Northumberland county

COUNTY OF NORTHUMBERLAND

TRANSPORTATION MASTER PLAN

FINAL REPORT | MARCH 2017

WSP | MMM GROUP

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Executive Summary

Northumberland County is changing. Situated next to the economic engine of Ontario, along the busiest highway in Canada, and poised for increased growth in the next 30 years, the County has completed its first Transportation Master Plan (TMP) in order to ensure that existing and future County residents, businesses and visitors continue to be able to access and enjoy all of the opportunities available.

The TMP is intended to be the guiding document for the County to implement for all matters related to transportation infrastructure and policy. The seven primary objectives of the TMP are:

- Create a long range transportation planning document;
- Prioritize future multi-modal transportation networks and infrastructure
- Develop a sustainable program of system expansion over multi-year horizons;
- Identify funding strategies;
- Analyze safety and operations at key intersections;
- Conduct a road rationalization assessment;
- Review transportation-related policies.

The Municipal Class Environmental Assessment (MCEA) process was followed in the development of the TMP. As part of the requirements of the MCEA process, two points of engagement were required. The TMP ultimately engaged with the public and stakeholders a total of seven times, from November 2014 to June 2016.

Added 2017

Input received from the public and other stakeholders helped the TMP Project Team to better understand existing issues and develop areas of focus for the TMP's recommendations related

to both infrastructure and policy. The public and stakeholder engagement process helped to place focus on elements of the TMP related to managing speed on the County Road network, providing facilities for cyclists and other road users, as well as the need to coordinate local transportation projects with larger regional initiatives.

The Picture Today

Section 2.0 of the TMP consists of a detailed discussion on the existing transportation conditions within the County. Three main focus areas were assessed: roads, policy, and sustainable transportation.

The roads component of the TMP reviewed a number of key items. Transportation studies completed previously in the County were noted and used in future assessments. Existing County intersection collision rates were calculated, and mitigation measures to improve the safety at these intersections were identified. High volume County intersections were also noted and evaluated in terms of meeting signal warrants. An assessment of all County roads for capacity, using existing volumes, was done through the calibration of a travel demand forecasting model. In addition, the classification of County roads was quantified using criteria from the Ontario Good Roads Association (OGRA).

The policy component reviewed existing policies within which the County's transportation policies must operate. These include provincial policies such as the Provincial Policy Statement, the Places to Grow Act, the Ontario Traffic Manuals (OTM), Ministry of Transportation (MTO) policies and the Accessibility for Ontarians with Disabilities Act (AODA). In addition to the provincial policies, which provide more general guidance, a number of local policies currently in force in the County were identified and reviewed for changes, where necessary. These local policies generally fell into the broad categories of Traffic Management, Infrastructure and Access Management, and Goods Movement. All of these policies were reviewed in the context of the County's Official Plan, local municipality Official Plans (OP), and the Northumberland Strategic Plan.

For the existing components of existing sustainable transportation within the County, existing transit and paratransit services within the County, as well as the proposed infrastructure in the pre-existing Cycling Master Plan, were identified. The majority of public transit service is focused on the urban areas of Port Hope and Cobourg, whereas the Northumberland Transportation Initiative services are provided in the other areas of the County. Furthermore, inter-regional public transit services are limited.

The synthesis of this information was used to highlight the primary opportunities and challenges facing the County's transportation infrastructure and policies. The existing challenges include: funding, the need for streamlined and consolidated transportation policies and guidelines, and the need to support growth in the County in an environmentally and financially sustainable manner. These are offset by opportunities for the County which include its proximity to the Greater Toronto and Hamilton Area (GTHA), providing a hub for future growth, and the emergence of "Mobility as

a Service" technologies which will potentially streamline and improve the efficiency of County transportation services.

The Picture Tomorrow

The vision for transportation in Northumberland County is to have a multi-faceted transportation network within the County, one that supports motor vehicle traffic, active transportation and other sustainable transportation modes. Five major guiding principles have been developed in support of this vision:

1. Maintain and improve County roads that operate as the primary transportation network throughout the County, ensuring the movement of goods and services between and within all County municipalities and businesses. To do this, County Roads should provide connections between municipalities within the County, and between the County, major provincial Highways, neighbouring municipalities, and regions.
2. Continue investment and supporting policy development for alternative uses, including providing transit services and building out the routes in the Cycling Master Plan.
3. Strengthen, update and develop the transportation policies in the County, in order to provide staff with the resources necessary to carry out their day-to-day activities. Policies should encourage collaboration, where possible, with member municipalities and/or external agencies, to ensure residents are receiving efficient and effective service.
4. Expand and improve the road network at a sustainable level, both from a funding as well as an environmental standpoint.
5. Ensure the road network is safe and operating as efficiently as possible.

Future Transportation Infrastructure

In order to identify the locations where future infrastructure may be required, an assessment of future County-wide conditions was undertaken, using the travel demand model projections for 2031, 2041 and 2061. The projections indicate that significant congestion is not expected for the 2031 horizon year, but some localized areas may be congested and should be investigated. By 2041 and especially 2061, more significant congestion is expected throughout the County's road network.

The model was updated to reflect the roadway improvements identified in the Development Charges (DC) study, Trent River Crossing and Arterial Road Network Environmental Assessment (EA) and the County Road 2 EA for the 2031, 2041 and 2061 horizon years.

Using the future travel demand models, areas where congestion may occur in the future were identified, and are shown in the report in **Figures 3.1, 3.2** and **3.3**. These locations could be improved via physical changes to intersections, or through a more general widening of the roadway to include additional lanes. This model focuses on a broader network and roadway

corridors as opposed to finer, more detailed link level congestion analysis, such as at the Trent River Crossing. The finer level of traffic analysis and evaluation of alternatives should be conducted and addressed as part of an environmental assessment for identified areas of congestion in the future. A process for evaluating these areas of congestion in the near term is provided in the TMP.

Road Rationalization

The County`s road network was evaluated using a road rationalization methodology, in order to confirm that existing County roads made sense to continue as County roads in the future, and whether some local roads were suitable to become County roads. The road rationalization was conducted based on the criteria identified by the Ontario Good Roads Association, with minimum scores for County roads developed based on a required minimum level of functionality. The intention of the road rationalization was to serve as an initial screen for the County and local municipal partners, to determine which roads should be discussed for a change in designation. The road rationalization does not, however, definitively state which roads should change designations, in large part because local context must be taken into account prior to changing roadway designation. The road rationalization was conducted based on the criteria identified by the Ontario Good Roads Association (OGRA), with minimum scores for County roads developed based on a required minimum level of functionality. As a result, the roadways identified for changes should be discussed further with municipalities. In addition, County Road 28 has been identified as a special discussion corridor with MTO, given it's important function in the County road network as a goods movement corridor, it's regional function beyond County boundaries, and the fact that it ranked highly in the road rationalization exercise.

Furthermore, as part of the road rationalization exercise, goods movement corridors within the County which provide connections to and from MTO facilities and the County`s industrial areas were identified. These goods movement corridors should be given future priority for maintenance, given their importance in the County road network and the need for these roadways to be free of half-load restrictions. The four goods movement corridors identified are County Roads 9, 28, 30 and 45.

Intersection Improvements

The locations previously identified in the existing conditions as the highest collision intersections within the County were assessed using the methods in the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual. Using this reference, improvements at each intersection were recommended for implementation.

Signal warrant calculations were completed for the ten highest-volume unsignalized intersections in the County. However, none of the intersections met the signal warrants at this time. Three intersections, County Road 29/County Road 30, County Road 2/County Road 74/County Road 10, and County Road 45/County Road 22, may meet warrants in the future and should be monitored.

Transportation Policies

The review of the transportation policies currently in effect in the County resulted in major and minor recommendations for changes to 12 policies and the creation of 10 new policies or guidelines.

Three of the new guidelines recommended for creation are the Complaint Procedure, the Hamlet Treatment Toolkit, and the Traffic Impact Study guidelines. The complaint procedure is intended to streamline the procedure for responding to complaints from residents, which would rely on underlying policies such as the traffic calming policy or other relevant policies. This would provide a measured and consistent response to transportation complaints received from residents and businesses. The Hamlet Treatment Toolkit provides a specific set of measures and improvements which can be used to better identify to drivers when they are entering hamlets, providing a measure of speed control and a level of visual consistency, resulting in improved driver compliance to speed limit transitions, across the County. The traffic impact study guidelines are intended to provide a consistent guidance to developers within the County, to ensure that they identify issues which may impact County roadways and provide the necessary improvements to address these issues.

Active Transportation

Given that the County has recently completed a Cycling Master Plan (CMP), the Active Transportation strategy within the TMP is intended to provide updated phasing for proposed cycling routes, and ensure consistency with OTM Book 18 which was published subsequent to the creation of the CMP.

Implementing the Plan

A measured and reasonable approach to implementing each of the components specified in the previous section has been identified. Furthermore, a number of these components has been adjusted or suggested based on feedback the project team has received from the public and Council, providing a consensus-based list of improvements. The proposed implementation plan includes the prioritization of projects by need, an approximate timeline for implementation of the projects, the identification of key projects which will provide the data necessary to monitor the progress of the TMP, the estimated cost of each project, the proposed EA schedule (where appropriate), and a listing of potential funding and partnership alternatives.

Recommendations

The proposed improvements to be implemented or studies to be undertaken as recommended in the TMP are identified in three key areas: infrastructure, policies, and active transportation. There are 15 infrastructure improvements identified, 22 policy modifications or new policies/guidelines to be created, and 9 active transportation recommendations. These are summarized, along with their proposed timeline, in the table below.

Table I: Summary of Infrastructure Recommendations

ID No.	Description of Recommendation	Timeline
IN1	Conduct a detailed safety review using the Highway Safety Manual at each intersection where mitigation measures are proposed. This will ensure that the proposed mitigation measures are effective and appropriate.	0-5 years
IN2	Review the highest volume intersections for signal warrants by conducting updated 8hour counts during the busiest 8-hours. Counts should be updated at a minimum of every 5 years, and more often if development occurs in the area.	0-5 years, ongoing updates every 5 years
IN3	Implement revised speed limits at locations where a greater than 20 km/h change in speed was identified, given that the maximum speed change at a location should be 20 km/h. These locations are identified on Figure 5.1.	0-5 years
IN4	Study and construct Hamlet Entry Treatments as described in Section 3.3 and in Appendix B.	0-5 years for priority locations, overall 10 year rollout
IN5	Conduct an operations and improvement staging study of County Road 2/County Road 74 between East Townline Road and County Road 45, as described in Section 3.0, to better identify a timeline for implementation of improvements.	5-10 years
IN6	Depending on the results of the operations study, conduct an Environmental Assessment for County Road 2/County Road 74 between East Townline Road and County Road 45. The completion of the MCEA should be appropriately timed with the need for improvements.	5-10 years (depends on timing as identified by corridor studies)
IN7	Complete operations and improvement staging studies and environmental assessments for 2041 and 2061 horizon year corridors, as confirmed by updated TMP work. The buildout timelines for other identified improvements will be further refined by future TMPs. However, the process of conducting operational reviews prior to completing Environmental Assessments should be continued to better focus resources on corridors most in need of improvements.	10+ years (depends on timing as identified by corridor studies)
IN8	Investigate and implement modification of the Highway 401 EDR to roadways north of 401, from sections where it is currently south of 401 (CR 2 through Colborne and Brighton, etc.)	0-10 years
IN9	Continue data collection program on County Roads; previous counts were conducted in 2008 and 2013. Counting program should continue at 5-year intervals.	On-going
IN10	Update and monitor collision information on an annual basis to update the current “top 10” list of the highest collision intersections.	On-going

ID No.	Description of Recommendation	Timeline
	Updated information should also be used to change the priority list of safety improvement locations, if necessary.	
IN11	Discuss with MTO and potentially prepare operational study to support consideration of jurisdictional change for CR28.	0-5 years
IN12	Collect and monitor speed data at locations where speed transitions exist or locations where complaints have been received.	On-going
IN13	Continue implementation of Cycling Master Plan proposed improvements	On-going
IN14	Investigate Funding Options	On-going
IN15	Complete a Business Case Study for GO Rail expansion into the County.	0-5 years

Added 2017

Table II: Summary of Policy Recommendations

ID No.	Improvement/Policy	Timeline
PO1	Traffic Calming	0-5 years
PO2	Advance warning Signs	0-5 years
PO3	Procedure to Close Road Allowance	0-5 years
PO4	Rural Street Lights	0-5 years
PO5	Land Development Standard Conditions	0-5 years
PO6	Entrance and Set Back	0-5 years
PO7	Road Permit Request	0-5 years
PO8	Fleep Maintenace and Operations	0-5 years
PO9	Salt Management Plan	0-5 years
PO10	Winter Control Quality Standard (WC04-01)	0-5 years
PO11	Fuel Spill Contingency Plan	0-5 years
PO12	Oversized Vehicles	0-5 years
PO13	Universal Complaint/Request Procedure for traffic, traffic calming, street lighting	0-5 years
PO14	Hamlet Entry Treatment	0-5 years
PO15	Accessibility	0-5 years
PO16	County Road Design Standards Compendium	0-5 years
PO17	Typical County Road Cross-Sections-Urban and Rural	0-5 years
PO18	Traffic Impact Study Guidelines	0-5 years
PO19	Road Rationalization Policy (including Goods Movement Corridors)	On-going
PO20	Conduct semi-annual discussions with Metrolinx on potential intra-regional transit connections.	On-going
PO21	Advocate for additional widening of Highway 401 east of Cobourg	On-going
PO22	5-Year Transportation Master Plan Updates	On-going

Added 2017

Table III: Summary of Active Transportation Recommendations

ID No.	Improvement/Policy	Timeline
R#1	As part of the Transportation Master Plan, the cycling vision be adopted as the desired vision for County-wide cycling.	0-5 years
R#2	Explore the development of a comprehensive trails master plan, providing a vision for trail development and design and outlining strategic improvements linking existing forest trails and municipal connections.	0-5 years
R#3	Update the AT Strategy GIS database to include existing trails found throughout Northumberland County	0-5 years
R#4	As part of a future update to the Cycling Master Plan, the County should re assess the results of step 2 and undertake step 3 in the facility selection process from OTM book 18 to confirm the preferred cycling facility types.	5-10 years
R#5	Northumberland County should use the recommended facility type revisions identified through the TMP as the basis from which to update the CMP – when the master plan is next updated.	5-10 years
R#6	Northumberland County should consider the implementation of the green bike route sign along existing and proposed signed bike routes within both the urban and rural areas of the County.	10+ years
R#7	When the Cycling Master Plan is next updated, the County should revise the operating space and operating width to be consistent with OTM Book 18 and MTO's Bikeways Design Guidelines	5-10 years
R#8	When the Cycling Master Plan is next updated, the County should incorporate the additional design considerations related to accessibility, complete streets, highway interchange crossings and freight, transit and emergency service routes	0-5 years
R#9	Additional consideration for the design guidelines outlined in Ontario Traffic Manual (OTM) Book 18, OTM Book 18, Ministry of Transportation Ontario Bikeway Design Guidelines and Accessibility for Ontarians with Disabilities Act should be incorporated into future updates of the Cycling Master Plan.	5-10 years

Costs

Section 3.2.5 addresses various mitigation methods to implement at the Top 10 intersections with the highest collision rates. Based on the magnitude of the mitigation methods, the following table shows the cost range associated with the proposed intersection safety improvements.

Table IV: Summary of Safety Improvement Costs (IN1)

Intersection	Cost Estimation
County Road 2 and Townline	$500
County Road 28 and County Road 9 (Oak Ridges Road)	$14,000
County Road 18 and Danforth Road	$1,000-$300,600
County Road 45 and Beagle Club Road	$1,000-$137,000
County Road 29 and Glover Road	$7,000-$307,000
County Road 18 and Telephone Road	$1,000-$300,600
County Road 8 and Wingfield Road	$1,000
County Road 20 (Elgin Street) and Ontario Street	$200,000-$1,000,000
County Road 45 and County Road 22 (Centreton Road)	$452,400
County Road 30 and 5th Line	$60,000-$260,000
Total High-End Estimate (All Recommended Improvements Necessary)	**$2,773,100**
Total Low-End Estimate (Only Some Improvements Necessary)	**$737,900**

Out of the three key areas for improvements, costs for policies and active transportation improvements are assumed to require in-house staff resources but will not incur additional costs. As a result, only costs for infrastructure improvements have been identified and compared to potential funding sources. The following table shows the estimated cost projection for infrastructure improvements throughout Northumberland.

Table V: Summary of Infrastructure Improvement Costs

ID No.	Cost
IN1	$737,900 - $2,773,100
IN2	$750,000
IN3	$27,000
IN4	$539,600
IN5	$50,000
IN6	$250,000
IN7	$2,000,000
IN8	$60,000
IN9	$10,000 for 10 locations. Also requires Staff Resources
IN10	Require Staff Resources

Added 2017

IN11	Require Staff Resources
IN12	Require Staff Resources
IN13	Require Staff Resources
IN14	Require Staff Resources
IN15	Require Staff Resources

Summary of TMP Improvements

Based on the 2016-2025 10-Year Capital Plan, various funding programs were identified for improvements. The following table identifies the total costs by implementation period for the proposed improvements and improvements studies, and the corresponding funding program that each infrastructure improvement could qualify under.

The majority of the improvements identified within the TMP will be in addition to planned works already associated with a particular funding program through the existing 10-Year Capital Plan; and as such, it may be necessary for an increase in funds in order to accommodate both planned works and improvements identified within the TMP.

Table VI: Potential Funding Sources compared to Estimated Costs, by Period

Period	Funding Sources (from 10 Year Capital Plan)	Related Improvement	Estimated Cost
0-5 years	Guiderail Replacement/Safety Improvements	IN1	$737,900 - $2,773,100
	Intersection Improvement Program	IN2 IN3 IN4	$250,000 $27,000 $269,800
	Transportation Service Improvement Needs	IN8	$30,000
5-10 years	Intersection Improvement Program	IN2 IN4	$250,000 $269,800
	Transportation Service Improvement Needs	IN5	$50,000
		IN6 IN8	$250,000 $30,000
10+ years*	Intersection Improvement Program	IN2	$250,000
	Transportation Service Improvement Needs	IN7	$2,000,000

1.0 Introduction

Northumberland County is embarking on an exciting time in its history. The County is uniquely positioned just outside the Greater Toronto and Hamilton Area (GTHA) to take advantage of a critical mass of people, industry and ideas located just west of its borders, to define itself as an attractive and desirable place for businesses to locate and expand, and as a place for families to live, work and play.

In order to prepare for this prosperous future, the County has undertaken a comprehensive Transportation Master Plan (TMP) study to provide a roadmap for the development of all modes of transportation in the near, medium and long-term horizons. It is intended to integrate with and support other policy documents prepared by the County, and it will provide future guidance for County Council, staff, residents and businesses in order to create a safe, supportive and efficient transportation network for all users. The TMP provides strategic direction for the County to ensure that transportation infrastructure, policies and programs proceed in a sustainable manner in concert with other plans in the County, and provides underlying guiding principles that meet the objectives of all County residents.

1.1 Study Objectives

A number of key objectives have been established for the TMP in order to ensure that the necessary components would be included, and that it would provide County staff with the guidance and resources needed to continue providing the high level of service that residents and businesses expect. The seven primary objectives of the TMP are:

- Create a long range transportation planning document;
- Prioritize future multi-modal transportation networks and infrastructure;

- Develop a sustainable program of system expansion over multi-year horizons;
- Identify funding strategies;
- Analyze safety and operations at key intersections;
- Conduct a road rationalization assessment; and
- Review transportation-related policies.

Each of the objectives above address key issues within the County and are discussed further in the TMP.

1.2 Municipal Class EA Process

When planning and designing for municipal infrastructure projects, the Municipal Class Environmental Assessment (MCEA) process (as identified in the Ontario Environmental Assessment Act) is normally applied. This process is intended to ensure that related environmental impacts are considered and that any negative impacts are identified so they can be appropriately addressed prior to implementation.

When preparing a master plan or strategy, the principles of the MCEA process typically apply – phases 1 and 2 (of the five (5) phased process) should be completed. **Figure 1.1** illustrates that MCEA phases and steps that were undertaken to complete the TMP.

The TMP document includes a detailed review of existing conditions and identifies areas for improvement where further investigation is required. In order to finalize and determine a preferred improvement, a separate Environmental Assessment encompassing Phases 3 and 4 of the Class EA process will be required. This is further discussed in Section 5.0 Implementing the Plan.

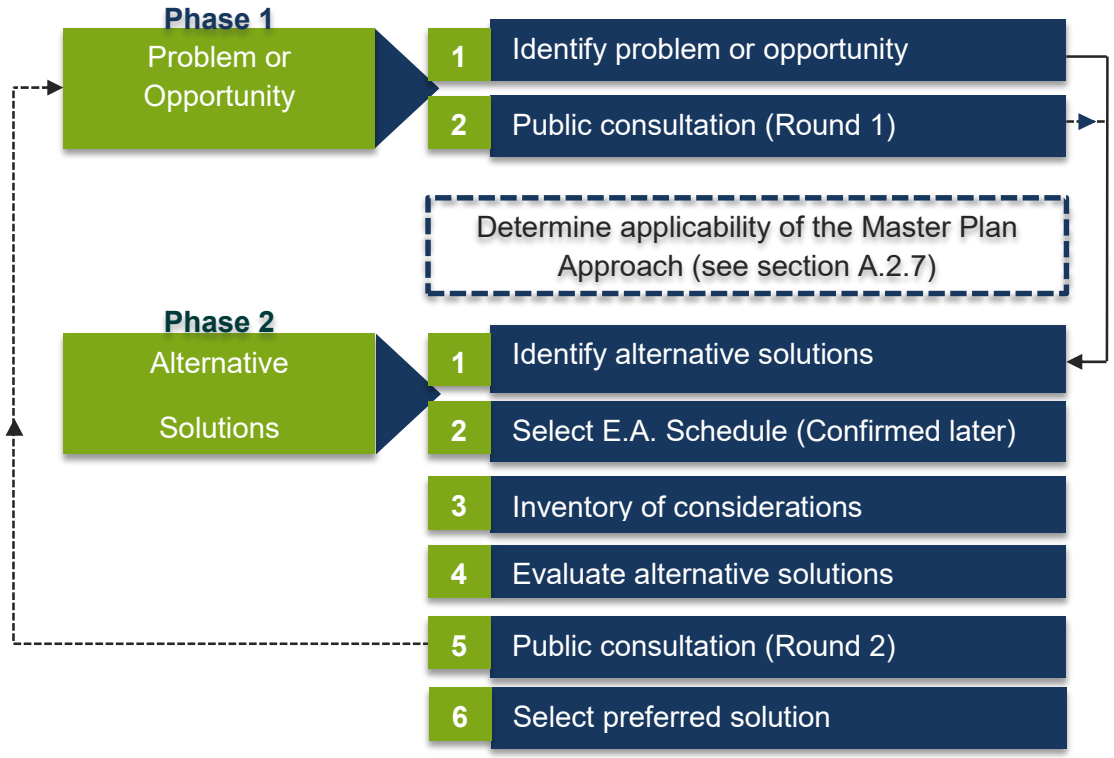

Figure 1.1 – Overview of the Municipal Class E.A. Process
Source: https://www.municipalclassea.ca

1.3 Gathering Public Input

As noted in **Section 1.2,** the Municipal Class Environmental Assessment (MCEA) process requires two rounds of consultation with members of the public and stakeholders. Consultation and engagement is a critical component of developing a long-term strategic planning document because the discussions illuminate the key opportunities, issues, challenges, and needs of those who will ultimately be responsible for implementation of the TMP. As part of the development of the TMP, the project team worked with County staff, an Advisory Committee appointed by County Council, and members of the public to achieve a comprehensive and inclusive consultation program. The engagement opportunities that were identified and undertaken evolved throughout the duration of the project in order to maximize engagement and feedback.

A summary of each of the consultation activities, including the inputs received is provided in **Appendix A**. An overview of the key engagement points for consulting with staff, municipalities and residents during the TMP are presented in **Figure 1.2**.

		Timeline: November 2014 – December 2015
1	Online Questionnaire & Study Webpage	To generate interest and gather input on the TMP study and guide the study process
		Timeline: October 2014 – March 2016
2	Advisory Committee Meetings	Provided a forum for discussing key study findings and recommendations during the course of the study
		Timeline: November/December 2014
3	Public Information Centre #1	To gather input on existing conditions, opportunities and challenges within the County
		Timeline: April 2015
4	Meetings with Provincial Agencies	Met with Metrolinx to discuss GO Rail expansion, discussed TMP with MTO to provide study update
		Timeline: May – June 2015
5	Meetings with Municipal Staff	To discuss specific issues and concerns concerning each member municipality.

		Timeline: November – December 2015
6	Meetings with Municipal Councils	To update local municipal councils and staff on the progress of the study, and to receive their feedback
		Timeline: November 2015
7	Public Information Centre #2	To gather input on the proposed areas of congestion and policy revisions

Figure 1.2 – Overview of Consultation & Engagement Activities for the TMP

1.4 How to Navigate the Report

This TMP document is intended to be easily accessible and readable for staff members, members of Council and County residents. One of the key ways to achieve this goal is by providing the necessary information in easy to reference sections of the report, while providing the details behind the recommendations and conclusions in Technical Appendices at the end of the report.

All existing information is contained in **Section 2.0**, while plans for the future are in **Sections 3.0, 4.0** and **5.0**. Subject headings are provided in each of these sections. In addition, any detailed analysis or contextual information can be found in the corresponding Technical Appendix, if additional information is required.

2.0 The Picture Today

The intent of Section 2.0 is to outline the assumptions that have been made to shape the building blocks of the TMP. It will also provide an overview of existing transportation conditions – policies, plans, processes and infrastructure – for the distinct geographic areas found within Northumberland County.

Revised 2017

Northumberland County today is made up of seven distinct municipalities, each of which has their own set of values that are important considerations for County in both the development and implementation of the master plan. Within each of the municipalities is a mixture of built-up areas, which represent the areas of growth and development in the County, balanced with rural areas which are intended to maintain the County's agricultural industries and natural beauty. These distinct areas are as per the County's Official Plan (OP). The approach within this TMP is to ensure that the key characteristics of both the built-up and rural areas are maintained and reinforced through transportation policy.

In addition to identifying key policies for each of these areas, the transportation operations as a whole for the County have been reviewed. This includes intersection operations and safety, existing transit service, roadway jurisdiction, and the existing policy context under which this TMP will operate. Finally, a summary of the travel demand model calibration is also provided.

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Notes:

1. For additional detail, this Schedule should be read in conjunction with the other Schedules of this Plan.
2. Individual designations within the Oak Ridges Moraine Conservation Plan Area are shown on the Schedule's to the lower tier municipal Official Plans.
3. Only select local roads have been shown for information purposes.

Notes:
1. For additional detail, this Schedule should be read in conjunction with the other Schedules of this Plan.
2. Individual designations within the Oak Ridges Moraine Conservation Plan Area are shown on the Schedule's to the lower tier municipal Official Plans,
3. Only select local roads have been shown for information purposes.

PLAN BUILD MOVE

MMM GROUP

Figure 2.1

County of Peterborough
Havelock-Belmont-Methuen Township

County of Peterborough
Asphodel-Norwood Township

County of Peterborough
Otonabee-South Monaghan Township

County of Peterborough
Cavan Monaghan Township

County of Hastings
Stirling-Rawdon Township

Region of Durham
Municipality of Clarington

County of Hastings
The City of Quinte West

Trent River
Seymour Lake
Crowe River
Hastings
Campbellford
FERRIS PROVINCIAL PARK
Municipality of Trent Hills
Myersburg
Rice Lake
Roseneath
Dartford
Alderville First Nation
Harwood
Warkworth
Fenella
Norham
Bewdley
Gore's Landing
Oak Ridges Dr
Elizabethville
Ganaraska Rd
Campbellcroft
Garden Hill
Township of Hamilton
PETER'S WOODS PROVINCIAL PARK
Township of Alnwick/Haldimand
Centreton Rd
Centreton
Castleton
Codrington
Orland
Township of Cramahe
Municipality of Brighton
Hilton
Dundonald
Osaca
Canton
Municipality of Port Hope
Camborne
Baltimore
Precious Corners
Welcome
Dale
Dale Rd
Eddystone
Vernonville
Wesleyville
Port Hope
Town of Cobourg
Cobourg
Grafton
Wicklow
Colborne
Salem
Lakeport
Smithfield
Brighton
Presqu'ile Bay
Popham Bay
PRESQU'ILE PROVINCIAL PARK
Lake Ontario

0 2.5 5 7.5 10 km

1:200,000

MERIDIAN PLANNING

June 2014

Legend

Land Use Designations
- Urban Area
- Rural Settlement Area
- Major Employment Area
- Oak Ridges Moraine Settlement Area
- Rural Area
- Agricultural Area
- Environmental Protection Area

Transportation Elements
- Highway 401
- County Road/Arterial Road
- Local Road
- Highway 401 Interchange
- Railway

First Nations Lands
- Alderville

Other Map Elements
- Built Boundary
- Provincial Park
- Oak Ridges Moraine Conservation Plan Boundary
- Northumberland Boundary
- Municipal Boundary

Northumberland county

NORTHUMBERLAND COUNTY OFFICIAL PLAN

SCHEDULE A LAND USE

2.1 County Land Use

Northumberland County is divided into two distinct types of land use. *Built-Up Areas* are those locations in the County where the majority of people live and work, and are designated for growth in the future. *Rural Areas* are where the majority of agricultural industries are focussed, and are intended to be preserved for use by future generations. The locations of these areas were distinguished in the County's OP. The Transportation Master Plan is intended to address the needs of both of these important, but distinct forms of land use, and they are shown in **Figure 2.1,** which is a copy of Schedule A from the OP**.**

2.1.1 Urban/Built Up Areas

"Built-up areas" define those communities within Northumberland County that are experiencing growth or development and includes the larger Urban Areas identified in the County's Official Plan as places for future projected growth and development. The following sections will provide:

- A detailed description, definition and assumptions regarding the built-up areas including sample communities or future areas where this growth is anticipated to occur. Also included will be some assumptions regarding anticipated land-uses as well as some socio-demographic assumptions that can be generated based on existing data.
- An overview of the existing transportation conditions of these areas e.g. mode choice, posted speed, traffic volumes, etc.
- A summary of relevant policies and practices that are currently applied to determine the decision making for these areas.

Built-up areas, as aforementioned, define communities within Northumberland County that are experiencing growth and development. According to page 10 of the *Northumberland County Official Plan* which was adopted by council on September 14, 2014*,* a minimum of 80% of expected population and employment in the planning period is expected to occur in the six built-up areas in the County. These areas - Brighton, Campbellford, Cobourg, Colborne, Hastings and Port Hope - are expected to have a population growth forecast of 14,426 and an employment growth forecast of 3,680 by 2034.

2.1.2 Rural Areas

"Rural areas" define the communities within Northumberland County that are experiencing minimal growth or development. Typically agricultural in nature, these areas could include local hamlets or villages – as defined by existing County policy. The following sections will provide:

- A detailed description, definition and assumptions regarding the rural areas including sample communities. Also included will be some assumptions regarding anticipated land uses as well as some socio-demographic assumptions that can be generated based on existing data.

- An overview of the existing transportation conditions of these areas e.g. mode choice, posted speed, traffic volumes, etc.
- A summary of relevant policies and practices that are currently applied to determine the decision making for these areas.

Rural areas as aforementioned define communities within Northumberland County that are experiencing minimal growth or development. According to the *Northumberland County Official Plan,* a maximum of 20% of expected population and employment in the planning period is expected to occur in the rural areas.

Rural lands include all of the land not included within an urban area and include rural settlement areas. These rural areas which include significant portions of Municipality of Brighton, Municipality of Trent Hills, Township of Cramahe, Municipality of Port Hope, Hamilton Township and the Township of Alnwick/Haldimand, are expected to have a population growth forecast of 3,607 and an employment growth forecast of 920 by 2034.

2.2 Current Policy Framework

2.2.1 Provincial Policies

The integration of transportation and land use planning is a recurring theme that can be found in many provincial policies. The 2014 Provincial Policy Statement (PPS) provides policy direction on matters of provincial interest related to land use planning and development. The PPS provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. It supports improved land use planning and management, which contributes to a more effective and efficient land use planning system.

The Places to Grow Act enables decisions about growth to be made in ways that sustain a robust economy, build strong communities and promote a healthy environment and a culture of conservation. It promotes a rational and balanced approach to decisions about growth that build on community priorities, strengths and opportunities and makes efficient use of infrastructure. The act enables planning for growth in a manner that reflects a broad geographical perspective and is integrated across natural and municipal boundaries. Finally, it ensures that a long-term vision and long-term goals guide decision making about growth and provide for the co-ordination of growth policies among all levels of government.

At a more detailed level, provincial policies can also provide guidance on various aspects of design. The Ontario Ministry of Transportation Transit-Supportive Design Guidelines provide direction on land use planning, urban design, facility design and operational procedures in order to create an environment that supports greater use of transit. Ontario Traffic Manual Book 18: Cycling Facilities provides guidance on the design of cycling networks and facilities. In addition, the Accessibility for Ontarians with Disabilities Act outlines design requirements that make the built environment, including transit vehicles and facilities, more accessible.

2.2.2 Local Policies

Several local policies have been reviewed and considered in the development of the Northumberland TMP. At a broad level, land use in the County is guided by the County's Official Plan. The OP provides direction and a policy framework for managing growth and land use decisions over the planning period to 2034. The OP is one of a series of policies, guidelines and regulations that direct the actions of the County and shapes growth and development.

The OP recognizes the importance of the land use planning responsibilities that are vested with the local municipalities. Given that the County of Northumberland OP is intended to establish an overall land use planning framework for the County and it municipalities, the OP is not intended to duplicate the policies of the lower tier Official Plans. Instead, the County OP is intended to provide the guidance necessary for the establishment of detailed strategies, policies and land use designations at the local level.

The transportation objectives within the Official Plan aim to facilitate the safe and efficient movement of people and goods within the County's communities and to and from adjacent municipalities. Contained within the transportation policies in the Official Plan is guidance on the County's road classification system, right-of-way widths and road widenings, County road design standards, pedestrian and cycling routes and facilities, private roads, provincial highways, rail corridors, and development in planned corridors.

Local official plans have been developed for each of the seven local municipalities including the Municipality of Port Hope, Brighton and Trent Hills, the Townships of Hamilton, Alnwick/Haldimand and Cramahe, and the Town of Cobourg.

The Northumberland Strategic Plan 2015-2019 provides a road map to the vision of the future. It is a plan meant to guide Council, departments and services to get the County from where it has been and where it is today, to where it wants to be. It contains specific, measurable, achievable and time-based objectives and action plans that are built around four key Strategic Pillars: Prosperity, Sustainability, Community and Excellence.

2.2.3 Existing County Policies

Existing policies have been categorized into three categories in order to appropriately scope the required change for each individual policy. The following list provides the categories for the existing policies, and indicates the general scope of the changes that are recommended. **Appendix B** discusses each policy in greater detail, and also provides comments on changes required. A summary of the proposed changes to the policies is provided in **Section 3.3**.

- Traffic management;
  - Warrants for and installation of traffic calming features on County roads where major changes are recommended;
  - Advance warning sign installation, maintenance and inspection where minor changes are proposed;

- Procedure to close road allowance, involving potentially minor changes;
- Property compensation which requires no changes.

- Infrastructure and Access Management;
  - Installation of street lights for illumination at isolated rural intersections where minor changes are recommended;
  - Warrants for the installation of surface treatment on county roads which requires no changes;
  - Land development applications standard conditions potentially requiring major changes;
  - Entrance and set-back policy where major changes could be considered;
  - Road permit requests requiring minor changes;
  - Fleet maintenance and operations which potentially could require major changes;
  - Salt management plan which could be consolidated;
  - Fuel spill contingency plan which could be redefined;
- Goods Movement;
  - Oversized vehicles or load permit applications which require minor updates.

2.3 Existing Transportation Conditions

This Section presents the existing conditions of the County's transportation network, focusing on roadway operations and safety, overall travel patterns, transit services and active transportation within the County's transportation network. These existing conditions form the baseline against which future recommendations will be compared, and will also provide the information necessary to highlight the opportunities and challenges for the County's transportation network. Both of these outputs are critical to set the stage for transportation planning analysis of future conditions.

2.3.1 Existing Transportation Studies

The County has recently undertaken two major transportation studies: The Trent River Crossing and Arterial Road Network Environmental Assessment; and The County Road 2 Municipal Class Environmental Assessment Study.

These two studies consider, in detail, the transportation issues that exist along focused portions of the County's road network and evaluate alternative methods for addressing those issues. The improvements recommended by these studies provide the basis for the baseline improvements to be included in the analysis of future conditions through the TMP.

The *Trent River Crossing and Arterial Road Network Environmental Assessment,* completed in 2016 identifies the need and justification for an additional crossing of the Trent River, to

complement the existing Bridge Street Bridge in Campbellford. The EA notes that, even after existing traffic signal timing and phasing optimization, existing conditions especially during the p.m. peak hour operated at poor levels of service and with significant queuing. This situation is forecast to be further exacerbated mainly by growth in and surrounding the County, and to a lesser degree in Campbellford itself. Other crossings in the area were deemed to be unsuitable in terms of traffic capacity, intended function and location. In addition to addressing existing and future transportation service needs, the second crossing also provides a critical "backup" link during times when the Bridge Street Bridge requires construction or is eventually replaced. This was identified as a key requirement for emergency services across the Trent River.

The *County Road 2 Environmental Assessment* was completed to determine the improvements required for County Road 2 between Port Hope and Cobourg. Five primary segments of the roadway were identified. Three of these segments, between Hamilton Road and Lovshin Road/New Amherst Boulevard, have a recommended cross-section with three lanes: two through lanes and a single centre two-way left turn lane, and a roundabout at Theatre Road. A multi-use trail would be provided on one side of County Road 2. The segment between Lovshin Road/New Amherst Boulevard to Rogers Road is recommended to be constructed with a four lane cross-section (two through lanes in each direction) and on-street bike lanes. The final segment between Rogers Road and Burnham Street/William Street has a recommended cross-section of five lanes (two through lanes in each direction and a centre turn lane) with a 3.0 m wide off-road multi use trail on the north side and no on-street bike lanes. The timeline for these improvements is between 5 and 20+ years, with the improvements to the east identified as the nearest-term priority.

In addition to these two studies, the *Area-Specific Development Background Study for the Cobourg East Community Area* was completed by Watson & Associates Economists Ltd. to prepare an analysis and policy recommendations report containing the proposed Area-Specific Development Charge By-law. The report was prepared to meet the statutory requirements applicable to the County's Area-Specific Development Charges background study. The Development Charges from this study were calculated based on improvements identified in the 2006 *Cobourg East Community Secondary Plan Area Transportation Study*, which include the following improvements:

1. Widening of Elgin Street from D'Arcy St. to Brook Rd.
2. Widening of Brook Road from Elgin St. to King St.
3. Intersection improvements at Elgin St./D'Arcy St., Elgin St./Brook Rd., Kerr St./Brook Rd., and King St./Brook Rd.
4. A CP/CN Rail Grade Separation for Brook Road.

Added 2017

For the purposes of analyzing future conditions within the County, it has been assumed that the recommendations from these three studies have been implemented by the 2031 horizon year. Thus, recommendations from the TMP are consistent with planned future infrastructure in the County.

2.3.2 Roadway Classification

Current information on roadway classification within the County is provided in the Northumberland County Official Plan (OP), which defines all roads in the County based on five categories: Provincial Highway, County Arterial Road, Arterial Road, Collector Road and Local Road. Of the five categories, County Arterial Roads are under the direct control of the County. As a result, references to the "County Road Network" within the TMP mean all of the County Arterial Roads as defined by the OP. All of the analyses, recommendations, policies and guidelines have been developed assuming that they will be applied to the County Arterial Roads, unless otherwise stated.

County Arterial Roads as defined in the OP are intended to have right-of-way widths up to 36.5 metres, with 2 to 4 travel lanes, and should have limited accesses onto the County roadway. There are provisions in the OP for the County to acquire additional land dedication to provide sufficient sight distances and turning lanes to and from other roadways. However, at the same time, the OP makes provision for modified right-of-ways based on the local context of the area, economic feasibility, and the presence of physical barriers that would prevent typical County right-of-ways.

The TMP takes into account the definition of County Arterial Roads within the OP and also provides additional guidance in determining whether existing County Arterial Roads are appropriately classified, and whether there are local Arterial Roads that may be more appropriately designed and designated as County Arterial Roads or vice versa, as part of the Road Rationalization exercise. This is detailed in Section 3.2.4 of the report.

Added 2017

Running east-west across southern Ontario, Provincial Highway 401 is a key linkage in the Quebec City – Windsor transportation corridor. Running east-west through Northumberland Highway 401 has connections to many of the County's urban communities located along the Lake Ontario shoreline. Since the downloading of highways in 1998 Highway 401 is the only provincial transportation facility remaining in Northumberland County. Under current conditions Highway 401 has a six (6) lane cross-section west of County Road 18 (Burnham Street) in Cobourg. East of County Road 18 the highway narrows to four (4) lanes, two westbound and two eastbound. In 2015 the MTO commenced construction on the expansion of Highway 401 to widen it from 4-lanes to 6-lanes over a 7.5 kilometre segment from Burnham Street to Nagle Road east of Cobourg. Presently, there are no plans for further widening of Highway 401 additional east of Nagle Road.

As noted by County Council, during peak periods congestion east of Cobourg through the existing 4-lane section can result in significant amounts of westbound traffic diverting from Highway 401 and following alternate routes through the eastern part of Northumberland County. This often results in significant additional traffic on key sections the County Road network including County Road 2 through Brighton, Colborne and Grafton as well as connecting north south routes. Additionally, eastbound or westbound closures of the Highway 401 due to incidents on the Highway can have similar or more significant impacts as traffic is difficult to accommodate on the

EDR. This additional traffic results in congestion, which adversely impacts the mobility of local traffic including emergency responders.

2.3.3 Intersection Safety

Collision analysis was conducted based on the procedure outlined in the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety Manual. Historical traffic accident data, in the form of collision reports, were collected and analyzed in order to calculate collision rates. The following intersections have been identified as the top 10 intersections in terms of highest collision rates. Collision diagrams were prepared for these intersections and used during site visits in Fall 2014, where MMM observed the conditions at the intersections in order to determine any potential safety features that influenced the reported collisions.

The top 10 intersections were ranked based on their calculated collision rate as shown in **Table 2.1**. Furthermore, descriptions of the most prevalent collision types are provided in

Table 2.2. For more detailed information at each intersection, including site photos and collision diagrams, please refer to **Appendix C**. For comparison purposes, the 2010 provincial average collision rate for MTO highway segments has also been included. While this is not a directly comparable value, it is included for contextual reasons. Intersections are generally expected to have higher collision rates than highway segments since the number of conflicts at intersections is greater than at mid-block locations on highways.

Table 2.1 – Summary of Collision Rates (Data from 2007 – 2014)

Rank	Road 1	Road 2	Estimated AADT[1]	#of Collisions	Collision Rate[2]	2010 Provincial Average Collision Rate[2,3]
1	County Rd 2	Townline Rd	1,400	7	1.83	1.70
2	County Rd 28	County Rd 9 (Oak Ridges Rd)	10,450	30	1.05	
3	County Rd 18	Danforth Rd	5,500	13	0.86	
4	County Rd 45	Beagle Club Rd	3,700	8	0.79	
5	County Rd 29	Glover Rd	2,800	6	0.78	
6	County Rd 18	Telephone Rd	5,500	11	0.73	
7	County Rd 8	Wingfield Rd	2,500	5	0.73	
8	County Rd 20 (Elgin St)	Ontario St	16,200	32	0.72	
9	County Road 45	County Rd 22 (Centreton Rd)	5,800	11	0.69	
10	County Rd 30	5th line	4,400	7	0.58	

Notes:
1. Estimated average sum of volume entering and exiting intersection, based on available 2013 annual average daily traffic (AADT)
2. Annual rate of reported collisions per million vehicles at the identified intersection.
3. Collision Rate per million vehicle km travelled for 2010, *Provincial highways: traffic volumes - King's highways, secondary highways, tertiary roads. 1988-2010.*, Ministry of Transportation Ontario.

County of Northumberland Transportation Master Plan
Top 10 Intersections with Highest Collision Rates
Figure 2.2

Legend

Top 10 Intersections with Highest Collision Rates

- Intersection indicating collision(s)

Road Network

- Highway
- County Road
- Local Road

Other

- Railway
- Provincial Park
- County Forest
- Property Parcel
- Alderville First Nations
- Northumberland County
- Municipal Boundaries
- Watercourse

Top 10 Intersection with Highest Collision Rates (Highest Collision Rates to Lowest Collision Rates)

1. County Road 2 and Townline Road
Collision Rate: 1.83

2. County Road 28 and County Road 9
Collision Rate: 1.05

3. County Road 18 and Danforth Road
Collision Rate: 0.86

4. County Road 45 and Beagle Club Road
Collision Rate: 0.79

5. County Road 29 and Glover Road
Collision Rate: 0.78

6. County Road 18 and Telephone Road
Collision Rate: 0.73

7. County Road 8 and Wingfield Road
Collision Rate: 0.73

8. County Road 20 and Ontario Street
Collision Rate: 0.72

9. County Road 45 and County Road 22
Collision Rate: 0.69

10. County Road 30 and 5th Line
Collision Rate: 0.58

TOWNSHIP OF HAMILTON / TOWN OF COBOURG

PETERBOROUGH COUNTY

0 4 8 16 Kilometres

N

Northumberland County

PLAN BUILD MOVE

Figure 2.2

MMM GROUP

Table 2.2 – Main Collision Types by Intersection

1	County Rd 2	Townline Rd	Single vehicle collisions, off-road
2	County Rd 28	County Rd 9 (Oak Ridges Rd)	Rear end and angle collisions, on CR 28
3	County Rd 18	Danforth Rd	Rear end and angle collisions, on CR 18.
4	County Rd 45	Beagle Club Rd	Rear end collisions southbound, single vehicle
5	County Rd 29	Glover Rd	Single vehicle collisions, off-road
6	County Rd 18	Telephone Rd	Rear end collisions, northbound on CR 18
7	County Rd 8	Wingfield Rd	Rear end collisions on CR 8
8	County Rd 20 (Elgin St)	Ontario St	Rear end and angle collisions on CR 20
9	County Road 45	County Rd 22 (Centreton Rd)	Single vehicle collisions, on both CR 22 and CR 45
10	County Rd 30	5th line	Single vehicle collisions, southbound right turn lane

Finally, the intersection locations are shown geographically in **Figure 2.2**.
It should be noted that the collision data was collected up to 2014. Since then, County Staff has advised that a number of fatal accidents have occurred at the intersection of County Road 28 and County Road 9. Therefore, this intersection should be prioritized to determine what safety improvements can be made at this intersection.

2.3.4 Existing Intersection Operations

In order to determine the most appropriate candidates for traffic signalization, the ten intersections with the highest combined road link volumes, based on annual average daily traffic (AADT) data that was provided by the County, were identified. **Table 2.3** shows the intersections which were found to have the highest combined road link volumes.

Table 2.3 – Top Ten Intersections with Highest Combined Link Volumes

Road 1	Road 2
County Road 74 (Dale Road)	County Road 45
County Road 45	County Rd 15 (Harwood Road)
County Road 20 (Elgin Street E)	County Road 20 (Brook Road N)
County Road 30	County Road 35
County Road 30	County Road 26
County Road 29	County Road 30
County Road 45	County Road 22 (Centreton Road)
County Road 2	County Road 23 (Lyle Street N)
County Road 2	County Road 74 (Dale Road)
County Road 25	County Road 35

These intersections have the highest likelihood of requiring signalization in the future, since traffic signal warrants rely primarily on traffic volumes for justification. Thus, 8 hour traffic counts were conducted at each of these intersections to determine if a warrant was met. The results of the signal warrant calculations are provided in Section 3.2.7.

2.3.5 Transportation Model

This section documents the existing transportation conditions as reported by the Northumberland County Model, the tool used to conduct the forecasting analysis. The existing conditions are based on year 2011, representing the 2011 census data obtained. The model was designed to present the p.m. peak hour results, since this is typically the "worst-case" scenario in terms of the highest volume of traffic on the County road network.

A detailed review of the calibration and validation exercise undertaken in order to ensure that the Transportation Model accurately replicates traffic conditions on the ground today is presented in **Appendix D**. The 2011 population and employment figures, as obtained from the 2011 National Household Survey (NHS) for Northumberland County, are as follows:

- Population: 82,126; and,
- Employment: 41,365.

In addition, the 2011 NHS indicates that approximately 80% of the County's workers travel within the County to reach their place of employment, while the remaining workers travel outside of the County to reach their place of employment. The vast majority of trips within the County are made by private automobile (90% as either a driver or passenger), with walking or bicycling comprising of only 8% of total trips. Transit consists of a very small portion (1%) of trips within the County at this time.

Typical system metrics for the 2011 model, which will be used in later sections of the TMP for comparison purposes, are summarized in **Table 2.4**. The Vehicle Kilometers Traveled (VKT) and Vehicle Hours Traveled (VHT) metrics measure the total amount of distance traveled in kilometers and the total amount of travel time, multiplied by the number of trips in the network, respectively. The v/c metric represents the volume-to-capacity ratio of the roadway, using the predicted volumes from the model and an assumed capacity of the roadway. This is a commonly used metric that compares the projected volume of vehicles along a roadway to the volume that the roadway is designed to accommodate.

Table 2.4 – 2011 Model System Metrics

System Metrics	Year: 2011
Daily VKT*	425,937
Daily VHT*	6,743
Total Lane Kms	2,467
VKT on v/c>0.7	758
VHT on v/c>0.7	39
% VKT on v/c>0.7	0.2%
% VHT on v/c>0.7	0.6%

*peak hour to daily conversion done using a multiplier of 10

A v/c ratio of 0.7 was used as the threshold for congestion, since this represents approximately the point at which roadways operate at Level of Service (LOS) 'D' based on the Highway Capacity Manual.

The table above indicates that 0.2% of the total vehicle kilometers travelled and 0.6% of vehicle hours travelled are spent in congestion, indicating that there is very little congestion in the network. The VKT and VHT on roadways with a v/c ratio of greater than 0.7 represent a small fraction of the daily totals. This is an expected outcome for the County's road network, which does not operate at high levels of congestion under existing conditions.

2.3.6 Existing Transit Services

The transit services within Northumberland County include both intra-regional and inter-regional services. The existing services are currently provided by a variety of service providers, and have different levels of service depending on the nature of the service. The services are summarized below in **Table 2.5** and individual route maps can be found in **Appendix E**.

Table 2.5 – Northumberland Regional Transit Service

#	Name	Municipality	Type of Service	Description
1	Town of Cobourg Transit	Cobourg	Public Buses	System consists of two routes – provides connections to and from residential and industrial areas to the downtown core.
2	Port Hope Transit	Port Hope	Public Buses	System includes two routes, one of which extends to Cobourg (Northumberland Mall and Northumberland Hills Hospital for an extra fare). System provides services from residential and industrial areas in Port Hope to the downtown. Paratransit services (ROLLS) are provided as well on-demand.
3	Northumberland Transportation Initiative (NTI)	Trent Hills Cramahe Alnwick / Haldimand Hamilton	On Demand Buses	On demand service operated by Northumberland Community Care. Operates in towns and hamlets within Trent Hills, Cramahe, Alnwick/Haldimand and Hamilton. Service from these areas to Cobourg is provided.
4	The Brighton Bus	Brighton	Seasonal Shuttle Bus	Service provided from Brighton to Presqu'ile Provincial Park in July and August, two days a week.
5	Via Rail	Cobourg / Port Hope	Rail	Stops in Cobourg and Port Hope along both the Toronto – Montreal and Toronto – Ottawa corridors.

Overall, current bus services primarily provide routes within the major built-up areas with rural service expansion underway through Northumberland Transportation Initiative (NTI). Inter-regional transit is limited to commercial service providers, with only intermittent rail service available between the County and the GTHA.

2.3.7 Active Transportation

A comprehensive Active Transportation (AT) strategy has been developed for Northumberland County. The AT strategy builds upon the existing trails found throughout the County's forests, open spaces and conservation areas, as well as the existing and proposed cycling routes identified in the 2012 / 2014 CMP.

The process used to develop the AT Strategy and the findings form this exercise are presented in **Section 4.0** of the TMP report.

2.4 Opportunities and Challenges

2.4.1 Problem/Opportunity Statement

The County of Northumberland is geographically vast and strategically located in south-eastern Ontario between Toronto and Kingston. It is an upper tier municipal government that weaves together seven local municipalities. The County has considerable growth potential, especially for local businesses and industry. The growth of the Greater Golden Horseshoe immediately to the west will significantly impact existing County infrastructure. The County's, transportation network covers over 500 km of roadways, and 112 bridges, providing the backbone upon which intra-county travel is made possible. In today's world of limited resources, the County must continue to evolve in order to ensure that its roadways can be maintained at the required level, in a sustainable manner. Furthermore, the outcomes of the TMP will support and reinforce the newly established County Official Plan.

The County's main issues, which this report is intended to address, and opportunities to allow the County to further evolve its future transportation network, are identified below.

2.4.2 Existing Challenges

2.4.2.1 Funding

As noted in detail in the County's 2016 Business Plan for the Transportation, Waste and Facilities Department, Transportation capital infrastructure was historically underfunded and while great strides have been made to increase annual funding, it is still below target thresholds to meet road system adequacy. As a result, County infrastructure will continue to deteriorate, especially if one-time windfalls from upper levels of government are not continually granted.

It should be noted that the funding projections do not include potential future capital infrastructure projects, similar to the Trent River Crossing or the County Road 2 widening, which would only further increase the urgency for additional funding.

These problems, however, cannot be solved simply through a single action or approach. Multiple strategies including, but not limited to, improved funding from existing sources, new funding sources, finding efficiencies in County maintenance, streamlined responses to requests from

residents, and better utilization of the existing County network, will be required in order to create a sustainable funding situation.

2.4.2.2 County Policies and Guidelines

Current County policies and guidelines provide some guidance on major issues, although the current overall approach to responding to resident complaints is on an ad-hoc basis. This can results in confusion when inconsistent standards are applied throughout the County, such as in situations where speed limit changes are requested.

Furthermore, it adds additional complications for staff who are unable to refer to a standards or best practices document when decisions are scrutinized. As a result, standardizing the complaints process will be important in terms of providing consistent service to County residents, and for ensuring that the latest guidelines and best practices in the province are continuing to be followed.

2.4.2.3 Balanced Growth

Growth is coming to Northumberland County. In order to be able to address this growth in a way that does not continue to put pressure on the available funding, the TMP must be able to ensure that the road network operates efficiently and provides the same or better service levels with minimal capital outlay. Although these two goals, growth and spending, seem to be at odds with each other, they do not necessarily need to be if the advantages of prudent improvements to existing facilities can be leveraged. For example, for two parallel corridors, one solution could be to widen the larger corridor, but perhaps a more cost-effective solution would be to improve the operations on the smaller corridor through turn lanes or signals at intersections. This would result in a more even distribution of volumes between both corridors, but would accommodate the same number of users while minimizing the cost to provide service.

2.4.3 Opportunities

Located at the edge of the GTHA, Northumberland County has a significant advantage in terms of municipalities to partner with, businesses to attract to the County, and exposure for attracting additional roadway, active transportation and transit dollars. The potential exists for creating new opportunities for businesses by focusing on trucking to areas along Highway 401, with the County serving as a hub just outside the GTHA. This will require ensuring that connections to and from Highway 401 are constructed and maintained to a high level. In addition to Northumberland County being strategically located between major commercial and industrial hubs in Central and Eastern Ontario, it offers land development opportunities for new businesses which directly support the trucking industry, immediately adjacent to Highway 401.

Further potential opportunities include:

-
- Leveraging new technologies to provide efficient and effective mobility services throughout the County, including on-demand transit.
- Improving Active Transportation facilities within urban areas to support utilitarian trips, building upon the work within the Cycling Master Plan.

Revised 2017

- Improving inter-regional public transit services, including extending the existing GO transit network currently available in neighbouring Durham Region .

2.4.3.1 Emergence of "Mobility as a Service"

Mobility as a Service (MaaS) represents a key set of intertwined technologies and service providers which leverage the fact that users have access to instant communication via smartphones and the internet. In the case of Northumberland, this can serve as the basis for an on-demand transit system which minimizes the amount of overhead required. For example, currently Northumberland Community Care provides an on-demand transit service via multiple locally owned buses and vans.

Utilizing the same platforms created by MaaS providers such as Uber, the overhead costs in determining optimum scheduling and routing is minimized since this is done by the software.

This would allow the County to potentially expand their service offerings for inter and intra-regional transit, creating an "intermediate" transit service network, providing demand-based service levels rather than requiring the County to fund the capital and maintenance costs of providing a full transit service. This type of "as needed" service perfectly aligns with the needs and funding realities of the County, which has different requirements for both built-up and rural areas.

MaaS service offerings and technology are constantly evolving and should be monitored closely in the future, as they can serve as an intermediate step for transit while demand and requests for these services continue to rise.

2.4.3.2 Active Transportation

Added 2017

The County has already prepared a Cycling Master Plan (CMP), anticipating the need to accommodate cyclists within the County as this mode continues to increase in popularity, especially for recreational purposes. While the CMP identifies a number of routes which are integral to recreational cycling, additional opportunities exist to use portions of these routes as "utilitarian" routes for commuters to and from work and home. In order to realize this opportunity, the routes identified in the CMP should be constructed to meet the latest standards in Ontario Traffic Manual Book 18, with special focus on those routes which travel through the urban areas where utilitarian cycling is likely to be highest.

2.4.3.3 GO Transit Expansion

Added 2017

Metrolinx announced plans in 2014 to extend GO Rail service from the current Oshawa GO terminus station to Bowmanville in 2024. The new service uses the CPR line which currently runs through the southern portion of the County, including Port Hope, Cobourg, Alnwick/Haldimand, Cramahe, Hamilton and Brighton. The potential exists for the extension to Bowmanville to facilitate further extensions into the County, especially to the high population centres in Port Hope and Cobourg. While discussions with Metrolinx indicate that this extension is not currently in GO expansion plans, ongoing dialogue between the County and Metrolinx continues to take place. Interim measures such as bus services to the GTHA from the County could also be implemented to prove the viability of the service.

3.0 The Picture Tomorrow

3.1 The Vision for Transportation in Northumberland

The intention of the TMP is to have a multi-faceted transportation network within the County, including planning for roadway motor vehicle traffic and active transportation. Within this framework, improving roadway operations for motor vehicles by improving intersection controls and safety, proposing modifications to the Emergency Detour Route to better serve road users during these situations, and, where necessary, the provision of additional turning or through lanes, were investigated. Furthermore, the TMP reviewed the County's Cycling Master Plan to identify where the plan is consistent with the new Ontario Traffic Manual Book 18, and where revisions may be considered in order to enhance the County's Active Transportation infrastructure.

These major areas of focus are supplemented by the policies and guidelines within the County. The TMP proposes to modify a significant number of these policies, and also identifies new policies and guidelines that should be developed in order to support the development of a multi-modal transportation network.

Furthermore, the intention of the TMP is to provide a number of guiding principles which will inform the critical decision making in the County. Overall, these principles for the future of transportation

in the County will dictate the issues that are dealt with, how they are prioritized, and what new programs will be developed and focused on. The principles form the basis for many of the recommendations and priorities found in the remaining sections of the report.

The guiding principles include:

1. Maintain and improve County Roads that operate as the primary transportation network throughout the County, ensuring the movement of goods and services between and within all County municipalities and businesses. To do this, County Roads should provide connections between municipalities within the County, and between the County, major provincial Highways, neighbouring municipalities, and regions.
2. Continue investment and supporting policy development for alternative uses, including providing transit services and building out the routes in the Cycling Master Plan.
3. Strengthen, update and develop the transportation policies in the County, in order to provide staff with the resources necessary to carry out their day-to-day activities. Policies should encourage collaboration, where possible, with member municipalities and/or external agencies, to ensure residents are receiving efficient and effective service.

Added 2017

4. Strengthen the character of Urban and Rural areas within the County with context-appropriate supporting policies and infrastructure initiatives. These policies should improve the quality and service of transportation infrastructure while ensuring that appropriate levels of development are maintained.
5. Expand and improve the road network at a sustainable level, both from a funding as well as an environmental standpoint.
6. Ensure the road network is safe and operating as efficiently as possible.

3.2 County Wide Future Traffic Conditions

According to latest population and employment growth projections, by 2031 Northumberland County is expected to increase its population by 15,680 residents, and the number of jobs in the county is expected to increase by 4,000. The total population will reach nearly 98,000 residents from the 2011 census value of 82,126, and the total number of jobs will increase from 41,365 today to nearly 45,500.

The changes in traffic patterns and operations on the roadway network as a result of this growth must be accounted for in future planning of the road network. In particular, the identification of the roadways which may need to be investigated for road improvements, either through a more detailed study or Environmental Assessment, is important for capital planning.

3.2.1 Current Capital Plan Improvements

The current improvements listed below have been programmed within the 10-Year Capital Plan based on the findings of the *Trent River Crossing and Arterial Road Network EA* and the *County Road 2 EA*. Since these improvements have already been initiated, these improvements are

assumed to be constructed in future analysis scenarios as part of the "Status Quo" or base case alternative detailed in the Section 3.2.2. The specific improvements include:

- A new bridge across Trent River connecting Alma Street to Second Street; and
- Additional lanes and improvements on County Road 2 - Hamilton Road to William Street/Burnham Street.

These two proposed capital plan improvements have been included in the future analysis of the County's road network for 2031, 2041 and 2061.

3.2.2 Future Travel Demand Forecast

Growth in population and employment will result in an increase in the number of vehicles travelling on the road network. However, similar to the fact that the growth will not be evenly spread out across the County, the increase of traffic on roadways will vary depending on the location and intensity of growth.

In order to estimate the effects of this uneven growth on the road network, the validated travel demand forecasting model was applied to future conditions. Population and employment growth numbers from Meridian Planning's *Northumberland County Official Plan,* for the 2034 horizon year, were used to calibrate the 2031, 2041, 2061 horizon years' input into the model, which provided estimated trip generation and assignment onto the road network.

Following the forecasting analysis for the existing conditions, the model was used to run three future scenarios with horizon years of 2031, 2041 and 2061 with the improvements noted in section 3.2.1. These three future scenarios assumed the construction of *only* the capital improvements noted in **Section 3.2.1**. Together, these scenarios with the current capital improvements represent the "Status Quo" or "Do Nothing" alternative, where additional improvements are not assumed to be in place.

3.2.2.1 2031 Horizon Year Analysis

Similar to existing conditions, the network is expected to be largely uncongested in the 2031 horizon. While the County has experienced growth and the VKT and VHT values have increased, the proportion of congested roadways to overall roadways remains small. The metrics are summarized in **Table 3.1**.

Table 3.1 - 2031 Model System Metrics

System Metrics	Year: 2031
Daily VKT*	552,769
Daily VHT*	9,777
Total Lane Kms	2467
VKT on v/c>0.7	18,593
VHT on v/c>0.7	516
% VKT on v/c>0.7	3.4%
% VHT on v/c>0.7	5.3%
Congested Lane Kms (v/c>0.7)	23

*Note: Peak hour to daily conversion done using a multiplier of 10

3.2.2.2 2041 Horizon Year Analysis

The network is forecast to continue to remain somewhat uncongested in the 2041 horizon. The growth in population and employment has increased the overall VKT and VHT as well as those on congested roadways. While the percentages of VKT and VHT on the network have increased substantially from the 2031 horizon, the congested roadways still represent a small portion of the overall network, as seen in **Table 3.2**. Furthermore, it should be noted that this scenario does not assume any additional improvements have been implemented since 2031, and therefore it identifies the locations of highest demand in the existing network once growth occurs.

Table 3.2 – 2041 Model System Metrics

System Metrics	Year: 2041
Daily VKT*	608,609
Daily VHT*	11,807
Total Lane Kms	2467
VKT on v/c>0.7	39,651
VHT on v/c>0.7	1,134
% VKT on v/c>0.7	6.5%
% VHT on v/c>0.7	9.6%
Congested Lane Kms (v/c>0.7)	49

*Note: Peak hour to daily conversion done using a multiplier of 10

3.2.2.3 2061 Horizon Year Analysis

The 2061 horizon represents the highest population and employment numbers based on the projected growth. It should be noted that the % VKT and % VHT on roads with v/c greater than 0.7 has increased to 17.5% and 36.2% respectively, indicating the impact of additional motor vehicles on an unimproved road network. Overall, while the network operates with some considerable congestion in key corridors, overall the majority of the network still operates without congestion. The focus in terms of infrastructure improvements should be centered on the key locations in section 3.2.3. **Table 3.3** shows the 2061 model system metrics.

Table 3.3 – 2061 Model System Metrics

System Metrics	Year: 2061
Daily VKT*	718,811
Daily VHT*	18,783
Total Lane Kms	2,467
VKT on v/c>0.7	125,710
VHT on v/c>0.7	6,810
% VKT on v/c>0.7	17.5%
% VHT on v/c>0.7	36.2%
Congested Lane Kms (v/c>0.7)	127

*Note: Peak hour to daily conversion done using a multiplier of 10

3.2.3 Identified Areas of Congestion

Using the transportation model as described in the previous section, areas of congestion have been identified throughout the County for each of the horizon years. Each of the areas of congestion were identified using a Volume to Capacity (v/c) threshold of 0.7. Based on the Highway Capacity Manual (2010), this represents a level of service (LOS) between 'C' and 'D'. This value is related to the amount of traffic expected on each road section for the entire day.

Generally speaking, by the time a roadway reaches an LOS 'D', improvements are necessary to maintain a free flow condition. Given that rural arterial roads are typically expected to be free flowing, this threshold was chosen as appropriate for identifying areas of concern that should be investigated.

Prior to the commencement of this TMP, the same criterion was used to determine the area of congestion around the Bridge Street Bridge in Campbellford. Although the analysis methods differ and therefore an exact comparison is not possible, the use of LOS measures for both the *Trent River Crossing and Arterial Road Network EA* and the TMP provides a consistent approach within the County for identifying and resolving areas of congestion.

The model has been developed for the County as a broad tool to determine where improvements may be required, on a link level. It identifies road corridor links or screenlines which may potentially become congested by a particular horizon year, which are then candidates for either further study or monitoring based on experience and knowledge of the identified corridors. As a result, the TMP recommends that the 2031 areas of congestion for further study or for monitoring be enacted immediately, while 2041 and 2061 areas of congestion be considered in future planning, but no action be undertaken in the immediate term. This is explored further in the following sections.

3.2.3.1 2031 Areas of Congestion

If a corridor is identified and chosen to be monitored, then these corridors should be flagged during the County's annual traffic count program and re-evaluated when new data becomes available. If volumes begin to approach congested levels, then these monitored locations could become candidates for further study. It has been assumed for the purposes of the TMP that if a corridor is identified for monitoring in one horizon year, it will require further study in the following horizon year.

The areas of congestion as identified for either monitoring or further study, for the 2031 horizon year, is provided in **Figure 3.1**.

For this horizon year, since the timeframe for improvements is relatively short, potential actionable items have been identified. The locations that should be further studied or monitored are provided below.

<u>Areas identified for further study:</u>

- County Road 2/County Road 74 between East Townline Road and County Road 45

County of Northumberland Transportation Master Plan
Identified Areas of Congestion - 2031
Figure 3.1

Legend

- Area to be Monitored 2031
- Area to be Studied 2031
- As Identified in Other Studies

Other

- Railway
- Provincial Park
- Watercourse

Road Network

- Highway
- County Road
- Local Road
- Alderville First Nations
- Surrounding Municipalities selection

0 2.75 5.5 11 Kilometres

N

MUNICIPALITY OF MARMORA AND LAKE
TOWNSHIP OF HAVELOCK-BELMONT-METHUEN
TOWNSHIP OF DOURO-DUMMER
TOWNSHIP OF STIRLING-RAWDON
TOWNSHIP OF ASPHODEL-NORWOOD
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
MUNICIPALITY OF TRENT HILLS
CITY OF QUINTE WEST
TOWNSHIP OF CAVAN-MONAGHAN
PETER'S WOODS PROVINCIAL PARK
TOWNSHIP OF ALNWICK/HALDIMAND
MUNICIPALITY OF BRIGHTON
TOWNSHIP OF CRAMAHE
TOWNSHIP OF HAMILTON
MUNICIPALITY OF PORT HOPE
MUNICIPALITY OF CLARINGTON
TOWN OF COBOURG
PRESQU'ILE PROVINCIAL PARK
LAKE ONTARIO

Northumberland county
PLAN BUILD MOVE

Figure 3.1

MMM GROUP

Areas identified for monitoring:

- County Road 9 between Cold Springs Camp Road and County Road 15
- County Road 45 between County Road 22 and County Road 74
- Bridge Street South from Water Street to County Road 25
- County Road 50 from Trent River Road to 14th Line East.

Any potential areas of congestion could be mitigated using a variety of improvements to the road section. Specifically for locations where congestion may be highly localized, or for parallel corridors, improvements to one intersection or one corridor may preclude the need for large-scale improvements to the whole corridor, or to multiple corridors.

The areas of congestion should be evaluated using the Class Environmental Assessment framework. Some of the improvements that should be considered as part of the evaluation, regardless of the road section in question, include:

- Do Nothing
- Implement improvements at intersections: options include turn lanes, signalization, and roundabouts
- Widen the roadway to add additional lanes on congested routes

This list is by no means exhaustive, and is meant to serve as the preliminary set of alternatives to evaluate each area. The TMP identifies these alternatives but does not provide a recommended alternative for each roadway, due to the long lead time envisioned prior to the improvements being required (e.g. at least 2031), the fact that additional alternatives may become apparent in the future, and so that future staff, businesses and residents are able to provide input into the alternatives generation process at the time when improvements are required.

Given the above-noted lead time prior to the need for improvements, the TMP recommends that the area of congestion identified for further study be evaluated and addressed using the following process:

1. The area will be evaluated in depth through an operational study, to determine a more precise timeline for improvements. The identification of a more precise timeline will also allow the County to budget appropriately for the potential future improvements, by including the project within the 10-year capital plan, if appropriate.
2. A Municipal Class Environmental Assessment (MCEA) should be prepared for the area of congestion to evaluate the proposed improvements in detail, and to determine a final preferred alternative and to evaluate alternative designs for the proposed solution. This study should be commenced approximately 5 years prior to the year that the operational study identified that the improvement will be necessary, with this timeline being confirmed in the MCEA. The MCEA process also requires additional consultation be undertaken at this stage, which would allow residents and member municipalities to comment on their view of the proposed alternatives and alternative designs.

3. Design should occur shortly after completion of the MCEA, with construction to follow. This timing will also be contingent on the availability and timing of funding for the proposed improvements.

3.2.3.2 2041 and 2061 Areas of Congestion

For the 2041 and 2061 horizon years, the corridors identified for further study or monitoring have been provided in order to inform the County on areas where traffic pressures will mount if no improvements are constructed. These areas are shown in **Figures 3.2** and **3.3**. While it is unlikely that the congestion shown will ever actually occur, since the County will continue to undergo operational studies, including those recommended by the TMP, the 2041 and 2061 results provide an idea of where congestion hotspots will occur so that advance planning and monitoring can be planned for the long-term horizon. For example, in 2041 and 2061 the construction and usage of Highway 407 to Highway 35/115 has resulted in additional traffic volumes on County Road 9. In addition, east-west links through Port Hope, Cobourg and Hamilton such as County Road 2 or Highway 401 become increasingly important as Durham Region is expected to provide a large portion of new employment for County residents in the long-term future. These strategic directions should be considered when evaluating future improvements to the County Road network.

3.2.4 Road Rationalization

One of the key objectives of the TMP is to conduct a road rationalization assessment, in order to ensure that the roads currently under the County's jurisdiction continue to be appropriate for use as County Arterial Roads, and to identify if there are other roads within the County that should be under consideration to be reclassified as County Arterial Roads.

The Road Rationalization exercise was conducted using the methodology and criteria established by the Ontario Good Roads Association (OGRA). Using the OGRA guide as a reference point allows for an objective analysis of all of the roadways within the County, and provides an initial screen to identify the roadways that should be investigated. However, using this methodology does not preclude the need for detailed review of each of the road sections, including discussions with the member municipalities impacted, since the initial OGRA screen cannot objectively capture the detailed context of each roadway in each municipality. The OGRA criteria are described in **Table 3.4**.

Table 3.4 – Road Rationalization Criteria and Weighting

Criteria	Score	Description
Urban Centre Connector	3	Road segment connects major urban centers.
Kings Highway / Upper Tier Connector	2	Extends Kings Highway to major commercial/ industrial, universities, hospitals, municipal boundaries, border crossings and provincial boundaries. Major is defined as 1000 vehicle trips per day.

County of Northumberland Transportation Master Plan
Identified Areas of Congestion - 2041
Figure 3.2

Legend

Horizon

- Previously studied congested corridors
- Area to be Monitored 2041
- Area to be Studied 2041
- As Identified in Other Studies

Other

- Railway
- Provincial Park
- Watercourse

Road Network

- Highway
- County Road
- Local Road
- Alderville First Nations
- Surrounding Municipalities selection

0 2.75 5.5 11 Kilometres

N

TOWNSHIP OF DOURO-DUMMER
TOWNSHIP OF ASPHODEL-NORWOOD
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
TOWNSHIP OF CAVAN-MONAGHAN
TOWNSHIP OF HAVELOCK-BELMONT-METHUEN
MUNICIPALITY OF MARMORA AND LAKE
TOWNSHIP OF STIRLING-RAWDON
MUNICIPALITY OF TRENT HILLS
CITY OF QUINTE WEST
TOWNSHIP OF ALNWICK/HALDIMAND
TOWNSHIP OF CRAMAHE
MUNICIPALITY OF BRIGHTON
TOWNSHIP OF HAMILTON
MUNICIPALITY OF PORT HOPE
MUNICIPALITY OF CLARINGTON
TOWN OF COBOURG
PETER'S WOODS PROVINCIAL PARK
PRESQU'ILE PROVINCIAL PARK
LAKE ONTARIO

Northumberland county

PLAN BUILD MOVE

Figure 3.2

MMM GROUP

County of Northumberland Transportation Master Plan
Identified Areas of Congestion - 2061
Figure 3.3

Legend

Horizon

- Previously studied congested roadway
- Area to be Monitored 2061
- As Identified in Other Studies

Other

- Railway
- Provincial Park
- Watercourse

Road Network

- Highway
- County Road
- Local Road
- Alderville First Nations
- Surrounding Municipalities selection

0 2.75 5.5 11 Kilometres

N

MUNICIPALITY OF MARMORA AND LAKE
TOWNSHIP OF STIRLING-RAWDON
TOWNSHIP OF SMITH-ENNISMORE-LAKEFIELD
CITY OF KAWARTHA LAKES
TOWNSHIP OF ASPHODEL-NORWOOD
CITY OF PETERBOROUGH
MUNICIPALITY OF TRENT HILLS
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
CITY OF QUINTE WEST
TOWNSHIP OF CAVAN-MONAGHAN
PETER'S WOODS PROVINCIAL PARK
TOWNSHIP OF ALNWICK/HALDIMAND
MUNICIPALITY OF BRIGHTON
TOWNSHIP OF CRAMAHE
TOWNSHIP OF HAMILTON
CITY OF PRINCE EDWARD COUNTY
MUNICIPALITY OF PORT HOPE
PRESQU'ILE PROVINCIAL PARK
MUNICIPALITY OF CLARINGTON
TOWN OF COBOURG
LAKE ONTARIO

Northumberland county
PLAN BUILD MOVE

Figure 3.3

MMM GROUP

Criteria	Score	Description
Heavy Industry Service	2	Provides service within 4.0km of a consistent major attractor or generator of heavy vehicles. May include municipal landfills.
Barrier Service	1	Road segment provides connection to Highway 401 or crosses river.
Resort Criterion	1	Roadway is within 4km of edge of resort area.
Urban Cell Service	N/A	Provides reasonable spacing between County Roads (~2km spacing) that act as major through routes in urban areas.
Urban Arterial Extension	3	Connects urban major arterial with Provincial Highway or County Road and has greater than 700 AADT.
Rural Cell Service	1	Provides reasonable roadway spacing (~2km spacing) for all continuous County road links in rural areas.
Traffic Speed	1	Roadway has a posted speed limit of 80 km/h.
Road Surface	0.5	Roadway has asphalt pavement.
Traffic Volume	0.5	Roadway has an AADT greater than 1000.
Urban Centre Connector	3	Road segment connects major urban centers.

Using the criteria as described above, County Geographic Information System (GIS) and traffic data were combined to produce a score for each County roadway, and for local roads that were determined by the study team to have potential in terms of providing a County Arterial Road function. A minimum score of 5 was identified as an appropriate threshold for whether a roadway should be considered a County Arterial Road. This score was determined based on the minimum number of criteria that a roadway should meet in order to be considered as a County Road. For example, a score of 5 could be a combination of a roadway being an extension of an urban arterial and providing service for heavy industry, or a roadway that meets criteria for traffic volume, road surface, traffic speed, rural cell service, barrier service, and provides service to a resort area. Providing this level of utility is necessary to be identified as a County Road.

The roadway segment descriptions, as well as the scoring of each roadway are provided in **Appendix F.** A map which identifies the roadways which are candidates for a change in classification is provided below in **Figure 3.4**.

County of Northumberland Transportation Master Plan
Candidates for Change in Road Classifications
Figure 3.4

Legend

Consider Uploaded to County Jurisdiction

Consider Downloading to Local Jurisdiction

Road Network

Road Network

Posted Speed Limit

Local Road

Railway

Other

Provincial Park

County Forest

Alderville First Nations

Watercourse

0 1.25 2.5 5 7.5 10 Kilometers

N

Revised 2017

Figure 3.4

PLAN BUILD MOVE

Northumberland County

MMM GROUP

EMILY CREEK
EMILY LAKE
UPPER CHEMONG LAKE
BUCKHORN LAKE
KATCHEWANOOKA LAKE
PETERBOROUGH COUNTY
MUNICIPALITY OF MARMORA AND LAKE
TOWNSHIP OF HAVELOCK-BELMONT-METHUEN
CROWE RIVER
TRENT RIVER
TOWNSHIP OF DOURO-DUMMER
TOWNSHIP OF STIRLING-RAWDON
TOWNSHIP OF SMITH-ENNISMORE-LAKEFIELD
OTONABEE RIVER
TOWNSHIP OF ASPHODEL-NORWOOD
FERRIS PROVINCIAL PARK
MUNICIPALITY OF TRENT HILLS
CITY OF PETERBOROUGH
LITTLE LAKE
INDIAN RIVER
MEYERSBURG
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
DARTFORD
ROSENEATH
BURNLEY
FENELLA
HARDWOOD
CODRINGTON
ORLAND
PETER'S WOODS PROVINCIAL PARK
MUNICIPALITY OF BRIGHTON
GORES LANDING
TOWNSHIP OF ALNWICK/HALDIMAND
CASTLETON
HILTON
BEWDLEY
CENTRETON
TOWNSHIP OF CRAMAHE
DUNDONALD
SMITHFIELD
CAMPBELLCROFT
GARDEN HILL
TOWNSHIP OF HAMILTON
COLD SPRINGS
ELIZABETHVILLE
CAMBORNE
BALTIMORE
SALEM
OSACA
MUNICIPALITY OF PORT HOPE
PRECIOUS CORNERS
CANTON
GRAFTON
WICKLOW
LAKEPORT
PRESQU'ILE PROVINCIAL PARK
MUNICIPALITY OF CLARINGTON
WELCOME
TOWN OF COBOURG
RICE LAKE
401

The information presented above should be treated as the initial identification of roadways that should be reviewed further. The additional review will involve, firstly, discussions with the local municipality to determine whether the road in question is appropriate for the change in justification. Should the review indicate that a change in status is warranted, detailed discussions on required upgrades to bring the roadways to acceptable standards, maintenance agreements, and other issues related to the jurisdiction of the road can take place. Finally, this approach to road rationalization in the County should be adopted as the standard for future consideration of road classification changes.

3.2.4.1 Emergency Detour Routes

During a public information centre (PIC) that had occurred in the Municipality of Brighton, concerns over the location of emergency detour routes (EDR) were voiced by local residents. Subsequently these same concerns were voiced at the Cramahe and Brighton Council presentations as well as other meetings. As a result, it was decided that a study of the potential relocation of the EDR to north of Highway 401 should be undertaken. Initial reviews of the current coverage of the EDR indicates that potential routes such as Telephone Road and County Road 21 should be explored. Based on the road rationalization table found in Appendix F, both roadways currently could be justified as County Roads, since County Road 21 currently meets the County Road criteria and Telephone Road could meet the criteria with an increase in volumes, which could be expected if it was designated and upgraded as a County Road. Furthermore, based on an understanding of the geometry and alignment of the roadways, County staff have indicated that Telephone Road is a more viable option for an EDR. Notwithstanding this, it is recommended that both roadways be explored in a feasibility study which will investigate the best roadway for a relocated EDR route.

3.2.4.2 Other Jurisdictional Considerations

Added 2017

In discussions with County Council, County Road 28 has been noted as a significant “through route” that, more so than other County roads, carries traffic between origins and destinations beyond Northumberland. County Road 28 connects Highway 401 to the Highway 7 corridor, the City of Peterborough and other urban centres. Within Northumberland County there are limited population centres on County Road 28 and the roadway functions as a primary goods movement route (see below). Reflective of these considerations and the fact that County Road 28 is one of the highest scoring sections identified through the road rationalization review, the TMP recommends that discussions be initiated with MTO to review the appropriateness of the road remaining under County jurisdiction. Depending on the direction of these initial discussions, the County may consider initiating an operational study to collect data to support further discussion.

3.2.5 Goods Movement

As a subset of the County Road network, primary goods movement routes have been identified in order to prioritize the roadways which do not or should not have half-load restrictions. This will allow for year-round goods movement within the County. **Figure 3.5** shows the proposed County

County of Northumberland Transportation Master Plan
Proposed Goods Movement Routes
Figure 3.5

Legend

- Currently Proposed
- Future Proposed

Road Network

- Road Network
- Highway
- Posted Speed Limit
- Local Road
- Railway

Other

- Provincial Park
- County Forest
- Alderville First Nations
- Watercourse

0 1.25 2.5 5 7.5 10 Kilometers

N

UPPER CHEMONG LAKE
BUCKHORN LAKE
KATCHEWANOOKA LAKE
MUNICIPALITY OF MARMORA AND LAKE
TOWNSHIP OF HAVELOCK-BELMONT-METHUEN
PETERBOROUGH COUNTY
CROWE RIVER
TOWNSHIP OF DOURO-DUMMER
TOWNSHIP OF STIRLING-RAWDON
TOWNSHIP OF SMITH-ENNISMORE-LAKEFIELD
OTONABEE RIVER
TRENT RIVER
TOWNSHIP OF ASPHODEL-NORWOOD
FERRIS PROVINCIAL PARK
MUNICIPALITY OF TRENT HILLS
CITY OF PETERBOROUGH
LITTLE LAKE
INDIAN RIVER
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
TOWNSHIP OF CAVAN-MONAGHAN
RICE LAKE
PETER'S WOODS PROVINCIAL PARK
TOWNSHIP OF ALNWICK/HALDIMAND
MUNICIPALITY OF BRIGHTON
TOWNSHIP OF CRAMAHE
TOWNSHIP OF HAMILTON
MUNICIPALITY OF PORT HOPE
MUNICIPALITY OF CLARINGTON
TOWN OF COBOURG
PRESQU'ILE PROVINCIAL PARK
401

Northumberland County
PLAN BUILD MOVE

Figure 3.5

MMM GROUP

roads that will allow for goods movements. These routes were determined by their connection to key networks such as provincial highways, as well as their proximity to local industry and prominence in the County Road network. Of the four primary corridors identified, three do not have half load restrictions while the fourth, County Road 9, is programmed for some improvements which may remove the half load restriction. The intention is to designate County Roads 28, 30 and 45 as goods movement routes immediately, with County Road 9 becoming designated once reconstruction work is complete. In addition, County Road 9 does not immediately require designation, since it will serve as a primary connector to Highway 35/115 and ultimately Highway 407, once it is constructed.

Furthermore, County Road 30 is currently discontinuous within the Municipality of Trent Hills, which results in a gap in the proposed goods movement network. Discussions on this section of the County goods movement network should take place with the Municipality as part of the overall road rationalization approach. Nevertheless, the current County Road 30, as well as the other routes identified above, should be designated as goods movement corridors as previously noted.

3.2.6 Safety Improvements

As outlined in section 2.3.3, the top 10 intersections with the highest collision rates were found through the procedure outlined in the AASHTO Highway Safety Manual (HSM). Through observations made during site visits in Fall 2014 and collision data that was provided by the County, collision diagrams were prepared in order to identify appropriate mitigation measures. **Table 3.5** lists mitigation measures for the common collision types at each intersection using the information available in the HSM.

Table 3.5 – Possible Mitigation Methods for Top 10 Highest Collision Rate Intersections

Intersection	Possible Mitigation Measures
County Road 2 and Townline	Implement advance signage on the west leg to help to provide additional warning to drivers of the upcoming intersection.
County Road 28 and County Road 9 (Oak Ridges Road)	Add flashing beacon to CR 9 to the "Prepare to Stop" signage to help to mitigate some of the collisions experienced. In addition, further investigation into the posted speed limit may be warranted in order to further mitigate the number of collisions occurring. Furthermore, a roundabout at this location has the potential to reduce the speeds on both CR28 and CR9, but careful consideration in the design to accommodate goods movement trucks will be required.
County Road 18 and Danforth Road	Implement signage on County Road 18 in advance of Danforth Road indicating the presence of an intersection to mitigate the collisions at this intersection. Further investigation into the provision of dedicated turn lanes at the intersection, including whether turn lanes would be warranted based on the volumes at the intersection, should also be conducted.
County Road 45 and Beagle Club Road	Implement advance warning signage, with the intersection being monitored to see if the signage has impact on collision rates. Additional mitigation measures which can be considered if the advance warning signage does not provide a major impact includes street lighting illumination, and an extension of the southbound-right-turn taper.
County Road 29 and Glover Road	Implement signage with flashing beacons on both the east and west leg of the intersection. Investigation into dedicated left turn lanes should be considered.
County Road 18 and Telephone Road	Implement advance warning signs on both the north and south legs of the intersection on CR 18 to help mitigate collisions. Investigation into dedicated left turn lane should be considered.
County Road 8 and Wingfield Road	Install advance warning signage at this location. In addition, a more detailed investigation into reducing the posted speed should also be undertaken, to determine if operating speeds are a factor in the collisions at this location.
County Road 20 (Elgin Street) and Ontario Street	Provide overhead lane designation signage and/or lane designation pavement markings, modifying signal timing and phasing, and constructing exclusive left turn or right turn lanes on CR 20. We would recommend that these steps be taken incrementally, since not all the measures may be required to mitigate the collisions.
County Road 45 and County Road 22 (Centreton Road)	Conduct a more detailed review of the speed limits approaching this intersection be undertaken to determine if operating speeds are higher than posted speeds. Also, the provision of signage clearly indicating the commercial driveway as separate from CR 22 may reduce the occurrence of collisions. Further, it should be noted that this intersection is approaching the warrants for traffic signals which may mitigate some collisions.
County Road 30 and 5th Line	Construct guide rails along the shoulder, or re-grade the southbound right turn lane.

The improvements identified in Table 3.5 above represent the proposed alternatives for improving the safety at each intersection. Where possible, the least disruptive improvement (e.g. implementing signs or beacons rather than physical construction such as widening) should be undertaken for both budgetary and environmental reasons. If these “less disruptive” measures are not effective, then additional alternatives should be assessed and constructed. This step-wise

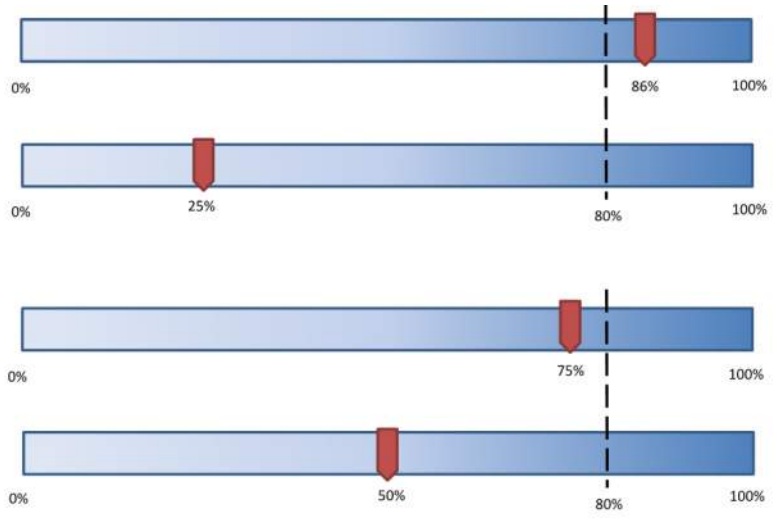
approach to alternative assessment meets the requirements of Phase 2 of the Municipal EA process.

3.2.7 Intersection Signalization

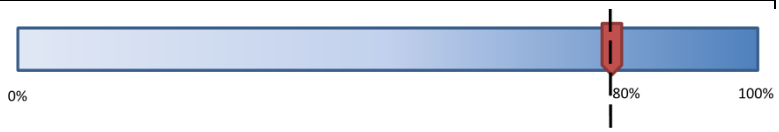
As previously mentioned, the ten intersections with the highest combined road link volumes, based on the annual average daily traffic (AADT) information provided by the County, were investigated for potential signalization. Once these intersections were identified, 12 hour turning movement counts were conducted at each intersection in order to identify the 8 highest volume hours, and complete the warrant calculations as presented in Ontario Traffic Manual Book 12: Traffic Signals. These warrant calculation results are summarized below, while the detailed warrant calculations are provided in **Appendix G**.

Based on the volume information, none of the intersections warrant signalization at this time. In order to meet the warrants, either warrant 1 or warrant 2 must be at 100% for both criteria, or warrant 1 and warrant 2 criteria must all be met to 80%. Based on this, the intersections of County Road 29 and County Road 30, County Road 2/County Road 74 and County Road 10, as well as County Road 45 and County Road 22 (Centreton Road), are relatively close to meeting warrants and should be reviewed in future studies for potential signalization. Consistent with Phase 2 of the Municipal EA process, consideration of other improvements, such as roundabouts, should be considered at these locations. Generally speaking, signalization represents the lowest cost and least disruptive improvement to address capacity concerns. Only in situations where an identified intersection also shows a history of angle-collisions, rear-end collisions, and where the required right-of-way for a roundabout is available, should it be considered as an alternative at the following locations.

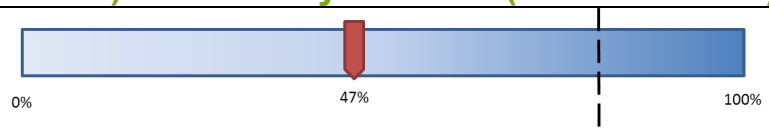
County Road 74 (Dale Road) and County Road 45

<table>
<tr><td rowspan="2">Warrant #1: Minimum Vehicular Volumes</td><td>A. All Approaches</td><td rowspan="4"> 
</td></tr>
<tr><td>B. Minor Street Both Approaches</td></tr>
<tr><td rowspan="2">Warrant #2: Delay to Cross Traffic</td><td>A. Major Street Both Approaches</td></tr>
<tr><td>B. Traffic Crossing Major Street</td></tr>
<tr><td colspan="2">Overall</td><td>Signal Warrant NOT Satisfied</td></tr>
</table>

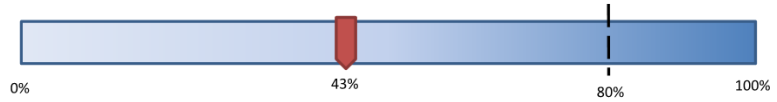
County Road 45 and County Road 15 (Harwood Road)

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

County Road 20 (Elgin Street E) and County Road 20 (Brook Road N)

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

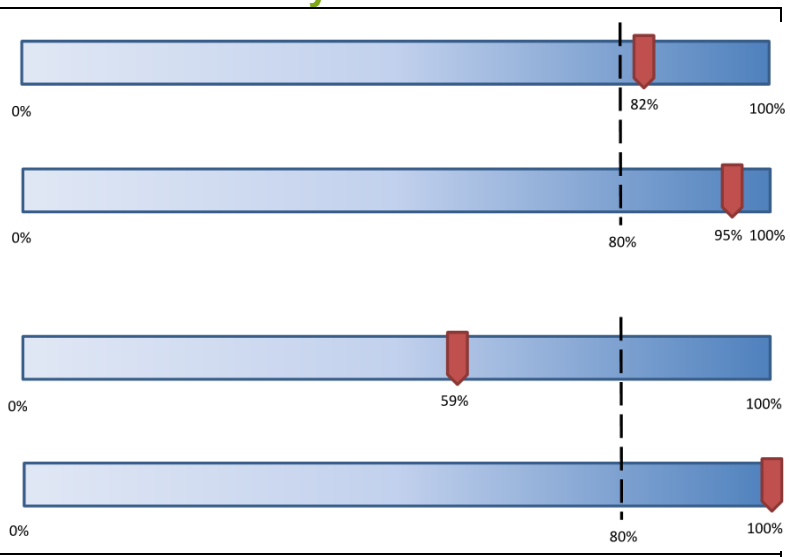
County Road 30 and County Road 35

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

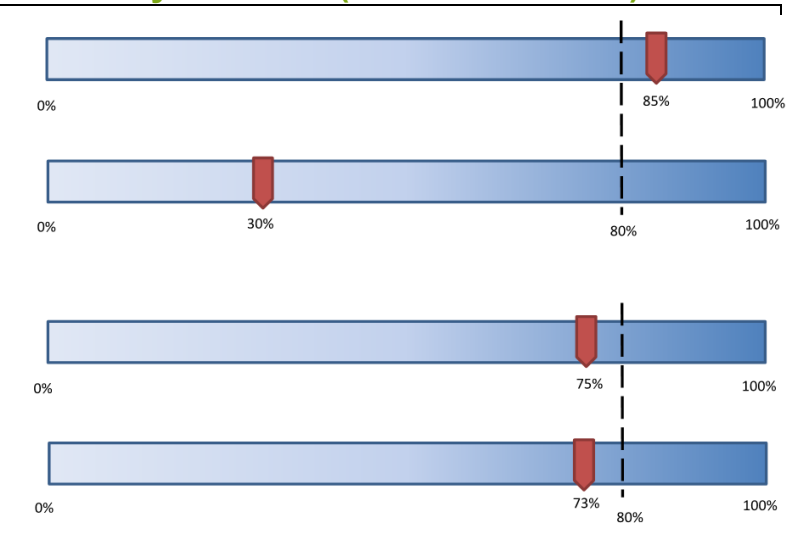
County Road 30 and County Road 26

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

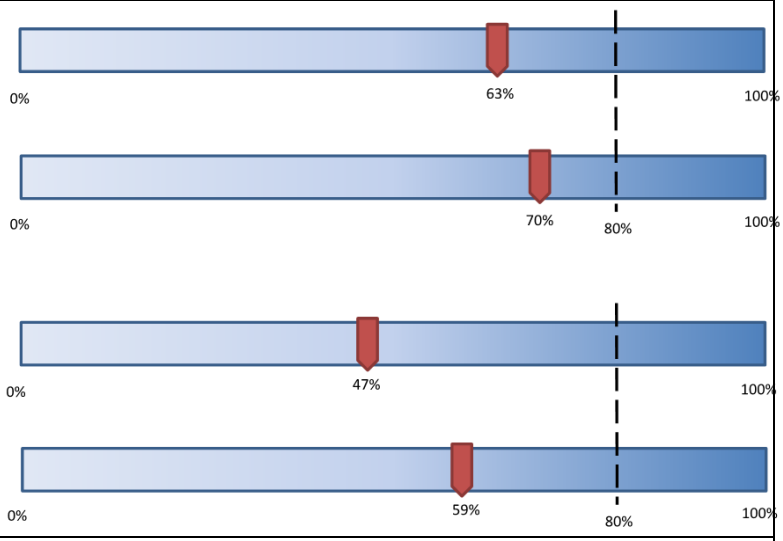
County Road 29 and County Road 30

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

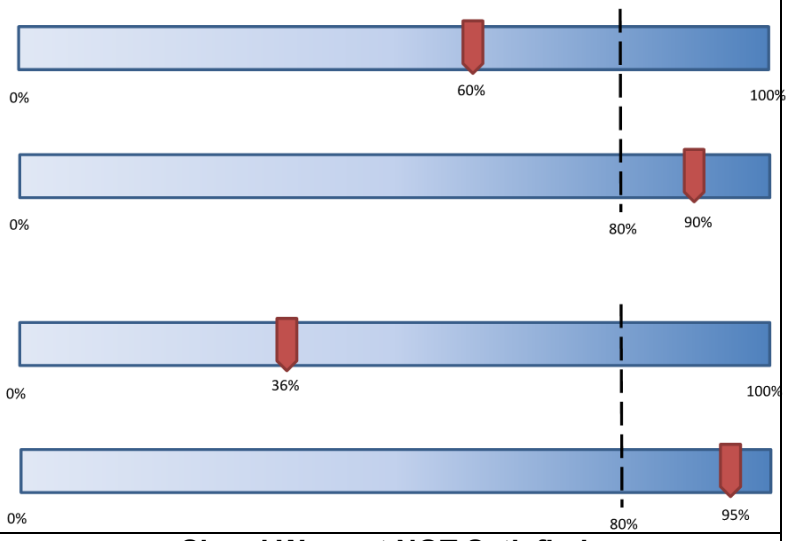
County Road 45 and County Road 22 (Centreton Road)

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

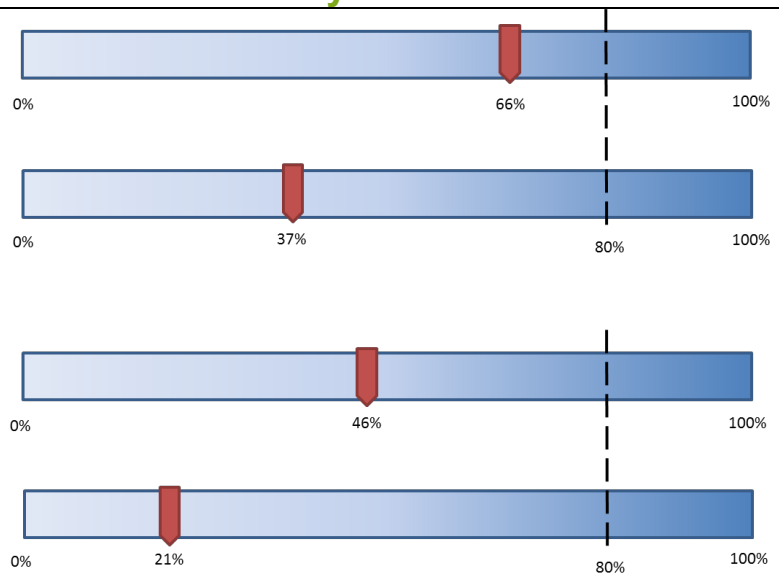
County Road 2 and County Road 23 (Lyle Street North)

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

County Road 2 / County Road 74 (Dale Road) and County Road 10

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

County Road 25 and County Road 35

Warrant #1: Minimum Vehicular Volumes	A. All Approaches	
	B. Minor Street Both Approaches	
Warrant #2: Delay to Cross Traffic	A. Major Street Both Approaches	
	B. Traffic Crossing Major Street	
Overall		**Signal Warrant NOT Satisfied**

As a result of this analysis, these intersections should be prioritized appropriately for additional data collection and construction of signals when warranted. It is recommended that 8-hour turning movement counts be conducted at these intersections at five-year intervals, consistent with the current timing of the County's AADT data collection. Should the intersection meet the signalization requirements as identified in OTM Book 12, justifications 1 – 3, then the intersection should be signalized and design work should commence. These justifications require a minimum number of vehicles on both the main and side streets at the intersection, over an 8-hour period, in order to require a traffic signal.

In addition to meeting volume warrants, intersection signalization should also be considered as a safety improvement if the intersection in question meets warrants 4-6 in OTM Book 12.

3.3 Policies and Practices

During the course of the existing policy review, a number of the policies have been recommended to be edited in order to bring these policies in-line with current best practices. These are identified below in **Table 3.6**.

Table 3.6 - Summary of Northumberland County Policy Review

Northumberland TMP Existing Policies Reviewed					
	Policy	**Date**	**Status**	**Recommend**	**Comments**
Traffic Management	Traffic Calming	17/09/14	Council Approved	Guide Major changes, two new guides (Complaint Procedure and Hamlet Treatment Toolkit)	▸ Amend complaint procedure ▸ Use policy as a Guideline ▸ Consider a wide range of tools ▸ Consider a tool kit for Hamlet treatment ▸ Consider Community Safety Zones for Hamlets

	Advance Warning Signs	Undated	Draft	Policy
				
				Minor changes
					▸ Partially superseded by agreements with most member municipalities dated Nov 2011 - May 2012
					▸ Edit the documents to ensure:
					  ▸ the draft is superseded;
					  ▸ the lower tier does not install signs on member municipality County roads;
					  ▸ the County only installs signs on lower tier roads in proximity to member municipality County roads.

	Procedure to Close Road Allowance	July 2005	Adopted for Use	Policy Minor changes	▸ Make the deposit non-refundable ▸ Institute an initial internal review ▸ Establish Fair Market Value through a Qualified Property Appraiser ▸ Consider competitive public sale
	Property Compensation	14/09/09	Council approved	Policy No changes	▸ Relating specifically to the proposed Trent River Bridge in Campbellford ▸ No changes proposed
Infrastructure & Access Management	Rural Street Lights	Undated	In Use	Guide Minor changes	▸ Primarily relates to intersections, on isolated sections of rural County roads ▸ Remove reference to “all” intersections ▸ A 50/50 sharing of capital installation costs is proposed at intersections with local roads ▸ Remove strict thresholds and rely upon a range of factors to prioritize
	Road Surface Treatment Warrants	After May 2012	In Use	Guide No changes	▸ Criteria is provided for the use of bituminous wearing surface ▸ No changes proposed

Northumberland TMP Existing Policies Reviewed					
	Policy	**Date**	**Status**	**Recommend**	**Comments**
	Land Development Standard Conditions	Undated	Draft	Policy Major changes	▶ The ultimate road allowance Right of Way (ROW) width for all County roads should be identified in the Official Plan ▶ If the ultimate ROW width varies for different County Roads, a schedule specifying each should be developed. ▶ If all County roads should have an ultimate ROW width of 36.5m, amend this policy to conform with the OP. ▶ Clarify when a new entrance is permitted on a County road between severance and site plan applications. ▶ Criteria for setback and signage policies, for urban and rural contexts, should be reviewed. Sample cross-sections are provided in Appendix G.
	Entrance and Set Back	2013	Draft	Policy Major changes	▶ This policy must be consistent with Land Development Standard Conditions Policy ▶ The schedule of fees must be consistent with the fees quoted for Road Permits ▶ Criteria for potential approval of a 2nd commercial access should be clarified
	Road Permit Request	Within past few years	In Use	Policy Minor changes	▶ Variety of permits: entrance; special events; permission to enter; setback application; permission to bore; permission to open cut ▶ Adopt a maintenance deposit for special events ▶ Set an annual or bi-annual schedule of fee review ▶ Refer to OTM Book 7
	Fleet Maintenance and Operations	~ 10 years old	Unknown	Guide & Policy Issues Major changes potentially	▶ This is both an operational and management guide. ▶ Sections relating to activities potentially subject to disciplinary actions should be policies ▶ An internal review is required to determine if it needs to be updated
Infrastructure & Access Management	Salt Management Plan	20/04/2005	Council approved	Guide Major changes potentially	▶ Consolidate with the Winter Control Quality Standard ▶ Ensure consistency between the two documents, or combine them ▶ Establish an annual reporting process if one does not already exist.
	Winter Control Quality Standard (WC04-01)	2004	Unknown	Guide Major changes	▶ Consolidate and make consistent with the Salt Management Plan ▶ Combine with Salt Management Plan

Northumberland TMP Existing Policies Reviewed					
	Policy	Date	Status	Recommend	Comments
	Fuel Spill Contingency Plan	03/09/2003	Staff Memo	Policy Minor rewrite	▸ The memo focuses on the reporting of spills. ▸ It should be rewritten so it is strictly a Reporting Procedure. ▸ Comprehensive workplace safety policies would be in effect to conform to the requirements of the Ministry of Labour.
Goods Movement	Oversized Vehicles	Oct 2013	Adopted for use	Policy Minor changes	▸ The fee should be reviewed annually and approved by Council ▸ The times of "congested traffic conditions" should be defined ▸ Dimension and weight thresholds are similar to MTO, and should be made consistent ▸ The exemptions in the Annual permits should be reconsidered for current appropriateness.

For detailed information on each of the existing policies, and the changes recommended to each policy, please see **Appendix B**.

Based upon the review of existing Northumberland County transportation-related policies, the following short list of potential new guidelines was generated. The need for these new documents has been identified through recommendations related to traffic calming, and common municipal practices.

- Traffic Management:
  - Universal complaint/request procedure – for traffic, traffic calming, drainage, street lighting, etc.;
  - Hamlet entry treatment (see Section 3.3.1) – traffic and road side features to impact motorists, but does not include boulevard features such as sidewalks, or widening of the roadway itself.
- Infrastructure and Access Management:
  - Accessibility – roadway design and operational features to facilitate the movement of people with the full spectrum of mobility and vision capabilities;
  - County road design standards – collection of current designs for a variety of elements found on a County road;
  - Typical County road cross sections – illustrations of the combination of typical roadway features (assemblage) on standard right-of-way widths of County roads. Based on discussions with staff, we believe it would be appropriate to incorporate different set-back standards based on the location of the right-of-way (urban versus rural). Samples of similar differing treatments for urban and rural locations from Halton Region in the Greater Toronto Region, and the City of Ottawa, are provided in **Appendix H**;

- Traffic impact study guidelines – the standard components and requirements of transportation studies being prepared to accompany subdivision and site plan applications. Typically a municipality will provide developers with instructions and guidelines as to what traffic and transportation issues must be addressed in support of their proposals, applications and required methods of analysis.

3.3.1 Hamlet Entry Treatment

As part of the TMP study, a number of sections of roadway were identified where speed changes of 20 km/h or greater occurred. Many of these “speed change” locations are at the entrances to hamlets within the County. As a result, a Hamlet Entry Treatment guideline has been proposed in order to better notify motorists of the reduction in speed along these roadways. Potential components of the Hamlet Entry Treatments include:

- Signs
  - Speed limit transitions < 20 km/h
  - Hamlet “welcome” signs on edge of shoulder
  - Community safety zone designations
  - White edge delineators on right side
- Pavement Markings
  - White edge lines on both sides
  - White edge bars on both sides
  - Wider centre line

Figures 3.6 to **3.12** provide examples of the potential mitigation measures the County could use at Hamlet entry points.

Figure 3.6 – Hamlet Sign – County Road 2, Grafton

Figure 3.7 – Community Safety Zone Sign – Welcome

Figure 3.8 - Hamlet Sign – Solina

Figure 3.9 – Pavement Markings – Highway 407

Figure 3.10 – Pavement Markings – Warkworth

Figure 3.11 – Rolled Curb – County Road 45, Roseneath

3.4 Public Transportation

The County is are currently engaged in discussions with both the Ministry of Transportation and Metrolinx with the intention of expanding existing GO Transit service to Port Hope and Cobourg. Three main points of contact have occurred: the first was the meeting that took place between the County, the TMP project team and Metrolinx in April of 2015. Subsequent to this, the Mayors of Port Hope and Cobourg submitted a letter on July 16, 2015 to Chris Burke, Director of Service Planning for Metrolinx, re-iterating their support for an extension of GO Transit services to Northumberland County. Furthermore, in tandem with Durham Region officials, the County again supported the extension of the GO Train Lakeshore East line in a formal submission to Steven Del Duca, Minister of Transportation on November 2, 2015.

The level of interest shown by County staff and Council indicate the desire for improved regional transit connections, especially to the Greater Toronto Area. As a result, in addition to the policy recommendations noted above, the TMP will recommend that the County continue discussions with Metrolinx in order to improve regional transit.

4.0 Active Transportation (AT) Strategy

4.1 Introduction & Background

As part of the development of the Transportation Master Plan for Northumberland County, the consultant team undertook a comprehensive active transportation assessment and developed a strategy to guide future planning, design and implementation.

The active transportation (AT) strategy builds upon a number of provincial, County and local municipal plans, projects and initiatives – specifically the County's existing Cycling Master Plan. The results of this exercise provide the County with a set of tools including policies, processes and recommendations which will help to improve walking and cycling for various trip types and people of all ages and abilities.

Before developing an AT strategy, it is important to identify its intents and purposes. The intents and purposes for Northumberland's AT Strategy are presented in **Table 4.1**:

Table 4.1 – Overview of AT Strategy Objectives

Is meant to…	is not meant to…
▸ Provide recommendations on revised cycling facility types – consistent with Step 1 of Ontario Traffic Manual Book 18 ▸ Provide direction on how to integrate AT into day-to-day County and municipal planning ▸ Provide the County with tools to facilitate implementation ▸ Identify revisions to the County's existing cycling design guidelines (to be consistent with current provincial guidelines and best practices)	▸ Be an update to the 2012 and 2014 Cycling Master Plan ▸ Be a comprehensive feasibility study of pedestrian and cycling routes (both on- and off-road) throughout the County ▸ Be a commitment of monies from the County for AT investment

4.2 Developing the AT Strategy

The AT Strategy was developed using a six-step process. The work completed does not establish an update to the Cycling Master Plan (2012), but rather uses the most recent design guidelines and facility selection process outlined in Ontario Traffic Manual Book 18: Cycling Facilities as well as best practices to:

- Assess the applicability of the facility types that were originally recommended in the CMP;
- Update the County's current cycling design guidelines;
- Revisit the timeline for implementation; and
- Identify potential policy revisions and / or additions for consideration by the County.

An overview of the process used to develop the AT Strategy is presented in **Table 4.2**.

Table 4.2 – Northumberland AT Strategy Development Process

Step 1	Step 2	Step 3
Review Previously developed Policies, Plans & Strategies	Review Existing Active Transportation Facilities	Map and Review Previously Proposed Active Transportation Routes
Step 4	**Step 5**	**Step 6**
Assess Applicability of Previously Proposed Facilities	Revise Facility Types	Update GIS Database & Prepare AT Strategy Report

Understanding the details of each step is core to understanding the outcomes that are presented in the AT Strategy. The following is a more detailed description of each of the steps in the AT Strategy development process.

Step 1: Review Previously Developed Policies, Plans & Strategies

Relevant policies, plans and strategies were reviewed in detail to provide the context for future improvements related to active transportation. A detailed understanding of supportive policies was the foundation of support.

Step 2: Review Existing Cycling Facilities

Building on the GIS database developed for the Cycling Master Plan and updated for the TMP, a desktop review of existing conditions, using GoogleEarth and Google Maps, was undertaken to identify routes / facilities that had been implemented since its most recent update.

Step 3: Map and Review Previously Proposed Cycling & Touring Routes

GIS information was the basis for all mapping generated for the AT Strategy. Additional documentation of existing and previously proposed cycling routes was integrated into GIS to form a comprehensive AT database of information. Mapping was generated as a result of this exercise.

Step 4: Assess Applicability of Previously Proposed Facilities

The Cycling Master Plan was originally completed in 2012 before the release of the most recent guidelines and standards for cycling and trail development. Specifically, the selection of routing and facilities types precedes publication of Ontario Traffic Manual Book 18: Cycling Facilities, Ministry of Ontario (MTO) Bikeway Design Guidelines, Accessibility for Ontarians with Disabilities Act Section 80 and 81 and Ontario Traffic Manual Book 15: Pedestrian Crossings, among others. To ensure that the proposed and implemented facility types are consistent with current guideline and standards, the proposed facilities identified in the original Cycling Master Plan were reviewed based on elements of the three step facility selection tool found in Ontario Traffic Manual Book 18.

Step 5: Revise Facility Types

Using the results of the exercise completed for step 4, the previously proposed cycling facility types were revised.

Step 6: Update GIS Database & Prepare AT Strategy Report

Using the results of each step, the GIS database and mapping was updated to identify potential infrastructure revisions – no additions were considered at this time. The results were used to develop the AT strategy for Northumberland County.

4.2.1 The Strategy: Some Assumptions

The six step process was established and confirmed based on a number of key assumptions. Key assumptions can be described as principles and foundations that were used to shape the process used to develop the AT strategy and the recommendations that have been developed. The following sections provide an overview of these assumptions.

4.2.1.1 Supporting the Vision for Walking and Cycling in Northumberland

As part of the 2012 Cycling Master Plan the County established a strong vision for cycling County-wide. The vision is made up of five statements which were established through consultation with local area municipalities, stakeholder groups and the public. The five visionary cycling statements are as follows.

That the CMP will:

- Provide the basis of policy direction and cycling network facilitation for a series of future CMP;
- Identify short, intermediate and long-term benchmarks to be reached within the 20 year plan duration;
- Identify a set of design guidelines based on established industry standards, design publications, other prevailing cycling plans;
- Promote a financially feasible and efficient infrastructure expenditures plan; and
- Make a concerted effort in terms of marketing Northumberland County as a unique cycling destination.

Through the development of the active transportation strategy component of the transportation master plan, it is recommended that the cycling vision established in the 2012 Cycling Master Plan continue to be used as the guiding framework for future investments related to cycling.

Though there are a number of existing trails that accommodate walking and hiking throughout Northumberland, a vision for the future of walking in the County has not formally been established. Sidewalk implementation is the responsibility of the local area municipalities and outside of the jurisdiction of the County. However, the County should work with the local area municipalities to develop a comprehensive trails strategy through which a vision for pedestrian improvements will be established.

Recommendation	As part of the Transportation Master Plan, the cycling vision be adopted as the desired vision for County-wide cycling.
Recommendation	Explore the development of a comprehensive trails master plan, providing a vision for trail development and design and outlining strategic improvements linking existing forest trails and municipal connections.

4.2.1.2 Designing On- and Off-road Facilities in Urban & Rural Areas

A connected and continuous active transportation system typically includes a range of on- and off-road facilities providing pedestrians and cyclists with cycling and walking alternatives. Off-road facilities typically include multi or single use trails found outside of the road right of way – in parklands, forests and linear corridors – or those facilities found within the road boulevard – sidewalks and active transportation pathways. On-road facilities pertain predominantly to cycling facilities found within the road right of way, such as bike lanes, signed bicycle routes with sharrows, paved shoulders, buffered bike lanes, etc.

The County's conditions and environment mean walking and cycling primarily occurs on sidewalks and in on-road cycling facilities within the built up areas. There is also significant demand for cycle tourism using Northumberland's rural roads and recreational walking and hiking in the existing forest trails and conservation areas.

To develop a comprehensive network of facilities, the on- and off-road linkages need to be connected and a strategic plan to enhance both pedestrian and cycling connections should be developed. As noted in **Section 4.2.1.1**, when next updated, the CMP should aim to connect with existing trail facilities to provide access to major trail destinations. In addition, a comprehensive trails master plan, formalizing the trails network, identifying future linkages and roles and responsibilities for those involved in their design and development should be developed. Additional details about the design of on and off-road facilities – specifically related to cycling – are provided in **Section 4.4**.

4.3 Updating the Active Transportation Network

One of the key purposes of the AT Strategy was to assess and confirm the applicability of previously proposed cycling facility types (as identified in the Cycling Master Plan). Using the facility selection tool identified in Ontario Traffic Manual Book 18, the proposed cycling facility types were reviewed taking into consideration the context, location, traffic volumes and operating speed of each route. The information contained within **Section 4.3** is the documentation of steps 2 through 5 of the AT strategy development process.

4.3.1 Step 2: Review Existing Facilities

4.3.1.1 Existing On-road Cycling Routes

The existing cycling network is made up of five cycling touring routes identified and promoted by the County and local partners (including but not limited to Northumberland Tourism, local bike clubs, etc.). The routes are documented in both the CMP as well as the tourism website(http://www.northumberlandtourism.com/en/outdoor-adventure/Top-5-Cycling-Routes.asp).

As part of the promotion of these touring routes, branded wayfinding / signage was developed and implemented. Wayfinding signs have been installed in locations where users may require directional guidance or at major decision points. In addition to the branded wayfinding and signage developed as a result of the CMP, wayfinding signage for regional trails i.e. the Trans Canada Trail, Waterfront Trail and the Oak Ridges Trail have also been installed. Though they are not regulatory signs, branded wayfinding and signage provide cyclists with directional cues for the touring routes and can be an effective awareness tool for cyclists, motorists and pedestrians.

Cycling related regulatory signage has been installed in the form of Share the Road signs. Share the Road signage is typically implemented along signed bicycle routes there is a change to the

roadway configurations e.g. cross-section such as narrowing, steep grades, roadway curves, etc. Share the Road signs can be found throughout the County at various locations along the five cycling touring loops.

4.3.1.2 Existing Off-road Trails

There are a number of off-road trail facilities found throughout Northumberland. There are 21 trail destinations promoted within Northumberland including:

- Ganaraska Forest
- Oak Ridges Trail
- Ganaraska Hiking Trail
- Majestic Hill Trail
- Ganaraska Millennium Trail
- Spartan Ravine Walkway
- Waterfront Trail
- Nawautin Nature Sanctuary and Wetland
- Lime Kiln Trail
- Northumberland County Forest
- Peter's Woods Provincial Nature Reserve
- Russ' Creek Trail
- Millennium Trail
- Trans Canada Trail
- Ferris Provincial Park

Each of the "destination trails" permit hiking with some that allow cycling and other seasonal uses e.g. cross country skiing. More comprehensive details on each of the trails including mapping of the routes is provided on the Northumberland Tourism website: http://www.northumberlandtourism.com/en/outdoor-adventure/Trails.asp.

In the short-term, trails should be integrated into a comprehensive GIS database for active transportation routes building on the GIS database prepared for the TMP AT Strategy. In the long-term Northumberland County should consider the development of a trails master plan or a comprehensive active transportation master plan and implementation strategy.

Recommendation #3	Update the AT Strategy GIS database to include existing trails found throughout Northumberland County

4.3.1.3 Documenting Existing Routes

GIS information was made available by the County which presented the existing transportation conditions including the proposed cycling touring routes noted in the Cycling Master Plan. The GIS database did not include detailed information on proposed cycling facility types or the intended timeline for implementation. In addition, the GIS information was last updated prior to the implementation of a number of proposed signed cycling routes. As such, a desktop exercise was undertaken using GoogleEarth and GoogleMaps, to review and confirm existing cycling

routes. The results of this high-level investigation show that there are currently three types of on-road cycling facilities. Since the completion of the 2012 Cycling Master Plan, 43km of the previously proposed cycling network has been implemented. A summary of these facilities is presented in **Table 4.3**. **Figures 4.1 - 4.8** illustrate the findings.

Table 4.3 – Summary of Existing Cycling Infrastructure in Northumberland County

Facility	Paved Shoulder	Bike Lane	Signed Route with Sharrow	Total
Distance	40	2	0.8	43

In addition to the facility types noted in the table above, the County has embarked on a rigorous strategy to design and implement branded wayfinding and signage – as noted in section 4.3.1.2. Though these route markers provide directional cues for cyclists they are not considered standards regulatory signs – as identified by OTM Book 18, MTO Bikeways Design Guidelines and the Highway Traffic Act (HTA). As such, these promoted touring routes are not currently being identified as "designated cycling routes" which is why they have not been included in the table above.

4.3.2 Step 3: Review Previously Proposed Active Transportation Routes

Information gathered early in the project process highlighted high-level on and off-road cycling routes throughout Northumberland. The information found within GIS includes the proposed alignment of the on-road cycling touring routes while online information can be found regarding the off-road trails. Together they form a County-wide system of active transportation routes.

4.3.2.1 Previously Proposed Cycling Routes

As part of the 2012 Cycling Master Plan, five cycling touring routes were identified linking major destinations and points of interest. The five routes include:

- Route 1: Glorious Ganaraska;
- Route 2: Rice Lake Ramble;
- Route 3: Shelter Valley Road;
- Route 4: Trent River Truckin; and
- Route 5: Presqu'ile Promise.

A total of 259km of cycling touring routes were proposed in the CMP. **Figures 4.1 – 4.8** illustrate the previously proposed touring routes identified County-wide, within the Town of Cobourg and other communities within Northumberland County. A summary of the distance for each of the five cycling routes previously proposed is provided in **Table 4.4.**

Legend

Existing Cycling Routes
- Existing Paved Shoulder
- Existing Bike Lane
- Existing Signed Bike Route with Sharrow

Cycling Master Plan Routes[1]
- Glorious Ganaraska Cycling Loop
- Rice Lake Ramble Cycling Loop
- Shelter Valley Road Cycling Loop
- Trent River Truckin' Cycling Loop
- Presqu'ile Promise Cycling Loop

Proposed Linkages[1]
- Proposed Future Linkage
- Cycling Linkage

Other Trails
- Oak Ridges Trail
- Waterfront Trail
- Trans Canada Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Other
- Railway
- Property Parcel
- Provincial Park
- Alderville First Nations
- County Boundary
- Watercourse

Note:
1. Routes identified in the Northumberland County Cycling Master Plan (July 2012)

0 2.5 5 10 Kilometres

N

Transportation Condi

Figure 4.1

CITY OF PRINCE EDWARD COUNTY
Northumberland county
PLAN BUILD MOVE

MMM GROUP

County of Northumberland Transportation Master Plan
Existing Active Transportation Conditions - Town of Cobourg
Figure 4.2

Northumberland county
PLAN BUILD MOVE

Figure 4.2

County of Northumberland Transportation Master Plan
Existing Active Transportation Conditions
Municipality of Port Hope
Figure 4.3

Legend

Existing Cycling Routes
- Existing Paved Shoulder
- Existing Bike Lane
- Existing Signed Bike Route with Sharrow

Cycling Master Plan Routes[1]
- Glorious Ganaraska Cycling Loop
- Rice Lake Ramble Cycling Loop
- Shelter Valley Road Cycling Loop
- Trent River Truckin' Cycling Loop
- Presqu'ile Promise Cycling Loop

Proposed Linkages[1]
- Proposed Future Linkage
- Cycling Linkage

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

Note:
1. Routes identified in the Northumberland County Cycling Master Plan (July 2012)

0 0.75 1.5 3 Kilometres

N

TOWNSHIP OF CAVAN-MONAGHAN

TOWNSHIP OF HAMILTON

MUNICIPALITY OF CLARINGTON

RICE LAKE

LAKE ONTARIO

See inset map

Northumberland county

PLAN BUILD MOVE

Figure 4.3

MMM GROUP

County of Northumberland Transportation Master Plan
Existing Active Transportation Conditions
Township of Hamilton
Figure 4.4

Legend

Existing Cycling Routes
- Existing Paved Shoulder
- Existing Bike Lane
- Existing Signed Bike Route with Sharrow

Cycling Master Plan Routes[1]
- Glorious Ganaraska Cycling Loop
- Rice Lake Ramble Cycling Loop
- Shelter Valley Road Cycling Loop
- Trent River Truckin' Cycling Loop
- Presqu'ile Promise Cycling Loop

Proposed Linkages[1]
- Proposed Future Linkage
- Cycling Linkage

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

Note:
1. Routes identified in the Northumberland County Cycling Master Plan (July 2012)

0 0.75 1.5 3 Kilometres

N

TOWNSHIP OF CAVAN-MONAGHAN

TOWNSHIP OF ALNWICK/HALDIMAND

MUNICIPALITY OF PORT HOPE

RICE LAKE

LAKE ONTARIO

Northumberland county

PLAN BUILD MOVE

Figure 4.4

MMM GROUP

County of Northumberland Transportation Master Plan
Existing Active Transportation Conditions
Municipality of Alnwick / Haldimand
Figure 4.5

Legend

Existing Cycling Routes
- Existing Paved Shoulder
- Existing Bike Lane
- Existing Signed Bike Route with Sharrow

Cycling Master Plan Routes[1]
- Glorious Ganaraska Cycling Loop
- Rice Lake Ramble Cycling Loop
- Shelter Valley Road Cycling Loop
- Trent River Truckin' Cycling Loop
- Presqu'ile Promise Cycling Loop

Proposed Linkages[1]
- Proposed Future Linkage
- Cycling Linkage

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- Provincial Park
- County Boundary
- Watercourse

Note:
1. Routes identified in the Northumberland County Cycling Master Plan (July 2012)

0 1.25 2.5 5 Kilometres

N

TOWNSHIP OF OTONABEE-SOUTH MONAGHAN

MUNICIPALITY OF BRIGHTON

TOWNSHIP OF CRAMAHE

TOWNSHIP OF HAMILTON

TRENT RIVER

INDIAN RIVER

RICE LAKE

LAKE ONTARIO

PETER'S WOODS PROVINCIAL PARK

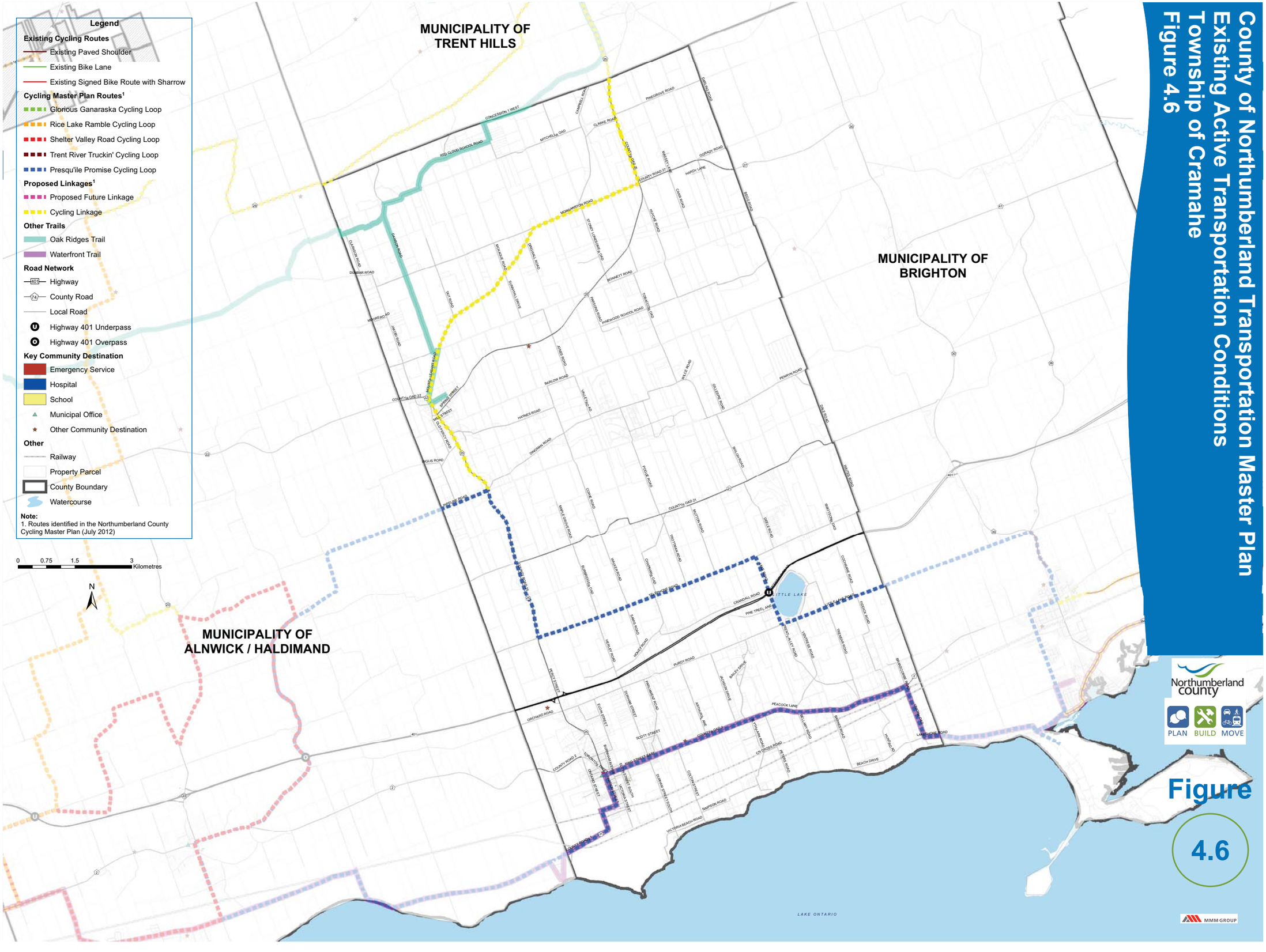
Northumberland county

PLAN BUILD MOVE

Figure 4.5

MMM GROUP

County of Northumberland Transportation Master Plan
Existing Active Transportation Conditions
Township of Cramahe
Figure 4.6



Northumberland county

PLAN BUILD MOVE

Figure 4.6

MMM GROUP

MUNICIPALITY OF TRENT HILLS

CITY OF QUINTE WEST

TOWNSHIP OF CRAMAHE

TRENT RIVER

TRENT RIVER

LITTLE LAKE

LAKE ONTARIO

PRESQU'ILE PROVINCIAL PARK

See inset map

0 1 2 4 Kilometres

N

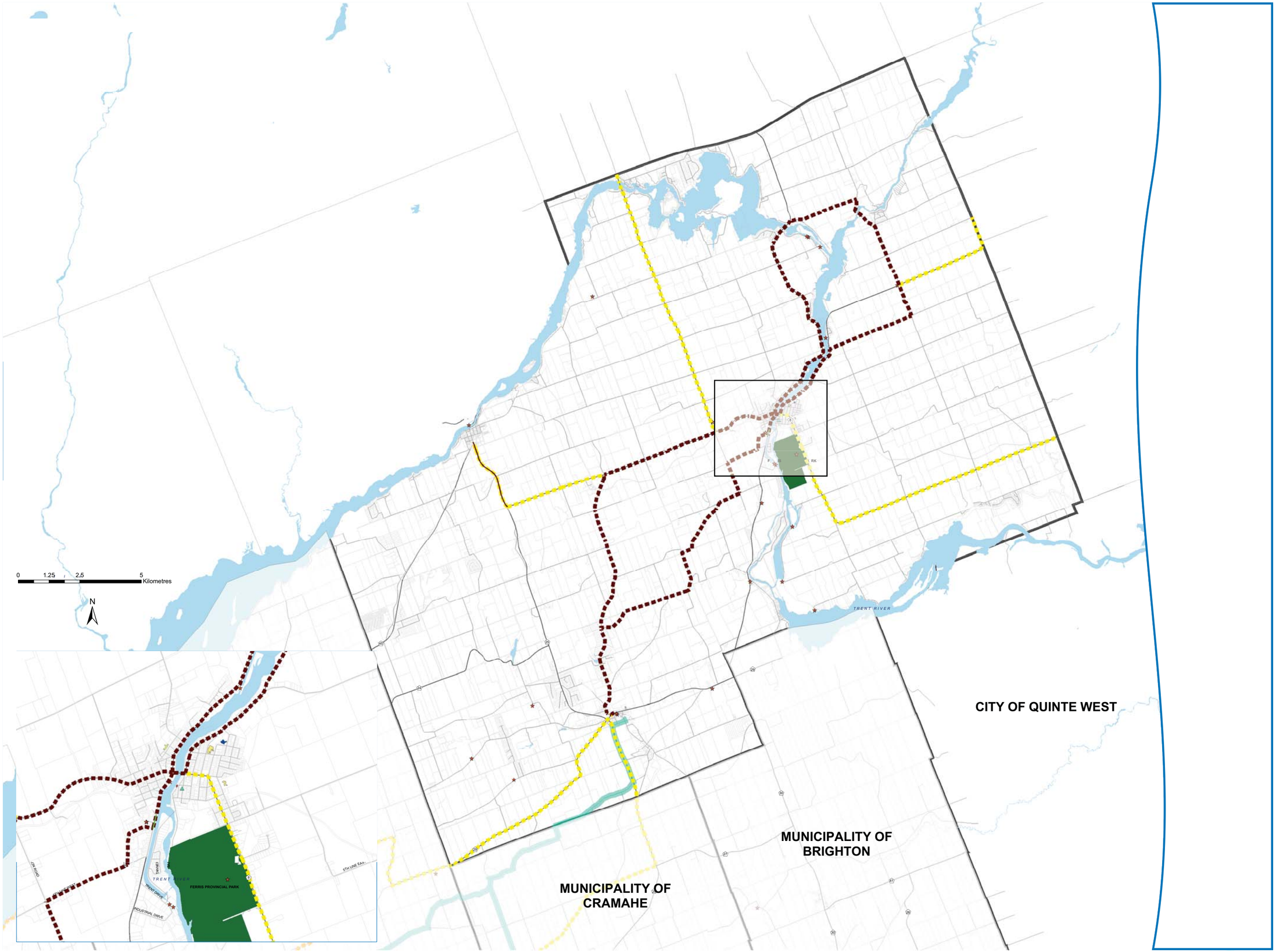

0 1.25 2.5 5 Kilometres
N
TRENT RIVER
CITY OF QUINTE WEST
MUNICIPALITY OF BRIGHTON
MUNICIPALITY OF CRAMAHE
FERRIS PROVINCIAL PARK
TRENT DRIVE
INDUSTRIAL DRIVE
5TH LINE EAST

Table 4.4 – Total Kilometres of Previously Proposed Cycle Touring Routes

Glorious Ganaraska	Rice Lake Ramble	Shelter Valley Road	Trent River Truckin	Presqu'ile Promise	Total
26	71	61	40	61	**259**

To achieve connectivity both between the proposed routes and to surrounding municipalities, additional cycling linkages were also proposed. A total of 146 km of additional cycling linkages were identified throughout Northumberland. The additional cycling linkages are also presented in **Figure 4.1 – 4.8.**

4.3.3 Step 4: Assess Applicability of Previously Proposed Facilities

As part of the 2012 / 2014 Cycling Master Plan, facility types were identified throughout Northumberland on both County roads and roads under the jurisdiction of the local area municipalities. Proposed facility types identified by the master plan include signed bike routes, bike lanes, off-road pathways and surface treated shoulders. The following sections provide an overview of the process that was used to assess the applicability of previously proposed facilities and the outcomes of this assessment.

4.3.3.1 Overview of Previously Proposed Facilities

A summary of the proposed facility types – relative to the touring routes and additional cycling linkages – identified in the master plan are presented in **Table 4.5**.

Table 4.5 – Previously Proposed Facility Types – by Touring Route

	Glorious Ganaraska	Rice Lake Ramble	Shelter Valley Road	Trent River Truckin	Presqu'ile Promise	Additional Cycling Links	Total
Signed Route	22	53	39	33	45	37	**229**
Bike Lane[1]	2	18	22	7	16	94	**159**
Bike Lane / Off-Road Path	0	0	0	0	0	15	**15**
Surface Treated Shoulders	2	0	0	0	0	0	**2**
Total Length (km)	**26**	**71**	**61**	**40**	**61**	**146**	**405**

1. Bike Lanes included Hot Mix Asphalt (HMA) paved shoulders.

As noted in earlier sections of the AT strategy, due to the fact that the master plan was developed prior to the publication of OTM Book 18 and 15 and MTO's Bikeway Design Guidelines, along select cycling routes, the proposed facility type may now not be considered appropriate. For example, on roadways with high volumes and speed, additional separation may be required in the form of a buffer. In some locations along the cycling network there are routes where signed bicycle routes are identified where the speed and volume documented along the roadway warrant a more separated facility. The previously proposed facilities that were reviewed included:

- Routes identified as a proposed bike lane and / or shoulder treatment in the County's Cycling Master Plan (2012) which did not meet the minimum proposed width of 1.5m;
- Routes with AADT volumes between 2,000 and 4,000 where additional information, such as operating speeds, is required to review and confirm facility types using Step 1 of the OTM process; and
- Routes with AADT volumes higher than 5,000 and that were previously recommended for implementation of a signed bike route in County's Cycling Master Plan (2012).

4.3.3.2 Overview of OTM Book 18 Facility Selection Process

The Facility Selection Process outlined in Ontario Traffic Manual Book 18: Cycling Facilities is made up of three steps. **Figure 4.9** illustrates the three step process. For the Northumberland AT Strategy, Steps 1 and 2 of the facility selection process were used. A more detailed description of the work involved in steps 1 and 2 follows.

Figure 4.9 – OTM Book 18 Facility Selection Process

Step 1: Facility Pre-Selection

For Step 1, routes are evaluated based on the 85th percentile motor vehicle operating speed and average daily traffic volumes. Annual Average Daily Traffic (A.A.D.T.) and posted speeds for were provided by the County to undertake this assessment. Using this information route segments were plotted on the nomograph (see figure below) and an initial preliminary level of separation was identified. The results of Step 1 are documented in the network database.

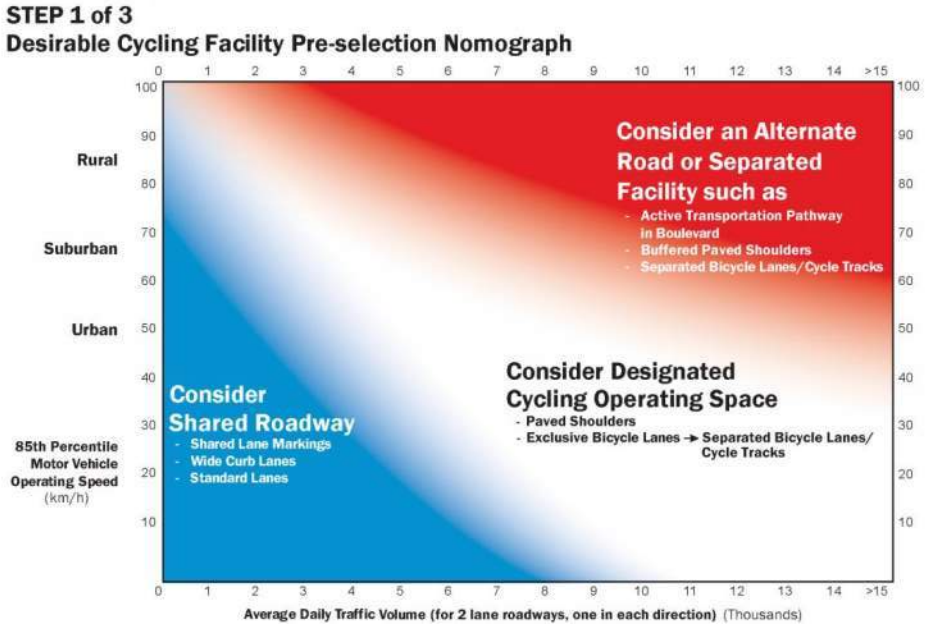
Building upon Step 1 results, the study team then undertook Step 2 of the Facility Selection process to determine the desirable facility types for each of the select routes based on other design criteria and considerations.

Step 2: A More Detailed Look

Step 2 further refines the results from Step 1 to determine an appropriate facility type using application heuristics that are context-sensitive. A set of application heuristics were reviewed which helped the study team to select a preferred cycling facility type. These application heuristics are intended to link site-specific conditions to the appropriate facility type and any additional design features. The application heuristics reviewed for each of the selected routes in the cycling network included:

- 85th percentile motor vehicle operating speed
- Motor vehicle volumes
- Function of road
- Vehicle Mix
- Available Space
- Cost
- Anticipated users in terms of skill and trip purpose
- Function of route within County-wide network
- On-street parking
- Frequency of intersection

Using the information made available by Northumberland County, a number of the heuristics were considered to identify the preliminary preferred facilities for the proposed cycling routes. The



results of Step 2 are documented in the network database. It is recommended that Northumberland County completed Step 3 to confirm the preferred cycling facility types for the proposed routes identified as part of the County's cycling network.

Recommendation	As part of a future update to the Cycling Master Plan, the County should re- assess the results of Step 2 and undertake Step 3 in the facility selection process to confirm the preferred cycling facility types.

4.3.4 Step 5: Revised Facility Types Additions & Revisions

The results of the assessment are illustrated on **Figures 4.10 – 4.17**. **Table 4.6** summarizes the previously proposed facility types as previously identified in the Cycling Master Plan and the total number of facility types proposed through the TMP review and assessment. The table also highlights the changes that have occurred as a result of the assessment. More detailed information can be found in the network spreadsheet – additional details provided in **Section 5.0**. It is important to note that the total number of kilometres proposed have not changed i.e. no additional routes were recommended as part of the TMP assessment.

Table 4.6 – Summary of Revised Cycling Facility Types

Signed Bike Route	229	277	+ 48
Signed Bike Route with Sharrow	-	2	+ 2
Signed Bike Route with Edgeline	-	10	+ 10
Bike Lane	159	9	-150
Buffered Bike Lane	-	1	+ 1
Paved Shoulder	2	86	+ 84
Buffered Paved Shoulder	-	27	+ 27
In-Boulevard Multi-use Trail	15	3	-12
	405	405	0

As noted above, there are still a number of signed routes identified throughout the County. This does not recognize the implementation of branded wayfinding and signage which has been developed and implemented County-wide. For proposed signed bike routs Northumberland County is encouraged to revisit the routes and implement a green bike route sign – consistent with OTM Book 18: Cycling Facilities and MTO Bikeway Design Guidelines.

Recommendation	Northumberland County should use the recommended facility type revisions identified through the TMP as the basis from which to update the CMP – when the master plan is next updated.
Recommendation	Northumberland County should review implementation of the green bike route sign along existing and proposed signed bike routes within both the urban and rural areas of the County.

County of Northumberland Transportation Master Plan
Existing and Proposed Facility Types - County-wide
Figure 4.10

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Cycling Routes[1]
- In-Boulevard Trail
- Buffered Paved Shoulder
- Paved Shoulder
- Buffered Bike Lane
- Bike Lane
- Signed Bike Route with Sharrow
- Signed Bike Route with Edgeline
- Signed Bike Route

Reviewed Cycling Routes[2]
- Cycling Master Plan (2012) Proposed Facility Type reviewed as part of the Northumberland County TMP (2016)

Other Trails
- Oak Ridges Trail
- Waterfront Trail
- Trans Canada Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Other
- Railway
- Property Parcel
- Provincial Park
- Alderville First Nations
- County Boundary
- Watercourse

0 2.5 5 10 Kilometres

N

Notes:
1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

CITY OF PRINCE EDWARD COUNTY
Northumberland county
PLAN BUILD MOVE

MMM GROUP

County of Northumberland Transportation Master Plan
Existing and Proposed Facility Types - Town of Cobourg
Figure 4.11

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Cycling Routes[1]
- In-Boulevard Trail
- Buffered Paved Shoulder
- Paved Shoulder
- Buffered Bike Lane
- Bike Lane
- Signed Bike Route with Sharrow
- Signed Bike Route with Edgeline
- Signed Bike Route

Reviewed Cycling Routes[2]
- Cycling Master Plan (2012) Proposed Facility Type reviewed as part of the Northumberland County TMP (2016)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

0 0.25 0.5 1 Kilometres

N

TOWNSHIP OF HAMILTON

LAKE ONTARIO

Notes:
1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

Northumberland county

PLAN BUILD MOVE

Figure

4.11

MMM GROUP

County of Northumberland Transportation Master Plan
Existing and Proposed Facility Types - Municipality of Port Hope
Figure 4.12

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Cycling Routes[1]
- In-Boulevard Trail
- Buffered Paved Shoulder
- Paved Shoulder
- Buffered Bike Lane
- Bike Lane
- Signed Bike Route with Sharrow
- Signed Bike Route with Edgeline
- Signed Bike Route

Reviewed Cycling Routes[2]
- Cycling Master Plan (2012) Proposed Facility Type reviewed as part of the Northumberland County TMP (2016)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

0 0.75 1.5 3 Kilometres

N

TOWNSHIP OF CAVAN-MONAGHAN

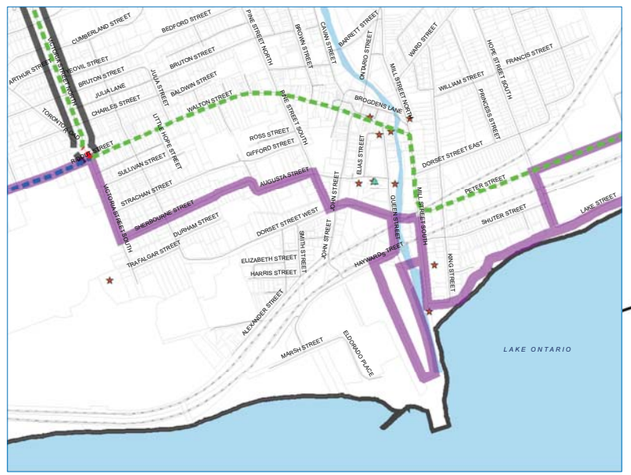
TOWNSHIP OF HAMILTON

MUNICIPALITY OF CLARINGTON

RICE LAKE

LAKE ONTARIO

See inset map



Notes:
1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.
2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

Northumberland county

PLAN BUILD MOVE

Figure 4.12

MMM GROUP

County of Northumberland Transportation Master Plan
Existing and Proposed Facility Types - Township of Hamilton
Figure 4.13

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Cycling Routes[1]
- In-Boulevard Trail
- Buffered Paved Shoulder
- Paved Shoulder
- Buffered Bike Lane
- Bike Lane
- Signed Bike Route with Sharrow
- Signed Bike Route with Edgeline
- Signed Bike Route

Reviewed Cycling Routes[2]
- Cycling Master Plan (2012) Proposed Facility Type reviewed as part of the Northumberland County TMP (2016)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

0 0.75 1.5 3 Kilometres

N

TOWNSHIP OF CAVAN-MONAGHAN

TOWNSHIP OF ALNWICK/HALDIMAND

MUNICIPALITY OF PORT HOPE

RICE LAKE

LAKE ONTARIO

Notes:
1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

Northumberland county

PLAN BUILD MOVE

Figure 4.13

MMM GROUP

County of Northumberland Transportation Master Plan
Existing and Proposed Facility Types - Municipality of Alnwick / Haldimand
Figure 4.14

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Cycling Routes[1]
- In-Boulevard Trail
- Buffered Paved Shoulder
- Paved Shoulder
- Buffered Bike Lane
- Bike Lane
- Signed Bike Route with Sharrow
- Signed Bike Route with Edgeline
- Signed Bike Route

Reviewed Cycling Routes[2]
- Cycling Master Plan (2012) Proposed Facility Type reviewed as part of the Northumberland County TMP (2016)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- Provincial Park
- County Boundary
- Watercourse

0 1.25 2.5 5 Kilometres

N

TOWNSHIP OF OTONABEE-SOUTH MONAGHAN

MUNICIPALITY OF BRIGHTON

TOWNSHIP OF CRAMAHE

TOWNSHIP OF HAMILTON

TRENT RIVER

INDIAN RIVER

RICE LAKE

LAKE ONTARIO

PRESQU'ILE PROVINCIAL PARK

PETER'S WOODS PROVINCIAL PARK

Notes:
1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

Northumberland county

PLAN BUILD MOVE

MMM GROUP

County of Northumberland Transportation Master Plan

Existing and Proposed Facility Types - Township of Cramahe

Figure 4.15

Notes:

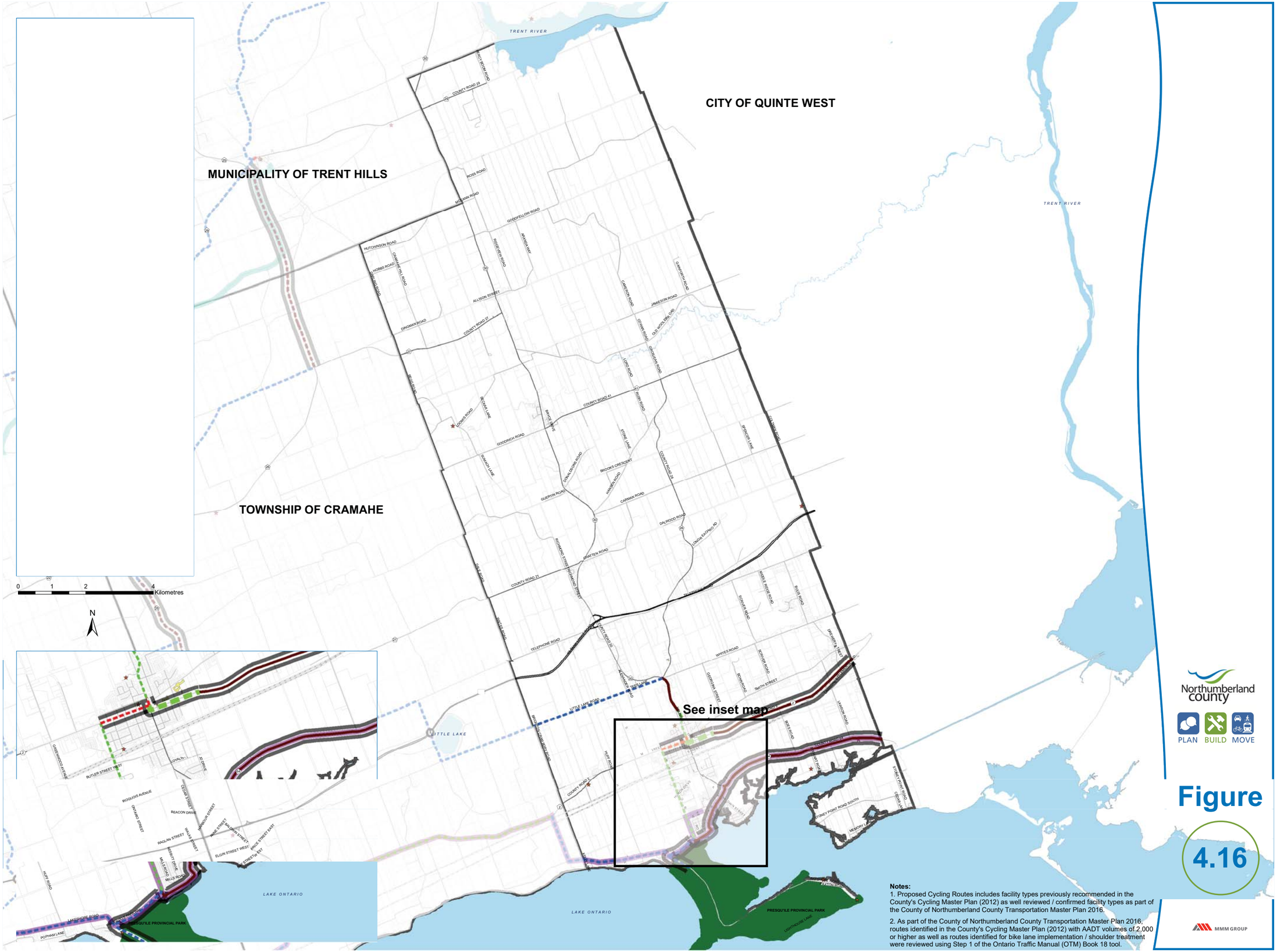
1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

Northumberland county

PLAN BUILD MOVE

MMM GROUP



Notes:

1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

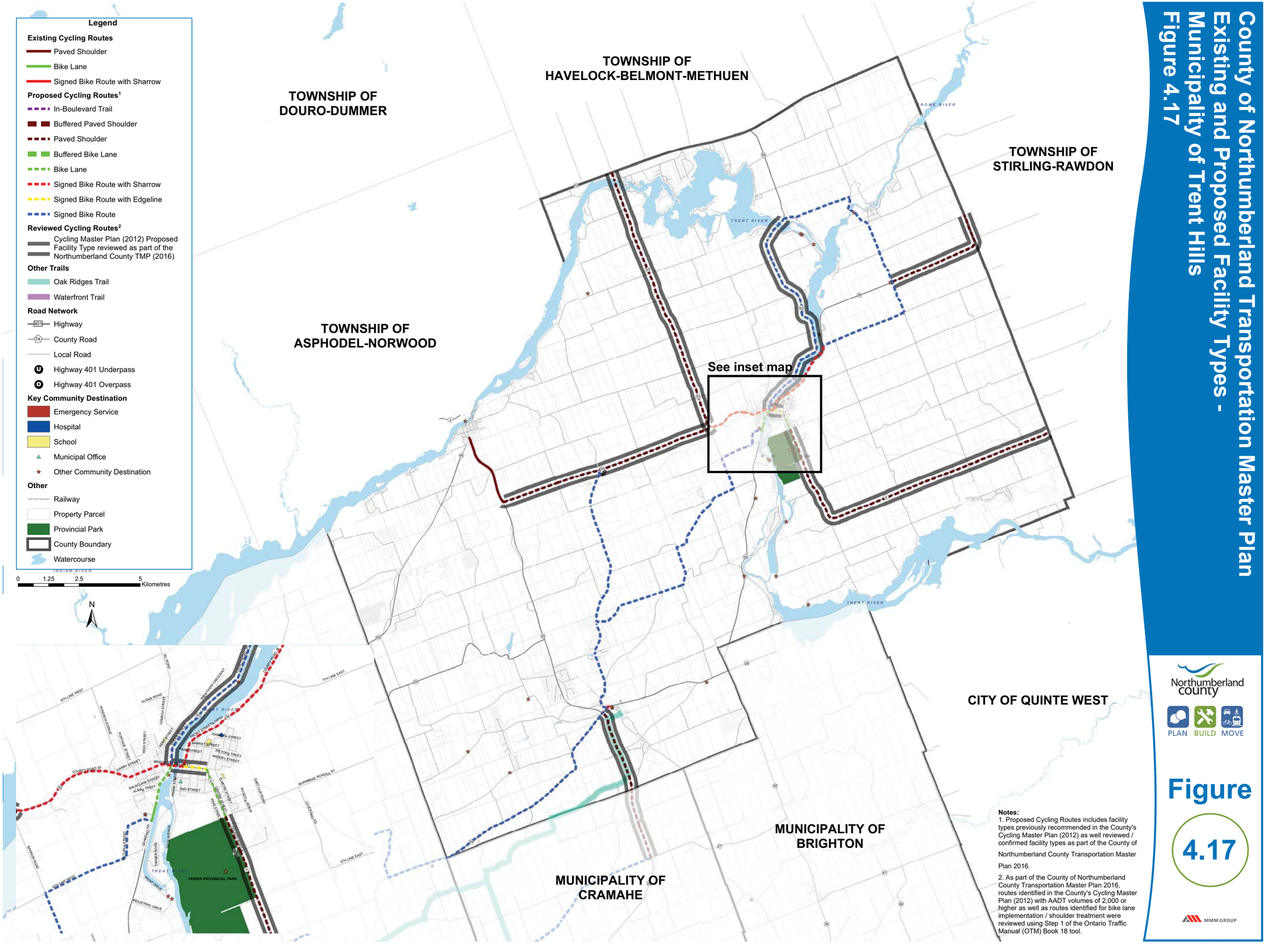
Northumberland county

PLAN BUILD MOVE

Figure 4.16

MMM GROUP

County of Northumberland Transportation Master Plan
Existing and Proposed Facility Types - Municipality of Trent Hills
Figure 4.17



Notes:

1. Proposed Cycling Routes includes facility types previously recommended in the County's Cycling Master Plan (2012) as well reviewed / confirmed facility types as part of the County of Northumberland County Transportation Master Plan 2016.

2. As part of the County of Northumberland County Transportation Master Plan 2016, routes identified in the County's Cycling Master Plan (2012) with AADT volumes of 2,000 or higher as well as routes identified for bike lane implementation / shoulder treatment were reviewed using Step 1 of the Ontario Traffic Manual (OTM) Book 18 tool.

Northumberland county

PLAN BUILD MOVE

Figure 4.17

MMM GROUP

4.4 Updating the Design Guidelines

In addition to the proposed facility types, the 2012 / 2014 CMP also included a set of design guidelines. The design guidelines were based on current best practices including publications from the Transportation Association of Canada (TAC) and Velo Quebec.

With the development and adoption of the new provincially recognized guidelines for the design, application and operation of bicycle and pedestrian facilities, an update to the County's current design guidelines are needed to ensure consistency and alignment with the now current best practices and standards. The following sections summarized the original design guidelines included in the 2012 / 2014 plan and identify how they should be updated / amended to be consistent with the new provincial guidelines.

4.4.1 Existing Guidelines & Proposed Revisions

The two primary revisions to note are the operating spaces and operating widths for cycling facilities. Operating space refers to the amount of space needed to maintain stability. The operating space is determined by examining typical bicycle dimensions, space requirements for maneuvering, horizontal clearance and vertical height. Operating widths refer to the amount of space provided for cyclists as part of a cycling facility.

Table 4.7 and **Table 4.8** outline the original recommendations for operating space and width as identified in the CMP and the recommended operating space and width as identified in Ontario Traffic Manual Book 18.

Table 4.7 – Overview of Changes to Operating Space for Cyclists

Cyclist Operating Space	Cycling Master Plan	OTM Book 18
Physical Space Occupied by a Cyclist	0.4m – 0.6m	0.75m
Minimum Operating Width	1.0m	1.2m
Desired Operating Width	1.5m	No change
Horizontal Maneuvering Space Width	N/A	0.1m – 0.45m
Minimum Horizontal Clearance from bridge abutments	N/A	0.25m
Operating Vertical Clearance	2.25m	2.5m

Table 4.8 – Overview of Changes to Operating Width for Cycling Facilities

Facility Type Operating Width	Cycling Master Plan	OTM Book 18
Wide Shared Roadway with Signed-only Bike Route	3.35m – 4.0m	4.0m – 4.5m (lane width)
Narrow Shared Roadway with Signed-only Bike Route	N/A	3.0m – 4.0m (lane width)

Facility Type Operating Width	Cycling Master Plan	OTM Book 18
Signed Bike Route with Sharrow	N/A	Placed 1.0m from the centre of the sharrow marking to the face of the curb or 1.3m from the outer edge of a parking lane. Place at typical intervals of 75m.
Signed Bike Route with Paved Shoulder	1.2m – 1.75m Width of paved shoulder is dependent upon roadway class, posted speed limit and average annual daily traffic (AADT). For example, 1.2m paved shoulders are recommended on collector roads with a posted speed (km/h) of 60 – 80 and an AADT between 1,000 and 3,000. Refer to section 4.1 in the Cycling Master Plan for additional details.	1.5m – 2.0m In locations where a signed bike route has a shoulder width of 2.0m±, the shoulder must include a 0.5m buffer zone.
Bike Lane	1.0m – 1.5m	1.5m – 1.8m In locations where separation between the bike lane and vehicle lane / parking lane is required, a buffer of 0.5m to 1.0m should be provided.
Cycle Track	N/A	1.5m – 2.0m (one-way) 3.0m – 4.0m (two-way)
In-Boulevard Facility	1.2m – 1.5m (one-way) 2.0m – 3.0m (one-way)	1.8m – 2.0m (one-way) 3.0m – 4.0m (two-way)
Off-Road Multi Use Trail	2.0m – 3.0m	3.0m – 4.0m

Recommendation

When the Cycling Master Plan is next updated, the County should revise the operating space and operating width to be consistent with OTM Book 18 and MTO's Bikeways Design Guidelines

4.4.2 Additional Design Considerations

In addition to the proposed revisions noted above, there are other active and sustainable transportation design considerations that have emerged since the development of the cycling master plan. The following are some additional design considerations that Northumberland County should consider incorporating into their design guidelines when next updated.

4.4.2.1 Accessibility

Section 2.5 of the CMP recommends that pedestrian, bicycle and wheelchair accessibility be encouraged throughout the community. Approximately one in eight Canadians has a disability. Mobility, agility, and pain-related disabilities are by far the most common types, each accounting for approximately 10% of reported disabilities nationally.

The Accessibility for Ontarians with Disabilities Act (AODA) states that "The people of Ontario support the right of persons of all ages with disabilities to enjoy equal opportunity and to participate fully in the life of the province." The stated goal of the AODA is "to make Ontario accessible for people with disabilities by 2025."

AODA Criteria which are to be considered include: operational experience, width, running slope, cross slope, total slope, surface, changes in level and signage. The guidelines and criteria set out in these documents apply to the development of trail and sidewalk facilities and are not required for consideration when designing and developing on-road cycling facilities.

The County should utilize the guidelines outlined in the Built Environment Standards to ensure that the needs of all user groups are accommodated and satisfying the requirements of the AODA to the greatest extent possible, given the context of each trail's location, the surrounding environment and type of trail experience that is desired. Specifically, sections 80.8 and 80.10 of the Accessibility Standards for the Built Environment provide the technical requirements for recreational trails. These include:

- Minimum clear width 1.0m;
- Minimum head room clearance of 2.1m above trail;
- Surfaces are to be firm, stable with minimal glare;
- Maximum running/longitudinal slope of 10%;
- Maximum cross slope of 2%;
- High tonal or textural changes to distinguish the edge;
- Standards also address changes in level, openings in the surface, edge protection (e.g. near water); and
- Signage shall be easily understood and detectable by users of all abilities. It is important to ensure that signage and mapping/messaging clearly communicates which pathways are accessible.

4.4.2.2 Complete Streets

All types of transportation should be considered and designs should aim to achieve a comfortable environment with minimal conflict for all potential users. Alternative modes of travel – specifically transit, cycling and walking – should be considered when exploring the development of a system of on and off-road active transportation routes.

There is an increasing amount of research regarding the design and development of complete streets. There is not a "one size fits all" solution or specific design standard that can be universally applied.

The Toronto Centre for Active Transportation (TCAT) recently published a report documenting the benefits, challenges, best practices and design alternatives for complete streets which are being implemented world-wide. Northumberland County and its local municipalities are encouraged to use this reference as a guide for future roadway design.

There are many kinds of complete streets, each are guided by the unique characteristics of the municipality in which they are being developed including but not limited to the community context and land use, the role of the street in the overall transportation network, traffic volumes of the proposed roadway and the existing transportation modes being accommodated. It is important to note that the implementation of a "complete street" approach requires coordination and support from a number of different sources including residents, businesses, planners and policy makers, engineers and landscape architects. Their combined input provides the balance of needs required to accommodate all modes of transportation including cycling while designing a useable space for all.

4.4.2.3 Freight, Transit & Emergency Service Routes

Special consideration should be made for those routes that are designated as freight, transit and / or emergency service routes. The implementation of formal cycling facilities or multi-use trails within the road right-of-way on these routes should be considered to accommodate the operating and design needs of large vehicles which conflict with those of cyclists. Cyclists' level of comfort and overall safety can be compromised due to the presence of large vehicles which may require the implementation of more separated cycling facilities (e.g. bike lanes and / or multi-use pathways outside of the road right-of-way) and / or alternate / parallel routes.

In these scenarios, the application of traffic calming measures may not be appropriate because of the potential disturbance that speed bumps tend to create and the turning space required for larger vehicles.

For those transit routes which are identified as part of the overall network, there is the potential for increased conflict points where buses are required to merge over proposed bicycle facilities to access transit stops. In these scenarios, the applications of left-side bike lanes or other design treatments could be considered to accommodate boarding passengers and to reduce the number of conflict points between passengers and cyclists. For additional details about the integration of cycling facilities at transit stops please reference section 5.4.2 in OTM Book18.

4.4.2.4 Highway Interchange Crossings

There are a number of major crossings over Provincial Highways within Northumberland County. Consideration needs to be made for those cycling routes which are proposed over Highway 401. On Figures 4.1 to 4.3, the major crossings of Highway 401 have been identified. Proposed cycling facilities are identified at both underpasses and overpasses of the highway. There are a total of 6 crossings of the Highway 401 corridor.

One of the six crossings is an overpass west of Vernonville Road and South of Telephone Road. A proposed signed bike route has been identified as the preferred facility design treatment for this linkage requiring no physical improvements / alternations to the overpass structure.

Four of the remaining underpasses identify a proposed signed bike route as the preferred design treatment. The remaining underpass – at Campbell Road and the 401 identifies a preferred paved shoulder which transitions into a bike lane.

Section 5.5 in OTM Book 18 provides direction on the various design alternatives for cycling facilities at interchanges and ramp crossings. When the proposed facility types at the crossings noted above and on maps 1 through 3 are implemented – specifically the crossing at Campbell Road – the County should review the various alternatives in consultation with MTO and identify the preferred solution which provides minimal impact and cost to both the County and the Province.

4.4.2.5 Risk Management & Liability

As bicycles are considered a vehicle under the Highway Traffic Act it means that if cycling facilities are improperly designed, constructed or maintained that the County may be partially liable. On-road facilities typically fall into the same liability category as roadways and sidewalks, as do off-road facilities that permit cycling.

Because of past case law, cycling facilities would be considered under many of the same basic immunities as other Highways. This further reinforces the importance of adhering to provincial and national design guidelines and standards as they provide the greatest legal protection. The following considerations should be incorporated into day to day risk management:

- Improve the physical environment and increase public awareness of user rights and obligations;
- Design facilities in compliance with best practices;
- Design facilities in compliance with applicable laws and regulations;
- Monitor on and off-road facilities through regular patrols and document physical conditions;
- Avoid use of the term “safe” or “safer” for cycling facilities; and
- Maintain proper insurance coverage.

As Northumberland County expands their cycling and pedestrian network staff should work to address concerns raised regarding risk management and liability and should develop a formal approach to address requests, inquiries and concerns that are submitted to county staff. Having a well-documented process to not only receive but address concerns is the first steps in ensuring that risk and liability are minimized.

Recommendation	When the Cycling Master Plan is next updated, the County should incorporate the additional design considerations related to accessibility, complete streets, highway interchange crossings and freight, transit and emergency service routes.
Recommendation	Additional consideration for the design guidelines outlined in Ontario Traffic Manual (OTM) Book 18, Ministry of Transportation Ontario Bikeway Design Guidelines and Accessibility for Ontarians with Disabilities Act should be incorporated into future updates of the Cycling Master Plan.

4.4.3 Conclusion & Next Steps

Northumberland County has strong support for walking and cycling which lays a strong foundation for future improvements. Ensuring that the policy documents and plans are up to date, reflect current best practices, processes and principles will help to guide future implementation.

Additional details regarding the implementation and funding of active transportation routes and facilities are provided in **Section 5.0**. Though implementation will be guided by the Cycling Master Plan, opportunities for economies of scale may be realized if cycling or pedestrian facilities are design and implemented at the same time as other capital projects. Realizing these economies of scale could be extremely beneficial for the County and its partners.

Northumberland County is encouraged to continue to work with its local municipal partners and other agencies such as the conservation authorities, tourism, school boards, health unit and other influential groups to promote, encourage and educate people on the importance of active transportation and the role it plays in the County's health, environment and economy.

5.0 Implementing the Plan

Section 5.0 outlines the recommended strategies and tools that are intended to be used to guide the short and long-term implementation of the transportation master plan. Building on the recommendations outlined in Section 3.0, an implementation plan, including potential funding and partnership alternatives, and prioritization of projects will be outlined in this section by providing the following:

- Identify the proposed improvements to the transportation network and transportation policy framework.
- Identify the estimated costs of each improvement, and identify a timeline for implementation.
- Set-out a detailed implementation process and set of tools that are intended to be used by staff to facilitate the implementation of the recommended transportation improvements.
- Recommend a set of criteria and proposed process for the future prioritization of Active Transportation routes and / or improvements as these opportunities become available.
- Establish a recommended monitoring strategy which can be used to assess and document the progress of the plan's implementation.
- Provide recommended next steps for policy revisions and future updates to the master plan.

5.1 Recommendations

5.1.1 Infrastructure Improvements

In order to summarize the findings of section 3.0, several important infrastructure recommendations are described in this section. These recommendations span those which would require physical changes to existing infrastructure, construction of new infrastructure, and studies to support the modification/construction of infrastructure. Each improvement has been assigned an identification number for ease of reference and are shown in **Table 5.1**.

The timing for completing these improvements, as well as the priority of intersections for the reviews and studies noted below are provided in Section 5.2.

Table 5.1 – Infrastructure Improvements

No.	Improvement/Study
IN1	Conduct a detailed safety review using the Highway Safety Manual at each intersection where mitigation measures are proposed. This will ensure that the proposed mitigation measures are effective and appropriate.
IN2	Review the highest volume intersections for signal warrants by conducting updated 8-hour counts during the busiest 8-hours. Counts should be updated at a minimum of every 5 years, and more often if development occurs in the area.
IN3	Implement revised speed limits at locations where a greater than 20 km/h change in speed was identified, given that the maximum speed change at a location should be 20 km/h. These locations are identified on **Figure 5.1.**
IN4	Study and construct Hamlet Entry Treatments as described in Section 3.3 and in Appendix B.
IN5	Conduct an operations and improvement staging study for County Road 2/County Road 74 between East Townline Road and County Road 45 as described in Section 3.0, to better identify a timeline for implementation of improvements.
IN6	Depending on the results of the operations and improvement staging study, an Environmental Assessment for County Road 2/County Road 74 between East Townline Road and County Road 45 should be undertaken. The completion of the MCEA should be appropriately timed with the need for improvements.
IN7	Complete operations and improvement staging studies and environmental assessments for 2041 and Beyond 2041 corridors, as confirmed by updated TMP work. The buildout timelines for other identified improvements will be further refined by future TMPs. However, the process of conducting operational reviews prior to completing Environmental Assessments should be continued to better focus resources on corridors most in need of improvements.
IN8	Investigate and implement modification of the Highway 401 Emergency Detour Route (EDR) to roadways north of 401, from sections where it is currently south of 401 (CR 2 through Colborne and Brighton, etc.)
IN9	Continue data collection program on County Roads; previous counts were conducted in 2008 and 2013. Counting program should continue at 5-year intervals.
IN10	Update and monitor collision information collected from MTO or local police agencies on an annual basis to update the current “top 10” list of the highest collision intersections. Updated information should also be used to change the priority list of safety improvement locations, if necessary.

No.	Improvement/Study
IN11	Discuss with MTO and potentially prepare operational study to justify jurisdictional change for CR28.
IN12	Collect and monitor speed data at locations where speed transitions exist or locations where complaints have been received.
IN13	Continue implementation of Cycling Master Plan proposed improvements
IN14	Investigate Funding Options
IN15	Complete a Business Case Study for GO Rail expansion into the County

Added 2017

5.1.2 Policy Recommendations

The recommendations for transportation policies include revising existing policies and preparing new policy documents as identified in the review. Changes are recommended for 12 policies and 10 new policies or guidelines are proposed.

One of the key policy directions is to identify priority locations and prepare designs for Hamlet Entry Treatments. The number of Hamlet Entry Treatments to be implemented will depend on timing of agreements with municipalities, and availability of funding.

Other policy recommendations include updating the Transportation Master Plan on a 5-year cycle and continue efforts to work on expanding inter-regional transit service within the County by advocating for the extension of commuter transit services to the County (GO Transit). As the technology emerges, Mobility as a Service (MaaS) services should be investigated for inter and intra-regional transit as well.

Finally, the County should create a policy for and continue the dialogue around road rationalization and work towards agreements between the County, member municipalities and MTO as appropriate, for alterations in road jurisdiction and improvements on key connections throughout the County. Road rationalization discussions should involve all identified roadways in the road rationalization exercise, and should also consider the preferences of the municipalities. **Table 5.2** lists the recommended policies that should be implemented or revised by the County.

Table 5.2 - Policy Recommendations

No.	Policy	Date	Recommendation
PO1	Traffic Calming	17/09/14	Guide Major changes, two new guides
PO2	Advance Warning Signs	Undated	Policy Minor changes
PO3	Procedure to Close Road Allowance	July 2005	Policy Minor changes
PO4	Rural Street Lights	Undated	Guide Minor changes

County of Northumberland Transportation Master Plan
Posted Speed Limits on County Roads
Figure 5.1

Legend

Posted Speed Limit on County Roads
- 80 km/h
- 70 km/h
- 60 km/h
- 50 km/h
- 40 km/h

Speed Limit Transition Areas
- Transition of 20 km/h
- Transition greater than 20 km/h

Road Network
- Highway (401)
- County Road (74)
- Local Road

Other
- Railway
- County Bridge (B)
- Property Parcel
- Provincial Park
- County Forest
- Alderville First Nations
- Northumberland County
- Municipal Boundaries
- Watercourse

0 2.5 5 10 Kilometres

N

Thompson Bridge
Safe Loading
(Tonnes): 10t

Loomis Bridge
Safe Loading
(Tonnes): 20t

Northumberland county
PLAN BUILD MOVE

Figure 5.1

MMM GROUP

No.	Policy	Date	Recommendation
PO5	Land Development Standard Conditions	Undated	Policy Major changes
PO6	Entrance and Set Back	2013	Policy Major changes
PO7	Road Permit Request	Within past few years	Policy Minor changes
PO8	Fleet Maintenance and Operations	~ 10 years old	Guide & Policy Issues Major changes potentially
PO9	Salt Management Plan	20/04/2005	Guide Major changes potentially
PO10	Winter Control Quality Standard (WC04-01)	2004	Guide Major changes
PO11	Fuel Spill Contingency Plan	03/09/2003	Policy Minor rewrite
PO12	Oversized Vehicles	Oct 2013	Policy Minor changes
PO13	Universal Complaint/ Request Procedure for traffic, traffic calming, street lighting	NEW	Create
PO14	Hamlet Entry Treatment	NEW	Create
PO15	Accessibility	NEW	Create
PO16	County Road Design Standards Compendium	NEW	Create
PO17	Typical County Road Cross-Sections – Urban and Rural	NEW	Create
PO18	Traffic Impact Study Guidelines	NEW	Create
PO19	Road Rationalization Policy (including Goods Movement Corridors)	NEW	Create
PO20	Conduct semi-annual discussions with	NEW	Create

No.	Policy	Date	Recommendation
	Metrolinx on potential intra-regional transit connections.		
PO21	Advocate for additional widening of Highway 401 east of Cobourg	NEW	Create
PO22	5-Year Transportation Master Plan Updates	NEW	Create

Added 2017

Added 2017

5.1.3 What Did We Hear from the Public?

As noted in Section 1.3, a number of consultation activities were held during the development of the TMP. At each of those points, efforts were made by the project team to ensure that key feedback received was incorporated into the final TMP document where possible. A number of the key recommendations and features of the TMP which were a direct or indirect result of public feedback are highlighted in the table below.

Consultation Opportunity	Feedback Received	Actions Taken
Advisory Committee Meeting #2 Advisory Committee Meeting #3	Suggestion that CR21 or Telephone road could be a potential future EDR	Recommendation that study be undertaken to move EDR route from CR2 east of Colborne, to either CR21 or Telephone Road.
Meetings with Municipal Councils November 2015 to February 2016	Hamlet Entry Treatments should incorporate Community Safety Zone designations where possible, to allow for increased fines in these zones	Recommendation that Community Safety Zones be considered for hamlets in the Traffic Calming policy changes; Hamlet Entry Treatment toolkit includes Community Safety Zone designations.
Meetings with Municipal Councils November 2015 to February 2016	TMP document should support expansion of intra-regional transit service	Recommendation that a semi-annual discussion with MTO and Metrolinx take place to discuss potential intra-regional transit connections with Durham Region. Recommendation that a business case study be undertaken for GO Rail expansion to the County.

Consultation Opportunity	Feedback Received	Actions Taken
Public Information Centre #2	Safety concerns regarding the CR28/CR9 intersection	CR28/CR9 is one of the first intersections recommended for a safety review.
	There may be a need to harmonize speed limits along CR45	Recommendation that action be taken on CR45 to reduce the number of speed limit transitions.
	General support for Cycling and Active Transportation in the County, through implementation of the Cycling Master Plan.	Recommendations to update and enhance the Cycling Master Plan.
Meeting with County Council – November 2016	County Road 28 volumes and use compares more closely with a Provincial Highway than a County Road.	Recommendation that discussions with MTO take place on the status of County Road 28
	Highway 401 should be widened to reduce volumes on County Road 2 east of Cobourg	Recommendation that discussions with MTO take place on future improvements to Highway 401
	Hamlet Entry Treatments should be prioritized based on locations where speeding has been identified as a problem.	Recommendation of regular collection of speeding data at locations where speed transitions exist or locations where complaints have been received

In addition to the key points above feedback from stakeholders and the public was relied on to help frame the objectives for many TMP recommendations and also help refine components of the underlying technical analysis such as the congestion modelling. Through the Public Information Centres the County also received public input on a variety of local concerns related to signs, pavement markings, roadside vegetation, etc. these issues were forward to the County's Road Operations group for investigation and action.

5.2 Implementation Strategy

5.2.1 Proposed Timeline for Implementation

5.2.1.1 Transportation Master Plan

Consistent with the horizons identified in the study objectives, this section will outline the assumed implementation horizons and will provide details on a short-term action plan for implementation in

the first 5 and 10 years, as well as anticipated implementation of infrastructure in the medium and long-term horizons. Where appropriate, the recommended EA schedule has also been identified for infrastructure improvements. Schedule A+ and A improvements can be commenced immediately, given that they have undertaken the first two phases of the EA process, whereas Schedule B improvements would require further screening, and Schedule C improvements must complete Phases 3 and 4 of the EA process.

This provides the County with a roadmap to move forward with in terms of the timing and priority of improvements. Based on the availability of staff resources and funding, the timelines may be modified but the priority should remain, unless future work or information changes the information that the priorities have been based upon.

5.2.1.2 Active Transportation Strategy

The implementation of the proposed cycling route and other active transportation infrastructure should be undertaken at the same time as other transportation improvements – where it is deemed possible. When identifying the recommended facility type revisions, an exercise was undertaken to update the phasing of the CMP to be concurrent with the TMP horizon. The following outlines the updated phases for the CMP and the tools to help facilitate its implementation.

Revisions to the Cycling Master Plan Phasing Plan

The County Cycling Master Plan (2012 and 2014) identified an implementation strategy that was intended to be flexible for County and local municipal staff and adapt to budget improvements, opportunities and constraints. The implementation strategy included a 20-year horizon and was based on the following strategies:

- Take advantage of and work in tandem with planned Ministry of Transportation, County and area Municipal road, trail and transit construction projects;
- Construct bikeways and pathways as part of the planning process in new development areas as construction occurs;
- Consult with and consider the opinions of the Cycling Steering Committee with respect to future major decisions in terms of cycling infrastructure implementation;
- Where County and Municipal budgets will allow, attempt to rectify identified problem areas in a timely and efficient fashion;
- Continue to connect our proposed cycling paths both internally within the County and externally to neighbouring communities in order to continually improve the Northumberland County cycling experience.

The implementation schedule was divided into the following three timelines:

- Short Term Implementation (2012-2016)
- Medium Term Implementation (2017-2021)
- Long Term Implementation (2022+)

County of Northumberland Transportation Master Plan
Proposed Phasing - County-wide
Figure 5.2

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Phasing
- Short Term (0-5 Years)
- Medium Term (6-10 Years)
- Long Term (10-15 Years)

Other Trails
- Oak Ridges Trail
- Waterfront Trail
- Trans Canada Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Other
- Railway
- Property Parcel
- Provincial Park
- Alderville First Nations
- County Boundary
- Watercourse

0 2.5 5 10 Kilometres

N

MUNICIPALITY OF MARMORA AND LAKE
TOWNSHIP OF HAVELOCK-BELMONT-METHUEN
TOWNSHIP OF STIRLING-RA
TOWNSHIP OF DOURO-DUMMER
TOWNSHIP OF SMITH-ENNISMORE-LAKEFIELD
TOWNSHIP OF ASPHODEL-NORWOOD
CITY OF PETERBOROUGH
MUNICIPALITY OF TRENT HILLS
FERRIS PROVINCIAL PARK
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN
CITY OF QUINTE WEST
TOWNSHIP OF CAVAN-MONAGHAN
TOWNSHIP OF ALNWICK/HALDIMAND
PETER'S WOODS PROVINCIAL PARK
MUNICIPALITY OF BRIGHTON
TOWNSHIP OF CRAMAHE
TOWNSHIP OF HAMILTON
MUNICIPALITY OF PORT HOPE
TOWN OF COBOURG
PRESQU'ILE PROVINCIAL PARK
MUNICIPALITY OF CLARINGTON
UPPER CHEMONG LAKE
KATCHEWANOOKA LAKE
OTONABEE RIVER
TRENT RIVER
INDIAN RIVER
RICE LAKE
LITTLE LAKE
LAKE ONTARIO
CROWE RIVER

Northumberland County
PLAN BUILD MOVE

Figure 5.2

MMM GROUP

TOWNSHIP OF HAMILTON

0 0.25 0.5 1 Kilometres

N

LAKE ONTARIO

Northumberland county

PLAN BUILD MOVE

Figure

5.3

MMM GROUP

County of Northumberland Transportation Master Plan
Proposed Phasing
Municipality of Port Hope
Figure 5.4

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Phasing
- Short Term (0-5 Years)
- Medium Term (6-10 Years)
- Long Term (10-15 Years)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

0 0.75 1.5 3 Kilometres

N

TOWNSHIP OF CAVAN-MONAGHAN

TOWNSHIP OF HAMILTON

MUNICIPALITY OF CLARINGTON

RICE LAKE

LAKE ONTARIO

See inset map

Northumberland county

PLAN BUILD MOVE

MMM GROUP

County of Northumberland Transportation Master Plan
Proposed Phasing
Township of Hamilton
Figure 5.5

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Phasing
- Short Term (0-5 Years)
- Medium Term (6-10 Years)
- Long Term (10-15 Years)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

0 0.75 1.5 3 Kilometres

N

TOWNSHIP OF CAVAN-MONAGHAN

TOWNSHIP OF ALNWICK/HALDIMAND

MUNICIPALITY OF PORT HOPE

RICE LAKE

LAKE ONTARIO

Northumberland county

PLAN BUILD MOVE

MMM GROUP

Figure 5.5

County of Northumberland Transportation Master Plan
Proposed Phasing
Municipality of Alnwick / Haldimand
Figure 5.6

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Phasing
- Short Term (0-5 Years)
- Medium Term (6-10 Years)
- Long Term (10-15 Years)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- Provincial Park
- County Boundary
- Watercourse

0 1.25 2.5 5 Kilometres

N

TOWNSHIP OF OTONABEE-SOUTH MONAGHAN

MUNICIPALITY OF BRIGHTON

TOWNSHIP OF CRAMAHE

TOWNSHIP OF HAMILTON

TRENT RIVER

INDIAN RIVER

RICE LAKE

LAKE ONTARIO

LITTLE LAKE

PETER HOODS PROVINCIAL PARK

Northumberland county

PLAN BUILD MOVE

Figure 5.6

MMM GROUP

County of Northumberland Transportation Master Plan
Proposed Phasing
Township of Cramahe
Figure 5.7

Legend

Existing Cycling Routes
- Paved Shoulder
- Bike Lane
- Signed Bike Route with Sharrow

Proposed Phasing
- Short Term (0-5 Years)
- Medium Term (6-10 Years)
- Long Term (10-15 Years)

Other Trails
- Oak Ridges Trail
- Waterfront Trail

Road Network
- Highway
- County Road
- Local Road
- Highway 401 Underpass
- Highway 401 Overpass

Key Community Destination
- Emergency Service
- Hospital
- School
- Municipal Office
- Other Community Destination

Other
- Railway
- Property Parcel
- County Boundary
- Watercourse

0 0.75 1.5 3 Kilometres

N

MUNICIPALITY OF TRENT HILLS

MUNICIPALITY OF BRIGHTON

MUNICIPALITY OF ALNWICK / HALDIMAND

LAKE ONTARIO

Northumberland county

PLAN BUILD MOVE

Figure 5.7

MMM GROUP

MUNICIPALITY OF TRENT HILLS

CITY OF QUINTE WEST

TOWNSHIP OF CRAMAHE

TRENT RIVER

TRENT RIVER

LAKE ONTARIO

LAKE ONTARIO

LITTLE LAKE

PRESQU'ILE PROVINCIAL PARK

PRESQU'ILE PROVINCIAL PARK

See inset map

0 1 2 4 Kilometres

N

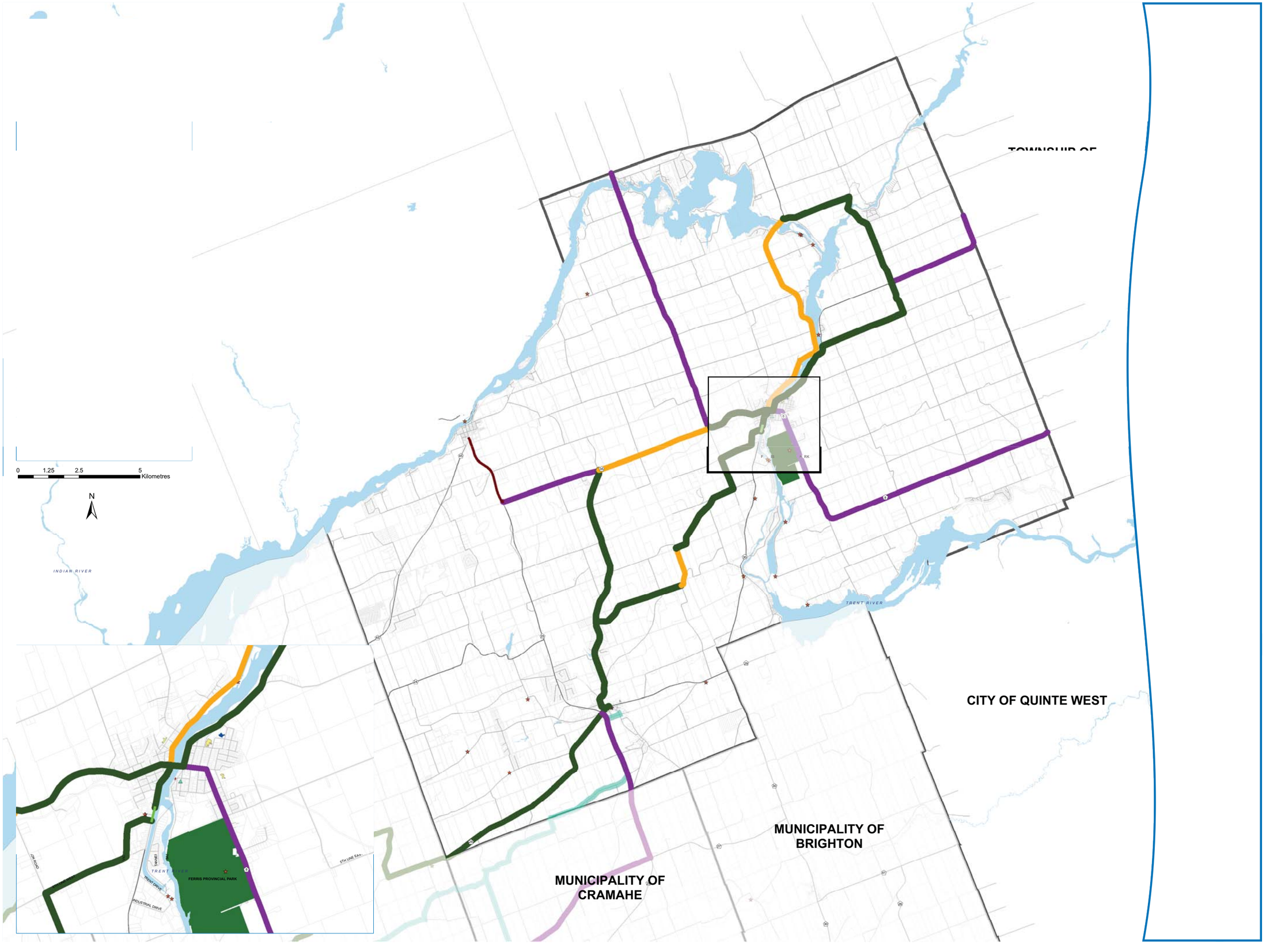
Northumberland county

PLAN BUILD MOVE

Figure

5.8

MMM GROUP


0 1.25 2.5 5 Kilometres
N
INDIAN RIVER
TRENT RIVER
CITY OF QUINTE WEST
MUNICIPALITY OF BRIGHTON
MUNICIPALITY OF CRAMAHE
FERRIS PROVINCIAL PARK
TRENT DRIVE
INDUSTRIAL DRIVE
5TH LINE EAST

With the first phase of the CMP implementation strategy nearing completion, the Transportation Master Plan marks an opportunity to revisit and revise phasing to reflect the work that has been done and the priorities for future consideration.

As part of the development of the AT strategy, the team reviewed and revised the phasing of proposed routes and updated the GIS database to incorporate phasing information as well as information which will help to influence the selection of the preferred facility types. To reflect the completion of the initial short-term phase, the network and phasing have been reviewed and revised, and the phasing has been shifted to the following:

- Short-term (2016 – 2021)
- Medium-term (2021 – 2025)
- Long-term (2025+)

Figures 5.2 - 5.9 illustrate the revised phasing for each of the proposed cycling routes identified throughout the County.

5.2.2 Priorities for Infrastructure

5.2.2.1 Intersection Safety and Signalization Improvements

A number of improvements for intersections, both for safety (Improvement **IN1**) and to improve operations through the implementation of signals (Improvement **IN2**), are proposed. Both of these types of improvements and their relative priorities are explained in further detail below.

While the TMP does not recommend any intersection signalization at this time, the priority list will indicate the most likely locations that will be signalized in the future, which in turn provides the County with advance warning that signalization will likely occur in the near term. At the same time, while meeting a warrant means that a signal could be installed, there is no requirement for installation. As a result, each of the intersections should undergo an operations assessment, prior to signalization, to determine whether the signalization will actually be beneficial to the intersection.

1. Update Priorities during AADT Counts

   The current list of prioritized intersections was identified by reviewing the locations where the convergence of AADT's was highest. Thus, during each update of the AADT information, the priority list of intersections can be adjusted as necessary. If any new intersections appear on the priority list, 8-hour traffic counts can be conducted in order to complete the warrant calculations as described in OTM Book 12.

2. Determine priorities during development applications

   In addition to conducting a periodic review during the AADT data collection, signalization should be evaluated as part of the full suite of improvements reviewed during the submission of a development application. This will help the County to identify intersections along County Arterial Roads that may, due to background growth or development of a land

parcel, require a new signal, especially for intersections where only one road is under County control.

Based on the discussion above, the TMP recommends the following priority list for signalization, with the knowledge that intersections may change, be added or removed from the list based on new data.

The intersections were ranked based on the highest warrant fulfillment percentages for either Warrant 1 or 2. Intersections with higher warrant fulfillment percentages were given higher priority in terms of implementation. Table 5.3 shows the priority given to each intersection based on its warrant average fulfillment percentage.

Table 5.3 - Signalization Priority List (IN1)

Intersection	Average Fulfillment Percentage (Higher of Warrant 1 or 2)	Priority Rank
County Road 29 and County Road 30	89%	1
County Road 2 / County Road 74 (Dale Road) and County Road 10	75%	2
County Road 45 and County Road 22 (Centreton Road)	74%	3
County Road 2 and County Road 23 (Lyle Street North)	65%	4
County Road 30 and County Road 35	64%	5
County Road 74 (Dale Road) and County Road 45	63%	6
County Road 20 (Elgin Street East) and County Road 20 (Brook Road North)	55%	7
County Road 25 and County Road 35	52%	8
County Road 45 and County Road 15 (Harwood Road)	48%	9
County Road 30 and County Road 26	47%	10

The intersection improvements identified previously in Section 3.2.5 to improve safety conditions at the highest collision rate locations in the County should be prioritized based on the location with the highest rate, in descending order. Based on the cost estimates and funding available as outlined in section 5.3, we believe that the safety improvements can be implemented at a rate of 2 per year. However, this will depend also on the availability of staff resources and other factors, which may change the overall timeline. **Table 5.4** provides the priority list and the proposed timeline.

It should be noted that, as part of the proposed annual safety reviews, the priority list may change and the resulting timelines may shift slightly. Furthermore, the proposed timelines are subject to funding availability on a year-to-year basis.

Table 5.4 - Intersection Safety Improvement Priority List (IN2)

Intersection	Priority	Proposed Timeline
County Road 2 and Townline	1	1 year
County Road 28 and County Road 9 (Oak Ridges Road)	2	1 year
County Road 18 and Danforth Road	3	2 years
County Road 45 and Beagle Club Road	4	2 years
County Road 29 and Glover Road	5	3 years
County Road 18 and Telephone Road	6	3 years
County Road 8 and Wingfield Road	7	4 years
County Road 20 (Elgin Street) and Ontario Street	8	4 years
County Road 45 and County Road 22 (Centreton Road)	9	5 years
County Road 30 and 5th Line	10	5 years

5.2.2.2 Road Segment Improvements

The priority and timelines associated with improvements to the operations of specific segments of roadway under the County's jurisdiction are outlined below in **Table 5.5**. The improvements represent infrastructure improvements **IN3** and **IN4**.

Table 5.5 - Proposed Road Segment Improvements and Priorities

I.D.	Improvement	Priority Locations	Timeline
IN3	Revised Speed Limits where speed changes exceed 20 km/h	Locations in proximity to schools and residential areas.	0-5 years
IN4	Hamlet Entry Treatments	At the County's discretion based on previous complaint history.	0-5 years for priority locations

5.2.2.3 Future Studies

A number of future studies have been identified as part of the TMP. The proposed timeline for the completion of these studies is provided in **Table 5.6**. Completion of the studies will be subject to staff and funding availability, and may need to be staggered over several years.

Table 5.6 - Timelines for Future Studies

I.D.	Study	Locations	Timeline
IN5	Corridor studies (on 2031 improvement locations)	County-wide	0-5 years
IN6	Complete EAs for 2031 improvement locations	County-wide	5-10 years (depends on timing as identified by corridor studies)

I.D.	Study	Locations	Timeline
IN7	Corridor studies and EAs for 2041 and beyond 2041 improvement locations	County-wide	Beyond 10 years, may change depending on new information
IN8	Emergency Detour Route relocation feasibility study	EDR segment south of 401 on County Road 2	0-5 years
IN15	Business Case Study for Go Rail Expansion	County-Wide	0-5 years

5.2.2.4 Monitoring and On-Going Projects

Table 5.7 summarizes the projects that are already underway in the County. These projects are integral to monitoring the implementation of the TMP and other County studies, as well as ensuring that the County can continue to fund their plans. They have been undertaken previously by County staff and should continue to play an important role in providing the necessary information and data to support County trans portation activities.

Table 5.7 – Ongoing Projects

I.D.	Project	Locations	Timeline
IN9	AADT and Intersection Data Collection Program	County-Wide, Intersection Signalization Priority locations	On-going
IN10	Collision Data Collection Program (as collected from MTO and local police departments)	County-Wide	On-going
IN11	County Road 28 Jurisdiction Review	County Road 28 north of Highway 401	On-going
IN12	Speed Data Collection Program (at key locations)	County-Wide (locations with transitions or complaints)	On-going
IN13	Cycling Master Plan Improvements	County-Wide	On-going
IN14	Investigate Funding Options	County-Wide	On-going

5.2.3 Priorities for Policy and Guideline Updates

The following section discusses potential priorities for Northumberland County to undertake a policy review. Some policies will require review from different departments and staff, when related to their area of responsibility and expertise.

When determining how to apply limited resources to the task of reviewing existing policies and guidelines, and generating new ones, the County must first identify which ones could be misinterpreted between partner agencies and member municipalities, in potentially challenging and immediate circumstances. Beyond this, policies which have been requested for review during the consultation, policies which may have a direct impact on County budgeting, and policies which

are dependent on each other should be reviewed. The schedule of policy review will be dependent upon the resources which the County can direct to these undertakings. The following list highlights the priority of policy review in sequential order:

1. The County should identify those policies which pose the greatest risk – or seriousness of consequences – if they are not addressed quickly. The policies which potentially fall into this category are those dealing with the installation of stop and warning traffic signs (Advance Warning Signs) and related to hazardous materials (Fuel Spill Contingency).

2. The next level of priority are those issues which have been the subject of greatest public concern as expressed throughout the development of the Transportation Master Plan, and beyond. These concerns clearly relate to the speed of traffic, and are represented under the general category of traffic calming. In addition to a review of the existing traffic calming policy, new guidelines are recommended to establish a streamlined, universal complaint and request procedure, and to document and implement traffic management measures as Hamlet Entry Treatment.

3. Consistent throughout the consultation for the TMP were concerns raised by the member municipalities about access policies on county roads, impacting potential land development opportunities. Several policies are encompassed in this category, and they should all be reviewed in unison because of the anticipated inter-connectedness of each. These policies represent the next level of priority for review: Land Development Standard Conditions, Entrance and Set Back policy, and Procedure to Close Road Allowance.

4. Member municipalities have also raised concerns about the criteria used by the County to determine where improvements are required to street lighting in rural settings. These improvements are directly related to the County's budget, and a review of the policy related to the construction of street illumination must be undertaken in the context of the funding available for such improvements. The County will also look for other opportunities to improve street lighting through other road improvement projects, funded through the project budget rather than the discrete street light budget item.

5. There are two inter-dependent policies which should be reviewed in 2016, regardless of the progress made in the review of the aforementioned policies: the Salt Management Plan and the Winter Control Quality Standard. Part of the review of these documents includes a determination of whether they can be consolidated. It would be prudent to review the Fleet Maintenance and Operations policy immediately after the above-mentioned winter maintenance review because of the reliance on and crucial role of maintenance vehicles during inclement weather.

6. Additional policies which should be reviewed in unison because of their inter-connectedness are those which control the issuance of road permits: there are a variety of permits which are encompassed in the Road Permit Request category, and a specific item called Oversized Vehicles.

7. New policies which are also interconnected are those which require the review or generation of road design standards. Road jurisdictions routinely have typical roadway cross sections which show standard dimensions of roadway elements, such a road beds and widths on urban and rural roads, and how features are typically assembled on standard widths of the road allowance. We would recommend that the County conduct such a review of roadway cross-sections, which would also focus on design and operational features to facilitate the movement and accommodation of people with mobility and vision challenges.

8. When property owners and developers consider improvements to their properties, there are numerous municipal requirements that have to be satisfied in order for projects to receive approval. One is the determination of the impacts that the development will generate traffic-wise. To assist developers in their pre-planning of projects, road jurisdictions provide guidelines which document the scope of traffic studies required to identify the potential traffic impacts to the satisfaction of the municipality, and the thresholds of acceptable impacts. The TMP recommends the County to develop such guidelines.

Policy Implementation Prioritization Rationale

Implement based on priority

Revised 2017

1. Greatest risk (highest priority)
- **PO2** - Installation of Stop and Warning Traffic Signs (Advance Warning signs)
- **PO11** - Hazardous Materials (Fuel Spill Contingency)

2. Primary and Member Municipality Concerns
- **PO1** - Traffic Calming Policies
- Access policies on County roads impacting land development opportunities

  PO5 - Land Development Standard Conditions
  PO6 - Entrance and Set Back Policy
  PO3 - Procedure to Close Road allowance
  PO13 - Universal Complaint/Request Procedure for Traffic, Traffic Calming and Street Lighting
  PO14 - Hamlet Entry Treatment
  PO19 - Road Rationalization Policy
  PO20 - Declare Support for Inter and Intra-Regional Transit

3. PO4 - Potential Street lighting Improvement

4. Road Permits
- **PO7 -** Road Permit Requests
  - Special events
  - Permission to enter
  - Setback application
  - Permission to bore
  - Permission to open cut
  - **PO12** - Oversized Vehicles

5. New Road Standard Policies
- **PO15 -** Accessibility
- **PO16 -** County Road Design Standards
- **PO17 -** Typical County Road Cross Sections
- **PO18 -** Traffic Impact Study Guidelines
- **PO21 -** Transportation Master Plan Updates

Set time for review

Spring 2017
- **PO9 -** Salt Management Plan
- **PO10 -** Winter Control Quality Standard
- **PO8** - Fleet Maintenance

5.2.4 Prioritizing Active Transportation

With the shifted phasing of the proposed routes, the intent is to still reflect the strategies noted in the original master plan but to reflect more current conditions and to allow Northumberland County with the flexibility to continue the implementation of the CMP with coordinated tools. Thus, the priorities of the proposed routes have not been modified.

As noted in the sections above, one of the primary outputs of the AT strategy is the development of a comprehensive GIS database of up to date active transportation related information. The database also includes documentation of the results of each of the steps undertaken to review the AT network.

The GIS database is complemented by a spreadsheet which consolidates all relevant information related to the planning, design and implementation. The spreadsheet is meant to be used as a tool by those staff who do not have access to GIS or who have greater experience and ease working within the Suite of Microsoft programs. By developing these tools, it will be easier for all staff involved in the planning, design and implementation of cycling facilities to coordinate and collaborate.

Once the TMP and AT Strategy have been adopted by Council, the tools should be integrated and adapted as need to remain a relevant / up to date tool used by County staff and its partners.

5.3 Implementation Funding

This section provides an order-of-magnitude estimate of the proposed new costs to implement the infrastructure improvements noted in Section 5.1, and a comparison of the costs with available funding as proposed in the 2016-2025 10-Year Capital Plan. The TMP has assumed that the review and creation of policies outlined in Section 5.2, as well as the on-going projects in Section 5.2.2.4, will be completed using existing staff resources.

5.3.1 Cost Estimates for Safety Improvements

Section 3.2.5 addresses various mitigation methods to implement into intersections with the highest collision rates. **Table 5.8** shows the estimated cost range associated with the mitigation methods for these intersections. **Appendix I** shows the cost breakdown for the minimum and maximum mitigations for each intersection.

Table 5.8 - Cost Estimates for Top Collision Intersections

Intersection	Cost Estimation
County Road 2 and Townline	$500
County Road 28 and County Road 9 (Oak Ridges Road)	$14,000
County Road 18 and Danforth Road	$1,000-$300,600
County Road 45 and Beagle Club Road	$1,000-$137,000

County Road 29 and Glover Road	$7,000-$307,000
County Road 18 and Telephone Road	$1,000-$300-600
County Road 8 and Wingfield Road	$1,000
County Road 20 (Elgin Street) and Ontario Street	$200,000-$1,000,000
County Road 45 and County Road 22 (Centreton Road)	$452,400
County Road 30 and 5th Line	$60,000-$260,000
Total High-End Estimate (All Recommended Improvements Necessary)	**$2,773,100**
Total Low-End Estimate (Only Some Improvements Necessary)	**$737,900**

While County's current long term plan (2016 - 10 year capital program) meets current operating and basic capital needs, it does not allow the County to make any significant progress in the implementation of the recommendations made in the TMP and other Environmental Assessment (EA) studies completed in recent years. For example, over the next 10 years, the actual available budget for the intersection improvements is only $735,000.00. This planned budget will prove to be insufficient to meet the intersection improvement needs estimated at $2,773,100.00 through the TMP. Similarly, the available funding under the County's current long term plan will not be able to support the major costs forecasted through other EA(s) and studies.

Although the overall condition of the transportation system is a reflection of an attractive and flourishing system, it is imperative that the County develop a self-sustaining long term funding plan needed to sustain the vital transportation infrastructure. Sustainable funding must also consider the additional needs imposed by increasing service expectations from both the public and regulatory agencies (i.e. the growing demand for cycling infrastructure and accessible pedestrian signals) as well as the risk management, which often expands the scope of the County's infrastructure projects to include measures to mitigate potential safety issues (i.e. profile modifications to improve sight lines) Accordingly, County's 10 year capital and operating plan should be revised to reflect new information and needs identified through the TMP and other future studies.

5.3.2 Cost Estimates for Proposed Infrastructure

The following **Table 5.9** provides cost estimates for all of the infrastructure improvements and studies. For some of the identified improvement studies, the cost to complete the study is conditional on the study being required. For example, if a Corridor study of one of the 2031 Improvement Locations does not recommend conducting an EA for several years, then the cost of completing an EA may not occur until later than the currently proposed implementation timeline. As a result, the costs in Table 5.9 are intended to be used as guidance only and do not necessarily represent the total cost of implementation of the recommendations of the TMP.

Table 5.9 - Cost Estimates for Proposed Infrastructure

I.D.	Description	Estimated Unit Cost	Estimated Timeline	Cost to Completion	EA Schedule
IN1	Intersection Safety Improvements	Study: $1,800 per intersection Implementation: See Table 3.6	0-5 years	Review: $36,000 Implementation: $701,900 - $2,737,100 **Total: $737,900 - $2,773,100**	A
IN2	Intersection Signalization	$250,000 per intersection	0-15 years, estimated 1 per 5 year period	**Estimated Total: $750,000**	A
IN3	Revised Speed Limits where speed changes exceed 20 km/h	$500 per sign	0-5 years	**Total: $27,000**	A
IN4	Hamlet Entry Treatments	$26,580 per treatment	0-10 years, 1-2 per year	**Total: $539,600**	A
IN5	Corridor Studies for 2031 Improvement Locations	Vary based on Corridor length and complexity. $25,000 per study	5-10 years, estimate 2 studies required	**Estimated Total: $50,000**	N/A
IN6	EAs for 2031 Improvement Locations	$250,000 per study	5-10 years, assume 1 required during this period	**Total: $250,000**	TBD
IN7	Corridor studies and EAs for 2041 and beyond 2041 improvement locations.	Vary based on Corridor length and complexity. $250,000	15-20 years, assume 4 corridors required for 2041 and 4 corridors required for beyond 2041.	**Total: $2,000,000**	TBD
IN8	Emergency Detour Route relocation feasibility study	$30,000 per study	0-10 years, assume two studies needed	**Total: $60,000**	N/A

I.D.	Description	Estimated Unit Cost	Estimated Timeline	Cost to Completion	EA Schedule
IN9	AADT and Intersection Data Collection Program	$1,000 per additional location	On-going	**Total: $10,000 for 10 locations, also requires Staff Resources**	N/A
IN10	Collision Data Collection Program	No additional costs	On-going	**Requires Staff Resources**	N/A
IN11	County Road 28 Jurisdiction Review	No additional costs	On-going	**Requires Staff Resources**	N/A
IN12	Speed Data Collection Program (at key locations)	Internal staff costs	On-going	**Requires Staff Resources**	N/A
IN13	Cycling Master Plan Improvements	Internal Staff costs	On-going	**Requires Staff Resources**	N/A
IN14	Investigate Funding Options	Internal staff costs	On-going	**Requires Staff Resources**	N/A
IN15	Business Case Study for GO Rail expansion	Internal Staff costs	0-5 years	**Requires Staff Resources**	N/A

Added 2017

Added 2017

Table 5.10 below identifies total costs by implementation period for the proposed improvements and improvement studies, and the corresponding funding program that each infrastructure improvement could qualify under, based on the 2016-2025 10-Year Capital Plan. It should be noted that the costs below have not yet been included in capital budget planning, and therefore should be assumed to require additional funding beyond what has been identified in the current 10-Year Capital Plan.

Table 5.10 – Summary of Costs and Funding Sources by 5-Year Period

Period	Funding Sources (from 10 Year Capital Plan)	Related Improvement	Estimated Cost for Period
0-5 years	Guiderail Replacement/Safety Improvements	IN1	$737,900 - $2,773,100
	Intersection Improvement Program	IN2 IN3 IN4	$250,000 $27,000 $269,800

Period	Funding Sources (from 10 Year Capital Plan)	Related Improvement	Estimated Cost for Period
	Transportation Service Improvement Needs	IN8	$30,000
5-10 years	Intersection Improvement Program	IN2 IN4	$250,000 $269,800
	Transportation Service Improvement Needs	IN5 IN6 IN8	$50,000 $250,000 $30,000
10+ years*	Intersection Improvement Program	IN2	$250,000
	Transportation Service Improvement Needs	IN7	$2,000,000

*Note: Funding for beyond 10-years has not been identified. As a result, funding has been assumed to stay constant with proposed 2020-2025 funding levels for any 5-year period beyond 2025.

5.4 Getting it Built: Funding & Partnership Sources

In order to properly fund the proposed infrastructure improvements, a number of funding alternatives are identified below. These should be studied further by staff as recommended in **IN12**.

5.4.1 New Building Canada Plan

The New Building Canada Plan provides stable funding for a 10-year period. Some components, including the Gas Tax Fund (GTF), currently provide funding to the County. In the case of the GTF, the County currently receives $2.3 million per year. Other components of the New Building Canada Plan include:

- A $14-billion New Building Canada Fund, which consists of the $4-billion National Infrastructure Component (NIC) that will support projects of national significance and the $10-billion Provincial-Territorial Infrastructure Component (PTIC) for projects of national, regional and local significance.
- To apply for the Building Canada Fund, completed business cases must be submitted to Infrastructure Canada. The eligible categories include highways and major roads, public transit, intelligent transportation systems and rail infrastructure projects.
- An additional $1.25 billion in funding for the P3 (Public-Private Partnerships) Canada Fund administered by PPP Canada.

5.4.2 Other Infrastructure Funds

5.4.2.1 Ontario Community Infrastructure Fund

The Ontario Community Infrastructure Fund (OCIF) provides funding for small and rural communities to develop infrastructure. The County currently receives approximately $180,000 per year in annual funding from the OCIF.

It should be noted that there is potential for expansion of OCIF funding, given that the formula-based funding model will increase from a province-wide total of $95 million in 2017 to $130 million in 2018 and $200 million in 2019 and beyond. Potential OCIF funding beyond 2017 has not been included in the County's 2016-2025 10-year Capital Plan.

5.4.2.2 Provincial-Territorial Base Fund

Established under the 2007 *Building Canada* plan, the $2.275 billion Provincial-Territorial Base Fund provides predictable funding to provinces and territories to address core infrastructure priorities. To be eligible for funding, provinces and territories were first required to sign a Provincial-Territorial Base Fund Agreement with the Government of Canada.

To receive funding, provinces and territories must submit a capital plan containing a list of initiatives for federal cost-sharing. The plan includes a brief description of each initiative, the eligible category of investment and the total eligible cost. The federal government will contribute up to 50 per cent of the plan's eligible costs for provinces and up to 75 per cent for territories.

5.4.3 Development Charges

Northumberland County has previously implemented an area-specific development charge for the Cobourg East Community Area. In order to fund the proposed infrastructure recommended from this TMP as well as existing and on-going projects in the County, it is recommended that a County-wide Development Charge (DC) study be undertaken to determine an equitable share of County infrastructure costs that can be borne by future development.

The DC study will require additional information as input, including resolution on the growth-related infrastructure improvements (**IN5-7**) in terms of the estimated cost of these improvements. In addition, in order to determine the benefits to existing users (non-growth related) component of the development charge, resolution on the County standard cross-sections (**PO16**), as discussed in Section 3.3, will be required.

It is recommended that the required infrastructure studies and policy work take place prior to commencing the DC study. Other municipal infrastructure, such as waste management, will also provide input into the study and may affect timelines for the DC study.

5.4.4 Alternative Financing Methods

5.4.4.1 Public-Private Partnerships

The term Public-Private Partnership (P3) is used to cover a wide range of contractual relationships and opportunities, where public agencies share the risks and benefits of infrastructure and service projects with the private sector. These contracts are sometimes referred to as Alternative Financing Procurement (AFP) projects and take the form of Design, Build & Finance (DBF) or Design, Build, Finance, Operate and Maintain (DBFOM). This strategy does not help to provide additional sources of revenue but rather provides greater overall project Value for Money (VFM) and alternative financing options (streamlining of payments).

Infrastructure Ontario is the primary provincial agency involved in procuring and administering P3 projects in the province. Given that there is the potential for substantial VFM that can be achieved in following a P3 method due to the benefits achieved in risk transfer and reduction, the County should consider working closely with the provincial government and following their lead in this regard. The potential for access to additional federal funding through the New Canada Building Fund is also available as described in Section 5.4.1.

It should be noted that even if financing is not part of a P3 contract, there are still significant advantages to P3 initiatives. P3 contracts can usually be delivered much faster, at lower overall project costs, with the contractor assuming some of the project risks and with contractor warranties. These contracts usually take the form of Design Build (DB), Design Build Maintain (DBM) or Design Build Operate Maintain (DBOM).

Although the administration of P3 projects varies from typical construction contracts, and therefore represents a significant unknown for the County, the benefits of the P3 process may be able to provide additional funding flexibility for future infrastructure projects and thus, should be explored in concert with other funding opportunities.

5.4.5 Active Transportation Funding Alternatives

The implementation of the AT Strategy should be a collaborative effort between the County, its partners and external funding sources and partnership opportunities. There are a number of funding strategies that are available for municipalities at the federal and provincial level. Funding opportunities were originally identified in **section 9.3.1** of the CMP including provincial grants and sponsorships, organizations that could be explore as sources for additional funding and other opportunities that could be explored such as County and Municipal Development Charges, political support, Build Canada Fund and the Federation of Canadian Municipalities transportation project grant.

Though some of these opportunities no longer have funds to support projects there are additional funding sources that could be explored by Northumberland County to facilitate the implementation of walking and cycling infrastructure and supportive programs. These additional funding opportunities are noted in **Table 5.11** below.

Table 5.11 – Active Transportation Funding Alternatives

Funding Source	Additional Details
Federal / Provincial Gas Tax	▶ See Section 5.4.1. The County currently receives $2.3 million per year in funding from the Gas Tax Fund.
ecoMobility (TDM) Grant Program	▶ For details on the ecoMobility Grant Program please refer to: http://data.tc.gc.ca/archive/eng/programs/environment-ecomobility-menu-eng-144.htm
Federation of Canadian Municipalities Green Municipal Fund	▶ For additional details regarding the Green Municipal Fund and potential funding alternatives please refer to: http://www.fcm.ca/home/programs/green-municipal-fund.htm
Trans Canada Trail Funding and Federal Fund Matching	▶ For additional information regarding trail funding alternatives please refer to: http://old1.tctrail.ca/trail_funding.php
Federal and Provincial Infrastructure / Stimulus Programs	▶ For Federal Government infrastructure stimulus fund details please refer to: http://www.bcfontario.ca/english/isf/guide.html ▶ For Provincial Government infrastructure stimulus fund details please refer to: http://www.moi.gov.on.ca/en/infrastructure/stimulus.asp
Ontario Trillium Foundation	▶ For details regarding potential funding alternatives please refer to: http://grant.otf.ca/
Corporate Environmental Funds (Shell and MEC)	▶ For additional details regarding MEC's fund to preserve recreationally significant landscapes please refer to: http://www.mec.ca/AST/ContentPrimary/Community/CommunityContributions/LandAcquisition.jsp
Corporate Donations	▶ Money or service in kind and have been contributed by a number of large and small corporations over the years
Connecting Links Funding	▶ The Connecting Links Program was initiated by the Ministry of Transportation Ontario to help pay the construction and repair costs for municipal roads and connect communities. Though the formal period to apply for the program was completed in 2016 it may be extended in the future: http://www.mto.gov.on.ca/english/highway-bridges/connecting-links.shtml
Trans Canada Trail Funding and Federal Fund Matching	▶ For additional information regarding trail funding alternatives please refer to: http://old1.tctrail.ca/trail_funding.php
Federal / Provincial Gas Tax	▶ See Section 5.4.1
#CycleON Strategy	▶ Future monies made available by the Ministry of Transportation Ontario as part of the #CycleON Action Plan

Appendix A

Summary of Consultation

WSP | MMM GROUP

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Section 1.0

A Consultation Overview

Developing a Transportation Master Plan (TMP) for the County of Northumberland requires an understanding of the current transportation trends and activities as well as the future alternatives and opportunities. A master plan that is being developed for such a large geographic area requires a tailored consultation strategy to engage the appropriate stakeholders and interest groups and the greatest number of public representatives. The following provides an overview of the consultation approach, objectives, strategies and outcomes.

1.1 What were the Objectives?

The consultation strategy was also guided by five (5) key objectives:

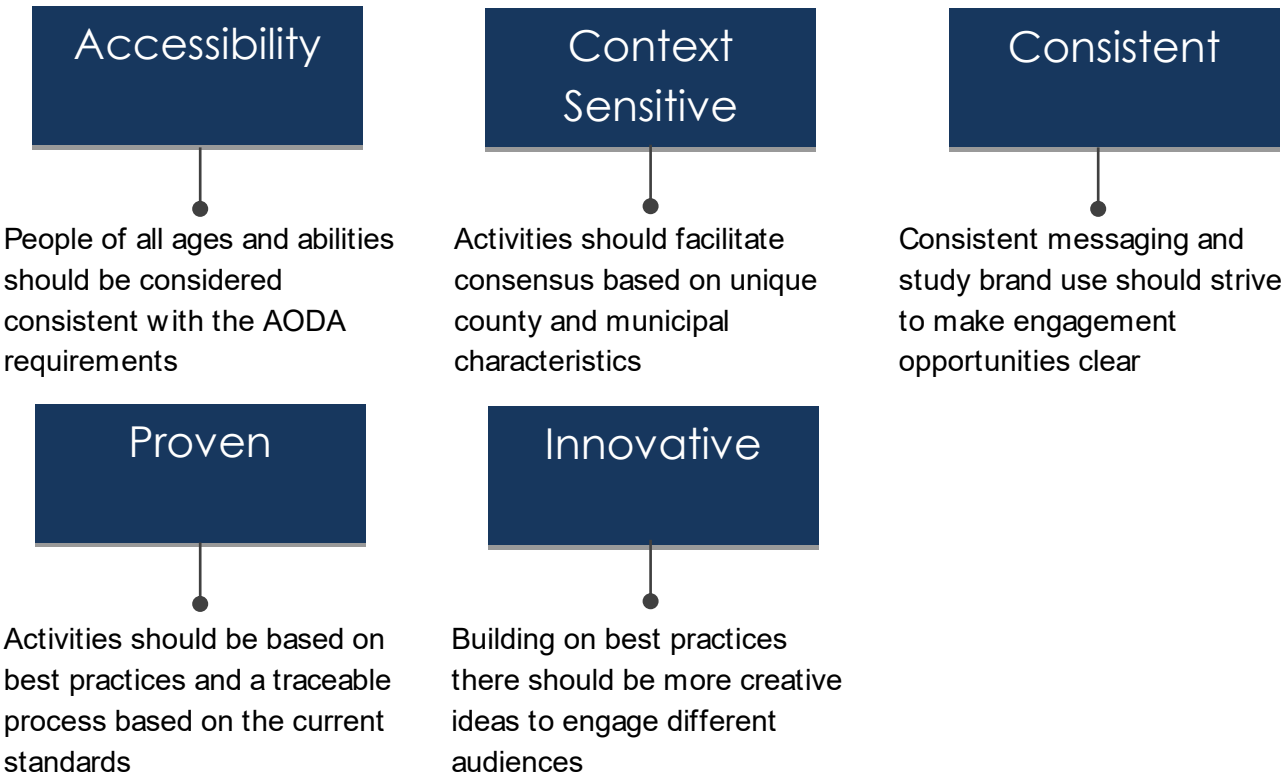


Figure 1 – Public & Stakeholder Consultation Objectives

The process of developing the TMP was developed in accordance with the Municipal Class Environmental Assessment (EA) requirements including the public and stakeholder consultation efforts undertaken. Consistent with a Schedule B Class EA, the project team was required to facilitate two distinct points of contact with the public.

For the purposes of this assignment and due to the unique characteristics of the County the study team aimed to go beyond the "requirements" to provide a menu of consultation alternatives for local residents, County and municipal staff and local interest groups.

1.2 Considering the Different Audiences

The goal of the master plan is to identify transportation solutions for the people who live, work and play throughout Northumberland County's rural and urban areas.

The recommendations included in the TMP will also be the guide for County staff for future decision making. As such, it was important for the consultation strategy to identify consultation opportunities that engage a number of key groups including public, political, private and technical representatives.

More specifically, the target audiences identified for the Northumberland TMP are presented in **Figure 2**.

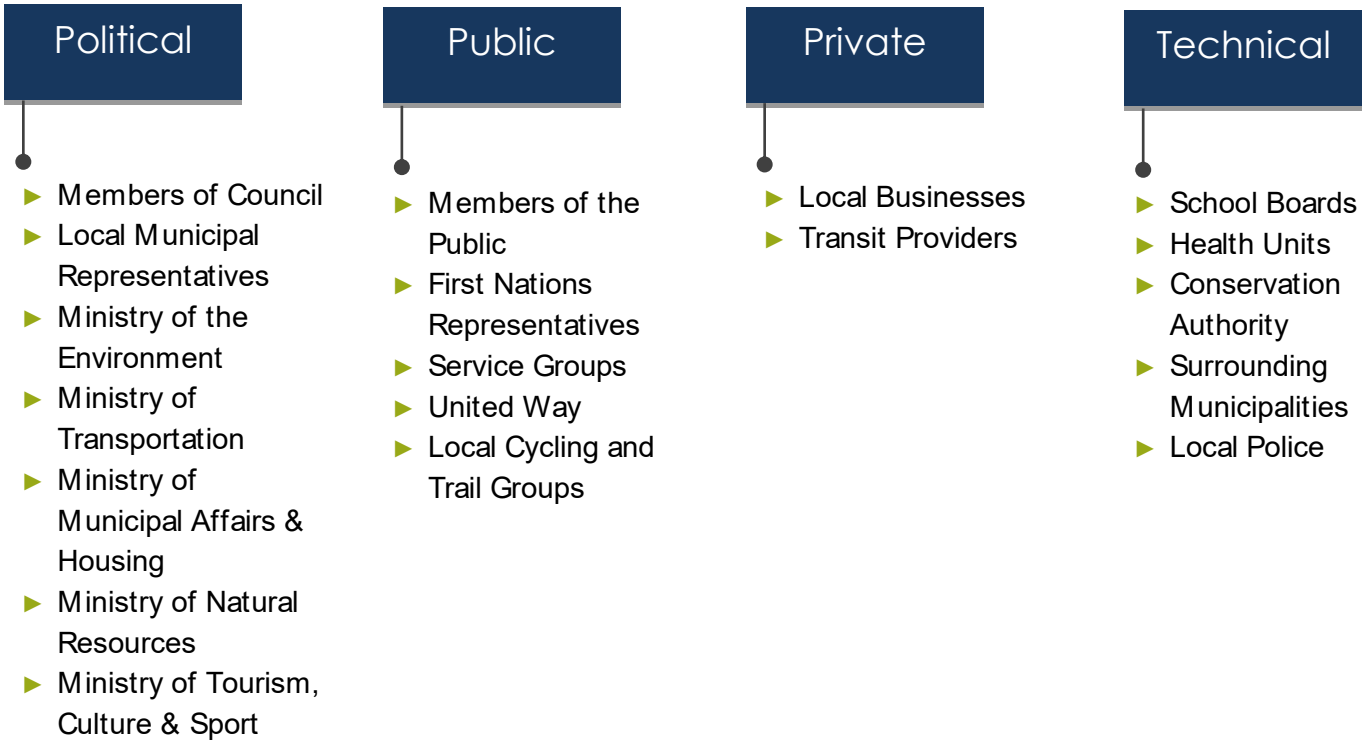


Figure 2 – Public & Stakeholder Representatives Engaged in the TMP Process

1.3 Defining the Scope of the Consultation

The principles of clarity, variation and adaptability were used as the cornerstones of the consultation program (see **Figure 3**). The following provides a description of each of the principles.

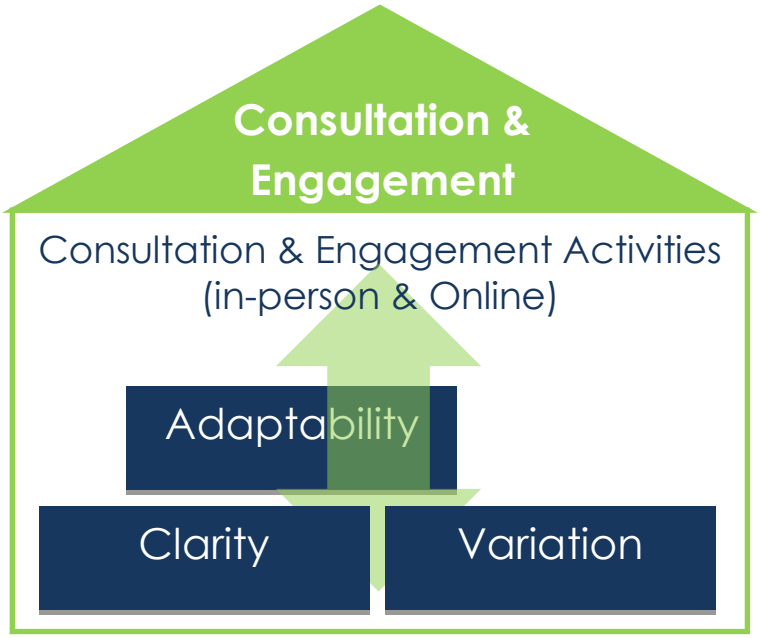


Figure 3 – Public & Stakeholder Consultation Cornerstones

Clarity |

Means the ability for the study team to identify consultation activities that are easy to get to or at a time that is, when possible, best suited to the schedules of local residents and stakeholders. It also means that study information can be found in one centralized location over the course of the study.

Variation |

Means that members of the public and stakeholders are being provided with a range of consultation and engagement options. Activities could be in-person, online or coordinated with other ongoing planning or engineering initiatives to generate multiple avenues for input.

Adaptability |

Means that not all consultation and engagement activities may work as originally anticipated. Where appropriate, adaptations to the consultation and engagement strategy or program may be required to help increase public and stakeholder engagement. It is important to understand what has worked and what may need to be reconsidered.

With these objectives in mind, a number of public and stakeholder consultation and engagement activities were identified. The activities were undertaken in two rounds consistent with phases 1 and 2 of the Municipal Class EA process. A figure illustrating the project timeline and the consultation activities used to gather input on key study deliverables is presented below.

August 2014

Ongoing Public & Stakeholder Consultation

- **Online Questionnaire** — A set of questions regarding current transportation trends and future improvements | Date: September 2014 (Ongoing)
- **Advisory Committee #1** — An opportunity for the AC to meet and discuss study objectives, opportunities and challenges | Date: September 30th, 2014
- **Public Information Centre #1** — An opportunity for members of the public to review initial study findings | Date: November 24th & 27th & December 1st, 2014
- **Advisory Committee #2** — An opportunity for the AC to meet and discuss TMP analysis, Policy Review and PIC #1 | Date: February 17th, 2015
- **Advisory Committee #3** — An opportunity for the AC to meet and discuss major modelling and network development components | Date: October 14th, 2015
- **Public Information Centre #2** — An opportunity for members of the public to review the results of major modelling and network development components | Date: November 7th, 2015
- **Advisory Committee #4** — An opportunity for the AC to meet and discuss the final "run" of the modal and additional cycling work | Date: March 10th, 2016

March 2016

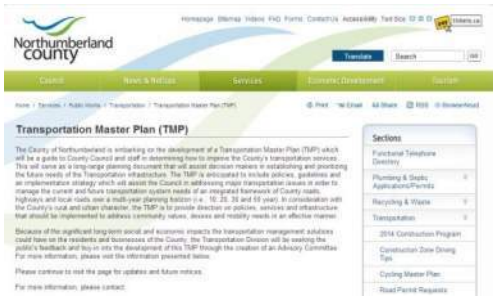
Ongoing promotion and outreach initiatives were used to increase awareness about the intent and objectives of the TMP and to provide the public with up to date information on public and stakeholder consultation opportunities. The methods of promotion and outreach used for the Northumberland TMP included:

Study Business Card

Media Promotion

- Local Radio
- Local Newspapers

Website Updates



Section 2.0

The Responses / Input Gathered

2.1 Who Responded

The number of responses gathered over the course of the study varied based on the type of activity that was used to engage and consult. Though there was significant effort to promote the consultation activities e.g. online engagement, social media, media releases and newsletters, momentum was at points, difficult to generate. The study team continuously adapted the promotion and outreach efforts to increase awareness and involvement as the consultation activities were rolled out.

The following table summarizes the number of attendees and / or responses that were generated from the online and in-person public and stakeholder consultation activities. The response rates are provided for the consultation events where attendance or responses could be tracked. This does not include study team meetings or promotion and outreach initiatives.

Table 1 – Summary of Response Rate by Consultation Activity

Activity	# of Respondents	Additional Promotion
Online Questionnaire	57 Responses	► Advisory Committee members were emailed with a link to the questionnaire ► Information was included on the study business cards ► A link to the questionnaire was also included on the project website
Advisory Committee Meeting #1	15 Attendees	► Advisory Committee members were emailed directly with the confirmed date and time and were provided with the materials in advance of the session ► A notice was distributed to the public through the study website and local newsletters / publications
Public Information Centre #1	Total over 3 venues – 10 Attendees	► A notice was developed and published in local publications and on the study webpage ► Information was also promoted through local radio stations
Advisory Committee Meeting #2	16 Attendees	► Advisory Committee members were emailed directly with the confirmed date and time and were provided with the materials in advance of the session ► A notice was distributed to the public through the study website and local newsletters / publications

Activity	# of Respondents	Additional Promotion
Advisory Committee Meeting #3	16 Attendees	► Advisory Committee members were emailed directly with the confirmed date and time and were provided with the materials in advance of the session ► A notice was distributed to the public through the study website and local newsletters / publications
Public Information Centre #2	46 Attendees	► A notice was developed and published in local publications and on the study webpage ► Information was also promoted through local radio stations ► As the session was part of a larger promoted public event additional promotional efforts were undertaken that were outside of the direct efforts of the County or the consultant team
Advisory Committee Meeting #4	16 Attendees	► Advisory Committee members were emailed directly with the confirmed date and time and were provided with the materials in advance of the session ► A notice was distributed to the public through the study website and local newsletters / publications

2.2 What did we Hear?

At each of the consultation events, the study team used different engagement techniques to gather input. The input that was gathered was used to develop and / or refine project deliverables. The intent was for the sessions to be as interactive as possible to demonstrate how public and stakeholder opinion was being used to shape the study findings and ultimately the proposed improvements and recommendations outlined in the TMP. Input provided at each of the consultation sessions / activities have been documented below.

2.2.1 Advisory Committee Meeting #1

Description: The first advisory committee meeting was used to introduce the committee members to members of the consultant team and County staff. The meeting was held over the course of 2 hours. The time was used to review initial findings from Phase 1 of the study including mapping of existing transportation conditions e.g. posted speeds, speed transition points, high volume intersections, high collision rate intersections and active transportation conditions. Attendees were also provided with an update on other public consultation activities and results from the online questionnaire.

Engagement Tools:

► The committee was given a presentation highlighting the project process, intended outcomes and results from phase 1 of the study.

- Large scale maps were provided to meeting attendees of existing transportation conditions to mark-up with their thoughts on transportation opportunities and challenges.

Response Highlights:

- Interest was expressed for the development of a long-term strategy that included infrastructure costing as well as programming including maintenance and rehabilitation of infrastructure.
- The TMP should reflect transportation related policies and processes outlined in the newly adopted County Official Plan (September 2014) for consistency. The TMP will provide more specific policies and initiatives that support OP objectives.
- Public and stakeholder input may be difficult to generate. The intent is to provide the public with a range of consultation opportunities at accessible venues e.g. community centres, malls and / or arenas. Because of the County's geography it is important to identify a range of venues in different municipalities.
- With regard to the content of the master plan there are a couple areas of focus that were suggested including guidelines on consistent signage – branding as well as regulatory; the clear designation of school zones; roadway classifications and rationalization; intersection treatments for different modes of transportation; traffic calming and emerging complete streets design guidelines and varying recommendations and priorities for urban and rural areas.
- One of the key goals of the project is to provide residents with transportation alternatives so that they can get to their destinations in efficient and effective manner.

2.2.2 Public Information Centre #1

Description: The first public information centre was scheduled to occur at three venues over the course of three evenings at the end of November and in early December. The venues were determined based on their geographic reach including both urban and rural areas. The first public information centre was used to provide the public with an overview of the outcomes of the first phase of the study. They were also asked to provide their input on key project deliverables.

Engagement Tools:

- A number of interactive display boards were developed for the public information centres which were used to gather input from members of the public. The displays asked questions about the existing transportation conditions as well as the objectives of the plan and the vision for future.
- The team provided laptops at some of the venues – where wifi was available – which allowed attendees to fill out the online questionnaire, as required.

Response Highlights:

- Some suggestions were provided regarding potential routes that could be downloaded from the County to the local municipalities including County Road 2 on the border of the County and the Township of Asphodel-Norwood, County Road 42 into Trent River and County Road 21 unto Dundonald.
- Comments regarding the accommodation of cyclists and trucks within Port Hope were provided. Many people use these roadways to access nearby tourism destinations and businesses in Prince Edward County.
- Where possible, gaps in the Greenbelt Route should be bridged and alternate routes should be considered.
- Additional County-wide transit linkages should be considered to connect the urban areas within Northumberland County. There are year round residents that commute between the municipalities that have no other option than to use their vehicles.

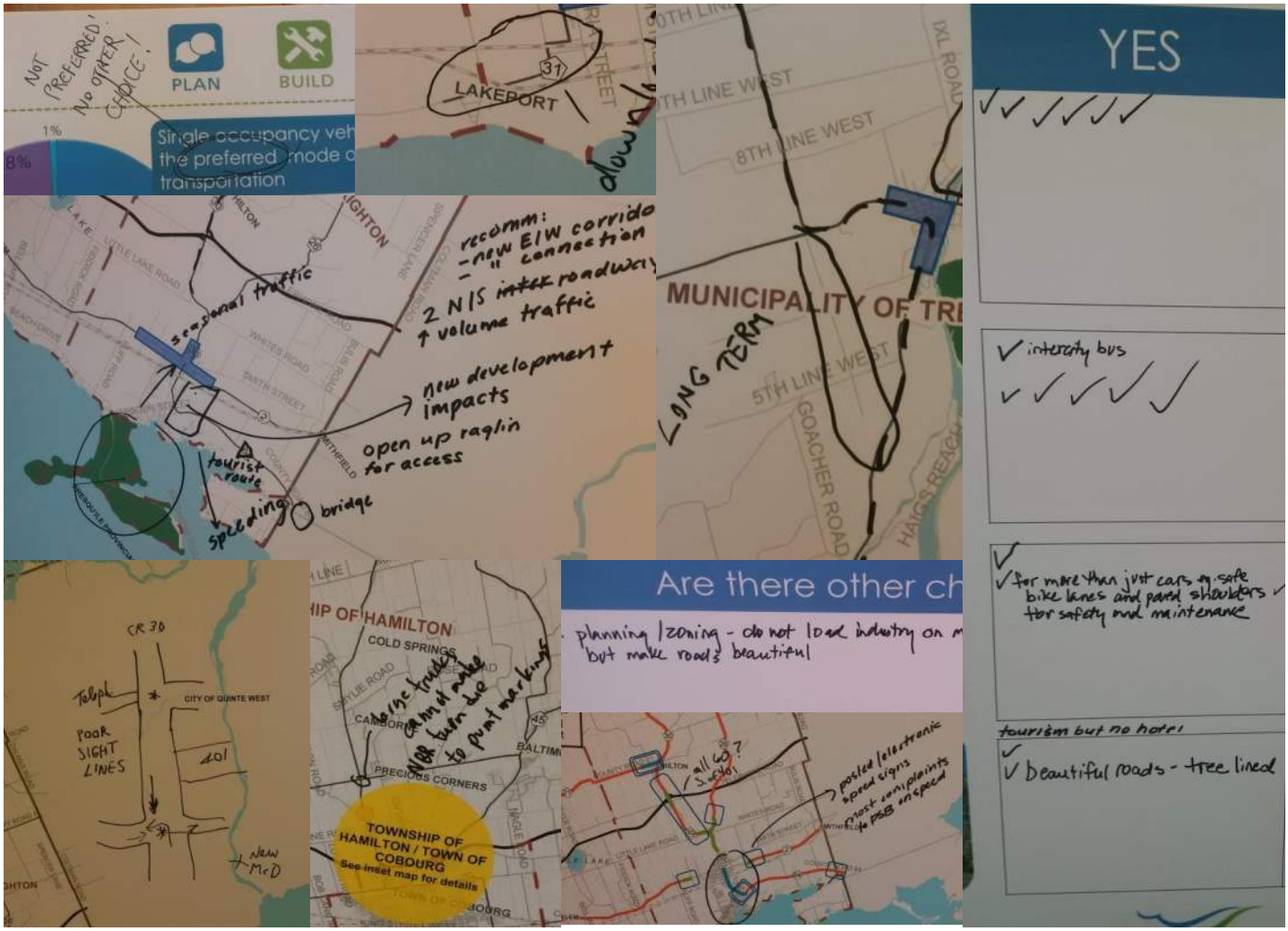


Figure 5 – Documented Comments from PIC #1 – Northumberland TMP

2.2.3 Advisory Committee Meeting #2

Description: The second advisory committee meeting was used to provide committee members with an update on the progress of the master plan. The meeting was held over the course of 2 hours. The time was used to give an update on the TMP analysis, policy review and development and the public and stakeholder consultation efforts to date. Attendees were also provided an opportunity to review of the draft table of contents for the TMP report.

Engagement Tools:

- The committee was given a presentation which presented the TMP analysis, policy review, a consultation update and review of the draft TMP table of contents.

Response Highlights:

- Concerns about CR 30 speed limit transition across Highway 401 and the absence of left-turn lanes as a problem at CR9 / CR28 were noted.
- Reference was made to the discontinuity of CR 2. CR 21 could be a future EDR; CR 31 and CR 33 could be candidates for transfer to Cramahe and to Alnwick/Haldimand respectively as a result of low traffic demand. Port Hope has showed interest in the transfer of CR 70. CR 65 is an important link to the west in the summer, and CR 2 in northwest Hastings is an important link to Peterborough CR 2.
- Mo and Denise identified numerous other items which would need to be considered in the sensitive assessment of jurisdictional transfer, including road condition, taxation, regional functionality, historical maintenance levels and public consultation.
- The AC discussed the response rate and ideas were raised for distributing the survey to a wider audience. Denise requested that the AC members provide a link of the survey to their staff etc.

2.2.4 Advisory Committee Meeting #3

Description: The third advisory committee meeting was used to provide committee members with an update on the progress of the master plan. The meeting was held over the course of 2 hours. The time was used to present the future road network recommendations, road rationalization review, proposed hamlet entry traffic calming treatment, transit feedback and summary of consultation with member municipalities.

Engagement Tools:

- The committee was given a presentation which presented the future road network recommendations, road rationalization review, proposed hamlet entry traffic calming treatment, transit feedback and summary of consultation with member municipalities.

Response Highlights:

- Concerns were raised about showing selected road widenings based upon the assumptions and results. Chris assured the meeting that the modelling results were not intended to represent firm recommendations at this stage, but rather a potential solution and the effects of the potential solution.
- Peter Angelo raised concerns about any Port Hope roads being uploaded to the County. He suggested that Port Hope may entertain consideration of CR 28 providing it was in a state of good repair. Potentially the CR 2 corridor through Brighton, Colborne and Cobourg could be considered as a contiguous County road, while roads would be retained as local in Port Hope, including the potential transfer of CR 70.
- The significance of connections to Highway 401 was noted, and Peter Angelo questioned whether Port Hope would support the transfer of the short section of Morrish Church Road, between the Hwy 401 interchange and CR 2, to the County.
- Angela Stewart advised that the MTO would be willing to review the designation of Highway 401 Emergency Detour Routes but stressed that the design and condition of the candidate roads is a crucial consideration. Previous discussion has centred on transferring the EDR to a roadway north of the 401 in Brighton and Cramahe, and the candidates were CR 21 and Telephone Road.
- Peter Angelo questioned the viability of using CSZs throughout the County, and Peter Hillier suggested that if CSZs become associated with this type of treatment in some locations through enforcement, then the CSZ designation may not be required throughout.

2.2.5 Public Information Centre #2

Description: The second Public Information Centre occurred on November 7, 2015 during the Family Wellness Day Expo at the Northumberland Mall. The intention of holding the PIC at the Expo was to minimize the amount of effort needed by residents to engage the project team on this assignment, thereby maximizing the quality and quantity of engagement. The second PIC was used to provide the public with an overview of the major recommendations of the report with regard to safety, hamlet entry treatments, road rationalization and traffic capacity.

Engagement Tools:

- A small number of information-dense display boards were developed, which were also interactive and allowed for comments by the public to be written directly on maps of the County.

Response Highlights:

- A number of residents concurred with the identification of CR9 / CR28 as an "unsafe" intersection.
- Residents were supportive of the need to harmonize speed limits along CR45

- Interest regarding the plans for Cycling and Active Transportation in the County was noted. Residents were directed to the County's Cycling Master Plan and were given information on how the TMP would support the CMP.
- A total of 46 members of the public attended the second PIC.

2.2.6 Advisory Committee Meeting #4

Description: The fourth advisory committee meeting was used to present the key highlights of the master plan report including an update on the status of the AT strategy and a more detailed description of the approach used to review and revise the cycling network identified in the cycling master plan.

Engagement Tools:

- The committee was given a presentation which highlighted the approach used to develop the transportation master plan, key highlights of findings and recommendations including policy updates and infrastructure implementation. A key component of the presentation was an update on the work being done related to active transportation.

Response Highlights:

- Concerns were raised about the cycling network and how it will interact with MTO infrastructure specifically overpasses of Highway 401.
- Questions about the proposed cycling facility types were raised including the implementation of paved shoulders and signed bike routes through communities and within the rural areas.
- Questions were asked about lighting of proposed active transportation routes.
- Questions were posed about the approach to address high collision intersections. Exactly what collision or conflict occurred and the different solutions that would be proposed to address them.

2.3 Discussions with Agencies

In addition to the primary points of engagement noted above, a number of discussions were held with provincial and municipal agencies and staff. The following table summarizes the number of attendees and / or responses that were generated from these additional discussions.

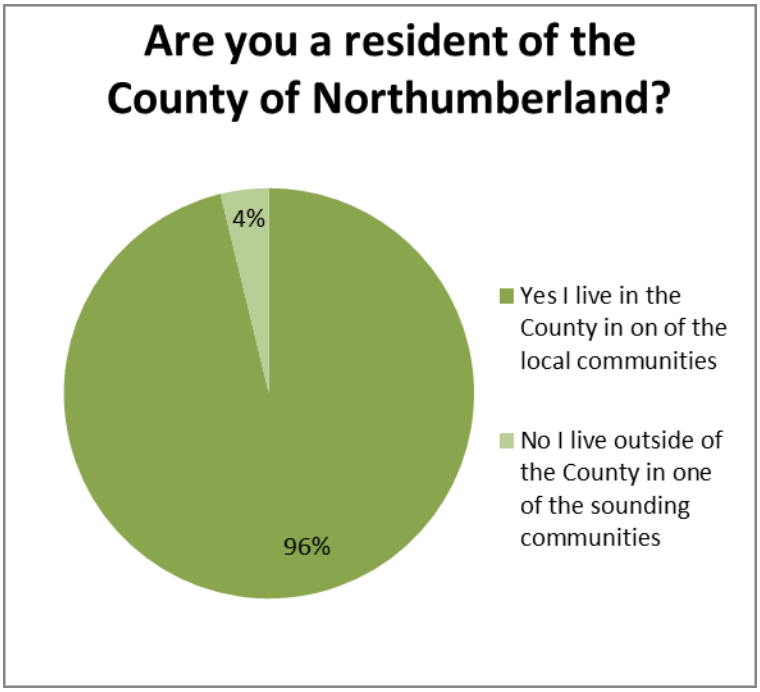
Table 2 – Summary of Discussions with Agencies

Activity	Summary
Meeting with Metrolinx	► Discussion with Chris Burke, Manager of Service Planning to discuss potential GO Train expansion to Port Hope and Cobourg. Although plans to extend GO Train service beyond Bowmanville are in place, options regarding potential connections to GO services via bus were identified.
Conference Call with MTO East Region	► Asked for information on potential highway expansion within the County. MTO indicated that no further work beyond the widening of Highway 401 from four to six lanes from Burnham Street to Nagle Road is planned. In addition, MTO staff were extended an invitation to attend future advisory committee meetings.
Meetings with Municipal Staff	► An overview of the TMP work to date was provided to municipal staff from County municipalities. Major items of discussion revolved around speed limits on County Roads in hamlet and school zones, locations with safety concerns, and discussion of the preliminary list of potential roadway classification changes.
Meetings with Municipal Councils	► Presentations were made to all County municipal councils to keep them appraised of current work. The majority of comments revolved around safety along County roads, including school zones and excessive speeding.

2.4 Online Engagement

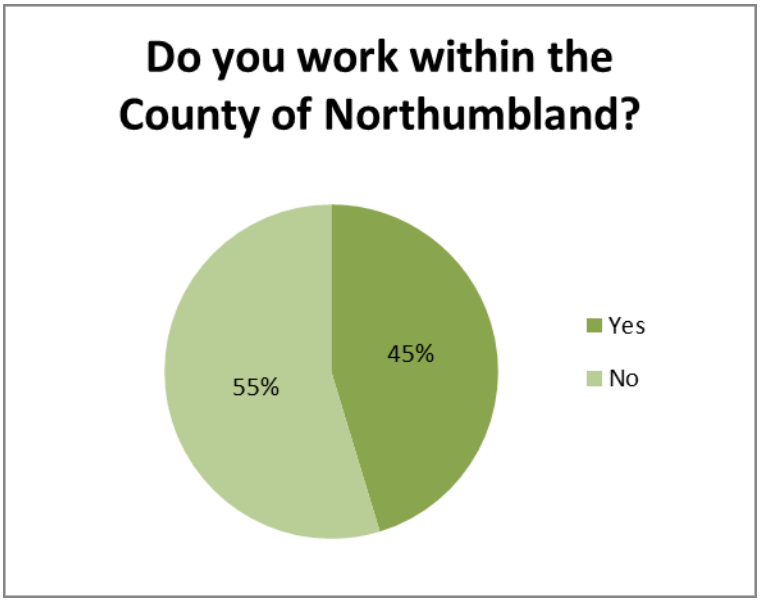
2.4.1 Results of the Online Questionnaire

Question #1



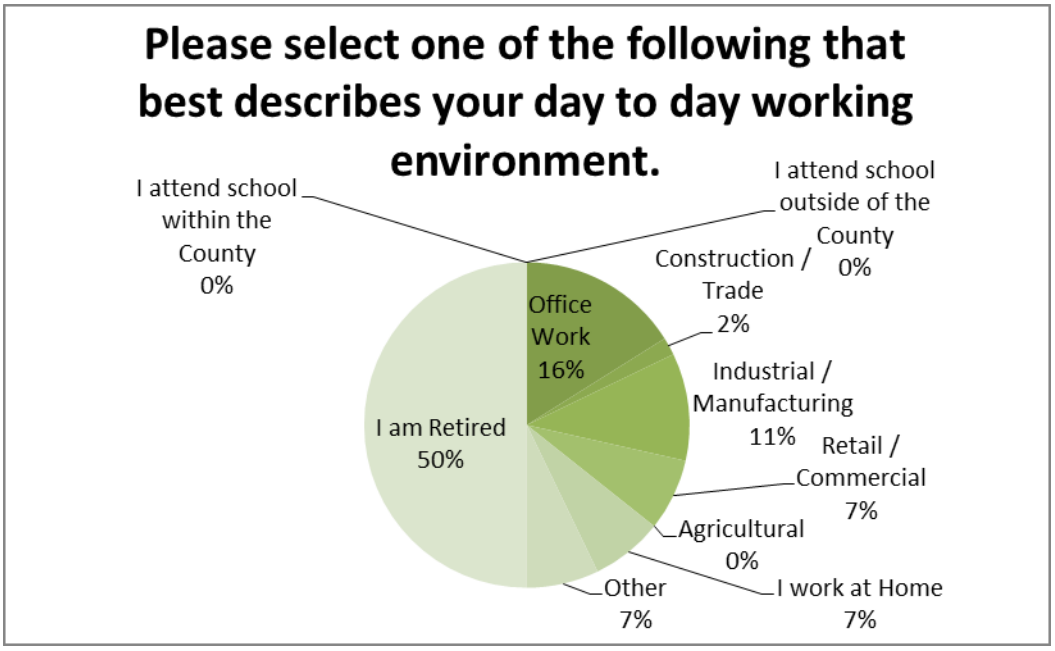
- Not surprisingly the vast majority of respondents live in the County of Northumberland (96%).

Question #2



- Respondents were almost split, with a slight majority (55%) working outside the County of Northumberland

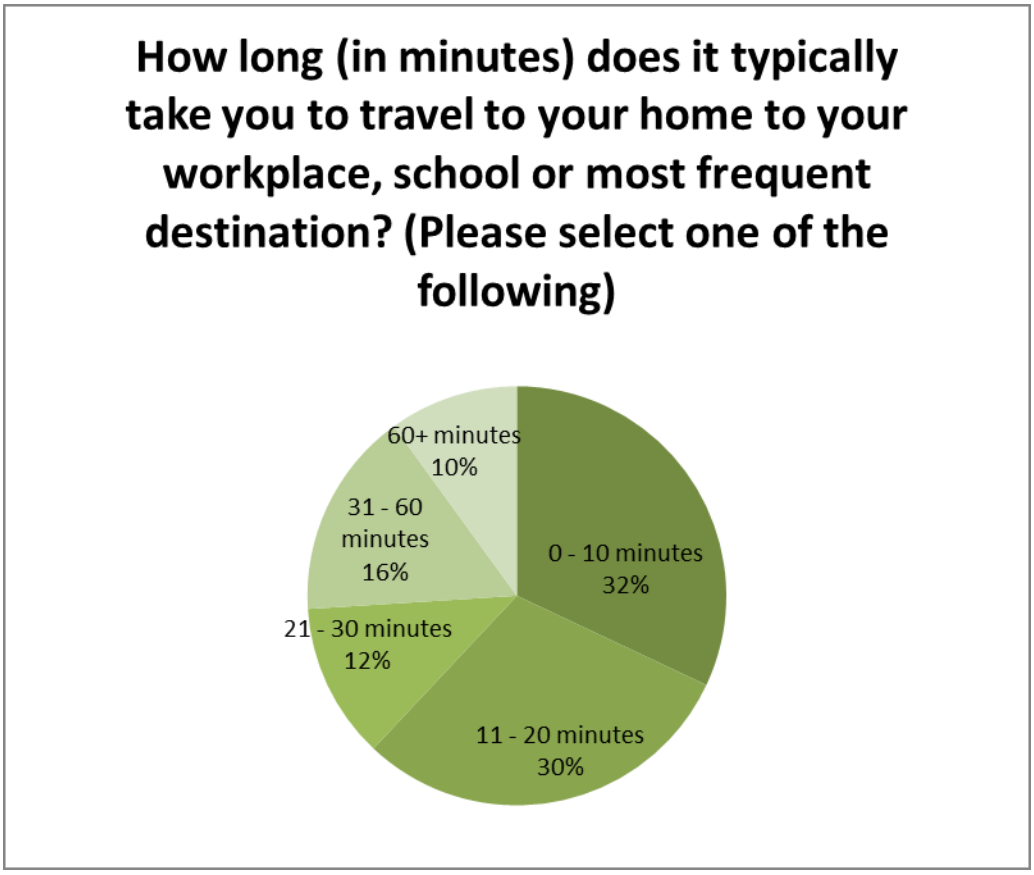
Question #3



Key Finding(s):

- The majority of respondents indicated they were retired (50%). The next most popular day to day working environment was Office Work (16%), followed by Industrial / Manufacturing (11%)

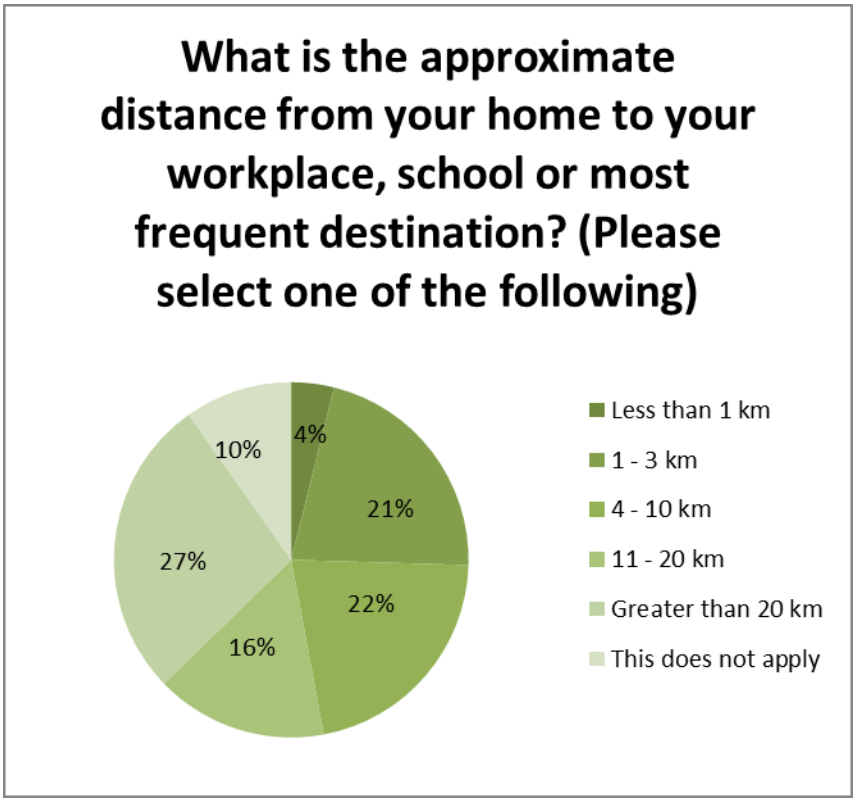
Question #4



Key Finding(s):

- Over 60% of respondents have a typical travel time of 20 minutes or less (32% 0-10 minutes, 30% 11-20 minutes). Almost three quarters (74%) of respondents have a typical travel time of 30 minutes or less.

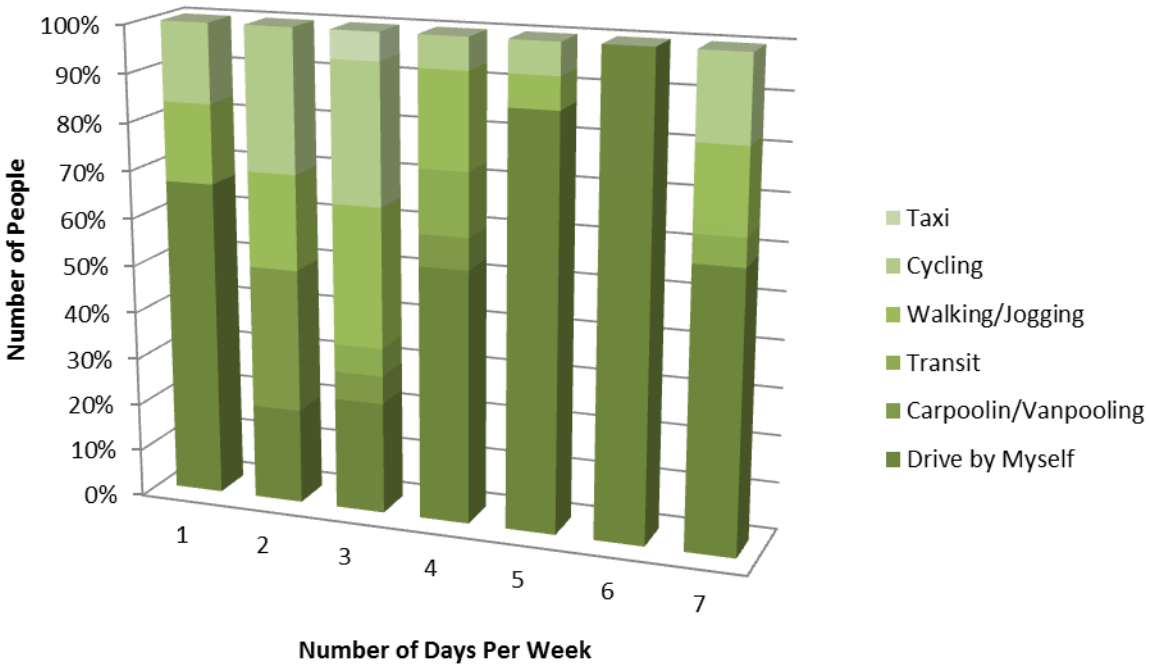
Question #5



Key Finding(s):

- Almost 60% of respondents indicated a trip distance of between 1 and 20 km. Only 4% has a trip distance of less than 1km, while 27% has a trip distance of greater than 20 km

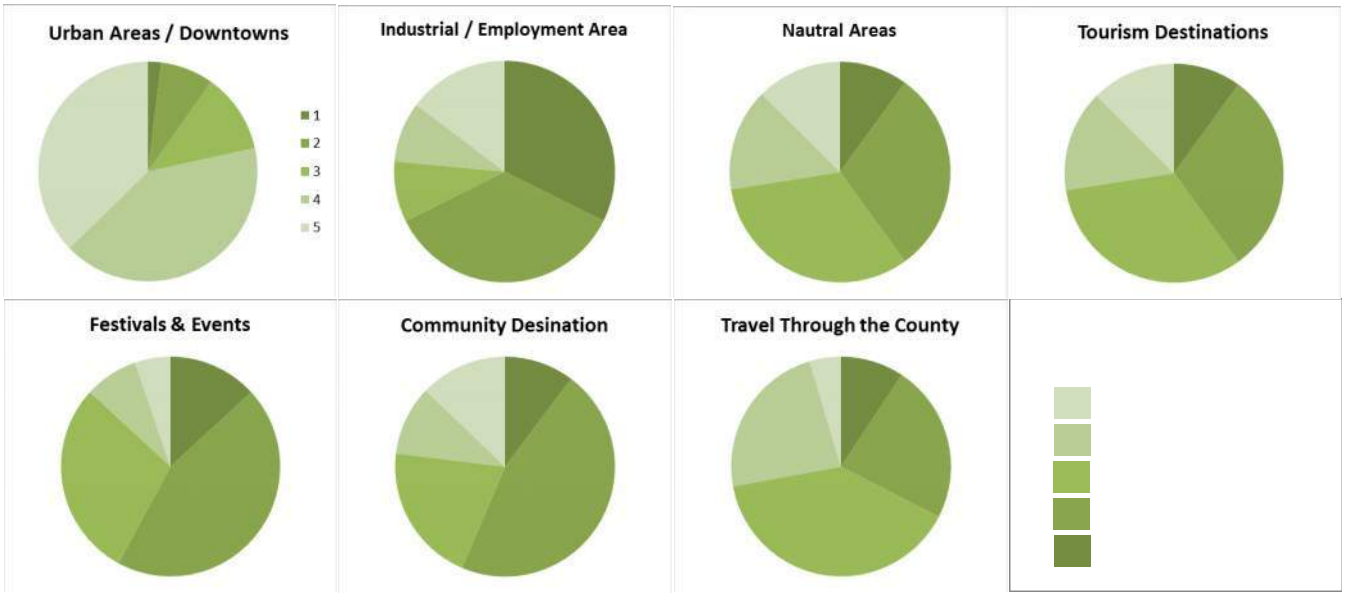
Question #6



Key Finding(s):

- Driving by myself was the dominate mode of transportation. The second most popular mode of transportation was walking/jogging

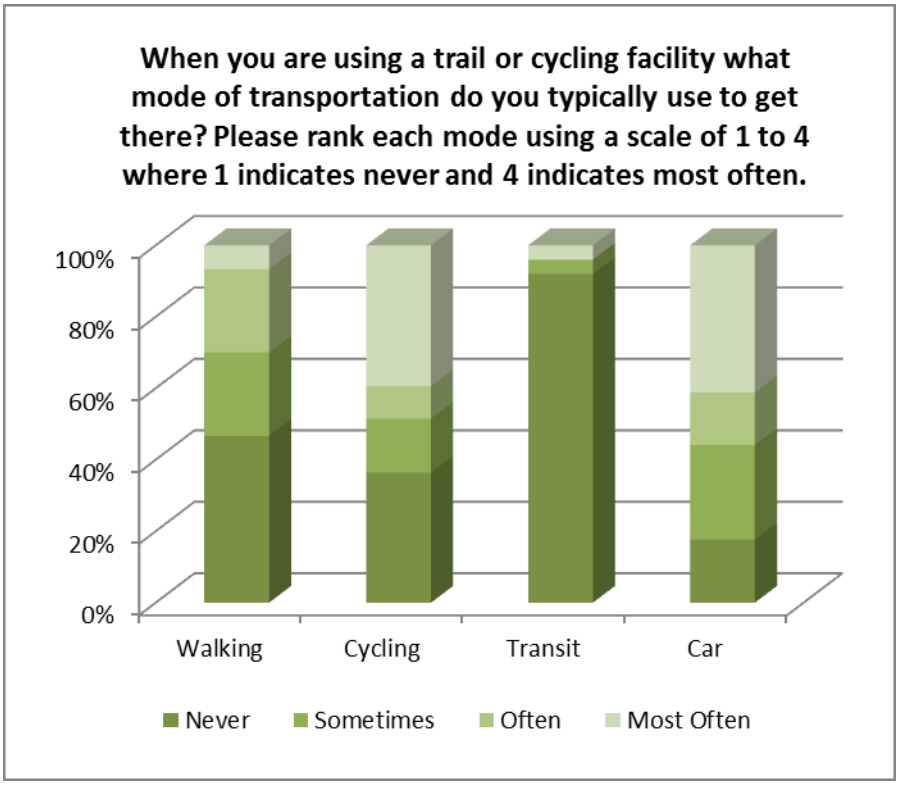
Question #7



Key Finding(s):

- The majority of respondents (78%) travel at least a couple times a week to an urban area / downtown
- 32% of respondents indicated they never travel to industrial / employment areas
- Tourism Destinations, Festivals & Events, and Travel Through the County were most commonly travelled to a couple times a month
- Community Destinations were most commonly traveled to a couple times a year

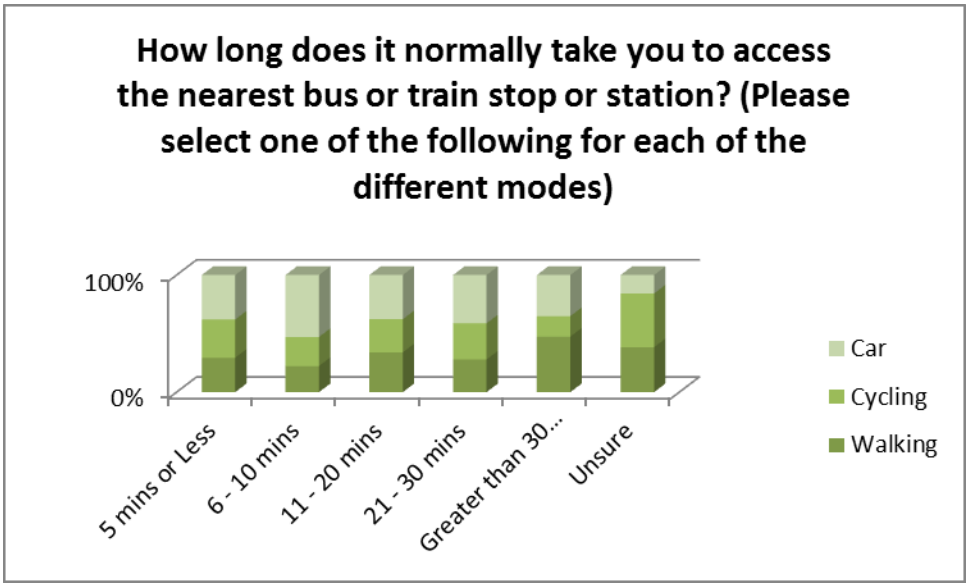
Question #8



Key Finding(s):

- When using a trail or cycling facility the majority of users arrive by cycling or driving

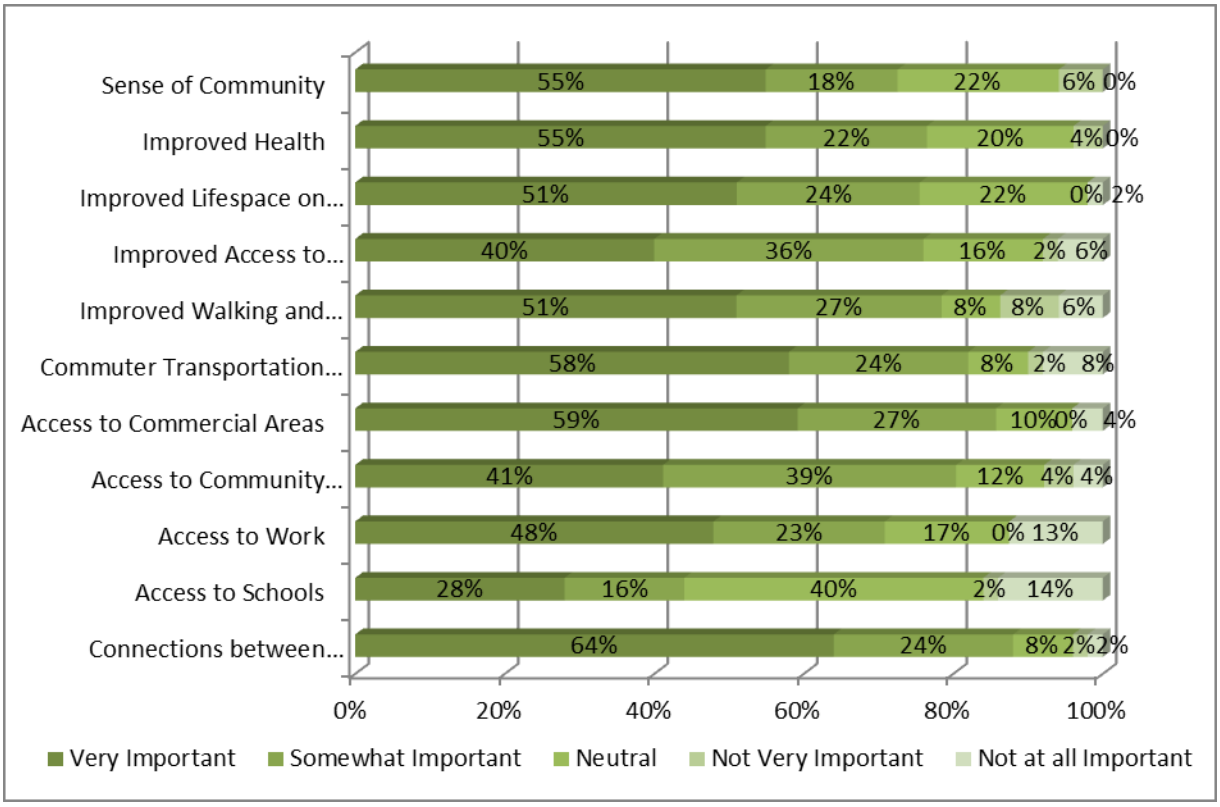
Question #9



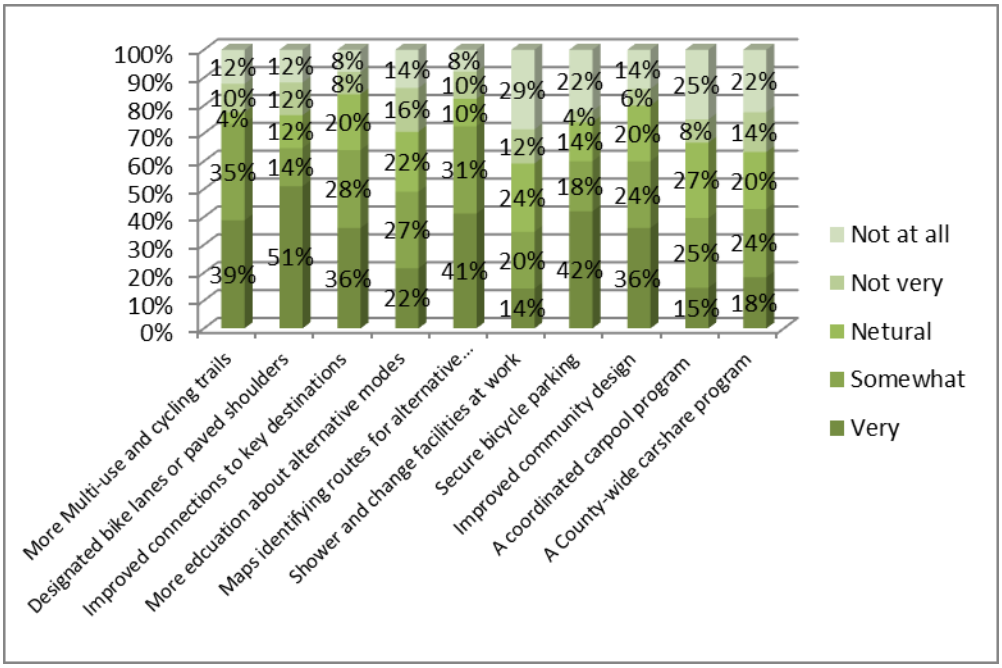
Key Finding(s):

- By car, 52% of respondents indicated the closest bus or train stop was 10 min or less away. When cycling, 39% we within 10 minutes while walking 36% were

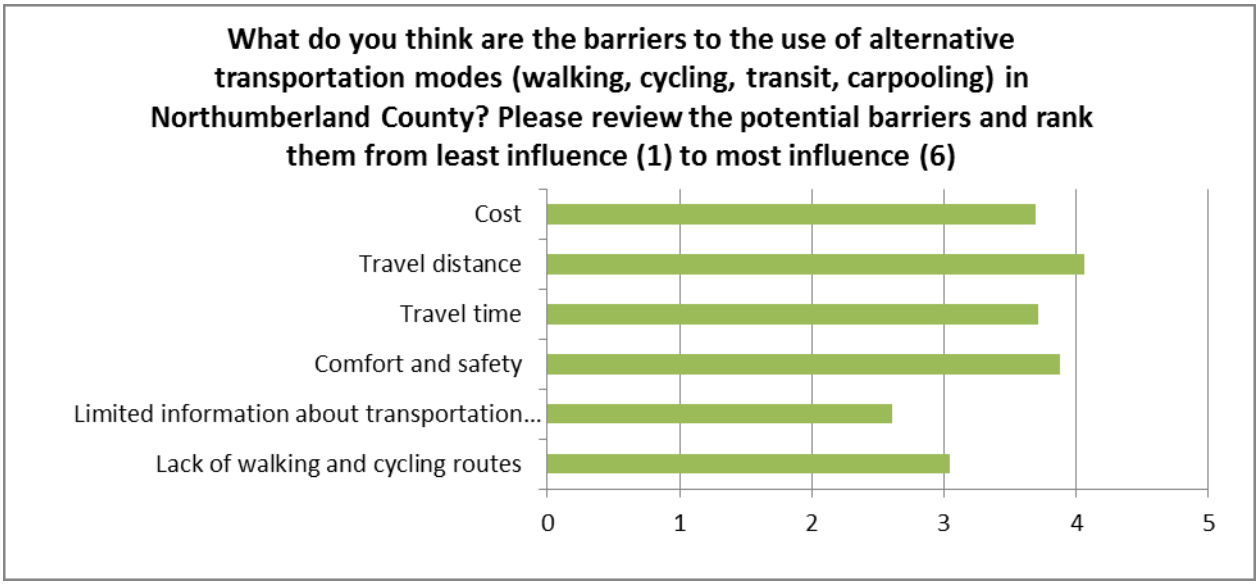
Question
#10


Sense of Community
55%
18%
22%
6%
0%
Improved Health
55%
22%
20%
4%
0%
Improved Lifespace on...
51%
24%
22%
0%
2%
Improved Access to...
40%
36%
16%
2%
6%
Improved Walking and...
51%
27%
8%
8%
6%
Commuter Transportation...
58%
24%
8%
2%
8%
Access to Commercial Areas
59%
27%
10%
0%
4%
Access to Community...
41%
39%
12%
4%
4%
Access to Work
48%
23%
17%
0%
13%
Access to Schools
28%
16%
40%
2%
14%
Connections between...
64%
24%
8%
2%
2%
0%
20%
40%
60%
80%
100%
Very Important
Somewhat Important
Neutral
Not Very Important
Not at all Important

Question #11



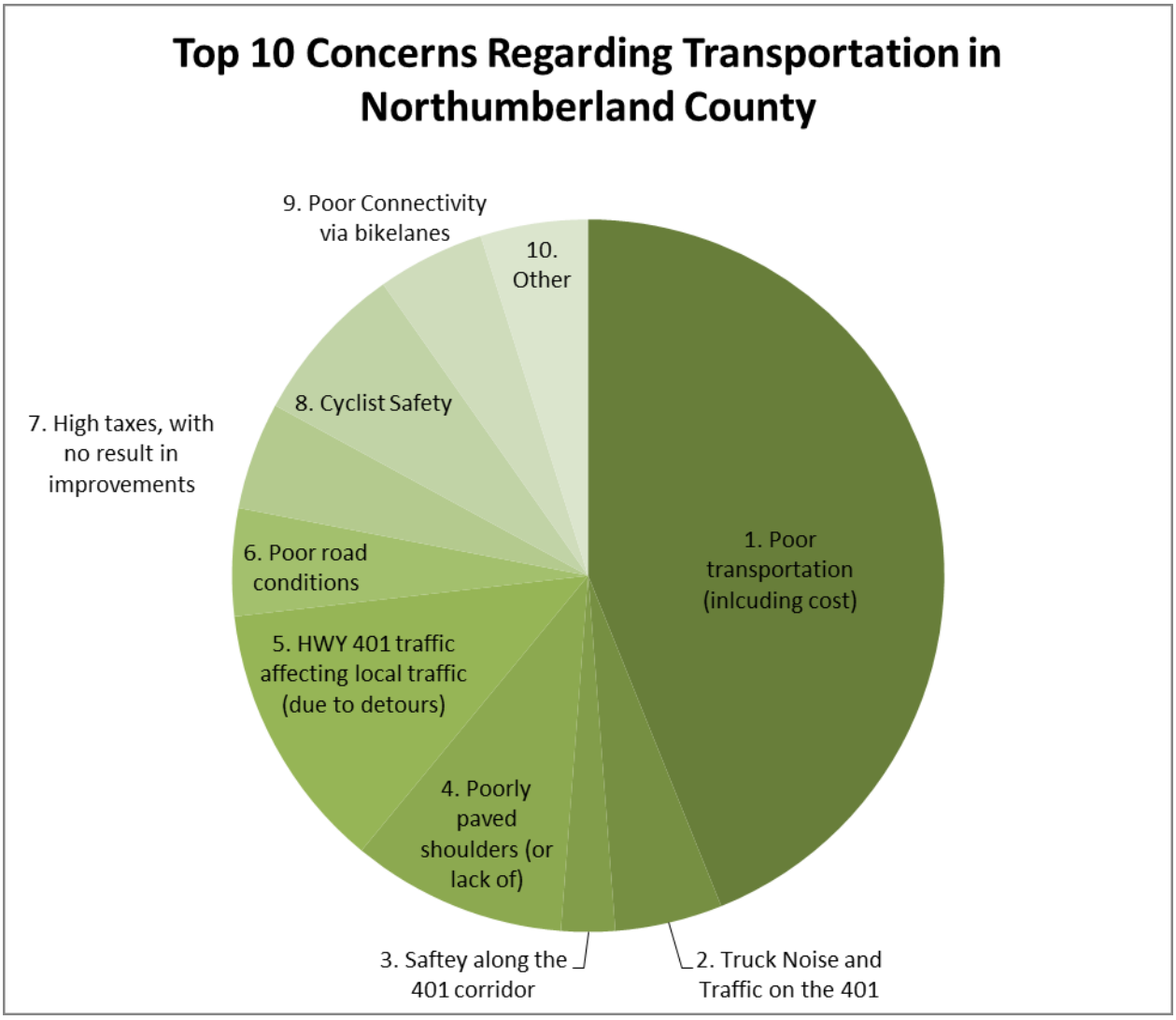
Question #12



Key Finding(s):

- Travel distance, comfort and safety, and travel time were the top three barriers identified

Question #13



Key Finding(s):

- Poor Transportation, Hwy 401 traffic affecting local traffic, and poorly paved shoulders were respondents top 3 concerns regarding transportation in Northumberland County

Question #14

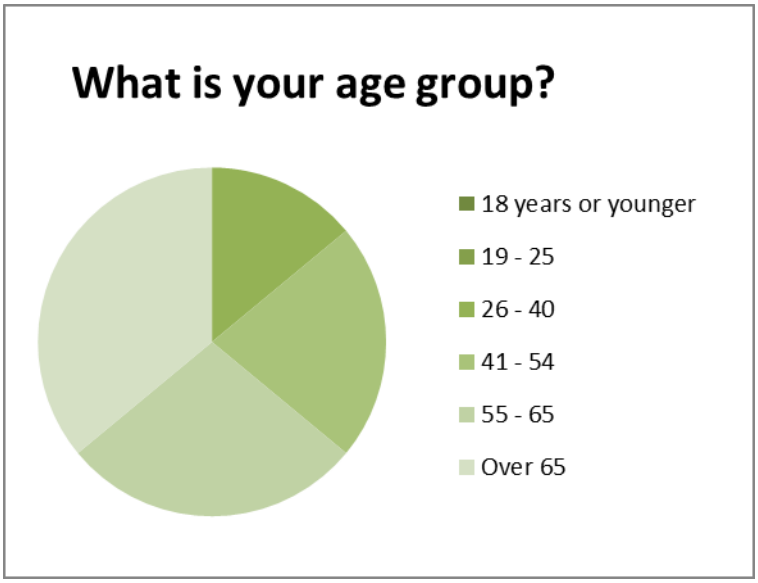
In question #14 Respondents were asked to give the top three transportation improvements they would like to see in Northumberland County. The following is a list of the top improvements indicated:

- Improved transit, which could include better local options, increased VIA rail service and new connections to GO Transit services (Train and Bus);
- Improved and increased paved shoulder on County Roads; and
- Safer and better signed bike cycling routes throughout the County.

Question #15

In question #15 Respondents if they had any other comments regarding the Northumberland County Transportation Master Plan. A total of 25 comments were received on a wide variety of topics. As was noted in Question #14 the majority of comments we on the topics of improving transit options and connections in the County along with increasing safety for cyclists. A number of respondents also indicated they were pleased with the overall process of this project and looked forward to continued engagement as the plan is implemented.

Question #16



Key Finding(s):

- 64% of respondents were 55 years of age or older, 36% of respondents were between the ages of 26 and 54, no respondents were under the age of 25

Appendix B

Policy Review

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Table of Contents

Section 1.0 - Introduction

Within the scope of work of the Northumberland County Transportation Master Plan (TMP) study is a review of a variety of transportation policies dealing with transportation operations and services. The policy review has been organized into broad categories corresponding to general areas of transportation administration. There are elements of the transportation system which are addressed in the overall TMP study which could eventually be related to Official Plan (OP) amendments, where appropriate. Discussion of these study elements will precede the individual policy review in this technical appendix.

1.1 Policy Review

The Official Plan for the County of Northumberland was adopted by County Council on September 17, 2014. Section E2 is dedicated to Transportation.

Individual, activity-specific transportation policies should reflect and support the County's Official Plan, as well as the Transportation Master Plan currently proposed. Therefore, the review of policies anticipates the direction of the TMP and the associated improvements to the County's transportation services. When adopted, the TMP will inform future reviews of the Official Plan. County policies should support and be supported by local policies where appropriate and applicable. In addition, the over-arching context for the development of policies and guidelines is the specific attributes of the County, namely the largely rural area to the north of Highway 401, and the more urbanized area to the south.

Following below is a discussion of several issues prior to consideration of the policies themselves. Firstly the references in the Transportation Element of the County Official Plan which are the forerunners to the emergence of "Complete Streets" policies, such as "context sensitivity." Secondly a discussion of speed limits, which speaks in part to a major concern voiced throughout the County: traffic speeding.

The policies reviewed within this TMP are listed below:

A. Traffic Management

1. Warrants for and installation of Traffic Calming features on County Roads – Detailed discussion below
2. Advance Warning Sign Installation, Maintenance and Inspection – Brief comments below
3. Procedure to Close Road Allowance – Brief comments below
4. Property Compensation – No changes to the policy at this time

B. Infrastructure and Access Management

1. Installation of Street Lights at Isolated Rural Intersections (draft) – Brief comments below

2. Warrants for the Installation of Surface Treatment on County Roads (draft) – No changes to the policy at this time
3. Land Development Applications Standard Conditions (draft) – Brief comments below
4. Entrance and Set-back Policy (draft) – Comments below
5. Road Permit Requests – Brief comments below
    a) Entrance Permit
    b) Road Use for Special Events
    c) Permission to Enter a County Road
    d) Setback Application
    e) Permission to Open-Cut a County Road
    f) Permission to Bore under a County Road
6. Fleet Maintenance and Operations – Brief comments below
7. Salt Management Plan – Brief comments below
8. Winter Control Quality Standard – Brief comments below
9. Fuel Spill Contingency Plan – Brief comments below

C. Goods Movement

1. Oversized Vehicle or Load Permit Applications – Brief comments below

Section 2.0 - Official Plan Direction

Typically, there is an inter-relationship between numerous transportation and traffic policies and procedures. For instance, traffic safety ought to be the first guiding principle in all cases, and related traffic speeds are also intrinsic in road classification, road function and rationalization, design speed and road design, traffic calming, surface treatment, street illumination, traffic operations, traffic devices and access management. The concept and practice of "Complete Streets" has gained considerable popularity in the past decade because one of its objectives is to combine many of these unified concepts into a single policy, design guide and procedure for the development of new and retrofit roads. "Context sensitivity" is a crucial additional element in the application of Complete Streets concepts in as much as the function of the road is considered in relation to the adjacent land use and prevailing environmental and public realm conditions and expectations. For instance, the importance of maintaining local economic vitality through goods movement would be balanced with critical neighbourhood, institutional and commercial considerations.

The recently adopted OP does not explicitly refer to Complete Streets. However, numerous items in Section E2 – Transportation – are consistent with Complete Streets principles. Namely: the safe accommodation of all modes of transportation; compatibility with existing and future land uses; encouragement for road design flexibility; and support and encouragement for the development of active transportation networks and facilities.

Section 3.0 - Speeding Issues & Speed Limits

The Northumberland County TMP includes a review of speed limit establishment and signing practices on rural County roads, and current speed limits have been mapped. The County does not currently have a policy which relates directly to the establishment of speed limits.

The predominant speed limit on rural County roads is 80km/h with several isolated reductions to 70 km/h) and 60 km/h or 50 km/h in hamlets or designated settlement areas. In general, 80 km/h should be appropriate, with speed reductions where conditions warrant. On rural roads there are often few significant cues to drivers in the basic design of the road to influence their driving speeds. For instance, when entering a hamlet the driver may notice additional homes and driveways, and a hamlet identification sign, but no other changes in road characteristics. It is not surprising that the County has received several complaints related to speed limits and speeding in these circumstances:

1. County Road 45 between Highway 401 and north of Baltimore – 50 km/h, 60 km/h, 70 km/h and 80 km/h;
2. County Road 45 approaching Roseneath – 70 km/h through Alderville First Nations and 50 km/h in Roseneath;
3. County Road 24 approaching Roseneath – 80 km/h transitioning to 50 km/h in Roseneath;
4. County Road 30 at the Hamlet of Orland – 80 km/h transitioning to 60 km/h in Orland.

Generally speaking, a speed reduction in excess of 20 km/h will likely result in poor compliance. Some municipalities have a maximum speed limit transition of 20 km/h. [OTM Book 5: " The MAXIMUM SPEED AHEAD sign (Rb-5) must be used to warn motorists of a posted speed reduction of 20 km/h or more."] Accompanying this discussion paper is a map of the County showing the known speed limits on all County roads. In addition, there is a version of the map where speed limit transitions are highlighted: those which are a 20 km/h transition and those where the transition is greater than 20 km/h (30km/h). Eleven locations have been identified throughout the County where there is currently a 30km/h speed limit transition on County roads. The identification of these locations is intended to help inform the discussion of the issue at the Advisory Committee, and subsequent undertakings within the TMP.

As a consequence of the TMP study, it would be prudent for the County to investigate each of the 11 high speed limit transitions to determine if a transition in speed reduction could be introduced, potentially in combination with other roadway or road-side treatments which would indicate to drivers that they are approaching and entering a hamlet or built-up area. A preliminary identification of the locations where speed limit translations should be investigated first, due to their proximity to schools or homes, has been provided in **Figure 5.1** of the TMP.

Also, as a general rule, frequent speed limit changes on a contiguous road section will confuse drivers and lead to poor speed limit compliance. Such sections of road are also awkward to enforce as motorists claim to be confused as to the applicable speed limit in any one location. One such road section in the County – which has been the subject of complaints and concerns – is County Road 45 between Highway 401 and north of Baltimore, in the Township of Hamilton. From south to north the speed limit transitions from 60km/h to 80km/h, then from 60km/h to 50km/h in Baltimore, then 70km/h to 80km/h. The prevailing opinion is to minimize the number of distinct speed transitions along the corridor, with appropriate consideration for the road environment, between Highway 401 and Baltimore in consultation with Hamilton Township. The 50km/h and 70km/h speed limits in and north of Baltimore should be reassessed and roadway and roadside treatments considered.

In the Greater Toronto and Hamilton Area, the establishment of speed limits is frequently aided by the use of the Automated Speed Limit Guidelines developed by the Transportation Association of Canada, which are applicable in both urban and rural contexts. In order to review speed limits on specific road sections, an operational study is required (which is outside of the scope of this TMP). What is suggested is that the County devise an annual program of review which is practical for the resources it has at hand. For instance, each year a traffic engineering practitioner could review the collision activity and identify the top 10 collision locations, much as has been undertaken during this TMP. A basic traffic and physical condition review would be undertaken in the same manner and to the same level of detail as a traffic complaint investigation, and would identify the potential need for street lights and other basic improvements. In the case of speed limits on rural sections of road and in settlement areas, the practitioner could apply the Automated Speed Limit Guidelines to determine if a speed limit change is required. In addition, recognizing that treatments of rural roads can be significantly more challenging than urban sites, several speed compliance treatments can be assessed for use in strategic locations, such as speed feedback signs, roadway edge lines, flex posts and gateway features, all of which are mentioned in text as options in Appendix A of the Northumberland County Traffic Calming Policy.

The County can establish a balance between the program of due diligence in response to traffic safety issues and complaints, and the resources available to investigate traffic operations and collision data for the purpose of identifying where and what remedial measures may be required. The establishment of procedural guidelines for the investigation of traffic complaints – which could be applied to a variety of traffic issues – is discussed further below in the context of traffic calming.

The combined size of the County policies submitted for review during this TMP study is unwieldy; therefore, a few bullets are provided at the introduction of each policy to note its key contents.

Section 4.0 - General Comments

The high-level County policy review in this TMP identifies candidates for fine tuning or updating. Some policies are straight forward whereas others are fairly complex. For instance the Surface Treatment policy adopted in 2012 seems uncomplicated and appropriate. On the other hand, traffic calming is a more complex issue which has been evolving in the past decade and is therefore a candidate for detailed discussion.

It appears as though some of the policies are draft, and may not have been formally adopted. In addition, some of the issues attributed to policies may be more appropriately addressed within the County as Council-approved or administrative guidelines. It would be prudent for the County to review the policies to determine which ones are statutory requirements or the foundation of agreements, and thus should remain as formal policies. In other cases, a document may provide operational guidance to staff in situations where the County would benefit from staff having the flexibility to apply professional judgement, and thus an operational or procedural guideline may be more appropriate.

Some of the policies reviewed are primarily operational in nature, and the review within the scope of the TMP did not identify significant issues or generate proposed modifications in several instances.

Traffic Management Policies

4.1 Traffic Calming

Notes:

- The policy was updated by County Council on September 17, 2014;
- The policy describes a procedure for dealing with traffic calming requests;
- Technical criteria (warrants) and additional considerations are specified;
- A list of mitigating treatments is provided; and
- A public consultation process and public support threshold is established.

Simply put, traffic calming evolved from changing attitudes towards the impact of motor vehicles in residential neighbourhoods. In North America, roads were designed and built to accommodate effective flow of motor vehicles. An awareness of alternate purposes for the public realm grew as residents wanted safer and more comfortable living environments, public spaces to walk and cycle, and healthier living environments on their streets and in their neighbourhoods. The design standards of roads and motor vehicles had evolved to address the safety needs of motor vehicle users, and traffic speeds and volumes increased. The safety and comfort of the more vulnerable street users, namely pedestrians and cyclists, was undermined as a result.

The most critical determining factors for the operational speed of traffic can be summarized as "friction." [Physical elements of friction include roadside hazards, road surface and geometry, road and driveway intersections, on-street parking and lane widths. Other influences include distractions and activities on or adjacent to the road, including the presence of pedestrians and cyclists.] As roads have been designed to reduce elements of friction, traffic speeds are inherently faster.

Many of these factors are combined in urban settings, whereas modern rural roads typically have wide road allowances and few elements of friction. Initially traffic calming focused on the introduction of physically constructed road elements. Because this represented a reversal in the road design trend, many North American jurisdictions introduced a formal public consultation process in the traffic calming procedure, and the results of a street plebiscite would be a major determining factor as to whether traffic calming would be introduced or not.

Traffic calming is often no longer seen as an oddity or exceptional design which the majority of residents on a street need to support, but more a component of a road design philosophy intended to improve the safety and comfort of a variety of road users. The concept of "Complete Streets" has gained popularity, resulting in a consideration of a variety of design and operational elements when designing new or retrofit roads, including traffic calming features. A variety of tools can be deployed to fit a variety of street types and functions in order to promote more sustainable transportation options, such as Active Transportation, and to encourage more liveable communities and neighbourhoods. Road design standards are evolving so as to provide community builders with a broader range of designs which can be applied to a variety of contexts, respecting a wider range of road functions. To provide the greatest impact upon traffic speeds, and the greatest benefit to all road users, design elements should be introduced at the preliminary design stage, rather than added as retrofit features after the street is constructed or reconstructed. In consideration of the aforementioned, traffic calming has become a more common feature in initial road design in one of its various forms, rather than a new concept which requires extensive public education and consultation.

Realistically, and in response to complaints or concerns, the majority of adjustments to streets will be in the form of retrofit, whether the treatment is road surface or road design, or signs and pavement markings. As reflected in the County's current policy, the range of Traffic Calming tools available includes operational features ranging from signs, pavement markings and parking – dependent upon the road designation, character and context.

Traffic concerns are often one of the most common public complaints received by a municipality, and a broad range of traffic calming tools can be considered to address bona fide safety risks or quality of life issues.

The County policy was originally adopted in 2009 and recently modified by County Council on September 17, 2014. The original policy had 3 sections: the policy text with procedure and warrants; Appendix A – Traffic Calming Options; Appendix B – Application of Traffic Calming Warrants and Installation Policy, which is a case study addressed in 2009 at the Percy Centennial Public School on CR 29 in Warkworth. The modifications recently adopted by

Council effectively added four more measures to the list of recommended treatments in Appendix A.

This case study represents a good opportunity to illustrate how an alternate approach to traffic calming issues could materially affect the County's procedures, and how the policy could be amended in response to such a trend. Briefly, the County received a request for traffic calming on County Road 29 near Percy Centennial Public School. The location passed the traffic calming pre-screen because a speed study revealed that more than 50% of traffic was exceeding the speed limit, the school is a significant generator of pedestrians, and the location is within a designated settlement area or hamlet. In order for traffic calming to be "warranted," at least 3 of a subsequent 12 criteria needed to be satisfied. Two of the criteria – constructability and cost - anticipated the potential treatment: line painting and flexible posts. One criterion required a public support level of 50% response and 60% support, and may not have been applied in this case.

An alternate approach to this type of issue would be to treat the traffic calming request as a public complaint about traffic safety, and investigate the matter as any traffic complaint could be handled. As mentioned at the conclusion of the previous section on speed limits, a focused and efficient method of dealing with a variety of traffic complaints could be established in procedural guidelines. For instance, the pre-screen would be the typical site and traffic investigation following the raising of a concern, potentially including a speed study, collision review, and assessment of site features such as traffic activity, including pedestrians and cyclists, and physical attributes. Based upon this initial, basic review, a traffic engineering practitioner would be able to determine if the concern or complaint is bona fide, and whether corrective treatment would be recommended to mitigate the problem(s).

If a problem and safety risk is identified, it is incumbent upon the County to find appropriate solutions. Typically the initial treatment would be the application of lower cost and less restrictive measures – depending upon the nature and severity of the problem – and a follow up review to assess the impact of the treatment. At the point of mitigation, it would be prudent to provide the traffic engineering practitioner with as wide a range of corrective tools as possible to address an identified problem. Further, the choice of treatment would only be given to the public stakeholders if the options were of similar value and anticipated to have the same positive impact upon the problem and identified risk.

The communication with the complainant and stakeholders may be coordinated with the Council member representing the area in question. Often sensitive communication is required if the traffic study does not reveal a safety risk or problem and no corrective action is recommended. In the event that complainants wish to pursue the "calming" of their street in order to improve the aesthetic quality (such as landscape features often associated with physical traffic calming) in advance of any potential street reconstruction, the residents could be polled to determine whether they would support and fund such treatment.

Based upon the discussion above, the fundamental changes suggested for the traffic calming policy are:

1. Consider the principles of traffic calming designs and treatments in any road construction or reconstruction project at a very early stage in the project planning, initiation and design phases;
2. Refer to the " policy" document as guidelines when traffic calming has been requested or identified, within an encompassing procedural guideline for addressing traffic complaints or issues. (I.E. treat a traffic complaint in a consistent investigative procedure whether or not it is framed as a " traffic calming" request);
3. Embrace the possibility of a wide range of professionally accepted tools to mitigate bona fide safety risks or traffic problems; and
4. In the event of an identified safety risk or traffic problem, conduct a plebiscite of the affected neighbours only to show preference between several available options of similar cost, benefit and impact, if such a choice exists.

4.2 Advanced Warning Signs

Notes:

- This policy is undated and may be a draft;
- It describes procedures for the installation of a variety of traffic signs on roads, and also the procedures and responsibilities for signs on " lower-tier" roadways which are installed to warn of intersecting County roads;
- It is partially superseded by agreements between the County and most member municipalities signed between November 2011 and May 2012;
- All the agreements cover the stop sign maintenance item quoted below, and some include other maintenance issues, such as winter maintenance;
- All agreements state that the County of Northumberland will maintain all stop and stop ahead signs on all roads that intersect County Roads.

This policy clearly identifies the responsibilities of the County and its member municipalities with respect to the placement, inspection and maintenance of signs on their respective rights-of-way. It adequately describes the procedure by which the County will seek permission to install a sign on a local roadway, and the assumption of ownership of the sign by the member municipality afterwards. One paragraph on page 4 of the policy could be edited to clarify its meaning and remove any possible misinterpretation: " Nothing in this policy shall preclude the lower tier road authority from installing an advanced warning sign on a road allowance should the lower tier road authority determine that an installation is required." A word or words should be added to this section to clarify whether it includes Northumberland County road allowances.

The last paragraph of the policy includes language respecting liability and insurance which would normally be found in a legal agreement. In all likelihood a legal expert would suggest the removal of this paragraph because it could suggest to practitioners that the policy is a legally binding agreement between parties, when it probably is not. A definitive comment on this

matter is outside the scope of this TMP. However, the individual agreements respecting stop signs partially addresses this issue.

The intent of the agreements is likely limited in scope to the intersections of local roads with County roads, which is not specified in most cases.

Based upon the foregoing, it would be prudent for the County to review the policy and agreements to determine if they are complementary and if the agreements should be updated in order to replace the policy in its entirety.

4.3 Procedure to Close Road Allowance

Notes:

- This policy was last modified in July 2005;
- A standard procedure is described for the closing of road allowances.

Comments pertain to the sections of the policy noted below:

1.2: Consider making the deposit non-refundable. If the sale is consummated, the deposit would be applied to the final closing costs. However, if there is no purchase, the County would still retain the deposit to off-set its own costs, and to deter frivolous applications. The value of the fee should be reviewed on an annual or bi-annual basis, approved by Council and included in an overall schedule of fees available to the public;

1.3: Prior to a report being presented to Council, an internal review procedure by affected departments should be documented;

1.5: A public notice should be posted prior to the passing of the by-law as well as afterwards;

1.7: The value of the land should be determined by a professional appraiser working in confidence for the benefit of the County. Depending upon the size of the property and other site circumstances, consideration should be given to using the same method for using a Qualified Property Appraiser to identify a Fair Market Value as described in Section 4.11 of the Property Compensation Policy. Potentially the market value would be determined as the median of values from three appraisal reports.

Depending on the site circumstances, such as size and location of the property, the County could consider a competitive public sale process. Depending upon the " in house" expertise and resources, the County could consider the use of an external agent to represent it during such property sales, if it does not do so already.

4.4 Property Compensation

Note:

- This policy is dated September 14, 2009, and relates specifically to the acquisition of property for the proposed Trent River bridge crossing in Campbellford.

No changes to the policy are suggested at this time.

Section 5.0 - Infrastructure & Access Management Policies

5.1 Street Lights at Isolated Rural Intersections

Notes:

- This is an undated policy which may be a draft;
- The policy provides criteria for justifying and prioritizing the installation of street lights on County Roads, primarily at intersections;
- A 50/50 sharing of capital installation costs is proposed between the County and the member municipality at intersections with local roads.

The policy is essentially a guideline, and it is somewhat confusing in as much as it includes criteria for the identification and prioritization of candidate locations (namely a night time collision risk and quantifiable threshold - an average of two night-time collisions per year for 3 years), yet it also stipulates that one street light should be used at all intersections. It is further confused by the illustration of one street light at a " T" intersection and two at a standard 4-way cross intersection. Other factors are listed which should be considered when determining the need for illumination: traffic volumes and the installation of raised medians or channelization. In addition, all intersections with traffic signals are to receive full illumination.

This policy is supportable as a general rule. However, a contradiction within the text should be removed where, on page 3, item 5 reads: " one street light should be used at intersections, where feasible and functional" because it suggests that all County road intersections should be illuminated. One approach the County could take would be to reframe this policy into a guideline to be used to prioritize the installation of street lights (based upon the assumption that a limited budget is established each year for the program of installing new street lights) and to establish a cost-sharing formula with the local municipalities.

The reference to collision frequency in this policy reinforces the need for the County to establish and maintain an annual program to review collision activity. However, if it was retitled as a guideline, it would provide more flexibility to address a range of issues which may be a concern to the County or member municipalities, and to establish priorities based upon factors such as collision frequency.

5.2 Warrants for the Installation of Surface Treatment on County Roads

Notes:

- This policy may be a draft which was written since May 2012;
- This is a guideline which provides criteria for the application of a bituminous wearing surface on a roadway.

No changes to the policy are suggested at this time as it may be used currently as an internal guideline.

5.3 Land Development Applications Standard Conditions

Notes:

- This policy is marked as a draft;
- This policy identifies standard conditions which the County requests be imposed upon the approval of land development applications;
- There are 4 scenarios: 1.0 Land Severance Applications; 2.0 Site Plan Applications; 3.0 Condominium Applications; and 4.0 Subdivision Applications;
- This policy relates directly to the Entrance and Set-back draft policy (Item 5.4 below).

Comments pertain to the sections of the policy noted below:

1.1: The dedication of land to the County is intended to protect for a 30m road allowance. Within the newly adopted Official Plan, the general design guideline for a County Arterial Road has a right-of-way width up to 36.5m.

The policy in question needs to be updated to respect the potential increased road allowance dedication.

1.8: The intent of this section should be clarified. In the case of a land severance, it states that no private driveways will be permitted onto the County road. Does this mean that the County will only consider the severance of land if the new parcel has access to a local road? Or does it mean that the new parcel must be large enough for the creation of a subdivision which would result in an intersection of a new local road with the County road? If neither of these scenarios is the correct interpretation, item 1.8 should be amended to allow consideration of a new private driveway onto a County road if the severed parcel would otherwise be " land locked."

2.6: This section seems to contradict 1.8 in as much as a driveway will be permitted as part of a site plan application. The apparent contradiction should be clarified.

4.5: See 1.1 above.

The references and rules as to where new entrances and driveways will be permitted must be consistent with other County policies. See Item 5.4 below.

5.4 Entrance and Set-back Policy

Notes:

- This is a draft policy written in 2013;
- The broad purpose of the policy is to establish rules and guidelines respecting the placement, design and construction of driveways; the minimum set-back distance, and a fee schedule;
- The Entrance Permit and Set-back Permit application forms serve as appendices to this policy;
- The policy makes specific references to circumstances where a new driveway will not be permitted, which relates directly to Land Development Applications Standard Conditions (Item 5.3 above).

Comments:

One of the stated objectives of this policy is the identification of " possible requirements for left and/or right turn lanes, centre median restrictions and other methods of control." The policy is silent on this aspect of access design, other than listing the TAC Geometric Design Guide as a reference. Explicit reference could be made in the policy to the use of the MTO warrants for the justification of left and/or right turn lanes because these are still used and accepted throughout Ontario.

The schedule of fees must be consistent between this document and the permit applications. There is more discussion of fees in Item 5.5 below.

Not only should the criteria for the establishment of new driveways be consistent with the standard conditions imposed upon Land Development Applications, there should be no confusion in the policy itself. In this regard it would be prudent to review Item 11 in Section 1, Section 3 bullet 1, and Section 4 bullet 2. In particular, Section 4 suggests that a second commercial driveway could be granted if the road frontage is less than 95m in length, which conflicts with Item 11 in Section 1.

As mentioned in Section 5.3 above, access rules respecting severances, site plans, condominiums and sub divisions could be clarified in the Land Development Applications Standard Conditions. This clarity should be mirrored in the Entrance and Set-back Policy.

Item 18 in section 1 reflects the common understanding that all liaison and fee payments to non-Northumberland County utility companies are the responsibility of the entrance or driveway applicant. The word " underground" could be deleted if this also applies to above-ground utilities which may also be impacted.

5.5 Road Permit Requests

Notes:

- There are a variety of permits which have likely been updated in the past few years;
- Permits reviewed: Entrance Permit; Road Use For Special Events; Permission to Enter; Setback Application; Permission To Open Cut; Permission to Bore;

Fees are required for all the permits except for Special Events. Depending upon the size of the event, and the experience the County has had with respect to clean up and restoration after such events, consideration could be given to securing a maintenance deposit which would be used in whole or in part to offset cleanup costs.

Fee schedules should be reviewed on an annual or bi-annual basis so that the County is satisfied with the remuneration it receives, and the fee schedules should be adopted by resolution of County Council. There should be clear statements that deposits may be used by the County in whole or in part to offset whatever restoration costs are required for damages in the road allowance. In the case of road restoration, these costs can be significantly higher than the standard $1000 deposit stipulated.

Condition 6(c) of the Permission To Open Cut makes reference to the payment of inspectors fees and other expenses incurred by the County. It would be prudent to include an estimated cost within the deposit fee and retain actual costs from the deposit before any portion of it is returned.

All references to barricades should be rewritten to state that all occupancy of the road allowance must be signed and protected in conformance with Ontario Traffic Manual Book 7. This reference should be in all permit applications.

Condition 7 of the Entrance Permit makes reference to the importance of a turnabout area for vehicles, but then uses "should" instead of "must," and "recommended" instead of "required." Such stronger language – to reflect the importance of the issue - can be followed by the caveat: "…unless it can be proven that such a requirement is impossible to fulfill, and adequate alternate arrangements are provided, such as a Traffic Control Person."

5.6 Fleet Maintenance & Operations

Notes:

- This document appears to be a comprehensive management and operational guide developed approximately 10 years ago;
- The policy covers motorized vehicles and equipment used on road allowances and facilities;
- The range of issues within the policy includes operational and safety practices, licencing, acquisition and identification.

Because of the apparent age of the document, it would be prudent for the County staff to review all aspects of these operational guidelines to determine if updates are required. If the County uses or plans to use passenger cars within its fleet, it could explore the cost and benefits of entering into a car share agreement whereby staff would use an auto sharing service when such a vehicle is required.

5.7 Salt Management Plan

Notes:

- This Salt Management Policy was adopted by County Council on April 20, 2005;
- This policy covers a range of winter maintenance operational issues and references numerous winter maintenance materials in addition to salt;
- The policy references a "Winter Maintenance Operations" County guideline document which is likely the "Winter Control Quality Standard" (WC 04-01) document discussed below.

Because two documents cover a range of winter maintenance policy, operational and reporting activities, it would be prudent for the County to consolidate the two into one comprehensive policy or procedural guide. Itemized comments on the Salt Management Plan are provided below.

3.1: Item 12 in Section 3.1 of the Salt Management Plan mentions "Sand/Salt Blends" are defined in the winter maintenance policy; however, there is no reference to the blend in the Winter Control Quality Standards document.

3.2: Item 17 in Section 3.2 of the Salt Management Plan lists the percentage of salt in winter sand as 15%. The reference above may need to be modified to reference this item instead, for clarity.

2.13: Reference is made to Salt/Sand/Grit Inventory in section 2.13, but "grit" is not defined in either of the two documents.

2.13: Even though this section makes reference to "continuous reporting of application of materials on roadways", there is no reference to an annual reporting process, whereby summaries would be prepared. When the policy was prepared in 2005, it noted salt and sand usage for the 2004/2005 winter in section 2.5, identifying the need to establish a 5 year average. This section needs to be updated to show the 5 year average.

3.5: This section specifies that a yearly review meeting of the plan must be undertaken prior to September 30. In all likelihood the summaries of annual material use are reviewed during that meeting.

5.8 Winter Control Quality Standard

Notes:

- This is a guideline which describes procedures undertaken by County staff, before, during and after a storm event, and the " centre bare" road standard target;
- These guidelines (WC 04-01) were likely established in 2004 to be used in conjunction with the Salt Management Plan noted above.

Similar to items 3.1 and 2.13 in the Salt Management Plan above, there is no definition for Winter Grit, Salt, sand and Sand/Salt Blends in this document. Such definitions would be useful and are basically promised in the Salt Management Plan. The word " grit" is used on page 6 in item 3 for the Salt section when it likely should be the word " salt."

The document references a roadway classification appendix, which is not attached to the document. Also, the County could confirm that it needs the Salt Management Plan as a separate document – perhaps for reporting purposes – rather than combine it with the Winter Control Quality standard. Otherwise it may be more effective to combine the two documents into a comprehensive procedural guide.

5.9 Fuel Spill Contingency Plan – Policy & Procedure

Note:

- This is a policy and procedural internal staff memo and Spill Report template, dated September 3, 2003.

There is a question as to what range of incidents this 2003 policy may apply to, and the range of materials which County staff may come into contact with in order to contain and clean up after the spill. For instance, does the document only refer to incidents involving County operations? Or does it encompass County staff response to a spill involving another agency or private operator? The Spill Report lists " Diesel fuel, hydraulic oil, etc." as examples of the " pollutant released." Are there other potential spill materials which staff would have to deal with which would not be classified as " fuel" ? In anticipation that this procedure is not intended to generate these types of questions, and could simply only be related to the REPORTING of spills from a variety of sources involving a wide range of toxic materials, it may be prudent to change the title of the memo and the focus of the introductory paragraph to limit the scope to Reporting Procedure only.

Section 6.0 - Goods Movement Policies

6.1 Oversized Vehicle or Load Permits

Note:

- There are two types of permits: Single Trip and Annual, both potentially last updated in October 2013. All of the first set of comments below applies to both categories. Several follow which are unique to the Annual Permit application.

The fee is stated on the permit and should be reviewed on an annual basis when the County reviews its schedule of fees. The space allotted for item 4 "Authorized route from/to Via County Road(s)" seems too small for the potential list of roads which could constitute a route. In addition, the title suggests that the origin and ultimate destination of the vehicle or load should be specified. If this is the case, the space on the permit seems too small to write the information. Item 5 identifies when the permit is not valid, and includes certain dimensions " in congested traffic conditions." Such conditions should be defined, and could specify weekday periods such as 7:00 – 9:00 am and 4:00 – 6:00 pm within the Town of Cobourg and the former town limits of Port Hope and Brighton. Consideration could be given to making the dimensions for this condition correspond to the MTO dimensions: a width of 3.7m for the MTO vs. the County's 3.05m; a length of 25m for the MTO vs. 24.5m.

Condition A (4) specifies the weight at which a vehicle and load should be driven over a bridge at the lowest practicable speed (exceeding 45,500kg gross in the County). Consideration could be given to making the threshold consistent with the MTO, which is 45,000kg gross weight.

Condition E (3) stipulates when two-way radio communication is required between the oversized vehicle driver and private escort vehicle drivers. It states that such communication is only required when vehicle and load exceeds 4.00m in width. Consideration should be given to removing the reference to width, and thus require such communication whenever escort vehicles are used, regardless of the dimensions.

In the Annual Permits, Item 5(v) states that over-height and overweight loads and vehicles are exempt from the three restrictions listed below. A review of these should be made to confirm the appropriateness of these exemptions: (ii) transport on Saturdays, Sundays and Statutory Holidays; (iii) transport during congested conditions: and transport during night time or poor visibility. Also in the Annual Permits, reference to Highway 17 between Sault Ste. Marie and Mattawa and south thereof could be removed so that the exemption would only correctly refer to Northumberland County roads, allowing transport on Saturdays except during June, July, August and September.

Appendix C

Intersection Safety

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Section - 1.0 Collision Rates

Collision rates were calculated as collisions per million vehicle kilometres (MVkm). The following formula is used to find the collision rate.

$$Collision\ Rate = \frac{Number\ of\ Collsions}{\frac{(AADT * 365\ days\ per\ year}{1{,}000{,}000\ km})}{Number\ of\ Years}$$

The following is an example using the formula:

At the CR28/CR9 Intersection

- 30 collisions between 2007 and 2014
- Estimated volume of intersection 10,450 AADT

$$Collision\ Rate = \frac{Number\ of\ Collsions}{\frac{(AADT * 365\ days\ per\ year}{1{,}000{,}000\ km})}{Number\ of\ Years} = \frac{\frac{30}{(\frac{10450 * 365\ days\ per\ year}{1{,}000{,}000\ km})}}{7.5} = 1.05$$

Therefore the collision rate for the intersection of CR28/CR9 is 1.05 MVkm. It should be noted that the provincial average collision rate for MTO's secondary highways is 1.00.

Moving forward, the top 10 intersections in terms of collision rates were found using the formula. Descriptions of each intersection are provided in the pages of the appendix that follows.

1.1 County Road 2 and Townline - Cramahe

Within the Township of Cramahe, the intersection of County Road 2 at Townline Road is located at the western boundary of Northumberland County, north of Highway 401. Most accidents reported involve only a single vehicle and property damage or injury. These collisions occurred in both the westbound and eastbound direction on the right shoulder. The westbound leg was observed to have poor sightlines as it is curved approaching the intersection. The collision pattern appears to indicate that vehicles may be unaware of the upcoming intersection, or cannot properly follow the curve of the road. Pavement markings currently consist of centreline and edge marking, but lane configurations are not drawn.

Figure 1- At Townline Road, looking west on County Road 2

1.2 County Road 28 and Oak Ridges Road (CR 9) – Port Hope/Hamilton

Bordering the Municipality of Port Hope ad Township of Hamilton, the intersection of County Road 28 and County Road 9 is located southwest of Rice Lake. There are several reports of rear-end and turning collisions, particularly in the northbound and southbound directions on County Road 28. Vehicles on CR 28 were observed travelling at higher speeds relative to CR 9, which may result in vehicles turning from CR28 to CR9 being unable to accelerate in time to match speeds on CR9. There already exists advance " Prepare to stop" signage on both the north and south legs of the intersection.

Figure 2 - At southeast corner of County Road 28 and Oak Ridges, facing northwest

1.3 County Road 18 and Danforth Road - Cobourg

Within the Township of Hamilton, the intersection of County Road 18 and Danforth Road is situated just north of the Town of Cobourg. Several rear-end and angle collisions were reported in the northbound and southbound directions. A potential reason for the significant amount of collisions could be unexpected turns or braking at the intersection from vehicles turning onto Danforth Road, given that vehicles have to slow significantly to negotiate the small curb radii. The side street of Danforth Road was also observed to have poor geometric design, as the east leg is on a high slope while the west leg has a steep driveway intersecting the leg from the southern side. This limits the view of the intersection from the east leg.

Figure 3 - At northeast corner of County Road 18 and Danforth Road, facing west

1.4 County Road 45 and Beagle Club Road – Alnwick/Haldimand

Within the Township of Alnwick / Haldimand, the intersection of County Road 45 and Beagle Club Road is historically experiences rear-end and single-vehicle property damage/injury collisions. The rear-end collisions occur predominantly with vehicles heading southbound. There is no street lighting in the vicinity and no advance warning signs are present on any leg of the intersection. The high posted speed limit of 80 km/h on County Road 45 may be a factor in the reported collisions, since vehicles have to slow significantly in a short period of time to turn onto Beagle Club Road, which is further compounded by the short southbound right-turn taper.

Figure 4 - At Beagle Club Road, looking north on County Road 45

1.5 County Road 29 and Glover Road – Trent Hills

The County Road 29 and Glover Road intersection is situated in the Municipality of Trent Hills. Historically, the collisions were single-vehicle cases of property damage/injury in the eastbound and westbound directions along CR29. A poor sightline was observed at the east leg due to the slope and curvature of CR29. Advance warning of the intersection was present in the form of signage on the east leg, but not on the west leg.

Figure 5 - At Glover Road, looking east on County Road 29

1.6 County Road 18 and Telephone Road - Cobourg

Within the Township of Hamilton, the intersection of County Road 18 and Telephone Road is situated just north of the Town of Cobourg. There have been several rear-end collisions reported for vehicles travelling northbound. This may be due to the poor sightline of Telephone Road from County Road 18. There is only one lane for each direction on County Road 18, meaning collisions may have occurred due to conflicts with vehicles continuing north and vehicles stopping suddenly to turn onto Telephone Road.

Figure 6 - At Telephone Road, looking south on County Road 18

1.7 County Road 8 and Wingfield Road – Trent Hills

The intersection of County Road 8 and Wingfield Road is situated near the northeast border of Northumberland County in the Municipality of Trent Hills. It was observed that vehicles travelling westbound on County Road 8 have a poor sightline of Wingfield Road. The west leg of the intersection curves, also causing sightline issues for eastbound vehicles approaching the intersection.

Figure 7 - At Wingfield Road, looking west on County Road 8

1.8 Elgin Street (CR 20) and Ontario Street - Cobourg

Located in the Town of Cobourg, the intersection of County Road 20 and Ontario Street has a history of numerous rear-end and turning collisions, predominantly for eastbound and westbound vehicles along CR 20. This may be due to the absence of exclusive right turn or left turn lanes on CR 20. The eastbound shared through and right turn lane was observed to not have any pavement marking, potentially leading to driver confusion regarding the lanes that turns could be performed. Also, the bridge guard rails located at the southwest and northeast corners of the intersection cause an obstruction in the sightline of CR 20 for vehicles waiting to turn left or right from Ontario Street onto CR 20.

Figure 8 - At southeast corner of County Road 20 and Ontario Street, facing west

1.9 County Road 45 and Centreton Road (CR 22) – Alnwick/Haldimand

The intersection of County Road 45 and County Road 22 is located in the Township of Alnwick/Haldimand. The speed of vehicles along both CR 45 and CR 22 is likely a significant issue. There is one streetlight illuminating the intersection. The southbound left turn lane and northbound right turn lanes both have a considerable amount of storage space. For vehicles travelling northbound on CR 45, the presence of a commercial driveway before CR22 might cause some driver confusion as they may unexpectedly turn prior to the intersection, due to the length of the right turn lane.

Figure 9 - At Centreton Road, looking south on County Road 45

1.10 County Road 30 and 5th Line – Trent Hills

The intersection of County Road 30 and 5th Line is located in the Municipality of Trent Hills. Numerous single-vehicle property damage collision have been reported, the majority of them occurring along the left shoulder in the southbound right turn lane. These right turning vehicles may have experienced problems due to the grade of the shoulder.

Figure 10 - At 5th Line, looking north on County Road 30

Vehicle Type


Automobile


Truck


Bus


Motorcycle


Other


Pedestrian


Uninvolved

Vehicle Movement


Left


Right


Straight

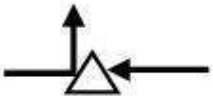

Backing

Severity


PDO


Injury


Fatal


Superimpose Severity and Crash Type

Crash Type


Rear End


Head On

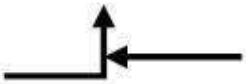

Angle


Sideswipe, Same Direction


Sideswipe, Opposite Direction


Out of Control


Collision with Fixed Object


Turning

Road Surface

C — Dry Clear

W — Wet

S — Snowy, Icy

O — Other

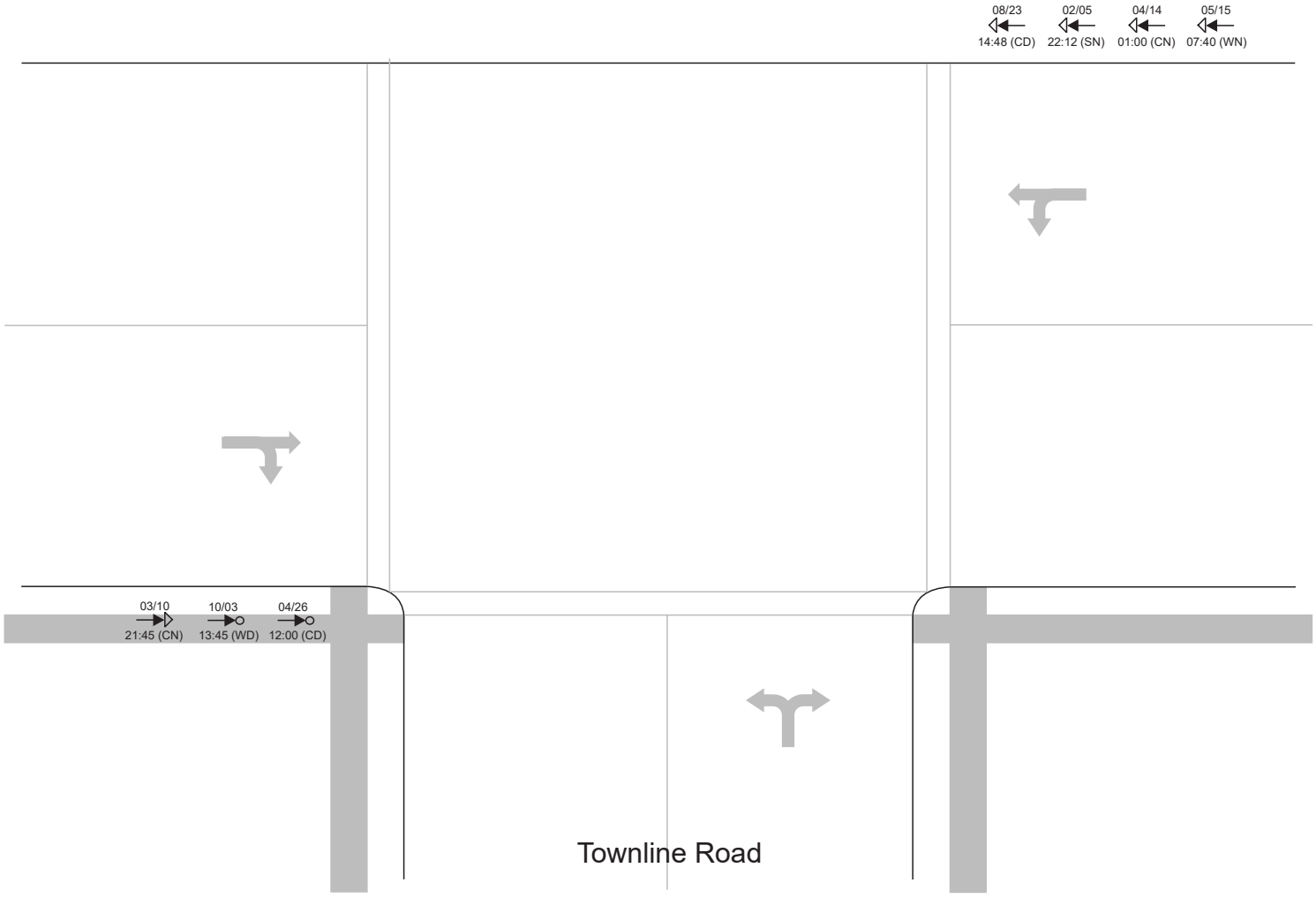
Lighting

D — Daylight

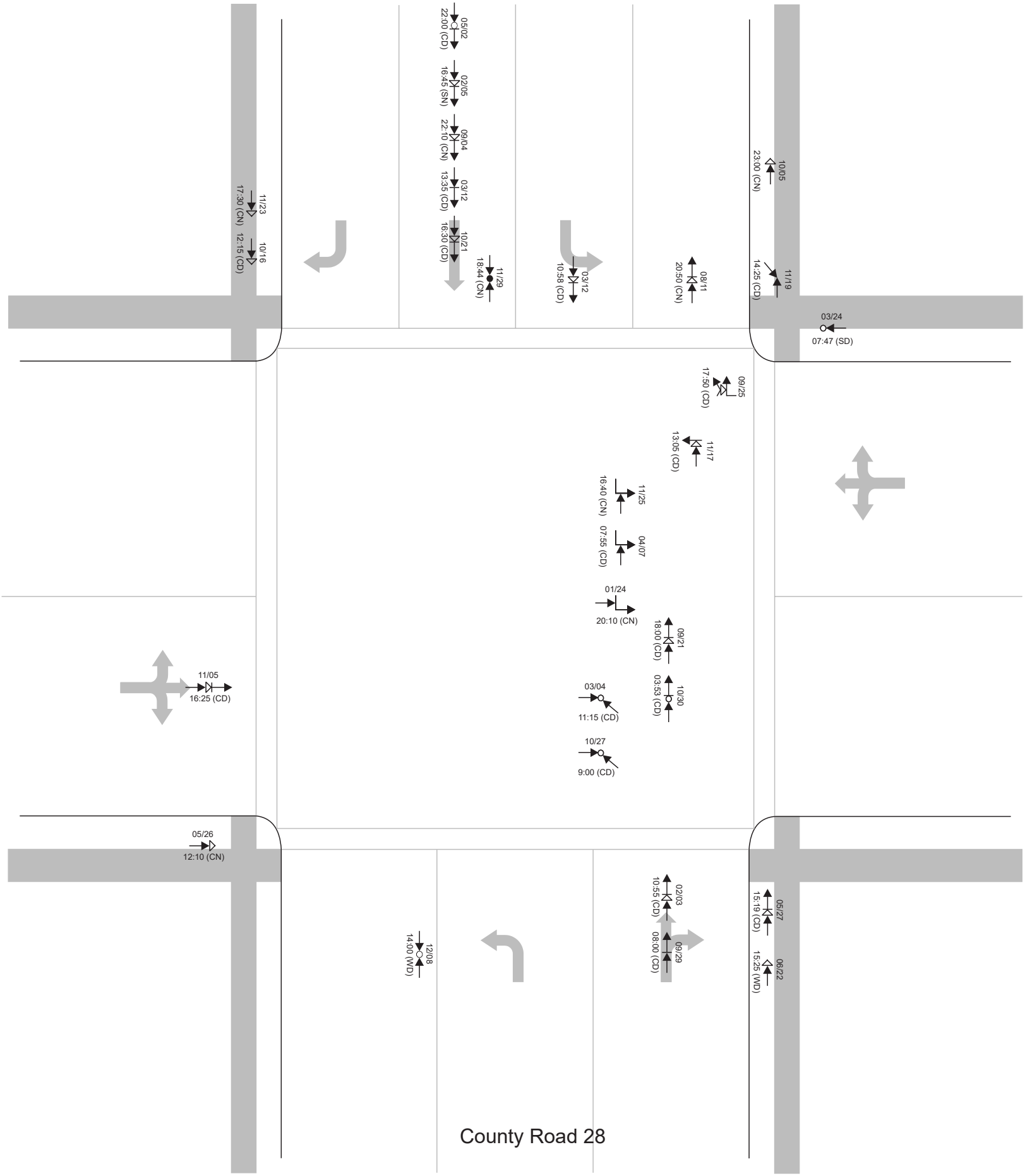
N — Dark No Lights

L — Dark with Street Lights

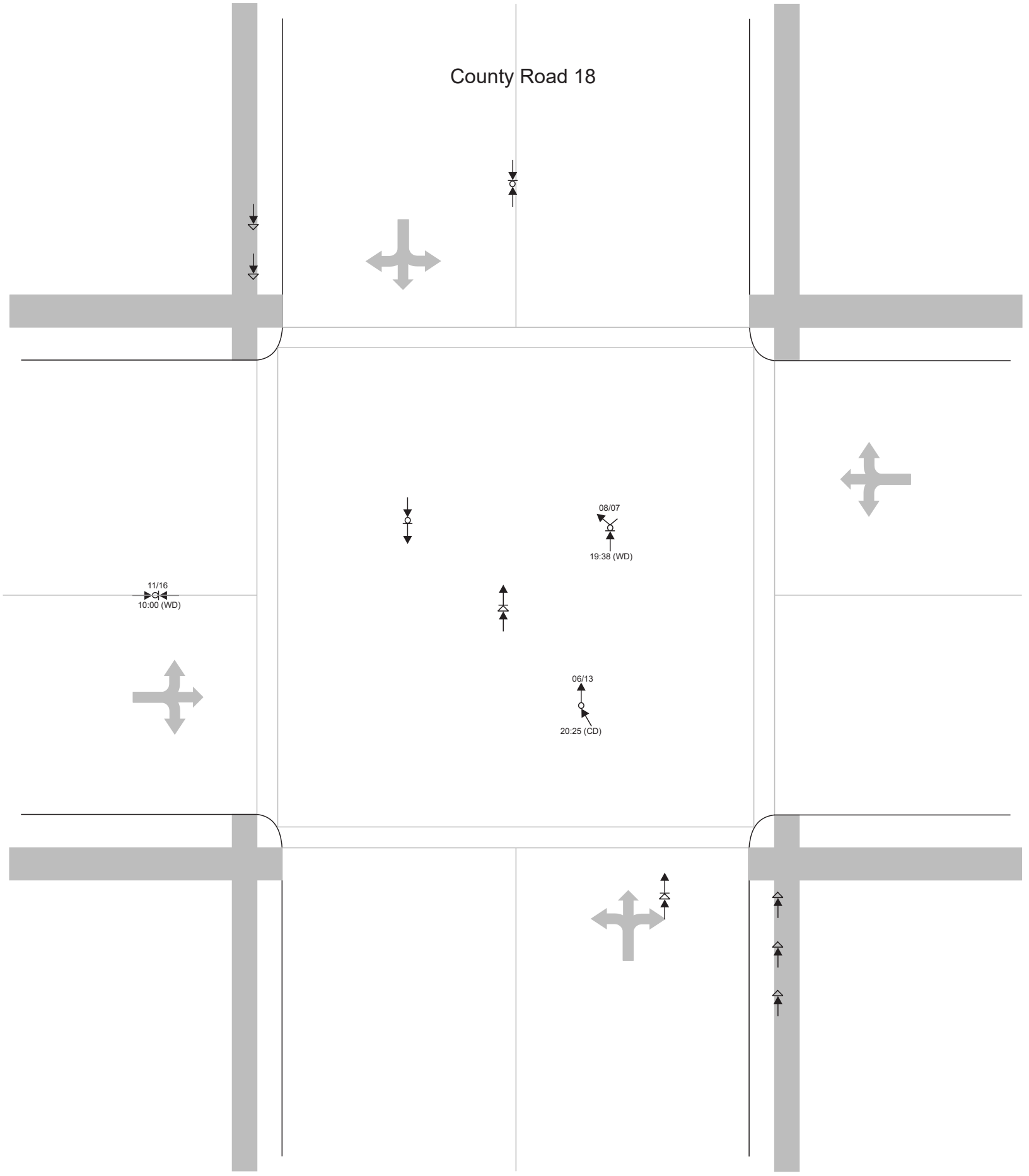
County Road 2 and Townline Road



County Road 28 and County Road 9

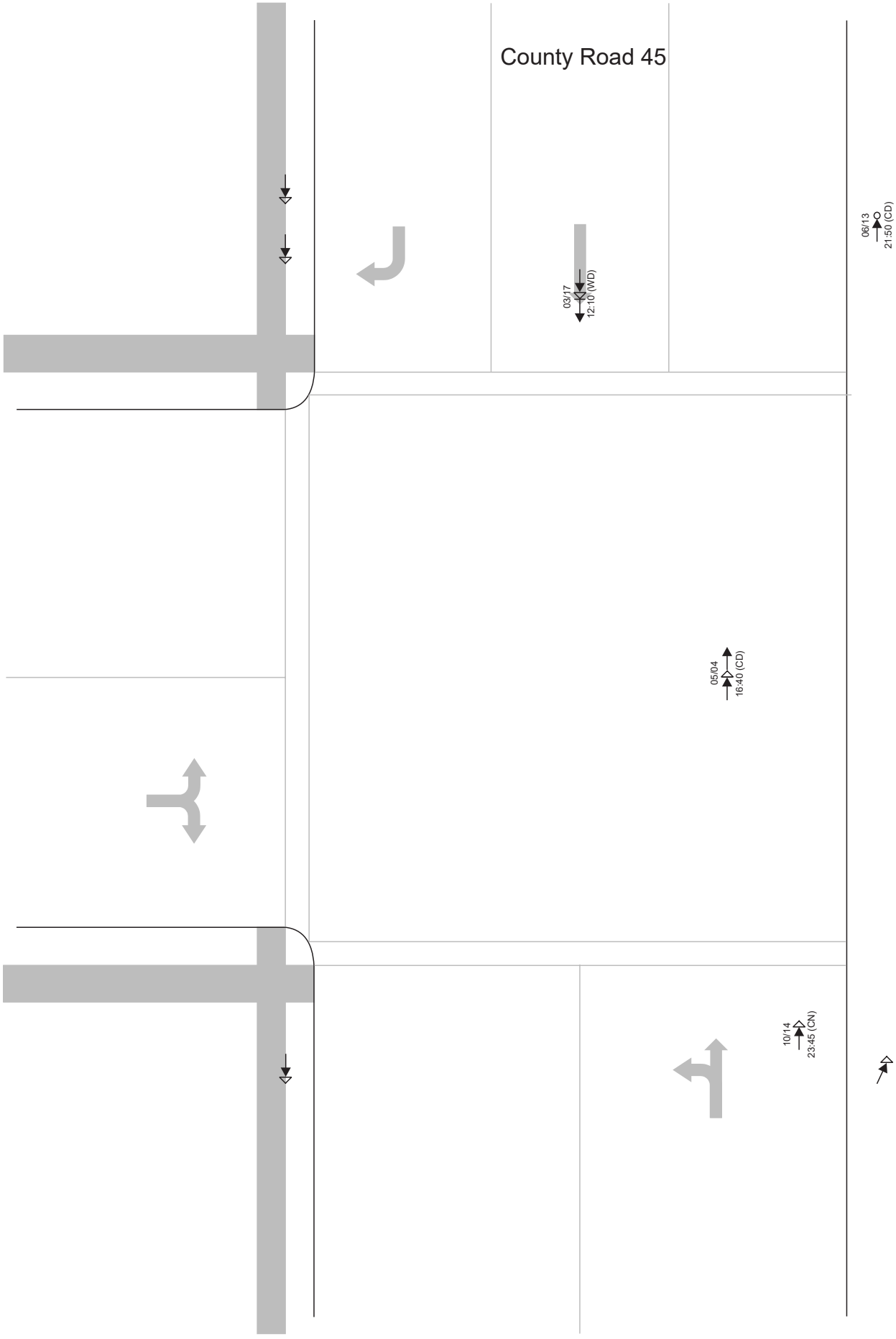


County Road 18 and Danforth Road

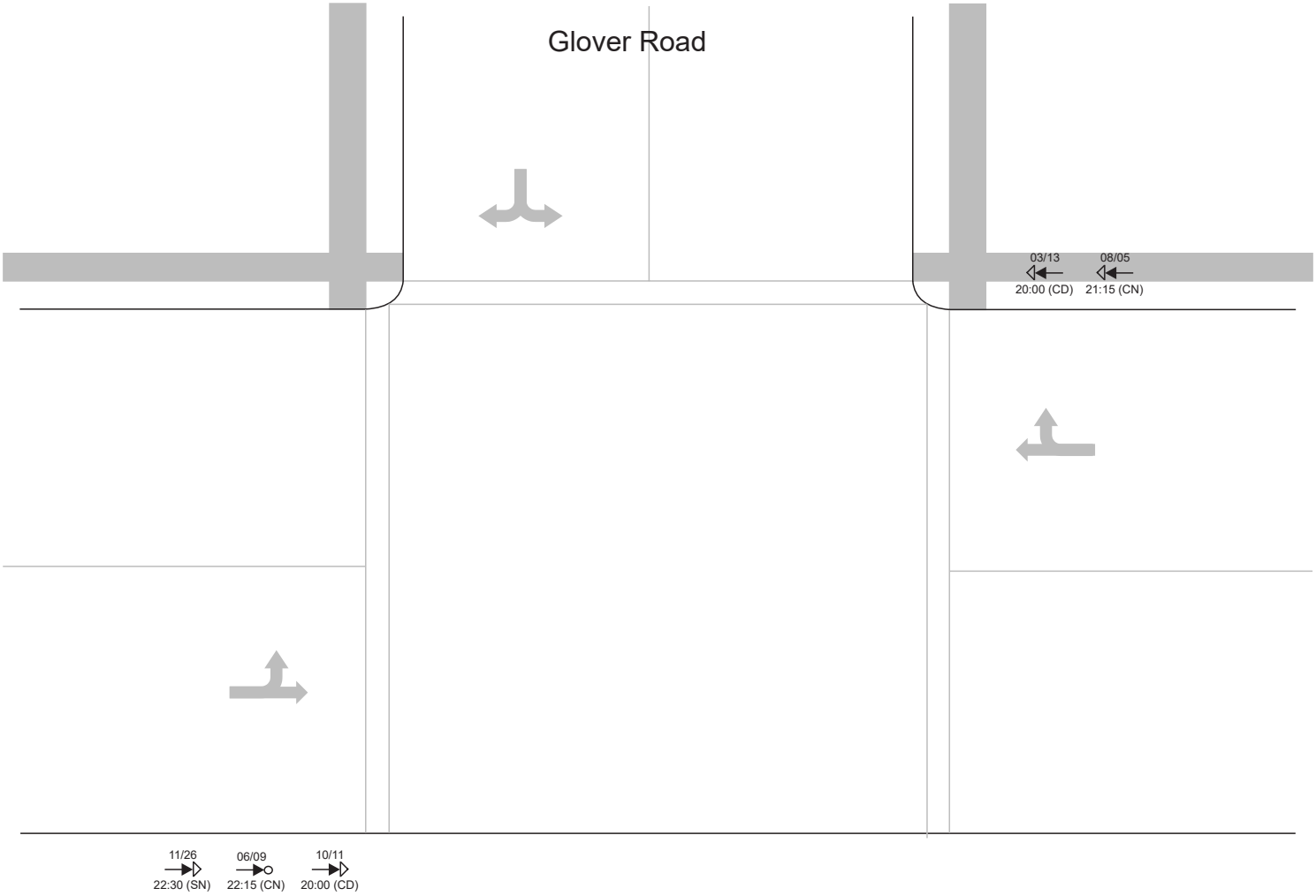


* 1 Accident not shown due to insufficient data

County Road 45 and Beagle Club Road

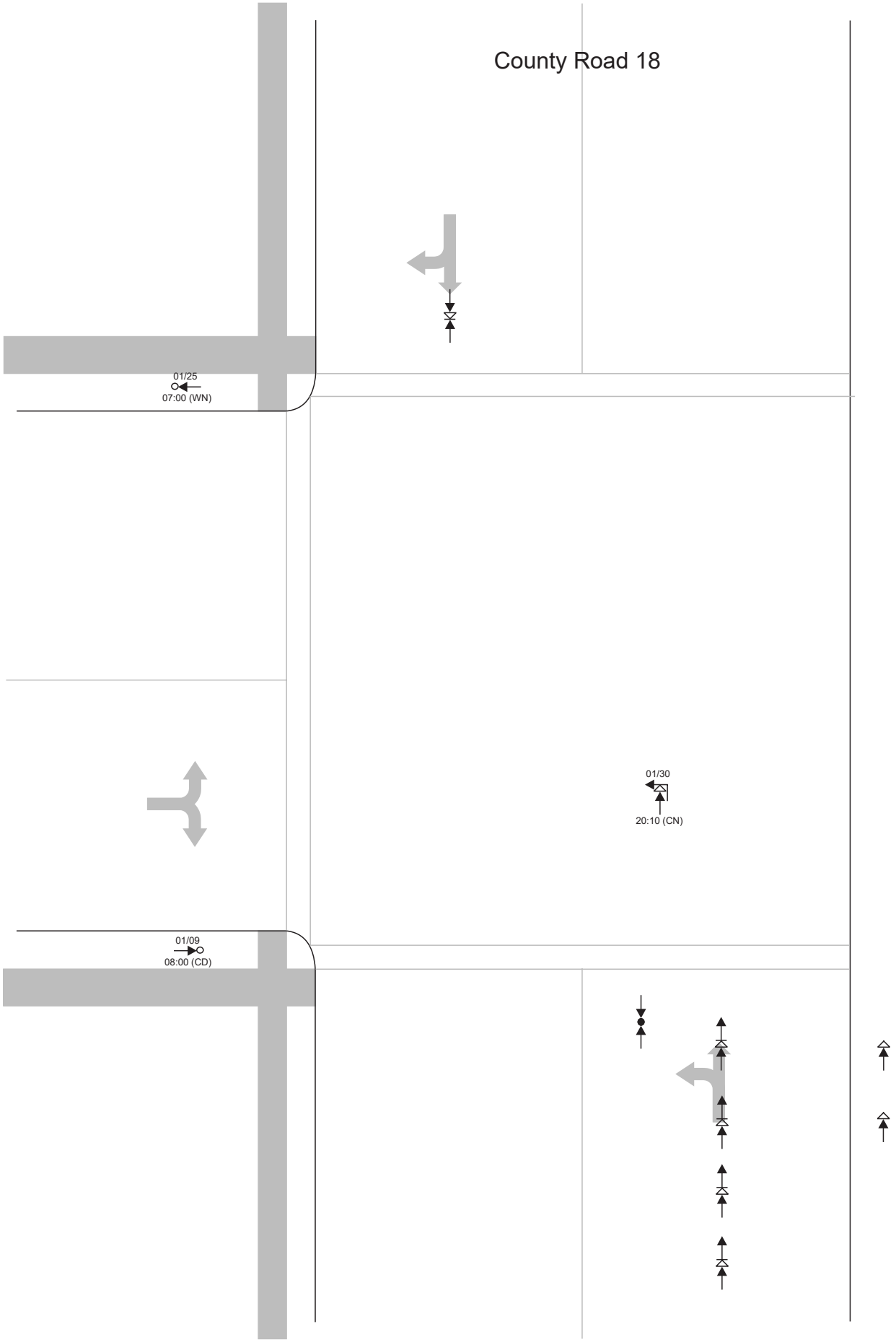


County Road 29 and Glover Road

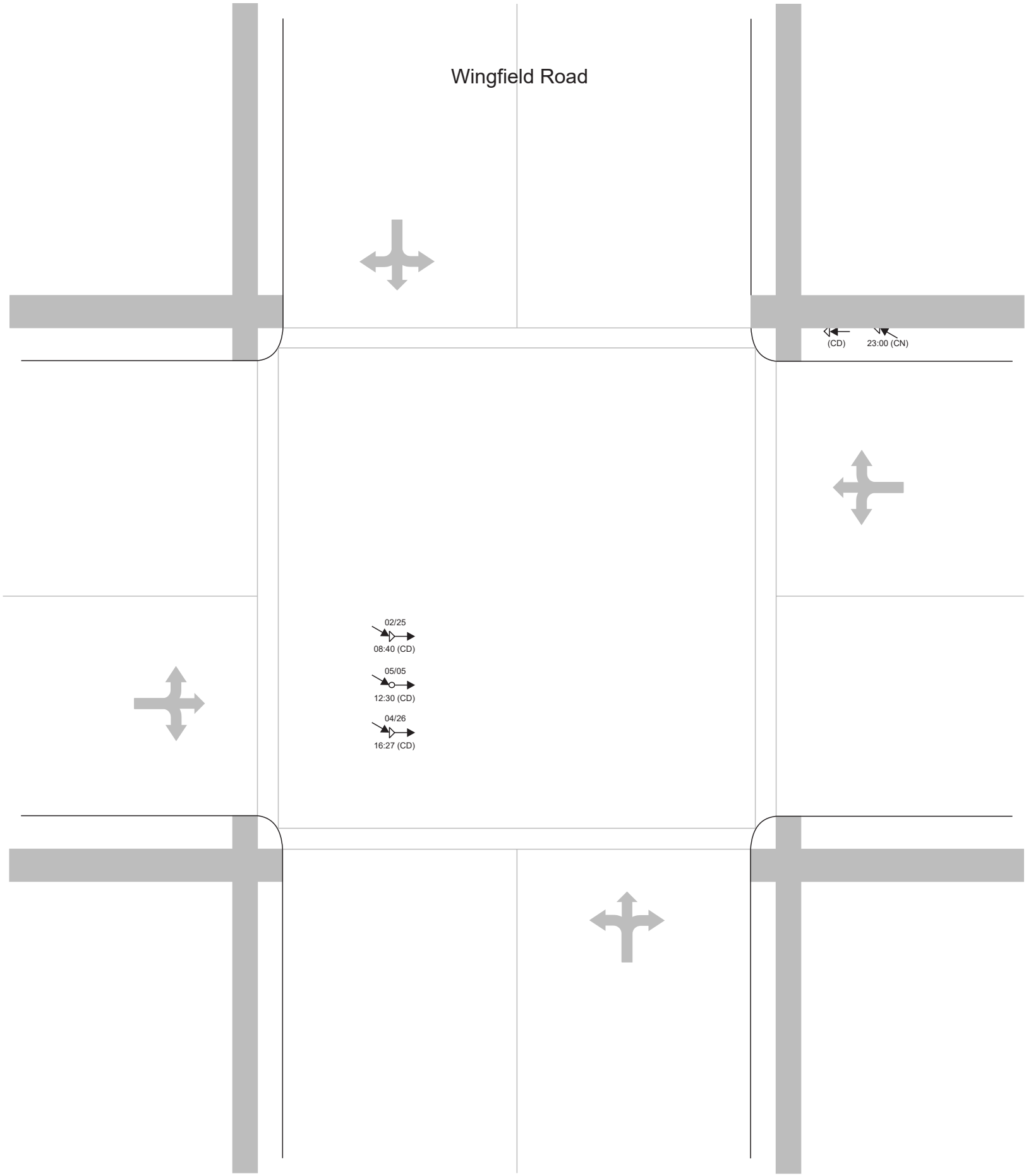


* 1 Accident not shown due to insufficient data

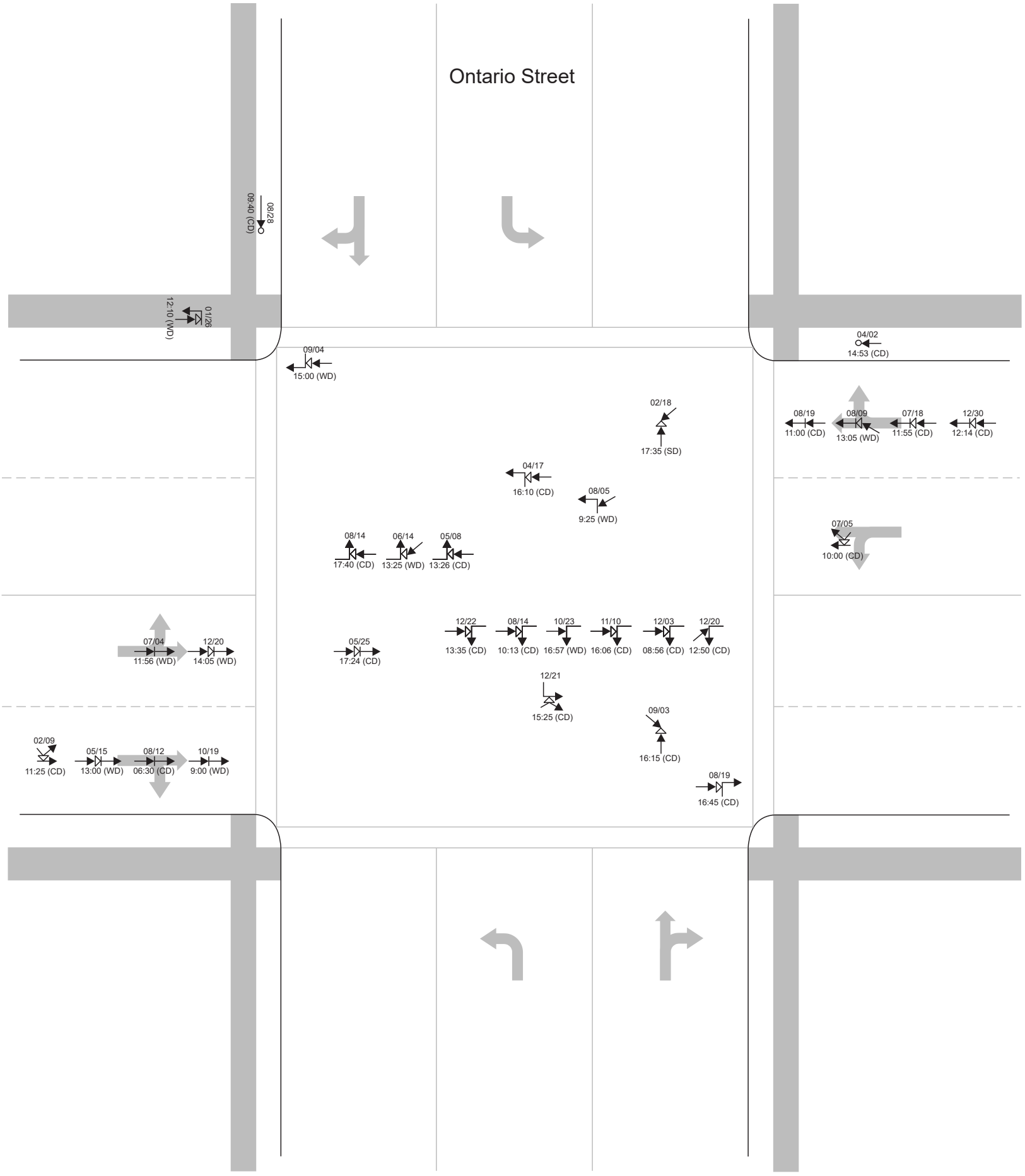
County Road 18 and Telephone Road



County Road 8 and Wingfield Road

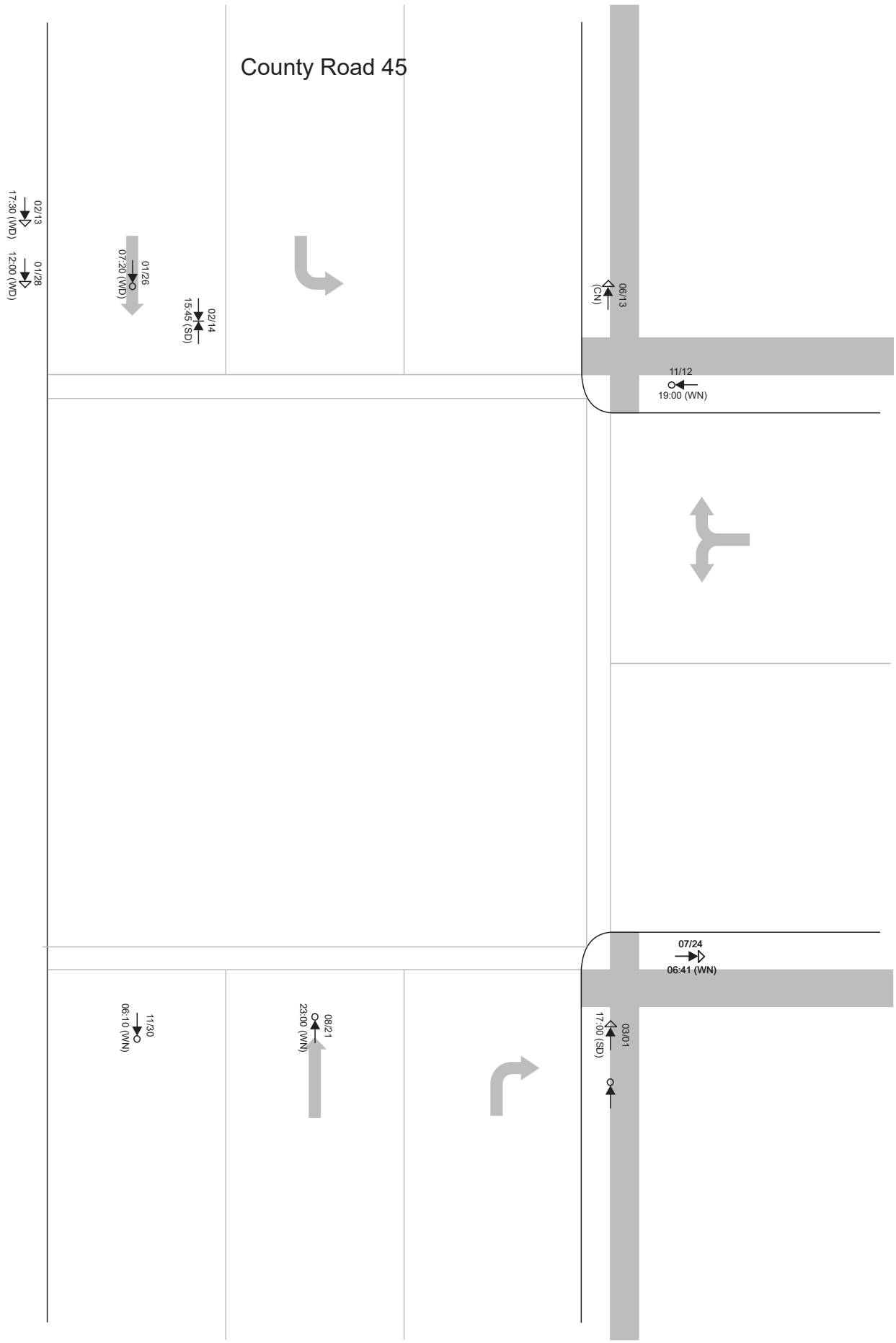


County Road 20 and Ontario Street

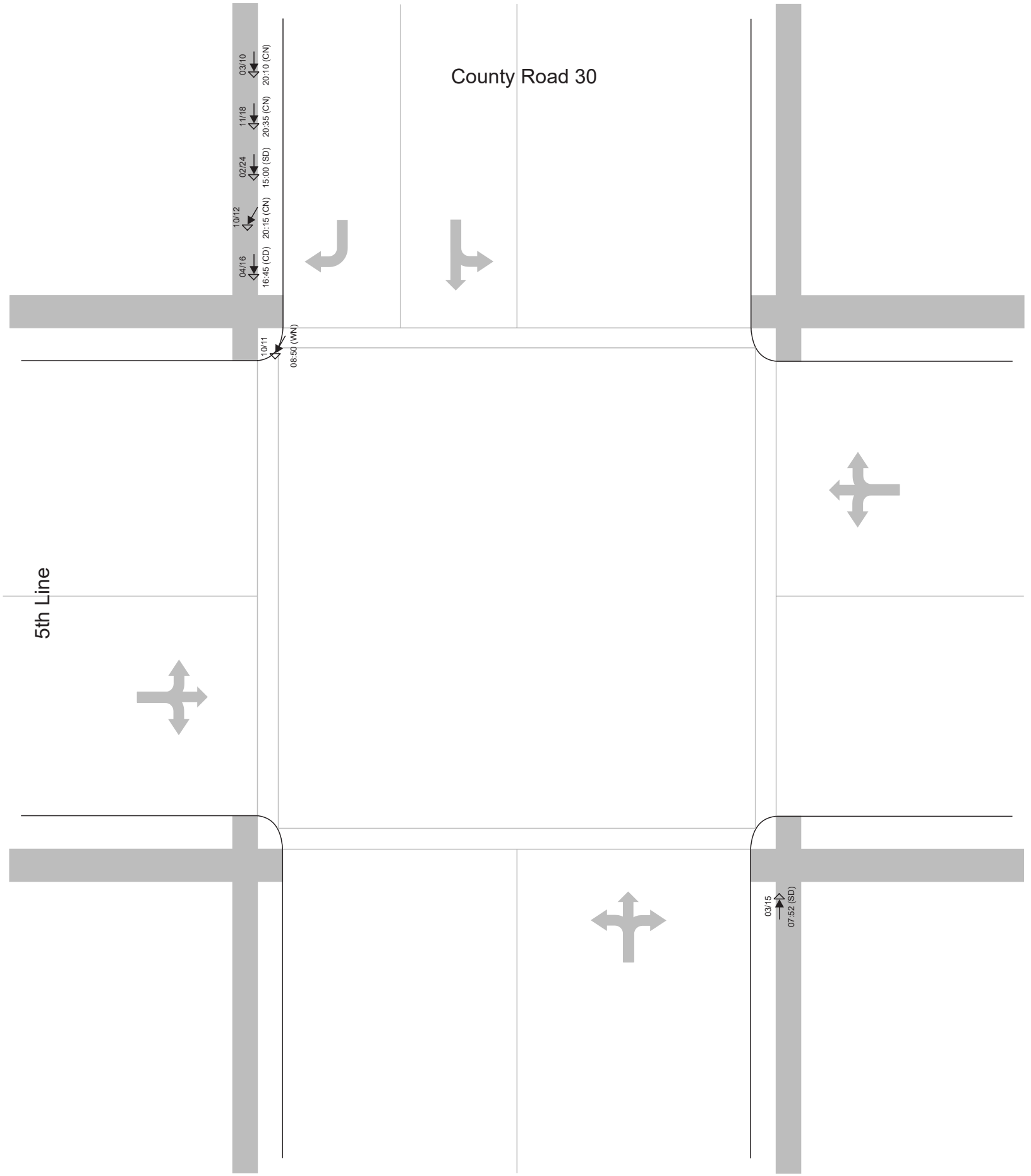


* 2 Accidents not shown due to insufficient data

County Road 45 and County Road 22



County Road 30 and 5th Line



Appendix D

Calibration and Validation

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Section 1.0 – Model Validation

A validation of the 2011 Model was completed in order to ensure that travel patterns forecasted in the model were consistent to those of existing conditions. This involved comparing the modelled volumes to Average Annual Daily Traffic (AADT), comparing the VKT and VHT metrics between the different roadway classes and reviewing the vehicle speeds of modelled traffic on the different roadway classes.

1.1 A.1 Average Annual Daily Traffic (AADT)

AADT was provided by the County and this represents the total daily volume of traffic on a roadway in the period of year. As the model was run for the p.m. peak hour, the AADT was converted to peak hour data to make it comparable to the modelled volumes. The two volumes were compared using the GEH statistic, a measure used to determine the accuracy of the modelled volumes. A summary of the GEH results can be seen in Table A.1 below.

Table A.1: Summary of GEH Results

GEH	Freq	Rel.Freq	Cum.Freq
5	57	39%	39%
10	35	24%	62%
15	19	13%	75%
20	13	9%	84%
>20	24	16%	100%
Total	148	100%	

The table shows that 62% of the modelled volumes are within GEH 10. The primary reason for a lower validation percentage is a result of the fact that the model assigns traffic to paths with the absolute shortest travel time when, in reality, drivers may choose to remain on an arterial route even if the travel time is slightly longer, since the travel times are likely not significantly longer. In order to attempt to account for some of these trips, the model was run using a stochastic assignment, to replicate the choice of drivers to not use the "most optimal" route. In reviewing the overall results from the existing model, the results seem to be reasonable since they identify the key corridors that are congested, or approaching congestion, today. Furthermore, the level at which the results are to be used for the future (at a corridor/screenline level) allows for a slightly less precise validation. As a result, the model is appropriately calibrated for identifying corridors or screenlines which require further, more detailed, review.

1.2 A.2 VKT and VHT by Roadway Classification

To determine whether the different road classes were being utilized in a manner that accurately reflects travel patterns, the VKT and VHT values by each road class were compared. These are shown in Table A.2 below.

Table A.2: 2011 VKT and VHT by Road Classification

Roadway Classification	Type Code	VKT	% of Total VKT	VHT	% of Total VHT	Total Distance (km)
Highway	12	225,253	53%	3,395	50%	131
Arterial	21	169,845	40%	2710	40%	1066
Collector	31	10,836	3%	225	3%	211
Rural	41	18,046	4%	353	5%	1040
Ramps	51	1,957	0%	60	1%	19
Total		**425,937**	**100%**	**6,743**	**100%**	**2,467**

Generally, the results are as expected. While only 40% of total VKT and 40% of total VHT are taken on arterial roadways, it must be noted that this only comprises of 43% of the total roadway network length in Northumberland. As a result, these numbers are largely in-line with the observed existing conditions, where travellers are not constrained by congestion and are taking the most convenient route.

1.3 A.3 Vehicle Speeds

A summary of posted speeds and modelled speeds are shown in Table A.3 below. The speeds have been categorized by the different road classes.

Table A.3: Vehicle Speeds by Road Classification

Roadway Classification	Posted Speed (km/h)	Average Speed (km/h)
Highway	100	71.23
Arterial	50-80	62.39
Collector	50-80	50.56
Rural	50-80	53.00
Network	**500-100**	**56.93**

An average speed of 56.93 km/h in the network indicates an overall low level of congestion. This is also represented amongst the different road classes. Generally speaking, due to the lack of congestion on the roadway network speeds are higher than posted, which is more in line with observed behavior for Northumberland residents. This also results in a larger percentage

of users travelling along MTO Highways since these are the highest design classification roadways. Overall these speeds are indicative of a largely rural road network with little congestion.

Appendix E

Bus Route Maps

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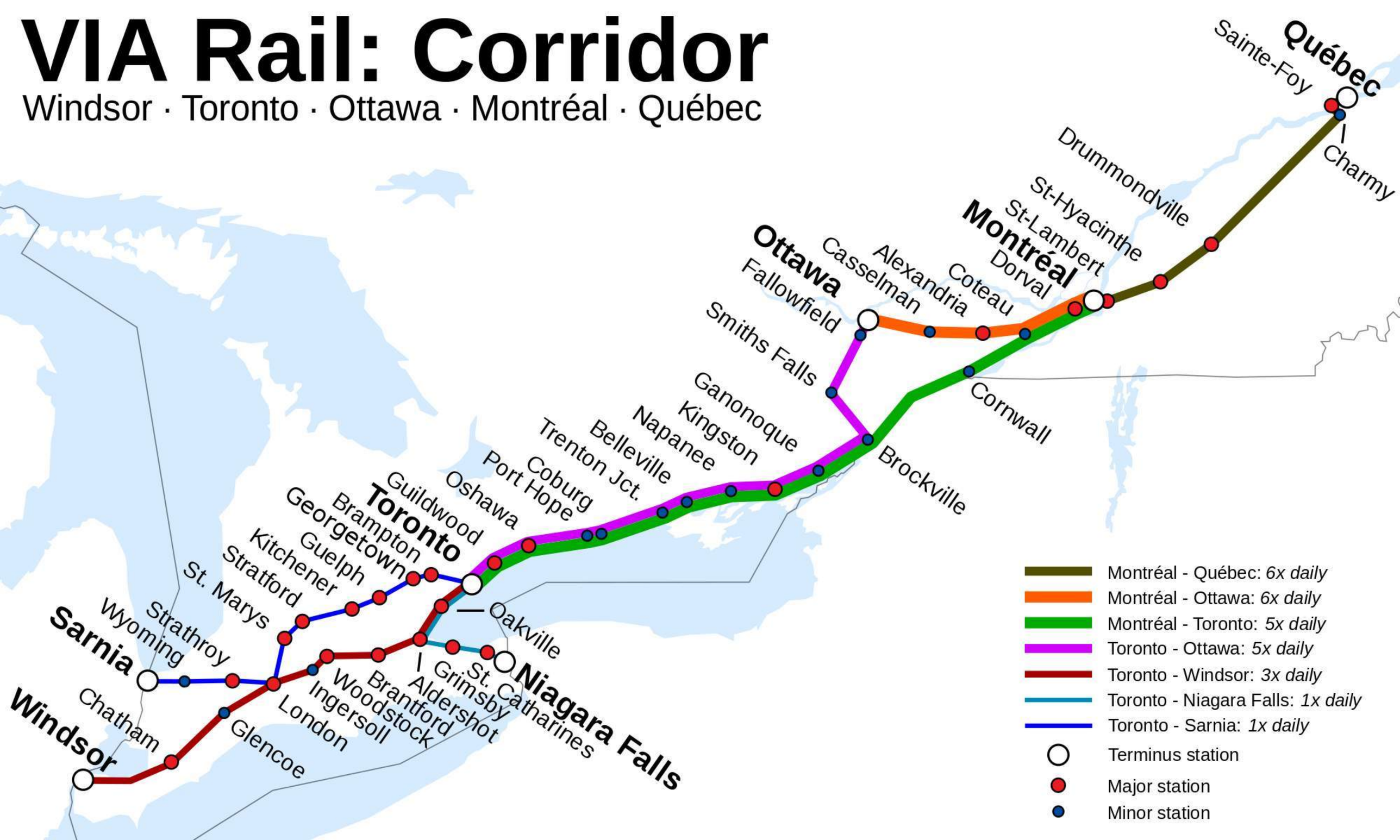
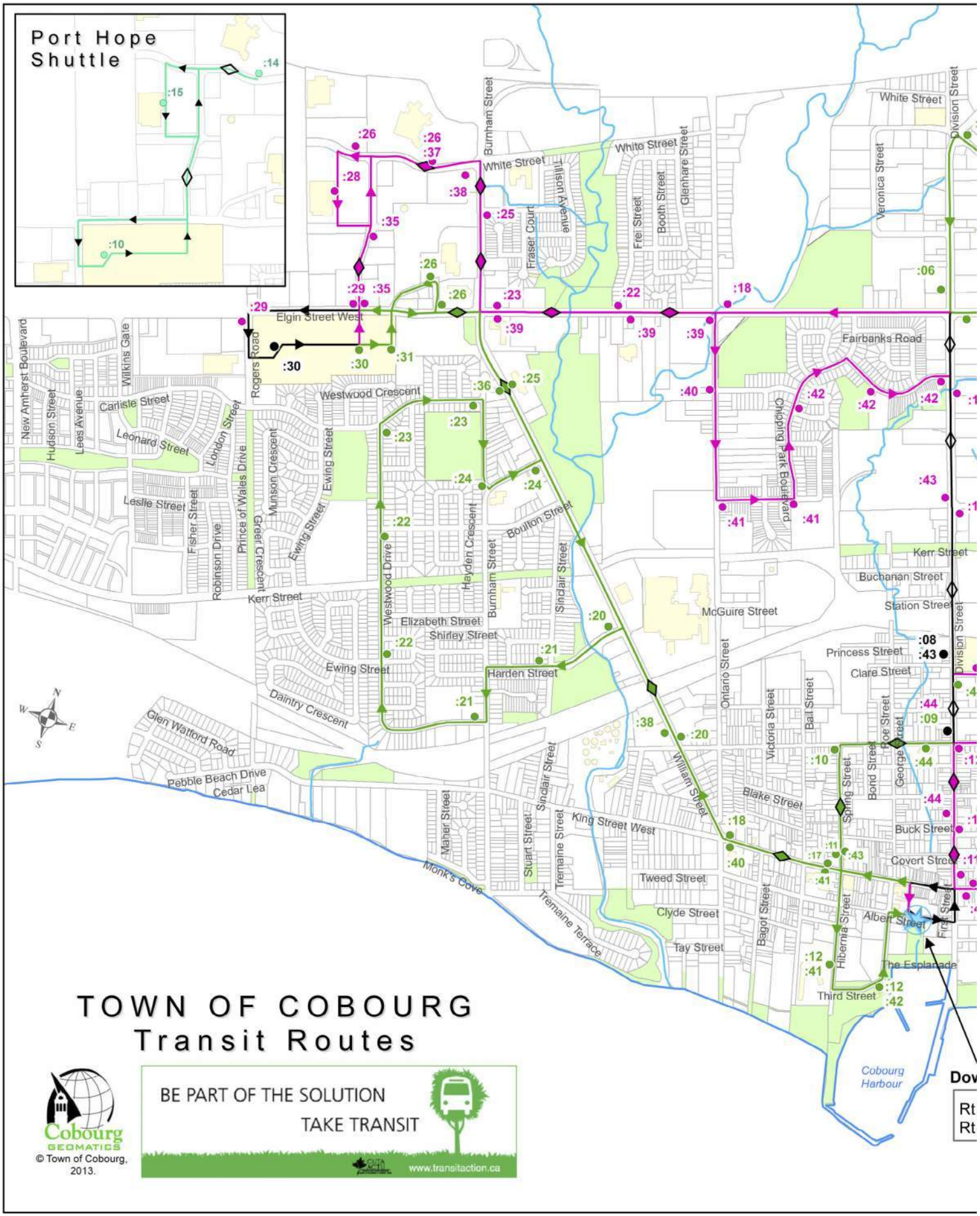
VIA Rail: Corridor

Windsor · Toronto · Ottawa · Montréal · Québec



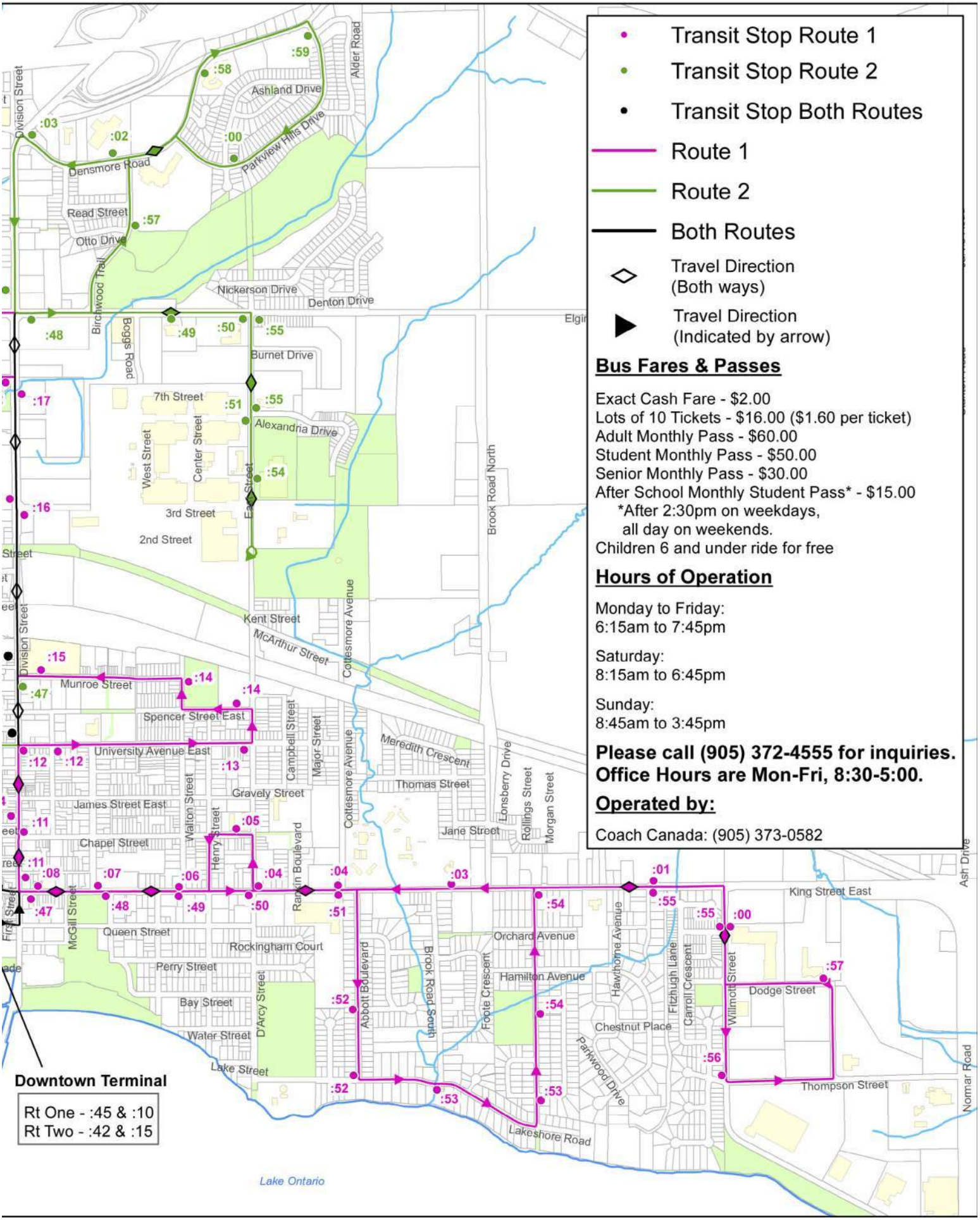


TOWN OF COBOURG
Transit Routes

Cobourg GEOMATICS

BE PART OF THE SOLUTION
TAKE TRANSIT

www.transitaction.ca


Transit Stop Route 1
Transit Stop Route 2
Transit Stop Both Routes
Route 1
Route 2
Both Routes
Travel Direction (Both ways)
Travel Direction (Indicated by arrow)
Bus Fares & Passes
Exact Cash Fare - $2.00
Lots of 10 Tickets - $16.00 ($1.60 per ticket)
Adult Monthly Pass - $60.00
Student Monthly Pass - $50.00
Senior Monthly Pass - $30.00
After School Monthly Student Pass* - $15.00
*After 2:30pm on weekdays, all day on weekends.
Children 6 and under ride for free
Hours of Operation
Monday to Friday:
6:15am to 7:45pm
Saturday:
8:15am to 6:45pm
Sunday:
8:45am to 3:45pm
Please call (905) 372-4555 for inquiries.
Office Hours are Mon-Fri, 8:30-5:00.
Operated by:
Coach Canada: (905) 373-0582
Downtown Terminal
Rt One - :45 & :10
Rt Two - :42 & :15
Lake Ontario
Densmore Road
Ashland Drive
Parkview Hills Drive
Alder Road
Division Street
Read Street
Otto Drive
Birchwood Trail
Nickerson Drive
Denton Drive
Boggs Road
Burnet Drive
7th Street
Alexandria Drive
West Street
Center Street
East Street
3rd Street
2nd Street
Brook Road North
Kent Street
McArthur Street
Cottesmore Avenue
Munroe Street
Spencer Street East
University Avenue East
Campbell Street
Major Street
Meredith Crescent
Thomas Street
Lonsberry Drive
Rollings Street
Morgan Street
Gravely Street
James Street East
Walton Street
Henry Street
Chapel Street
Jane Street
Rankin Boulevard
King Street East
Ash Drive
McGill Street
Queen Street
Rockingham Court
Perry Street
Bay Street
Water Street
D'Arcy Street
Lake Street
Abbott Boulevard
Brock Road South
Foote Crescent
Orchard Avenue
Hamilton Avenue
Hawthorne Avenue
Fitzhugh Lane
Carroll Crescent
Willmott Street
Dodge Street
Chestnut Place
Parkwood Drive
Thompson Street
Normar Road
Lakeshore Road
First Street

Our Partners

- HKPR District Health Unit
- Northumberland United Way
- Ontario Disability Support Program
- The Help Centre • YMCA Early Years
- Northumberland County Community & Social Services
- Port Hope Community Health Centre

The Northumberland Transportation Initiative is operated by: Community Care Northumberland

NEED A RIDE? WE CAN HELP.

1-866-768-7778

Funding Support for Northumberland Transportation Initiative

NTI graciously acknowledges the valuable support of this community project from the following agencies and organizations:

- **Northumberland United Way**
- **Ontario Trillium Foundation**
- **Northumberland County**
- **Ontario Disability Support Program**
- **Township of Cramahe**
- **Township of Alnwick/Haldimand**
- **Municipality of Trent Hills**
- **The Campbellford/Seymour Community Foundation**

Northumberland Transportation Initiative

Affordable transportation for our rural communities

Transportation for:

• Families • Youth • Seniors • Adults

Rides to attend:

• Appointments • Meetings • Work • School • Social • Shopping • Recreation

Various pick up & drop-off locations.

Travel for as low as

$5 one way

Call for details

Van Hours - 8:00 am to 6:00 pm
Contact our office for daily schedules

Call us: 905-355-1444 or 1-866-768-7778

Moving the Community Together

Northumberland Transportation Initiative

How to Register

Please register prior to riding.

If over 16 years of age please complete your own NTI application form and return to the office:

Send by mail:

NTI Office
11 King Street East, P.O. Box 33
Colborne, ON
K0K 1S0
(Located inside Downey Pharmacy)

Send by Fax:
1-905-355-1805

To Book & Reserve

Call Toll Free
1-866-768-7778

Reservation Information

- Call at least 24 hours in advance
- Leave a detailed message
- Availability: first come/ first served day, time and pick up location
- Various pick up and drop off locations along routes, please call for more details

Need to cancel?

If you need to cancel a ride please call the NTI office ASAP to cancel any booked rides at ***1-866-768-7778***

Drop off and pick up locations in Cobourg:

- Northumberland Mall
- Downtown Cobourg; Main Bus Stop, behind Town Hall,
- Northumberland Hills Hospital
- King Street / Cottesmore Avenue

Stop Request

Please arrange with the NTI Coordinator if you wish to be picked up or dropped off at a location other than a regular stop. The driver will let you off the van as close to your request as safely possible.

Please help keep the van tidy!
No food, drink or smoking is permitted in van.

Payment

Please pay the driver when boarding. Please have exact change. Bus transfer pass-enables you to transfer to ride the Cobourg transit, Please ask the driver for your ticket.

Policies/Procedures

Safety - You are required to wear your seat belt at all times. Children under 8 must in be proper car seats.

Car Seats - NTI has infant & child car seats, ask for details.

Storage - space is very limited; advise if bringing large items for office approval

Pets - No pets allowed; certified medical assistance & guide dogs excepted.

Lost items - We are not responsible for personal items lost or stolen. Items left behind will be stored in our office for no longer than two months.

Minors - Passengers under 16 must be accompanied by an adult.

Cramahe & Alnwick /Haldimand Route

Monday, Tuesday, Thursday, Friday, 8:00 am to 6 pm (except holidays)

- *Colborne*
- *Castleton*
- *Dundonald*
- *Morganston*
- *Salem*
- *Grafton*
- *Cobourg*
- *Lakeport*
- *Centreton*
- *Roseneath*
- *Fenella*
- *Wicklow*
- *Eddystone*
- *Vernonville*
- *Bomanton*
- *Burnley*
- *Brookside*
- *Roseneath Landing*

Trent Hills Route

Monday, Tuesday, Thursday, Friday, 8:00 am to 6 pm (except holidays)

- *Campbellford*
- *Hoard's Station*
- *Burnbrae*
- *Menie*
- *Petherick's Corner's*
- *Allen Mills*
- *Stanwood*
- *Healey Falls*
- *Trent River*
- *Hastings*
- *Brickley*
- *Dartford*
- *Warkworth*
- *Meyersburg*
- *Percy Boom*
- *Norham*
- *Oak Heights*

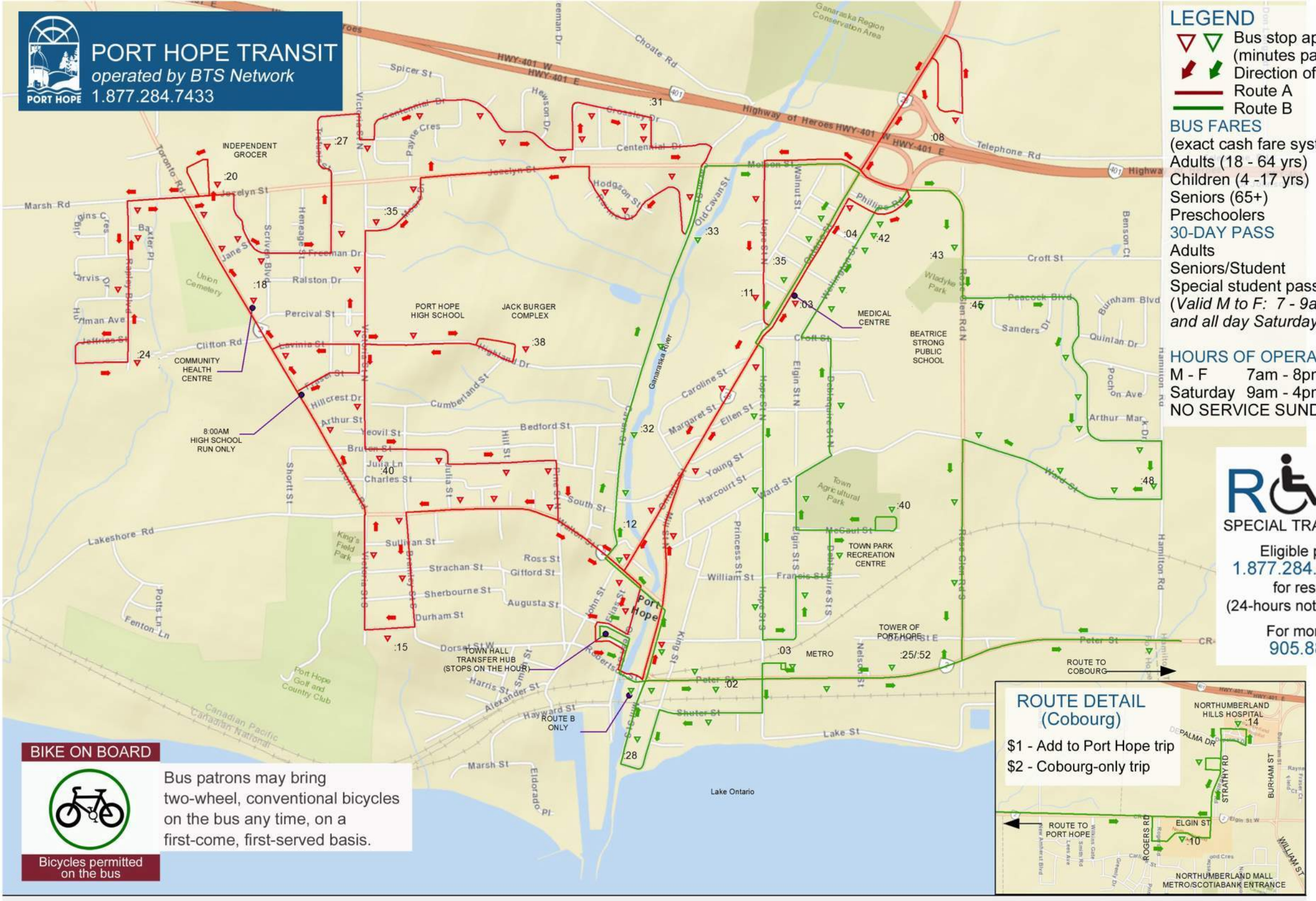
Registration forms are also available at most service agencies, local libraries, post offices & arenas in the service area.
Online at: www.commcare.ca (under NTI link)
Cramahe Township, Alnwick/Haldimand & Trent Hills websites

Call us Toll Free: 1-866-768-7778 **Moving the Community Together**

PORT HOPE TRANSIT

operated by BTS Network

1.877.284.7433



LEGEND

- Bus stop approximate stop time (minutes past the hour)
- Direction of travel
- Route A
- Route B

BUS FARES

(exact cash fare system)

Adults (18 - 64 yrs)	$2.00
Children (4 -17 yrs)	$1.50
Seniors (65+)	$1.50
Preschoolers	FREE

30-DAY PASS

Adults	$50.00
Seniors/Student	$30.00
Special student pass	$15.00

(*Valid M to F: 7 - 9am & 2:45 - 8pm and all day Saturday*)

HOURS OF OPERATION

M - F	7am - 8pm
Saturday	9am - 4pm

NO SERVICE SUNDAYS OR HOLIDAYS

ROLLS

SPECIAL TRANSIT SERVICE

Eligible patrons call

1.877.284.RIDE (7433)

for reservations

(24-hours notice appreciated)

For more info call

905.885.2431

ROUTE DETAIL (Cobourg)

$1 - Add to Port Hope trip

$2 - Cobourg-only trip

BIKE ON BOARD

Bicycles permitted on the bus

Bus patrons may bring two-wheel, conventional bicycles on the bus any time, on a first-come, first-served basis.

PORT HOPE TRANSIT
905.885.2431
Operated by BTS Network 1.877.284.7433

ROUTE "A"
(Approximate Stop Time in Minutes)

Town Hall (56 Queen St.)	00
Mill St. & Dorset St. West	01
Mill St. & Ward St.	02
Ontario St. & Bloomsgrove Ave.	02
Medical Centre (Ontario St.)	03
Arby's	04
Easton's Service Centre	08
Hope St. North & Bennett Court	10
Hope St. North & Howard St.	11
Ontario St. & Caroline St.	11
Ontario St. & Barrett St.	12
Bank of Montreal – Walton St.	12
Walton St. & Pine St.	12
Walton St. & Church St.	13
Walton St. & Julia St.	13
Ridout St. & Bramley St.	13
Bramley St. & Strachan St.	14
Trafalgar St.	15
Victoria St. & Sullivan St.	15
Toronto Rd. & Arthur St.	16
Toronto Rd. & Lavinia St.	17
Community Health Centre (Toronto Rd.)	18
Toronto Rd. & Jane St. (Plaza)	18
Toronto Rd. & Jocelyn St.	19
Independent Grocer (Toronto Rd. & Jocelyn St.)	20
Rapley Blvd. & Huffman Ave.	23
Rapley Blvd. & Jeffries St./Ramsey Road	24
Rapley Blvd. & Baxter Place	25
Marsh Road and Toronto Road	25
Freeman Dr. & Jane St.	25
Freeman Dr. & Scriven Blvd.	25
Freeman Dr. & Heneage St.	26
Trefusis St. & Southby Place	26
Trefusis St. & Chalmers Court	27
Vaughn Ave. & Centennial Dr.	28
Centennial Dr. & Spicer St.	28
Centennial Dr. & Payne Crescent	29
Centennial Dr. & Carol Place	29
Centennial Dr. & Hewson Dr.	30
Centennial Dr. & Crossley Dr.	30
Crossley Dr. & St. Andrews St.	31
Crossley Dr. & Calgary St.	31
Calgary St. & Centennial Dr.	32
Cavan St. & Ravine Dr.	33
Ravine Dr. near Gibson Place	33
Ravine Dr. near Herbert Place	34
Jocelyn St. & Moore Dr.	34
Moore Dr. & Victoria St. North	35
Victoria St. North & Ralston Dr.	36
Victoria St. North & Lavinia St.	37
Port Hope High School (Highland Drive)	38
Sports Complex (Jack Burger)	38
Victoria St. North & Fraser St.	39
Victoria St. North & Yeovil St.	39
Bruton St. & Bramley St.	40
Bruton St. & Julia St.	41
Bruton St. (between Julia St. & Pine St.)	42
Bruton St. & Pine St.	43
Pine St. & Walton St.	45
Walton St. & Bank of Nova Scotia	46
Capitol Theatre (Queen St.)	47
Town Hall (56 Queen St.)	00

Route "B"
(Approximate Stop Time in Minutes)

Town Hall (56 Queen St.)	00
Peter St. & Mill Street	01
Beer Store (Peter St.)	02
Metro (Peter St. – Store front)	03
Giant Tiger	04
Northumberland Mall – Cobourg	10
Northumberland Hills Hospital – Cobourg	14
Wal-Mart – Strathy Road – Cobourg	15
Tower of Port Hope – Peter St.	25
Metro	26
Shuter St.	27
Fire Truck Museum (Mill St. South)	28
Ruth Clark Centre (Mill St. South)	28
Mill St. South and Dorset St.	29
Bank of Montreal – Walton St.	30
Cavan St. & Barrett St.	31
Cavan St. & Bedford St.	32
Cavan St. & Highland Dr.	33
Cavan Street & Ravine Dr.	33
Ontario St. & Helm St.	35
Hope St. North & Ontario St.	36
Hope St. North & Ellen St.	36
Hope St. North & Ward St.	37
Hope St. South & Dorset St.	37
Elgin St. & Francis St.	38
Deblaquire St. & McCaul St.	39
Town Park Recreation Centre	40
Elgin St. & McCaul St.	40
Deblaquire St. & College St.	41
Medical Centre (Wellington St.)	41
Wellington St. & Oxford St.	42
Wellington St. & Rosevear Blvd.	42
Wellington St. & Phillips Road	43
Rose Glen Rd. & Croft St.	43
Peacock Blvd. (between Sanders Dr. & Scott Ct.)	45
Peacock Blvd. & Quinlan Dr.	45
Peacock Blvd. & Stanley Dr.	46
Peacock Blvd. & Arthur Mark Dr. (East exit)	46
Peacock Blvd. & Arthur Mark Dr. (South exit)	46
Ward St. & Hamilton Rd.	48
Joice Sweanor (Ward St.)	49
Ward St. & Talbot Dr.	49
Ward St. & Rose Glen Rd.	50
Rose Glen Rd. (North of railway tracks)	51
Rose Glen Rd. (South of railway tracks)	51
Tower of Port Hope (Peter St.)	52
Peter St. & King St.	53
Town Hall (56 Queen St.)	00
Northumberland Mall – Cobourg	10
Northumberland Hills Hospital – Cobourg	14
Wal-Mart – Strathy Road – Cobourg	15
Tower of Port Hope – Peter St.	25
Metro	26
Shuter St.	27
Fire Truck Museum (Mill St. South)	28
Ruth Clark Centre (Mill St. South)	28
Mill St. South and Dorset St.	29
Bank of Montreal – Walton St.	30
Cavan St. & Barrett St.	31

Appendix F

Capital Plan Improvements - Road Rationalization

WSP | MMM GROUP

APPENDIX F - Road Rationalization Screening

Definitions	Urban Center Connector	Kings Highway / Upper Tier Connector	Heavy Industry Service	Barrier Service	Resort Criterion	Urban Cell Service	Urban Arterial Extension	Rural Cell Service	Traffic Speed	Road Surface	Traffic Volume
Screening threshold for County Road classification is a total score of 5	Connects Major Urban Centers	Extends Kings Highway to major commercial/ industrial, universities, hospitals, municipal boundaries, border crossings and provincial boundaries. Major is 1000 vehicle trips per day.	Provides service within 4.0km of a consistent major attractor or generator of heavy vehicles. May include municipal landfills.	Connection to Highway 401 or crosses river	Within 4km of edge of resort area	Provides reasonable spacing between major through routes in urban areas.	Connects urban major arterial with Provincial Highway or County Road and has greater than 700 AADT	Provides reasonable locations for continuous road link within County Road grid network in rural areas.	Is road typically 80km/h?	Roads with asphalt pavement	Taken from 2013 AADT Data - does roadway have more than 1000 AADT?

COUNTY ROADS Candidate for Download

North/South

Route Segement	Route	Municipality	Location	Urban Center Connector	Kings Highway / Upper Tier Connector	Heavy Industry Service	Barrier Service	Resort Criterion	Urban Cell Service	Urban Arterial Extension	Rural Cell Service	Traffic Speed	Road Surface	Traffic Volume	TOTAL
				30	**20**	**20**	**10**	**10**	**N/A0**	**30**	**10**	**10**	**.50**	**.50**	
1	County Road 65	Port Hope	N of 74			Y					Y	Y	Y		4.5
2	County Road 10	Port Hope	N of 74			Y	Y			Y		Y	Y	Y	8
3	County Road 28	Port Hope	N of 74	Y	Y	Y	Y			Y	Y	Y	Y	Y	14
4	County Road 28	Port Hope	S of 74	Y	Y		Y			Y			Y	Y	10
5	County Road 18	Hamilton	N of 74	Y		Y		Y			Y		Y	Y	8
6	County Road 18	Hamilton	S of 74	Y		Y	Y			Y	Y	Y	Y	Y	12
7	County Road 18	Cobourg	N of 20	Y			Y			Y			Y	Y	8
8	County Road 15	Hamilton	E of 18			Y		Y				Y	Y	Y	5
9	County Road 33	Alnwick/Haldimand	N of 45			Y		Y				Y	Y		4.5
10	County Road 45	Alnwick/Haldimand & Trent Hills	N of 18	Y		Y				Y	Y	Y	Y	Y	11
11	County Road 45	Alnwick/Haldimand	N of 22	Y		Y	Y	Y			Y	Y	Y	Y	10
12	County Road 45	Hamilton & Alnwick/Haldimand	S of 22			Y	Y			Y	Y	Y	Y	Y	9
13	County Road 23	Alnwick/Haldimand	S of 22			Y	Y				Y	Y	Y	Y	6
14	County Road 23	Alnwick/Haldimand	N of 2		Y		Y				Y	Y	Y	Y	6
15	County Road 25	Trent Hills	N of 29			Y				Y		Y	Y	Y	7
16	County Road 25	Cramahe	N of 22							Y		Y	Y	Y	5
17	County Road 25	Cramahe	S of 22		Y	Y				Y		Y	Y	Y	9
18	County Road 25	Cramahe	Around 2		Y	Y				Y			Y	Y	8
19	County Road 30	Trent Hills	N of 29	Y	Y	Y	Y			Y	Y	Y	Y	Y	14
20	County Road 30	Trent Hills & Brighton	S of 29	Y		Y	Y			Y	Y	Y	Y	Y	12
21	County Road 30	Brighton	S of 41	Y		Y	Y			Y	Y		Y	Y	11
22	County Road 30	Brighton	Around 2			Y				Y			Y		5.5
23	County Road 50	Trent Hills	N of 8			Y	Y			Y	Y	Y	Y	Y	9
24	Ciounty Road 26	Brighton	N of 30			Y				Y		Y	Y		6.5

*Note: County Road 65 excluded from download candidacy for emergency service reasons

East/West

Route Segement	Route	Municipality	Location	Urban Center Connector	Kings Highway / Upper Tier Connector	Heavy Industry Service	Barrier Service	Resort Criterion	Urban Cell Service	Urban Arterial Extension	Rural Cell Service	Traffic Speed	Road Surface	Traffic Volume	TOTAL
				30	**20**	**20**	**10**	**10**		**30**	**10**	**10**	**.50**	**.50**	
1	County Road 42	Trent Hills			Y						Y	Y	Y	Y	5
2	County Road 2A	Trent Hills			Y		Y				Y		Y	Y	5
3	County Road 38	Trent Hills			Y	Y	Y			Y	Y	Y	Y	Y	11
4	County Road 35	Trent Hills				Y					Y	Y	Y	Y	5
5	County Road 8	Trent Hills	S of Campbellford			Y	Y			Y		Y	Y	Y	8
6	County Road 8	Trent Hills				Y				Y	Y	Y	Y	Y	8
7	County Road 24	Alnwick/Haldimand & Trent Hills				Y	Y				Y	Y	Y		5.5
8	County Road 9	Port Hope & Hamilton & Alnwick/Haldimand		Y	Y	Y					Y	Y	Y	Y	10
9	County Road 29	Alnwick/Haldimand & Trent Hills				Y		Y			Y	Y	Y		5.5

Route Segement	Route	Municipality	Location	Urban Center Connector	Kings Highway / Upper Tier Connector	Heavy Industry Service	Barrier Service	Resort Criterion	Urban Cell Service	Urban Arterial Extension	Rural Cell Service	Traffic Speed	Road Surface	Traffic Volume	TOTAL
				30	**20**	**20**	**10**	**10**	**N/A0**	**30**	**10**	**10**	**.50**	**.50**	
10	County Road 22	Alnwick/Haldimand		Y		Y					Y	Y	Y	Y	8
11	County Road 22	Cramahe		Y		Y					Y	Y	Y	Y	8
12	County Road 27	Cramahe & Brighton				Y	Y				Y	Y	Y		5.5
13	County Road 41	Brighton			Y	Y					Y	Y	Y	Y	7
14	County Road 74	Port Hope & Hamilton		Y	Y	Y					Y	Y	Y	Y	10
15	County Road 21	Cramahe & Brighton				Y	Y				Y	Y	Y		5.5
16	County Road 70	Port Hope			Y		Y			Y			Y	Y	7
17	County Road 2	Hamilton & Cobourg		Y		Y				Y		Y	Y	Y	10
18	County Road 20	Cobourg			Y	Y							Y	Y	5
19	County Road 2	Cobourg & Hamilton & Alnwick/Haldimand		Y						Y		Y	Y	Y	8
20	County Road 2	Alnwick/Haldimand & Cramahe		Y		Y						Y	Y	Y	7
21	County Road 2	Brighton		Y		Y							Y	Y	6
22	County Road 31	Cramahe & Alnwick Haldimand				Y	Y	Y					Y		4.5
23	County Road 64	Brighton		Y		Y							Y	Y	6
24	County Road 2	Port Hope	W of 10			Y				Y		Y	Y	Y	7

LOCAL ROADS

Candidate for Upload

Route Segement	Route	Municipality	Location	Urban Center Connector	Kings Highway / Upper Tier Connector	Heavy Industry Service	Barrier Service	Resort Criterion	Urban Cell Service	Urban Arterial Extension	Rural Cell Service	Traffic Speed	Road Surface	Traffic Volume	TOTAL
				30	**20**	**20**	**10**	**10**		**30**	**10**	**10**	**.50**	**.50**	
1	Wesleyville Road	Port Hope	N of 401		Y	Y	Y					Y	Y		6.5
2	Division Street	Hamilton/Cobourg	Around 401		Y	Y	Y			Y			Y		8.5
3	Ontario Street	Port Hope	S of 401		Y		Y			Y			Y		6.5
4	Toronto Road	Port Hope	S of 401 to 70		Y	Y	Y			Y			Y		8.5
5	Toronto Street	Cramahe	W of 25 along 2	Y		Y				Y			Y		8.5
6	King Street East	Cramahe	E of 25 along 2	Y		Y				Y			Y		8.5
7	Main Street	Brighton	W of 30 along 2	Y		Y				Y			Y		8.5
8	Young Street	Brighton	N of 2 along 30	Y		Y	Y			Y			Y		9.5
9	King Street East	Cobourg	W of 2	Y						Y			Y		6.5
10	Baltimore Road / Division Street	Cobourg	S of 401 to 20	Y		Y				Y			Y		8.5
11	Shelter Valley Road	Alnwick/Haldimand	CR 2 to CR 25			Y							Y		2.5
12	McDonald Road	Alnwick/Haldimand	CR 22 to CR 29			Y		Y			Y		Y		4.5
13	Bridge Street West	Trent Hills	CR 30 to Queen St			Y		Y		Y			Y		6.5
14	Grand Road	Trent Hills	CR 30 to Bridge St			Y		Y		Y			Y		6.5
15	Elizabeth Street	Brighton	Yonge St to CR 2	Y		Y				Y			Y		8.5
16	Telephone Road	Cramahe / Brighton	CR 25 to CR 30			Y	Y				Y		Y		4.5

Appendix G

Warrant Calculations

WSP | MMM GROUP

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 45 & Dale Rd
Municipality: Northumberland County
Major Road: County Road 45
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 50 km/hr
Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	12:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	601	632	515	556	610	724	841	829	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled										100	100	100	300
	80% Fulfilled					80	80			80				240
	Actual % if Below 80%							72	77					149
													Total:	689
													Actual Average (Total/8):	86%

B. Minor Street Both Approaches.

100%	180	383	180	255	255	49	64	68	73	87	138	138	150	100%
80%	143	305	143	203	203									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					13	17	18	19	23	36	36	39	200
													Total:	200
													Actual Average (Total/8):	25%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 45 & Dale Rd
Municipality: Northumberland County
Major Road: County Road 45
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 50 km/hr
Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	12:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	552	568	447	483	523	586	703	679	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled										80	80	80	240
	Actual % if Below 80%					77	79	62	67	73				357
													Total:	597
													Actual Average (Total/8):	75%

B. Traffic Crossing Major Street.

100%	50	113	50	75	75	30	32	32	41	54	85	88	106	100%
80%	40	90	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled												80	80
	Actual % if Below 80%					27	28	28	36	48	75	78		320
													Total:	400
													Actual Average (Total/8):	50%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 45 & Harwood Rd
Municipality: Northumberland County
Major Road: County Road 45
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 50 km/hr
Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	539	543	456	498	540	623	736	732	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled											100	100	200
	80% Fulfilled										80			80
	Actual % if Below 80%					75	75	63	69	75				358
													Total:	638
													Actual Average (Total/8):	80%

B. Minor Street Both Approaches.

100%	180	383	180	255	255	89	70	55	53	63	58	64	49	100%
80%	143	305	143	203	203									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					23	18	14	14	16	15	17	13	131
													Total:	131
													Actual Average (Total/8):	16%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 45 & Harwood Rd
Municipality: Northumberland County
Major Road: County Road 45
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 50 km/hr
Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	450	473	401	445	477	565	672	683	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled											80	80	160
	Actual % if Below 80%					63	66	56	62	66	78			390
													Total:	550
													Actual Average (Total/8):	69%

B. Traffic Crossing Major Street.

100%	50	113	50	75	75	1	2	3	2	4	4	2	2	100%
80%	40	90	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					1	2	3	2	4	4	2	2	18
													Total:	18
													Actual Average (Total/8):	2%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: Elgin St E & Brook Rd N
Municipality: Northumberland County
Major Road: Elgin St E
Major Road Runs: E/W one lane each way
Operating Speed of Major Road: 60 km/hr
Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	331	274	333	295	298	415	444	334	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					46	38	46	41	41	58	62	46	378
													Total:	378
													Actual Average (Total/8):	47%

B. Minor Street Both Approaches.

100%	180	383	180	255	255	115	86	109	86	71	136	126	95	100%
80%	143	305	143	203	203									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					30	22	28	22	19	36	33	25	215
													Total:	215
													Actual Average (Total/8):	27%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: Elgin St E & Brook Rd N
Major Road: Elgin St E
Operating Speed of Major Road: 60 km/hr
Municipality: Northumberland County
Major Road Runs: E/W one lane each way
Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	216	188	224	209	227	279	318	239	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					30	26	31	29	32	39	44	33	264
													Total:	264
													Actual Average (Total/8):	33%

B. Traffic Crossing Major Street.

100%	50	113	50	75	75	109	81	98	79	64	118	111	81	100%
80%	40	90	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled										100			100
	80% Fulfilled					80		80				80		240
	Actual % if Below 80%						72		70	57			72	270
													Total:	610
													Actual Average (Total/8):	76%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 30 & County Road 35 **Municipality:** Northumberland County
Major Road: County Road 30 **Major Road Runs:** N/S one lane each way
Operating Speed of Major Road: 70 km/hr **Operating under free flow conditions**

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	10:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	443	436	444	413	413	473	525	508	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled											100	100	200
	80% Fulfilled					80	80	80	80	80	80			480
	Actual % if Below 80%													0
													Total:	680
													Actual Average (Total/8):	85%

B. Minor Street Both Approaches.

100%	270	255	180	255	255	148	106	96	99	106	105	125	141	100%
80%	215	203	143	203	203									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					55	39	36	37	39	39	46	52	343
													Total:	343
													Actual Average (Total/8):	43%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 30 & County Road 35 **Municipality:** Northumberland County
Major Road: County Road 30 **Major Road Runs:** N/S one lane each way
Operating Speed of Major Road: 70 km/hr **Operating under free flow conditions**

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	10:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	295	330	348	314	307	368	400	367	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled											80		80
	Actual % if Below 80%					61	69	73	65	64	77		76	485

Total:	565
Actual Average (Total/8):	71%

B. Traffic Crossing Major Street.

100%	75	75	50	75	75	16	11	13	12	19	22	13	20	100%
80%	60	60	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					21	15	17	16	25	29	17	27	168

Total:	168
Actual Average (Total/8):	21%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 30 & County Road 26 **Municipality:** Northumberland County
Major Road: County Road 30 **Major Road Runs:** E/W one lane each way
Operating Speed of Major Road: 60 km/hr **Operating under restricted flow conditions**

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	10:00	11:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	492	419	403	441	474	543	574	457	100%
80%	385	575	480	720	900									Yes: No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					68	58	56	61	66	75	80	63	528
													Total:	528
													Actual Average (Total/8):	66%

B. Minor Street Both Approaches.

100%	180	383	180	255	255	45	49	43	43	47	55	72	33	100%
80%	143	305	143	203	203									Yes: No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					12	13	11	11	12	14	19	9	101
													Total:	101
													Actual Average (Total/8):	13%

Accu-Traffic Inc.
Traffic Monitoring & Data Analysis
www.accu-traffic.ca
Tel: 1-416-910-0171
Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 30 & County Road 26 **Municipality:** Northumberland County
Major Road: County Road 30 **Major Road Runs:** E/W one lane each way
Operating Speed of Major Road: 60 km/hr **Operating under restricted flow conditions**

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	10:00	11:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	447	370	360	398	427	488	502	424	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					62	51	50	55	59	68	70	59	474

Total:	474
Actual Average (Total/8):	59%

B. Traffic Crossing Major Street.

100%	50	113	50	75	75	42	40	37	38	37	41	55	19	100%
80%	40	90	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					37	35	33	34	33	36	49	17	273

Total:	273
Actual Average (Total/8):	34%

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Fax: 1-888-711-3125

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Count Date: 17-Sep-14
Intersection: County Road 30 & County Road 29 **Municipality:** Northumberland County
Major Road: County Road 30 **Major Road Runs:** N/S one lane each way
Operating Speed of Major Road: 80 km/hr **Operating under free flow conditions**

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **80% Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	406	433	367	410	417	459	503	409	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled											100		100
	80% Fulfilled					80	80		80	80	80		80	480
	Actual % if Below 80%							76						76

Total:	656
Actual Average (Total/8):	82%

B. Minor Street Both Approaches.

100%	120	170	120	170	170	119	146	119	130	134	172	193	131	100%
80%	95	135	95	135	135									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled						100		100	100	100	100	100	600
	80% Fulfilled					80		80						160
	Actual % if Below 80%													0

Total:	760
Actual Average (Total/8):	95%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 30 & County Road 29 **Municipality:** Northumberland County
Major Road: County Road 30 **Major Road Runs:** N/S one lane each way
Operating Speed of Major Road: 80 km/hr **Operating under free flow conditions**

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	13:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	287	287	248	280	283	287	310	278	100%
80%	385	575	480	720	900									Yes: No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					60	60	52	58	59	60	65	58	471
													Total:	471
													Actual Average (Total/8):	59%

B. Traffic Crossing Major Street.

100%	50	75	50	75	75	65	92	69	78	88	115	133	81	100%
80%	40	60	40	60	60									Yes: X No:
All Approaches	100% Fulfilled					100	100	100	100	100	100	100	100	800
	80% Fulfilled													0
	Actual % if Below 80%													0
													Total:	800
													Actual Average (Total/8):	100%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 45 & Centreton Rd
Municipality: Northumberland County
Major Road: County Road 45
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 80 km/hr
Operating under free flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	12:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	434	452	377	387	414	479	540	568	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled											100	100	200
	80% Fulfilled					80	80		80	80	80			400
	Actual % if Below 80%							79						79

Total:	679
Actual Average (Total/8):	85%

B. Minor Street Both Approaches.

100%	270	255	180	255	255	117	112	64	74	60	68	74	83	100%
80%	215	203	143	203	203									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					43	41	24	27	22	25	27	31	241

Total:	241
Actual Average (Total/8):	30%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 45 & Centreton Rd
Municipality: Northumberland County
Major Road: County Road 45
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 80 km/hr
Operating under free flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	12:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	317	340	313	313	354	411	466	485	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled												100	100
	80% Fulfilled										80	80		160
	Actual % if Below 80%					66	71	65	65	74				341

Total:	601
Actual Average (Total/8):	75%

B. Traffic Crossing Major Street.

100%	75	75	50	75	75	96	87	45	51	43	49	46	51	100%
80%	60	60	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled					100	100							200
	80% Fulfilled													0
	Actual % if Below 80%							60	68	57	65	61	68	380

Total:	580
Actual Average (Total/8):	73%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 2 & Lyle St N
Municipality: Northumberland County
Major Road: County Road 2
Major Road Runs: E/W one lane each way
Operating Speed of Major Road: 50 km/hr
Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	10:00	13:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	379	386	409	375	419	592	608	522	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled										80	80		160
	Actual % if Below 80%					53	54	57	52	58			73	346
													Total:	506
													Actual Average (Total/8):	63%

B. Minor Street Both Approaches.

100%	120	170	120	170	170	83	104	111	90	75	158	185	151	100%
80%	95	135	95	135	135									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled											100		100
	80% Fulfilled										80		80	160
	Actual % if Below 80%					49	61	65	53	44				272
													Total:	532
													Actual Average (Total/8):	67%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 2 & Lyle St N
Municipality: Northumberland County
Major Road: County Road 2
Major Road Runs: E/W one lane each way
Operating Speed of Major Road: 50 km/hr
Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	10:00	13:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	296	282	298	285	344	434	423	371	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					41	39	41	40	48	60	59	52	380
													Total:	380
													Actual Average (Total/8):	47%

B. Traffic Crossing Major Street.

100%	50	75	50	75	75	21	40	41	38	21	59	79	66	100%
80%	40	60	40	60	60									Yes: / No: X
All Approaches	100% Fulfilled											100		100
	80% Fulfilled												80	80
	Actual % if Below 80%					28	53	55	51	28	79			293
													Total:	473
													Actual Average (Total/8):	59%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 2 & Dale Rd
Municipality: Northumberland County
Major Road: County Road 2
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 60 km/hr
Operating under restricted flow conditions

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	10:00	12:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	376	402	387	373	411	517	526	450	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					52	56	54	52	57	72	73	63	478
													Total:	478
													Actual Average (Total/8):	60%

B. Minor Street Both Approaches.

100%	120	170	120	170	170	155	157	167	187	175	194	194	166	100%
80%	95	135	95	135	135									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled								100	100	100	100		400
	80% Fulfilled					80	80	80					80	320
	Actual % if Below 80%													0
													Total:	720
													Actual Average (Total/8):	90%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 2 & Dale Rd
Municipality: Northumberland County
Major Road: County Road 2
Major Road Runs: N/S one lane each way
Operating Speed of Major Road: 60 km/hr
Operating under restricted flow conditions

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	9:00	10:00	12:00	14:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	221	245	220	186	236	323	332	284	100%
80%	385	575	480	720	900									Yes:
														No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					31	34	31	26	33	45	46	39	284
													Total:	284
													Actual Average (Total/8):	36%

B. Traffic Crossing Major Street.

100%	50	75	50	75	75	78	70	86	78	73	80	92	77	100%
80%	40	60	40	60	60									Yes:
														No: X
All Approaches	100% Fulfilled					100		100	100		100	100	100	600
	80% Fulfilled						80			80				160
	Actual % if Below 80%													0
													Total:	760
													Actual Average (Total/8):	95%

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Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 25 & County Road 35 **Municipality:** Northumberland County
Major Road: County Road 25 **Major Road Runs:** N/S one lane each way
Operating Speed of Major Road: 80 km/hr **Operating under free flow conditions**

Warrant #1: Minimum Vehicular Volumes.

A. All Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	11:00	13:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	308	279	261	267	310	331	394	421	100%
80%	385	575	480	720	900									Yes: / No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled											80	80	160
	Actual % if Below 80%					64	58	54	56	65	69			366
													Total:	526
													Actual Average (Total/8):	66%

B. Minor Street Both Approaches.

100%	270	255	180	255	255	71	77	92	97	96	112	129	125	100%
80%	215	203	143	203	203									Yes: / No: X
Minor Street Both Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					26	29	34	36	36	41	48	46	296
													Total:	296
													Actual Average (Total/8):	37%

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Fax: 1-888-711-3125

Accu-Traffic Inc

Count Date: 17-Sep-14
Intersection: County Road 25 & County Road 35 **Municipality:** Northumberland County
Major Road: County Road 25 **Major Road Runs:** N/S one lane each way
Operating Speed of Major Road: 80 km/hr **Operating under free flow conditions**

Warrant #2: Delay to Cross Traffic.

A. Major Street Both Approaches. **Not Satisfied**

No of Lanes	Minimum Requirements					Hours Ending								Percentage
	1 Lane Each Way		2 Lanes Each Way		3 Lanes									
Flow Condition	1 Lane F. Flow (Code 1)	1 Lane R. Flow (Code 2)	2 Lane F. Flow (Code 3)	2 Lane R. Flow (Code 4)	or More R. Flow (Code 5)	8:00	9:00	11:00	13:00	15:00	16:00	17:00	18:00	
100%	480	720	600	900	1125	237	202	169	170	214	219	265	296	100%
80%	385	575	480	720	900									Yes:
														No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					49	42	35	35	45	46	55	62	369

Total:	369
Actual Average (Total/8):	46%

B. Traffic Crossing Major Street.

100%	75	75	50	75	75	15	11	15	7	18	15	20	25	100%
80%	60	60	40	60	60									Yes:
														No: X
All Approaches	100% Fulfilled													0
	80% Fulfilled													0
	Actual % if Below 80%					20	15	20	9	24	20	27	33	168

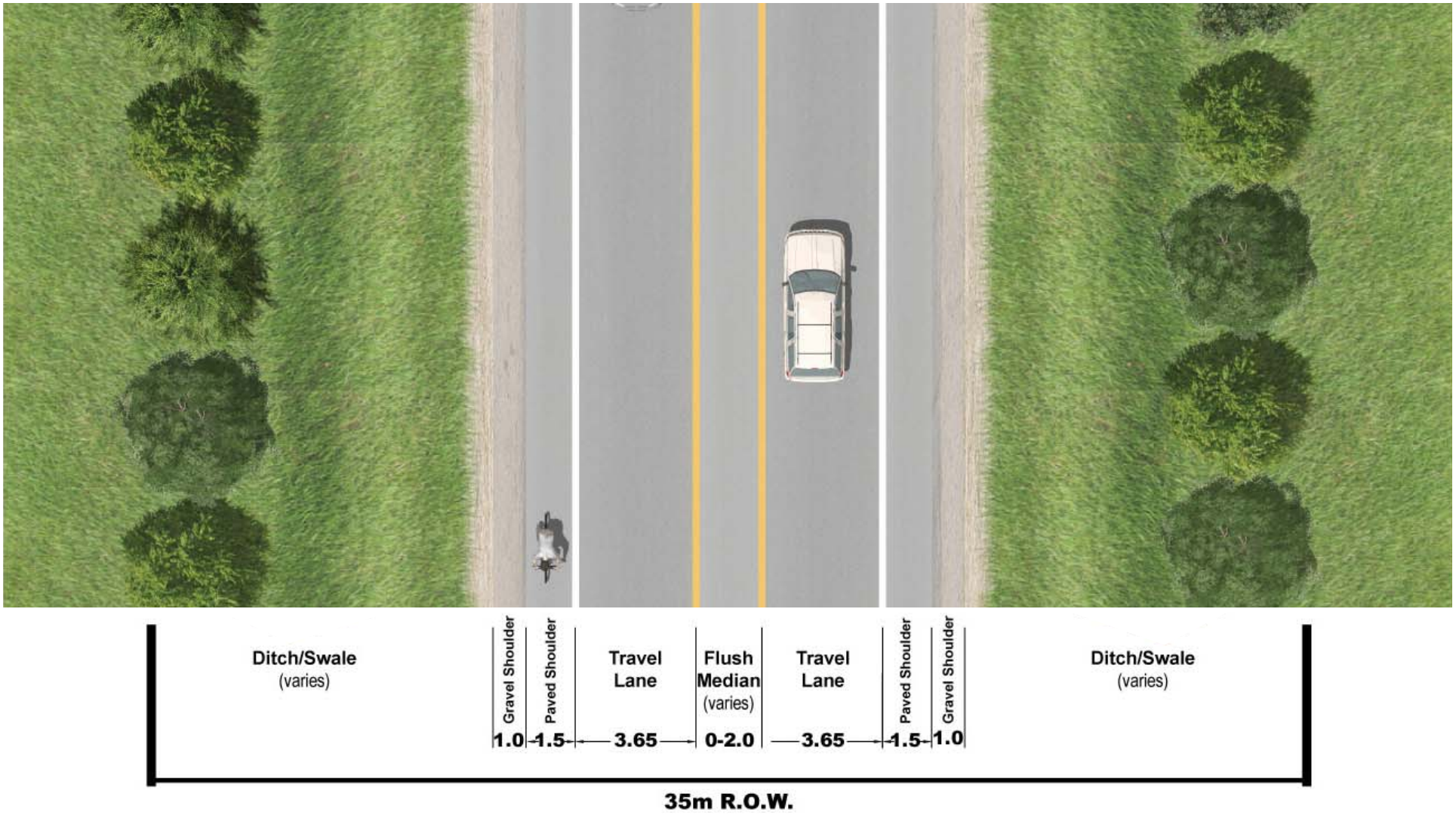
Total:	168
Actual Average (Total/8):	21%

Appendix H

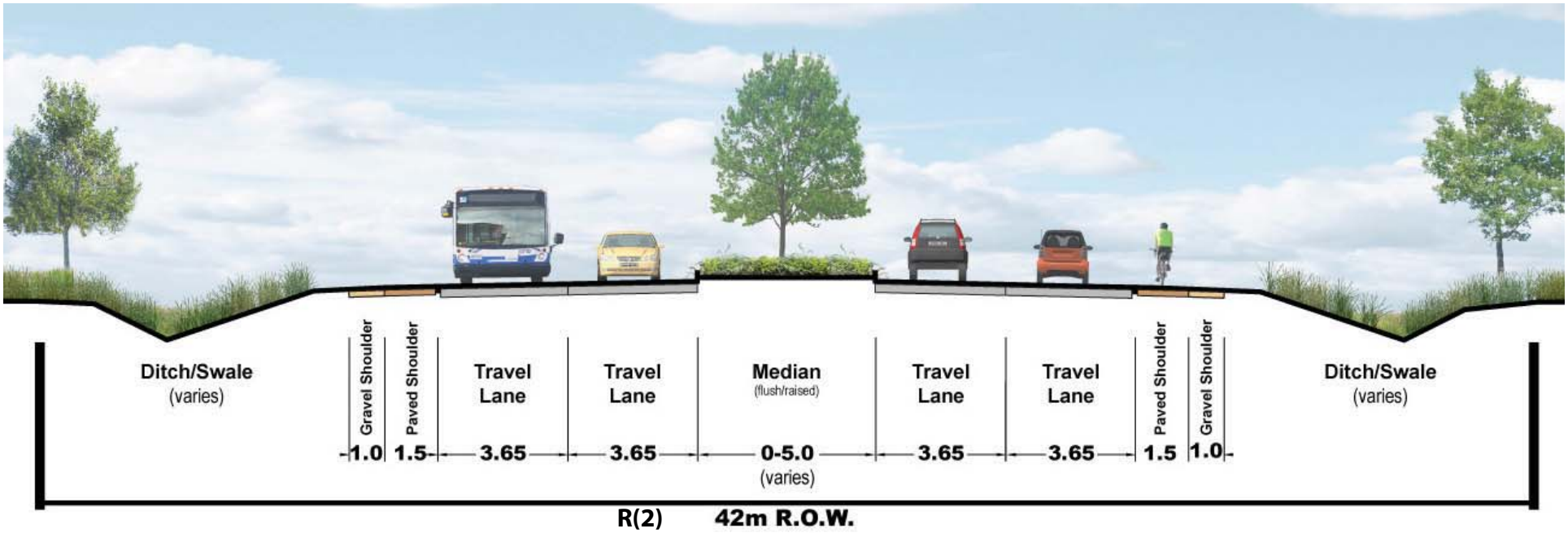
Suggested Typical County Road Cross-Sections

WSP | MMM GROUP

R(1) Rural

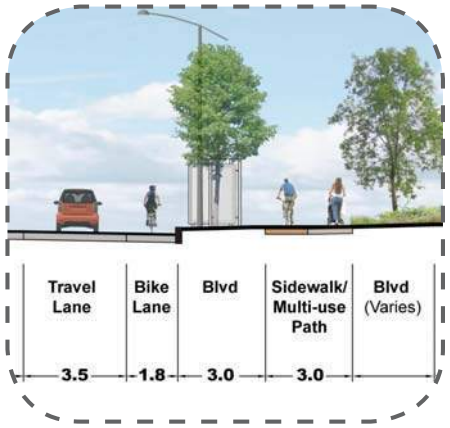

Ditch/Swale
(varies)
Gravel Shoulder
Paved Shoulder
Travel Lane
Flush Median
(varies)
Travel Lane
Paved Shoulder
Gravel Shoulder
Ditch/Swale
(varies)
1.0
1.5
3.65
0-2.0
3.65
1.5
1.0
35m R.O.W.

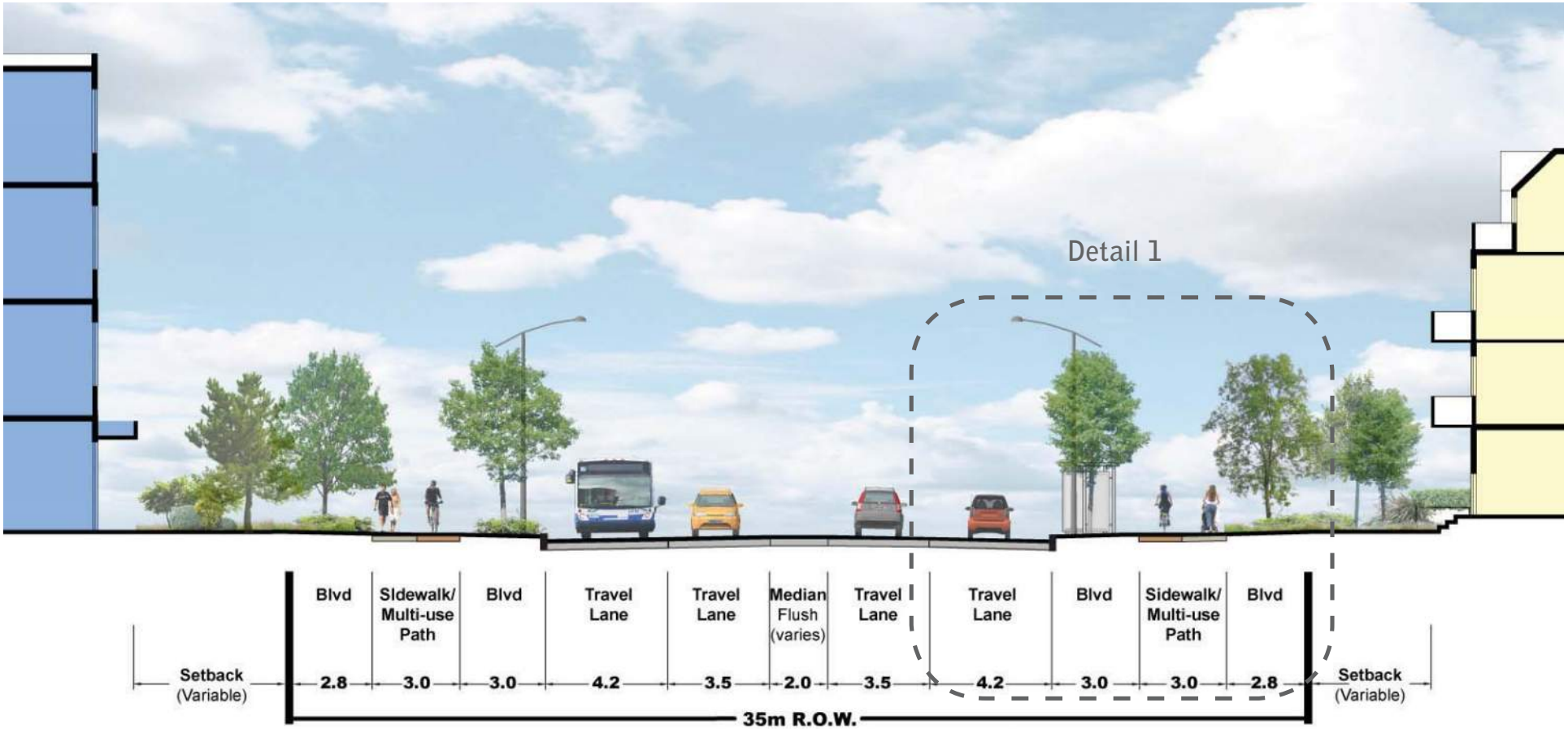
R(2) Rural



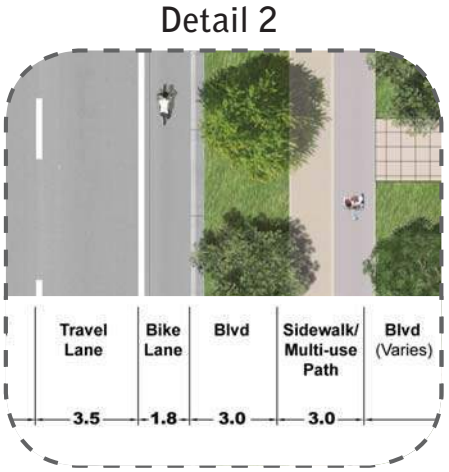
R(2) 42m R.O.W.

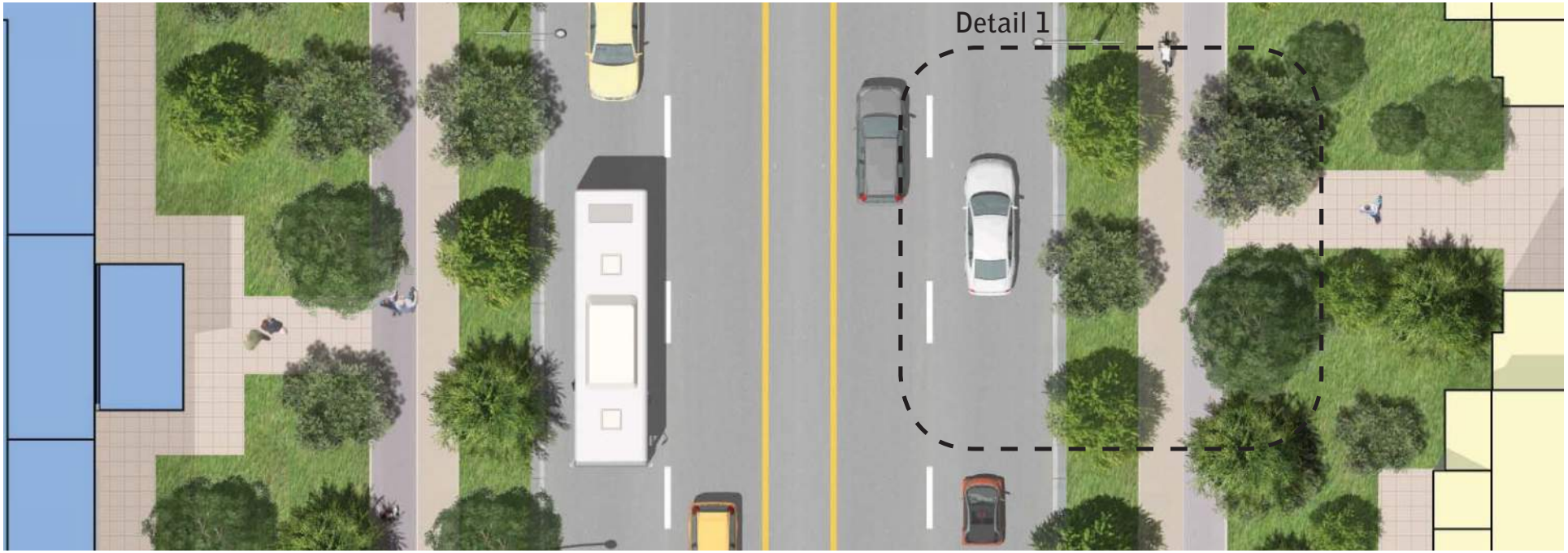
C(2) Urban


Detail 2
Travel Lane
Bike Lane
Blvd
Sidewalk/ Multi-use Path
Blvd (Varies)
3.5
1.8
3.0
3.0


Detail 1
Setback (Variable)
Blvd
2.8
Sidewalk/ Multi-use Path
3.0
Blvd
3.0
Travel Lane
4.2
Travel Lane
3.5
Median Flush (varies)
2.0
Travel Lane
3.5
Travel Lane
4.2
Blvd
3.0
Sidewalk/ Multi-use Path
3.0
Blvd
2.8
Setback (Variable)
35m R.O.W.

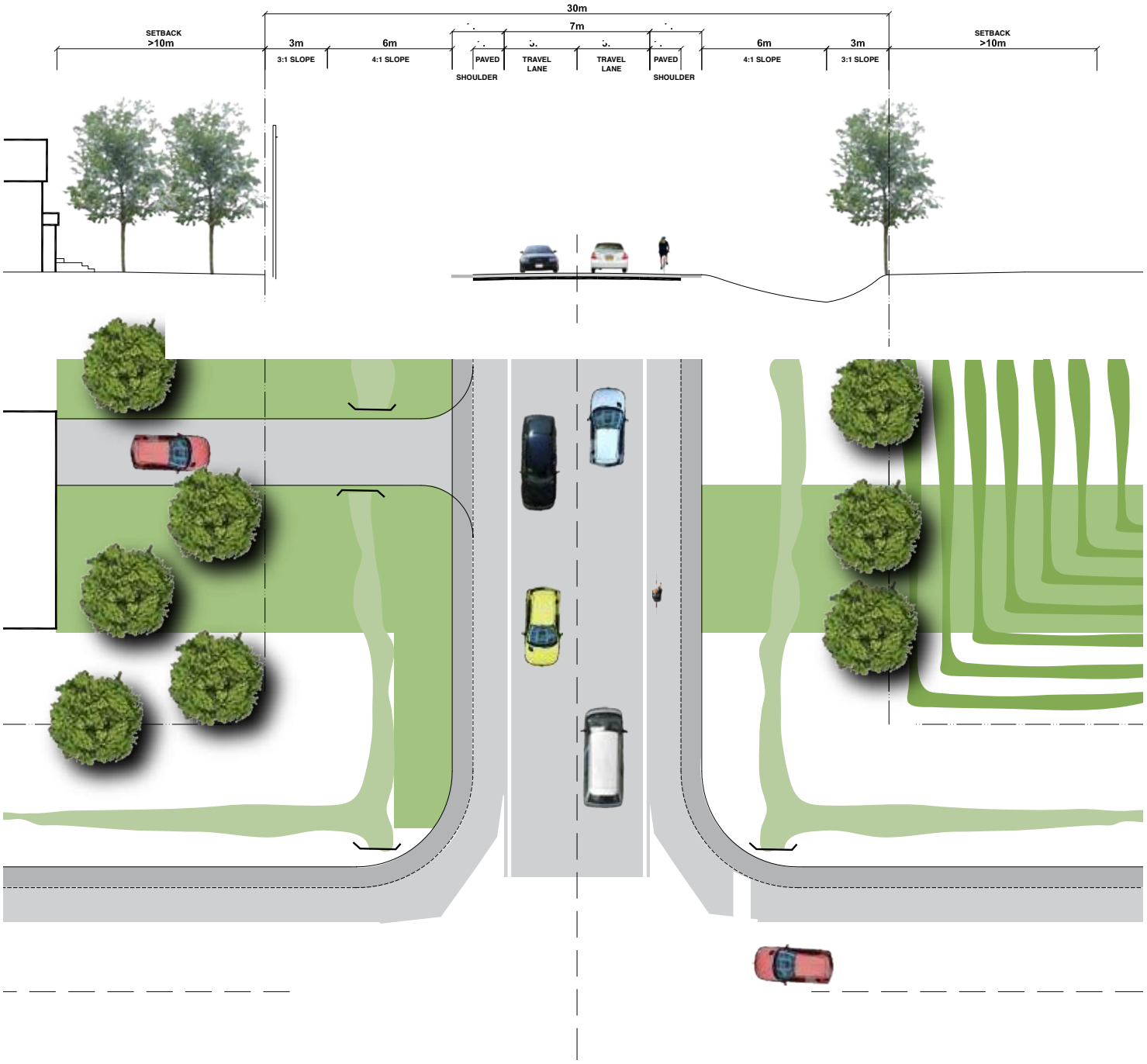
C(2) Urban


Detail 2
Travel Lane
Bike Lane
Blvd
Sidewalk/ Multi-use Path
Blvd (Varies)
3.5
1.8
3.0
3.0


Detail 1
Blvd
Sidewalk/ Multi-use Path
Blvd
Travel Lane
Travel Lane
Median Flush (varies)
Travel Lane
Travel Lane
Blvd
Sidewalk/ Multi-use Path
Blvd
Setback (Variable)
2.8
3.0
3.0
4.2
3.5
2.0
3.5
4.2
3.0
3.0
2.8
Setback (Variable)
35m R.O.W.

Rural Arterial Demonstration

30m ROW



Potential Application

- New or reconstructed Arterial Roads in the Rural Area.
- See Tables 7-1 and 7-2.

Defining Characteristics

- 7.0m paved surface
- 3.5m travel lanes
- Potential for narrow (1.5m) paved shoulders that benefit cyclists and farm vehicles
- Trees located outside the ROW
- Buildings typically set back 6m plus from ROW limit
- Designated an Arterial

Services & Utilities

- Roadside ditch drainage
- As electrical distribution is overhead, trees under lines need to be less than 6m height at maturity, and overhead restricted zone building setback requirements apply.
- See section 5.8

A-14

Appendix I

Cost Estimation for Top Collision Intersections

WSP | MMM GROUP

	Intersection	Minimum Mitigation	Minimum Cost Estimate	Maximum Mitigation	Maximum Cost Estimate	Comments
1	County Road 2 and Townline	- Implement advanced warning signage on west leg	$500	-	-	-
2	County Road 28 and County Road 9 (Oak Ridges Road)	- Add Flashing Beacons	$3,500*4 = $14,000	-	-	-
3	County Road 18 and Danforth Road	- Implement advanced warning signage on CR 18 (2-legs)	$500*2 = $1,000	- Implement advanced warning signage on CR 18 - Implementation of dedicated turn lanes	$300*2 + $300,000 = $300,600	Implementing signs will be less expensive if it is done with other rehabilitation procedures.
4	County Road 45 and Beagle Club Road	- Implement advanced warning signs (2-legs)	$500 * 2 = $1,000	- Implement advanced warning signage on CR 18 - Street lighting illumination - Extention of southbound-right-turn taper	$300*2 + $9,100*4 + $100,000 = $137,000	Implementing signs will be less expensive if it is done with other rehabilitation procedures. Right turn taper of 100 m.
5	County Road 29 and Glover Road	- Implement signage with flashing beacons on both the east and west leg	$3,500*2 = $7,000	- Implement signage with flashing beacons on both the east and west leg - Implementation of dedicated left turn lanes	$3,500*2 + $300,000 = $307,000	-
6	County Road 18 and Telephone Road	- Implement advance warning signs on both the north and south legs	$500*2 = $1,000	- Implement advance warning signs on both the north and south legs - Implementation of dedicated turn lanes	$300*2 + $300,000 = $300,600	Implementing signs will be less expensive if it is done with other rehabilitation procedures.
7	County Road 8 and Wingfield Road	- Install advance warning signage at this location (2-legs)	$500*2 = $1,000	-	-	-
8	County Road 20 (Elgin Street) and Ontario Street	- Provide overhead lane designation signage and/or lane designation pavement markings, modifying signal timing and phasing	$200,000	- Provide overhead lane designation signage and/or lane designation pavement markings, modifying signal timing and phasing - Construct exclusive left turn or right turn lanes on CR 20	$1,000,000	Estimates are higher and have a greater range due to intersection situated on bridge over a creek. Therefore, precise value for rehabiliation is difficult.
9	County Road 45 and County Road 22 (Centreton Road)	- Implementing traffic signals	$450,000 + $300*8 = $452,400	-	-	New signal signs must be implemented
10	County Road 30 and 5th Line	- Construct guide rails along the shoulder	$60,000	- Construct guide rails along the shoulder - Regrade the southbound-right-turn lane	$60,000 + $200,000 = $260,000	Regrade length of 100m Guide rails are $30,000 per 100 m of guide rail