MOVING ROADS FORWARD

Niagara Region

Niagara Escarpment Crossing Comprehensive Environmental Assessment Proposed Terms of Reference

Appendix B Traffic, Operations and Safety Work Plan

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1 Introduction

This document outlines the proposed work plan that will be carried out during the Niagara Escarpment Crossing Environmental Assessment (EA) to generate a more detailed understanding of travel demand, as well as traffic operations and safety and how that information will be used to further define the purpose of the proposed project, describe and assess the “alternatives to” the project, and assess the “alternative methods” of carrying out the project. This Work Plan forms **Appendix B** to the proposed Niagara Escarpment Crossing Comprehensive EA Terms of Reference (ToR) and should be read in conjunction with it.

The ToR provides an initial problem/opportunity statement (purpose of the proposed project) with the commitment that it will be reviewed during preparation of the Niagara Escarpment Crossing EA, and a finalized statement will be presented in the EA Report. With this commitment in mind, **Section 2** describes the Travel Demand Analysis and the Traffic Operations and Safety Assessment that will be carried out during the Niagara Escarpment Crossing EA as part of finalizing the problem/opportunity statement.

Similarly, the ToR provides a preliminary list of alternatives to the project, which once confirmed during the Niagara Escarpment Crossing EA will be assessed and comparatively evaluated based on evaluation criteria. **Section 3** outlines the preliminary evaluation criteria associated with the Traffic Demand Analysis and Traffic Operations and Safety Assessment.

Following the identification of the preferred alternative(s) to the project, alternative methods for carrying out the project will be generated, possibly screened, assessed, and comparatively evaluated leading to a recommended method(s). **Section 4** presents the preliminary evaluation criteria associated with the Traffic Demand Analysis and Traffic Operations and Safety Assessment.

2 Purpose of the Project

The purpose of the proposed project is to provide a north-south multimodal transportation crossing corridor of the Niagara Escarpment between the Queen Elizabeth Way (QEW) and Regional Road 20 that:

- provides for safe and effective commercial vehicle movements and operations;
- accommodates commercial vehicles and other transportation modes;
- provides greater safety for local communities;
- provides for additional transportation system capacity, redundancy and resiliency; and
- improves the economy vitality with the efficient movement of goods and people.

The preceding purpose / opportunity statement will be reviewed during preparation of the Niagara Escarpment Crossing EA, and a finalized statement will be presented in the EA Report. As part of finalizing the statement, relevant provincial, regional, and municipal planning documents including, but not limited to, the following will be reviewed as part of forming the policy basis for the proposed project:

- Provincial documents:
    - Ministry of Municipal Affairs and Housing: A Place to Grow: Growth Plan for the Greater Golder Horseshoe (2020)
    - Ministry of Transportation: Connecting the GGH: Transportation Plan for the Greater Golden Horseshoe (2022)
    - Ministry of the Environment, Conservation and Parks: Greenbelt Plan (2017)
    - Niagara Escarpment Commission: Niagara Escarpment Plan (2017)
- Niagara Region documents:
    - Official Plan (2022)
    - Transportation Master Plan (2017)
    - Council Strategic Priorities (2023-2026)
    - Complete Streets Design Manual (2023)
- Local Municipalities documents:

- Town of Grimsby, Town of Lincoln, and Township of West Lincoln transportation planning studies and Official Plans (for example, the Smithville Transportation Master Plan)

It should be noted that the preceding documents may be updated and/or added to during preparation of the Niagara Escarpment Crossing EA. As a result, the most current version at the time of the Niagara Escarpment Crossing EA will be considered.

As stated, a Travel Demand Analysis and Traffic Operations and Safety Assessment will be carried out during the Niagara Escarpment Crossing EA as part of finalizing the problem/opportunity statement (purpose of the proposed project). The Travel Demand Analysis and Traffic Operations and Safety Assessment are elaborated upon in the following sub-sections.

2.1 Travel Demand Analysis

2.1.1 Traffic Data Review and Collection

Currently, there are ten road crossings of the Niagara Escarpment within the Towns of Grimsby (three) and Lincoln (seven) which presently exhibit steep grades (10%-16%), narrow shoulders, limited roadside protection, and sightline issues. The ten road crossings of the Niagara Escarpment are listed by municipality as follows:

1. Mountain Road (Regional Road 12) – Town of Grimsby
2. Park Road – Town of Grimsby
3. Thirty Road – Town of Grimsby / Town of Lincoln
4. Mountain Street (Regional Road 18) – Town of Lincoln
5. Victoria Avenue (Regional Road 24) – Town of Lincoln
6. Woolverton Road – Town of Grimsby
7. Mountainview Road – Town of Lincoln
8. Aberdeen Road – Town of Lincoln
9. Quarry Road – Town of Lincoln
10. Cherry Road – Town of Lincoln

Commercial vehicles using the existing Niagara Escarpment crossings pose safety risks, traffic operations and undesirable impacts on local communities and residential areas such as noise and vibration issues.

Intersections at the base of the Niagara Escarpment often exhibit skewed alignment, steep northbound and southbound grades, and buildings in close proximity with pedestrian and parking movements that contribute to truck related collisions. The increasing truck volumes through the built-up areas conflict with downtown areas in Lincoln and Grimsby, which currently impact local business operations.

Of the ten crossings of the Niagara Escarpment, the following five crossings exhibit the highest Total Volume and Percentage of Heavy Trucks on a typical day:

- Mountain Road (Regional Road 12) – Grimsby
- Park Road – Grimsby
- Thirty Road – Town of Grimsby / Town of Lincoln
- Mountain Street (Regional Road 18) – Lincoln
- Victoria Avenue (Regional Road 24) - Lincoln

The following list summarizes the traffic data that is currently available. Updated and additional traffic data will be required to be collected within the preliminary study area as part of the proposed Niagara Escarpment Crossing EA data collection program stated in Section 2.1.3. It is proposed that locations with counts older than 5 years or counts collected in COVID impacted years (2020, 2021) will be included in the data collection program.

- Niagara Escarpment Crossing Transportation Study (2016) – 2012 Traffic data from the following 12 stations is available:
  - Grimsby: Mountain Road and Park Road
  - Lincoln: Thirty Road, Mountain Street, Victoria Avenue, and Vineland Townline
  - Pelham: Twenty Road and Highway 20
  - West Lincoln: Twenty Mile Road, Thirty Road, Highway 20, and Grimsby Road
- Niagara Escarpment Crossings Traffic Operations and Safety Study (2019) – 2018 traffic counts:
  - Beamsville: King Street (RR 81) & Ontario Street (RR 18) intersection, King Street (RR 81) & Mountain Street (RR 18) intersection, and Mountain Street (RR18) south of Hillside Drive

  - Grimsby: Main Street (RR 81) west of Park Road South and Mountain Road (RR 12) north of Ridge Road
  - Vineland: Victoria Avenue (RR 24) and King Street (RR 81) intersection and Victoria Avenue (RR 24) north of Moyer Road
- Beamsville Truck By-Pass Implementation Study (2021):
  - Turning Movement Counts: South Service Road and Durham Road, Durham Road and King Street (RR 81), Ontario Street (RR 18) and King Street. (RR 81), Mountain Street (RR 18) and King Street (RR 81), Bartlett Road and King Street (RR 81), Bartlett Road and Greenlane, Bartlett Road and Union Road, South Service Road and Bartlett Road, Queen Elizabeth Way off ramp and Ontario Street (RR 18), and South Service Road and Ontario Street (RR 18).
  - Midblock Counts (Trucks): Durham Road, King Street, Mountain Street, King Street, South Service Road, and Bartlett Road
- Niagara Region Traffic Data (Latest available from the Region):
  - Relevant Intersection Turning Movement Counts within the preliminary study area
- Grimsby Beach Land Use Study (2021):
  - Relevant Intersection Turning Movement Counts within the preliminary study area

Previous studies indicated that the existing north-south crossings had sufficient capacity to accommodate the traffic flows using them on an aggregate screenline basis. However, local areas traffic congestion is experienced in the built-up areas of Grimsby, Beamsville, Vineland, and Smithville.

In establishing the baseline traffic conditions as part of the Niagara Escarpment Crossing EA (assumed to be 2025), it is proposed that the existing traffic and safety conditions in the preliminary study area be confirmed by undertaking a comprehensive traffic data collection program to include of 24-hour ATR counts on the Escarpment Crossings and intersection turning movement counts at downtown intersections being impacted by heavy truck movements.

2.1.2 Travel Demand Analysis Background and Overview

The 2017 Niagara Region Transportation Master Plan (2017 TMP) was based on population growth and employment to 2041:

- Population forecast to grow by 36% between 2016 and 2041 representing an increase from 450,000 to 610,000
- Employment forecast to grow by 31% between 2016 and 2041 representing an increase from 203,000 to 265,000

It is noted that subsequent to the 2017 TMP approval, the Province announced new 2051 population and employment forecasts that are substantially different than the forecasts used in the 2017 TMP 4-step transportation demand EMME (circa 2015) Model.

The Niagara Region's 4-step EMME model was the travel demand forecasting tool used in the 2017 TMP. The model was used to develop and analyse the long-term transportation infrastructure needs required for the 2041 planning period, which was documented in the 2017 TMP. The 2017 TMP analysis indicated that a Niagara Escarpment Crossing is required by 2031. It was noted that both projects would be subject to further analysis and EA studies with the long-term goal that the new Escarpment Crossing would connect with Regional Road 20.

The Greater Golden Horseshoe Transportation Plan (GGHTP) by the Ministry of Transportation (MTO) used a travel demand model to forecast future travel demands for the 2051 planning horizon. During the GGHTP working group meetings, Niagara Region noted that the MTO GGH Model was under simulating traffic forecasts in Niagara Region, especially related to Regional Roads crossing the Niagara Escarpment.

More recently (2021/2022), Niagara Region has developed an Activity Based Travel Demand Model (ABM) based on the GTA Model (V4.0+) that incorporates the most recent population and employment forecast and travel characteristics.

2.1.3 Traffic Demand Analysis Work Plan

As part of finalizing the problem/opportunity statement, a transportation analysis will be carried out during the Niagara Escarpment Crossing EA, which will include, but may not be limited to, the following:

- Review relevant background reports including those listed in the proposed Niagara Escarpment Crossing ToR (**Section 4.4**).
- Confirm the initial Traffic Analysis Study Area that allows for aggregate corridor (screen line) and individual corridor analysis. The initial Traffic Analysis Study Area is generally bounded by Lake Ontario to the north, Highway 20 (West Lincoln) to the south, Tufford Road (Lincoln) to the east, and Mountain Road

(Grimsby) to the west. The initial Traffic Analysis Study Area will be confirmed during the Niagara Escarpment Crossing EA.

- Undertake a data collection program that includes ATR and intersection turning movement counts along regional escarpment crossing corridors, generally bounded by the confirmed Traffic Analysis Study Area. The data collection program will be reviewed by Niagara Region during the Niagara Escarpment Crossing EA and will include, but may not be limited to, the following:
    - 8-hour weekday and weekend turning movement counts (TMCs) at regional road intersections within the confirmed Traffic Analysis Study Area
    - 24-hour/7-day volume and speed data along corridors such as QEW, Lincoln Avenue, Park Road, 30 Road, Bartlett Avenue, Regional Road 18 / Mountain Road, Regional Road 20, etc.
    - Origin-Destination Surveys for Commercial Vehicle traffic along escarpment crossings within the confirmed Traffic Analysis Study Area

    As part of initiating the Niagara Escarpment Crossing EA, Niagara Region's subarea model for the confirmed Traffic Analysis Study Area which comes from their latest available EMME Travel Demand Model will be used and the associated documentation for the existing and future horizon years (2031, 2041, and 2051) for the AM, PM, and Weekend peak period (minimum of 3-hour peak period).
- Conduct Existing Condition Analysis for the AM, PM, and Weekend peak period of existing traffic demand and operations at potential Escarpment Crossings and corridors in the Beamsville, Smithville, and Grimsby downtown areas, which consists of the following:
    - Validate and calibrate the subarea of the latest available Niagara Region EMME Travel Demand Model for the AM, PM, and Weekend peak period that incorporates highway and arterials corridors within the preliminary study area such as QEW, Lincoln Avenue, Park Road, Thirty Road, Bartlett Avenue, Regional Road 18 / Mountain Road, Regional Road 20, etc.
    - Review the calibration/validation results with MTO's System Analysis and Forecasting Office (SAFO) to confirm that the existing highway traffic operations modelled are in-line with MTO.
- Compare existing condition analysis findings with findings documented in Niagara Escarpment Crossing Study Master Plan (2017) that examined the need

for a new or improved crossing to the Escarpment to accommodate commercial vehicles safely and efficiently. The comparison will include, but may not be limited to, the following:

- Identify areas of congestion in the built-up parts of Grimsby, Beamsville, and Smithville for the AM, PM, and Weekend peak periods.
- Evaluate commercial vehicle traffic volume on Escarpment crossings for the AM, PM, and Weekend peak periods.

- Travel Demand Analysis for the interim (2035) and ultimate planning horizon years (assumed to be 2051) for the AM, PM, and Weekend peak period will be conducted using appropriate forecasting techniques ranging from trend analysis to the Region's EMME model to assess future Escarpment Crossing demand/capacity service levels. Steps in the Travel Demand Analysis include:
  - Evaluate traffic demand and operations for the do-nothing scenario for the interim and ultimate planning horizon year, which includes, vehicles kilometres travelled (VKT), volume-to-capacity analysis and Level-of-Service calculations at highway and arterials corridors within the preliminary study area.
  - Confirm that the future QEW configuration (i.e., mainline widenings, interchange reconfigurations, etc.) and operations in the Niagara Region's model are in-line with the latest available MTO's GGHM EMME model results.
  - Evaluate the traffic demand and operations for the alternatives to and alternative methods identified in Transportation Planning and Engineering Work Plan for the interim and ultimate horizon year for the AM, PM, and Weekend peak period.

2.2 Traffic Operations and Safety

2.2.1 Traffic Operations and Safety Background and Overview

As noted in **Section 2.1.1**, there are presently ten north-south crossings of the Niagara Escarpment within the Towns of Grimsby and Lincoln. Currently, all of these escarpment crossings, as defined by the 2016 Niagara Crossing Transportation Study, have incompatibilities for continued use because they create an intrusion of commercial vehicles into residential areas and areas of high pedestrian or cyclist activity. With population growth, there is also an increased emphasis on many of the other

transportation activities that occur along or across the escarpment. The Bruce Trail[1] and the Niagara Region Wine and Cycling Routes[2] also use the escarpment transportation corridors.

Furthermore, there are presently no truck restrictions on the Regional Roads crossing the Escarpment[3]. As part of the 2019 Niagara Escarpment Crossings Traffic Operations and Safety Study, it was observed that there had been a significant variation on the vehicle types crossing the escarpment and the route choice due to the residential and commercial traffic demands.

Currently, access to the provincial highway system via the QEW require travelling through the local downtown areas, which have resulted in significant traffic operational and safety issues. Previously, Niagara Region has undertaken many signing, marking, and other operational improvements on the Escarpment crossings.

Post-Covid, a number of new issues and policy considerations have arisen and/or are starting to be seen through changing lenses, such as an increased focus on the environment and climate change, an increased focus on road safety through Vision Zero, changing rural issues, and social equity issues, among others. Several of the existing escarpment crossings have experienced increased usage from residential and recreational growth.

As with any transportation corridor, there must always be a consideration given to the maintenance of such a corridor. As noted, the escarpment crossings have significant grades on them, and weather conditions can exacerbate any operational concerns. This applies to the roadway and any active transportation facilities that may also be present.

2.2.2 Traffic Operations and Safety Analysis Methodology

A traffic operational and safety review will be conducted as part of the Niagara Escarpment Crossing EA that will include, but may not be limited to, the following:

- Perform a field review of existing operational, safety issues and constraints along Park Road, Thirty Road, Ontario Street, Mountain Street (Lincoln) and Mountainview Road, bounded by the preliminary study area. The field review should be conducted for a typical summer weekday and weekend day, covering

[1] Niagara Escarpment Commission Website: https://escarpment.org/
[2] *Wine Route and Cycling Routes, 2023, https://www.niagararegion.ca/transportation/cycling-walking/default.aspx*
[3] Niagara Escarpment Crossings Traffic Operations and Safety Study, 2019

AM, mid-day and PM peak periods. The following data will be obtained, if available:

- Crash/Collision information at corridors and intersections within the preliminary study area
- Complaints Register received by local residents and/or businesses
- Short-term and long-term road improvements and construction plan
- Significant Development Applications that meet the following criteria:
  - Plans of subdivision/condominium; or Buildings greater than three storeys; or Commercial buildings larger than 100,000 square feet; and have been approved/constructed over the last 18 months in Beamsville or Grimsby.
  - Any other major buildings that recently completed construction over the past six months that could have increased heavy vehicle traffic in the preliminary study area;
  - Recent or planned gravel pit expansions or significant farming expansions along the Niagara Escarpment.

- Prepare an existing conditions traffic operations (AM, PM peak period for Weekday and the Weekend peak period) and safety analysis report (LOS, V/C, Queuing, Collision Analysis)
- Analyze the existing speed profiles for the AM, PM peak period for Weekday and the Weekend peak period on a directional and sectional basis along corridors within the preliminary study area
- Identify commercial vehicle traffic trends within the preliminary study area based on the latest available MTO Commercial Vehicle Survey Data and the collected O-D commercial vehicle survey data as part of the Data Collection Program
- Identify traffic operations and safety for interim (2035) and ultimate (assumed to be 2051) horizon year for the AM, PM peak period for Weekday and the Weekend peak period (LOS, V/C, Queuing (95^{th} percentile queue), Reduction in Number of Conflicts).
- Identify additional traffic management measures.

3 Alternatives To the Project

Following confirmation of the preliminary list of alternatives to the project, they will be assessed and comparatively evaluated leading to a recommended alternative(s) to the project.

3.1 Preliminary Criteria and Indicators

The preliminary evaluation criteria and indicators that will be used for assessing the alternatives to the project from a traffic operations and safety perspective include, but may not be limited to, those set out in **Table 3-1**. The preliminary evaluation criteria and indicators will be finalized based on comments received during the Niagara Escarpment Crossing EA and documented in the EA Report.

Table 3-1: Preliminary Criteria and Indicators for Assessing the Alternatives to the Project

Category	Criterion	Indicator
Transportation	- Ability to accommodate auto and commercial vehicle traffic demand to support efficient movement of people and goods across Niagara Escarpment	- Network-wide Passenger Vehicles and Commercial Vehicle Density - Network-wide Vehicle Kilometers Travelled (VKT)
Transportation	- Ability to improve road network redundancy in the area by providing an alternative travel route	- Reduced local congestion and improve QEW access (Travel Time, Travel Delay, LOS, V/C) at locations within the preliminary study area, as identified in Section 2.1.3.
Transportation	- Ability to improve corridor accessibility and operations	- Corridor Congestion level (Travel Time, Travel Delay, LOS, V/C) - Overall reduction in operating speeds across the escarpment.
Transportation	- Ability to enhance traffic safety	- Reduction in predicted collisions and conflicts for the interim and ultimate horizon year on network and corridor level
Transportation	- Ability to provide and/or improve emergency access in Niagara Escarpment	- Connectivity in travel distance and travel time to nearest hospital - Additional breakdown areas for commercial vehicles on the escarpment

4 Alternative Methods of Carrying Out the Project Design

Following the identification of the preferred alternative(s) to the project, alternative methods of carrying out the project will be generated, possibly screened, assessed, and comparatively evaluated leading to a recommended method(s).

The Transportation Planning and Engineering Work Plan (**Appendix A**) describes how the alternative methods will be generated including the proposed level of design.

4.1 Preliminary Criteria and Indicators

The preliminary evaluation criteria and indicators that will be used for assessing the alternative methods of carrying out the project from a traffic operations and safety perspective include, but may not be limited to, those set out in **Table 4-1**. The preliminary evaluation criteria and indicators will be finalized based on comments received during the Niagara Escarpment Crossing EA and documented in the EA Report.

Table 4-1: Preliminary Criteria and Indicators for Assessing the Alternative Methods of Carrying Out the Project

Category	Criterion	Indicator
Transportation	Effect on Traffic Operations	- Future Interim and Ultimate Conditions Traffic Operations (Travel Time, Travel Delay, LOS, Density, Queueing) along QEW Mainline, Interchange, and corridors and intersections (as identified in Section 2.1.3 and confirmed by Niagara Region) impacted by the preferred corridor alternative - Impact of Construction Staging - Commercial Vehicles Travel Times traversing the preliminary study area along the escarpment crossings - Feasibility of Active Transportation facility
Transportation	Effect on Traffic Safety	- Predicted collisions for future interim and ultimate horizon years - Traffic signal and illumination warrant analysis

5 Impact Assessment of the Proposed Project

Once selected, the preferred method(s) of carrying out the project (i.e., proposed project) will be further developed at a preliminary design level of detail so that the potential environmental effects can be identified with more certainty, more site-specific impact management measures (i.e., avoidance, mitigation, and compensation measures) can be developed for application, net environmental effects can be identified with more certainty, appropriate monitoring requirements can be clearly defined, and specific approval/permitting requirements for constructing the proposed project can be identified.

Concurrent with preparing the preliminary design level of detail, it may be necessary to undertake additional work (e.g., field investigations, microsimulation modelling, etc.) at the impact assessment stage of the Niagara Escarpment Crossing EA. The additional work proposed as part of the Traffic, Operations and Safety Work Plan could include the following subject to preparation of the EA:

- Conduct Level of Service, Travel Time, Delay, and Queueing assessment at regional road corridors, intersections, mainline segments, and interchanges using microsimulation software. The limit of the microsimulation model will depend on the proposed project. The traffic operations will be modelled for the Weekday AM and PM peak period and Weekend peak period (3 hours per period).
- Conduct evaluation of potential construction sequencing and staging alternatives.
- Simulate future interim and ultimate conditions, which include proposed improvements (including mainline widening, interchange improvements, regional road and intersection improvements) to the road network within the preliminary study area and the travel demand matrices will be based on the future conditions travel demand model from Section 2.1.1.
- Assess the opportunity of including Active Transportation facilities by consulting OTM Books and relevant publications.

6 Documentation

The results of implementing this work plan will be documented in four reports during the Niagara Escarpment Crossing EA:

- **Data Collection Program Report** – will provide a comprehensive overview of available and collected traffic data.
- **Travel Demand Analysis Report** – will document the existing conditions transportation system within the Traffic Analysis study area based on the Niagara Region's latest available existing conditions travel demand model. Furthermore, it will provide a comprehensive overview of the future conditions' travel demand, transportation needs, and the impacts of the alternatives to and alternative methods based on the network-wide and corridor-level analysis.
- **Operations and Safety Analysis Report** – will document the review of existing operational, safety issues and constraints along corridors and the comparison of the potential future (interim and ultimate horizon year) impact of the alternatives to and alternative methods.
- **Traffic, Operations and Safety Assessment of the Proposed Project Report** - will document the results of the traffic assessment, and operations and safety assessment of the proposed project including any additional work such as the microsimulation modelling assessment of the existing, future interim, future ultimate, and construction staging scenarios. Furthermore, it will include additional work related to traffic safety analysis.

Upon completion, each report will be made available during the Niagara Escarpment Crossing EA to review agencies, Indigenous Communities, and the public for their information via the project website and upon request and will become either a reference or supporting document to the submitted EA Report. The EA Report will be based on and reflect the information contained in the four reports.