Transportation Impact Study

CBM Aberfoyle South Pit Expansion

November 2023 | Contract # 18174

CBM AGGREGATES, a Division of St. Marys Cement Inc. (Canada)

cbm

VOTORANTIM cimentos

TYLin

EXECUTIVE SUMMARY

CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) has retained TYLin to complete a Transportation Impact Study for the proposed Aberfoyle South Pit Expansion, a 'Feeder Pit' that would send unprocessed aggregate to the CBM processing plant located approximately 1.8 kilometers east of the site along Concession 2. The Aberfoyle South Pit Expansion (the Pit) is proposed to extract up to 1,000,000 tonnes annually and operate daily from 7am and 7pm. Shipping hours are proposed on weekdays from 7AM to 6PM and Saturday from 8AM to 4PM.

The pit is planned to replace similar 'feeder pits' that CBM has in the area, which will soon reach the point of exhaustion, based on input from CBM. Accordingly, as part of this study TYLin assessed future traffic operations at the proposed pit access and the westernmost CBM processing plant access to Concession 2 (to be accessed by the pit trucks).

Existing traffic volumes along Concession 2 at the access intersections were derived using historical turning movement count data at the adjacent intersection of Concession 2 at Sideroad 20 S during the weekday AM and PM peak hours. The historical data was grown to 2023 Existing conditions and balanced along the corridor. This traffic data was then grown to 2028 conditions to derive future background traffic volumes.

Traffic generated by the proposed pit was based on input from CBM, which they derived using truck sizes, annual tonnage limits and previous site operations. A total of 28 trips during the AM peak hour (14 inbound trips and 14 outbound trips) and 28 trips during the PM peak hour (14 inbound trips and 14 outbound trips) are projected for the subject site.

The 2028 future total traffic volumes were derived by adding site generated traffic to the future background traffic volumes. Review of the projected traffic operations and turning lane warrant analysis under future total conditions confirms that both study intersections are projected to operate under good conditions with all turning movements at LOS B or better and minor delay.

TYLin completed a desktop review of the boundary road network alignment and has confirmed that Concession 2 is relatively straight and flat within the study area. Accordingly, the future access to the pit is projected to meet the applicable sightline requirements. Based on a preliminary review of the roadway's structural adequacy, a structural evaluation and safe load capacity of Mill Creek Culvert could be undertaken, including engaging a geotechnical and material testing firm to do the borings for soil bearing capacity and concrete and rebar testing.

Township's Roads Management Plan recommends upgrading Concession 2 from County Road 35 to Sideroad 20 S using single lift of asphalt and from Sideroad 20 S to Sideroad 25 S using double lift of asphalt. TYLin recommends upgrading the 175m stretch of Concession 2 from 10m west of

the proposed pit access to Sideroad 20 S to double lift of asphalt based on the expected use by pit trucks.

TYLin further recommends provision of rumble bars on access of the proposed Aberfoyle South Pit Expansion.

Based on the findings from this study, traffic from Aberfoyle South Pit Expansion can be accommodated by the boundary road network and operations at the proposed pit access are acceptable.

Should you have any questions about the contents of this study, please contact the undersigned (CVs included in **Appendix A**).

Sincerely,

T. Y. Lin International Company

Technical Analyst

[redacted]

Gaurav Chauhan, M.S.
Transportation Planner | Gaurav.chauhan@tylin.com

Project Supervisor

[redacted]

Michael Dowdall, C.E.T., MITE
Director | michael.dowdall@tylin.com

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

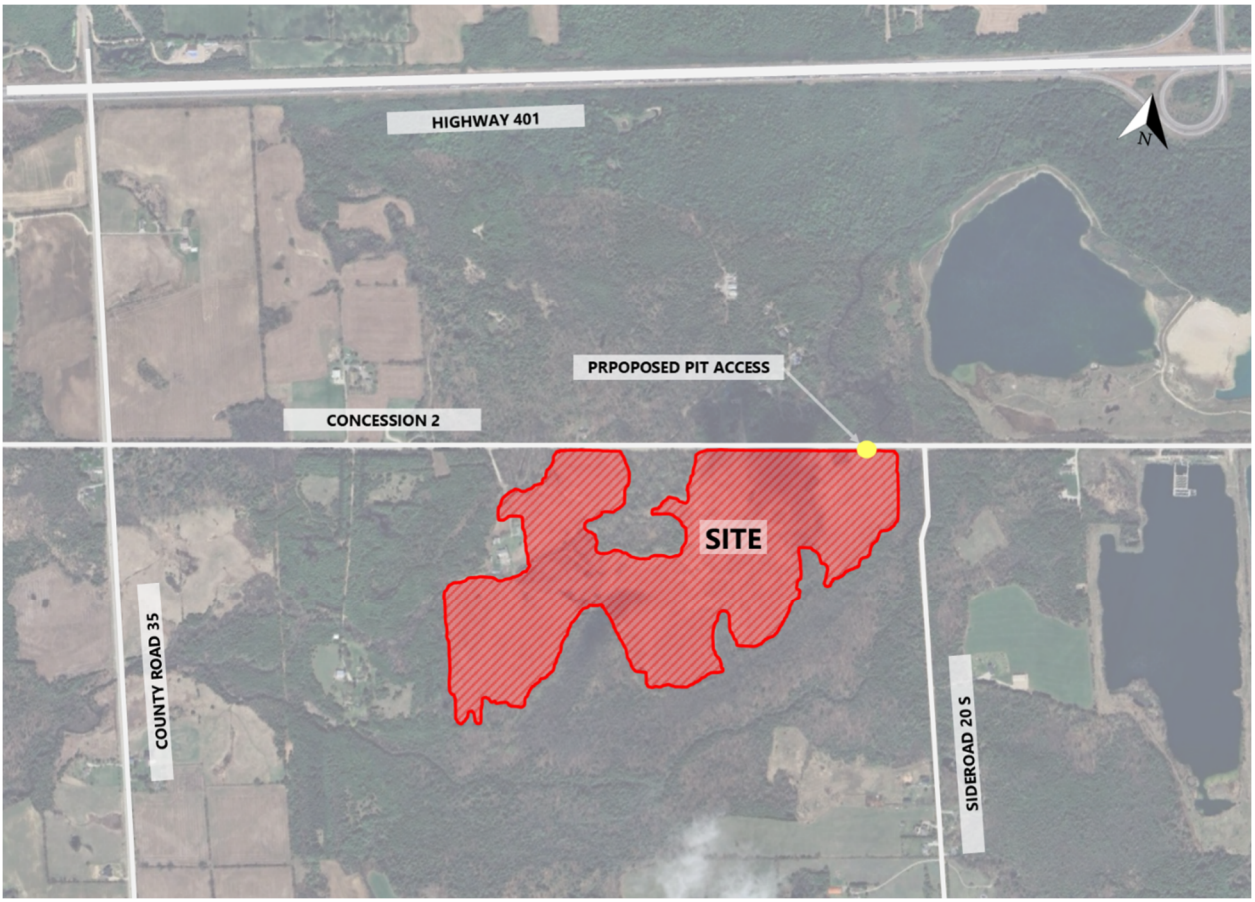
T. Y. Lin International (previously TMIG), was retained by CBM Aggregates, a division of St. Marys Cement Inc. (Canada), to prepare a transportation impact study (TIS) for the Aberfoyle South Pit Expansion (herein after referred to as the 'Pit'), located in the Township of Puslinch.

The pit, currently operating as a farm, is proposed to be a 'Feeder Pit' sending unprocessed aggregate to the CBM processing plant located approximately 1.8 kilometers east of the pit along Concession 2. An access to the pit is proposed on Concession 2 approximately 165 m west of Sideroad 20 S.

The pit is proposed to extract up to 1,000,000 tonnes annually and operate daily from 7am and 7pm. Shipping hours are proposed on weekdays from 7AM to 6PM and Saturday from 8AM to 4PM.

All material will be destined to the processing facility. **Figure 1-1** below shows the location of the proposed pit and its access on Concession 2.

Figure 1-1 Aberfoyle South Pit Expansion Location



Source: Google Earth and MHBC

It is TYLin's understanding that the proposed pit is planned to replace similar 'feeder pits' that CBM has in the area, whose resources are nearly exhausted and whose extraction activities are winding down. Trucks from the proposed pit are projected to access CBM's processing plant via its westernmost access.

Accordingly, TYLin has completed the following as part of this review:

- Review of traffic data along the boundary road network to derive baseline traffic volumes during the weekday AM and PM peak hours;
- Review of truck traffic projected to be generated by the proposed pit along the haul route; and
- Review of the projected traffic operations at the proposed pit access and at the existing processing plant access under future conditions to confirm that future traffic can be accommodated and to assess the need for any roadway improvements.

2 EXISTING TRAFFIC CONDITIONS

2.1 Boundary Road Network & Haul Route

The pit, as well as the CBM processing plant, have frontage along Concession 2. Concession 2 is a two-lane east-west road with a rural cross section under the jurisdiction of the Township of Puslinch, and has a posted speed limit of 60 km/h east of Sideroad 20 S and 80 km/h west of Sideroad 20 S, within the study area.

Access to the CBM processing plant that would be used by the pit trucks is located on Concession 2 on the western end of the plant approximately 400 m west of Sideroad 25 S. Pit-generated traffic would exit turning right out of the pit via a new access to be constructed near the east limit of the property's frontage approximately 165 m west of Sideroad 20 S, travel east along Concession 2 to the CBM processing plant, and turn left into the plant (and complete the return trip back to the feeder pit).

As per the above, TYLin completed a review of traffic operations at the following study intersections as part of the transportation impact study:

- The proposed Pit Access at Concession 2
- The existing CBM Processing Plant Access at Concession 2

The traffic operations review conducted as part of this TIS relates to future traffic conditions.

2.2 Traffic Data

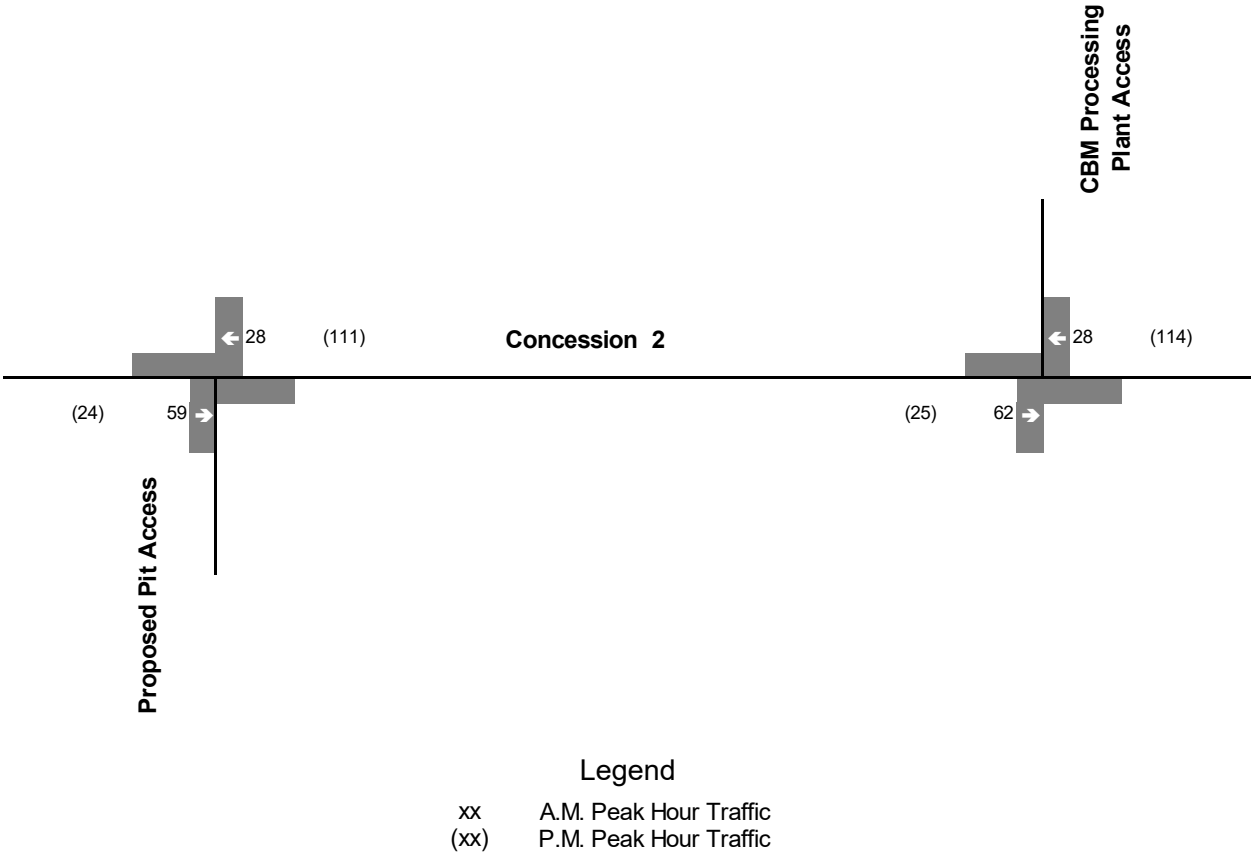
As part of this study, TYLin assessed traffic operations at the study intersections during the weekday AM and PM peak hours of roadway. These periods were selected as the proposed pit would be operational during that time and traffic volumes along the roadway would be at their highest.

Due to the on-going Covid-19 pandemic at the time of the study, traffic patterns were not normalized and any up-to-date survey data would not be applicable for traffic review. As such, TYLin utilized historical Turning Movement Counts (TMC) data at the adjacent intersection of Concession 2 at Sideroad 20 S, grown to 2023 conditions, in order to derive 2023 traffic volumes along Concession 2 at the study intersections.

TMC data at the intersection of Concession 2 at Sideroad 20 S was surveyed on June 27, 2018, between 6AM-9AM and 4PM-7PM. Peak hours were identified as occurring between 7:15AM-8:15AM and 4:30PM-5:30PM, within the planned hours of the proposed pit, so they were deemed suitable to establish the peak hour periods for our operational analyses. The TMC data has been included in **Appendix B** for reference.

Volumes from the surveyed intersection were balanced to the proposed pit access and the CBM processing plant access intersections to Concession 2 in order to derive the through traffic along the corridor. These volumes were then grown from 2018 to 2023 conditions using a conservative annual growth rate of 2%. The derived 2023 Existing traffic volumes at the study intersections have been illustrated in **Figure 2-1**.

Figure 2-1 2023 Existing Traffic Volumes



3 FUTURE BACKGROUND TRAFFIC CONDITIONS

3.1 Horizon Year

A 5-year study horizon to 2028 was selected to assess the impacts of the proposed pit traffic at the study intersections.

3.2 Planned Development and Roadway Improvements

As per recently approved Township of Puslinch's Roads Management Plan (dated August 30, 2023), Concession 2 from County Road 35 to Sideroad 25 S has been identified as one of the top 20 road sections for road resurfacing in the Township as per the calculated priority ratings and is scheduled to occur within the next 1-5 years. The stretch from County Road 35 to Sideroad 20 S is recommended for single lift asphalt and the stretch from Sideroad 20 S to Sideroad 25 S is identified as a truck route and recommended for a double lift of asphalt. The Township's Roads Management Plan is included in the **Appendix C**.

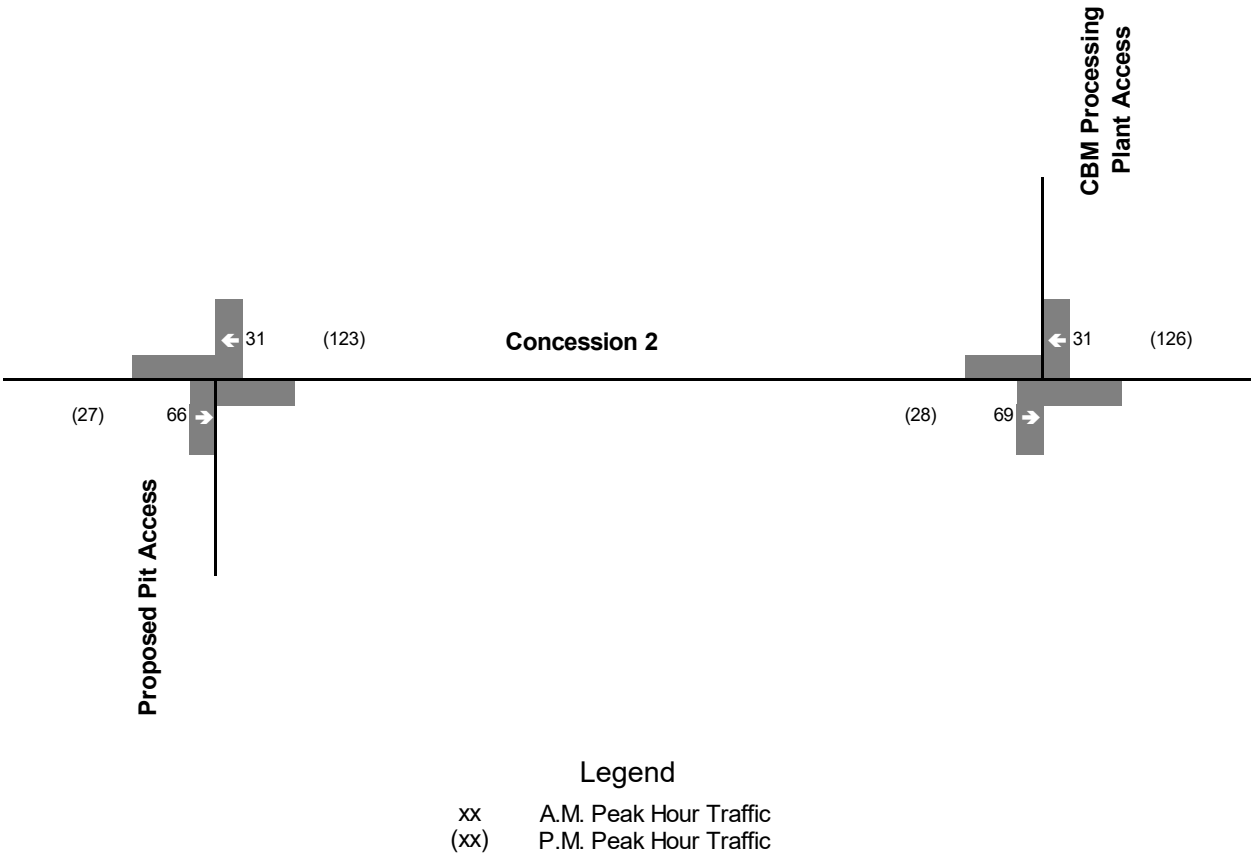
3.3 Background Corridor Growth Rates

As part of the baseline traffic growth for the study area, TYLin applied a 2% annual growth rate for the traffic volume along the boundary road network as confirmed by the Township to account for a nominal amount of non pit-related traffic growth on the boundary road network.

3.4 2028 Future Background Traffic Volumes

The 2028 future background traffic volumes were calculated by growing the 2023 Existing traffic volumes to the 2028 horizon year using the 2% annual growth rate as detailed above. The 2028 future background traffic volumes under the weekday AM and PM peak hours have been illustrated in **Figure 3-1**.

Figure 3-1 2028 Future Background Traffic Volumes



4 FUTURE TOTAL TRAFFIC CONDITIONS

4.1 Trip Generation

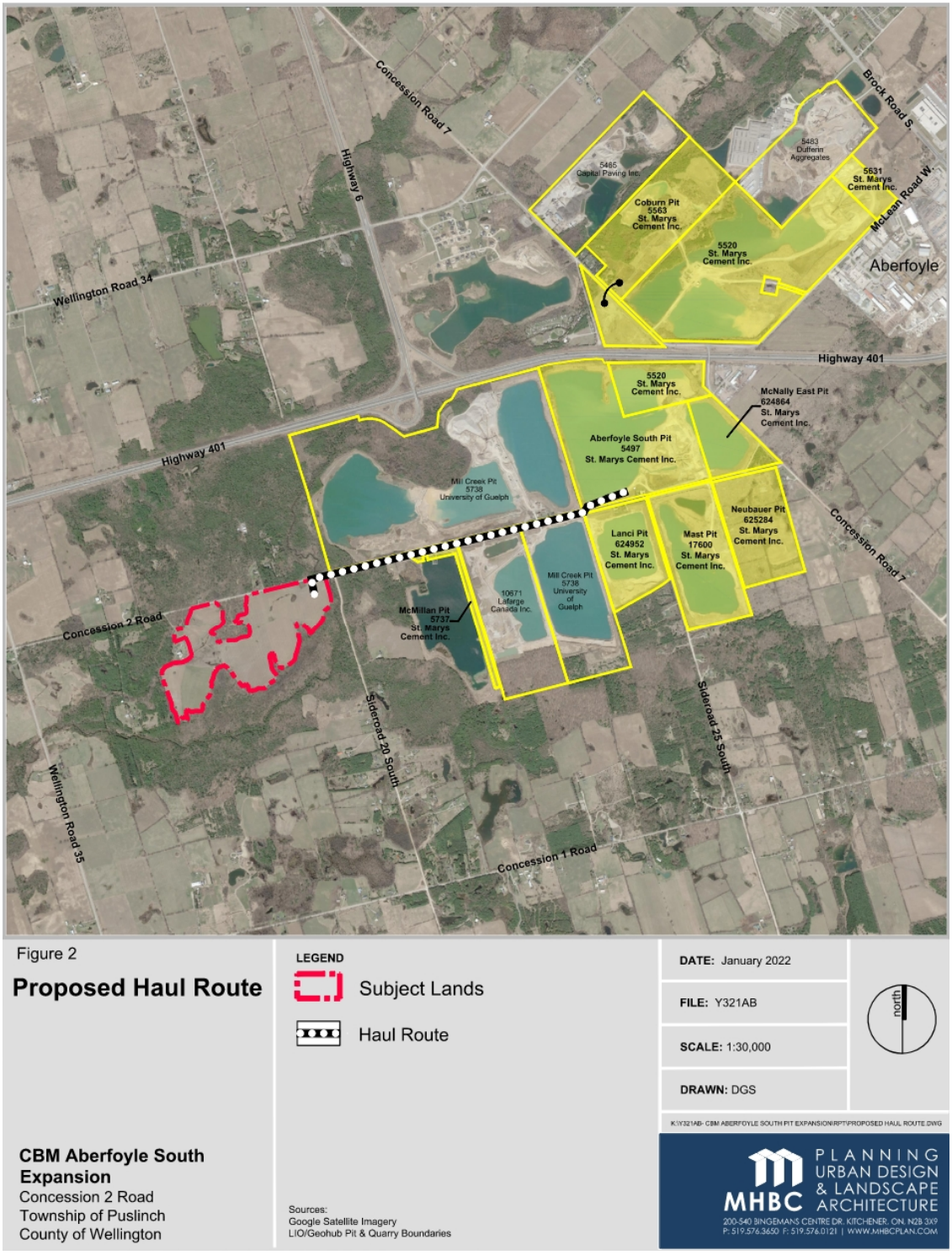
We understand that operations at the proposed pit will occur at a steady pace between March and December with no dominant peak hour shipping period (i.e., truck traffic is projected to be steady throughout the day).

As per consultation with CBM, and in line with the proposed annual tonnage limit, it was confirmed that a maximum of 14 trucks can be loaded per hour within the lands using one loader. Accordingly, TYLin considered a fixed-rate trip generation for the pit totaling 28 trips during each of the AM and PM peak hours, consisting of 14 inbound trips and 14 outbound trips for each peak hour. This typical hourly truck generation rate is consistent with other pit applications for which TYLin has prepared TIS and has been customized to reflect the site-specific extraction and loading operations planned at this pit.

4.2 Trip Distribution/Assignment

Trips generated by the pit will travel on Concession 2 to/from the westernmost access of the CBM processing plant located approximately 400m west of the Sideroad 25 S (with trucks prohibited from travelling west of the proposed pit access on Concession 2). The truck route has been confirmed with CBM and illustrated in **Figure 4-1** for reference.

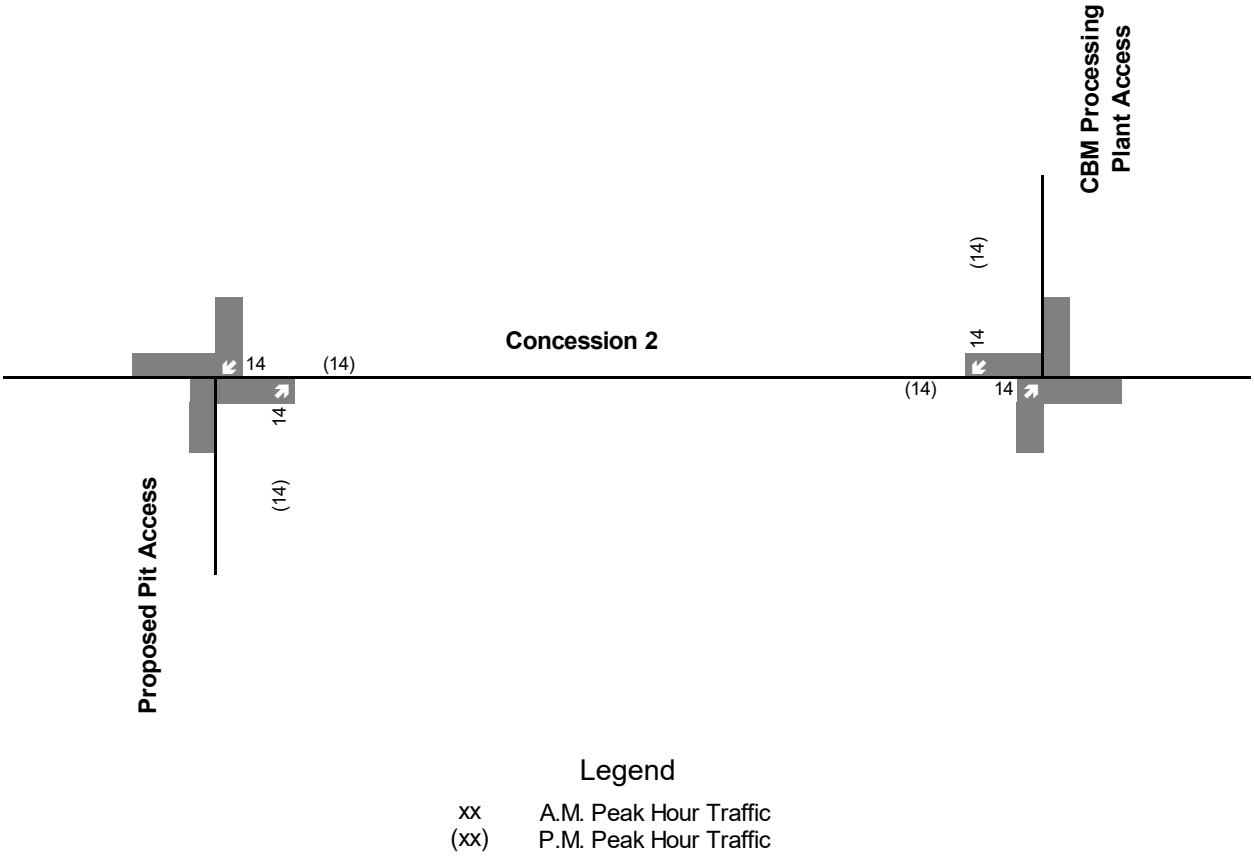
Figure 4-1 Proposed Truck Route



Source: MHBC

Accordingly, 100% of site trips were assigned to the proposed truck route, turning right out of the proposed pit access, travel east along Concession 2, turning left into the CBM processing plant access and then completing return trip using the same route. Please refer to **Figure 4-2** for the projected hourly traffic volumes following this pattern.

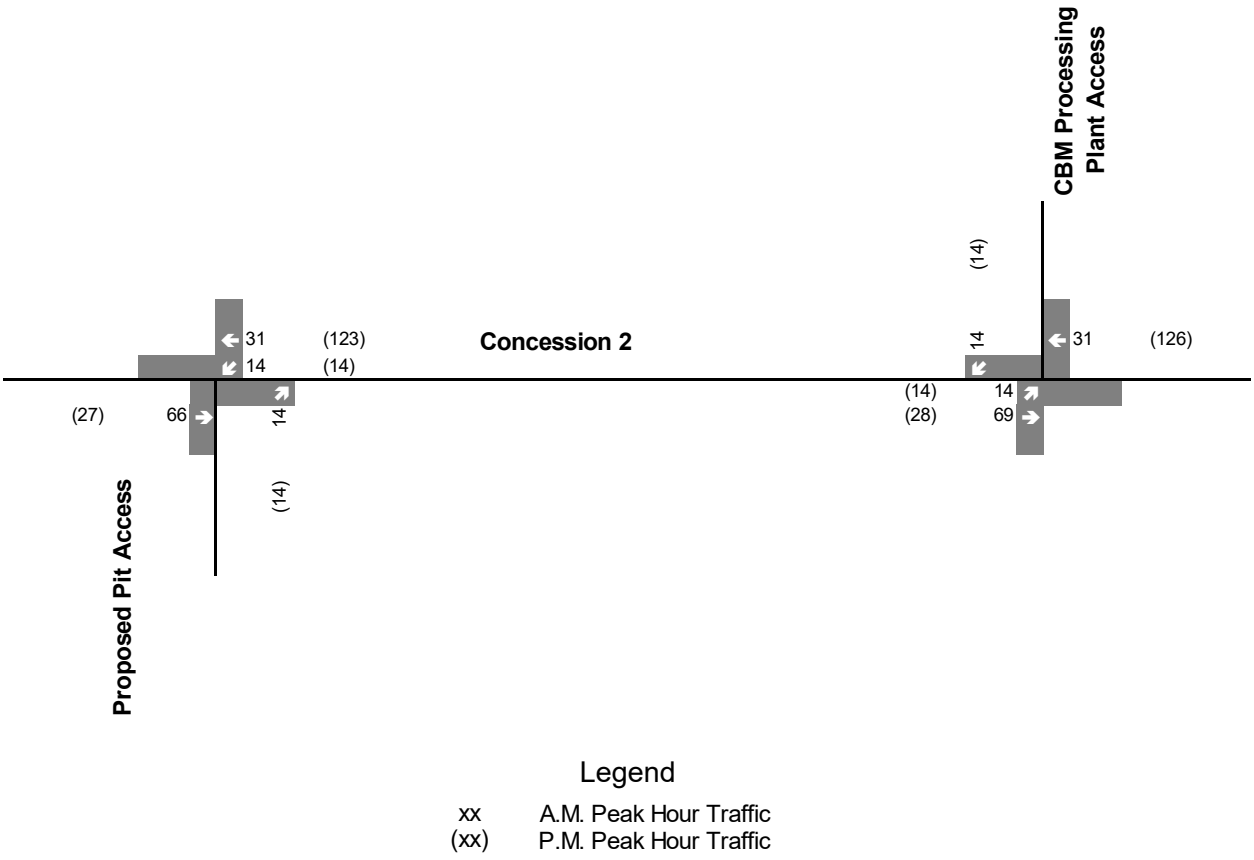
Figure 4-2 Site Traffic Volumes



4.3 2028 Future Total Traffic Volumes

The 2028 future total traffic volumes were calculated by adding the projected site generated trips to the future background traffic volumes. The 2028 future total traffic volumes under the weekday AM and PM peak hours have been illustrated in **Figure 4-3.**

Figure 4-3 2028 Future Total Traffic Volumes



4.4 Left Turn Lane Warrant

The MTO left-turn lane warrant was used to determine if a westbound left-turn lane at the proposed pit access or eastbound left-turn lane at the processing plant access is warranted.

For Concession 2 east of Sideroad 20 S, a design speed of 80km/h was used based on the posted speed limit of 60km/h; and for Concession 2 west of Sideroad 20 S, a design speed of 100km/h was used based on the posted speed limit of 80km/h along with the 2028 future total traffic volumes. Analysis confirmed that left-turn lanes are not warranted along Concession 2 at the study intersections. Warrant analysis sheets have been included in **Appendix D**.

4.5 Traffic Operations Review

TYLin completed a review of the projected traffic operations under 2028 future total conditions at the study intersections. The analysis contained in this report utilized the Highway Capacity Manual (HCM) 2000 techniques within the Synchro Version 10 Software package. The reported intersection volume-to-capacity ratios (v/c) are a measure of the saturation volume for each turning movement, while the levels-of-service (LOS) are a measure of the average delay for each turning movement.

As part of this review, a default peak hour factor of 0.92 was assumed for the study intersections, with the truck and heavy vehicle percentage along Concession 2 assessed as surveyed and traffic to/from the proposed pit and processing plant assumed as 100% heavy vehicles for the purpose of this analysis.

The traffic operations review has been detailed in **Table 4-1**, with all Synchro reports included in **Appendix E**.

Table 4-1 2028 Future Total Conditions – Traffic Operations

Intersection Turning Movement	AM Peak Hour			PM Peak Hour		
	V/C	Delay	LOS	V/C	Delay	LOS
Proposed Pit Access at Concession 2						
Eastbound Through+Right	0.04	0	A	0.02	0	A
Westbound Through+Left	0.01	3	A	0.01	1	A
Northbound Left+Right	0.02	10	A	0.02	10	A
CBM Processing Plant Access at Concession 2						
Eastbound Through+Left	0.01	2	A	0.01	3	A
Westbound Through+Right	0.02	0	A	0.08	0	A
Southbound Left+Right	0.02	10	A	0.02	11	B

As per the table above, traffic entering and exiting the proposed pit and processing plant accesses are projected to do so at LOS 'B' or better, with a delay of 11 seconds/vehicle for the vehicles exiting the processing plant during the PM peak hour (all delays contained on-site).

Traffic generated by the proposed pit can be easily accommodated by the boundary road network without any additional operational related improvements, beyond construction of the proposed pit access driveway (which is assumed to be built in accordance with Township design requirements).

4.6 Access Sightline Analysis

As part of this TIS, TYLin reviewed the locations of the proposed pit and the processing plant accesses on Concession 2, with regards to the sightline requirements and its adequacy / compliance.

A desktop review of the boundary road network shows that Concession 2 is flat and level at both accesses, with ample unobstructed sightlines in both directions. Accordingly, it is TYLin's opinion that the intersection sight distance requirements for the proposed pit access (236m for right-turning vehicles out of the pit and 264m for left-turning vehicles out of the pit based on a design speed of 100km/h), for the processing plant access (189m for right-turning vehicles out of the plant and 211m for left-turning vehicles out of the plant based on a design speed of 80km/h)

would be satisfied as per TAC requirements.

Please refer to **Figure 4-4** and **Figure 4-5** for the viewpoints looking east and west along Concession 2 from the proposed pit access and processing plant access, respectively.

Figure 4-4 Pit Access Viewpoints Looking East and West

Source: Google Earth

Figure 4-5 Processing Plant Access Viewpoints Looking East and West

Source: Google Earth

5 PRELIMINARY ROADWAY AND STRUCTURAL CONDITIONS REVIEW

To comply with Township requirements, we have included the following summary of road conditions and features in the general area to add context to the traffic analysis in terms of physical road conditions and available structural information. Included below is a summary of information received from the Township of Puslinch, Township's Roads Management Plan, the Ontario Structure Inspection Manual (OSIM) report, and our visual review of the road conditions and load restrictions from a site visit in July of 2021:

- Concrete culvert located about 120 meters east of the site, over Mill Creek and carrying Concession 2 is overall in good condition. The culvert has asphalt wearing surface directly on top with no fill. Light map cracking, medium to severe unsealed longitudinal and transverse cracking in asphalt wearing surface observed during the site visit. Unknown utilities are attached to the south elevation of the culvert. Ontario Structure Inspection Manual (OSIM) inspections report recommends removal and replacement of guide rail, and conduit connections repair over the 6-10 years period.
- Corrugated steel plate pipe arch culvert located about 1.4 kilometers east of the site, over the conveyor, and carrying Concession 2 had limited access at the time of the site visit. NO HEAVY TRUCKS (Rb-62) sign is located approximately 500 m west of the culvert in the westbound direction and does not cover the road portion where the culvert is located. No other limiting signs are observed at the time of the site visit. The culvert is initially identified as a soil steel structure with varying fill depth. Medium unsealed transverse cracking in asphalt wearing surface observed during the site visit.
- OSIM report (dated 6/15/2021) obtained from the Township does not include any information that indicates culvert load capacity and/or weight limit posting. It does however mention that it is an open box culvert built in 1994, see **Appendix F**.
- As discussed earlier in **Section 3.2**, Township of Puslinch recently approved it's Roads Management Plan according to which, Concession 2 from County Road 35 to Sideroad 25 S has been identified as one of the top 20 road sections for road resurfacing in the Township as per their calculated priority ratings which is scheduled to occur within the next 1-5 years. The stretch from County Road 35 to Sideroad 20 S is recommended for single lift asphalt and the stretch from Sideroad 20 S to Sideroad 25 S is identified as a truck route and is recommended for double lift of asphalt based on the expected truck use.
- Signage installed: 750m to the east of Sideroad 20 S (500m west of culvert over conveyor, as mentioned above), a NO HEAVY TRUCKS (Rb-62) sign is currently posted on Concession 2 in the westbound direction. According to the Township Bylaw 063-2021, passed in December 2021, currently there is a heavy vehicle restriction on Concession 2 west of Sideroad 20 S. However, as the Township's Roads Management Plan has identified the Concession 2 stretch from Sideroad 20 S to Sideroad 25 S as a truck route, this sign is expected to be removed after

resurfacing with double lift of asphalt which is expected to be completed within the next 1-5 years. This will leave the 165m stretch on Concession 2 from the proposed pit access to Sideroad 20 S with a single lift of asphalt. We recommend upgrading this stretch of Concession 2 and additional 10m stretch west of the proposed pit access (total 175m) to double lift of asphalt based on the expected use by pit trucks.

- To mitigate dust and debris, we recommend provision of rumble bars on the proposed pit access to slow down the trucks merging on to Concession 2.
- As shown in **Figure 4-3,** Concession 2 is expected to have eastbound through traffic volume of 63 vehicles/hour during 2028 horizon year AM peak, which would translate to approx. 1 vehicle per minute. According to section 9.9 in Chapter 9 of the Transportation Association of Canada (TAC) manual, single unit trucks need a time gap of 8.5 seconds while making a right-turn maneuver, which is expected to be adequate for merging on to eastbound traffic on Concession 2 given that 14 pit trucks are expected to merge during the AM peak resulting in less than 1 truck merging every four minutes.

We understand that the following improvements were proposed in the 2022 Capital Budget and were included in the 2021 approved budget:

a. Concession 2 – Sideroad 20 S to Concession 7 (just east of culvert): 2024 capital project
b. Concession 2 – County Rd 35 to Sideroad 20 (fronts onto the site): 2027 capital project
c. Concession 2 culvert: 2027 capital project at $120,000

During the permit approval process, a structural evaluation and safe load capacity of Mill Creek Culvert could be undertaken, including engaging a geotechnical and material testing firm to do the borings for soil bearing capacity and concrete and rebar testing.

6 SUMMARY AND CONCLUSIONS

TYLin was retained to complete a Transportation Impact Study for the proposed Aberfoyle South Pit Expansion, a 'Feeder Pit' that would send extracted unprocessed aggregate to the CBM processing plant located approximately 1.8 kilometers east of the site along Concession 2. The pit is proposed to extract up to 1,000,000 tonnes annually and operate daily from 7AM and 7PM. Shipping hours are proposed on weekdays from 7AM to 6PM and Saturday from 8AM to 4PM.

TYLin assessed future traffic operations at the proposed pit access (approx. 165 m west of Sideroad 20 S) and the westernmost CBM processing plant access (approx. 400 m west of Sideroad 25 S) at Concession 2 (to be accessed by the proposed pit trucks).

Existing traffic volumes along Concession 2 at the study intersections were derived using historical turning movement count data at the adjacent intersection of Concession 2 at Sideroad 20 S during the weekday AM and PM peak hours. The historical data was grown to 2023 Existing conditions and balanced along the corridor. This traffic data was then grown to 2028 conditions to derive future background traffic volumes.

Traffic generated by the proposed pit was based on input from CBM, which they derived using truck sizes, annual tonnage limits and previous site operations. Accordingly, a total of 28 trips during the AM peak hour (14 inbound trips and 14 outbound trips) and 28 trips during the PM peak hour (14 inbound trips and 14 outbound trips) are projected for the subject lands.

The 2028 future total traffic volumes were derived by adding site generated traffic to the future background traffic volumes. Review of the projected traffic operations and turning lane warrant analysis under future total conditions confirms that both study intersections are projected to operate with nearly zero delay and highly efficient conditions with all turning movements at LOS A except for the outbound movement from the processing plant during PM peak hour, which is still projected to operate very efficiently at LOS B. No exclusive turn lanes at the pit or processing plant accesses, would be required to accommodate the projected development traffic.

A site visit and desktop review of the boundary road network alignment has confirmed that Concession 2 is relatively straight and flat within the study area. Accordingly, the future access to the proposed pit and existing access to the processing plant are projected to meet (or exceed) the applicable sightline requirements.

Based on a preliminary review of the roadway's physical condition, and available material obtained from the Township, TYLin recommends that a comprehensive test of the structural condition of the Mill Creek culvert (structure ID 2012) be undertaken. Results from this test should then be reviewed in the context of the Township's capital works plan and forecasted rehabilitation schedule for the Mill Creek culvert.

As per recently approved Township's Roads Management Plan, Concession 2 from County Road 35 to Sideroad 25 S has been identified as one of the top 20 road sections for road resurfacing in the Township as per the calculated priority ratings which is scheduled to occur within the next 1-5 years. The stretch from County Road 35 to Sideroad 20 S is recommended for single lift of asphalt and the stretch from Sideroad 20 S to Sideroad 25 S is identified as a truck route with a recommended double lift of asphalt based on expected truck use.

TYLin recommends upgrading the stretch of Concession 2 starting from 10m west of the proposed pit access to Sideroad 20 S (approx. 175m) to double lift of asphalt, based on expected use by pit trucks.

To mitigate dust and debris, TYLin recommends rumble bars on the proposed pit access on Concession 2.

APPENDIX A

Report Author CVs

TYLin

YEARS OF EXPERIENCE
15 Years

YEARS WITH TYLIN
7 Years

EDUCATION
Advanced Diploma in Transportation Engineering Technology, Mohawk College, 2010

EMPLOYMENT HISTORY
2016 to Present, TYLin

2012 to 2016, GHD

2007 to 2012, Transtech (The Sernas Group Inc.)

LICENSE
Certified Engineering Technologist, Ontario

CERTIFICATIONS
WHMIS 2015 Training, 2016

AODA Understanding Human Rights, 2016

AODA Customer Service Training, 2016

Supervisor Health and Safety Awareness in 5 Steps, 2016

Workplace Violence and Harassment Training (Bills 168 and 132), 2016

AFFILIATIONS
Ontario Association of Certified Technicians and Technologists (OACETT)

Institute of Transportation Engineers (ITE)

BUILDINGS

Michael Dowdall, C.E.T., MITE

DIRECTOR OF TRAFFIC

Michael is the Director of Traffic at TYLin with extensive experience in all aspects of the transportation planning field at the municipal, regional, and provincial level. He has significant experience using AutoCAD for the functional design of roadways and site accesses, traffic management implementation plans, and construction management plans. Michael's project experience includes the identification and mitigation of traffic impacts for land development, preparation of conceptual roadway / highway layouts, site access schemes, internal circulation systems, queuing studies, and parking needs reviews. His key public sector experience includes traffic calming, secondary plan road network assessments, and urban / suburban parking studies. This experience enables Michael to prepare thorough and informed transportation studies in support of development applications.

PROJECT EXPERIENCE

Lakeview Village Community Partners for the City of Mississauga | Lakeview Village Transportation Considerations Report | Mississauga, Ontario

Buildings, Traffic | Engineering Fees $1,500,000 | 2016 – Ongoing | Study-Analysis-Report | Project Director

Project Director for development of vehicle travel demand throughout the study area road network and examining the transportation operations under a series of potential road network design options, and made recommendations on the ultimate road network to accommodate the predicted build-out of the Lakeview Village area and surrounding developments. A Transportation Considerations Report and was submitted in support of the proposed Official Plan, Rezoning and Draft Plan applications for the future development containing approximately 8,050 residential units, and considerable office, institutional, retail, commercial, civic and green space. Subsequent traffic studies were prepared and submitted in support of a Minster's Zoning Order to allow the development of an expected 16,000 new residential units. Michael managed a project team to submit a number of planning and transportation studies in support of the future development of Lakeview Village aimed to promote attractive mobility alternatives to reduce automobile dependency in a stable and sustainable way while promoting the creation of strong, clean, and healthy communities including; the Transportation Considerations Report, Transportation Demand Management and Parking Strategies, and a MiWay Transit Service Plan.

Town of East Gwillimbury, Green Lane MESP | East Gwillimbury, ON

Buildings, Traffic | Engineering Fees $420,000 | 2017 - 2019 | Study-Analysis-Report | Traffic Analyst

Examined and assessed the operational impacts of trips generated by the Green Lane Secondary Plan area in the context of the broader area transportation demands. Created a micro-analysis traffic operations model using Synchro and tested the major intersections for Level (Quality) of Service, volume to capacity ratios, delay, and queuing. Tested the reasonableness and ability of the planned internal and external road system to accommodate future traffic. In concert with the traffic operations assessment, developed a series of transportation system plans in coordination with the Region's Transportation Master Plan and other relevant documents. Developed a comprehensive strategy to highlight the features and opportunities of the GLSP study area in efforts to encourage a shift away from SOV travel.

Davis Drive 404 Retail Limited Partnership, Davis Drive & Highway 404 Retail Development Transportation Mobility Plan | Newmarket, ON

Buildings, Traffic | Engineering Fees $95,000 | 2020-Ongoing | Study-Report | Project Director

Michael was responsible for the coordination and completion of a traffic impact study, site access configuration assessment, internal circulation review, and functional roadway and intersection design for a 170,000 sq ft membership retail warehouse and 125,00 sq ft of commercial retail located in the southwest quadrant of Harry Walker Parkway and Highway 404 the Town of Newmarket.

Orlando Corporation, Coleraine Business Park | Brampton, ON

Buildings, Traffic | Engineering Fees $345,000 | 2017-Ongoing | Study-Design-Report | Traffic Lead

Led the completion of a Transportation Impact Study for a proposed 3 million sq ft industrial subdivision within the Highway 427 Industrial Secondary Plan Area located west of Highway 50, south of Countryside Drive, in the City of Brampton. The City and Region required the access design to reflect proposed changes to the surrounding road network resulting from the subject development and future growth. Michael also prepared the functional access designs for the future access points on Coleraine Drive, Countryside Drive and Highway 50.

RCG Islington 401 GP Inc., 2200 Islington Avenue Transportation Impact Study | Toronto, ON

Buildings, Traffic | Engineering Fees $125,000 | 2019-2023 | Study-Analysis-Report | Project Manager

TYLin was retained to prepare a Transportation Impact Study for a proposed 162,000 sq ft membership retail warehouse and 330,00 sq ft of commercial retail located at 2200 Islington Avenue located in the southwest quadrant of the intersection of Islington Avenue and Rexdale Boulevard in the City of Toronto. The multi-block development consists of 12 commercial retail blocks, one membership retail warehouse and multi-level parking. Access to the proposed development was secured via new public roads and restricted access to the arterial road network with a direct connection to Islington Avenue. As Project Manager, Michael led the required Loading Study, Parking Study, Traffic Operations Study, and Transportation Impact Study for this assignment.

North Leslie West Residential Subdivisions | Richmond Hill, ON

Buildings, Traffic | Engineering Fees $100,000 | 2016-Ongoing | Study-Analysis-Report | Project Manager

Michael completed a Traffic Impact Study's for the Raki Holdings Inc., Richview 19 Holdings Inc., Earlglen Investments Inc. and Autumnhill Investment Ltd. Draft Plans within the North Leslie West Secondary Plan consistent with their conditions of approval and the North Leslie MESP. Michael calculated trip generation of the proposed subdivisions and documented the internal road network elements and external arterial access points to ensure the traffic generated by the three subject subdivisions can be accommodated by the network. Traffic Management Implementation Plans and Transportation Demand Management components were included to accommodate other modes of transportation.

Fieldgate Developments, Secondary Mixed-Use Node (SMUN) Lands Transportation Impact Study | Milton, ON

Buildings, Traffic | Engineering Fees $150,000 | 2016- Ongoing | Study- Design | Project Manager

Examined the traffic impacts from a proposed Mixed-Use Node development and considered the Town's Traffic Demand Management Strategies and parking requirements for the site. A review of the design of the site accesses and internal drive aisles was conducted to ensure the efficient movement of cars, delivery vehicles, waste collection vehicles, and emergency vehicles through the site. Site traffic was distributed according to existing traffic patterns and planned changes to the transportation system within the vicinity of the site, including functional design of a proposed roundabout subsequent analysis. coordination with existing roundabouts.

Town of Milton, Traffic Control Plans | Milton, ON

Buildings, Traffic | Engineering Fees $100,000 | 2016- Ongoing | Design | Designer – Project Manager

Prepared traffic control plans for a variety of residential subdivisions within the Sherwood and Boyne Survey Secondary Plans. The subdivisions included Mattamy Church Lands Neighbourhood, Willmott Neighbourhood Phase 1 & 2, Capozzi Neighbourhood Phase 2A, Fieldgate West, Matamy Bayview Lexis and Tor Lands, and Milton Main Street Homes.

AGGREGATE RESOURCE APPLICATIONS

Michael was responsible for the coordination and completion of Transportation Impact Studies for multiple clients and sites across south and central Ontario. Traffic studies completed for aggregate extraction including haul route assessments, safety reviews and OLT testimony, examined the impacts on the adjacent road network to permit a mineral aggregate operation, or from expanding the extraction area within the existing property boundary. Michael also contributed to the recommendations regarding the access design and road improvements to accommodate the haul vehicles.

- Aggregate Expansion Haul Route Analyses, Transportation Impact Study | Aberfoyle South Pit | Township of Puslinch
- New Aggregate Extraction Haul Route Analyses, Transportation Impact Study, Safety Reviews, and OLT Testimony | Olszowka | Brant County
- Aggregate Expansion Haul Route Analyses, Safety review, Transportation Impact Study, OLT Testimony | Fleming Pit | Township of Ramara
- Aggregate Expansion Haul Route Analyses, Transportation Impact Study, LPAT Expert Witness | Hillsburgh Pit | County of Wellington
- New Asphalt Batch Plant Haul Route Analyses, Transportation Impact Study, LPAT Expert Witness | Dig-Con International | Town of Caledon
- New Aggregate Extraction; Haul Route Analyses, Transportation Impact Study | Caledon Pit / Quarry | Town of Caledon
- Aggregate Expansion Haul Route Analyses, Transportation Impact Study | Goodwood Pit | Township of Uxbridge
- Aggregate Pit Reclamation Haul Route and Transportation Impact Study | Stouffville Pit | Town of Whitchurch-Stouffville
- Aggregate Expansion Haul Route Analyses, Transportation Impact Study | Woodville Pit | Kawartha Lakes
- New Aggregate Extraction; Haul Route Analyses, Transportation Impact Study | Uppers Quarry | Niagara Region
- Annual Traffic and Safety Review Haul Route Analyses, Transportation Impact Study | Codrington Pit | Northumberland County
- Aggregate Expansion Haul Route Analyses, Transportation Impact Study | Paris Pit | Brant County
- Aggregate Expansion Haul Route Analyses, Transportation Impact Study | Milton Quarry | Town of Milton
- Aggregate Expansion Haul Route Analyses, Transportation Impact Study | Hampshire Mills | County of Simcoe

LANDOWNER GROUP ADVISORY SERVICES

Milton Phase IV Landowners Group, Britannia Urban Expansion Area | Milton, ON

Buildings, Traffic | $75,000 | 2019 - Ongoing | Advisory-Analysis | Project Director

Provide advisory transportation planning / engineering services for the Landowners Group of the South Milton Urban Expansion Area (established through the passing of Regional Official Plan Amendment 38), and of the ongoing and future Transportation Planning assignments and Capital Works projects that will directly affect these lands and the broader development of Milton.

Block 64 South Landowners Group, Trafalgar-Agerton Urban Expansion Area | Vaughan, ON
Buildings, Traffic | $150,000 | 2019 - Ongoing | Advisory-Study-Analysis | Project Manager
Project manager for advisory services on behalf of the Block 64 South Landowners Group to complete a Transportation Impact Study in support of a Block Plan Amendment to replace previously approved cul-de-sacs with proposed site accesses to the existing arterial boundary road network and proposed new public roads.

Milton Phase IV Landowners Group, Trafalgar-Agerton Urban Expansion Area | Milton, ON
Buildings, Traffic | $350,000 | 2018 - Ongoing | Advisory-Study-Analysis | Project Director
Project Director for advisory services on behalf of the Milton Phase 4 Trafalgar-Agerton Landowners Group to develop and prepare a Road Network Assessment (RNA), as required by the Town of Milton and Halton Region. The RNA was prepared in tandem with, and in support of, the overall Tertiary Plan for the Trafalgar lands within Milton's Phase 4 Lands defined as the next Urban Expansion Area for the year 2021 and beyond. The Trafalgar Corridor will bring 19,000 jobs and 32,000 residents to Milton over the next 20 years.

Milton Phase III Landowners Group, Boyne Survey Roads Needs Assessment | Milton, ON
Buildings, Traffic | $500,000 | 2009 - 2016 | Advisory-Study-Analysis | Traffic Analyst
The Boyne Survey Secondary Plan Area is located in the Milton Urban Expansion Area, south of the existing Bristol Survey and Sherwood Survey Secondary Plan Areas. This urban expansion is under construction with a planned future population of 50,000. Michael analyzed the traffic conditions for full build-out and identified the interim and ultimate intersection improvements required to accommodate development based on the scheduled capital works phasing. The Town adopted this study as a basis for all future development within the Boyne Secondary Plan.

ENVIRONMENTAL ASSESSMENTS

- Burnhamthorpe Road Watermain Twinning EA and Preliminary Design Traffic Analysis | City of Brampton
- Huron Road Improvements | City of Kitchener
- Cawthra Road Watermain Installation Traffic Management Plans | City of Mississauga
- Britannia Road Watermain Installation Traffic Construction Staging | Town of Milton

FUNCTIONAL DESIGN

- Highway 9 and First Line Localized Widening Design, Town of Mono
- Derry / Scott Commercial Access Design, Town of Milton
- William Allen Road Commercial Access Design, City of Toronto
- Caledon-King Townline Residential, Town of Caledon
- 7150 Edwards Boulevard Parking Lot Layout, City of Mississauga
- Richmond Hill GO Access Design, City of Vaughan
- Rotherglen School Parking Layout, Town of Oakville
- Steeles and Financial Drive Access Design, City of Brampton

PARKING STUDIES

- Shingar Banquet Hall, City of Brampton
- Oakville Entertainment Centre, Town of Oakville
- Meadowvale Christian Academy, City of Mississauga
- Trafalgar Sports Park, Town of Milton
- Rotherglen School, Town of Oakville
- Chinguacousy Road Commercial, City of Brampton
- 2441 Finch Residential, City of Toronto
- Faith of Life Place of Worship, City of Mississauga
- Oakleaf Academy, Town of Oakville
- Four Seasons Garden Condominium, Town of Richmond Hill
- Electric Building Condominiums, City of Toronto

TYLin

YEARS OF EXPERIENCE
6

YEARS WITH TYLIN
1

EDUCATION
University of Florida, Gainesville, Florida, US, Master of Science in Civil Engineering, Major: Transportation Engineering, 2015

S.V. National Institute of Technology, India, Bachelor of Technology in Civil Engineering, 2010

PROFICIENCIES (E.G. SOFTWARE)
VISSIM, CORSIM, Synchro, SimTraffic, Highway Capacity Software (HCS), SIDRA Intersection, MicroStation, AutoCAD, AutoTURN, CUBE Voyager, MS Office (Word, PowerPoint, Advanced Excel), MS Outlook, SPSS, N-Logit, Python, Power BI, SQL(Postgre), C++

AFFILIATIONS
Institute of Transportation Engineers

BUILDINGS

GAURAV CHAUHAN, M.S.

TRANSPORTATION PLANNER

Experienced Traffic/Transportation engineer with excellent technical, managerial and communication skills. Six years of total experience in traffic engineering, transportation planning, traffic analysis, micro-simulation, traffic studies, safety studies and roadway construction; working for private clients in Greater Toronto Area (GTA) and surrounding counties, cities and townships in Southern Ontario. Earlier experience included strategic clients like Florida Department of Transportation (FDOT), City of Tampa, FL and several counties in the State of Florida, US. Extensive experience working on complex projects (e.g., complex Traffic Impact Studies, Transportation Demand Management (TDM) Plans System modifications, Interchange modifications, major arterials, major signalized intersections) including performing traffic analysis/simulation from scratch as well as preparing technical reports.

PROJECT EXPERIENCE

County of Brant | Traffic Impact Study | Paris, ON, Canada
On-Going | North America, Buildings | Transportation Planner |
Performed Traffic Impact Study (TIS) for Dufferin Paris Pit expansion located south of Watts Pond Road and east of Pinehurst Road in Town of Paris. Study included evaluating the truck traffic's impact on the site access and adjacent intersection on haul route along Watts Pond Road for buildout and future horizon years.

Township of Ramara | Traffic Impact Study | Brechin, ON, Canada
2453 | On-Going | North America, Buildings | Transportation Planner |
Performed Traffic Impact Study (TIS) for Brechin Quarry located in the southwest quadrant of Highway 12 and Concession Road 2 in Ramara Township. Study included evaluating the truck traffic's impact on the site access and adjacent intersection for two future horizon years.

City of Richmond Hill | Traffic Impact Study | Richmond Hill, ON, Canada
100145 | On-Going | North America, Buildings | Transportation Planner |
Performed Traffic Impact Study (TIS) for a mixed-use development consisting of high-rise condominium and retail space proposed at the northwest quadrant of Yonge Street and High-Tech Road in Richmond Hill, ON. Responsibilities included evaluating the impact of site generated traffic on Yonge Street corridor, preparing functional design of High-Tech Road west extension, site circulation review and preparing a Transportation Demand Management (TDM) Plan.

Region of Peel | Traffic Impact Study | Brampton, ON, Canada
10215 | On-Going | North America, Buildings | Transportation Planner |
Performed Traffic Impact Study (TIS) for a warehouse development consisting of three buildings proposed at the corners of future intersection of East-West Arterial and Arterial A2 in Brampton, ON. Responsibilities included evaluating the impact of site generated traffic on future arterials, conducting site circulation and parking review.

City of Vaughan | Traffic Impact Study | Vaughan, ON, Canada
100172 | On-Going | North America, Buildings | Transportation Planner |
Analyzed impact of a new warehouse development on Highway 50 and Gibraltar Road. Conducted internal site circulation review and parking study. Prepared Transportation Demand Management (TDM) Plan.

City of Mississauga | Lakeview Village Project | Mississauga, ON, Canada
17201 | On-Going | North America, Buildings | Transportation Planner |
Analyzed Lakeshore Road corridor using VISSIM as part of the revised Lakeview Village project and prepared the microsimulation report.

City of Mississauga | Lakeview Village Block-7 Traffic Impact Study | Mississauga, ON, Canada
100043 | On-Going | North America, Buildings | Transportation Planner |
Performed Traffic Impact Study (TIS) for Lakeview Village Block-7 comprising of approximately 1000 residential units in the city of Mississauga, ON.

Miami-Dade County | I-195 IMR | Miami, Florida, US

Developed future year traffic volumes (AADTs/DDHVs), evaluated I-195 at Miami Avenue interchange for existing and future year traffic conditions using Synchro and VISSIM and prepared the Interchange Modification Report (IMR).

Prepared Smart Work Zones (SWZ) plans in MicroStation consisting of Variable Speed Limits (VSL), Portable Changeable Message Signs (PCMS), CCTV/PTZ cameras following the guidelines of MUTCD and FDOT ITS design standards.

City of Miami | Traffic Impact Studies | Miami, Florida, US

Reviewed Traffic Impact Analysis studies provided by developers, checked methodology and calculations, and made comments/recommendations according to the guidelines and procedures outlined in the ITE Trip Generation manual.

Capital Metropolitan Transportation Authority | Blue Line Corridor – Project Connect Study | Austin, Texas, U.S.

Coded Railroad Preemption for Capital Metropolitan Transportation Authority's (CMTA) proposed Light Rail Transit (LRT) in Austin, Texas in VISSIM using RBC controllers.

Florida Department of Transportation (FDOT) – District 7 | Tampa Bay Next | Hillsborough County, Florida, U.S.

Worked on Tampa Bay Next Project (TB Next) for FDOT District-7. Prepared Methodology Letter of Understanding (MLOU), Systems Interchange Modification Report (SIMR), developed future year traffic volumes (AADTs/DDHVs), conducted traffic analysis/simulation using Synchro and CORSIM and prepared concept plans using MicroStation.

Conducted Intersection Control Evaluation (ICE) to evaluate most efficient, safe and economical intersection geometry for several intersections for the TB Next project including performing cost-benefit analysis and intersection analysis using ICE tools, Synchro and SIDRA Intersection.

Performed analysis at the intersection of I-4 and US-301 using Synchro, prepared concept plans using MicroStation, worked on traffic volume computations and prepared line diagrams for various sections of the Tampa Bay Next project.

Performed traffic volume computations for Noise Study at the SR 60 (Memorial Highway) and prepared spreadsheets to include DDHVs and traffic factors as part of Tampa Bay Next project.

Tampa Hillsborough Expressway Authority (THEA) | USDOT Connected Vehicle Pilot Deployment (CVPD) Program | Tampa, Florida, U.S.

Analyzed a network composed of Florida Avenue, Meridian Avenue and Twiggs Street in downtown Tampa, FL using VISSIM to evaluate the deployment of Connected Vehicles as part of USDOT Connected Vehicle Pilot Deployment (CVPD) Program. Built and calibrated VISSIM models for the

network consisting of three arterials/corridors, 25 signalized intersections (using Econolite ASC/3 Controllers) and transit routes (Bus and Railroad).

Florida Department of Transportation (FDOT) – District 3 | US 231 Project Development and Environment (PD&E) study | Hillsborough County, Florida, U.S.

Performed traffic analysis for US 231 Project Development and Environment (PD&E) for FDOT District-3; built and analyzed complex network in Synchro consisting of grade separated roundabouts and signalized intersections, and prepared traffic report.

Hillsborough County | Fowler Avenue/ N 53rd St Traffic Study | Hillsborough County, Florida, U.S.

Performed traffic composite study at the intersection of Fowler Avenue and North 53rd Street in Tampa, FL to evaluate a partial median opening closure using Synchro and recommended improvements.

Florida Department of Transportation (FDOT) – District 1 | Lakeland Area Alternative Analysis | Lakeland, Florida, U.S.

Analyzed Lakeland Area corridors in Polk County, FL for existing year traffic conditions using VISSIM to evaluate different improvement alternatives as part of Lakeland Area Alternative Analysis (LAAA) PD&E Study. The study included 5 roadway corridors and 12 signalized intersections.

Performed traffic forecasting model output comparisons using CUBE Voyager for different alternatives for the future year for Lakeland Area Alternative Analysis PD&E Study and summarized results using advanced excel formulae.

Hillsborough County | Districtwide Traffic and Safety study contract | Hillsborough County, Florida, U.S.

Conducted traffic analyses at signalized and un-signalized intersections in Hillsborough County, FL using Synchro to evaluate existing traffic issues including high left-turn delays and insufficient queue storage, suggested improvements and summarized results in Intersection Study Reports.

Performed intersection, pedestrian/bicycle facility improvement studies, crash analyses, lighting justifications, identified potential mid-block crossing locations and prepared concept plans for FDOT District-7 in District Wide Safety Studies contract.

Conducted traffic study at Madison Avenue in Hillsborough County, FL and used Synchro to evaluate existing and future year traffic conditions including queue storage issues and suggested recommendations to enhance operations and prepared traffic report.

Florida Department of Transportation (FDOT) – District 1 | I-75 IMR | Sarasota County, Florida, US

Analyzed I-75 at Fruitville Road Interchange in Sarasota County, FL for existing and future year traffic conditions using VISSIM to revise the proposed interchange design to Diverging Diamond Interchange (DDI) as part of PD&E re-evaluation and summarized efforts/findings in Interchange Modification Report (IMR).

Florida Department of Transportation (FDOT) – District 1 | Sarasota/Manatee Barrier Island Traffic Study | Sarasota and manatee Counties, Florida, US

Analyzed 14 signalized, stop-controlled and roundabout intersections in Manatee/Sarasota County Barrier Islands to improve traffic operations using SimTraffic and SIDRA Intersection as part of the Barrier Island Congestion Relief Study.

Florida Department of Transportation (FDOT) – District 7 | Pasadena Avenue Corridor Study | Pinellas County, Florida, US

Conducted traffic analysis of the intersections along Pasadena Avenue corridor in Pinellas County, FL to identify improvement needs, evaluated multi-modal solutions and contributed to the preparation of Existing Conditions Traffic Report.

Florida Department of Transportation (FDOT) – District 1 & 5 | Districtwide Traffic and Safety study contract | Pinellas County, Florida, US

Conducted Signal Warrant, Left-Turn delay and composite studies for FDOT District-1 and District-5, performed field reviews, crash analyses, qualitative/quantitative assessments, recommended improvements, developed cost estimates and prepared reports.

Florida Department of Transportation (FDOT) – District 7 | US 19 Corridor Safety study | Pasco County, Florida, US

Conducted corridor safety study at SR 55 (US 19) in Pasco County, FL, identified patterns in pedestrian/bicycle crashes, recommended enhancements along the corridor, developed cost estimates and concept plans for these recommendations.

APPENDIX B

Traffic Data

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 9:00:00

One Hour Peak
From: 7:15:00
To: 8:15:00

Municipality: Puslinch
Site #: 1822000001
Intersection: Concession 2 & Sideroad 20 S
TFR File #: 20
Count date: 27-Jun-18

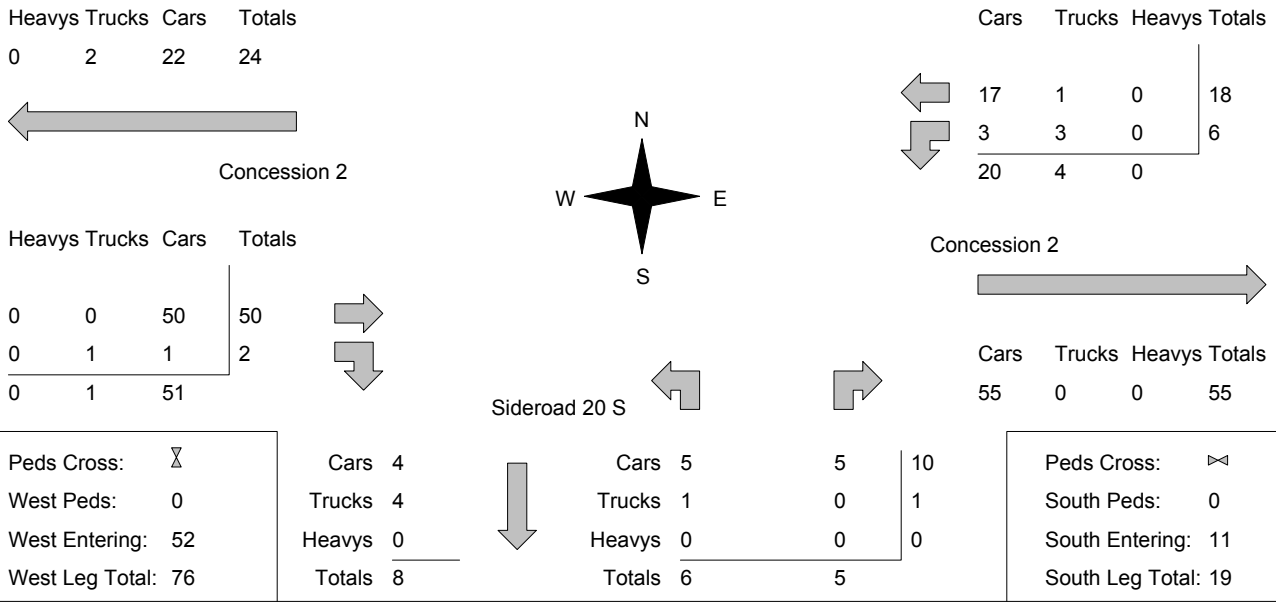
Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Concession 2 runs W/E

East Leg Total: 79
East Entering: 24
East Peds: 0
Peds Cross:



Peds Cross:
West Peds: 0
West Entering: 52
West Leg Total: 76

Cars 4
Trucks 4
Heavys 0
Totals 8

Cars 5 5 10
Trucks 1 0 1
Heavys 0 0 0
Totals 6 5

Peds Cross:
South Peds: 0
South Entering: 11
South Leg Total: 19

Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

Municipality: Puslinch
Site #: 1822000001
Intersection: Concession 2 & Sideroad 20 S
TFR File #: 20
Count date: 27-Jun-18

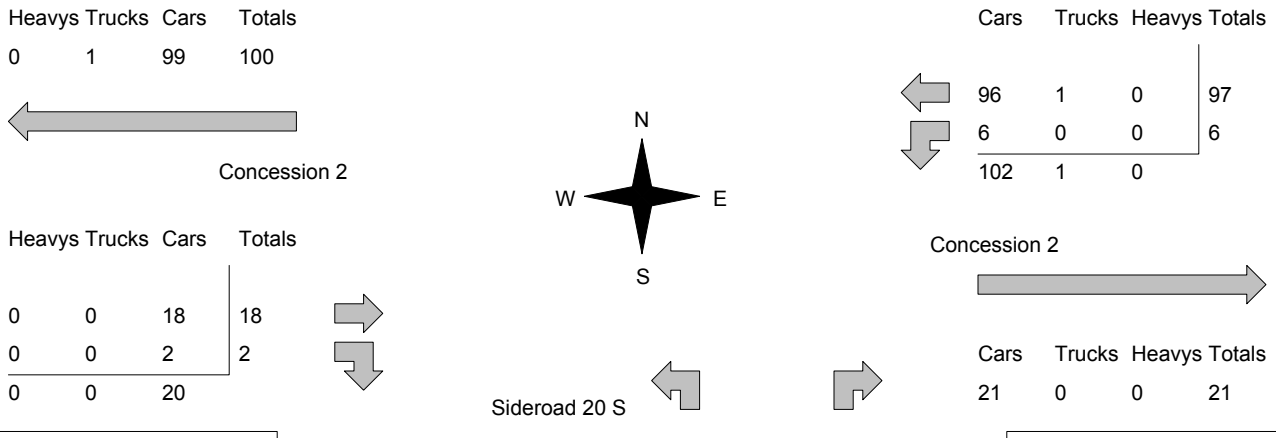
Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Concession 2 runs W/E

East Leg Total: 124
East Entering: 103
East Peds: 0
Peds Cross:



Peds Cross:
West Peds: 0
West Entering: 20
West Leg Total: 120

Peds Cross:
South Peds: 0
South Entering: 6
South Leg Total: 14

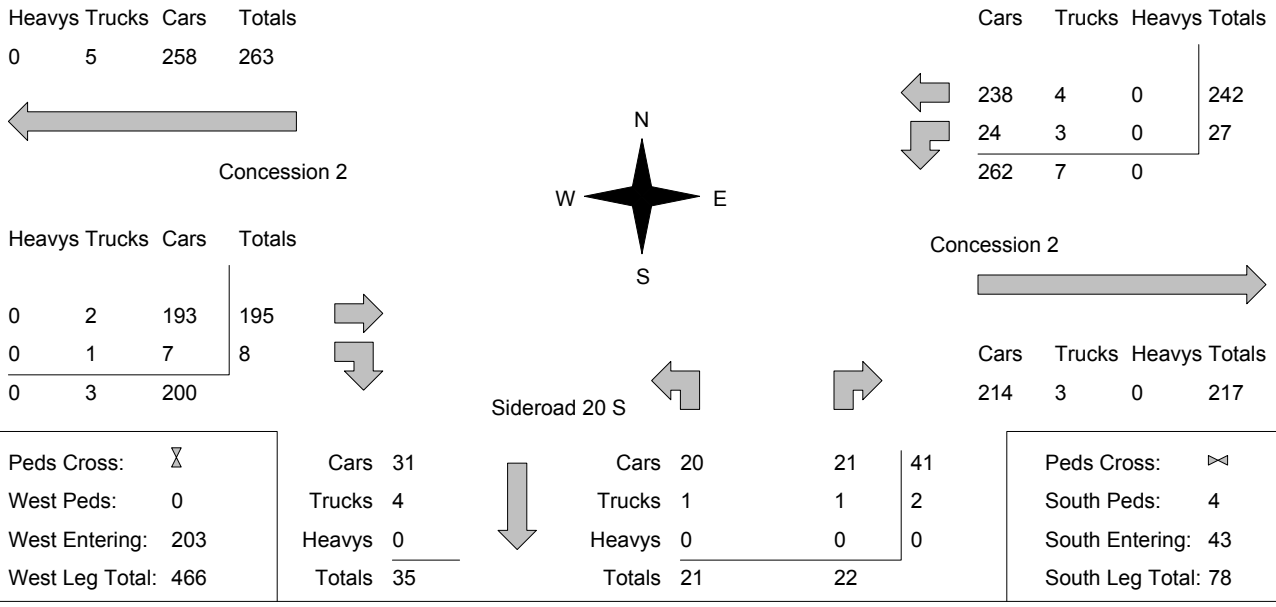
Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Puslinch	**Weather conditions:**
Site #: 1822000001	
Intersection: Concession 2 & Sideroad 20 S	**Person(s) who counted:**
TFR File #: 20	
Count date: 27-Jun-18	
**** Non-Signalized Intersection ****	**Major Road:** Concession 2 runs W/E

East Leg Total: 486
East Entering: 269
East Peds: 0
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 0
West Entering: 203
West Leg Total: 466

Peds Cross: ⋈
South Peds: 4
South Entering: 43
South Leg Total: 78

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: Concession 2 & Sideroad 20 S | **Count Date:** 27-Jun-18 | **Municipality:** Puslinch

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	0	0	0	0	0	5
8:00:00	0	0	0	0	0	6
9:00:00	0	0	0	0	0	17
16:00:00	0	0	0	0	0	0
17:00:00	0	0	0	0	0	4
18:00:00	0	0	0	0	1	4
19:00:00	0	0	0	0	0	7
Totals:	0	0	0	0	1	43

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	1	0	4	5	0
8:00:00	3	0	3	6	0
9:00:00	8	0	9	17	0
16:00:00	0	0	0	0	0
17:00:00	1	0	3	4	0
18:00:00	4	0	0	4	0
19:00:00	4	0	3	7	4
Totals:	21	0	22	43	4

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	0	9	0	9	0	71
8:00:00	5	22	0	27	0	78
9:00:00	3	14	0	17	0	50
16:00:00	0	0	0	0	0	0
17:00:00	3	82	0	85	0	100
18:00:00	8	80	0	88	0	109
19:00:00	8	35	0	43	0	64
Totals:	27	242	0	269	0	472

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	0	62	0	62	0
8:00:00	0	50	1	51	0
9:00:00	0	32	1	33	0
16:00:00	0	0	0	0	0
17:00:00	0	12	3	15	0
18:00:00	0	21	0	21	0
19:00:00	0	18	3	21	0
Totals:	0	195	8	203	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	6:00	7:00	8:00	9:00	16:00	17:00	18:00	19:00
Crossing Values:	0	1	3	8	0	1	4	4

Ontario Traffic Inc.

Count Date: 27-Jun-18 Site #: 1822000001

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
18:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
18:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
19:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
19:00:03	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Ontario Traffic Inc.

Count Date: 27-Jun-18 Site #: 1822000001

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Heavys - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	0	0	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	0	0	9	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	17	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	1	1	26	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	2	1	30	4	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	3	1	31	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	3	0	34	3	0	0	3	1	1	1	0	0	0	0	0	0	0	0	0	0
8:30:00	3	0	37	3	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
8:45:00	5	2	41	4	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
9:00:00	5	0	44	3	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
9:00:03	5	0	44	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
16:00:00	5	0	44	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
16:15:00	5	0	74	30	0	0	3	0	3	2	0	0	0	0	0	0	0	0	0	0
16:30:00	5	0	85	11	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
16:45:00	6	1	107	22	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
17:00:00	8	2	123	16	0	0	3	0	4	1	0	0	0	0	0	0	0	0	0	0
17:15:00	10	2	163	40	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
17:30:00	11	1	181	18	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
17:45:00	13	2	194	13	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
18:00:00	16	3	203	9	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
18:15:00	19	3	215	12	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
18:30:00	21	2	228	13	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
18:45:00	22	1	233	5	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
19:00:00	24	2	238	5	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
19:00:03	24	0	238	0	0	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0

Ontario Traffic Inc.

Count Date: 27-Jun-18 Site #: 1822000001

Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Heavys - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	1	1	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	1	0	0	0	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30:00	1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45:00	3	2	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00:00	4	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15:00	6	2	0	0	11	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0
8:30:00	8	2	0	0	14	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45:00	9	1	0	0	14	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00:00	11	2	0	0	15	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0
9:00:03	11	0	0	0	15	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
16:00:00	11	0	0	0	15	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
16:15:00	11	0	0	0	15	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
16:30:00	11	0	0	0	15	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
16:45:00	12	1	0	0	17	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0
17:00:00	12	0	0	0	18	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
17:15:00	13	1	0	0	18	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
17:30:00	14	1	0	0	18	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
17:45:00	16	2	0	0	18	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
18:00:00	16	0	0	0	18	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
18:15:00	16	0	0	0	18	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
18:30:00	16	0	0	0	19	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
18:45:00	17	1	0	0	21	2	1	0	0	0	1	0	0	0	0	0	0	0	3	3
19:00:00	20	3	0	0	21	0	1	0	0	0	1	0	0	0	0	0	0	0	4	1
19:00:03	20	0	0	0	21	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0

Ontario Traffic Inc.

Count Date: 27-Jun-18 Site #: 1822000001

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Heavys - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	0	0	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	0	0	23	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	0	0	45	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	0	0	62	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15:00	0	0	71	9	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
7:30:00	0	0	81	10	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7:45:00	0	0	99	18	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
8:00:00	0	0	111	12	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0
8:15:00	0	0	121	10	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0
8:30:00	0	0	127	6	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
8:45:00	0	0	136	9	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
9:00:00	0	0	142	6	1	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0
9:00:03	0	0	142	0	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:00:00	0	0	142	0	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:15:00	0	0	145	3	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:30:00	0	0	147	2	2	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:45:00	0	0	151	4	2	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
17:00:00	0	0	154	3	4	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0
17:15:00	0	0	161	7	4	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
17:30:00	0	0	165	4	4	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
17:45:00	0	0	173	8	4	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
18:00:00	0	0	175	2	4	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
18:15:00	0	0	180	5	6	2	0	0	2	0	1	0	0	0	0	0	0	0	0	0
18:30:00	0	0	184	4	6	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
18:45:00	0	0	188	4	7	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0
19:00:00	0	0	193	5	7	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
19:00:03	0	0	193	0	7	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0

APPENDIX C

Roads Management Plan

Prepared By:

in association with:

Township of Puslinch

Roads Management Plan

GMBP File: 121149

August 30, 2023

TOWNSHIP OF
PUSLINCH
EST 1850

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER |LONDON | HAMILTON | GTA
650 WOODLAWN RD. W., BLOCK C, UNIT 2, GUELPH ON N1K 1B8 P: 519-824-8150
WWW.GMBLUEPLAN.CA

TABLE OF CONTENTS

APPENDICES

REVISION HISTORY

Revision	Date	Description	Revised by
1	August 26, 2022	Draft Submission	RG, GC
2	October 7, 2022	Draft Submission	RG, GC
3	October 12, 2022	Final Submission	RG, GC
4	November 4, 2022	Revised Final Submission per Council Comments	RG, GC
5	August 8, 2023	Added Process for Requesting Conversion to Hard-surface Road (Section 4.9), revised Capital Program costs based on recent local tender pricing, added Public Engagement (Section 9)	RG, GC
6	August 30, 2023	Issued for Council Approval	RG, GC

The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

TOWNSHIP OF PUSLINCH

ROADS MANAGEMENT PLAN

GMBP FILE: 121149

AUGUST 30, 2023

1 INTRODUCTION AND APPROACH

1.1 INTRODUCTION

The Township of Puslinch (Township) retained GM BluePlan Engineering Limited (GMBP) to prepare a Roads Management Plan in response to a high-priority need identified by the Council of the Township of Puslinch. The purpose of this Plan is to:

- Allow the Township to appropriately plan and undertake maintenance on the Township's road network as well as to plan and prioritize the appropriate capital work.
- Establish criteria and steps to follow for responding to service requests or service upgrades relating to the Township's road network (e.g., paving, sidewalks, street lights, changes to speed limits).
- Identify road rehabilitation needs to assist the Township in developing a realistic annual capital budget to provide an adequate service level.
- Assist the Township in formalizing an ongoing road maintenance operation and to facilitate proactive planning for future operations, replacements, and upgrades.

This Plan has been developed into a single document consisting of current practices and proposed practices to fit the local conditions. It is intended to be used as a guidance document for Township staff for the purposes of maintaining and operating the Township's road network, budgeting for capital and maintenance expenditures for the Township's road network, and providing a mechanism to respond to concerns and requests from residents regarding the Township's road network.

1.2 SCOPE OF WORK

The scope of work associated with this assignment includes the following:

- Updating of the Township existing inventory and pertinent attributes that are key to the analysis and scope of this assignment.
- Pavement and gravel road condition assessments for the entire network.
- Recommendations for design standards for existing and proposed roads and a preliminary design checklist for new roads and rehabilitation road projects.
- Updated traffic counts for 28 mid-block locations and growth projections.
- Review of the existing services and updates based on the review of current best practices, amendments to the Minimum Maintenance Standards (MMS, O.Reg. 366/18) and Township-identified specific local requirements.
- Development of road capital rehabilitation needs including timing, improvement type and costs.
- Development of recommendations for traffic calming, speed control and truck routes.

1.3 TOWNSHIP ROAD CHARACTERISATION

Township roads are classified as "Local Roads", in that they are a road intended to provide access to development only (e.g., residents, businesses, etc.). It is understood that the Township's road network is occasionally used for agricultural vehicles and modes of active transportation (walking, cycling, etc.); however, the Township's road network does not have dedicated facilities for these types of users within the available road platform.

The Township of Puslinch is uniquely situated between three major urban centres (City of Guelph, City of Cambridge and City of Hamilton) as well as in close proximity to Greater Toronto Area centres. There are two major Provincial highways that bisect the Township both north-south and east-west (Highways 6 and 401, respectively), as well as major County-level roads. Under specific circumstances (e.g., major closures or traffic incidents), Township roads can become temporarily congested and overwhelmed with traffic from these major routes. Township roads are neither designed nor intended to accommodate intermittent and unpredictable major traffic events and, therefore, it is not the intention of the Township to expand their existing road network's capacity and facilities to accommodate these temporary conditions.

1.4 POLICY, REGULATIONS, AND STANDARDS

All recommendations put forward in this report are based on review and input from the following policies, regulations, standards and guidelines.

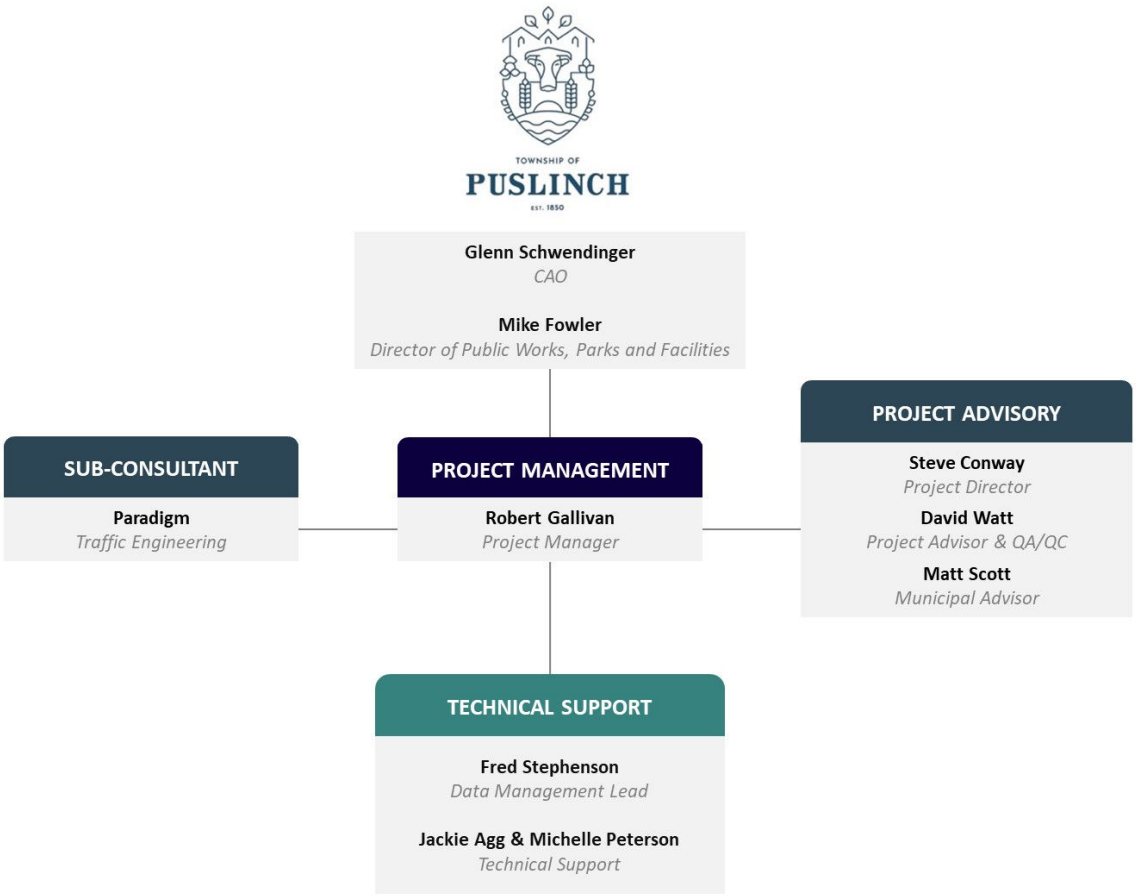
- Accessibility for Ontarians with Disabilities Act, 2005, S.O. 2005, c. 11
- City of Hamilton, *City of Hamilton Truck Route Master Plan Study* (2010)
- Highway Traffic Act, R.S.O. 1990, c. H.8
- Institute of Transportation Engineers, *Subcommittee of Traffic Calming* (1997)
- Institute of Transportation Engineers, *Trip Generation Manual* (2021)
- Ministry of Transportation of Ontario, *Freight Supportive Guidelines* (2016)
- Ministry Transportation of Ontario (MTO), *Inventory Manual* (1991)
- Ministry of Transportation of Ontario, *SP 022 Manual for Condition Rating of Flexible Pavement Rating – Guidelines for Municipalities* (1989)
- Ministry of Transportation of Ontario, *SP 024 Manual for Condition Rating of Flexible Pavements* (2016)
- Ministry of Transportation of Ontario, *SP 025 Manual for Condition Rating of Gravel Surface Roads* (1989)
- Ministry of Transportation of Ontario, *Ontario Structure Inspection Manual* (2018)
- Ministry of Transportation of Ontario, *Ontario Traffic Manual Book 5: Regulatory Signs* (2021)
- O. Reg 239/02. & O. Reg. 366/18: *Minimum Maintenance Standards for Municipal Highways*
- O.Reg. 586/06: *Local Improvement Charges – Priority Lien Status*
- Ontario Provincial Standard Drawings (OPSD)
- Ontario Provincial Standard Specifications (OPSS)
- Ontario Trucking Association, *Local Truck Routes: A Guide for Municipal Officials* (2011)
- Township of Puslinch, *Municipal Development Standards* (2019) available at: https://puslinch.ca/doing-business/planning-and-development/
- Transportation Association of Canada, *Canadian Guidelines for Establishing Posted Speed Limits* (2009)
- Transportation Association of Canada, *Canadian Guide to Traffic Calming* (2016)
- Transportation Association of Canada (TAC), *Geometric Design Guide for Canadian Roads* (2017)
- Wellington County, *Official Plan* (1999)

2 PROJECT TEAM

Sections 1-7 of this Plan were authored by GMBP. Section 8 of this Plan was authored by Paradigm Transportation Solutions Limited (Paradigm). Section 9 of this plan was authored jointly by GMBP and Paradigm.

Refer to **Figure 1** for the multidisciplinary project team that provided input during the preparation of this Plan to the Township of Puslinch

Figure 1: Roads Management Plan Project Team



3 ROAD CONDITION ASSESSMENT

3.1 ROAD NETWORK INVENTORY

This study inventoried and assessed a total of 179.1 km of roadway within the Township. No considerations or allowances were made for 4.0 km of boundary roads. Prior to undertaking this assessment, the Township database inventory and pertinent attributes related to this assignment was updated to reflect current conditions. Note that centreline km differ from lane km (e.g., a typical Township road that is 1 centreline km long has 2 lane km of road).

The road network is comprised of hot mix asphalt and gravel road surfaces. Refer to **Table 1** for the distribution of surface type within the Township's road network.

Table 1: Assessed Road Network Surface Type Distribution

Surface Type	Centreline Kilometres	Percentage of Network
Asphalt	128.0	71.5%
Gravel	51.1	28.5%

The Township's road network is mostly rural in nature with sparse urbanized centres and residential neighbourhoods. These "Roadside Environments" are divided into three classes, Rural, Semi-Urban, and Urban. Rural Environment means roads that generally abut agricultural lands or open spaces such as forests, have relatively high posted speed limits and infrequent entrances, and typically have open drainage conveyance. Semi-Urban roads are those which are adjacent to or inside of built-up areas (residential or commercial development), but do not include curb & gutter or storm sewers. Urban Environment refers to roadways that are in an urban or built-up area, generally have low to moderate posted speeds and frequent entrances, may have features such as sidewalks and on-street parking, and generally include curb & gutter and storm sewers for conveying drainage. Refer to **Table 2** for the distribution of roadside environment within the Township's road network.

Table 2: Road Network Roadside Environment Distribution

Roadside Environment	Centreline Kilometres	Percentage of Network
Rural	164.2	91.7%
Semi-Urban	8.8	4.9%
Urban	6.0	3.4%

The Township's asphalt road network is comprised of both single-lift and double-lift asphalt wearing surfaces. Refer to **Appendix A** for a summary of the Township's road network inventory as well as road sections that are assumed to be double-lift roads for the purposes of this Plan.

3.2 CONDITION EVALUATION

In April 2022, the condition of all Township roads was assessed by GMBP. The condition assessments were conducted in accordance with the procedures outlined in the following guidelines for evaluating the condition of municipal roadways:

- *SP 022 Manual for Condition Rating of Flexible Pavement Rating – Guidelines for Municipalities* for paved urban/residential roadways
- *SP 024 Manual for Condition Rating of Flexible Pavements* for paved rural/semi-urban roads
- *SP 025 Manual for Condition Rating of Gravel Surface Roads* for gravel roads

3.2.1 Distress Manifestation Index

Regardless of the road surface material or roadside environment, the condition evaluations are based on the type, severity ("how bad is it") and density ("how much is there") of specific pavement or gravel distresses.

A Distress Manifestation Index (DMI) is computed based on these parameters and represents the overall effect that each observed distress has on the condition of the roadway. The DMI is a 0-10 scale index whereby the higher the DMI number, the better the surface condition of the road. To compute the DMI, each distress was assigned a weighting factor based on the relative importance of the distress type and its impact on the potential deterioration of the roadway.

Refer to **Table 3** for a summary of the distresses for asphalt and gravel road surface types. Weight factors used in calculating the DMI are provided in parentheses after each distress.

Table 3: Pavement Distresses (and Weight Factors)

SP 022 Distresses (Urban/Residential Asphalt)	SP 024 Distresses (Rural/Semi Urban Asphalt)	SP 025 Distresses (Gravel)
Raveling (3.0)	Raveling (3.0)	Loose Gravel (3.0)
Flushing (1.5)	Flushing (1.5)	Dust (2.0)
Potholes (3.0)	Rippling and Shoving (1.0)	Potholes (1.0)
Pavement Edge Breaks (3.0)	Wheel Track Rutting (3.0)	Breakup (1.0)
Rippling and Shoving (1.0)	Distortion (3.0)	Washboard (1.0)
Wheel Track Rutting (3.0)	Longitudinal Wheel-track – Single or Multiple (1.5)	Rutting (1.0)
Distortion (3.0)	Longitudinal Wheel-track – Alligator (3.0)	Flat/Reverse Crown (3.0)
Patching/U-Cuts (1.0)	Centerline Cracking – Single or Multiple (0.5)	Distortion (2.0)
Longitudinal Cracking (1.0)	Centerline Cracking – Alligator (2.0)	
Transverse Cracking (1.0)	Pavement Edge – Single or Multiple (0.5)	
Pavement Edge Cracking (3.0)	Pavement Edge – Alligator (1.5)	
Map Cracking (1.0)	Transverse Cracking – Half, Full or Multiple (1.0)	
Alligator Cracking (3.0)	Transverse Cracking – Alligator Cracking (3.0)	
	Linear Meander or Mid-lane Cracking (1.0)	
	Random/Map Cracking (0.5)	

For asphalt roadways, distress severity and extent limits used in calculating the DMI are summarized in **Table 4**, as taken from SP 022 and SP 024.

Table 4: SP 022 and SP 024 Asphalt Distress Severity and Extent Limits

Rating	Severity	Extent (% Surface Area)	Rating
1	Very Slight	0 to 10	Occasional
2	Slight	10 to 20	Intermittent
3	Moderate	20 to 50	Frequent
4	Severe	50 to 80	Extensive
5	Very Severe	>80	Throughout

For gravel roadways, distress severity and extent limits used in calculating the DMI are summarized in **Table 5**.

Table 5: SP 025 Gravel Distress Severity and Extent Limits

Rating	Severity	Extent (% Surface Area)	Rating
1	Slight	0 to 20	Intermittent
2	Moderate	20 to 50	Frequent
3	Severe	50 to 100	Extensive

Using the above tables, the DMI is calculated based on the following formulas:

SP 022 (Urban/Semi-urban, asphalt): $DMI = 10 \times \left[153 - \sum \frac{W_i \times (S_i + D_i)}{153}\right]$

SP 024 (Rural, asphalt): $DMI = 10 \times \left[208 - \sum \frac{W_i \times (S_i + D_i)}{208}\right]$

SP 025 (All gravel roads): $DMI = 10 \times \left[96 - \sum \frac{W_i \times (S_i + D_i)}{96}\right]$

Where $\mathbf{W_i}$ is the weighting an individual distress, $\mathbf{S_i}$ is the severity the same distress, and $\mathbf{D_i}$ is the density of the same distress.

3.2.2 Ride Condition Rating

A Ride Condition Rating (RCR) was assigned to each road section based on the criteria summarized in **Table 6**, which are generally consistent across all guideline documents.

Table 6: RCR Criteria

RCR	Description	Criteria
8 – 10	Excellent	Very Smooth
6 – 8	Good	Smooth with a few bumps and depressions
4 – 6	Fair	Comfortable with intermittent bumps or depressions
2 – 4	Poor	Uncomfortable with frequent bumps or depressions. Unable to maintain speed at lower end of the scale
0 – 2	Very Poor	Very uncomfortable with constant jarring bumps or depressions. Unable to maintain posted speed and need to steer constantly to avoid bumps and depressions

For all roads surface types, the inspector assigned the RCR score based on their perception of the rideability of the road, which is generally accepted within the industry to be a subjective component of the rating process.

3.2.3 Pavement Condition Index

An overall Pavement Condition Index (PCI) was established for each road section by combining the DMI scores and RCR scores. The PCI formula is derived from MTO's "PAV-86-02 Pavement Condition Index (PCI) for Flexible Pavements" (1992). The PCI ranges from 0-100, where the lower the PCI score the worse overall condition of the roadway.

The following formulas were used based on the roadway surface type:

Asphalt: $PCI = 13.75 + (9 \times DMI) - \left(\frac{7.5 \times e^{[8.5 - RCR]}}{3.02}\right)$

Gravel: $PCI = 12.75 + (9 \times DMI) - \left(\frac{5.5 \times e^{[9.94 - RCR]}}{3.46}\right)$

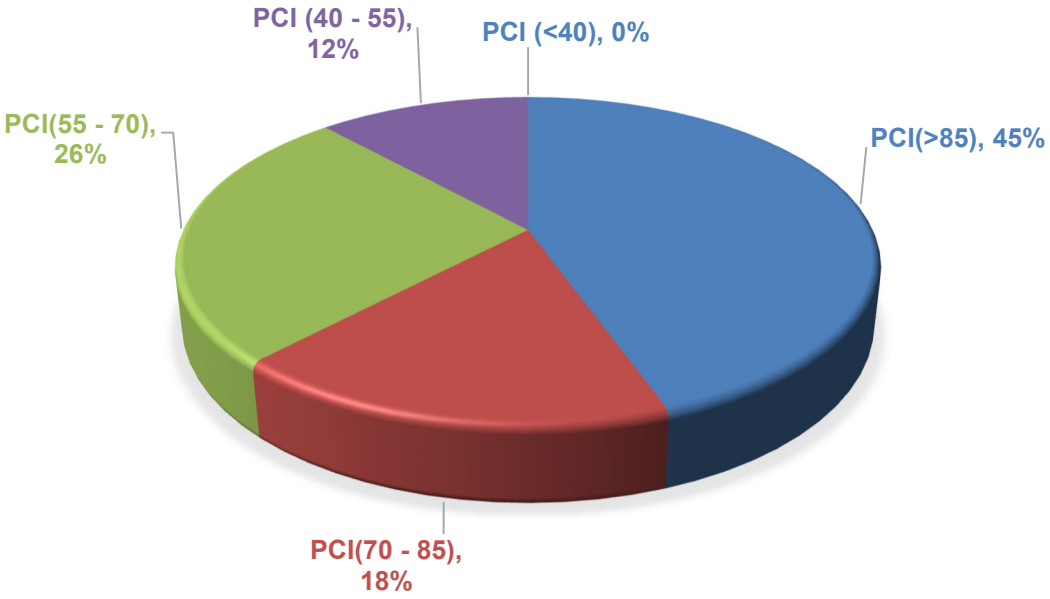
Where **DMI** is the Distress Manifestation index and **RCR** is the Ride Condition Rating.

Using the above PCI rating criteria and calculation methods, the Township's paved road network **average PCI** was determined to be approximately **77.3,** weighted by centerline length of road. Refer to **Table 7** and **Figure 2** for a summary of the distribution of roadway condition across the Township's paved road network. A map of the Township's asphalt road PCI ratings is provided in **Appendix A.**

Table 7: Paved Road Network PCI Distribution (April 2022)

Condition	PCI	Centerline Kilometres	% Paved Road Network
Very Good	>85	57.00	45%
Good	70-85	22.45	18%
Fair	55-70	33.51	26%
Poor	40 - 55	15.01	12%
Very Poor	< 40	0.0	0.0
	Total	127.97	

Figure 2: Paved Road Network PCI Distribution (April 2022)



The average PCI for the Township's gravel road network was determined to be approximately 65.0, weighted by centerline length of road. Refer to **Table 8** for a summary of the distribution of roadway condition across the Township's gravel road network. A map of the Township's gravel road PCI ratings is provided in **Appendix A.**

Table 8: Gravel Road Network PCI Distribution (April 2022)

Condition	PCI	Centerline Kilometres	% Gravel Road Network
Good	>75	14.18	28%
Fair	50-75	27.97	55%
Poor	<50	8.91	17%
	Total	**51.06**	

At the time of the inspection approximately 14.2 km or 28% of the gravel road network was considered in good condition with approximately 8.9 km or 17% of the network was considered in poor condition.

Refer to **Table 9** for gravel road sections with a PCI < 50, indicating that the road sections were assessed to be in Poor condition at the time of the inspection in April 2022, which may indicate recurring spring thaw issues in these areas or other problematic drainage or road base/subbase issues.

Table 9: Gravel Road Sections with PCI < 50 (April 2022)

Asset ID	Road Name	From Road	To Road	Length (km)	PCI
64	Maltby Road East	Concession 11	Nassagaweya-Puslinch Townline	0.31	22.0
114	Concession 7	Calfass Road	Concession 2A	1.62	35.7
43	Sideroad 17	Nassagaweya-Puslinch Townline	Concession 11	0.38	39.6
112	Sideroad 25 North	Concession 7	End	0.57	42.9
105	Sideroad 20 South	Concession 1	Concession 2	2.09	45.1
64	Maltby Road East	Watson Road South	Concession 11	2.07	46.0
91	Sideroad 10 South	Gore Road	Concession 1	1.88	46.0
			Total	**8.92**	

It must be noted that the gravel road condition assessments were done just after spring thaw and during gravel road grading operations. As a result, these findings may not be representative of the Township's gravel roads throughout the year. Condition ratings completed at different times of the year can greatly vary. It is generally accepted that gravel road conditions after the spring thaw would be markedly improved, with the possible exception of known issues of subbase and drainage deficiencies.

For comparison purposes, a small subset of gravel roads with low PCI scores in the spring was undertaken in September of 2022. As can be seen in **Table 10**, the PCI of these gravel roads improved significantly due to completion of spring and summer maintenance activities.

Table 10: Gravel Road Sections PCI Comparison (September 2022)

Asset ID	Road Name	From Road	To Road	PCI (April 2022)	PCI (Sept 2022)
64	Maltby Road East	Concession 11	Nassagaweya-Puslinch Townline	22.0	80.1
64	Maltby Road East	Watson Road South	Concession 11	46.0	76.9
95	Sideroad 10 North	County Road 34	Concession 4	56.6	80.7
43	Sideroad 17	Nassagaweya-Puslinch Townline	Concession 11	39.6	80.1
105	Sideroad 20 South	Concession 1	Concession 2	45.1	75.9
112	Sideroad 25 North	Concession 7	End	42.9	84.0

4 ROAD DESIGN STANDARDS

4.1 BACKGROUND INFORMATION

The Township maintains an inventory of urban and rural roads for residential, commercial, industrial and agricultural use. These roads are generally either asphalt or gravel, though we understand that some boundary roads have a bituminous surface treatment ("tar-and-chip") wearing surface, but these roads are typically maintained by the adjacent municipality with the Township only providing financial contributions.

Since 2011, GMBP has assisted the Township in executing their annual asphalt program, mainly with preparing bidding documents and administering construction. The program laid out by the Township has typically included the following scope of work:

- Small-diameter culvert replacements (typically 900 mm diameter or less)
- Pulverizing the existing road surface, or removal of the road surface where an increase in road elevation cannot be accommodated
- Re-grading the pulverized/gravel surface to provide a minimum 2% cross-fall
- For rural and urban residential roads that do not require truck traffic considerations:
    - Single lift of HL 4 Surface Course asphalt at a thickness of approximately 50 mm for a paved width of 7 m (3.5 m wide lanes)
    - Minimum 0.5 m wide granular shoulders (thickness to match asphalt thickness)
- For rural and urban roads that require truck traffic considerations:
    - Single lift of HL 8 Binder Course asphalt at a thickness of approximately 50 mm and single lift of HL 4 Surface Course asphalt at a thickness of approximately 50 mm for a paved width of 7 m to 8.5 m (3.5 m to 4.25 m wide lanes), depending on available platform
    - Minimum 0.5 m wide granular shoulders (thickness to match asphalt thickness), with preference given to shoulders at least 1.0 m wide on busier truck routes

The following additional improvements have been applied on a case-by-case basis where budget permits:

- Rip-rap ditching along steep slopes susceptible to erosion
- Paved shoulders on steep slopes
- Concrete curb and gutter around curves on steep slopes
- Paved shoulders on inside radii of curves
- Increased asphalt depth to minimum 60 mm thickness (single lift asphalt roads)

Through the Roads Management Plan, the Township has requested that standards be developed for existing and proposed roads, preliminary design checklists be developed for existing and proposed roads, and discussion of various re-surfacing methods be evaluated to develop a road management strategy for gravel roads.

4.2 DESIGN STANDARDS FOR PROPOSED ROADS

Proposed (new) roads are generally anticipated to be required as part of a new development, and therefore, would be expected to be designed by the developer's engineer and reviewed by the Township. Design of these roads shall follow the recommendations contained within the Township's *Municipal Development Standards*, Section 3.0 Roads.

These standards reference Ontario Provincial Standard Specifications (OPSS), Ontario Provincial Standard Drawings (OPSD), and the *Geometric Design Guide for Canadian Roads*.

For new roads that are designed by the Township, design shall follow the Township's *Municipal Development Standards*.

4.3 DESIGN STANDARDS FOR EXISTING ROADS

It is our experience that existing road networks often cannot meet the requirements of development standards for proposed (new) roads, as they were constructed during time periods when their use was much different than current demands. Therefore, following the Township's *Municipal Development Standards* may not be practical when assessing capital needs for the existing road network.

We do not believe that the Township has specific standards for its existing road network, and we don't believe that many local municipalities have their own standards. We estimate that most adjacent municipalities rely heavily on the *Inventory Manual*, OPSS, OPSD and the *Geometric Design Guide for Canadian Roads*, and recommend a similar approach for the Township.

Before completing capital works on existing roads, specific locations with known issues should be investigated through additional engineering review (e.g., topographic survey, geotechnical investigation). Issues that may trigger review would include, but not be limited to, the following:

- Premature failure of wearing surface (extensive cracking, rutting, etc.)
- Sight line issues at driveways/intersections
- History of accidents or collisions
- Change in road use due to development or change in public driving habits or increased traffic volumes
- Drainage concerns

We estimate that applying the Township's Typical Rural Cross-Section (STD-102) of the *Municipal Development Standards* will not be possible on the majority of the Township's existing road network due to factors such as inadequate Right-of-Way width, existing topography and budget. Therefore, we suggest that the Township consult road cross-section geometry as provided in the *Inventory Manual* for the following:

- Surface width following Table 85R for Rural Sections or Table 93R for Minimum Tolerable Surface Width for Rural Sections
- Shoulder width following Table 84R for Rural Sections
- Road Classifications per Item 33 for Rural Sections
- Road Design Standards per Table F-1 for Rural Roads

Excerpts from the *Inventory Manual* are attached to this Plan in **Appendix B**. We recognize that the *Inventory Manual* is a relatively dated publication; however, it is still generally accepted as one of the prevailing guidance documents for geometric road criteria for Ontario municipalities.

The majority of the Township's Roads are estimated to fall between a Road Class of 100 to 500 as defined by the *Inventory Manual*. The minimum acceptable dimensions for a road platform and road construction within the manual for these road classes would be:

- 5.0 m to 6.0 m road surface width (3.0 m lanes)
- 0.5 m to 2.5 m wide shoulders
- Overall platform width of 6.0 m to 8.5 m
- Road construction:
- Gravel surface for roads up to Class 200, double surface treatment for roads up to Class 300, 50 mm hot mix asphalt for roads up to Class 500
- 150 mm Granular 'A'
- 300 mm Granular 'B' for roads up to Class 300, 450 mm Granular 'B' for roads up to Class 500

Refer to **Appendix C** for a cross-section adapted from the Township's *Municipal Development Standards* for paving of existing roads. This is a suggested starting point to use when reviewing existing roads for resurfacing and reconstruction needs.

While the practice of surfacing a road with a single lift of asphalt at 50 mm depth is supported in the *Inventory Manual*, our opinion is that this is the minimum thickness that asphalt should be applied at for a single lift road. Issues have been observed when the specified thickness of 50 mm is not achieved in isolated sections due to construction tolerances, causing premature failure of these areas. For example, prior to paving a road the existing granular base is to be graded, typically to *Ontario Provincial Standards*. Ontario Provincial Standard – Municipal 314 allows for tolerances of up to 30 mm in finished granular courses from specified grade. To mitigate risks of paving at thicknesses below 50 mm, we have had success in the past of specifying a thickness of 60 mm for single lift roads.

4.4 ROAD SURFACING TYPES

4.4.1 Gravel Road Resurfacing

Fresh gravel is typically applied to gravel roads every 2-3 years to maintain performance of the road. In our research and discussion with other industry professionals, gravel is recommended to be added to the roads at a minimum thickness of three times the largest aggregate size (Granular 'M' has 19 mm aggregate x 3 = 57 mm), though a ratio of 3.5 – 4.0 times the largest aggregate size is ideal.

For a 1 km section of road with a platform width of 8.0 m, applying Granular 'M' at a minimum thickness of 57 mm is estimated to cost approximately $15,000-$20,000 + HST. This cost accounts for supply of the granular material and grading time by Township staff to grade and compact the supplied material to the appropriate cross-fall. This does not account for any associated improvements such as ditching, road widening, culvert replacements, subbase improvements, etc., nor does it account for any engineering or construction administration. Costs are based on 2022 pricing.

Note that a platform width of 8.0 m was assumed for this analysis to be consistent with other non-truck route surfacing options. To our knowledge, the majority of the Township's gravel roads have an estimated platform width of 6.0 – 7.0 m.

Additional Granular 'M' would need to be added to the road surface every 2-3 years in perpetuity. The Township currently places Granular 'M' on its roads every two years at an estimate thickness of approximately 25-50 mm (based on budget and the length of the Township's gravel road network). If the thickness were increased to the recommended 3.5-4.0 times the largest aggregate size, we believe it may be possible to increase the frequency of additional granular material to every three years.

We understand that the Township switched from Granular 'A' to Granular 'M' in approximately 2019, and has subjectively noted an improvement in the consistency of material and performance of its gravel roads.

The Township's 2022 budget for resurfacing half of its gravel road network was approximately $80,000.

4.4.2 Surface Treatment

The process of surface treating roads is an iterative process. The general methodology for hard-surfacing and maintaining a surface treated road is as follows:

- When first surface treating a road, a double-lift of surface treatment is applied to the granular base.
- In the year immediately following the first double-lift application, a single-lift of surface treatment is applied.

- Every 5-7 years following the third application layer, asphalt padding is used to mitigate wheel-track rutting and potholes prior to another single-lift of surface treatment being applied.
- After each application, sweeping of loose stones and cleaning stones from ditches is often required.

Due to the thin application of surface treatment lifts, shouldering is not completed. Instead, the surface treatment is generally extended to the top of the road platform.

For a 1 km section of road with a platform width of 8.0 m, applying the double lift of surface treatment in year 1 would cost approximately $85,000-$90,000 + HST. A single lift of surface treatment in year 2 would cost approximately $45,000-$50,000 + HST. At year 8, asphalt padding and another single lift of surface treatment would be applied at a cost of approximately $55,000-$60,000 + HST. As the Township does not have any previous surface treatment pricing, so estimates in this section have been based on tenders in adjacent municipalities between 2019 and 2022.

Note that a platform width of 8.0 m was assumed for this analysis to be consistent with other non-truck route surfacing options.

These costs account for pulverizing, grading and compacting the existing road base in year 1 as well as the application of small amounts of Granular 'A' for grading purposes to allow the road to receive the initial double lift of surface treatment. We do not believe it is typical practice in other municipalities to pulverize the existing road, especially when the existing road is a gravel road; however, in discussion with Township staff and to be consistent with asphalt surfacing options, a pulverizing item has been considered.

These costs do not account for any associated improvements such as ditching, road widening, culvert replacements, subbase improvements, etc., nor do they account for any engineering or construction administration.

We note that requirement for regular additional lifts of surface treatment needs to be considered as part of any lifecycle costing, and not just the initial investment.

4.4.3 Asphalt Wearing Surface (No Truck Traffic Considerations)

We believe the typical practice for paving typical rural asphalt roads without special consideration for truck traffic would include pulverizing the existing road surface, applying amounts of Granular 'A' to assist with grading and provide minor profile / cross-fall corrections, paving the asphalt wearing surface to the desired width and thickness, then completing shouldering.

A 1 km section of road with a paved width of 7.0 m and 0.5 m wide shoulders, providing a 50 mm thick HL 4 Surface Course (current Township practice) is estimated to cost approximately $110,000-$115,000 + HST.

For comparison purposes only, a 1 km section of road with a paved width of 7.0 m and 0.5 m wide shoulders, providing a 60 mm thick HL 8 Binder Course and 35 mm thick HL 3 Surface Course (asphalt thickness matching the Township's *Municipal Development Standards*) is estimated to cost approximately $170,000-$175,000 + HST.

Also for comparison purposes only, increasing the thickness of a single lift road from 50 mm to 60 mm is estimated to increase the overall cost of a 1 km section of road with a paved width of 7.0 m and 0.5 m wide shoulders by approximately $7,000 + HST.

These costs do not account for any associated improvements such as ditching, road widening, culvert replacements, subbase improvements, etc., nor do they account for any engineering or construction administration. Costs are based on 2022 pricing.

Historically, the Township's single lift asphalt roads have had a service life between 15-20 years, depending on quality of subbase materials. Typically, opportunities have been minimal for the Township to complete additional capital investments to extend the service life of the roads (e.g., crack sealing, overlays, slurry seal, etc.) as the failure mechanisms tend to be "bottom-up" resulting from inadequate drainage and inadequate subbase strength.

We anticipate that increasing the asphalt thickness to 95 mm would provide greater opportunities for maintenance activities to be utilized for extending the service life of its asphalt road network. However, geotechnical investigations should be completed as part of the design process to confirm recommended asphalt thicknesses.

4.4.4 Asphalt Wearing Surface (Truck Traffic Considerations)

We believe the typical practice for paving typical rural and industrial roads that have significant truck traffic roads would be similar to that for asphalt roads without considerations for truck traffic, but the platform width would be increased as well as the asphalt and granular thicknesses. In our opinion, truck traffic considerations need to be made with the percentage of truck traffic is more than 10% of the total traffic volume.

A 1 km section of road with a paved width of 7.5 m and 1.0 m wide shoulders, providing a 50 mm thick HL 8 Binder Course and 50 mm thick HL 4 Surface Course (current Township practice) is estimated to cost approximately $200,000-$205,000 + HST.

For comparison purposes only, a 1 km section of road with a paved width of 7.5 m and 1.0 m wide shoulders, providing a 60 mm thick HL 8 Binder Course and 50 mm thick HL 4 Surface Course (asphalt thickness matching the Township's *Municipal Development Standards*) is estimated to cost approximately $220,000-$225,000 + HST.

These costs do not account for any associated improvements such as ditching, road widening, culvert replacements, subbase improvements, etc., nor do they account for any engineering or construction administration. Costs are based on 2022 pricing.

We anticipate that double lift roads would be able to provide a service life between 15-20 years if left un-maintained, depending on quality of subbase materials; however, this would be anticipated to allow for maintenance activities such as crack sealing, overlays, and slurry seals to prolong the service life to beyond 20 years, if they were appropriately timed and proper drainage and subbase materials were present.

4.4.5 Summary of Road Surfacing Types

Provided below in **Table 11** is a summary of the road surfacing types discussed, as well as their suggested implementation triggers as outlined in the *Inventory Manual*.

Table 11: Road Surfacing Types Summary

Surface	Initial Capital Investment (per km)*	Anticipated Future Capital Investments	Suggested Implementation Triggers
Gravel	$15,000-$20,000	$15,000-$20,000 every 2-3 years	• Dead end roads • <200 AADT • No truck traffic
Surface Treatment	$130,000-$140,000 (years 1 & 2)	$55,000-$60,000 every 7 years	• >200 & <400 AADT • No truck traffic
Asphalt Road (No Truck Traffic Considerations)	$110,000-$175,000**	$5,000-$10,000 for crack sealing or other maintenance activities, every 5-10 years	• >200 AADT • Minimal truck traffic

Surface	Initial Capital Investment (per km)*	Anticipated Future Capital Investments	Suggested Implementation Triggers
Asphalt Road (Truck Traffic Considerations)	$200,000-$225,000**	$5,000-$10,000 for crack sealing or other maintenance activities, every 5-10 years	• Where significant heavy truck traffic is permitted

*Costs normalized to a minimum 8 m wide platform for comparison purposes.

**Ranges in cost reflect differences between current Township practices and those identified in the Township's *Municipal Development Standards* for applied asphalt thickness.

Refer to **Appendix D** for breakdowns of estimated costs presented in this table.

For all road surfacing options, it is important to distinguish that all roads, regardless of wearing surface, require adequate consideration for drainage and subbase strength. These considerations are not specifically dealt with in this section, as they are needs for any road surfacing option.

Cost estimates provided in this section are based on construction costs only (2022 pricing) for the **surfacing works only.** The cost estimates do not include drainage / subbase improvements, engineering, contingencies, permit approval fees, utility relocations, property acquisitions, etc., and **should not be used for budgetary purposes** without further considerations for all project-related costs. **These values do not correspond with the budgetary values presented in Section 7 of this Plan.**

4.5 ROAD IMPROVEMENT TYPES (INVENTORY MANUAL)

Improvement types that would be applicable to the Township's road network are described in the *Inventory Manual*, and summarized below:

- **Basic Resurfacing (code R1 or R2):** hot mix asphalt padding, addition of single or double lift hot mix asphalt, addition of granular material to raise shoulders to new edge of pavement.
- This option would generally be considered an "asphalt overlay".
- To be applicable, the existing asphalt surface would need to be generally in good condition with minimal rutting and cracking as well as adequate subbase construction and drainage.
- We believe this option would be most-applicable when there is a change in use or public driving habits on a section of road.
- **Pulverizing and Resurfacing (code PR1 or PR2):** pulverize existing road surface, addition of single or double lift hot mix asphalt, addition of granular material to raise shoulders to new edge of pavement.
- To be applicable, the existing road surface would need to have adequate subbase construction and drainage.
- This is the option that the Township generally employs on all its roads, with the application of additional Granular 'A' before paving to assist with grading, add material to the road base, and complete minor profile / crossfall adjustments.
- **Base and Surface (BS):** place granular base and surface material, minimal shouldering widening and ditching, addition of surface gravel / surface treatment / hot mix asphalt (depending on road class).
- To be applicable, the existing road surface would need to have adequate subbase construction and drainage.
- This describes the Township's maintenance of gravel roads, and preparation of existing asphalt roads that have been pulverized and will be re-paved.

The Township's practice of pulverizing and placing a minimum of 50 mm asphalt wearing surface is supported within the *Inventory Manual* as an acceptable asphalt thickness for roads with an Annual Average Daily Traffic (AADT) up to 1,999 vehicles (PR1 or PR2 above, supplemented with BS), notwithstanding road base, subbase and drainage conditions. Based on data provided by the Township and our recent involvement in the Township's

annual asphalt program, this practice has been allowing the Township to realize a service life of its asphalt roads averaging 19 years. In our opinion, a target service life for a township-level road would be approximately 15-22 years. Refer to **Appendix E** for a summary of road age data for recent asphalt program works.

For roads that have an AADT between 2,000 and 4,000 vehicles, a minimum 100 mm asphalt wearing surface is recommended, notwithstanding road base, subbase and drainage conditions. Township roads that currently meet this criteria that only have an asphalt thickness of approximately 50 mm include:

- Victoria Road South, Maltby Road East to Wellington County Road 36
- Watson Road South, Arkell Road to Maltby Road East
- Niska Road, Whitelaw Road to bridge

Note that AADT values for the road sections noted above have been assumed based on the traffic counts completed as part of this Plan; however, the traffic counts completed as part of this Plan do not constitute sufficient data for confirming the AADT. Additional studies for road sections identified as potential candidates may be required.

In reviewing adjacent municipal annual paving programs, we are aware of the following typical asphalt restoration thicknesses for typical rural road sections:

- Township of Woolwich: 60 mm HL 4 Binder Course, 50 mm HL 3 Surface Course (Source: RFT 2021-05 – 2021 Paving Program)
- Township of North Dumfries: 50 mm HL 4 Binder Course, 50 mm HL 3 Surface Course (Source: ND-RFT-EPW01-2022 – Road Resurfacing 2022)
- Township of Centre Wellington: 50 mm HL 4 Binder Course, 50 mm HL 4 Surface Course (Source: RFT 15-21 – Asphalting of Various Roads, 2021)

This suggests that other lower-tier municipalities in Wellington County and Waterloo Region are moving towards a two-lift system for all paved rural roads. We estimate that contributing factors to these decisions could include geotechnical investigations / recommendations, anticipated changes in public driving habits, anticipated increased truck / farm vehicle traffic, and improved ability to utilize maintenance strategies on double lift roads (for example, crack sealing on single lift roads is generally less effective than on thicknesses less than 60 mm).

Cost implications from an initial capital investment standpoint are highlighted in **Section 4**. However, it is estimated that double lift roads would be able to withstand increased traffic volumes and provide more opportunities for maintenance activities. However, additional asphalt thickness should not be taken as a substitute for proper subbase construction and drainage.

4.6 ADDITIONAL ROAD IMPROVEMENT TYPES NOT CONSIDERED FOR TOWNSHIP

The following additional maintenance and improvement types were reviewed, and deemed not to be appropriate for the Township to implement on its own.

4.6.1 Microplaning or Micro Milling

Microplaning is the process of milling an asphalt surface using a specialty milling machine with more teeth on the milling drum than a standard milling machine drum. This allows for removal of the surface asphalt at thinner depths than a standard milling machine. It can be used to address profile deficiencies in the road surface to create a smoother ride. It can also be used to prepare a surface for application of a thin overlay.

Microplaning can be used as a maintenance practice to address the ride quality of existing road surfaces; however, it is not intended to appreciably extend the life of a road surface.

Due to the class of roads maintained by the Township, we do not believe that Microplaning is a viable maintenance practice for the Township.

4.6.2 Asphalt Recycling

Asphalt recycling refers to the process of reusing material from the existing asphalt surface to form part of a new asphalt surface. There are many types of asphalt recycling distinguished by the milling depth, the process used to rejuvenate the asphalt and the materials used to reconstruct the road.

Full depth reclamation (FDR), also known as pulverizing, is the process of uniformly pulverizing the full thickness of asphalt and a specified thickness of the upper portion of the granular road base. This process blends the pulverized asphalt aggregate with the granular road base to improve the strength and consistency. This is the process that the Township currently uses for rehabilitation of its paved roads as it is typically more cost effective than removing the asphalt. FDR is not suitable for roads that cannot accommodate an increase in road profile. When this is the case, asphalt removal is required.

Cold In-Place Recycling (CIR) is the process of cold milling the existing asphalt surface to a specified depth, screening the material to a desired aggregate distribution, mixing the aggregate with an asphalt binder and re-laying the mixture in one continuous operation. Roads that have a well drained and structurally adequate road base and subbase are ideal candidates for this process. Since the process is completed in the absence of heating, it reduces the energy required as compared to the process for hot mix asphalt. Asphalt laid as part of the CIR process is overlain by one or more lifts of hot mix asphalt or surface treatment.

Hot In-Place Recycling (HIR) is a similar process to CIR but involves heating the milled asphalt along with adding material to regain workability. HIR involves the milling, heating, scarify, stripping, mixing and repaving of the existing asphalt to remediate of the road surface. Asphalt additives such as binders and fine aggregate as well a surface layer may need to be incorporated to create a good quality driving surface.

CIR and FDR can be supplemented by Expanded Asphalt Stabilization to improve the strength of the existing road structure. We understand from conversations with adjacent municipalities that complete an Expanded Asphalt Stabilization program that there needs to be a long, continuous stretch of road to be resurfaced for this process to be cost effective. In our opinion, and based on discussions with adjacent municipalities, the Township would need to complete road resurfacing of a minimum of 6 km of continuous road for Expanded Asphalt Stabilization to begin to be cost-effective from a lifecycle perspective. As the Township's annual paving program generally consists of 4-8 km of road, and generally not continuous stretches, we do not believe that this is a viable resurfacing process for the Township. The same logic would apply to HIR.

4.6.3 Slurry Seal

A slurry seal is a thin layer of asphalt placed over an existing surface that delays the appearance of surface defects caused by environmental factors (e.g., oxidization) by helping to seal any voids in the surface. This seal protects pavement by providing a new 1 mm to 6 mm driving surface. Slurry seals are a low-cost option to correct minor surface problems such as cracks and provide winter benefits such as reduced salt absorption and skid resistance. The new driving surface has characteristics similar to an HL 3 surface course and is only suitable for low volume roads. Fog seals can be used for high volume roads, as their composition differs in that it does not contain aggregate.

In our experience, the majority of asphalt defects that present themselves on the Township's road network are "bottom up" defects such as alligator cracking, tire rutting and edge cracking due to inadequate platform width. Therefore, we do not believe that slurry seals are a viable maintenance practice for the Township.

4.6.4 Preservation Seal

A preservation seal can be added to new or used pavement to reduce life-cycle cost and environmental impact. The seal penetrates the pavement creating a more durable pavement by rebalancing the chemistry of oxidized asphalt to delay the aging process, which is estimated to add approximately 5-7 years of additional service life to the road. An example of a proprietary product used as a preservation seal is Reclamite.

The general practice is to place preservation seals in the same year as paving operations. Subsequent treatments are applied every seven years after the initial treatment.

In our experience, the majority of asphalt defects that present themselves on the Township's road network are "bottom up" defects such as alligator cracking, tire rutting and edge cracking due to inadequate platform width. Therefore, we do not believe that preservation seals are a viable maintenance practice for the Township.

4.7 GRAVEL ROAD CONVERSIONS TO HARD-SURFACE

The Township has expressed interest in understanding the process of converting existing gravel roads to hard-surfaced roads, either with surface treatment or asphalt. The proposed approach to the Township for conversion of gravel roads is provided below, along with a flow chart attached to this Plan.

4.7.1 Step 1: Desktop Evaluation for Improvement

The following criteria have been proposed for assessing the need to convert a gravel road to hard-surface for a given road segment:

- Is full regrading completed more than four times during each of two consecutive non-winter periods (May 1 to November 1)? If yes, criterion is met.
- Does the traffic volume (annual average daily traffic, AADT) exceed 200 vehicles? If yes, criterion is met.
- Is the road section isolated from the Public Works Yard? If yes, criterion is met.
- Is the road is connected to other paved roads? If yes, criterion is met.
- Is there future development planned on the road section that would affect the current use of the road (e.g., Upper-tier or Provincial Road Network expansions)? If no, criterion is met.
- Is there a high relative rural population density? If yes, criterion is met.

Relative prioritization between sections meeting the above criteria would be at the Township's discretion.

Refer to **Table 12** for the desktop evaluation completed by the project team. Note that AADT values have been assumed based on the traffic counts completed as part of this Plan; however, the traffic counts completed as part of this Plan do not constitute sufficient data for confirming the AADT. Additional studies for road sections identified as potential candidates may be required.

The proposed criteria above are based on similar programs implemented in other municipalities. If the Township has alternative or additional criteria specific to Puslinch that they would like to consider, staff and Council can review and implement these criteria, as appropriate.

Table 12: Desktop Evaluation of Gravel Roads

Asset ID	Street Name	From Street	To Street	# Times Re-graded May – November	ADT	Isolated from Township Yard	Paved Connection	Future Development	High Rural Population Density
211	Ann Street	County Road 36 (Badenoch Street)	dead end	<4	0-49	Y	Y	N	Y
200	Boyce Drive	County Road 46	dead end	<4	0-49	Y	Y	N	Y
27	Calfass Road	Concession 7	Victoria Street	<4	50-199	N	Y	Y	N
27B	Carter Road	Arkell Road (County Road 37)	Cooks Mill Road	<4	200-499	Y	Y	N	N
129	Concession 11	Little Road	Leslie Road East	<4	50-199	Y	N	N	N
142	Concession 11	Sideroad 17	County Road 36	<4	50-199	Y	Y	N	N
143	Concession 11	County Road 34	Sideroad 17	<4	50-199	Y	Y	N	N
144	Concession 11	Maltby Road East	County Road 34	<4	50-199	Y	Y	N	N
145	Concession 11	Hume Road	Maltby Road East	<4	50-199	Y	Y	N	N
146	Concession 2	Concession 2/2A	Concession 7	<4	0-49	N	Y	Y	N
113	Concession 7	Concession 1	Gore Road	>4	200-499	N	Y	N	N
118	Concession 7	County Road 34	pavement transition	<4	50-199	N	Y	Y	N
81	Cooks Mill Road	Carter Road	Bridge	<4	200-499	Y	Y	N	N
71	Farnham Road	Arkell Road (County Road 37)	Carter Road	<4	50-199	Y	Y	N	N
47	Gilmour Road	Victoria Road South	new subdivision	>4	200-499	N	Y	N	Y
53	Hammersley Road	County Road 46	dead end	<4	0-49	N	Y	N	N
157	Jones Baseline	Stone Road East	dead end	<4	0-49	Y	Y	N	N
31	Little Road	Nassagaweya-Puslinch Townline	County Road 36	<4	50-199	Y	Y	N	N
8	MacPherson's Lane	Puslinch-Flamborough Townline	Highway 6	<4	0-49	Y	Y	N	N
64	Maltby Road East	Watson Road South	Concession 11	<4	50-199	N	Y	N	N
65	Maltby Road East	Concession 11	Nassagaweya-Puslinch Townline	<4	50-199	N	Y	N	N
158	McLean Road East	Victoria Road South	dead end	<4	0-49	Y	Y	N	N
149	Nassagaweya-Puslinch Townline	Leslie Road East	Sideroad 10 Nassagaweya	<4	50-199	Y	N	N	N
150	Nassagaweya-Puslinch Townline	Leslie Road East	Little Road	<4	50-199	Y	N	N	N
152	Nassagaweya-Puslinch Townline	Sideroad 17	dead end	<4	50-199	Y	Y	N	N
103	Pioneer Trail	Laird Road West	Niska Road	<4	50-199	Y	Y	N	Y
98	Sideroad 10 North	County Road 34	Concession 4	<4	50-199	N	Y	Y	N
95B	Sideroad 10 North	Laird Road West	dead end	<4	0-49	Y	Y	N	N
91	Sideroad 10 South	Gore Road	Concession 1	<4	50-199	Y	Y	N	N
92	Sideroad 10 South	Concession 1	Concession 2	<4	200-499	Y	Y	N	N
93	Sideroad 10 South	Concession 2	Concession 2	<4	50-199	Y	Y	N	N
101	Sideroad 12 North	Concession 4	dead end	<4	0-49	Y	Y	N	N
100	Sideroad 12 North	Forestell Road	Concession 4	<4	50-199	N	Y	N	N
43	Sideroad 17	Nassagaweya-Puslinch Townline	Concession 11	<4	50-199	Y	Y	N	N
106	Sideroad 20 North	County Road 34	dead end	<4	0-49	N	Y	N	N
104	Sideroad 20 South	Gore Road	Concession 1	<4	50-199	Y	Y	N	N
105	Sideroad 20 South	Concession 1	Concession 2	<4	50-199	Y	Y	N	N
112	Sideroad 25 North	Concession 7	dead end	<4	50-199	N	Y	N	N
110	Sideroad 25 South	Concession 1	Gore Road	<4	50-199	Y	Y	N	N
111	Sideroad 25 South	Concession 2	Concession 1	<4	50-199	Y	Y	N	N
26	Small Rd/Leslie Rd E	Nassagaweya-Puslinch Townline	Concession 11	<4	50-199	Y	N	N	N

Based on **Table 12**, **none of the road sections meet all the recommended criteria for further consideration to be converted to a hard-surfaced road**; however, we understand that the Township has prioritized hard-surfacing of its gravel road network. The Township may, at its discretion, choose to weight specific criteria more-heavily than others or remove specific criteria to mee their objective with regards to the gravel road network. Should the Township wish to proceed with hard-surfacing gravel roads, the following road sections have the fewest criteria not met under the current evaluation framework:

- Carter Road, Arkell Road (County Road 37) to Cooks Mill Road
- Cooks Mill Road, Carter Road to Bridge
- Concession 7, Concession 1 to Gore Road
- Gilmour Road, Victoria Road South to new subdivision
- Pioneer Trail, Laird Road West to Niska Road
- Sideroad 10 South, Concession 1 to Concession 2

In our opinion, all of the road sections identified above would require some level of upgrade prior to hard-surfacing. We anticipate that upgrades may include, but not be limited to, ditching, isolated full depth reconstruction, drainage improvements, platform widening and small diameter culvert replacements for all road sections identified.

Prior to proceeding with the hard-surfacing of additional gravel roads, we suggest that Council document the revised criteria used for this evaluation and develop guidelines for staff to administer the decision making process.

4.7.2 Step 2: Field Review

Once the desktop review has been completed, field reviews should be completed on each road section to assess the following from a visual perspective:

- Condition of existing drainage (ditches, culverts, etc.)
- Existing platform / shoulder width
- Sightlines at intersections and driveways

As part of the field review, considerations should be given to additional studies, investigations or data collection that will be important for design of the road section including:

- Inspection of the gravel base confirming the road can support hard-surfacing
- Horizontal and vertical alignment of the existing road and associated speed limits
- Inspection of any culvert or bridge structures on the road section

Collection of this data may require expenditures by the Township to retain the services of qualified firms to complete the data collection, analysis and provide recommendations.

At this time, the Township should also complete additional investigations such as geotechnical investigations, legal surveys, utility daylighting, etc.

4.7.3 Step 3: Design and Construction for Gravel Road Improvement (if required)

Once the necessary information has been collected as part of the field review, a preliminary scope of work should be prepared including an estimated construction cost estimate. This estimate should include the costs to prepare the existing road to receive hard-surfacing (e.g., road base upgrades, ditching, road widening, vertical/horizontal realignment, etc.) and associated works (e.g., mobilization, traffic control, bonding and insurance, contingencies, materials testing, etc.). The estimated construction cost estimate and engineering costs should be compared

against the Township's available capital works budget to confirm that the project has the necessary allocation of funds.

This step involves taking an in-depth look at the performance of the existing road section. The Township should take this opportunity to assess whether the road meets current safety and geometric standards based on its road classification and determine whether to fully upgrade the road to meet the applicable standards or to accept the risk of maintaining the road in a substandard condition.

This step would not be required if the gravel road section being considered does not have any geometric or performance issues that would cause premature failure of hard-surfacing.

4.7.4 Step 4: Desktop Evaluation for Hard-surfacing

At the Township's discretion, there may be a desire to hard-surface roads that do not meet all the criteria of their Asset Management Plan. Provided that Steps 1 to 3 have been completed, and the Township has the approved funding to complete the project, we do not foresee a technical issue with the Township removing the AADT and/or number of times the road is maintained in non-winter periods criteria from consideration.

There may be sections of road that, upon completing the gravel road improvement, are functioning to a level that meets the Township's desired level of service. In these instances, the Township may elect to maintain the road as a gravel road surface. As such, budget would not be allocated to hard-surfacing of this section of road and it would be maintained as a gravel road.

4.7.5 Step 5: Design and Construction for Hard-surfacing

At this stage, the Township can evaluate the selected road surface for the appropriate hard-surfacing alternative. Factors such as cost, quality of road base, type of vehicle traffic, connectivity to other hard-surface roads and AADT can be contributing factors to this selection. This step is optional based on the evaluation in Step 4.

It is recommended to maintain road sections that have had road base and subbase improvements as a gravel road for at least one winter season to assess the performance of the improvement and make any necessary adjustments prior to hard-surfacing.

4.7.6 Additional Considerations for Hard-surfacing Roads

Upgrading existing gravel road sections and maintaining additional lengths of hard-surfaced roads should not come at the expense of maintaining the Township's current inventory of hard-surfaced roads. Therefore, it is suggested that this work would need to be completed in addition to the current annual capital program.

Historic costing for previous asphalt paving projects that included isolated improvements / reconstruction within the Township suggest that the increase to the per kilometre capital cost can be as much as 2.0-3.0 times more than the cost of hard-surfacing with a single lift of asphalt, alone. We recognize that this is based on limited data from projects within the Township, but it does provide evidence that isolated improvements / reconstruction work can add a substantial amount to the capital cost of a road surfacing project.

For conversion of existing gravel roads to hard-surfaced roads, refer to **Appendix F** a flow chart that the Township can use that outlines the entire recommended process for completing a gravel road conversion.

4.8 PLANNING CHECKLIST FOR CAPITAL ROAD PROJECTS

To assist the Township with planning considerations for road surfacing and reconstruction projects, we have developed a planning checklist that can be used by the Township or an external consultant to document the planning process used for capital upgrade projects. Refer to **Appendix G** for the recommended checklist, which is intended to outline the following topics:

- Project Definition
- Background Review
- Existing Conditions
- Existing Geometry
- Structures and Drainage
- Utilities
- Construction Staging
- Anticipated Approvals/Permits
- Summary and Recommendations

The purpose of this checklist is to take a "snap-shot" look at a section of road that is scheduled for capital works in the next five years. The checklist is recommended to be completed within 2 years prior to planned works so that additional investigations, engineering and studies can be scoped and completed to inform the upcoming capital works and budgets can be adjusted accordingly.

Where projects are delayed, this checklist should be revised so that it has been updated within 2 years of the planned implementation.

4.9 REQUESTS FOR CONVERSIONS TO HARD-SURFACE

The following section addresses requests from property owners to have the roadway their property fronts onto upgraded from a gravel road to a hard-surface road, provided that it is a Township Road. Property owners that live on a Wellington County or Provincial Road would have to submit any requests related to those roadways to the corresponding level of government. This section does not cover requests related to traffic management (e.g., speed limits, traffic calming). Refer to **Section 8** of the report for more information on the process used for these requests.

Township property owners may submit a request to upgrade a road that their property fronts onto from a gravel wearing surface to an asphalt wearing surface. The following process is suggested for the Township's consideration to be further evaluated and enhanced for inclusion as a practice endorsed by Council. This process is based on our understanding of the *Local Improvement Charges – Priority Lien Status* legislature.

- A property owner submits a formal request in writing (e.g., signed letter or email) for a road upgrade (the "Request") including the following information:
    - Identify the road that the upgrade is being requested on (include "to" and "from" limits along road).
    - State the nature of the requested upgrade (e.g., upgrade the existing gravel road on Sideroad ## between Concession ## and Concession ## to an asphalt wearing surface).
    - If multiple Requests are received for the same upgrade, the Township will only correspond directly with the property owner that submitted the initial Request until the review process has been completed.
- The Township evaluates the Request for completeness and responds to the property owner acknowledging the Request has been received, confirming any details, and identifying the next steps.
- The Township reviews the Request against established Township standards for the conversion of gravel roads to hard-surface (**Appendix F**) and/or other appropriate criteria (e.g., relevant design guidelines or standards). This may include additional review by an engineering consultant retained by the Township.
- The Township issues a formal response (e.g., signed letter or email) to the property owner(s) that submitted the Request summarizing the review, outcome(s) and next steps. A benchmark cost estimate will be provided within the formal response for preliminary budgeting purposes.
    - If the Request is deemed to meet the criteria for establishment of a Project, Township staff will inform the property owner(s) of the details of the improvement Project and prepare a report for

Council consideration to include the Project within the Capital Program. Prioritization within the Capital Program will be based on available funding and relative priority to other projects already programmed for construction. Detailed design and tendering will be commenced based on the year that the Project is scheduled for construction. Should Council approve the report, the Capital Program will be updated accordingly. No further action on the part of the property owner(s) is required.

  - If the Request does not meet the criteria, or Council does not approve the Project despite meeting the criteria, Township staff will inform the property owner(s) that the Request has been denied and will not be included within the Capital Program.

- For Requests that are denied, either at the staff level or by Council, property owner(s) may elect to submit a Petition under the *Local Improvement Charges – Priority Lien Status* legislation to complete the project as a Local Improvement. A sufficient Petition under this legislation must include signature in agreement from at least two-thirds of the property owners representing at least 50% of the value of lots liable to be assessed under the Request / Project. The value of lots is determined by the last returned assessment roll. As part of the Petition, property owners would be consenting to funding the entire project costs (including all costs incurred prior to commencement of construction) through special charges levied on their property tax, including financing options and costs. Property owners may choose to pay the entire lump sum or their assessed value or finance the amount over a specified repayment period as outlined in the by-law passed by Council.
- Once a sufficient Petition has been received, the Township will issue notice to all affected property owners including the estimated total cost of the upgrade, next steps in the process and requirements for submitting a Petition against undertaking the proposed work.
- If there is agreement by the property owners to proceed, the Township will retain an engineering consultant to proceed with engineering design and approvals. The Township will issue notices to affected property owners at milestones prescribed in the Local Improvement Charges – Priority Lien Status legislation providing updates on the process, updated cost estimates and timelines. If the property owner(s) request that the Project not proceed to construction, Township staff will request a Petition from the property owner(s) against the Project.
- If the Petition against the Project is sufficient, all Project costs incurred to the date of the Petition would be charged to the property owner(s) (e.g., engineering costs, administrative costs, etc.). A sufficient Petition against the Project requires signature in agreement from at least two-thirds of the property owners representing at least 50% of the value of lots liable to be assessed under the Project.
- Provided that a sufficient Petition against the Project is not received, Council will award the construction contract and the Township will assess properties to determine the final estimated charges per property. The total costs assessed to the property owner(s) will be in accordance with the *Local Improvement Charges – Priority Lien Status* legislation.
- Council will pass a Local Improvement by-law for the purposes of levying special charges to the assessed properties.
- Upon completion of construction, the Township will issue notice to the property owner(s) confirming the final charges to be assessed.
- Property owner(s) will pay their assessed charge through property tax over the stipulated horizon, including financing costs. The recommended period for projects covered under this practice is 10 years.
- The Township will not entertain new requests for upgrades to a road that has been reviewed for a similar request and denied within the previous three years, subject to no major changes in land use or planning in the immediate vicinity of the Township Road.

Should Council consider this practice, the next steps would involve the development of a program that may include a by-law, financing options, Petition form, user guide and relevant background information for Council approval.

5 TRAFFIC COUNT COLLECTION & GROWTH PROJECTION

Traffic counts were collected at 28 locations across the Township. These traffic counts were used to update the traffic data for road segments in the vicinity of the count locations. Given the limited number of traffic count locations, and the age of historical counts, only an estimate of traffic count ranges could be assumed on the majority of the road segments. This process involved a general review of probable traffic flows between adjacent road segments and County roads, as well as input from Township staff. Ten year forecasted traffic counts were calculated for all road segments using a 0.5 %annual growth rate on most of the Township roads. A 2% annual growth rate was applied to segments of Forestell Road, Laird Road West, Roszell Road, Victoria Road South and Watson Road South based on feedback from Township staff. **Appendix H** lists the current traffic counts and 10 year forecasted traffic counts.

Table 13 below provides a breakdown of the road network by 2022 traffic ranges

Table 13: Traffic Volume (ADT) Distribution across Road Network

Traffic Volume (ADT)	Centreline Kilometres	Percentage of Network
0 -49	5.4	3.0%
50 - 199	48.3	27.0%
200 - 499	42.7	23.9%
500 - 999	26.5	14.8%
1000 - 1999	37.1	20.7%
2000 - 2999	12.5	7.0%
3000 - 3999	4.5	2.5%
4000 - 4999	2.1	1.2%

5.1 MAINTENANCE CLASS

The Maintenance Class of a roadway is set as per Section 1(4) of *Minimum Maintenance Standards for Municipal Highways*. Maintenance Class is determined by using a combination of the posted speed of a highway, and the Average Daily Traffic (ADT). The Maintenance Class helps to set the level of service offered by the Township, in accordance with the Regulations. The classification chart is illustrated in **Table 14**. Note that the classification chart provided in the *Minimum Maintenance Standards for Municipal Highways* does have higher daily traffic counts than what is shown in this table.

Table 14: Classification of Road Maintenance Class (*Minimum Maintenance Standards for Municipal Highways*)

Average Daily Traffic (vehicles)	91 - 100 km/h speed limit	81 - 90 km/h speed limit	71 - 80 km/h speed limit	61 - 70 km/h speed limit	51 - 60 km/h speed limit	41 - 50 km/h speed limit	1 - 40 km/h speed limit
4,000 - 4,999	1	2	3	3	3	4	4
3,000 - 3,999	1	2	3	3	3	4	4
2,000 - 2,999	1	2	3	3	4	5	5
1,000 - 1,999	1	3	3	3	4	5	5
500 - 999	1	3	4	4	4	5	5
200 - 499	1	3	4	4	5	5	6
50 - 199	1	3	4	5	5	6	6
0 - 49	1	3	6	6	6	6	6

When the classifications are applied to the known and estimated traffic volumes, and speed limits of the Township's roads, the distribution of Maintenance Classification is provided in **Table 15**.

Table 15: Maintenance Class Distribution for Road Network

Maintenance Class	Centreline Kilometres	Percentage of Network
Class 3	27.2	15.2%
Class 4	78.0	43.5%
Class 5	62.0	34.7%
Class 6	11.8	6.6%

Appendix I provides a map of all traffic count locations and estimated traffic ranges used in this analysis. Due to the MMS, the Township should look to review the speed limits and estimated counts in this report, and update traffic counts on a regular basis. Priority for additional traffic counts should be on roads where the current estimated traffic count is near the next Maintenance Class.

6 ROAD MAINTENANCE STRATEGY

The Township has identified the need for the activities identified within the current Roads Maintenance Budget to be reviewed and updated based on current best practices, amendments to the *Minimum Maintenance Standards for Municipal Highways* and Township identified specific unique local requirements. This review has led to the development of an updated set of recommendations for maintenance activities for the following asset groups:

- Hard surface and gravel roads and shoulders
- Storm drainage – catchbasins, storm sewers, ditches
- Sidewalks
- Bridges and culverts
- Signs & pavement markings
- Lighting

The maintenance activities identified within this document focus on ensuring that the Township roads continue to provide a safe environment for the travelling public. The maintenance activities defined are categorized by the following classifications:

- **Routine:** regular scheduled activities including crack sealing, patching, pothole filling, cleaning, grass cutting, debris management and landscape maintenance, cleaning bridge drainage
- **Regulatory:** *Minimum Maintenance Standards for Municipal Highways* inspections to identify safety & maintenance repairs
- **Winter Maintenance:** winter patrols, salting/brining, snow clearing
- **Storm Water Management:** watercourse maintenance/inspection

Table 16 summarizes the recommended maintenance activities for each of the major asset types. It should be noted that Winter Maintenance & Road/Traffic Patrol & Inspection have been identified separately.

Table 16: Maintenance Activities

Asset Type / Major Activity	Asset Component	Maintenance Activity
Roadway	Roadway	Pothole Repair
Roadway	Roadway	Grading
Roadway	Roadway	Crack Sealing/Filling
Roadway	Shoulders	Repair
Roadway	Crash Attenuators	Safety Barrier Repair
Roadway	Sidewalks	Repair/Maintenance/Replacement
Roadway	Curbs	Repair/Maintenance

Asset Type / Major Activity	Asset Component	Maintenance Activity
Drainage	Catch Basins	Catch Basin Cleaning
Drainage	Catch Basins	Catch Basin Repairs
Drainage	Culverts	Culvert Cleaning
Drainage	Culverts	Culvert Repair/Replacement
Drainage	Inlets/Outlets	Inlet/Outlet Cleaning
Drainage	Pipes	Storm Sewer CCTV & Cleaning
Bridges & Structural Culverts	Bridges	Bridge Maintenance - Own Forces.
Bridges & Structural Culverts	Structural Culverts	Repair/Maintenance
Traffic	Signs & Supports	Sign Placement New
Traffic	Signs & Supports	Sign Repair or Replacement
Traffic	Delineators	Repair/Maintenance/Replacement
Traffic	Lighting	Street Lighting Lamp Replacement
Traffic	Pavement Markings	Centre and Edge Line
Traffic	Pavement Markings	Zone Painting (i.e. turn lanes, stop bars etc.)
Winter Control	Roadway	Anti-Icing - Activation
Winter Control	Roadway	Patrolling/Weather Monitoring
Winter Control	Roadway	Plowing - Activation
Vegetation/ Cleaning & Debris Management	Roadway	Grass and Weed Control Management and Debris Pickup
Vegetation/ Cleaning & Debris Management	Roadway	Sweeping
Vegetation/ Cleaning & Debris Management	Roadway	Tree Maintenance - General
Road Patrol & Inspection	Roadway	Road Patrol & Inspection
Road Patrol & Inspection	Traffic	Traffic Sign Patrol & Inspection

6.1 MAINTENANCE ACTIVITIES: OPERATIONAL PLAN

Details of the recommended maintenance activities and the associated schedules are set out below and a detailed summary of the maintenance activities are included in **Appendix J**. In addition to the activity description, the following classifications/drivers for each of the activities have been included:

- **In-house staff**: activity carried out by Township staff
- **Contracted Service**: activity carried out by contractors
- **Regulatory**: activity is identified in current regulations such as *Minimum Maintenance Standards for Municipal Highways*
- **Safety**: activity is required to maintain the safety of the roadway
- **Maintenance**: the activity is required for asset operation
- **Asset Preservation**: activity will contribute to the extension of the asset life by increasing the time between major interventions
- **Planned**: activity is part of an ongoing maintenance program and is budgeted and funded
- **Reactive**: activity will be completed as required when identified through complaints, inspections and/or road patrols
- **Closure Activity:** activity requires the closure of either a lane or the entire width of the road
- **Frequency**: how often will the activity be completed
- **Costs Recoverable:** the activity is typically associated with damage resulting from accidents and the costs are recoverable from insurance companies and/or individuals

The current version of the *Minimum Maintenance Standards for Municipal Highways* can be downloaded from the Ontario government website using the URL: https://www.ontario.ca/laws/regulation/020239.

6.1.1 Roadway

POTHOLE REPAIR

Description:

Two types of repair procedures are available for pothole repair, semi-permanent repair and temporary repair. A semi-permanent repair is an effective patching method that results in long term durability of the repaired pothole and that of the surrounding distressed area which may often extend well beyond the location of the actual pothole. A temporary repair of a pothole and/or distressed area is conducted for restoring rideability and safety as quickly as possible; it is intended to prevent/restrict moisture from penetrating into the road base.

Semi-permanent repair:

Hot Mix Patching: means a single lift of hot mix surface course placed over short segments of distressed pavement (30 m in length or less) generally for improving strength, ride ability or safety. Hot mix patching is a permanent repair that includes grinding cleaning, application of a tack coat, and a single lift of hot mix asphalt.

Temporary repairs:

Installation and compaction of cold mix asphalt in potholes as part of ongoing routine maintenance in the winter. Installation and compaction of hot mix asphalt in potholes ongoing routine maintenance in the warmer months.

Procedures shall follow Pothole Patching Procedure (PW-OPS-RD-OP-01).

Reference *Minimum Maintenance Standards for Municipal Highways* Section 6.

In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	✓	**Asset Preservation**	✓
Planned	×	**Reactive**	✓
Closure Activity	×		
Frequency	Repair within 7 to 30 days on roadway. Repair within 14 to 60 days on shoulder for class 3 to 5 roads.	**Costs Recoverable**	×

CRACK SEALING/FILLING

Description: Crack sealing involves placement of a variety of specialized materials or sealant products into working cracks using unique configurations. Working cracks are defined as those that experience significant horizontal movements, generally greater than 2.5 mm (0.1 in). The process consists of mechanically cutting a sealant reservoir of a desired shape at the working crack, cleaning and drying with hot compressed air, and filling the formed reservoir with the specified materials. Crack Filling involves cleaning and placement of materials into non-working cracks in the bituminous pavement surface. Reference *Minimum Maintenance Standards for Municipal Highways* section 8.			
In-House Staff	×	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	✓	**Asset Preservation**	✓
Planned	×	**Reactive**	×
Closure Activity	×		
Frequency	* Repair within 60 to 180 days.	**Costs Recoverable**	×

*This is currently not undertaken by the Township, but is being considered as an option for maximizing the service life of the paved roads.

CRASH ATTENUATORS – SAFETY BARRIER REPAIR

Description: Remove/install/repair anchors, guide rail posts, guide wire, guide rails, compact fill material and all other pertinent devices.			
In-House Staff	✓	**Contracted Service**	✓
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	×	**Reactive**	✓
Closure Activity	×		
Frequency	As Required	**Costs Recoverable**	✓

CURB REPAIR/MAINTENANCE

Description: Task includes on-site concrete preparation for repairs and repairing defects in concrete surfaces, using mortar or grout and trowel, and smoothing rough spots using chisel and abrasive stone.			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	✓
Planned	×	**Reactive**	✓
Closure Activity	×		
Frequency	As Required	**Costs Recoverable**	×

6.1.2 Drainage

CATCH BASIN CLEANING

Description: Removal and disposal of debris and sediment from catch basin chambers to maintain surface water flow into the storm sewers and the cleaning of catch basin leads are required.			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	✓
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	Every 2 years	**Costs Recoverable**	×

CATCH BASIN REPAIRS

Description: Replace damaged/fractured catch basin lids and repair of concrete deficiencies, to maintain the flow of surface water into the storm system.			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	✓
Planned	✓	**Reactive**	✓
Closure Activity	Lane		
Frequency	As Required	**Costs Recoverable**	×

CULVERT CLEANING

Description: Remove sediment, leaves, and debris from culverts to maintain the flow of surface water into the storm system.			
In-House Staff	✓	**Contracted Service**	✓
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	✓
Planned*	✓	**Reactive**	✓
Closure Activity	Lane		
Frequency	5 Years	**Costs Recoverable**	×

CULVERT REPAIR/REPLACEMENT

Description: Repair defects or replace culverts when defects are identified with the cleaning program. Includes culverts with a shorter span of less than 3 m.			
In-House Staff	✓	**Contracted Service**	✓
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	✓
Planned	✓	**Reactive**	✓
Closure Activity	Lane		
Frequency	15 Years	**Costs Recoverable**	×

INLET/OUTLET CLEANING

Description: Remove sediment, leaves, and debris from inlets/outlets to maintain the flow of surface water into the storm system.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	As required	**Costs Recoverable**	×

STORM SEWER CCTV & CLEANING

Description: Flushing to remove sediment, leaves, and debris from storm sewer system to maintain the flow of surface water into the storm system. This will be carried out in-conjunction with CCTV inspection using PACP (Pipeline Assessment Certification Program) defect coding to identify future repair needs.			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	✓
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	As required	**Costs Recoverable**	×

6.1.3 Bridges & Structural Culverts

BRIDGE WASHING, FLUSHING, CLEANING

Description: Bridge washing, power washing, flushing, inspections. and cleaning including abutments, bearings, deck, drainage, joints, parapets, piers, wing walls; typically carried out in Spring.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	✓
Planned	✓	**Reactive**	×
Closure Activity	Lane		
Frequency	Annual	**Costs Recoverable**	×

STRUCTURAL CULVERT REPAIR/MAINTENANCE

Description: Repair defects or replace culverts (3 m span or greater) when defects are identified during the OSIM inspection program.			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	✓
Planned	×	**Reactive**	✓
Closure Activity	Lane/Road		
Frequency	As Required	**Costs Recoverable**	×

6.1.4 Traffic Signs & Supports

NEW SIGN PLACEMENT

Description: Installation of new signs approved by council bylaws. All signs are placed as per the Ontario Traffic Manual.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	×	**Asset Preservation**	×
Planned	✓	**Reactive**	×
Closure Activity	×		
Frequency	As Required	**Costs Recoverable**	×

SIGN REPAIR OR REPLACEMENT

Description: The repair or replacement of supports and signs due to wear and tear, wind damage, auto accidents. Reference *Minimum Maintenance Standards for Municipal Highways* Sections 11 & 12.			
In-House Staff	✓	**Contracted Service**	✓
Regulatory	✓	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	×	**Reactive**	✓
Closure Activity	×		
Frequency	Repair or replace within 21 to 30 days for class 3 to 5.	**Costs Recoverable**	✓ Accidents only

DELINEATORS REPAIR/MAINTENANCE/REPLACEMENT

Description: The repair or replacement of delineators and supports (if applicable) due to wear and tear, wind damage, and auto accidents.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	×	**Safety**	✓
Maintenance	×	**Asset Preservation**	×
Planned	×	**Reactive**	✓
Closure Activity	×		
Frequency	As Required	**Costs Recoverable**	✓ Accidents only

STREET LIGHTING LAMP REPLACEMENT

Description: Replacement of burnt out lamps. Reference *Minimum Maintenance Standards for Municipal Highways* Section 10.			
In-House Staff	×	**Contracted Service**	✓
Regulatory	✓	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	×	**Reactive**	✓
Closure Activity	×		
Frequency	Replace within 14 days.	**Costs Recoverable**	×

6.1.5 Pavement Markings

CENTRE AND EDGE LINE PAINTING

Description: Refers to applying a material formulated for application onto asphalt or concrete pavement to delineate vehicle operating limits (e.g., center line and edge line).			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	×
Closure Activity	Lane		
Frequency	2 Years	**Costs Recoverable**	×

ZONE PAINTING

Description: Refers to applying a material formulated for application onto asphalt or concrete pavement to delineate vehicle operating limits (e.g., stop bars, turn arrows, and miscellaneous text).			
In-House Staff	×	**Contracted Service**	✓
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	×
Closure Activity	Lane		
Frequency	2 Years	**Costs Recoverable**	×

6.1.6 Winter Control

ANTI-ICING

Description: Reference *Minimum Maintenance Standards for Municipal Highways* Section 5.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	×	**Asset Preservation**	×
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	Per Section 5.1, Ice formation prevention within 16 to 24 hours 5.1 (3) treatment of ice formation within 8 to 16 hours for class 3 to 5 roads	**Costs Recoverable**	×

PATROLLING/WEATHER MONITORING

Description: Reference *Minimum Maintenance Standards for Municipal Highways* Section 3.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	×	**Asset Preservation**	×
Planned	✓	**Reactive**	×
Closure Activity	×		
Frequency		**Costs Recoverable**	×

PLOWING

Description: Reference *Minimum Maintenance Standards for Municipal Highways* Section 4.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	×	**Asset Preservation**	×
Planned	✓	**Reactive**	✓
Closure Activity			
Frequency	Snow accumulation 8 to 10 cm of snow to respond, 12 to 24 hours to clear after accumulation. Ice formation prevention within 16 to 24 hours. Treatment of ice formation within 8 to 16 hours for class 3 to 5 roads. Patrol once every 7 to 30 days for Class 3 to 5 roads. 3.1(1) & (2) Winter monitoring 3x a day, May - Sept 1x per day.	**Costs Recoverable**	×

6.1.7 Vegetation/Cleaning and Debris Management

GRASS AND WEED CONTROL MANAGEMENT AND DEBRIS PICKUP

Description: Grass cutting activities and weed control. Pick up and removal of debris. Reference *Minimum Maintenance Standards for Municipal Highways* Section 9.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	4x per year.	**Costs Recoverable**	×

SWEEPING

Description: Removes gravel or stone at Township road intersections. In response to accidents or spills, clear affected area of debris or liquid. Remove mud or debris tracked onto roadways from construction sites. Maintenance and cleaning of bridge decks and structural components by sweeping decks when required.			
In-House Staff	✓	**Contracted Service**	✓
Regulatory	×	**Safety**	×
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	Current practice once annually or as required	**Costs Recoverable**	×

TREE MAINTENANCE – GENERAL

Description: The maintenance associated with trimming, removal of fallen trees, branches and limbs that result in reduced visibility/sightlines or pose a hazard to the public.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	×	**Safety**	✓
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	✓
Closure Activity	×		
Frequency	4x per year	**Costs Recoverable**	×

6.1.8 Road & Traffic Patrol & Inspection

ROAD PATROL & INSPECTION

Description: Routine patrol for deficiencies such as potholes, cracks, defective luminaries, debris and general unsafe roadway conditions. Reference *Minimum Maintenance Standards for Municipal Highways* Section 3.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	✓
Maintenance	✓	**Asset Preservation**	✓
Planned	✓	**Reactive**	×
Closure Activity	×		
Frequency	3 times every 10 to 10 days. May to Sept weekly.	**Costs Recoverable**	×

TRAFFIC SIGN PATROL & INSPECTION

Description: Routine patrol to identify deficiencies on regulatory and warning signs. Reference *Minimum Maintenance Standards for Municipal Highways* Section 11 – 12.			
In-House Staff	✓	**Contracted Service**	×
Regulatory	✓	**Safety**	×
Maintenance	✓	**Asset Preservation**	×
Planned	✓	**Reactive**	×
Closure Activity	×	**Annual Closure Activity**	×
Frequency	Inspect, test & maintain 1x per year (within 16 months of previous).	**Costs Recoverable**	×

6.2 SCHEDULE OF PLANNED ACTIVITIES

The following section provides a summary of activities based on their frequency; these are categorized as follows:

- Annual (refer to **Table 17**)
- Yearly Plus (refer to **Table 18**)
- Monthly (refer to **Table 19**)
- As Required (refer to **Table 20**)
- To-be-considered (refer to **Table 21**)

Table 17: Annual Maintenance Activities

Asset Type	Asset Component	Maintenance Activity	Closure Activity	Seasonal Preference
Bridges & Structural Culverts	Bridges	Bridge Maintenance-own Forces	Lane	Spring
Road & Traffic Patrol & Inspection	Traffic	Traffic Sign Patrol and Inspection	No	-
Vegetation / cleaning & Debris management	Roadway	Sweeping	No	Spring

Table 18: Yearly Plus Maintenance Activities

Asset Type / Major Activity	Asset Component	Maintenance Activity	Closure Activity	Frequency	Seasonal Preference
Drainage	Catch Basins	Catch Basin Cleaning	Lane	2 years	Spring
Drainage	Culverts	Culvert Repair / Replacement	Lane	15 years	Spring/Summer/Fall
Drainage	Inlets/Outlets	Inlet/Outlet Cleaning	Lane	5 years	Spring
Traffic	Pavement Markings	Centre and Edge Line	Lane	2 years	Spring/Summer/Fall
Traffic	Pavement Markings	Zone Painting (e.g., turn lanes, stop bars, etc.)	Lane	2 years	Spring/Summer/Fall

Table 19: Monthly Maintenance Activities

Asset Type / Major Activity	Asset Component	Maintenance Activity	Closure Activity	Seasonal Preference
Vegetation / Cleaning & Debris Management	Roadway	Sweeping	Lane	Spring/Summer/Fall
Roadway	Roadway	Grading	No	Once per month from Spring to freeze up
Vegetation / Cleaning & Debris Management	Roadway	Tree Maintenance - General	No	Spring/Summer/Fall 4x per year

Asset Type / Major Activity	Asset Component	Maintenance Activity	Closure Activity	Seasonal Preference
Vegetation / Cleaning & Debris Management	Roadway	Grass and Weed Control Management and Debris Pickup	No	Spring/Summer/Fall 4x per year

Table 20: As-Required Maintenance Activities

Asset Type / Major Activity	Asset Component	Maintenance Activity	Closure Activity	Seasonal Preference
Roadway	Roadway	Pothole Repair	No	Winter/Spring
Roadway	Shoulder	Repair	No	Spring/Summer/Fall
Roadway	Crash Attenuators	Safety Barrier Repair	Lane	Spring/Summer/Fall
Roadway	Sidewalks	Repair/maintenance/ Replacement	No	Spring/Summer/Fall
Roadway	Curbs	Repair/Maintenance	Lane / Road	Spring/Summer/Fall
Drainage	Catch Basins	Catch Basin Repairs	Lane	Spring/Summer/Fall
Drainage	Culverts	Culvert Cleaning	Lane	Spring
Drainage	Pipe	Storm Sewer CCTV & Cleaning	Lane	Spring
Bridges & Structural Culverts	Structural Culverts	Repair/Maintenance	Lane / Road	Spring/Summer/Fall
Traffic	Signs & Supports	Sign Placement New	No	As required
Traffic	Signs & Supports	Sign Repair or Replacement	No	Ongoing
Traffic	Overhead Signs & Supports	Sign Repair or Replacement	Lane	Ongoing
Traffic	Delineators	Repair/Maintenance/ Replacement	No	Spring/Summer/Fall
Traffic	Lighting	Street Lighting Lamp Replacement	No	Ongoing
Winter Control	Roadway	Anti-Icing - Activation	No	Winter
Winter Control	Roadway	Patrolling/Weather Monitoring	No	Winter
Winter Control	Roadway	Plowing - Activation	No	Winter
Road & Traffic Patrol & Inspection	Roadway	Road Patrol & Inspection	No	Ongoing
Road & Traffic Patrol & Inspection	Traffic	Traffic Sign Patrol and Inspection	No	Spring/Summer/Fall

Table 21: To-be-Considered Maintenance Activities

Asset Type / Major Activity	Asset Component	Maintenance Activity	Closure Activity	Seasonal Preference
Roadway	Roadway	Crack Sealing/Filling	Lane / Road	Spring

Crack sealing is considered one of the most cost-effective processes that could be incorporated into the Township's road maintenance plan. Sealing cracks at an early stage (3 to 5 years after construction) on roads which have had a double lift of asphalt and making them watertight will help direct surface runoff towards ditches and prevent water and moisture from getting into the road base. This will also prevent moisture from freezing in the cracks during the winter, which causes the cracks to expand when the water freezes leading to additional cracks, potholes and rough riding surfaces. Implementing crack sealing annually is anticipated to result in the pavement service life being maximized.

Since the Township is currently not undertaking crack sealing, the Township should consider the following prior to setting up an annual crack sealing program;

- The estimated crack sealing averages about $8 per linear metre (excluding construction inspection and traffic control costs);
- There is currently approximately 22.7 km of roads which have had a double lift of asphalt (**Appendix A**); and,
- The lack of in-house staff to undertake construction inspection.

A crack sealing program is estimated to provide an additional 3-5 years of additional service life for roads that have adequate drainage and subbase, based on the experiences of project team members. Our experience has been that crack sealing offers its greatest benefit to increasing service life on double-lift asphalt roads. We have concerns about whether crack sealing on roads with 50 mm or less of asphalt thickness would have any measurable impact to the service life.

6.3 REGULATORY MAINTENANCE ACTIVITIES

The following activities are required to satisfy the *Minimum Maintenance Standards for Municipal Highways*:

- Roadway - Pothole Repair
- Roadway - Crack Sealing/Filling
- Crash Attenuators - Safety Barrier Repair
- Street Lighting - Lamp Replacement
- Roadway - Anti-Icing - Activation
- Roadway - Patrolling/Weather Monitoring
- Roadway - Plowing - Activation
- Sign - Placement New
- Sign - Repair or Replacement
- Routine Signal Inspection & Maintenance
- Traffic Sign - Patrol & Inspection
- Road - Patrol & Inspection

Within the *Minimum Maintenance Standards for Municipal Highways*, each of the activities have defined criteria for response times. These response times have been identified in the activity descriptions shown above.

7 CAPITAL NEEDS REQUIREMENTS

The following section discusses the analysis of capital needs across the Township's paved road network (not including boundary roads). Any decision to convert gravel roads to asphalt as a capital project should be taken into consideration when developing budgetary requirements and prioritizing capital needs.

The costs provided within this section are to be used for high-level budgeting values. These numbers should be re-evaluated periodically (i.e., every 5 years) to ensure that market trends and needs identified through the Preliminary Design Checklists are incorporated into the budget values. **These budgetary values do not correspond with the values provided in Section 4 of this Plan**. Unlike the cost information provided in Section 4, cost estimates within this section include items for the following:

- Associated costs such as mobilization, traffic control, bonding, insurance
- Small diameter (<900mm) culvert replacements where upsizing the culvert is not required
- Minor earth excavation quantities for ditching and/or small diameter culvert replacements
- Minor rip-rap quantities
- Restoration
- Line painting
- Allowances for an Asphalt Cement Index adjustment payment, contingency, engineering design, construction layout, materials testing, contract administration and inspection, and conservation authority permit applications.

Detailed breakdowns of these cost estimates are provided in **Appendix K**. As no site-specific considerations have been considered, these estimates should be considered with an accuracy of ± 40%.

7.1 TIME OF NEED

The Time of Need represents the timeline in which major road rehabilitation or reconstruction will be required. The PCI scores derived from the road condition assessments are used as a guide to determine the Time of Need of each road section. Refer to **Table 22** for a summary of the Time of Need based on PCI.

Immediate resurfacing or reconstruction needs are identified as "NOW" needs. Roads sections have also been assigned "1-5 Year" and "6-10 Year" Time of Need based on their PCI score. This means that these road sections should be resurfaced before the next 5 or 10 years, respectively, as they will likely require major rehabilitation or reconstruction beyond these timeframes. Roads that are not expected to have a Time of Need within the next 10 years are identified as "Adequate".

Table 22: Time of Need for Paved Roads (based on 2022 pricing)

Time of Need	PCI	Centerline Kilometres	Percentage of Network	Estimated Resurfacing Cost
Adequate	>80	61.2	48%	0
6 – 10 Years	65-80	31.1	24%	$12,811,000
1 – 5 Years	50-65	29.2	23%	$11,619,000
NOW Resurfacing	30-50	6.4	5%	$2,691,000
NOW Reconstruct	< 30	0.0	0.0	0
			Total	**$27,121,000**

The table above shows that majority of the Township's paved road network is considered "Adequate" with no immediate resurfacing needs. However, it should be noted that roads falling into this category are still candidates for potential maintenance activities such as crack sealing and patching.

The results show that approximately 23% of the paved road network is in the "1-5 Year" Time of Need for resurfacing with an additional 5% of the network requiring immediate resurfacing. The results also show that approximately $27.1M (2023 dollars) in resurfacing needs are currently identified across the paved road network. Roads will deteriorate over time, and as such, roads that are considered "Adequate" today will eventually become resurfacing needs over the next 10-15 years.

Road sections identified in the "NOW" time of need are summarized in **Table 23**.

Table 23: NOW Resurfacing Time of Need for Paved Roads

Asset ID	Street Name	From Street	To Street	Est. Cost/km	Estimated Cost
4	Gore Road	Sideroad 20 South	Valens Road	$370,000	$983,000
38	Mason Road	Concession 7	End	$370,000	$84,000
148	Puslinch-Flamborough Townline	Leslie Road West	Township Limits	$370,000	$114,000
25	Leslie Road West	Curve at Highway 401	Puslinch-Flamborough Townline	$370,000	$384,000
37	Concession 2A	Concession 2	Concession 7	$494,000	$117,000
139	Watson Road South	Hume Road	Maltby Road East	$494,000	$1,009,000
				Total	**$2,691,000**

7.2 PRIORITY RATING

The previous section outlined Road Needs based solely on condition. However, it is generally acknowledged that there are additional factors which are considered when developing a capital program.

By means of the MTO's Priority Rating (PR) score, not only is the condition of the road taken into the account but also the number of users (i.e., ADT) the roadway serves.

The Priority Rating formula is as follows:

Priority Rating: $$PR = 0.2 \times (100 - PCI) \times (ADT + 40)^{0.25}$$

Where **PCI** is the Pavement Condition Index and **ADT** is the Average Daily Traffic

By applying the Priority Rating, roads with higher traffic volumes will be prioritized over lower traffic volume roads of similar condition. Likewise, traffic being equal, roads with a lower condition rating will rank higher for prioritizing capital needs.

The top 20 road sections by Priority Rating are provided in **Table 24**.

Table 24: Top Priority Ratings for Township Paved Roads

Asset ID	Street Name	From Street	To Street	Length (m)	Traffic	Truck	PCI	Time of Need	Treatment	Estimated Cost	Priority Rating
4	Gore Road	Sideroad 20 South	Valens Road	2606.6	1000-1999		42.2	NOW Resurface	PR1	$983,000	101.4
139	Watson Road South	Hume Road	Maltby Road East	2041.7	2000-2999		47.8	NOW Resurface	PR2	$1,009,000	99.9
6	Gore Road	Concession 7	Lennon Road	959.1	1000-1999		51.8	1- 5 Years	PR1	$362,000	84.5
5	Gore Road	Valens Road	Concession 7	1526.6	1000-1999		54.2	1- 5 Years	PR1	$576,000	80.4
37	Concession 2A	Concession 2	Concession 7	235.3	500-999	Y	47.1	NOW Resurface	PR2	$117,000	78.5
126	Victoria Road South	County Road 34	Maltby Road East	2074.1	4000-4999		68.3	6 - 10 Years	PR2	$1,025,000	72.8
18	Concession 1/Leslie Rd W	Concession 7	Highway 6	2350.3	1000-1999		58.6	1- 5 Years	PR1	$887,000	72.6
33	Concession 2	Sideroad 10 South	County Road 35	2063.5	500-999		51.9	1- 5 Years	PR1	$778,000	71.5
35	Concession 2	Sideroad 20 South	Sideroad 25 South	2050.2	500-999	Y	54.2	1- 5 Years	PR2	$1,013,000	68.0
90	Roszell Road	Forestell Road	Concession 4	993.8	1000-1999		61.9	1- 5 Years	PR1	$375,000	66.8
34	Concession 2	County Road 35	Sideroad 25 South	2096.2	500-999		55.9	1- 5 Years	PR1	$791,000	64.9
54a	Roszell Road	Concession 4	Townline Road	1369.1	1000-1999		64.2	1- 5 Years	PR1	$517,000	64.2
3	Gore Road	County Road 35	Foreman Road	2067.0	1000-1999		66.4	6 - 10 Years	PR1	$212,000	61.8
115	Concession 7	Concession 2A	Mason Road	428.2	3000-3999	Y	71.4	6 - 10 Years	PR2	$479,000	61.7
12	Concession 1	Townline Road	transition	1269.2	1000-1999		66.7	6 - 10 Years	PR1	$780,000	60.5
212a	Winer Road	McLean Road	Nicholas Beaver Road	785.8	**200-499**	**Y**	53.8	1- 5 Years	PR2	$389,000	57.5
38	Mason Road	Concession 7	End	222.6	50-199		43.3	NOW Resurface	PR1	$84,000	56.9
148	Puslinch-Flamborough Townline	Leslie Road West	Township Limits	301.4	50-199		43.3	NOW Resurface	PR1	$114,000	56.9
14	Concession 1	Sideroad 10 South	County Road 35	2068.7	1000-1999		68.8	6 - 10 Years	PR1	$780,000	56.7
13a	Concession 1	transition	transition	2112.9	1000-1999		68.8	6 - 10 Years	PR1	$797,000	56.6
			Total:	**29.6**	**kms**					**$12,068,000**	

The Priority Ranking should only be used to assist in the prioritization and development of the annual Capital program. An optimal approach will be different for any given municipality, as there are other factors that need to be considered such as available budgets, truck traffic, road continuity, roads with isolated and especially poor condition, safety considerations, other planned or necessary construction activities (e.g., land development, sewer replacement), or site-specific conditions such as geometric deficiencies.

A listing of all paved road sections and associated treatment needs and costs, and Time of Need and Priority Rating is provided in **Appendix K**. This list will aid the Township in developing its capital program.

8 TRAFFIC MANAGEMENT POLICIES

8.1 TRAFFIC CALMING

8.1.1 Introduction

8.1.1.1 Purpose

The **Traffic Calming Policy** is intended to aid the Township in assessing the merit of installing traffic calming measures on Township roads. The policy:

- Identifies locations where traffic calming may and may not be appropriate;
- Outlines the steps to be completed in responding to a request for traffic calming; and,
- Provides guidance on the selection and design of traffic calming measures.

The Wellington County Official Plan notes local roadways include both urban and rural roadways under the jurisdiction of a local municipal government. Section 12.5.4 c) of the plan states that "local roads will be improved through widenings, intersection improvements, signalization daylight triangles, turning lanes, tapers and traffic calming devices where required." That said, Section 12.5.4 a) indicates that "rural roads laid out along original township concession and lot lines often provide important collector functions and operate at reasonably high speeds. These routes need to be protected from strip development, access points with poor visibility and other conditions which would impair their functions." This infers traffic calming measures will be more appropriately applied on urban roads rather than rural roads in the Township. Further the Official Plan encourages walking and cycling both as a means of travel and for recreation (Sections 12.2 and 12.3), with the plan policies focussing on the provision of supportive facilities in urban areas of the Township.

8.1.1.2 Objectives

The *Canadian Guide to Traffic Calming* describes traffic calming as "the process and measures applied by road authorities to address concerns about the behaviour of motor vehicle drivers travelling on streets within their jurisdictions." [1] Such measures are usually applied on roads experiencing excessive vehicle speeds and/or high volumes of shortcutting traffic.

Municipalities implement traffic calming measures to enhance community livability, reduce aggressive driving, and improve road safety, particularly for vulnerable users such as pedestrians and cyclists. The application of traffic calming is intended to restore streets to their desired function, which will depend on the location and classification of the roadway. Most Township roads are intended to serve local traffic and are not designed to carry higher volumes of traffic, especially trucks, at higher speeds.

This policy broadly categorizes traffic calming measures into two groups being:

- **Physical Measures**, which primarily consist of vertical and horizontal deflections in the roadway. This group also includes treatments that narrow the roadway, alter the road surface, and restrict access; and
- **Non-Physical Measures**, which include tools and strategies designed to influence or modify driver behaviour. This group is often described as education and enforcement.

The Traffic Calming Toolbox (see **Appendix L**) provides further information on the physical and non-physical traffic calming measures applicable for use in the Township.

When applied properly, traffic calming can help "reduce the negative effects of motor vehicle use, alter driver behaviour, and improve conditions for non-motorized street users" [2] by decreasing:

- Motor vehicle speeds;

- Traffic volumes;
- Shortcutting (traffic infiltration);
- Conflicts between roadway users;
- Pedestrian crossing distances and times; and
- Risk and severity of motor vehicle collisions.

However, traffic calming measures, especially physical devices, can be costly and time-consuming to design, install, and maintain if used inappropriately. The installation of traffic calming measures can also cause unintended consequences, such as:

- Increased emergency vehicle response times;
- Reduced or impeded vehicle access to neighbourhoods;
- Shifting or diverting shortcutting and/or speeding concerns onto other roadways;
- Higher maintenance costs for services such as snow clearing and curbside waste collection; and
- Increased vehicle emissions, noise pollution, and/or visual intrusion.

Careful consideration and proper planning, design, and implementation are key to the success of a traffic calming plan.

8.1.1.3 Scope

This Traffic Calming Policy defines the municipal position on the application of traffic calming measures on Township roads. The policy features:

- A neighbourhood driven process for receiving, evaluating, and responding to citizen requests for traffic calming, including a typical community engagement protocol;
- A methodology and evaluation criteria for determining if traffic calming is appropriate for a given street and a protocol for prioritizing locations recommended for implementation;
- A list of proven traffic calming measures (the “toolbox”); and
- A procedure for monitoring and assessing the effectiveness of traffic calming measures after installation.

The policy combines best practices in traffic calming with local context to provide an appropriate, efficient, and flexible framework for addressing traffic-related inquiries received by the Township. It supplements guidance contained in the *Canadian Guide to Traffic Calming* and *Geometric Design Guide for Canadian Roads*. The policy also reflects applicable Provincial legislation including the *Accessibility for Ontarians with Disabilities Act* (AODA) and the *Highway Traffic Act* (HTA). The planning, design, and implementation of Traffic Calming Plans on roads in the Township of Puslinch must comply with relevant provisions of these and other statutes.

8.1.2 Traffic Calming Policy Statement

8.1.2.1 Application of Traffic Calming

The Township may implement traffic calming measures on roads under its jurisdiction based on the provisions of this policy.

The Township will typically apply non-physical traffic calming measures before implementing physical measures.

If non-physical measures prove ineffective or inappropriate under the circumstances, the Township will consider the installation of physical traffic calming measures on its roads:

- Where there is a demonstrated safety, excessive speed, and/or shortcutting traffic concern; and

- After exploring opportunities to improve operation of the County road and/or Provincial highway networks.

The Township may also consider implementing traffic calming measures, pursuant to **Section 8.1.2.5**:

- In new developments as part of the development approval process; and
- On road reconstruction projects where safety, excessive speed, and/or shortcutting traffic concerns are anticipated to occur upon (re)opening the road to traffic after construction.

The Township will not install traffic calming measures on streets in new subdivision plans until they have been assumed by the municipality. Measures may be installed by others during the development phase if approved by the Township.

Where the installation of physical traffic calming measures is deemed the preferred course of action, the Township will:

- Determine whether an area-wide plan or street-specific plan is more suitable. An area-wide plan will be pursued if a street-specific plan would likely result in the displacement of traffic onto adjacent streets.
- Take into consideration the needs of non-motorized modes of transportation when developing the Traffic Calming Plan. Measures will typically be designed to minimize impacts to pedestrian and cyclist movement and enhance the experience of these users.

Traffic calming measures may not be appropriate in every situation and, if considered for implementation, should ensure the equitable and consistent treatment of all street users following the guidance in this document.

8.1.2.2 Responsibilities

The Director of Public Works, Parks, and Facilities (the Director), or designate, will apply the Traffic Calming Policy on behalf of the Township of Puslinch through Traffic Calming Studies led by the Public Works, Parks, and Facilities Department. Other Township departments, external agencies, and consultants, if required, may partake in these studies at the request of the Director or designate. Members of Township Council, residents, businesses, and interested groups may also participate in the study process, as noted in **Section 8.1.3.3**.

8.1.2.3 Initiating a Traffic Calming Study

The Township may initiate a Traffic Calming Study following the process illustrated in **Figure 3** and described in **Section 8.1.3** for streets meeting all screening criteria listed in **Table 25**. Requests for a study that do not satisfy these minimum thresholds will be denied. See Stage 2 of the study process for further guidance on the initial screening.

Table 25: Screening Criteria for Traffic Calming Study

Criteria	Threshold	A Traffic Calming Study may be considered if:
Previously Requested	Within Last Three Years	A prior request for traffic calming on the subject street has not been denied within the last three years
Measures Removed	Within Last Five Years	Traffic calming measures have not been removed from the subject street within the last five years
Roadway Classification	Township Road	The subject street is under the Township's jurisdiction
Location	Primary Fire Routes	The subject street does not serve as a primary fire route in the Township
Speed Limit	≤ 50 km/h	The posted speed limit on the subject street is 50 km/h or less

Criteria	Threshold	A Traffic Calming Study may be considered if:
Road Grade	≤ 8%	The grade of the subject street is less than 8%
Segment Length	≤ 150 metres	The distance between stop-controlled intersections along the subject street is 150 metres or more
	Are All Criteria Met?	**Yes/No**

Per the screening criteria in **Table 25**, the Township will not entertain new requests for a Traffic Calming Study for a period of at least:

- Three years on streets reviewed and denied for physical traffic calming at any stage in the process (unless otherwise specified in **Section 8.1.3**); or
- Five years on streets where traffic calming measures have been removed (see **Subsection 8.1.2.7**).

8.1.2.4 Required Neighbourhood Support

For most Traffic Calming Studies, the Township will gauge the level of resident support to proceed to subsequent stages in the study process through a neighbourhood survey. For each survey, the Township must receive a response for at least 25% of all eligible households (response rate), with at least 51% of those households responding in the affirmative (support rate), for the study to proceed to the next step. The Township may deviate from the minimum response and/or support rates on a study-specific basis if the Director or their designate deems the revised rate(s) more representative for the study area. Survey responses not meeting the minimum thresholds will typically result in the Township ending the Traffic Calming Study. See Stages 4, 5, and 7 of the Traffic Calming Study process set out in **Section 8.1.3** for further guidance on the application of these criteria.

The Township will issue only one survey questionnaire to each household within the study area regardless of the number of residents living at the address.

8.1.2.5 Other Triggers to Implement Traffic Calming

Traffic calming measures may also be implemented through land development and road reconstruction projects. In both cases, measures will still be selected from the Traffic Calming Toolbox provided in **Appendix L** and approved by the Township. The resulting traffic calming installation will also be monitored and evaluated after implementation following the procedures described in Stage 9 of the Traffic Calming Study process set out in **Section 8.1.3**.

New Development

The Township may require the implementation of traffic calming measures through the land development process, typically as a condition of approval for a Plan of Subdivision or Site Plan Control application. The Township may request proponents to investigate the need for changes to the street network, including consideration of traffic calming measures, as part of the Transportation Impact Assessment completed in support of the proposed development. This may include traffic calming measures on existing roads to mitigate anticipated negative impacts of the development and on planned roads within the development to avoid potential issues in the future. In most cases, the Township will require the proponent to finance all costs to implement the measures.

Road Reconstruction Projects

The Township may install traffic calming measures as part of a road reconstruction project where safety, excessive speed, and/or shortcutting traffic concerns are anticipated upon (re)opening the road to traffic after construction. Combining traffic calming projects with other planned works can reduce costs and lessen

community impact and intrusion caused by construction activity. The Township will generally follow the process set out in **Section 8.1.3** in developing the Traffic Calming Plan component of the integrated project.

8.1.2.6 Trial Installations

The Township will typically implement the recommended Traffic Calming Plan on a trial basis using temporary/seasonal measures before installing the permanent solution. This approach enables the Township to:

- Better understand the plan's impacts and effectiveness before investing in a permanent installation, thereby allowing for refinement of the final design and avoidance of "throwaway" costs;
- Avoid or defer the initial capital cost of more expensive permanent installations;
- Gauge community reaction prior to permanent installation; and
- Retain flexibility to remove traffic calming measures seasonally.

Products typically used for temporary/seasonal traffic calming installations include:

- Removable rubber products (e.g., curbing, speed humps, tables, cushions);
- Removable/flexible posts and bollards;
- Painted pavement markings;
- Regulatory, warning, and informational traffic signs; and
- Temporary speed display boards.

In certain circumstances, the Township may proceed with permanent installation, without a trial application, after considering the possible negative aspects and outcomes of using temporary/seasonal measures, which can include:

- Lower relative aesthetic value;
- On-going operational costs and/or additional operational resource requirements;
- Challenges with winter maintenance;
- Requirements for seasonal installation and removal;
- Potential to have similar or higher overall costs than permanent installations;
- Potentially lower effectiveness than permanent materials; and
- Quicker degradation of roadway surfaces, specifically where measures are anchored into existing road surfaces.

8.1.2.7 Reconsideration and Removal

The Township may consider the removal of permanent traffic calming installations if a majority of residents (51%) directly fronting the subject street support the request. The approved Traffic Calming Plan must be installed for at least three years before removal can be requested. If the measures are removed, residents of the subject street must wait at least five years before submitting a new request for traffic calming. See Stage 9 of the Traffic Calming Study process set out in **Section 8.1.3** for further information on the resident-initiated removal process.

If requested to remove only a portion of an approved Traffic Calming Plan, the Township may choose to remove the entire installation if the proposed changes significantly degrade or compromise the effectiveness and/or safety of the remaining measures or cause unintended consequences that cannot be rectified to the municipality's satisfaction. In most cases, the plan is designed to function with all measures in place.

The Township reserves the right to remove traffic calming measures deemed ineffective, causing a safety risk, and/or creating unintended consequences that cannot be rectified to the municipality's satisfaction. This may include the diversion of traffic onto a parallel or adjacent Township road rather than onto the County road and/or

Provincial highway network. See Stage 9 of the Traffic Calming Study process set out in **Section 8.1.3** for further information on the Township-initiated removal process.

8.1.2.8 Use of Regulatory Traffic Signs for Traffic Calming

Consistent with the guidance contained in the *Canadian Guide to Traffic Calming*, the Township will not use the following types of regulatory traffic signs for the sole purpose of traffic calming:

All-Way Stop Control

The purpose of an all-way stop is to assign right-of-way between vehicles approaching an intersection from different directions when traffic signals are not warranted or not yet installed. All-way stop control should not be used:

- Where the protection of pedestrians, particularly school children, is a prime concern. Other measures can address this concern more effectively;
- As a speed control device; and/or
- As a means of deterring the movement of through traffic in a residential area.

Using all-way stops indiscriminately can lead to increased driver delay and frustration, greater speeding between intersections, increased noise from vehicle acceleration, increased emissions from vehicles forced to stop and idle, and reduced compliance with all-way stop control, both at the subject location and in general. Even when justified, all-way stops can increase the risk of certain collision types, most notably rear-end crashes.

The Township will follow the provincially recommended guidelines set out in Ontario Traffic Manual (OTM) *Book 5 – Regulatory Signs* in assessing the justification for all-way stop control on roads under its jurisdiction. These warrants consider vehicle and pedestrian volumes, traffic distribution (percent of vehicles on the major street versus the minor street), and collision history to determine the merit of installing an all-way stop.

Speed Reduction and Movement Restriction

Regulatory signs intended to control vehicle speeds (e.g., speed limits, Community Safety Zones) or restrict traffic movements (e.g., turn prohibitions, one-way streets) often require enforcement to achieve driver compliance and ensure effectiveness. For this reason, the TAC *Canadian Guide to Traffic Calming* recommends using these signs only to supplement and reinforce desired driver behaviour and not as traffic calming measures on their own.

The Township will follow the guidance contained in the complementary **Speed Limit Policy** and **Community Safety Zone** Policy in assessing requests for speed limit changes and Community Safety Zones, respectively, on roads under its jurisdiction.

8.1.3 Traffic Calming Study Process

8.1.3.1 Study Process

Figure 3 illustrates the process for responding to resident-initiated requests for traffic calming on Township roads primarily in Hamlet Areas and Urban Centres defined on Schedule A7 (Puslinch) of the Wellington County Official Plan. The Township will review traffic calming requests for areas outside Hamlet Areas and Urban Centres on a case-by-case basis to determine if the location would be a candidate for traffic calming (see **Table 25**) or would be better served by alternative strategies (such as the Speed Limit and Community Safety Zone Policy or the Truck Route Policy). The Traffic Calming Study process, which involves both engagement and technical tasks, can be distilled into the following nine stages. The Township will administer the process:

Stage 1 – Traffic Calming Request

Residents will submit their written request for a Traffic Calming Study to the Township's Public Works, Parks, and Facilities Department using the Community Traffic Issue Reporting Form in **Appendix M**. The requester must specify the subject street and the nature of the traffic concern. Members of Township Council can also request a study on behalf of their constituents.

Stage 2 – Initial Screening

Township staff will screen the request to determine if the subject street meets all criteria for a Traffic Calming Study per **Table 25**. Requests not satisfying these minimum thresholds will be denied and the process ended. In some locations, the Township may consider non-physical traffic calming measures such as education and enforcement to address resident concerns as an alternative or a first step.

After completing the initial screening, Township staff will notify the original requester whether the location satisfies the minimum thresholds for a Traffic Calming Study and, if so, outline the next steps in the process. If denied, Township staff will provide an explanation as to why the request was refused.

Stage 3 – Technical Assessment

Township staff will assess requests satisfying the initial screening to gauge the potential benefit of installing physical traffic calming measures on the subject street. The point system shown in **Table 26** provides the basis for assessing requests, with top priority given to projects achieving the highest scores. The maximum score, calculated by summing the individual criteria points, is 100 points based on this methodology.

Township staff will assign a point score to each criterion in **Table 26** based on traffic and road condition data. The Township will typically collect the data required to complete the technical assessment in the spring, summer, and/or fall season. Requests received in the winter season will be investigated in the spring.

Requests meeting a minimum score of 40 points for the technical criteria (out of 100) will proceed to a neighbourhood survey in Stage 4. Requests not attaining this minimum threshold will only be considered for non-physical traffic calming measures such as education and enforcement.

Stage 4 – Neighbourhood Survey

Township staff will survey households within the study area to gauge resident support for developing a Traffic Calming Plan for the subject street. Key considerations when defining the study area include:

- Subject street (segment(s) of concern);
- Traffic data;
- Location and context of sensitive land uses near, or adjacent to, streets of interest;
- Other Township policies;
- Opportunities and limitations such as available resources and partnerships; and
- Environmental factors (e.g., geographic features, major streets, key intersections).

The study area will typically comprise households with direct frontage on the subject street but may be expanded capture households on other streets, especially if shortcutting traffic is the primary concern and traffic diversion is a possible outcome.

Requests meeting the minimum response and support rates per **Section 8.1.2.4** will be considered for plan development in Stage 5. Requests not attaining these thresholds will be denied and the process ended. The Township will also not entertain a new request for a Traffic Calming Study on the subject street for a period of at least three years. Township staff will inform study area households of the survey results and next steps.

Figure 3: Traffic Calming Study Process

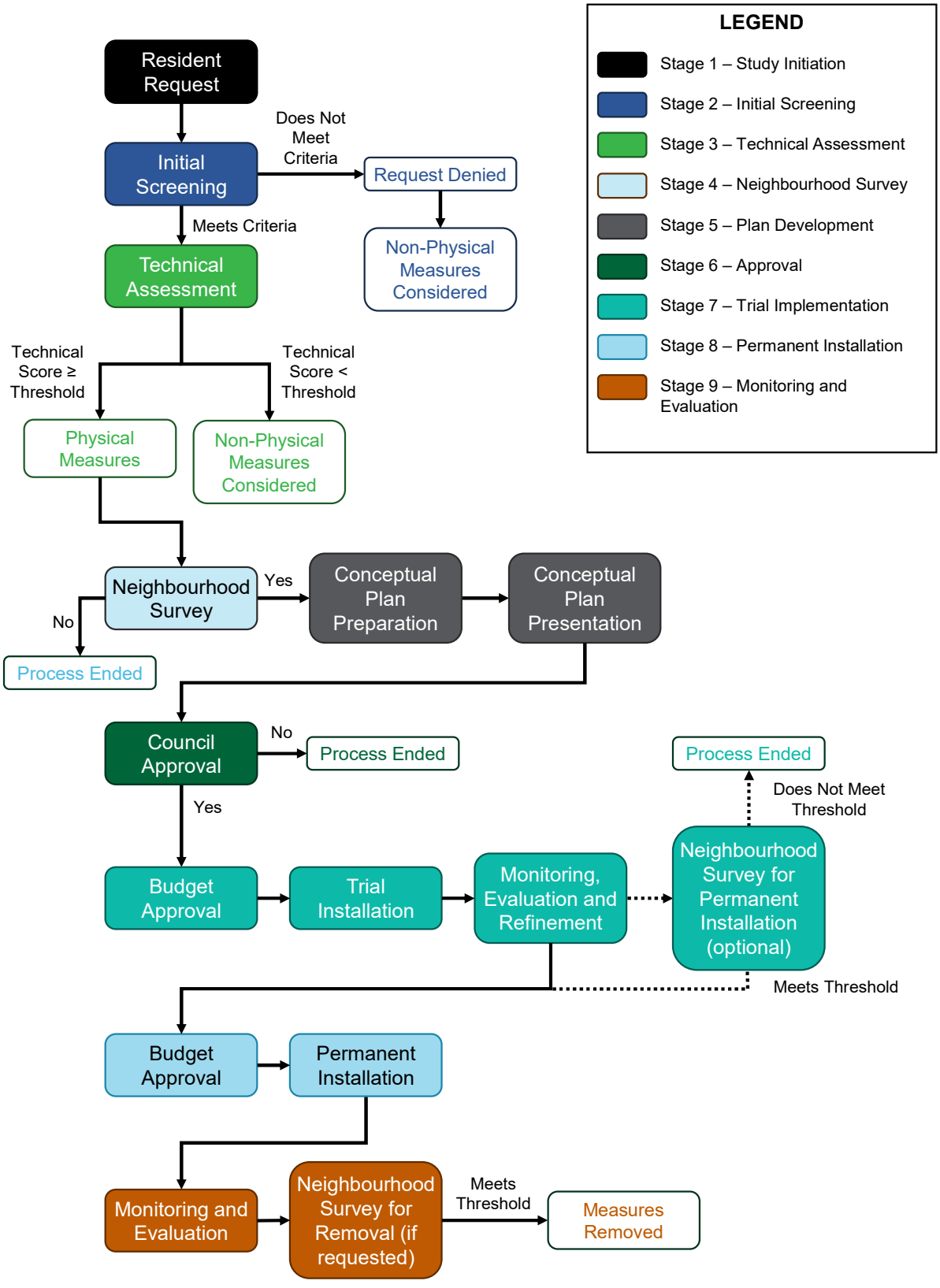


Table 26: Technical Assessment and Prioritization Criteria

Criteria	Point Assignment	Maximum Points
Vulnerable Road Users	5 points for each adjacent pedestrian and/or cycling generator within the study area (e.g., school, park, playground, recreation centre, senior's home, library, shopping centre, place of worship, etc.)	20
Pedestrian and Cycling Facilities	5 points if no sidewalks on the subject street 5 points for designated cycling facilities on the subject street	10
Residential Frontage	5 points for primarily (more than 50%) residential frontage on subject street	5
Cut-Through Traffic[1]	5 points if 25% plus 5 points for each 10% increment thereafter	15
Total Traffic Volumes[2]	1 point for every 100 vehicles per day	15
Speed[3]	1 point for every: • 1 km/h over the posted speed limit; and • 1% of vehicles observed 10 km/h or more over the posted speed limit	30
Collision History[4]	1 point for each qualifying collision over the last three years	5
	Minimum Total Score to Proceed	**40 (out of 100)**

Notes:

1. See **Section 8.1.3.2** to estimate the percentage of cut-through (non-local) traffic.
2. Traffic volumes used in the evaluation are two-way average daily volumes over a 24-hour period.
3. The 85th percentile speed is calculated from data collected using automated traffic recorders (or similar units) over a 24-hour period.
4. Includes all collisions along the subject street except for collisions occurring at intersections with County roads or Provincial highways and collisions involving animals.

Stage 5 – Plan Development

Township staff will initiate development of a Traffic Calming Plan for the subject street contingent on available financing and staff resources. Multiple requests may be prioritized based on the scores from Stage 3.

The toolbox of measures contained in **Appendix L** will be referenced in selecting and designing traffic calming treatments. The Township will typically select speed humps/tables for most traffic calming installations unless site-specific conditions/considerations do not support their use. Other measures from the Traffic Calming Toolbox may be applied in such instances. Data collected during earlier stages, in addition to site visits, historical information, future maintenance and construction plans, and participant feedback, will be considered in preparing the plan. The Township may consider rural traffic calming measures in conjunction with a speed limit review following the Speed Limit and Community Safety Zone Policy.

The Township will develop the Traffic Calming Plan in consultation with residents and stakeholders following the three-step process below:

- Step 1: Consult with residents and stakeholders to confirm traffic issues, note potential implementation challenges, and identify candidate traffic calming measures.
- Step 2: Prepare conceptual Traffic Calming Plan (options) taking into consideration resident and stakeholder input.

- Step 3: Present conceptual Traffic Calming Plan (options) to residents, incorporate feedback received, and finalize the proposed plan (options).

Stage 6 – Council Approval

Township staff will present the proposed Traffic Calming Plan to Township Council for approval. Council may suggest changes to the plan in considering approval (e.g., cost, design, funding source).

If the plan is not approved, the Township will not entertain new requests for a Traffic Calming Study from residents on the subject street for a period of at least three years.

Stage 7 – Trial Implementation

Township staff may propose trial traffic calming installations for the coming year through Capital Budget preparation. Locations will be selected and prioritized based on the point score calculated through the technical assessment in Stage 3.

Upon budget approval, Township staff will implement the approved Traffic Calming Plan for a period of up to 24 months, at the discretion of the Director, using temporary/seasonal materials per **Section 8.1.2.5**. Township staff will notify study area households of the intention to install the traffic calming measures on a trial basis prior to implementation.

The Township will monitor the effectiveness of the installation and make minor refinements, if needed, during the trial period. The modifications should not alter the intent or key features of the recommended Traffic Calming Plan unless a significant operational and/or safety concern arises following installation.

As the trial period closes, Township staff will evaluate the success of the trial installation and identify potential refinements if the Traffic Calming Plan is being considered for permanent installation. The scope of the evaluation should be consistent with the investigations conducted prior to installation to allow “before/after” or “cause/effect” comparisons. Potential studies may include speed surveys (to assess change in vehicle speeds), traffic counts (to determine changes in volumes), and/or origin-destination surveys (to estimate the volume of traffic diverting to adjacent streets). The evaluation should also consider winter operating conditions.

The Traffic Calming Plan should not cause transference of traffic from the subject street to adjacent Township roads. If evaluation studies indicate traffic volumes have increased by 15% or more (with a minimum of 100 vehicles per day) on an adjacent Township road after implementing the traffic calming measures, the Township will consider corrective action to remedy the situation or reconsider permanent installation.

The Township may survey study area households to gauge support before making the Traffic Calming Plan permanent, subject to any plan refinements identified through monitoring and evaluation. The thresholds for defining broad-based neighbourhood support noted in **Section 8.1.2.4** apply (i.e., minimum of 51% support from at least 25% of all eligible households within the study area). The Township may also consult with study area residents and/or stakeholders in determining whether to install the plan permanently, including publishing the findings of the monitoring and evaluation program online.

After reviewing the technical and public/stakeholder input, Township staff will recommend the retention, removal, or alteration of the Traffic Calming Plan to Township Council.

Stage 8 – Permanent Installation

Township staff may propose permanent traffic calming installations for the coming year through Capital Budget preparation. Locations will be selected based on their relative priority and included in the Capital Budget request presented to Township Council with a high-level cost estimate for implementation.

Upon budget approval, Township staff will prepare detailed design and construction tender documents if required and implement the approved Traffic Calming Plan with permanent materials, subject to available resources. Township staff will inform study area households of the intention to install the traffic calming measures permanently prior to implementation.

Stage 9 – Monitoring and Evaluation

Township staff will continue to monitor the subject street (and entire study area as required) after implementation of the permanent installation to ensure the approved Traffic Calming Plan functions as designed. The monitoring process will also identify any unintended impacts on the surrounding road network and the need for potential refinements and/or remedial measures.

The scope of the post-implementation evaluation should be consistent with the investigations conducted prior to installation. Potential studies may include speed surveys (to assess change in vehicle speeds), traffic counts (to determine changes in volumes) and/or origin-destination surveys (to estimate the volume of traffic diverting to adjacent streets).

The Traffic Calming Plan should not cause transference of traffic from the subject street to adjacent Township roads. If post-implementation evaluation studies indicate traffic volumes have increased by 15% or more (with a minimum of 100 vehicles per day) on an adjacent Township road after implementing the traffic calming measures, the Township will consider corrective action to remedy the situation and/or minimize the impact.

In certain instances, the Township may wish to remove permanent traffic calming installations determined through post-implementation evaluation to be ineffective, causing a safety risk, and/or creating unintended consequences that cannot be rectified to the municipality's satisfaction. Township staff will notify study area households of the intended action by mail and through a posting on its website. The Township may consult with study area residents and/or stakeholders, and if needed, survey study area households to obtain their views on removing the permanent installation. If removal remains the preferred course of action, Township staff will prepare a report to Township Council and, if approved, take the necessary steps to return the subject street to its configuration prior to the Traffic Calming Plan. Township staff will inform study area households of the intention to eliminate the traffic calming measures prior to removal.

Residents can also request the removal of permanent traffic calming installations in place for at least three years pursuant to **Section 8.1.2.7**. Township staff will evaluate the request and survey study area households to gauge support for removing the permanent measures. Requests not meeting the thresholds for broad-based neighbourhood support noted in **Section 8.1.2.4** (i.e., minimum of 51% support from at least 25% of all eligible households within the study area) will be denied. The Township will also consult with study area residents and/or stakeholders in determining whether to remove the measures.

If the request is supported by affected residents, Township staff will prepare a report to Township Council and, if approved, take the necessary steps to return the subject street to its configuration prior to the Traffic Calming Plan. Township staff will inform study area households of the intention to eliminate the traffic calming measures prior to removal. If the request is not supported by residents or refused by Township Council, the Township will not entertain a new request for removal of the approved Traffic Calming Plan for a period of at least five years. Township staff will inform study area households of the results and any further steps.

8.1.3.2 Estimating Cut-Through Traffic

When applying **Table 26**, the Township will estimate the percentage of cut-through (non-local) traffic on the subject street using one of the following methods, listed in order from least to most complex/resource intensive/accurate. Select the technique providing the necessary level of precision for the least effort, with Method 1 or Method 2 typically used earlier in the study process (Stage 2 – Initial Screening and Stage 3 –

Technical Assessment) and Method 3 in the later stages (Stage 7 – Trial Implementation and Stage 9 – Monitoring and Evaluation):

Method 1 – Simplified Trip Generation Calculation

Approximate the percentage of cut-through traffic in predominately residential areas using the following formula:

$$Percentge\ Cut\text{-}Through\ Traffic = \frac{(ADT - (\ 10\ x\ Dwellings))}{ADT}$$

Where **ADT** is the recorded Average Daily Traffic volume (vehicles per day) and **Dwellings** is the number of houses on the subject street.

Each dwelling on the subject street is assumed to generate 10 vehicle trips per day, roughly the weekday trip generation rate for a single-family detached dwelling cited in the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*. The percentage of cut-through traffic on the subject street should be measured between main intersections or entry points into the study area.

Method 2 – Study Area Trip Generation Calculation

Determine the daily or peak hour trip generation potential of the study area based on its land uses and ITE *Trip Generation Manual* rates. Compare the projected volume of trips to the recorded ADT or peak hour traffic counts to calculate the percentage of cut-through traffic. Similar in approach to Method 1, this method can be used for study areas that feature a range of land uses, like residential, commercial, schools and parks, for example.

Method 3 – Origin-Destination Study

Record vehicle license plates at all entry and exit points to the study area manually or using digital technology. Match the license plates of vehicles entering and exiting. Determine the percentage of vehicles passing through the study area compared to those that begin or end their trip within the zone.

8.1.3.3 Engagement and Communication

Resident and stakeholder involvement plays a vital role in the Traffic Calming Study process. Active and robust participation helps foster support (and avert opposition) for potential traffic calming measures and ultimately aids in ensuring a positive outcome. Township Council is also more inclined to approve a Traffic Calming Plan that has demonstrated resident and stakeholder involvement and support than one met by negative opinion.

The Township will engage with residents and stakeholders impacted by potential traffic calming measures in a consistent and meaningful manner throughout the Traffic Calming Study process. Parties potentially impacted will:

- Have the opportunity to participate in developing and providing input on proposed solutions;
- Be provided with convenient and accessible methods to participate in the study and offer feedback;
- Be provided with relevant technical information to provide informed input;
- Feel that the process is open, understandable, transparent, and inclusive;
- Understand what is (and is not) considered within the project scope; and
- Understand how their feedback has influenced the decision-making process, including why specific suggestions were (or were not) included.

There may be instances when traffic calming measures are warranted, but affected residents have conflicting opinions on the preferred approach to addressing the identified concerns. In these circumstances, the Township may need to conduct additional engagement and further outreach with the potentially impacted residents to

address the situation. Similarly, stakeholders, including emergency responders and other Township departments, may have concerns specific to their mandates requiring further dialogue and resolution.

As noted, the Township will engage two primary groups in the Traffic Calming Study process being:

- **Residents** – Includes all households in the study area as defined by Township staff in Stage 4 of the Traffic Calming Study process.
- **Stakeholders** – Includes emergency responders (Township of Puslinch Fire Services, Ontario Provincial Police, and Wellington County/Township Paramedics). Also includes school councils, resident associations, and other community groups with a mandate specific to the neighbourhood (not Township-wide).

It is expected that most requests for traffic calming will originate from the community, signalling their involvement from the beginning of the Traffic Calming Study. Decision-makers may also engage residents and stakeholders.

Points in the Traffic Calming Study process where the Township will engage with residents and stakeholders include:

- Stage 4 – Neighbourhood Survey
  - Survey to gauge resident support for developing a Traffic Calming Plan for the subject street.
- Stage 5 – Plan Development
  - Step 1: Consultation with residents and stakeholders to confirm traffic issues, note potential implementation challenges, and identify candidate traffic calming measures.
  - Step 3: Consultation with residents to present conceptual Traffic Calming Plan (options) and receive feedback to be considered in preparing the proposed plan (options).
- Stage 7 – Trial Implementation
  - If necessary and appropriate, survey to gauge resident support for implementing the approved Traffic Calming Plan with a permanent installation.
  - If necessary and appropriate, consultation with potentially impacted residents and stakeholders prior to implementing the approved Traffic Calming Plan.
- Stage 9 – Monitoring and Evaluation (if necessary and appropriate)
  - Survey to gauge resident support for removing an installed Traffic Calming Plan.
  - Consultation with potentially impacted residents and stakeholders prior to removing an installed Traffic Calming Plan.

The Township will undertake communication activities to support the Traffic Calming Study. Communication will occur throughout the study process, specifically:

- After initial screening in Stage 2 to notify the original requester whether the location satisfies the minimum thresholds for a Traffic Calming Study;
- After each neighbourhood survey to inform residents of the results and next steps;
- Two-weeks in advance of any engagement opportunity (i.e., survey, workshop, etc.);
- When traffic calming measures are to be installed, whether trial or permanent installation; and
- If traffic calming measures are to be removed, whether trial or permanent installation.

The above communications should be distributed to affected residents and stakeholders via mail and/or email and posted on the Township's website. The Township will also use the Engage Puslinch engagement site [https://engagepuslinch.ca/] as a "one-stop portal" and landing page for all project-related information and online traffic calming engagement efforts. The Township may also include these communications on their social media feeds and in local newspapers, as deemed appropriate. Distribution methods will depend on the size and nature of the study area.

8.1.4 Traffic Calming Toolbox

The *Canadian Guide to Traffic Calming* identifies a broad range of traffic calming techniques. From this catalogue of options, the Township has established a shortlist of potential traffic calming measures for use in Puslinch.

Appendix L provides the "toolbox" of traffic calming measures with a description and photo of each treatment. The Traffic Calming Toolbox notes where the measures are applicable and summarizes potential traffic calming benefits and other implementation considerations. The toolbox also includes a process for selecting the most appropriate traffic calming treatments from the list of potential measures. Indicative costs and design guidance are provided as well.

Applying the toolbox consistently will assist the Township in selecting appropriate measures to address specific community traffic issues and help to avoid the undesirable consequences of traffic calming noted in **Section 0**. It is important to note that not all traffic calming measures are appropriate under all circumstances. Selection of suitable measures will depend on the specific issues being addressed and careful consideration of site-specific conditions. The Township may consider rural traffic calming measures in conjunction with a speed limit review following the Speed Limit and Community Safety Zone Policy.

8.2 SPEED LIMIT AND COMMUNITY SAFETY ZONE POLICY

8.2.1 Introduction

8.2.1.1 Purpose

The **Speed Limit Policy** and **Community Safety Zone Policy** are intended to provide the Township with clear, concise, and standardized processes for assessing community requests for lower speed limits and/or the placement of Community Safety Zones. The Speed Limit Policy will aid the Township in establishing consistent, enforceable, and safe speed limits on its roads. The Community Safety Zone Policy will assist the Township in identifying locations meriting heightened safety and enforcement.

8.2.1.2 Objectives

Speed Limits

Speed limits aid motorists in selecting safe operating speeds for the prevailing conditions, which will vary as roadway geometry, traffic demands, and road environment change. The selection of an appropriate posted speed limit must take into consideration legislative regulations, public recognition and understanding, ease of implementation, and adherence to recognized engineering standards and practices.

The *Highway Traffic Act* (HTA) establishes the regulatory framework for setting speed limits in Ontario. Section 128 (Rate of Speed), subsection (1) of the HTA defines the "default" limits as:

- 50 km/h on roads within a built-up area; and
- 80 km/h on roads not within a built-up area and within a local municipality that had the status of a township on December 31, 2002 (the Township of Puslinch falls into this category).

These provisions, commonly referred to as the urban and rural statutory speed limits, respectively, apply to all roads without MAXIMUM SPEED signs posted.

Section 128, subsection (2) permits municipal councils to prescribe rates of speed that differ from the statutory limits on roads under their jurisdiction. The speed limit set must be less than 100 km/h.

Section 128, subsection (2.1) allows municipalities to prescribe rates of speed lower than 50 km/h for all roads within a designated area. When the municipality posts gateway speed limit signs at entry and exit points to this designated area, all streets within that area assume the same speed limit.

Studies have shown that drivers will generally choose the speed that allows them to reach their destination as quickly as possible without endangering themselves, others, or their property. Posted speed limits are one factor, but not the only not the most important consideration for a motorist in selecting their operating speed. Other tools like increasing law enforcement presence, educating drivers on the risks of speeding, and/or changing the design of a roadway tend to be more effective and usually necessary to realize meaningful long-term change.

Community Safety Zones

Pursuant to Section 214.1 (Community Safety Zones, Municipal Highways) of the HTA, the Township can designate Community Safety Zones to denote locations of heightened safety and enforcement emphasis on its roads. Community Safety Zone signs inform drivers they are entering an area the community has deemed paramount to the safety of its children and citizens. These sections of roadway are typically near schools, day care centres, playgrounds, parks, hospitals, senior citizen residences and may also be used for collision-prone areas within a community. Traffic related offences committed within Community Safety Zones are subject to increased fines. Many set fines are doubled, including speeding and traffic signal related offences.

Designating Community Safety Zones enables the Township to focus resources and attention on specific locations where safety risk to vulnerable road users is highest. However, experience from other communities suggests the signs can be ineffective in some circumstances and benefits are not commensurate with the enforcement effort required.

Network and Other Considerations

The Township of Puslinch does not have its own Official Plan and relies on the Wellington County Official Plan for direction on the physical development of the municipality. [3] The Wellington County Official Plan does not define a road classification system beyond road jurisdiction. Higher order roads, most of which fall under the jurisdiction of Wellington County, function to provide capacity and mobility for traffic movement between the Township roads and Provincial highways. Roads under Township jurisdiction generally follow a standard grid, traverse rural terrain, and may or may not be hard surfaced. In the urban centres of Aberfoyle and Morriston and hamlet of Arkell more suburban style road networks exist.

8.2.1.3 Scope

The Speed Limit Policy and Community Safety Zone Policy include:

- A process for receiving, evaluating, and responding to citizen requests for speed limit changes;
- A process for establishing appropriate speed limits on Township roadways. Separate guidance is provided for urban and rural roads given their different characteristics and conditions;
- An evaluation methodology for undertaking speed limit assessments; and
- Criteria for establishing Community Safety Zones.

The policies supplement guidance contained in the Transportation Association of Canada (TAC) publications *Canadian Guidelines for Establishing Posted Speed Limits* and *Geometric Design Guide for Canadian Roads*. The document also reflects applicable Provincial legislation including the *Accessibility for Ontarians with Disabilities Act* (AODA) and the *Highway Traffic Act* (HTA).

8.2.2 Speed Limit Policy Statement

The Township will apply the methodology set out in the *Canadian Guidelines for Establishing Posted Speed Limits* in setting speed limits on its roads where noted. The recommended practice contained in this guidebook should be applied with sound engineering judgment.

This policy will apply to requests received for speed limit changes on Township roads. The Township should consider conducting a comprehensive speed limit review for all roads under its jurisdiction to minimize the number of such requests.

8.2.2.1 Urban Areas

The Township will maintain the statutory 50 km/h speed limit on Township roads in Hamlet Areas and Urban Centres defined on Schedule A7 (Puslinch) of the Wellington County Official Plan. If justified by analysis following the *Canadian Guidelines for Establishing Speed Limits*, the Township may consider a 40 km/h speed limit for road sections:

- Within a designated School Zone or Community Safety Zone;
- With unfavourable geometric characteristics and design speeds of 50 km/h or less (e.g., sight distance, horizontal or vertical curvature). Use of appropriate warning signs should be considered before changing the speed limit depending on length of the design feature; or
- With unprotected shared use pathways or cycling routes.

Area-wide (i.e., gateway) signing may denote the limits of speed zones comprising multiple roads in the same area.

Speed limit transition zones should be no less than 250 metres on Township roads. Refer to Ontario Traffic Manual (OTM) *Book 5 – Regulatory Signs* for guidance on the placement of speed limit signs within transition zones.

8.2.2.2 Rural Areas

The Township will maintain the statutory 80 km/h speed limit on Township roads outside the urban area designations shown on Schedule A7 (Puslinch) of the Wellington County Official Plan. If justified by analysis following the *Canadian Guidelines for Establishing Posted Speed Limits*, the Township may reduce speed limits for road sections:

- Within a designated School Zone or Community Safety Zone to 50 km/h;
- With unfavourable geometric characteristics and design speeds of 90 km/h or less (e.g., sight distance, horizontal or vertical curvature). The speed limit shall be set at or below the speed dictated by the geometric restriction, but no less than 50 km/h. Use of appropriate warning signs should be considered before changing the speed limit depending on the length of the design feature; or
- Where Township roads are within the area of influence of a County road with lower or higher posted speeds. The Township may consider increasing or decreasing the speed limit by 10 km/h on the Township road to bring its posted speed closer to the County road.

Speed limit transition zones should be no less than 500 metres on Township roads. Refer to Ontario Traffic Manual (OTM) *Book 5 – Regulatory Signs* for guidance on the placement of speed limit signs within transition zones.

The Township will not entertain requests for speed limit reductions on roads outside the Hamlet Areas and Urban Centres shown on Schedule A7 (Puslinch) of the Wellington County Official Plan solely to address concerns expressed by residents about the perceived safety of walking on the side or shoulder of the roadway.

8.2.3 Community Safety Zone Policy Statement

The Township may consider installing Community Safety Zones on a site-specific basis but will not actively pursue new locations for designation.

The Township may designate Community Safety Zones on Township roads meeting the three warrants defined in **Appendix N**. If justified, the Township will consider the following three factors before designating the zone, all of which depend on the nature and extent of the safety issue and are not prescribed by legislation:

- **Size:** A Community Safety Zone could encompass all streets surrounding a particular site or only a section of the street fronting the subject site.
- **Duration**: The Community Safety Zone should be removed once the identified concern is resolved.
- **Time Period**: A Community Safety Zone may be in effect during certain times of the day, days of the week, and/or months of the year.

8.2.4 Speed Limit and Community Safety Zone Review Process

Figure 4 illustrates the process for responding to resident-initiated requests for speed limit changes and/or Community Safety Zones on Township roads. The five-step process for completing the review is described below.

At any point, the Township may determine the traffic concerns cited could be better addressed using other measures and may decide to administer the request through a different process, such as the Township Traffic Calming Policy or the Township Truck Route Policy. Township staff will inform the resident(s) of this decision after completing the assessment. Residents will also be advised if their request is denied for any reason.

Step 1 – Resident Request

Residents with traffic-related concerns will submit their written request to the Township's Public Works, Parks and Facilities Department using the Community Traffic Issue Reporting Form in **Appendix M**. The requester must specify the subject street and the nature of the traffic concern. Requests received from residents living on the subject street will be given priority. Members of Township Council can also submit requests on behalf of their constituents.

Step 2 – Initial Screening

Township staff will conduct an initial screening of the request based on the following two questions to determine if the subject street satisfies the minimum criteria for a speed limit change and/or Community Safety Zone:

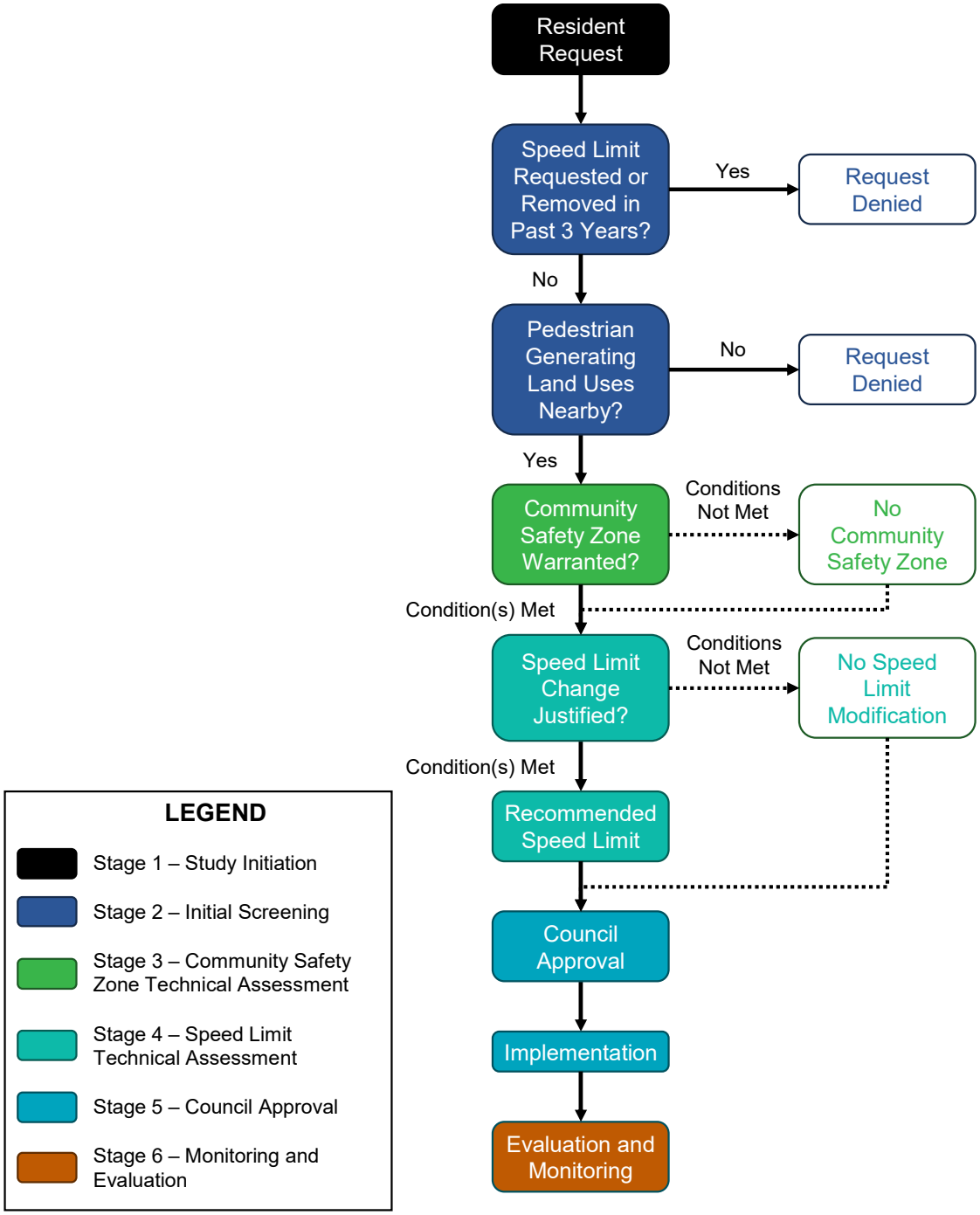
A. *Has a request for a Community Safety Zone and/or speed limit modification been received or implemented within the last three years?* If no, proceed to initial screening question B, or for speed limit requests, proceed to Step 4 – Speed Limit Technical Assessment. If yes, but circumstances surrounding the inquiry and/or conditions in the immediate area have changed since the previous submission, still proceed to initial screening question B. For speed limit requests, proceed to Step 4 – Speed Limit Technical Assessment. If not, the request will be denied.

B. ***Only for Community Safety Zone Reviews:*** *Are one or more of the following pedestrian generating land uses present on the subject street?*
   - Elementary or secondary school
   - Daycare centre
   - Retirement residence or senior's centre
   - Community centre
   - Hospital

- High pedestrian traffic locations (more than 75 pedestrians per hour for any eight hours of the day)

If no, the request is denied and the process is ended. If yes, proceed to Step 3 – Community Safety Zone Technical Assessment.

Figure 4: Speed Limit Change / Community Safety Zone Study Process



Step 3 – Community Safety Zone Technical Assessment

For requests satisfying the initial screening, Township staff will assess whether a Community Safety Zone is justified based on the Community Safety Zone Warrants provided in **Appendix N**.

Step 4 – Speed Limit Technical Assessment

For requests satisfying the initial screening, Township staff will assess whether a speed limit change is justified based primarily on the methodology set out in the *Canadian Guidelines for Establishing Posted Speed Limits*.

If the subject street does not meet the requirements for a speed limit change, Township staff will consider whether the concerns cited could be better addressed using other measures and may decide to administer the request through a different process, such as the Township Traffic Calming Policy or Township Truck Route Policy.

If a subject street meets the requirements for a speed limit change or does not meet the requirements for a speed limit change but meets the requirements for a Community Safety Zone, Township staff will proceed to Step 5 (Council Approval).

Step 5 – Council Approval

After completing the technical assessments, Township staff will present the recommended speed limit change and/or Community Safety Zone to Council for approval. An amendment to the Consolidated Regulatory Signs By-law will be required to implement the new speed limit and/or Community Safety Zone.

Upon receiving Council approval, Township staff will install the official signs needed to enact the changes.

Step 6 – Monitoring and Evaluation

Following implementation, Township staff will evaluate the effectiveness of the speed limit change and/or Community Safety Zone for the subject street and monitor its impact on the surrounding road network. The Township may conduct speed surveys to quantify the change in vehicle speeds.

8.3 TRUCK ROUTE POLICY

8.3.1 Introduction

8.3.1.1 Purpose

The **Truck Route Policy** provides guidelines and principles for identifying acceptable truck routes in the Township of Puslinch based on sound engineering, ensuring adherence to other Township policies, and minimizing impacts on the environment, social fabric, and economic sustainability. The policy aims to balance the needs of commerce and the trucking industry with the desire to minimize the impacts of trucks on sensitive land uses.

8.3.1.2 Objectives

The safe and efficient movement of goods is important to economic development and commerce in the Township. Trucks play an important role for local businesses, delivering raw materials to manufacturers and transporting finished products to market. Their relevance is heightened in communities like the Township with limited or no access to alternative freight shipping modes, namely rail, air, and water. Without other options, local businesses and residents depend almost entirely on trucking for access to markets and the supply of essential commodities.

The movement of trucks needs special consideration given their increased size and weight and perceived negative impacts on safety, congestion, noise, vibration, air quality, and livability in communities. Many

municipalities have established truck routes to define a network of safe, efficient, and connected roadways and related operating procedures for trucks travelling within and through their jurisdictions. These policies aim to balance the needs of commerce and the trucking industry with the desire to minimize the impacts of heavy vehicles on sensitive land uses.

8.3.1.3 Scope

The Truck Route Policy incorporates best practices with local context to identify a network of routes and supporting measures that facilitate movement for heavy vehicles, enhance quality of life for residents, and minimize Township road maintenance costs. The policy:

- Establishes a truck route network (Section 8.3.2);
- Provides a roadway signage strategy for demarcating these routes (Section 8.3.3);
- Addresses freight movement needs in planning (Section 8.3.4); and
- Sets out the basis of a truck route by-law (Section 8.3.5).

For the purposes of this policy, a truck is defined as “a motor vehicle, other than a bus, which is larger than a passenger vehicle, sport utility vehicle (SUV), pick-up truck or van, carries cargo and transports goods, freight, commodities, livestock, etc. A truck may:

- Be a single unit (cab plus cargo area) or a combination vehicle (tractor and trailer(s));
- Have a variety of different cargo carrying configurations – enclosed, flatbed, open with sidewalls, containers, automobile rack, etc.;
- Be operated under a for-hire common carrier or private carrier; or
- Also be operated by a truckload carrier (e.g., single load transported from origin to destination) or a ‘less than truckload’ (LTL) carrier.” [4]

8.3.1.4 Guidance

Wellington County Official Plan

It is the goal of the Wellington County Official Plan, in Section 12.1, to “encourage the development of safe and efficient transportation systems which are both environmentally responsible and convenient for users. The County will co-operate with surrounding jurisdictions to develop a transportation system that recognizes the mobility of people within [the] area and their need for effective inter-regional transportation systems.” [3] Section 12.5.3 (Major Roads) further states that “major roadways are expected to provide and serve high volumes of traffic including truck traffic.”

The Township relies on a well-defined grid network of Provincial highways, County roads, and Township roads to serve local travel needs. Section 12.5.4 (Local Roads) notes that “rural roads laid out along original township concession and lot lines often provide important collector functions and operate at reasonably high speeds, whereas urban roads may be classified as arterial, collector, or local routes to recognize a hierarchy of functions…”

Truck Route Specific Policies

Neither the Township of Puslinch or Wellington County currently have a truck route policy or broader goods movement strategy. All County roads and Provincial highways within the Township serve as goods movements routes.

Other Guidance

The Truck Route Policy is influenced by guidance from Provincial agencies and industry groups, as well as initiatives of other municipalities. Notable guidance includes the:

- Ministry of Transportation *Freight-Supportive Guidelines*, which helps local jurisdictions plan available land, design sites, and manage municipal transportation networks to support effective freight movement.
- Ontario Trucking Association *Local Truck Routes: A Guide for Municipal Officials*, which provides advice on establishing truck routes that preserve mobility for all roadway users, including the safe and efficient movement of freight to grow the local economy.
- City of Hamilton *Truck Route Master Plan*, which offers insight into the process of establishing a comprehensive truck route network and policies for signage.

The policy also reflects applicable Provincial policy and legislation including the Provincial Policy Statement, *Accessibility for Ontarians with Disabilities Act* (AODA), and the *Highway Traffic Act* (HTA).

8.3.2 Truck Route Network

8.3.2.1 Rationale and Approach

The Township will establish a truck route network to manage and regulate the flow of trucks on Township of Puslinch roads. For the purposes of this policy, a “truck route” is defined as a road segment formally designated for trucks to use when traveling through or within the Township.

The truck routes are denoted on the most suitable roads to the greatest extent possible, while limiting intrusion into designated Urban Centres and Hamlet Areas such as Aberfoyle, Morriston, and Arkell to the minimum possible. The goal is to define the preferred method of moving trucks through the Township with a network of routes that:

- Are safest for the movement of heavy vehicles;
- Avoid sensitive land uses like schools, residential areas, and community facilities;
- Support local and regional commerce and industry; and
- Provide sufficient capacity and adequate design features to accommodate the anticipated volume, size, and weight of vehicles.

The truck route network in Puslinch is designed to direct truck traffic to major roads (primarily Provincial highways and County roads) intended for use by heavy vehicles and avoid minor streets (Township roads) with more sensitive abutting land uses. It is based on the principle that heavy vehicles should stay on designated routes and only use minor streets to access local destinations.

Consistent with this philosophy, the Township will introduce a primarily permissive signing system to denote the truck route network. This type of system offers better guidance to truck drivers, minimizes the potential for confusion, and supports consistent enforcement. A predominately permissive system also requires far fewer signs than an entirely restrictive one, in which all roads not forming the network must be signed. As well, it recognizes heavy vehicles with local origins or destinations can still travel on any road to access a designated truck route by law, as permitted by the *Highway Traffic Act*. **Section 8.3.3** describes the proposed “hybrid” roadway signage strategy in further detail.

8.3.2.2 Establishing the Truck Routes

The process of developing the permissive truck route network involved identifying a series of roadway segments suitable (and preferred) for heavy vehicle use based on the following factors:

- Existing truck routes and restrictions;
- Roadway classification and jurisdiction;
- Adjacent land uses;
- Road condition and structural capacity;
- Bridge locations;
- Network improvements; and
- Traffic volumes.

Other considerations also factored into the assessment, helping to justify the inclusion or exclusion of specific road sections from the network. These include:

- **Social, environmental, and economic impacts** – Routes should pose the least visual, safety, noise, vibration, and traffic impacts while offering the most efficient routes possible to deliver goods expeditiously.
- **Route connectivity, continuity, and consistency** – Routes should link key destinations in a logical, direct manner, providing for uninterrupted, non-circuitous travel for trucks while still avoiding sensitive land uses.
- **Parallel route duplication** – Routes serving similar travel patterns as Provincial highways and County roads should be avoided where possible.
- **Active transportation corridors** – Routes should avoid designated pedestrian and cycling corridors (including locations identified in the County's Road Master Action Plan). Recognizing this is not always practical (as many County roads provide the most direct route between centres), separated active transportation facilities may need to be considered.
- **Need for enforcement** – Routes should be logical to vehicle operators to avoid the need for extensive police enforcement to ensure compliance.

8.3.2.3 Key Goods Movement Generators

Major destinations for trucks typically include commercial areas with high volumes of deliveries, industrial areas, and intermodal freight facilities. Schedule A7 of the Wellington County Official Plan illustrates the key rural employment areas and mineral aggregate areas, which include lands surrounding:

- Highway 6 between Laird Road and Wellington Road 34;
- Wellington Road 46 (Brock Road) between Highway 401 and Aberfoyle; and
- Concession Road 7 near Calfass Road.

8.3.2.4 Preferred Network

Figure 5 illustrates the preferred truck route network for the Township of Puslinch. The network comprises only County roads and Provincial highways.

Assuming a by-law like the template set out in **Appendix O** is enacted, trucks would be prohibited from using Township roads unless destined to or originating from a location on the subject street, with enforcement provided by the Ontario Provincial Police and/or Ministry of Transportation. **Section 8.3.3** outlines the recommended approach for reconciling signage.

Time of day restrictions may be needed for certain road sections abutting urban residential areas with numerous driveways. Trucks could be prohibited from operating overnight (e.g., between 7:00 PM and 7:00 AM) on these routes. However, alternative routing would be required during these periods. The Township should coordinate time of day restrictions with Wellington County and the Ministry of Transportation, as deemed appropriate.

N

TOWN OF MILTON

TOWN OF HALTON HILLS

CITY OF GUELPH

TOWNSHIP OF GUELPH/ERAMOSA

CITY OF CAMBRIDGE

TOWNSHIP OF NORTH DUMFRIES

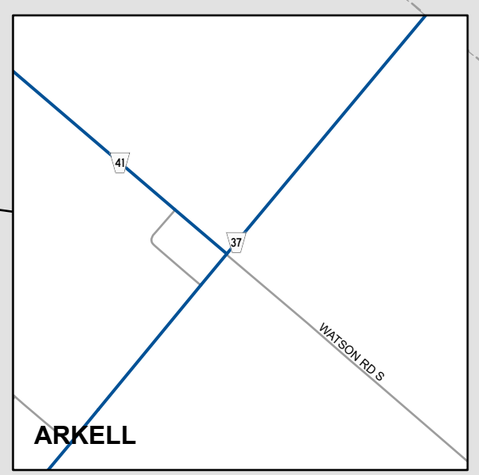
CITY OF HAMILTON

COOKS MILL RD
CARTER RD
HUME RD
WATSON RD S
MALTBY RD E
DARKWOOD RD
CONCESSION 11
VICTORIA RD S
FOX RUN DR
GILMOUR RD
LESLIE RD W
MCLEAN RD W
CALFASS RD
MADDAUGH RD
PIONEER TRL
LAIRD RD W
FORESTELL RD
CONCESSION 12
SIDEROAD 12
ROSZELL RD
SIDEROAD 10 N
SIDEROAD 20 N
CONCESSION 1
CONCESSION 2
ELLIS RD
SIDEROAD 10 S
SIDEROAD 20 S
SIDEROAD 25 S
GORE RD

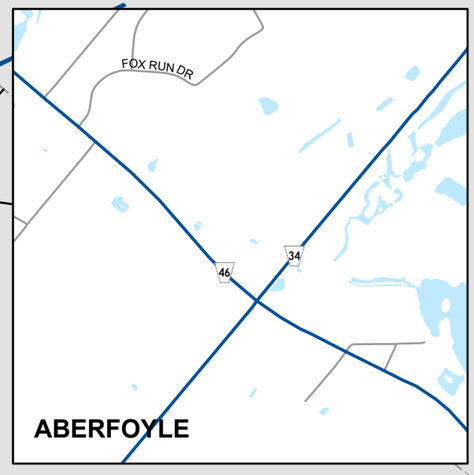
41 37 34 46 36 35 32 33 6 401

0 1.25 2.5 5
kilometers

ARKELL



ABERFOYLE



MORRISTON

TOWNSHIP OF
PUSLINCH
EST. 1850

TRAFFIC MANAGEMENT POLICIES

FIGURE 5

PREFERRED TRUCK ROUTE NETWORK

LEGEND

Preferred Truck Route

COORDINATE SYSTEM: NAD 1983 UTM Zone 16N

OCTOBER 2022

DATA SOURCES:
Township of Puslinch, Land Information Ontario, ESRI

paradigm TRANSPORTATION SOLUTIONS LIMITED

8.3.2.5 *Measures to Support Truck Route Network*

Infrastructure

In some instances, improvements to the roadway infrastructure forming the preferred truck route network could help to overcome perceive impediments to its use by heavy vehicle operators. Typical measures used to mitigate potential conflicts between road users, enhance the safety of trucking, and/or improve the efficiency of freight movement include:

- Wayfinding and guide sign installations to provide clear, consistent, and easily identifiable messaging to truck drivers. **Section 8.3.3** discusses recommended measures in further detail;
- Pavement marking, geometric design, and structural modifications to help trucks merging and diverging into traffic, and turning and manoeuvring at intersections, driveways, bridges, and on grades;
- Traffic signal timing and synchronization changes to reduce the number of stops and improve traffic flow; and
- Intelligent Transportation Systems (ITS) deployment to collect and communicate information pertinent to freight movement and better manage the flow of heavy truck traffic.

The Township should work with Wellington County and the Ministry of Transportation to identify and implement potential infrastructure measures as the more senior levels of government have jurisdiction over the roadways forming the preferred truck route network.

Education and Communication

The Township should develop an education and communication campaign in association with Wellington County to inform residents, businesses, and heavy vehicle operators of the truck route network and its purpose. Education will be an important element of implementing and enforcing the truck route network and should be targeted to improve compliance and reduce inappropriate complaints.

As a first step, the Township should work with Wellington County to implement truck route mapping and signage (see **Section 8.3.3** for recommended signing). A webpage like the outline provided in **Appendix P** should also be created on the Township website. These and other education and communication techniques should be explored to disseminate information about local heavy vehicle provisions.

The Township should also consider forming a liaison committee with local businesses, the trucking industry, enforcement entities, community representatives, and Wellington County to facilitate ongoing communication about trucking. Having a common understanding of the issues, educating and building awareness, keeping an open dialogue, and organizing and working together to craft solutions can help to avoid misconceptions and foster mutual cooperation.

Enforcement

Assuming a by-law like the template set out in **Appendix O** is enacted, failure to adhere to the truck route network and other heavy truck restrictions could result in fines under the *Highway Traffic Act*. For this reason, the Township should work with the Ontario Provincial Police and Ministry of Transportation to enforce and refine the proposed provisions.

8.3.3 Truck Route Signage Strategy

8.3.3.1 *Rationale and Approach*

Denoting the truck route network using clear, consistent, and easily identifiable roadway signage provides clarity to truck drivers and helps ensure compliance with municipal regulations. Signage identifying the truck routes is

expected to reduce the number of heavy vehicles using Township roads unnecessarily, improve safety, and reduce damage and maintenance costs to the Township's infrastructure.

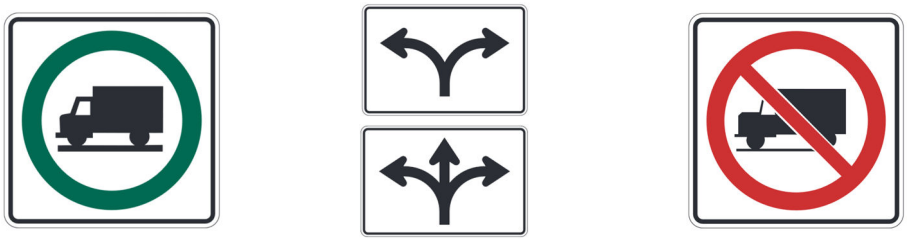
As noted in **Section 8.3.2**, the truck route network will feature a "hybrid" signing system. This system combines permissive signs (Rb-61 TRUCK ROUTE and Rb-61t MOVEMENTS PERMITTED Tab) directing heavy vehicles to the prescribed truck routes. Restrictive signs (Rb-62 NO HEAVY TRUCKS) may be used to prohibit access to streets: where truck traffic is undesirable or less safe; experiencing poor compliance with permissive signing; and/or where drivers maybe confused.

8.3.3.2 Signage Hierarchy

The Ontario Traffic Manual (OTM) establishes a hierarchy of roadway signs in order of importance. The following sign types are proposed for the truck route network:

- Regulatory signs will inform truck drivers of actions needed to comply with the truck route by-law. The signs are enforceable pursuant to the *Highway Traffic Act* and the enabling municipal by-law, disregard of which would constitute a violation. **Figure 6** illustrates the regulatory signs to be used.
- Guide and information signs will supplement the regulatory signage and be installed at strategic locations to direct truck drivers to/along the routes and/or bring awareness to the truck route network. **Figure 7** illustrates the guide and information signs to be used, which can be described as follows:
    - Gateway signs will be used at entries into the Township and on roads at Highway 401 or Highway 6 interchanges to advise truck drivers and other motorists of the truck route network;
    - Alternate signs will be used in advance of intersections to inform truck drivers of designated routes on adjoining Wellington County roads;
    - Directional signs will be used approaching/at intersections to inform truck drivers where routes change direction; and
    - Boundary signs will be used at entries into the Township without Gateway signs to inform truck drivers and other motorists of the requirement for heavy vehicles to follow the truck route network.

Figure 6: Regulatory Signs for Truck Routing

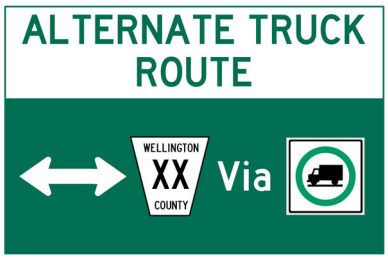


TRUCK ROUTE (Rb-61) | **MOVEMENTS PERMITTED Tab (Rb-61t)** | **NO HEAVY TRUCKS (Rb-62)**

Figure 7: Guide and Information Signs for Truck Routing

Gateway (G432)

Directional



Alternate (G432)

Boundary

8.3.3.3 *Recommended Signing Plan*

Figure 8 illustrates the locations of recommended signs to implement the truck route network. The figure identifies the proposed sign type for each location. In addition, Boundary signs, as shown above, should be installed on each road entering the Township without a Gateway sign. The Township may consider supplementing the recommended plan with additional signs if further guidance or clarification is required.

8.3.3.4 *Use of Restrictive Signage*

Existing restrictive signage (Rb-62 NO TRUCKS) will be maintained at all current locations until signs need to be replaced. At that time, the Township will review the need to retain the signs based on the following five-step process:

1. Confirm history of complaints for the area with police.
2. Verify issue by collecting and analyzing truck volume data (particularly illegal movement data);
3. If there is a demonstrated concern or issue, install additional permissive signage to reinforce the designated routes;
4. If there continues to be a demonstrated need, target area for police enforcement and monitor results; and
5. If additional, redundant permissive signage and/or police enforcement do not significantly improve the situation, implement restrictive signage.

The Township may consider the installation of new restrictive signage on roads that do not form part of the truck route network subject to the criteria and procedure described above.

8.3.4 Freight Movement Needs in Planning

Incorporating freight movement needs into land use and transportation planning and site design can help ensure trucking occurs safely and efficiently with less impact on sensitive land uses in the future. The *Freight-Supportive*

Guidelines provide guidance on a range of potential strategies and actions that explicitly consider freight in the planning process, as summarized below.

8.3.4.1 *Land Use and Transportation Planning*

Coordinating and integrating land use planning with transportation planning is an important step in creating an efficient, complete, and sustainable community. To this end, the Township should explicitly consider freight movement and trucking when carrying out land use and transportation planning exercises, such as preparing new or updated planning policies and/or zoning by-laws. Preparation of this truck route policy is an example of such a strategy.

The Township should consider requesting a policy in the Wellington County Official Plan that provides support and direction for local freight movement and specifically addresses truck route planning. Protecting industrial and/or commercial lands located near identified truck routes, particularly properties adjacent to Highway 401 interchanges, is another strategy the Township should consider to better facilitate freight movement and minimize conflicts with trucks. Provisions should also be included in the Township's zoning by-law, such as setbacks, loading zones, ingress, and egress, to support freight movement and address potential impacts to adjacent sensitive land uses.

In future land use planning, the Township should locate new and expanded employment areas close to or in the vicinity of transportation facilities, including the preferred truck route network. Freight-intensive land uses, specifically, should be directed to areas well served by major road and rail facilities, such as the Highway 401 corridor. This reduces the number of trucks that need to travel on local roads between locations and helps cargo move more efficiently. The location of existing and planned infrastructure should also be considered when planning employment uses, along with the separation of sensitive uses, in determining the best location for high freight generating facilities.

When planning for cycling and pedestrian movements, the Township should avoid co-locating active transportation facilities with truck routes. Alternative routes for cyclists or landscaped buffers or barriers to separate users should be considered.

TOWNSHIP OF PUSLINCH
EST. 1850

TRAFFIC MANAGEMENT POLICIES

FIGURE 8

RECOMMENDED SIGNAGE PLAN

TOWN OF MILTON

TOWN OF HALTON HILLS

CITY OF GUELPH

TOWNSHIP OF GUELPH/ERAMOSA

CITY OF CAMBRIDGE

TOWNSHIP OF NORTH DUMFRIES

CITY OF HAMILTON

ARKELL

ABERFOYLE

MORRISTON

0 1.25 2.5 5
kilometers

LEGEND

Preferred Truck Route

Sign Type

- Gateway Sign
- Boundary Sign
- Rb-61 (Truck Route)
- Rb-62 (No Heavy Trucks)

COORDINATE SYSTEM: NAD 1983 UTM Zone 16N

OCTOBER 2022

DATA SOURCES:
Township of Puslinch, Land Information Ontario, ESRI

paradigm TRANSPORTATION SOLUTIONS LIMITED

8.3.4.2 *Site Design*

Proper design of vehicle circulation and loading facilities at commercial and industrial sites results in development that blends more seamlessly into the surrounding community and limits noise and air pollution. Examples of supportive site design features include:

- Appropriate site access points that consider manoeuvrability of trucks typically serving the development;
- On-site circulation and loading docks designed to accommodate the types of vehicles expected to use the facility;
- Adequate parking, designed with appropriate dimensions and reserved for trucks;
- Appropriate building and amenity placement on site, with suitable setbacks, landscaping, noise mitigation, and lighting;
- Safe accommodation of pedestrians and cyclists; and
- Appropriate design of service lanes in strategic locations, if appropriate.

Smaller delivery vehicles are often used to transport relatively small volumes of freight and/or in built-up areas with constraints on the movement of larger trucks. The Township can improve the efficiency of small-scale delivery operations and reduce the need for heavy vehicle movements through actions such as:

- Accounting for the size and number of trucks/delivery vehicles when determining loading requirements and related infrastructure improvements in downtown Morriston and other hamlet or urban centre areas;
- Assessing opportunities for smaller retail and/or manufacturing uses to share loading facilities, after considering the typical frequency and duration of deliveries for each user; and
- Providing on-street lay-bys for short-term, time-sensitive loading activity in locations not interfering with other community uses, typically with signage indicating a limited stopping period (typically ten minutes).

Site design features to help mitigate the impacts of noise, vibration, and air quality concerns for sensitive land uses abutting truck routes include:

- Implementing buffers;
- Introducing rear lotting (in areas with moderate to high pedestrian activity);
- Providing larger setbacks;
- Installing sounds barrier walls;
- Enhancing building surface density in new and retrofit construction.

8.3.5 Truck Route By-law

The Township will enforce the proposed truck route network and accompanying policies through the enactment of the truck route by-law. The by-law template attached as **Appendix O** describes typical truck route regulations, detailing where, when, and to whom they apply. The by-law template:

- Defines a “truck route” and a “non-truck route”;
- Lists the Township roads included in the truck route network by schedule;
- Defines the types of vehicles that must follow the designated truck routes, being:
    - Commercial motor vehicles over 5,000 kilograms in gross vehicle weight; and
    - Trailers over 1,360 kilograms in gross weight.
- Exempts certain types of vehicles from the truck route provisions including:
    - Vehicles operated by or on behalf of the Township for highway maintenance or transporting waste;
    - Trucks following a route approval through a site alternation agreement (if such a policy exists);
    - Emergency vehicles;
    - School buses; and

    - Vehicles instructed by a police officer to operate on a truck route.
- Requires heavy vehicles to use the shortest route to or from the truck route when:
    - Hauling water;
    - Transporting milk;
    - Serving agricultural purposes;
    - Following a temporary detour route; or
    - Delivering or providing goods or services.
- Specifies the roads and time of year reduced load limits; and
- Prescribes penalty, obstruction, severability, enforcement, and enactment provisions.

9 PUBLIC ENGAGEMENT

The Township provided an open comment period for the Roads Management Plan through its "Engage Puslinch" website from May 5, 2023 to June 12, 2023. Additional comments have been received between 2018 and 2022 that Township staff have included as part of this engagement tracking.

For public comments relating to roads in general as well as this Plan, and comments received moving forward, the Township will follow the following general process:

- Comment is received and itemized in a "Public Comments – Roads" register.
- Comments that do not require further investigation will be addressed within a reasonable timeline and confirmation will be provided to the commenting author. No further action will be required. These comments are expected to be minor in nature and generally related to maintenance of existing roads (e.g., broken signs, potholes, vegetation trimming, etc.).
- An internal review will be initiated for any comments received that require further investigation, consultation with standards and guidelines, or retention of third-party specialists to inform the review process and provide recommendations. The Township will endeavour to review and provide a response to the commenting author within 30 days; however, depending on the level of review required, this response time may vary. Comments of this nature are anticipated to relate to expansions to existing Township facilities or enhancements to levels of service (e.g., additional signage, additional roadside safety features, etc.).
- If the review determines that an action is recommended, a staff report will be prepared for Council review and approval as these will generally have budget implications. The staff report will detail the initial budget implications of the action and future maintenance / capital expenditures that are to be expected. The Township will notify the commenting author of the results of the review and that the staff report will be prepared and presented to Council in advance of the next budgeting cycle, along with any other comments where an action is required. This is anticipated to generally occur in September of each year.

Refer to **Appendix Q** for the public engagement notice, comments received as part of this Plan and proposed responses to be provided by the Township upon Council acceptance of this Plan. A general summary of the recommended outcomes of these comments is as follows:

- Forward comments and requests received that did not apply to Township infrastructure to the required municipal government (i.e., Wellington County, City of Guelph, Ontario Ministry of Transportation).
- Initiate reviews in response to comments received following the practices, policies, guidelines and standards provided within this Plan and following the practice above.
- Implement a comment tracking register for current and future public comments regarding road-related facilities (refer to **Appendix Q** for a template register).

10 RECOMMENDATIONS & CONCLUSIONS

The following is a brief summary of recommendations made based on the information contained within this Plan.

- It is recommended that annual roads capital funding for road rehabilitation be approximately $2.7M based on the Road Condition Assessment indicating that the total 10 Year Road Capital Needs are $27.1M.
- It is recommended that the Township's *Municipal Development Standards* and guidance within the Inventory Manual be used for the planning, design and construction of capital improvements on its existing road network, to the extent practical and feasible.

- It is recommended that the proposed cross-section for surfacing of existing roads be implemented as a guideline. Each road section will need to be evaluated on a case-by-case basis for confirm suitability of asphalt depths and thicknesses, drainage, subbase suitability as well as lane and shoulder widths.
- Data provided by the Township suggests that the current approach used to maintain the existing asphalt road network is allowing the Township to realize an appropriate service life out of each road asset. It is recommended that geotechnical investigations are completed on existing roads scheduled for resurfacing to inform asphalt and road base thicknesses for road segments that are not realizing a minimum service life of 15 years.
- Where a single lift of asphalt is to be applied, whether for a gravel road conversion or where budget does not permit a two-lift road, and in the absence of a geotechnical investigation, it is recommended that the Township increase its budget to accommodate a single lift of HL 4 Surface Asphalt at a minimum thickness of 60 mm. Our experience has been that premature restoration of isolated sections of road due to paving at thicknesses less than 50 mm is comparable to the additional cost of paving the additional 10 mm of asphalt. The additional 10 mm of asphalt has, in our experience, mitigated issues of paving at thicknesses less than 50 mm when combined with increased emphasis on proper grading of the road prior to paving.
- It is recommended that the Township increase the asphalt thickness for resurfacing projects on roads with an AADT greater than 2,000 vehicles to a minimum asphalt thickness of 100 mm, as prescribed within the Inventory Manual. Geotechnical investigations should be completed to confirm road base construction and subbase conditions. Additional studies may be required to confirm AADT values for identified road sections.
- For roads that need to consider truck traffic, the Township has historically applied 100 mm of asphalt (50 mm HL 4 Binder Course, 50 mm HL 4 Surface Course). In the absence of a geotechnical investigation report, It is recommended that the Township consider increasing its budget to allow for the thickness of asphalt applied as part of its surfacing program to be the minimum thickness provided in the Township's *Municipal Development Standards* standard drawing STD-101, which is 110 mm (60 mm HL 8 Binder Course, 50 mm HL 4 Surface Course) for all roads requiring consideration for truck traffic.
- It is recommended that the Township follow the provided flow chart for conversions of existing gravel roads, including an evaluation of surface treatment versus asphalt for hard-surfacing type. Ditching and subbase improvement programs should be implemented to provide adequate drainage and strength to road prior to hard-surfacing. A minimum of 1 year between ditching and subbase improvements and hard-surfacing is recommended. In general, a three year approach should be taken to gravel road conversions: investigate and gather information in Year 1; complete required platform, drainage and subbase upgrades in Year 2; hard-surface in Year 3.
- Where the Township wishes to proceed with hard-surfacing of gravel roads where the recommended criteria have not been met, it is recommended that the revised criteria are documented and guidelines are developed for staff to administer the decision making process.
- It is recommended that the Township consider the process for property owner requests to hard-surface an existing gravel road for further development and adoption into a formal practice, if desired. A petition form should also be developed by the Township for use by property owners when making requests under the practice.
- It is recommended that the Township institute a ditching program for its road network. An annual budget of $50,000 is suggested until the Township has completed one or two seasons of ditching and can more-reasonably estimate an annual amount to carry for future years.
- It is recommended that the Township's annual gravel road budget be increased to accommodate placement of granular material at a minimum thickness of 60 mm. Following application of this recommended increased thickness, as well as completion of ditching, a review to determine if the application of gravel can be increased from every 2 years can be completed.
- It is recommended that the Township utilize the preliminary design checklist for capital works projects provided. The first iteration of this checklist should be completed (or revised) within 2 years prior to the

desired capital project's scheduled construction date to ensure that the budget can be refined ahead of the planned implementation.

- It is recommended that the Township allocate $10,000 in the current Roads Maintenance Budget in 2023 for crack sealing. Prior to contracting this service, Township staff should review the current sections of road which have a double lift of asphalt to identify crack sealing candidate locations. As well, the Township should follow-up with Wellington County to explore the opportunity of adding the Township locations onto the Wellington County crack sealing contract. The advantages here would be possible cost savings of being part of a larger contact and the ability to share construction inspection services. At the completion of the crack sealing program in 2023, the budget should be re-examined to reflect the experience and knowledge achieved through the implementation of this program and possible needs in 2024.
- It is recommended that the Traffic Management Policies outlined this Plan be implemented.
- It is recommended that the Township consider conducting a comprehensive speed limit review for all roads under its jurisdiction with a posted speed above 60 km/h. An approximate budget for this study would be $30,000.
- It is recommended that the Township implement the recommendations provided within the Public Engagement section of the Plan for responding to public comments and internal tracking.

11 BIBLIOGRAPHY

[1] Transportation Association of Canada, "Canadian Guide to Traffic Calming," Ottawa, ON, 2016.

[2] Institute of Transportation Engineers, "Subcommittee of Traffic Calming," 1997.

[3] Wellington County, "Official Plan," 1999.

[4] Ontario Trucking Association, "Local Truck Routes: A Guide for Municipal Officials," 2011.

APPENDIX A:
TOWNSHIP ROAD NETWORK INVENTORY TABLES AND ROAD PCI MAPS

TOWNSHIP INVENTORY - ALL ROADS

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Estimated Traffic Range	Truck Route	Minimum Maint. Class	PCI
211	Ann Street	County Road 36 (Badenoch Street)	End	63.1	Gravel	RUR	50.0	0-49		6	83.6
30	Back Street	Main Street	Badenoch St E	345.5	Paved	SU	50.0	50-199		6	74.9
214	Beiber Road	Nicholas Beaver Road	End	169.7	Paved	URB	50.0	200-499	Y	5	74.0
208	Boreham Drive	County Road 37 (Arkell Road)	County Road 41 (Watson Road South)	442.3	Paved	SU	50.0	200-499		5	74.1
200	Boyce Drive	County Road 46	End	253.5	Gravel	RUR	50.0	0-49		6	82.1
185	Bridle Path	Brock Rd N	Bridle Path	446.0	Paved	URB	50.0	200-499		5	57.5
204	Bridle Path	Bridle Path	Bridle Path	1116.0	Paved	URB	50.0	200-499		5	65.0
27	Calfass Road	Concession 7	Victoria Street	2077.4	Gravel	RUR	50.0	50-199		6	63.4
27b	Calfass Road	Victoria Street	Queen Street (Highway 6)	97.0	Paved	URB	50.0	200-499		5	89.3
201	Carriage Lane	Bridle Path	End	738.0	Paved	URB	50.0	200-499		5	85.8
129	Carter Road	Arkell Road (County Road 37)	Cooks Mill Road	1849.2	Gravel	RUR	50.0	200-499		5	83.6
202	Cassin Court	Daymond Drive	End	164.2	Paved	URB	50.0	200-499		5	82.7
50	Cockburn Street	Country Road 46	Old Brock Road	123.5	Paved	URB	30.0	200-499		6	89.7
12	Concession 1	Townline Road	transition	1269.2	Paved	RUR	80.0	1000-1999		3	66.7
14	Concession 1	Sideroad 10 South	County Road 35	2068.7	Paved	RUR	80.0	1000-1999		3	68.8
15	Concession 1	County Road 35	Sideroad 20 South	2073.8	Paved	RUR	60.0	1000-1999		4	93.9
16	Concession 1	Sideroad 20 South	Sideroad 25 South	2062.4	Paved	RUR	60.0	1000-1999		4	94.7
17	Concession 1	Sideroad 25 South	Concession 7	2065.1	Paved	RUR	60.0	1000-1999		4	94.7
19	Concession 1	Leslie Road W	Highway 6	546.9	Paved	RUR	80.0	200-499		4	55.8
13a	Concession 1	transition	transition	2112.9	Paved	RUR	80.0	1000-1999		3	68.8
13b	Concession 1	transition	Sideroad 10 South	751.8	Paved	RUR	80.0	1000-1999		3	71.7
18	Concession 1/Leslie Rd W	Concession 7	Highway 6	2350.3	Paved	RUR	80.0	1000-1999		3	58.6
142	Concession 11	Little Road	Leslie Road East	2065.7	Gravel	RUR	60.0	50-199		5	56.7
143	Concession 11	Sideroad 17	County Road 36	1320.9	Gravel	RUR	60.0	50-199		5	77.8
144	Concession 11	County Road 34	Sideroad 17	1960.4	Gravel	RUR	60.0	50-199		5	75.9
145	Concession 11	Maltby Road East	County Road 34	2053.6	Gravel	RUR	60.0	50-199		5	74.9
146	Concession 11	Hume Road	Maltby Road East	2053.6	Gravel	RUR	60.0	50-199		5	74.9
32	Concession 2	Sideroad 10 South	County Road 32	2101.3	Paved	RUR	80.0	500-999		4	94.6
33	Concession 2	Sideroad 10 South	County Road 35	2063.5	Paved	RUR	80.0	500-999		4	51.9
34	Concession 2	County Road 35	Sideroad 25 South	2096.2	Paved	RUR	80.0	500-999		4	55.9
35	Concession 2	Sideroad 20 South	Sideroad 25 South	2050.2	Paved	RUR	60.0	500-999	Y	4	54.2
36	Concession 2	Concession 2/2A	Concession 7	261.4	Gravel	RUR	60.0	0-49		6	71.1
36	Concession 2/2A	Sideroad 25 South	Concession 2	639.3	Paved	RUR	60.0	500-999	Y	4	64.4
37	Concession 2A	Concession 2	Concession 7	235.3	Paved	RUR	60.0	500-999	Y	4	47.1
55	Concession 4	Forestell Road	County Road 32	1239.0	Paved	RUR	80.0	200-499		4	85.3
56	Concession 4	County Road 32	Sideroad 10 North	2072.0	Paved	RUR	80.0	200-499		4	95.0
57	Concession 4	Sideroad 10 North	Sideroad 12 North	823.3	Paved	RUR	60.0	200-499		5	97.4
58	Concession 4	Sideroad 12 North	County Road 35	1235.7	Paved	RUR	80.0	200-499		4	96.0
59	Concession 4	County Road 35	Sideroad 20 North	2068.3	Paved	RUR	80.0	200-499		4	63.9
161	Concession 4	Curve in Road	Highway 6	784.8	Paved	RUR	80.0	200-499		4	67.1

TOWNSHIP INVENTORY - ALL ROADS

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Estimated Traffic Range	Truck Route	Minimum Maint. Class	PCI
113	Concession 7	Concession 1	Gore Road	1922.6	Gravel	RUR	60.0	200-499		5	76.9
114	Concession 7	Concession 1	Calfrass Road	1031.7	Gravel	RUR	60.0	500-999		4	58.6
114	Concession 7	Calfrass Road	Concession 2A	1619.2	Gravel	RUR	60.0	500-999		4	35.7
115	Concession 7	Concession 2A	Mason Road	428.2	Paved	RUR	60.0	3000-3999	Y	3	71.4
116	Concession 7	Mason Road	McLean Road West	235.7	Paved	RUR	60.0	3000-3999	Y	3	97.4
118	Concession 7	County Road 34	Start of Pavement	35.3	Gravel	RUR	60.0	50-199		5	60.8
118	Concession 7	Start of Pavement	Maltby Road West	2017.4	Paved	RUR	60.0	50-199		5	78.2
81	Cooks Mill Road	Carter Road	Bridge	596.7	Gravel	RUR	50.0	200-499		5	80.0
82	Cooks Mill Road	Bridge	County Road 41	437.0	Paved	SU	50.0	200-499		5	69.1
180	Currie Drive	County Road 36 (Badenoch Street)	Highway 6 (Queen Street)	888.1	Paved	SU	50.0	200-499		5	89.7
202	Daymond Drive	Brock Rd N	End	441.7	Paved	URB	50.0	200-499		5	78.9
195	Deer View Ridge	Hammersley Drive	Fox Run Drive	665.6	Paved	URB	50.0	200-499		5	69.4
44	Ellis Road	County Road 33	County Road 32	2185.5	Paved	RUR	50.0	500-999		5	93.8
45a	Ellis Road	6725 Ellis Road	Sideroad 10 North	448.6	Paved	RUR	80.0	200-499		4	83.8
45b	Ellis Road	County Road 32	6725 Ellis Road	1866.5	Paved	RUR	80.0	200-499		4	79.4
79	Farnham Road	Arkell Road (County Road 37)	Carter Road	962.4	Gravel	RUR	50.0	50-199		6	72.1
66	Forestell Road	Roszell Road	County Road 32	1220.7	Paved	RUR	60.0	1000-1999		4	93.2
67	Forestell Road	County Road 32	Sideroad 10 North	2079.9	Paved	RUR	80.0	1000-1999		3	94.3
68	Forestell Road	Sideroad 10 North	Sideroad 12 North	821.3	Paved	RUR	80.0	1000-1999		3	94.0
69	Forestell Road	Sideroad 12 North	County Road 35	1239.7	Paved	RUR	80.0	1000-1999		3	94.3
196	Fox Run Drive	Deer View Ridge	Fox Run Drive transition to curb	415.6	Paved	SU	50.0	200-499		5	73.7
205	Fox Run Drive	Fox Run Drive transition to median	Fox Run Drive transition to curb	200.1	Paved	URB	50.0	200-499		5	70.1
206	Fox Run Drive	Brock Rd N	Fox Run Drive transition to median	160.5	Paved	URB	50.0	200-499		5	65.4
207	Fox Run Drive	Fox Run Drive	Fox Run Drive	650.8	Paved	SU	50.0	200-499		5	73.2
46	Gilmour Road	County Road 46 (Brock Road)	subdivision entrance	248.1	Paved	URB	60.0	200-499		5	76.2
47	Gilmour Road	Victoria Road South	new subdivision	1729.1	Gravel	RUR	60.0	200-499		5	74.2
1	Gore Road	Townline Road	Sideroad 10	4138.0	Paved	RUR	60.0	1000-1999		4	85.6
2	Gore Road	Sideroad 10 South	County Road 52 (Cooper Road)	1529.7	Paved	RUR	60.0	1000-1999		4	89.3
3	Gore Road	County Road 35	Foreman Road	2067.0	Paved	RUR	60.0	1000-1999		4	66.4
4	Gore Road	Sideroad 20 South	Valens Road	2606.6	Paved	RUR	60.0	1000-1999		4	42.2
5	Gore Road	Valens Road	Concession 7	1526.6	Paved	RUR	60.0	1000-1999		4	54.2
6	Gore Road	Concession 7	Lennon Road	959.1	Paved	RUR	60.0	1000-1999		4	51.8
53	Hammersley Road	County Road 46	End	1002.5	Gravel	RUR	60.0	0-49		6	75.9
77	Hume Road	Nassagaweya-Puslinch Townline	Watson Road South	2344.4	Paved	RUR	60.0	200-499		5	71.7
157	Jones Baseline	Stone Road East	End	434.6	Gravel	RUR	60.0	0-49		6	62.5
198	Kerr Crescent	McLean Road West	McLean Road West	834.7	Paved	SU	50.0	500-999	Y	5	88.5
210	Laing Court	Currie Drive	End	113.5	Paved	SU	50.0	50-199		6	82.7
72	Laird Road West	End	County Road 32	427.4	Paved	RUR	50.0	0-49		6	57.5
72	Laird Road West	County Road 32	Sideroad 10 North	2063.8	Paved	RUR	60.0	2000-2999	Y	4	95.9
73	Laird Road West	Sideroad 10 North	Pioneer Trail	828.4	Paved	RUR	60.0	2000-2999	Y	4	95.9

TOWNSHIP INVENTORY - ALL ROADS

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Estimated Traffic Range	Truck Route	Minimum Maint. Class	PCI
74	Laird Road West	Pioneer Trail	County Road 35	1239.1	Paved	RUR	60.0	2000-2999	Y	4	97.4
20	Leslie Road West	Highway 6	Victoria Road South	2045.0	Paved	RUR	80.0	200-499		4	92.1
21	Leslie Road West	Victoria Road South	Watson Road South	2015.6	Paved	RUR	80.0	200-499		4	60.8
22	Leslie Road West	Watson Road South	Bridge 5 (Mountsberg)	543.2	Paved	RUR	80.0	50-199		4	57.1
23	Leslie Road West	Mountsberg Bridge	Curve at Hwy 401	1204.8	Paved	RUR	80.0	50-199		4	51.1
25	Leslie Road West	Curve at Highway 401	Puslinch-Flamborough Townline	1018.1	Paved	RUR	80.0	50-199		4	46.3
31	Little Road	Nassagaweya-Puslinch Townline	County Road 36	389.9	Gravel	RUR	60.0	50-199		5	75.0
8	MacPherson's Lane	Puslinch-Flamborough Townline	Highway 6	878.6	Gravel	RUR	60.0	0-49		6	74.0
121a	Maddaugh Road	14th Concession East	Highway 6	487.7	Paved	RUR	60.0	500-999		4	63.7
121b	Maddaugh Road	Puslinch-Flamborough Townline	14th Concession East	507.9	Paved	RUR	60.0	500-999		4	74.7
29	Main Street	Badenoch St E	Morriston Ball Park	256.0	Paved	SU	50.0	50-199		6	71.4
64	Maltby Road East	Watson Road South	Concession 11	2070.3	Gravel	RUR	60.0	50-199		5	46.0
64	Maltby Road East	Concession 11	Nassagaweya-Puslinch Townline	308.0	Gravel	RUR	60.0	50-199		5	22.0
63a	Maltby Road East	Victoria Road South	1161m East of Victoria Road South	1161.0	Paved	RUR	80.0	50-199		4	78.4
63b	Maltby Road East	1161m East of Victoria Road South	Watson Road South	924.9	Paved	RUR	80.0	50-199		4	64.3
52	Maple Leaf Lane	County Road 46	End	266.2	Paved	SU	30.0	50-199		6	57.2
38	Mason Road	Concession 7	End	222.6	Paved	SU	50.0	50-199		6	43.3
40	McLean Road East	County Road 46 (Brock Road)	Sideroad 25 North	3052.8	Paved	RUR	60.0	3000-3999	Y	3	96.3
158	McLean Road East	Brock Road South	End	652.1	Paved	SU	50.0	1000-1999	Y	5	97.4
159	McLean Road East	Victoria Road South	End	361.8	Gravel	RUR	50.0	0-49		6	69.2
165	McLean Road/Concession 7	Sideroad 25 North	County Road 34	829.5	Paved	RUR	60.0	3000-3999	Y	3	94.9
149	Nassagaweya-Puslinch Townline	Leslie Road East	Sideroad 10 Nassagaweya	141.3	Gravel	RUR	60.0	50-199		5	70.1
150	Nassagaweya-Puslinch Townline	Leslie Road East	Little Road	2062.8	Gravel	RUR	60.0	50-199		5	69.2
152	Nassagaweya-Puslinch Townline	Sideroad 17	End	826.4	Gravel	RUR	60.0	50-199		5	50.3
162	Nicholas Beaver Road	Winer Rd	Brock Rd S	957.3	Paved	URB	60.0	500-999	Y	4	68.7
78	Niska Road	Bailey Bridge	Whitelaw Road	613.7	Paved	RUR	50.0	2000-2999		5	85.9
181	Ochs Drive	Currie Drive	County Road 36 (Badenoch Street)	576.2	Paved	SU	50.0	50-199		6	90.2
51	Old Brock Road	County Road 46	Cockburn Street	227.3	Paved	URB	50.0	50-199		6	80.1
51	Old Brock Road	Cockburn Street	End	115.8	Paved	SU	50.0	0-49		6	56.6
103	Pioneer Trail	Laird Road West	Niska Road	2080.9	Gravel	RUR	60.0	50-199		5	76.9
9	Puslinch-Flamborough Townline	Victoria Road South	Maddaugh Road	1081.3	Paved	RUR	60.0	500-999		4	80.4
10	Puslinch-Flamborough Townline	14th Concession East	Victoria Road South	1388.9	Paved	RUR	60.0	500-999		4	85.0
148	Puslinch-Flamborough Townline	Leslie Road West	Township Limits	301.4	Paved	RUR	80.0	50-199		4	43.3
90	Roszell Road	Forestell Road	Concession 4	993.8	Paved	RUR	60.0	1000-1999		4	61.9
54a	Roszell Road	Concession 4	Townline Road	1369.1	Paved	RUR	60.0	1000-1999		4	64.2
191	Settler's Road	Calfass Road	Telfer Glen	318.9	Paved	SU	50.0	50-199		6	77.6
94	Sideroad 10 North	County Road 34	Ellis Road	808.4	Paved	RUR	60.0	200-499		5	82.1
95	Sideroad 10 North	County Road 34	Concession 4	2038.6	Gravel	RUR	60.0	50-199		5	56.6
96	Sideroad 10 North	Concession Road 4	Forestell Road	1036.8	Paved	RUR	60.0	50-199		5	86.6
97	Sideroad 10 North	Forestell Road	Laird Road West	1037.7	Paved	RUR	60.0	50-199		5	62.1

TOWNSHIP INVENTORY - ALL ROADS

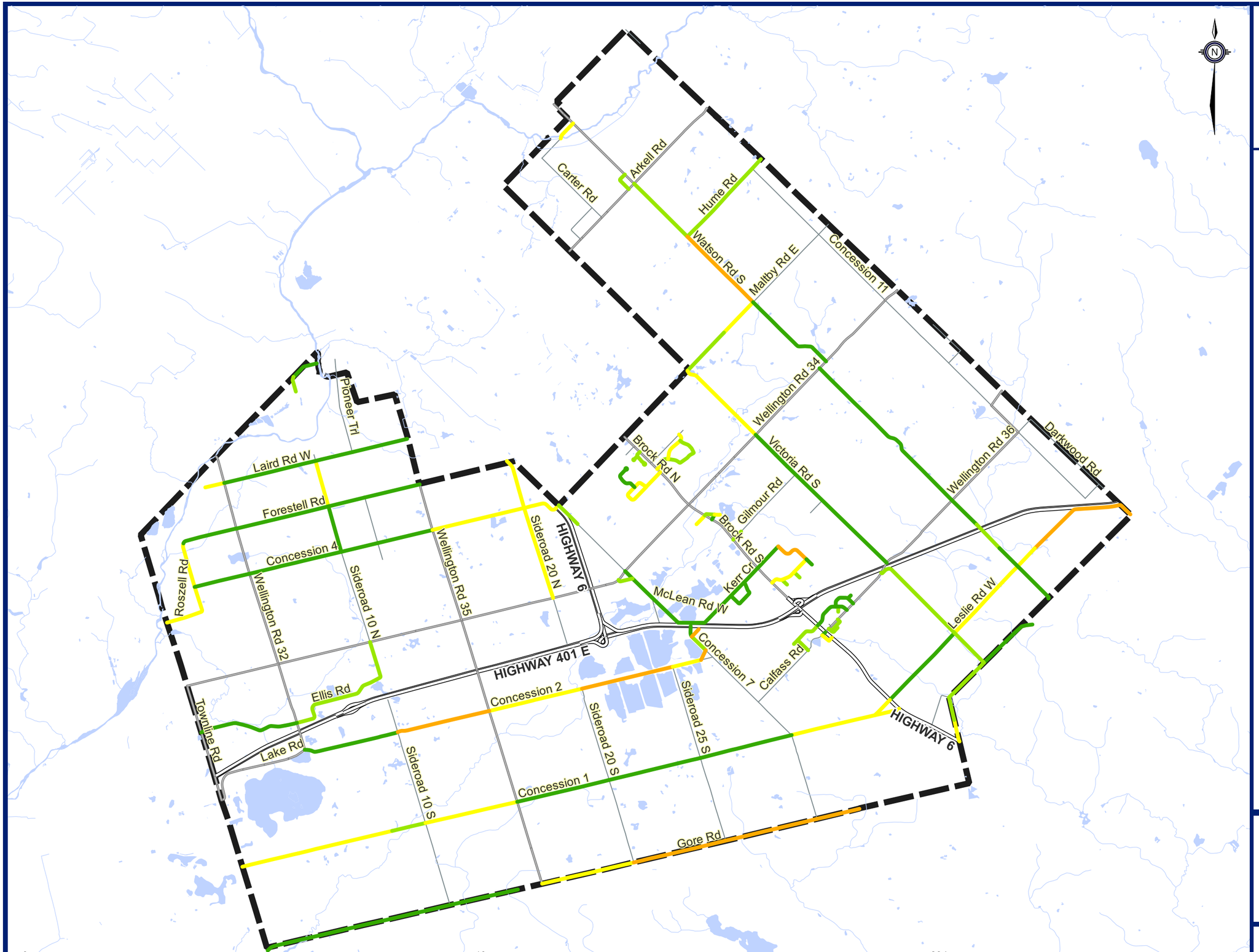
GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Estimated Traffic Range	Truck Route	Minimum Maint. Class	PCI
98	Sideroad 10 North	Laird Road West	End	137.5	Gravel	RUR	60.0	0-49		6	74.9
99a	Sideroad 10 North	Whitelaw Road	End	335.4	Paved	RUR	50.0	50-199		6	84.4
91	Sideroad 10 South	Gore Road	Concession 1	1879.1	Gravel	RUR	60.0	50-199		5	46.0
92	Sideroad 10 South	Concession 1	Concession 2	2085.8	Gravel	RUR	60.0	200-499		5	76.1
93	Sideroad 10 South	Concession 2	Concession 2	738.6	Gravel	RUR	60.0	50-199		5	72.0
100	Sideroad 12 North	Concession 4	End	335.8	Gravel	RUR	60.0	0-49		6	73.2
101	Sideroad 12 North	Forestell Road	Concession 4	1040.2	Gravel	RUR	60.0	50-199		5	57.9
43	Sideroad 17	Nassagaweya-Puslinch Townline	Concession 11	376.5	Gravel	RUR	60.0	50-199		5	39.6
106	Sideroad 20 North	County Road 34	End	1044.0	Gravel	RUR	60.0	0-49		6	75.9
108	Sideroad 20 North	County Road 34	Concession 4	2076.7	Paved	RUR	80.0	200-499		4	64.0
166	Sideroad 20 North	Concession 4	Forestell Road	1113.8	Paved	RUR	80.0	200-499		4	61.2
104	Sideroad 20 South	Gore Road	Concession 1	1890.4	Gravel	RUR	60.0	50-199		5	65.3
105	Sideroad 20 South	Concession 1	Concession 2	2093.9	Gravel	RUR	60.0	50-199		5	45.1
112	Sideroad 25 North	Concession 7	End	566.8	Gravel	RUR	60.0	50-199		5	42.9
110	Sideroad 25 South	Concession 1	Gore Road	1897.3	Gravel	RUR	60.0	50-199		5	64.5
111	Sideroad 25 South	Concession 2	Concession 1	2091.9	Gravel	RUR	60.0	50-199		5	55.0
26	Small Rd/Leslie Rd E	Nassagaweya-Puslinch Townline	Concession 11	432.7	Gravel	RUR	60.0	50-199		5	69.2
48	Smith Road	Concession 7	County Road 34	332.0	Paved	SU	60.0	50-199		5	71.9
213	Tawse Place	Nicholas Beaver Road	End	154.1	Paved	SU	50.0	50-199	Y	6	84.1
190	Telfer Glen	Queen Street (Highway 6)	End	697.8	Paved	SU	50.0	200-499		5	71.8
122	Victoria Road South	Leslie Road West	Flamborough Puslinch Townline	918.5	Paved	RUR	80.0	1000-1999		3	81.1
123	Victoria Road South	Leslie Road West	County Road 36	2232.3	Paved	RUR	80.0	1000-1999		3	77.0
124	Victoria Road South	County Road 36 (Badenoch Street)	Gilmour Road	3042.0	Paved	RUR	80.0	2000-2999		3	93.5
126	Victoria Road South	County Road 34	Maltby Road East	2074.1	Paved	RUR	80.0	4000-4999		3	68.3
125a	Victoria Road South	Gilmour Road	entrance to Aberfoyle Pit #2	357.7	Paved	RUR	60.0	2000-2999		4	95.9
125b	Victoria Road South	entrance to Aberfoyle Pit #2	County Road 34	621.8	Paved	RUR	60.0	2000-2999	Y	4	95.0
28	Victoria Street And Church Street	Calfass Road	Queen Street (Highway 6)	282.7	Paved	URB	50.0	50-199		6	69.9
133	Watson Road South	Leslie Road West	McRae Station Road	988.8	Paved	RUR	80.0	500-999		4	94.4
134	Watson Road South	bridge	Leslie Road West	565.8	Paved	RUR	80.0	500-999		4	94.6
135	Watson Road South	bridge	bridge	721.9	Paved	RUR	80.0	500-999		4	76.6
136	Watson Road South	County Road 36 (Badenoch Street)	Bridge	758.0	Paved	RUR	80.0	500-999		4	95.7
137	Watson Road South	County Road 34	County Road 36	4144.8	Paved	RUR	80.0	500-999		4	95.9
138	Watson Road South	Maltby Road East	County Road 34	2130.4	Paved	RUR	80.0	1000-1999		3	89.8
139	Watson Road South	Hume Road	Maltby Road East	2041.7	Paved	RUR	80.0	2000-2999		3	47.8
140	Watson Road South	County Road 37 (Arkell Road)	Hume Road	1647.4	Paved	RUR	80.0	2000-2999		3	78.8
209	Winer Court	Ochs Drive	End	89.4	Paved	SU	50.0	0-49		6	94.9
212a	Winer Road	McLean Road	Nicholas Beaver Road	785.8	Paved	SU	50.0	200-499	Y	5	53.8
212b	Winer Road	Nicholas Beaver Road	End	167.9	Paved	SU	50.0	50-199	Y	6	89.3

TOWNSHIP INVENTORY - DOUBLE LIFT ASPHALT ROADS (ASSUMED)

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Estimated Traffic Range	Truck Route	Minimum Maint. Class	PCI
214	Beiber Road	Nicholas Beaver Road	End	169.7	URB	Paved	50.0	200-499	Y	5	74.0
208	Boreham Drive	County Road 37 (Arkell Road)	County Road 41 (Watson Road South)	442.3	SU	Paved	50.0	200-499		5	74.1
185	Bridle Path	Brock Rd N	Bridle Path	446.0	URB	Paved	50.0	200-499		5	57.5
204	Bridle Path	Bridle Path	Bridle Path	1116.0	URB	Paved	50.0	200-499		5	65.0
201	Carriage Lane	Bridle Path	End	738.0	URB	Paved	50.0	200-499		5	85.8
202	Cassin Court	Daymond Drive	End	164.2	URB	Paved	50.0	200-499		5	82.7
50	Cockburn Street	Country Road 46	Old Brock Road	123.5	URB	Paved	30.0	200-499		6	89.7
35	Concession 2	Sideroad 20 South	Sideroad 25 South	2050.2	RUR	Paved	60.0	500-999	Y	4	54.2
36	Concession 2/2A	Sideroad 25 South	Concession 2	639.3	RUR	Paved	60.0	500-999	Y	4	64.4
37	Concession 2A	Concession 2	Concession 7	235.3	RUR	Paved	60.0	500-999	Y	4	47.1
115	Concession 7	Concession 2A	Mason Road	428.2	RUR	Paved	60.0	3000-3999	Y	3	71.4
116	Concession 7	Mason Road	McLean Road West	235.7	RUR	Paved	60.0	3000-3999	Y	3	97.4
202	Daymond Drive	Brock Rd N	End	441.7	URB	Paved	50.0	200-499		5	78.9
195	Deer View Ridge	Hammersley Drive	Fox Run Drive	665.6	URB	Paved	50.0	200-499		5	69.4
196	Fox Run Drive	Deer View Ridge	Fox Run Drive transition to curb	415.6	SU	Paved	50.0	200-499		5	73.7
205	Fox Run Drive	Fox Run Drive transition to median	Fox Run Drive transition to curb	200.1	URB	Paved	50.0	200-499		5	70.1
206	Fox Run Drive	Brock Rd N	Fox Run Drive transition to median	160.5	URB	Paved	50.0	200-499		5	65.4
207	Fox Run Drive	Fox Run Drive	Fox Run Drive	650.8	SU	Paved	50.0	200-499		5	73.2
198	Kerr Crescent	McLean Road West	McLean Road West	834.7	SU	Paved	50.0	500-999	Y	5	88.5
72	Laird Road West	County Road 32	Sideroad 10 North	2063.8	RUR	Paved	60.0	2000-2999	Y	4	95.9
73	Laird Road West	Sideroad 10 North	Pioneer Trail	828.4	RUR	Paved	60.0	2000-2999	Y	4	95.9
74	Laird Road West	Pioneer Trail	County Road 35	1239.1	RUR	Paved	60.0	2000-2999	Y	4	97.4
40	McLean Road East	County Road 46 (Brock Road)	Sideroad 25 North	3052.8	RUR	Paved	60.0	3000-3999	Y	3	96.3
158	McLean Road East	Brock Road South	End	652.1	SU	Paved	50.0	1000-1999	Y	5	97.4
165	McLean Road/Concession 7	Sideroad 25 North	County Road 34	829.5	RUR	Paved	60.0	3000-3999	Y	3	94.9
162	Nicholas Beaver Road	Winer Rd	Brock Rd S	957.3	URB	Paved	60.0	500-999	Y	4	68.7
78	Niska Road	Bailey Bridge	Whitelaw Road	613.7	RUR	Paved	50.0	2000-2999		5	85.9
51	Old Brock Road	County Road 46	Cockburn Street	227.3	URB	Paved	50.0	50-199		6	80.1
213	Tawse Place	Nicholas Beaver Road	End	154.1	SU	Paved	50.0	50-199	Y	6	84.1
190	Telfer Glen	Queen Street (Highway 6)	End	697.8	SU	Paved	50.0	200-499		5	71.8
28	Victoria Street And Church Street	Calfass Road	Queen Street (Highway 6)	282.7	URB	Paved	50.0	50-199		6	69.9
212a	Winer Road	McLean Road	Nicholas Beaver Road	785.8	SU	Paved	50.0	200-499	Y	5	53.8
212b	Winer Road	Nicholas Beaver Road	End	167.9	SU	Paved	50.0	50-199	Y	6	89.3
			Total:	**22.7**	**KMS**						



THE TOWNSHIP OF

Puslinch

Puslinch Roads Management Plan

Paved Roads - PCI Range

- Very Good >85
- Good 70-85
- Fair 55-70
- Poor 40-55
- Highway
- County Road
- Railway
- waterways
- Waterbodies
- Municipal Boundary

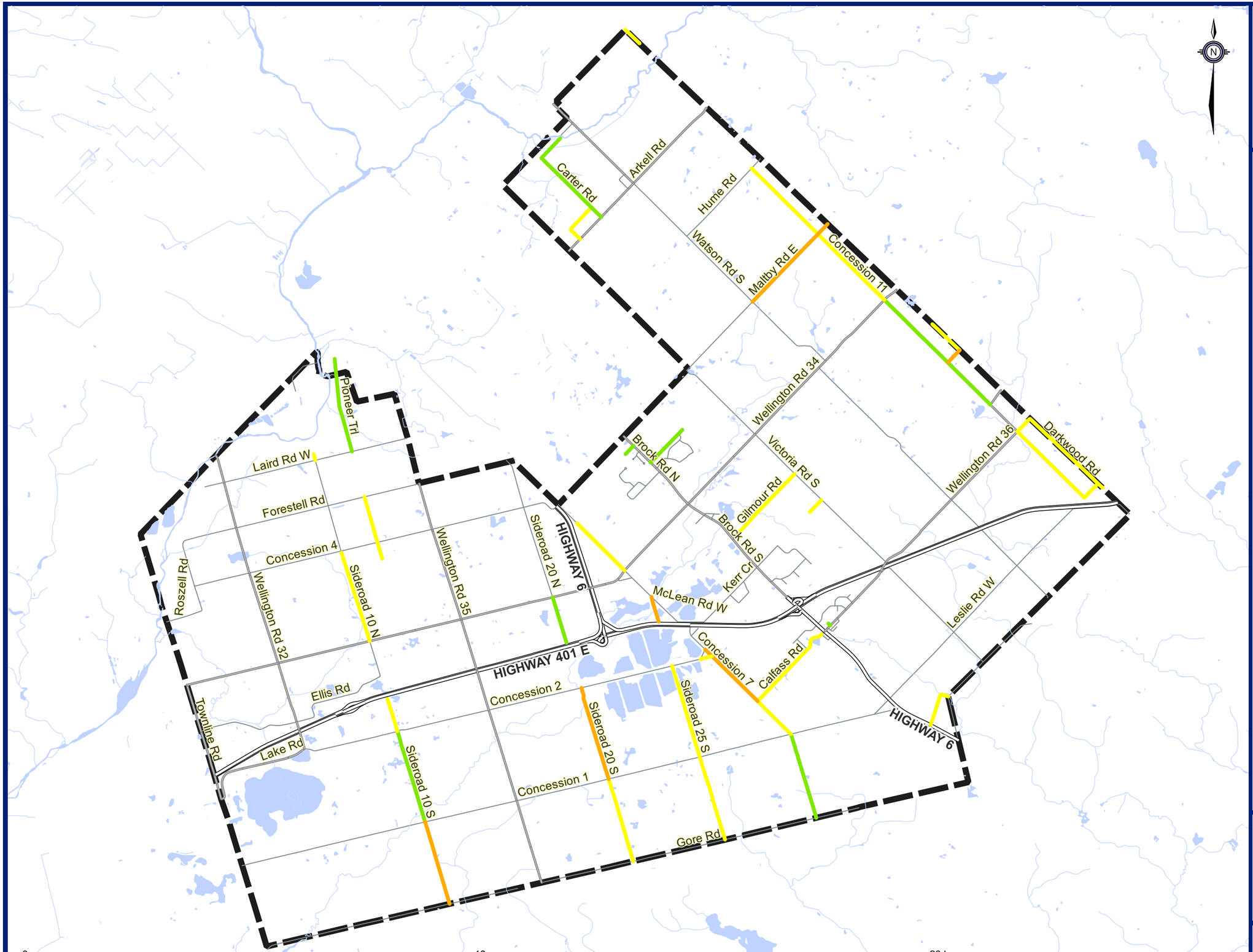
Township of Puslinch
Paved Roads - PCI

BluePlan ENGINEERING

October, 2022
Project #121149
Projection EPSG:26917

THE TOWNSHIP OF
Puslinch

Puslinch Roads Management Plan



Gravel Roads - PCI Range

- >75 Good
- 50-75 Fair
- <50 Poor
- Highway
- County Road
- Railway
- Waterways
- Waterbodies
- Municipal Boundary

Township of Puslinch
Gravel Roads - PCI

BluePlan ENGINEERING

October, 2022
Project #121149
Projection EPSG:26917

Document Path: W:\Guelph\121-202112121149 2021 Puslinch Roads Management Plan\5 Work in Progress\GIS and Databases\20210111_PuslinchRoads.qgs.qgz

APPENDIX B:
EXCERPTS FROM MTO INVENTORY MANUAL

#ITEM 32 ROADSIDE ENVIRONMENT

CODE (R) - Rural Section

Rural Environment is defined as being where:

- Areas with sparse development
  or where

Development is less than 50% of the frontage, including developed areas extending less than 300 metres on one side or 200 metres on both sides and no curbs and gutters

CODE (S) - Semi-Urban/Suburban Section

Semi-Urban/Suburban Environment is defined as being where:

- development exceeds 50% of the frontage for a minimum of 300 metres on one side or 200 metres on both sides
  and
- no curbs and gutters, with or without storm/combination sewers or curb and gutter on one side only without storm/combination sewers
  or
- for subdivisions, the majority of the lot frontages are 30 metres or greater and the roads comply with the ministry's suburban area standards (refer to Directive B-18) as a minimum.

CODE (U) - Urban Section

Urban Environment is defined as being where:

- Curb and gutters on both sides with or served by storm/combination sewers
  or
- Curb and gutter on one side with or served by storm/combination sewers
  or
- Reversed paved shoulders with or served by storm/combination sewers

- for subdivisions, the majority of the lot frontages must be less than 30 metres (refer to Directive B-18)

ITEM 33 EXISTING CLASS

RURAL SECTIONS

Enter the Existing Class for rural sections according to the present AADT (Item 57) as follows (Classes 100 to 800 apply only to road sections with less than 4 lanes):

CODE (100) - 01 - 49 AADT
(200) - 50 - 199 AADT

(3 0 0) - 200 - 399 AADT
(4 0 0) - 400 - 999 AADT
(5 0 0) - 1000 - 1999 AADT
(6 0 0) - 2000 - 2999 AADT
(7 0 0) - 3000 - 3999 AADT
(8 0 0) - 4000 AADT and over
(4 L N) - 4 or more lanes
(E X P) - **Rural Expressways** connect the larger cities, industrial concentrations and recreational areas. They carry large volumes of traffic moving at high speeds under free-flowing conditions.

SEMI-URBAN SECTIONS

Enter the Existing Class for semi-urban sections as follows:

CODE (A L L) - **Alleyways** are public ways functioning as an alternative to a local street servicing business sections or off-street parking lots. They have a width of 5.0 m or more, and are continuous through a block (Refer to MTR-B51 for details).
(L/R) - **Local Residential** roads provide access to residential developments.
(L C I) - **Local Commercial or Industrial** roads provide access to commercial or industrial areas.
(C/R) - **Collector Residential** roads serve traffic between local residential and arterial roads, and provide access to adjacent residential properties.
(C C I) - **Collector Commercial or Industrial** roads serve traffic between local commercial or industrial and arterial roads, and provide access to adjacent commercial or industrial properties.
(A R T) - **Arterial** roads serve large volumes of all types of traffic moving at medium to high speeds. Direct access to adjacent development is limited, and traffic flow is generally uninterrupted. Design speeds range between 50 km/h and 100 km/h.

Note: Collector roads are characterized by interrupted traffic, design speeds normally between 50 km/h and 80 km/h, and equal importance given to traffic movement and land access.

URBAN SECTIONS

The definitions for Semi-Urban road classes also apply to the Urban environment. Enter the Existing Class for urban sections according as follows:

CODE (A L L) - Alleyways
(L/R) - Local Residential
(L C I) - Local Commercial or Industrial
(C/R) - Collector Residential
(C C I) - Collector Commercial or Industrial
(A R T) - Arterial
(E X P) - **Urban Expressways** serve traffic between large residential areas, industrial or commercial concentrations and the central business district. They carry high volumes of traffic, moving at high speeds under free-flowing conditions.

For municipalities with pavement management studies, the ten point roughness rating may be used as the ten point Surface Condition rating for this item.

Rate the existing Surface Condition as follows:

POINT RATING

(1 0) - If the section affords a fully adequate standard of service, with no annoyance or discomfort.

(09 to 07) - If it is possible to maintain the lesser of the Minimum Tolerable Average Operating Speed **(Item 91)** the legal Speed Limit **(Item 51)** with only a noticeable amount of annoyance to the driver due to sway, vibration or steering effort, but with no noticeable feeling of hazard.

(06 to 04) - If maintaining even the lesser of the Minimum Tolerable Average Operating Speed **(Item 91)** or the legal Speed Limit **(Item 51)** results in either a "tug-of-war" with a too-steep or uneven crown, or a feeling that the car is taking undue punishment.

(03 to 01) - If the surface irregularities are so severe that a driver will tend to reduce speed considerably, possibly even steering an irregular course, or if the crown is so steep as to be hazardous in winter.

* ITEM 84 SHOULDER WIDTH - *Maximum Points 10*

(RURAL AND SEMI-URBAN SECTIONS ONLY)

Point ratings for Shoulder Width will be calculated by the computer and are based on Shoulder Width **(Item 40)** and Existing Class **(Item 33)** using linear interpolation.

The Shoulder Width Point Rating Tables are shown below.

TABLE 84R RURAL SECTIONS

Point Rating	EXISTING CLASS							
	100 & 200	300	400	500	600	700	800	4LN,EXP
10	1.5	1.5	1.5	2.5	2.5	3.0	3.0	3,0
1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

TABLE 84S SEMI-URBAN SECTIONS

	Local Roads		Collector Roads		Arterials
Point Rating	Residential ALL,L/R	Comm/Ind LCI	Residential C/R	Comm/Ind CCI	All Lanes ART
10	1.5	2.0	2.5	3.0	3.5
1	0.5	1.0	1.0	1.5	1.5

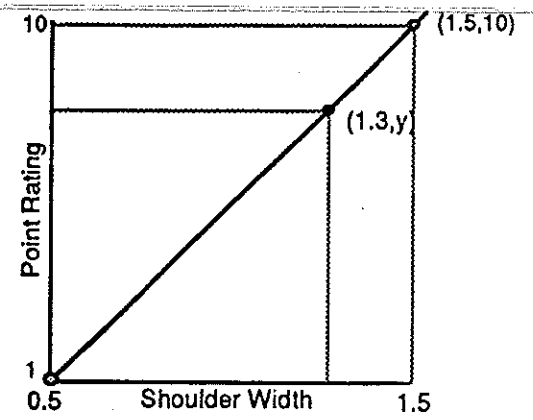
Note: The highest point rating corresponds to the design standard surface width or more; and the lowest point rating corresponds to the minimum tolerable surface width or less. Point ratings for intermediate surface widths will be determined by the computer through interpolation.

Example

For a shoulder width of 1.3 m on a rural road section with an existing class coded as (400), the computer will calculate a Shoulder Width point rating of 8.2 as follows:

$$\frac{1.3 - 0.5}{y - 1} = \frac{1.5 - 0.5}{10 - 1}$$

$$y = 8.2$$



#* ITEM 85 SURFACE WIDTH

(RURAL AND SEMI-URBAN SECTIONS) - *Maximum Points 15*
(URBAN SECTIONS) - *Maximum Points 25*

Point ratings for Surface Width will be calculated by the computer and are based on Roadside Environment (**Item 32**), Existing Class (**Item 33**) and Surface Width (**Item 37**) using linear interpolation. The Surface Width Point Rating Tables are shown below for information purposes.

TABLE 85R RURAL SECTIONS

Point Rating	EXISTING CLASS							
	100 & 200	300	400	500	600	700	800	4LN,EXP
15	6.0	6.0	6.5	7.0	7.0	7.0	7.0	3.75/lane
1	5.0	5.0	6.0	6.0	6.0	6.5	6.5	3.5/lane

TABLE 85S SEMI-URBAN SECTIONS

	2LN				3LN				4LN		2LN	3LN	4LN	6LN	6LN	7LN	8LN	9LN
Point Rating	L/R ALL	LCI	C/R	CCI	L/R	LCI	C/R	CCI	C/R	CCI	Arterials ART							
15	6.0	6.5	6.5	7.5	9.0	9.75	9.75	11.25	13.0	15.0	7.5	11.25	15.0	18.75	22.5	26.25	30.0	33.75
1	5.0	5.5	5.5	6.0	7.5	9.0	9.0	9.0	11.0	12.0	6.0	9.0	12.0	15.0	18.0	21.5	24.5	27.5

TABLE 85U URBAN SECTIONS

	2LN				3LN				4LN		2LN	3LN	4LN	6LN	6LN	7LN	8LN	9LN	Express ways
Point Rating	L/R ALL	LCI	C/R	CCI	L/R	LCI	C/R	CCI	C/R	CCI	Arterials ART								EXP
25	6.0	6.5	6.5	7.5	9.0	9.75	9.75	11.25	13.0	15.0	7.5	11.25	15.0	18.75	22.5	26.25	30.0	33.75	3.75/lane
1	5.5	6.0	6.0	6.5	8.25	9.0	9.0	9.0	11.5	12.5	6.5	9.5	12.5	15.5	18.5	22.0	25.0	28.0	3.5/lane

#* ITEM 93 SURFACE WIDTH

RURAL

Under Existing Conditions the Surface Width (**Item 37**) is transcribed by the computer. The Minimum Tolerable Standard for the existing Road Class (**Item 33**) is then derived using Table 93R.

TABLE 93R - MINIMUM TOLERABLE SURFACE WIDTH - RURAL (metres)

	EXISTING CLASS									
	100	200	300	400	500	600	700	800	4LN	EXP
ROADWAY WIDTH	5.0	5.5	5.5	6.0	6.0	6.0	6.5	6.5	13.0	3.5/lane

SEMI-URBAN and URBAN

Under Existing Conditions the Surface Width (**Item 37**) is transcribed by the computer. The Minimum Tolerable Standard for the existing Road Class (**Item 33**), the Number of Lanes (**Item 34**) and the Traffic Operation (**Item 53**) is then derived using Table 93SU.

TABLE 93SU - MINIMUM TOLERABLE SURFACE WIDTH - SEMI-URBAN and URBAN (metres)

	SEMI-URBAN		URBAN	
FUNCTIONAL CLASSIFICATION	2 Way (2W,2M)	1 Way (1W,1M)	2 Way (2W,2M)	1 Way (1W,1M)
2-lane Local Comm. & Ind.	5.5	5.5	6.0	6.0
2-lane Collector Residential	5.5	5.5	6.0	6.0
2-lane Collector Comm. & Ind.	6.0	6.0	6.5	6.5
2-lane Arterial	6.0	6.0	6.5	6.5
3-lane Local Comm. & Ind.	9.0	8.7	9.0	8.7
3-lane Collector Residential	9.0	8.7	9.0	8.7
3-lane Collector Comm. & Ind.	9.0	8.7	9.0	8.7
3-lane Arterial	9.0	9.0	9.5	9.5
4-lane Collector Residential	11.0	11.0	11.5	11.5
4-lane Collector Comm. & Ind.	12.0	12.0	12.5	12.5
4-lane Arterial	12.0	12.0	12.5	12.5
5-lane Arterial	15.0	15.0	15.5	15.5
6-lane Arterial	18.0	18.0	18.5	18.5
7-lane Arterial	21.5	21.5	22.0	22.0
8-lane Arterial	24.5	24.5	25.0	25.0
9-lane Arterial	27.5	27.5	28.0	28.0
Expressway	—	—	3.5/ln	3.5/ln

In all cases the computer compares Existing Condition to the Minimum Tolerable Standard and code as follows:

RURAL SECTIONS

CODE (**Now**) - If the Existing Condition is less than the Minimum Tolerable Standard, based on the existing AADT (**Item 57**).

(1-5) - If the existing Surface Width based on the 10 year forecasted AADT (**Item 65**), is expected to be less than the Minimum Tolerable Standard within 5 years.

(6-10) - If the existing Surface Width, based on the 10 year forecasted AADT (**Item 65**) is expected to be less than the Minimum Tolerable Standard in the 6-10 year time period.

TABLE F-1 ROAD DESIGN STANDARDS

RURAL ROAD STANDARDS

		50-199 AADT 200	200-399 AADT 300	400-999 AADT 400	1000-1999 AADT 500	2000-2999 AADT 600	3000-3999 AADT 700	4000+ AADT 800	4 lanes & Exp 4LN,EXP
	Surface Width (m)	6.0	6.0	6.5	6.5	7.0	7.0	7.5	15.0
Shw	Shoulder Width (m)	1.5	1.5	1.5	2.5	2.5	3.0	3.0	3.0
DDP	Hot Mix (mm)		*16	50	50	100	100	100	100
DA	Granular A (mm)	150	150	150	150	150	150	150	150
	Southern Ontario								
DB	*Granular B (mm)*								
	BS	150	150	150	150	150	150	150	150
	RW, REC,NC	300	300	450	450	450	450	450	450
	Northern Ontario								
DB	*Granular B (mm)*								
	BS	250	250	250	250	250	250	250	250
	RW, REC,NC	400	400	550	550	550	550	550	550
	Concrete Surface								
DC	Concrete (mm)	150	150	150	225	225	225	225	225
DB	Granular B (mm)	150	150	150	150	150	150	150	150

* Double Surface Treatment (DST) assumed to equal 16 mm of Hot Mix

Note: Class 100 rural roads are eligible for maintenance subsidy only.

SEMI-URBAN ROAD STANDARDS

		Local Roads		Collector Roads		Arterials
		Residential LR	Comm/Ind LCI	Residential CR	Comm/Ind CCI	All Lanes ART
	Lane Width (m)	3.0	3.25	3.25	3.75	3.75
Shw	Shoulder Width (m)	1.5	1.5	2.5	2.5	3.0
DDP	Hot Mix (mm)	50	50	50	100	100
DA	Granular A (mm)	150	150	150	150	150
	Southern Ontario					
DB	*Granular B (mm)*					
	BS	150	150	150	150	150
	RW, REC	250	300	300	450	450
	Northern Ontario					
DB	*Granular B (mm)*					
	BS	250	250	250	250	250
	RW, REC	350	400	400	550	550
	Concrete Surface					
DC	Concrete (mm)	150	150	225	225	225
DB	Granular B (mm)	150	150	150	150	150

URBAN ROAD STANDARDS

		Local Roads		Collector Roads		Arterials	Expressways
		Residential LR	Comm/Ind LCI	Residential CR	Comm/Ind CCI	All Lanes ART	All Lanes EXP
	Through Lane Width (m)	3.0	3.25	3.25	3.75	3.75	3.75
	Parking Lane Width (m)	2.5	2.5	2.5	2.5	3.0	3.0
	Curb Offset each side (m)	.5	.5	.5	.5	.5	.5
	Granular Base						
DDP	Hot Mix (mm)	100	100	100	150	150	150
DA	Granular A (mm)	150	150	150	150	150	150
DB	Granular B (mm)						
	Southern Ontario	300	300	300	300	450	450
	Northern Ontario	400	400	400	400	550	550
	Concrete Base						
DDP	Hot Mix (mm)	50	50	50	50	100	100
DC	Concrete (mm)	150	150	200	200	200	200
DB	Granular B (mm)	150	150	150	150	150	200
	Concrete Surface						
DC	Concrete (mm)	150	150	250	250	250	250
DB	Granular B (mm)	150	150	150	150	150	150

Note: Bench Mark Costs will not exceed the design standards specified in the above tables

APPENDIX C:
RECOMMENDED CROSS-SECTION FOR EXISTING ROADS

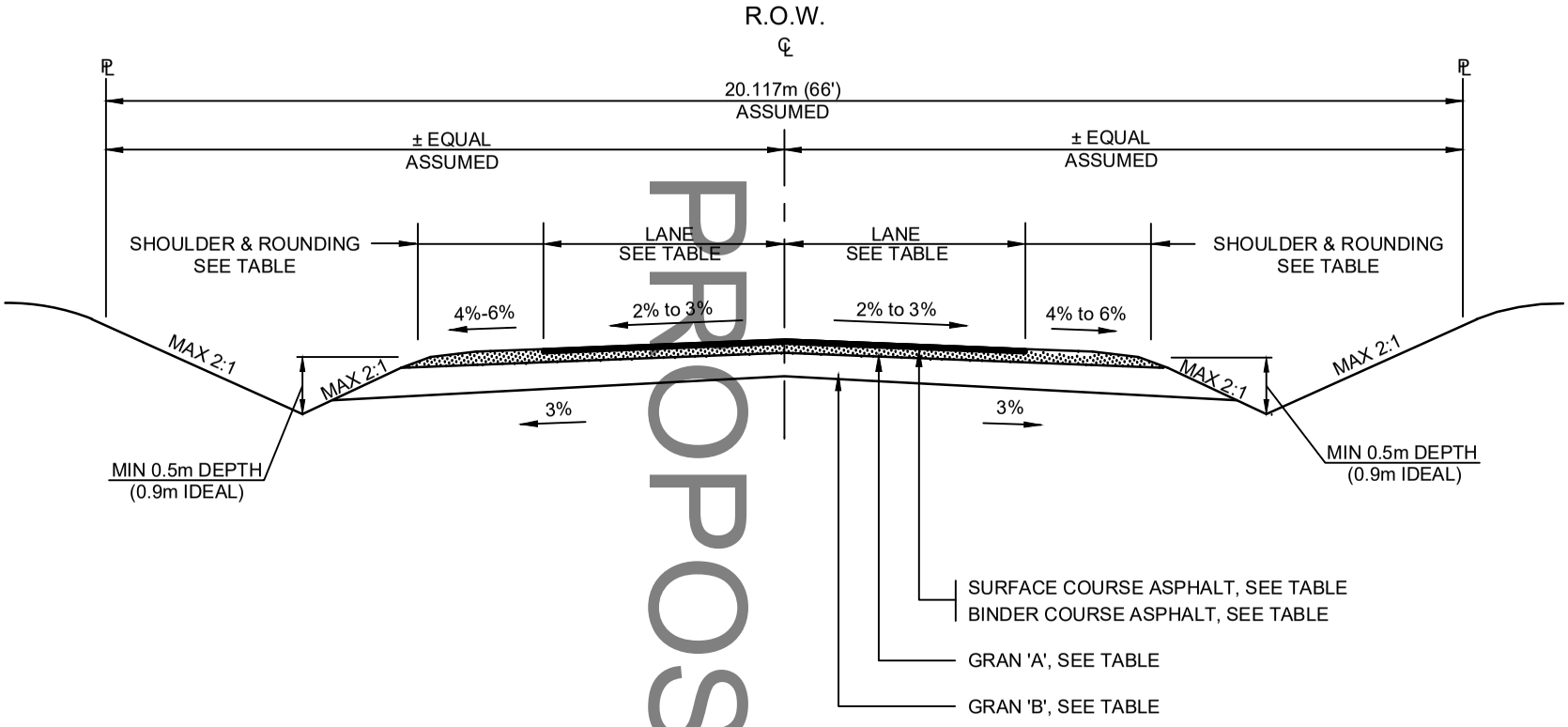
PUSLINCH

RURAL ROAD CROSS-SECTION

(EXISTING ROAD)

TOWNSHIP OF PUSLINCH STANDARD DRAWING

DATE: SEPT. 2022



PROPOSED

ROAD DESCRIPTION	SURFACE COURSE	BINDER COURSE	GRAN 'A'	GRAN 'B'	LANE	SHOULDER & ROUNDING
LOCAL RURAL, AADT ≤ 1999, NO TRUCK TRAFFIC CONSIDERATIONS	60mm HL 4	--	150mm	300mm-450mm	3.5m	0.5m MIN (1.0m IDEAL)
LOCAL RURAL, AADT > 1999, NO TRUCK TRAFFIC CONSIDERATIONS	35mm HL 3	60mm HL 4	150mm	450mm	3.5m-4.0m	0.5m MIN (2.0m IDEAL)
LOCAL RURAL, TRUCK TRAFFIC CONSIDERATIONS	50mm HL 4	60mm HL 8	150mm-200mm	450mm	3.75m-4.25m	1.0m MIN (2.0m IDEAL)

ROAD BASE DEPTHS TO BE CONFIRMED THROUGH GEOTECHNICAL INVESTIGATION.
VALUES IN TABLE REPRESENT MINIMUM RECOMMENDATIONS.
REFER TO MTO INVENTORY MANUAL FOR RECOMMENDED INTERPRETATION BETWEEN RANGES IN THE ABSENCE OF A GEOTECHNICAL INVESTIGATION.

APPENDIX D:
COST ESTIMATES FOR SURFACING OPTIONS

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Gravel Road Surfacing
GMBP Project: 121149

Date: 2022-10-11

Year 1 Cost - Gravel Addition (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Supply Granular 'M'	t	1210	$ 12.00	$ 14,520.00
A2		Grade and Compact Road (by Township forces)	LS	1	$ 3,000.00	$ 3,000.00
		Sub-total per km				**$ 17,520.00**
		TOTAL per km (rounded)				**$ 18,000.00**

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Surface Treatment
GMBP Project: 121149

Date: 2022-10-11

Year 1 Cost - Double Lift Surface Treatment (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 2,000.00	$ 2,000.00
A2		Mobilization and Demobilization	LS	1	$ 5,000.00	$ 5,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 3,000.00	$ 3,000.00
A4		Pulverize Existing Road	m2	8000	$ 0.50	$ 4,000.00
A5		Grade and Compact Road Base	m2	8000	$ 1.00	$ 8,000.00
A6		Granular 'A' (for grading)	t	480	$ 15.00	$ 7,200.00
A7		Double Lift Surface Treatment	m2	8000	$ 6.50	$ 52,000.00
A8		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
A9		Street Sweeping	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total per km				**$ 85,200.00**
		TOTAL per km (rounded)				**$ 86,000.00**

Year 2 Cost - Single Lift Surface Treatment (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 1,000.00	$ 1,000.00
A2		Mobilization and Demobilization	LS	1	$ 5,000.00	$ 5,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 2,000.00	$ 2,000.00
A4		Single Lift Surface Treatment	m2	8000	$ 4.50	$ 36,000.00
A5		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
A6		Street Sweeping	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total per km				**$ 48,000.00**
		TOTAL per km (rounded)				**$ 48,000.00**

Year 8 Cost - Asphalt Padding and Single Lift Surface Treatment (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 1,000.00	$ 1,000.00
A2		Mobilization and Demobilization	LS	1	$ 5,000.00	$ 5,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 2,000.00	$ 2,000.00
A4		Asphalt Padding (allowance)	LS	1	$ 10,000.00	$ 10,000.00
A5		Single Lift Surface Treatment	m2	8000	$ 4.50	$ 36,000.00
A6		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
A7		Street Sweeping	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total per km				**$ 58,000.00**
		TOTAL per km (rounded)				**$ 58,000.00**

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Asphalt Wearing Surface (No Truck Traffic Considerations, Existing Practice)
GMBP Project: 121149

Date: 2022-10-11

Year 1 Cost - Pulverize and Pave (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 3,000.00	$ 3,000.00
A2		Mobilization and Demobilization	LS	1	$ 6,000.00	$ 6,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 3,000.00	$ 3,000.00
A4		Pulverize Existing Road	m2	8000	$ 1.00	$ 8,000.00
A5		Grade and Compact Road Base	m2	8000	$ 1.00	$ 8,000.00
A6		Granular 'A' (for grading)	t	480	$ 15.00	$ 7,200.00
A7		HL 4 Surface Asphalt (50 mm)	t	875	$ 80.00	$ 70,000.00
A8		Granular 'A' Shoulders (50 mm)	t	270	$ 15.00	$ 4,050.00
A9		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total				**$ 111,250.00**
		TOTAL (rounded)				**$ 112,000.00**

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Asphalt Wearing Surface (No Truck Traffic Considerations, Development Standards)
GMBP Project: 121149

Date: 2022-10-11

Year 1 Cost - Pulverize and Pave (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 4,000.00	$ 4,000.00
A2		Mobilization and Demobilization	LS	1	$ 8,000.00	$ 8,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 3,000.00	$ 3,000.00
A4		Pulverize Existing Road	m2	8000	$ 1.00	$ 8,000.00
A5		Grade and Compact Road Base	m2	8000	$ 1.00	$ 8,000.00
A6		Granular 'A' (for grading)	t	480	$ 15.00	$ 7,200.00
A7		HL 4 Binder Asphalt (60 mm)	t	1050	$ 75.00	$ 78,750.00
A8		HL 3 Surface Asphalt (35 mm)	t	620	$ 75.00	$ 46,500.00
A9		Granular 'A' Shoulders (95 mm)	t	510	$ 15.00	$ 7,650.00
A10		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total				**$ 173,100.00**
		TOTAL (rounded)				**$ 174,000.00**

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Asphalt Wearing Surface (Truck Traffic Considerations, Existing Practice)
GMBP Project: 121149

Date: 2022-10-11

Year 1 Cost - Pulverize and Pave (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 5,000.00	$ 5,000.00
A2		Mobilization and Demobilization	LS	1	$ 9,000.00	$ 9,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 3,000.00	$ 3,000.00
A4		Pulverize Existing Road	m2	9500	$ 1.00	$ 9,500.00
A5		Grade and Compact Road Base	m2	9500	$ 1.00	$ 9,500.00
A6		Granular 'A' (for grading)	t	570	$ 15.00	$ 8,550.00
A7		HL 8 Binder Asphalt (50 mm)	t	940	$ 75.00	$ 70,500.00
A8		HL 4 Surface Asphalt (50 mm)	t	940	$ 78.00	$ 73,320.00
A9		Granular 'A' Shoulders (100 mm)	t	800	$ 15.00	$ 12,000.00
A10		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total				**$ 202,370.00**
		TOTAL (rounded)				**$ 203,000.00**

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Asphalt Wearing Surface (Truck Traffic Considerations, Development Standards)
GMBP Project: 121149

Date: 2022-10-11

Year 1 Cost - Pulverize and Pave (per km of road)

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
A1		Bonding and Insurance	LS	1	$ 6,000.00	$ 6,000.00
A2		Mobilization and Demobilization	LS	1	$ 10,000.00	$ 10,000.00
A3		Traffic Control (Road Closed)	LS	1	$ 3,000.00	$ 3,000.00
A4		Pulverize Existing Road	m2	9500	$ 1.00	$ 9,500.00
A5		Grade and Compact Road Base	m2	9500	$ 1.00	$ 9,500.00
A6		Granular 'A' (for grading)	t	570	$ 15.00	$ 8,550.00
A7		HL 8 Binder Asphalt (60 mm)	t	1130	$ 75.00	$ 84,750.00
A8		HL 4 Surface Asphalt (50 mm)	t	940	$ 78.00	$ 73,320.00
A9		Granular 'A' Shoulders (110 mm)	t	880	$ 15.00	$ 13,200.00
A10		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total				**$ 219,820.00**
		TOTAL (rounded)				**$ 220,000.00**

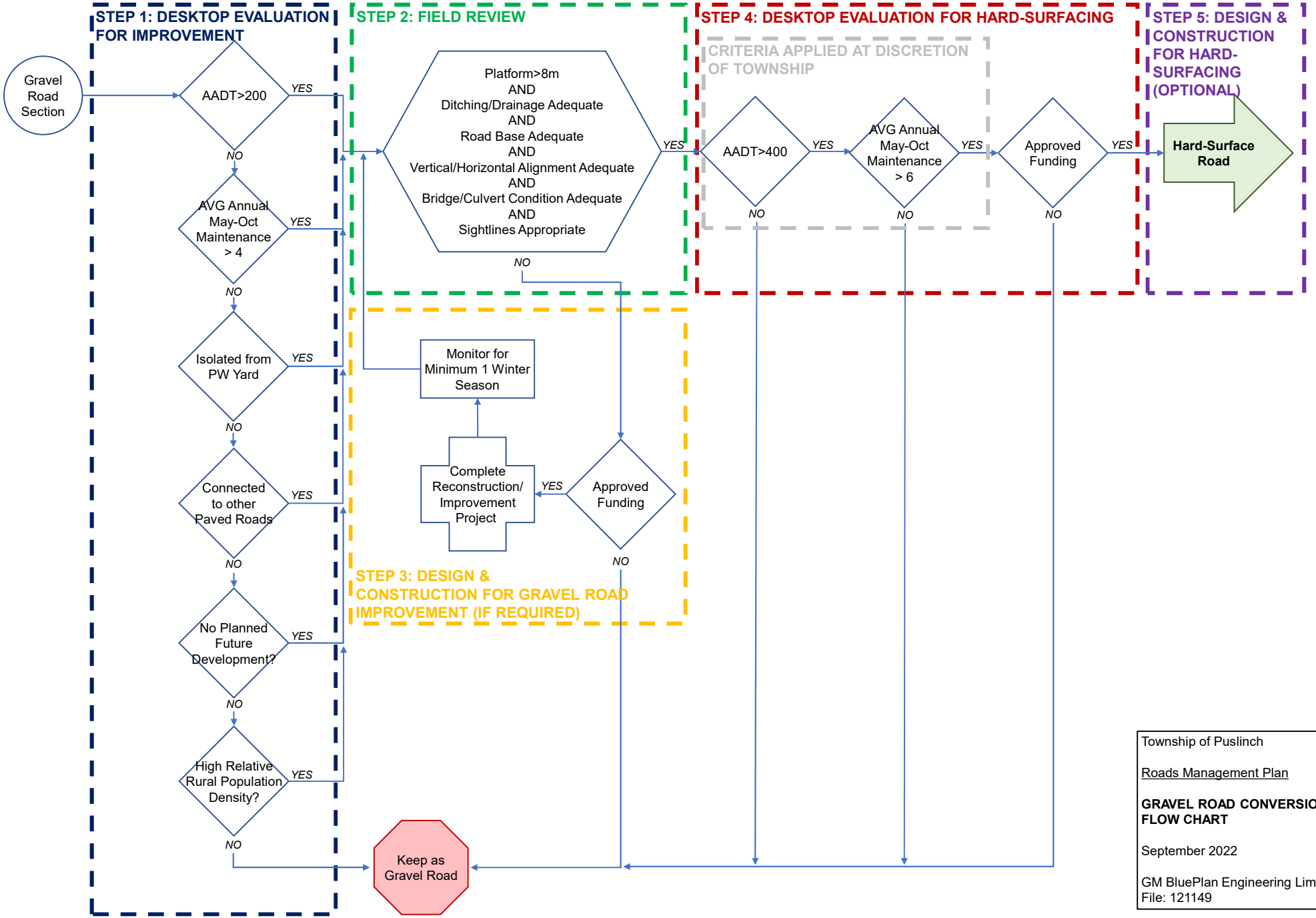
APPENDIX E:
ROAD AGE CALCULATIONS

Asphalt Road Age Summary
Township of Puslinch

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Acquisition Date	Re-Acquisition Date	Achieved Road Life
1	Gore Road	Townline Road	Sideroad 10	1995	2015	20
2	Gore Road	Sideroad 10 South	County Road 52	1996	2015	19
3	Gore Road	County Road 35	Foreman Road	1992	2013	21
12	Concession 1	transition	Townline Road	1999	2013	14
13B	Concession 1	Sideroad 10 South	transition	1999	2013	14
14	Concession 1	Sideroad 10 South	County Road 35	2000	2013	13
16	Concession 1	Sideroad 20 South	Sideroad 25 South	1999	2020	21
17	Concession 1	Sideroad 25 South	Concession 7	1997	2020	23
20	Leslie Road West	Highway 6	Victoria Road South	1993	2016	23
33	Concession 2	Sideroad 10 South	County Road 35	1996	2014	18
40	McLean Road East	County Road 46	Concession 7	2007	2021	14
56	Concession 4	County Road 32	Sideroad 10 North	2008	2021	13
57	Concession 4	Sideroad 10 North	Sideroad 12 North	2004	2019	15
58	Concession 4	Sideroad 12 North	County Road 35	2003	2019	16
66	Forestell Road	County Road 32	Roszell Road	2000	2018	18
67	Forestell Road	Sideroad 10 North	County Road 32	1999	2017	18
68	Forestell Road	Sideroad 12 North	Sideroad 10 North	1999	2018	19
69	Forestell Road	County Road 35	Sideroad 12 North	1999	2018	19
72	Laird Road West	County Road 32	Sideroad 10 North	1999	2017	18
73	Laird Road West	Sideroad 10 North	Pioneer Trail	1999	2017	18
123	Victoria Road South	Leslie Road West	County Road 36	1993	2014	21
124	Victoria Road South	County Road 36	Gilmour Road	1995	2019	24
125A	Victoria Road South	Gilmour Road	entrance to Aberfoyle Pit #2	2000	2019	19
125B	Victoria Road South	entrance to Aberfoyle Pit #2	County Road 34	1990	2016	26
126	Victoria Road South	County Road 34	Maltby Road East	1995	2016	21
133	Watson Road South	Leslie Road West	McRae Station Road	1997	2020	23
134	Watson Road South	bridge	Leslie Road West	1996	2020	24
136	Watson Road South	County Road 36	bridge	1998	2020	22
137	Watson Road South	County Road 34	County Road 36	1996	2020	24
138	Watson Road South	Maltby Road East	County Road 34	1994	2016	22
158	McLean Road East	Brock Road South	Brock Road South	1996	2021	25
164	Concession 7	bridge	Sideroad 25 North	2004	2021	17
165	Concession 7	Sideroad 25 North	County Road 34	2004	2021	17
180	Currie Drive	County Road 36	Highway 6	1993	2015	22
181	Ochs Drive	Currie Drive	County Road 36	1998	2015	17
210	Lang Court	Currie Drive	dead end	1995	2015	20
27B	Calfass Road	Victoria Street	Highway 6	1995	2016	21
					Average:	**19**
					Min:	**13**
					Max:	**26**

APPENDIX F:
GRAVEL ROAD CONVERSION FLOW CHART



Township of Puslinch

Roads Management Plan

GRAVEL ROAD CONVERSION FLOW CHART

September 2022

GM BluePlan Engineering Limited
File: 121149

APPENDIX G:
PRELIMINARY DESIGN CHECKLIST FOR TRANSPORTATION CAPITAL PROJECTS

TOWNSHIP OF PUSLINCH

Transportation Capital Project – Preliminary Design Checklist

Capital Project:		Asset IDs:	
Description:			
Checklist Prepared By:		Date:	

Project Definition:

Main Road Name:				Length:	
	From:			To:	
Road Construction:	☐ Urban	☐ Semi-Urban	☐ Rural		
Traffic:	☐ Local Residential	☐ Collector Residential	☐ Local Commercial	☐ Collector Commercial	
	☐ Other:				
AADT:			% Trucks:		
Traffic Growth Rate:			10 Year AADT:		
Improvement:	☐ New Road	☐ Gravel Conversion	☐ Resurfacing	☐ Reconstruction	
	☐ Other:				
Boundary Road? Y / N			Rail Crossing? Y / N		
Construction Year:		Budget:		Preliminary Cost Estimate:	
Funding:					

Background Review:

Studies:	*Required*	*Date Received*	*Comments*
Topographic Survey:	Y / N		
Legal Survey:	Y / N		
Permission to Enter:	Y / N		
Geotechnical Investigation:	Y / N		
Environmental Assessment:	Y / N		
Environmental Impact Study:	Y / N		
Traffic Study:	Y / N		
Development Study:	Y / N		
Active Transportation:	Y / N		
Traffic Calming:	Y / N		
Pavement Management:	Y / N		
Functional Plans:	Y / N		
Noise Impact Study:	Y / N		
Archaeology:	Y / N		
Heritage:	Y / N		
Tree Inventory:	Y / N		
Bridge/Culvert Review:	Y / N		
Hydrogeology:	Y / N		

Existing Conditions:

Item	*Comments*
Pavement History:	
Pavement Condition:	
Maintenance Demand:	
Landscaping:	
Horizontal Alignment Issues:	
Vertical Alignment Issues:	
Collision/Accident History:	
Sightline Issues:	
Drainage Issues:	
Subbase Issues:	

Existing Geometry:

Pavement Width:		Shoulder Width:		Platform Width:	
Boulevard Type/Width:			Sidewalk Type/Width:		
Right-of-Way Width:					

Structures and Drainage:

Item	*Comments*
Curb and Gutter:	
Storm Sewer:	
Ditches:	
Municipal Drains:	
Watercourses:	
Equalization Culverts:	
Driveway Culverts:	
Guide Rail:	
Bridges/Culverts:	
Retaining Walls:	

Utilities:

Utility	*Identified*	*Exposed*	*Date Exposed*	*Comments*
Storm Sewer:	Y/N	Y/N		
Sanitary Sewer:	Y/N	Y/N		
Watermain:	Y/N	Y/N		
Natural Gas:	Y/N	Y/N		
Telecommunications:	Y/N	Y/N		
Cable:	Y/N	Y/N		
Hydro:	Y/N	Y/N		
Street Lighting:	Y/N	Y/N		
Other:	Y/N	Y/N		

Construction Staging:

Traffic Management:	☐ Road Closed	☐ One Lane Open
Waste Collection Day:		
School Bus Routes:		
Business Delivery Schedules:		

Anticipated Approvals/Permits:

Studies:	*Required?*	*Date Received*	*Comments*
MECP C of A:	Y / N		
MTO:	Y / N		
PTTW / EASR:	Y / N		
Rail Authority:	Y / N		
Conservation Authority:	Y / N		
Drainage Act:	Y / N		
DFO:	Y / N		
TC:	Y / N		
MECP SAR:	Y / N		
County of Wellington:	Y / N		
MCEA:	Y / N		

Summary and Recommendations:

Additional Investigations Required:				
Utilities to be Daylighted:				
Public Consultation:				
Procurement Recommended:	☐ Sole Source	☐ RFQ	☐ RFT	☐ RFP
Council Approval:				
Other:				

APPENDIX H:
CURRENT TRAFFIC COUNTS AND 10 YEAR FORECAST

TRAFFIC COUNT LOCAITONS AND TRAFFIC RANGE ESTIMATES (INCLUDING PROJECTED GROWTH)

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Truck Route	2022 Traffic Count (ADT)	Estimated Traffic Range	Assumed Growth Rate	Esitamte 10 Year ADT
211	Ann Street	County Road 36 (Badenoch Street)	End	63.1	Gravel	RUR	50.0			0-49	0.5%	51.5
30	Back Street	Main Street	Badenoch St E	345.5	Paved	SU	50.0			50-199	0.5%	131.4
214	Beiber Road	Nicholas Beaver Road	End	169.7	Paved	URB	50.0	Y		200-499	0.5%	367.9
208	Boreham Drive	County Road 37 (Arkell Road)	County Road 41 (Watson Road South)	442.3	Paved	SU	50.0			200-499	0.5%	367.9
200	Boyce Drive	County Road 46	End	253.5	Gravel	RUR	50.0			0-49	0.5%	51.5
185	Bridle Path	Brock Rd N	Bridle Path	446.0	Paved	URB	50.0			200-499	0.5%	367.9
204	Bridle Path	Bridle Path	Bridle Path	1116.0	Paved	URB	50.0			200-499	0.5%	367.9
27	Calfass Road	Concession 7	Victoria Street	2077.4	Gravel	RUR	50.0		190	50-199	0.5%	199.7
27b	Calfass Road	Victoria Street	Queen Street (Highway 6)	97.0	Paved	URB	50.0			200-499	0.5%	367.9
201	Carriage Lane	Bridle Path	End	738.0	Paved	URB	50.0			200-499	0.5%	367.9
129	Carter Road	Arkell Road (County Road 37)	Cooks Mill Road	1849.2	Gravel	RUR	50.0		220	200-499	0.5%	231.3
202	Cassin Court	Daymond Drive	End	164.2	Paved	URB	50.0			200-499	0.5%	367.9
50	Cockburn Street	Country Road 46	Old Brock Road	123.5	Paved	URB	30.0			200-499	0.5%	367.9
12	Concession 1	Townline Road	transition	1269.2	Paved	RUR	80.0		1732	1000-1999	0.5%	1820.6
14	Concession 1	Sideroad 10 South	County Road 35	2068.7	Paved	RUR	80.0		1750	1000-1999	0.5%	1839.5
15	Concession 1	County Road 35	Sideroad 20 South	2073.8	Paved	RUR	60.0		1750	1000-1999	0.5%	1839.5
16	Concession 1	Sideroad 20 South	Sideroad 25 South	2062.4	Paved	RUR	60.0			1000-1999	0.5%	1576.7
17	Concession 1	Sideroad 25 South	Concession 7	2065.1	Paved	RUR	60.0			1000-1999	0.5%	1576.7
19	Concession 1	Leslie Road W	Highway 6	546.9	Paved	RUR	80.0			200-499	0.5%	131.4
13a	Concession 1	transition	transition	2112.9	Paved	RUR	80.0		1732	1000-1999	0.5%	1820.6
13b	Concession 1	transition	Sideroad 10 South	751.8	Paved	RUR	80.0		1732	1000-1999	0.5%	1820.6
18	Concession 1/Leslie Rd W	Concession 7	Highway 6	2350.3	Paved	RUR	80.0			1000-1999	0.5%	1576.7
142	Concession 11	Little Road	Leslie Road East	2065.7	Gravel	RUR	60.0		95	50-199	0.5%	99.9
143	Concession 11	Sideroad 17	County Road 36	1320.9	Gravel	RUR	60.0		140	50-199	0.5%	147.2
144	Concession 11	County Road 34	Sideroad 17	1960.4	Gravel	RUR	60.0		140	50-199	0.5%	147.2
145	Concession 11	Maltby Road East	County Road 34	2053.6	Gravel	RUR	60.0		111	50-199	0.5%	116.7
146	Concession 11	Hume Road	Maltby Road East	2053.6	Gravel	RUR	60.0		122	50-199	0.5%	128.2
32	Concession 2	Sideroad 10 South	County Road 32	2101.3	Paved	RUR	80.0			500-999	0.5%	788.4
33	Concession 2	Sideroad 10 South	County Road 35	2063.5	Paved	RUR	80.0			500-999	0.5%	788.4
34	Concession 2	County Road 35	Sideroad 25 South	2096.2	Paved	RUR	80.0		720	500-999	0.5%	756.8
35	Concession 2	Sideroad 20 South	Sideroad 25 South	2050.2	Paved	RUR	60.0	Y		500-999	0.5%	788.4
36	Concession 2	Concession 2/2A	Concession 7	261.4	Gravel	RUR	60.0			0-49	0.5%	51.5
36	Concession 2/2A	Sideroad 25 South	Concession 2	639.3	Paved	RUR	60.0	Y		500-999	0.5%	788.4
37	Concession 2A	Concession 2	Concession 7	235.3	Paved	RUR	60.0	Y		500-999	0.5%	788.4
55	Concession 4	Forestell Road	County Road 32	1239.0	Paved	RUR	80.0			200-499	0.5%	367.9
56	Concession 4	County Road 32	Sideroad 10 North	2072.0	Paved	RUR	80.0			200-499	0.5%	367.9
57	Concession 4	Sideroad 10 North	Sideroad 12 North	823.3	Paved	RUR	60.0			200-499	0.5%	367.9
58	Concession 4	Sideroad 12 North	County Road 35	1235.7	Paved	RUR	80.0			200-499	0.5%	367.9
59	Concession 4	County Road 35	Sideroad 20 North	2068.3	Paved	RUR	80.0		347	200-499	0.5%	364.7

TRAFFIC COUNT LOCAITONS AND TRAFFIC RANGE ESTIMATES (INCLUDING PROJECTED GROWTH)

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Truck Route	2022 Traffic Count (ADT)	Estimated Traffic Range	Assumed Growth Rate	Esitamte 10 Year ADT
161	Concession 4	Curve in Road	Highway 6	784.8	Paved	RUR	80.0			200-499	0.5%	367.9
113	Concession 7	Concession 1	Gore Road	1922.6	Gravel	RUR	60.0		294	200-499	0.5%	309.0
114	Concession 7	Concession 1	Calfrass Road	1031.7	Gravel	RUR	60.0			500-999	0.5%	788.4
114	Concession 7	Calfrass Road	Concession 2A	1619.2	Gravel	RUR	60.0			500-999	0.5%	788.4
115	Concession 7	Concession 2A	Mason Road	428.2	Paved	RUR	60.0	Y		3000-3999	0.5%	3679.0
116	Concession 7	Mason Road	McLean Road West	235.7	Paved	RUR	60.0	Y		3000-3999	0.5%	3679.0
118	Concession 7	County Road 34	Start of Pavement	35.3	Gravel	RUR	60.0			50-199	0.5%	131.4
118	Concession 7	Start of Pavement	Maltby Road West	2017.4	Paved	RUR	60.0			50-199	0.5%	131.4
81	Cooks Mill Road	Carter Road	Bridge	596.7	Gravel	RUR	50.0			200-499	0.5%	367.9
82	Cooks Mill Road	Bridge	County Road 41	437.0	Paved	SU	50.0			200-499	0.5%	367.9
180	Currie Drive	County Road 36 (Badenoch Street)	Highway 6 (Queen Street)	888.1	Paved	SU	50.0			200-499	0.5%	367.9
202	Daymond Drive	Brock Rd N	End	441.7	Paved	URB	50.0			200-499	0.5%	367.9
195	Deer View Ridge	Hammersley Drive	Fox Run Drive	665.6	Paved	URB	50.0			200-499	0.5%	367.9
44	Ellis Road	County Road 33	County Road 32	2185.5	Paved	RUR	50.0			500-999	0.5%	788.4
45a	Ellis Road	6725 Ellis Road	Sideroad 10 North	448.6	Paved	RUR	80.0			200-499	0.5%	367.9
45b	Ellis Road	County Road 32	6725 Ellis Road	1866.5	Paved	RUR	80.0			200-499	0.5%	367.9
79	Farnham Road	Arkell Road (County Road 37)	Carter Road	962.4	Gravel	RUR	50.0			50-199	0.5%	367.9
66	Forestell Road	Roszell Road	County Road 32	1220.7	Paved	RUR	60.0			1000-1999	2.0%	1828.5
67	Forestell Road	County Road 32	Sideroad 10 North	2079.9	Paved	RUR	80.0			1000-1999	2.0%	1828.5
68	Forestell Road	Sideroad 10 North	Sideroad 12 North	821.3	Paved	RUR	80.0			1000-1999	2.0%	1828.5
69	Forestell Road	Sideroad 12 North	County Road 35	1239.7	Paved	RUR	80.0			1000-1999	2.0%	1828.5
196	Fox Run Drive	Deer View Ridge	Fox Run Drive transition to curb	415.6	Paved	SU	50.0			200-499	0.5%	367.9
205	Fox Run Drive	Fox Run Drive transition to median	Fox Run Drive transition to curb	200.1	Paved	URB	50.0			200-499	0.5%	367.9
206	Fox Run Drive	Brock Rd N	Fox Run Drive transition to median	160.5	Paved	URB	50.0			200-499	0.5%	367.9
207	Fox Run Drive	Fox Run Drive	Fox Run Drive	650.8	Paved	SU	50.0			200-499	0.5%	367.9
46	Gilmour Road	County Road 46 (Brock Road)	subdivision entrance	248.1	Paved	URB	60.0		248	200-499	0.5%	260.7
47	Gilmour Road	Victoria Road South	new subdivision	1729.1	Gravel	RUR	60.0		248	200-499	0.5%	260.7
1	Gore Road	Townline Road	Sideroad 10	4138.0	Paved	RUR	60.0		1936	1000-1999	0.5%	2035.0
2	Gore Road	Sideroad 10 South	County Road 52 (Cooper Road)	1529.7	Paved	RUR	60.0			1000-1999	0.5%	1576.7
3	Gore Road	County Road 35	Foreman Road	2067.0	Paved	RUR	60.0		1823	1000-1999	0.5%	1916.2
4	Gore Road	Sideroad 20 South	Valens Road	2606.6	Paved	RUR	60.0			1000-1999	0.5%	1576.7
5	Gore Road	Valens Road	Concession 7	1526.6	Paved	RUR	60.0			1000-1999	0.5%	1576.7
6	Gore Road	Concession 7	Lennon Road	959.1	Paved	RUR	60.0			1000-1999	0.5%	1576.7
53	Hammersley Road	County Road 46	End	1002.5	Gravel	RUR	60.0			0-49	0.5%	51.5
77	Hume Road	Nassagaweya-Puslinch Townline	Watson Road South	2344.4	Paved	RUR	60.0		312	200-499	0.5%	328.0
157	Jones Baseline	Stone Road East	End	434.6	Gravel	RUR	60.0			0-49	0.5%	51.5
198	Kerr Crescent	McLean Road West	McLean Road West	834.7	Paved	SU	50.0	Y		500-999	0.5%	788.4
210	Laing Court	Currie Drive	End	113.5	Paved	SU	50.0			50-199	0.5%	131.4
72	Laird Road West	End	County Road 32	427.4	Paved	RUR	50.0			0-49	0.5%	51.5

TRAFFIC COUNT LOCAITONS AND TRAFFIC RANGE ESTIMATES (INCLUDING PROJECTED GROWTH)

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Truck Route	2022 Traffic Count (ADT)	Estimated Traffic Range	Assumed Growth Rate	Esitamte 10 Year ADT
72	Laird Road West	County Road 32	Sideroad 10 North	2063.8	Paved	RUR	60.0	Y	2418	2000-2999	2.0%	2947.5
73	Laird Road West	Sideroad 10 North	Pioneer Trail	828.4	Paved	RUR	60.0	Y		2000-2999	2.0%	3047.5
74	Laird Road West	Pioneer Trail	County Road 35	1239.1	Paved	RUR	60.0	Y		2000-2999	2.0%	3047.5
20	Leslie Road West	Highway 6	Victoria Road South	2045.0	Paved	RUR	80.0		267	200-499	0.5%	280.7
21	Leslie Road West	Victoria Road South	Watson Road South	2015.6	Paved	RUR	80.0		257	200-499	0.5%	270.1
22	Leslie Road West	Watson Road South	Bridge 5 (Mountsberg)	543.2	Paved	RUR	80.0			50-199	0.5%	131.4
23	Leslie Road West	Mountsberg Bridge	Curve at Hwy 401	1204.8	Paved	RUR	80.0			50-199	0.5%	131.4
25	Leslie Road West	Curve at Highway 401	Puslinch-Flamborough Townline	1018.1	Paved	RUR	80.0			50-199	0.5%	131.4
31	Little Road	Nassagaweya-Puslinch Townline	County Road 36	389.9	Gravel	RUR	60.0			50-199	0.5%	131.4
8	MacPherson's Lane	Puslinch-Flamborough Townline	Highway 6	878.6	Gravel	RUR	60.0			0-49	0.5%	51.5
121a	Maddaugh Road	14th Concession East	Highway 6	487.7	Paved	RUR	60.0			500-999	0.5%	788.4
121b	Maddaugh Road	Puslinch-Flamborough Townline	14th Concession East	507.9	Paved	RUR	60.0			500-999	0.5%	788.4
29	Main Street	Badenoch St E	Morriston Ball Park	256.0	Paved	SU	50.0			50-199	0.5%	131.4
64	Maltby Road East	Watson Road South	Concession 11	2070.3	Gravel	RUR	60.0			50-199	0.5%	131.4
64	Maltby Road East	Concession 11	Nassagaweya-Puslinch Townline	308.0	Gravel	RUR	60.0			50-199	0.5%	131.4
63a	Maltby Road East	Victoria Road South	1161m East of Victoria Road South	1161.0	Paved	RUR	80.0			50-199	0.5%	131.4
63b	Maltby Road East	1161m East of Victoria Road South	Watson Road South	924.9	Paved	RUR	80.0			50-199	0.5%	131.4
52	Maple Leaf Lane	County Road 46	End	266.2	Paved	SU	30.0			50-199	0.5%	131.4
38	Mason Road	Concession 7	End	222.6	Paved	SU	50.0			50-199	0.5%	131.4
40	McLean Road East	County Road 46 (Brock Road)	Sideroad 25 North	3052.8	Paved	RUR	60.0	Y		3000-3999	0.5%	3679.0
158	McLean Road East	Brock Road South	End	652.1	Paved	SU	50.0	Y		1000-1999	0.5%	1576.7
159	McLean Road East	Victoria Road South	End	361.8	Gravel	RUR	50.0			0-49	0.5%	51.5
165	McLean Road/Concession 7	Sideroad 25 North	County Road 34	829.5	Paved	RUR	60.0	Y		3000-3999	0.5%	3679.0
149	Nassagaweya-Puslinch Townline	Leslie Road East	Sideroad 10 Nassagaweya	141.3	Gravel	RUR	60.0			50-199	0.5%	131.4
150	Nassagaweya-Puslinch Townline	Leslie Road East	Little Road	2062.8	Gravel	RUR	60.0			50-199	0.5%	131.4
152	Nassagaweya-Puslinch Townline	Sideroad 17	End	826.4	Gravel	RUR	60.0			50-199	0.5%	131.4
162	Nicholas Beaver Road	Winer Rd	Brock Rd S	957.3	Paved	URB	60.0	Y		500-999	0.5%	788.4
78	Niska Road	Bailey Bridge	Whitelaw Road	613.7	Paved	RUR	50.0			2000-2999	0.5%	2627.9
181	Ochs Drive	Currie Drive	County Road 36 (Badenoch Street)	576.2	Paved	SU	50.0			50-199	0.5%	131.4
51	Old Brock Road	County Road 46	Cockburn Street	227.3	Paved	URB	50.0			50-199	0.5%	131.4
51	Old Brock Road	Cockburn Street	End	115.8	Paved	SU	50.0			0-49	0.5%	51.5
103	Pioneer Trail	Laird Road West	Niska Road	2080.9	Gravel	RUR	60.0		154	50-199	0.5%	161.9
9	Puslinch-Flamborough Townline	Victoria Road South	Maddaugh Road	1081.3	Paved	RUR	60.0			500-999	0.5%	788.4
10	Puslinch-Flamborough Townline	14th Concession East	Victoria Road South	1388.9	Paved	RUR	60.0			500-999	0.5%	788.4
148	Puslinch-Flamborough Townline	Leslie Road West	Township Limits	301.4	Paved	RUR	80.0			50-199	0.5%	131.4
90	Roszell Road	Forestell Road	Concession 4	993.8	Paved	RUR	60.0			1000-1999	2.0%	1828.5
54a	Roszell Road	Concession 4	Townline Road	1369.1	Paved	RUR	60.0		1646	1000-1999	2.0%	2006.5
191	Settler's Road	Calfass Road	Telfer Glen	318.9	Paved	SU	50.0			50-199	0.5%	131.4
94	Sideroad 10 North	County Road 34	Ellis Road	808.4	Paved	RUR	60.0			200-499	0.5%	367.9

TRAFFIC COUNT LOCAITONS AND TRAFFIC RANGE ESTIMATES (INCLUDING PROJECTED GROWTH)

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Truck Route	2022 Traffic Count (ADT)	Estimated Traffic Range	Assumed Growth Rate	Esitamte 10 Year ADT
95	Sideroad 10 North	County Road 34	Concession 4	2038.6	Gravel	RUR	60.0		159	50-199	0.5%	167.1
96	Sideroad 10 North	Concession Road 4	Forestell Road	1036.8	Paved	RUR	60.0			50-199	0.5%	131.4
97	Sideroad 10 North	Forestell Road	Laird Road West	1037.7	Paved	RUR	60.0			50-199	0.5%	131.4
98	Sideroad 10 North	Laird Road West	End	137.5	Gravel	RUR	60.0			0-49	0.5%	51.5
99a	Sideroad 10 North	Whitelaw Road	End	335.4	Paved	RUR	50.0			50-199	0.5%	78.8
91	Sideroad 10 South	Gore Road	Concession 1	1879.1	Gravel	RUR	60.0		120	50-199	0.5%	126.1
92	Sideroad 10 South	Concession 1	Concession 2	2085.8	Gravel	RUR	60.0		240	200-499	0.5%	252.3
93	Sideroad 10 South	Concession 2	Concession 2	738.6	Gravel	RUR	60.0			50-199	0.5%	131.4
100	Sideroad 12 North	Concession 4	End	335.8	Gravel	RUR	60.0			0-49	0.5%	51.5
101	Sideroad 12 North	Forestell Road	Concession 4	1040.2	Gravel	RUR	60.0			50-199	0.5%	131.4
43	Sideroad 17	Nassagaweya-Puslinch Townline	Concession 11	376.5	Gravel	RUR	60.0			50-199	0.5%	131.4
106	Sideroad 20 North	County Road 34	End	1044.0	Gravel	RUR	60.0			0-49	0.5%	51.5
108	Sideroad 20 North	County Road 34	Concession 4	2076.7	Paved	RUR	80.0			200-499	0.5%	131.4
166	Sideroad 20 North	Concession 4	Forestell Road	1113.8	Paved	RUR	80.0			200-499	0.5%	131.4
104	Sideroad 20 South	Gore Road	Concession 1	1890.4	Gravel	RUR	60.0			50-199	0.5%	131.4
105	Sideroad 20 South	Concession 1	Concession 2	2093.9	Gravel	RUR	60.0			50-199	0.5%	131.4
112	Sideroad 25 North	Concession 7	End	566.8	Gravel	RUR	60.0			50-199	0.5%	131.4
110	Sideroad 25 South	Concession 1	Gore Road	1897.3	Gravel	RUR	60.0			50-199	0.5%	131.4
111	Sideroad 25 South	Concession 2	Concession 1	2091.9	Gravel	RUR	60.0			50-199	0.5%	131.4
26	Small Rd/Leslie Rd E	Nassagaweya-Puslinch Townline	Concession 11	432.7	Gravel	RUR	60.0			50-199	0.5%	131.4
48	Smith Road	Concession 7	County Road 34	332.0	Paved	SU	60.0			50-199	0.5%	131.4
213	Tawse Place	Nicholas Beaver Road	End	154.1	Paved	SU	50.0	Y		50-199	0.5%	131.4
190	Telfer Glen	Queen Street (Highway 6)	End	697.8	Paved	SU	50.0			200-499	0.5%	367.9
122	Victoria Road South	Leslie Road West	Flamborough Puslinch Townline	918.5	Paved	RUR	80.0			1000-1999	0.5%	1576.7
123	Victoria Road South	Leslie Road West	County Road 36	2232.3	Paved	RUR	80.0			1000-1999	0.5%	1576.7
124	Victoria Road South	County Road 36 (Badenoch Street)	Gilmour Road	3042.0	Paved	RUR	80.0		2528	2000-2999	2.0%	3081.6
126	Victoria Road South	County Road 34	Maltby Road East	2074.1	Paved	RUR	80.0		4511	4000-4999	2.0%	5498.9
125a	Victoria Road South	Gilmour Road	entrance to Aberfoyle Pit #2	357.7	Paved	RUR	60.0		2528	2000-2999	2.0%	3081.6
125b	Victoria Road South	entrance to Aberfoyle Pit #2	County Road 34	621.8	Paved	RUR	60.0	Y	2528	2000-2999	2.0%	3081.6
28	Victoria Street And Church Street	Calfass Road	Queen Street (Highway 6)	282.7	Paved	URB	50.0			50-199	0.5%	131.4
133	Watson Road South	Leslie Road West	McRae Station Road	988.8	Paved	RUR	80.0			500-999	0.5%	788.4
134	Watson Road South	bridge	Leslie Road West	565.8	Paved	RUR	80.0			500-999	0.5%	788.4
135	Watson Road South	bridge	bridge	721.9	Paved	RUR	80.0			500-999	0.5%	788.4
136	Watson Road South	County Road 36 (Badenoch Street)	Bridge	758.0	Paved	RUR	80.0			500-999	0.5%	788.4
137	Watson Road South	County Road 34	County Road 36	4144.8	Paved	RUR	80.0		619	500-999	0.5%	650.7
138	Watson Road South	Maltby Road East	County Road 34	2130.4	Paved	RUR	80.0		1917	1000-1999	2.0%	2336.8
139	Watson Road South	Hume Road	Maltby Road East	2041.7	Paved	RUR	80.0		2152	2000-2999	2.0%	2623.3
140	Watson Road South	County Road 37 (Arkell Road)	Hume Road	1647.4	Paved	RUR	80.0			2000-2999	2.0%	3047.5
209	Winer Court	Ochs Drive	End	89.4	Paved	SU	50.0			0-49	0.5%	51.5

TRAFFIC COUNT LOCAITONS AND TRAFFIC RANGE ESTIMATES (INCLUDING PROJECTED GROWTH)

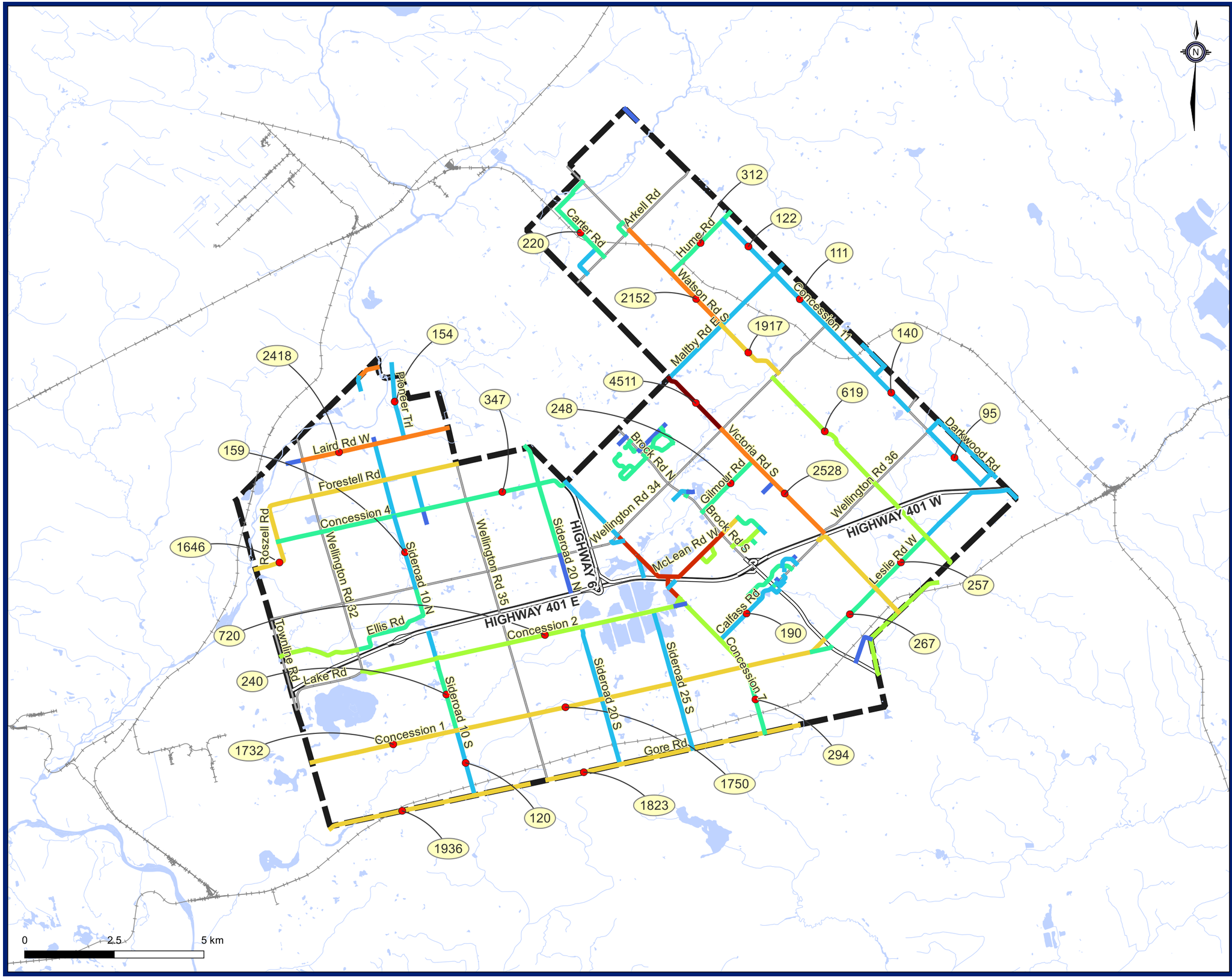
GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Truck Route	2022 Traffic Count (ADT)	Estimated Traffic Range	Assumed Growth Rate	Esitamte 10 Year ADT
212a	Winer Road	McLean Road	Nicholas Beaver Road	785.8	Paved	SU	50.0	Y		200-499	0.5%	367.9
212b	Winer Road	Nicholas Beaver Road	End	167.9	Paved	SU	50.0	Y		50-199	0.5%	131.4

APPENDIX I:
TRAFFIC COUNT LOCATIONS AND TRAFFIC RANGE ESTIMATES

THE TOWNSHIP OF
Puslinch

2021 Puslinch Roads Management Plan



Traffic Count Locations

ADT

Puslinch-Traffic Range

- 0-49
- 50-199
- 200-499
- 500-999
- 1000-1999
- 2000-2999
- 3000-3999
- 4000-4999
- Rail
- Highway

Puslinch Traffic Count Locations

BluePlan ENGINEERING

October, 2022
121149
Projection EPSG:26917

APPENDIX J:
ROAD MAINTENANCE ACTIVITY SPREADSHEET

Asset Type	Asset Component	Maintenance Activity	In-House Staff	Contracted Service	Regulatory	Safety	Maintenance	Asset Preservation	Planned	Reactive	Closure Activity	Costs Recoverable	Frequency
Roadway	Roadway	Pothole Repair	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No		As Required per Sect6.(1) MMS: repair within 7 to 30 days of ID [roadway] within 14 to 60 days of ID [shoulder] based on Class 3 to 5 roads.
	Roadway	Crack Sealing/Filling	No	No	Yes	Yes	Yes	Yes	No	No	No		As Required per Sect8.(1) MMS: repair within 60 tp 180 days based on Class 3 to 5 roads.
	Roadway	Grading	Yes	No	No	No	Yes	Yes	Yes	Yes	No		Once per month from spring till freeze up
	Shoulders	Repair	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No		As Required per Sect6.(1) MMS: repair within 7 to 30 days based on Class 3 to 5 roads. Monthly as needed basis
	Crash Attenuators	Safety Barrier Repair	Yes	Yes	No	Yes	Yes	No	No	Yes	No	Yes (for accidents only)	As Required
	Sidewalks	Repair/Maintenance/Replacement	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No		As Required
	Curbs	Repair/Maintenance	No	Yes	No	No	Yes	Yes	No	Yes	No		As Required
Drainage	Catch Basins	Catch Basin Cleaning	No	Yes	No	No	Yes	No	Yes	Yes	No		Every 2 years
	Catch Basins	Catch Basin Repairs	No	Yes	No	No	Yes	Yes	No	Yes	No		As Required
	Culverts	Culvert Cleaning	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No		As required
	Culverts	Culvert Repair/Replacement	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Lane		15 years
	Inlets/Outlets	Inlet/Outlet Cleaning	Yes	No	No	No	Yes	No	Yes	Yes	No		5 years and as required
	Pipes	Storm Sewer CCTV & Cleaning	No	Yes	No	No	Yes	Yes	Yes	Yes	No		As required
Bridges & Structural Culverts	Bridges	Bridge Maintenance - Own Forces.	Yes	No	No	No	Yes	Yes	Yes	No	Lane		Annually
	Structural Culverts	Repair/Maintenance	No	Yes	No	Yes	Yes	Yes	No	Yes	Lane/Road		As Required
Traffic	Signs & Supports	Sign Placement New	Yes	No	Yes	Yes	Yes	No	Yes	No	No		As Required
	Signs & Supports	Sign Repair or Replacement	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes (for accidents only)	Reg/Warning signs; per Sects 11 & 12.(2) MMS: repair within 21 to 30 days once ID SIGNS; per Sect11.(1) MMS: repair as soon as practicable once ID.
	Delineators	Repair/Maintenance/Replacement	Yes	No	No	Yes	No	No	No	Yes	No	Yes (for accidents only)	As Required
	Lighting	Street Lighting Lamp Replacement	No	Yes	Yes	Yes	Yes	No	No	Yes	No		Per Sect10.(2)-(5) MMS: repair within 14 days.
	Pavement Markings	Centre and Edge Line	No	Yes	No	Yes	Yes	No	Yes	No	Lane		Every 2 years
	Pavement Markings	Zone Painting (i.e. turn lanes, stop bars etc.)	No	Yes	No	Yes	Yes	No	Yes	No	Lane		Every 2 years
Winter Control	Roadway	Anti-Icing - Activation	Yes	No	Yes	Yes	No	No	Yes	Yes	No		Per Sect 5.1 Ice formation prevention within 16 to 24 hours 5.1 (3) treatment of ice formation within 8 to 16 hours for Class 3 to 5 roads.
	Roadway	Patrolling/Weather Monitoring	Yes	No	Yes	Yes	No	No	Yes	No	No		Per Sect 3 Patrol every 7 to 30 days. 3.1(1)& (2) Winter monitoring 3x a day, May - Sept 1x per day.
	Roadway	Plowing - Activation	Yes	No	Yes	Yes	No	No	Yes	Yes	No		Per Sect 4.1 MMS: snow accumulation 8 to 10 cm of snow to respond, 12 to 24 hours to clear after accumulation 5.1 Ice formation prevention within 16 to 24 hours 5.1 (3) treatment of ice formation within 8 to 16 hours for Clss 3 to 5 roads.
Vegetation/ Cleaning &	Roadway	Grass and Weed Control Management and Debris Pickup	Yes	No	No	Yes	Yes	No	Yes	Yes	No		4x per year.
	Roadway	Sweeping	Yes	Yes	No	No	Yes	No	Yes	Yes	No		once annually and as required

Asset Type	Asset Component	Maintenance Activity	In-House Staff	Contracted Service	Regulatory	Safety	Maintenance	Asset Preservation	Planned	Reactive	Closure Activity	Costs Recoverable	Frequency
Debris Management	Roadway	Tree Maintenance - General	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes		4 times per year
Road and Traffic Patrol and Inspection	Roadway	Road Patrol & Inspection	Yes	No	Yes	Yes	Yes	No	Yes	No	No		Per Sect 3 Patrol every 7 to 30 days for Class 3 to 5 roads. May to Sept weekly
	Traffic	Traffic Sign Patrol & Inspection	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No		Sign reflectivity performed once per year (within 16 months of previous); patrol and inspection done 7 to 30 days for Class 3 to 5 roads.

APPENDIX K:
TIME OF NEED AND PRIORITY RATINGS

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Capital Project for Asphalt Resurfacing (No Truck Traffic Considerations)
GMBP Project: 121149

Date: 2023-06-19

COST ESTIMATE PER KM OF ROAD

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1		Bonding and Insurance	LS	1	$ 10,000.00	$ 10,000.00
2		Mobilization and Demobilization	LS	1	$ 10,000.00	$ 10,000.00
3		Traffic Control (road closed)	LS	1	$ 8,000.00	$ 8,000.00
4		Pulverize Existing Road	m2	8000	$ 1.80	$ 14,400.00
5		Earth Excavation and Offsite Disposal (small diameter culvert)	m3	150	$ 40.00	$ 6,000.00
6		Remove Existing Culvert (small diameter)	ea	1	$ 1,000.00	$ 1,000.00
7		HDPE Pipe Culvert (small diameter)	m	14	$ 600.00	$ 8,400.00
8		Earth Excavation and Offsite Disposal (ditching)	m3	80	$ 50.00	$ 4,000.00
9		Earth Excavation and Offsite Disposal (road reconstruction)	m3	120	$ 50.00	$ 6,000.00
10		Granular A (backfill)	t	360	$ 30.00	$ 10,800.00
11		Granular B (road reconstruction)	t	180	$ 30.00	$ 5,400.00
12		Granular A (road reconstruction)	t	120	$ 30.00	$ 3,600.00
13		Mill Lap Joint	m2	25	$ 150.00	$ 3,750.00
14		R-10 Rip-Rap on Geotextile	t	40	$ 100.00	$ 4,000.00
15		Grade and Compact Road Base	m2	8000	$ 1.50	$ 12,000.00
16		Hot Mix HL 4 Base Asphalt (60 mm)	t	1050	$ 90.00	$ 94,500.00
17		Hot Mix HL 3 Surface Asphalt (35 mm)	t	620	$ 90.00	$ 55,800.00
18		Material Transfer Unit	t	1670	$ 3.00	$ 5,010.00
19		Hot Mix HL 4 Surface Asphalt (50mm, driveways)	t	25	$ 160.00	$ 4,000.00
20		Granular A (driveways)	t	60	$ 50.00	$ 3,000.00
21		Granular A (shoulders)	t	350	$ 30.00	$ 10,500.00
22		Water for Compaction and Dust Suppression	m3	500	$ 25.00	$ 12,500.00
23		Topsoil, Seed and Erosion Control Blanket	m2	250	$ 18.00	$ 4,500.00
24		Line Painting	LS	1	$ 2,000.00	$ 2,000.00
		Sub-total (Construction)				**$ 299,160.00**
a		*Allowance for AC Index Adjustment Payment*	*LS*	*1*	*$ 5,000.00*	*$ 5,000.00*
b		*Contingency*	*LS*	*1*	*$ 40,000.00*	*$ 40,000.00*
c		*Engineering Design and Contract Preparation*	*LS*	*1*	*$ 6,000.00*	*$ 6,000.00*
d		*Construction Layout*	*LS*	*1*	*$ 5,000.00*	*$ 5,000.00*
e		*Materials Testing*	*LS*	*1*	*$ 5,000.00*	*$ 5,000.00*
f		*Contract Administration and Construction Inspection*	*LS*	*1*	*$ 8,000.00*	*$ 8,000.00*
g		*Permit Application Allowance*	*LS*	*1*	*$ 1,000.00*	*$ 1,000.00*
		TOTAL per km of Road				**$ 369,160.00**
		TOTAL (rounded) per km of Road				**$ 370,000.00**

ROADS MANAGEMENT PLAN
Township of Puslinch
Pre-Engineering Cost Estimate - Capital Project for Asphalt Resurfacing (Truck Traffic Considerations)
GMBP Project: 121149

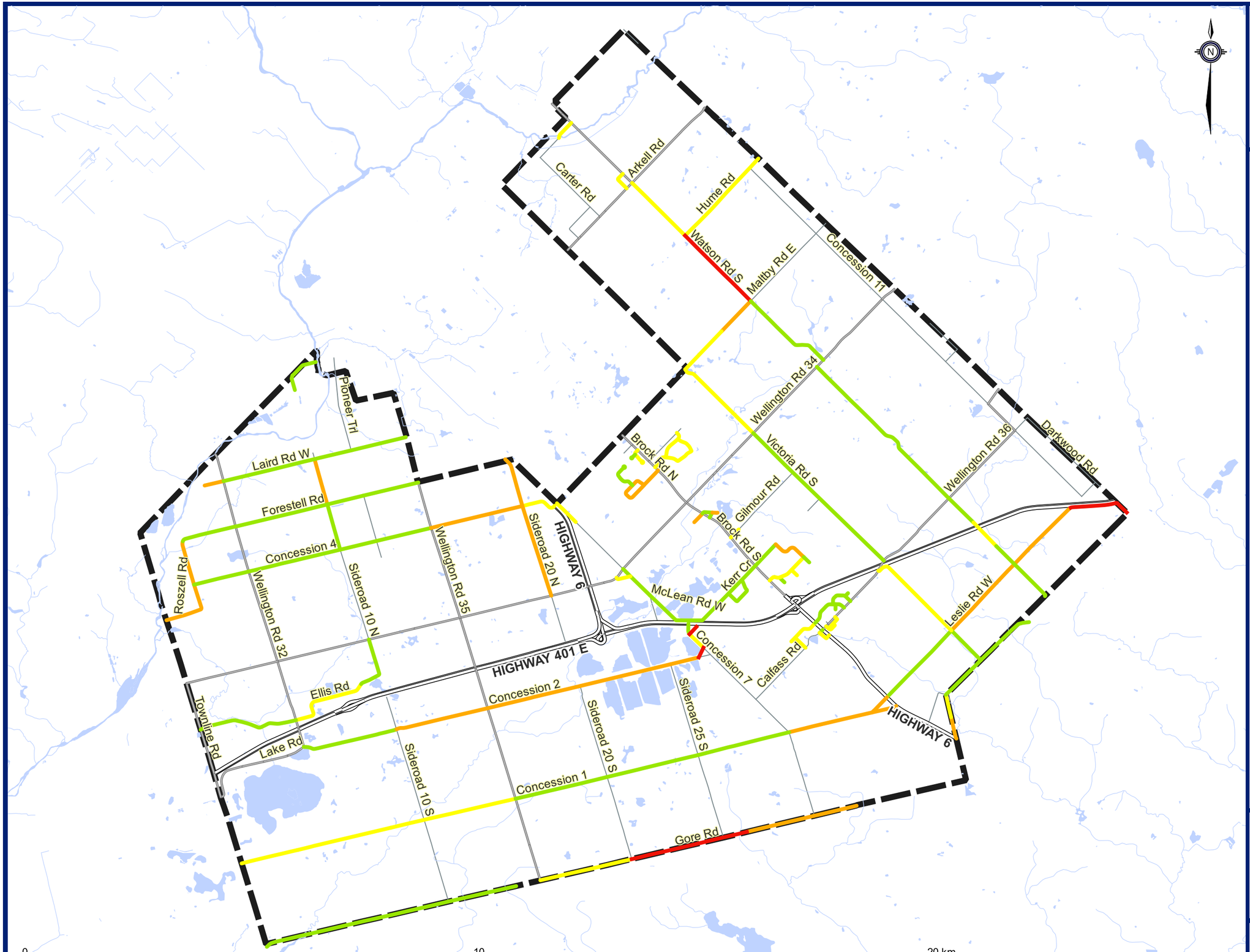
Date: 2023-06-19

COST ESTIMATE PER KM OF ROAD

ITEM	SPEC.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL AMOUNT
1		Bonding and Insurance	LS	1	$ 15,000.00	$ 15,000.00
2		Mobilization and Demobilization	LS	1	$ 15,000.00	$ 15,000.00
3		Traffic Control (road closed)	LS	1	$ 20,000.00	$ 20,000.00
4		Pulverize Existing Road	m2	9500	$ 1.80	$ 17,100.00
5		Earth Excavation and Offsite Disposal (small diameter culvert)	m3	175	$ 40.00	$ 7,000.00
6		Remove Existing Culvert (small diameter)	ea	1	$ 1,500.00	$ 1,500.00
7		HDPE Pipe Culvert (small diameter)	m	18	$ 600.00	$ 10,800.00
8		Earth Excavation and Offsite Disposal (ditching)	m3	80	$ 50.00	$ 4,000.00
9		Earth Excavation and Offsite Disposal (road reconstruction)	m3	150	$ 50.00	$ 7,500.00
10		Granular A (backfill)	t	420	$ 30.00	$ 12,600.00
11		Granular B (road reconstruction)	t	220	$ 30.00	$ 6,600.00
12		Granular A (road reconstruction)	t	150	$ 30.00	$ 4,500.00
13		Mill Lap Joint	m2	35	$ 100.00	$ 3,500.00
14		R-10 Rip-Rap on Geotextile	t	40	$ 100.00	$ 4,000.00
15		Grade and Compact Road Base	m2	9500	$ 1.00	$ 9,500.00
16		Hot Mix HL 8 Base Asphalt (60 mm)	t	1130	$ 100.00	$ 113,000.00
17		Hot Mix HL 4 Surface Asphalt (50 mm)	t	940	$ 100.00	$ 94,000.00
18		Material Transfer Unit	t	2070	$ 3.00	$ 6,210.00
19		Hot Mix HL 4 Surface Asphalt (50mm, driveways)	t	60	$ 160.00	$ 9,600.00
20		Granular A (driveways)	t	60	$ 35.00	$ 2,100.00
21		Granular A (shoulders)	t	720	$ 25.00	$ 18,000.00
22		Water for Compaction and Dust Suppression	m3	650	$ 18.00	$ 11,700.00
23		Topsoil, Seed and Erosion Control Blanket	m2	250	$ 20.00	$ 5,000.00
24		Line Painting	LS	1	$ 2,500.00	$ 2,500.00
		Sub-total (Construction)				**$ 400,710.00**
a		*Allowance for AC Index Adjustment Payment*	*LS*	*1*	*$ 10,000.00*	*$ 10,000.00*
b		*Contingency*	*LS*	*1*	*$ 50,000.00*	*$ 50,000.00*
c		*Engineering Design and Contract Preparation*	*LS*	*1*	*$ 10,000.00*	*$ 10,000.00*
d		*Construction Layout*	*LS*	*1*	*$ 5,000.00*	*$ 5,000.00*
e		*Materials Testing*	*LS*	*1*	*$ 7,000.00*	*$ 7,000.00*
f		*Contract Administration and Construction Inspection*	*LS*	*1*	*$ 10,000.00*	*$ 10,000.00*
g		*Permit Application Allowance*	*LS*	*1*	*$ 1,000.00*	*$ 1,000.00*
		TOTAL per km of Road				**$ 493,710.00**
		TOTAL (rounded) per km of Road				**$ 494,000.00**

THE TOWNSHIP OF
Puslinch

Puslinch Roads Management Plan



Paved Roads - Time of Need

- Adequate
- 6 - 10 Years
- 1- 5 Years
- NOW Resurface
- Highway
- County Road
- Railway
- Waterways
- Waterbodies
- Municipal Boundary

Township of Puslinch
Time of Need Map

BluePlan ENGINEERING

October, 2022
Project #121149
Projection EPSG:26917

TOWNSHIP INVENTORY - TIME OF NEED AND PRIORITY RATING

GMBP: 121149

Asset ID	Street Name	From Street	To Street	Length (m)	Surface	Environment	Speed Limit	Estimated Traffic Range	Truck Route	Minimum Maint. Class	PCI	Time of Need	Treatment	Unit Rate (per km)	Estimated Cost	Prirority Rating
4	Gore Road	Sideroad 20 South	Valens Road	2606.6	Paved	RUR	60.0	1000-1999		4	42.2	NOW Resurface	PR1	$ 377,000	$ 983,000	101.4
139	Watson Road South	Hume Road	Maltby Road East	2041.7	Paved	RUR	80.0	2000-2999		3	47.8	NOW Resurface	PR2	$ 494,000	$ 1,009,000	99.9
6	Gore Road	Concession 7	Lennon Road	959.1	Paved	RUR	60.0	1000-1999		4	51.8	1- 5 Years	PR1	$ 377,000	$ 362,000	84.5
5	Gore Road	Valens Road	Concession 7	1526.6	Paved	RUR	60.0	1000-1999		4	54.2	1- 5 Years	PR1	$ 377,000	$ 576,000	80.4
37	Concession 2A	Concession 2	Concession 7	235.3	Paved	RUR	60.0	500-999	Y	4	47.1	NOW Resurface	PR2	$ 494,000	$ 117,000	78.5
126	Victoria Road South	County Road 34	Maltby Road East	2074.1	Paved	RUR	80.0	4000-4999		3	68.3	6 - 10 Years	PR2	$ 494,000	$ 1,025,000	72.8
18	Concession 1/Leslie Rd W	Concession 7	Highway 6	2350.3	Paved	RUR	80.0	1000-1999		3	58.6	1- 5 Years	PR1	$ 377,000	$ 887,000	72.6
33	Concession 2	Sideroad 10 South	County Road 35	2063.5	Paved	RUR	80.0	500-999		4	51.9	1- 5 Years	PR1	$ 377,000	$ 778,000	71.5
35	Concession 2	Sideroad 20 South	Sideroad 25 South	2050.2	Paved	RUR	60.0	500-999	Y	4	54.2	1- 5 Years	PR2	$ 494,000	$ 1,013,000	68.0
90	Roszell Road	Forestell Road	Concession 4	993.8	Paved	RUR	60.0	1000-1999		4	61.9	1- 5 Years	PR1	$ 377,000	$ 375,000	66.8
34	Concession 2	County Road 35	Sideroad 25 South	2096.2	Paved	RUR	80.0	500-999		4	55.9	1- 5 Years	PR1	$ 377,000	$ 791,000	64.9
54a	Roszell Road	Concession 4	Townline Road	1369.1	Paved	RUR	60.0	1000-1999		4	64.2	1- 5 Years	PR1	$ 377,000	$ 517,000	64.2
115	Concession 7	Concession 2A	Mason Road	428.2	Paved	RUR	60.0	3000-3999	Y	3	71.4	6 - 10 Years	PR2	$ 494,000	$ 212,000	61.7
12	Concession 1	Townline Road	transition	1269.2	Paved	RUR	80.0	1000-1999		3	66.7	6 - 10 Years	PR1	$ 377,000	$ 479,000	60.5
3	Gore Road	County Road 35	Foreman Road	2067.0	Paved	RUR	60.0	1000-1999		4	66.4	6 - 10 Years	PR1	$ 377,000	$ 780,000	61.8
212a	Winer Road	McLean Road	Nicholas Beaver Road	785.8	Paved	SU	50.0	200-499	Y	5	53.8	1- 5 Years	PR2	$ 494,000	$ 389,000	57.5
38	Mason Road	Concession 7	End	222.6	Paved	SU	50.0	50-199		6	43.3	NOW Resurface	PR1	$ 377,000	$ 84,000	56.9
148	Puslinch-Flamborough Townline	Leslie Road West	Township Limits	301.4	Paved	RUR	80.0	50-199		4	43.3	NOW Resurface	PR1	$ 377,000	$ 114,000	56.9
14	Concession 1	Sideroad 10 South	County Road 35	2068.7	Paved	RUR	80.0	1000-1999		3	68.8	6 - 10 Years	PR1	$ 377,000	$ 780,000	56.7
13a	Concession 1	transition	transition	2112.9	Paved	RUR	80.0	1000-1999		3	68.8	6 - 10 Years	PR1	$ 377,000	$ 797,000	56.6
121a	Maddaugh Road	14th Concession East	Highway 6	487.7	Paved	RUR	60.0	500-999		4	63.7	1- 5 Years	PR1	$ 377,000	$ 184,000	54.0
25	Leslie Road West	Curve at Highway 401	Puslinch-Flamborough Townline	1018.1	Paved	RUR	80.0	50-199		4	46.3	NOW Resurface	PR1	$ 377,000	$ 384,000	53.9
185	Bridle Path	Brock Rd N	Bridle Path	446.0	Paved	URB	50.0	200-499		5	57.5	1- 5 Years	PR2	$ 494,000	$ 221,000	52.9
36	Concession 2/2A	Sideroad 25 South	Concession 2	639.3	Paved	RUR	60.0	500-999	Y	4	64.4	1- 5 Years	PR2	$ 494,000	$ 316,000	52.9
13b	Concession 1	transition	Sideroad 10 South	751.8	Paved	RUR	80.0	1000-1999		3	71.7	6 - 10 Years	PR1	$ 377,000	$ 284,000	51.5
23	Leslie Road West	Mountsberg Bridge	Curve at Hwy 401	1204.8	Paved	RUR	80.0	50-199		4	51.1	1- 5 Years	PR1	$ 377,000	$ 455,000	49.1
162	Nicholas Beaver Road	Winer Rd	Brock Rd S	957.3	Paved	URB	60.0	500-999	Y	4	68.7	6 - 10 Years	PR2	$ 494,000	$ 473,000	46.5
21	Leslie Road West	Victoria Road South	Watson Road South	2015.6	Paved	RUR	80.0	200-499		4	60.8	1- 5 Years	PR1	$ 377,000	$ 760,000	45.6
59	Concession 4	County Road 35	Sideroad 20 North	2068.3	Paved	RUR	80.0	200-499		4	63.9	1- 5 Years	PR1	$ 377,000	$ 780,000	44.9
19	Concession 1	Leslie Road W	Highway 6	546.9	Paved	RUR	80.0	200-499		4	55.8	1- 5 Years	PR1	$ 377,000	$ 207,000	44.4
204	Bridle Path	Bridle Path	Bridle Path	1116.0	Paved	URB	50.0	200-499		5	65.0	1- 5 Years	PR2	$ 494,000	$ 552,000	43.6
206	Fox Run Drive	Brock Rd N	Fox Run Drive transition to median	160.5	Paved	URB	50.0	200-499		5	65.4	6 - 10 Years	PR2	$ 494,000	$ 80,000	43.0
22	Leslie Road West	Watson Road South	Bridge 5 (Mountsberg)	543.2	Paved	RUR	80.0	50-199		4	57.1	1- 5 Years	PR1	$ 377,000	$ 205,000	43.0
52	Maple Leaf Lane	County Road 46	End	266.2	Paved	SU	30.0	50-199		6	57.2	1- 5 Years	PR1	$ 377,000	$ 101,000	42.9
140	Watson Road South	County Road 37 (Arkell Road)	Hume Road	1647.4	Paved	RUR	80.0	2000-2999		3	78.8	6 - 10 Years	PR2	$ 494,000	$ 814,000	42.1
161	Concession 4	Curve in Road	Highway 6	784.8	Paved	RUR	80.0	200-499		4	67.1	6 - 10 Years	PR1	$ 377,000	$ 296,000	40.9
123	Victoria Road South	Leslie Road West	County Road 36	2232.3	Paved	RUR	80.0	1000-1999		3	77.0	6 - 10 Years	PR1	$ 377,000	$ 842,000	40.4
166	Sideroad 20 North	Concession 4	Forestell Road	1113.8	Paved	RUR	80.0	200-499		4	61.2	1- 5 Years	PR1	$ 377,000	$ 420,000	38.9
82	Cooks Mill Road	Bridge	County Road 41	437.0	Paved	SU	50.0	200-499		5	69.1	6 - 10 Years	PR1	$ 377,000	$ 165,000	38.5
195	Deer View Ridge	Hammersley Drive	Fox Run Drive	665.6	Paved	URB	50.0	200-499		5	69.4	6 - 10 Years	PR2	$ 494,000	$ 329,000	38.1
97	Sideroad 10 North	Forestell Road	Laird Road West	1037.7	Paved	RUR	60.0	50-199		5	62.1	1- 5 Years	PR1	$ 377,000	$ 392,000	38.0
121b	Maddaugh Road	Puslinch-Flamborough Townline	14th Concession East	507.9	Paved	RUR	60.0	500-999		4	74.7	6 - 10 Years	PR1	$ 377,000	$ 192,000	37.6
51	Old Brock Road	Cockburn Street	End	115.8	Paved	SU	50.0	0-49		6	56.6	1- 5 Years	PR1	$ 377,000	$ 44,000	37.3
205	Fox Run Drive	Fox Run Drive transition to median	Fox Run Drive transition to curb	200.1	Paved	URB	50.0	200-499		5	70.1	6 - 10 Years	PR2	$ 494,000	$ 99,000	37.1
72	Laird Road West	End	County Road 32	427.4	Paved	RUR	50.0	0-49		6	57.5	1- 5 Years	PR1	$ 377,000	$ 162,000	36.6
108	Sideroad 20 North	County Road 34	Concession 4	2076.7	Paved	RUR	80.0	200-499		4	64.0	1- 5 Years	PR1	$ 377,000	$ 783,000	36.1
63b	Maltby Road East	1161m East of Victoria Road South	Watson Road South	924.9	Paved	RUR	80.0	50-199		4	64.3	1- 5 Years	PR1	$ 377,000	$ 349,000	35.8
190	Telfer Glen	Queen Street (Highway 6)	End	697.8	Paved	SU	50.0	200-499		5	71.8	6 - 10 Years	PR2	$ 494,000	$ 345,000	35.1
135	Watson Road South	bridge	bridge	721.9	Paved	RUR	80.0	500-999		4	76.6	6 - 10 Years	PR1	$ 377,000	$ 273,000	34.7
77	Hume Road	Nassagaweya-Puslinch Townline	Watson Road South	2344.4	Paved	RUR	60.0	200-499		5	71.7	6 - 10 Years	PR1	$ 377,000	$ 884,000	34.4
207	Fox Run Drive	Fox Run Drive	Fox Run Drive	650.8	Paved	SU	50.0	200-499		5	73.2	6 - 10 Years	PR2	$ 494,000	$ 322,000	33.3
196	Fox Run Drive	Deer View Ridge	Fox Run Drive transition to curb	415.6	Paved	SU	50.0	200-499		5	73.7	6 - 10 Years	PR2	$ 494,000	$ 206,000	32.8
214	Beiber Road	Nicholas Beaver Road	End	169.7	Paved	URB	50.0	200-499	Y	5	74.0	6 - 10 Years	PR2	$ 494,000	$ 84,000	32.3
208	Boreham Drive	County Road 37 (Arkell Road)	County Road 41 (Watson Road South)	442.3	Paved	SU	50.0	200-499		5	74.1	6 - 10 Years	PR2	$ 494,000	$ 219,000	32.2
28	Victoria Street And Church Street	Calfass Road	Queen Street (Highway 6)	282.7	Paved	URB	50.0	50-199		6	69.9	6 - 10 Years	PR2	$ 494,000	$ 140,000	30.2
29	Main Street	Badenoch St E	Morriston Ball Park	256.0	Paved	SU	50.0	50-199		6	71.4	6 - 10 Years	PR1	$ 377,000	$ 97,000	28.7
48	Smith Road	Concession 7	County Road 34	332.0	Paved	SU	60.0	50-199		5	71.9	6 - 10 Years	PR1	$ 377,000	$ 126,000	28.2
46	Gilmour Road	County Road 46 (Brock Road)	subdivision entrance	248.1	Paved	URB	60.0	200-499		5	76.2	6 - 10 Years	PR1	$ 377,000	$ 94,000	27.5
202	Daymond Drive	Brock Rd N	End	441.7	Paved	URB	50.0	200-499		5	78.9	6 - 10 Years	PR2	$ 494,000	$ 219,000	26.3
45b	Ellis Road	County Road 32	6725 Ellis Road	1866.5	Paved	RUR	80.0	200-499		4	79.4	6 - 10 Years	PR1	$ 377,000	$ 704,000	25.7
30	Back Street	Main Street	Badenoch St E	345.5	Paved	SU	50.0	50-199		6	74.9	6 - 10 Years	PR1	$ 377,000	$ 131,000	25.2
191	Settler's Road	Calfass Road	Telfer Glen	318.9	Paved	SU	50.0	50-199		6	77.6	6 - 10 Years	PR1	$ 377,000	$ 121,000	22.4
118	Concession 7	Start of Pavement	Maltby Road West	2017.4	Paved	RUR	60.0	50-199		5	78.2	6 - 10 Years	PR1	$ 377,000	$ 761,000	21.9
63a	Maltby Road East	Victoria Road South	1161m East of Victoria Road South	1161.0	Paved	RUR	80.0	50-199		4	78.4	6 - 10 Years	PR1	$ 377,000	$ 438,000	21.6

Total Needs **$ 27,121,000**

APPENDIX L:
TRAFFIC CALMING TOOLBOX

Township of Puslinch
Traffic Calming Toolbox

This appendix provides the "toolbox" of traffic calming measures with a description and photo of each treatment. The **Traffic Calming Toolbox** notes whether the measures are intended for use on urban and/or rural roads, sets out typical criteria for their applicability, and highlights potential benefits and disbenefits. **Table A** summarizes the traffic calming measures applicable for use on roads in Puslinch and the indicative costs. **Table B** summarizes the potential traffic calming benefits and implementation considerations for the measures. Detailed descriptions of the measures follow the introductory section.

The Township will typically select speed humps for most traffic calming installations unless site-specific conditions/considerations do not support their use. Other measures from the Traffic Calming Toolbox may be applied in such instances. Applying the toolbox consistently in these circumstances will assist the Township in selecting appropriate measures to address specific traffic issues and help to avoid the undesirable consequences of traffic calming. It is important to note that not all traffic calming measures are appropriate under all circumstances. Selection of suitable measures will depend on the specific issues being addressed and careful consideration of site-specific conditions.

Selecting Measures from the Toolbox

The following outlines the typical decision process for selecting the most appropriate measures from the **Traffic Calming Toolbox**. Note that other, site-specific factors can also influence the measures selected:

- **Step 1** – Determine if the subject street is a candidate for physical traffic calming measures. Per the **Traffic Calming Policy**, locations meeting the initial screening criteria (assessed in Stage 2 of the process) would be candidates for physical treatments. Streets not satisfying these criteria may be considered for passive traffic calming measures such as enforcement and education to address resident concerns as an alternative or a first step.

- **Step 2** – Assess whether speed humps/tables would be appropriate for the subject street based on the guidance in **Table B** and the detailed information provided below.

- **Step 3** – Identify the list of potential traffic calming measures based on roadside environment. For urban roads, use Column 2 in **Table A**. For rural roads, use Column 3.

- **Step 4** – Confirm and rank (based on severity) the primary issue(s) to be addressed through the Traffic Calming Plan. Potential issues include:

    - Speeding
    - Shortcutting traffic
    - Pedestrian crossings
    - Vehicle and pedestrian/cyclist conflicts
    - Heavy vehicles

- **Step 5** – Shortlist the measures that address the identified issue(s) and severity/priority. Select measures considering the potential traffic calming benefits detailed in **Table B** and defined as follows:

  - **Speed Reduction**: Measures aimed at reducing the speed vehicles are travelling at through the study area.
  - **Volume Reduction**: Measures aimed at reducing the volume of vehicles travelling through and without a destination within the study area.
  - **Conflict Reduction**: Measures aimed at reducing conflicts between vehicles, pedestrians, and cyclists.

- **Step 6** – Eliminate measures that would not be appropriate for the subject street. Focus on incorporating measures that would complement the following conditions, considering midblock versus intersection application:

  - School zones and Community Safety Zones
  - Active transportation routes
  - Adjacent to a park
  - High pedestrian generators
  - Adjacent land uses (residential versus non-residential)
  - Planned reconstruction
  - Available budget
  - Applicability for temporary installation

- **Step 7** – Confirm measures can be used under prevailing roadway characteristics. Factors to consider include:

  - Existing intersections and control
  - Midblock pedestrian/cyclist crossings and control
  - Cross-section width
  - Need for on-street parking
  - Roadway alignment (i.e., horizontal and vertical curvature)
  - Grade
  - Block length
  - Driveway density
  - Pavement condition and materials
  - Drainage
  - Utilities and street furniture (e.g., poles, boxes, benches)
  - Streetlighting

TABLE A: POTENTIAL TRAFFIC CALMING MEASURES

Measure		Applicability		Indicative Cost
		Urban	Rural	
Vertical Deflection				
1	Raised Crosswalk	●		$-$$
2	Raised Intersection	●		$$-$$$
3	Speed Hump/Table	●		$-$$
4	Speed Cushion	●		$-$$
Horizontal Deflection				
5	Chicane (One-Lane, Two-Lane)	●		$$
6	Curb Radius Reduction	●		$-$$
7	Lateral Shift	●	●	$-$$
8	Speed Kidney	●		$-$$
9	Traffic Circle/Traffic Button/ Mini-Roundabout	●	●	$$-$$$
Roadway Narrowing				
10	Curb Extension	●		$$-$$$
11	Lane Narrowing	●		$-$$
12	On-Street Parking	●		$-$$
13	Raised Median Island	●		$$-$$$
14	Lane Reconfiguration (Road Diet)	●		$-$$$
15	Vertical Centreline Treatment	●		$
Surface Treatment				
16	Sidewalk Extension/Textured Crosswalk	●		$-$$
17	Textured Pavement	●		$$-$$$
18	Transverse Rumble Strips		●	$
Pavement Markings				
19	Converging Chevrons		●	$
20	Dragon's Teeth		●	$
21	Full-Lane Transverse Bars		●	$
22	Peripheral Transverse Bars		●	$
23	On-Road "Sign" Pavement Markings	●	●	$

TABLE A: POTENTIAL TRAFFIC CALMING MEASURES

Measure		Applicability		Indicative Cost
		Urban	Rural	
Access Restriction				
24	Directional Closure	●		$-$$$
25	Diverter	●		$-$$
26	Full Closure	●		$$-$$$
27	Intersection Channelization	●		$-$$
28	Raised Median Through Intersection	●	●	$-$$
29	Right-in/Right-Out Island	●	●	$-$$
Gateways				
30	Gateway[1]	●	●	$-$$
Shared Spaces				
31	Shared Space[2]	●		$-$$$
Enforcement and Education				
32	Speed Display Devices	●	●	$-$$
33	Targeted Speed Enforcement	●	●	$$$
34	Targeted Education Campaign	●	●	$-$$$

Legend:
$ - $1,000 or less
$$ - $1,000 to $10,000
$$$ - $10,000 or more

Notes:

1. To be used in conjunction with other traffic calming measures, typically consider for new development
2. Measure is site specific, implemented as part of road reconstruction or new development

TABLE B: POTENTIAL BENEFITS AND IMPLEMENTATION CONSIDERATIONS

	Measure	Potential Traffic Calming Benefits			Implementation Considerations					
		Speed Reduction	Volume Reduction	Conflict Reduction	Local Vehicle Access	Emergency Vehicle Response	Cycling Use	Traffic Enforcement	Vehicle Parking	Street Maintenance
Vertical Deflection										
1	Speed Hump/Table	■	◘	◘	□	■	◘	□	◘	◘
2	Raised Crosswalk	■	◘	◘	□	■	◘	□	□	◘
3	Raised Intersection	■	◘	◘	□	■	◘	□	□	◘
4	Speed Cushion	■	◘	◘	□	◘	◘	□	◘	◘
Horizontal Deflection										
5	Chicane (One-Lane, Two-Lane)[1]	■	◘	◘	□	◘	◘	□	■	◘
6	Curb Radius Reduction	◘	□	◘	□	□	◘	□	□	◘
7	Lateral Shift	◘	□	□	□	□	□	□	◘	□
8	Speed Kidney	◘	□	□	□	□	◘	□	◘	◘
9	Traffic Circle/Traffic Button/Mini-Roundabout	■	□	■	□	◘	◘	□	◘	◘
Roadway Narrowing										
10	Curb Extension	◘	□	◘	□	□	◘	□	■	■
11	Lane Narrowing	◘	□	□	□	□	◘	□	◘	□
12	On-Street Parking	◘	□	□	□	◘	◘	□	□	◘
13	Raised Median Island	◘	□	◘	◘	□	□	□	◘	◘
14	Lane Reconfiguration (Road Diet)	■	□	■	□	◘	□	□	□	□
15	Vertical Centreline Treatment	◘	□	□	□	□	□	□	□	◘
Surface Treatment										
16	Sidewalk Extension/ Textured Crosswalk	◘	□	◘	□	□	◘	□	□	■
17	Textured Pavement	◘	□	□	□	□	◘	□	□	■
18	Transverse Rumble Strips	◘	□	□	□	□	◘	□	□	◘

TABLE B: POTENTIAL BENEFITS AND IMPLEMENTATION CONSIDERATIONS

Measure		Potential Traffic Calming Benefits			Implementation Considerations					
		Speed Reduction	Volume Reduction	Conflict Reduction	Local Vehicle Access	Emergency Vehicle Response	Cycling Use	Traffic Enforcement	Vehicle Parking	Street Maintenance
Pavement Markings										
19	Converging Chevrons	■	□	□	□	□	□	□	□	◘
20	Dragon's Teeth	■	□	□	□	□	□	□	□	◘
21	Full-Lane Transverse Bars	■	□	□	□	□	□	□	□	◘
22	Peripheral Transverse Bars	■	□	□	□	□	□	□	□	◘
23	On-Road "Sign" Pavement Markings	◘	□	□	□	□	□	□	□	◘
Access Restriction										
24	Directional Closure	◘	■	◘	■	◘	◘	◘	□	◘
25	Diverter	□	■	◘	■	◘	◘	□	□	◘
26	Full Closure	□	■	■	■	■	◘	□	□	◘
27	Intersection Channelization	□	◘	◘	■	◘	□	□	□	◘
28	Raised Median Through Intersection	□	■	◘	■	◘	◘	□	◘	◘
29	Right-in/Right-out Island	□	◘	◘	◘	◘	◘	◘	□	◘
Gateways										
30	Gateways	■	□	□	□	□	□	□	□	■
Shared Space										
31	Shared Space	■	◘	□	□	◘	□	□	□	■
Enforcement and Education										
32	Speed Display Devices	◘	□	□	□	□	□	□	□	■
33	Targeted Speed Enforcement	◘	□	□	□	□	□	■	□	■
34	Targeted Education Campaign	□	□	□	□	□	□	□	□	□

Legend: No Benefit □ / Impact □ Minor Benefit ◘ / Impact ◘ Substantial Benefit ■ / Impact ■

VERTICAL DEFLECTION
1 – Speed Hump/Table

Description and Purpose

A speed hump is a raised area on a road that causes the vertical upward movement of a traversing vehicle, creating driver discomfort. A speed table is an elongated, raised speed hump with a flat-topped section that is long enough to raise the entire wheelbase of a vehicle. The flat section of the table may be constructed with brick or other textured materials.

A speed hump/table is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – 8% or less

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	◘
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	■
Cycling Use	◘
Traffic Enforcement	□
Vehicle Parking	◘
Street Maintenance	◘

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

VERTICAL DEFLECTION
2 – Raised Crosswalk

Description and Purpose

Marked pedestrian crosswalk at an intersection or mid-block location constructed at a higher elevation than the adjacent roadway. The raised area on the road causes the vertical upward movement of a traversing vehicle, creating driver discomfort.

A raised crosswalk is intended to lower vehicle speeds, better define crosswalk areas, and reduce pedestrian–vehicle conflicts.

Applicability

- Roadside Environment – Urban
- Location – Midblock or intersection, sidewalk on at least one side of road
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – Between 1% and 8%

Cost

- $ to $$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	◘
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	■
Cycling Use	◘
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	◘

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

VERTICAL DEFLECTION
3 – Raised Intersection

Description and Purpose

Intersection, that may include crosswalks, constructed at a higher elevation than the adjacent approach roadways. The raised area on the road causes the vertical upward movement of a traversing vehicle, creating driver discomfort.

A raised intersection is intended to lower vehicle speeds, improve pedestrian visibility, and reduce pedestrian–vehicle conflicts.

Applicability

- Roadside Environment – Urban
- Location – Intersection
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – Between 1% and 8%

Cost

- $$ to $$$

Potential Benefits

Speed Reduction	■
Volume Reduction	▣
Conflict Reduction	▣

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	■
Cycling Use	▣
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	▣

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

VERTICAL DEFLECTION
4 – Speed Cushion

Description and Purpose

A raised area like a speed hump but does not extend the entire width of the road. Designed to allow larger vehicles, such as buses or fire trucks, to “straddle” the cushion, while smaller vehicles will have at least one side deflected upward.

Speed cushions are intended to cause sufficient driver discomfort to lower smaller vehicle speeds (yet allow the driver to maintain control) while allowing larger vehicles to pass without (with less) difficulty.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – 8% or less

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	◘
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	◘
Cycling Use	◘
Traffic Enforcement	□
Vehicle Parking	◘
Street Maintenance	◘

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

HORIZONTAL DEFLECTION
5 – Chicane

Description and Purpose

A series of curb extensions on alternating sides of a road, which narrow the roadway and require drivers to steer from one side to the other, forcing the lateral shifting of the vehicle. Multiple series of curb extensions can be used.

A chicane is intended to discourage shortcutting or through traffic, lower vehicle speeds, and can enhance corridor aesthetics.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 50 km/h or less
- Traffic Volume – More than 750 vpd
- Grade – 8% or less

Cost

- $$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	◘
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	◘
Cycling Use	◘
Traffic Enforcement	□
Vehicle Parking	■
Street Maintenance	◘

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

HORIZONTAL DEFLECTION
6 – Curb Radius Reduction

Description and Purpose

Reconstruction or modification of an intersection corner with a smaller radius, usually in the 3.0 m to 5.0 m range, creating a more abrupt turning movement.

A curb radius reduction is intended to lower right-turning vehicle speeds, reduce pedestrian crossing distances, and improve visibility of pedestrians.

Applicability

- Roadside Environment – Urban
- Location – Intersection
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	■

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	■
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

HORIZONTAL DEFLECTION
7 – Lateral Shift

Description and Purpose

The use of pavement markings or curb extensions to create a curvilinear alignment (a 'jog') like a chicane within an otherwise straight section of roadway, forcing the lateral shifting of the vehicle. This effect can also be achieved with the use of a central island.

A lateral shift is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	■
Street Maintenance	□

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

HORIZONTAL DEFLECTION
8 – Speed Kidney

Description and Purpose

An arrangement of three speed humps elongated with a curvilinear shape in the direction of traffic, forcing the lateral shifting of the vehicle. Vehicle drivers choosing to drive in a straight path will travel over a raised area on the road, experiencing discomfort as two or four wheels traverse the different parts of the speed kidney. Vehicles are required to take a curvilinear path to avoid vertical upward movement that creates driver discomfort.

A speed kidney is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – 5% or less

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	◘
Street Maintenance	◘

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

HORIZONTAL DEFLECTION

9 – Traffic Circle/Traffic Button/ Mini-Roundabout

Description and Purpose

A circular intersection with an island located in the centre that requires vehicles to travel around the feature in a counter-clockwise direction. Yield traffic control is recommended on all approaches.

Mini-roundabouts are designed similar to full-size roundabouts, with splitter islands and deflection of vehicles on all approaches, but with a smaller diameter and traversable islands. A traffic circle is typically smaller than a mini-roundabout and does not have splitter islands on the approaches. A traffic button is like a traffic circle but with a mountable central island.

Left-turning trucks, buses, and emergency vehicles, which require a larger turning radius than the intersection provides, may turn in front of the traffic circle, or mount the central raised island.

A traffic circle/traffic button/mini-roundabout is intended to lower vehicle speeds and reduce conflicts.

Applicability

- Roadside Environment – Urban
- Location – Intersection, two-lane road
- Speed Limit – 50 km/h or less
- Traffic Volume – 1,500 vpd or more
- Grade – All

Cost

- $$-$$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	■

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	▣
Cycling Use	▣
Traffic Enforcement	□
Vehicle Parking	▣
Street Maintenance	▣

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

ROADWAY NARROWING
10 – Curb Extension

Description and Purpose

Also known as a neckdown, choker, curb bulb, or bulb-out, a horizontal intrusion of the curb into the roadway to narrow the travelled portion. The curb is extended on one or both sides to reduce the roadway width to as a little as 6.0 m for two-lane, two-way traffic. In some locations, it may be possible to implement curb extensions by removing existing parking spaces.

A curb extension is intended to lower vehicle speeds, reduce pedestrian crossing distances, increase visibility of pedestrians, prevent parking close to an intersection, and better define parking areas.

Applicability

- Roadside Environment – Urban
- Location – Midblock or intersection
- Speed Limit – 60 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $$-$$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	■
Street Maintenance	■

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ROADWAY NARROWING
11 – Lane Narrowing

Description and Purpose

The use of pavement markings or other features (for example, bicycle lanes, street beautification programs, pavement texture) to reduce lane widths. The intention is for drivers to perceive the roadway to be less comfortable to travel at higher speeds due to the narrowing of the lanes.

Lane narrowing is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 60 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	◘
Street Maintenance	☐

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ROADWAY NARROWING
12 – On-Street Parking

Description and Purpose

Allowing motor vehicles to park adjacent and parallel to the curb to reduce the roadway width available for vehicle movement. Angled parking is not appropriate as a traffic calming measure due to the increased potential for conflicts.

On-street parking is intended to lower vehicle speeds while allowing vehicles to continue to park on road.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	■
Cycling Use	■
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

ROADWAY NARROWING
13 – Raised Median Island

Description and Purpose

A raised island constructed on the centerline of a two-way roadway to reduce the overall width of the adjacent travel lanes. The island can provide a refuge for pedestrians and cyclists, enabling them to cross one direction of travel at a time, thereby reducing waiting time for gaps when crossing the roadway.

A raised median island is intended to lower vehicle speeds, reduce conflicts, and reduce crossing distances for pedestrians.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 60 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $$-$$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	■

Implementation Considerations

Local Vehicle Access	■
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	■
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

ROADWAY NARROWING
14 – Lane Reconfiguration (Road Diet)

Description and Purpose

A reconfiguration of a roadway to reduce the number of travelled lanes and/or the effective width. The reclaimed space can then be allocated to other uses, such as wider sidewalks, turning lanes, bus lanes, pedestrian refuge islands, bike lanes, parking, etc.

The most common form of lane reconfiguration involves converting a four-lane, undivided roadway segment to a three-lane cross-section consisting of two through lanes, a centre two-way left-turn lane, and two bicycle lanes. Other conversions include four-lane to five-lane, two-lane to three-lane, and five-lane to three-lane.

A lane reconfiguration is intended to lower vehicle speeds and reduce conflicts.

Applicability

- Roadside Environment – Urban
- Location - Midblock
- Speed Limit – 60 km/h or less
- Traffic Volume – Moderate
- Grade – All

Cost

- $-$$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	■

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	▣
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	□

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

ROADWAY NARROWING
15 – Vertical Centreline Treatment

Description and Purpose

The use of vertical treatments, such as flexible post-mounted delineators or raised pavement markers, to create a centre median, thereby giving the perception of lane narrowing and a sense of constriction. The treatments can also raise driver awareness of school areas and other locations where vulnerable road users are present.

A vertical centreline treatment is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock, two-lane road
- Speed Limit – 60 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

SURFACE TREATMENT

16 – Sidewalk Extension/ Textured Crosswalk

Description and Purpose

A sidewalk continued across a local street intersection at the same elevation as the roadway. Textured/patterned elements that contrast the roadway can be incorporated into the sidewalk extension.

A sidewalk extension visually enhances a pedestrian crossing location, so drivers become more aware of its presence. It is not intended to indicate whether drivers or pedestrians are required to yield. Traffic must comply with local or provincial regulations governing the type of pedestrian crossing system being enhanced by the sidewalk extension/textured crosswalk.

With a sidewalk extension/textured crosswalk, the continuation of the surface and enhanced visual/tactile identification of the crosswalk area emphasizes pedestrian priority.

A sidewalk extension/textured sidewalk is intended to lower vehicle speeds and reduce pedestrian-vehicle conflicts.

Applicability

- Roadside Environment – Urban
- Location – Midblock or intersection, sidewalks on both sides
- Speed Limit – 60 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	■

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

SURFACE TREATMENT
17 – Textured Pavement

Description and Purpose

Roadway pavement that incorporates a textured and/or patterned surface that contrasts other adjacent roadways in the surrounding area. The difference in texture alerts drivers of the need to reduce speed.

Textured pavement is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban
- Location – Midblock or intersection
- Speed Limit – 60 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $$-$$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	■

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

SURFACE TREATMENT
18 – Transverse Rumble Strips

Description and Purpose

Raised buttons, bars or grooves closely spaced at regular intervals on the roadway that create both noise and vibration in a moving vehicle, alerting motorists to a traffic control device associated with unusual or changing conditions ahead. Rumble strips are sometimes inappropriately used in isolation as a speed control device.

Transverse rumble strips are intended to lower vehicle speeds.

Applicability

- Roadside Environment – Rural
- Location – Midblock
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	■
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

PAVEMENT MARKINGS
19 – Converging Chevrons

Description and Purpose

A series of pavement markings painted in the shape of a forward-facing V, pointing in the roadway travel direction, to alert the driver of the need to reduce speed. The markings may be spaced closer together or painted thinner as the target feature (e.g., speed limit change, entry to built-up area) approaches to create the illusion that the speed of the vehicle is increasing.

Converging chevrons are intended to lower vehicle speeds.

Applicability

- Roadside Environment – Rural
- Location – Midblock, entrances to communities
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	▣

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

PAVEMENT MARKINGS
20 – Dragon's Teeth

Description and Purpose

A series of triangular pavement markings placed along the edge of the travelled lanes to alert the driver of the need to reduce speed. The markings may be spaced closer together or painted with increasing size as the target feature (e.g., speed limit change, entry to built-up area) approaches to create the illusion that the speed of the vehicle is increasing.

Dragon's teeth are intended to lower vehicle speeds.

Applicability

- Roadside Environment – Rural
- Location – Midblock, entrances to communities
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	▣

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

PAVEMENT MARKINGS
21 – Full-Lane Transverse Bars

Description and Purpose

A series of parallel pavement markings extending across most of the travelled lane to alert the driver of the need to reduce speed. The markings may be spaced close together or painted thinner as the target feature (e.g., speed limit change, entry to built-up area) approaches to create the illusion that the speed of the vehicle is increasing.

Full lane transverse bars are intended to lower vehicle speeds.

Applicability

- Roadside Environment – Rural
- Location – Midblock, entrances to communities
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	▣

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

PAVEMENT MARKINGS
22 – Peripheral Transverse Bars

Description and Purpose

A series of parallel pavement markings placed along the edge of the travelled lanes to alert the driver of the need to reduce speed. The markings may be spaced closer together or painted with increasing size as the target feature (e.g., speed limit change, entry to built-up area) approaches to create the illusion that the speed of the vehicle is increasing.

Peripheral transverse bars are like full-lane transverse bars but require less maintenance of pavement markings.

Peripheral transverse bars are intended to lower vehicle speeds.

Applicability

- Roadside Environment – Rural
- Location – Midblock, entrances to communities
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	▣

Legend

No Benefit □ / Impact □
Minor Benefit ▣ / Impact ▣
Substantial Benefit ■ / Impact ■

PAVEMENT MARKINGS

23 – On-Road "Sign" Pavement Markings

Description and Purpose

Pavement markings painted on the roadway to convey information typically given to drivers through signage. The words and symbols provide a larger image of the sign information but directly in the driver's line of sight. Examples include speed limit, 'SLOW', 'Stop Ahead, etc.

On-road "sign" pavement markings are intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock, approaching feature
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ■ / Impact ■
Substantial Benefit ■ / Impact ■

ACCESS RESTRICTIONS
24 – Directional Closure

Description and Purpose

A curb extension or vertical barrier extending to approximately the centerline of the roadway, effectively obstructing (prohibiting) one direction of traffic. Bicycles are typically permitted to travel through a directional closure in both directions, including the direction in which motor vehicle traffic is obstructed. In some cases, gaps or a contra-flow bicycle lane are used to provide bicycle access.

A directional closure is intended to eliminate short-cutting or through traffic and reduce conflicts.

Applicability

- Roadside Environment – Urban
- Location – Midblock or intersection
- Speed Limit – All
- Traffic Volume – Less than 1,500 vpd
- Grade – All

Cost

- $-$$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	■
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	■
Emergency Vehicle Response	◘
Cycling Use	◘
Traffic Enforcement	◘
Vehicle Parking	□
Street Maintenance	◘

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ACCESS RESTRICTIONS
25 – Diverter

Description and Purpose

A raised barrier placed diagonally across an intersection that forces vehicles to turn, thereby preventing drivers from proceeding straight through the intersection. Diverters can incorporate gaps for pedestrians, wheelchairs and bicycles and can be mountable by emergency vehicles.

A diverter is intended to eliminate short-cutting or through traffic and reduce conflicts.

Applicability

- Roadside Environment – Urban
- Location – Intersection
- Speed Limit – 50 km/h or less
- Traffic Volume – Less than 1,500 vpd, use with caution for volumes up to 5,000 vpd
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	☐
Volume Reduction	■
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	■
Emergency Vehicle Response	◘
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	◘

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ACCESS RESTRICTIONS
26 – Full Closure

Description and Purpose

A barrier extending the entire width of a roadway that obstructs all motor vehicle traffic movements from continuing along the roadway. A closure can change a four-way intersection to a three-way, or a three-way intersection to a non-intersection. Closures can incorporate gaps for pedestrians, wheelchairs and bicycles and can be mountable by emergency vehicles.

A full closure is intended to eliminate short-cutting or through traffic and reduce conflicts.

Applicability

- Roadside Environment – Urban
- Location – Intersection
- Speed Limit – 50 km/h or less
- Traffic Volume – All
- Grade – All

Cost

- $$-$$$

Potential Traffic Calming Benefits

Speed Reduction	☐
Volume Reduction	■
Conflict Reduction	■

Implementation Considerations

Local Vehicle Access	■
Emergency Vehicle Response	■
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	◘

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ACCESS RESTRICTIONS
27 – Intersection Channelization

Description and Purpose

Raised islands or bollards located in an intersection to obstruct specific traffic movements and physically direct traffic through an intersection. Bicycles are typically permitted to make all movements, including those which motor vehicles are prevented from making, either through gaps or depressions in the island, or by travelling around the island.

Intersection channelization is intended to obstruct short-cutting or through traffic and reduce crossing distances for pedestrians.

Applicability

- Roadside Environment – Urban
- Location – Intersection
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	☐
Volume Reduction	◘
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	■
Emergency Vehicle Response	◘
Cycling Use	☐
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	◘

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ACCESS RESTRICTIONS
28 – Raised Median Through Intersection

Description and Purpose

A raised island constructed on the centerline of a two-way roadway through an intersection to prevent left turns and through movements to and from the intersecting roadways. The island can provide a refuge for pedestrians and cyclists, enabling them to cross one direction of travel at a time, thereby reducing waiting time for gaps when crossing the roadway.

A raised median through an intersection is intended to eliminate short-cutting or through traffic, reduce conflicts, and reduce crossing distances for pedestrians.

Applicability

- Roadside Environment – Urban or rural
- Location – Intersection
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	☐
Volume Reduction	■
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	■
Emergency Vehicle Response	◘
Cycling Use	◘
Traffic Enforcement	☐
Vehicle Parking	◘
Street Maintenance	◘

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ACCESS RESTRICTIONS
29 – Right-In/Right-Out Island

Description and Purpose

A raised triangular island at an intersection approach that obstructs left turns and through movements to and from the intersecting street or driveway. Bicycles are typically permitted to make left turns and through movements from the side street, either through gaps or depressions in the island, or by travelling around the island.

A right-in/right-out island is intended to obstruct short-cutting or through traffic and reduce crossing distances for pedestrians.

Applicability

- Roadside Environment – Urban or rural
- Location – Intersection
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	☐
Volume Reduction	◘
Conflict Reduction	◘

Implementation Considerations

Local Vehicle Access	◘
Emergency Vehicle Response	◘
Cycling Use	◘
Traffic Enforcement	◘
Vehicle Parking	☐
Street Maintenance	◘

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

GATEWAYS
30 – Gateway

Description and Purpose

A combination of traffic calming measures that help to create an entry or “gateway” to a community. Gateways typically denote transitional zones between commercial/ residential areas and urban/rural villages or hamlets.

A gateway is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock or intersection
- Speed Limit – All
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	□
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	□
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

SHARED SPACES
31 – Shared Space

Description and Purpose

A design concept that shifts priority from vehicles to cyclists and pedestrians, allowing vulnerable road users to cross anywhere along the roadway. Often, there are no pavement markings, traffic signals, signs, or barriers, requiring drivers to be more attentive. There may also be trees or street furniture in the roadway to act as deflections.

Shared space design is intended to lower vehicles speeds and enhance the public realm.

Applicability

- Roadside Environment – Urban
- Location – Midblock
- Speed Limit – 50 km/h or less, lower to 20-30 km/h
- Traffic Volume – Less than 15,000 vpd
- Grade – All

Cost

- $-$$$

Potential Traffic Calming Benefits

Speed Reduction	■
Volume Reduction	◘
Conflict Reduction	□

Implementation Considerations

Local Vehicle Access	□
Emergency Vehicle Response	◘
Cycling Use	□
Traffic Enforcement	□
Vehicle Parking	□
Street Maintenance	■

Legend

No Benefit □ / Impact □
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ENFORCEMENT AND EDUCATION
32 – Speed Display Devices

Description and Purpose

An interactive sign that displays the speed of an approaching vehicle. The vehicle speed is captured using radar and can trigger the display board to show specific messages when a driver approaches at a predetermined undesirable speed. The devices are often used upstream of targeted speed enforcement areas.

A speed display device is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock
- Speed Limit – All (typically 60 km/h or less)
- Traffic Volume – All
- Grade – All

Cost

- $-$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	☐
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	■

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ENFORCEMENT AND EDUCATION
33 – Targeted Speed Enforcement

Description and Purpose

Additional police enforcement in locations where speed, collisions, citations, resident comments, or other sources of information suggest that the site is unusually hazardous due to illegal driving practices.

Targeted speed enforcement is intended to lower vehicle speeds.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock
- Speed Limit – All (typically 60 km/h or less)
- Traffic Volume – All
- Grade – n/a

Cost

- $$$

Potential Traffic Calming Benefits

Speed Reduction	◘
Volume Reduction	☐
Conflict Reduction	☐

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	☐
Traffic Enforcement	■
Vehicle Parking	☐
Street Maintenance	■

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

ENFORCEMENT AND EDUCATION
34 – Targeted Education Campaign

Description and Purpose

Initiatives to raise awareness of road safety issues. Education campaigns typically include an element of community outreach and involvement and often will complement physical traffic calming measures. In some cases, these campaigns will form an integral component of an overall strategic road safety program.

A targeted education campaign is intended to raise driver awareness with the aim of lowering vehicle speeds, reducing short-cutting or through traffic, and/or reducing conflicts.

Applicability

- Roadside Environment – Urban or rural
- Location – Midblock
- Speed Limit – All (typically 50 km/h or less)
- Traffic Volume – All
- Grade – n/a

Cost

- $-$$$

Potential Traffic Calming Benefits

Speed Reduction	☐
Volume Reduction	☐
Conflict Reduction	☐

Implementation Considerations

Local Vehicle Access	☐
Emergency Vehicle Response	☐
Cycling Use	☐
Traffic Enforcement	☐
Vehicle Parking	☐
Street Maintenance	☐

Legend

No Benefit ☐ / Impact ☐
Minor Benefit ◘ / Impact ◘
Substantial Benefit ■ / Impact ■

APPENDIX M:
COMMUNITY TRAFFIC ISSUE REPORTING FORM

Community Traffic Issue Reporting Form

Name: _____

Mailing Address: _____

Phone: _____

Email: _____

Please indicate the location (street or area) of the traffic concern:

_____

What is the area/zone of your traffic concern?

- ☐ School Zone/Community Safety Zone
- ☐ Park
- ☐ Residential Area
- ☐ Road with limited visibility
- ☐ Hamlet
- ☐ Other

Please select any of the following traffic concerns:

- ☐ Speeding
- ☐ Collision concerns
- ☐ Vehicle volumes
- ☐ Cut-through traffic
- ☐ Pedestrian Safety

When does the problem typically occur?

- ☐ Morning rush hour
- ☐ Weekdays
- ☐ Mid-day
- ☐ Weekends
- ☐ Afternoon rush hour
- ☐ Other

Which seasons does the problem occur?

- ☐ Winter
- ☐ Summer
- ☐ Spring
- ☐ Fall

Please provide any further comments:

_____

_____

_____

APPENDIX N:
WARRANTS FOR COMMUNITY SAFETY ZONES

Community Safety Zone Warrants

The following warrants are to be used in conjunction with the **Community Safety Zone Policy** when considering designating a Community Safety Zone on a Township of Puslinch road.

Road Name and Limits: _____

Date Inquiry Received: _____

Date Inquiry Completed: _____

Name of Reviewer: _____

Road Environment: Urban ☐ Rural ☐

Warrant 1 – Areas of Special Consideration

Community Safety Zones should only be implemented in locations of special concern that are obvious to the road user, specifically:

- Elementary and secondary school
- Daycare centre
- Retirement residence or senior's centre
- Community centre
- Hospital
- High pedestrian traffic locations (more than 75 pedestrians per hour for any 8 hours of the day)

Warrant 2 – Identified Safety Concern

Community Safety Zones should only be implemented in locations of identified safety concern. The safety warrant is comprised of two parts. Either component must be met to satisfy the warrant:

- **Collision Component:** Collision ratio is less than 1:900 (collisions per year to average annual daily traffic (AADT)) averaged over 36 consecutive months.

- **Risk Component:** Locations where a significant safety concern may exist even though it is not reflected in the collision component. **Table A** lists the six risk factors considered in assessing the level of risk. Locations scoring:

    - 6 points are considered low risk;
    - 7 to 12 points are considered moderate risk; and
    - 13 to 18 points are considered high risk.

    A minimum score of 13 points is required to satisfy the risk component of the safety warrant.

TABLE A: COMMUNITY SAFETY ZONE RISK FACTOR SCORING

Risk Factor	Risk Factor Scoring			Score
	High (Score 3)	Moderate (Score 2)	Low (Score 1)	
85th Percentile Speed (above posted speed limit)	>20	15-20	<15	
Average Annual Daily Traffic Volume (AADT)	>2,000	1,000-2,000	<1,000	
Truck Volume (% of AADT)	>5%	3%-5%	<3%	
Pedestrian Volume (in any 8 hours)	>75	40-75	<40	
Length of Sidewalks (% of Road)	<25%	25%-75%	>75%	
Intersection and Entrances (per kilometre)	>10	4-10	<4	
			Total Score	

Prior to assessing the risk component of the safety warrant, field observations or local law enforcement must verify that there is an unusually high violation rate in the subject location.

Warrant 3 – Ability to Enforce

Community Safety Zone implementation in Puslinch requires enforcement commitment from the Ontario Provincial Police (OPP). This warrant ensures that sufficient resources are available to provide the necessary enforcement.

APPENDIX O:
TRUCK ROUTE BY-LAW TEMPLATE

TOWNSHIP OF PUSLINCH

By-law No. xx-xx

Being a by-law to identify Truck Routes and to restrict Heavy Trucks on Non-Truck Routes within the Township of Puslinch

WHEREAS Section 10 (2) subsection 7 of the *Municipal Act, 2001*, c. 25, as amended, (the Act) provides that a municipality may pass by-laws to provide any service or thing that the municipality considers necessary or desirable to the public;

WHEREAS Section 27 (1) of the Act authorizes municipalities to pass by-laws in respect of a highway under its jurisdiction;

WHEREAS Section 429 (1) of the Act authorizes a municipality to establish a system of fines for offences under a by-law of the municipality;

AND WHEREAS Section 122 (7) of the *Highway Traffic Act*, R.S.O 1990, c.H.8, as amended, provides that the municipality or other authority having jurisdiction over a highway may by by-law designate the date on which a reduced load period shall start or end and the highway or portion thereof under its jurisdiction to which the designation applies,

NOW THEREFORE the Council of The Corporation of the Township of Puslinch enacts as follows:

PART I – SHORT TITLE

This by-law may be cited as the **Truck Route By-law**.

PART II – DEFINITIONS

1. In this by-law,

    a. “Agricultural Purposes” means land where animals or birds are kept for grazing, breeding, raising, boarding, training, or for the tillage of soil rowing, harvesting of vegetables, fruits, field crops or landscaping materials;

    b. “Commercial Motor Vehicle” means a motor vehicle having permanently attached thereto a truck or delivery body, and includes ambulances, hearses, casket wagons, fire apparatus, motor buses and tractors used for hauling purposes on the highways;

    c. "Council" means the Council of the Corporation of the Township of Puslinch;

d. “Director of Public Works” means Director of Public Works or any employee or agent of the Township designated by the said Director of Public Works to act on their behalf;

e. “Heavy Truck(s)” means:

i. any commercial motor vehicle that has a registered gross vehicle weight exceeding 5 tonnes (5,000 kilograms) according to the current permit or vehicle registration which has been issued under the *Highway Traffic Act*, or its foreign equivalent for such vehicle, regardless of the actual weight of such vehicles; or

ii. a trailer that has a manufacturer’s gross weight rating exceeding 1,360 kilograms, regardless of the actual weight of such trailer;

f. “Highway” means a common and public highway and includes one or both of the following:

i. any street, road, avenue, parkway, lane, driveway, boulevard, sidewalk, square, place, bridge, viaduct or trestle, any part of which is intended for or used by the public for the passage of vehicles or persons; or

ii. the area between the lateral property lines of any highway or road allowance including any curbs, gutters, boulevards, culverts, ditches and retaining wall;

g. “Motor Vehicle” includes an automobile, motorcycle, motor assisted bicycle unless otherwise indicated in this by-law, and any other vehicle propelled or driven otherwise than by muscular power, but does not include a street car, or other motor vehicles running only upon rails, or a motorized snow vehicle, traction engine, farm tractor, self-propelled implement of husbandry or road building machine within the meaning of the *Highway Traffic Act*;

h. “Municipal Law Enforcement Officer” means a person or persons duly appointed, pursuant to the *Police Services Act*, by Council;

i. “Non-Truck Route” means any Highway or part thereof within the Township not set forth in Schedule A of this by-law and further not signed as a Truck Route;

j. “Officer” means a Municipal Law Enforcement Officer duly appointed by Council, and includes any police officer appointed pursuant to the *Police Services Act* and any enforcement officer for the Ministry of Transportation;

k. “Person” includes any individual, driver, vehicle operator, firm, partnership, association, corporation, company or organization of any kind;

l. “Reduced Load Limit” means and refers to a Heavy Truck restricted to a limit of a maximum weight of five (5) tonnes per axle for any vehicle traveling on the said Highways during the Reduced Load Period in any year;

m. “Reduced Load Period” means the period between March 1st to April 30th inclusive in any year;

n. “Road Allowance” means all allowances for roads, except in so far as they have been stopped up according to law, made by the Crown surveyors, all Highways laid out or established under the authority of any statute, all roads on which public money has been expended for opening them or on which statute labour has been usually performed, all roads dedicated by the owner of the land to public use, and all alterations and deviations of and all bridges over any such allowance for Highway or road;

o. "School Bus" means a chrome yellow bus that is used for the transportation of:

   i. children; or

   ii. individuals with physical and/or intellectual disabilities to or from a training centre that bears on the front and rear thereof the words “School Bus” and on the rear thereof the words “Do Not Pass When Signals Flashing”;

p. “Site Alteration Agreement” means a permit issued pursuant to the provisions of the xxx by the Township;

q. “Township” means the Corporation of the Township of Puslinch;

r. “Truck Route” means a Highway identified in Schedule A of this by-law;

s. “Water Hauler” means vehicles transporting potable water in a water tank fixed to a truck.

PART III – HEAVY VEHICLES

2. Heavy Truck Routes

   a. No Person shall operate or permit the operation of a Heavy Truck except on a Truck Route, unless otherwise exempt or provided for in this by-law.

b. The Director of Public Works is hereby authorized to erect such signage as is required to properly designate and identify the Highways listed in Schedule A of this by-law as Truck Routes.

c. The Director of Public Works is hereby authorized to erect such signage as is required to properly designate and identify the Highways not listed in Schedule A of this by-law as prohibited for use by Heavy Trucks.

3. Reduced Load Limit

a. The Highways set out in Schedule B to this by-law are restricted to a Reduced Load Limit during the Reduced Load Period.

b. The Director of Public Works is hereby authorized to erect such signage as is required to properly designate and identify the Highways listed in Schedule B of this by-law as having Reduced Load Limits during the Reduced Load Period.

c. No Person shall operate or permit the operation of a vehicle on a Highway that does not comply with the Reduced Load Limit during the Reduced Load Period.

4. Exceptions

a. Section 2 above does not apply in the following circumstances:

i. To a Person operating a Heavy Truck by or on behalf of the Township, for the purposes of Highway maintenance, including the carriage and application of abrasives or chemicals to the Highway, the stockpiling of abrasives or chemicals for use on a Highway, or the removal of snow from a Highway;

ii. To a Person operating a Heavy Truck following a route that has been approved through a Site Alteration Agreement with the Township;

iii. To a Person operating fire apparatus or other vehicles which are responding to a bona fide emergency;

iv. To a Person operating Heavy Trucks on behalf of the Township for the purposes of transporting waste;

v. To a Person operating a public utility or emergency vehicle;

vi. To a Person operating a School Bus; or

vii. To a Person operating a Heavy Truck on a Non-Truck Route when instructed to do so by a police officer.

b. Section 2 does not apply to a Person operating a Heavy Truck in the usual conduct of business (existing or established place of business) and proceeding by way of the shortest route to or from any Truck Route in respect of the following vehicles:

i. Water Haulers;

ii. Heavy Trucks used exclusively for the transportation of milk;

iii. Heavy Trucks being used for Agricultural Purposes;

iv. Heavy Trucks on any Highway or part of Highway which has been properly authorized as a temporary detour route; or

v. Heavy Trucks delivering or providing goods or services.

PART IV – PENALTY

5. Every Person who contravenes any of the provisions of this by-law and, if the Person is a corporation, every director or officer of the corporation who knowingly concurs in the contravention, is guilty of an offence and on conviction is liable:

a. On a first conviction, to a fine of not more than $10,000; and

b. On a subsequent conviction, to a fine of not more than $10,000 for each day, or part thereof, upon which the contravention has continued after the day on which the Person was first convicted.

6. Notwithstanding Section 5 above, where the Person convicted is a corporation, the maximum penalty that may be imposed is:

a. On a first conviction, a fine of not more than $50,000; and

b. On a subsequent conviction, a fine of not more than $25,000 for each day, or part thereof, upon which the contravention has continued after the day on which the corporation was first convicted, and not as provided in subsection a.

7. For the purposes of establishing set fines, every Person who contravenes any provision of this by-law is guilty of an offence and is subject to a fine pursuant to the provisions of the *Provincial Offences Act*, R.S.O., 1990, c. P.33, as amended, or any other applicable legislation or successor thereto.

PART V – OBSTRUCTION

8. No Person shall hinder or attempt to hinder or obstruct an Officer in carrying out their duties under this by-law.

9. No Person shall obstruct any employee or authorized agent in carrying out work

for the Township, such as erecting signage, under this by-law.

PART VI – SEVERABILITY

10. If a court or tribunal of competent jurisdiction declares any portion of this by-law to be illegal or unenforceable, that portion of this by-law will be considered to be severed from the balance of the by-law, which will continue to operate in full force.

PART VII – ENFORCEMENT

11. This by-law may be enforced by any Officer as defined in this by-law.

PART VIII – ENACTMENT

12. This by-law comes into force and effect on the date of its passing.

Schedule A

Truck Routes

Road Name	From	To

Schedule B

Reduced Load Limit Highways

Road Name	From	To

APPENDIX P:
WEB PAGE OUTLINE, HEAVY TRUCK USAGE

Web Page Outline

HEAVY TRUCK USE IN PUSLINCH

TRUCK ROUTE NETWORK

What is it?

The Truck Route By-law identifies roads within the Township of Puslinch (under the Township's jurisdiction) where heavy trucks are permitted. This by-law is designed to restrict the gross vehicle weight limit to 5 tonnes per axle for road sections not identified as truck routes and provides additional information regarding restrictions during the spring thaw period from February 15 to May 15 in each calendar year on a portion of the truck route network.

Exceptions to the Truck Route By-law on non-heavy truck roads include but is not limited to:

- Trucks making local deliveries of goods and services
- Water haulers
- Milk deliveries
- Emergency Services vehicles
- Municipal vehicles or vehicles providing services on behalf of the Township.

Exceptions also include various agricultural vehicles and activities.

The *Municipal Act, 2001* authorizes the Township of Puslinch Council to pass by-laws with respect to highways. The Truck Route By-law will be enforced by the Ontario Provincial Police (OPP) through the *Highway Traffic Act* and persons guilty of violations are subject to fines approved by the Ministry of the Attorney General and prescribed under the *Provincial Offences Act*.

The Ministry of Transportation (MTO) is also granted enforcement rights through the *Highway Traffic Act* for gross vehicle and axle weights. These enforcement rights apply to vehicles that are overloaded as described in the *Highway Traffic Act*, as well as vehicles traversing load posted bridges.

Which roads are truck routes?

The truck routes are denoted on the most suitable roads to the greatest extent possible, while limiting intrusion into residential neighbourhoods and core areas like Aberfoyle, Morriston, and Arkell to the minimum possible. The goal is to define the preferred method of moving trucks through the Township with a network of routes that:

- Are safest for the movement of heavy vehicles;
- Avoid sensitive land uses like schools, residential areas, and community facilities;
- Support local and regional commerce and industry; and

- Provide sufficient capacity and adequate design features to accommodate the anticipated volume, size, and weight of vehicles.

The truck route network in Puslinch is designed to direct truck traffic to roads more intended for use by heavy vehicles and avoid minor streets with more sensitive abutting land uses. It is based on the principle that heavy vehicles should stay on designated routes (primarily Provincial highways and County roads) and only use minor streets (Township roads) to access local destinations.

[MAP OF TRUCK ROUTE NETWORK]

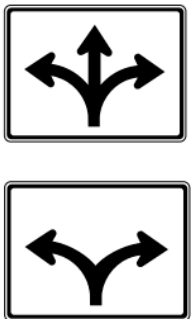
How are truck routes denoted?

The truck route network combines permissive signs directing heavy vehicles to the prescribed truck routes with restrictive signs prohibiting access to streets: where truck traffic is undesirable or less safe; experiencing poor compliance with permissive signing; and/or where drivers maybe confused.

Regulatory signs inform truck drivers of actions needed to comply with the Truck Route By-Law. The signs are enforceable traffic regulations prescribed under the *Highway Traffic Act* and the Truck Route By-law, disregard of which would constitute a violation. Below illustrates the regulatory signs used for the truck route network.

TRUCK ROUTE Sign

Denote roads where heavy truck use is permitted



MOVEMENTS PERMITTED Tab Sign

Used in combination with TRUCK ROUTE signs to denote permitted turns by trucks

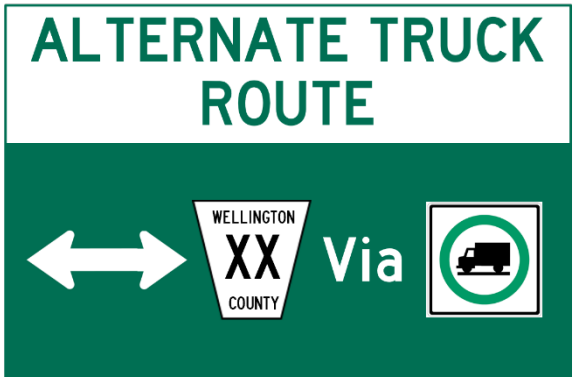
NO HEAVY TRUCKS Sign

Denote roads where heavy truck use is not permitted unless one of the exemptions listed above applies

Guide and information signs supplement the regulatory signage and are installed at strategic locations to guide truck drivers to/along the routes and/or bring awareness to the truck route network. Below illustrates the guide and information signs used for the network.

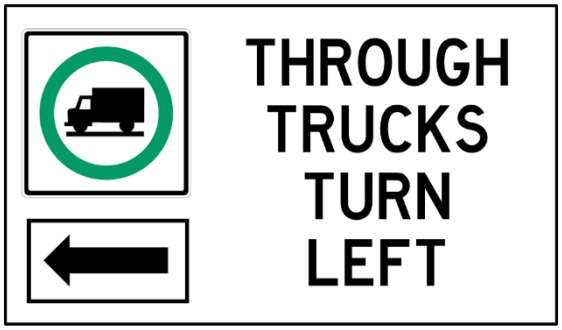
TRUCK ROUTE GATEWAY Sign

Used at entries into the Township and on roads at Highway 401 interchanges to inform truck drivers and other motorists of the route network



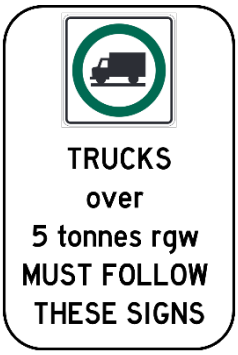
ALTERNATE TRUCK ROUTE Sign

Used in advance of intersections to inform truck drivers of designated routes on adjoining Wellington County roads



TRUCK ROUTE DIRECTIONAL Sign

Used approaching/at intersections to inform truck drivers where routes change direction



TRUCK ROUTE BOUNDARY Sign

Used at entries into the Township without Gateway signs to inform truck drivers and other motorists of the requirement for trucks to follow the route network

HALF-LOAD RESTRICTIONS

What is a half-load restriction?

The Township imposes an annual “half-load” season from February 15 to May 15 on select Township roads to protect the road and road base from being permanently damaged during the spring thaw. During this period vehicles over a certain weight class (5 tonnes per axle) are not permitted to use the roadway. It is the responsibility of the heavy equipment operator to ensure that they plan their route to avoid roadways with half-load restrictions.

Passenger vehicles are exempt from the restriction. Larger vehicles such as dump trucks, delivery trucks, concrete trucks and heavy equipment floats that haul excavators, bulldozers, and cranes are included.

How does a road get permanently damaged?

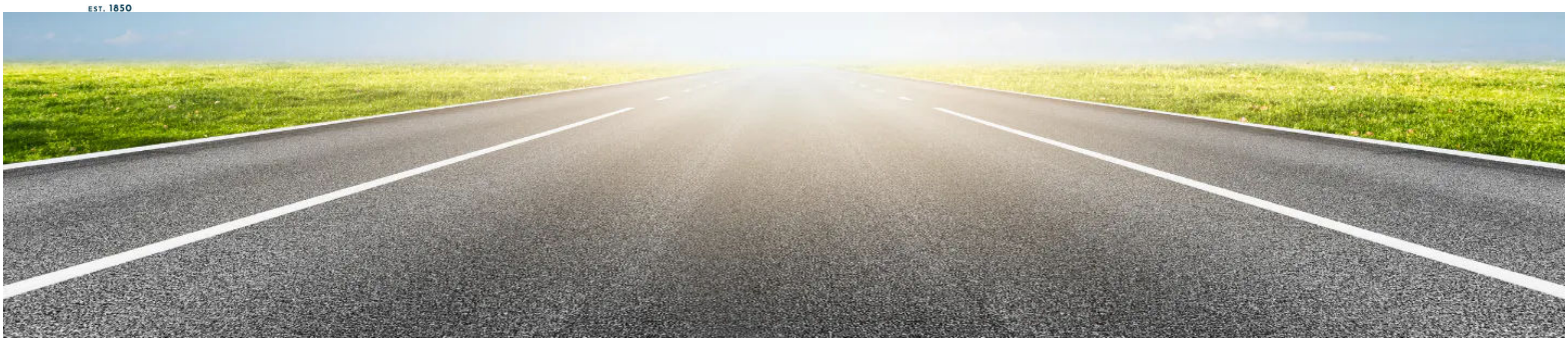
In the spring, frost comes out of the ground. As moisture comes out of the road base, the road becomes softer and weaker. Heavy loads can cause the road to sink and break apart, which can lead to permanent damage. Most rural roads and highways are not built to withstand the pressures of heavy equipment.

Why are half-load restrictions imposed?

To avoid rebuilding after every spring thaw, which would cost a lot of taxpayer dollars, municipalities impose restrictions to give the roads time to properly shed the frost.

APPENDIX Q:
PUBLIC ENGAGEMENT, COMMENTS AND RESPONSES

TOWNSHIP OF PUSLINCH EST. 1850



Roads Management Plan

Join the conversation about the Township of Puslinch's Roads Management Plan.

The Township of Puslinch is seeking your feedback regarding its Roads' Management Plan.

What is a Roads Management Plan?

The purpose of a Roads Management Plan is to:

- Allow the Township to appropriately plan and undertake maintenance on the Township's road network as well as to plan and prioritize the appropriate capital work;
- Establish criteria and steps to follow for responding to service requests or service upgrades relating to the Township's road network (e.g., paving, sidewalks, street lights, changes to speed limits);
- Identify road rehabilitation needs to assist the Township in developing a realistic annual capital budget to provide an adequate service level; and
- Assist the Township in formalizing an ongoing road maintenance operation and to facilitate proactive planning for future operations, replacements, and upgrades.

View the Roads Management Plan on the Township of Puslinch Website or under the Roads Management Plan Documents available on this page.

The Township will be collecting feedback regarding the Roads Management Plan until 12:00 p.m. on June 12, 2023. Feedback is being received through the feedback form below or through written comments sent to the Municipal Office (7404 Wellington Rd 34, Puslinch ON, N0B 2J0).

Survey

CLOSED: This survey has concluded.

Roads Management Plan Feedback

The Township of Puslinch wants to hear your feedback regarding its Roads Management Plan. All comments will be provided to the appropriate staff for consideration.

SHARE YOUR FEEDBACK

Page last updated: 05 Jun 2023, 02:58 PM

Roads Management Plan Documents

- Section 1 Introduction and Approach .pdf (131 KB) (pdf)
- Section 2 Project Team .pdf (201 KB) (pdf)
- Section 3 Road Condition Assessment .pdf (209 KB) (pdf)
- Section 4 Road Design Standards.pdf (253 KB) (pdf)
- Section 5 Traffic Count Collection & Growth Project.pdf (165 KB) (pdf)
- Section 6 Road Maintenance Strategy.pdf (279 KB) (pdf)
- Section 7 Capital Needs Requirements .pdf (157 KB) (pdf)
- Section 8 Traffic Management Policies .pdf (2.87 MB) (pdf)
- Section 9 Recommendations & Conclusions.pdf (130 KB) (pdf)
- Section 10 Bibliography.pdf (102 KB) (pdf)
- Appendix A- Township Road Network Inventory Tables and Road PCI Maps.pdf (3.47 MB) (pdf)
- Appendix B- Excerpts from MTO Inventory Manual .pdf (406 KB) (pdf)
- Appendix C- Recommended Cross-Section for Existing Roads .pdf (248 KB) (pdf)
- Appendix D- Cost Estimates for Surfacing Options .pdf (163 KB) (pdf)
- Appendix E- Road Age Calculations .pdf (128 KB) (pdf)
- Appendix F- Gravel Road Conversion Flow Chart .pdf (144 KB) (pdf)
- Appendix G- Preliminary Design Checklist for Transportation Capital Projects.pdf (186 KB) (pdf)

Appendix H- Current Traffic Counts and 10 Year Forecast .pdf (172 KB) (pdf)

Appendix I- Traffic County Locations and Traffic Range Estimates .pdf (1,68 MB) (pdf)

Appendix J- Road Maintenance Activity Spreadsheet .pdf (182 KB) (pdf)

Appendix K- Time of Need and Priority Ratings .pdf (1,98 MB) (pdf)

Appendix L- Traffic Calming Toolbox .pdf (3,87 MB) (pdf)

Appendix M- Community Safety Zones .pdf (175 KB) (pdf)

Appendix N- Warrants for Community Safety Zones .pdf (162 KB) (pdf)

Appendix O- Truck Route By-law Template.pdf (183 KB) (pdf)

Appendix P- Web Page Outline, Heavy Truck Usage.pdf (302 KB) (pdf)

REGISTER to get involved!

Comments Received between 2018 and 2022

Date	Comments
June 6, 2018	I am a local concerned citizen. I have lived in the city of Guelph since 2011 I and just recently moved to Puslinch. It's a corner house that sits on the intersection of Old Ruby and Victoria. The reason for this letter is because it has come to my attention recently that the traffic has severely increased on Victoria. Along with the traffic increase, the speeds of the cars are also surpassing the actual speed limit of side street. The other problem is that our house has no protection along the side ofthe road. No barriers or fence (fence not allowed land developer). The exposed back and front yard coupled with the excess speeds on (road) now creates a hazard for me and my family. This really hit home for me last month when a car had a flat tire on the road and swerved into our yard area. Not by a lot, only a few feet. But I thought what if my kids were playing the back yard and what if the car was speeding and then blew a tire or just lost control. So that's when I thought I should at least make the city aware of the situation. I don't know if there can be something done in the form of maybe a stop sign, or speed bumps, or something of that matter in order to help either reduce the speeds or at least protect my open space. I would definitely appreciate any feedback from your end. I do thank you for allowing me the opportunity to voice my concerns and to thank you for all that you do to keep our community clean and safe.
	Response: ***The Township has received the request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures can be implemented.***

Date	Comments
November 29, 2019	This letter is being written on behalf of the residents of Puslinch Concession 4 (see attached petition), who reside between Sideroad 20 and Wellington Road 35 (Downey Road). Our purpose is to request of the Puslinch Township Council that the speed limit on this part of Concession 4 be lowered from 80 kph and posted at 60 kph. Our request for this lowering of the speed limit is based upon our experiences of life on this roadway where there are almost daily near-miss accidents between cars and pedestrians and/or between passing cars and residents attempting to access their properties. This section of road is 1 ½ km in length and there are now 18 driveways and 4 field accesses along the distance. Eleven of the resident families have owned their properties for 30 years or more and they have seen, first-hand, the changes in traffic densities and speeds. We make this request based upon the following considerations: • The road is very much a thoroughfare for commuters to and from Guelph, Kitchener and Cambridge. Traffic density and speed has increased yearly during morning and evening rush hours over a thirty-year period. • On the occasions when highway 401 is closed, and Wellington Road 34 is congested, our road is used as an alternate. At these times the traffic is frequently bumper to bumper, travelling at high speeds. • The speed limit on the Hanlon Expressway is 80 kph and that road is a four-lane highway with wide shoulders and controlled access points. Surely our narrow roadway, Concession 4, should have a lower, safer speed. • The Aberfoyle Waste Facility is located on this section of Concession 4. On Saturdays, in particular, there is heavy traffic along the road, turning in and out of the Facility. There is a marked increase on Wednesdays and Fridays as well since these are the Facilitiy's other two open days. • To all intents and purposes, there are no shoulders or walkways on this section of Concession 4. It is dangerous to walk at the sides and/or to go out to collect the mail. Riding a bicycle on this stretch is a precarious endeavor. • Residents are able to provide first hand testimony of cars that regularly travel 100 kph on this section of road. • Several of the driveways have limited sight ranges. Extreme caution is required whenever a resident leaves his or her property. • Frequently, gravel trucks travel this section and often at high speeds In closing I would like to add that the existing 80 kph speed limit was established over 70 years ago when population and traffic densities were dramatically lower. In 2019, this is not the case and the residents of Concession 4 between Sideroad 20 and Downey Road should not have to fear for their lives every time they leave or enter their properties due to the exponential increase in traffic density and speed of travel in recent decades. We would welcome the opportunity to present our request to Puslinch Council at a forthcoming meeting. Thank you for your attention to this matter.
	Response: ***The Township has received the request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures can be implemented. Please reach out to the Director of Public Works, Parks and Facilities at the Township of Puslinch to initiate discussions on your comments.***

Date	Comments
July 8, 2020	Increased traffic and speeding along Lake Rd and surrounding area are making our community more dangerous. More often we are hearing about hazardous incidents along these roads. Just recently a man was charged after an encounter with a young mom and her baby resulted in him throwing a full pop bottle at the pair as he blasted past them in his vehicle. With more construction coming to the nearby 401, our roads are once again going to be burdened with extra traffic bypassing the work, bringing more cars, more noise pollution and more litter along the roads. It's scary to think about our children playing in our yards and standing on the gravel shoulder on a school bus route while heavy trucks and lines of cars speed by. We need to get out in front of this problem before it gets any more serious. After bringing these concerns forward to our mayor, our MP, or MPP, Wellington County, the OPP and the Ministries of Natural Resources and of Transportation, we have not been able to come to a resolution. So we the citizens of this great community are getting together to rally for positive change to make our community safer. We are asking you to sign this petition to join us in demanding the safety of our children and families are prioritized above the needs of people who are just passing through to avoid congestion on the highway. We Request: - Safety plan which could include a reduced speed limit, speed bumps, sidewalks and/or other traffic calming measures. - Greater police presence to crack down on transport trucks speeding and breaking rules surrounding weight limits on our roads. - Plan to measure and address noise pollution resulting from more traffic and construction, including a sound barrier between the highway and Lake Road. - Community input on the plan to bypass traffic during 401 construction, where the impacts are carefully considered by our local leaders. - More attention to the pollution and litter in and around Little Lake as more people park their cars to enjoy nature. The parking situation also requires attention. We are asking for a meeting with our local leaders including Mayor James Seeley and our 4 Puslinch Councillors, MP Mike Chung, MPP Ted Arnott, Wellington County Officials and the OPP. We want to begin a dialogue to address our concerns and hear from our leaders how this situation can be improved.
	Response: ***Lake Road is a Wellington County Road. Any changes to speed limits, traffic calming measures, sidewalks and signage on this road would be a Wellington County decision. Township staff have forwarded this request to Wellington County staff. Should you wish to follow up directly with Wellington County staff and require assistance in locating a suitable contact at Wellington County, please follow up with Township staff for assistance.***
August 12, 2020	Re: Boreham Drive We have a problem on our street, people with fancy cars want to show off them by going really fast and they are whizzing arounf the corner and there could be little kids playing and people can get hit. All I am asking is for you to put a couple of speed bumps on our road and if you don't want to then at least put down a sign. Other than that would you rather put down a sidewalk? I got the entire street to sign, that is 12 people. I am trying to save lots of lives and not only the people on the street but the pople in the car. Our street is Boreham Dr Arkell.
	Response: ***The Township has received the request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures can be implemented.***

Date	Comments
September 15, 2020	I wasn't aware that the speed limit is 80 kms when there are no signs. I would like to see the speed reduced to 60 kms. Our stretch is used as a short cut from Wellington Rd 32 to Cambridge and vice versa. The cars come off 32, which is 80 kms, and continue on our stretch sometimes faster as there is a hill along this portion with hidden driveways. Roszell Rd is 60 kms from Wellington Rd 32 into Cambridge. There is a stretch of Concession 4 between Side Rd 10 and 12 where the speed is reduced from 80 km to 60 km. Side Rd 10 and 12 are 60 km. Laird Rd is 60 km. The stretch of Wellington Rd 34 from Wellington Rd 32 to Townline Rd is 60 kms. We have a community of about 10 homes here. It has been mostly an older population but there seems to be a shift recently with some younger families purchasing here. My greatest fear is for a child to be playing and chase after a ball or perhaps 1 of the elderly residents hit while walking along the road. If there is anything I can do to help my case with the Township Transportation Master Plan please let me know. If theres an opportunity to talk or if a petition signed by neighbours would help, again please let me know.
	Response: ***The Township has received the request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures can be implemented.***
October 15, 2020	Thank you for your time and consideration with the following matters. Old Brock road during school drop off and pickup times 8:15 am-8:35 and 2:45-3:05 has become extremely dangerous. Parents dropping off and picking up has been an ongoing issue however, with covid the issue has heightened as less children ride the bus. Parents have been asked to park at the community center and use the new side walk. I would say 50% of parents are following these guidelines. The other 50% are parking on both sides of Cockburn street facing the wrong direction, parking very tight on Old Brock and making it impossible for people who live on the street to exit or enter their own driveways, turning around in peoples driveways where children are walking home and parking directly under no stopping signs. The school has mandated that parents can no longer park in the staff parking lot but the other day I witnessed a parent blocking the staff lot so she could have a prime spot. Children had to walk behind her running car to get home. The school has even tried placing pylons on the street but parents are moving them. I can only imagine that as the weather turns colder this problem will become a bigger issue as less parents will want to walk the 2 minutes from the community center. I have suggested possibly a crossing guard at the lights will make parents feel more conformable but the school needs time to look into that. Possibly Old Brock road and Cockburn needs No Stopping/Parking signs Monday to Friday. Another issue is the No Exit sign at the end of Old Brock Road. At least 10 times a day we have cars drive down the street only to realize it is a dead end. On weekends I would say 10-20 cars especially during antique market times. A lot of times people are frustrated and end up driving across lawns and speeding back down the street. Is it possible to make the No Exit Sign larger or place one on each side of the road. I know we can't fix stupid but maybe we can eliminate some of the frustrations on these streets.

Date	Comments
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage and/or traffic calming measures.***
October 21, 2020	Proposal to address the "Community Safety Zone" in Puslinch to also include Victoria Rd between Maltby Road and Wellington Road 34, in addition to Aberfoyle Brock Rd and Lake Rd. -Concerns: 70 km speed limit through this area as well as the safety issue in the residential area along this stretch of road due to increased speed (in excess of the posted limit), transport and other heavy trucks travelling this road despite signs, dangerous passing and racing on Victoria Rd between Wellington 34 and Maltby Rd. (Exotic Car Rentals), drag racing of muscle cars and motorcycles. The proposal is to lower the speed limit through this stretch of Victoria Road to be included in a "Community Safety Zone", install lane dividers in front of residential homes similar to those located on Wellington Road 36 to limit speed, traffic and unsafe passing. Reason: multiple children in this area boarding school buses, residences in this area with cars attempting to turn or merge into traffic, a high number of cyclists in the area with a non existent bike lane.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures or designated areas can be implemented.***
March 16, 2021	As a Puslinch resident and avid biker for fitness on the weekends and commuting during the week I'm concerned about my and other biker safety on Puslinch roads. Of particular concerns are the gravel and heavy trucks. With spring quickly approaching I was wondering: 1. what historically has been done to raise awareness about respecting bikers, sharing the road and enforcing laws that help protect bikers & increase their safety. 2. are there any initiatives or plans being worked on currently to help further protect our citizens and other local bikers 3. Has there been consideration or exploration around securing grants or funds from various other levels of government etc. that support healthy living, biker safety, bike lanes, increasing biker awareness signage etc. etc. 3. I wondered if council and the mayor might be open to creating or working towards some form of campaign, program to make Puslinch more bike friendly as we are uniquely positioned as one of the best areas for road biking. I would be interested in personally participating, possibly leading and/or financial contributing to this as I think it's an important and growing issue in our township.

Date	Comments
	Response: 1. ***The Township participated in Wellington County's Active Transportation Plan, which is available on Wellington County's website at the following location: https://www.wellington.ca/en/resident-services/pl-activetransportation.aspx .*** 2. ***All initiatives relating to active transportation are being administered through Wellington County for consistency across the County's road network as well as the local municipalities.*** 3. ***There has currently not been any exploration or consideration around securing grants or funds from various other levels of government that support biker safety, bike lanes, increasing biker awareness, signage, etc. at the Township level. There have been grants that have been applied for and received to develop new walking and active transportation trails in off-road settings in the past. There are no plans within the Capital Program to install bicycle lanes on any Township road. Township roads currently do not have the required platform width or Right-of-Way property to support this expansion.*** 4. ***Township staff have forwarded this request to Wellington County staff. Should you wish to follow up directly with Wellington County staff and require assistance in locating a suitable contact at Wellington County, please follow up with Township staff for assistance. Additionally, please reach out to the Director of Public Works, Parks and Facilities to initiate discussions based on your comments of what can be achieved locally within the Township.***
June 1, 2021	I'm a student and find it very difficult to find transportation since Puslinch doesn't have much options of public transportation. I'm writing this email to see if there's a possibility that a bikeway could be made in the road of Gordon St. Riding my bike to get to places is one of the best options since it's cheap and good for the environment, but the only issue is the traffic and risk there is for bike riders. Hope my voice can be heard since many students and bike riders have the same problem.
	Response: ***Gordon Street is a City of Guelph road, and within Puslinch, Wellington County Road 46 / Brock Road is a Wellington County Road. Township staff have forwarded this request to Wellington County and City of Guelph staff. Should you wish to follow up directly with Wellington County or City of Guelph staff and require assistance in locating a suitable contact at Wellington County or the City of Guelph, please follow up with Township staff for assistance. .***
June 21, 2021	Hi, I'm just wondering if we can get a "please slow done" sign or "share the road" sign for the 90 degree bend area where Forestell Road to Roszell Road meet. This has been a concern for years. But, there are more kids in this section, crossing the road and there is no shoulder for driver error. There are numerous accidents on this corner reported and often unreported. With the number of bikers, walkers and an increase in people using the trail, I'm thinking it's time to try to slow the traffic down. And thank you, to the officers that do ride programs and speed traps on this road. It is much appreciated and sadly needed.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage.***

Date	Comments
July 13, 2021	I am writing to you after reaching a precipice of my tolerance this morning on my drive into work. I have worked in Kitchener for 18 years as a Practitioner in the Emergency Department of St Mary's General Hospital. I live on the south end of Guelph just off of Downey Rd and my commute into work includes the stretch of Laird Rd between Downey Rd and County Road 32 where we currently have at least 2 active aggregate sites as well as multiple entrances on the adjacent roads (Sideroad 10, Downey Rd). As you probably are aware, during and since the Niska Road single lane bridge construction, there has been a tremendous shift in the volume of traffic daily to Laird Rd. The posted speed on Laird had been reduced a few years ago across it's entire length to 60km/hr. This was a positive decision on many levels given the scattered residential areas, the low visibility rollers on that stretch, no shoulder and many many cyclists who frequent the road for their commutes to work and leisure (this includes myself and my children on occasion). On many accounts, I've appreciated vehicles bombing along this road at rates of speed well beyond the posted rate, I've been nearly blown off the road on my bike on multiple occasions while 6" from the shoulder, by various aggregate haulers as well as standard cars and trucks. This morning's auto commute without a doubt takes the cake and I think there needs to be some discussion and accountability taken before we have another incident like that of OPP veteran, Gregory Stobbart. 6:55 AM this morning, while driving Downey southbound, as I approached the right hand turn onto Laird (westbound) from Downey Rd (green light), A full sized tractor with a trailer labelled 'CV Quarry and Contractors Water Service Inc' was subsequently making a left hand turn from Downey northbound onto Laird Rd. This truck turned at the last minute right in front of me causing me to have to hit the breaks and reach a standstill for at least 5-10 second while they cleared the intersection. They then started to accelerate on Laird and appeared to be pulling away from me at quite significant speed so I caught up to them, then maintained their speed. They were cruising at a crazy 94 km/hr through the entire roller, low visibility section. The truck then turned left into the COX Asphalt Plant. Simply dangerous and tremendously irresponsible. This is a REAL problem. I know that the vast majority of aggregate drivers are cautious on this stretch. I ask quite simply that you have the appropriate discussions with your drivers/contractors/clients etc about this issue.
	Response: ***The Township will notify the local detachment of the Ontario Provincial Police of your comments. While the Township routinely discusses issues of roadside safety and adherence to traffic regulations with its staff, contractors and clients, the Township does not enforce regulations of the Highway Traffic Act.***

Date	Comments
August 15, 2021	On Saturday afternoon, Aug. 6th, under sunny weather conditions, William Irving of Guelph died in a car crash at the corner of Watson and Maltby Roads, Puslinch. In addition to numerous minor accidents at this dangerous intersection, other drivers have died here in the past. How could Puslinch make this intersection safer? 1) Regularly cut back the vegetation along the margins of the roads to the fence lines, especially at intersections. I have seen no evidence this has been done this year at the intersection of Watson and Maltby. Visibility is currently seriously impaired (one must partially enter the intersection to see oncoming traffic) and likely contributed to the Aug. 6th accident. This could be accomplished by two workers in an hour. 2) Post the 80 kph speed limit along Watson Rd. between Arkell Rd. ad Wellington 34. Many drivers are unaware of the speed limit. This action is simple; cost is moderate. 3) Consider reducing the speed limit to 70 kph at the intersection of Watson and Maltby. This an easy, low cost action (installation of two signs, northbound and southbound). 4) Contact the OPP and request that they ticket speeders. I regularly witness vehicles travelling faster than 130 km/hr on Watson Road. There is no cost to Puslinch to make this request. 5) Install rumble strips on both Maltby and Watson Roads. They would force drivers to notice the intersection and to slow down. I think this would be very effective. 6) Install gentle speed bumps on both Maltby and Watson Roads. They would force drivers to slow down to desired speeds. In my opinion this would be the most effective long-term solution. 7) Install a traffic light and signs indicating a new stop light. This is an expensive option and my least favourite. If some of these actions had been taken after the last fatal crash at this corner, William Irving may be alive today. Please, Puslinch- take actions NOW and prevent another fatality.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage, traffic calming measures and posted speed limits. The Township has installed additional "all-way" stop signs at this intersection since the submission of this comment.***

Date	Comments
August 27, 2021	RE: TRAFFIC PROBLEM, HUME ROAD, PUSLINCH TWP. I would like to express our concern about the current traffic situation on Hume Road in our Township of Puslinch, ln a nutshell, the major issue is that of uncontrolled and dangerous speeding of motor vehicles on this road. We, the residents would like the speed linlit to reset from 60 to 50kmr/H and combined with reasonable traffic calming measures. Since Hume Road was repaired and re-surfaced many years ago, it has become a much used transit for vehicles entering or leaving Watson Road or Nassagaweya Lines. The latter linking WR 34 and Arkell Road to and from Rockwood, Maximum traffic volume appears to be compatible with working hours and some weekends. The speed limit is currently set to 60 km/H but this is rarely followed, Concurrently with residential development along this road the following factors need to be considered: 1, There are now numerous hidden entrances and exits from properties 2. There are more children playing, cycling, or being picked up and deposited by school buses 3, There are more pedestrians and dog walkers along the road as well as some wheelchair bound individuals 4, There are more service vehicles with ongoing construction, increased services, and congestion with on road parking of commercial vehicles 5. There are many hílly areas with restricted sightlines 6. There is an unregulated railway crossing on this road, We recogrrize thât these ere common problems throughout the township, t:ut this road has beconre a significant conduit for nrotor vehicles to and from the points mentioned. The lowered speed linrit to 50km/hr. with some enforcement would be a good place to start
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage, traffic calming measures and posted speed limits. The Township has installed additional "all-way" stop signs at the intersection of Hume Road and Watson Road South since the submission of this comment.***
September 20, 2021	a grade 12 student at Bishop Macdonell Catholic High School. I'm writing this letter since I've been having trouble when needing transportation to get home. I live in Fox Run Dr and there's very little options of transportation to get to Guelph or back home when I'm in town. I'm trying to find a job so I can save for a car, but in the meantime it is impossible to find a way to get to the city other than uber, which gets expensive or biking which only works in summer and not winter of course. My brother is my same age and he is currently employed at Mucho Burrito in Stone Road, he spends about $60 a week in uber since he doesn't have another way to get to his job, of course when my mom is not busy, she tries her best to help him, but most of the time he needs to take an uber 3 times a week (back and forth). I'm writing this letter hoping to be heard and being the voice of many students of Puslinch to have a better transportation choice. I'm wondering if this problem can be solved by making bus stops or having a city bus that could take us town. I will be waiting for a response, thank you very much for your time and I hope this problem can be solved.

Date	Comments
	Response: ***There are currently no plans within the Township for public transportation services. Expansion of City of Guelph public transportation would require discussion with the City of Guelph staff. Township staff have forwarded this request to City of Guelph staff. Should you wish to follow up directly with City of Guelph staff and require assistance in locating a suitable contact at the City of Guelph, please follow up with Township staff for assistance.***
December 21, 2021	In response to the online public consultation regarding the new construction of Hwy 6 / Hanlon expressway the following is the concern we sent using their process. We felt it important to also present our concerns directly to the Puslinch Council. We have a concern regarding the intersection at the Hanlon & Conc 4 remaining open during construction. Concession 4 (a country road) will become even more dangerous with the increase in commuter traffic than it already is. For many years the residents have complained about excessive traffic & speeding during prime commuter hours and a lack of police radar control. Wellington Rd 34 is avoided by many commuters who want to skip the long wait times due to the stop sign at Townline Road. Using Concession 4 to Rozell Road allows commuters to avoid the wait and gives them an uninterrupted right of way along Townline. With the heavy commuter traffic on Wellington Rd 35 even that intersection at Conc 4 has become a challenge. Conc 4 has the Donkey Sanctuary, Aberfoyle dump and is used for training by cycling and skiing groups and exiting our driveways safely is often difficult. The intersection at the Hanlon and Conc 4 has a history of accidents with aggressive drivers taking risks to cross and should be closed to avoid creating an even more dangerous situation.
	Response: ***The Township has received this comment and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage, traffic calming measures and posted speed limits on Concession 4. Requests to review the intersection of Wellington Road 35 and Concession 4 need to be raised with Wellington County staff. Requests to review the intersection of Highway 6 and Concession 4 need to be raised with the Ontario Ministry of Transportation. Township staff have forwarded this request to Wellington County and Ontario Ministry of Transportation staff. Should you wish to follow up directly with Wellington County or Ontario Ministry of Transportation staff and require assistance in locating a suitable contact at Wellington County or the Ontario Ministry of Transportation, please follow up with Township staff for assistance.***
February 11, 2022	I am part of the Families for Rolling Hills Group. We have shared concerns with Puslinch Council regarding the City of Guelph's Transportation Master Plan. As a subdivision that was originally a part of Puslinch, I hope you are familiar with our area. We share your concerns about the transition from urban to rural, the increased traffic flow on township roads, and of course the overall effect residential intensification will have. Specifically, the increased density and traffic along Clair Road will surely lead to an increase in traffic heading to the 401 via Victoria Rd S. This section of road was not designed for high levels of traffic; sight zones are poor, and significant areas along the roadway are environmentally sensitive. Further, ponds, wetlands and the natural topography do not lend themselves to any safe use for pedestrians and cyclists, etc. I am sure the township is already aware of the impact adding the apartment buildings at Clair and Victoria has already had on the township's roadways. The City of Guelph's Transportation Master Plan does not address any of this increased usage. It also fails to address the future increases that the redevelopment of Clair Rd will have on the township. Given these facts, we find it objectionable that the City is planning any sort of additional intensification along Clair Rd. We are hoping that Puslinch Council is expressing similar concerns to the City of Guelph and will demand that these issues be addressed before any redevelopment of Clair Road is permitted.

Date	Comments
	Response: ***The Township has received this comment and have previously raised concerns to the City of Guelph Council regarding the City of Guelph's Transportation Master Plan. Township staff have forwarded this request to City of Guelph staff. Should you wish to follow up directly with City of Guelph staff and require assistance in locating a suitable contact at the City of Guelph, please follow up with Township staff for assistance.***
March 4, 2022	I would like to draw your attention the need to take immediate action for signage at this intersection of Church Street, Victoria Street and Whitcomb Way. There is no stop sign where these 3 roads meet. For decades Church and Victoria have been used as a two way road. Whitcomb lines up with Victoria. Much of the traffic exiting Whitcomb doesn't stop at this intersection and because Whitcomb is a wider road those traveling much of the full length enter the intersection at quite a speed. On March 1 there was an accident where a pickup truck exiting from Whitcomb collided with a vehicle coming up Church and heading into the Church parking lot. True the Church street driver should have checked for traffic before making the awkward left into the church parking lot. (which is straight ahead) However, I feel even if she was rounding the bend she would have been hit. Having Sara Bailey's contact information, I sent her a note to bring it to the attention of Council. Afterwards I spoke with the attending police officer who said that there was no stop sign, he couldn't enforce traffic exiting the sub-division. We had concerns over this corner for quite some time, but the traffic exiting the subdivision was light and seemed to recognize that it was two way traffic they were entering. With further development and the increase in traffic on Whitcomb you see more often vehicles travelling from Whitcomb onto Victoria entering at about 30km without slowing, as they feel it is a continuation of the same road. This very thing happened while I was talking to the officer who was parked visibly in the church lot. I feel it is my duty for the safety of everyone using this road to bring this to the IMMEDIATE ATTENTION of the Township to put a stop sign on Whitcomb, as quickly as possible. Even if it is just a temporary sign. There is another problem that we have noticed with this intersection but it has more to do with lack of common sense. The traffic coming up Church Street wishing to enter onto Whitcomb, start to make their left hand turn before arriving at the blind corner and checking to look for traffic coming up Victoria Street. Thank you in advance for your immediate attention to this serious problem. Hoping you will be able to set a sign up in the next few days.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage. The Township has installed additional stop signs at this intersection since the submission of this comment.***

Date	Comments
May 27, 2022	I am writing as a concerned resident and parent who lives on concession 1 in Puslinch. I have witnessed on serveral occasions this year drivers who have been speeding and barely stopped for my children's school bus and in some cases have failed to stop at all. There are a number of factors to consider as to why this is occurring but I want to get in touch with the proper authorities to make changes to the speed limit and signage on the road before a tragedy occurs. Our address is 6994 on Concession 1, and the bus stops at our driveway which is on the crest of a hill making it difficult to see when approaching from the other direction. In addition, the posted speed limit of 60km/hr ends a few hundred meters before our stop. I often witness vehicles approaching our location well over 100 kph while we wait for the bus! This in addition to increased traffic over the last few years and increases number of new residential homes on the road are all contributing to an unsafe situation and increasing the likelyhood of a severe or fatal incident. I would like to speak with someone at the municipality in order to make changes to the posted speed limit and install additional signage that a school bus stop is located here.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage.***
July 7, 2022	RE: ONGOING TRAFFIC PROBLEM, HUME ROAD, PUSLINCH TWP. This is a reminder and a follow up in relation to our presentation to Council in November 2021. Your office will no doubt have copies of the details and I will not repeat these here. I am willing to forward copies if necessary. Essentially nothing much has changed, and we continue to be concerned about the speeding on this road and the attendant dangers. There have been quite a few new houses constructed or in process on Hume Road. The amount of traffic using Hume Road as a conduit to and from elsewhere is increasing. Of course, the presence of School Buses and the parking of large construction related vehicles along the road all create further dangers. In addition, the volume of cyclists this year is probably at al all time high. The speeding of motor vehicles is our principal concern. Casual observation can show speeds of 100 KmH which is totally irresponsible and well above the posted limit. It is "a disaster waiting to happen " as the saying goes. The time has come to reset the speed limit at 50 km/h as we requested and to install the appropriate traffic calming measures. The 3-way STOP at Hume/Watson recently installed does help at that corner but does not address our major concern.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage, traffic calming measures and posted speed limits.***

Comments Received between during 2023 Public Comment Period

Date	Comments
January 2, 2023	Summary: The Ontario government has given municipalities the power to reduce residential speed limits from the statutory default 50 km/h to 40 km/h, or to set their own statutory speed limits. We recommend that Puslinch Township and Wellington County initiate the below maximum speed limits for Arkell Rd and Watson Rd S, and consider the safety benefits of Arkell being zoned a “Community Safety Zone” with electronic Speed Display Signs. Problems 1. The major speed limit change from 50 to 80 km/h, when driving north from Arkell on Watson Rd S, is in too short a distance. Drivers see the 80 km/h sign, while still in the 50 km/h zone in Arkell, and speed up which totally defeats the 50 km/h speed limit in Arkell. 2. Speed limits fail to graduate when driving north from Arkell on Watson Rd S, for example, from 40 to 50 to 60 km/h. Instead, they go from 50 to 80 km/h and then back to 50 km/h after descending two hills. A good example of speed limits that graduate is Victoria Rd N from Speedvale Ave north past the Eramosa River Trail. It is a similar road to Watson Rd S where people park in order to walk the trails. 3. More and more trail walkers are parking along the two trail entrances north of Arkell on Watson Rd S, especially at Arkell Springs Trail. Vehicles driving by at 80-120 km/h while people with dogs are exiting their vehicles is unsafe. The shoulders were not designed for parking. Safety of these people should be a major reason for reducing the speed limit to 60 km/h. Eventually, a parking area may be necessary, similar to Starkey Hill’s. Recommendations 1. That the speed limits of 50 km/h currently on Arkell Rd and Watson Rd S be reduced to 40 km/h.“40 is the new 50” is what municipalities are saying. Reductions in speed limits are being made all across Ontario and Canada. Guelph, Kitchener, Sarnia, Ottawa, Sudbury, and Mississauga are but a few examples. 2. That the 80 km/h sign on Watson Rd S near Boreham Dr, be posted further north of Arkell, for example, past Mott’s Equestrian Centre (756 Watson Rd S), and changed to 60 km/h. 3. That 60 km/h (not 80) be posted on Watson Rd S, from Arkell to Arkell Ridge Sand and Gravel (661 Watson Rd S), and then 40 km/h (not 50) to Stone Rd. We hope both Councils will keep safety as top priority, and add local input and insight to the criteria for setting maximum speed limits.

Date	Comments
	Response: ***Roadways entering the village of Arkell from the west, east and north are Wellington County Roads. Any changes to speed limits and signage on these roads would be a Wellington County decision. As the Township only has ownership of Watson Road South, south of Arkell Road, we would defer the decision of revised speed limits or additional signage to the County. Should the County elect to change the maximum speed limits within the village of Arkell and designate a "Community Safety Zone", the Township would apply these same requirements on roads of their ownership within the village for consistency.*** ***Problem/Recommendation 1: Watson Road South, north of Arkell Road, is a Wellington County Road. The Township does not have the authority to implement any changes to speed limits on this road. Township staff have forwarded this request to Wellington County staff. Should you wish to follow up directly with Wellington County staff and require assistance in locating a suitable contact at Wellington County, please follow up with Township staff for assistance.*** ***Problem/Recommendation 2: Refer to the response provided for Problem/Recommendation 1.*** ***Problem/Recommendation 2: Refer to the response provided for Problem/Recommendation 1.***
March 9, 2023	I would like to know who I can speak to about a installing a traffic shield on Roszell Rd. There are regular accidents in the bend of the road including 3 in the past 3 weeks. One of which hit a tree on our property, and the most recent of took out a quarter of our garage. Two of the three accidents occurred on dry roads with no inclement weather
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional roadside safety measures.***
April 19, 2023	Just an FYI. We're residents on Concession 4, and it was recently repaved (about 2 years ago). We noticed that there appears to be a depression with significant cracking a bit east of 35. Perhaps someone wants to take a look at it, especially if there's some type of warranty period for the road work.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional works / warranty work.***
May 6, 2023	Wondering what it would take to get speed limit signs up on concession 1? When you turn left from townline road in the first 1-2kms a speed limit sign would be great!

Date	Comments
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage.***
May 14, 2023	This is regarding Pioneer Trail. Recent grading, along with the better weather, has significantly worsened dust raised by vehicles. It has also significantly reduced wheel traction. The dust affects all of us who walk, run, bicycle and reside on this route. [It is particularly popular with a number of Guelph residents who live nearby] It has also become a dangerous situation for vehicles following others as the brake lights of the vehicle ahead are often hidden in the dust. Many vehicles are driving well below the speed limit, but there are some who are actually going above the speed limit. Giving the limited traction, this is asking for trouble, but these drivers don't seem to realize the risk they are taking. Just a few days back, there was a "situation" where the vehicle ahead was turning into one of the residences while the vehicle behind reacted late, possibly because the brake lights were partially or fully obscured -- no accident, luckily. I have sent a video depicting the situation to services@puslinch.ca.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional road maintenance.***
May 16, 2023	This is with respect to dirt roads. Could grading and dust suppression be considered a single task? It appears that, for possibly good reasons, grading of all Puslinch roads is completed prior to commencement of dust suppression works. This leaves a window between grading and suppression when: 1. Road traction is greatly reduced 2. Brake light visibility is reduced, often obscured completely 3. At times the entire vehicle ahead is obscured not only making its position unknown but also obscuring oncoming traffic 4. Runners, walkers, cyclists and residents are treated to regular doses of the fine clay dust of Guelph Please figure out ways to immediately follow grading of a road with dust suppression. Thank you.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine whether adjustments can be made to the grading and dust suppressant operations.***
May 17, 2023	I would like to comment about Sideroad 10 N on the gravel portion as that’s where I live. Firstly the speed limit is way too high for it and all gravel roads in the township. Many people (including two police vehicles I witnessed just last week) travel in excess of the posted limit. This takes a tolls not only on the road condition but the amount of dust created and stones being thrown which I have been hit by in the past. I understand the issues in paving the entire road as well but wondering if it could be considered to pave a section of 10 N just north of WR 34 for the denser (relatively) collection of houses that are there. It would help to mitigate dust and rocks for those residents and allow us to open windows without having our interiors covered in a thick layer of dirt.

Date	Comments
	Response: ***The recommended process for evaluating whether gravel roads are candidates for being upgraded to paved roads is provided in Section 4.7 of the Roads Management Plan. For roads that do not meet the criteria outlined within this recommended process, the Township has initiated the process of formalizing a practice around completing these requested upgrades through the provisions of O.Reg. 586/06 Local Improvement Charges – Priority Lien Status legislation. This process has been outlined in Section 4.9 of the revised Roads Management Plan for Council consideration.***
May 18, 2023	Please cut down trees that look like they are about to fall , on Gore Road. Between Shellard and Townline.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine whether maintenance of vegetation is required.***
May 18, 2023	I live on concession #1 where we see large numbers of cyclists in all weather. With poor sight lines on many of our roads, I am amazed that we haven't had more serious accidents involving cyclists. I have personally observed several very close calls. I suggest bicycle lanes be added to the roads plan whenever feasible. Perhaps this could be done in collaboration with a cyclist organization. Thanks for the opportunity to voice my concern.
	Response: ***The Township has received this request. The Township will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan of whether additional measures can be added to improve safety; however, there are no plans within the Capital Program to install bicycle lanes on any Township road. Township roads currently do not have the required platform width or Right-of-Way property to support this expansion.***
May 18, 2023	Paved shoulders for safe cycling usage please!
	Response: ***The Township has received this request. There are no plans within the Capital Program to install bicycle lanes on any Township road. Township roads currently do not have the required platform width or Right-of-Way property to support this expansion.***
May 19, 2023	Consider Side Road 20 north for paving. Thank you.

Date	Comments
	Response: ***The recommended process for evaluating whether gravel roads are candidates for being upgraded to paved roads is provided in Section 4.7 of the Roads Management Plan. For roads that do not meet the criteria outlined within this recommended process, the Township has initiated the process of formalizing a practice around completing these requested upgrades through the provisions of O.Reg. 586/06 Local Improvement Charges – Priority Lien Status legislation. This process has been outlined in Section 4.9 of the revised Roads Management Plan for Council consideration.***
May 21, 2023	Quite frankly I'm not sure anybody on Council knows where Concession 11 is and if they do, they would probably avoid it. We moved here in 2002 and the road wasn't very good them. 20 years later and at least 10 more home between 34 and Hume and the increased traffic - it has just gotten worse. They come and plough it every once in a while but three days later it is pothole ruckus again. And the dust! Nobody knows what 60 k/hour means. Paving would be ideal but for some reason other roads are more important. Must have something to do with the tax base. I wonder why they can't at least put calcium down more frequently to help with the dust. Sum up - try driving on Concession 11 after a couple of days of rain, or when the snow is melting. Suggest you need 4 WD.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine whether adjustments can be made to the grading and dust suppressant operations.*** ***The recommended process for evaluating whether gravel roads are candidates for being upgraded to paved roads is provided in Section 4.7 of the Roads Management Plan. For roads that do not meet the criteria outlined within this recommended process, the Township has initiated the process of formalizing a practice around completing these requested upgrades through the provisions of O.Reg. 586/06 Local Improvement Charges – Priority Lien Status legislation. This process has been outlined in Section 4.9 of the revised Roads Management Plan for Council consideration.***
May 23, 2023	The village of Arkell suffers with increasing excessive speeds to the extent of burn outs and brake stands (both have occurred in front of my home). This condition worsens every year and it appears nothing is done. I would like to see digital speed indicators installed in all 50 zones, speed limit numbers painted on the road so drivers actually see them and more random opp speed traps. All of these need to be implemented asap before someone is hit.

Date	Comments
	Response: ***Roadways entering the village of Arkell from the west, east and north are Wellington County Roads. Any changes to speed limits and signage on these roads would be a Wellington County decision. As the Township only has ownership of Watson Road South, south of Arkell Road, we would defer the decision to Wellington County staff. Should the County elect to change the maximum speed limits within the village of Arkell and designate a "Community Safety Zone", the Township would apply these same requirements on roads of their ownership within the village for consistency. Township staff have forwarded this request to Wellington County staff. Should you wish to follow up directly with Wellington County staff and require assistance in locating a suitable contact at Wellington County, please follow up with Township staff for assistance.*** ***The Township will notify the local detachment of the Ontario Provincial Police of your comments.***
May 25, 2023	Due to the closure of lake rd, CR#32 for the summer could you please put some traffic slowing speed bumps on Ellis rd near the golf course. The traffic is going between 80 and 100 km/hr down our rd that is 50 km/hr.
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage and/or roadside safety measures.***
May 27, 2023	paving on .side road would be great...sideroad 10.south like a washboard most times
	Response: ***The recommended process for evaluating whether gravel roads are candidates for being upgraded to paved roads is provided in Section 4.7 of the Roads Management Plan. For roads that do not meet the criteria outlined within this recommended process, the Township has initiated the process of formalizing a practice around completing these requested upgrades through the provisions of O.Reg. 586/06 Local Improvement Charges – Priority Lien Status legislation. This process has been outlined in Section 4.9 of the revised Roads Management Plan for Council consideration.***
May 28, 2023	Hello Was have lived on Concession 1 for 3 years and have noticed an steep increase in the traffic volume, and cyclist traffic. Our main concern is that with only 2 lanes people are passing cyclists and other vehicles very frequently with little visibility due to the blind hills. We lived in a valley on Concession 1 where the speed limit is 60km/h but due to the hills on both sides people often drive in excess of 100 km/h. If someone were to set up speed recording it would not take more than 20 to catch people approaching or exceeding stunt driving speeds. I have not seen any Police presence but perhaps they have high priorities. With no bike lanes or turning lanes this is a major hazard. Is it possible to suggest a bike lane for the long-term plan and perhaps a short term mitigation would be one of those flashing signs that displays your speed and says slow down? As I'm typing this, a car drove by so fast that I could not even tell what kind it was. Your assistance is greatly appreciated.

Date	Comments
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage. There are no plans within the Capital Program to install bicycle lanes on any Township road. Township roads currently do not have the required platform width or Right-of-Way property to support this expansion.***
May 31, 2023	As you are aware there is an incredible amount of traffic on highway 6 (Brock Road). As parents and grandparents of children at Aberfoyle, we have been walking across the street from the community centre for two years. We have been witness to many close calls, erratic driving, people running red lights, people on cell phones. Parents are walking across with children and strollers and newborn babies in the middle of winter on icy roads and through the pouring rain. We are hoping there is a solution that could allow for a one-way street in front of the school with a designated time and or drop off zone for parents Right now, we have the ability to drop a child off but for ones that are in kindergarten or require extra assistance, we are walking across the busy highway. They do not allow people to park and leave your vehicle. At the end of the street past the school there is also a turning circle, perhaps this could be utilized to help with traffic flow. We have spoken to the school about our concerns, but they feel that their hands are tied. We need a solution that makes sense for everyone. Right now, this is very unsafe and not a solution. Someone could be killed with the current set up. We need help to address this.
	Response: ***Brock Road in the village of Aberfoyle is a Wellington County Road. Township staff have forwarded this request to Wellington County staff. Should you wish to follow up directly with Wellington County staff and require assistance in locating a suitable contact at Wellington County, please follow up with Township staff for assistance.*** ***The Township has received the request to review Old Brock Road in front of the Aberfoyle Public School and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures or designated areas can be implemented on Old Brock Road.***
June 6, 2023	I noticed that the road management link is now closed for comments. Residents on Maltby have formed a community association and we are very concerned about road safety, drivers speeding in excess of 100 km/h in a 60 zone and passing school buses. Wildlife crossings are another concern. We have erected lawn signs to try and slow traffic but a more permanent solution is necessary. We need help from you and other council members. I understand that Maltby from Victoria to Watson is to be resurfaced this summer. We would rather have permanent solar powered road signs erected to show speeders that they need to slow down. Also we would like wildlife crossings put in at a number of locations as per what Guelph did for the Maltby section west of Victoria. Can you meet with us to discuss. The Clair, Maltby expansion is going to add more traffic stress to our area and we would like to be proactive

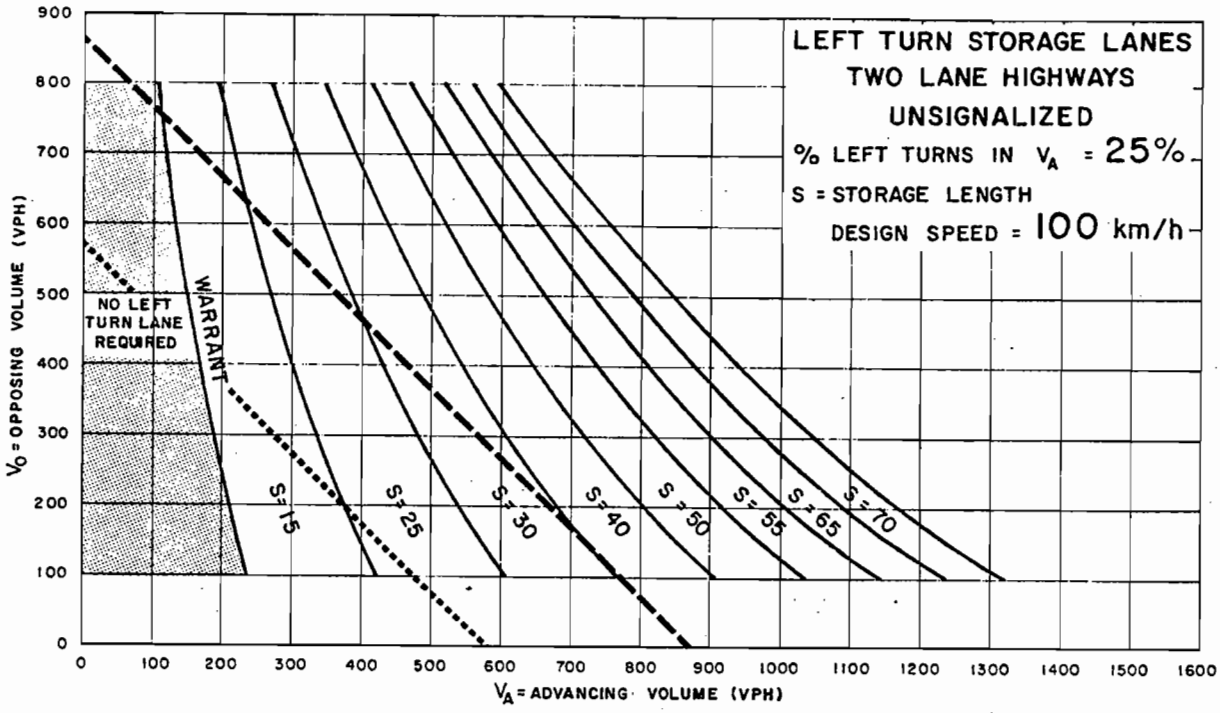
Date	Comments
	Response: ***The Township has received this request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine the warrant of additional signage. Please reach out to the Director of Public Works, Parks and Facilities at the Township of Puslinch to initiate discussions on your comments.***

PUBLIC COMMENTS REGISTER - ROADS

Item	Date Received	Name (and address)	Contact Information (phone / email)	Comment	Date Response Provided	Response Provided	Further Action Required? (Y/N)	Description of Further Action	Status (Open / Closed)
1	*Jan 1, 2023*	*Sample #1*	*000-000-0000*	*We are requesting a traffic calming study be completed on Watson Road between Arkell Road and Stone Road*	*Feb 1, 2023*	*The identified road section is a Wellington County Road. Township staff have forwarded this request to Wellington County Staff. Should you wish to follow up directly with Wellington County staff and require assistance in locating a suitable contact at Wellington County, please follow up with Township staff for assistance.*	*N*	*-*	*Closed*
2	*Jan 1, 2023*	*Sample #2*	*sample2@email.com*	*We are requesting a traffic calming study be completed on Boreham Drive*	*Feb 1, 2023*	*The Township has received the request and will initiate a review under the practices, policies, guidelines and standards provided within the Roads Management Plan to determine if additional traffic calming measures can be implemented*	*Y*	*Complete a review under the Roads Management Plan, provide followup with commenting author pending result of review.*	*Open*
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

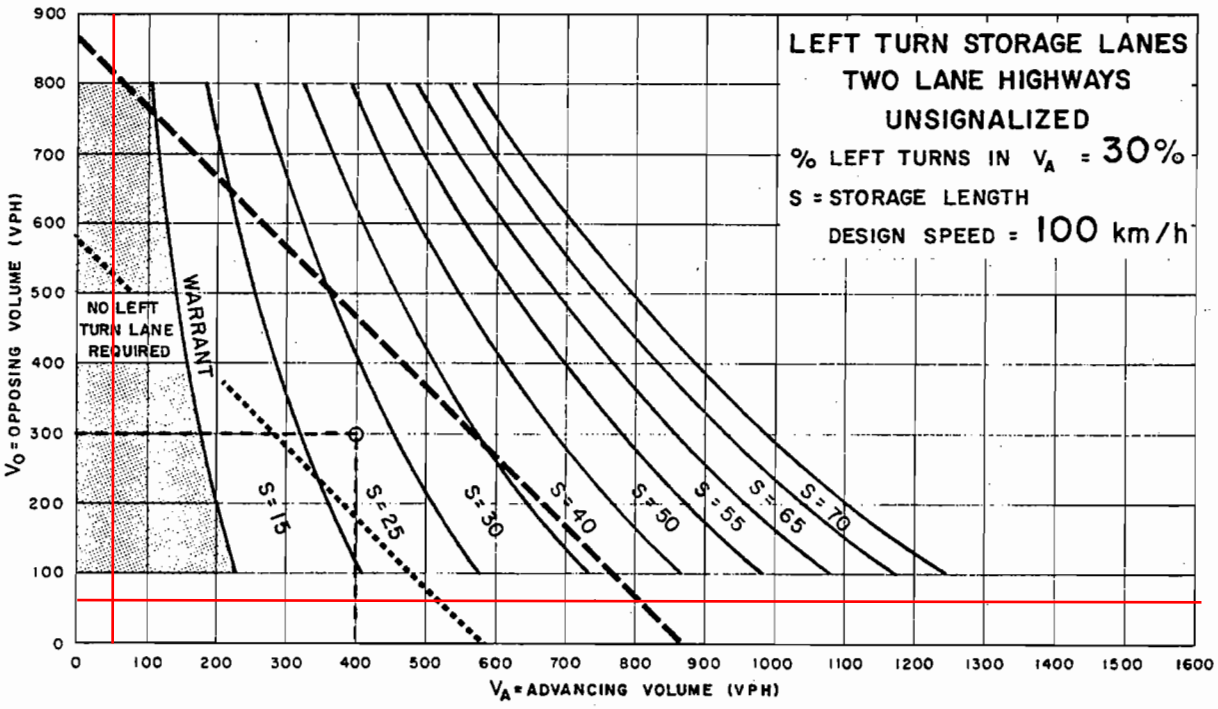
APPENDIX D

Left-Turn Lane Warrants



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

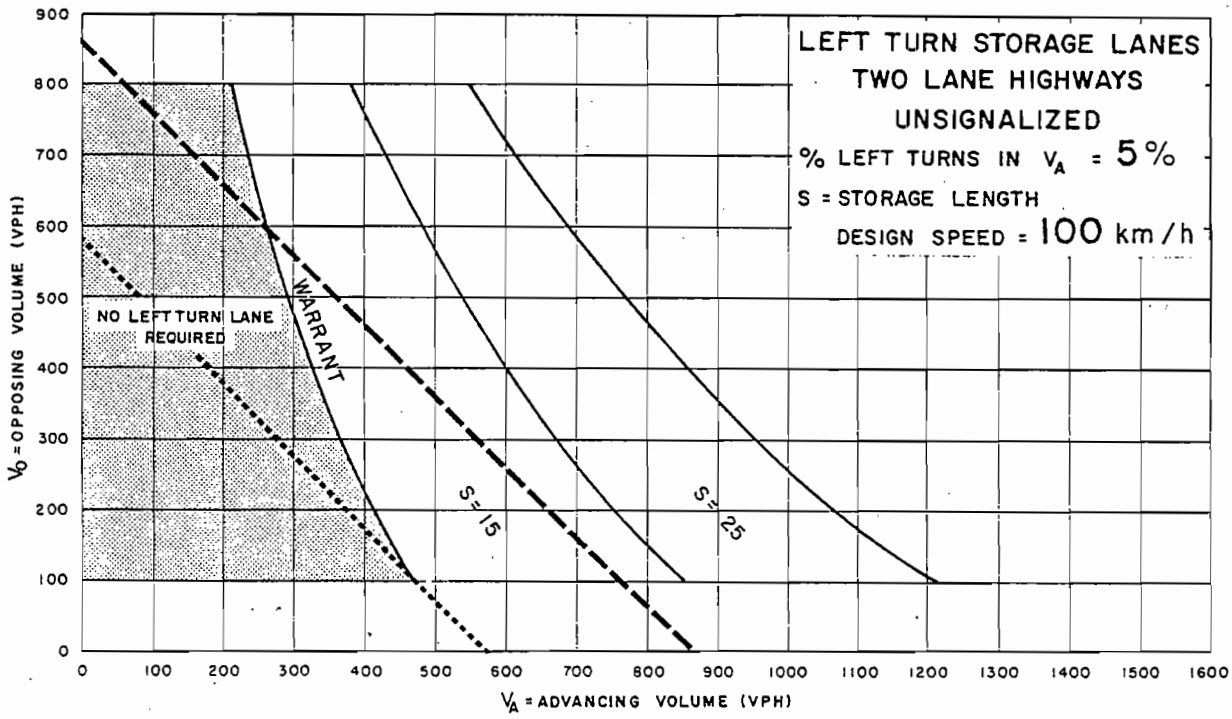
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS



Feeder Pit Access - 2028 FT AM
V_A = 45 vehicles
V_L = 14 vehicles (31%)
V_O = 66 vehicles

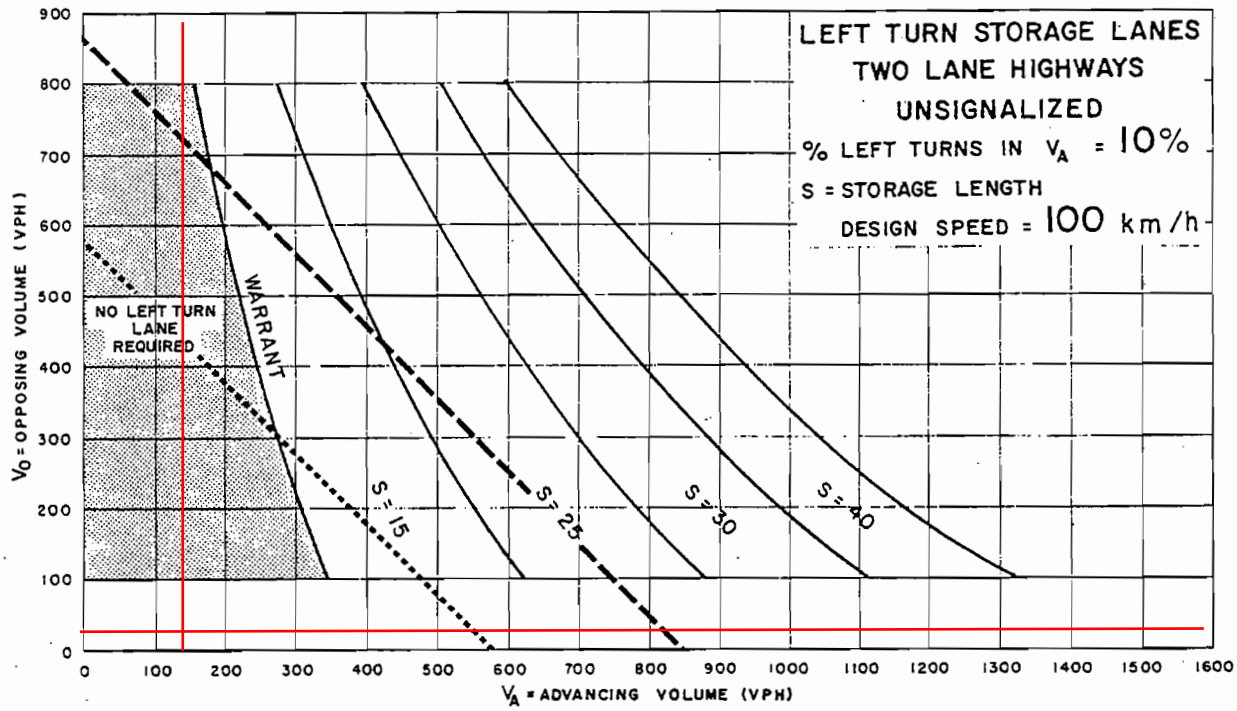
No Left-Turn Lane Required

Figure EA-24



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

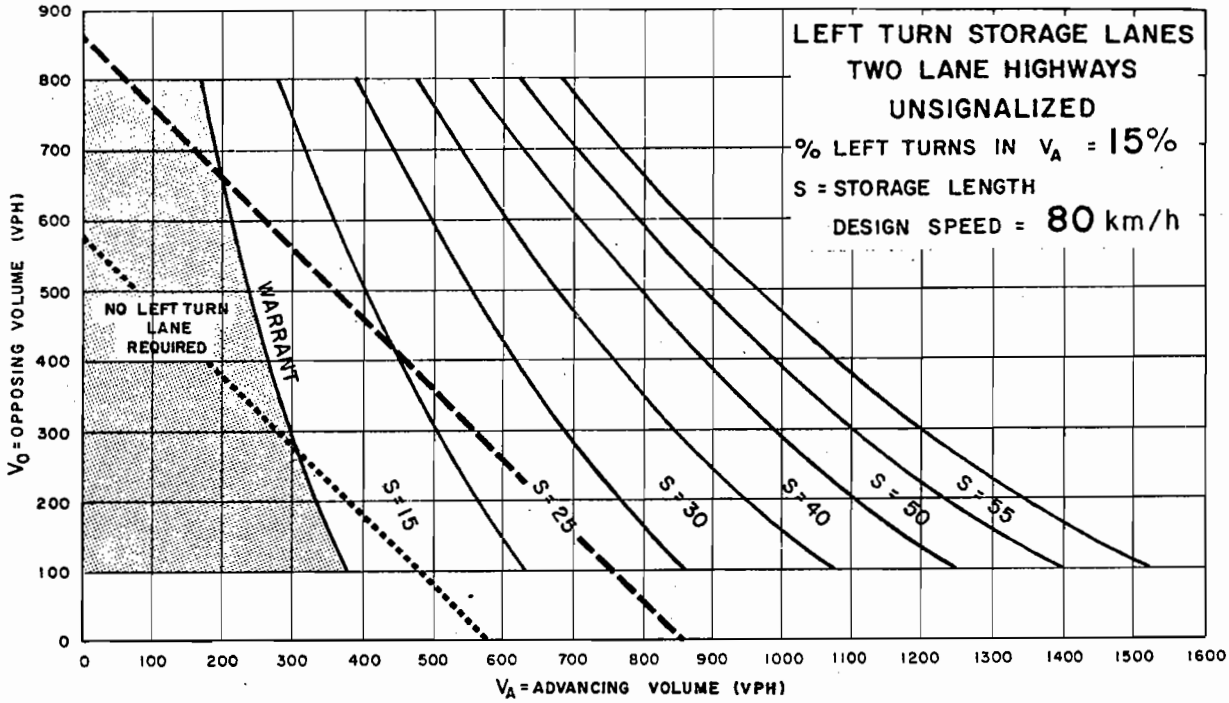
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS



Feeder Pit Access - 2028 FT PM
V_A = 137 vehicles
V_L = 14 vehicles (10%)
V_O = 27 vehicles

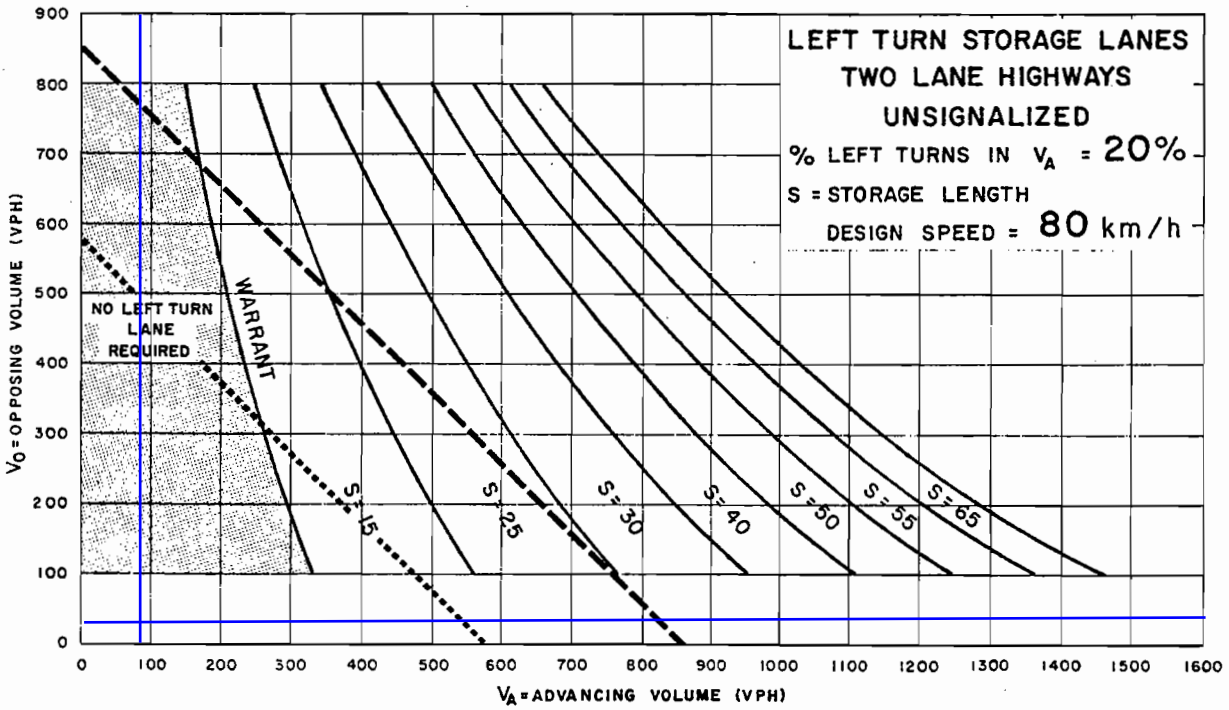
No Left-Turn Lane Required

Figure EA-22



TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

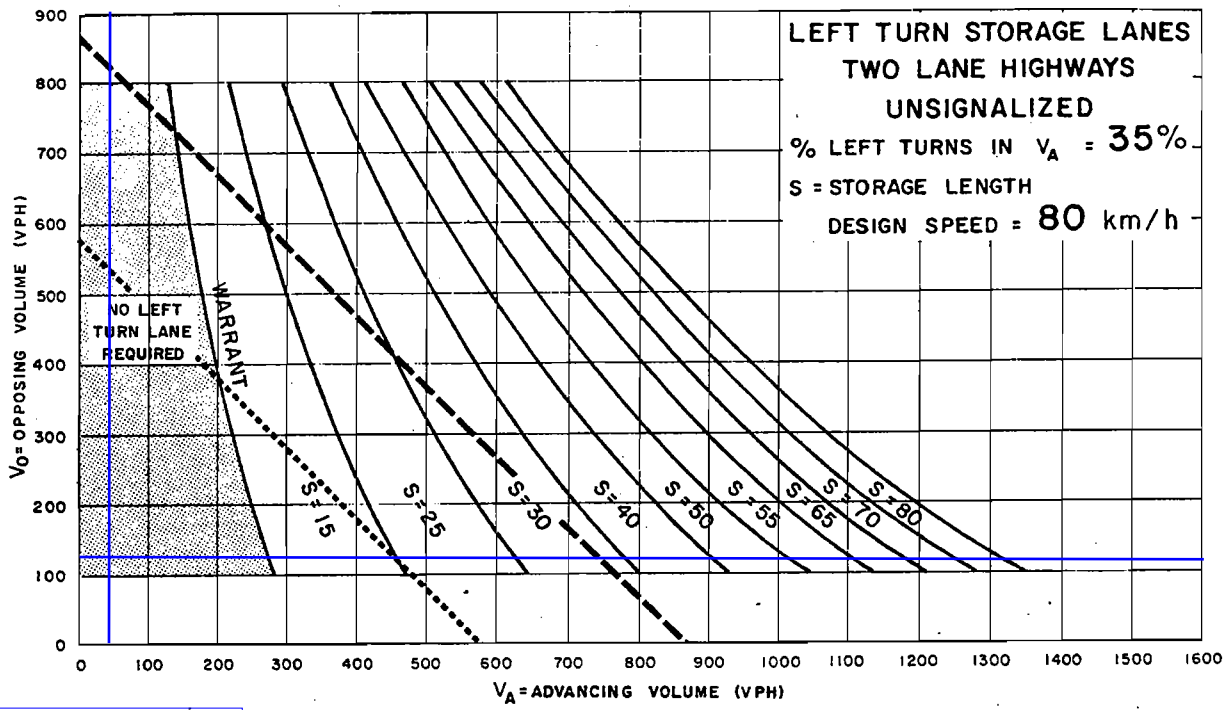
TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS



Processing Plant Access - 2028 FT AM
V_A = 83 vehicles
V_L = 14 vehicles (17%)
V_O = 31 vehicles

No Left-Turn Lane Required

Figure EA-15



Processing Plant Access - 2028 FT PM
V_A = 42 vehicles
V_L = 14 vehicles (33%)
V_O = 126 vehicles

No Left-Turn Lane Required

TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

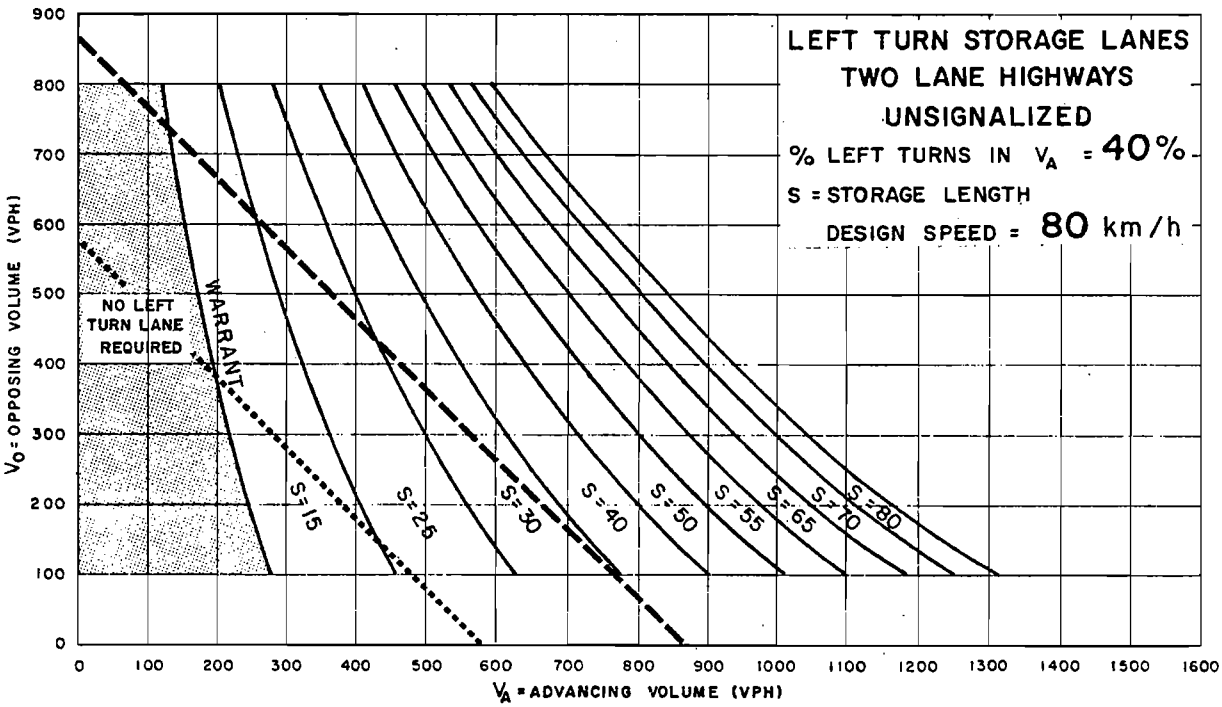


Figure EA-17

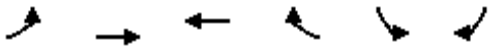
APPENDIX E

Synchro Results

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	66	0	14	31	0	14
Future Volume (Veh/h)	66	0	14	31	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	0	15	34	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			72		136	72
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			72		136	72
tC, single (s)			5.1		6.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		3.5	4.2
p0 queue free %			99		100	98
cM capacity (veh/h)			1082		850	774

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	72	49	15
Volume Left	0	15	0
Volume Right	0	0	15
cSH	1700	1082	774
Volume to Capacity	0.04	0.01	0.02
Queue Length 95th (m)	0.0	0.3	0.5
Control Delay (s)	0.0	2.6	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	2.6	9.7
Approach LOS			A

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	69	31	0	0	14
Future Volume (Veh/h)	14	69	31	0	0	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	75	34	0	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	34				139	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34				139	34
tC, single (s)	5.1				6.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				3.5	4.2
p0 queue free %	99				100	98
cM capacity (veh/h)	1123				847	817

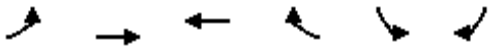
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	90	34	15
Volume Left	15	0	0
Volume Right	0	0	15
cSH	1123	1700	817
Volume to Capacity	0.01	0.02	0.02
Queue Length 95th (m)	0.3	0.0	0.4
Control Delay (s)	1.5	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	1.5	0.0	9.5
Approach LOS			A

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	0	14	123	0	14
Future Volume (Veh/h)	27	0	14	123	0	14
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	0	15	134	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			29		193	29
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			29		193	29
tC, single (s)			5.1		6.4	7.2
tC, 2 stage (s)						
tF (s)			3.1		3.5	4.2
p0 queue free %			99		100	98
cM capacity (veh/h)			1129		790	823

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	29	149	15
Volume Left	0	15	0
Volume Right	0	0	15
cSH	1700	1129	823
Volume to Capacity	0.02	0.01	0.02
Queue Length 95th (m)	0.0	0.3	0.4
Control Delay (s)	0.0	0.9	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	0.9	9.5
Approach LOS			A

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	28	126	0	0	14
Future Volume (Veh/h)	14	28	126	0	0	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	30	137	0	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	137				197	137
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	137				197	137
tC, single (s)	5.1				6.4	7.2
tC, 2 stage (s)						
tF (s)	3.1				3.5	4.2
p0 queue free %	99				100	98
cM capacity (veh/h)	1014				784	705

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	45	137	15
Volume Left	15	0	0
Volume Right	0	0	15
cSH	1014	1700	705
Volume to Capacity	0.01	0.08	0.02
Queue Length 95th (m)	0.3	0.0	0.5
Control Delay (s)	3.0	0.0	10.2
Lane LOS	A		B
Approach Delay (s)	3.0	0.0	10.2
Approach LOS			B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	23.3%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX F

OSIM Inspection Report

Summary Action Report

Inspection Date: 6/15/2021

Next Biennial Inspection: 6/15/2023

Bridge Condition Value (BCI): 75

Performance Deficiencies

Element Group	Element Name	Performance Deficiency
Accessories	Utilities	Pedestrian/vehicular hazard

Maintenance Needs

Element Group	Element Name	Maintenance Need
Accessories	Utilities	Other
Embankments & Streams	Embankments	Erosion Control at Bridges

Repair/Rehabilitation

Element Group	Element Name	Repair/Rehabilitation	Priority	Est. Cost
Accessories	Utilities	Repair conduit connections	6-10 Years	$5,000
Approaches	Barriers	Remove and replace guide rail	6-10 Years	$80,000
			Total Repair/Rehabilitation Cost	$85,000
			Total Associated Work Cost	$35,000
			Total Cost	$120,000

Overall Comments

Overall structure is in good condition. Maintenance required. Minor rehabilitation work recommended.

Additional Investigations

$0.00

Ontario Structure Inspection Manual - Inspection Form

MTO Site Number: 2012

Structure Name: Structure 2012

Structure ID: 2012

Inventory Data:

Structure Name	Structure 2012		
Main Hwy/Road #		On ☐ Under ☑	Crossing Type: Nav Water ☐ Non Nav Water ☑
Hwy/Road Name	Concession 2		Rail ☐ Road ☐ Ped ☐ Other ☐
Structure Location	Lot 20, Conc. 1/2		
Latitude (decimal degrees)	43.43749	Longitude (decimal degrees)	-80.183847
Owner(s)	Township of Puslinch	Heritage:	Not Cons ☐ Cons Not/App ☐ List/Not Desig ☐
Region	Southwestern	Designation:	Desig Not List ☐ Desig List ☐
District	Owen Sound	Road Class:	Freeway ☐ Arterial ☐ Collector ☐ Local ☑
Old County	Wellington	No. of Lanes: 2	Posted Speed: 80 (km/h)
Geographic Twp		AADT: 402	Trucks: (%)
Structure Type	Rectangular Culvert		
Total Deck Length	7 (m)		
Overall Str Width	17.8 (m)		
Total Deck Area	124.6 (sq m)	Min. Vertical Clearance	(m)
Roadway Width	7.8	Special Routes:	Transit ☐ Truck ☐ School ☑ Bicycle ☐
Skew Angle	20 (deg)	Detour Length	8 (km)
No. of Spans	1	Direction of Structure	East/West
Span Lengths	5.85 (m)	Fill on Structure	0 (m)

Historical Data:

Year Built	1994	Year of Last Rehab	
Last OSIM Inspection	4/11/2019	Last Evaluation	
Last Enhanced OSIM Inspection		Current Load Limit	(tonnes)
Enhanced Access Equipment (ladder, boat, lift, etc)		Load Limit By Law	
		By Law expiry Date	
Last Condition Survey		Last underwater Inspection	

Rehabiliation History:

Ontario Structure Inspection Manual - Inspection Form

MTO Site Number: 2012

Structure Name: Structure 2012

Structure ID: 2012

Field Inspection Information:

Date of Inspection: (mm/dd/yyyy)	06/15/2021	Inspection Type:	OSIM
Inspector:	LF		
Others in Party:	TQ		
Equipment Used:	Measuring tape, hammer, camera		
Weather:	Sunny		
Temperature ºC:	20		

Additional Investigations Required:

	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey	☑	☐	☐	$0
Non-destructive Delam. Survey of Asphalt-Covered Deck	☑	☐	☐	$0
Concrete Substructure Condition Survey	☑	☐	☐	$0
Detailed Coating Condition Survey	☑	☐	☐	$0
Detailed Timber Investigation	☑	☐	☐	$0
Post-Tensioned Strand Investigation	☑	☐	☐	$0
Underwater Investigation	☑	☐	☐	$0
Fatigue Investigation	☑	☐	☐	$0
Seismic Investigation	☑	☐	☐	$0
Structure Investigation	☑	☐	☐	$0
Monitoring Deformations, Settlements, Movements	☑	☐	☐	$0
Monitoring Crack Widths	☑	☐	☐	$0
			Total Cost:	**$0**

Investigation Notes:

Overall Structure Notes:

Overall Comments: Overall structure is in good condition. Maintenance required. Minor rehabilitation work recommended.

Recommended Work: Minor Rehab

Next Inspection: 06/15/2023 Recommended Work Time: 6-10yr

Suspected Performance Deficiencies

00 None
01 Load carrying capacity
02 Excessive deformations (deflections & rotations)
03 Continuing settlement
04 Continuing movements
05 Seized bearings
06 Bearing not uniformly loaded/unstable
07 Jammed expansion joint
08 Pedestrian/vehicular hazard
09 Rough riding surface
10 Surface ponding
11 Deck drainage
12 Slippery surface
13 Flooding/channel blockage
14 Undermining of foundation
15 Unstable embankments
16 Other

Maintenance Needs

01 Lift & Swing Bridge Maintenance
02 Bridge Cleaning
03 Bridge Handrail Maintenance
04 Painting Steel Bridge Structures
05 Bridge Deck Joint Repair
06 Bridge Bearing Maintenance
07 Repair to Structural Steel
08 Repair to Bridge Concrete
09 Repair to Bridge Timber
10 Bailey Bridges - Maintenance
11 Animal/Pest Control
12 Bridge Surface Repair
13 Erosion Control at Bridges
14 Concrete Sealing
15 Rout and Seal
16 Bridge Deck Drainage
17 Scaling (Loose Concrete or ACR Steel)
18 Other

Element Data:

Element Group:	**Accessories**	Length:	0.00
Element Name:	**Utilities**	Width:	0.00
Location:	Conduit on south face	Height:	0.00
Material:	Steel	Count:	1.0
Element Type:	-	Total Quantity:	1.0
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:	Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
	Each	0.0	0.0	0.0	1.0	8

Comments: Conduit connections in poor condition.

Recommended Work:	Rehab	Maint. Needs:	17	Maint. Priority:	
Recommended Timing:	6-10 Years	Maint. Desc.:	Install hazard markers at structure		
Work Details:	Repair conduit connections				

Element Group:	**Approaches**	Length:	73.50
Element Name:	**Barriers**	Width:	0.00
Location:	Each side, steel beam	Height:	0.00
Material:	Steel	Count:	2.0
Element Type:	-	Total Quantity:	147.0
Environment:	Severe	Limited Inspection	☐
Protection System:	Hot dip galvanizing		

Condition Data:	Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
	m	0.0	127.0	15.0	5.0	

Comments: Isolated severe permanent deformation of rails; Light checking and splitting of posts. Light abrasion at west end of SW rail. Discoloration of steel beam throughout; Light rot and decay on isolated posts

Recommended Work:	Rehab	Maint. Needs:		Maint. Priority:	
Recommended Timing:	6-10 Years	Maint. Desc.:			
Work Details:	Remove and replace guide rail				

Ontario Structure Inspection Manual - Inspection Form

MTO Site Number: 2012

Structure Name: Structure 2012

Structure ID: 2012

Element Group:	**Approaches**	Length:	19.00
Element Name:	**Wearing Surface**	Width:	7.80
Location:	Over structure	Height:	0.00
Material:	Asphalt	Count:	1.0
Element Type:	-	Total Quantity:	148.2
Environment:	Severe	Limited Inspection	☐
Protection System:	None		

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
sq.m.	0.0	135.2	7.0	6.0	

Comments: Wide transverse crack along both approaches (full width); Wide longitudinal crack along centre line (full length).

Recommended Work:		Maint. Needs:		Maint. Priority:	
Recommended Timing:		Maint. Desc.:			
Work Details:					

Element Group:	**Culverts**	Length:	17.75
Element Name:	**Barrels**	Width:	5.85
Location:	All	Height:	2.05
Material:	Cast-in-Place Concrete	Count:	1.0
Element Type:	Frames - Rigid (3-Sided)	Total Quantity:	176.6
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
sq.m.	0.0	175.6	0.5	0.5	

Comments: Hairline-medium vertical stained cracking with efflorescence; Light honeycombing, random bugholes, numerous patches throughout; 6 weep holes per side with small disintegration around holes; Utilities along south face sagging with major hole.

Recommended Work:		Maint. Needs:		Maint. Priority:	
Recommended Timing:		Maint. Desc.:			
Work Details:					

Ontario Structure Inspection Manual - Inspection Form

MTO Site Number: 2012

Structure Name: Structure 2012

Structure ID: 2012

Element Group:	**Culverts**	Length:	0.00
Element Name:	**Inlet Components**	Width:	0.00
Location:	North end	Height:	0.00
Material:	Cast-in-Place Concrete	Count:	0.0
Element Type:	-	Total Quantity:	33.2
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
sq.m.	0.0	33.0	0.1	0.1	

Comments: Light scaling; Hairline cracks on face; Bugholes on face; Light spalling.

Recommended Work: | Maint. Needs: | Maint. Priority:

Recommended Timing: | Maint. Desc.:

Work Details:

Element Group:	**Culverts**	Length:	0.00
Element Name:	**Outlet Components**	Width:	0.00
Location:	South end	Height:	0.00
Material:	Cast-in-Place Concrete	Count:	0.0
Element Type:	-	Total Quantity:	33.2
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
sq.m.	0.0	33.0	0.1	0.1	

Comments: Light scaling; Hairline cracks on face; Bugholes on face; Light spalls at corners

Recommended Work: | Maint. Needs: | Maint. Priority:

Recommended Timing: | Maint. Desc.:

Work Details:

Ontario Structure Inspection Manual - Inspection Form

MTO Site Number: 2012

Structure Name: Structure 2012

Structure ID: 2012

Element Group:	**Embankments & Streams**	Length:	0.00
Element Name:	**Embankments**	Width:	0.00
Location:		Height:	0.00
Material:		Count:	4.0
Element Type:	-	Total Quantity:	4.0
Environment:		Limited Inspection	☐
Protection System:			

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
Each	0.0	0.0	4.0	0.0	

Comments: Asphalt spillway on NE and SE embankments; Medium erosion of all embankments due to lack of vegetation

Recommended Work:		Maint. Needs:	13	Maint. Priority:	
Recommended Timing:		Maint. Desc.:	Stabilize embankments		
Work Details:					

Element Group:	**Embankments & Streams**	Length:	0.00
Element Name:	**Slope Protection**	Width:	0.00
Location:	NE and SE embankments	Height:	0.00
Material:	Asphalt	Count:	2.0
Element Type:	Bituminous	Total Quantity:	2.0
Environment:	Moderate	Limited Inspection	☐
Protection System:	None		

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
Each	0.0	2.0	0.0	0.0	

Comments: Light erosion around spillways

Recommended Work:		Maint. Needs:		Maint. Priority:	
Recommended Timing:		Maint. Desc.:			
Work Details:					

Ontario Structure Inspection Manual - Inspection Form

MTO Site Number: 2012

Structure Name: Structure 2012

Structure ID: 2012

Element Group:	**Embankments & Streams**	Length:	0.00
Element Name:	**Streams and Waterways**	Width:	0.00
Location:		Height:	0.00
Material:		Count:	1.0
Element Type:	-	Total Quantity:	1.0
Environment:		Limited Inspection	☐
Protection System:			

Condition Data:

Units:	Exc.	Good:	Fair:	Poor:	Performance Deficiencies:
All	0.0	0.0	1.0	0.0	

Comments: Silt built-up around northwest leg; scouring of stream along east leg due to alignment;

Recommended Work:		Maint. Needs:		Maint. Priority:	
Recommended Timing:		Maint. Desc.:			
Work Details:					

Repair / Rehabilitation Required

Element Group	Element	Repair / Rehabilitation	Priority	Const Cost
Accessories	Utilities	Repair conduit connections	6-10 Years	$5,000
Approaches	Barriers	Remove and replace guide rail	6-10 Years	$80,000
		Total Repair/Rehabilitation Cost		**$85,000**

Associated Work

	Comments	Estimated Cost
Approaches		$0
Detours		$0
Traffic Control		$0
Utilities		$0
Right-of-Way		$0
Environmental Study		$0
Other	*None*	$0

Contingencies	21.00%	$18,000
Engineering	20.00%	$17,000
Total Associated Work Cost		**$35,000**
Total Repair / Rehabilitation Cost		$85,000
Total Cost		**$120,000**

Justification

Inspection Photos

Plan view looking east

North guide rail

South elevation

Barrel looking north

West side of barrel

North elevation