	●	●	●	●	●	●
Private Transit Service: An employer can initiate private shuttle services to create a last-mile connection to transit to be more feasible and attractive. Private Transit Service can also be possible with special events or areas of residential developments with residents of limited mobility. Notably, with NRT's new OnDemand transit system, fewer gaps in transit service are anticipated in Old Town, Virgil, and Glendale, though it should be appreciated nonetheless that it is infeasible for transit to try to be everything to everybody.	●	●	●		●	●
Carsharing/Bikesharing: Provide shared bikes or cars so that residents and the surrounding community may use a shared option instead of needing to own a car or bike. Many services offer 24-hour access, self-service reservation systems, monthly billings, financing, insurance, and maintenance of the vehicles.	●	●		●	●	●
Ridesharing: Promote ridesharing to residents making inter-regional trips. Employers can have a dedicated portal for employees seeking and offering rideshare services. Discounted parking fees for carpools can be an extra incentive to rideshare. Ridesharing opportunities are greatest in situations where transit ridership is low, parking costs are high, and where larger numbers of car commuters live reasonably far from the workplace.	●	●	●	●	●	●

Figure 5.26:
Cycle of Automobile Dependency



professional organizations and codified in municipal zoning by-laws. These standards are often excessive and can usually be significantly reduced. Most parking standards have historically erred toward oversupply as a way of mitigating externalities – reducing on-street parking. Applying such historical parking rates provides far more parking supply than is usually needed, reinforcing automobile dependency. This is particularly the case at mixed-use destinations, serviced with good travel options, and where parking can be efficiently priced or managed.

Oversupply of on-site parking has additional externalities: the high costs of the parking structures themselves, along with the societal costs of the upkeep and maintenance of underutilized structures, and high water and energy usage.

Contextual Parking By-Laws

Currently, the Town of Niagara-on-the-Lake applies blanket parking rates across most of the town based on land use. The one exception is within the Old Town where commercially zoned properties can reduce their parking requirements by 50%. There are opportunities to expand upon this and create specific zones where reduced parking requirements are applicable for residential, and other land uses to encourage higher-density housing and transit-oriented development.

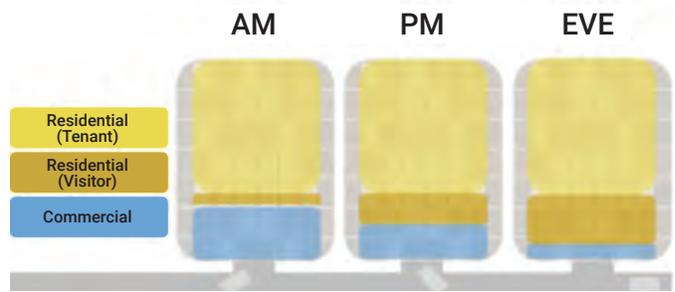
Many municipalities create specific zones or secondary plan areas where parking rates are adjusted to reflect the local context. For instance, a high-density development adjacent to transit or active transportation may require less parking by the nature of having additional mobility options.

Reducing parking requirements in areas that are capable of shifting drivers onto alternative modes of transportation can enhance not only the built form, but also support transit and active transportation to make those modes viable.

Parking Maximums

Traditionally, the supply of parking is regulated through zoning codes that prescribe minimum parking requirements

Figure 5.27: Diagram of how shared parking functions between different land uses



calculated as a ratio of the number of parking spaces required per square foot, dwelling unit or other measure of intensity. The methodology often results in oversupply of parking leading to vast expanses of parking which in turn separates land uses, reduces densities, impairs walkability, and creates obstacles to providing transit and pedestrian friendly communities.

Maximum parking requirements on the other hand limit the number of parking spaces that may be built and prevent the developer from building additional spaces than required. This will guide developers toward developments that are more transit-oriented in nature.

Shared Parking

Best-practices for parking utilize shared parking strategies to minimize a building’s parking footprint while simultaneously maximizing parking utilization. Shared parking serves multiple land uses that have different peak demand periods with one set of parking spaces that are shared as visualized in **Figure 5.27**.

Considering the Town’s Official Plan, and this TMP’s objectives, it is important that development parking requirements do not result in an oversupply of spaces. An oversupply of parking represents underutilized infrastructure that will need to be continually maintained and paid for with little operational benefit and can even work against other municipal investments in transit and active transportation.

Parking Spaces and Carpooling

Carpooling is the sharing of car journeys so that more than one person travels in a car and prevents the need for others to have to drive to a location themselves. In addition to alleviating the demand for driving, carpooling reduces personal travel costs such as fuel, tolls, maintenance and driving stress.

Carshare Spaces

Carshare programs provide access to short-term car rentals and are operated by private transportation network companies. Language can be included into the zoning bylaws which encourage or require developers to provided dedicated carshare spaces and partnerships with private companies. In

turn, developers could be provided incentives for providing car share vehicle spaces through reduced parking requirements.

Priced Parking - Increased Parking Fees

Setting the price of parking involves much more than just revenue generation because it can address a number of transportation objectives. It can be implemented as a Transportation Demand Management (TDM) strategy to reduce vehicle traffic in an area by encouraging use of alternative modes of travel. The price of parking also forms part of a parking management strategy to reduce parking problems in a particular location such as a downtown. Also, to make transit a financially competitive option compared to driving, tying the pricing of monthly parking passes to monthly adult transit passes is strongly advised.

Increased parking revenue could be invested back into the neighbourhoods where it originated in smarter ways rather than going into the Town's general fund. Additional revenue could be used to pay for services such as: additional street patrols, transit, streetscaping, advanced parking management systems, additional parking lots/ garages, etc.

Cash-in-Lieu of Parking

Cash-in-lieu (also called fee-in-lieu or payment-in-lieu) parking programs allow developers to provide fewer on-site parking stalls in exchange for contributing money to the cash-in-lieu fund. Typically, these funds are then used to facilitate construction of offsite shared parking facilities. Most often, cash-in-lieu is intended to allow commercial development to occur, especially the redevelopment of existing buildings on lots that are too small to accommodate on-site parking, without providing the full amount of parking that is required under the Bylaw. The funds could also be used to develop active transportation facilities and streetscaping to motivate a mode change.

School Travel Planning (STP)

A study by York University and the Hospital for Sick Children in 2016 found that the most dangerous part of a child's day is during the morning school drop-off. Researchers observed at least two instances of dangerous driving during the morning rush at 88% of the Toronto public elementary schools that were monitored as part of the study. In relation to this, they also observed that each dangerous driving behaviour during school drop-off periods were associated with a 45% greater risk of collisions.

The study looked at collisions, injury rates as well as parents' driving habits during a typical day. Some of the observed issues included parents doing U-turns in front of a school during rush hour, blocking wheelchair loading zones, and not stopping or putting their car in the park while their children exit. Over a 12-year period this study identified that 411

children in Toronto were hit by a car within 200 metres of a school. While the study results speak to larger cities, similar concerns may exist in smaller communities including Niagara-on-the-Lake, particularly as there is a higher auto mode share as well as some sidewalk gaps within residential communities.

Schools have become hot spots for vehicle/pedestrian conflicts as fewer students walk or bike to school which has led to the increase in parents driving their children to a school and inadvertently putting other children at risk in doing so. A tool that has been gaining traction in reducing school-related traffic injuries is implementing a School Travel Planning (STP) program.

STP is a process that involves school staff, parents and students working with transportation/traffic staff, police and public health to develop a plan to address parental concerns and challenges about school routes, and get more students walking and cycling for the school journey. The focus of this is to apply context-sensitive TDM measures in collaboration with schools to reduce the number of private automobile student drop-offs in favour of active transportation options.

The organization Green Communities Canada currently delivers the Ontario Active School Travel program which is an Ontario-wide program dedicated to children's mobility, health and happiness. The organization leverages a six-phase process over an initial period of two to three years, guided by a facilitator whose role is to bring everyone together, coordinate activities and compile the STP. The six phases of this framework include:

- **Phase 1: Set-up the project.** Getting STP started involves appointing a Facilitator, identifying the schools and stakeholders to participate, and establishing STP committees to support and oversee the process.
- **Phase 2: Assess conditions.** The second phase of STP involves collecting the information needed to identify and understand local school travel issues. The data collected in this phase also provides a baseline against which progress can be measured over the course of the STP process.
- **Phase 3: Develop Action Plan.** The third phase of STP is to develop a plan of action based on the issues and barriers to active school travel that have been identified in Phase 2. Action items should be realistic and measurable, and it's important to identify responsibilities and deadlines.
- **Phase 4: Implement Action Plan.** The fourth phase of STP is all about making the Action Plan happen! This requires ongoing communication with the school community and STP committees and requires updating the Action Plan at regular intervals to track progress.
- **Phase 5: Evaluate progress.** The fifth phase is the evaluation of the STP project and involves collecting follow-up data to compare to the baseline data collected in

Phase 2 and updating the School Travel Plan to document Action Plan progress. Phase 5 also involves celebrating successes and planning resources for the continuation of the project.

- **Phase 6: Keep it going.** The sixth phase involves transitioning the STP Committees to continue working on STP once the Facilitator reduces their involvement. The STP Committee will keep the STP process going through Phases 3 to 6 on a cyclical basis to implement the Action Plan, reassess conditions, and update the Action Plan.

There is an opportunity for the Town of Niagara-on-the-Lake to coordinate with local school boards to implement STP within the community to not only enhance roadway safety around schools, but to also encourage a better utilization of planned active transportation improvements identified in this TMP.

TDM Recommendations

The Town of Niagara-on-the-Lake should develop context specific TDM policies, including associated zoning by-law updates for parking policies. This will provide a mechanism by which the Town can use to collaborate with developers to encourage active transportation and transit, while also presenting opportunities for developers to mitigate their impact on the vehicular network as well as mitigating the spatial needs of parking on a site.

Recommended Policy Documents:

- Develop a Transportation Demand Management Checklist of applicable TDM measures for new developments based on land use;
- Context-sensitive amendments to zoning and parking by-laws including developing maximum and reduced vehicular parking rates for new developments based on the implementation of TDM measures; and
- Coordinate with local school boards to develop a School Travel Planning Program.

5.6.9 TRANSPORTATION ACCESS AND EQUITY

As a town with unique demographics and travel patterns, Niagara-on-the-Lake must consider the transportation access and equity impacts within its decision-making process. While transportation demand is highly seasonal and primarily comprised of tourism activities during those seasonal peaks, the Town also has a large community of migrant workers who may have limited or no access to a personal vehicle. These workers typically are low-income and racialized members of the community who are underserved by traditional transportation options.

Further, the Niagara College campus in Glendale brings many students to the community, who may also lack access to

personal vehicles to commute to/from campus or run errands. Another significant population within Niagara-on-the-Lake are seniors, who may no longer be able to drive and deserve dignified ways to travel to their destinations.

A final group who surprisingly may not be served by the existing transportation system are tourists. As transit access to Niagara Region using the GO Transit rail and bus system improves, more tourists will arrive in the region without a vehicle and struggle to access tourist destinations and support local businesses without alternative transportation methods.

These unique combinations of demands point to a need for solutions which are complimentary to the car. For financial, practical or safety reasons, the personal automobile does not equitably serve the transportation requirements of all residents and tourists within Niagara-on-the-Lake. Therefore, the Town should consider incorporating an equity analysis process (or equity lens) within its future transportation planning projects, to ensure that the needs of these underserved groups are met.

Applying an equity lens, simply put, involves understanding the demographics of affected residents within a project area, and developing the project such that it does not create disproportional impacts to these communities. An example of this may be a road widening project which has senior care located along the corridor. An outcome of the equity lens process may be the inclusion of wider sidewalks and new crosswalks to allow senior citizens to get around the area safely.

Looking at a future project through an equity lens helps to understand who will be served by planned improvements and ensures that improvements are distributed fairly across the community to provide benefit to those that need it most. This may be manifested in the creation of bike trails which connect wineries to improve migrant workers' commutes and the convenience of tourist access, or continuing improvements to the transit system to allow students to shop for groceries during off-peak periods.

5.6.10 SMART MOBILITY

Transportation and mobility are changing every day as new technological advances are being made at a rapid pace. New technologies have the potential to transform the way that people move around, though all come with their own set of impacts, which can be positive and negative. The adoption of the 'sharing economy' has enabled a variety of new business models to proliferate. These business models have generally been enabled by technology, namely, app-based platforms, which have become increasingly accessible as 89% of Ontarians now own a smartphone according to the Consumer Technology Association (CTA).

The purpose of this subsection is to provide an overview of the dominant trends in the current mobility landscape to lay the groundwork for appropriate actions and provisions for these technologies in the future.

Future Mobility Considerations

Ride-Hailing Services

Transportation network companies (TNCs) or mobility service providers (MSPs) are companies that match passengers with drivers through a digital platform, usually a smartphone or a website. Drivers are typically registered to drive their own vehicles, and as such TNCs do not own vehicle fleets. Users use apps to hail their rides to a certain destination, as opposed to traditional taxis which can be hailed from the street.

With the rise of the sharing economy, TNCs have gained popularity in various jurisdictions around the world, including across Niagara Region and in Niagara-on-the-Lake, particularly among the visitor population and during summer months. TNCs have served as an alternative to traditional taxi services and provide coverage in many areas where traditional taxi services may be limited. TNCs often charge lower rates than traditional taxi services and use pre-determined pricing and live location tracking which can create appealing value to the user.

In general, TNCs have signaled their intentions to decrease fees per trip by operating fleets of autonomous vehicles. At the time of writing, several TNCs are still developing autonomous vehicle technology, and legislation surrounding autonomous vehicles in Canada is pending.

Key considerations surrounding ride hailing services include competition with taxi companies and public transit ridership, congestion caused by additional curbside pick-up and drop-off activity, safety, and the traffic impact of additional vehicles circulating around streets. These considerations will become increasingly important in the future as Uber and other TNCs continue to grow in relevance in Niagara-on-the-Lake, potentially becoming more appealing to residents in addition to visitors, pending the resumption of pre-COVID travel habits.

Car-Sharing

Car-sharing companies aim to own and operate fleets of vehicles for users to locate and drive themselves. Car-sharing services became popularized in the early 2010's, in particular in urban cores, as a viable supplement for car ownership. These car-sharing services typically own fleets of vehicles that are located in dedicated parking spaces in either public or private lots. These cars can be booked using an app and located by the user. Some car-sharing models require the user to return the vehicle to the same spot (i.e., a round-trip booking), while some car-sharing models allow the user to park at a different location than their origin (i.e., a one-way booking).

In Niagara-on-the-Lake, car-sharing companies are not likely to make significant traction as the Town has high car ownership levels and visitors primarily access the Town by driving. Moreover, the introduction of additional car-share vehicles

would exacerbate current challenges with respect to parking and congestion, particularly during the summer months. A notable exception to this may be in Glendale where considerable development is expected to occur. Here, residential developments can incorporate car-sharing spaces on their properties in order to act as a transportation demand management measure, as car-sharing can help offset the demand for car ownership and additional car trips. Glendale is also well-suited to this opportunity given its large student population that may only be residing in Town temporarily, and many of whom may not be able to afford their own car.

In addition to models where car-sharing companies own fleets of vehicles, peer-to-peer (P2P) car sharing has emerged in many markets. P2P car sharing allows existing car owners to make their vehicles for others to rent for periods of time. Similar to other methods, users can then find available vehicles to rent using an app, which they can then pick up or have delivered to them. P2P car sharing is an alternative to fleet-based car sharing platforms as well as conventional car rental agencies. In some markets, P2P car sharing has emerged as a popular way for users to gain short-term access to luxury vehicles that are typically not offered by conventional car rental agencies.

P2P car sharing services typically do not raise concerns about parking spaces as cars are typically kept in the car owner's space, however in situations where cars are being delivered to the user, curbside space will be occupied. In Niagara-on-the-Lake, P2P car sharing may be an incentive for visitors to leave their cars at home, accessing the Town by other means (GO Train and other transit services, for example), and still having a vehicle available for the duration of their stay. This may be a means of improving the utilization of the vehicles of residents, particularly in Old Town, who may not be using their vehicles during the day. The opportunity here may be even larger in the coming years if there is a notable increase in the number of people telecommuting post-pandemic.

Microtransit

Microtransit is a form of transit that is intended to be demand-responsive to schedule and routing demands from end users. Niagara-on-the-Lake is already familiar with the concept of microtransit through its participation in the NRT OnDemand program. Notably, microtransit systems are still evolving and companies such as Via continue to expand their product and service offerings, so it is recommended that Niagara-on-the-Lake (together with Niagara Region) continue to stay up to date with the latest industry developments to understand how the NRT OnDemand system may bring further benefit to Niagara-on-the-Lake residents and visitors in the future.

Additionally, it must be appreciated there may come a tipping point where latent transit demand has been captured to the extent that it becomes appropriate to reintroduce fixed-route service in lieu of (or in addition to) microtransit, as fixed-route services remain the more effective and efficient method of providing transit service in instances where there is significant demand.

Mobility-as-a-Service (MaaS)

Mobility-as-a-Service (MaaS) is the concept of mobility being provided in the form of services to be consumed by the user as opposed to modes that are owned by the user, which is enabled through digital platforms. With MaaS, users can use apps to enter a destination, select their preferred mode (or multiple modes if necessary) to arrive at the destination, and be given directions to complete their journey using their selected mode(s). Depending on what services are available to the user, these modes can include public transit, carsharing, ridesharing, bikesharing, or e-scooter. With MaaS, users can either pre-pay for a service or subscribe to a mobility service package plan, similar to the pricing method for mobile phone plans.

The goal of MaaS is to integrate various modes of transportation and to eliminate the logistics of locating, booking and paying for each mode of transportation, with the objective of making mobility so convenient that the user does not opt to own a car, as the alternatives are more attractive. MaaS has the potential to greatly reduce the demand for car ownership, particularly in urban areas where costs associated with car ownership are high and travel by car is not convenient due to congestion and the difficulty and expense of parking is high. MaaS also has high potential to help solve the ‘first-mile, last-mile’ problem between transit services and user destinations, as it aims to make the integration between modes much more accessible and flexible.

MaaS technologies have been piloted in cities such as Helsinki, Finland, and Gothenburg, Sweden. Various organizations and companies are looking to expand into the MaaS market, including public transit operators, roadway authorities/municipalities, auto manufacturers, technology companies, and transportation network companies. In Niagara-on-the-Lake, it is likely that MaaS would be an initiative developed at the Regional level, with origins similar to that of Niagara Region Transit and NRT OnDemand. As there may not be a place for e-scooters and other forms of micromobility (discussed further in the subsection below) in the Old Town Heritage District, MaaS concepts would likely be launched first in Glendale. It is recommended that Niagara-on-the-Lake monitor any MaaS developments at the Regional level (or in St. Catharines) and seek to piggyback on any St. Catharines focused programs in hopes the service could be extended to Glendale.

Autonomous and Connected Vehicles

Autonomous vehicle (AV) technology refers to vehicles which are capable of operating without human assistance. There are several levels of automation which describe the degree of autonomy that a vehicle has. There are standard levels that are established by SAE International (Society of Automotive Engineers). These levels include:

- **Level 0:** Automated system issues warnings and may momentarily intervene but has no sustained vehicle control.

- **Level 1 (“hands on”):** The driver and the automated system share control of the vehicle. Examples are systems where the driver controls steering and the automated system controls engine power to maintain a set speed or engine and brake power to maintain and vary speed, where steering is automated while speed is under manual control. The driver must be ready to retake full control at any time. Lane Keeping Assistance, Adaptive Cruise Control, and Parking Assistance are examples of SAE Level 1 autonomy.
- **Level 2 (“hands off”):** The automated system takes full control of the vehicle (accelerating, braking, and steering). The driver must monitor the driving and be prepared to intervene immediately at any time if the automated system fails to respond properly. The shorthand “hands off” is not meant to be taken literally. In fact, contact between hand and wheel is often mandatory during SAE 2 driving, to confirm that the driver is ready to intervene.
- **Level 3 (“eyes off”):** The driver can safely turn their attention away from the driving tasks, e.g. the driver can text or watch a movie. The vehicle will handle situations that call for an immediate response, like emergency braking. The driver must still be prepared to intervene within some limited time, specified by the manufacturer, when called upon by the vehicle to do so.
- **Level 4 (“mind off”):** As level 3, but no driver attention is ever required for safety, e.g. the driver may safely go to sleep or leave the driver’s seat. Self-driving is supported only in limited spatial areas or under special circumstances, like traffic jams. Outside of these areas or circumstances, the vehicle must be able to safely abort the trip, e.g. park the car, if the driver does not retake control.
- **Level 5 (“steering wheel optional”):** No human intervention is required at all. An example would be a robotic taxi.

The Ontario Government has funded the Autonomous Vehicle Innovation Network (AVIN) which is intended to advance research and development of autonomous vehicle technology in the province. At the time of writing, most of the commercially available autonomous vehicle technologies are at a level 1 or level 2. Benefits of autonomous vehicle technology include improved safety from a reduction in human error-caused collisions, accessibility to users who currently cannot or have difficulty operating motor vehicles such as seniors and people with disabilities, and easier access to rural areas that require long and tiring drives. It is also possible that autonomous vehicles can decrease headways between vehicles and as such make more efficient usage of existing roadways and increase vehicle throughput, reducing the need to build new roadways and new road lanes.

Connected vehicles (CVs) feature different functionalities that ‘connect’ the vehicle with other vehicles, transportation infrastructure such as traffic lights and roadways, central networks, its occupants, or any combination of the aforementioned. Connected vehicles may have certain degrees of autonomy incorporated, but all connected vehicles do not

necessarily have to operate autonomously. CVs may interact with their users via smartphone app or other means, such as voice detection. Connected vehicles also may be connected to other vehicles which allow them to ‘communicate’ with each other, for example, if a vehicle brakes in front of them, the vehicle can communicate this to the driver or its own internal system. CVs can communicate with infrastructure, for example, if a vehicle is approaching a traffic light that is about to turn red, that can notify the vehicle and/or the driver.

Intelligent Transportation Systems (ITS) and Smart Infrastructure

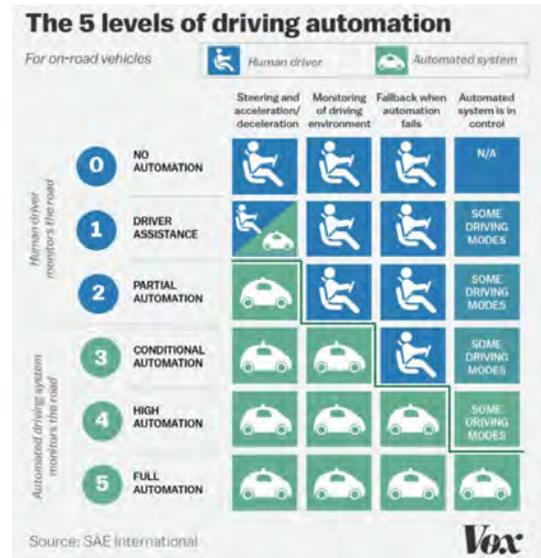
Intelligent transportation systems (ITS) technology has existed in the field of transportation and traffic management for several decades. ITS has traditionally referred to technologies such as electronic lane management, vehicle detection (using loop detectors, Bluetooth, cameras, etc), signal pre-emption, and adaptive signal controllers.

New advancements such as artificial intelligence (AI) and deep learning/machine learning are also being applied to transportation infrastructure systems. Much of this technology is related to CVs, for example, ‘smart’ traffic signals, where cars can ‘speak’ to the signals for example, extend green times to allow for traffic platoons to pass through or modify cycle lengths to allow for more cohesive traffic signal coordination. Smart traffic signal applications also are not necessarily limited to vehicles; smart traffic signals also may have functionalities to detect pedestrians and bicycles, for example, to extend pedestrian walk times for pedestrians moving at slower speeds (i.e. seniors or children, for example) or to coordinate green ‘waves’ for bicycles moving through intersections upon detection. This brings active transportation safety benefits in addition to the benefits to transportation flow. A summary of popular ITS/CAV initiatives around the world for further consideration by the Town include Signal Phase and Timing (SPaT), Transit Signal Priority (TSP), Emergency Vehicle Pre-emption (EVP), and pedestrian safety applications. These applications require technology deployment at the roadside, enabling Vehicle-to-Vehicle (V2V), Vehicle-to-Pedestrian (V2P), and Vehicle-to-Infrastructure (V2I) connectivity.

It is recommended that new traffic signal cabinet implementations follow the Advanced Transportation Controller Cabinet (ATCC) Standard, which maximizes functionality, optimizes power consumption, introduces standardization (manufacturer agnostic), and simplifies personnel training. Equally as critical as traffic cabinets is having an appropriate central system that can communicate with each of the traffic cabinets, facilitate data collection, and allow for dynamic traffic management.

Today we are entering the Next Gen ITS paradigm where ITS devices are beyond the traditional CCTVs, dynamic message signs (DMSs), etc. and data analysis can occur through fiber communication and outside of Traffic Management Centres. It is past the time that only certain devices could have access to the internet and transmit data over the communication

Figure 5.28: Factors in Urban Mobility



network. Now the rule is “anything that can be connected will be connected”. This includes cell phones, wearable devices, lights, cameras, and more. The Next Gen ITS is made possible through advances in sensing and communication technologies, cloud-based data processing, AI algorithms and the evolution in the effective integration of networked information systems, decision making, and physical infrastructure. The exchange of information in the Next Gen ITS may happen through different communication types including 5G, Wi-Fi, Dedicated Short Range Communications (DSRC), and fiber.

Privacy considerations are currently a significant topic surrounding smart infrastructure that contain embedded cameras and sensors.

Electric Vehicles

In the coming years, electric vehicles (EVs) will become standard, with many automobile manufacturers pledging to cease production of fossil fuel-powered vehicles in the next 10-20 years. The question of EV adoption is therefore not if, but how soon. This shift to EVs will be the largest change in automobile technology since the inception of the internal combustion engine.

To create an environment which is supportive of EV adoption, the Town should review its strategy with respect to EV charging infrastructure. While chargers are currently installed at private businesses, the public sector will need to show leadership in fostering EV adoption. Town-managed property such as tourist attractions and community centres should be looked at as potential charger locations.

Providing ample EV charging capacity is also a critical component of the Town’s tourism strategy. EV adoption will be driven by those living in denser urban areas where trip distances between charges are short and a higher concentration of chargers can be found. Those travelling in EVs to Niagara-on-the-Lake from Toronto, Hamilton or Niagara Falls will expect to be able to charge their vehicles at their

destination. Installing EV chargers at strategic locations within the Town will eliminate ‘range anxiety’ (the fear of running out of EV battery capacity before reaching one’s destination) and maintain the attractiveness of the Town as a convenient tourist destination.

Intelligent Curbside Management

The increased use of future mobility services has already begun to increase demand for use of the curb. New technologies are transforming the way we use our curbs, such as EV charging, ride-hailing or AV pickups/drop-offs, micromobility docking, and increased package deliveries. These uses are in addition to existing uses such as on-street parking, taxi pickup/drop-off, bike lanes, and freight deliveries. As a tourist centre, Niagara-on-the-Lake has its own unique mix of curbside uses, such as increased demand for taxi and ride-hailing services, relatively low transit usage, and goods delivery for local businesses in the Old Town.

The answer that many municipalities are taking to this challenge is the development of Curbside Management Strategy (CMS) documents which outline how the curb will be used, factoring in forward-looking technologies and uses. The City of Toronto’s CMS outlined various curbside management measures, grouped by implementation term, such as the following examples:

- Quick Wins – Designated delivery vehicle parking zones, taxi waiting area pilot project.
- Early in the Short Term (0-2 Years) – Support off-peak deliveries, improve messaging and signage, utilize laneways for loading/deliveries.
- Later in the Short Term (3-5 Years) – Implement variable parking pricing, create courier/delivery vehicle permit system, introduce designated pickup/drop-off and parking zones in high-demand areas, introduce automated parking enforcement systems.

As technology improves, it is envisioned that connected vehicles (autonomous or otherwise) would integrate with the local municipalities’ digital curbside use database, dictating to vehicles where they can and cannot park, drop-off passengers, or deliver goods. Until this future arrives, municipalities should utilize other, lower-tech methods to control curb access and usage, such as those mentioned in the Toronto CMS – signage, enforcement, permits, and designated zones.

Niagara-on-the-Lake should consider developing its own ‘made in Niagara-on-the-Lake’ curbside management strategies which seeks to mitigate impacts to tourism and local businesses, while ensuring the curbside can continue to be harmoniously shared by everyone.

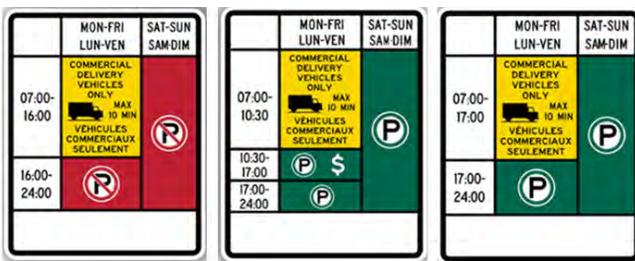


Figure 5.29: Flex/ loading zone pilot signage by the City of Fredericton

Micromobility

E-Scooters

Electric scooters (e-scooters) are scooters that are motorized with a small electric motor. Recently, dockless e-scooters have grown in popularity as app-based ride share companies have introduced them in various cities across North America. The scooters are generally unlocked using a smartphone app, and users are charged an unlocking fee as well as a usage fee by the minute.

E-scooters have gained popularity in many cities as trips can even be faster than car-based trips, the cost of scooters is relatively low, and they are perceived by many to be intuitive to use.

5.7 SUPPORTING POLICIES

A successful multi-modal transportation network relies on a mixture of physical infrastructure and policies that regulate and guide the Town toward a vision for the future. The Town’s Official Plan provides a blueprint for how the community will grow into the future, while the zoning by-laws dictate the operational and physical specifications for the land uses prescribed within the Official Plan. This is done so that the vision identified in the Official Plan can be implemented.

In a similar regard, the transportation network needs policies and zoning by-laws to enhance transportation holistically over time. There are several recommended infrastructure improvements identified in this TMP that have a deeply connected relationship with land-use that requires a lock-step approach to addressing the Town’s multi-modal mobility needs.

For instance, as new cycling routes are built across the town, it will be important to ensure that new developments are built in a way that strategically connects to these facilities so that their benefits can be fully realized. This not only involves identifying potential on-site design measures that are amenable to walking and cycling (called Transportation Demand Management), but also parking policies to promote alternative modes of transportation.

Beyond new developments, as more residents are encouraged to use active transportation, there will be an increase in interactions between vehicles, cyclists, and pedestrians. Developing a traffic calming policy will be important so that the Town can appropriately and equitably address concerns relating to roadway safety.

Many safety considerations are intrinsically connected to municipal design standards for roadways that will need to be updated to equitably accommodate different roads users through design in a way that is amenable to encouraging safe movements of all modes of transportation through Complete Streets.

All of this is impacted by the environmental reality that faces Niagara-on-the-Lake each year in terms of rain and snow that impact how residents use the transportation system. Despite

these weather events, residents still need to have a maintained network of roads, bicycle lanes, and sidewalks in the winter.

This section summarizes and outlines policy-driven recommendations for:

- Traffic Calming;
- Pedestrian Safety and Crosswalks;
- The Commons Special Events Traffic Policy; and
- Traffic Operations.

5.7.1 TRAFFIC CALMING

The Town of Niagara-on-the-Lake does not have an existing Traffic Calming Policy, and it is recommended that one is appropriately scaled and tailored for Niagara-on-the-Lake.

Traffic calming policies and guidelines are important tools within a municipality's repertoire in terms of implementing safety improvements or addressing safety concerns for residents. As part of the Town of Niagara-on-the-Lake's mandate to build and maintain a safe and efficient road system for all road users, it is necessary that Niagara-on-the-Lake has updated policies that reflect best-practices for effective safety measures.

Traffic calming measures are in support of underlying objectives of the TMP such as prioritizing and encouraging active modes and transit, enhancing multi-modal connections, and improving safety for all road users.

What is traffic calming?

Traffic calming is a term commonly associated with physical features such as: speed humps, pinch-points, and chicanes. They are installed on a road to reduce the speeds at which vehicles travel, to discourage through traffic, to improve traffic safety, and to improve comfort levels for all road users. Traffic calming can also consist of passive measures, such as narrowed travel lanes, radar display speed signs, and on-street parking.

Traffic calming is intended to improve the quality of life for residents on traffic calmed streets, achieve slower speeds for motor vehicles, discourage neighbourhood shortcutting, and increase the safety for non-motorized users of the street. Traffic calming solutions should be looked at as a community-wide strategy (as opposed to on a street-by-street basis) to ensure that volume and speed concerns are not transferred to adjacent streets.

Review of Typical Traffic Calming Policy

This section summarizes what a Traffic Calming Policy could look like for the Town.

Initiation of a Traffic Calming Project

A proposed traffic calming policy will typically identify prerequisites where some or all need to be satisfied prior to assessing specific safety criteria for traffic calming. Potential warrants include:

- Written request from the public
- Request from Council
- History of traffic accidents or pedestrian collisions

Important opportunities to include traffic calming measures and other related roadway improvements can come about as part of broader transportation work such as an engineering study or road reconstruction opportunities, or could be desirable if the Town decides to conduct road safety audits. Town staff could proactively identify opportunities to implement traffic safety improvements through the completion of ongoing studies rather than having to wait for and receive a request.

After the prerequisites are met, technical criteria can be applied to eliminate unsuitable roadways before moving to the prioritization stage. Examples of technical criteria are:

- Minimum daily traffic volume
- Minimum 85th percentile measured speed above speed limit
- Zero impact to emergency services
- Maximum level of opposition/minimum level of support, as determined by surveys

Point Assessment Criteria

A Traffic Calming Policy typically provides a framework to assign points, summing up to 100, according to various warranting criteria for traffic calming measures. This measure is used to prioritize ongoing traffic calming projects. The following warrant criteria are included in the policy:

- **Speed:** Allocates points for each km/h the 85th percentile measured speed is over the posted/default speed limit.
- **Volume:** Allocates points for each unit of daily traffic volume observed on the roadway.
- **Pedestrians/Cyclists:** Allocates points for each active transportation generator such as schools, places of worship, playgrounds, recreation centers, senior centres, etc.
- **Safety:** Allocates points for each reported preventable collision in recent history on the roadway.

These criteria are discussed below.

Speed

It should be noted that this approach does identify locations where speeding above the posted speed limit is a problem, however, would not identify areas where the posted speed already exceeds the recommended speed limit in this area. For example, if the posted speed limit on a roadway is 50 km/h, the policy does not consider the fact that perhaps the speed of the roadway should not be posted at 50 km/h in the first place (as the roadway may have been designed with a different speed limit in mind). As such, it is recommended that a separate assessment of the speed limit itself is incorporated into the traffic calming review process; a separate "speed limit reduction warrant" would need to be in place.

If a reduction in speed limit was to be warranted, appropriate traffic calming measures such as lane width narrowing, curb extensions, etc. could be suggested in order to reduce the design speed, as simply posting a lower speed limit is shown to be ineffective in decreasing operating speeds.

Conventional practice designates a design speed higher than the posted speed limit to accommodate driver error. However, this practice only encourages speeding and increases the likelihood of traffic crashes, fatalities, and injuries. A proactive approach selects the appropriate target speed and uses design elements to achieve the appropriate speed by influencing driver behaviour.

NACTO recommends a maximum design speed of 40 km/h for urban areas, and consideration of safety, health, mobility, economic and environmental goals in mind when determining different speed limits. The City of Toronto reduces the speed limit to 30 km/h on streets where all of the traffic calming warrants are met, in conjunction with the installation of traffic calming measures. Speed is one of the leading contributors to traffic safety – it is recommended that the speed warrant is given equal weight to factors such as traffic volumes.

Traffic Volumes

The traffic volume criteria should be allocated such that the maximum amount represents the typical industry maximum road volumes. This volume is generally advised to be around 2,000-2,500 vehicles per day for a local street.

Pedestrians/Cyclists

Active transportation generators such as schools and senior care centres prompt a need for traffic calming to ensure that road safety is maintained for all users. Typically, the trip generator will have a direct connection to the subject roadway, and does not include residential dwellings. This is a generally acceptable way of accounting for key pedestrian destinations along a corridor and pedestrian activity should be a key consideration when determining the need for traffic calming measures.

Safety

The safety criteria refers to the history of collisions on the roadway. Typically, police statistics can be used to determine the number of recorded preventable collisions in the past several (2-5) years. At the discretion of the Town, a differentiation between injury-causing collisions and fatal injuries could be incorporated into the criteria to determine roadways with a history of more dangerous collisions. It is recommended that if a fatality occurs, a separate process is considered to implement traffic calming and safety measures.

Additional Considerations

The following were identified as additional areas that should be considered within Niagara-on-the-Lake's Traffic Calming Policy based on a review of the traffic calming policy and industry best practices:

- **Road Grades and Curvature:** Jurisdictions such as the Town of Innisfil recommend that traffic calming measures are implemented on roadways with no more than 5% grade, while the City of Toronto includes locations with grades greater than 5% and horizontal curves when considering a posted speed limit reduction. Niagara-on-the-Lake might develop similar thresholds tailored to the local road network and geography.
- **Near Miss Reporting:** Generally, traffic calming policy leans on reported collision history for justification for implementing traffic calming measures. The common issues with using reported collisions are that firstly, not all collisions may be reported to police, and second, using historic collisions is a very reactive way of implementing traffic safety measures. In order to take a more proactive approach to traffic calming, residents can be encouraged to report "near misses" (i.e. situations where they narrowly missed a collision or felt that they were in danger of a collision). The locations of these reports can then be tracked and trends can be identified to proactively recommend traffic safety measures before someone is injured.
- **Emergency Response Impact:** The emergency response vehicle impact should be considered. It is noted that generally traffic calming measures can be designed to allow for minimal impact on emergency response vehicles, but all physical traffic calming measures increase the response time for all emergency vehicles, so incorporating this criteria should also take the overall context into consideration.
- **Transit Impact:** While Niagara-on-the-Lake currently has a relatively limited transit system, the impacts to transit should be considered if they are present. As with emergency response vehicles, traffic calming measures can generally be designed to minimize the impact on transit vehicles (i.e. vertical deflection devices such as speed humps would typically not be recommended on transit routes).
- **Maintenance and snow removal needs:** An important criteria when considering the type of traffic calming measure is the impact on road maintenance, and specifically winter maintenance and snow removal. Some physical traffic calming measures may cause inconvenience for snow removal vehicles.
- **Connection between criteria and specific traffic calming measures:** Currently, there is no connection between the assessment criteria and the type of traffic calming measure that should be undertaken. It is recommended that the mitigating measures are specifically designed to address the concerns that are highlighted in the assessment criteria. For example, if the assessment criteria are almost all speed related, the primary focus on the traffic calming measures should be ones that aim to address speed concerns.
- **Ranking and Prioritization:** The Traffic Calming Policy should also consider a ranking tool to prioritize projects

such that budgetary limitations are respected.

Solution Identification

When determining which traffic calming measure is to be implemented to address the confirmed issue, consideration should be given to whether a physical measure or a social / cultural traffic calming measure is preferred:

- **Physical measure:** Attempts to improve conditions through physical alterations to the roadway. Physical measures come with benefits such as reduced volume, speed, noise, and pollution, but can also include detrimental impacts such as traffic diversion, reduced connectivity and access for emergency vehicles, and difficulty with snow removal.
- **Social and Cultural Measure:** Attempts to increase road safety by psychological measures which lead to reduced automobile usage and safer driving habits (newspaper ads, brochures, speed watch programs, educational programs).

Town-Wide Speed Limited Reduction

Across the world, communities are implementing reduced speed limits on local streets. In Ontario, according to the Highway Traffic Act (HTA), the statutory speed limit in urban areas is 50km/h when there is no posted speed limit. Many communities across Ontario typically lower speed limits down to 40 km/h on local streets, however there is a further push by transportation and health officials to reduce speed limits on local streets down to 30 km/h. The rationale behind this is that research suggests that vehicle/ pedestrian collisions begin to result in significantly more injuries or fatalities when they involve speeds above 30 km/h as visualized in **Figure 5.30**.

Research compiled by The Centre for Active Transportation (TCAT) in Toronto provides case studies both within Canada and abroad that suggest implementing lower speed limits on local streets can yield reductions in roadway injuries and fatalities. For instance, the City of Calgary found an average speed of 32 km/h in 30 km/h school zones, and an 85th percentile speed of 38.8 km/h. While 54% of vehicles drove at speeds higher than 30 km/h, only 10% drove at speeds more than 10 km/h over the speed limit. Another example from the City of London (UK) identified a reported reduction of road casualties by 41.9% in 20 mph (32 km/h) traffic speed zones compared to adjacent areas without lowered speed limits.

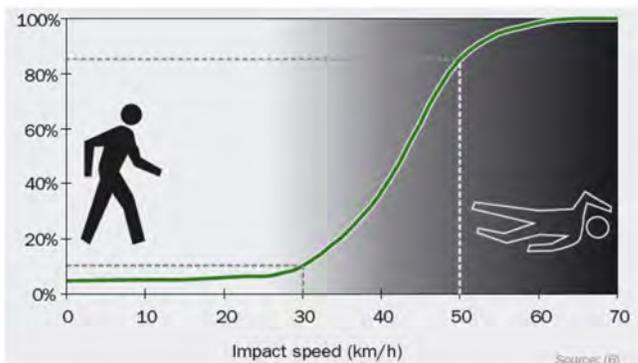


Figure 5.30: Likelihood of pedestrian injury based on vehicular impact speed

While reducing speed limits on their own can bring modest road safety benefits, best practice is to reduce speed limits alongside the implementation of other traffic calming measures and geometric changes, which act to support the speed limit reductions and provide drivers a more natural sense to adhere to a reduced speed limit. Such measures should be evaluated on a case-by-case basis and might include radar speed signs that display a vehicle's current speed, on-street parking, stop signs, textured pavement, lane narrowings, curb extensions, chicanes, and roundabouts or traffic circles. Speed humps, raised crosswalks, and raised intersections are worth considering too, however, the vertical deflection they create can be problematic to emergency response vehicles, and if traveling at higher speeds can cause injury to persons with spinal issues and should be avoided whenever possible on roadways classified above a collector or major routes that service medical facilities. Mitigation measures can include tire track cuts into the vertical deflection customized to the wheelbase of an emergency vehicle, however passenger vehicles are also able to straddle one of the tire track cuts which can limit their effectiveness at reducing speeds.

The overall objective of town-wide local street reductions to 30 km/h is to encourage walking and biking by enhancing roadway safety and reducing roadway-related injuries. While this TMP study did not evaluate town-wide collision statistics and cannot make a definitive recommendation on its suitability for Niagara-on-the-Lake, there are opportunities to review roadway collision statistics as a separate study to further evaluate whether implementing a 30 km/h speed limit reduction on local streets is warranted.

Photo-Radar (Automated Speed Enforcement)

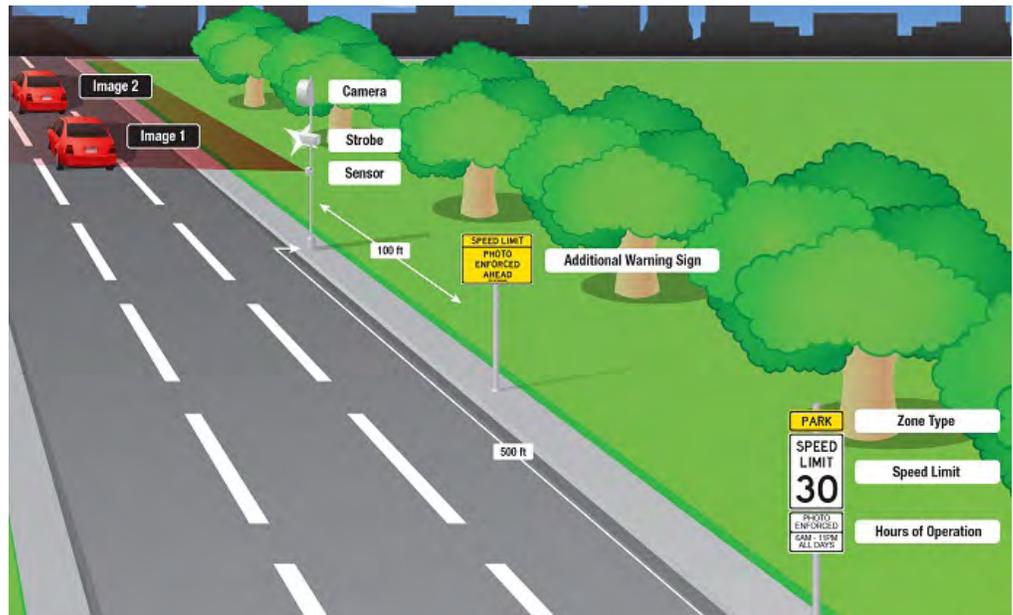
On May 30, 2017, the Province of Ontario passed the Safer School Zones Act, 2017 to facilitate the municipal adoption of automated speed enforcement (ASE) technology on roads with speed limits under 80 km/h in school and community safety zones.

Automated speed enforcement is a safety technique that reduces excessive speeding and improves roadway safety by using fixed or mobile cameras and other equipment to detect and capture images of vehicles traveling at dangerous speeds (as visualized in **Figure 5.31**). Such measures may be considered along corridors such as Niagara Stone Rd.

In connection with this, the provincial Ministry of Transportation is also proposing to make supporting amendments to Ontario Regulation 277/99 to streamline the regulatory approval process for accepting municipalities into Ontario's Red Light Camera Program (RLC).

To support legislative changes passed under Bill 65, The Safer School Zones Act, 2017, the ministry plans to bring forward supporting ASE regulations to outline various operational, procedural and evidentiary requirements for the ASE program. These programs may include such things as a description of how photographs are to be used as evidence, the types of ASE

Figure 5.31: Concept of how ASE systems function



Source: City of Chicago, 2013 (https://www.chicago.gov/city/en/depts/cdot/provdrs/traffic_signals_andstreetlights/news/2013/aug/automated_speed_enforcementcamerasbeginwarningperiod.html)

system technology that may be used by municipalities, and a description of enforcement procedures for any resulting Provincial Offences Act charges.

With respect to Ontario's Red Light Camera program, the ministry is proposing changes to Ontario Regulation 277/99 in support of amendments made under the Safer School Zone Act, 2017, to streamline municipal authorization to use RLCs.

ASE systems have shown to be particularly effective in School Zones. New York City, which has one of the most extensive and robust ASE programs in North America reported that traffic fatalities near schools with ASE sites were reduced by more than half, and speeding was reduced by more than 60 percent. The City of Edmonton, together with the University of Alberta has also conducted a number of studies on the effectiveness of their ASE program in and have found that severe collisions (involving fatalities and/or injuries) have been reduced by 32% and speed related collisions have been reduced by 27%. In addition to these jurisdictions the cities of Washington D.C., Portland, Seattle, and Chicago have all experienced reductions in relation to the implementation of ASE systems.

Locally, the City of Toronto conducted an ASE study pilot between September and December 2018 which included the installation of signage and speed measuring / camera devices around 8 schools. Despite not being able to ticket speed offenders, the pilot identified that all of the school zones experienced significant non-compliance with posted speed limits presenting an opportunity to improve safety through the implementation of ASE in the future.

While this TMP did not have the necessary traffic, collision, and speed data necessary to evaluate the applicability of ASE systems in Niagara-on-the-Lake, there is an opportunity for the Town to engage the Ministry of Transportation and monitor for provincial guidelines that will be coming in the next few years.

Stop Warrants

Stop signs are a basic piece of transportation infrastructure, yet perform a critical role in traffic calming and road safety. Stop warrants are the set of criteria which allow for a systematic approach to the installation of stop signs. A well-designed stop warrant policy will direct resources where they are needed the most and avoid a scattershot approach to signage installation.

Careful consideration should be taken when considering a conversion of a two-way or one-way stop control measure into an all-way stop control measure. Typically, engineering best practices are to consider all-way stop controls when both the major street and minor street demonstrate similar traffic volumes. In addition, stop signs can serve as an interim measure before traffic signals are installed at an intersection. All-way stops can also be considered in circumstances where a collision concern exists that can be specifically mitigated by a conversion to an all-way stop. If applied inappropriately, such as where volumes on the major street and minor street are imbalanced, it can result in the creation of transportation safety concerns rather than mitigation. These unintended consequences include vehicles on the major street routinely performing a "rolling stop" in lieu of a "full stop" if volumes on the minor street are significantly lower, resulting in a broadside collision. Other considerations include line-of-sight and visibility of the stop sign to approach vehicles and appropriate advance warning signage where applicable.

Community Safety Zones

Community Safety Zones (CSZs) are simply areas where pedestrian safety is a high priority. Typically, CSZs encompass community amenities which serve vulnerable populations, such as schools, daycares, senior care, or hospitals. These areas are indicated by designated road signage which alerts drivers to be cautious while driving through the CSZ.

To reflect the increased caution that drivers should exhibit while passing through a CSZ, fines related to traffic incidents or violations are often doubled within the zones. There is potential to couple the CSZ approach with ASE to produce stronger results with respect to road safety.

Niagara Region has implemented two CSZs to date in Niagara-on-the-Lake, at St. David's Public School and Crossroads Public Elementary School. Suggested locations for future CSZ are detailed in **Table 5.17**.

Traffic Calming Recommendations

The advent of future traffic growth on Niagara-on-the-Lake's roadways in conjunction with future active transportation improvements will require the Town to be vigilant in addressing safety concerns in a way that is effective and collaborative with the local community.

The existing and draft traffic calming policies require additional changes so that the policy can be a tool between the Town and residents to identify and implement tailor-made safety solutions throughout Niagara-on-the-Lake's transportation network.

As a result, it is recommended that the Town of Niagara-on-the-Lake develop a traffic calming policy that integrates the identified additional considerations within this TMP, as well as addresses the several issues and concerns raised within this section. Additionally, the traffic calming policy should allow Town staff to initiate a traffic calming study, rather than requiring a member of the public to initiate the process.

It is further recommended that the Town of Niagara-on-the-Lake develop a traffic calming guide to accompany the traffic calming policy. The intent is so that while the policy can be a legal document, the traffic calming guide can be a more readable and engaging document that is easy to understand by residents. This guide should identify the main framework of the traffic calming policy as well as directly links criteria with recommended physical and non-physical solutions. One size does not fit all when it comes to addressing safety, and there should be flexibility in the guide so that contextually sensitive solutions can be made.

It is also recommended that the applicability of implementing town-wide speed limit reduction on local streets and the applicability of automated speed enforcement systems in school zones be evaluated further in relation to collision statistics and safety hot spots.

In that vein, it is recommended that the Town focus traffic calming measure implementation on the Heritage District, school zones, areas of higher collision rates, areas of rapid growth, and along Niagara Stone Rd.

Recommended Policy Documents:

- Develop a Traffic Calming Policy;
- Develop a Traffic Calming Guide to accompany the policy, including appropriate measures and a clear procedural process for evaluation;
- Conduct a review of Town-wide collision data and evaluate the suitability of implementing reduced (30 km/h) speed limits on local streets and automated speed enforcement systems in school zones; and
- Conduct safety evaluations for the community identified areas using the Traffic Calming Policy framework.

A draft policy can be found in **APPENDIX B: Draft Traffic Calming Policy**.

Figure 5.32: Example of CSZ signage



Table 5.17: List of Recommended Community Safety Zones

Roadway	Description	Justification
Wellington Street	Picton Street to Ricardo Street	<ul style="list-style-type: none"> • Niagara Long-Term Care Residence • St Vincent de Paul Church • Royal Oak Independent School
Four Mile Creek Road	Pleasant Lane to Line 1 Road	<ul style="list-style-type: none"> • Radiant Care Long-Term Care Residence
Line 2 Road	Niagara Stone Road to Pierpoint Drive or Concession 6 Road	<ul style="list-style-type: none"> • Adjacent to Crossroads Public Elementary School

5.7.2 PEDESTRIAN SAFETY AND CROSSWALKS

Niagara-on-the-Lake is a town with a unique demand for pedestrian accommodations. Populations such as tourists, retirees, students and temporary migrant workers all require safe, comfortable pedestrian amenities to allow them to travel across the town on foot. The Town should seek to develop a policy which allows pedestrian infrastructure needs to be prioritized based on set criteria.

Sidewalks are the foundation of a pedestrian-friendly environment, and the predominantly auto-oriented design of Niagara-on-the-Lake has historically limited the inclusion of sidewalks along areas which are now frequented by pedestrians. Two examples of this are roadways in Glendale, around Niagara College, and roadways around vineyards which migrant workers walk alongside to commute to their jobs.

As seen in **Figure 5.33**, the abrupt end to the pedestrian walkway after the crosswalk is seen at Niagara College in Glendale. A policy for pedestrian infrastructure should encourage continuity, and seek to fill gaps in the current network. Much like the road network, sidewalks should be installed between trip generators (residential areas, community centres, retail, schools, etc.) to encourage more trips to be taken on foot instead of by automobile.

Niagara-on-the-Lake attracts a large migrant worker population who work at nearby vineyards. Lacking pedestrian infrastructure or access to an automobile, many are forced to walk on the unpaved road shoulder to access their places of employment. Evidence of this can be seen in **Figure 5.34**. Notice the condition of the grass on the left side of the image versus the right, forming a 'desire line' that runs adjacent to the roadway.

In rural areas where the construction of sidewalks may not be feasible, greater pedestrian safety may be achieved by painting defined shoulders, creating a visible buffer between vehicles and pedestrians. The Sidewalk and Crosswalk Policy should allow for the process to be initiated by Council, Town staff, or through resident input.

In addition to the implementation of new pedestrian infrastructure, the Town should seek to ensure that existing assets are kept in a state of good repair. A faded crosswalk or uneven sidewalk could be an even greater safety hazard than the absence of the asset. The Town should ensure that the Sidewalk and Crosswalk Policy includes provisions for state of good repair, to maintain a safe pedestrian environment for all.

A draft policy can be found in **APPENDIX C: Draft Pedestrian Safety and Crosswalks Policy**.

5.7.3 THE COMMONS SPECIAL EVENTS TRAFFIC POLICY

As a popular arts and culture hub, Niagara-on-the-Lake hosts events which may be disruptive to the local transportation network. The Commons, a historical site and popular events venue, sees large influxes of traffic volumes during major events such as concerts and festivals. A Special Events Traffic Policy can be one method to ensure that these traffic impacts to the local community are mitigated.

Policies belonging to a cultural peer, the City of Stratford, were reviewed to provide some best practices to consider for Niagara-on-the-Lake. Firstly, all events at The Commons should be booked through the Special Event Application to the Town, allowing the required event information to be acquired and disseminated to the proper departments. The application includes the planned event capacity, which should be compliant with the site's fire code capacity limit.

As a part of the application, the event organizer must submit a site plan or route map to indicate access and egress routes and parking areas. All road closures required for the event should include a mandatory 6-metre emergency access lane which would remain unobstructed to allow emergency vehicles to access the site. The site plan would be reviewed by the Town and finalized collaboratively. In addition, it would be the responsibility of the organizer to develop event directional signage on the event grounds, whereas the Town may need to develop signage to guide attendees to/from the venue.

The Town should work with Parks Canada and other relevant stakeholders to determine specific emergency preparedness and safety requirements at The Commons. As is currently required, proof of insurance coverage for all events at The Commons should be provided by the organizer. Additionally, if the event takes place on or adjacent to Parks Canada property, they should be included as an 'additional insured' for the event.

Efforts should be taken by the Town to use TDM measures to minimize demand for parking. In a large event context, specific actions such as providing shuttle service or encouraging cycling should be taken. Shuttle service could be provided by the event organizers either from major origin points (such as St. Catharines), or from an offsite parking location. Another approach may be to encourage attendees to use transit, by either providing free trips or bundling a day pass within the ticket cost.

With respect to cycling, event organizers will often provide supervised bicycle parking to address concerns about theft at major events. In 2018, the Hamilton band Arkells led a 'bike train' of concert attendees to the venue, avoiding dozens of required parking spaces. Enticing attendees to arrive by bicycle should leverage the Town's cycling network to designate direct routes to the venue.

A draft policy can be found in **APPENDIX D: Draft Commons Special Events Traffic Policy**.



Figure 5.33: Sidewalk ends abruptly after crosswalk at Niagara College

Source: Google Images, Street View



Figure 5.34: Desire lines along Concession 4 Road near Hunter Rd, showing evidence of pedestrian use

Source: Google Images, Street View

5.7.4 TRAFFIC OPERATIONS

TIS Guidelines

There are currently no Traffic Study Guidelines for Niagara-on-the-Lake, therefore, the Niagara Region and provincial (MTO) traffic guidelines are applicable for new developments in Niagara-on-the-Lake. To ensure area-specific measures are taken when new developments are planned in Niagara-on-the-Lake, a number of requirements may be considered in addition to the current TIS guidelines that govern the Town. Considerations may include:

- Parking utilization studies:** To proactively manage parking within the Town, particularly in areas with current constraints such as Old Town, a parking assessment for developments that meet an outlined criteria may be considered, where the parking supply and availability can be detailed within the proposed development and surrounding area. While a robust parking analysis may not be required for all developments, appropriate levels of analysis based on the proposed development density (i.e. residential units, gross floor area etc.) and location may be specified by the Town. The threshold for a parking analysis should be continually updated to align with parking management targets throughout the Town.
- TDM requirements:** The Region TIS guidelines mandate a TDM plan if a reduction of site trips is proposed. To ensure multi-modal connections are evaluated and considered in all development applications, the Town can require a TDM Plan for proposed developments in all focus areas- where the level of detail of the TDM plan will be dependent on the relative size of the development. This will ensure that existing and planned multi-modal connections in and around the development site are considered early-on. Alignment between the TDM strategy and achievement of the aggressive modal split goals is recommended to facilitate the desired travel behaviour changes for the long-term horizon.
- Set Town-specific TIS requirements:** The Niagara Region TIS Guidelines currently specify the requirement of a TIS for

developments that generate more than 500 peak hour trips. Given the nature of regional versus local Town roads, a smaller threshold can be specified by the Town to require a TIS. This threshold may be determined based on best practices, peer municipalities and Town staff insights. The TIS requirements should be supplemented with clear guidelines for conducting the TIS, including documentation of the following information, at a minimum:

- Trip generation and distribution estimates
- Peak hour operation analyses of critical adjacent intersections, including proposed site accesses, using industry-standard software and/or analysis methods
- Identification of roadway, intersection and/or traffic signal mitigation measures to address transportation impacts
- Multi-modal assessment of the proposed development, including connectivity of internal networks to surrounding networks
- **Collision data hotspots:** Using the areas identified to have a higher prevalence of collisions, certain areas or intersections may be flagged for specified safety analyses or considerations if they are included within a development study area.

Traffic Count Program

Active evaluation and management of the transportation network requires routine traffic monitoring and analysis to compare traffic volumes and travel patterns to the assumptions made in this TMP. This requires routine traffic data collection to be undertaken along each of the screenlines used in this analysis on a 2-year basis. The proposed data collection Schedule is as follows:

Odd-Numbered Years:

- Screenline 1:
 - East and West Line / Niagara Parkway (intersection)
 - East and West Line / Concession Line 2 (intersection)
 - East and West Line / Niagara Stone Road (intersection)
 - Lakeshore Road / Garrison Village Drive (intersection)
- Screenline 2:
 - Lakeshore Road immediately west of Firelane 5 (segment)
 - East and West Line / Concession 6 Road (intersection)
 - Niagara Stone Road / Concession 6 Road (roundabout)
- Screenline 3:
 - Line 3 Road / Four Mile Creek Road (intersection)
 - Line 3 Road / Concession 2 Road (intersection)
 - Line 3 Road / Niagara Parkway (intersection)
- Screenline 5:
 - Queenston Road / Concession 5 Road (intersection)
 - Queenston Road / York Road (intersection)

Even-Numbered Years:

- Screenline 4:
 - Queenston Road / Niagara Stone Road (intersection)
 - Queenston Road / Airport Road (intersection)
 - Queenston Road / Concession 7 Road (intersection)
- Screenline 6:
 - York Road / Concession 2 Road (intersection)
 - York Road / Four Mile Creek Road (intersection)
- Screenline 7:
 - Taylor Road / Mountain Road (intersection)
 - Four Mile Creek Road / Niagara Town Line (intersection)
 - York Road / Niagara Parkway (intersection)
- Screenline 8:
 - Lakeshore Road / Read Road (intersection)
 - Carlton Street / Read Road (intersection)
 - Glendale Avenue / Homer Road (intersection)

All traffic counts should collect multi-modal data (vehicles, cyclists, pedestrians) and be conducted for a 24-hour duration during the peak season. In addition to traffic volumes, data collection should include vehicle speeds and class. By collecting for a 24-hour period, future analysis can be conducted to evaluate how peak hour periods compare to daily volumes, how modal shifts occur, and if any peak hour spread occurs as a result of seasonal congestion. When possible, data should be collected at an approximately similar time period annually for data consistency. For example, summer weekend afternoons would be an ideal time to conduct traffic counts due to the heightened levels of travel in and around the Town. In locations where traffic may be higher at other times of the year, for instance nearby the Niagara College Niagara-on-the-Lake Campus in Glendale where there may be higher student activity in the fall, winter, and/or spring, traffic counts in the summer can still proceed and college enrollment numbers can be used as a proxy for adjusting the summer traffic counts accordingly.

Additional traffic counts should be conducted at locations programmed for network improvements, both pre-construction, immediately after construction, and approximately 6-9 months after construction. These three time periods are recommended to document baseline conditions, the immediate impacts following implementation, and the potential lingering traffic conditions after traffic has had an opportunity to normalize to the changed network conditions.

Tour Bus Considerations

Every year there are thousands of tour buses that navigate Niagara-on-the-Lake's roads, many of which are in operation during the times of the day (and year) when the roads are the most congested. Tour buses primarily arrive into the Town via Niagara Stone Road or via the Niagara Parkway depending on

the point of origin, which are many and varied and include but are not limited to Toronto, Hamilton, Niagara Falls, and New York State. They are required to park at the designated motor coach parking facility located by Fort George.

A challenge posed by the current tour bus routes and the location of the designated parking facility is that buses entering Niagara-on-the-Lake via Niagara Stone Road contribute to roadway congestion not only along Niagara Stone Road where volume-to-capacity ratios are already very high, but also throughout the Heritage District as the buses are required to navigate towards Fort George upon entering Old Town.

To improve the navigation of tour buses throughout the Town, and by extension improve the circulation of traffic more generally speaking, it is recommended that the Town define tour bus routes that all tour buses entering the Town are required to follow. For buses approaching from Niagara Falls or the United States, the route can consist of Niagara Parkway (via York Road and Four Mile Creek Road if coming from the United States). For buses approaching from elsewhere, rather than using Niagara Stone Road, the route might be designated as York Road – Concession 6 – Line 3 Road – Niagara Parkway, as this would help to alleviate congestion along Niagara Stone Road while also eliminating the need for tour buses to navigate the Heritage District streets. This recommendation can be enforced by closing certain corridors or corridor segments to tour buses entirely. These vehicle restrictions might be piloted on appropriate streets within the Heritage District to start, which may prompt tour bus operators to change their routes to/from the designated parking location more naturally.

Relatedly, as a standalone exercise it is recommended that the Town develop a Tourism Strategy. This tourism strategy would be all-encompassing, i.e. not only related to transportation, but it should reference the Transportation Master Plan where appropriate. Notably, in addition to these tour bus recommendations, the Tourism Strategy's recommendations should dovetail with the wayfinding and signage recommendations included in this TMP. The Tourism Strategy might also consider a more fulsome wayfinding signage and review across the Town as a component of its scope of work.

Non-Traditional Vehicles on Town Streets

Non-traditional vehicles such as pedicabs, pedal pubs and golf carts are used on Town streets. To help safely regulate the use of these vehicles a number of strategies and policies may be applied. For instance, permitted roadways/ trails should be established based on speed, roadway right-of-way, traffic volumes and surrounding land uses. Notably, these vehicles will likely only be used within urbanized communities for tourism and recreation, as such certain time restrictions may be appropriate (i.e. weekends). Conversely, for safety purposes, these vehicles may be restricted during evenings.

In another context, non-traditional vehicles used for farming activities are common on rural roadways in Niagara-on-the-Lake. It has been noted that farming vehicles such as grape harvesters sometimes utilize roadways, which may cause traffic delays for other vehicles sharing the roadways. It should be made clear to all road users that farming vehicles using the roadway in a permitted manner are allowed to share the roadway. This can be accomplished using "Share the road" signage which communicates that the roadway may be used by non-traditional vehicles. By creating the expectation of a shared roadway, other users of the roadway are able to make informed travel choices, such as detouring along a different route. Educating drivers ahead of time also reduces potential frustration, as they will have made the 'educated choice' to utilize the roadway, knowing that their trip may be delayed. It is recommended that, similar to **Figure 5.35** Niagara-on-the-Lake installs signage along roadways where traffic conflicts have been noted between farm vehicles and traditional vehicles. A draft policy can be found in **APPENDIX E: Draft Traffic Operations Policy**.



Figure 5.35: "Share the Road" signage used by the Town of the Blue Mountains



6. PLAN IMPLEMENTATION

6. PLAN IMPLEMENTATION

Through the development of alternative transportation solutions, several roadway, active transportation, and policy-related improvements have been recommended. With a desire to shift to transit and active modes captured in the vision for the current Transportation Master Plan, there is an opportunity to expand the scope of infrastructure implementation to target strategic corridors of the transit, automobile, cycling, and pedestrian networks through the road capital and rehabilitation programs. The following concept outlines the approach developed to identify, prioritize, and implement recommended improvements to create a connected network over the plan's horizon years.

6.1 CATEGORIES

Each of the following implementation categories involved a review of each recommended improvement to identify the most appropriate method for implementing it.

Recommended improvements are split into three categories:

- 1. Minor Additions:** Several active transportation improvements can be added to existing roadways without altering the roadway infrastructure or geometry. Examples of these types of improvements include painted markings, signage, or the addition of flex bollards on existing bike lanes.
- 2. Rehab Additions:** The road maintenance plan provides an opportunity to provide active transportation facilities as roads are reconstructed / rehabilitated. This is a cost-effective method of implementing active transportation facilities with savings realized through dovetailing recommended action items with already planned reconstructions. Planned Rehab Additions include active transportation facilities that would require physical changes to the existing roadway infrastructure such as minor roadway widening for accommodating bike lanes or adding pedestrian sidewalks/multi-use paths within the right-of-way.
- 3. Capital Investments:** Planned Capital Investments include improvements that would require new infrastructure or major alterations to existing infrastructure. Examples of these types of improvements include road widenings, roadway extensions, new roads, or new multi-use paths that are standalone from larger road projects

6.2 IMPLEMENTATION CONSIDERATIONS

Considerations for the implementation TMP is divided into two general categories:

- 1. Active Transportation,** which includes both on and off-road cycling infrastructure as well as sidewalks and multi-use paths or trails
- 2. Roadway Network,** which includes roundabouts and transit priority measures

6.2.1 IMPLEMENTATION CHALLENGES

Some of the recommended improvement projects will have some inherent implementation challenges which will need to be considered on a case-by-case basis. For example, the widening of corridors such as Niagara Stone Road and Airport Road from two to four lanes. These corridors are limited in right of way and may require additional land via expropriation and be physically difficult to construct due to topography and the adjacent location of private lots.

The feasibility and potential impacts and mitigations of each project should be explored at the planning and design stages. All of the major roadway improvement projects would require an Environmental Assessment (EA) study which would allow the solution to be further refined through public consultation to develop a preferred design that balances the needs of all road users compared to the benefits, costs, and environmental impacts of the proposed solution. Depending on the nature of the project, one of four different EA schedules will apply – schedules A, A+, B, and C – where 'A' is the most limited in terms of project scope and scale, and 'C' is the most significant in terms of project scope and scale.

Each of the four Municipal Class EA schedules have different sets of EA requirements that must be adhered to. In the context of the TMP recommendations, road widenings-costlier than \$2.7M are generally Schedule C, while those less than \$2.7M are generally Schedule B, though it is possible that cost limits will be removed in the future and project schedule determination will be solely rooted in each project's level of complexity, level of interest from the community, and extent of environmental impacts, etc. In that regard, a new Class EA schedule was proposed in late 2019, and although the pandemic has resulted in delays to this amendment being approved, it is anticipated that it will be approved in the coming months (as of the time of writing). In the new Class EA schedule, road widenings would no longer fall into Schedule C or B depending on their cost, rather projects involving the addition of travel lanes would fall into Schedule B while projects bringing substantial impacts to the road allowance

would fall into Schedule C. Bike lane projects are generally Schedule A+, both with the current and proposed Class EA schedules.

6.2.2 POLICIES AND STRATEGIES

The roadways identified for future improvements are a combination of municipal and regional roads. For municipal roads, it is expected that Niagara-on-the-Lake will have sole responsibility for implementation. For regional roads, while it is expected that the Town will collaborate with the Region, ultimately the Region will be responsible for implementation. For municipal roads that intersect with regional roads, coordination and consultation with the Region may be appropriate to streamline planning efforts and facilitate smoother implementation.

The policies and strategies summarized in the TMP are not reliant on specific timing for implementation, rather, they are intended as broader concepts that should be considered in the decision-making related to transportation planning and engineering activities going forward. Through consideration of these policies and strategies, and implementation of measures where appropriate, the Town will be better positioned to achieve its mode split objectives and extract full value from implementation of the recommendations summarized below. They will also enable the Town to be proactive in its management of the transportation network, helping to prevent issues before they arise, maximize full use of its transportation assets, and therefore potentially defer the need for additional capital investments.

6.2.3 ACTIVE TRANSPORTATION

The recommended pedestrian and cycling corridors include the following types:

- **Signed Route (Sharrow):** A signed bike route with sharrow lane markings including route signs every 330m and sharrow stencil every 75m as per Ministry guidelines. Additional costing assumptions are included in **section 6.3**.
- **Conventional Bike Lane:** An on-road conventional cycling lane between 1.5m-1.8m wide on each side of the roadway. The lane is identified through pavement markings, including a 100mm white edge line, as well as signage every 400-800m at minimum.
- **Protected Bike Lane:** Similar to the conventional bike lane but with additional protection in the form of a physical barrier separating it from the rest of the roadway such as to offer additional protection to cyclists from motor vehicle traffic. The physical barrier can take many forms, such as a curb or a narrow median.
- **Sidewalk:** Along corridors with on-street parking, curbside pedestrian infrastructure of approximately 3.0m in width is recommended to ease mobility from parked vehicles to adjacent land uses. Along corridors with no on-street

parking, a separated sidewalk with a boulevard space between the roadway travel lanes and sidewalk is recommended to provide a buffer space for pedestrians.

- **Two-Way Multi-Use Path:** Represents a separated path from the roadway where a 3.0m wide hard surface pathway (asphalt) is available for active modes (walking or cycling). These can be located within or outside of the road right of way. This has been specified in the costing.

6.2.4 ROADWAY NETWORK

The recommended roadway improvements have been staged into short term (< 5 years), medium term (5-10 years) and long term (> 10 years) horizons. The improvements consist mainly of road widenings which are required to improve capacity issues along the corridors, and transit priority measures, which are recommended to improve transit performance and reduce the vehicular demand on the road network by encouraging transit usage.

Roundabouts

The recommended road classification projects may include modifications to the intersections along the corridors. When these projects advance to the design stage, roundabouts should be considered as an alternative to 2-way stops, 4-way stops, and signalization. The potential benefits of roundabouts include reductions in vehicular delays (and corresponding reductions in emissions), reduction in collision frequency and severity (including those involving pedestrians), and opportunities for aesthetic improvements. Roundabouts are also safe for inexperienced drivers in that they only require the driver to make a right turn, regardless of the direction of travel. Roundabouts also have their disadvantages, for example, they require more space, they treat all traffic flow the same even if one corridor has significantly more traffic flow than the intersecting corridor, and they can be challenging to implement on sloped terrain. A comparative analysis should be completed for each intersection in question to determine the preferred treatment. Potential criteria for evaluation may include:

- Intersection/roundabout traffic capacity (in terms of delay/LOS and queue lengths)
- Traffic flow through the intersection, and traffic counts along the intersecting corridors individually
- Accommodation of pedestrians and cyclists
- Cost (considering both construction and maintenance costs)
- Constructability
- Site impacts including additional land requirements and utility conflicts
- Environmental impacts (e.g.: emissions, noise, tree impacts)
- Safety (e.g. roadway speed limits, the presence (or lack thereof) of other traffic calming measures, historical collision counts, and the presence (or lack thereof) of visual impediments)
- Percentage grade

An evaluation using these criteria can be completed to identify and prioritize appropriate locations for construction of future roundabouts. It is recommended that the Town consult the Ontario Traffic Manual to evaluate the conditions under which stop-signed intersections or traffic signals are warranted. For roundabouts, while the Ontario Traffic Manual does not get into detail regarding roundabout planning, other resources exist in the form of the TAC Synthesis of North American Roundabout Practice and the NCHRP Report 672 – Roundabouts: An Informational Guide. These resources can act as reference points when evaluating the potential for future roundabouts.

Importantly, the suggested evaluation criteria described above should be treated as a guideline rather than a rigid framework. There may be intersections in Niagara-on-the-Lake which score relatively low against these evaluation criteria, but which may still benefit from roundabout implementation. Factors such as development charge contributions, public consultation input, and a qualitative assessment of the overall functionality of the roundabout and the surrounding road network, may impact the minimum score needed to proceed with roundabout implementation. Put simply, the evaluation criteria should be a tool that is used to assess roundabout potential, not the tool.

Transit Priority Measures

Transit priority measures can comprise a variety of tools including:

- **Transit signal priority**, whereby traffic signal sensors detect approaching buses and adjust the signal phasing to give an advantage to buses, for example through extending additional green time to ensure the bus can clear the intersection. The result is that delays and dwell time for buses at intersections are minimized.
- **Queue jump lanes**, which allow a bus approaching an intersection to navigate around the queue of vehicles via a bus-only lane (sometimes service dual-purpose as a right-turn only lane), and navigate in front of the queue of vehicles upon clearing the intersection with appropriate signal phasing.
- **Dedicated bus lanes**, and shared bus lanes with taxis and carpoolers. Dedicated bus lanes are sometimes accompanied by policy / regulatory decisions, for example through enforcement during certain hours of the day only, leaving the lanes available to all road users outside of those hours.

In many larger cities, these different types of transit priority measures are combined for maximum impact. In the case of Niagara-on-the-Lake, no transit priority measures are recommended specifically at this time. With the current NRT OnDemand system, transit priority measures would have minimal impact to transit priority, and may be ineffective as the dynamic routing of NRT OnDemand can result in the bypassing of the implemented priority measures for some trips. Transit developments in the short-term should focus

instead on the success of the NRT OnDemand system and how it might be tweaked or expanded for greater impact. In the medium-to-long-term, however, and particularly if we reach a time where it becomes appropriate to reintroduce fixed-route transit, these transit priority measure concepts may be revisited. In particular, transit signal priority measures may be explored as a component of the Town's other pursuits in Intelligent Transportation Systems (ITS). That is not to suggest that there will never be a place for queue jump lanes or dedicated bus lanes, but rather that transit priority objectives might be achieved without the need for road infrastructure interventions.

6.3 COSTS OF THE PLAN

The capital cost of the recommended transportation strategy over the next 10+ years, inclusive of new road construction, intersection improvements, pedestrian routes, multi-use trails, and cycling facilities will total approximately \$35,301,957 for the Town and \$28,842,060 for the Region (\$64,144,017 in total).

Of the total capital costs:

- \$6,967,092 is needed by the Town and \$22,957,420 is needed by the Region for short-term improvements (<5 years);
- \$28,332,800 is needed by the Town and \$2,963,640 is needed by the Region for medium-term improvements (5-10 years); and
- \$2,065 is needed by the Town and \$2,921,000 is needed by the Region for long-term improvements (10+ years)

Certain transportation improvements will benefit current residents and would comprise the non-growth component of the Development Charges (non-DC). The improvements required to accommodate higher volumes of traffic and increased demand on the existing infrastructure directly attributable to new developments are eligible for funding through Development Charges (DC). Generally, transportation improvements in the Glendale area would likely be eligible to be paid through development charges (DC) due to the significant development expected in this part of the Town. This would also include transportation improvements that seek to connect the active transportation network in Glendale to that in the rest of Niagara-on-the-Lake.

6.3.1 COST ASSUMPTIONS

High-level cost estimates were developed for each of the proposed improvements based on presumed unit costs, as summarized below:

- \$3.25M per linear kilometre to widen an existing arterial roadway from 2 to 4 lanes.
- \$1.625M per linear kilometre to widen an existing arterial roadway from 2 to 3 lanes.
- \$0.582M per linear kilometre to upgrade from local to collector roadway (keeping # of lanes the same).

Table 6.1: Cost of Recommendations

ID	Location	Description	Limits	Improvement Type	Jurisdiction	Length (m)	Implementation Category	Class EA – Current	Total Cost
SHORT-TERM RECOMMENDATIONS (0–5 YEARS)									
1	Niagara Stone Road	Conventional Bike Lane	Line 1 Road to south of Four Mile Creek Road	Cycling	Region	800	Rehab Addition	Schedule A+	\$9,600
2	York Road	Conventional Bike Lane	Queenston Road to Four Mile Creek Road	Cycling	Region	590	Rehab Addition	Schedule A+	\$7,080
3	Niagara Stone Road	Conventional Bike Lane	Anderson Lane to Mary Street	Cycling	Region	510	Rehab Addition	Schedule A+	\$6,120
4	Concession 6 Road	Signed Route	East and West Line to north of Niagara Stone Road	Cycling	Town	1,970	Minor Addition	Schedule A+	\$6,895
5	Line 3 Road	Signed Route	Townline Road to Four Mile Creek Road	Cycling	Town	3,520	Minor Addition	Schedule A+	\$12,320
6	Line 1 Road	Signed Route	Concession 4 Road to Niagara River Parkway	Cycling	Town	4,280	Minor Addition	Schedule A+	\$14,980
7	Concession 6 Road	Conventional Bike Lane	Niagara Stone Road to southern Town boundary	Cycling	Town	7,170	Rehab Addition	Schedule A+	\$86,040
8	Mississagua Street	Conventional Bike Lane	Mary Street to Queen Street	Cycling	Town	750	Rehab Addition	Schedule A+	\$9,000
9	Queen Street / Queen's Parade	Protected Bike Lane	Mississagua Street to John Street East	Cycling	Town	2,440	Rehab Addition	Schedule A+	\$619,760
10	Four Mile Creek Road	Conventional Bike Lane	North of York Road to David Secord Drive	Cycling	Region	1,080	Rehab Addition	Schedule A+	\$12,960
11	Niagara Townline Road	Conventional Bike Lane	Niagara Town Line to Niagara Parkway	Cycling	Region	3,270	Rehab Addition	Schedule A+	\$39,240
12	Four Mile Creek Road	Conventional Bike Lane	Niagara Stone Road to Line 2 Road	Cycling	Region	410	Rehab Addition	Schedule A+	\$4,920
13	Line 1 Road	Conventional Bike Lane	Concession 6 to Niagara Stone Road	Cycling	Town	1,490	Rehab Addition	Schedule A+	\$17,880
14	Line 2 Road	Conventional Bike Lane	Concession 6 to Niagara Stone Road	Cycling	Town	640	Rehab Addition	Schedule A+	\$7,680
15	Niagara Stone Road	Upgrade from 2-lane rural to 4-lane rural collector	Airport Road to Concession 6	Roadway	Region	4,060	Capital Investment	Schedule C	\$13,470,000
16	Airport Road	Upgrade from 2-lane rural to 4-lane rural collector	Niagara Stone Road to York Road	Roadway	Region	2,810	Capital Investment	Schedule C	\$9,407,500
17	Concession 6 Road	Upgrade from 2-lane rural to 2-lane rural collector	Niagara Stone Road to East and West Line	Roadway	Town	2,370	Capital Investment	Schedule B	\$1,529,552
18	Concession 4 Road	Upgrade from 2-lane rural to 2-lane rural collector	Niagara Stone Road to Line 2 Road	Roadway	Town	1,340	Capital Investment	Schedule B	\$930,000
19	Line 1 Road	Upgrade from 2-lane rural to 2-lane rural collector	Concession 6 Road to Concession 4 Road	Roadway	Town	1,990	Capital Investment	Schedule B	\$1,308,358
20	Townline Road	Upgrade from 2-lane rural to 2-lane rural collector	Line 3 Road to East and West Line	Roadway	Town	2,560	Capital Investment	Schedule B	\$1,640,149
21	Charlotte Street	Upgrade to urban collector	Niagara Street to John Street	Roadway	Town	1,090	Capital Investment	Schedule B	\$784,478
22	Townwide	New sidewalks	At locations illustrated in the Figures in Section 5.5	Pedestrian	Town	-	Minor Addition	Schedule A+	Relatively minor
SUBTOTAL (TOWN)									\$6,967,092
SUBTOTAL (REGION)									\$22,957,420
SUBTOTAL (COMBINED)									\$29,924,512
MEDIUM-TERM RECOMMENDATIONS (5–10 YEARS)									
23	Line 3 Road	Conventional Bike Lane	Four Mile Creek Road to Niagara River Parkway	Cycling	Town	4,490	Rehab Addition	Schedule A+	\$53,880
24	Line 6 Road	Signed Route	Concession 6 Road to Concession 1 Road	Cycling	Town	5,250	Minor Addition	Schedule A+	\$18,375
25	Line 6 Road	Signed Route	Concession 1 Road to Niagara River Parkway	Cycling	Town	1,000	Minor Addition	Schedule A+	\$3,500
26	Stewart Road	Multi-Use Trail	Lakeshore Road to Niagara Stone Road	Cycling	Region	5,790	Capital Investment	Schedule A+	\$2,200,200
27	Townline Road	Signed Route	Lakeshore Road to Line 3 Road	Cycling	Town	2,810	Minor Addition	Schedule A+	\$9,835
28	Niagara Town Line	Conventional Bike Lane	Four Mile Creek Road to Portage Road	Cycling	Region	1,120	Rehab Addition	Schedule A+	\$13,440
29	Queenston Road	Conventional Bike Lane	Niagara Stone Road to Airport Road	Cycling	Town	1,630	Rehab Addition	Schedule A+	\$19,560
30	Concession 5 Road	Road extension	Walker Road to Line 3 Road	Roadway	Town	590	Capital Investment	Schedule B	\$2,067,500
31	Four Mile Creek Road @ York Road	Roundabout	-	Roadway	Region	-	Capital Investment	Schedule A+	\$750,000
32	Four Mile Creek Road @ Warner Road	NB left turn storage	-	Roadway	Region	-	Rehab Addition	Schedule A+	Relatively minor
33	Tanbark Road @ York Road	Signals and left turn lanes	-	Roadway	Region	-	Minor Addition	Schedule A+	Relatively minor

ID	Location	Description	Limits	Improvement Type	Jurisdiction	Length (m)	Implementation Category	Class EA – Current	Total Cost
34	East and West Line	Upgrade from 2-lane rural to 2-lane rural collector	Lakeshore Road to Niagara Parkway	Roadway	Town	8,350	Capital Investment	Schedule C	\$5,135,448
35	Four Mile Creek Road	Upgrade from 2-lane rural to 2-lane rural collector	Lakeshore Road to Niagara Stone Road	Roadway	Town	3,760	Capital Investment	Schedule B	\$2,338,657
36	Concession 6 Road	Upgrade from 2-lane rural to 2-lane rural collector	York Road to Line 3 Road	Roadway	Town	5,860	Capital Investment	Schedule C	\$3,411,045
37	Queen Street / Picton Street	Convert to flex street	Wellington Street to Gate Street	Roadway	Town	750	Capital Investment	Schedule C	\$15,275,000 (variable)
SUBTOTAL (TOWN)									\$28,332,800
SUBTOTAL (REGION)									\$2,963,640
SUBTOTAL (COMBINED)									\$31,296,440
LONG-TERM RECOMMENDATIONS (10+ YEARS)									
38	Glendale Avenue	Road extension	York Road to Queenston Road	Roadway		420	Capital Investment	Schedule B	\$1,515,000
39	Carlton Street	Multi-use Trail	St. Catharines Boundary to Townline Road	Cycling	Region	3,700	Capital Investment	Schedule A+	\$1,406,000
40	Glendale Avenue @ QEW	Interchange (1/3rd contribution)	-	Roadway	Town / Region / Province	-	Capital Investment	Schedule C	Unknown
41	Glendale Avenue	Road extension	York Road to Queenston Road	Roadway	Region	420	Capital Investment	Schedule B	\$1,515,000
SUBTOTAL (TOWN)									\$2,065
SUBTOTAL (REGION)									\$2,921,000
SUBTOTAL (COMBINED)									\$2,923,065
GRAND TOTAL (Town):									\$35,301,957
GRAND TOTAL (Region):									\$28,842,060
GRAND TOTAL (Combined):									\$64,144,017

- \$750K for construction of a one-lane roundabout
- \$3.5K per linear kilometre of signed bike route
- \$12K per linear kilometre of conventional bike lane
- \$254K per linear kilometre of protected bike lane
- \$380K per linear kilometre of two-way multiuse path
- \$150K for Class B EA Study
- \$275K for Class C EA Study
- \$15M for construction of approximately 750m of a flex street (cost is variable depending on design elements)

A detailed line-by-line summary of each improvement is provided in **Table 6.1**.

6.4 FUNDING MECHANISMS

6.4.1 ACTIVE TRANSPORTATION

Financing implementation of the active transportation improvements could be supported by a variety of provincial and federal financing programs. One of the most widely used programs is the Gas Tax Fund (New Deal for Cities and Communities) initiative which consists of an ongoing transfer of funds from the federal government to municipalities. The funds are generally allocated to municipalities on a per capita basis and are to be used for “environmentally sustainable municipal infrastructure.” Eligible expenditures include public transit, water, wastewater, solid waste, community energy

systems, as well as local roads, bridges and tunnels, and active transportation infrastructure (e.g. bike lanes) that enhance sustainability outcomes. There cannot be any reduction in capital funding provided by the municipality and the funds must be used within three years of receipt.

6.4.2 TRANSIT

A similar program to the Federal Gas Tax Fund is offered by the province of Ontario. The Ontario Gasoline Tax is an ongoing transfer of funds to municipalities exclusively for public transit. The existing allocation is based upon each municipality's proportionate share of the province's population. The funds can be used for either operating or capital costs. While there are no explicit transit recommendations requiring funding in this TMP, this funding should be considered in the event that expansion of the NRT OnDemand system, or of transit in Niagara-on-the-Lake in other form(s), is warranted. The provincial and federal government have committed a total of 650 million dollars to help municipal transit systems address the financial impacts of the COVID-19 pandemic. Funding can be put towards initiatives that make it easier and more affordable to use transit including adding capacity for on-demand service.



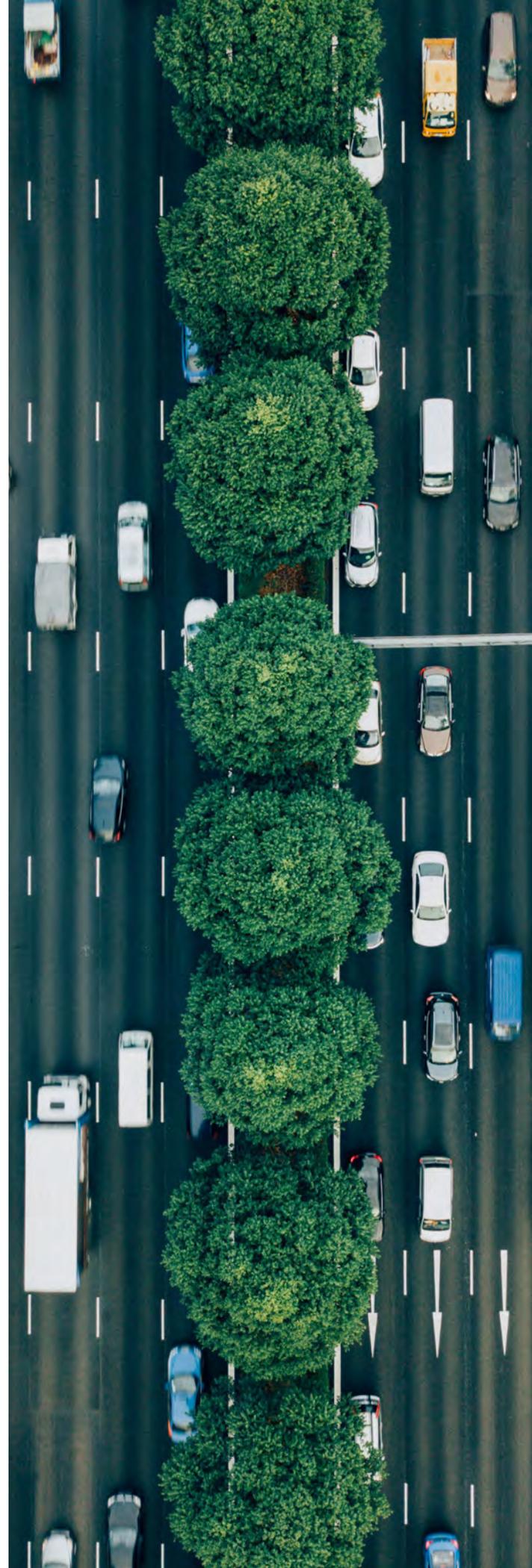
7. CONCLUSION

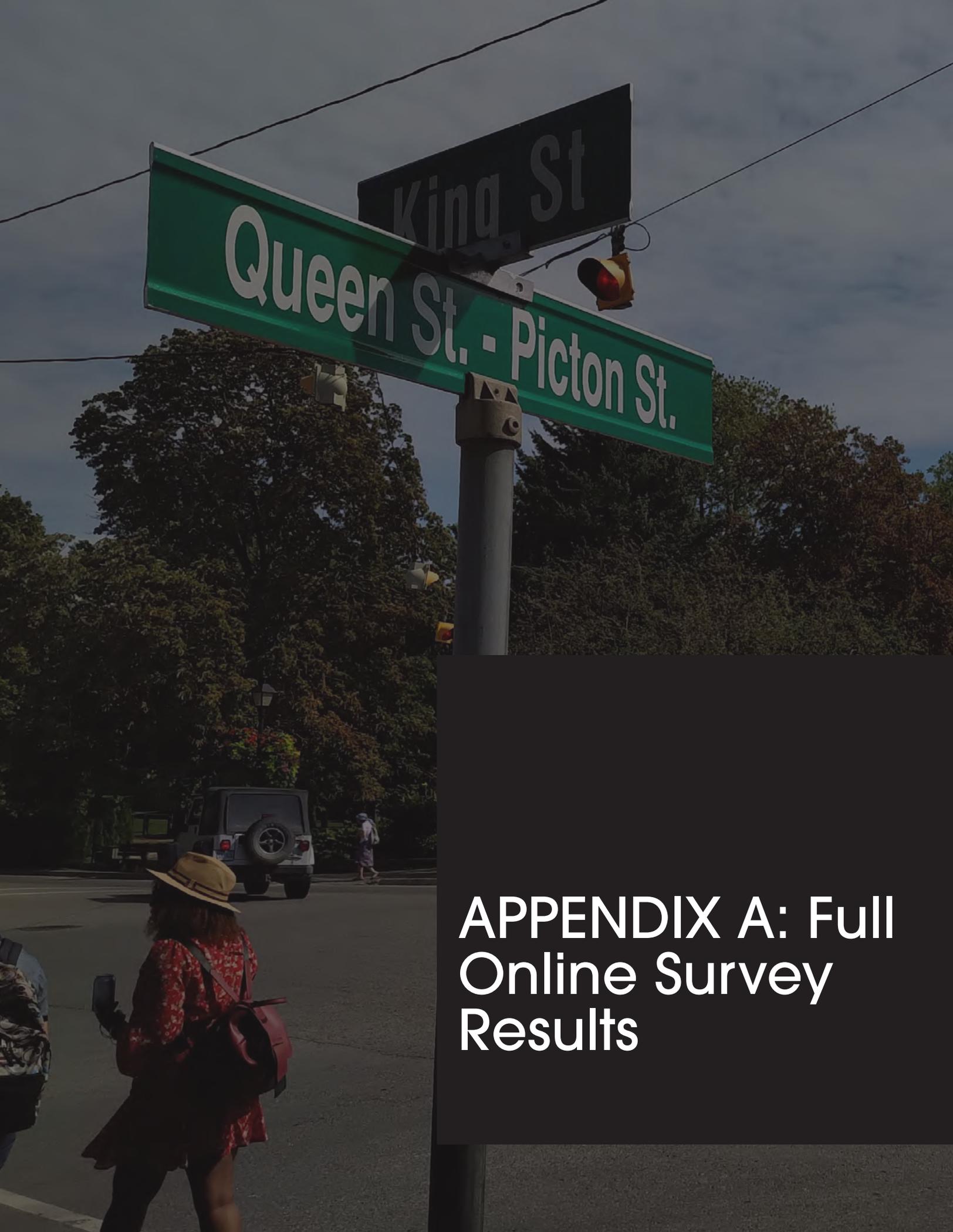
7. CONCLUSION

The purpose of this Transportation Master Plan (TMP) is to develop a long-term strategic vision for the future of transportation in Niagara-on-the-Lake, evaluating all aspects of the transportation network including roads, active transportation, and transit. Emphasis was placed on sustainable modes of transportation including active modes and transit, with the objective of achieving a mode shift away from single-occupancy vehicles to the extent feasible. The TMP process began with a round of engagement and a review of current and future transportation conditions in the Town. From here, growth forecasts were undertaken, needs and opportunities were evaluated, and multimodal transportation network recommendations were developed. Implementation considerations were then drafted alongside a series of policies and strategies for consideration, intended to support the transportation network recommendations. Some transportation policies were also prepared, in draft format, for the Town's early consideration and action.

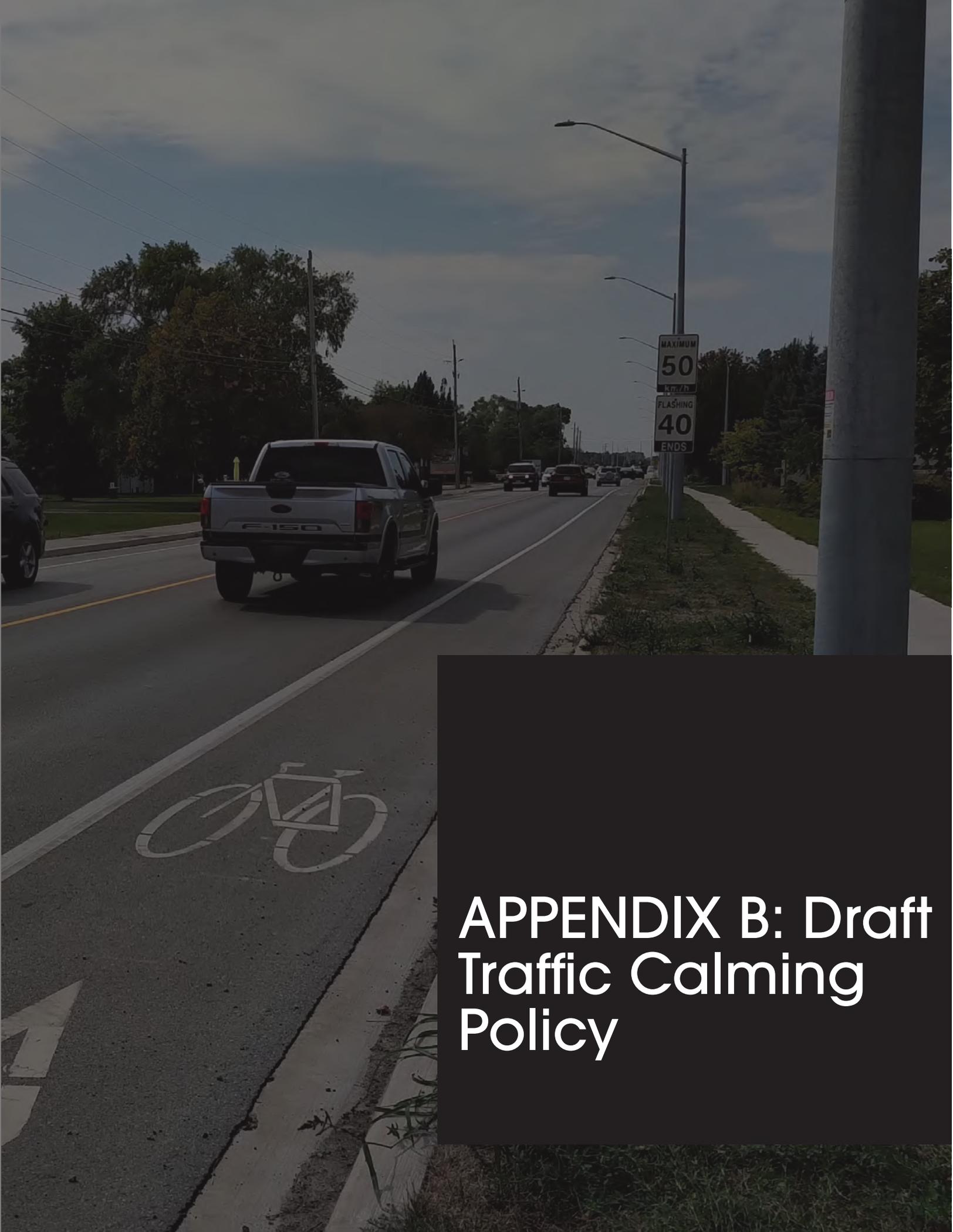
In the course of this TMP, reference was made to past relevant studies such as the previous Niagara-on-the-Lake TMP (2004), the Niagara Region TMP (2017), and the Provincial Southern Highways Program (2017) and the outcomes of this TMP seek to align and integrate with these studies as appropriate. At the same time it is noted that Niagara-on-the-Lake contains a wealth of corridors that are regionally owned, including Niagara Stone Road where the greatest transportation constraints in the Town were observed. This TMP is not to suggest that the Town necessarily be solely responsible for implementing all recommendations, but rather that the Town implement what it can itself and work with regional (or provincial) agencies to implement the items that involve corridors managed by other tiers of government.

When moving forward with implementation, it must be appreciated that the suite of recommendations, policies, and strategies presented in this TMP are best treated as pieces of a larger puzzle rather than as standalone action items. That is, all elements of the transportation network are interrelated, and the package of recommendations together is greater than the sum of the parts. Traffic calming recommendations, for example, go hand-in-hand with active transportation network recommendations in the spirit of enhancing safety while promoting walking and cycling. In turn, these are all related to road classifications and roadway design, most notably with respect to Queen St. where a flex street concept is proposed – a concept where success will depend (in part) on implementation of the deployment of additional periphery parking options and other parking management strategies. With this integrated focus on implementation, and on transportation in Niagara-on-the-Lake more generally speaking, the Town will be well-positioned for economic prosperity, for community building, for preserving established neighbourhoods, and for maintaining a high quality of life into the future.





APPENDIX A: Full Online Survey Results



APPENDIX B: Draft Traffic Calming Policy

The Town of Niagara-on-the-Lake does not have an existing Traffic Calming Policy, and so as recommended in Phase 3, a draft policy was developed which is appropriately scaled and tailored for Niagara-on-the-Lake.

Traffic calming policies and guidelines are important tools within a municipality's repertoire in terms of implementing safety improvements or addressing safety concerns from residents. As part of the Town of Niagara-on-the-Lake's mandate to build and maintain a safe and efficient road system for all road users, it is necessary that Niagara-on-the-Lake has updated policies that reflect best-practices for effective safety measures.

Traffic calming measures are in support of underlying objectives of the TMP such as prioritizing and encouraging active modes and transit, enhancing multi-modal connections, and improving safety for all road users.

Draft Traffic Calming Policy

Initiation of a Traffic Calming Project

To initiate a traffic calming project, one or all of the pre-requisites below need to be satisfied prior to assessing specific safety criteria for traffic calming. Pre-requisites include:

1. Written request from the public
2. Request from Council
3. Recent history of fatalities or serious injuries caused by a collision

Important opportunities to include traffic calming measures and other related roadway improvements can come about as part of broader transportation work such as an engineering study or road reconstruction opportunities, or could be desirable if the Town decides to conduct road safety audits. Town staff could proactively identify opportunities to implement traffic safety improvements through the completion of ongoing studies rather than having to wait for and receive a request.

Upon meeting one or all of the pre-requisites, technical criteria are applied to eliminate unsuitable roadways before moving to the prioritization stage. The technical criteria which must be met are:

- Minimum daily traffic volume that exceeds 110% of the roadway's classification
- Minimum 85th percentile measured speed of 110% or 5km/hr above posted speed limit, whichever is greater
- No identified impacts to emergency services

Prioritization Criteria

The Traffic Calming Policy includes framework to assign points, summing up to 100, according to various warranting criteria for traffic calming measures. This measure is used to prioritize ongoing traffic calming projects, recognizing that all roadways which have met the pre-requisites and technical criteria above are eligible for traffic calming measures. The following warrant criteria are included in the policy:

- **Speeding:** Allocates points for each km/h the 85th percentile measured speed is over the posted/default speed limit (20 points)
- **Volume:** Allocates points for each unit of daily traffic volume observed on the roadway. (1 point per 100 AADT, up to 20 points)
- **Pedestrians/Cyclists:** Allocates points for each active transportation generator such as schools, places of worship, playgrounds, recreation centers, senior centres, etc (10 points per generator, up to 30 points)
- **Safety:** Allocates points for each reported preventable collision in the last five years on the roadway (10 points per collision, up to 30 points)

Speed Limit Reduction Warrant

For roadways which have met the pre-requisites and technical criteria an additional speed limit reduction investigation will be conducted which determines if the existing posted speed limit is too high for the roadway. A speed limit of 30km/h for local streets and 40km/h for collector streets is recommended, in line with NACTO and peer best practices. 30km/h speed limits should also be considered along streets that are adjacent to playgrounds, parks, and in subdivisions where through traffic access points are limited.

If a reduction in speed limits were to be warranted, appropriate traffic calming measures such as lane width narrowing, curb extensions, etc. could be suggested in order to reduce the design speed, as simply posting a lower speed limit is shown to be ineffective in decreasing operating speeds.

Traffic Calming Measures

In addition to the measures discussed above, traffic calming measures which may be considered for a roadway traffic calming project include:

- Speed bumps
- Traffic circles
- Bike lanes
- On-street parking
- Medians
- Chicanes
- Signage

Draft Stop Warrant Policy

In accordance with the Ontario Traffic Manual, the all-way stop warrant policy described below describes the conditions under which all-way stop signs may be installed at an intersection. It should be noted that 'vehicles' referenced below includes automobiles, bicycles, and other 'new mobility' devices such as e-scooters.

Volume Warrants

The following warrants must all be met for the road type to proceed with all-way stop signs.

For arterial/collector roads:

- The road volume total for all intersection approaches should exceed 500 vehicles per hour for any eight hours of the day
- The combined total vehicular and pedestrian volume on the minor street should exceed 200 units per hour
- The volume split should not exceed 70/30 (percent), where the 70% represents vehicular volume on the major street and the 30% represents the volume of all vehicles and pedestrians

For local roads:

- The road volume total for all intersection approaches should exceed 350 vehicles for the highest hour recorded
- The volume split should not exceed 75/25 for three-way control or 65/35 for all-way control, where volume is defined as vehicles only

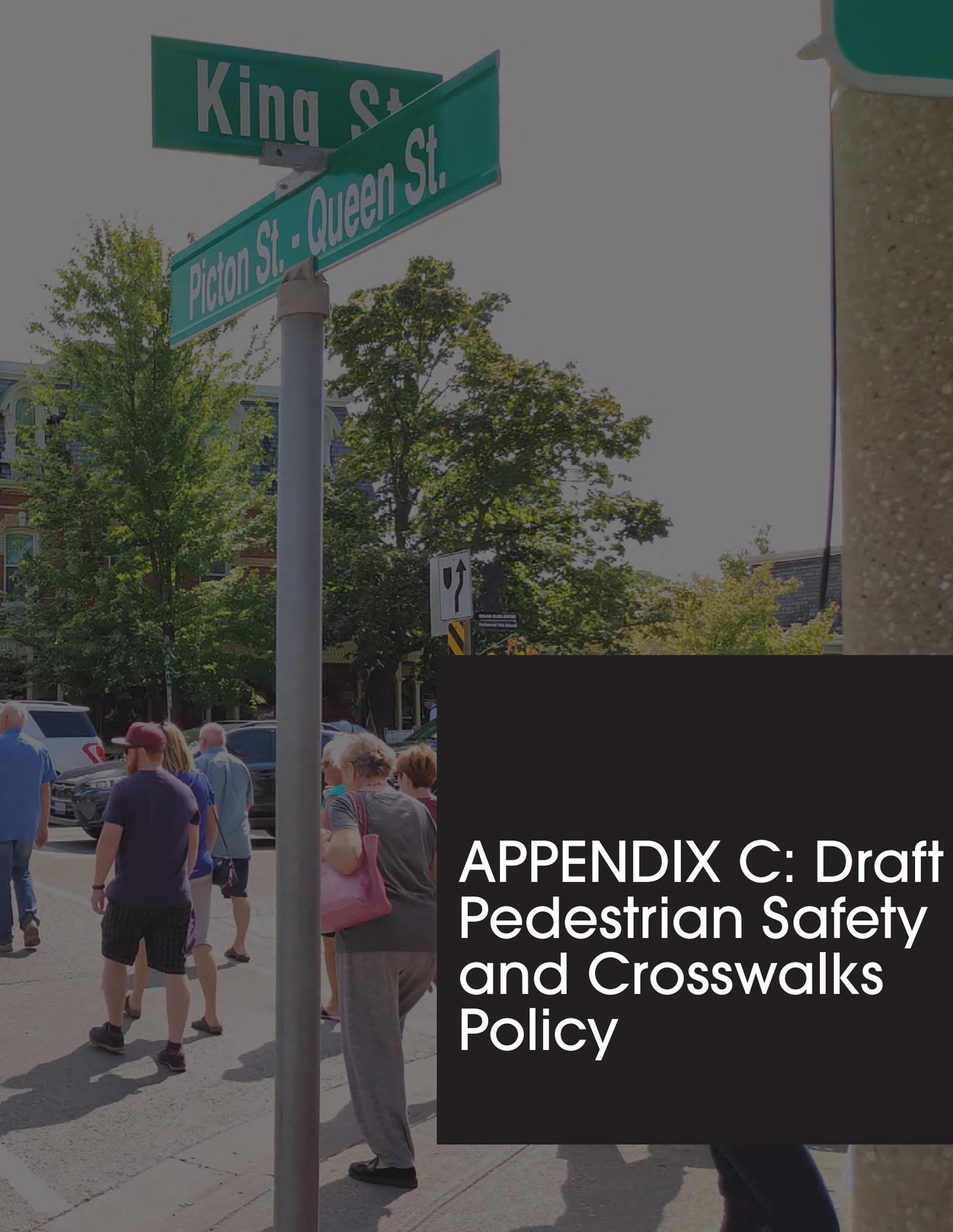
Collision Warrants

An accident frequency of four relevant collisions per year, over a three-year period, should be considered the threshold to implement all-way stop signs. Relevant collisions include those which are susceptible to relief through all-way stop sign implementation, such as right-angle or turning-type collisions.

Exceptions

All-way stop signs should not be implemented under the following conditions:

- Solely as a speed control device
- Solely to deter through-traffic in a residential area
- On urban roads which have a speed limit in excess of 60km/h
- Along transit or truck routes, except where two routes cross
- Where traffic would be required to stop on steep grades



APPENDIX C: Draft Pedestrian Safety and Crosswalks Policy

Draft Pedestrian Safety and Crosswalks Policy

Niagara-on-the-Lake is a town with a unique demand for pedestrian accommodations. Populations such as tourists, retirees, students and temporary migrant workers all require safe, comfortable pedestrian amenities to allow them to travel across the town on foot. To accommodate these requirements, a crosswalk policy was developed to assess the suitability of a crosswalk at a given location.

Draft Crosswalk Policy

In accordance with the Ontario Traffic Manual, the following technical criteria should be satisfied to install a crosswalk in a given location:

- **Proximity to traffic control devices:** The candidate crosswalk location should be at least 200m from the nearest traffic control device.
- **Pedestrian connectivity:** The pedestrian network such as sidewalks or walkways should connect to the candidate crosswalk location. Pedestrian 'desire lines' (evidence of frequent pedestrian crossings in the location, such as trampled grass) may be observed.
- **Traffic volume:** The candidate roadway should see a minimum vehicular traffic volume of 750 vehicles and pedestrian traffic volume of 100 pedestrians in an 8-hour period.

Note: If a candidate crosswalk meets the first two requirements but does not meet the minimum traffic volumes, it may still be acceptable, based on sound engineering judgment.



APPENDIX D: Draft Commons Special Events Traffic Policy

As a popular arts and culture hub, Niagara-on-the-Lake hosts events which may be disruptive to the local transportation network. The Commons, a historical site and popular events venue, sees large influxes of traffic volumes during major events such as concerts and festivals. A Special Events Traffic Policy can be one method to ensure that these traffic impacts to the local community are mitigated. A draft policy is provided in this section for the Town's reference.

Draft Commons Special Events Traffic Policy

- As a part of the Special Event Application, the event organizer must submit a site plan or route map to indicate ingress and egress routes and parking areas.
 - All road closures required for the event should include a mandatory 6-metre emergency access lane which would remain unobstructed to allow emergency vehicles to access the site.
 - The proposed site plan will be reviewed by the Town and finalized collaboratively. In addition, it is the responsibility of the organizer to develop event directional signage on the event grounds, whereas the Town may need to develop signage to guide attendees to/from the venue.
- Efforts should be taken to use TDM measures to minimize demand for parking. In a large event context, specific actions such as providing as following can be taken:
 - Encouraging the event organizer to offer a shuttle service from major origin points or from an offsite parking location.
 - Implementing temporary cycling infrastructure/ designated routes leading to The Commons.
 - Provide free transit trips or incentivize the event organizer to include a transit day pass within the ticket cost.
 - Provide free supervised bicycle parking.
 - Create taxi and transit staging areas.
- Coordinate road closures and impacts to the transportation network with municipal and regional stakeholders such as emergency services, health care providers, business improvement areas, etc.



APPENDIX E: Draft Traffic Operations Policy

Draft Traffic Operations Policy

The Niagara Region Traffic Impact Study (TIS) Guidelines are currently under review by the Region, with the intent of updating the document to facilitate standardization for the municipalities contained within Niagara Region. The existing regional TIS Guidelines are available on Niagara Region's website.¹

It is recommended that the Town of Niagara-on-the-Lake adopt the new Niagara Region TIS Guidelines once they are finalized, with amendments where required to adjust to the local context. The following are recommended to be amended to account for the smaller size of the Town relative to other municipalities in the Region. Changes or additions are italicized below:

TIS Warrants

In general, a TIS will be required when any one of the following criteria is met:

- More than 75 new peak hour auto trips are generated as a result of the project/development/redevelopment; and/or
- Localized safety or capacity issues already exist; and/or
- Localized safety or capacity issues are anticipated as a result of the proposed project/development/redevelopment; and/or
- There are site-specific or project-specific characteristics that warrant more detailed transportation analysis

Study Horizons

Established based on scale of development application. Two scenarios are required:

- *Full occupancy of the development (minimum 3 years after submission date)*

And one of the following:

- *Site plan applications = 5 years after full occupancy (minimum 3 years after submission date); or*
- *Rezoning or OPA applications = 10 years after full occupancy (minimum 3 years after submission date)*

Traffic Analysis Software Configuration

- Lane Settings:
 - Ideal Saturated Flow: 1,650 vphpl
 - Total Lost Time: 4 seconds (if applicable)
- Volume Settings:
 - Peak Hour Factor: 0.92
- Timing Settings:
 - Existing timing as per timing plan
 - Control Type: As per signal timing plan unless new signal then fully actuated
 - Leading Protected/Permissive advance greens only
 - Lead/Lag Optimization: No
 - Recall Mode: Minimum recall to main street through phases

1. <https://www.niagararegion.ca/business/pdf/traffic-impact-study-guidelines.pdf>



1888

THE TOWER WAS BUILT BY THE
TOWN OF PORT CHARLOTTE
IN 1888 AS A MONUMENT
TO THE TOWN'S
HUNDENTH BIRTHDAY

Plus
Gifts

Shops