

Schedule "C"

1st Submission and comment summary



Comment Summary – Zoning By-law Amendment Application – DAAZ Inc.

Consultant	Comments
GM BluePlan - Engineers	See letter attached
County of Wellington Planning	See letter attached
Ecologist	<p>Impacts to trees and tree protection should be addressed at the Site Plan Control phase through a Tree Protection Plan (TPP), as stated in the PJR (page 12): <i>The Zoning By-law Amendment application is a precursor to a future Site Plan Control application that will address the detailed/technical aspects of the development including building and site layout, site servicing and lot grading, tree protection/landscape design, etc.</i></p> <p>Given the existing vegetation (woodland) on the subject lands, the Site Plan application should clearly demonstrate compliance with the County of Wellington By-Law 5115-09 – Conservation and Sustainable Use of Woodlands (https://puslinch.ca/wp-content/uploads/2019/11/forest-conservation-by-law.pdf).</p> <p>The Site Plan application should also speak to timing restrictions for vegetation removal as due diligence respecting:</p> <ol style="list-style-type: none"> 1. the Migratory Bird Convention Act (MBCA) regarding bird nesting windows; and



	<p>2. the Species at Risk Act (SARA) and Endangered Species Act (ESA) regarding bat maternity roosting windows, where applicable.</p>
Township Hydrogeologist	See letter attached
Township of Puslinch Fire Department – Brent Smith	The previous comments were addressed in the updated site plan providing the ‘underground tank’ shown on the drawing is for firefighting purposes. If the designer could show the location of the pumper connection of the tank that would be appreciated. Please find attached the township’s specifications for the tank/connections
Township of Puslinch Building Department – Andrew Hartholt	Comments pending
Township of Puslinch Public Works – Mike Fowler	No comments received
Township of Puslinch By-law – Jacob Normore	By-law has no comments or concerns at this time.
Source Water	See letter attached
MTO	The subject properties are beyond MTO’s Permit Control Area. Therefore, MTO review, approval and permits are not required.
GRCA	<p>GRCA has no objection to the proposed ZBA application. The subject property does not contain any watercourses, floodplains, shorelines, wetlands, valley slopes or other natural hazard features of interest to GRCA. The property is not subject to Ontario Regulation 150/06 and, therefore, a permission from GRCA is not required.</p> <p>We defer review of stormwater management to the Township.</p>



FUSLINCH

--	--



November 3, 2023
Our File: 123006-031

Township of Puslinch
7404 Wellington Road 34
Guelph, ON N0B 2J0

Attention: Ms. Lynne Banks

Re: First Submission for Zoning By-Law Amendment
Proposed Commercial Development
7456 McLean Rd. W and 197 Brock Rd. S.
Township of Puslinch

Dear Ms. Banks,

An email was received by GM BluePlan Engineering from the Township of Puslinch on October 25, 2023, requesting comments on the first submission for Zoning By-law Amendment related to the proposed development of a small-scale commercial development on the subject lands at 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch. The proposed development consists of a gas station complete with accessory buildings and parking for both cars and trucks. The Site Plan shows a full turns access from McLean Road West and a right-in, right-out only access along Brock Road South.

As part of the Zoning By-law Amendment application, the following documents and drawings were received and reviewed:

- Zoning By-law Amendment Application.
- Ontario Land Registrar application, dated September 14, 2022.
- Functional Servicing & Stormwater Management Report, prepared by Crozier Consulting Engineers, dated October 20, 2023.
- Site Plan & Key Plan (A001), prepared by ATA Architects Inc., dated October 4, 2023.
- Preliminary Erosion, Sediment Control and Removals Plan (C101), prepared by Crozier Consulting Engineers, dated October 20, 2023.
- Preliminary Site Grading Plan (C102), prepared by Crozier Consulting Engineers, dated October 20, 2023.
- Preliminary Site Servicing Plan (C103), prepared by Crozier Consulting Engineers, dated October 20, 2023.
- Preliminary Pre-Development Drainage Plan (FIG 1), prepared by Crozier Consulting Engineers, dated October 20, 2023.
- Preliminary Post-Development Drainage Plan (FIG 2), prepared by Crozier Consulting Engineers, dated October 20, 2023.
- Comment Summary, prepared by Township of Puslinch.

We defer review of the following to the County of Wellington Planning Department:

- Planning Justification Report, prepared by Siv-ik Planning and Design Inc., dated September 20, 2023.

We defer detailed review of the following to the County of Wellington Roads Department and Township of Puslinch traffic consultant:

- Transportation Impact Study, prepared by Crozier Consulting Engineers, dated October 2023.

We defer review of the following to the Township of Puslinch Ecologist:

- Requirement for an Environmental Impact Study memo, prepared by Aboud & Associates Inc., dated May 31, 2023.
- Environmental Impact Study requirement email correspondence, dated June 5, 2023.

We defer detailed review of the following to the Township Hydrogeologist:

- Hydrogeological Assessment Report, prepared by Crozier Consulting Engineers, dated October 20, 2023.

Based on our review, we provide the following comments on the Zoning By-law Amendment application and supporting documents:

Deficiencies/Outstanding Matters

Item No.	Matter / Requirement	Drawing / Document Reference	Date Issue Identified	Comment
1.	Fire Tank	Site Plan	November 1, 2023	Please show the location of the proposed fire water supply cistern on the Site Plan.
2.	Fire Hydrant	Site Plan, Servicing Plan	November 1, 2023	The Site Plan shows a fire hydrant at the north corner of the proposed building, however, this hydrant is not mentioned in the FSSWM report or Servicing Plan. Please coordinate and confirm hydrant location in both the Site Plan and Servicing Plan.
3.	Mud Mat	Erosion, Sediment Control and Removals Plan	November 1, 2023	The mud mat does not appear to match the full width entrance and the length does not adhere to the Erosion and Sediment Control Guideline for Urban Construction. Please revise the mud mat size and corresponding detail accordingly.
4.	Silt Fence	Erosion, Sediment Control and Removals Plan	November 1, 2023	The silt fence is currently shown as light-duty on the Erosion, Sediment Control and Removals Plan. Provided that silt fencing is the primary erosion and sediment control measure on site, we kindly request that the silt fence be revised to heavy-duty silt fence per OPSD 219.131 in order to mitigate potential sediment spills from the site.
5.	Catchbasin Sediment Control	Erosion, Sediment Control and Removals Plan	November 1, 2023	Please revise the catchbasin sediment control detail to show the Erosion, Sediment Control and Removals Plan a silt sack as described in the FSSWM report.
6.	Drawing Readability	Grading Plan	November 1, 2023	Features to be removed, such as trees and buildings, and existing elevation points within the site do not need to be shown on the Grading Plan. Please show existing contours with contour labels.
7.	Drawing Labelling	Grading Plan	November 1, 2023	Please label all depressed curbs so they can be easily identified on the Grading Plan.
8.	Maximum Slopes	Grading Plan	November 1, 2023	Proposed slopes along the northwest limit of the site appear to significantly exceed 3:1. Please ensure that all areas labelled as "MAX 3:1" in the Grading Plan do not exceed a slope of 3:1.

Item No.	Matter / Requirement	Drawing / Document Reference	Date Issue Identified	Comment
9.	Parking Lot Grading	Grading Plan	November 1, 2023	One of the proposed grades pointing towards PR. STM DCB1 is 0.4% on the Grading Plan. Please ensure that proposed grades in the parking lot are 0.5% at minimum.
10.	Surface Ponding	Grading Plan	November 1, 2023	The depth of ponding for PR. STM DCB1 appears to be 350mm per the Grading Plan. Please ensure that surface ponding does not exceed a depth of 300mm.
11.	Retaining Wall	Grading Plan	November 1, 2023	The proposed retaining wall shown in the Grading Plan is of significant height and is located in close proximity to the septic system as well as the underground tank for the truck gas bar. Please confirm there is no conflict between this infrastructure and the retaining walls to ensure a feasible design. The septic beds should be located outside the zone of influence of the adjacent retaining wall.
12.	Existing Features to Remain	Servicing Plan, Post-Development Drainage Area Plan	November 1, 2023	The existing conditions appear to be cut off by the property line in the Servicing Plan and Post-Development Drainage Area Plan. Please show existing features that are to remain in their entirety, such as trees along the property line, to ensure there are no conflicts with proposed infrastructure.
13.	Stormwater Storage Facility Detail	Servicing Plan	November 1, 2023	As requested in GMBP's pre-submission letter, dated December 2, 2022, please provide a detail for the proposed stormwater management facility. For Zoning By-law Amendment, the detail is expected to be preliminary but should indicate key information such as tank depth, groundwater level, and whether the tank has an impermeable liner. If the tank is proposed to infiltrate (ie. , the OGS treatment unit should be located upstream of the tank for pre-treatment.
14.	Orifice Plate	Servicing Plan	November 1, 2023	The Servicing Plan indicates a 138mm diameter orifice plate while the FSSWM report indicates 134mm. Please confirm orifice plate diameter.
15.	Storm Sewer Insulation	Servicing Plan	November 1, 2023	The 375mm storm pipe southeast of PR. STM CBMH2 has only 1m depth of cover to the obvert based on the Servicing Plan.

Item No.	Matter / Requirement	Drawing / Document Reference	Date Issue Identified	Comment
				Please increase depth of cover or indicate insulation per Township of Puslinch Municipal Development Standards.
16.	Sewage System Notes	Servicing Plan	November 1, 2023	Item #9 under the Sewage System Notes states that gravity sewers with less than 1.0m of cover shall be insulated. Please revise to indicate that gravity sewers with less than 1.2m of cover shall be insulated, per Ontario Building Code standards.
17.	Hydrologic Modelling	FSSWM Report	November 1, 2023	Please provide a hydrologic model output rather than modified rational method calculations for stormwater quantity control.
18.	OGS Particle Size Distribution	FSSWM Report	November 1, 2023	The TSS removal calculation in the OGS sizing report does not indicate ETV particle size distribution, please revise OGS calculations to show ETV particle distribution. Please note that only 50% TSS removal is accredited to standalone OGS system per current industry practice. Applicant to demonstrate how the site will achieve an enhanced level of quality control treatment (80% TSS removal).
19.	LID Implementation	FSSWM Report	November 1, 2023	The FSSWM report states that LID strategies are not proposed due to risk of hydrocarbon infiltration from the gas station into groundwater. However, given the infiltration deficit of 205mm/yr, LID implementation should be explored to lessen the water balance deficit (ie. infiltration of clean runoff from rooftops or grassed areas). The rainwater harvesting and enhanced topsoil strategies mentioned in the FSSWM report should be assessed.

Additional Commentary

Item No.	Additional Commentary
1.	The Township and County Roads departments should review entrance locations and traffic impacts.
2.	The Township Fire Department and Building Department should review fire tank sizing and fire access route.
3.	The Township Building Department should review septic tank sizing and on-site sewage design.



If you have any questions or require additional information, please do not hesitate to contact us.

Yours truly,

GM BLUEPLAN ENGINEERING

Per:



Sergio Zaga, M.Eng.
Project Designer

Cc: Steve Conway, GM BluePlan Engineering Limited.



COUNTY OF WELLINGTON

PLANNING AND DEVELOPMENT DEPARTMENT
ALDO SALIS, B.S., M.Sc. MCIP, RPP, DIRECTOR OF PLANNING AND DEVELOPMENT
TEL: (519) 837-2600 EXT. 2064
FAX: (519) 823-1694
1-800-663-0750

ADMINISTRATION CENTRE
74 WOOLWICH STREET
GUELPH, ONTARIO
N1H 3T9

November 6th, 2023

Courtenay Hoytfox
Acting CAO
Township of Puslinch
7404 Wellington County Rd 34
Puslinch, On
N0B 2J0

Dear Courtenay:

Re: ZONING BY-LAW AMMENDMENT – Initial Comments
DAAZ Inc.
7456 McLean and 197 Brock Road S
Township of Puslinch

Please find the Planning comments below in reference to the above noted Zoning By-law amendment based on our preliminary review of the documents below. These comments are provided based on a review of the following:

Reports Submitted:

- Planning Justification Report, prepared by Siv-ik (September 20th, 2023)
- Draft Zoning By-law, prepared by Siv-ik
- Functional Servicing & Stormwater Management Report, prepared by Crozier Consulting Engineers (October 20th, 2023)
- Site Plan & Key Plan (A001), prepared by ATA Architects Inc., (October 4th, 2023)
- Preliminary Erosion, Sediment Control and Removals Plan (C101), prepared by Crozier Consulting Engineers (October 20, 2023)
- Preliminary Site Grading Plan (C102), prepared by Crozier Consulting Engineers (October 20th, 2023)
- Preliminary Site Servicing Plan (C103), prepared by Crozier Consulting Engineers (October 20th, 2023)
- Preliminary Pre-Development Drainage Plan (FIG 1), prepared by Crozier Consulting Engineers, (October 20th, 2023)
- Preliminary Post-Development Drainage Plan (FIG 2), prepared by Crozier Consulting Engineers (October 20th, 2023)
- Transportation Impact Study, prepared by Crozier Consulting Engineers (October 2023)
- Hydrogeological Assessment Report, prepared by Crozier Consulting Engineers (October 20th, 2023)
- Comment Summary, prepared by Township of Puslinch

Planning Comments:

1. The subject property is designated as Rural Employment and is included in Special Policy Area PA7-1 in the County's Official Plan. PA7-1 Puslinch Economic Development Area allows for "locations for

economic activity and employment opportunities. This area is the predominant location for business and industry in the Township”

2. Staff will also review the proposal in relation to Official Plan policy 9.8.1 regarding access to Brock Road.
3. Section 9.8.3 allows for complementary commercial uses in areas designated as Rural Employment in Puslinch. Examples include automotive uses, restaurants, and limited retail.
4. The property is located in WHPA Q1 and Q2. The County's Risk Management Official will provide additional comments on the proposal related to sourcewater protection requirements and policies.
5. The County's Roads department will provide further information regarding submitted traffic impact study. Staff note that previous comments indicated access from Brock Road S would not be permitted and the applicant is indicating that a right in-right out access is required to facilitate the development of the site.
6. 197 Brock Rd S is zoned IND (h5). 7456 McLean Rd W is zoned IND (sp54). Both properties are included in the Township's Industrial Overlay.
7. The applicant is proposing to rezone the property to Highway Commercial (HC) to facilitate the construction of a multi-tenant commercial development including a gas bar, restaurant with a drive-thru and a convenience store.
8. The applicant has provided a concept plan with the submission and is requesting a reduced landscaped open space of 21% of the lot area where 25% is required in the parent zone which is proposed to be recognized in a site-specific zone.
9. The applicant is indicating their intent to provide a 6m wide landscaping buffer along Brock Road.
10. The property is subject to the Township's Urban Design guidelines and landscaping buffers are supported and encouraged.
11. An oil-grit separator is proposed for the site, GM BluePlan and the County's Road department will also review the submitted stormwater management plan. The applicant should investigate LID features which could include rooftop drainage, where appropriate.
12. The current Holding provision requires site plan approval to be achieved prior to being lifted. Staff would likely recommend that the Holding provision remain in place for the same reasons it was originally added.

Traffic Impact Study

13. The draft By-law also includes a site-specific parking provision for 1 space per 20 m²; whereas 1 space per 10 m² is required in the zoning by-law.
14. The applicant's TIS indicates a required parking number of 60 spaces and 49 spaces provided. Table 14 uses the required parking for 'other uses,' this is incorrect. The Township's zoning by-law does not indicate additional parking for restaurants with drive-through facilities nor does it indicate reduced requirements. The applicant should clarify if the restaurant is serviced by the drive-through only or if there is seating/service in addition to the drive-through. Further, the applicant

should compare parking requirements for this type of use with neighbouring municipalities and provide justification for the reduced parking requirement for the restaurant and drive-through use.

15. Table 5.4 of the Township's zoning by-law provides an opportunity to calculate shared use parking. This Section should be referred to when determining the required parking for the site.
16. The TIS and/or site plan should include the estimated number of spaces included in the drive-through before impeding the fire route and/or access to the site. The Township zoning by-law does not have specific requirements but there are other municipalities with drive-through queuing requirements.

These comments are intended to provide initial feedback to the applicant and Township on the initial zoning By-law submission. As more information is provided and detailed review of the application is completed more comments may arise. I trust these initial comments will be of assistance.

Regards,



Zach Prince, RPP MCIP
Senior Planner



Harden Environmental Services Ltd.
4622 Nassagaweya-Puslinch Townline
Moffat, Ontario, L0P 1J0
Phone: (519) 826-0099 Fax: (519) 826-9099

Hydrogeological Assessment

Geochemistry

Phase I / II ESA

Regional Flow Studies

Contaminant Investigations

OLT Hearings

Water Quality Sampling

Groundwater & Surface Water
Monitoring

Groundwater Protection
Studies

Groundwater Modelling

Groundwater Mapping

Permits to Take Water

Environmental Compliance
Approvals

Designated Substance Surveys

Our File: 2360

November 7, 2023

Township of Puslinch
7404 Wellington Road 34
Puslinch, Ontario N0B 2J0

Attention: Lynne Banks
Development and Legislative Coordinator

**Re: Hydrogeological Comments
7456 McLean Road and 197 Brock Road South, Puslinch, Ontario
Zoning By-law Amendment Application**

Dear Lynne,

Harden Environmental Services Ltd. (Harden) is pleased to provide hydrogeological comments for zoning by-law amendment application at 7456 McLean Road and 197 Brock Road South in Puslinch, Ontario (the site).

We have reviewed the following reports as part of this submission:

1. C.F. Crozier & Associates Inc. (Crozier), 2023a. Hydrogeological Assessment Report. 7456 McLean Road and 197 Brock Road South, Township of Puslinch, County of Wellington. Prepared for: Black-Hart Construction, CFCA File No. 2377-6556, dated October 2023.
2. Crozier, 2023b. Functional Servicing & Stormwater Management Report. 7456 McLean Road and 197 Brock Road South, Township of Puslinch, County of Wellington. Prepared for: Black-Hart Construction Inc., CFCA File No. 2377-6556, dated October 2023.

Based on the applicant's submission and supporting documents, we understand that:

- The applicant plans to rezone the site from the existing industrial use to highway commercial use to permit a "small-scale multi-tenant commercial development with a gas bar, convenience store and drive-through restaurant."

- The site consists of an approximately square-shaped 1.62-ha parcel which is currently vacant/undeveloped. The site is bounded by Brock Road to the east, McLean Road West to the south, vacant land to the west and north. The Township is presently reviewing development plans for the adjacent vacant lands.
- The proposed development includes a 1-storey convenience store (235 m²), a 1-storey drive-thru restaurant (379 m²), a 4-pump car gas bar and 6-pump truck gas bar, 41 standard parking spaces and 8 transport truck parking spaces, along with internal paved areas.

Harden provides the following hydrogeological comments:

1. Blue Triton Brands (Blue Triton), a local bottled water producer, is located approximately 450 m northwest of the site. The development site is located within the drawdown cone of Blue Triton's production well.
2. The Site is located within the Paris Galt Moraine Policy Area under Schedule B7 of the County of Wellington Official Plan and the Section 4.9.7 Policies and Objectives will apply. The development must also adhere to Sections 4.9.3 (Groundwater), 4.9.4 (Policy Direction) and 4.9.5 (Source Water Protection).
3. Crozier (2023b) indicates that the daily sewage design flow was estimated at 20,000 L/day. Since the total daily design sewage flow exceeds 10,000 L/day an Environmental Compliance Approval (ECA) is required from the Ministry of the Environment, Conservation and Parks (MECP) under Section 53 of the OWRA. Harden therefore defers commenting to the MECP groundwater technical reviewer on sewage impacts to groundwater; however, we request that notifications regarding ECA approvals for the site be circulated to Harden via the Township for comment.
4. Shallow groundwater was identified at the western portion of the site, with static groundwater levels as high as 0.38 m below existing grade recorded in April 2023. The hydrograph for MW4-23 also shows groundwater levels within 0.25 m of the ground surface in April 2023. These shallow groundwater levels occur beneath the proposed septic bed area. The high groundwater elevations will have to be considered as part of the septic system design.
5. The hydrograph for MW6-23 also showed significant fluctuation in groundwater levels in April 2023, with the groundwater level in the well recovering following installation to about 0.6 m below existing grade, which was captured by the datalogger between manual measurements. Interestingly, the declining groundwater trend appeared to stabilize immediately following the manual

measurement on June 7, 2023. We recommend that Crozier check the validity of the logger data for this well given the unusual trend observed in this hydrograph.

6. Given the significant fluctuation observed in the groundwater hydrographs and groundwater levels in all three hydrographs observed with 1 m of existing grade in April-May 2023, the potential for high groundwater levels across the site should be considered in the design of subsurface infrastructure for the property.
7. Section 7.0 of the hydrogeological report (Crozier, 2023a) indicates that the development will be serviced by a private water supply well, which is yet to be installed. Crozier recommended that the supply well should be installed and a pumping test completed along with water quality testing. Harden concurs with this recommendation and requests the opportunity to review the pumping test report and water quality analyses once completed.

Harden further notes that the new supply well must be installed within the upper bedrock or properly cased into the lower bedrock. Multiple aquifer penetrating wells (i.e., wells that are constructed with an open hole between two or more aquifers) are not permitted.

8. As part of the development all unused wells must be decommissioned in accordance with R.R.O. 1990 Regulation 903: Wells under the Ontario Water Resources Act (OWRA). Section 4.4.1 of the hydrogeological report (Crozier, 2023a) indicates that 4 wells are mapped on the site, including 3 monitoring wells (installed in 2021) and a 29-m deep drilled well within a concrete well pit (installed in 1984). Harden stresses that due to the proposed use of the site as a gas station in addition to the proximity of existing groundwater users it will be important to ensure that existing wells are properly decommissioned.
9. Section 3.0 of the hydrogeological report (Crozier, 2023a) indicates that the site is within a significant groundwater recharge area (SGRA) but that no specific source protection policies apply. However, Harden notes that the site is within the draft wellhead protection area (WHPA)-Q for quantity. While the policy is still in draft, we recommend that the WHPA-Q policies listed in the source protection plan be adhered to as part of the development. Groundwater recharge policies in the Source Water Protection Plan apply to this site.
10. Section 8.0 of the FSR report (Crozier, 2023b) indicates that “infiltration facilities shall be designed to ensure that under post-development conditions, infiltration volumes match the pre-development condition.” However, the water balance in Section 6.0 of the hydrogeological report (Crozier, 2023a) shows an infiltration deficit of 205 mm/year. Section 6.4 of the hydrogeological report (and section 8.3 of the FSR report) states that “LID strategies have not been proposed as the major

use of the proposed development will be a gas station and LID features could cause hydrocarbons to infiltrate into groundwater.” Harden disagrees with this rationale based on the following.

The site will undergo significant grade changes to redirect storm water towards storm sewers along McLean Road West (Crozier, 2023b). At present, approximately half of the runoff from the site flows toward the northwest corner and there is no drainage pathway from this site to Mill Creek, therefore any runoff would be captured in the lower elevations north of this site and infiltrate. Thus, there is “clean” water recharge occurring from precipitation falling onto this site. Conversely, water directed into storm sewers along McLean Road West drains eastward to Brock Road South and via southward surface flow in roadside ditches, and discharges to the Carroll Pond. The Carroll Pond is underlain by relatively impervious sediments where very little infiltration occurs. Therefore, it will be more advantageous for the underlying aquifer to have greater infiltration within this property’s limits. Similar issues arose at the Morguard property on the east side of Brock Road and they incorporated infiltration galleries beneath the parking area to facilitate the groundwater recharge.

Harden recommends that LID strategies be implemented as part of Site Plan Approval, such as those proposed in the FSR (rainwater harvesting and enhanced topsoil), to infiltrate as much clean runoff as possible on site. We recommend that the water balance be updated to reflect the proposed LIDs in an effort to maintain infiltration at the site and reduce runoff to the storm sewer network. Also, please check the validity of pre- and post-development evapotranspiration remaining the same as shown in the tables. The evapotranspiration for landscaped surfaces may be the same pre- and post-development but the impervious surfaces will have a significantly different evapotranspiration.

Spill management measures to reduce the risk of hydrocarbon infiltration into groundwater should be incorporated into the design as part of Site Plan Approval, especially considering the proximity of nearby private water well users as well as Blue Triton (a water bottling facility) within 500 m of the site.

A salt management plan should also be developed for the site as part of Site Plan Approval to limit the amount of salt discharged in runoff to the storm sewer system.

11. Section 4.4.1 of the hydrogeological report (Crozier, 2023a) indicates that there are 20 bedrock supply wells and 1 overburden supply well mapped within 500 m of the site. Section 8.3 of the report also discusses impacts to local water supply wells, and notes that there no supply wells downgradient of the leaching bed. The

supporting documentation for the ECA should address the potential for downward migration of contaminants into the underlying aquifers.

12. The FSR identifies significant grading to take place on the property. Any import/export of fill/soil from the site must be conducted in accordance with O. Reg. 406/19: On-Site and Excess Soil Management, the Rules for Soil Management and Excess Soil Quality Standards (Soil Rules) and O. Reg. 153/04, as amended.

In summary,

- Harden looks forward to the opportunity to review the pumping test report and water quality analyses for the site.
- Harden looks forward to the opportunity to comment on the MECP's review of the hydrogeological report in support of the ECA for the site.
- LIDs should be implemented on site to infiltrate as much clean runoff as possible in an effort to maintain recharge on site and reduce runoff directed to storm sewer infrastructure.
- A salt management plan and spill management plan will be required as part of Site Plan Approval.
- All unused wells on the site must be decommissioned in accordance with Reg. 903.
- The development must adhere to the policies in the County of Wellington Official Plan Sections 4.9.3, 4.9.4, 4.9.5 and 4.9.7.
- Excess soil management must be completed in accordance with O. Reg. 406/19, the Soil Rules and O. Reg. 153/04.

We appreciate the opportunity to provide these comments. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

Harden Environmental Services Ltd.

A black rectangular redaction box covers the signature of Angela M. Mason.

Angela M. Mason, M.Sc., P.Geo., QP_{ESA}
Senior Hydrogeologist

A black rectangular redaction box covers the signature of Stan Denhoed.

Stan Denhoed, P.Eng., M.Sc.
President and Senior Hydrogeologist



11/03/2023

Memorandum

To: Lynne Banks – Development and Legislative Coordinator, Township of Puslinch

Cc: Meagan Ferris – Manager of Planning and Environment, Wellington County

From: Kim Funk – Source Protection Coordinator, Wellington Source Water Protection

**RE: 7456 Mclean Road West, Township of Puslinch
Zoning By-law Amendment**

Wellington Source Water Protection (WSWP) staff have had the opportunity to review the submitted documents in support of the above noted application. Based on our review, WSWP have no objections to the proposed application receiving draft approval subject to the following requirements and conditions:

- 1) Pursuant to the *Clean Water Act*, there is no Notice required for this proposal. It should be noted that if the nature of the development changes, Section 59 Notices may apply.
- 2) Additional documentation will be required during the Site Plan application. Please refer to the comments provided via e-mail dated June 23, 2022 (attached) for further details.
- 3) The current proposal indicates a 78% reduction in infiltration. It is recommended that further investigation into recharge measures be completed and that the proposal is reviewed by the Township Hydrogeologist to determine the impact that reduced infiltration may have on groundwater recharge.

For more information, please contact sourcewater@centrewellington.ca.

Sincerely,



Nov. 3, 2023

Kim Funk
Source Protection Coordinator
519-846-9691 ext 283
kfunk@centrewellington.ca

Attachments: WHPA Maps
June 23, 2022 e-mail

Township of Puslinch
c/o Wellington Source Water Protection
Risk Management Office, 1 MacDonald Square, Elora, ON, NOB 1S0
1-844-383-9800 sourcewater@centrewellington.ca wellingtonwater.ca

From: Danielle Walker
Sent: June 23, 2022 11:31 AM
To: Lynne Banks
Cc: Source Water
Subject: RE: Preconsultation request 7456-McLean-Road-W-197-Brock-Road-S
Attachments: WHPA_Map_McLeanW_7456_BrockS_197_Q.pdf; WHPA_Map_McLeanW_7456_BrockS_197_SGRA.pdf; WHPA_Map_McLeanW_7456_BrockS_197.pdf

Sensitivity: Confidential

Hi Lynne,

As requested, please find our initial comments for 7456 McLean Road West – 197 Brock-Road South, preconsultation. We can provide more detailed comments when required.

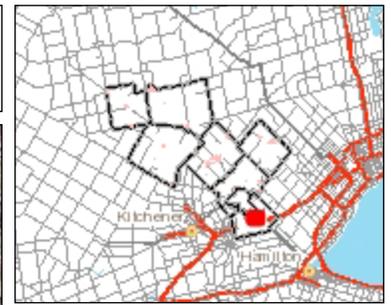
This site is located in a Significant Groundwater Recharge Area (SGRA) and a draft Wellhead Protection Area for Quantity (WHPA-Q) with a significant risk level. See attached maps.

The proposed development would require the following during the site plan process:

- Completion of the Drinking Water Threats Screening Form. This form is an important tool that the Risk Management office uses to determine how Source Protection Plan policies may affect the property.
- Depending on answers to screening form, a chemical management plan (CMP) for fuel, chemical and / or waste handling and storage may be recommended. At minimum, we will request that a site plan condition be required for any temporary fuel storage during construction.
- Due to the amount of impervious surface proposed, we would recommend that a Salt Management Plan be submitted for the property to manage winter maintenance activities
- Confirmation of stormwater management design for the property and whether an Environmental Compliance Approval (ECA) is required.
- Confirmation of sewage works capacity for the property and whether an Environmental Compliance Approval (ECA) is required. If capacity is in excess of 10,000L per day, Ministry approval is required.
- Please discuss if any Permits to Take Water are required or are currently subject to the property. If water taking's exceed 50,000L per day, Ministry approval is required.
- In relation to consumptive water taking, we encourage that properties within the WHPA-Q install a flow meter to monitor water usage. Its not a legal requirement yet but when the policies become in legal effect, it may be required by the township. During the site plan process, we will provide best management practices for the recharging and infiltration of clean water. Please provide a description of what water is used for on site (ie potable use, truck washing etc) in future submissions.
 - It is important to note that depending on when site plan is submitted, these draft policies may be in legal effect.
- Details on any excavation, deep cassions or piers, geothermal, existing wells and other potential transport pathways proposed.

If you have any further questions regarding this application, or in the event of any technical problem with the email or attachments, please contact me.

Kind regards,



Legend

- Parcels
- Waterbodies
- Watercourses
- Well Locations
- Wellhead Protection Area Boundaries**
 - A
 - B
 - C
 - D
- Issue Contributing Area**
 - Chloride
 - Nitrate
 - Sodium
 - TCE
- Vulnerability Score**
 - 10
 - 8, D; 8, C
 - 2, 4, 6 (A, B or C)
 - 2,4,6, D; 2,4, D; 2, 4, 6 (D); 4, D; 6,
- HVA
- RoadsLookup

1: 32,000



This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Produced using information under License with the Grand River Conservation Authority. Copyright © Grand River Conservation Authority, 2022.

Notes



Puslinch Fire and Rescue

7404 Wellington Rd 34, Puslinch, ON, N0B 2J0

Fire Chief Luis Gomes

Water Storage Tanks and Hydrants for Fire Protection

Water Storage Tanks

1. Water storage tanks will be sized as per the Ontario Building Code.
2. The top of the tank to be installed below the frost line. Minimum 1.3 M.
3. The bottom of the tank must not be more than 4.6 M below ground level.
4. Access manhole must have lockable heavy metal cover with no holes.
5. Access ladder to be aluminum with rungs to floor of tank.
6. Concrete to be 35 MPA at 30 days with 6% air entrainment.
7. Reinforcement to be per manufacturers specifications.
8. Install a vent pipe with rodent and insect screen.
9. Install automatic float valve system to a water source with back flow preventer.
10. Compliance with the inspection, testing and maintenance provisions of NFPA 25, "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems", for tanks is deemed to satisfy the maintenance requirements
11. The water supply source for the dry hydrant shall provide, on a year-round basis, the required quantity of water, as determined in NFPA 1142, Chapter 4, and Ontario Fire Marshal's Guidelines on Rural water Supplies for firefighting.
12. The fire department will:
 - inspect during installation of tank or tanks
 - inspect location of hydrant
 - inspect before filling
 - perform a pump test with fire pumper before final approval.

Dry Hydrant Design and Location.

- 1** Puslinch Fire and Rescue Services shall approve all aspects of the dry hydrant design and construction, including the type of materials, pipe size, and system fittings to be used.
- 2** All dry hydrant systems shall be designed and constructed to provide a minimum flow of 1000 gpm (3800 L)
- 3.** Adequate working space shall be provided around the dry hydrant to provide for a safe working environment.
- 4.** Dry hydrant systems shall be designed and constructed so that slope and piping configurations do not impede drafting operations.
- 5.** Suction hose connection(s) shall be compatible with the fire department's hard suction hose size and shall conform to NFPA 1963, *Standard for Fire Hose Connections*. The connection(s) shall include a protective cap. The cap and adapter shall be of materials that minimize rust and galvanic corrosion at draft.
- 6.** Dry hydrant to be installed a minimum of 30 M from any building and will be approximately 1.8 meters from the edge of driveway using 150 mm (6") pipe. The fire department connection fitting will be 67 cm to 90cm above the ground and facing fire truck location. The Fire Department connection must be NH (National Hose) 150mm (6") thread - female connection with a cap to seal the opening.
- 7.** The dry hydrant system and access to the site shall be developed in a manner that allows the fire department pump to connect to the hydrant using not more than 20 ft (6 m) of hard suction hose
- 8.** Dry hydrants shall be located such that they are accessible under all weather conditions. Grass, brush, and other vegetation shall be kept trimmed and neat. Vegetation shall be cleared for a minimum 3 ft (0.9 m) radius from around hydrants
- 9.** Dry hydrants shall be located a minimum of 100 ft (30 m) from any structure
- 10.** No parking or other obstacles shall be allowed within 20 ft (6 m) of the access side of the hydrant.
- 11.** Dry hydrants shall be protected from damage by vehicular and other perils, including freezing and damage from ice and other objects.
- 12.** Dry hydrants shall be inspected at least quarterly and maintained as necessary to keep them in good operating condition. The hydrants shall be flow tested at least annually with an approved pump to ensure the minimum design flow is maintained. Compliance with the inspection, testing and maintenance provisions of NFPA 25, "Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems", for hydrants is deemed to satisfy the maintenance requirements
- 13.** Dry hydrant locations shall be made visible from the main roadway during emergencies by reflective marking and signage approved by Puslinch Fire and Rescue services

General Notes:

NFPA 25:

4.1 Responsibility of the Owner or Occupant.

4.1.1* The owner or occupant shall provide ready accessibility to components of waterbased fire protection systems that require inspection, testing, or maintenance.

4.1.2* The responsibility for properly maintaining a waterbased fire protection system shall be that of the owner of the property.

In accordance with the Fire Protection and Prevention Act, Puslinch Fire and Rescue Services requests that all test and inspection documentation be submitted annually to fireprevention@puslinch.ca, all work must be performed by qualified fire protection technicians.

Rev 2019.01.21

**HYDROGEOLOGICAL
ASSESSMENT REPORT**

**7456 MCLEAN ROAD AND
197 BROCK ROAD SOUTH**

**TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON**

PREPARED FOR:

BLACK-HART CONSTRUCTION

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4**

OCTOBER 2023

CFCA FILE NO. 2377-6556

The material in this report reflects best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Revision Number	Date	Comments
Rev.0	October 20, 2023	Issued for 1 st Submission (ZBA)

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	BACKGROUND INFORMATION	1
2.1	Site Description	1
2.2	Proposed Development	1
3.0	SOURCE PROTECTION	2
4.0	ENVIRONMENTAL SETTING	2
4.1	Physiography, Topography & Drainage	2
4.2	Regional Geology	3
4.3	Local Geology	3
4.4	Hydrogeology	3
4.4.1	MECP Well Records.....	3
4.4.2	Aquifer Properties.....	4
5.0	FIELD STUDY	5
5.1	Test Pit Investigation	5
5.2	Monitoring Well Construction	6
5.3	Groundwater Monitoring	6
6.0	WATER BALANCE ASSESSMENT	7
6.1	Methodology	8
6.1.1	Precipitation (P)	8
6.1.2	Storage (S).....	9
6.1.3	Evapotranspiration/Evaporation (ET)	9
6.1.4	Water Surplus (R + I)	10
6.1.5	Soil Moisture Determination.....	10
6.2	Pre-Development Infiltration	11
6.3	Post-Development Infiltration	11
6.4	Water Balance Impact Assessment & Mitigation Recommendations	11
7.0	GROUNDWATER IMPACT ASSESSMENT	12
7.1	Attenuation Zone	12
7.2	Groundwater Impacts	13
7.4	Impact on Local Municipality Supply Wells	14
8.0	PROPOSED SEWAGE SYSTEM EFFLUENT CRITERIA	14
9.0	CONCLUSIONS AND RECOMMENDATIONS	15
10.0	REFERENCES	16

LIST OF TABLES

Table 1:	Hydrostratigraphy of the Puslinch Area
Table 2:	Monitoring Well Construction Details (Aardvark and CMT)
Table 3:	Groundwater Levels and Groundwater Elevations
Table 4:	Water Balance Assessment Summary
Table 4:	Groundwater Impact Assessment Parameters
Table 5:	Climate Data Summary (1981 - 2010) for Waterloo Wellington A Climate Station
Table 6:	Summary of Pre-Development Drainage Catchments (Crozier, October 2023)
Table 7:	Summary of Post-Development Drainage Catchments (Crozier, October 2023)
Table 8:	Groundwater Impact Assessment Parameters
Table 9:	Proposed Effluent Criteria

LIST OF APPENDICES

Appendix A:	Site Plan
Appendix B:	Well Record Summary Table
Appendix C:	Test Pit Logs
Appendix D:	Test Pit Grain Size Analysis
Appendix E:	Monitoring Well Logs and Well Records
Appendix F:	Hydrographs
Appendix G:	Water Balance Assessment Calculations
Appendix H:	Groundwater Impact Assessment

LIST OF FIGURES

Figure 1:	Site Location Plan
Figure 2:	Site General Layout
Figure 3:	Physiography
Figure 4:	Bedrock Geology
Figure 5:	Surficial Geology
Figure 6:	MECP Well Location Plan
Figure 7:	Test Pit and Monitoring Well Location Plan
Figure 8:	Interpreted Groundwater Flow
Figure 9:	Attenuation Zone

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) has been retained by Black-Hart Construction to prepare a Hydrogeological Assessment to support the Zoning By-Law Amendment for the mixed-use commercial development located at 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch (the Site).

The purpose of the Hydrogeological Assessment is to characterize the hydrogeological regime in the vicinity of the Site, outline applicable source water protection policies, identify the seasonally high groundwater elevations, and complete supporting assessments related to the proposed development (pre-to-post water balance analysis). This report also includes a Groundwater Impact Assessment to examine the impact of the proposed onsite sewage system on the environmental receivers, and to confirm the effluent criteria for the onsite sewage system.

2.0 Background Information

The following background studies and reports have been reviewed in preparation of this study:

- Source Protection Information Atlas, Ministry of Environment, Conservation and Parks, accessed July 2023.
- Well Records Database, Ministry of Environment, Conservation and Parks, accessed July 2023.
- The Physiography of Southern Ontario prepared by Chapman and Putnam, dated 1984.
- Geotechnical Investigation Report – 7456 McLean Road, prepared by CMT Engineers Inc., dated July 13, 2023.
- Functional Servicing and Stormwater Management Plan prepared by Crozier, dated October 2023.

2.1 Site Description

The Site encompasses an area of approximately 1.62 ha and currently consist of two adjacent properties (7456 McLean Road and 197 Brock Road South). The Site is comprised of vegetated/landscaped areas and is bounded by Dufferin Aggregates (aggregate pit) to the north, Brock Road South (Wellington Road 46) to the east, McLean Road West to the south, and St. Mary's Cement Inc. (aggregate pit) to the west. The Site location is shown on Figure 1. A Site overview is shown on Figure 2.

2.2 Proposed Development

According to the Site Plan prepared by ATA Architects Inc. dated October 4, 2023, the proposed mixed-use commercial development will consist of the following elements:

- A 1-storey convenience store (235 sq.m).
- A 1-storey drive-thru restaurant (379 sq.m).
- A 4-pump car gas bar and a 6-pump truck gas bar.

- 41 standard parking spaces (including 3 accessible parking spaces and 4 electric vehicle charging spaces) and 8 transport truck parking spaces.
- Internal paved areas including access to McLean Road West and Brock Road South.

The Site Plan is provided in Appendix A. The existing vegetated and landscaped areas will be removed to accommodate the proposed mixed-use commercial development.

There are no municipal services available in the vicinity of the Site, therefore the proposed development will be serviced with private services (e.g., an onsite sewage system and water supply well). The proposed servicing strategy is outlined in the Functional Servicing and Stormwater Management Report prepared by Crozier, dated October 2023 (submitted under separate cover).

3.0 Source Protection

The Province of Ontario's Source Protection Information Atlas designates the Site as being part of the Grand River Source Protection Area. Therefore, the Grand River Source Protection Plan and the policies contained within all have legal effect in the province per Section 31 of the Clean Water Act.

The Site is located within a significant groundwater recharge area (SGRA); however, a risk level has not been defined in the Grand River Source Protection Plan and therefore no specific source protection policies apply.

4.0 Environmental Setting

4.1 Physiography, Topography & Drainage

The Site lies within the physiographic region known as the Horseshoe Moraines, which is located between the Guelph Drumlin Field to the north and the Flamborough Plain to the south (see Figure 3). The Horseshoe Moraines contain, among others, the well-known Paris-Galt moraine and nearly abuts the Oak Ridges Moraine to the east separated only by a thin band of the Niagara Escarpment. Locally, the Site is within Till Plains which is bounded by Spillways to the northwest and Limestone Plains to the southeast in the Badenoch area and south of Morriston. The Limestone Plains are dotted with drumlins and the occasional esker in a northwest – southeast orientation, which is indicative of the direction of ice flow during the last ice age.

According to topographic mapping, the Site has a drainage split across the centre of the Site. The western portion of the Site generally slopes from east to west and runoff is directed via sheet flow to the adjacent property to the west. The eastern portion of the Site generally slopes west to east, and runoff is directed via sheet flow to McLean Road West.

A review of the watershed mapping and boundaries indicate that the Site is located within the Mill Creek Subwatershed of the Grand River watershed. Mill Creek is a spring-fed cold-water stream that originates in the uplands and woodlands/wetlands of the Township of Puslinch, flowing south-west through the Township and the City of Cambridge, where it joins the Grand River. Mill Creek is located approximately 4 km west of the Site. The nearest surface water feature is Aberfoyle Creek located approximately 900 m north of the Site, which flows into Mill Creek. There are also several ponds associated with the aggregate operations on adjacent properties at 125 Brock Road South and 4397 Concession 7.

4.2 Regional Geology

Bedrock geology in the region of the Site is mapped as sandstone, shale, dolostone, and siltstone of the Guelph Formation as shown on Figure 4. The depth to bedrock is approximately 20 to 30 mbgs, or 300 to 290 masl.

According to Ontario Geological Survey (OGS) mapping, the surficial geology in the region of the Site consists of stone-poor, sandy-silt to silty-sand textured till on Paleozoic terrain as shown on Figure 5. The dominant soil material in the area of the Township of Puslinch is coarse textured till, with interbeds of sand, silty sand, and gravel. Accumulations of peat and muck occur in the lower regions between hills.

4.3 Local Geology

A total of seven (7) boreholes were advanced on Site by CMT Engineering Inc. (CMT) as part of a geotechnical investigation completed for the Site. Further discussion on the results of the geotechnical investigation is presented in Section 5.2. The following surficial materials (in stratigraphic order) were generally encountered during the geotechnical investigation:

- Topsoil
- Fill on the eastern portion of the Site, primarily consisting of sand, silty sand, and gravel fill with wood pieces
- Sandy silt/silty sand
- Sand and gravel

The findings from the geotechnical investigation are generally consistent with the surficial materials reported in the geological mapping.

4.4 Hydrogeology

4.4.1 MECP Well Records

A review of the Ministry of Environment, Conservation and Parks (MECP) Well Record Database indicates there are 66 well records within 500 m of the Site (Figure 6). A summary table of the well records is included in Appendix B. In general, a review of the identified well records can be summarized as follows:

- Of the 66 reported wells, 12 are used for domestic water supply purposes, 10 are used for commercial/industrial purposes, 24 are used as monitoring wells, and the remaining wells are reported as test holes or their use was not identified.
- 4 wells are mapped within the property boundary. According to the well record, Well ID 6707585 was installed in 1984 for domestic purposes and consists of a 6-inch steel cased well, installed to a depth of 29 mbgs completed in limestone. This well was identified on Site by Crozier personnel, and it was noted to be installed within a concrete well pit. The remaining three (3) wells (Well IDs 7394717, 7394716 and 7394715, and 7112542) are identified as monitoring wells installed in 2021.
- Of the water supply wells (21), 20 are installed within bedrock and 1 is installed within the overburden.

- Static water levels range from 1.4 mbgs to 21.34 mbgs, with an average static water level of 10.60 mbgs.
- Reported well yields in the bedrock wells ranged from 12.0 L/min up to 189.3 L/min with an average well yield of 87.8 L/min. The majority of the well yields were in excess of 50 L/min.
- Where indicated, water quality was reported as clear and fresh.
- Zero (0) reported dug wells are noted to be within the study area.

4.4.2 Aquifer Properties

The general hydrostratigraphy of the area is described in detail in the Tier Three Water Budget and Local Area Risk Assessment Characterization Report for the City of Guelph and Township of Guelph/Eramosa (Golder, 2011). A summary of the hydrostratigraphy is shown in Table 1 below.

Table 1: Hydrostratigraphy of the Puslinch Area

System	Layer	Name	Function	Material	Water Supply
Overburden	Youngest – 1	Grand River Outwash	aquifer	gravel, sand	domestic
	2	Wentworth Till	aquitard/aquifer	silt, sand, clay	
	3	Glaciolacustrine, Glaciofluvial Sediments	aquifer	silt, sand, clay	domestic
	4	Port Stanley Till, Cattfish Creek Till	aquitard	silt, clay	
	5	Older Glaciofluvial Sediments	aquifer	sand, gravel	domestic
Bedrock	6	Contact Aquifer	aquifer	weathered bedrock	domestic, Cambridge
	7	Guelph Formation	aquifer	dolomitic limestone	domestic
	8	Eramosa Formation	aquitard	dolomitic limestone, shale	

	9	Goat Island	aquifer	dolomitic limestone	
	10	Upper Gasport Formation	aquifer	dolomitic limestone, dolostone	Guelph
	11	Middle Gasport Formation	aquifer	dolomitic limestone, dolostone	Guelph, Puslinch, Cambridge
	12	Lower Gasport Formation	aquifer	dolomitic limestone, dolostone	Guelph, Puslinch
	Oldest – 13	Cabot Head Formation	aquitard	shale	

The majority of domestic and commercial/industrial water users in the general area around the Site draw groundwater from the upper bedrock system within the Guelph Formation, whereas municipal groundwater supply wells generally draw water from the Gasport Formation.

5.0 Field Study

5.1 Test Pit Investigation

A Site investigation was completed by representatives from Crozier on June 7, 2023. The purpose of the investigation was to characterize the soils and groundwater conditions in potential areas for the leaching bed. A mini excavator was used to excavate two test pits in the potential leaching bed areas to a maximum depth of 2.10 m below grade. The test pit locations were approximately located in the field by Crozier referencing property lines and other Site features and are illustrated on Figure 7. Test pit logs are enclosed in Appendix C.

The general soil stratigraphy encountered in the test pits consisted of a 0.10 – 0.20 m thick layer of surficial topsoil. The topsoil is underlain with deposits of sandy silt and silty sand with some stones and boulders that extend from 0.20 to approximately 1.0 m below the ground surface. Extending to the maximum depth of 2.10 m, the silty sand and sandy silt deposits were thicker consisting of more silt and trace clay material. Fill material consisting of old bricks and presumed non-native soils was encountered in TP-1 at 0.9 m to 1.3 m. Fill material consisting of white stones was also encountered in TP-2 at 0.40-0.45 m.

Groundwater was encountered in one test pit (TP-1) at a depth of approximately 1.20 m below grade. The test pit was dug to a maximum depth of 1.30 m and the test pit walls caved in at 1.30 m below grade. No free groundwater was identified in TP-2 or TP-3 and the test pit walls were observed to be stable.

Representative samples of the soils were collected from the test pits for visual examination of the density, colour, moisture content, plasticity, and texture. A sample from TP-3 was submitted to Chung & Vander Doelen (CVD) Engineering Ltd. for particle size distribution analysis. The laboratory test results are enclosed in Appendix D.

Referring to Supplementary Standard SB-6 of the 2012 Ontario Building Code (OBC) and the results of the particle size distribution analysis for the soil sample obtained from the test pits, the predominant soil is classified as SM soil as described by the Unified Soil Classification System. An SM soil is a silty sand, or sand and silt mix with a percolation rate ranging from 8 min to 20 min/cm. Based on the percentage of sand in this soil sample, a percolation rate of 15 min/cm has been assigned for the sewage system design.

5.2 Monitoring Well Construction

On April 12, 2023, CMT supervised the drilling and sampling of seven (7) boreholes across the Site, which included the installation of three (3) monitoring wells (BH4/MW4-23, BH5/MW5-23, and BH6/MW6-23). The boreholes and monitoring wells were installed to establish subsurface and groundwater conditions across the Site. At the time of the drilling, three (3) monitoring wells were also identified on Site (MW1-21, MW2-21, and MW3-21). According to the MECP well records, these monitoring wells were installed as part of a 2021 investigation by Aardvark Drilling Inc. Table 2 provides a summary of the construction details for each well.

Table 2: Monitoring Well Construction Details (Aardvark and CMT)

Monitoring Well	Total Depth (mbgs)	Screened Interval (m)	Screened Material
MW1-21	7.6	6.1-7.6	Silt and Gravel
MW2-21	10.7	9.1-10.7	Sand and Gravel
MW3-21	15.2	9.1-10.7	Silt, Sand and Gravel
BH4/MW4-23	6.1	3.1 – 6.1	Sand and Gravel
BH5/MW5-23	6.1	3.1 - 6.1	Sand and Gravel and Silty Sand
BH6/MW6-23	12.2	9.1 – 12.2	Sandy Silt

The monitoring well locations are shown on Figure 7 and the CMT monitoring well logs are included in Appendix E. Well records for the 2021 monitoring wells are also included in Appendix E.

5.3 Groundwater Monitoring

Groundwater level measurements were collected on April 19, 2023, June 7 2023, and July 21, 2023 by Crozier. Groundwater measurements were collected using an electric water level meter.

Groundwater levels and corresponding elevations are presented in Table 3.

Table 3: Groundwater Levels and Groundwater Elevations

		April 19, 2023		June 7, 2023		July 21, 2023	
Monitoring Well Location	Ground Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)	Static Level (mbgs)	Groundwater Elevation (masl)
MW1-21	327.60	3.41	324.19	3.87	323.73	5.27	322.33
MW2-21	326.88	3.01	325.87	-	-	4.03	324.85
MW3-21	326.95	5.47	321.48	5.75	321.20	5.88	321.07
MW4-23	321.81	0.38	321.43	1.14	320.67	1.04	320.77
MW5-23	325.82	0.42	325.40	1.27	324.55	1.77	324.05
MW6-23	328.84	5.08	323.76	6.56	322.28	6.04	322.80

As shown in Table 3, groundwater elevations ranged from 321.82 meters above sea level (masl) (0.38 mbgs) to 325.48 masl (5.47 mbgs) in April 2023. Groundwater elevations are presented on Figure 6. Based on the water levels collected to date, there appears to be a groundwater flow divide between the western and eastern portions of the Site, consistent with topography. Groundwater flow on the eastern portion of the Site is interpreted to flow primarily to the east/southeast, while groundwater flow on the western portion of the Site is interpreted to flow primarily to the west. The interpreted groundwater flow direction is shown on Figure 8.

Automatic water level loggers were also deployed into MW4-23, MW5-23, and MW6-23 to collect a more comprehensive dataset. Hydrographs are presented in Appendix F. As shown, the water levels appear to respond to precipitation events, demonstrated by the spikes in water levels following precipitation. In general, the water levels from April 2023 to July 2023 have decreased since installation.

6.0 Water Balance Assessment

A water balance assessment was conducted to assess potential impacts of the proposed development on the local groundwater conditions. It should be noted that the calculations below are preliminary and should be used for initial reference only.

The following subsections below outlines the pre- and post- development site infiltration and discusses the overall infiltration deficit due to increased imperviousness on the Site. Please refer to Appendix G for detailed calculations.

The results of the water balance analysis are summarized in Table 4 below.

Table 4: Water Balance Assessment Summary

Pre-Development Infiltration (mm/yr)	Post-Development Infiltration (mm/yr)	Infiltration Deficit (mm/yr)
264.96	59.61	205.34

6.1 Methodology

The water balance on site can be estimated from the following equation described in Thornthwaite and Mather 1957:

$$P = S + R + I + ET$$

where: P = precipitation

S = change in groundwater storage

R = surface water runoff

I = infiltration

ET = evapotranspiration/evaporation

The components of the water balance equation can be estimated using field observations of drainage conditions, land cover, soil types, groundwater conditions and local records.

The site-specific components of the water balance are discussed in detail below:

6.1.1 Precipitation (P)

The nearest climate station to the Site is located 20 km southwest of the Site and is known as Environment Canada Waterloo Wellington A Climate Station Number 6149387 (43°27'00.000" N, 80°23'00.000" W, elevation of 317 masl). Canadian climate normals from the Waterloo Wellington A Climate Station from 1981 - 2010 were used to complete the water balance calculations for the Site. The long-term monthly average for precipitation and climate is shown in Table 5 below.

Table 5: Climate Data Summary (1981 - 2010) for Waterloo Wellington A Climate Station

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Precipitation (mm)	65.2	54.9	61	74.5	82.3	82.4	98.6	83.9	87.8	67.4	87.1	71.2	916.3¹
Temperature (°C)	-6.5	-5.5	-1	6.2	12.5	17.6	20	18.9	14.5	8.2	2.5	-3.3	7²

1. Total average annual precipitation from 1981 – 2010.
2. Average annual temperature from 1981 – 2010.

Therefore, based on the data above, the long-term annual average precipitation for the area is **916.3 mm/year** and the long-term average temperature for the subject area is **7 °C**.

6.1.2 Storage (S)

Long-term groundwater storage (S) is assumed to be negligible as no evidence of groundwater impact on significant groundwater pumping or withdrawal is noted in regional studies of the area. The seasonal changes in water levels are expected to balance annually.

6.1.3 Evapotranspiration/Evaporation (ET)

The rate of evapotranspiration is a function of the water holding capacity of the soil, soil and vegetation type and land cover.

Through the Thornthwaite and Mather method or a soil moisture balance approach and local climate data, the Potential Evapotranspiration (PET) and the Actual Evapotranspiration (AET) can be calculated (see Appendix G) using the following equations:

$$PET = 16 \times \left(\frac{10T_a}{H_i} \right)^\alpha$$

Where: T_a = average daily temperature, 0 degrees for negative temperature months

H_i = heat index value, assuming 12 hours per day, 30 days a month of daylight

The average heat index value is estimated using the following equation:

$$H_i = \sum_{i=1}^{12} \left(\frac{10T_a}{5} \right)^{1.514}$$

The evapotranspiration factor (α) is determined using the following equation:

$$\alpha = 0.49 + (0.0179 \times H_i) - (0.0000771 \times H_i^2) + (0.000000675 \times H_i^3)$$

PET is adjusted to account for the average number of hours of daylight per month for a given location. The adjustment factor is dependent on the Site's latitude and is presented in Appendix G (Thornthwaite and Mather, 1957). The PET is multiplied by the adjustment factor per month to determine the Adjusted Potential Evapotranspiration (PET_{adj}).

The Actual Evapotranspiration (AET) is determined using the following equation:

$$AET = PET_{adj} - \Delta S$$

The Change in Soil Storage (ΔS) is depended on the types of soil on the property and the Accumulated Potential Water Loss (APWL) per month. The Change in Soil Storage and Accumulated Potential Water Loss can be calculated using the following equations:

$$\Delta S = S_{mc} \times e^{\left(\frac{APWL}{S_{mc}}\right)}$$

Where: S_{mc} = soil moisture capacity

APWL = accumulated potential water loss

$$\text{For } \Delta P < 0: APWL = -\sum_{i=0}^{12} PET_i$$

$$\text{For } \Delta P < 0: APWL = \frac{\ln\left(\frac{AET - PET}{S_{mc}}\right)}{S_{mc}}$$

As discussed in Section 5 above, the soils on the property were determined to be silty sand to sandy silt. Using the Ministry Environment, Conservation and Parks (MECP) Stormwater Management and Design Manual Table 3.1. (2003), the soil moisture capacity was estimated to be 100 mm for silty sand soils for within pasture/shrubs (Catchment 101) and 250 mm year for silty sand soils within mature forests (Catchment 102). Therefore, based on local climate conditions the Actual Evapotranspiration (AET) is calculated to be 585 mm/year.

6.1.4 Water Surplus (R + I)

The difference between mean annual P and mean annual ET outputs the amount of water surplus for the Site. The water surplus either infiltrates (I) into the soil or travels across the Site as runoff (R).

The distribution of water that infiltrates into the soil is a function of an infiltration factor as described in Table 3.1 of the MECP Stormwater Management Planning and Design Manual (MECP, 2003). The infiltration factor for each catchment area was determined using the MECP methodology. The water balance components were used to estimate the pre-development and post-development water balance scenarios. Detailed water balance calculations for the Site can be seen in Appendix G.

6.1.5 Soil Moisture Determination

Using monthly soil-moisture calculations, the pre-development infiltrations and runoff volumes were determined for the existing area conditions. This method assumes that the soil does not release water as potential recharge while a soil moisture deficit exists. In the wet season, excess precipitation first restores soil moisture then infiltrates or contributes to indirect runoff.

A soil moisture capacity of **100 mm** and **250 mm** was used for the different land uses, using Table 3.1 of the Ontario Stormwater Management and Design Manual (Government of Ontario, 2003). A higher soil moisture capacity was used for wooded areas. Using the soil moisture capacity values and several other parameters, the monthly potential evapotranspiration and the actual evapotranspiration were calculated. The water balance components were used to estimate the pre-development and post-development water balance scenarios. Detailed water balance calculations for the Site can be seen in Appendix G.

6.2 Pre-Development Infiltration

The pre-development site wide water balance was calculated using the pre-development drainage catchments shown in Figure 1 – Pre-Development Drainage Area Plan (Crozier, October 2023). Catchment Areas and percent imperviousness is shown Table 6 below.

Table 6: Summary of Pre-Development Drainage Catchments (Crozier, October 2023)

Catchment ID	Land Area (m ²)	Percent Impervious
101	8,099	0
102	8,102	0

1. Estimated using Urban Storm Drainage Criteria Manual Volume 1 and field observations.

Based on the water balance components, the pre-development infiltration value for the Site is calculated to be approximately **4,292 m³/yr** or **264.96 mm/yr**.

6.3 Post-Development Infiltration

The post-development site wide water balance was determined using the areas and imperviousness percentages presented in Figure 2 – Post-Development Drainage Area Plan (Crozier, October 2023). The catchment areas and percent imperviousness are shown in Table 7.

Table 7: Summary of Post-Development Drainage Catchments (Crozier, October 2023)

Catchment ID	Area (m ²)	Percent Imperviousness (%)
201	1,875	0
202	13,505	0.88
203	821	0

Based on the water balance components, the calculated post-development infiltration volumes are estimated to be **965.8 m³/yr** or **59.6 mm/yr**. In comparing the pre and post development infiltration volumes, the proposed development has the potential to reduce infiltration by approximately **78%**.

6.4 Water Balance Impact Assessment

Without mitigation strategies, the proposed development of the Site has the potential to impact the natural water balance of the Site and impact the surrounding area. The proposed development will introduce impervious surfaces and in turn, decrease soil infiltration in the area. The removal of vegetation combined with the reduction in soil infiltration will result in most of the precipitation to become surplus water and direct runoff from the development.

Increased runoff from the development and reduction in soil infiltration can be addressed using appropriate stormwater management (SWM) techniques and the introduction of LID structures. To achieve water balance, a deficit of **205 mm/yr** must be mitigated. LID strategies have not been proposed as the major use of the proposed development will be a gas station and LID features could cause hydrocarbons to infiltrate into groundwater. Refer to the Functional Servicing and Stormwater Management Report (Crozier, 2023) for additional information.

7.0 Water Supply Assessment

There are no municipal water services in the vicinity of the Site, therefore the proposed development will be serviced with a water supply well. As presented in the Functional Servicing and Stormwater Management Report (Crozier, 2023), the calculated water demands for the proposed development is 6.94 L/min (average day), 13.89 L/min (maximum day), and 27.78 L/min (peak hour). Based on the review of the well records in the vicinity of the Site (refer to Section 4.4), the majority of the bedrock wells report well yields far greater than the peak hour demand. According to the MECP Well Record, the existing onsite well (Well ID 6707585) has sufficient yield (30.3 L/min) to meet the peak hour demand for the proposed development. However, the well location conflicts with development plans and therefore a new water supply well is proposed. Refer to the Functional Servicing and Stormwater Management Report (Crozier, 2023) for further discussion.

It is Crozier's opinion that a water supply well installed within bedrock should be able to provide sufficient yield to meet the proposed development's demands. However, this should be confirmed following well installation and completion of a pumping test. Water quality samples should also be collected during well testing to confirm water quality and determine if any water treatment is required.

8.0 Groundwater Impact Assessment

MECP Guideline B-7 "Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities", also known as the Reasonable Use Policy, was developed to establish what constitutes a reasonable expectation of the use of groundwater, and to examine how development can contribute to a reduction in groundwater quality. According to the Reasonable Use Policy, the reasonable use of groundwater is generally accepted to be drinking water. Onsite sewage systems can contribute nitrate nitrogen to the shallow groundwater regime, which may impact drinking water quality. Therefore, the impact of a proposed onsite sewage system must be examined to ensure that downgradient groundwater users have access to a safe and reliable drinking water supply.

As presented in the Functional Servicing and Stormwater Management Report (Crozier, 2023), the total daily design sewage flow for the proposed onsite sewage system is 20,000 L/day. Therefore, an impact assessment in accordance with Chapter 22 – Large Subsurface Disposal Systems of the MECP Design Guidelines for Sewage Works (2008) is required.

8.1 Attenuation Zone

An attenuation zone has been estimated for the proposed leaching bed based on the methodology outlined in Chapter 22 of the MECP Design Guidelines for Sewage Works (2008). The attenuation zone is based on an interpreted westerly shallow groundwater flow direction as shown on Figure 9. The western property boundary is therefore identified as the downgradient receiver.

As shown, the attenuation zone area is approximately 700 m² (0.07 ha) and was used for the impact assessment calculations below.

8.2 Groundwater Impacts

According to Chapter 22 – Large Subsurface Disposal Systems, the target effluent concentration of nitrate-nitrogen is calculated as follows:

$$C_{effluent} = C_{max} (V_{effluent} + V_{influent}) / V_{effluent}$$

Where **C_{effluent}** is the concentration of nitrate-nitrogen required in the effluent to meet the maximum allowable concentration at the receptor.

C_{max} is the maximum allowable concentration of nitrate-nitrogen at the downgradient boundary.

V_{influent} is the volume of infiltration based on an infiltration rate of 250 mm/m²/year over the area of the attenuation zone available for infiltration (e.g., dilution area).

V_{effluent} is the average volume of treated effluent discharged to the leaching bed. As noted above, the maximum daily volume to be discharged to each leaching bed is 20,000 L/day. Applying a peaking factor of 2, the average value is expected to be 10,000 L/day.

According to Chapter 22 – Large Subsurface Disposal Systems, the maximum allowable concentration of nitrate-nitrogen in the groundwater plume at the property boundary is 2.5 mg/L. Therefore, **C_{max}** has been assigned a value of 2.5 mg/L.

Table 8 outlines these parameters for the sewage system design. Calculations can be found in Appendix H.

Table 8: Groundwater Impact Assessment Parameters

Parameter	Subsurface Discharge System
Area of Dilution (ha)	0.08 ha ¹
Average volume of effluent (L/day)	10,000 ²
V_{influent} (m ³ /year)	6,698
V_{effluent} (m ³ /year)	6,023
C_{max} (mg/L)	2.5
C_{effluent} (mg/L)	2.64

1. Estimated Area of the attenuation zone available for infiltration (e.g., dilution area).
2. Estimated average day effluent flow.

As shown in Table 8, the maximum allowable concentration of nitrate nitrogen permitted in the effluent is 2.64 mg/L. Given the conservative assumptions applied in the calculations above, an effluent objective of 3 mg/L for the treatment works is recommended. Denitrification will be required as part of the advanced treatment system to meet the effluent objective for nitrate-nitrogen.

8.3 Impact on Onsite and Local Water Supply Wells

As discussed in Section 4.4.1., the MECP well database identified one (1) well onsite. This well is 6-inch in diameter and was installed approximately 29 mbgs into bedrock. As shown on Figure 6, this well is located approximately 65 m from the proposed leaching bed, which is greater than the minimum setback requirements per OBC (15 m). This well is also hydraulically upgradient of the of the leaching bed and associated attenuation zone. Due to the depth (29 mbgs) and location (hydraulically upgradient of the leaching bed), we do not anticipate the well to be impacted from treated effluent in the shallow groundwater. Furthermore, the effluent objective for the treatment works (3 mg/L) is less than the Ontario Drinking Water Quality Standard Maximum Allowable Concentration (ODWQS MAC) for nitrate (10 mg/L). As outlined in the Functional Servicing and Stormwater Management Report (Crozier, 2023), this well is proposed to be decommissioned once the Site is developed and a new well will be installed. The new well is proposed to be installed within bedrock approximately 47 m southeast of the proposed leaching bed. Given the above, we do not anticipate any significant impacts to water quality on the existing or proposed water supply wells from the onsite sewage system.

As shown on Figure 6, there is one (1) well adjacent to the western Site boundary which would be considered hydraulically downgradient of the leaching bed and associated attenuation zone. This well (Well ID 7399815) is a monitoring well, which would not be used for drinking water purposes. According to the MECP well record search, there are no domestic water supply wells immediately downgradient of the leaching bed or attenuation zone. The closest water supply wells to the leaching bed are Well IDs 6702527 and 7202412. These wells are approximately 175 m south and 275 m southwest, respectively, from the leaching bed. Considering these wells are hydraulically upgradient or cross-gradient of the leaching bed, no significant drinking water impacts are anticipated to these water supply wells.

8.4 Impact on Local Municipality Supply Wells

Based on the review provincial Source Protection mapping (Ontario Source Protection Information Atlas, 2023), the Site is not located within any Wellhead Protection Areas (WHPAs) or within a Highly Vulnerable Aquifer (HVA). The nearest municipal water supply well is located approximately 8 km north in the City of Guelph. Therefore, there are no anticipated impacts to local municipal supply wells from the proposed onsite sewage system.

8.5 Proposed Sewage System Effluent Criteria

The effluent criteria for the proposed new centralized onsite sewage system have been selected in accordance with the groundwater impact assessments completed above. The effluent criteria are shown in Table 9.

Effluent objectives and limits for biochemical oxygen demand (BOD) and total suspended solids (TSS) are consistent with Sentences 8.6.2.2 and 8.9.2.3 of the OBC. The effluent objective for nitrate-nitrogen is based on the impact assessment completed above.

Table 9: Proposed Effluent Criteria

Parameter	Unit	Effluent Objective (mg/L)	Effluent Limit (mg/L)
Biochemical Oxygen Demand (BOD)	mg/L	10	20
Total Suspended Solids (TSS)	mg/L	10	20
Nitrate-nitrogen	mg/L	3	--

9.0 Conclusions and Recommendations

Based on the foregoing, Crozier offers the following conclusions and recommendations:

- The surficial soils on the Site are primarily silty sand to sandy silt, above sand and gravel.
- Groundwater was encountered in the silty sand and sand and gravel units. Manual groundwater levels ranged from 321.82 meters above sea level (masl) (0.38 mbgs) to 325.48 masl (5.47 mbgs) in April 2023.
- Based on the water levels collected to date, there appears to be a groundwater flow divide between the western and eastern portions of the Site, consistent with topography. Groundwater flow on the eastern portion of the Site is interpreted to flow primarily to the east/southeast, while groundwater flow on the western portion of the Site is interpreted to flow primarily to the west.
- A pre- to post-development water balance assessment was conducted for the property based on the Site Plan by ATA Architects Inc. dated October 4, 2023. Pre-development infiltration rates have been estimated to be 264.96 mm/yr. Post-development infiltration rates have been estimated to be 59.6 mm/yr.
- Based on a review of the surrounding well records, it is Crozier's opinion that a water supply well installed within bedrock should be able to provide sufficient yield to meet the proposed development's demands. However, this should be confirmed following well installation and completion of a pumping test. Water quality samples should also be collected during well testing to confirm water quality and determine if any water treatment is required.
- A groundwater impact assessment was conducted to estimate potential impacts from the onsite sewage system on downgradient receivers. Denitrification will be required for the onsite sewage system to meet Reasonable Use and other applicable guidelines.
- An effluent objective of 3 mg/L for nitrate-nitrogen is recommended. Proposed effluent objectives and limits for BOD and TSS are 10 mg/L and 20 mg/L, respectively, in accordance with OBC.

10.0 References

Chapman and Putnam. 1984. The Physiography of Southern Ontario.

Golder Associates Ltd., 2011. City of Guelph Tier Three Water Budget and Local Area Risk Assessment Appendix A: Characterization Final Report.

Ministry of Environment Conservation and Parks. Source Water Protection Information Atlas. Accessed January 2023.

Ministry of Environment Conservation and Parks. Map: Water Well Records. Accessed July 2023.

Ontario Geological Survey Geological Maps and Digital Data Index. Retrieved from:
<https://data.ontario.ca/dataset/ontario-geological-survey-geological-maps-and-digital-data-index>.

Singer, S.N., C.K. Cheng and M.G. Scafe. 2003. The Hydrogeology of Southern Ontario, 2nd Edition. Environmental Monitoring and Reporting Branch, Ontario Ministry of the Environment. Toronto, Canada.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Jessica Doherty, P.Eng.
Project Manager

Al/jd/rl:tc

C.F. CROZIER & ASSOCIATES INC.

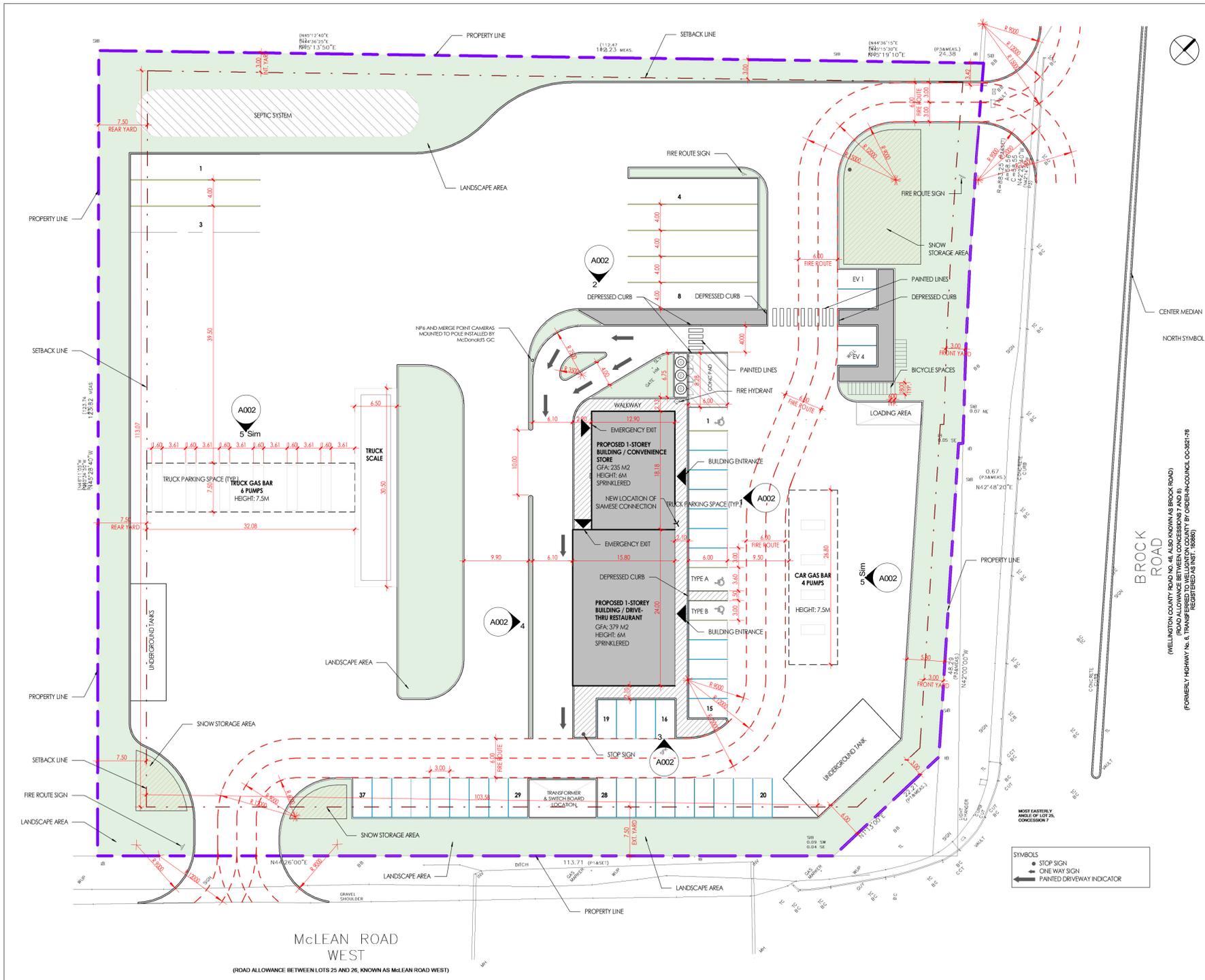


Katherine Rentsch, P.Eng.
Senior Project Manager

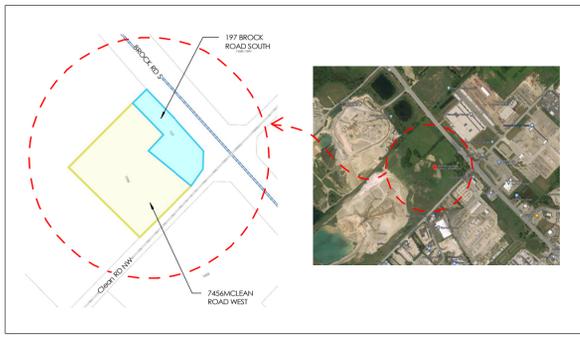
J:\Crozier-Files\Projects\2300\2377 - Black-Hart Construction\6556- 7456 McLean Road and 197 Brock Road South\Reports\Hydrogeological\2023.10.16_Hydrogeological Assessment Report.docx

APPENDIX A

Site Plan



1 00 - SITE PLAN
1:350



KEY PLAN
1:100

HC ZONE REQS	REQUIRED	PROPOSED
PERMITTED USES	SEE TABLE 8.1 ZONING BY LAW	GAS BAR(S), CONVENIENCE STORE AND RESTAURANT
LOT AREA (MIN)	0.4 HA	1.62 HA
LOT FRONTAGE (MIN)	20 M	101 M
FRONT YARD (MIN)	3 M	3 M
INTERIOR SIDE YARD (MIN)	3 M	3 M
EXTERIOR SIDE YARD (MIN)	7.5 M	7.5 M
REAR YARD (MIN)	7.5 M	3 M
RESTAURANT AREA		379 m ²
CONVENIENCE STORE		235 m ²
GAS BAR CANOPY (CARS)		201 m ²
GAS BAR CANOPY (TRUCKS)		241 m ²
TOTAL BUILDINGS / STRUCTURE AREA		1,056 m ²
LOT COVERAGE (MAX)	45%	6.5%
LANDSCAPED OPEN SPACE	25%	24%
PARKING SPACES:		
GAS BAR(S) - CARS	(1 PER PUMP) = 4	REFER TO PARKING SCHEDULE BELOW
GAS BAR(S) - TRUCKS	(1 PER PUMP) = 6	8
CONVENIENCE STORE	(1 PER 20 M ²) = 12	REFER TO PARKING SCHEDULE BELOW
RESTAURANT	(1 PER 10 M ²) = 38	REFER TO PARKING SCHEDULE BELOW
TOTAL	60	49

PARKING SCHEDULE	
TYPE OF PARKING SPACE	PROVIDED PARKING SPACE
ACCESSIBLE PARKING - TYPE A	2
ACCESSIBLE PARKING - TYPE B	1
TRUCK PARKING SPACE	8
TYPICAL PARKING SPACE	38
TOTAL:	49

5.2.15 BICYCLE PARKING

A. BICYCLE PARKING SPACES SHALL BE REQUIRED FOR THE USES LISTED IN TABLE 5.6 BELOW (FROM ZONING BY LAW) IN ADDITION TO ANY REQUIRED PARKING SPACES.

B. EACH BICYCLE PARKING SPACE SHALL BE A MINIMUM OF 60 CENTIMETERS WIDE AND 1.8 METERS LONG.

REQUIRED BICYCLE BY ZONING: 16
PROPOSED BICYCLE IN SITE PLAN: 19

USE	REQUIRED PARKING STANDARDS (PER NET FLOOR AREA)
Retail, personal, institutional	The greater of 2 spaces or 1 space /1000 m ²
Industrial	2 /1,000 m ²
Long term care facility, retirement home	The lesser of 5 or 0.25 per bed or dwelling unit
Public and private school	1 /10 students of design capacity & 1 space/35 employees
Dwelling units or mixed-use buildings with more than 6 dwelling units	2 spaces for the first 6 dwelling units plus 2 spaces for each additional 6 dwelling units or fraction thereof

2 SITE STATISTICS & TABLES
1:120

NOTE:
THE ARCHITECTURAL SITE PLAN IS FOR GENERAL ARRANGEMENT ONLY. REFER TO THE LANDSCAPE DRAWINGS, THE CIVIL ENGINEERING DRAWINGS AND THE SURVEY FOR LANDSCAPING, GRADING AND SERVING DETAILS.

REVISION

NUMBER	DATE	REMARKS
005	2023 10 04	FOR CLIENT REVIEW
004	2023 09 27	FOR CLIENT REVIEW
003	2023 08 28	FOR CLIENT REVIEW
002	2023 05 24	FOR CLIENT REVIEW
001	2023 01 05	DRAFT SITE PLAN

CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS AND CONDITIONS ON THE PROJECT AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK. DRAWINGS ARE NOT TO BE SCALED.

CONTRACT DOCUMENTS ARE THE COPYRIGHT OF THE CONSULTANTS AND SHALL NOT BE USED OR REPRODUCED WITHOUT AUTHORIZATION. DOCUMENTS ARE TO BE RETURNED UPON COMPLETION OF THE PROJECT.

ATA ARCHITECTS
ATA ARCHITECTS INC.
BURLINGTON OFFICE:
3221 NORTH SERVICE ROAD, SUITE 101
BURLINGTON, ONTARIO, L7N 3G2.
T 905 849 6888 F 905 849 4369
E admin@ataarchitectsinc.com

SEALS

PROJECT

PROPOSED GAS BARS,
RETAIL STORE &
DRIVE-THRU RESTAURANT
7456 MCLEAN ROAD W,
PUSLINCH, ON NOB 2JO

DRAWING

SITE PLAN & KEYPLAN

DRAWN

AA

SCALE

As indicated

DATE

2023 10 04

CHECKED

AT

PROJECT

#TBD

DRAWING

A001

APPENDIX B

Well Record Summary Table

MECP WATER WELL RECORDS

Project Number: 2377-6556
Prepared by: A,C/A,L

Address: 7456 McLean, Puslinch
Date completed: 2023-08-22

Well ID	Inside Diameter (cm)	Depth (m)	Static Level (m)	Quantity (Lpm)	Quality	Materials	Aquifer ¹	Use	Location	Notes	Date Completed
7414795	5.1	4.6	3.05	N/A	Untested	Black loam / brown fill / grey clay	OB	Monitoring	Lot 25, Concession 7		2021-12-29
7412600	5.1	16.8	15.24	N/A	Untested	Brown sand / brown clay / brown sand	OB	Monitoring	Lot 26, Concession 8		2022-02-10
7406730	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-24
7406699	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-24
7406698	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-25
7406693	5.1	3.9	N/A	N/A	Untested	Brown rock / brown sand / grey silt	OB	Monitoring	Lot 26, Concession 8		2021-11-25
7399817	5.1	9.1	6.10	N/A	Untested	Black loam / brown clay / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-09-08
7399816	5.1	7.6	4.57	N/A	Untested	Black loam / brown clay / grey silt / grey sand	OB	Monitoring	Lot 25, Concession 7		2021-09-08
7399815	5.1	7.6	4.57	N/A	Untested	Black loam / brown clay / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-09-08
7399813	5.1	7.6	N/A	N/A	Untested	Black loam / brown clay / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-09-09
7394717	5.1	10.7	N/A	N/A	Untested	Brown sand / grey sand	OB	Monitoring	Lot 25, Concession 7		2021-06-29
7394716	5.1	15.2	N/A	N/A	Untested	Brown sand / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-06-29
7394715	5.1	15.2	N/A	N/A	N/A	Brown silt / grey silt	OB	Monitoring	Lot 25, Concession 7		2021-06-28
7357994	15.9	N/A	12.19	N/A	Clear	N/A	N/A	N/A	Lot 26, Concession 8	Well head upgrade	2020-04-09
7353361	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Concession 7		2020-01-13
7331341	5.1	6.1	N/A	N/A	Untested	Brown sand	OB	Test hole	Lot 25, Concession 7		2019-03-05
7331340	5.1	7.6	N/A	N/A	N/A	Sand	OB	Test hole	Lot 25, Concession 7		2019-03-05
7317763	15.2	N/A	N/A	N/A	Disinfected	N/A	N/A	N/A	N/A	Well head upgrade	2018-08-17
7296634	5.1	6.7	N/A	N/A	N/A	Sand	OB	Test hole / monitoring	Lot 25, Concession 8		2017-09-08
7296633	5.1	6.9	N/A	N/A	N/A	Sand	OB	Test hole / monitoring	Lot 25, Concession 8		2017-09-05
7291411	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		2017-06-14
7291402	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		2017-06-14
7230460	5.2	9.2	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230459	5.2	10.7	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230458	5.2	6.1	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230457	5.2	9.2	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7230456	5.2	6.1	N/A	N/A	N/A	Topsoil / fine sand	OB	Monitoring	N/A		2014-07-25
7220822	5.1	6.1	N/A	N/A	N/A	Sand / till	OB	Monitoring	Lot 25, Concession 8		2013-05-03
7214833	15.9	61.3	14.20	113.6	N/A	Clay / gravel / limestone	BR	Domestic	Lot 25, Concession 8		2013-07-30
7214832	15.9	61.0	13.60	113.6	N/A	Clay / boulders / gravel / limestone	BR	Domestic	Lot 25, Concession 8		2013-08-08
7202412	5.1	10.9	N/A	N/A	N/A	Sand / silt	OB	Test hole	N/A		2013-03-03
7201847	12.0	21.8	15.30	N/A	N/A	Native / bentonite / pea stone	OB	Not used	Lot 25, Concession 8	Abandonment record	2013-04-19
7199708	N/A	24.4	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2012-04-17
7189280	15.6	54.9	15.80	60.6	N/A	Clay / gravel / rock	BR	Industrial	Lot 25, Concession 8		2012-09-12
7189279	15.6	54.9	15.80	60.6	N/A	Clay / gravel / rock	BR	Industrial	Lot 25, Concession 8		2012-09-13
7159585	5.1	8.8	N/A	N/A	N/A	Sand / silt	OB	Test hole	N/A		2011-01-28
7122497	5.0	7.6	N/A	N/A	N/A	Sand	OB	Monitoring	Lot 25, Concession 8		2008-07-15
7122497	N/A	N/A	1.40	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-15
7122497	N/A	N/A	4.00	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-15
7122497	N/A	N/A	4.00	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7122497	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7122497	N/A	N/A	2.20	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7122497	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 8		2008-07-16
7121698	15.9	44.2	13.10	170.3	N/A	Sand gravel / sand / coarse sand / limestone	BR	Commercial	Lot 26, Concession 8		2009-03-17
7112542	5.1	6.0	N/A	N/A	N/A	Sand / silt	OB	Monitoring	N/A	Cluster of wells	2008-08-14
7041704	15.9	65.2	12.80	56.8	N/A	Clay gravel / gravel / clay & stones / limestone	BR	Commercial, industrial	Lot 25, Concession 7		2007-01-06
7041703	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 5, Concession 7		2007-01-09
7039424	1.9	4.6	N/A	N/A	N/A	Brown sand	OB	Observation	Lot 25, Concession 7		2006-12-15
6716001	15.9	43.3	14.60	113.6	N/A	Clay & stones / gravel & sand / clay & gravel / limestone	BR	Domestic	Lot 26, Concession 7		2006-10-27
6715873	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 25, Concession 7		2006-08-05
6715825	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lot 26, Concession 7		2006-06-21
6715718	5.1	4.5	N/A	N/A	N/A	Sand / silt / clay	OB	Testing	Lot 26, Concession 7		2006-04-07
6715714	15.2	57.6	17.37	12.0	Clear, fresh, disinfected	Brown clay / brown gravel / brown rock / grey rock	BR	Commercial	Lot 26, Concession 7		2006-04-26
6713044	15.2	56.4	21.34	75.7	Clear, fresh	Brown clay / brown gravel / brown limestone	BR	Domestic	Lot 14, Concession 7		1999-07-01
6712209	15.2	36.6	11.90	75.7	N/A	loam / clay/ limestone	BR	Domestic	Lot 26, Concession 7		1997-04-02
6711872	15.2	73.2	13.10	151.4	N/A	Clay / sand / rock	BR	Industrial	Lot 26, Concession 8		1995-10-17
6711723	15.2	49.1	16.44	94.6	Clear, fresh	Brown clay / brown limestone / grey limestone	BR	Industrial	Lot 13, Concession 7		1995-06-15
6711713	15.2	48.8	4.00	170.3	N/A	Clay / sand / rock	BR	Industrial	Lot 26, Concession 7		1995-04-11
6711455	15.2	49.7	17.07	45.4	Clear, fresh	Sand / brown limestone / grey limestone	BR	Domestic	Lot 26, Concession 7		1994-07-06
6707585	15.2	29.0	4.60	30.3	N/A	Sandy clay / gravel / limestone	BR	Domestic	Lot 25, Concession 7		1981-03-26
6707241	30.5	25.0	3.96	26.5	Clear, fresh	Loam / brown clay / brown hardpan / brown rock	BR	Commercial	Lot 24, Concession 7		1980-02-21
6704401	15.2	19.2	3.05	94.6	Clear, fresh	Pit gravel / grey gravel / grey clay / grey limestone	BR	Domestic	Lot 24, Concession 7		1972-10-16
6703496	15.2	25.9	16.50	75.7	N/A	Clay / stones / limestones	BR	Domestic	Lot 25, Concession 8		1969-11-26
6702529	15.9	24.4	12.20	37.9	N/A	Clay / stones / gravel / limestone	BR	Domestic	Lot 26, Concession 7		1959-01-13
6702528	12.7	30.5	12.80	189.3	N/A	Clay / stones / gravel / rock	BR	Domestic	Lot 26, Concession 7		1966-08-16
6702527	15.9	20.7	12.20	75.7	N/A	Clay / sad / gravel	OB	Domestic	Lot 26, Concession 7		1966-10-19
MAX	30.5	73.2	21.34	189.3							
MIN	1.9	3.9	1.40	12.0							
AVERAGE	9.9	23.2	10.60	87.8							

Data Source: Ministry of the Environment, Conservation, and Parks, retrieved May 10, 2023

1. OB = Overburden Aquifer, BR = Bedrock Aquifer

APPENDIX C

Test Pit Logs



ONSITE SEWAGE SYSTEM TEST PIT LOG

Project Name: 7456 Mclean Road and 197 Brock Road South
Project Number: 2377-6556
Address: 7456 Mclean Rd W

Date: Wednesday June 7
Field Technician: AL&JG
Weather: 17°C and sunny

	GPS	Depth	Soil Description	Soil Sample	USCS Soil Classification	Groundwater Observations
Test Pit No. 1	17T	0 m - 0.2 m	TOPSOIL: Dark brown silty sand, moist, minor rootlets			Groundwater observations were made at 1.2m and walls were seen caving at 1.3m
	569773	0.2 m - 0.9 m	SILTY SAND: Brown silty sand, trace gravel with cobbles, trace clay, moist, medium grain	TP-1A		
	4812353	0.9 m - 1.3 m	FILL: silty sand fill, trace gravel stones, bricks found, damp,	TP-1B		
Test Pit No. 2	17T	0 m - 0.2 m	TOPSOIL: Dark brown silty sand, moist, minor rootlets			No groundwater observed. Test pit sidewalls relatively stable
	569751	0.2 m - 0.40 m	SILTY SAND: brown silty sand, trace stones	TP-2A		
	4812353	0.4 m - 0.45 m	FILL: light brown, fine grain sand, some stones	TP2-B		
		0.45 m - 1.20 m	SILTY SAND: Dark brown silty sand, trace clay, boulders, coarse grain	TP-2C		
		1.20 m - 2.0 m	SILT: Light brown silt with some clay, some stones	TP-2D		
Test Pit No. 3	17T	0 m - 0.3 m	TOPSOIL: Dark brown silty sand, moist, minor rootlets			No groundwater observed. Testpit sidewalls stable
	569885	0.3 m - 0.70 m	SILTY SAND: Dark brown silty sand, coarse grain, minor rootlets	TP-3A		
	4812416	0.7 - 1.40 m	SILTY GRAVELLY SAND: Brown silty sand, trace clay, trace stones, medium grained, boulders	TP-3B	SM	
		1.40 m - 2.1 m	SANDY SILT: Brown sandy silt, trace stones, medium grained, boulders	TP-3C		

APPENDIX D

Test Pit Grain Size Analysis



CHUNG & VANDER DOELEN
ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1
519-742-8979

July 4, 2023

File No.: M22543 (2377-6556)

Attn: Katherine Rentsch, P.Eng.
Crozier Consulting Engineers
2800 High Point Drive, Suite 100
Milton, Ontario
L9T 6P4

RE: Grain Size Analysis Test Result
7456 Mclean Road
Puslinch, Ontario

Chung & Vander Doelen Engineering Ltd. (CVD) is pleased to submit the enclosed grain size analysis test results for the above noted project.

Should you have any questions, please contact our office at your convenience.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

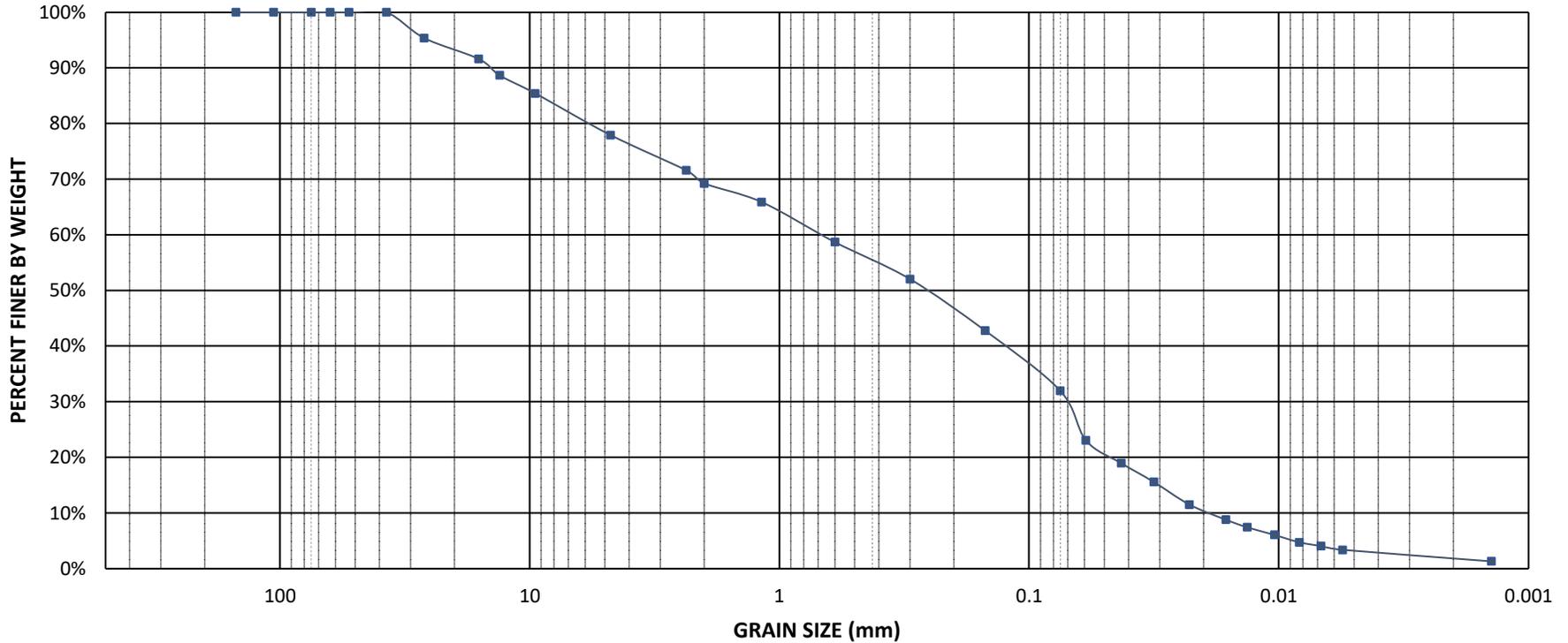


Hugh Arthur
Laboratory Supervisor

GEOTECHNICAL / CONSTRUCTION INSPECTION / MATERIALS TESTING
ENVIRONMENTAL SERVICES / WASTEWATER ENGINEERING / HYDROGEOLOGY

GRAIN SIZE DISTRIBUTION

Unified Soil Classification System						
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



LL	PL	PI	Cc	Cu	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	% Gravel	% Sand	% Silt	% Clay
			0.39	35.8	37.5	0.68	0.071	0.019	22.1%	45.9%	32.0%	

 CHUNG & VANDER DOELEN ENGINEERING LTD.	SAMPLE INFORMATION		PROJECT INFORMATION	
	Material Type:	Silty Gravelly Sand, trace Clay	Project:	7456 Mclean Road
	Lab No.:	771	Location:	Puslinch, Ontario
Sampled From:	TP3B (0.7 m - 1.3 m)	Client:	Crozier Consulting Engineers	
Sample No.:	1	File No.:	M22543 (2377-6556)	
Date Sampled:	-	Encl. No.:	1	
Sampled By:	Client			
Date Tested:	Wednesday, June 21, 2023			

APPENDIX E

Monitoring Well Logs and Well Records

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 323495

Type *

Construction Abandonment

Measurement recorded in: *

Metric Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Organization 2701267 Ontario Inc.	Email Address

Current Address

Unit Number	Street Number * 10480	Street Name * The Gore Road	City/Town/Village Brampton
Country Canada	Province Ontario	Postal Code L6P 0A6	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 7456	Street Name * McLeanRd W	Township Puslinch
Lot	Concession	County/District/Municipality WELLINGTON	
City/Town Puslinch	Province Ontario	Postal Code N0B 2J0	
UTM Coordinates	Zone * 17	Easting * 569893	Northing * 4812360
NAD 83			<input type="button" value="Test UTM in Map"/>
Municipal Plan and Sublot Number			

Other

3. Overburden and Bedrock Material *

Well Depth *	50	(ft)			
General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Silt	Sand	Gravel	0	20
Grey	Silt	Sand	Gravel	20	50

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	1	Concrete	0.33
1	2	Sand	0.33
2	29	Bentonite	8.83
29	35	Sand	1.96
35	50	Holeplug	4.91

5. Method of Construction *

- Cable Tool Rotary (Conventional) Rotary (Reverse) Boring Air percussion Diamond
 Jetting Driving Digging Rotary (Air) Augering Direct Push
 Other (specify) _____

6. Well Use *

- Public Industrial Cooling & Air Conditioning
 Domestic Commercial Not Used
 Livestock Municipal Monitoring
 Irrigation Test Hole Dewatering
 Other (specify) _____

7. Status of Well *

- Water Supply Replacement Well Test Hole
 Recharge Well Dewatering Well Observation and/or Monitoring Hole
 Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor Water Quality
 Abandoned, other (specify) _____
 Other (specify) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole or Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
2	Plastic	0.25	-3	30

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	10	30	35

10. Water Details

Water found at Depth (ft) Gas Kind of water Fresh Untested Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	50	8

12. Results of Well Yield Testing

Pumping Discontinued

Explain _____

If flowing give rate

Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

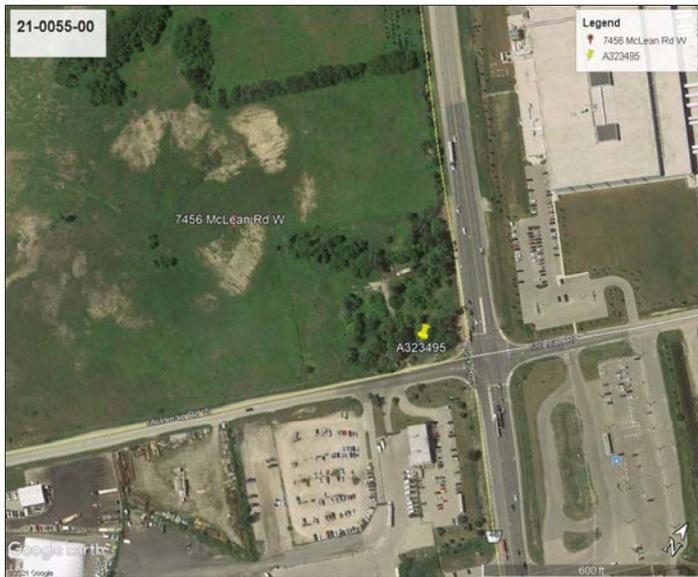
Clear and sand free Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. Make map area bigger



14. Information

Well owner's information package delivered <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
		2021/06/28

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Aardvark Drilling Inc.	7675

Business Address

Unit Number	Street Number	Street Name *
C	25	Lewis Road
City/Town/Village *	Province	Postal Code *
Guelph	ON	N1H 1E9

Business Telephone Number	Business Email Address
519-826-9340	info@aardvarkdrillinginc.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
England	Matt	3059

16. Declaration *

I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
England	Matthew	mengland@aardvarkdrillinginc.com

Signature	Date Submitted (yyyy/mm/dd)
Matt England Digitally signed by Matt England Date: 2021.08.09 14:31:18 -04'00'	2021/08/09

17. Ministry Use Only

Audit Number
9KUI ET4F

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 323496

Type *

Construction Abandonment

Measurement recorded in: *

Metric Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Organization 2701267 Ontario Inc.	Email Address

Current Address

Unit Number	Street Number * 10480	Street Name * The Gore Road	City/Town/Village Brampton
Country Canada	Province Ontario	Postal Code L6P 0A6	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 7456	Street Name * McLeanRd W	Township Puslinch
Lot	Concession	County/District/Municipality WELLINGTON	
City/Town Puslinch	Province Ontario	Postal Code N0B 2J0	
UTM Coordinates NAD 83	Zone * 17	Easting * 569853	Northing * 4812349
			Municipal Plan and Sublot Number Test UTM in Map

Other

3. Overburden and Bedrock Material *

Well Depth * 50	(ft)				
General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Sand	Gravel	Dense	0	21
Grey	Silt	Gravel	Dense	21	50

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	1	Concrete	0.33
1	24	Bentonite	7.52
24	31	Sand	2.29
31	50	Bentonite	6.21

5. Method of Construction *

- Cable Tool Rotary (Conventional) Rotary (Reverse) Boring Air percussion Diamond
 Jetting Driving Digging Rotary (Air) Augering Direct Push
 Other (specify) _____

6. Well Use *

- Public Industrial Cooling & Air Conditioning
 Domestic Commercial Not Used
 Livestock Municipal Monitoring
 Irrigation Test Hole Dewatering
 Other (specify) _____

7. Status of Well *

- Water Supply Replacement Well Test Hole
 Recharge Well Dewatering Well Observation and/or Monitoring Hole
 Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor Water Quality
 Abandoned, other (specify) _____
 Other (specify) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole or Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
2	Plastic	0.25	-3	25

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	10	25	30

10. Water Details

Water found at Depth 21 (ft) Gas Kind of water Fresh Untested Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	50	8

12. Results of Well Yield Testing

Pumping Discontinued

Explain _____

If flowing give rate

Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

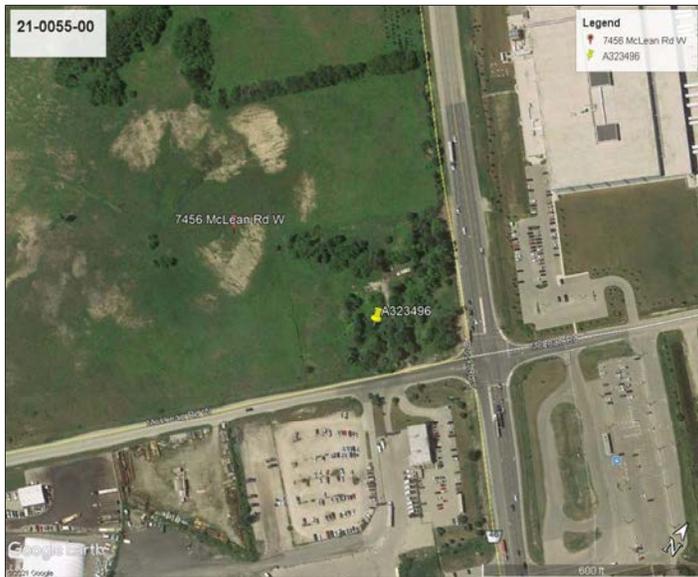
Clear and sand free Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. Make map area bigger



14. Information

Well owner's information package delivered <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) * 2021/06/29
Comments		

15. Well Contractor and Well Technician Information

Business Name of Well Contractor * Aardvark Drilling Inc.		Well Contractor's License Number * 7675	
Business Address			
Unit Number C	Street Number 25	Street Name * Lewis Road	
City/Town/Village * Guelph		Province ON	Postal Code * N1H 1E9
Business Telephone Number 519-826-9340		Business Email Address info@aardvarkdrillinginc.com	
Last Name of Well Technician * Bartley		First Name of Well Technician * Andrew	Well Technician's License Number * 3110

16. Declaration *

I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name England	First Name Matthew	Email Address mengland@aardvarkdrillinginc.com
Signature Matt England Digitally signed by Matt England Date: 2021.08.09 14:32:26 -04'00'		Date Submitted (yyyy/mm/dd) 2021/08/09

17. Ministry Use Only

Audit Number JKO8 VKOA

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A323497

Type *

Construction Abandonment

Measurement recorded in: *

Metric Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Organization 2701267 Ontario Inc.	Email Address

Current Address

Unit Number	Street Number * 10480	Street Name * The Gore Road	City/Town/Village Brampton
Country Canada	Province Ontario	Postal Code L6P 0A6	Telephone Number

2. Well Location

Address of Well Location

Unit Number	Street Number * 7456	Street Name * McLeanRd W	Township Puslinch
Lot	Concession	County/District/Municipality WELLINGTON	
City/Town Puslinch	Province Ontario	Postal Code N0B 2J0	
UTM Coordinates NAD 83	Zone * 17	Easting * 569861	Northing * 4812403
			Municipal Plan and Sublot Number Test UTM in Map

Other

3. Overburden and Bedrock Material *

Well Depth * 35	(ft)				
General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Sand	Gravel	Dense	0	21
Grey	Sand	Gravel	Dense	21	35

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	1	Concrete	0.33
1	2	Sand	0.33
2	29	Bentonite	8.83
29	35	Sand	1.96

5. Method of Construction *

- Cable Tool Rotary (Conventional) Rotary (Reverse) Boring Air percussion Diamond
 Jetting Driving Digging Rotary (Air) Augering Direct Push
 Other (specify) _____

6. Well Use *

- Public Industrial Cooling & Air Conditioning
 Domestic Commercial Not Used
 Livestock Municipal Monitoring
 Irrigation Test Hole Dewatering
 Other (specify) _____

7. Status of Well *

- Water Supply Replacement Well Test Hole
 Recharge Well Dewatering Well Observation and/or Monitoring Hole
 Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor Water Quality
 Abandoned, other (specify) _____
 Other (specify) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole or Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
2	Plastic	0.25	-3	30

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
2	Plastic	10	30	35

10. Water Details

Water found at Depth 21 (ft) Gas Kind of water Fresh Untested Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	35	8

12. Results of Well Yield Testing

Pumping Discontinued

Explain _____

If flowing give rate

Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

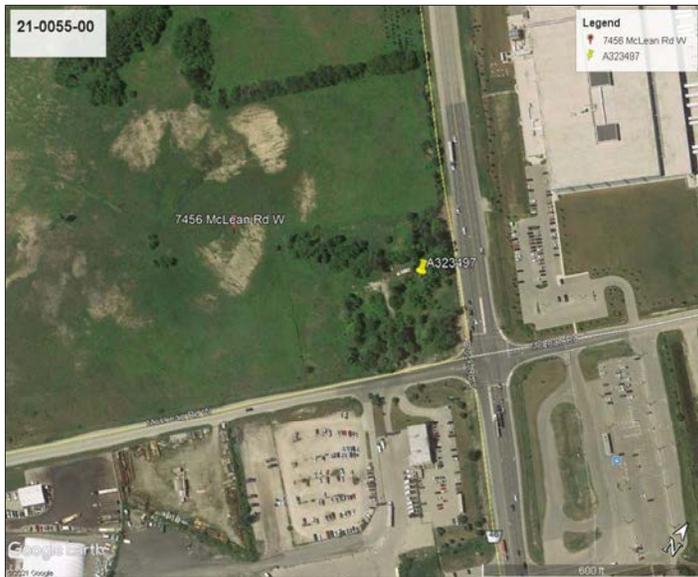
Clear and sand free Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. Make map area bigger



14. Information

Well owner's information package delivered <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
		2021/06/29

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Aardvark Drilling Inc.	7675

Business Address

Unit Number	Street Number	Street Name *
C	25	Lewis Road
City/Town/Village *	Province	Postal Code *
Guelph	ON	N1H 1E9

Business Telephone Number	Business Email Address
519-826-9340	info@aardvarkdrillinginc.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Bartley	Andrew	3110

16. Declaration *

I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
England	Matthew	mengland@aardvarkdrillinginc.com

Signature	Date Submitted (yyyy/mm/dd)
Matt England Digitally signed by Matt England Date: 2021.08.09 14:33:28 -04'00'	2021/08/09

17. Ministry Use Only

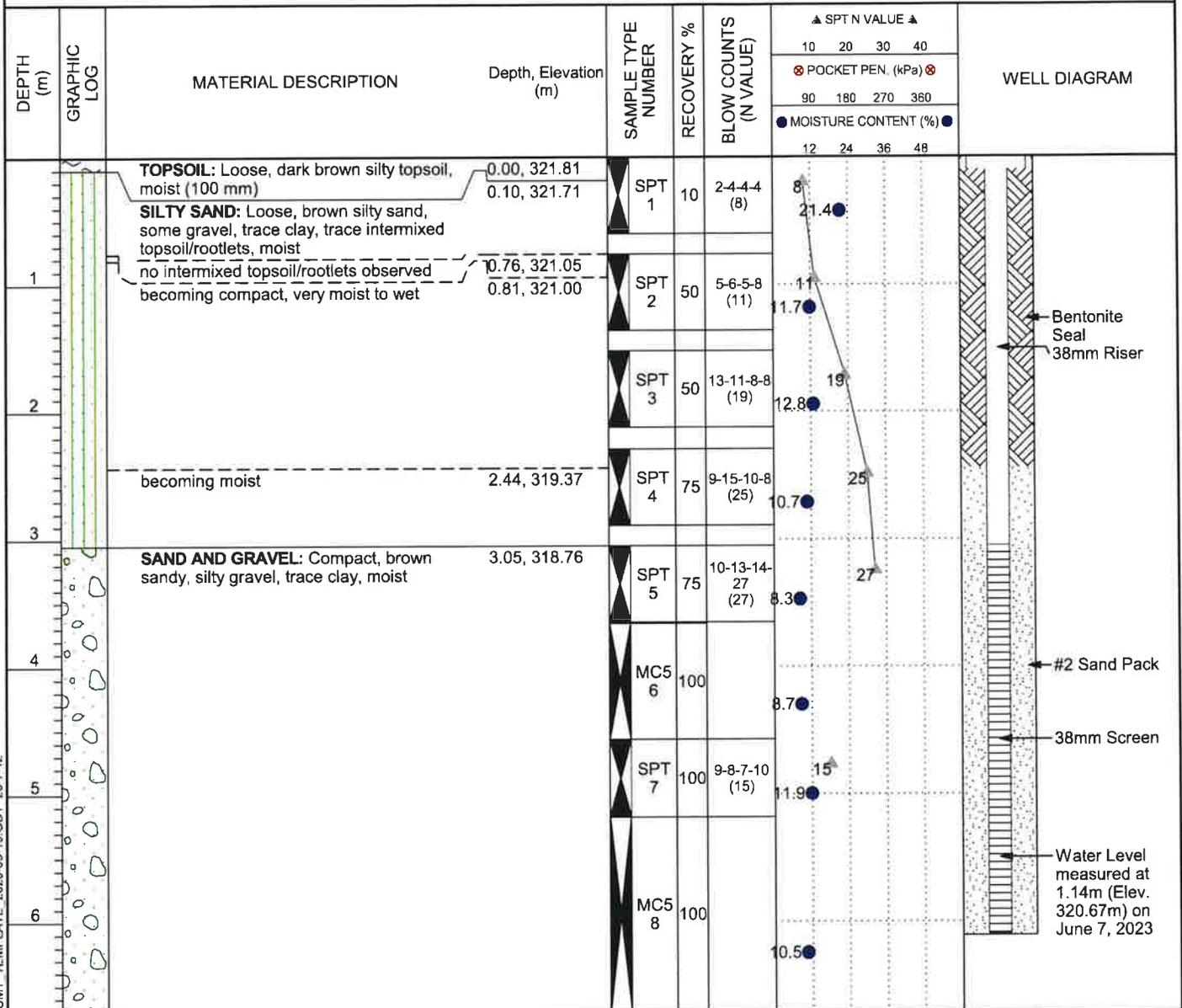
Audit Number
MIIO HQ93



CMT Engineering Inc.
 1011 Industrial Crescent
 St. Clements, Ontario, N0B 2M0
 Telephone: 519-699-5775
 Fax: 519-699-4664

BOREHOLE NUMBER 4

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT LOCATION: Puslinch, Ontario
PROJECT NUMBER: 23-133
DRILLING DATE: 23-4-12
DRILLING CONTRACTOR: CMT DRILLING INC.
DRILLING EQUIPMENT: Geoprobe 7822DT
GROUND ELEVATION: 321.81 m
LOGGED BY: BL
SAMPLING METHOD: SPT/MC5



Bottom of borehole at 6.71 m, Elevation 315.10 m.

Monitoring well installed at an elevation of approximately 315.71m on April 12, 2023.

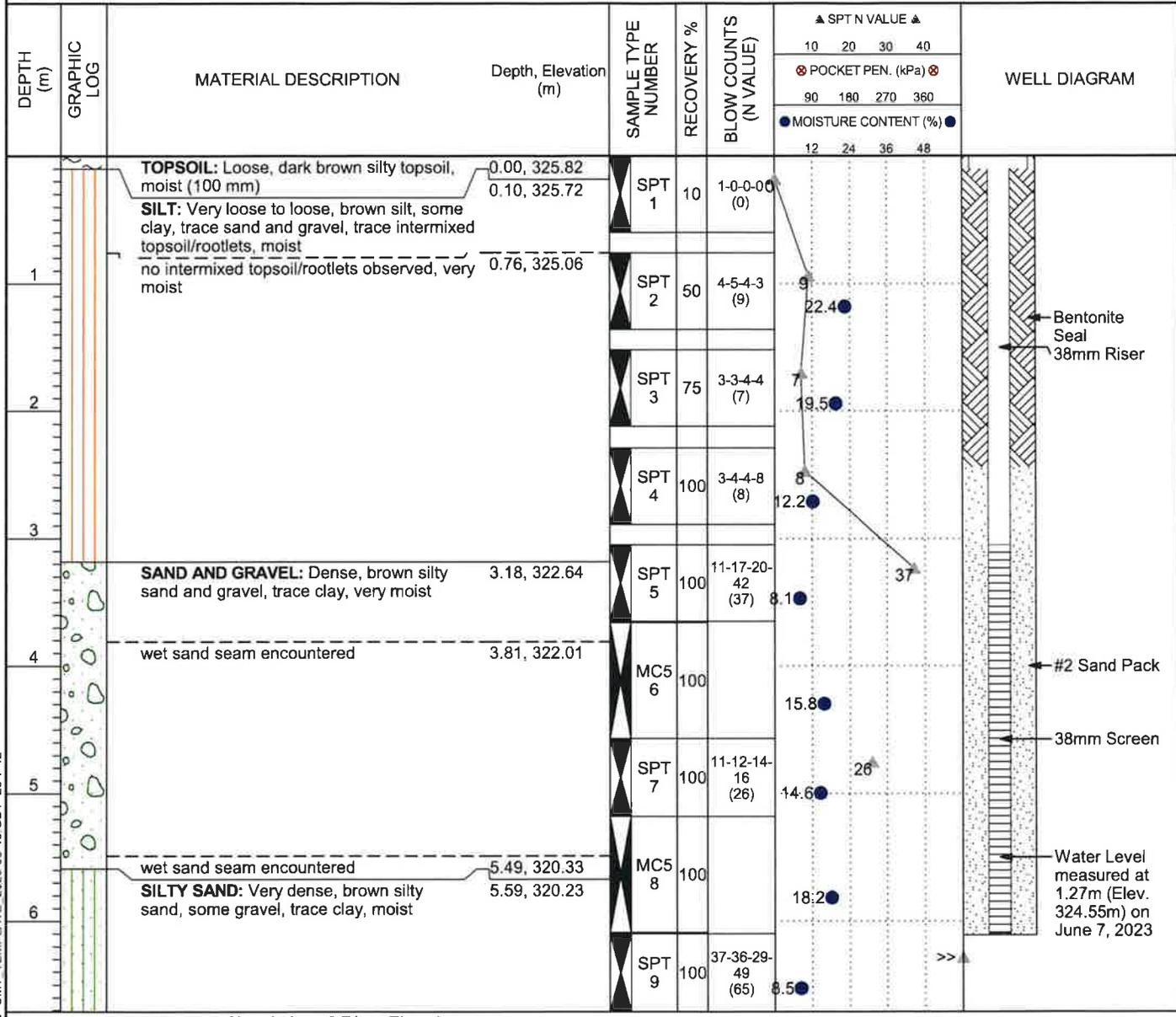
Groundwater measured at approximately 1.14m below the ground surface (Elev. 320.67m) on June 7, 2023.

BOREHOLE LOG WITH WELL2 23-133 - MW.GPJ CMT TEMPLATE 2020-05-15.GDT 23-7-12



CMT Engineering Inc.
 1011 Industrial Crescent
 St. Clements, Ontario, N0B 2M0
 Telephone: 519-699-5775
 Fax: 519-699-4664

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT LOCATION: Puslinch, Ontario
GROUND ELEVATION: 325.82 m
LOGGED BY: BL
SAMPLING METHOD: SPT/MC5
PROJECT NUMBER: 23-133
DRILLING DATE: 23-4-12
DRILLING CONTRACTOR: CMT DRILLING INC.
DRILLING EQUIPMENT: Geoprobe 7822DT



BOREHOLE LOG WITH WELL2 23-133 - MW.GPJ CMT TEMPLATE 2020-05-15.GDT 23-7-12

Bottom of borehole at 6.71 m, Elevation 319.11 m.

Monitoring well installed at an elevation of approximately 319.72m on April 12, 2023.

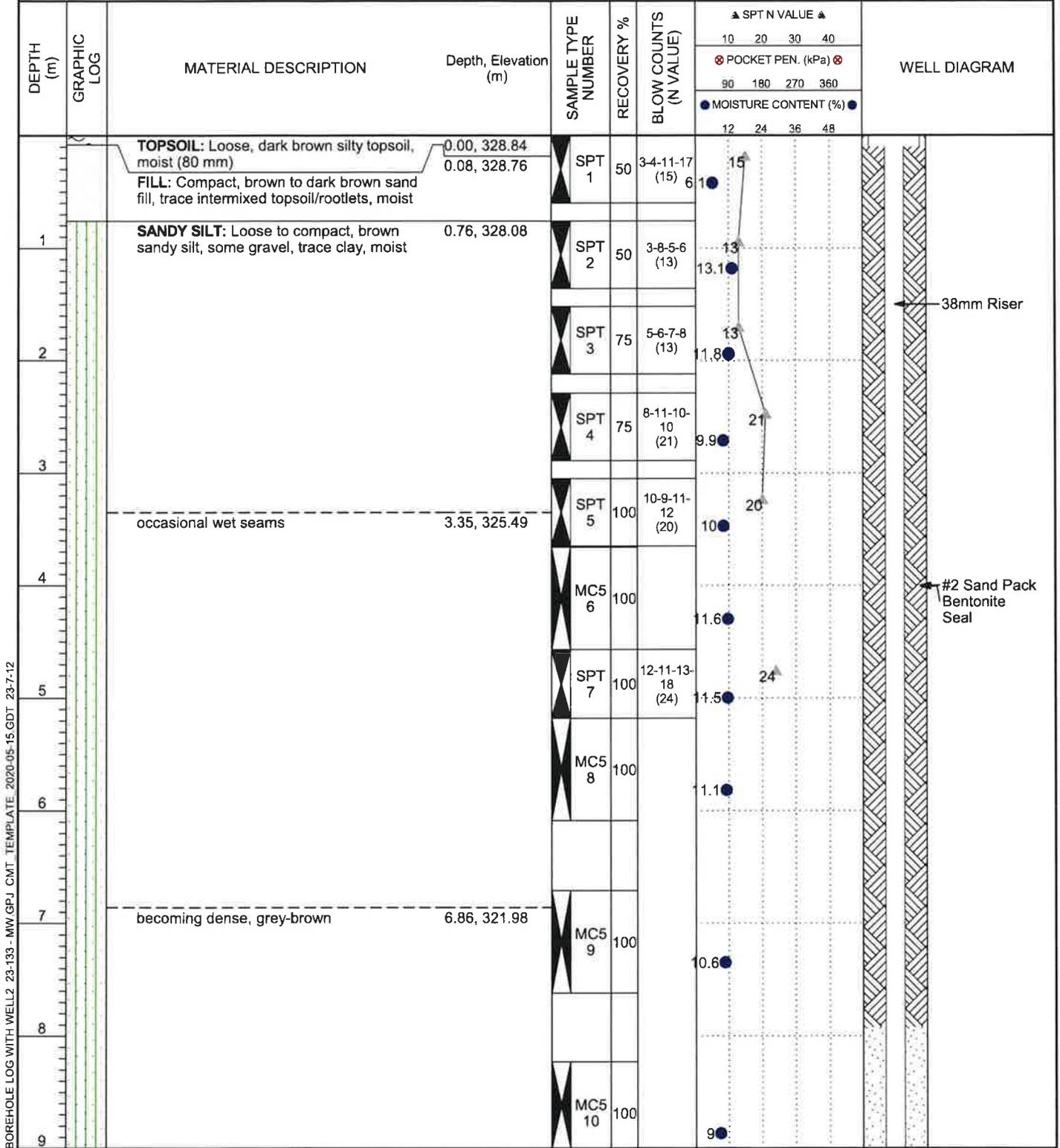
Groundwater measured at approximately 1.27m below the ground surface (Elev. 324.55m) on June 7, 2023.



CMT Engineering Inc.
 1011 Industrial Crescent
 St. Clements, Ontario, N0B 2M0
 Telephone: 519-699-5775
 Fax: 519-699-4664

BOREHOLE NUMBER 6

PROJECT: Proposed Development
PROJECT ADDRESS: 7456 McLean Road
PROJECT LOCATION: Puslinch, Ontario
PROJECT NUMBER: 23-133
DRILLING DATE: 23-4-12
DRILLING CONTRACTOR: CMT DRILLING INC.
DRILLING EQUIPMENT: Geoprobe 7822DT
GROUND ELEVATION: 328.84 m
LOGGED BY: BL
SAMPLING METHOD: SPT/MC5



BOREHOLE LOG WITH WELL2 23-133 - MW.GPJ CMT TEMPLATE 2020-05-15.GDT 23-7-12

(Continued Next Page)



CMT Engineering Inc.
 1011 Industrial Crescent
 St. Clements, Ontario, N0B 2M0
 Telephone: 519-699-5775
 Fax: 519-699-4664

BOREHOLE NUMBER 6

PROJECT NUMBER: 23-133

PROJECT: Proposed Development

PROJECT ADDRESS: 7456 McLean Road

PROJECT LOCATION: Puslinch, Ontario

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	▲ SPT N VALUE ▲				WELL DIAGRAM
							10	20	30	40	
		becoming dense, grey-brown (continued)	6.86, 321.98 (continued)								
10				MC5 11	100						<p>Water Level measured at 6.56m (Elev. 322.28m) on June 7, 2023 38mm Screen</p>
11											
12				MC5 12	100						

Bottom of borehole at 12.19 m, Elevation 316.65 m.

Monitoring well installed at an elevation of approximately 316.65m on April 12, 2023.

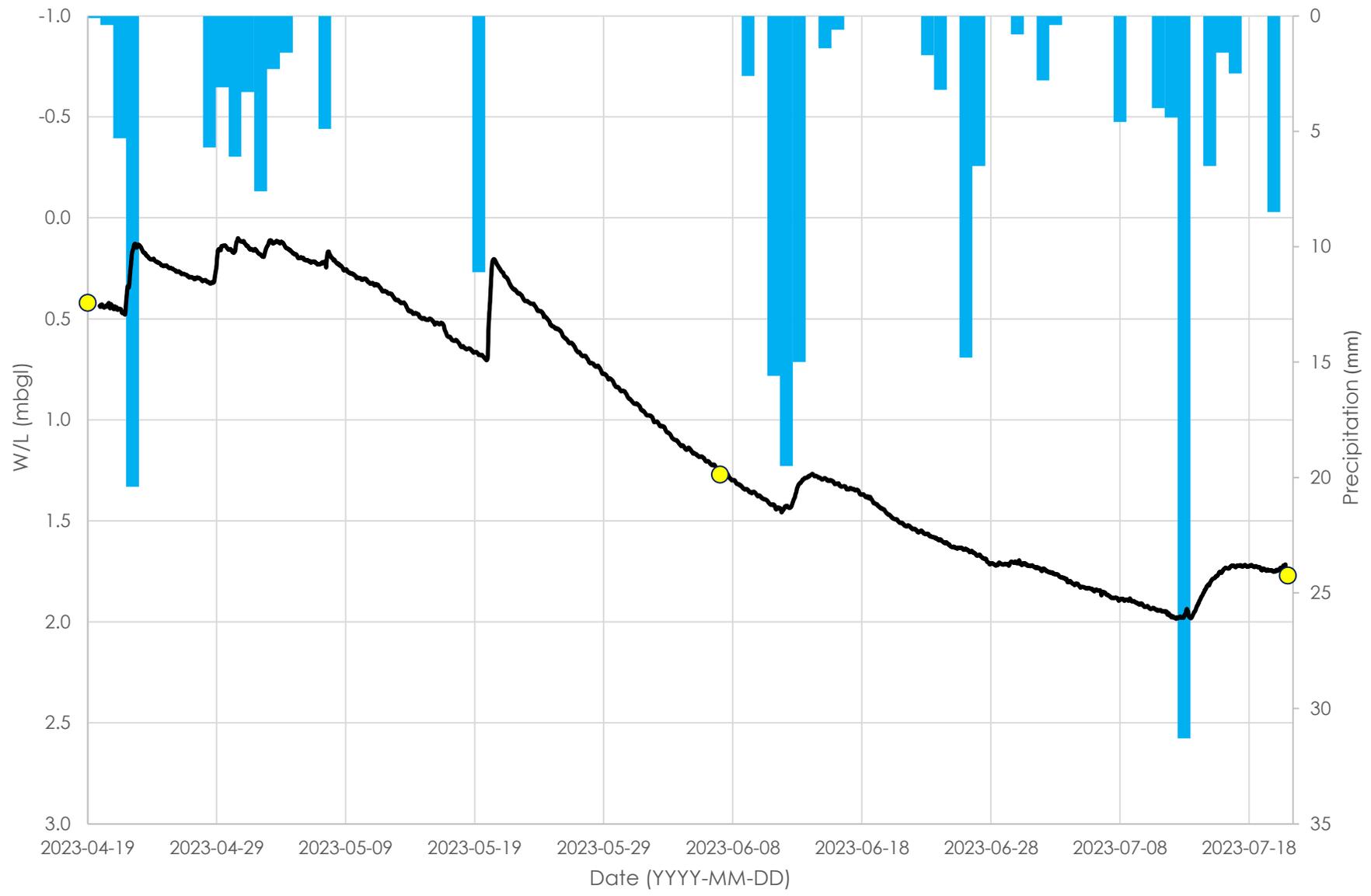
Groundwater measured at approximately 6.56m below the ground surface (Elev. 322.28m) on June 7, 2023.

APPENDIX F

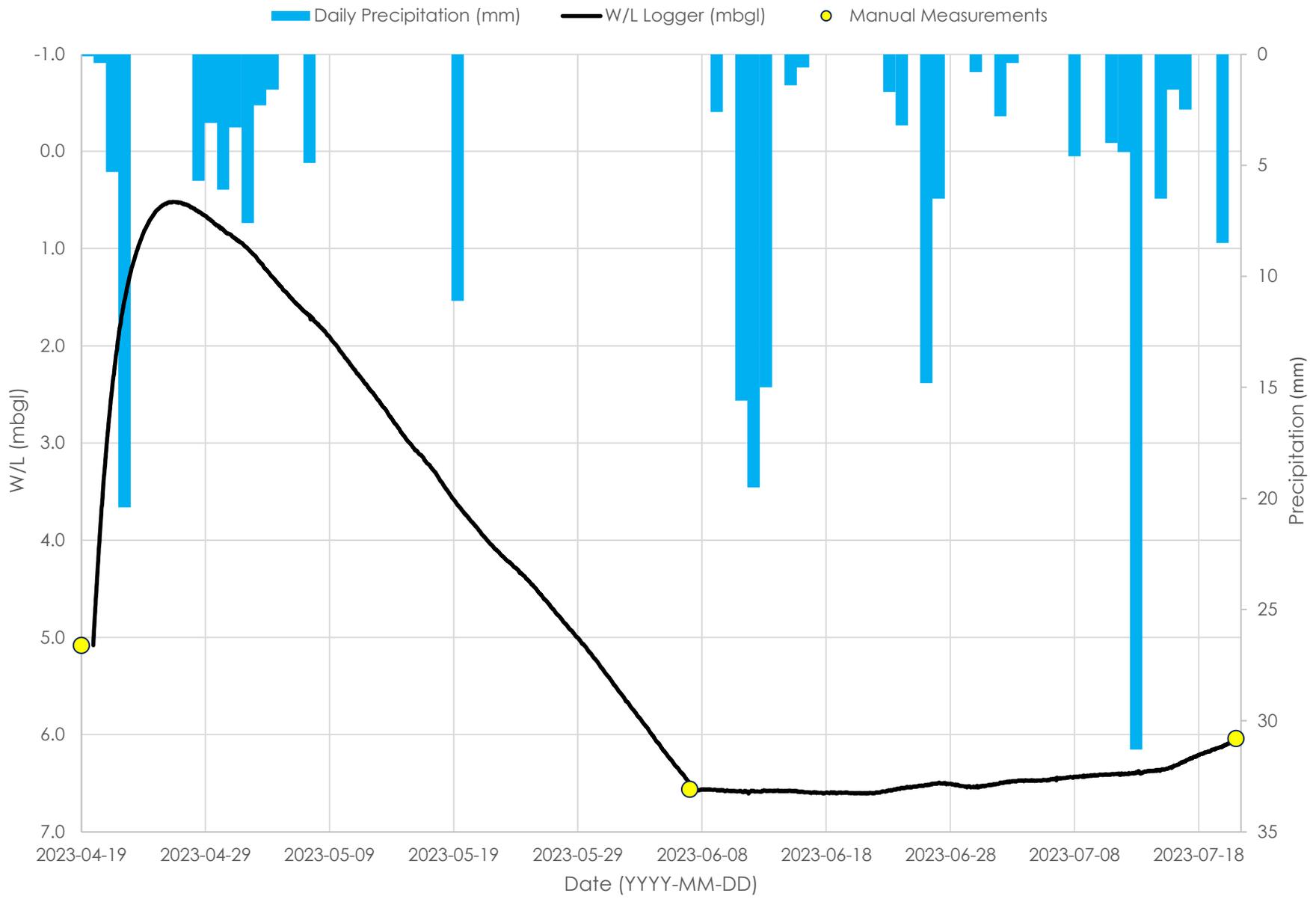
Hydrographs

MW5-23, 7456 McLean Road

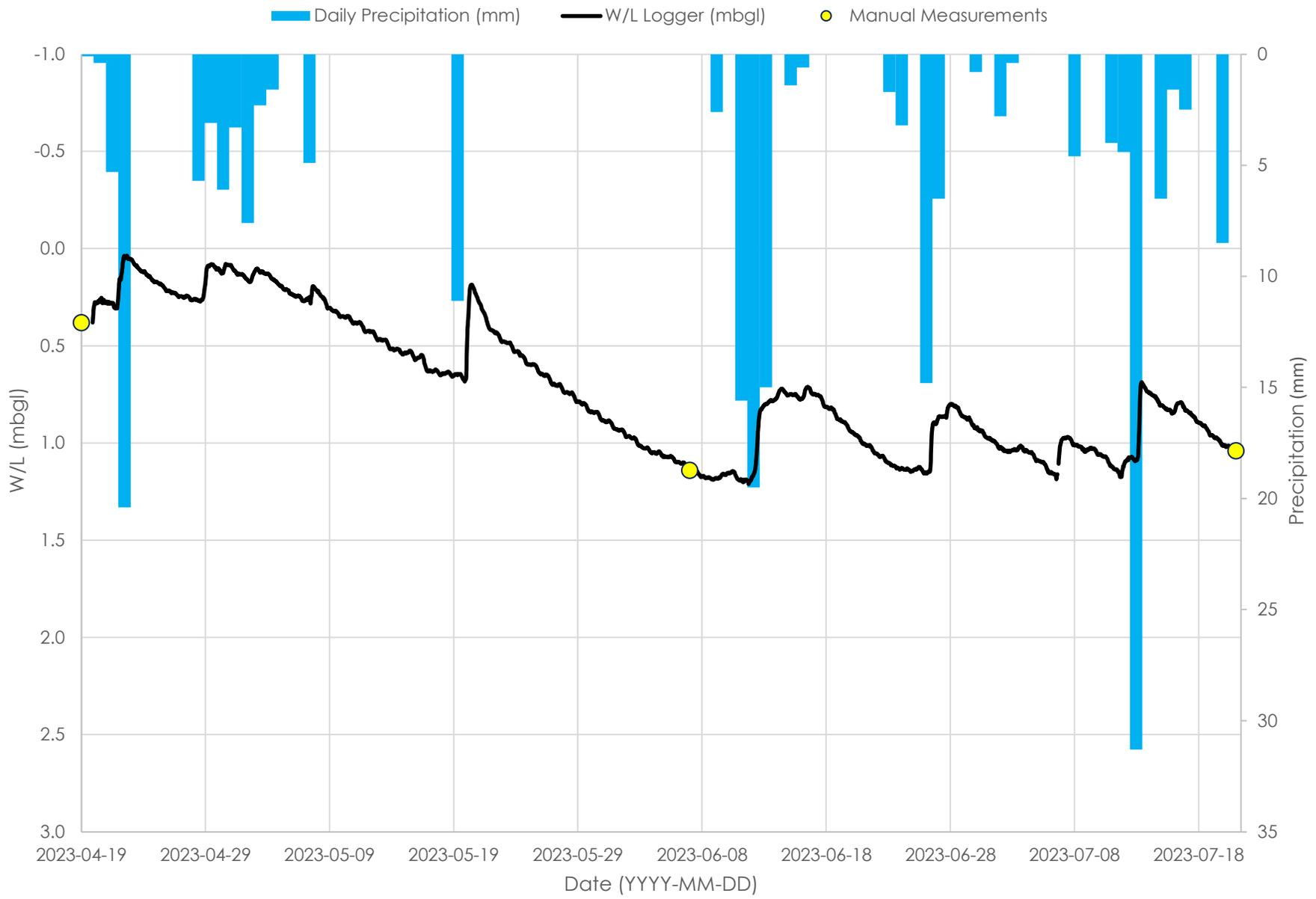
Daily Precipitation (mm) W/L Logger (mbgl) Manual Measurements



MW6-23, 7456 McLean Road



MW4-23, 7456 McLean Road



APPENDIX G

Water Balance Assessment Calculations



Water Balance Parameters
Thornthwaite & Mather Method

Project Name: 7456 McLean
Project Number: 2377-6556
Created By: AL
Checked By: CM/JD
Date: 2023-10-19

Project Name: **7456 McLean**
Location: **Puslinch**

Climate Station: WATERLOO WELLINGTON A
Longitude: 80°23'00.000" W
Latitude: 43°27'00.000" N
Elevation: 317.0 m
Station ID: 6149387

LATITUDE **43** DEGREES

Month	Mean Temperature (C°) ¹	Heat Index [i=(t/5) ^{1.514}]	α	Potential Evapotranspiration (PET) (mm)	Correction Factor ²	Adjusted Potential Evapotranspiration (APET) (mm)	Total Precipitation (P) (mm) ¹	P - APET (mm)	APET - P (mm)
January	-6.5	0.0000	0.4924	0.0000	0.81	0	65.2	65.2	0.0
February	-5.5	0.0000	0.4924	0.0000	0.82	0	54.9	54.9	0.0
March	-1	0.0000	0.4924	0.0000	1.02	0	61	61.0	0.0
April	6.2	1.3850	0.5171	29.0873	1.12	33	74.5	41.9	0.0
May	12.5	4.0039	0.5629	61.0592	1.26	77	82.3	5.4	0.0
June	17.6	6.7215	0.6096	87.6815	1.28	112	82.4	0.0	29.8
July	20	8.1568	0.6338	100.3739	1.29	129	98.6	0.0	30.9
August	18.9	7.4873	0.6225	94.5450	1.2	113	83.9	0.0	29.6
September	14.5	5.0127	0.5804	71.4364	1.04	74	87.8	13.5	0.0
October	8.2	2.1148	0.5299	39.0944	0.95	37	67.4	30.3	0.0
November	2.5	0.3501	0.4987	11.1313	0.81	9	87.1	78.1	0.0
December	-3.3	0.0000	0.4924	0.0000	0.77	0	71.2	71.2	0.0
TOTAL		35.2	1.1			585.1	916.3	421.44	90.27

TOTAL WATER DEFICIT = 90.27 mm
TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = 331.17 mm

NOTES: 1. Precipitation and Temperature data from the WATERLOO WELLINGTON A (Station No.6149387) Environment Canada Station Data
2. Latitude adjustment factors determined based on site latitude assuming 12 hours of sunlight per day for 30 days



Pre-Development Water Balance
Thornthwaite & Mather Method

Project Name: 7456 McLean
Project Number: 2377-6556
Created By: AL
Checked By: CM/JD
Date: 2023-10-19

Project Name: **7456 McLean**
Location: **Puslinch**

Catchment Summary											
TOTAL SITE AREA (m ²)	16,200										
Land Description Factors	101	102									
Topography - flat/rolling/hilly (rolling/flat)	0.1	0.3									
Soils	0.4	0.4									
Cover - cultivated/woodland	0.2	0.2									
Sum (Infiltration Factor)	0.7	0.9									
Soil Moisture Capacity (mm)	100	250									
Catchment Area (m ²)	8,099	8,102									
Percent Impervious	0	0									
Land Use	101	102									
Total Impervious Area (m ²)	0	0									
Percentage of Impervious Area (%)	0%	0%									
Total Pervious Area (m ²)	8,099	8,102									
Percentage of Pervious Area (%)	100%	100%									

Catchment ID 101													
Evapotranspiration/Evaporation Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	65	55	61	75	82	82	99	84	88	67	87	71	916
Adjusted Potential Evapotranspiration (APET)	0	0	0	33	77	112	129	113	74	37	9	0	585
P-APET	65	55	61	42	5	-30	-31	-30	14	30	78	71	331
Change in Storage	0	0	0	0	0	-30	-31	-30	14	30	47	0	
Storage (S) (mm)	100	100	100	100	100	70	39	10	23	53	100	100	
Pervious Area Infiltration/Runoff Analysis													
Water Surplus (mm)	65	55	61	42	5	0	0	0	0	0	32	71	331
Potential Infiltration (I) (mm)	46	38	43	29	4	0	0	0	0	0	22	50	232
Potential Direct Surface Water Runoff (R) (mm)	20	16	18	13	2	0	0	0	0	0	9	21	99
Impervious Area Evapotranspiration/Evaporation/Runoff Analysis													
Impervious Evapotranspiration/Evaporation (mm)	0	0	0	11	12	12	15	13	13	10	13	0	100
Impervious Runoff (mm)	65	55	61	63	70	70	84	71	75	57	74	71	817
Combined Water Balance													
Pervious ET (m ³)	0	0	0	264	623	909	1049	919	602	301	73	0	4739
Impervious ET (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	158	133	148	102	13	0	0	0	0	0	77	173	805
Impervious Runoff (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m ³)	370	311	346	238	30	0	0	0	0	0	179	404	1877
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Catchment ID 102													
Evapotranspiration/Evaporation Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	65	55	61	75	82	82	99	84	88	67	87	71	916
Adjusted Potential Evapotranspiration (APET)	0	0	0	33	77	112	129	113	74	37	9	0	585
P-APET	65	55	61	42	5	-30	-31	-30	14	30	78	71	331
Change in Storage	0	0	0	0	0	-30	-31	-30	14	30	47	0	
Storage (S) (mm)	250	250	250	250	250	220	189	160	173	203	250	250	
Pervious Area Infiltration/Runoff Analysis													
Water Surplus (mm)	65	55	61	42	5	0	0	0	0	0	32	71	331
Potential Infiltration (I) (mm)	59	49	55	38	5	0	0	0	0	0	28	64	298
Potential Direct Surface Water Runoff (R) (mm)	7	5	6	4	1	0	0	0	0	0	3	7	33
Impervious Area Evapotranspiration/Evaporation/Runoff Analysis													
Impervious Evapotranspiration/Evaporation (mm)	0	0	0	11	12	12	15	13	13	10	13	0	100
Impervious Runoff (mm)	65	55	61	63	70	70	84	71	75	57	74	71	817
Combined Water Balance													
Pervious ET (m ³)	0	0	0	264	623	909	1049	919	602	301	73	0	4741
Impervious ET (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	53	44	49	34	4	0	0	0	0	0	26	58	268
Impervious Runoff (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m ³)	475	400	445	306	39	0	0	0	0	0	230	519	2415
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Pre-Development Water Balance Summary						
Pre-Development Infiltration	4292.3	m ³ /yr	265.0	mm/yr	0.0084	L/s
Pre-Development Runoff	1073.0	m ³ /yr	66.2	mm/yr	0.0021	L/s

NOTES:

- According to the Site Plan Prepared by ATA Architects Inc., dated October 4, 2023
- The infiltration factor is determined using the MECP Methodology outlined in SWM 2003 Manual.
- Catchment Areas and impervious fraction coefficients are presented in the Functional Servicing and Stormwater Management Report prepared by Crozier dated October 2023.
- Additional assumptions:
 - > Surplus water is unavailable for runoff and recharge in months where water losses from AET exceed precipitation inputs.
 - > Runoff, infiltration and evapotranspiration do not occur when average temperature is below zero.
 - > Precipitation during winter months (Dec. through Mar. is assumed to be accumulated as snow.
 - > Soil Moisture Capacity is at a maximum in April.



Post-Development Water Balance
Thornthwaite & Mather Method

Project Name: 7456 McLean
Project Number: 2377-6556
Created By: AL
Checked By: CM/JD
Date: 2023-10-19

Project Name: **7456 McLean**
Location: **Puslinch**

Catchment Summary												
TOTAL SITE AREA (m ²)	16,200											
Land Description Factors	201	202	203									
Topography - flat/rolling/hilly	0.1	0.3	0.3									
Soils	0.4	0.4	0.4									
Cover - cultivated/woodland	0.1	0	0.1									
Sum (Infiltration Factor)	0.6	0.7	0.8									
Soil Moisture Capacity (mm)	50	50	50									
Catchment Area (m ²)	1,875	13,505	821									
Percent Impervious	0	0.88	0									
Land Use	201	202	203									
Total Impervious Area (m ²)	0	11884.4	0									
Percentage of Impervious Area (%)	0%	88%	0%									
Total Pervious Area (m ²)	1,875	1,621	821									
Percentage of Pervious Area (%)	100%	12%	100%									

Catchment ID 201													
Evapotranspiration/Evaporation Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	65	55	61	75	82	82	99	84	88	67	87	71	916
Adjusted Potential Evapotranspiration (APET)	0	0	0	33	77	112	129	113	74	37	9	0	585
P-APET	65	55	61	42	5	-30	-31	-30	14	30	78	71	331
Change in Storage	0	0	0	0	0	-30	-31	-30	14	30	47	0	
Storage (S) (mm)	50	50	50	50	50	20	-11	-40	-27	3	50	50	
Pervious Area Infiltration/Runoff Analysis													
Water Surplus (mm)	65	55	61	42	5	0	0	0	0	0	32	71	331
Potential Infiltration (I) (mm)	39	33	37	25	3	0	0	0	0	0	19	43	199
Potential Direct Surface Water Runoff (R) (mm)	26	22	24	17	2	0	0	0	0	0	13	28	132
Impervious Area Evapotranspiration/Evaporation/Runoff Analysis													
Impervious Evapotranspiration/Evaporation (mm)	0	0	0	11	12	12	15	13	13	10	13	0	100
Impervious Runoff (mm)	65	55	61	63	70	70	84	71	75	57	74	71	817
Combined Water Balance													
Pervious ET (m ³)	0	0	0	61	144	210	243	213	139	70	17	0	1097
Impervious ET (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	49	41	46	31	4	0	0	0	0	0	24	53	248
Impervious Runoff (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m ³)	73	62	69	47	6	0	0	0	0	0	36	80	373
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Catchment ID 202													
Evapotranspiration/Evaporation Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	65	55	61	75	82	82	99	84	88	67	87	71	916
Adjusted Potential Evapotranspiration (APET)	0	0	0	33	77	112	129	113	74	37	9	0	585
P-APET	65	55	61	42	5	-30	-31	-30	14	30	78	71	331
Change in Storage	0	0	0	0	0	-30	-31	-30	14	30	47	0	
Storage (S) (mm)	50	50	50	50	50	20	-11	-40	-27	3	50	50	
Pervious Area Infiltration/Runoff Analysis													
Water Surplus (mm)	65	55	61	42	5	0	0	0	0	0	32	71	331
Potential Infiltration (I) (mm)	46	38	43	29	4	0	0	0	0	0	22	50	232
Potential Direct Surface Water Runoff (R) (mm)	20	16	18	13	2	0	0	0	0	0	9	21	99
Impervious Area Evapotranspiration/Evaporation/Runoff Analysis													
Impervious Evapotranspiration/Evaporation (mm)	0	0	0	11	12	12	15	13	13	10	13	0	100
Impervious Runoff (mm)	65	55	61	63	70	70	84	71	75	57	74	71	817
Combined Water Balance													
Pervious ET (m ³)	0	0	0	53	125	182	210	184	120	60	15	0	948
Impervious ET (m ³)	0	0	0	133	147	147	176	150	157	120	155	0	1184
Pervious Runoff (m ³)	32	27	30	20	3	0	0	0	0	0	15	35	161
Impervious Runoff (m ³)	77.5	65.2	72.5	75.3	83.1	83.2	99.6	84.8	88.7	68.1	88.0	84.6	970.6
Pervious Infiltration (m ³)	7.4	6.2	6.9	4.8	6	0	0	0	0	0	3.6	8.1	37.6
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Catchment ID 203													
Evapotranspiration/Evaporation Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	65	55	61	75	82	82	99	84	88	67	87	71	916
Adjusted Potential Evapotranspiration (APET)	0	0	0	33	77	112	129	113	74	37	9	0	585
P-APET	65	55	61	42	5	-30	-31	-30	14	30	78	71	331
Change in Storage	0	0	0	0	0	-30	-31	-30	14	30	47	0	
Storage (S) (mm)	50	50	50	50	50	20	-11	-40	-27	3	50	50	
Pervious Area Infiltration/Runoff Analysis													
Water Surplus (mm)	65	55	61	42	5	0	0	0	0	0	32	71	331
Potential Infiltration (I) (mm)	52	44	49	34	4	0	0	0	0	0	25	57	265
Potential Direct Surface Water Runoff (R) (mm)	13	11	12	8	1	0	0	0	0	0	6	14	66
Impervious Area Evapotranspiration/Evaporation/Runoff Analysis													
Impervious Evapotranspiration/Evaporation (mm)	0	0	0	11	12	12	15	13	13	10	13	0	100
Impervious Runoff (mm)	65	55	61	63	70	70	84	71	75	57	74	71	817
Combined Water Balance													
Pervious ET (m ³)	0	0	0	27	63	92	106	93	61	30	7	0	480
Impervious ET (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m ³)	11	9	10	7	1	0	0	0	0	0	5	12	54
Impervious Runoff (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m ³)	43	36	40	28	4	0	0	0	0	0	21	47	218
Impervious Infiltration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Post-Development Water Balance Summary						
Post-Development Infiltration	965.8		m ³ /yr	59.6		L/s
Post-Development Runoff	10169.8		m ³ /yr	627.8		L/s

NOTES:

- According to the Site Plan Prepared by ATA Architects Inc. dated October 4, 2023
- The infiltration factor is determined using the MECF Methodology outlined in SWM 2003 Manual.
- Catchment Areas and impervious fraction coefficients are presented in the Functional Servicing and Stormwater Management Report prepared by Crozier dated October 2023.
- Additional assumptions:
 - > Surplus water is unavailable for runoff and recharge in months where water losses from AET exceed precipitation inputs.
 - > Runoff, infiltration and evapotranspiration do not occur when average temperature is below zero.
 - > Precipitation during winter months (Dec. through Mar. is assumed to be accumulated as snow.
 - > Soil Moisture Capacity is at a maximum in April.



Water Balance Summary

Thornthwaite & Mather Method

Project Name: 7456 McLean
Project Number: 2377-6556
Created By: AL
Checked By: CM/JD
Date: 2023-10-19

Project Name: **7456 McLean**
Location: **Puslinch**

Characteristic	Pre-Development	Post-Development	% Change (Pre to Post)
Precipitation (mm/yr)	916.30	916.30	0%
Water Surplus (mm/yr)	331.17	331.17	0%
Evapotranspiration (mm/yr)	585.13	585.13	0%
Natural Infiltration (mm/yr)	264.96	59.61	-78%
Total Infiltration (mm/yr)	264.96	59.61	-78%
Total Runoff (mm/yr)	66.23	627.76	848%

APPENDIX H

Groundwater Impact Assessment



NITRATE ATTENUATION CALCULATION

Date: 2023-07-20
Completed By: JD
Checked By: JD

Project Name: 7456 McLean
Project Number: 2377-6556

IMPACT ASSESSMENT

MOE, 2008

Calculate the Effluent Nitrate Concentration Required to meet Maximum Allowable Values at the Downgradient Boundary (Property or Surface Water)

= Manual Data Entry

Infiltration Volume

Area of Dilution = ha
Background Nitrate Quality in Groundwater = 0 mg/L
Annual Infiltration Rate = 250 mm/m²/yr
Annual Infiltration Volume = 200 m³

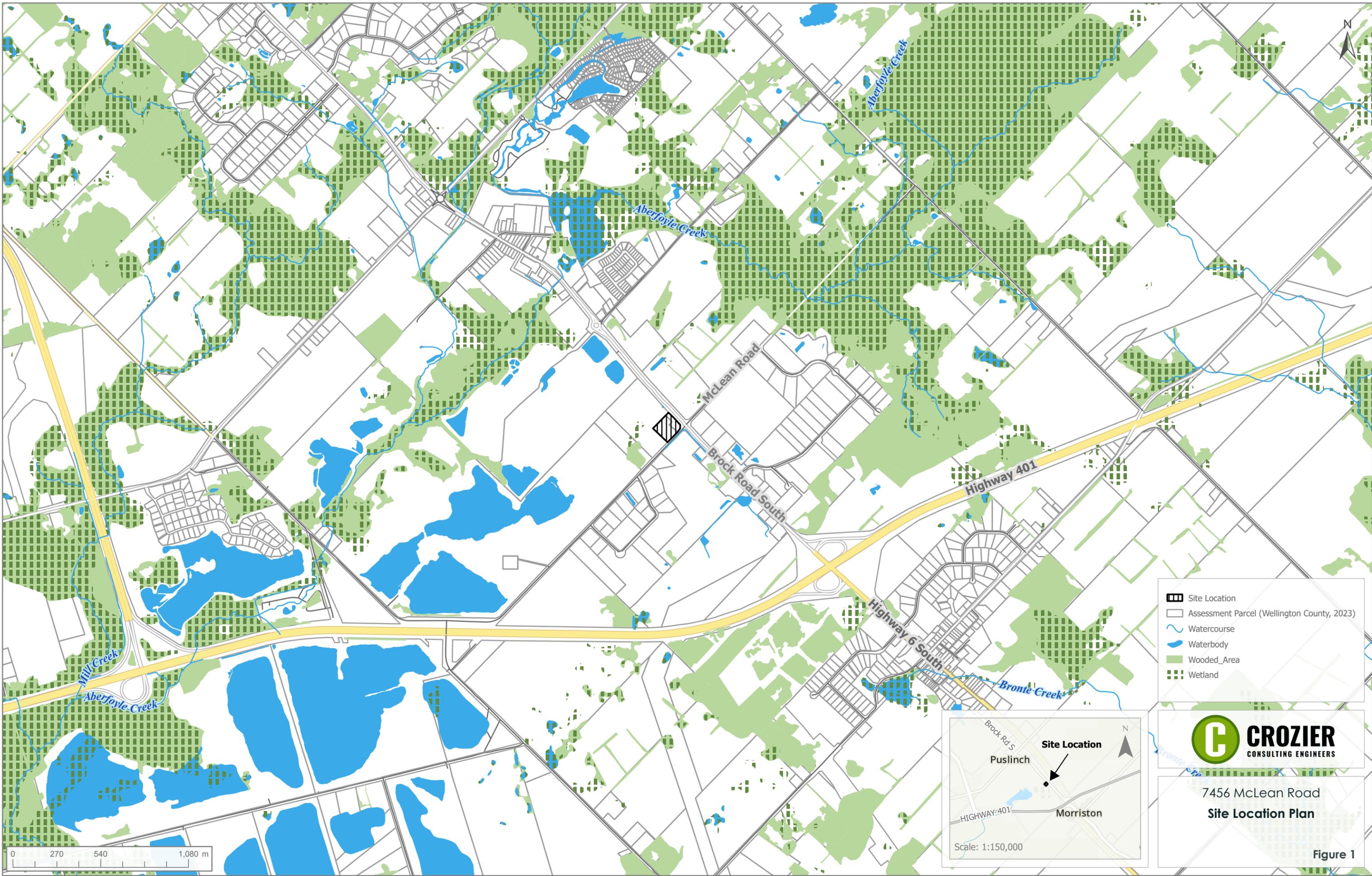
Sewage Effluent Volume

Average Daily Volume of Sewage Effluent = L/day
Number of Days of Operation/Use = days/year
Annual Volume of Sewage Effluent = 3,650 m³
Maximum Nitrate Concentration at Boundary = mg/L

Totals

Total Dilutant = wastewater V + infiltration V = 3,850 m³/year
Maximum Allowable Nitrate Concentration in Effluent **2.64 mg/L**

FIGURES



-  Site Location
-  Assessment Parcel (Wellington County, 2023)
-  Watercourse
-  Waterbody
-  Wooded_Area
-  Wetland



7456 McLean Road
Site Location Plan

Figure 1



Site Location



7456 McLean Road
Site Overview

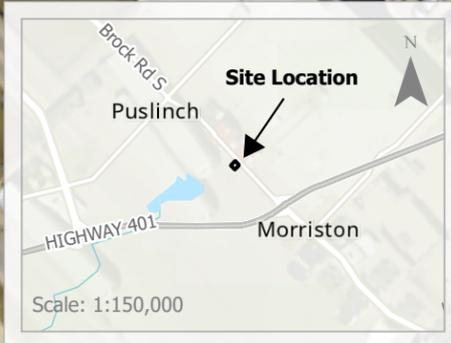
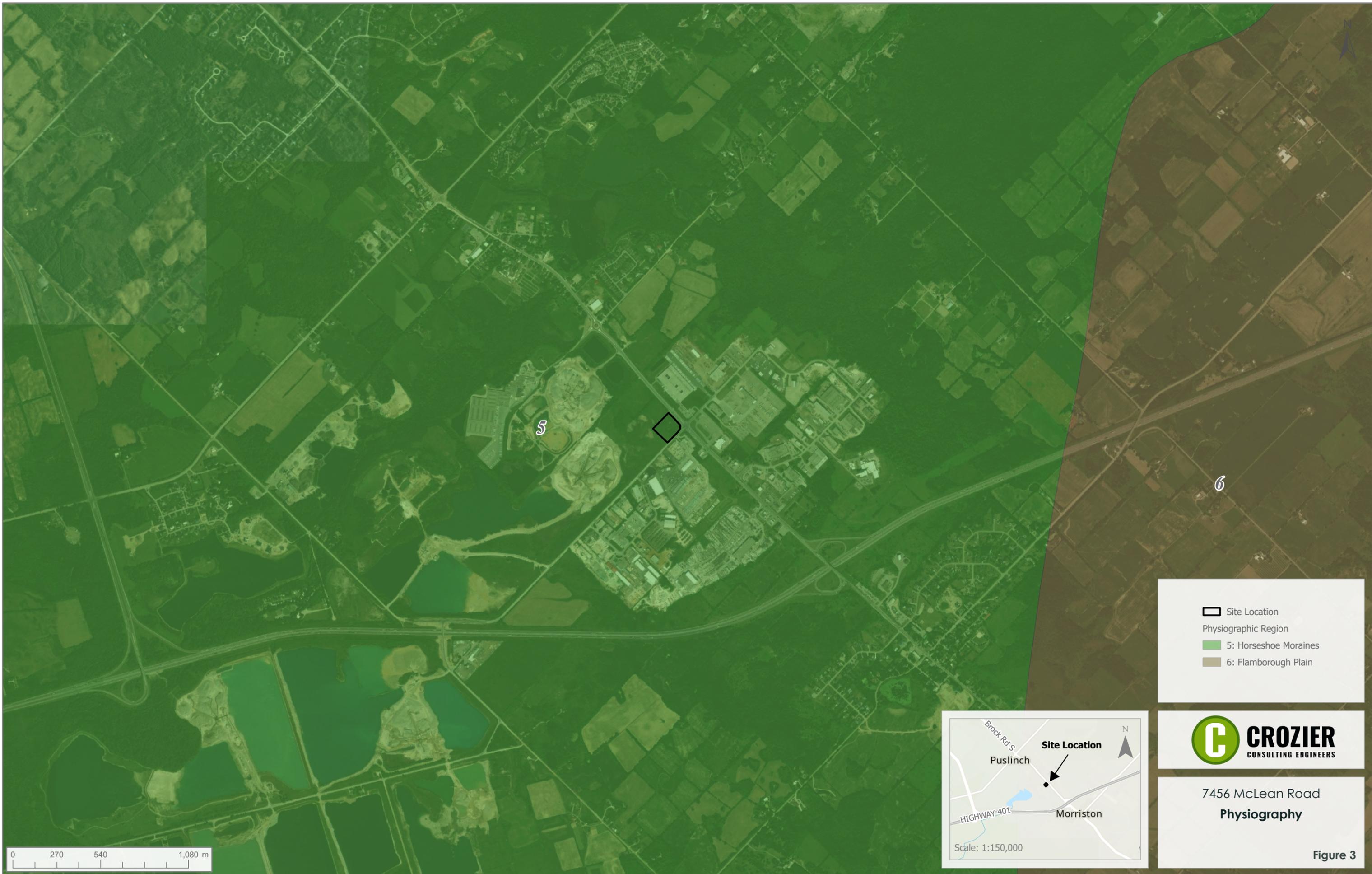


Figure 2



-  Site Location
- Physiographic Region
-  5: Horseshoe Moraines
-  6: Flamborough Plain



7456 McLean Road
Physiography

0 270 540 1,080 m

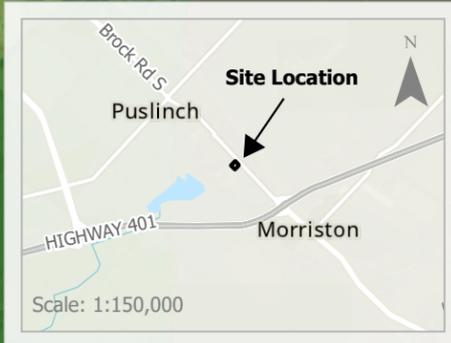
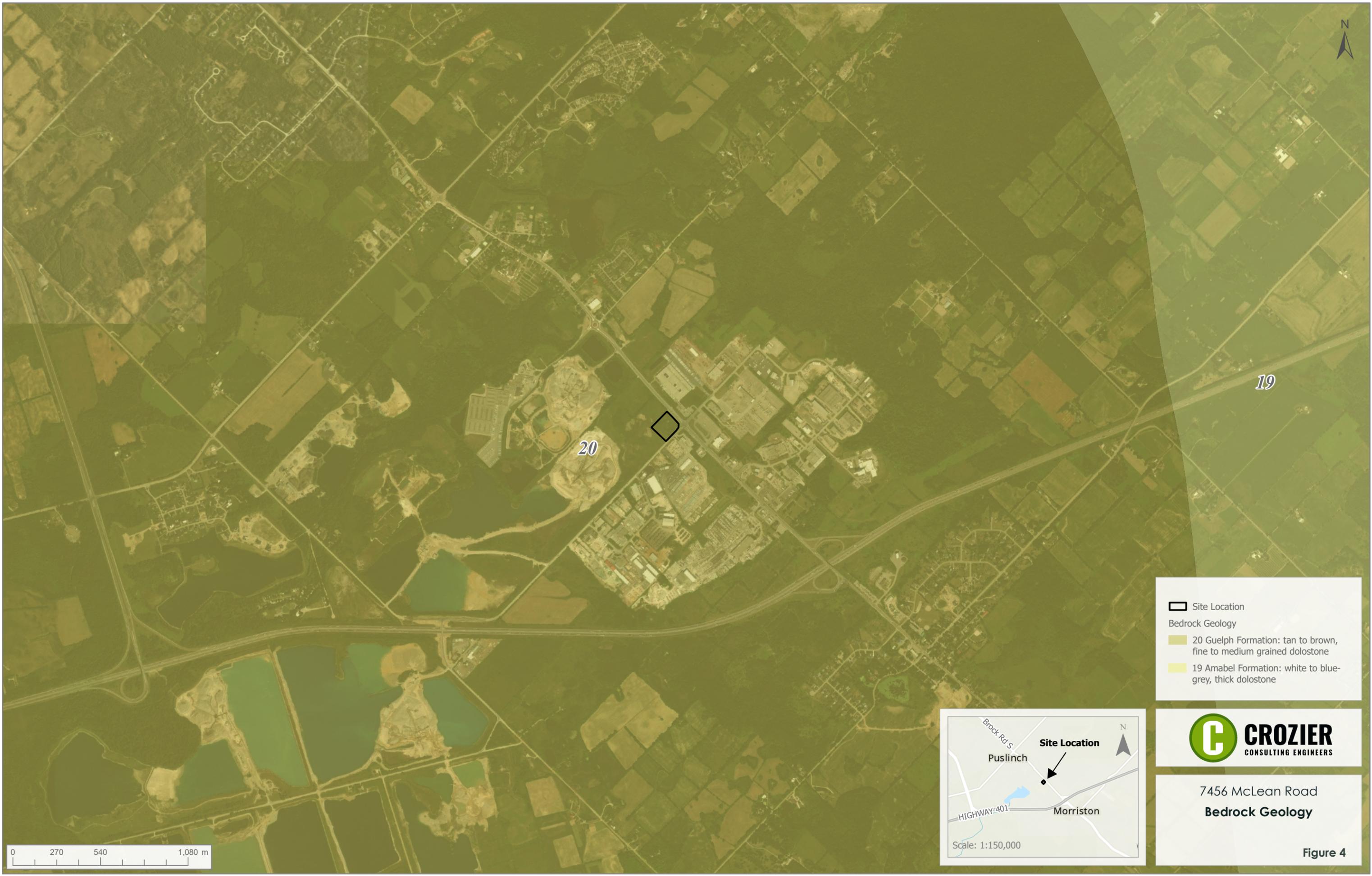


Figure 3



20

19

-  Site Location
- Bedrock Geology
 -  20 Guelph Formation: tan to brown, fine to medium grained dolostone
 -  19 Amabel Formation: white to blue-grey, thick dolostone



7456 McLean Road
Bedrock Geology

Figure 4

0 270 540 1,080 m



Site Location

Surficial Geology

- 20: Organic peat, muck, marl
- 7a: Glaciofluvial sand
- 7b: Glaciofluvial gravel
- 6: Ice-contact sand and gravel
- 5b: Stone-poor sandy silt to silty sand till
- 3: Paleozoic bedrock



7456 McLean Road
Surficial Geology

Figure 5



7456 McLean Road
MECP Well Location Plan

Figure 6



-  Site Location
-  Monitoring Well
-  1m Contour
-  Test Pit



CROZIER
CONSULTING ENGINEERS

7456 McLean Road
**Monitoring Well &
 Test Pit Location Plan**

Figure 7



- Site Location
- Monitoring Well
- 1m Contour
- Interpreted Groundwater Flow Direction

321.48 Seasonally High Groundwater Elevation (April 2023, Crozier)

CROZIER
CONSULTING ENGINEERS

7456 McLean Road
Interpreted Groundwater Flow Direction

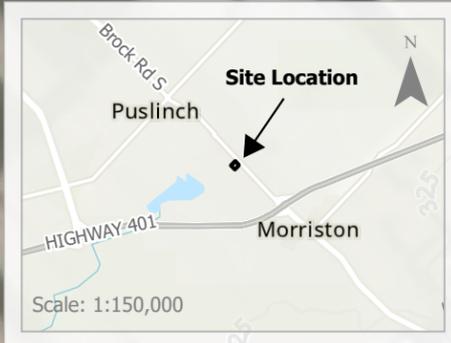


Figure 8

Proposed Leaching Bed
Bed Area = 0.0405 ha
Total Attenuation Area = 0.0830 ha



- Site Location
- Monitoring Well
- Interpreted Groundwater Flow Direction
- Seasonally High Groundwater Elevation (April 2023, Crozier)
- 1m Contour
- Proposed Leaching Bed
- Dilution Area



7456 McLean Road
Attenuation Zone

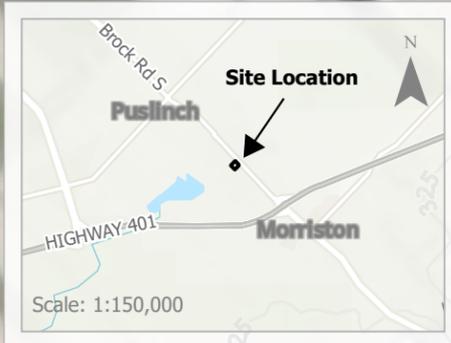


Figure 9

TRANSPORTATION IMPACT STUDY

**7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON**

**PREPARED FOR:
BLACK-HART CONSTRUCTION INC.**

**PREPARED BY:
C.F. CROZIER & ASSOCIATES INC.
211 YONGE STREET, SUITE 600
TORONTO, ON M5B 2H1**

OCTOBER 2023

CFCA FILE NO. 2377-6556

The material in this report reflects best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Revision Number	Date	Comments
Rev.0	September 2023	Issued for Client Review
Rev.1	October 2023	Issued or Submission

Executive Summary

C.F. Crozier & Associates Inc. (Crozier) was retained by Black-Hart Construction Inc. to complete a Transportation Impact Study for a mixed-use commercial and gas station development situated at 7456 McLean Road & 197 Brock Road South, Township of Puslinch, County of Wellington.

The analysis undertaken herein was completed using the latest Site Plan prepared by ATA Architects Inc., dated October 4, 2023. Any minor changes to the Site Plan will not materially affect the conclusions set out within this report.

The site is proposed to be re-zoned to a commercial development that would include the following:

- A four-pump gas station with a 1-storey accessory retail/convenience store (235 m²)
- A six-pump truck gas station
- A 1-storey fast food restaurant (379 m²) with drive-thru
- 41 vehicle parking spaces including 3 accessible spaces and 4 electric vehicle charging spaces
- 8 truck parking spaces
- 1 loading space
- 19 bicycle parking spaces
- To facilitate the development, one full moves site access is proposed via McLean Road and one restricted right-in, right-out access is proposed via Brock Road

Under 2023 existing conditions, both Study Intersections are operating adequacy with LOS "B" or better during the weekday a.m. and p.m., peak hours.

In the 2029 Future Background conditions, both Study Intersections are expected to continue operating adequacy with LOS "B" or better during the weekday a.m. and p.m., peak hours.

The proposed development is forecast to generate a total of 148 and 139 primary vehicle trips in the weekday a.m. and p.m. peak hours, respectively.

In the 2029 Future Total condition, the intersection of Brock Road South at Nicholas Beaver Road maintains the same levels of service while the intersection of Brock Road South at McLean Road is expected to decrease from operating at a LOS "B" to operate with a LOS "C" during the weekday a.m. and p.m. peak hours, when compared to the 2029 Future Background conditions. Both proposed Site accesses expected to operate acceptably with LOS "C" or better during the weekday a.m. and p.m. peak hours.

No issues were identified regarding sight lines or access spacing were identified at the proposed site accesses.

A vehicle maneuvering assessment was conducted and the subject development can accommodate most of the design vehicles expected to maneuver the site including MSU (Medium Single Unit) Trucks, GFL Garbage Truck, Pumper Fire Truck, and passenger vehicles. Some vehicle maneuvering issues were identified in the northeast corner of the site due to the turning radii provided at the Brock Road South Site Access and preceding internal turn not being sufficient for the WB-20 Truck and 8 Axle Fuel Tanker movements, respectively, as well as the west most truck gas pump not providing sufficient spacing for the WB-20 trucks to access. These aspects of the Site Plan will be revised as part of the future applications.

The development proposes a parking supply surplus and meets the loading space requirements when compared to the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18.

In conclusion, the proposed commercial development at 7456 McLean Road & 197 Brock Road South in the Township of Puslinch, County of Wellington can be supported from a transportation operations and safety perspective for the Zoning By-Law Application.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Development Lands	1
1.2	Development Proposal	1
2.0	EXISTING CONDITIONS.....	4
2.1	Study Road Network	4
2.2	Study Intersections	4
2.3	Transit Network	6
2.4	Active Transportation Network	6
2.5	Traffic Data	7
2.6	Traffic Modelling	7
2.7	Intersection Operations	7
3.0	FUTURE BACKGROUND CONDITIONS.....	9
3.1	Study Horizons.....	9
3.2	Background Developments	9
3.3	Traffic Growth Rates	10
3.4	Future Roadway Improvements	10
3.5	Intersection Operations	13
4.0	SITE GENERATED TRAFFIC	15
4.1	ITE Trip Generation.....	15
4.2	Trip Distribution and Assignment	16
5.0	FUTURE TOTAL TRAFFIC CONDITIONS	19
5.1	Intersection Operations	19
6.0	SITE ACCESS REVIEW	23
6.1	Sight Distance Assessment.....	23
6.2	Access Spacing.....	26
7.0	MANEUVERING ASSESSMENT.....	27
7.1	Loading Vehicles.....	27
7.2	Emergency Vehicles.....	27
7.3	Passenger Vehicles.....	27
8.0	PARKING AND LOADING REVIEW	37
8.1	Auto Parking Space Requirements	37
8.2	Accessible Parking Space Requirements	38
8.3	Bicycle Parking Space Requirements.....	38
8.4	Loading Requirements.....	39
9.0	CONCLUSION	40

List of Appendices

- Appendix A: Terms of Reference Correspondence**
- Appendix B: County Road Master Action Plan**
- Appendix C: Transit Maps and Schedules**
- Appendix D: Traffic Data**
- Appendix E: Level of Service Definitions**
- Appendix F: Peak Hour Factor Calculations**
- Appendix G: Existing Synchro and SimTraffic Reports**
- Appendix H: Future Background Synchro and SimTraffic Reports**
- Appendix I: ITE Trip Generation Manual Excerpts**
- Appendix J: Future Total Synchro and SimTraffic Reports**
- Appendix K: Township of Puslinch’s Comprehensive Zoning By-Law No. 023-18 relevant excerpts**

List of Tables

Table 1: Development Statistics	1
Table 2: Traffic Data.....	7
Table 3: Peak Hour Factors	7
Table 4: 2023 Existing Operations	9
Table 5: Background Growth Rates.....	10
Table 6: 2024 Future Background Operations	13
Table 7: 2029 Future Background Operations	14
Table 8: ITE Trip Generation.....	15
Table 9: Site Distribution.....	16
Table 10: Pass-by Distribution.....	16
Table 11: 2024 Future Total Operations	19
Table 12: 2029 Future Total Operations	22
Table 13: Sight Distance Analysis	24
Table 14: Zoning By-Law Parking Review	37
Table 15: Zoning By-Law Accessible Parking Spaces Review	38
Table 15: Zoning By-Law Bicycle Parking Space Review	38
Table 16: Zoning By-Law Loading Review	39

List of Figures

Figure 1: Site Location	2
Figure 2: Site Plan	3
Figure 3: Existing Lane Configurations	5
Figure 4: 2023 Existing Traffic Volumes	8
Figure 5: 2024 Future Background Volumes	11
Figure 6: 2029 Future Background Volumes	12
Figure 7: Primary Trip Assignment	17
Figure 8: Pass-By Trip Assignment	18
Figure 9: 2024 Future Total Traffic Volumes	20
Figure 10: 2029 Future Total Traffic Volumes	21
Figure 11: Sight Distance Analysis	25
Figure 12: Vehicle Turning Analysis – Medium Single Unit Truck-1	28
Figure 13: Vehicle Turning Analysis – Medium Single Unit Truck-2	29
Figure 14: Vehicle Turning Analysis – WB-20 Truck	30
Figure 15: Vehicle Turning Analysis – 8 Axle Fuel Tanker	31
Figure 16: Vehicle Turning Analysis – GFL Garbage Truck-1	32
Figure 17: Vehicle Turning Analysis – GFL Garbage Truck-2	33
Figure 18: Vehicle Turning Analysis – Pumper Fire Truck-1	34
Figure 19: Vehicle Turning Analysis – Pumper Fire Truck-2	35
Figure 20: Vehicle Turning Analysis – Passenger Vehicle	36

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Black-Hart Construction Inc. to complete a Transportation Impact Study for a mixed-use commercial and gas station development situated at 7456 McLean Road & 197 Brock Road South, Township of Puslinch, County of Wellington.

The purpose of the Transportation Impact Study is to evaluate the impacts of the proposed development on the surrounding road network and recommend transportation-related mitigation measures, if required.

A Terms of Reference (ToR) encompassing the scope of the Transportation Impact Study was circulated to the County of Wellington and the Town Puslinch on November 23, 2022, and comments from the County were received on December 7, 2022. Correspondence from the County is included in **Appendix A**.

1.1 Development Lands

The subject lands cover an area of approximately 1.56 ha and consists of two adjacent properties (7456 McLean Road and 197 Brock Road South). The Site is currently comprised of vegetated/landscaped areas and is bounded by Dufferin Aggregates (aggregate pit) to the north, Brock Round to the east, McLean Road to the south, and St. Mary's Cement Inc. (aggregate pit) to the west.

Both properties (7456 McLean Road and 197 Brock Road South) are zoned as site-specific industrial with holding provisions and are within the designated Rural Employment area per the County of Wellington Official Plan.

The Site Location is included in **Figure 1**.

1.2 Development Proposal

The proposed development envisions the construction of A two-storey mixed-use commercial and gas station development, the proposed site statistics are displayed in **Table 1**.

Table 1: Development Statistics

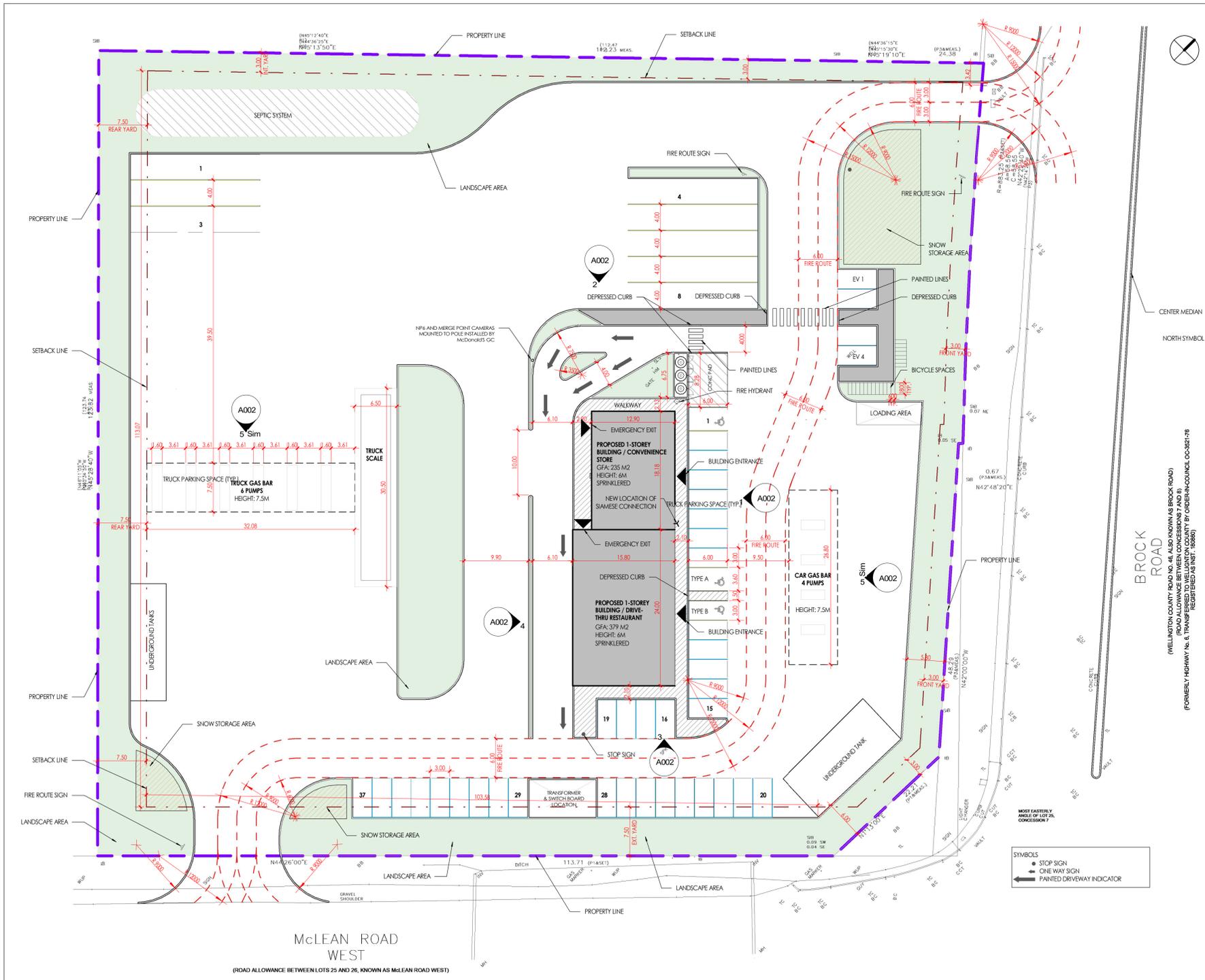
Land Use	Units
Vehicle Gas Pumps	4 Pumps
Truck Gas Pumps	6 Pumps
Convenience Store	235 m ²
Fast Food Restaurant with Drive Thru	379 m ²
Total Building GFA	572 m²
Vehicle Parking Spaces	41 spaces (Including 3 accessible parking spaces and 4 electric vehicle parking spaces)
Truck Parking Spaces	8 spaces

To facilitate the development, one full moves site access is proposed via McLean Road and one restricted right-in, right-out access is proposed via Brock Road.

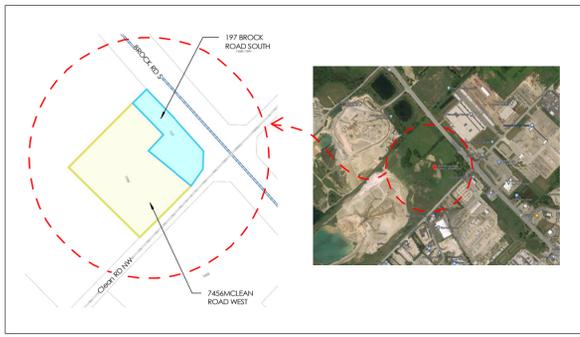
The most recent Site Plan prepared by ATA Architects Inc. (dated October 4, 2023) is included as **Figure 2**.



Legend	7456 McLean Road & 197 Brock Road South	 CROZIER CONSULTING ENGINEERS	Figure 1 Project No. 2377-6556 Date. 2023.08.15 Analyst. TDS
	 Site Boundary			Site Location



1 00 - SITE PLAN
1:350



KEY PLAN
1:100

HC ZONE REQS	REQUIRED	PROPOSED
PERMITTED USES	SEE TABLE 8.1 ZONING BY LAW	GAS BAR(S), CONVENIENCE STORE AND RESTAURANT
LOT AREA (MIN)	0.4 HA	1.62 HA
LOT FRONTAGE (MIN)	20 M	101 M
FRONT YARD (MIN)	3 M	3 M
INTERIOR SIDE YARD (MIN)	3 M	3 M
EXTERIOR SIDE YARD (MIN)	7.5 M	7.5 M
REAR YARD (MIN)	7.5 M	3 M
RESTAURANT AREA		379 m ²
CONVENIENCE STORE		235 m ²
GAS BAR CANOPY (CARS)		201 m ²
GAS BAR CANOPY (TRUCKS)		241 m ²
TOTAL BUILDINGS / STRUCTURE AREA		1,056 m ²
LOT COVERAGE (MAX)	45%	6.5%
LANDSCAPED OPEN SPACE	25%	24%
PARKING SPACES:		
GAS BAR(S) - CARS	(1 PER PUMP) = 4	REFER TO PARKING SCHEDULE BELOW
GAS BAR(S) - TRUCKS	(1 PER PUMP) = 6	8
CONVENIENCE STORE	(1 PER 20 M ²) = 12	REFER TO PARKING SCHEDULE BELOW
RESTAURANT	(1 PER 10 M ²) = 38	REFER TO PARKING SCHEDULE BELOW
TOTAL	60	49

PARKING SCHEDULE	
TYPE OF PARKING SPACE	PROVIDED PARKING SPACE
ACCESSIBLE PARKING - TYPE A	2
ACCESSIBLE PARKING - TYPE B	1
TRUCK PARKING SPACE	8
TYPICAL PARKING SPACE	38
TOTAL:	49

5.2.15 BICYCLE PARKING

A. BICYCLE PARKING SPACES SHALL BE REQUIRED FOR THE USES LISTED IN TABLE 5.6 BELOW (FROM ZONING BY LAW) IN ADDITION TO ANY REQUIRED PARKING SPACES.

B. EACH BICYCLE PARKING SPACE SHALL BE A MINIMUM OF 60 CENTIMETERS WIDE AND 1.8 METERS LONG.

REQUIRED BICYCLE BY ZONING: 16
PROPOSED BICYCLE IN SITE PLAN: 19

USE	REQUIRED PARKING STANDARDS (PER NET FLOOR AREA)
Retail, personal, institutional	The greater of 2 spaces or 1 space /1000 m ²
Industrial	2 /1,000 m ²
Long term care facility, retirement home	The lesser of 5 or 0.25 per bed or dwelling unit
Public and private school	1 /10 students of design capacity & 1 space/35 employees
Dwelling units or mixed-use buildings with more than 6 dwelling units	2 spaces for the first 6 dwelling units plus 2 spaces for each additional 6 dwelling units or fraction thereof

2 SITE STATISTICS & TABLES
1:120

NOTE:
THE ARCHITECTURAL SITE PLAN IS FOR GENERAL ARRANGEMENT ONLY. REFER TO THE LANDSCAPE DRAWINGS, THE CIVIL ENGINEERING DRAWINGS AND THE SURVEY FOR LANDSCAPING, GRADING AND SERVING DETAILS.

REVISION

NUMBER	DATE	REMARKS
005	2023 10 04	FOR CLIENT REVIEW
004	2023 09 27	FOR CLIENT REVIEW
003	2023 08 28	FOR CLIENT REVIEW
002	2023 05 24	FOR CLIENT REVIEW
001	2023 01 05	DRAFT SITE PLAN

CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS AND CONDITIONS ON THE PROJECT AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK. DRAWINGS ARE NOT TO BE SCALED.

CONTRACT DOCUMENTS ARE THE COPYRIGHT OF THE CONSULTANTS AND SHALL NOT BE USED OR REPRODUCED WITHOUT AUTHORIZATION. DOCUMENTS ARE TO BE RETURNED UPON COMPLETION OF THE PROJECT.

ATA ARCHITECTS
ATA ARCHITECTS INC.
BURLINGTON OFFICE:
3221 NORTH SERVICE ROAD, SUITE 101
BURLINGTON, ONTARIO, L7N 3G2.
T 905 849 6888 F 905 849 4369
E admin@ataarchitectsinc.com

SEALS

PROJECT

PROPOSED GAS BARS,
RETAIL STORE &
DRIVE-THRU RESTAURANT
7456 MCLEAN ROAD W,
PUSLINCH, ON NOB 2JO

DRAWING

SITE PLAN & KEYPLAN

DRAWN

AA

SCALE

As indicated

DATE

2023 10 04

CHECKED

AT

PROJECT

#TBD

DRAWING

A001

2.0 Existing Conditions

The following intersections were reviewed as part of the study area (per confirmation with Township and County staff):

- McLean Road and Brock Road South (Wellington Road 46)
- Brock Road South (Wellington Road 46) and Nicholas Beaver Road
- Proposed restricted right-in right-out site access via Brock Road South (Wellington Road 46)
- Proposed full-moves site access via McLean Road

The following section provides a description of the study area from a transportation context, as well as a traffic operations analysis of the study road network.

2.1 Study Road Network

The directional orientation of the study roadways is slightly skewed; however, it is generally understood that to/away from the lake are considered the north/south directions and parallel along the lake are considered the east/west directions. To ensure clarity and consistency in this report, Brock Road is designated as a north-south roadway, while McLean Road and Nicholas Beaver Road are designated as east-west roadways.

Brock Road South (Wellington Road 46) is an east/west roadway with a four-lane urban cross-section. Brock Road South operates as a Major Arterial under the County of Wellington's jurisdiction. The roadway has a posted speed limit of 70 km/h. Paved shoulders are provided on both sides of the roadway, no sidewalks or active transportation facilities are provided.

McLean Road is a north/south roadway with a two-lane cross-section. McLean Road operates as a Major Collector roadway under the Township of Puslinch's jurisdiction. The roadway has a posted speed limit of 60 km/h. Paved shoulders are provided on both sides of the roadway, no sidewalks or active transportation facilities are provided.

Nicholas Beaver Road is a north/south roadway with a two-lane cross-section. Fenton Way operates as a Minor Collector under the Township of Puslinch's jurisdiction. The roadway has an assumed speed limit of 50 km/h. No sidewalks or active transportation facilities are provided.

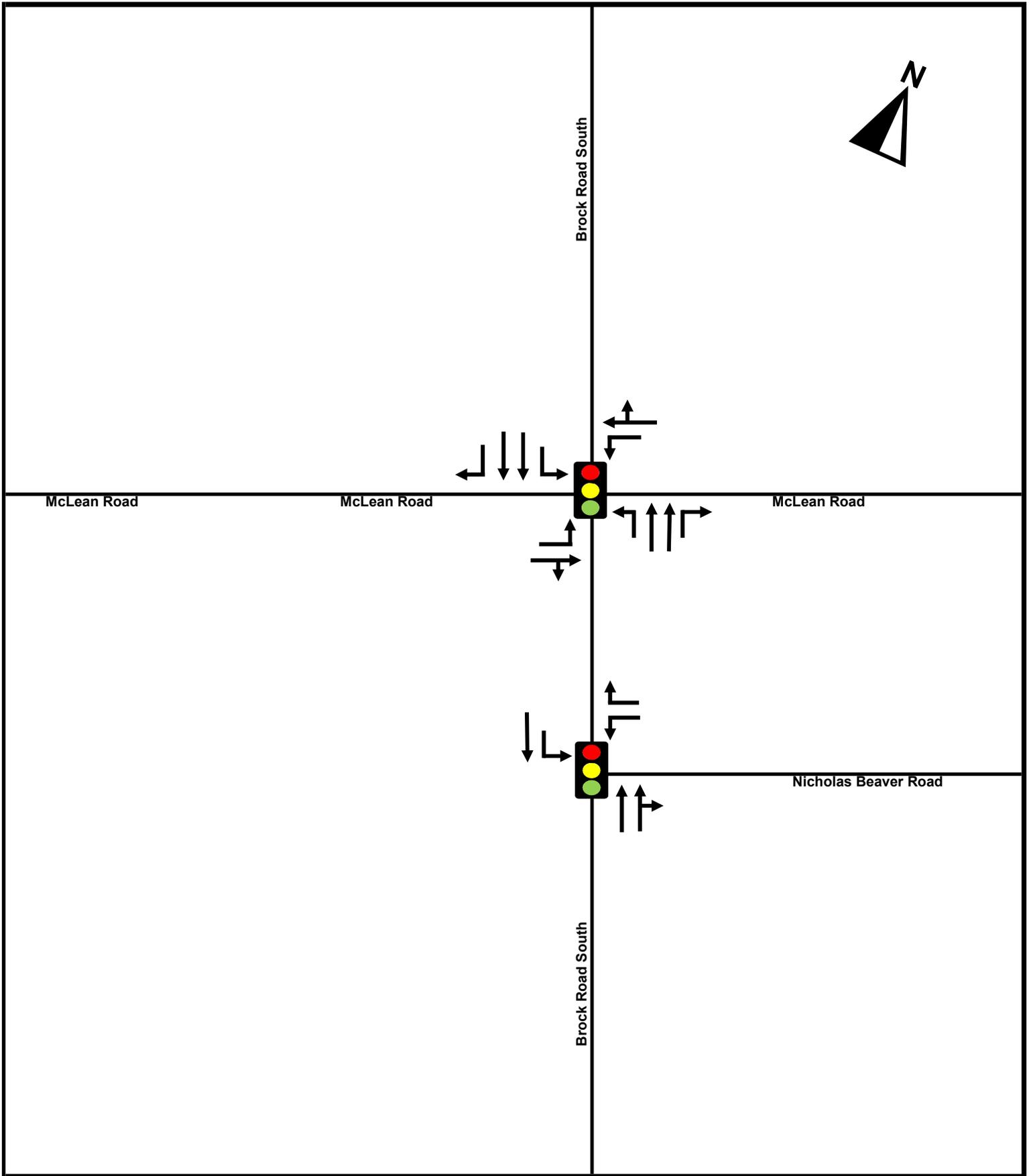
Excerpts of the County of Wellington Road Master Action Plan are included in **Appendix B**.

2.2 Study Intersections

The intersection of **Brock Road South at McLean Road** is a four-legged signalized intersection. The southbound and northbound approach on Brock Road South both consist of a single auxiliary left-turn lane, a single auxiliary right-turn lane, and two through lanes. The eastbound and westbound approach on McLean Road both consist of a single auxiliary left-turn lane and one single through-right-turn lane.

The intersection of **Brock Road South at Nicholas Beaver Road** is a three-legged signalized intersection. The southbound approach on Brock Road South consists of a single auxiliary left-turn lane and two through lanes. The northbound approach on Brock Road South consists of one single through lane and one single through-right-turn lane. The westbound approach on Nicholas Beaver Road consists of a single auxiliary left-turn lane and one single auxiliary right-turn lane.

Figure 3 outlines the existing lane configurations in the area.



Legend

-  Signalized Intersection
-  Stop-Controlled Intersection

7456 McLean Road & 197 Brock Road South

Existing Lane Configurations



Figure 3

Project No. 2377-6556
Date. 2023.08.15
Analyst. TDS

2.3 Transit Network

The Subject Lands are located on the northwest corner of the intersection of Brock Road South at McLean Road. Just opposite to the Subject Lands, on the southeast corner of the intersection, is the Brock Road at McLean Road (Aberfoyle) Park & Ride. GO Transit operates 4 routes through that station connecting users to the Greater Toronto Area. **Table 3** below outlines the existing transit routes, days of operation, peak hour headways, and the location of bus stops in the study area.

Route	Direction	Span	Days of Operation	Peak Hour Headways (min)	Transit and Connecting Stops in Study Area
GO Transit, 17 Waterloo/Hamilton	Two-Way East-West	University of Waterloo to Hamilton GO	Monday – Friday	60 mins	Brock Road at McLean Road (Aberfoyle) Park & Ride (350 m, 5 min walk)
GO Transit, 29 Guelph/Mississauga	Two-Way East-West	Guelph Central GO to Kipling Bus Terminal	Monday- Sunday	30 mins	
GO Transit, 48 Guelph – Hwy 407 Bus Terminal	Two-Way East-West	University of Guelph to Pickering GO	Monday – Friday	50 mins	
GO Transit, 25 Waterloo/Mississauga	Two-Way East-West	University of Waterloo to Square One	Monday- Sunday	60 mins	

As shown above, these buses provide commuters and visitors fast connectivity throughout the Greater Toronto Area. It is noted that the nature of this transit stop is so that it operates as a Park & Ride, transit users would be expected drive to the station as local transit routes are not available. **Appendix C** contains relevant transit information.

2.4 Active Transportation Network

There are currently no sidewalks or active transportation facilities along the roadways, although sidewalks are provided at the intersections to facilitate safe pedestrian crossing. Otherwise, the Study Area roadways only feature paved shoulders within their ROW, the Study Area is considered primarily automobile transportation mode driven.

2.5 Traffic Data

In accordance with the Township Terms of Reference, new turning movement counts (TMC) for 2023 were collected at the following intersections by Spectrum Traffic Inc. at the associated timeframes as summarized in **Table 2**.

Signal timing plans for the study intersection were provided by Puslinch staff for modelling purposes, also provided in **Table 2**.

Table 2: Traffic Data

Intersection	TMC Date	Timing Plan Date
Brock Road South at McLean Road	May 02, 2023	November 04, 2013
Brock Road South at Nicholas Beaver Road	May 02, 2023	July 04, 2013

The traffic count data and signal timing plans are provided in **Appendix D**. Existing traffic volumes are illustrated in **Figure 4**.

2.6 Traffic Modelling

The evaluation of intersections within this report is conducted based on the methodology outlined in the Highway Capacity Manual (2010), using Synchro 11 modelling software. Intersections are assessed using a Level of Service (LOS) metric, with ranges of intersection delays assigned a letter from "A" to "F". For stop-controlled intersections, a Level of Service "A" or "B" would typically be measured during off-peak hours when lesser traffic volumes are on the roadways. Levels of Service "C" through "F" would typically be observed during commuter peak hours when significant vehicle volumes would cause lengthy travel times. The Level of Service definitions for signalized and stop-controlled intersections are included in **Appendix E**.

For modelling purposes, Peak Hour Factors were calculated using volumes from the existing counts per County of Wellington Guidelines. The Peak Hour Factors used are shown in **Table 3**. Calculations for the Peak Hour factors can be found in **Appendix F**.

Table 3: Peak Hour Factors

Intersection	A.M.	P.M.
Brock Road South at McLean Road	0.88	0.95
Brock Road South at Nicholas Beaver Road	0.92	0.87

2.7 Intersection Operations

The traffic operations at the study intersections were analyzed based on observed traffic volumes during the weekday a.m. and p.m. peak hours, as illustrated in **Figure 4**. Detailed capacity analyses are included in **Appendix G**. **Table 4** summarizes the existing traffic operations within the study area.



Legend

xx A.M. Peak Hour Traffic Volumes
 (xx) P.M. Peak Hour Traffic Volumes

7456 McLean Road & 197 Brock Road South

2023 Existing Traffic Volumes



Figure 4

Project No. 2377-6556
 Date. 2023.08.15
 Analyst. TDS

Table 4: 2023 Existing Operations

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Critical V/C Ratio ² (Movement)	95 th Percentile Queue Length > Storage Length [50 th Percentile Queue]
Brock Road South at McLean Road	Signal	A.M.	B	17.5 s	0.53 (SBT)	None
		P.M.	B	15.4 s	0.34 (NBT, EBT)	None
Brock Road South at Nicholas Beaver Road	Signal	A.M.	B	11.7 s	0.53 (WBL)	35m>20m (SBL) [20m]
		P.M.	B	12.7 s	0.57 (WBL)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.85 for through or shared through/turn movements and v/c ratios greater than 0.90 for dedicated left or right turn movements are outlined and highlighted.

As indicated in **Table 4**, both intersections are currently operating acceptably with LOS “B” during the weekday a.m. and p.m. peak hours.

The signalized intersection of Brock Road South at McLean Road operates with a LOS “B” during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.53 and 0.34 was observed during the weekday a.m. and weekday p.m. peak hours, respectively.

The signalized intersection of Brock Road South at Nicholas Beaver Road operates with a “LOS “B” during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.53 and 0.57 was observed during the weekday a.m. and weekday p.m. peak hours, respectively.

3.0 Future Background Conditions

3.1 Study Horizons

Following consultation with the Township and County and confirmation with Municipality and County Staff, the horizon years of 2024 (full build-out), 2029 (five-year horizon) was considered to be appropriate for analysis purposes.

3.2 Background Developments

Per consultation with the County of Wellington and the Township of Puslinch, no background developments were identified as part of the study area.

3.3 Traffic Growth Rates

The County of Wellington confirmed the growth rate (compounded annually) to be used for all corridors and movements in the Study Area to be used provided, listed in **Table 5** below.

Table 5: Background Growth Rates

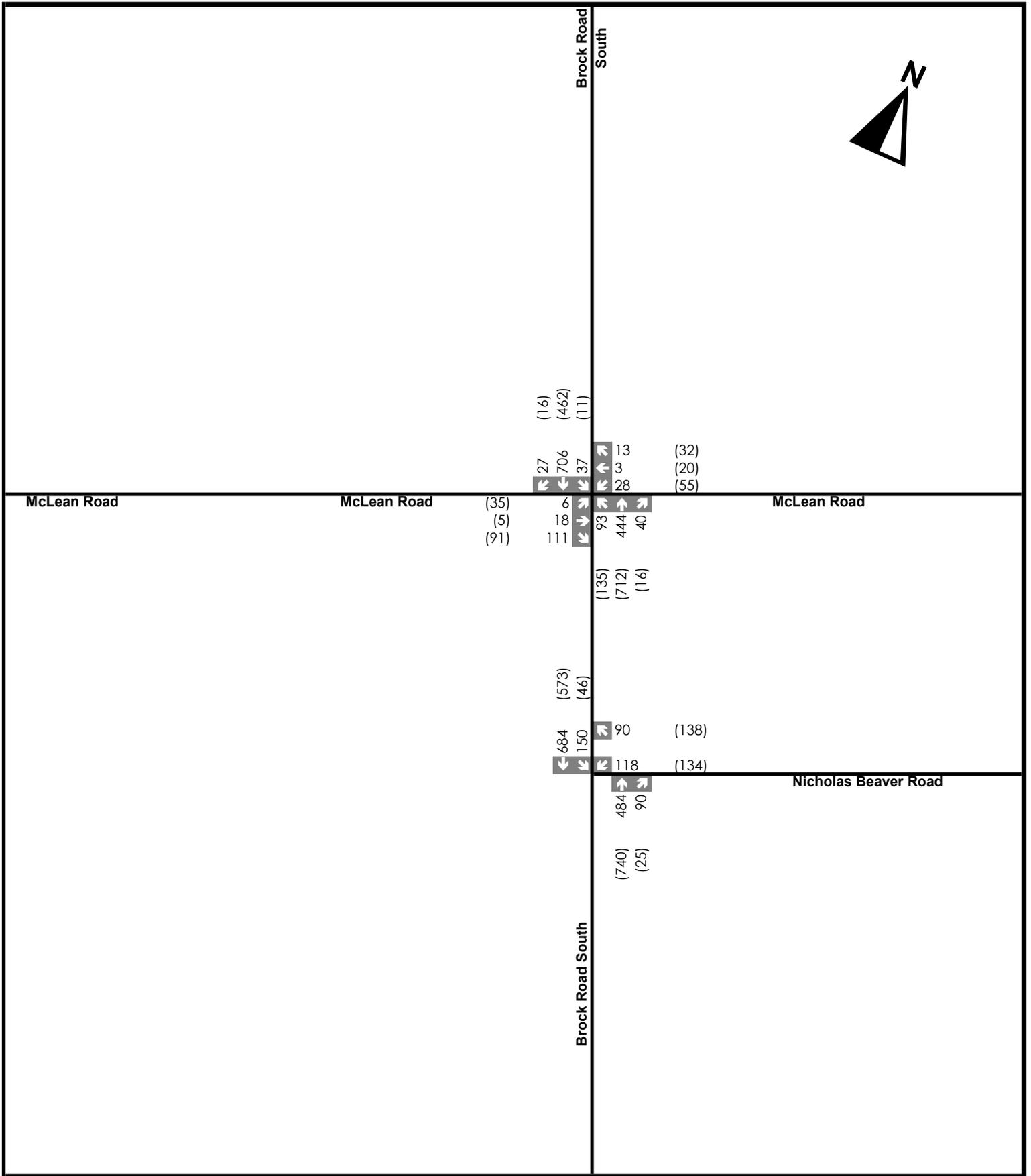
Intersection	Growth Rates	
	2023-2024	2024-2029
Brock Road South	2%	
McLean Road		
Nicholas Beaver Drive		

The 2024 and 2029 future background traffic volumes are also illustrated in **Figure 5** and **Figure 6**, respectively.

3.4 Future Roadway Improvements

The County of Wellington Road Master Action Plan (December 2021) highlights Brock Road (Wellington Road 46) as a roadway in need of improvement through widening and/or a road diet. However, no definitive improvements are planned and the proposed improvements outlined in the County of Wellington Road Master Action plan occur north of the subject lands, therefore they are not relevant to the study. No other improvements within the study horizons within the study area were noted.

Appendix B contains excerpts from the Wellington County Road Master Action Plan.





Legend

xx A.M. Peak Hour Traffic Volumes
 (xx) P.M. Peak Hour Traffic Volumes

7456 McLean Road & 197 Brock Road South

2029 Future Background Volumes



Figure 6

Project No. 2377-6556
 Date. 2023.08.15
 Analyst. TDS

3.5 Intersection Operations

Traffic operations at the study intersections were analyzed following addition of volumes from associated growth rates and background developments in the vicinity of the subject development.

The future background intersection operations at the study intersections were analyzed using the 2024 and 2029 future background traffic volumes illustrated previously in **Figure 5** and **Figure 6**, respectively.

Table 6 and **Table 7** summarizes the 2024 and 2029 future background Levels of Service, respectively. Detailed capacity analyses are included in **Appendix H**.

Table 6: 2024 Future Background Operations

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Critical V/C Ratio ² (Movement)	95 th Percentile Queue Length > Storage Length [50 th Percentile Queue]
Brock Road South at McLean Road	Signal	A.M.	B	17.7 s	0.54 (SBT)	None
		P.M.	B	15.5 s	0.35 (NBT, EBT)	None
Brock Road South at Nicholas Beaver Road	Signal	A.M.	B	11.9 s	0.54 (WBL)	30m>20m (SBL) [20m]
		P.M.	B	12.9 s	0.58 (WBL)	25m>20m (SBL) [10m]

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.85 for through or shared through/turn movements and v/c ratios greater than 0.90 for dedicated left or right turn movements are outlined and highlighted.

Table 7: 2029 Future Background Operations

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Critical V/C Ratio ² (Movement)	95 th Percentile Queue Length > Storage Length [50 th Percentile Queue]
Brock Road South at McLean Road	Signal	A.M.	B	18.8 s	0.61 (SBT)	None
		P.M.	B	16.8 s	0.44 (NBT)	None
Brock Road South at Nicholas Beaver Road	Signal	A.M.	B	12.5 s	0.58 (WBL)	35m>55m (WBL) [20m]
		P.M.	B	13.5 s	0.62 (WBL)	25m>20m (SBL) [10m]

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.85 for through or shared through/turn movements and v/c ratios greater than 0.90 for dedicated left or right turn movements are outlined and highlighted.

As indicated in **Table 7**, both intersections are expected to continue to operate acceptably with LOS “B” during the weekday a.m. and p.m. peak hours.

The signalized intersection of Brock Road South at McLean Road is expected to continue to operate with a LOS “B” during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.61 and 0.44 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

The signalized intersection of Brock Road South at Nicholas Beaver Road is expected to continue to operate with a “LOS “B” during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.58 and 0.62 is expected during the weekday a.m. and weekday p.m. peak hours, respectively.

4.0 Site Generated Traffic

The proposed development will result in additional vehicles on the surrounding network that previously did not exist, and the following section outlines the methodology used to estimate the generation and distribution of trips expected to be generated by the proposed development.

4.1 ITE Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual 11th Edition was used to forecast the number of trips generated by the proposed mixed-use commercial and gas station development. As the development proposes a commercial development with multiple land uses, the most appropriate land use was determined to be Truck Stop, Land Use Code (950), for the Truck Gas Station portion of the development, Convenience Store/Gas Station, Land Use Code (945), for the vehicle gas station and convenience store portion of the development, and Fast-Food Restaurant with Drive-Through Window, Land Use Code (934), for the restaurant portion of the development. Average rates were used for both land uses and peak periods, considering the R² values for the fitted curve equations are less than 0.6 or are not provided.

Relevant excerpts from the ITE Trip Generation Manual 11th Edition are included in **Appendix I**.

Table 8 summarizes the number of trips forecasted to be generated by the proposed development.

Table 8: ITE Trip Generation

ITE Land Use Category	Units	Trip Type	A.M Peak Hour Trips Generated			P.M Peak Hour Trips Generated		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Truck Gas Station - LUC 950 - Truck Stop	6 Pumps	Primary	15	16	31	21	18	39
		Pass-by	26	27	53	28	25	53
Vehicle Gas Station Pumps + Convenience Store - LUC 945 - Convenience Store/Gas Station	4 Pumps	Primary	13	13	26	16	16	33
		Pass-by	19	19	38	21	21	41
Fast Food Restaurant with Drive Thru - LUC 934 - Fast-Food Restaurant with Drive- Through Window	4,080 ft ²	Primary	47	44	91	35	33	68
		Pass-by	46	45	91	35	32	67
Combined Site		Total Primary	75	73	148	72	67	139
		Total Pass-by	91	91	182	84	78	162
		Total Trips	166	164	330	156	145	301

As shown in **Table 8**, the subject site is expected to generate 148 two-way (75 inbound and 73 outbound) primary trips during the weekday a.m. peak hour, and 139 (72 inbound and 67 outbound) primary trips during the weekday p.m. peak hour.

4.2 Trip Distribution and Assignment

The Transportation Tomorrow Survey (TTS) is a comprehensive travel data survey conducted in the Greater Toronto and Hamilton Area. Data from the 2016 TTS is often used to determine the peak hour trip distribution at the site. However, due to the Study Area (GTA Zones 8317 and 8310) not being built out at the time of the survey in 2016 and a lack of commercial land use in the area, the data from TTS was deemed insufficient to be statistically significant.

As a result, the trip distribution for the Subject Development was determined using existing travel patterns. The primary trips were distributed to the boundary road network proportionally based on the recorded 2023 Turning Movement Counts at the intersections of Brock Road South at McLean Road and Brock Road South at Nicholas Beaver Road. **Table 9** summarizes the primary site trip distribution.

Table 9: Site Distribution

Entrance to Boundary Road Network (Eastbound traffic enters at "West via Countryside Drive")	A.M. Peak Hour		P.M. Peak Hour	
	In	Out	In	Out
West via Brock Road S	44.6%	26.9%	27.7%	44.4%
East via Brock Road S	33.3%	46.6%	43.5%	40.3%
North via McLean Road	2.4%	5.5%	6.0%	1.7%
South via McLean Road	7.7%	7.1%	7.4%	9.7%
North via Nicholas Beaver Road	12.0%	14.0%	15.4%	4.0%
Total	100%	100%	100%	100%

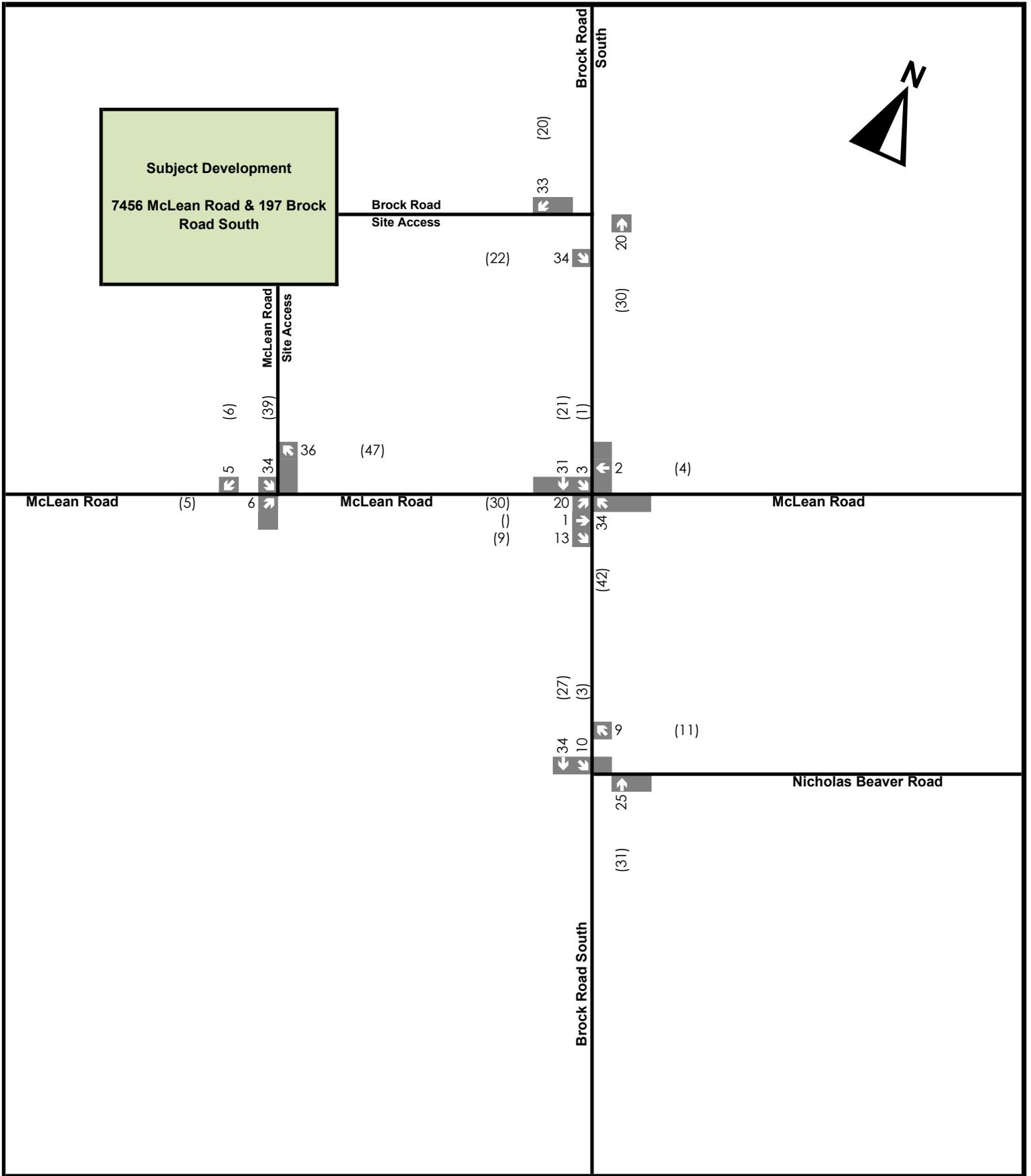
The pass-by trips were distributed to the boundary road network proportionally based on the recorded 2023 Turning Movement Counts at the intersection of Brock Road South at McLean Road using the through movements in each direction. **Table 10** summarizes the pass-by distribution for the proposed development.

Table 10: Pass-by Distribution

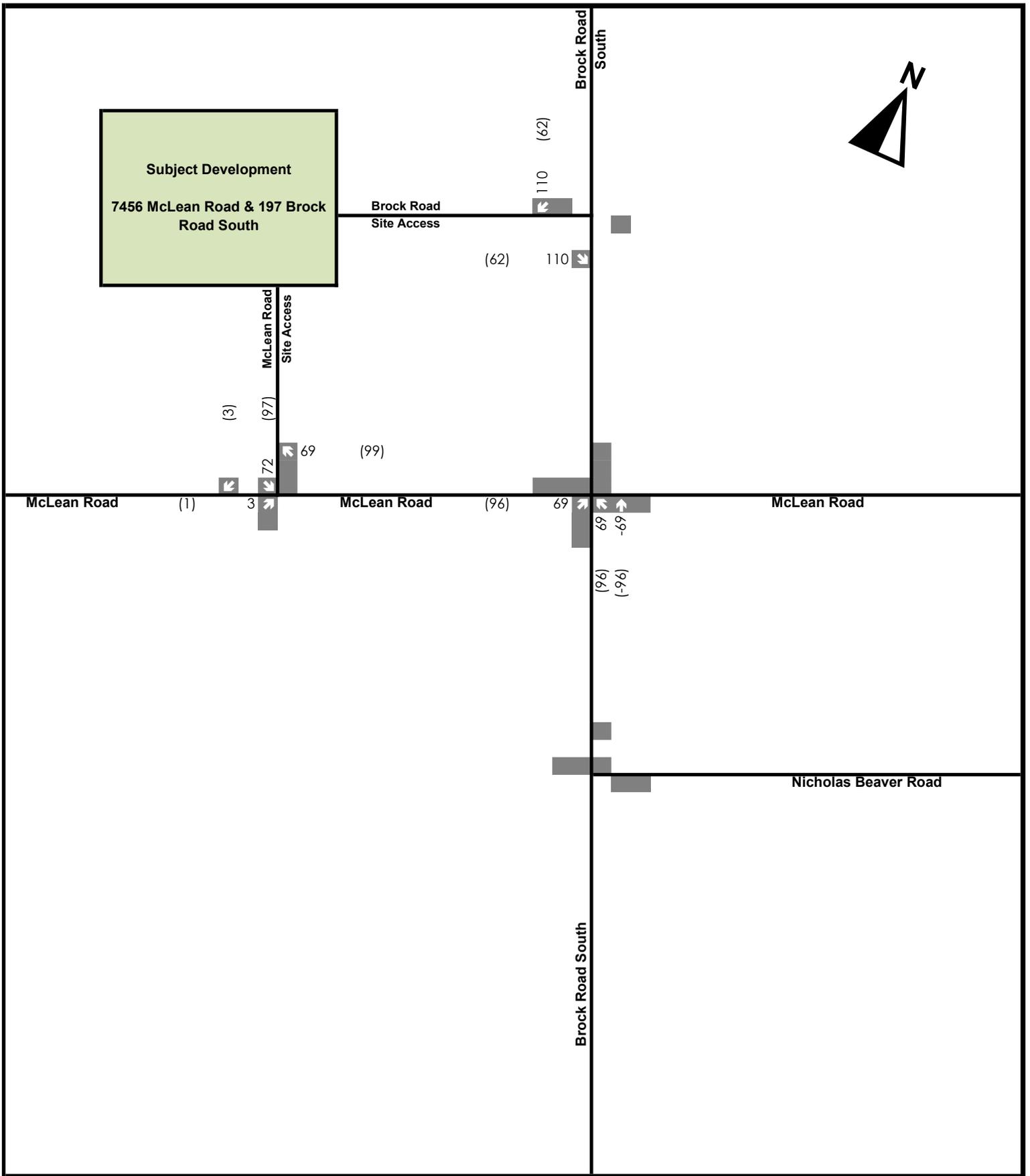
Direction	A.M.	P.M.
Westbound via Brock Road S	38%	60%
Eastbound via Brock Road S	60%	39%
Northbound via McLean Road	1%	0%
Southbound via McLean Road S	0%	2%
Total	100%	100%

The trip assignment for primary and pass-by trips were established by applying each of the distributions to the proposed development trips.

Figure 7 outlines the primary trips forecast for the proposed development, while **Figure 8** outlines the pass-by trips forecast for the proposed development.



Legend xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	7456 McLean Road & 197 Brock Road South		Figure 7
	Primary Trip Assignment		Project No. 2377-6556 Date. 2023.08.15 Analyst. TDS



Legend xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes	7456 McLean Road & 197 Brock Road South		Figure 8 Project No. 2377-6556 Date. 2023.08.15 Analyst. TDS
	Pass-By Trip Assignment		

5.0 Future Total Traffic Conditions

5.1 Intersection Operations

Traffic operations at the study intersections were analyzed with the addition of the site generated traffic to the future background traffic. The total 2024 and 2029 traffic volumes are illustrated in **Figure 9** and **Figure 10**, respectively.

Table 11 and **Table 12** summarizes the 2024 and 2029 future total Levels of Service, respectively. Detailed capacity analyses are included in **Appendix J**.

Table 11: 2024 Future Total Operations

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Critical V/C Ratio ² (Movement)	95 th Percentile Queue Length > Storage Length [50 th Percentile Queue]
Brock Road South at McLean Road	Signal	A.M.	C	23.5 s	0.86 (NBL)	180m>140m(NBL) [120m]
		P.M.	B	19.4 s	0.60 (NBL)	None
Brock Road South at Nicholas Beaver Road	Signal	A.M.	B	11.9 s	0.54 (WBL)	40m>20m (SBL) [25m]
		P.M.	B	12.8 s	0.57 (WBL)	None
Brock Road South at Proposed Right-in/Right Out Site Access	Stop	A.M.	B	15.0 s	0.33 (SBT)	None
		P.M.	B	11.1 s	0.26 (NBT)	None
McLean Drive at Proposed Site Access	Stop	A.M.	B	11.5 s	0.18 (SBLR)	None
		P.M.	B	12.6 s	0.25 (SBLR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.85 for through or shared through/turn movements and v/c ratios greater than 0.90 for

Table 12: 2029 Future Total Operations

Intersection	Control	Peak Hour	Level of Service ₁	Control Delay	Critical V/C Ratio ² (Movement)	95 th Percentile Queue Length > Storage Length [50 th Percentile Queue]
Brock Road South at McLean Road	Signal	A.M.	C	27.0 s	0.98 (NBL)	180m>140m(NBL) [140m]
		P.M.	C	20.2 s	0.67 (NBL)	155m>140m(NBL) [85m]
Brock Road South at Nicholas Beaver Road	Signal	A.M.	B	12.6 s	0.58 (WBL)	40m>20m (WBL) [25m]
		P.M.	B	13.5 s	0.62 (WBL)	25m>20m (SBL) [10m]
Brock Road South at Proposed Right-in/Right Out Site Access	Stop	A.M.	C	15.9 s	0.36 (SBT)	None
		P.M.	B	11.4 s	0.28 (NBT)	None
McLean Drive at Proposed Site Access	Stop	A.M.	B	11.8 s	0.19 (SBLR)	None
		P.M.	B	13.1 s	0.26 (SBLR)	None

Note 1: The Level of Service of a signalized intersection is based on the average control delay per vehicle (Synchro/ICU). The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach (HCM 2000).

Note 2: The critical v/c ratio is considered to be the maximum v/c ratio for movements at the intersection. In addition, all v/c ratios greater than 0.85 for through or shared through/turn movements and v/c ratios greater than 0.90 for dedicated left or right turn movements are outlined and highlighted.

As indicated in **Table 12**, both intersections are expected to continue to operate acceptably with LOS “C” during the weekday a.m. and p.m. peak hours.

The signalized intersection of Brock Road South at McLean Road is expected to decrease from operating at a LOS “B” to operate with a LOS “C” during the weekday a.m. and p.m. peak hours, when compared to 2029 Future Background conditions. A maximum volume-to-capacity ratio of 0.98 (0.37 increase from 2029 Future Background) and 0.67 (0.32 increase from 2029 Future Background) is expected during the weekday a.m. and weekday p.m. peak hours, respectively. These metrics indicate that the intersection is expected to operate adequately with acceptable delays and reserve capacity to accommodate future increases in traffic volume.

The signalized intersection of Brock Road South at Nicholas Beaver Road is expected to continue to operate with a “LOS “B” during the weekday a.m. and p.m. peak hours. A maximum volume-to-capacity ratio of 0.58 (0.04 increase from 2029 Future Background) and 0.62 (0.04 increase from 2029 Future Background) is expected during the weekday a.m. and weekday p.m. peak hours, respectively. These metrics indicate that the intersection is expected to operate efficiently with minimal delays and reserve capacity to accommodate future increases in traffic volume.

Both proposed Site accesses expected to operate acceptably with LOS “C” or better during the weekday a.m. and p.m., peak hours. Additionally, no volume to capacity or storage issues are expected. Therefore, the accesses are expected to operate efficiently with minimal delays and reserve capacity to accommodate future increases in traffic volumes.

6.0 Site Access Review

Given the primary land-use for the development, gas station, the access to Brock Road is vital from an economic standpoint. To facilitate the development, one full moves site access is proposed via McLean Road and one restricted right-in, right-out access is proposed via Brock Road.

This section analyzes the proposed site accesses for the subject development from a safety perspective.

It is noted that future accesses on properties north of the Subject Lands could be consolidated to the subject access. Thus, a restricted right-in, right-out access via Brock Street is supportable from this perspective.

6.1 Sight Distance Assessment

The available sightlines at the proposed site access were measured and compared to the standards set out in the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR), June 2017. Sight distance was measured from the Site access using the following assumptions:

- A standard driver eye height of 1.08 m for a passenger car, and
- A 4.4 m setback from the approximate extension of the outer curb to represent a vehicle waiting to exit the Site.

Intersection sight distance is calculated using Equation 9.9.1 from the GDGCR as outlined below:

$$ISD = 0.278 * V \text{ major} * tg$$

Where:

ISD = Intersection Sight Distance

V major = design speed of roadway (km/h)

tg = assumed time gap for vehicles to turn from stop onto roadway (s)

Table 13 outlines the sight distance requirements for the proposed site access. **Figure 11** illustrates the sight lines at the site.

Table 13: Sight Distance Analysis

Feature	McLean Road Access	Brock Road Access
Access Type	Full moves	Right-In Right-Out
Posted Speed Limit	60 km/h	70 km/h
Assumed Design Speed	80 km/h	90 km/h
Base Time Gap (right turn)	Right Turn: 6.5 s Left turn: 7.5 s	Right Turn: 6.5 s
Additional Time Gap	None	None
Grade of Roadway	Less than 3%	Less than 3%
Horizontal Alignment of Roadway	Straight	Straight
Required Sight Distance	Right turn: 145 m Left Turn: 170 m	Right Turn: 165 m
Available Sight Distance	Right turn: 200 + m Left Turn!: 200 + m	Right turn: 300 + m

Note 1: The Brock Road Site Access is spaced approximately 105m away from the intersection of McLean Road and Brock Road South. Sight lines through the intersection are clear and unobstructed, turning vehicles are expected to turn onto Brock Road at speeds much lower than the design speed.

Note 2: The McLean Road Site Access is spaced approximately 100m away from the intersection of McLean Road and Brock Road South. Sight lines through the intersection are clear and unobstructed, turning vehicles are expected to turn onto Brock Road at speeds much lower than the design speed.

As outlined in **Table 13**, Brock Road and McLean Road are straight, relatively flat, with no visible obstructions noted. Minimum sight distance requirements are expected to be satisfied at both accesses. The permanent site accesses can be supported from a traffic safety perspective. **Figure 11** illustrates the sight lines at the site.



Legend

 Passenger car

 Minimum Sight Distance

 Measured Sight Distance

No.	ISSUE	DATE: MMM/DD/YYYY
0	ISSUED FOR SUBMISSION	10/20/2023

Engineer _____ Engineer _____

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project **BLACK-HART CONSTRUCTION INC.**
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Drawing **SIGHT DISTANCE ANALYSIS**



211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CROZIER.CA
INFO@CROZIER.CA

Drawn By	B.L.	Design By	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale N.T.S. Drawing FIG 11

6.2 Access Spacing

Brock Road Site Access

Brock Road is classified as a County Road under the jurisdiction of the County of Wellington and operates as a Major Arterial. As such, TAC site access requirements were assessed under those conditions.

Per Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDGCR) Section 8.2, direct property access at a major arterial roadway should be restricted, as such, a restricted right-in, right-out access is proposed.

Per TAC GDGCR Figure 8.8.2, a driveway or public lane along an arterial road should be located at a minimum clearance of 70 metres from a signalized intersection and a minimum clearance of 35 metres from a stop-controlled intersection. As the proposed access is over 105 metres from the Brock Road at McLean Road signalized intersection to the south, over 400m from Brock Road at Gilmour Road/Private Access signalized intersection to the north, as well as over 350 m from the nearest stop-controlled access north of the Site, the proposed site access at Brock Road is supportable from this perspective.

McLean Road Site Access

McLean Road is classified as a Major Collector roadway under the Township of Puslinch's jurisdiction. As such, TAC site access requirements were assessed under those conditions.

Per TAC GDGCR Figure 8.8.2, a driveway or public lane along a collector road should be located at a minimum clearance of 55 metres from a signalized intersection and a minimum clearance of 25 metres from a stop-controlled intersection. As the proposed access is over 100 metres from the Brock Road at McLean Road signalized intersection to the east, over 250m from McLean Road at Kerr Crescent stop-controlled intersection to the west, the proposed site access at McLean Road is supportable from this perspective.

7.0 Maneuvering Assessment

A maneuvering assessment was conducted to ensure the proposed site design provides adequate space for the design vehicles expected at the site. The maneuvers of these design vehicles are elaborated upon in the following section.

7.1 Loading Vehicles

A maneuvering assessment was conducted for loading vehicles using a MSU (Medium Single Unit) Truck design vehicle, WB-20 Truck, and an 8 Axle Fuel Tanker. **Figure 12** and **Figure 13** illustrates the MSU Truck entering and exiting the site in both directions, as well as entering and exiting the proposed loading spaces at each building. **Figure 14** illustrate the WB-20 Truck entering the site and accessing the Truck gas pumps before exiting the site. **Figure 15** shows the 8 Axle Fuel Tanker navigating the proposed tanker route within the site. As shown in **Figure 14** and **Figure 15**, some vehicle maneuvering issues were identified in the northeast corner of the site due to the turning radii provided at the Brock Road South Site Access and preceding internal turn not being sufficient for the WB-20 Truck and 8 Axle Fuel Tanker movements, respectively, as well as the west most truck gas pump not providing sufficient spacing for the WB-20 trucks to access. These aspects of the Site Plan will be revised as part of the future applications.

Waste Vehicles

Since the proposed development is intended for commercial uses, waste collection is intended to be undergone privately, a GFL Garbage Truck 10m in length was used. **Figure 16** and **Figure 17** illustrates the GFL Garbage Truck entering and exiting the site, as well as entering and exiting the proposed loading space.

7.2 Emergency Vehicles

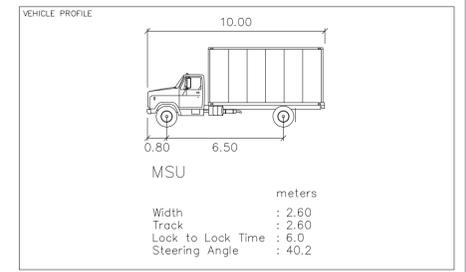
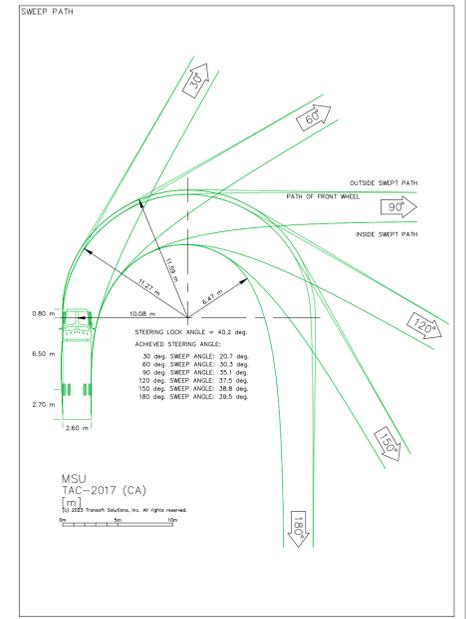
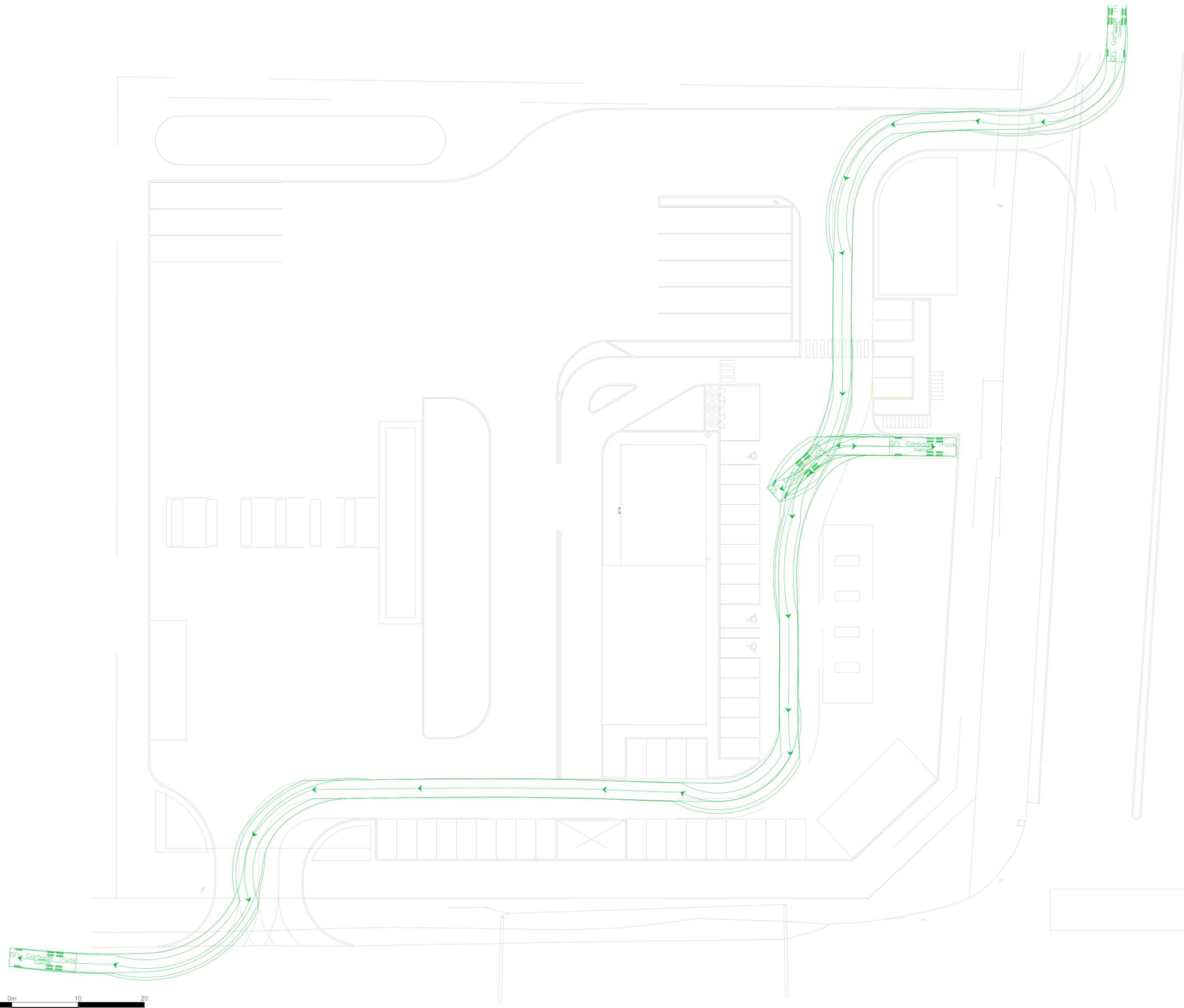
A maneuvering assessment was conducted for emergency vehicles using a Pumper Fire Truck 13.4 metres in length. As shown in **Figure 18** and **Figure 19**, the fire truck is able to enter the site using both site accesses and can safely maneuver the proposed fire route in either direction safely entering and exiting the site.

7.3 Passenger Vehicles

A maneuvering assessment was conducted using a Passenger TAC (P-TAC) vehicle as shown in **Figure 20**, which demonstrates that passenger vehicles can enter and exit critical parking spots within a three-point turning movement, as well as restaurant drive through. No issues were identified with any of the proposed parking spaces or site accesses from a maneuverability perspective.

Based on the assessments above, the development can be supported from a maneuverability perspective.

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
BLACK-HART CONSTRUCTION INC.
 7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
 TOWNSHIP OF PUSLINC, COUNTY OF WELLINGTON

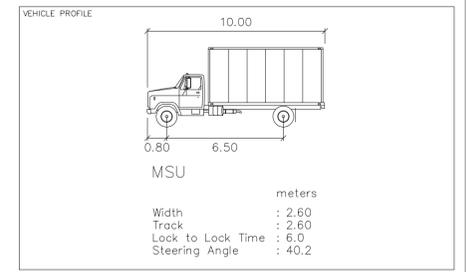
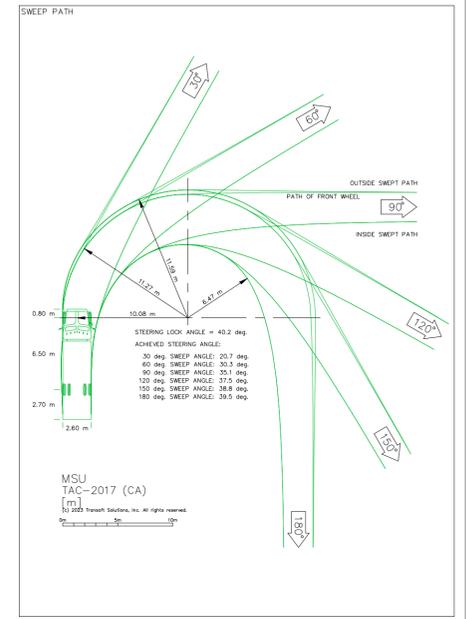
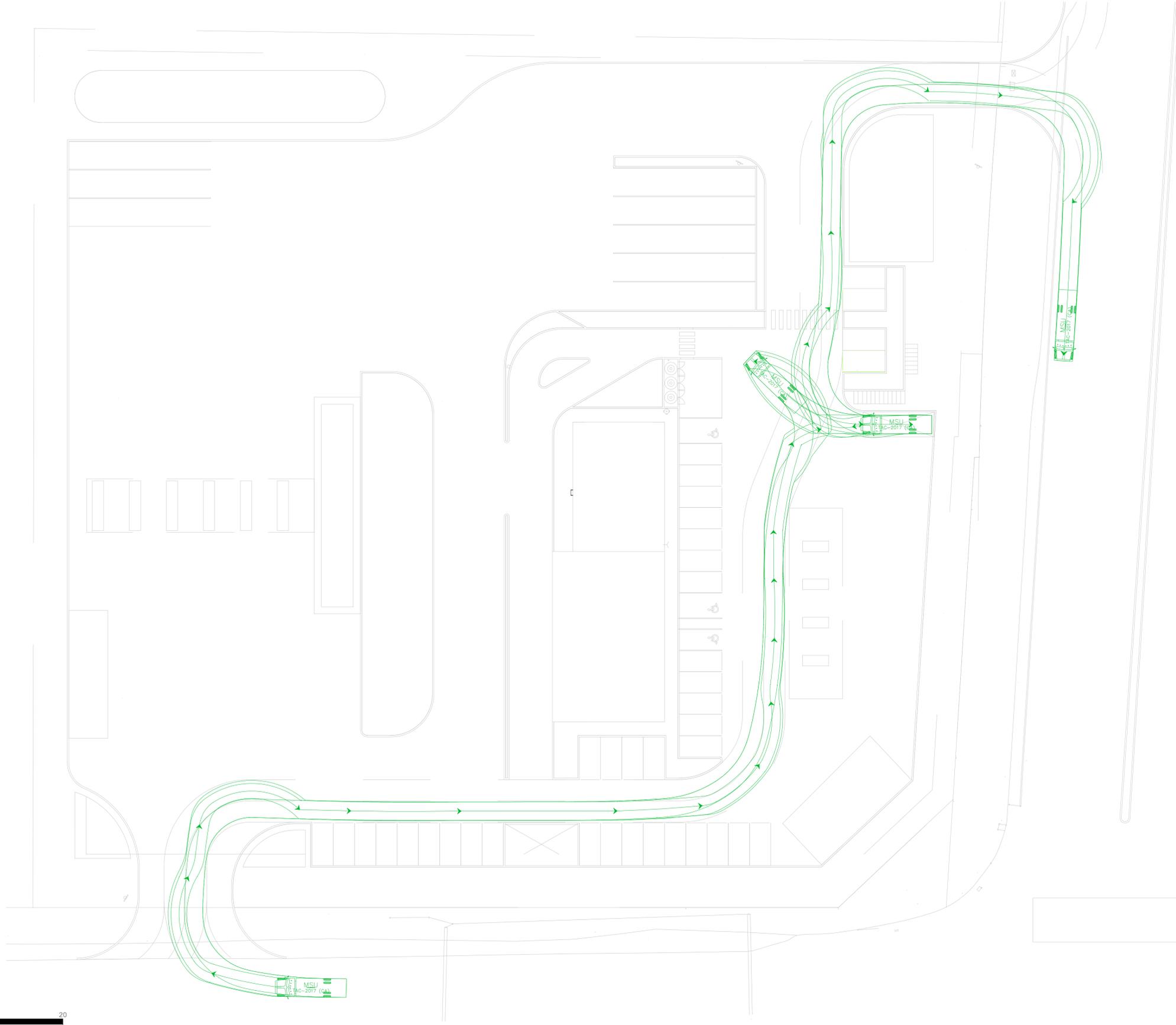
Drawing
**MEDIUM SINGLE UNIT
 VEHICLE MANEUVERING ANALYSIS**

211 YONGE STREET
 SUITE 301
 TORONTO, ON, M5B 1M4
 416-477-3392 T
 WWW.CFCROZIER.CA
 INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 12



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINC, COUNTY OF WELLINGTON

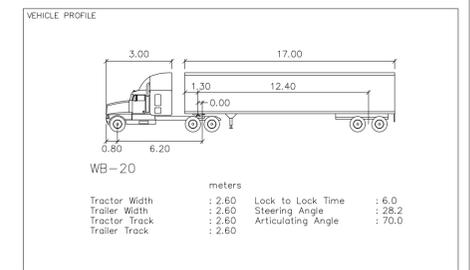
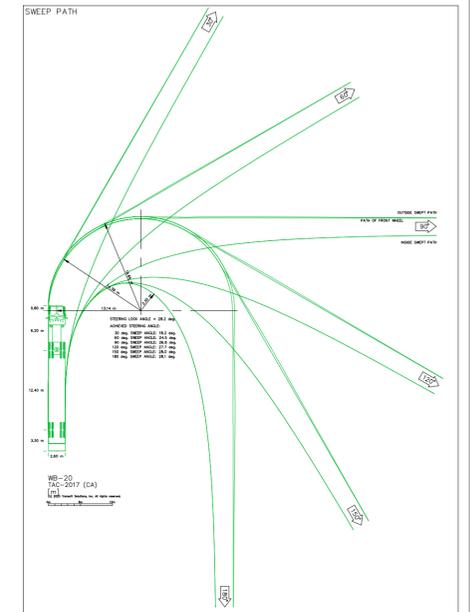
Drawing
MEDIUM SINGLE UNIT
VEHICLE MANEUVERING ANALYSIS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 13



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

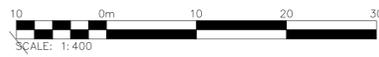
Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Drawing
WB-20 TRUCK
VEHICLE MANEUVERING ANALYSIS

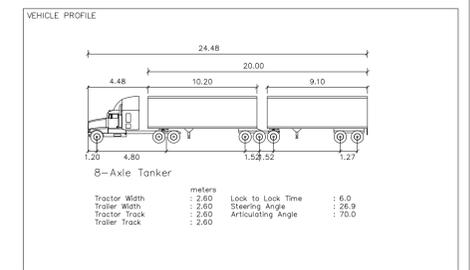
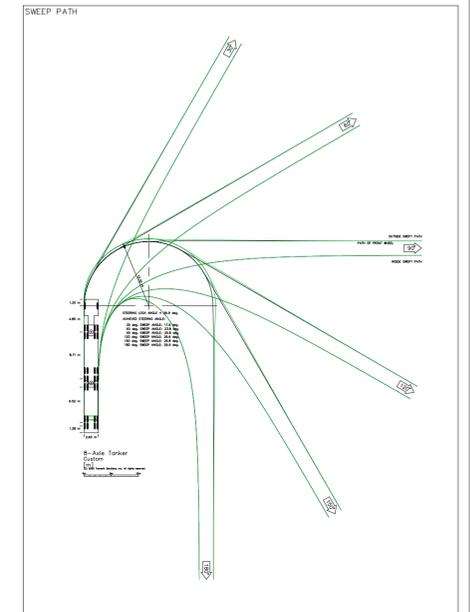
CROZIER
CONSULTING ENGINEERS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:400
				Drawing	FIG 14



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

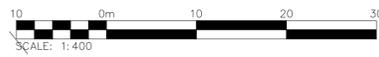
Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINC, COUNTY OF WELLINGTON

Drawing
8 AXLE FUEL TANKER
VEHICLE MANEUVERING ANALYSIS

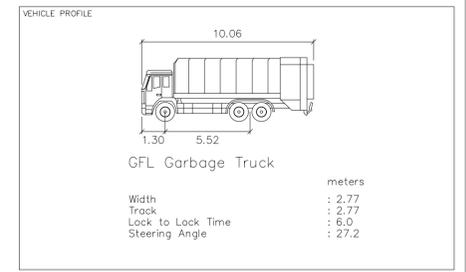
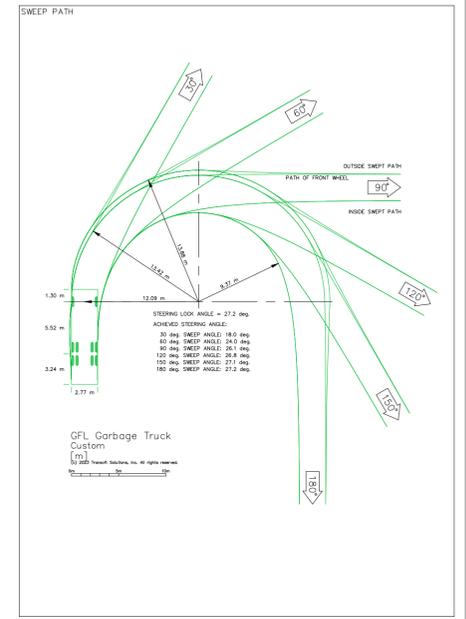
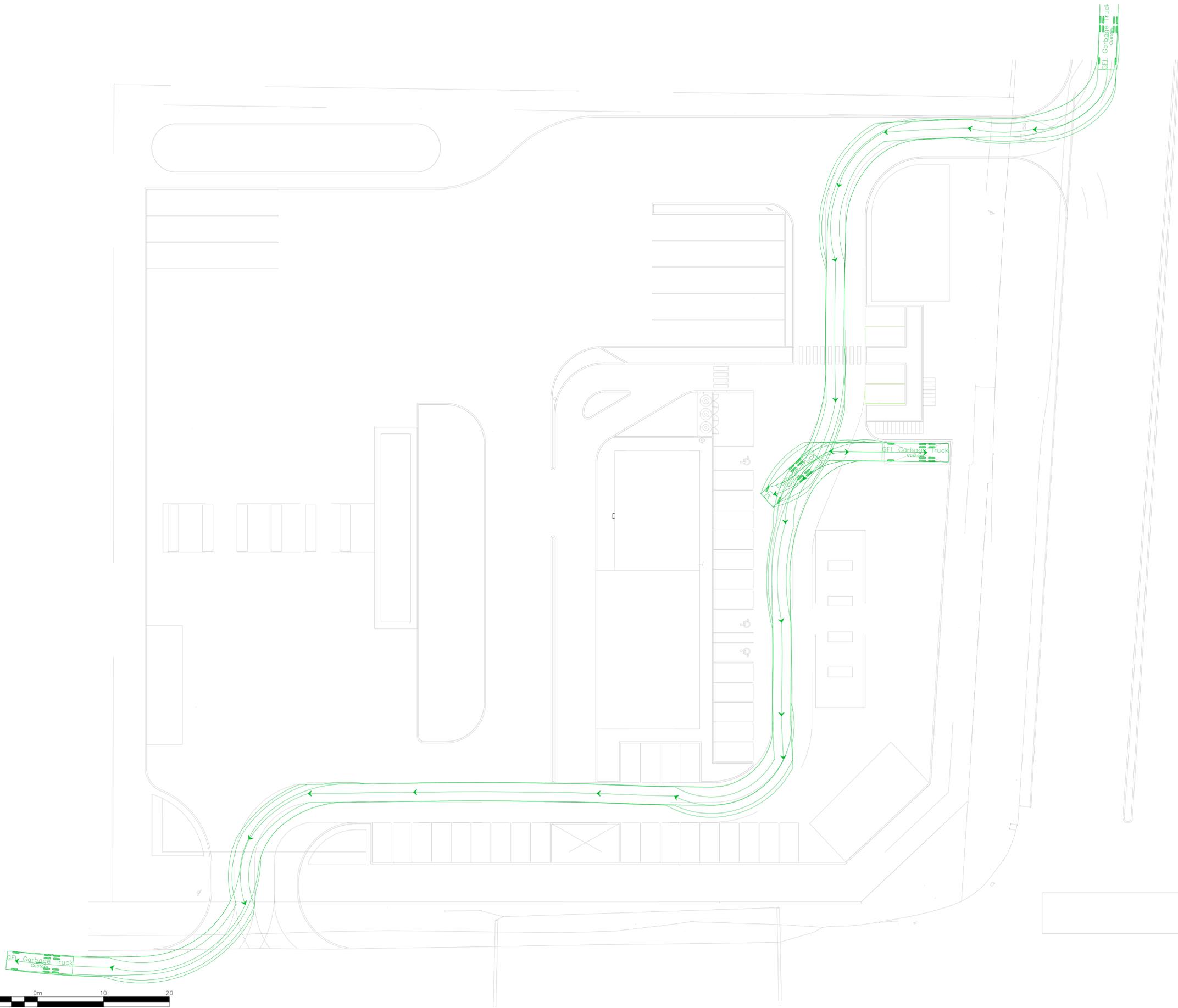
CROZIER
CONSULTING ENGINEERS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:400
				Drawing	FIG 15



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Drawing
WASTE COLLECTION
VEHICLE MANEUVERING ANALYSIS

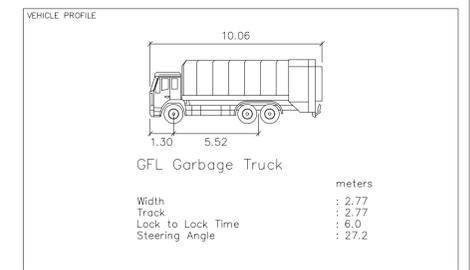
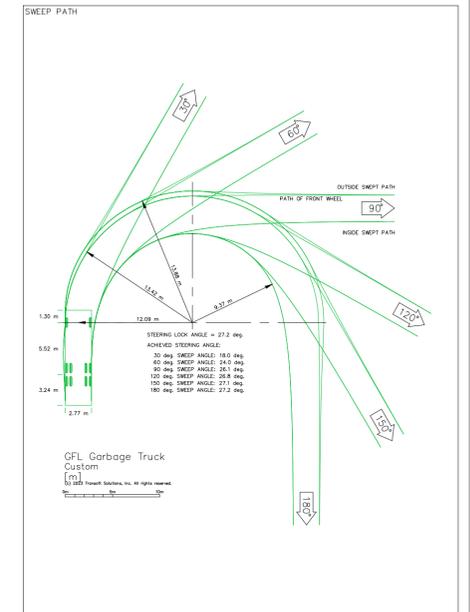
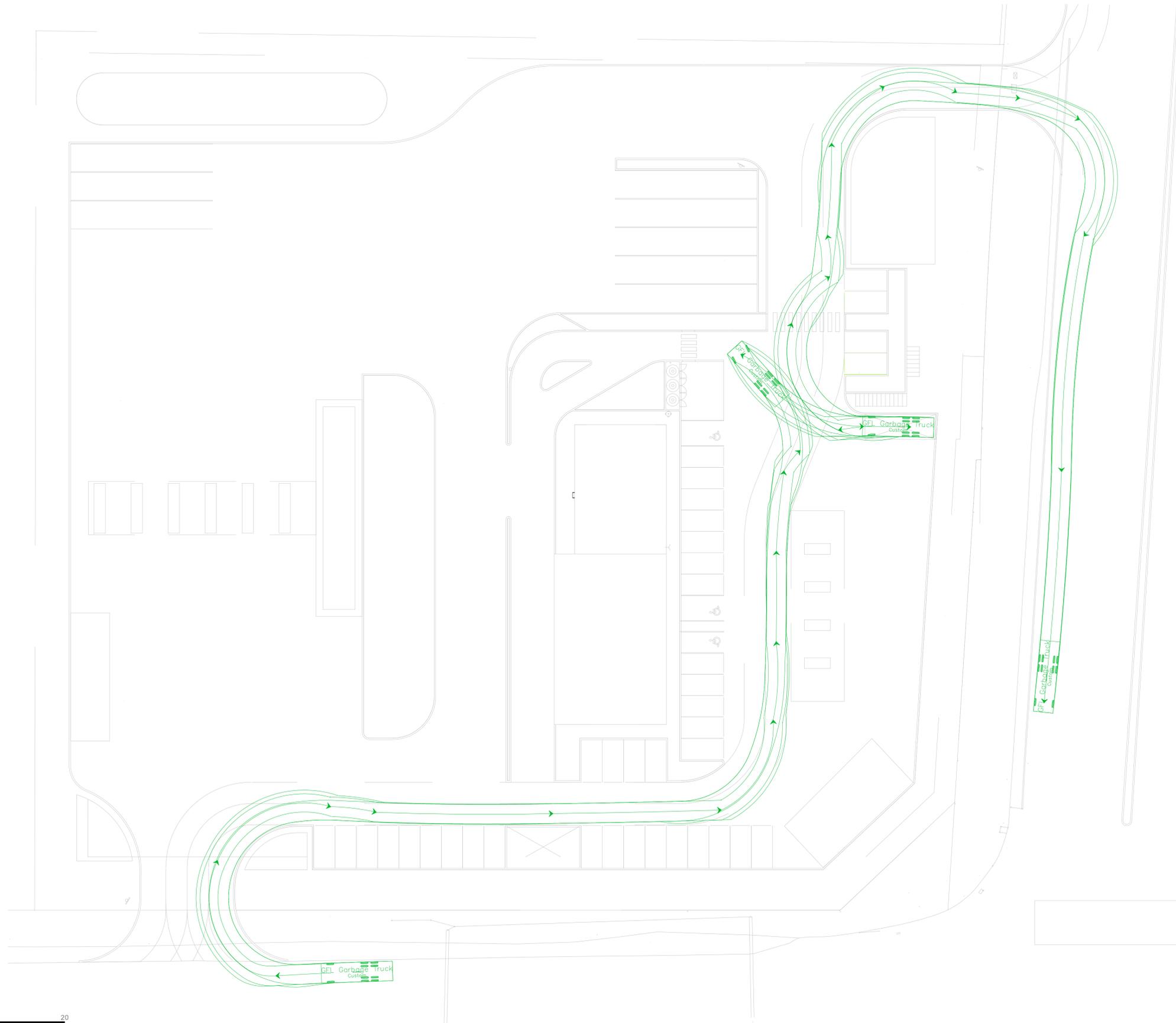
CROZIER
CONSULTING ENGINEERS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 16



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
 BLACK-HART CONSTRUCTION INC.
 7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
 TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Drawing
 WASTE COLLECTION
 VEHICLE MANEUVERING ANALYSIS

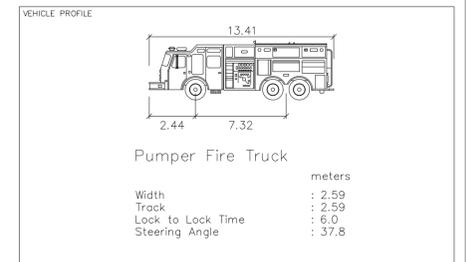
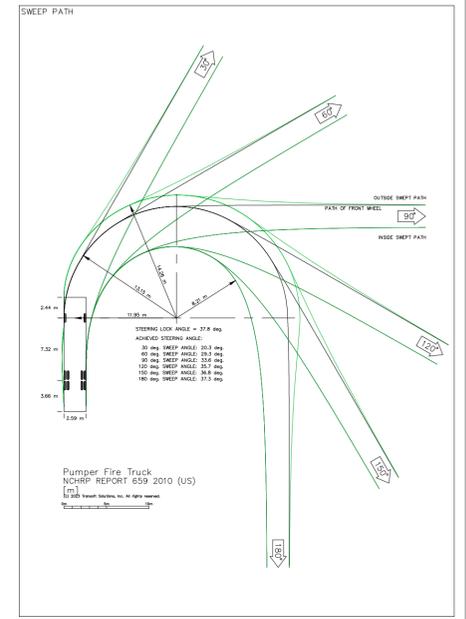
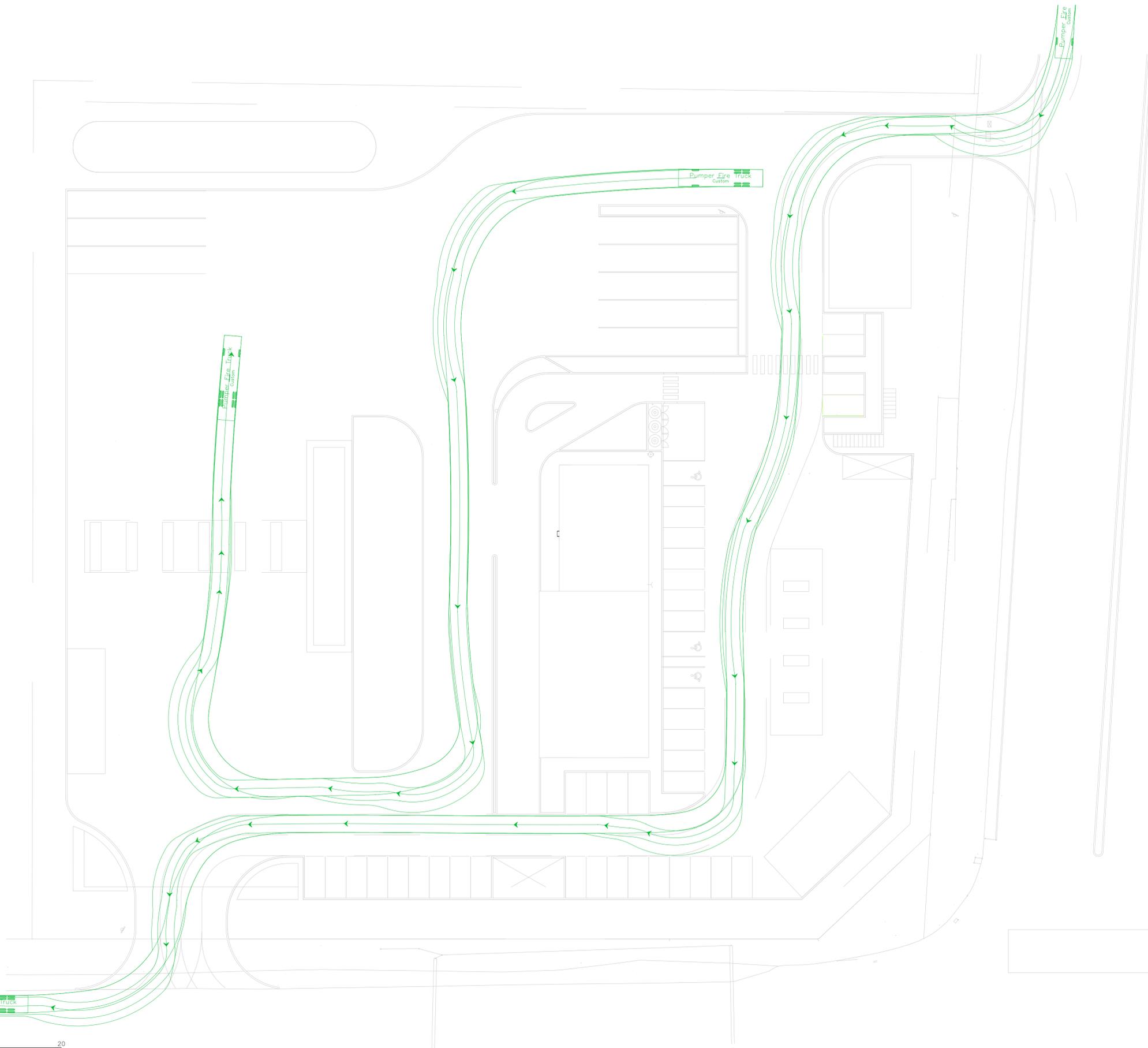
CROZIER
CONSULTING ENGINEERS

211 YONGE STREET
 SUITE 301
 TORONTO, ON, M5B 1M4
 416-477-3392 T
 WWW.CFCROZIER.CA
 INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 17



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINC, COUNTY OF WELLINGTON

Drawing
FIRE TRUCK
VEHICLE MANEUVERING ANALYSIS

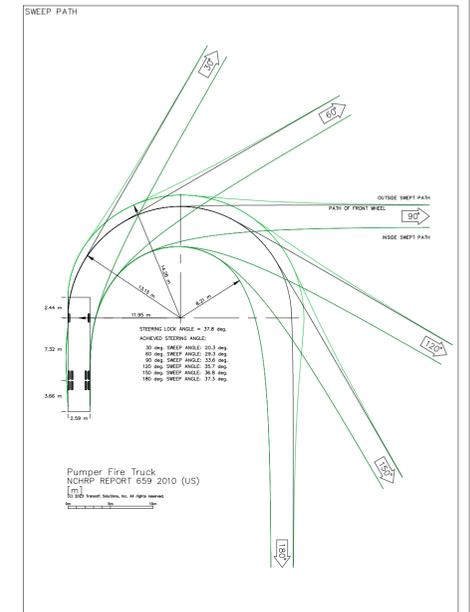
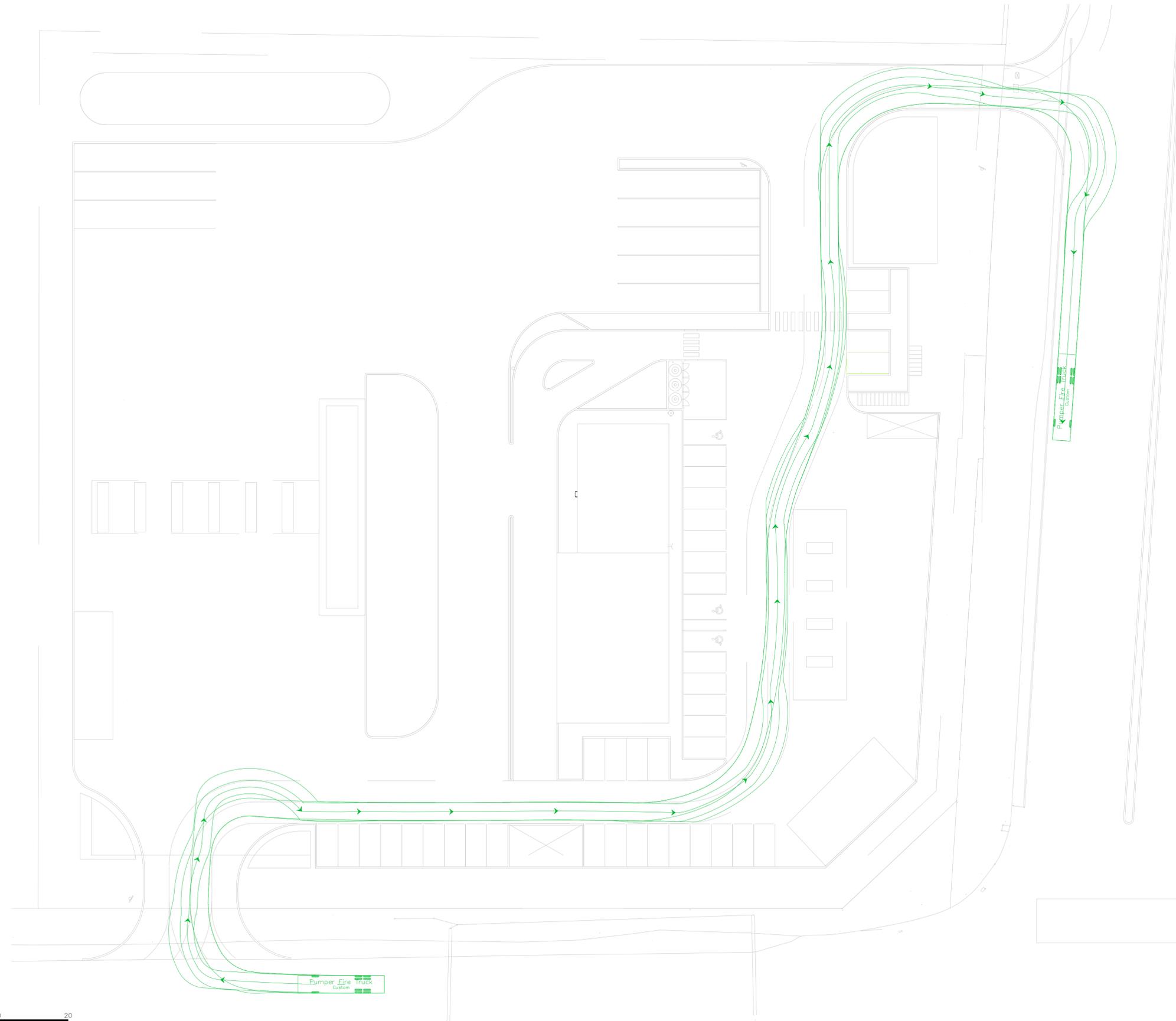
CROZIER
CONSULTING ENGINEERS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 18



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



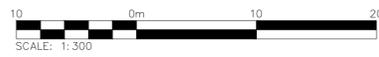
No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINC, COUNTY OF WELLINGTON

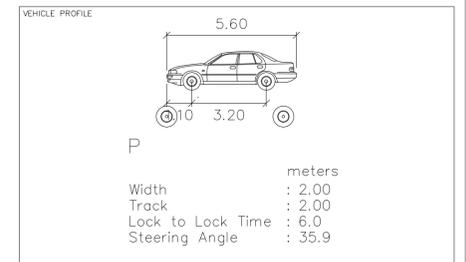
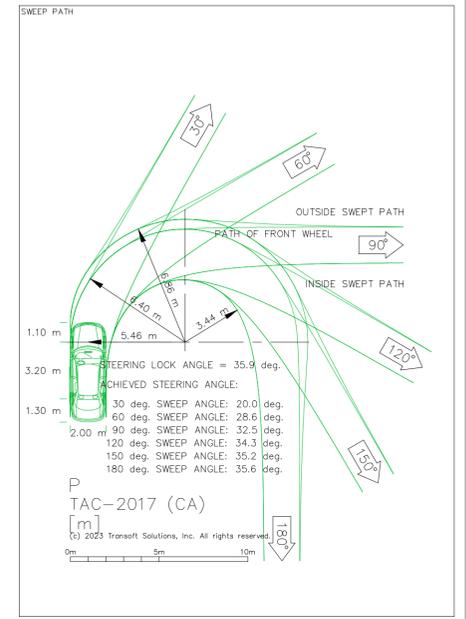
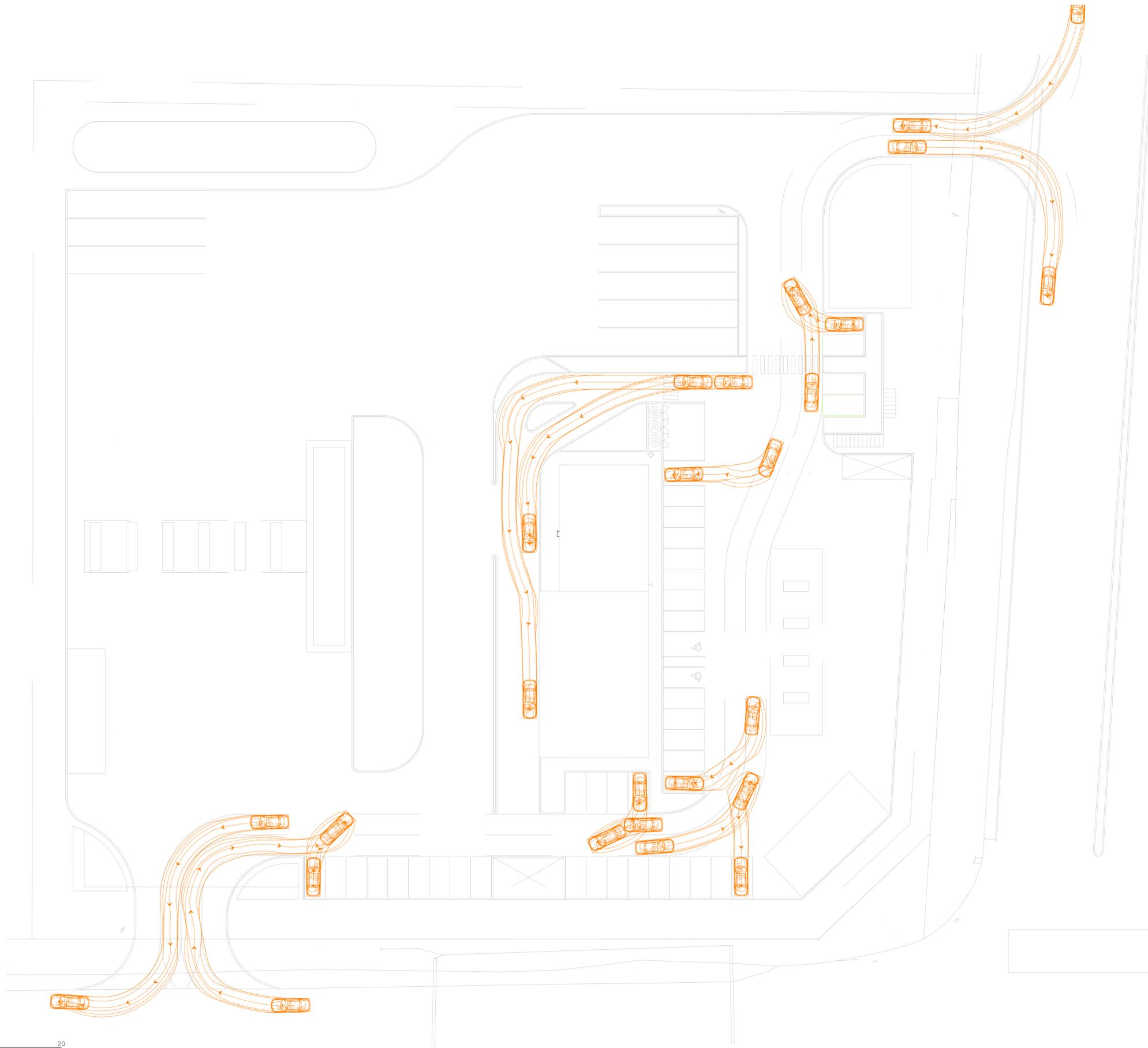
Drawing
FIRE TRUCK
VEHICLE MANEUVERING ANALYSIS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 19



FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION



No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR REVIEW	08/31/2023
2	ISSUED FOR SUBMISSION	10/19/2023

Project
BLACK-HART CONSTRUCTION INC.
7456 MCLEAN ROAD & 197 BROCK ROAD SOUTH
TOWNSHIP OF PUSLINC, COUNTY OF WELLINGTON

Drawing
PASSENGER VEHICLE
VEHICLE MANEUVERING ANALYSIS

CROZIER
CONSULTING ENGINEERS

211 YONGE STREET
SUITE 301
TORONTO, ON, M5B 1M4
416-477-3392 T
WWW.CROZIER.CA
INFO@CROZIER.CA

Drawn By	I.A.	Design By	I.A.	Project	2377-6556
Check By	T.D.S.	Check By	B.B.	Scale	1:300
				Drawing	FIG 20



8.0 Parking and Loading Review

Section 5 of the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 was reviewed to determine the parking and loading requirements of the proposed development.

8.1 Auto Parking Space Requirements

Section 5.2.2 of the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 was reviewed to determine the auto parking requirements of the proposed development. A summary of the proposed parking and required parking at the development can be found in **Table 14**.

Table 14: Zoning By-Law Parking Review

Land Use	Zoning By-Law Land Use	Zoning By-Law Parking Rate	Gas Bar Pumps/ Net Floor Area (m ²)	Required Parking Spaces
Vehicle Parking Space Requirement				
Vehicle Gas Bar + Convenience Store	Gas Bar	1 space per gas bar pump	4 pumps	4
Convenience Store	Retail Store	1 space per /20 m ² GFA	235 m ²	12
Drive-Thru Restaurant ¹	"Any other use permitted by this by-law other than those listed above" ¹	1 space per /20 m ² GFA	379 m ²	17
Total Vehicle Parking Spaces Required				33
Total Vehicle Parking Spaces Proposed (Surplus/Deficit)				41 (+8)
Truck Parking Space Requirement				
Truck Gas Bar	Gas Bar	1 space per gas bar pump	6 pumps	6
Total Truck Parking Spaces Required				6
Total Truck Parking Spaces Proposed (Surplus/Deficit)				8 (+2)

Note 1: The Township of Puslinch does not provide an adequate land use category for a drive-thru restaurant within a gas station as part of its Comprehensive Zoning By-Law No. 023-18 but does provide a general land parking rate for "land uses not listed in the Zoning By-Law" of 1 parking space per 20 m² of Gross Floor Area. It is noted that the closest category listed in the Zoning By-Law to the proposed drive-thru restaurant is "restaurant" which requires a rate of 1 parking space per 10 m². However, the drive-thru restaurant in the proposed gas station development is expected to operate differently than a traditional restaurant, therefore the general rate was used.

As shown in **Table 14**, the proposed auto parking rate for the proposed mixed-use commercial and gas station development meets the Township's Zoning By-law requirements, as the proposed vehicle parking supply is in surplus of 8 parking spaces and the truck parking is in surplus by 2 parking spaces, when compared to the Township's Zoning By-law requirements.

Relevant excerpts from the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 can be found in **Appendix K**.

8.2 Accessible Parking Space Requirements

Section 5.2.14 of the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 was reviewed to determine the accessible parking space requirements of the proposed development. A summary of the proposed parking and required parking at the development can be found in **Table 15**.

Table 15: Zoning By-Law Accessible Parking Spaces Review

Zoning By-Law Accessible Parking Spaces Rate	Zoning By-Law Parking Spaces Supply Requirement	Total Parking Spaces Proposed	Required Accessible Parking Spaces
For developments with a parking space supply requirement between 26 and 100 spaces - 1 + 3% of total number of parking spaces on lot is required	39	51	3 spaces
Total Accessible Parking Spaces Proposed (Surplus/Deficit)			3 (0)

As shown in **Table 15**, the proposed accessible parking space supply for the proposed gas station meets the Township's Zoning By-Law requirements.

Relevant excerpts from the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 can be found in **Appendix K**.

8.3 Bicycle Parking Space Requirements

Section 5.2.15 of the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 was reviewed to determine the bicycle parking space requirements of the proposed development. A summary of the proposed parking and required parking at the development can be found in **Table 16**.

Table 16: Zoning By-Law Bicycle Parking Space Review

Land Use	Zoning By-Law Loading Rate	Net Floor Area (m ²)	Required Loading Spaces
Convenience Store	The greater of 2 spaces or 1 space/1000 m ²	235 m ²	/
Drive-Thru Restaurant ¹		379 m ²	/
Total Loading Spaces Required		614 m²	2
Total Truck Parking Spaces Proposed (Surplus/Deficit)			19 (+17)

As shown in **Table 16**, the proposed bicycle parking space supply for the proposed gas station development is in surplus by 17 bicycle parking spaces when compared to the Township's Zoning By-Law requirements.

Relevant excerpts from the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 can be found in **Appendix K**.

8.4 Loading Requirements

Section 5.1.2 of the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 was reviewed to determine the loading requirements of the proposed development. A summary of the proposed parking and required parking at the development can be found in **Table 17**.

Table 17: Zoning By-Law Loading Review

Land Use	Zoning By-Law Loading Rate	Net Floor Area (m ²)	Required Loading Spaces
Convenience Store	For buildings with a Net Floor Area between 250 m ² and 2500 m ²	235 m ²	/
Drive-Thru Restaurant ¹		379 m ²	/
Total Loading Spaces Required		614 m²	1
Total Truck Parking Spaces Proposed (Surplus/Deficit)			1 (0)

As shown in **Table 17**, the proposed loading space supply for the proposed gas station development meets the Township's Zoning By-Law requirements.

Relevant excerpts from the Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 can be found in **Appendix K**.

9.0 Conclusion

The findings and recommendations of the Transportation Impact Study are summarized below:

- Under 2023 existing conditions, both Study Intersections are operating adequality with LOS "B" or better during the weekday a.m. and p.m., peak hours.
- In the 2029 Future Background conditions, both Study Intersections are expected to continue operating adequality with LOS "B" or better during the weekday a.m. and p.m., peak hours.
- The proposed development is forecast to generate a total of 148 and 139 primary vehicle trips in the weekday a.m. and p.m. peak hours, respectively.
- In the 2029 Future Total condition, the intersection of Brock Road South at Nicholas Beaver Road maintains the same levels of service while the intersection of Brock Road South at McLean Road is expected to decrease from operating at a LOS "B" to operate with a LOS "C" during the weekday a.m. and p.m. peak hours, when compared to the 2029 Future Background conditions. Both proposed Site accesses expected to operate acceptably with LOS "C" or better during the weekday a.m. and p.m. peak hours.
- No issues were identified regarding sight lines or access spacing were identified at the proposed site accesses.
- The development proposes a parking supply surplus and meets the loading space requirements when compared to the Township of Puslinch's Comprehensive Zoning By-Law.
- A vehicle maneuvering assessment was conducted and the subject development can accommodate most of the design vehicles expected to maneuver the site including MSU (Medium Single Unit) Trucks, GFL Garbage Truck, Pumper Fire Truck, and passenger vehicles. Some maneuvering issues were identified regarding the WB-20 Truck and 8 Axle Fuel Tanker movements. These aspects of the Site Plan will be revised as part of the future applications.

In consideration that the proposed site does not materially impact the boundary road network due to the small number of site-generated traffic, the site access is expected to operate with minimal delays and offers sufficient sight lines, the proposed development can be supported from a transportation perspective for the Zoning By-Law Application.

We trust that this letter satisfies any transportation related concerns associated with the proposed development. Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Brandon Bradt, M.Eng. CEM, P.Eng.
Project Manager, Transportation

C.F. CROZIER & ASSOCIATES INC



Theshantha De Silva, E.I.T.
Engineering Intern, Transportation

TDS/BB
J:\2300\2377 - Black-Hart Construction\6556- 7456 McLean Road and 197 Brock Road
South\Reports\Transportation\2023.10.20 - 7456 McLean and 197 Brock - TIS.docx

Appendix A

Terms of Reference Correspondence

Theshantha De Silva

From: Brandon Bradt
Sent: Wednesday, April 12, 2023 3:56 PM
To: Theshantha De Silva
Subject: FW: FW: Transportation Terms of Reference - 7456 McLean Road and 197 Brock Road South
Attachments: Signal Timing - WR46@Mclean.pdf; Signal Timing - WR46@Nicholas Beaver.pdf

FYI

Brandon Bradt, M.Eng. CEM, P.Eng.
Manager (Planning), Transportation
DID: 416.842.0033

From: Kooistra, Tim <tkooistra@dillon.ca>
Sent: December 7, 2022 10:58 AM
To: Brandon Bradt <bbradt@cfcrozier.ca>
Cc: Pasquale Costanzo <pasqualec@wellington.ca>; Ariel Yerushalmi <ayerushalmi@cfcrozier.ca>; mfowler@puslinch.ca
Subject: Re: FW: Transportation Terms of Reference - 7456 McLean Road and 197 Brock Road South

Good afternoon Brandon,

Thank you for reaching out regarding the planned Transportation Impact Assessment you are looking to prepare for a proposed development found at 7456 McLean Road in the Township of Puslinch, noting that this development is located on the northwest quadrant of the McLean Road and Brock Road (Wellington Road 46) intersection.

As you may be aware, Dillon Consulting Limited has been retained by the County of Wellington to review the proposed scope of work for various traffic impact studies that may impact the County road network and associated intersections. As a result, this response is being provided on behalf of the County of Wellington for your consideration.

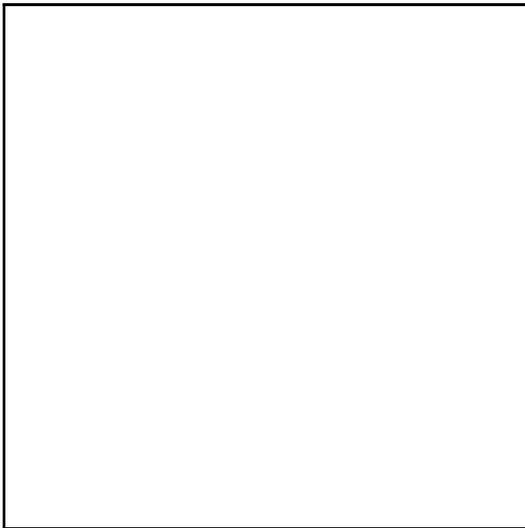
The scope you have identified is generally acceptable, noting that the following needs to be considered in the study and also within the development plan.

- In accordance with the [County of Wellington's Official Plan](#) (Section 9.8.1, item c), no driveway access to Brock Road (Wellington Road 46) will be permitted. As a result, only one driveway access to McLean Road will be able to be provided to the site and all trips generated by the site will need to be assigned via this sole driveway access. As a result, all on-site vehicle maneuvering analyses will need to consider entering and exiting the site to/from McLean Road only.
- The study area must also include the signalized intersection of Brock Road (Wellington Road 46) and Nicholas Beaver Road found south of the proposed development.
- A 2.0% per annum growth rate (compounded annually) needs to be applied to all movements and corridors within the study area.
- The Township of Puslinch will need to be contacted to identify any other background developments and/or associated traffic impact studies that have been previously submitted as they may impact the future traffic volumes that need to be considered in the study.
- No changes to geometry or traffic control are anticipated within the study area.
- The signal timing plans for the two Brock Road South (Wellington Road 46) intersections that need to be assessed (at Nicolas Beaver Road & McLean Road) have been attached to this email.

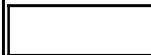
- No turning movement count data is available for these two study area intersections, as a result, new data will need to be collected.

Thank you,

Tim



Tim Kooistra, C.E.T.
Dillon Consulting Limited
130 Dufferin Avenue Suite 1400
London, Ontario, N6A 5R2
T - 519.438.1288 ext. 1330
F - 519.672.8209
M - 519.851.5403
TKooistra@dillon.ca
www.dillon.ca



From: Brandon Bradt <bbradt@cfcrozier.ca>
Sent: Wednesday, November 23, 2022 4:46 PM
To: mfowler@puslinch.ca; Pasquale Costanzo <pasqualec@wellington.ca>
Cc: Ariel Yerushalmi <ayerushalmi@cfcrozier.ca>
Subject: Transportation Terms of Reference - 7456 McLean Road and 197 Brock Road South

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you know the contents to be safe.

Good Afternoon Mike and Pasquele,

Lynne Banks passed along your info to reach out to regarding a Terms of Reference we have prepared for the Township and County's review prior to us conducting our Traffic Impact Study to support a Zoning By-law Amendment and Site Plan Application for the site located 7456 McLean Road. We also note that no comments have been provided yet by County Transportation staff based on the pre-con notes summary.

If you could both review the Terms of Reference below or pass it along to the correct colleague for review it would greatly appreciated so that we can begin our study.

The site is proposed to be re-zoned to a commercial development that would include the following:

- A 1-storey fast food restaurant (220 m²) with drive-thru and 24 regular parking spaces.
- A 1-storey transport terminal building (1,008 m²) with 15 trailer parking spaces and 12 regular parking spaces.
- An eight-pump gas station with a 1-storey accessory retail/convenience store (180 m²).
- A stormwater management pond.
- An internal paved area with driveways connecting the two proposed full-moves accesses via McLean Road and Brock Road South.

For additional detail please refer to the preliminary Site Plan attached here but note that it is subject to change prior to the submission.

Furthermore, it is noted that while the site is situated near Highway 401 which is part of the Ministry of Ontario (MTO) jurisdiction, but it is not part of the MTO permit control area. Hence, MTO involvement is not expected, and only the [County's Guidelines](#) are planned to be used to prepare the TIS.

Study Methodology for the Traffic Impact Study

The following intersections are proposed to be analyzed as part of the study scope:

- McLean Road and Brock Road South
- McLean Road at Site Access
- Brock Road South at Site Access

We kindly request that you please confirm that the noted intersections are sufficient for the study.

We currently do not possess the traffic counts necessary to conduct the study. We request that any counts in the County's possession could be shared for use in the study if they are deemed applicable. Additionally, please provide any collision data at the intersections within the last 5 years that should be reviewed in the TIS.

Alternatively, we can collect new traffic counts for the study intersections using a third-party provider. The counts would be collected for one day on a Tuesday, Wednesday or Thursday for during the A.M. and P.M. periods (6:30-9:30 and 16:00-19:00, respectively).

Please confirm that new parking counts can be collected subject to the parameters above should there be no recent and applicable traffic data at the study intersections.

Analysis Periods and Scenarios

The weekday A.M. and P.M. peak hours will be analyzed as part of the study per the County TIS Guidelines. Furthermore, the following horizon years for will be analyzed, consistent with the County's TIS Guidelines:

- 2023 existing conditions
- 2024 full build-out year
- 5-year horizon beyond build-out (2029)

Future Background Traffic Growth

Per the County of Wellington's standards, a growth rate of 2% will be applied to background traffic movements. Please advise whether the assumed growth rate is sufficient, or alternatively provide an appropriate growth rate to reflect expected growth in the region.

Background Developments and Transportation Improvements

We have reviewed the County of Wellington's website to determine if there are any additional background developments that should be considered within the horizon of the study and did not find any significant developments to include.

Please confirm that there are no active developments to be included as background development in the TIS. If there are developments that need to be considered, please provide the associated transportation impact studies that should be included in our analysis.

Further, please advise whether there are any roadway, transit, or active transportation improvements planned within the vicinity of the site.

Analysis Procedure

The [County of Wellington's Traffic Impact Study Guidelines](#) will be used as guidance regarding roadway analysis.

Standard metrics of assessment including delay, Level of Service (LOS), capacity, and 95th percentile queues will be analyzed using Synchro 11.0 analysis software with all outputs in the HCM 2000 format.

Parameters for Synchro inputs will conform to the County's Synchro guidelines, and any unspecified values will be left as defaults. Peak hour factors will be calculated by intersection based on the existing traffic data. The Synchro model shall reflect existing and future proposed geometric characteristics of the road network based on any planned improvements.

Trip Generation and Distribution

Trip generation for the proposed development will be forecasted using the Trip Generation Manual, 11th Edition, prepared by the Institute of Transportation Engineers (ITE):

- Land Use Category 934: Fast-Food Restaurant with Drive-Through Window
- Land Use Category 030: Intermodal Truck Terminal
- Land Use Category 945: Convenience Store/Gas Station

In the case that this is not the intended use of the land, or that a more accurate Land Use Category is to be used, please let us know. It is noted that appropriate pass-by trip reductions will be used according to the ITE Manual for the convenience and fast-food uses but no internal synergy or TDM reductions will be proposed to ensure a conservative assessment of vehicle trips.

Data from the 2016 Transportation Tomorrow Survey (TTS) will be used to determine the trip distribution for the associated peak periods.

Site Access Review

We will be reviewing the site access locations and type of control, as well as to confirm sightlines, access spacing, and driveway design based on the TAC Geometric Design Guide for Canadian Roads (GDGCR). The need for auxiliary turn lanes will also be assessed according to TAC GDGCR.

Vehicle Maneuvering Analysis

Vehicle maneuvering analysis will be conducted using AutoTurn software to confirm that expected design vehicles on site will not have any maneuvering conflicts or encroachments. The design vehicles expected on site include:

- Passenger vehicles maneuvering in and out of critical parking spaces, as well as the drive-through area
- WB-20 trucks circulating and exiting/entering the site, and maneuvering the loading spaces
- Waste trucks circulating the site and maneuvering in and out of loading spaces
- Fire truck circulating and entering/exiting the site

Summary

We request the following information for inclusion in the study, along with any comments that arise with regards to the above Terms of Reference.

Please provide:

- Confirmation that the collection of 2023 traffic counts for the intersections of study is acceptable. Otherwise, please provide data for use in the study or advise on an appropriate method of obtaining existing conditions traffic data.
- Confirmation of a general 2% growth rate along the corridors in the study. This includes turning movements at major intersections.
- Confirmation of the proposed ITE land use codes.
- Confirmation that there are no relevant background developments to be included in our analysis. If there are, please provide the completed TIS reports for inclusion in the background analysis.
- Please provide details of any planned roadway or transit improvements in the surrounding study area within the horizon years, if there are any.

Please let us know if there are any questions or concerns.

Kind Regards,

Brandon Bradt, M.Eng.CEM, P.Eng. | Project Manager, Transportation
211 Yonge Street, Suite 600 | Toronto, ON M5B 1M4
T: 416.842.0033



Crozier Connections: [f](#) [t](#) [in](#) [@](#)

Read our latest news and announcements [here](#).

Brandon Bradt, M.Eng. CEM, P.Eng. | Project Manager
211 Yonge Street, Suite 600 | Toronto, ON M5B 1M4
T: 416.477.3392



Crozier Connections: [f](#) [t](#) [in](#) [@](#)

Read our latest news and announcements [here](#).

This email was sent on behalf of C.F. Crozier & Associates Inc. and may contain confidential and/or privileged information for the sole use of the intended recipient. If you have received this email in error, please contact the sender and delete all copies. Any review or distribution by anyone other than the intended recipient is strictly prohibited.

This message is directed in confidence solely to the person(s) named above and may contain privileged, confidential or private information which is not to be disclosed. If you are not the addressee or an authorized representative thereof, please contact the undersigned and then destroy this message.

Ce message est destiné uniquement aux personnes indiquées dans l'entête et peut contenir une information privilégiée, confidentielle ou privée et ne pouvant être divulguée. Si vous n'êtes pas le destinataire de ce message ou une personne autorisée à le recevoir, veuillez communiquer avec le soussigné et ensuite détruire ce message.

Appendix B

County Road Master Action Plan



WELLINGTON
COUNTY

ROAD Master Action Plan

 | December 2021

DILLON
CONSULTING

11.2.3 Modifications to Active Transportation Network

The County of Wellington Active Transportation Plan was also reviewed to identify any potential modifications to the existing or planned active transportation network for each of the 22 intersections. **Table 32** presents the active transportation components that align with the short-term intersection improvements.

Table 32: Short-term Intersection Improvements

#	Major Road	Minor Road	Alignment with ATP
1	WR 18	WR 26	The ATP has not proposed active transportation infrastructure for this area
2	WR 124	WR 24	The ATP has not proposed active transportation infrastructure for this area
3	WR 7	WR 12	Include signed route on WR 12, if already implemented, during construction of roundabout
4	WR 8	WR 9	The ATP has not proposed active transportation infrastructure for this area
5	WR 7	WR 18	Include paved shoulders on WR 18 during construction of roundabout
6	WR 46	Fox Run Bridle Path	The ATP has not proposed active transportation infrastructure for this area
7	WR 30	Township Road 3	Include paved shoulders on WR 30 during roundabout construction
8	WR 16	WR 109	Maintain signed route on WR 16, if already implemented, during re-alignment construction
9	WR 22	WR 29	Include paved shoulders on WR 29 and WR 22 (east) during realignment construction
10	WR 18	WR 29	Include paved shoulders on WR 18 and WR 29 during intersection improvements
11	WR 24	WR 42	Include paved shoulders on WR 42 during intersection improvements
12	WR 18	2 Line	The ATP has not proposed active transportation infrastructure for this area
13	WR 19	2 Line	Existing paved shoulders on WR 19 should remain to connect to Spine Off-Road Route to south
14	WR 52	Ninth Line	Include paved shoulders on WR 52 and Ninth Line in the conversion to all-way stop

#	Major Road	Minor Road	Alignment with ATP
15	WR 18 (Geddes Street)	David Street	Maintain signed route with sharrows on WR 18 and signed route on WR 18, if already implemented, when converting to all stop-way control
16	WR 22 (East)	WR 26	Include paved shoulders on WR 26 and WR 22 during intersection improvements
17	WR 8	WR 17	Include paved shoulders on WR 17 during intersection improvements
18	WR 8	WR 10	The ATP has not proposed active transportation infrastructure for this area
19	WR 7	WR 11	Maintain Signed Route on WR 11, if already implemented, during intersection improvements
20	WR 7	WR 10	The ATP has not proposed active transportation infrastructure for this area
21	WR 44	Eramosa-Milton Townline	The ATP has not proposed active transportation infrastructure for this area
22	WR 25	WR 124	Include paved shoulders on WR 25 during intersection improvements

11.3 Wellington Road 46 – Strategic Traffic Analysis

A review of the existing and future traffic conditions (i.e., capacity and performance) on Wellington Road 46 (WR 46) was also completed as part of the RMAP to assess the potential effects of a proposed 'road diet' through the community of Aberfoyle within Wellington County.

The proposed road diet on Wellington Road 46 through Aberfoyle would see a conversion of the existing four-lane cross-section, two travel lanes in each direction between Wellington Road 34 and Gilmour Road, to a single travel lane in each direction **Figure 29**.

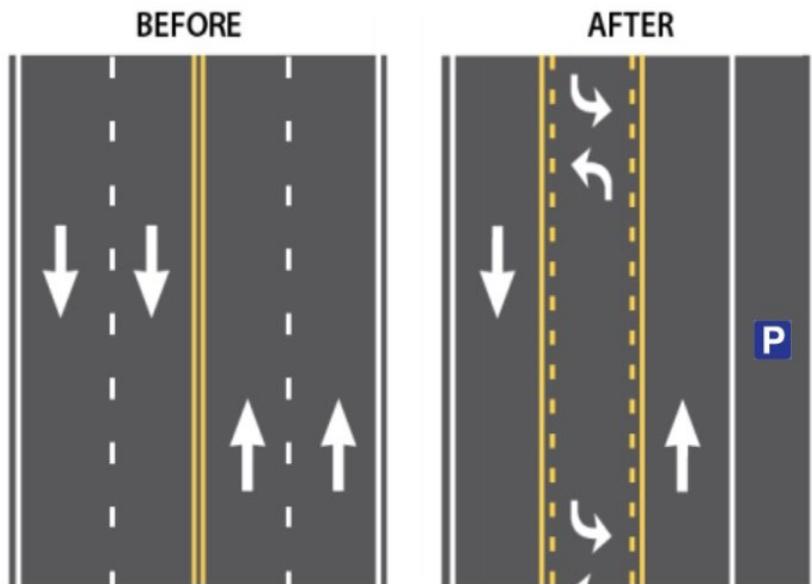


Figure 29: Aberfoyle Road Diet

11.3.1 Approach

Observed volumes from 2017 to 2018 were used to identify existing conditions. The estimated link volumes were then compared to planning level lane capacities to identify the capacity performance of the different sections of Wellington Road 46.

Future conditions (2041) were established using a County-wide strategic forecasting tool that accounts for background growth, area population and employment growth, and available local secondary plans in the County (see **Section 4.4** for methodology). Link volumes are estimated for Wellington Road 46 and compared to the planning level lane capacities.

Having established the forecast conditions for Wellington Road 46 specifically, a review of the strategic corridor capacity is undertaken. This includes reviewing the conditions on adjacent and parallel facilities. As part of this analysis, the City of Guelph's strategic travel demand model (VISUM) was used to assess the travel markets within the corridor. The market review allows an assessment of the potential diversion of traffic if capacity conditions were to change on Wellington Road 46 (i.e. if the capacity were reduced through the application of a road diet).

11.3.2 **Assessment**

A detailed technical analysis was undertaken, which is documented in **Appendix L**. Some of the most relevant highlights are provided below.

11.3.2.1 **Existing Conditions**

Table 33 summarizes the existing conditions on Wellington Road 46. Under existing conditions, Wellington Road 46 has sufficient capacity to carry the existing demand between Wellington Road 34 and Highway 401. However, between Maltby Road to Wellington Road 34, where the cross section of Wellington Road 46 is reduced to two-lanes, volumes are approaching levels where the flow is unstable and minor incidents can cause delays.

11.3.2.2 **Future Conditions**

Table 34 summarizes the existing conditions on Wellington Road 46. Under total future volume conditions, Wellington Road 46 has sufficient capacity to carry the forecast existing demand between Wellington Road 34 and Highway 401. However, there is a significant capacity deficiency (V/C ratio of 1.28) between Maltby Road to Wellington Road 34, where the cross section of Wellington Road 46 is reduced to two-lanes.

Table 33: Existing Conditions: Wellington Road 46

Section	Number of Travel Lanes (2-way)	Lane Capacity (veh/hr)	Directional Capacity (veh/hr)	Existing AADT	DHV (%)	Directional Split (%)	PM Peak Hour	V/C Ratio
Maltby Road to County Road 34	2	1,200	1,200	19,381	9%	55%	960	0.80
County Road 34 to McLean Road	4	1,200	2,400	19,392	8.5%	60%	990	0.41
McLean Road to Highway 401	4	1,200	2,400	23,560	7.5%	55%	970	0.40

Note: V/C Range: < 0.70 = Good Capacity, 0.70 – 0.85 = Approaching Capacity, > 0.85 = Over Capacity Conditions

Table 34: 2041 Total Future Volume Conditions: Wellington Road 46

Section	Number of Travel Lanes (2-way)	Lane Capacity (veh/hr)	Directional Capacity (veh/hr)	Existing AADT	DHV (%)	Directional Split (%)	PM Peak Hour	V/C Ratio
Maltby Road to County Road 34	2	1,200	1,200	31,149	9%	55%	1,540	1.28
County Road 34 to McLean Road	4	1,200	2,400	30,525	8.5%	60%	1,550	0.65
McLean Road to Highway 401	4	1,200	2,400	35,068	7.5%	55%	1,440	0.60

Note: V/C Range: < 0.70 = Good Capacity, 0.70 – 0.85 = Approaching Capacity, > 0.85 = Over Capacity Conditions

11.3.2.3

Strategic Review

Reductions in capacity (i.e. the road diet) on Wellington Road 46 between Wellington Road 34 and Gilmour Road will extend the identified capacity constraint further south to Gilmour Road. Under such capacity constraints, it is likely that traffic would divert from Wellington Road 46 to parallel routes. To achieve satisfactory capacity conditions, approximately 550 - 700 peak hour vehicles would need to divert from Wellington Road 46.

Table 35 and **Table 36** summarize the screenline results for the PM peak hour for the existing and total future volume conditions respectively.

Table 35: Aberfoyle Screenline Results: Existing Conditions

Roadway Name	Direction	Capacity # of Lanes	Capacity Per Lane	Capacity Total	PM Peak Hour Volume	PM Peak Hour V/C
Hanlon Expressway (Highway 6)	NB	2	1,500	3,000	1,170	0.39
Concession Road 7	NB	1	1,000	1,000	120	0.12
Wellington Road 46	NB	2	1,200	2,400	990	0.41
Victoria Road	NB	1	800	800	140	0.18
Total	NB	6	N/A	7,200	2,420	0.34

Note: V/C Range: < 0.70 = Good Capacity, 0.70 – 0.85 = Approaching Capacity, > 0.85 = Over Capacity Conditions

Table 36: Aberfoyle Screenline Results: 2041 Total Future Volume Conditions

Roadway Name	Direction	Capacity # of Lanes	Capacity Per Lane	Capacity Total	PM Peak Hour Volume	PM Peak Hour V/C
Hanlon Expressway (Highway 6)	NB	2	1,800	3,600	1,880	0.52
Concession Road 7	NB	1	1,000	1,000	60	0.06
Wellington Road 46	NB	2	1,200	2,400	1,550	0.65
Victoria Road	NB	1	1,000	1,000	460	0.46
Total	NB	6	N/A	8,000	3,950	0.49

Note: V/C Range: < 0.70 = Good Capacity, 0.70 – 0.85 = Approaching Capacity, > 0.85 = Over Capacity Conditions

Overall, there is a significant amount of available capacity across the Aberfoyle screenline in both the existing (V/C ratio of 0.34) and total future volume (V/C ratio of 0.49) scenarios. Even when the capacity is reduced on Wellington Road 46 to simulate the proposed road diet condition, the capacity across the Aberfoyle screenline is still well within the 'Good' range (V/C ratio of 0.58), as illustrated in **Table 37**.

Table 37: Aberfoyle Screenline Results: Total Future Volumes – Road Diet

Roadway Name	Direction	Capacity # of Lanes	Capacity Per Lane	Capacity Total	PM Peak Hour Volume	PM Peak Hour V/C
Hanlon Expressway (Highway 6)	NB	2	1,800	3,600	1,880	0.52
Concession Road 7	NB	1	1,000	1,000	60	0.06
Wellington Road 46	NB	1	1,200	1,200	1,550	1.29
Victoria Road	NB	1	1,000	1,000	460	0.46
Total	NB	5	N/A	6,800	3,950	0.58

Note: V/C Range: < 0.70 = Good Capacity, 0.70 – 0.85 = Approaching Capacity, > 0.85 = Over Capacity Conditions

However, the use of Concession Road 7 and Victoria Road as alternative roadways to Wellington Road 46 to travel between Guelph and Highway 401/Highway 6 would increase travel on McLean Road and Gilmour Road in order for vehicles to connect to Concession Road 7 and Victoria Road respectively. Increasing commuter travel volumes on McLean Road and Gilmour Road is not desirable given their current roles and functions, and based on their surrounding land uses (industrial and residential respectively).

Assuming that additional commuter traffic on McLean Road and Gilmour Road (diverted trips) is undesirable, the Hanlon Expressway is the most appropriate alternative to absorb the diverted traffic resulting from the proposed vehicle capacity reduction (road diet) on Wellington Road 46. Therefore, an assessment that exclusively considers the Hanlon Expressway and Wellington Road 46 within the total future volume road diet scenario was undertaken. The Aberfoyle screenline is forecast to have a V/C ratio of 0.71 (as illustrated in Table 8) which is in the “Approaching Capacity” range. A screenline V/C ratio of 0.71 would indicate that both the Hanlon Expressway and Wellington Road 46 could experience some period of unstable flow during portions of the peak hour.

The Ontario Ministry of Transportation (MTO) is moving forward with a Preliminary Design Review and Detailed Design under the Class Environmental Assessment (EA) for improvements to Highway 6 (from Highway 401 to Maltby Road) and Highway 401 (Wellington Road 36 to Wellington Road 35). As part of this review analysis did consider these future improvements and their impacts on area flows. It was concluded that while there will be some diversion away from WR 46 as a result of the planned improvements by the Ministry, specifically the Morriston By-Pass, it is not significant enough to suggest that lane/capacity reductions on WR 46 will result in satisfactory operating conditions. There is no appreciable benefit of the by-pass to trips that already prefer to use the Wellington Road 46 route over Hanlon Expressway to facilitate their trip (i.e., trips to and from the east on Highway 401).

Conclusions and Recommendations

Based on the foregoing analysis, the following conclusions are reached:

- Wellington Road 46 is operating within capacity for the existing conditions.
- By 2041, the two-lane section of Wellington Road is forecast to experience significant congestion between Maltby Road and County Road 34.
- A reduction in capacity of the section of Wellington Road 46 between Gilmour Road and Wellington Road 34 would result in significant capacity constraints. Approximately 550-700 peak hour vehicles would need to divert to result in adequate operating conditions on Wellington Road 46
- The broader strategic corridor network has capacity to absorb the 550-700 peak hour peak hour vehicles, but diversion of this magnitude is not forecast to occur due to origin-destination of trips and associated travel time and distance increases.
- While the Morriston By-Pass is likely to result in some reduction in volume in the Wellington Road 46 corridor, it will not be significant enough to justify reduced capacity on Wellington Road 46.
- While Hanlon Expressway is the more appropriate road for the trips to divert to and is forecast to have the available capacity, the assessment of the travel market for Wellington Road 46 shows using this route would result in increases in travel distance and travel time. It is more likely that trips would use the Victoria Road via Gilmour Road to bypass the constrained sections of Wellington Road 46.
- Any reduction in capacity (i.e., implementation of a road diet) on Wellington Road 46 through Aberfoyle will result in a significant increase on non-County roadways (Gilmour Road and Victoria Road). The design and environment for these roads is not suited to accommodate the changed role and function.
- Overall, a road diet through the community of Aberfoyle within Wellington County could be accommodated from a strategic capacity perspective but the commensurate impacts on the adjacent municipal network is not desirable from an operational and road safety perspective.
- A future review and study is required once future infrastructure and service is implemented (Ministry of Transportation improvements to the Hanlon Expressway, including a new interchange and Morriston By-Pass; All-day, two-way rail service on Kitchener line). This study could take the form of an area specific Master Plan or a

Municipal Class EA where alternative methods and alternative design concepts would be fully explored (i.e., impacts and costs).

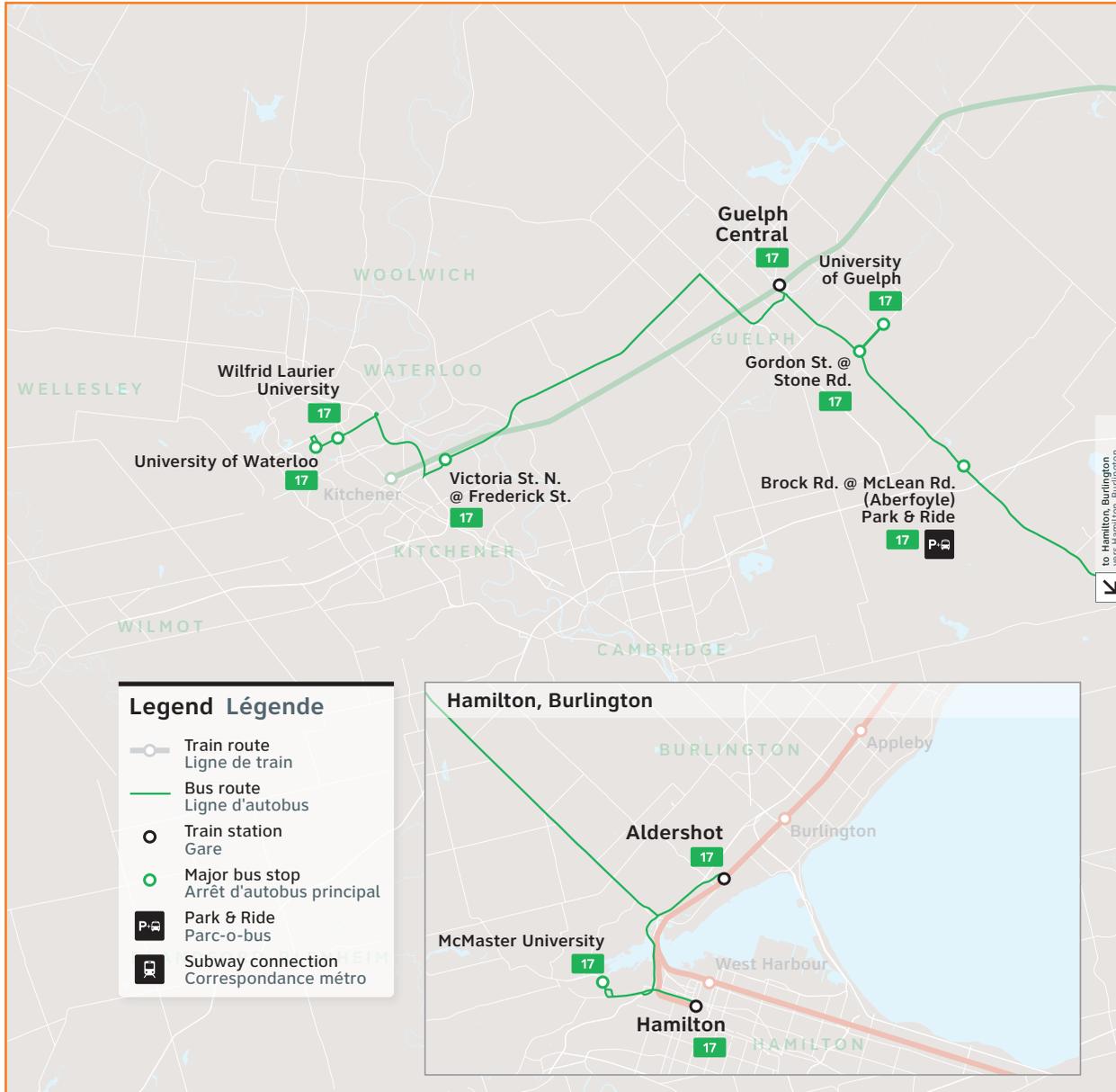
Appendix C

Transit Maps and Schedules

17

Route number
Nombre d'itinéraire

Waterloo/Hamilton



CONTACT US

1-888-438-6646
416-869-3200
TTY: #711 or call
1-800-855-0511

gotransit.com/schedules

@GOtransitBus

See Something?
Say Something.
24/7 Transit Safety Dispatch:
1-877-297-0642

prestocard.ca

Sign-up for email or
text alerts/ Inscrivez-
vous pour recevoir des
alertes par courriel ou
message texte.
gotransit.com/OnTheGO

Waterloo/ Hamilton



GO Bus Schedule/
Horaire des autobus GO



17

- University of Waterloo
- Wilfrid Laurier University
- Victoria St. @ Frederick St.
- Guelph Central GO
- University of Guelph
- Brock Rd. @ McLean Rd.
- Aldershot GO
- McMaster University
- Hamilton GO Centre

Daily / Quotidiennement

Includes GO Bus routes 17 / Inclut les routes 17 d'autobus GO

Effective / À partir de:
8 APRIL
AVRIL **2023**



How to read our schedules

Step 1

Find the station or terminal you are departing from. Stops are listed across the top in the order they are served.

Step 2

The upper left corner tells you what day the schedule is for and the direction of travel.

Step 3

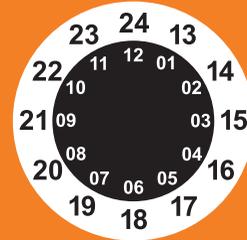
Look across the rows for available departure times.

Step 4

Not all trains or buses stop at every station. If you see → the train or bus will not stop at that station.

Schedule times shown in 24-hour clock

Midnight to noon
00 01 - 12 00
Noon to midnight
12 01 - 24 00



Legend

 Bus trips

→ Trip does not serve this location.

 GO Bus service is accessible to passengers using mobility devices at this location.

 Parking available.

For the latest schedule information and updates, please visit gotransit.com/schedules.

Notes

Bicycles

1. Bicycles are not allowed in Union Station or on-board trains during morning rush hour (6:30-9:30) and evening rush hour (15:30-18:30), Monday to Friday.
2. Foldable bicycles are allowed on-board trains at all times.

Comment lire nos horaires

Étape 1

Trouvez votre gare ou terminus de départ. La liste des arrêts est donnée en haut dans l'ordre dans lequel ils sont desservis.

Étape 2

Le coin supérieur gauche vous indique le jour pour lequel l'horaire est donné et la direction de circulation.

Étape 3

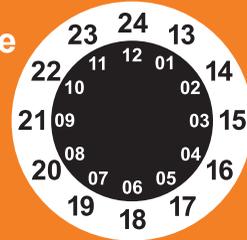
Regardez dans les rangées pour obtenir les heures de départ offertes.

Étape 4

Les trains ou les autobus ne s'arrêtent pas tous à chaque gare. Si vous voyez le symbole → le train ou l'autobus ne s'arrêtera pas à cette gare.

Indications selon un système horaire de 24 heures

De minuit à midi:
00 01 - 12 00
De midi à minuit:
12 01 - 24 00



Légende

 Horaire des autobus

→ Trajet ne sert pas cette station.

 Service d'autobus GO accessible aux personnes utilisant des aides à la mobilité à cet endroit.

 Stationnement disponible.

Pour consulter les horaires les plus récents et les mises à jour, veuillez visiter gotransit.com/schedules.

Notes

Vélos

1. Les vélos ne sont pas autorisés dans la gare Union ou à bord des trains du lundi au vendredi, pendant l'heure de pointe (6:30-9:30) et pendant l'heure de pointe du soir (15:30-18:30).
2. Les vélos pliables sont permis à bord des trains en tout temps.



SAVE WITH PRESTO!

You can load money onto your PRESTO card:

- At **prestocard.ca**
- By creating a My PRESTO Account and setting up Autoload
- With a PRESTO self-serve machine
- At select Shoppers Drug Mart locations in the GTHA or select Fortinos locations in Hamilton.
- At ticket counters in GO stations, GO Bus terminals, and at participating ticket agencies
- By phone at 1-877-378-6123

For more information please visit

gotransit.com/PRESTO



ÉCONOMISEZ AVEC PRESTO!

Vous pouvez ajouter des fonds à votre carte PRESTO :

- À **cartepresto.ca**
- En créant un compte PRESTO et en configurant le chargement automatique
- À partir d'une borne de rechargement libre-service PRESTO
- Dans certains magasins Shoppers Drug Mart dans la RGTH ou dans certains établissements Fortinos à Hamilton
- À une billetterie dans une gare GO ou une station d'autobus GO, ou à une billetterie participante
- Par téléphone au 1-877-378-6123

Pour en savoir davantage, veuillez visiter le site

gotransit.com/fr/PRESTO

29

Route number
Numéro du trajet

Guelph/Mississauga



Legend Légende

- Train route
Ligne de train
- Bus route
Ligne d'autobus
- Train station
Gare
- Major bus stop
Arrêt d'autobus principal
- Park & Ride
Parc-o-bus
- Subway connection
Correspondance métro

CONTACT US

1-888-438-6646
416-869-3200
TTY: #711 or call
1-800-855-0511

gotransit.com/schedules

@GOtransitBus

See Something?
Say Something.
24/7 Transit Safety Dispatch:
1-877-297-0642

prestocard.ca

Sign-up for email or
text alerts/ Inscrivez-
vous pour recevoir des
alertes par courriel ou
message texte.
gotransit.com/OnTheGO

Guelph/ Mississauga



GO Bus Schedule/
Horaire des autobus GO



29

- Kipling Bus Terminal
- Renforth Transitway
- Dixie Transitway
- Square One GO
- Erin Mills Transitway Station
- Winston Churchill Transitway Station
- Regional Rd.25 @ Hwy.401 Park & Ride
- Aberfoyle Park & Ride
- University of Guelph
- Guelph Central

Daily / Quotidiennement
Includes GO Bus route 29 /
Inclut le trajet 29 d'autobus GO

Effective / À partir de:
7 JANUARY 2023



How to read our schedules

Step 1

Find the station or terminal you are departing from. Stops are listed across the top in the order they are served.

Step 2

The upper left corner tells you what day the schedule is for and the direction of travel.

Step 3

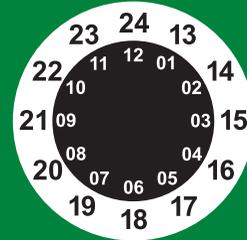
Look across the rows for available departure times.

Step 4

Not all trains or buses stop at every station. If you see → the train or bus will not stop at that station.

Schedule times shown in 24-hour clock

Midnight to noon
00 01 - 12 00
Noon to midnight
12 01 - 24 00



Legend

 Bus trips



GO Bus service is accessible to passengers using mobility devices at this location.



Parking available.

For the latest schedule information and updates, please visit gotransit.com/schedules.

2

Notes

Bicycles

1. Bicycles are not allowed in Union Station or on-board trains during morning rush hour (6:30-9:30) and evening rush hour (15:30-18:30), Monday to Friday.
2. Foldable bicycles are allowed on-board trains at all times.

Comment lire nos horaires

Étape 1

Trouvez votre gare ou terminus de départ. La liste des arrêts est donnée en haut dans l'ordre dans lequel ils sont desservis.

Étape 2

Le coin supérieur gauche vous indique le jour pour lequel l'horaire est donné et la direction de circulation.

Étape 3

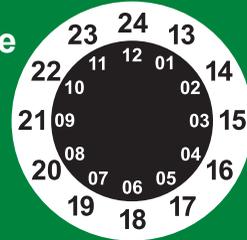
Regardez dans les rangées pour obtenir les heures de départ offertes.

Étape 4

Les trains ou les autobus ne s'arrêtent pas tous à chaque gare. Si vous voyez le symbole → le train ou l'autobus ne s'arrêtera pas à cette gare.

Indications selon un système horaire de 24 heures

De minuit à midi:
00 01 - 12 00
De midi à minuit:
12 01 - 24 00



Légende

 Horaire des autobus



Service d'autobus GO accessible aux personnes utilisant des aides à la mobilité à cet endroit.



Stationnement disponible.

Pour consulter les horaires les plus récents et les mises à jour, veuillez visiter gotransit.com/schedules.

3

Notes

Vélos

1. Les vélos ne sont pas autorisés dans la gare Union ou à bord des trains du lundi au vendredi, pendant l'heure de pointe (6:30-9:30) et pendant l'heure de pointe du soir (15:30-18:30).
2. Les vélos pliables sont permis à bord des trains en tout temps.

Monday to Friday (except holidays)
Du lundi au vendredi (sauf les jours fériés)

EASTBOUND / EN DIRECTION EST												WESTBOUND / EN DIRECTION OUEST												
Route Number Numéro du trajet	Zone→	Guelph 39		University of Guelph		Brook Rd. @ McLean Rd. (Aberfoyle)		Regional Rd. 25 @ Hwy. 401		Winston Churchill Transitway Station		Erin Mills Transitway Station		Square One		Dixie Transitway Station		Renforth Transitway Station		Kipling Bus Terminal				
Trip Number Numéro du parcours	Dp	Dp	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	Ar		
29	29130	05 15	05 25	05 40	05 56	06 17	06 20	06 30	06 37	06 42	06 55	29	29121	06 25	06 35	06 40	06 50	06 58	07 01	07 23	07 40	07 55	08 10	
29	29190	06 15	06 25	06 45	07 01	07 22	07 25	07 35	07 42	07 47	08 00	29	29151	06 55	07 05	07 10	07 20	07 28	07 31	07 53	08 10	08 25	08 40	
29	29240	07 10	07 20	07 40	07 59	08 22	08 25	08 35	08 42	08 47	09 00	29	29181	07 25	07 35	07 40	07 50	07 58	08 01	08 23	08 40	08 55	09 10	
29	29280	08 05	08 15	08 35	08 54	09 17	09 20	09 35	09 42	09 47	10 00	29	29211	07 55	08 05	08 10	08 20	08 28	08 31	08 53	09 10	09 25	09 40	
29	29320	09 10	09 20	09 40	09 56	10 17	10 20	10 35	10 42	10 47	11 00	29	29231	08 25	08 35	08 40	08 50	08 58	09 01	09 23	09 23	09 23	09 40	10 10
29	29360	10 15	10 25	10 45	11 01	11 17	11 20	11 35	11 42	11 47	12 00	29	29251	08 55	09 05	09 10	09 20	09 28	09 31	09 53	10 10	10 25	10 35	
29	29400	11 15	11 30	11 50	12 06	12 22	12 25	12 40	12 47	12 52	13 05	29	29291	09 55	10 05	10 10	10 20	10 28	10 31	10 53	11 10	11 25	11 35	
29	29440	12 15	12 30	12 50	13 06	13 22	13 25	13 40	13 47	13 52	14 05	29	29331	10 55	11 05	11 10	11 20	11 28	11 31	11 53	12 10	12 30	12 40	
29	29480	13 10	13 25	13 45	14 01	14 17	14 20	14 35	14 42	14 47	15 05	29	29371	11 55	12 05	12 10	12 20	12 28	12 31	12 53	13 10	13 30	13 40	
29	29540	14 10	14 25	14 45	15 01	15 17	15 20	15 35	15 42	15 47	16 05	29	29411	12 55	13 05	13 10	13 20	13 28	13 31	13 55	14 15	14 35	14 45	
29	29570	14 35	14 50	15 10	15 26	15 47	15 50	16 05	16 12	16 17	16 35	29	29421	13 25	13 35	13 40	13 50	13 58	14 01	14 25	14 45	15 05	15 15	
29	29600	15 05	15 20	15 40	15 56	16 17	16 20	16 35	16 42	16 47	17 05	29	29451	13 55	14 05	14 10	14 20	14 28	14 31	14 55	15 15	15 35	15 45	
29	29630	15 30	15 45	16 05	16 21	16 42	16 45	17 00	17 07	17 12	17 30	29	29461	14 25	14 35	14 40	14 50	14 58	15 01	15 25	15 45	16 05	16 15	
29	29660	16 05	16 20	16 40	16 56	17 17	17 20	17 35	17 42	17 47	18 05	29	29501	14 55	15 05	15 10	15 20	15 28	15 31	15 55	16 15	16 35	16 45	
29	29680	16 30	16 45	17 05	17 21	17 42	17 45	18 00	18 07	18 12	18 30	29	29511	15 20	15 32	15 37	15 50	15 58	16 01	16 25	16 45	17 05	17 15	
29	29700	17 05	17 20	17 40	17 56	18 17	18 20	18 35	18 42	18 47	19 05	29	29561	15 50	16 02	16 07	16 20	16 28	16 31	16 55	17 15	17 35	17 45	
29	29720	17 35	17 50	18 10	18 26	18 47	18 50	19 05	19 12	19 17	19 35	29	29621	16 50	17 02	17 07	17 20	17 28	17 31	17 55	18 15	18 35	18 45	
29	29740	18 05	18 20	18 40	18 56	19 17	19 20	19 35	19 42	19 47	20 00	29	29671	17 50	18 02	18 07	18 20	18 28	18 31	18 55	19 15	19 30	19 40	
29	29760	18 35	18 50	19 10	19 26	19 47	19 50	20 05	20 12	20 17	20 30	29	29711	18 55	19 05	19 10	19 20	19 28	19 31	19 53	20 10	20 25	20 35	
29	29780	19 15	19 25	19 45	20 01	20 22	20 25	20 40	20 47	20 42	21 05	29	29751	19 55	20 05	20 10	20 20	20 28	20 31	20 53	21 10	21 25	21 35	
29	29820	20 20	20 30	20 45	21 01	21 17	21 20	21 35	21 42	21 47	22 00	29	29791	20 55	21 05	21 10	21 20	21 28	21 31	21 53	22 10	22 25	22 35	
29	29850	21 20	21 30	21 45	22 01	22 17	22 20	22 35	22 42	22 47	23 00	29	29831	21 55	22 05	22 10	22 20	22 28	22 31	22 53	23 10	23 25	23 35	
29	29880	22 20	22 30	22 45	23 01	23 17	23 20	23 35	23 42	23 47	00 00	29	29891	23 55	00 05	00 10	00 20	00 28	00 31	00 53	01 10	01 25	01 35	

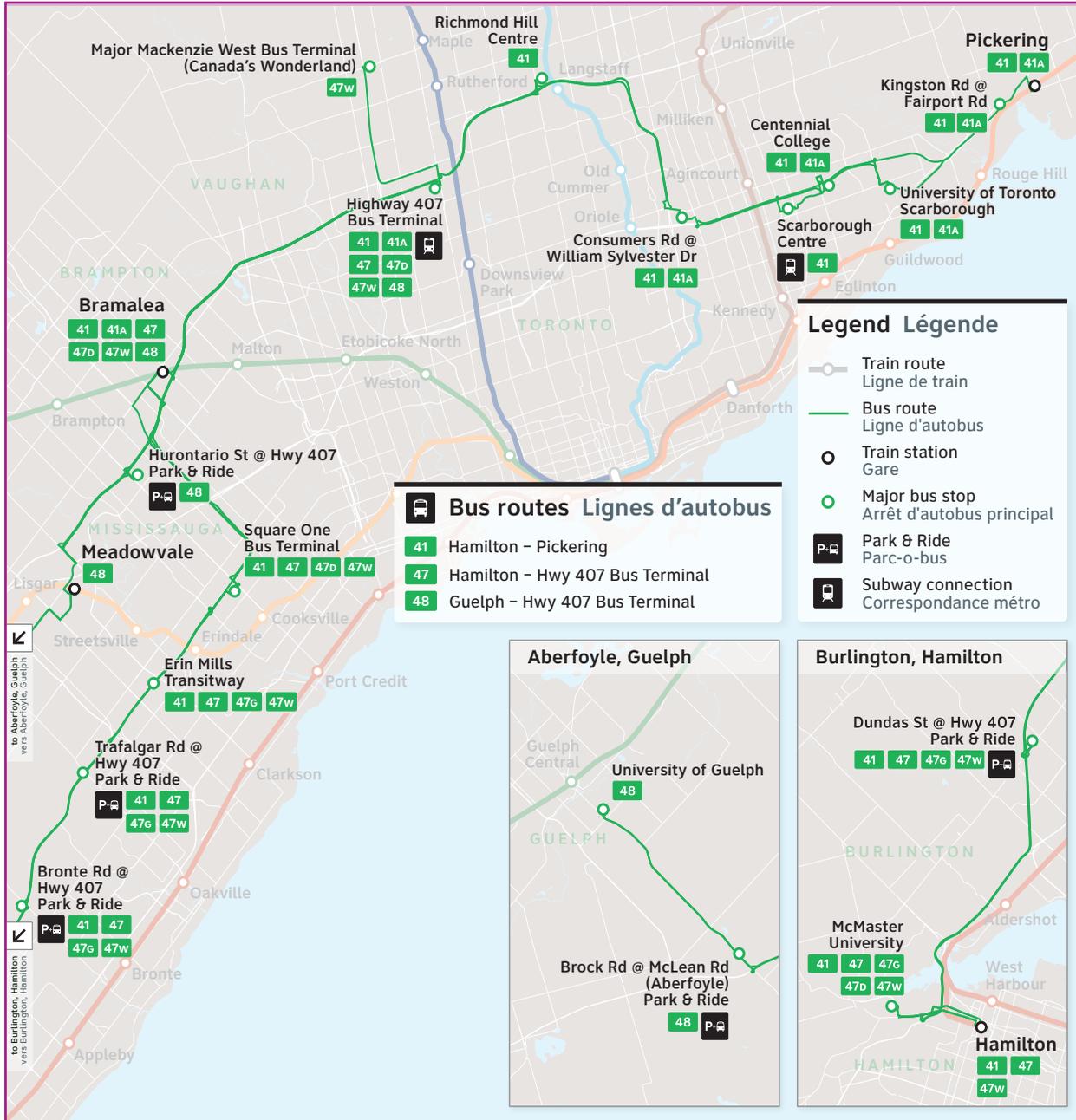
Saturday and Sunday
Samedi et dimanche

EASTBOUND / EN DIRECTION EST												WESTBOUND / EN DIRECTION OUEST											
Route Number Numéro du trajet	Zone→	Guelph 39		University of Guelph		Brook Rd. @ McLean Rd. (Aberfoyle) P&R		Regional Rd. 25 @ Hwy. 401 P&R		Winston Churchill Transitway Station		Erin Mills Transitway Station		Square One		Dixie Transitway Station		Renforth Transitway Station		Kipling Bus Terminal			
Trip Number Numéro du parcours	Dp	Dp	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	Ar	
29	29190	06 45	06 55	07 10	07 26	07 42	07 45	07 55	08 02	08 07	08 20	29	29211	08 00	08 10	08 15	08 25	08 33	08 36	08 58	09 15	09 30	09 40
29	29240	07 40	07 50	08 05	08 21	08 39	08 42	08 55	09 02	09 07	09 20	29	29251	09 00	09 10	09 15	09 25	09 33	09 36	09 58	10 15	10 30	10 40
29	29280	08 35	08 45	09 05	09 21	09 39	09 42	09 55	10 02	10 07	10 20	29	29291	10 00	10 10	10 15	10 25	10 33	10 36	10 58	11 15	11 35	11 45
29	29320	09 30	09 45	10 05	10 21	10 39	10 42	10 55	11 02	11 07	11 20	29	29331	11 00	11 10	11 15	11 25	11 33	11 36	11 58	12 15	12 35	12 45
29	29360	10 30	10 45	11 05	11 21	11 39	11 42	11 55	12 02	12 07	12 20	29	29371	12 00	12 10	12 15	12 25	12 33	12 36	12 58	13 15	13 35	13 45
29	29400	11 30	11 45	12 05	12 21	12 39	12 42	12 55	13 02	13 07	13 20	29	29411	13 00	13 10	13 15	13 25	13 33	13 36	13 58	14 15	14 35	14 45
29	29440	12 30	12 45	13 05	13 21	13 39	13 42	13 55	14 02	14 07	14 20	29	29451	14 00	14 10	14 15	14 25	14 33	14 36	14 58	15 15	15 35	15 45
29	29480	13 30	13 45	14 05	14 21	14 42	14 45	15 00	15 07	15 12	15 25	29	29501	15 00	15 10	15 15	15 25	15 33	15 36	15 58	16 15	16 35	16 45
29	29540	14 30	14 45	15 05	15 21	15 42	15 45	16 00	16 07	16 12	16 25	29	29561	16 00	16 10	16 15	16 25	16 33	16 36	16 58	17 15	17 35	17 45
29	29600	15 30	15 45	16 05	16 21	16 42	16 45	17 00	17 07	17 12	17 25	29	29621	17 00	17 10	17 15	17 25	17 33	17 36	17 58	18 15	18 35	18 45
29	29660	16 30	16 45	17 05	17 21	17 42	17 45	18 00	18 07	18 12	18 25	29	29671	18 00	18 10	18 15	18 25	18 33	18 36	18 58	19 15	19 35	19 45
29	29700	17 30	17 45	18 05	18 21	18 39	18 42	18 55	19 02	19 07	19 20	29	29711	19 00	19 10	19 15	19 25	19 33	19 36	19 58	20 15	20 35	20 45
29	29740	18 30	18 45	19 05	19 21	19 39	19 42	19 55	20 02	20 07	20 20	29	29751	20 00	20 10	20 15	20 25	20 33	20 36	20 58	21 15	21 35	21 45
29	29780	19 30	19 45	20 05	20 21	20 39	20 42	20 55	21 02	21 07	21 20	29	29791	21 00	21 10	21 15	21 25	21 33	21 36	21 58	22 15	22 35	22 45
29	29820	20 40	20 50	21 05	21 21	21 39	21 42	21 55	22 02	22 07	22 20	29	29831	22 00	22 10	22 15	22 25	22 33	22 36	22 58	23 15	23 30	23 40
29	29880	22 40	22 50	23 05	23 21	23 39	23 42	23 55	00 02	00 07	00 20	29	29891	00 00	00 10	00 15	00 25	00 33	00 36	00 58	01 15	01 30	01 40

41-47-48

Route number
Numéro du trajet

Hamilton/Pickering



CONTACT US

1-888-438-6646
416-869-3200
TTY: #711 or call
1-800-855-0511

gotransit.com/schedules

@GOtransitBus

See Something?
Say Something.
24/7 Transit Safety Dispatch:
1-877-297-0642

prestocard.ca

Sign-up for email or
text alerts/ Inscrivez-
vous pour recevoir des
alertes par courriel ou
message texte.
gotransit.com/OnTheGO

Hamilton/ Pickering



GO Bus Schedule/
Horaire des autobus GO



41 47 48

- Hamilton
- Burlington
- Oakville
- Mississauga
- Brampton
- Vaughan
- Richmond Hill
- Scarborough
- Pickering

Daily / Quotidiennement

Includes GO Bus routes 41, 45, 47,
48 / Inclut les trajets 41, 45, 47, 48
d'autobus GO

Effective / À partir de:

6 MAY
MAI 2023



How to read our schedules

Step 1

Find the station or terminal you are departing from. Stops are listed across the top in the order they are served.

Step 2

The upper left corner tells you what day the schedule is for and the direction of travel.

Step 3

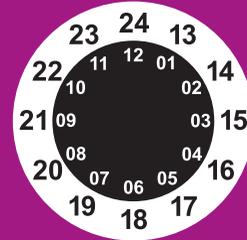
Look across the rows for available departure times.

Step 4

Not all trains or buses stop at every station. If you see → the train or bus will not stop at that station.

Schedule times shown in 24-hour clock

Midnight to noon
00 01 - 12 00
Noon to midnight
12 01 - 24 00



Legend

 Bus trips

→ Trip does not serve this location.



GO Bus service is accessible to passengers using mobility devices at this location.



Parking available.

Bicycles

1. Bicycles are not allowed in Union Station or on-board trains during morning rush hour (6:30-9:30) and evening rush hour (15:30-18:30), Monday to Friday.
2. Foldable bicycles are allowed on-board trains at all times.

2

Notes

For the latest schedule information and updates, please visit gotransit.com/schedules.

Comment lire nos horaires

Étape 1

Trouvez votre gare ou terminus de départ. La liste des arrêts est donnée en haut dans l'ordre dans lequel ils sont desservis.

Étape 2

Le coin supérieur gauche vous indique le jour pour lequel l'horaire est donné et la direction de circulation.

Étape 3

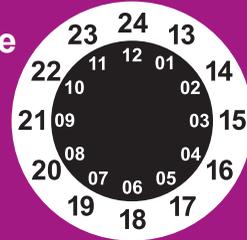
Regardez dans les rangées pour obtenir les heures de départ offertes.

Étape 4

Les trains ou les autobus ne s'arrêtent pas tous à chaque gare. Si vous voyez le symbole → le train ou l'autobus ne s'arrêtera pas à cette gare.

Indications selon un système horaire de 24 heures

De minuit à midi:
00 01 - 12 00
De midi à minuit:
12 01 - 24 00



Légende

 Horaire des autobus

→ Trajet ne sert pas cette station.



Service d'autobus GO accessible aux personnes utilisant des aides à la mobilité à cet endroit.



Stationnement disponible.

Vélos

1. Les vélos ne sont pas autorisés dans la gare Union ou à bord des trains du lundi au vendredi, pendant l'heure de pointe (6:30-9:30) et pendant l'heure de pointe du soir (15:30-18:30).
2. Les vélos pliables sont permis à bord des trains en tout temps.

3

Notes

Pour consulter les horaires les plus récents et les mises à jour, veuillez visiter gotransit.com/schedules.

		Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)																										
		EASTBOUND / EN DIRECTION EST																										
Route Number Numéro du trajet	Zone →	Zone 39 Guelph	Zone 39 Dp Puslinch Brock Rd. @ McLean Rd. (Aberfoyle)	Hamilton 18	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 22	Mississauga 22	Mississauga 21	Mississauga 20	Square One	Brampton 32	Bramalea GO	Vaughan 19	A	Dp	Richmond Hill 60	North York 5	Scarborough 7	Scarborough 89	Scarborough 89	Pickering 91	Pickering 91	A		
41	41020			04 40	04 52	05 09	05 16	05 24	→	05 32	05 45	06 02	06 20	06 02	06 20	06 25	06 35	06 53	07 05	07 12	07 22	07 33	07 40					
48	48100	05 00	05 15	→	→	→	→	→	05 50	06 04	→	→	06 15	06 35														
41A	41030			05 05	05 17	05 37	05 44	05 52	→	→	06 00	06 15	06 32	06 50	06 55	07 05	07 25	07 40	07 47	08 02	08 13	08 20						
41A	41042								05 50	06 04	→	→	06 20	06 37	06 57	→	07 20	→	07 37	07 52	08 03	08 10						
41A	41044								06 35	06 52	07 12	07 12	→	07 35	→	07 52	08 07	08 18	08 25									
41	41050			05 30	05 42	06 02	06 10	06 19	→	→	06 27	06 43	07 00	07 20	07 25	07 35	07 58	08 15	08 22	08 37	08 48	08 55						
48	48160	05 50	06 05	→	→	→	→	→	06 45	06 59	→	→	07 10	07 30														
41A	41052								06 55	07 15	07 35	07 35	→	08 01	→	08 17	08 32	08 43	08 50									
47	47060			05 45	05 57	06 17	06 25	06 34	→	→	06 42	07 00	07 20	07 40														
41A	41062								07 10	07 30	07 50	07 50	→	08 16	→	08 32	08 47	08 58	09 05									
41	41060			06 00	06 12	06 32	06 40	06 49	→	→	06 57	07 15	07 35	07 55	08 00	08 10	08 33	08 50	08 57	09 12	09 23	09 30						
41A	41072								07 25	07 45	08 05	08 05	→	08 31	→	08 47	09 02	09 13	09 20									
47	47080			06 15	06 27	06 47	06 55	07 04	→	→	07 12	07 30	07 50	08 10														
41A	41092								07 40	08 00	08 20	08 20	→	08 46	→	09 02	09 17	09 28	09 35									
48	48220	06 35	06 50	→	→	→	→	→	07 35	07 54	→	→	08 05	08 25														
41	41100			06 30	06 42	07 05	07 13	07 22	→	→	07 32	07 50	08 10	08 30	08 35	08 45	09 05	09 20	09 27	09 42	09 53	10 00						
47	47110			06 45	06 57	07 20	07 28	07 37	→	→	07 47	08 05	08 25	08 45														
41A	41112								08 15	08 35	08 55	08 55	→	09 20	→	09 35	09 47	09 58	10 05									
41	41120			07 00	07 12	07 35	07 43	07 52	→	→	08 02	08 20	08 40	09 00	09 05	09 15	09 35	09 50	09 57	10 12	10 23	10 30						
47	47140			07 15	07 32	07 55	08 03	08 12	→	→	08 22	08 40	09 00	09 20														
41A	41132								08 45	09 05	09 25	09 25	→	09 50	→	10 05	10 17	10 28	10 35									
41	41140			07 30	07 47	08 10	08 18	08 27	→	→	08 37	08 55	09 15	09 35	09 40	09 50	10 10	10 25	10 32	10 42	10 53	11 00						
48	48260	07 25	07 40	→	→	→	→	→	08 35	08 54	→	→	09 05	09 25														
41A	41152								09 10	09 30	09 50	09 50	→	10 14	→	10 29	10 37	10 48	10 55									
41	41170			07 55	08 12	08 35	08 43	08 52	→	→	09 02	09 20	09 40	10 00	10 05	10 15	10 35	10 50	10 57	11 07	11 18	11 25						
41A	41192								09 35	09 55	10 15	10 15	→	10 39	→	10 54	11 02	11 13	11 20									
48	48300	08 35	08 50	→	→	→	→	→	09 35	09 54	→	→	10 05	10 25														
41	41210			08 30	08 47	09 10	09 17	09 25	→	→	09 35	09 50	10 07	10 25	10 30	10 40	11 00	11 15	11 22	11 32	11 43	11 50						
41A	41212								10 05	10 22	10 40	10 40	→	11 04	→	11 19	11 27	11 38	11 45									
41	41230			08 55	09 12	09 35	09 42	09 50	→	→	10 00	10 15	10 32	10 50	10 55	11 05	11 25	11 40	11 47	11 57	12 08	12 15						
41A	41252								10 40	10 57	11 15	11 15	→	11 39	→	11 54	12 07	12 18	12 25									
41	41260			09 30	09 47	10 07	10 14	10 22	→	→	10 30	10 45	11 02	11 20	11 25	11 35	11 53	12 05	12 12	12 27	12 38	12 45						
48	48340	09 50	10 05	→	→	→	→	→	10 45	10 59	→	→	11 10	11 30														
41A	41272								11 10	11 27	11 45	11 45	→	12 09	→	12 24	12 37	12 48	12 55									
41	41280			10 00	10 17	10 37	10 44	10 52	→	→	11 00	11 15	11 32	11 50	11 55	12 05	12 23	12 35	12 42	12 57	13 08	13 15						
41A	41292								11 35	11 55	12 15	12 15	→	12 37	→	12 52	13 07	13 18	13 25									
41	41300			10 25	10 42	11 02	11 09	11 17	→	→	11 25	11 40	12 00	12 20	12 25	12 35	12 53	13 05	13 12	13 27	13 38	13 45						
48	48380	10 45	11 00	→	→	→	→	→	11 40	11 59	→	→	12 10	12 30														
41A	41320								12 10	12 30	12 50	12 50	→	13 12	→	13 27	13 42	13 53	14 00									
41	41320			11 00	11 17	11 37	11 44	11 52	→	→	12 00	12 15	12 35	12 55	13 00	13 10	13 28	13 40	13 57	14 02	14 13	14 20						
41	41340			11 25	11 42	12 02	12 09	12 17	→	→	12 25	12 40	13 00	13 20	13 25	13 35	13 53	14 05	14 12	14 27	14 38	14 45						
47	47360			11 40	11 57	12 17	12 24	12 32	→	→	12 40	12 55	13 15	13 35														
48	48420	11 45	12 00	→	→	→	→	→	12 40	12 59	→	→	13 10	13 30														
41	41360			11 55	12 12	12 32	12 39	12 47	→	→	12 55	13 10	13 30	13 50	13 55	14 05	14 25	14 40	14 47	15 02	15 13	15 20						
47	47380			12 10	12 27	12 47	12 54	13 02	→	→	13 10	13 25	13 45	14 05														
41	41380			12 25	12 42	13 02	13 09	13 17	→	→	13 25	13 40	14 00	14 20	14 25	14 35	14 55	15 10	15 17	15 32	15 43	15 50						
48	48460	12 45	13 00	→	→	→	→	→	13 40	13 59	→	→	14 10	14 30														
47	47400			12 40	12 57	13 17	13 24	13 32	→	→	13 40	13 55	14 15	14 35														
41	41400			12 55	13 12	13 32	13 39	13 47	→	→	13 55	14 10	14 30	14 50	14 55	15 05	15 25	15 40	15 47	16 02	16 13	16 20						
41	41420			13 25	13 42	14 02	14 09	14 17	→	→	14 25	14 40	15 00	15 20	15 25	15 35	15 55	16 10	16 17	16 32	16 43	16 50						
47	47430			13 40	13 57	14 17	14 24	14 32	→	→	14 40	14 55	15 15	15 35														
48	48510	13 45	14 00	→	→	→	→	→	14 40	14 59	→	→	15 10	15 30														
41	41430			13 55	14 12	14 32	14 39	14 47	→	→	14 55	15 10	15 30	15 50	15 55	16 05	16 28	16 45	16 52	17 07	17 20	17 30						
47	47440			14 10	14 29	14 49	14 57	15 05	→	→	15 15	15 30	15 50	16 10														
47D	47446								14 45	→	→	→	→	15 25	15 45	16 05												

		Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)																									
		EASTBOUND / EN DIRECTION EST																									
Route Number Numéro du trajet	Zone →	Zone 39 Guelph	Zone 39 Dp Puslinch Brock Rd. @ McLean Rd. (Aberfoyle)	Hamilton 18	Hamilton 18	Burlington 16	Oakville 14	Oakville 13	Mississauga 22	Mississauga 22	Mississauga 21	Mississauga 20	Square One	Brampton 32	Bramalea GO	Vaughan 19	A	Dp	Richmond Hill 60	North York 5	Scarborough 7	Scarborough 89	Scarborough 89	Pickering 91	Pickering 91	A	
41	41450			14 25	14 44	15 04	15 12	15 20	→ <th>→ <th>15 30</th> <th>15 45</th> <th>15 55</th> <th>16 05</th> <th>16 25</th> <th>16 25</th> <th>16 25</th> <th>16 30</th> <th>16 40</th> <th>17 03</th> <th>17 20</th> <th>17 27</th> <th>17 42</th> <th>17 55</th> <th>18 05</th> <th></th> <th></th></th>	→ <th>15 30</th> <th>15 45</th> <th>15 55</th> <th>16 05</th> <th>16 25</th> <th>16 25</th> <th>16 25</th> <th>16 30</th> <th>16 40</th> <th>17 03</th> <th>17 20</th> <th>17 27</th> <th>17 42</th> <th>17 55</th> <th>18 05</th> <th></th> <th></th>	15 30	15 45	15 55	16 05	16 25	16 25	16 25	16 30	16 40	17 03	17 20	17 27	17 42	17 55	18 05		

**Saturday and Sunday
Samedi et dimanche**

EASTBOUND / EN DIRECTION EST

Route Number Numéro du trajet	Zone→ Trip Number Numéro du parcours	18	Dp	18	16	14	13	21	20	32	19	19	Ar
		Hamilton Hamilton GO Centre ♿		Hamilton McMaster University ♿	Burlington Dundas St. @ Hwy. 407 ♿	Oakville Bronte Rd. @ Hwy. 407 ♿	Oakville Trafalgar Rd. @ Hwy. 407 ♿	Mississauga Erin Mills Transitway Station ♿	Mississauga Square One ♿	Brampton Bramalea GO ♿	Vaughan Hwy. 407 Bus Terminal ♿	Vaughan Major Mackenzie W. Terminal ♿	
47	47090	04 40		04 52	05 09	05 16	05 24	05 32	05 45	06 02	06 20		
47	47120	05 10		05 22	05 39	05 46	05 54	06 02	06 15	06 32	06 50		
47	47160	05 40		05 52	06 09	06 16	06 24	06 32	06 45	07 02	07 20		
47W	47180	06 10		06 22	06 39	06 46	06 54	07 02	07 15	07 32	07 50	08 05	
47	47210	06 40		06 52	07 09	07 16	07 24	07 32	07 45	08 02	08 20		
47W	47230	07 05		07 22	07 39	07 46	07 54	08 02	08 15	08 32	08 50	09 05	
47	47250	07 35		07 52	08 09	08 16	08 24	08 32	08 45	09 02	09 20		
47W	47270	08 05		08 22	08 39	08 46	08 54	09 02	09 15	09 32	09 50	10 05	
47	47290	08 30		08 47	09 07	09 14	09 22	09 30	09 45	10 02	10 20		
47W	47310	09 00		09 17	09 37	09 44	09 52	10 00	10 15	10 32	10 50	11 05	
47	47330	09 30		09 47	10 07	10 14	10 22	10 30	10 45	11 02	11 20		
47W	47350	10 00		10 17	10 37	10 44	10 52	11 00	11 15	11 32	11 50	12 05	
47	47370	10 30		10 47	11 07	11 14	11 22	11 30	11 45	12 02	12 20		
47W	47390	11 00		11 17	11 37	11 44	11 52	12 00	12 15	12 32	12 50	13 10	
47	47410	11 30		11 47	12 07	12 14	12 22	12 30	12 45	13 02	13 20		
47W	47430	12 00		12 17	12 37	12 44	12 52	13 00	13 15	13 32	13 50	14 10	
47	47450	12 30		12 47	13 07	13 14	13 22	13 30	13 45	14 02	14 20		
47W	47470	13 00		13 17	13 37	13 44	13 52	14 00	14 15	14 32	14 50	15 10	
47	47500	13 30		13 47	14 07	14 14	14 22	14 30	14 45	15 02	15 20		
47W	47530	13 55		14 15	14 35	14 43	14 51	15 00	15 15	15 32	15 50	16 10	
47	47560	14 25		14 45	15 05	15 13	15 21	15 30	15 45	16 02	16 20		
47W	47590	14 55		15 15	15 35	15 43	15 51	16 00	16 15	16 32	16 50	17 10	
47	47620	15 25		15 45	16 05	16 13	16 21	16 30	16 45	17 02	17 20		
47W	47650	15 55		16 15	16 35	16 43	16 51	17 00	17 15	17 32	17 50	18 10	
47	47670	16 25		16 45	17 05	17 13	17 21	17 30	17 45	18 02	18 20		
47W	47690	16 55		17 15	17 35	17 43	17 51	18 00	18 15	18 32	18 50	19 05	
47	47710	17 25		17 45	18 05	18 13	18 21	18 30	18 45	19 02	19 20		
47W	47730	17 55		18 15	18 35	18 43	18 51	19 00	19 15	19 32	19 50	20 05	
47	47750	18 25		18 45	19 05	19 13	19 21	19 30	19 45	20 02	20 20		
47W	47770	18 55		19 15	19 35	19 43	19 51	20 00	20 15	20 32	20 50	21 05	
47	47790	19 30		19 47	20 07	20 14	20 22	20 30	20 45	21 02	21 20		
47W	47810	20 00		20 17	20 37	20 44	20 52	21 00	21 15	21 32	21 50	22 05	
47	47840	21 00		21 17	21 37	21 44	21 52	22 00	22 15	22 32	22 50	22 50	
47	47880	22 00		22 17	22 37	22 44	22 52	23 00	23 15	23 32	23 50	23 50	
47	47910	23 05		23 17	23 37	23 44	23 52	00 00	00 15	00 32	00 50	00 50	

**Saturday and Sunday
Samedi et dimanche**

WESTBOUND / EN DIRECTION OUEST

Route Number Numéro du trajet	Zone→ Trip Number Numéro du parcours	19	Dp	19	32	20	21	13	14	16	18	18	Ar
		Vaughan Major Mackenzie W. Terminal ♿		Vaughan Hwy. 407 Bus Terminal ♿	Brampton Bramalea GO ♿	Mississauga Square One ♿	Mississauga Erin Mills Transitway Station ♿	Oakville Trafalgar Rd. @ Hwy. 407 ♿	Oakville Bronte Rd. @ Hwy. 407 ♿	Burlington Dundas St. @ Hwy. 407 ♿	Hamilton McMaster University ♿	Hamilton Hamilton GO Centre ♿	
47	47111			06 40	06 55	07 20	07 28	07 35	07 43	07 51	08 10	08 25	
47	47141			07 10	07 25	07 50	07 58	08 05	08 13	08 21	08 40	08 55	
47	47201			08 10	08 25	08 50	08 58	09 05	09 13	09 21	09 40	09 55	
47W	47231	08 25		08 40	08 55	09 20	09 28	09 35	09 43	09 51	10 10	10 25	
47	47251			09 10	09 25	09 50	09 58	10 05	10 13	10 21	10 40	10 55	
47W	47271	09 25		09 40	09 55	10 20	10 28	10 35	10 43	10 51	11 10	11 25	
47	47291			10 10	10 25	10 50	10 58	11 05	11 13	11 21	11 40	11 55	
47W	47311	10 25		10 40	10 55	11 20	11 28	11 35	11 43	11 53	12 15	12 30	
47	47331			11 10	11 25	11 50	11 58	12 05	12 13	12 23	12 45	13 00	
47W	47351	11 25		11 40	11 55	12 20	12 28	12 35	12 43	12 53	13 15	13 30	
47	47371			12 10	12 25	12 50	13 03	13 10	13 18	13 28	13 50	14 05	
47W	47391	12 25		12 40	12 55	13 20	13 33	13 40	13 48	13 58	14 20	14 35	
47	47411			13 10	13 25	13 50	14 03	14 10	14 18	14 28	14 50	15 05	
47W	47431	13 25		13 40	13 55	14 20	14 33	14 40	14 48	14 58	15 20	15 35	
47	47451			14 10	14 25	14 50	15 03	15 10	15 18	15 28	15 50	16 05	
47W	47471	14 25		14 40	14 55	15 20	15 33	15 40	15 48	15 58	16 20	16 35	
47	47491			15 10	15 25	15 50	16 03	16 10	16 18	16 28	16 50	17 05	
47W	47521	15 25		15 40	15 55	16 20	16 33	16 40	16 48	16 58	17 20	17 35	
47	47551			16 10	16 25	16 50	17 03	17 10	17 18	17 28	17 50	18 10	
47W	47581	16 25		16 40	16 55	17 20	17 33	17 40	17 48	17 58	18 20	18 40	
47	47611			17 10	17 25	17 50	18 03	18 10	18 18	18 28	18 50	19 10	
47W	47641	17 25		17 40	17 55	18 20	18 33	18 40	18 48	18 58	19 20	19 40	
47	47671			18 10	18 25	18 50	19 03	19 10	19 18	19 28	19 50	20 10	
47W	47691	18 25		18 40	18 55	19 20	19 33	19 40	19 48	19 58	20 20	20 40	
47	47711			19 10	19 25	19 50	20 03	20 10	20 18	20 28	20 50	21 10	
47W	47731	19 25		19 40	19 55	20 20	20 33	20 40	20 48	20 58	21 20	21 40	
47	47751			20 10	20 25	20 50	20 63	21 00	21 08	21 18	21 40	22 00	
47W	47781	20 25		20 40	20 55	21 20	21 33	21 40	21 48	21 58	22 20	22 40	
47	47791			21 10	21 25	21 50	21 63	22 00	22 08	22 18	22 40	23 00	
47W	47811	21 25		21 40	21 55	22 20	22 33	22 40	22 48	22 58	23 20	23 40	
47	47831			22 10	22 25	22 50	23 03	23 10	23 18	23 28	23 50	24 10	
47W	47841	22 25		22 40	22 55	23 20	23 33	23 40	23 48	23 58	00 10	00 25	
47	47851			23 10	23 25	23 50	24 03	00 05	00 13	00 21	00 40	00 55	
47	47881			00 10	00 25	00 50	01 03	01 05	01 13	01 21	01 40	01 55	
47	47911			01 10	01 25	01 50	02 03	02 05	02 13	02 21	02 40	02 55	

Appendix D

Traffic Data

Turning Movement Counts



Turning Movement Count (1 . MCLEAN RD W & BROCK RD S (WELLINGTON RD 46))

Start Time	N Approach BROCK RD S (WELLINGTON RD 46)						E Approach MCLEAN RD W						S Approach BROCK RD S (WELLINGTON RD 46)						W Approach MCLEAN RD W						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
06:30:00	4	151	10	0	0	165	1	1	6	0	0	8	13	47	14	0	0	74	27	5	1	0	0	33	280		
06:45:00	5	139	12	0	0	156	6	1	7	0	0	14	12	54	26	0	0	92	34	9	1	0	0	44	306		
07:00:00	5	129	5	0	0	139	8	3	9	0	0	20	15	87	15	0	0	117	24	4	1	0	0	29	305		
07:15:00	6	176	7	0	0	189	3	3	5	0	0	11	4	93	23	0	0	120	18	6	1	0	0	25	345	1236	
07:30:00	9	164	7	0	0	180	4	0	12	0	0	16	10	85	27	0	3	122	28	7	2	0	0	37	355	1311	
07:45:00	6	199	17	0	0	222	4	1	6	0	0	11	11	123	20	0	0	154	28	6	0	0	0	34	421	1426	
08:00:00	5	153	7	0	0	165	2	1	7	0	0	10	10	102	13	0	0	125	29	1	1	0	0	31	331	1452	
08:15:00	6	176	5	0	0	187	2	0	2	0	0	4	8	125	31	0	0	164	23	3	2	0	0	28	383	1490	
08:30:00	4	154	6	0	0	164	4	1	7	0	0	12	6	99	21	0	0	126	24	3	3	0	0	30	332	1467	
08:45:00	8	127	7	0	0	142	0	0	5	0	0	5	9	106	26	0	0	141	27	3	0	0	0	30	318	1364	
09:00:00	3	104	3	0	0	110	3	4	9	0	0	16	11	78	16	0	0	105	27	2	3	0	0	32	263	1296	
09:15:00	4	103	3	0	0	110	3	1	5	0	0	9	7	84	11	0	0	102	22	1	3	0	0	26	247	1160	
BREAK																											
16:00:00	0	91	3	0	0	94	19	15	18	0	0	52	3	138	20	0	0	161	31	2	11	0	0	44	351		
16:15:00	6	132	3	0	0	141	4	1	10	0	0	15	4	157	26	0	1	187	29	1	4	0	1	34	377		
16:30:00	3	119	4	0	0	126	9	4	19	0	0	32	5	180	27	0	0	212	25	1	14	0	0	40	410		
16:45:00	3	116	2	0	0	121	4	2	6	0	0	12	2	188	30	0	0	220	21	1	7	0	0	29	382	1520	
17:00:00	3	85	1	0	0	89	14	12	18	0	0	44	4	173	49	0	0	226	14	1	9	0	0	24	383	1552	
17:15:00	2	128	1	0	0	131	3	1	4	0	0	8	2	171	30	0	0	203	19	3	5	0	0	27	369	1544	
17:30:00	4	89	2	0	0	95	6	3	10	0	0	19	4	151	35	0	0	190	12	1	9	0	0	22	326	1460	
17:45:00	2	96	6	0	1	104	3	1	4	0	0	8	6	152	37	0	0	195	14	2	1	0	0	17	324	1402	
18:00:00	5	101	0	0	0	106	3	3	5	0	0	11	5	168	36	1	1	210	11	1	4	0	0	16	343	1362	
18:15:00	4	92	1	0	0	97	3	5	5	0	0	13	2	141	10	1	3	154	13	1	3	0	0	17	281	1274	
18:30:00	2	63	1	0	0	66	2	0	7	0	0	9	1	127	10	0	0	138	7	0	3	0	0	10	223	1171	
18:45:00	2	56	4	0	0	62	1	2	8	0	0	11	1	110	13	0	0	124	8	4	2	0	0	14	211	1058	
Grand Total	101	2943	117	0	1	3161	111	65	194	0	0	370	155	2939	566	2	8	3662	515	68	90	0	1	673	7866	-	
Approach%	3.2%	93.1%	3.7%	0%	-	-	30%	17.6%	52.4%	0%	-	-	4.2%	80.3%	15.5%	0.1%	-	76.5%	10.1%	13.4%	0%	-	-	-	-	-	
Totals %	1.3%	37.4%	1.5%	0%	40.2%	-	1.4%	0.8%	2.5%	0%	4.7%	2%	37.4%	7.2%	0%	-	46.6%	6.5%	0.9%	1.1%	0%	-	-	8.6%	-	-	
Heavy	11	244	25	0	-	-	27	14	93	0	-	-	28	242	158	0	-	194	14	10	0	-	-	-	-	-	
Heavy %	10.9%	8.3%	21.4%	0%	-	-	24.3%	21.5%	47.9%	0%	-	-	18.1%	8.2%	27.9%	0%	-	37.7%	20.6%	11.1%	0%	-	-	-	-	-	
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Mist (1.86 °C)

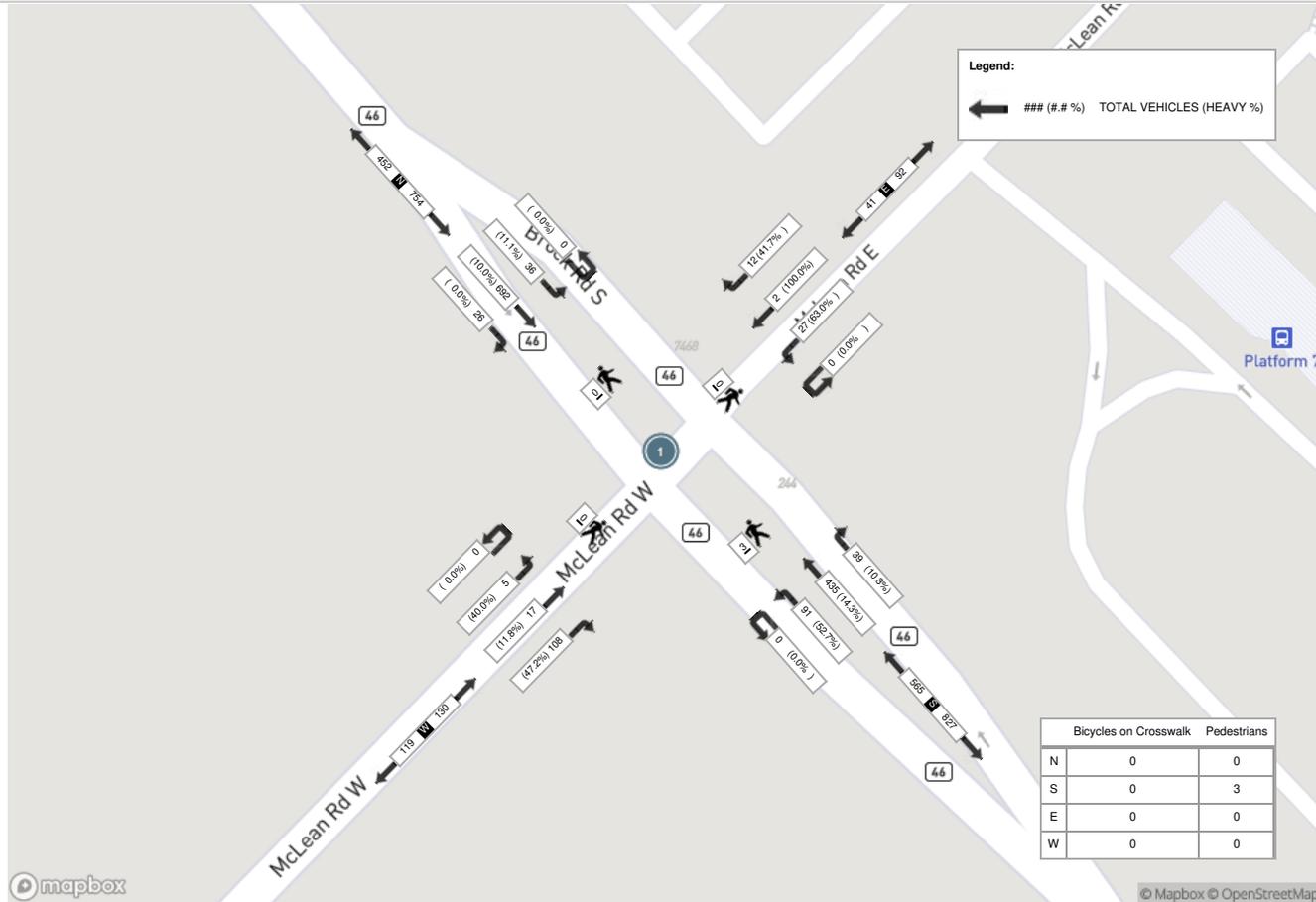
Start Time	N Approach BROCK RD S (WELLINGTON RD 46)						E Approach MCLEAN RD W						S Approach BROCK RD S (WELLINGTON RD 46)						W Approach MCLEAN RD W						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	9	164	7	0	0	180	4	0	12	0	0	16	10	85	27	0	3	122	28	7	2	0	0	37	355
07:45:00	6	199	17	0	0	222	4	1	6	0	0	11	11	123	20	0	0	154	28	6	0	0	0	34	421
08:00:00	5	153	7	0	0	165	2	1	7	0	0	10	10	102	13	0	0	125	29	1	1	0	0	31	331
08:15:00	6	176	5	0	0	187	2	0	2	0	0	4	8	125	31	0	0	164	23	3	2	0	0	28	383
Grand Total	26	692	36	0	0	754	12	2	27	0	0	41	39	435	91	0	3	565	108	17	5	0	0	130	1490
Approach%	3.4%	91.8%	4.8%	0%	-	-	29.3%	4.9%	65.9%	0%	-	6.9%	77%	16.1%	0%	-	-	83.1%	13.1%	3.8%	0%	-	-	-	-
Totals %	1.7%	46.4%	2.4%	0%	50.6%	0.8%	0.1%	1.8%	0%	2.8%	2.6%	29.2%	6.1%	0%	37.9%	7.2%	1.1%	0.3%	0%	8.7%	-	-	-	-	
PHF	0.72	0.87	0.53	0	0.85	0.75	0.5	0.56	0	0.64	0.89	0.87	0.73	0	0.86	0.93	0.61	0.63	0	0.88	-	-	-	-	
Heavy	0	69	4	0	73	5	2	17	0	24	4	62	48	0	114	51	2	2	0	55	-	-	-	-	
Heavy %	0%	10%	11.1%	0%	9.7%	41.7%	100%	63%	0%	58.5%	10.3%	14.3%	52.7%	0%	20.2%	47.2%	11.8%	40%	0%	42.3%	-	-	-	-	
Lights	26	623	32	0	681	7	0	10	0	17	35	373	43	0	451	57	15	3	0	75	-	-	-	-	
Lights %	100%	90%	88.9%	0%	90.3%	58.3%	0%	37%	0%	41.5%	89.7%	85.7%	47.3%	0%	79.8%	52.8%	88.2%	60%	0%	57.7%	-	-	-	-	
Single-Unit Trucks	0	14	1	0	15	0	0	2	0	2	1	23	4	0	28	5	0	0	0	5	-	-	-	-	
Single-Unit Trucks %	0%	2%	2.8%	0%	2%	0%	0%	7.4%	0%	4.9%	2.6%	5.3%	4.4%	0%	5%	4.6%	0%	0%	0%	3.8%	-	-	-	-	
Buses	0	6	2	0	8	4	0	5	0	9	0	4	1	0	5	1	0	0	0	1	-	-	-	-	
Buses %	0%	0.9%	5.6%	0%	1.1%	33.3%	0%	18.5%	0%	22%	0%	0.9%	1.1%	0%	0.9%	0.9%	0%	0%	0%	0.8%	-	-	-	-	
Articulated Trucks	0	49	1	0	50	1	2	10	0	13	3	35	43	0	81	45	2	2	0	49	-	-	-	-	
Articulated Trucks %	0%	7.1%	2.8%	0%	6.6%	8.3%	100%	37%	0%	31.7%	7.7%	8%	47.3%	0%	14.3%	41.7%	11.8%	40%	0%	37.7%	-	-	-	-	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
Bicycles on Road %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	-	-	-	
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	3	-	-	-	-	0	-	-	-	-	
Pedestrians%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-	-	-	
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	



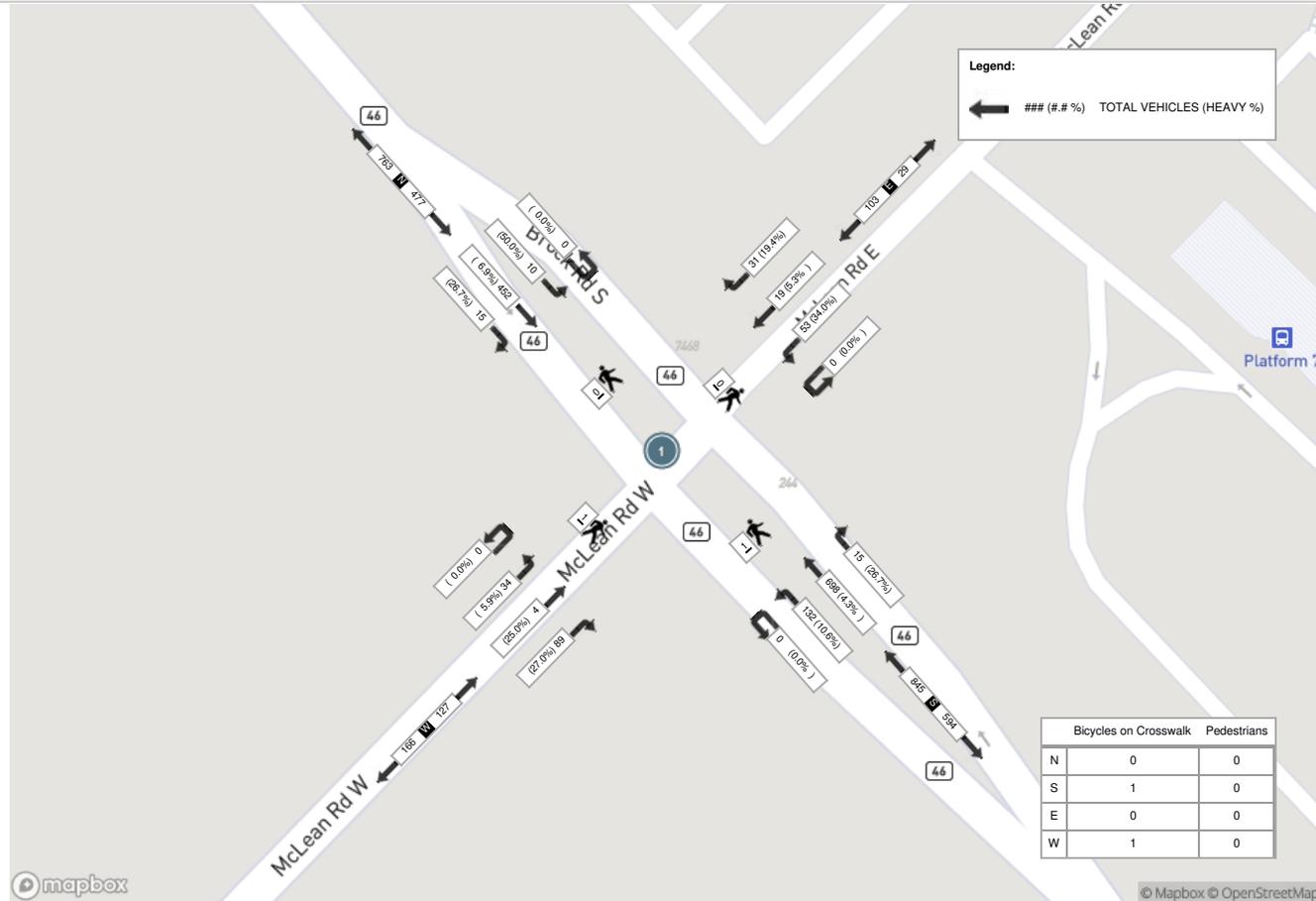
Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (4.44 °C)

Start Time	N Approach BROCK RD S (WELLINGTON RD 46)						E Approach MCLEAN RD W						S Approach BROCK RD S (WELLINGTON RD 46)						W Approach MCLEAN RD W						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	6	132	3	0	0	141	4	1	10	0	0	15	4	157	26	0	1	187	29	1	4	0	1	34	377
16:30:00	3	119	4	0	0	126	9	4	19	0	0	32	5	180	27	0	0	212	25	1	14	0	0	40	410
16:45:00	3	116	2	0	0	121	4	2	6	0	0	12	2	188	30	0	0	220	21	1	7	0	0	29	382
17:00:00	3	85	1	0	0	89	14	12	18	0	0	44	4	173	49	0	0	226	14	1	9	0	0	24	383
Grand Total	15	452	10	0	0	477	31	19	53	0	0	103	15	698	132	0	1	845	89	4	34	0	1	127	1552
Approach%	3.1%	94.8%	2.1%	0%	-	-	30.1%	18.4%	51.5%	0%	-	-	1.8%	82.6%	15.6%	0%	-	-	70.1%	3.1%	26.8%	0%	-	-	-
Totals %	1%	29.1%	0.6%	0%	30.7%	2%	1.2%	3.4%	0%	6.6%	1%	45%	8.5%	0%	54.4%	5.7%	0.3%	2.2%	0%	8.2%	-	-	-	-	-
PHF	0.63	0.86	0.63	0	0.85	0.55	0.4	0.7	0	0.59	0.75	0.93	0.67	0	0.93	0.77	1	0.61	0	0.79	-	-	-	-	-
Heavy	4	31	5	0	40	6	1	18	0	25	4	30	14	0	48	24	1	2	0	27	-	-	-	-	-
Heavy %	26.7%	6.9%	50%	0%	8.4%	19.4%	5.3%	34%	0%	24.3%	26.7%	4.3%	10.6%	0%	5.7%	27%	25%	5.9%	0%	21.3%	-	-	-	-	-
Lights	11	421	5	0	437	25	18	35	0	78	11	668	118	0	797	65	3	32	0	100	-	-	-	-	-
Lights %	73.3%	93.1%	50%	0%	91.6%	80.6%	94.7%	66%	0%	75.7%	73.3%	95.7%	89.4%	0%	94.3%	73%	75%	94.1%	0%	78.7%	-	-	-	-	-
Single-Unit Trucks	2	11	3	0	16	1	1	1	0	3	3	12	6	0	21	5	1	2	0	8	-	-	-	-	-
Single-Unit Trucks %	13.3%	2.4%	30%	0%	3.4%	3.2%	5.3%	1.9%	0%	2.9%	20%	1.7%	4.5%	0%	2.5%	5.6%	25%	5.9%	0%	6.3%	-	-	-	-	-
Buses	1	2	2	0	5	5	0	9	0	14	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Buses %	6.7%	0.4%	20%	0%	1%	16.1%	0%	17%	0%	13.6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	-	-	-	-
Articulated Trucks	1	18	0	0	19	0	0	8	0	8	1	18	8	0	27	19	0	0	0	19	-	-	-	-	-
Articulated Trucks %	6.7%	4%	0%	0%	4%	0%	0%	15.1%	0%	7.8%	6.7%	2.6%	6.1%	0%	3.2%	21.3%	0%	0%	0%	15%	-	-	-	-	-
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-
Bicycles on Road %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	50%	-	-	-	-	50%	-	-	-	-	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Mist (1.86 °C)



Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (4.44 °C)



mapbox

© Mapbox © OpenStreetMap



Turning Movement Count (2 . NICHOLAS BEAVER RD & BROCK RD S (WELLINGTON RD 46))

Start Time	N Approach BROCK RD S (WELLINGTON RD 46)					E Approach NICHOLAS BEAVER RD					S Approach BROCK RD S (WELLINGTON RD 46)					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
06:30:00	114	61	0	0	175	16	25	0	0	41	31	59	0	0	90	306	
06:45:00	113	58	0	0	171	17	21	0	1	38	43	73	0	0	116	325	
07:00:00	143	33	0	0	176	44	39	0	0	83	9	84	0	0	93	352	
07:15:00	165	30	0	0	195	22	43	0	3	65	19	91	0	0	110	370	1353
07:30:00	162	37	0	0	199	26	20	0	1	46	16	103	0	0	119	364	1411
07:45:00	186	46	0	0	232	25	23	0	0	48	24	127	0	0	151	431	1517
08:00:00	163	32	0	0	195	13	41	0	0	54	28	100	0	0	128	377	1542
08:15:00	159	32	0	0	191	24	31	0	2	55	20	144	0	0	164	410	1582
08:30:00	154	35	0	0	189	29	20	0	0	49	18	106	0	0	124	362	1580
08:45:00	123	35	0	0	158	21	36	0	0	57	15	115	0	0	130	345	1494
09:00:00	123	30	0	0	153	20	30	0	2	50	13	96	0	0	109	312	1429
09:15:00	109	21	0	0	130	25	26	0	0	51	17	75	0	0	92	273	1292
BREAK																	
16:00:00	122	17	0	0	139	39	47	0	2	86	10	136	0	0	146	371	
16:15:00	142	21	0	0	163	31	32	0	0	63	4	148	0	0	152	378	
16:30:00	174	7	0	0	181	37	40	0	0	77	6	201	0	0	207	465	
16:45:00	126	6	0	0	132	17	21	0	0	38	9	189	0	0	198	368	1582
17:00:00	119	11	0	0	130	50	38	0	1	88	5	187	0	0	192	410	1621
17:15:00	136	9	0	0	145	12	22	0	0	34	9	182	0	0	191	370	1613
17:30:00	107	13	0	0	120	19	22	0	0	41	4	177	0	0	181	342	1490
17:45:00	107	11	0	0	118	10	20	0	0	30	15	181	0	0	196	344	1466
18:00:00	99	12	0	0	111	19	21	0	1	40	7	187	0	0	194	345	1401
18:15:00	99	8	0	0	107	14	24	0	0	38	7	142	0	0	149	294	1325
18:30:00	76	7	0	0	83	5	13	0	0	18	9	136	0	0	145	246	1229
18:45:00	62	8	0	0	70	7	14	0	0	21	6	111	0	0	117	208	1093
Grand Total	3083	580	0	0	3663	542	669	0	13	1211	344	3150	0	0	3494	8368	-
Approach%	84.2%	15.8%	0%	-	-	44.8%	55.2%	0%	-	-	9.8%	90.2%	0%	-	-	-	-
Totals %	36.8%	6.9%	0%	-	43.8%	6.5%	8%	0%	-	14.5%	4.1%	37.6%	0%	-	41.8%	-	-
Heavy	477	50	0	-	-	45	109	0	-	-	97	419	0	-	-	-	-
Heavy %	15.5%	8.6%	0%	-	-	8.3%	16.3%	0%	-	-	28.2%	13.3%	0%	-	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicycle %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 07:30 AM - 08:30 AM Weather: Mist (1.86 °C)

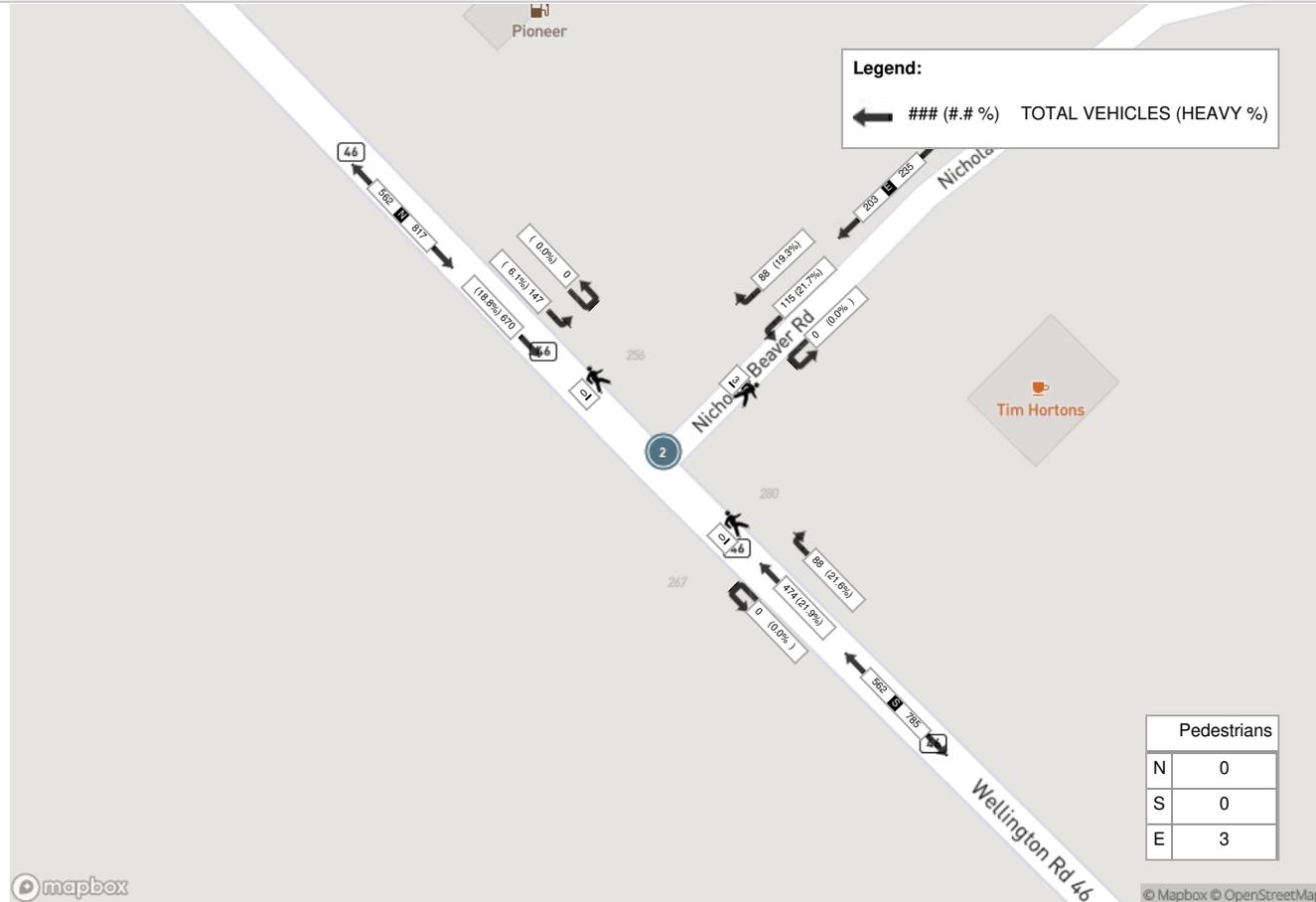
Start Time	N Approach BROCK RD S (WELLINGTON RD 46)					E Approach NICHOLAS BEAVER RD					S Approach BROCK RD S (WELLINGTON RD 46)				Int. Total (15 min)	
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds		Approach Total
07:30:00	162	37	0	0	199	26	20	0	1	46	16	103	0	0	119	364
07:45:00	186	46	0	0	232	25	23	0	0	48	24	127	0	0	151	431
08:00:00	163	32	0	0	195	13	41	0	0	54	28	100	0	0	128	377
08:15:00	159	32	0	0	191	24	31	0	2	55	20	144	0	0	164	410
Grand Total	670	147	0	0	817	88	115	0	3	203	88	474	0	0	562	1582
Approach%	82%	18%	0%		-	43.3%	56.7%	0%		-	15.7%	84.3%	0%		-	-
Totals %	42.4%	9.3%	0%		51.6%	5.6%	7.3%	0%		12.8%	5.6%	30%	0%		35.5%	-
PHF	0.9	0.8	0		0.88	0.85	0.7	0		0.92	0.79	0.82	0		0.86	-
Heavy	126	9	0		135	17	25	0		42	19	104	0		123	-
Heavy %	18.8%	6.1%	0%		16.5%	19.3%	21.7%	0%		20.7%	21.6%	21.9%	0%		21.9%	-
Lights	544	138	0		682	71	90	0		161	69	370	0		439	-
Lights %	81.2%	93.9%	0%		83.5%	80.7%	78.3%	0%		79.3%	78.4%	78.1%	0%		78.1%	-
Single-Unit Trucks	17	4	0		21	10	18	0		28	10	20	0		30	-
Single-Unit Trucks %	2.5%	2.7%	0%		2.6%	11.4%	15.7%	0%		13.8%	11.4%	4.2%	0%		5.3%	-
Buses	11	0	0		11	0	0	0		0	0	10	0		10	-
Buses %	1.6%	0%	0%		1.3%	0%	0%	0%		0%	0%	2.1%	0%		1.8%	-
Articulated Trucks	98	5	0		103	7	7	0		14	9	74	0		83	-
Articulated Trucks %	14.6%	3.4%	0%		12.6%	8%	6.1%	0%		6.9%	10.2%	15.6%	0%		14.8%	-
Pedestrians	-	-	-	0	-	-	-	-	3	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-



Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (4.44 °C)

Start Time	N Approach BROCK RD S (WELLINGTON RD 46)					E Approach NICHOLAS BEAVER RD					S Approach BROCK RD S (WELLINGTON RD 46)				Int. Total (15 min)	
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds		Approach Total
16:15:00	142	21	0	0	163	31	32	0	0	63	4	148	0	0	152	378
16:30:00	174	7	0	0	181	37	40	0	0	77	6	201	0	0	207	465
16:45:00	126	6	0	0	132	17	21	0	0	38	9	189	0	0	198	368
17:00:00	119	11	0	0	130	50	38	0	1	88	5	187	0	0	192	410
Grand Total	561	45	0	0	606	135	131	0	1	266	24	725	0	0	749	1621
Approach%	92.6%	7.4%	0%		-	50.8%	49.2%	0%		-	3.2%	96.8%	0%		-	-
Totals %	34.6%	2.8%	0%		37.4%	8.3%	8.1%	0%		16.4%	1.5%	44.7%	0%		46.2%	-
PHF	0.81	0.54	0		0.84	0.68	0.82	0		0.76	0.67	0.9	0		0.9	-
Heavy	62	9	0		71	8	12	0		20	16	46	0		62	-
Heavy %	11.1%	20%	0%		11.7%	5.9%	9.2%	0%		7.5%	66.7%	6.3%	0%		8.3%	-
Lights	499	36	0		535	127	119	0		246	8	679	0		687	-
Lights %	88.9%	80%	0%		88.3%	94.1%	90.8%	0%		92.5%	33.3%	93.7%	0%		91.7%	-
Single-Unit Trucks	10	7	0		17	4	8	0		12	6	17	0		23	-
Single-Unit Trucks %	1.8%	15.6%	0%		2.8%	3%	6.1%	0%		4.5%	25%	2.3%	0%		3.1%	-
Buses	9	0	0		9	0	0	0		0	0	6	0		6	-
Buses %	1.6%	0%	0%		1.5%	0%	0%	0%		0%	0%	0.8%	0%		0.8%	-
Articulated Trucks	43	2	0		45	4	4	0		8	10	23	0		33	-
Articulated Trucks %	7.7%	4.4%	0%		7.4%	3%	3.1%	0%		3%	41.7%	3.2%	0%		4.4%	-
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-
Pedestrians%	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-

Peak Hour: 07:30 AM - 08:30 AM Weather: Mist (1.86 °C)



Signal Timing Plans

Configuration

```

-----
                Controller Sequence Priority
                1     2     3     4     5     6     7     8     9     10    11    12
Ring 1 Phases . . 1     2   | 3     4   | 9    10   | 0     0     0     0     0     0
Ring 2 Phases . . 5     6   | 7     8   |11    12   | 0     0     0     0     0     0

                Phase
                1     2     3     4     5     6     7     8     9     10    11    12
In Use. . . . . X     X     .     X     X     X     .     X     .     .     .     .
Exclusive Ped . . . . . .     .     .     .     .     .     .     .     .     .     .     .
Direction . . . . .

                Overlap
                A     B     C     D
Direction . . .
    
```

Load Switch Channel/Driver Group Assign (Info Only):

Load Switch (MMU) Channel	Driver Phase/Ovlap	Signal Group Ped
1	1	.
2	2	.
3	3	.
4	4	.
5	5	.
6	6	.
7	7	.
8	8	.
9	2	X
10	4	X
11	6	X
12	8	X
13	A	.
14	B	.
15	C	.
16	D	.

Configuration Continued

Event Enabling

Alarm Enabling

```

Critical RFE'S (MMU/TF) . . . . .
Non-Critical RFE'S (DET/TEST) . . .
Detector Errors . . . . .
Coordination Errors . . . . .
MMU Flash Faults. . . . .
Local Flash Faults. . . . .
Preempt . . . . .
Power On/Off. . . . .
Low Battery . . . . .
ALARM 1 . . . . .
ALARM 2 . . . . .
ALARM 3 . . . . .
ALARM 4 . . . . .
ALARM 5 . . . . .
ALARM 6 . . . . .
ALARM 7 . . . . .
ALARM 8 . . . . .
ALARM 9 . . . . .
ALARM 10. . . . .
ALARM 11. . . . .
ALARM 12. . . . .
ALARM 13. . . . .
ALARM 14. . . . .
ALARM 15. . . . .
ALARM 16. . . . .
    
```

```

Supervisor Access Code. . . ****
Data Change Access Code . . ****
    
```

MMU Compatibility Program (Info Only)

Channel	Is Allowed to Time With Channel														
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
1
2
3
4
5
6
7
8
9
10.
11.
12.
13.
14.
15.

Version Info:		
Software Assy.	Part No.	Version
Boot	27831	2.83
Program	45561	7.9
Application		. 3
Help	27891	6.23
Configuration	27908	C000r

Ped Carryover

Ped Start Phase	Carry Over Phase
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0

Power Start, Remote Flash

	Phase															
	1	2	3	4	5	6	7	8	9	10	11	12				
Power Start	X	.	.	.	.	.	.	.	.	.	.
External Start	X	.	.	.	.	.	.	.	.	.	.
Into Remote Flash	X	.	.	.	.	.	.	.	.	.	.
Exit Remote Flash	X	.	.	.	.	.	.	.	.	.	.	Overlap			
Remote Flash Yellow	A	B	C	D
Flash Together	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X

Initialization Interval:

Power Start Yellow
 External Start Yellow

Power Start All Red Time 0
 Power Start Flash Time 0

Remote Flash Options:

Out of Flash Yellow NO
 Out of Flash All Red NO
 Minimum Recall NO
 Alternate Flash NO
 Flash Thru Load Switches NO
 Cycle Through Phases NO

Option Data

	Phase											
	1	2	3	4	5	6	7	8	9	10	11	12
Guaranteed Passage
Call To NonActuated 1	X	.	.	.	X	.	.	.	.	.	.
Call To NonActuated 2	X	.	.	.	X	.	.	.	.
Dual Entry.	X	.	X	.	X	.	X	.	X	.	X
Conditional Service	X	.	X	.	X	.	X	.	X	.	X	.
Conditional Reservice
Actuated Rest in Walk
Flashing Walk

Enable Programmable Options

Dual Entry.	ON	Backup Protection Group 1	ON
Conditional Service	OFF	Backup Protection Group 2	OFF
Ped Clearance Protection.	OFF	Backup Protection Group 3	OFF
Special Preempt Overlap Flash	OFF	Simultaneous Gap Group 1.	OFF
Cond Service Det Cross Switch	OFF	Simultaneous Gap Group 2.	OFF
Lock Detectors in Red Only.	OFF	Simultaneous Gap Group 3.	OFF

Five Section Left Turn Control

Phases: 5-2 7-4 1-6 3-8 11-10 9-12

Left Turn Head.
-------------------------	---	---	---	---	---	---

Detector Type/Timers

Det.	Locking	Log	Timers		Don't Reset	Type
	Memory	Enable	Extend	Delay	Extend	
1	NO	NO	0.0	0	.	1 - Extend/Delay
2	NO	NO	0.0	0	.	1 - Extend/Delay
3	NO	NO	0.0	0	.	1 - Extend/Delay
4	NO	NO	0.0	7	.	1 - Extend/Delay
5	NO	NO	0.0	0	.	1 - Extend/Delay
6	NO	NO	0.0	0	.	1 - Extend/Delay
7	NO	NO	0.0	0	.	1 - Extend/Delay
8	NO	NO	0.0	7	.	1 - Extend/Delay
9	NO	NO	0.0	0	.	0 - Normal
10	NO	NO	0.0	0	.	0 - Normal
11	NO	NO	0.0	0	.	0 - Normal
12	NO	NO	0.0	0	.	0 - Normal
13	NO	NO	0.0	0	.	0 - Normal
14	NO	NO	0.0	0	.	0 - Normal
15	NO	NO	0.0	0	.	0 - Normal
16	NO	NO	0.0	0	.	0 - Normal
17	NO	NO	0.0	0	.	0 - Normal
18	NO	NO	0.0	0	.	0 - Normal
19	NO	NO	0.0	0	.	0 - Normal
20	NO	NO	0.0	0	.	0 - Normal
21	NO	NO	0.0	0	.	0 - Normal
22	NO	NO	0.0	0	.	0 - Normal
23	NO	NO	0.0	0	.	0 - Normal
24	NO	NO	0.0	0	.	0 - Normal
25	NO	NO	0.0	0	.	0 - Normal
26	NO	NO	0.0	0	.	0 - Normal
27	NO	NO	0.0	0	.	0 - Normal
28	NO	NO	0.0	0	.	0 - Normal
29	NO	NO	0.0	0	.	0 - Normal
30	NO	NO	0.0	0	.	0 - Normal
31	NO	NO	0.0	0	.	0 - Normal
32	NO	NO	0.0	0	.	0 - Normal

Detector Names

Det 1: Detector 1	Det 17: Detector 17
Det 2: Detector 2	Det 18: Detector 18
Det 3: Detector 3	Det 19: Detector 19
Det 4: Detector 4	Det 20: Detector 20
Det 5: Detector 5	Det 21: Detector 21
Det 6: Detector 6	Det 22: Detector 22
Det 7: Detector 7	Det 23: Detector 23
Det 8: Detector 8	Det 24: Detector 24
Det 9: Detector 9	Det 25: Detector 25
Det 10: Detector 10	Det 26: Detector 26
Det 11: Detector 11	Det 27: Detector 27
Det 12: Detector 12	Det 28: Detector 28
Det 13: Detector 13	Det 29: Detector 29
Det 14: Detector 14	Det 30: Detector 30
Det 15: Detector 15	Det 31: Detector 31
Det 16: Detector 16	Det 32: Detector 32

Detector Type/Timers

```

-----
33    NO      NO      0.0    0      .      0 - Normal
34    NO      NO      0.0    0      .      0 - Normal
35    NO      NO      0.0    0      .      0 - Normal
36    NO      NO      0.0    0      .      0 - Normal
37    NO      NO      0.0    0      .      0 - Normal
38    NO      NO      0.0    0      .      0 - Normal
39    NO      NO      0.0    0      .      0 - Normal
40    NO      NO      0.0    0      .      0 - Normal
41    NO      NO      0.0    0      .      0 - Normal
42    NO      NO      0.0    0      .      0 - Normal
43    NO      NO      0.0    0      .      0 - Normal
44    NO      NO      0.0    0      .      0 - Normal
45    NO      NO      0.0    0      .      0 - Normal
46    NO      NO      0.0    0      .      0 - Normal
47    NO      NO      0.0    0      .      0 - Normal
48    NO      NO      0.0    0      .      0 - Normal
49    NO      NO      0.0    0      .      0 - Normal
50    NO      NO      0.0    0      .      0 - Normal
51    NO      NO      0.0    0      .      0 - Normal
52    NO      NO      0.0    0      .      0 - Normal
53    NO      NO      0.0    0      .      0 - Normal
54    NO      NO      0.0    0      .      0 - Normal
55    NO      NO      0.0    0      .      0 - Normal
56    NO      NO      0.0    0      .      0 - Normal
57    NO      NO      0.0    0      .      0 - Normal
58    NO      NO      0.0    0      .      0 - Normal
59    NO      NO      0.0    0      .      0 - Normal
60    NO      NO      0.0    0      .      0 - Normal
61    NO      NO      0.0    0      .      0 - Normal
62    NO      NO      0.0    0      .      0 - Normal
63    NO      NO      0.0    0      .      0 - Normal
64    NO      NO      0.0    0      .      0 - Normal

```

Detector Names

```

Det 33: Detector 33
Det 34: Detector 34
Det 35: Detector 35
Det 36: Detector 36
Det 37: Detector 37
Det 38: Detector 38
Det 39: Detector 39
Det 40: Detector 40
Det 41: Detector 41
Det 42: Detector 42
Det 43: Detector 43
Det 44: Detector 44
Det 45: Detector 45
Det 46: Detector 46
Det 47: Detector 47
Det 48: Detector 48
Det 49: Detector 49
Det 50: Detector 50
Det 51: Detector 51
Det 52: Detector 52
Det 53: Detector 53
Det 54: Detector 54
Det 55: Detector 55
Det 56: Detector 56
Det 57: Detector 57
Det 58: Detector 58
Det 59: Detector 59
Det 60: Detector 60
Det 61: Detector 61
Det 62: Detector 62
Det 63: Detector 63
Det 64: Detector 64

```


Ped/SD Local Assign,Log Interval

	Phase Ped Detector											
	1	2	3	4	5	6	7	8	9	10	11	12
Is Ped Detector No. . . .	1	2	3	4	5	6	7	8	9	10	11	12

	*Local System Detector No.															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Is Local Detector No. . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Detector Log Interval . . 0

*NOTE: System master designations cross referenced to local system detector numbers are:

- SDA1 = 1 & 9
- SDA2 = 2 & 10
- SDB1 = 3 & 11
- SDB2 = 4 & 12
- SDC1 = 5 & 13
- SDC2 = 6 & 14
- SDD1 = 7 & 15
- SDD2 = 8 & 16

Diagnostic Plans/Fail Action

Plan		Detector															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Plan		Detector															
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*NOTE: 0 = No Action, 1 = Min Recall, 2 = Max Recall in Effect
 3 = Detector Fail Max Time from By-Phase Timing Data

Diagnostic Plans/Fail Action

Plan		Detector															
		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Plan		Detector															
		49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

*NOTE: 0 = No Action, 1 = Min Recall, 2 = Max Recall in Effect
 3 = Detector Fail Max Time from By-Phase Timing Data

Detector Diagnostic Intervals

```
-----
```

Diagnostic Number	*No-Activity Diagnostic Interval	*Max Presence Diagnostic Interval	Erratic Counts
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0

*NOTE: Scaling is specified in each detector diagnostic plan.

Speed Detectors

	Local Speed Detector							
One Detector Speed:	1	2	3	4	5	6	7	8
Local Detector Number.	0	0	0	0	0	0	0	0
Vehicle Length	0	0	0	0	0	0	0	0
Loop Length.	0	0	0	0	0	0	0	0
Two Detector Speed:								
Local Detector Number.	0	0	0	0	0	0	0	0
Speed Trap Length.	0	0	0	0	0	0	0	0

	Local Speed Detector							
One Detector Speed:	9	10	11	12	13	14	15	16
Local Detector Number.	0	0	0	0	0	0	0	0
Vehicle Length	0	0	0	0	0	0	0	0
Loop Length.	0	0	0	0	0	0	0	0
Two Detector Speed:								
Local Detector Number.	0	0	0	0	0	0	0	0
Speed Trap Length.	0	0	0	0	0	0	0	0

Units. Inches

NOTE: Speed Detector 1 = STA, Speed Detector 2 = STB

Coordinator Manual Command and Options

```

-----
Manual Enable . . . . . Pattern . . . . . 0

Split Units . . . . . Percent          OffsetUnits . . . . . Percent
Interconnect Format . STD              Interconnect Source . NIC
Transition. . . . . SMOOTH             Dwell Period. . . . . 0
Resync Count. . . . . 0

```

```

Actuated Coord Phase . . . . . Actuated Walk Rest . . . . .
Inhibit Max Timing . . . . . Max 2 Select . . . . .
Floating Force Off . . . . . Multisync. . . . .

```

Split Demand: Call	Time	Cyc	Count	Phase												
				1	2	3	4	5	6	7	8	9	10	11	12	
Demand 1 . .	0		0	.	.	.	.	.	.	.	.	.	.	.	.	.
Demand 2 . .	0		0	.	.	.	.	.	.	.	.	.	.	.	.	.

Auto Permissive Min Green .	Phase											
	1	2	3	4	5	6	7	8	9	10	11	12
	0	0	0	0	0	0	0	0	0	0	0	0

Free Alternate Sequence . .	A	B	C	D	E	F
	

Coordination Patterns

NIC/TOD Clock/Calendar

Manual NIC Program Step 0

Manual TOD Program Step 0

NIC Resync Time 0000

Sync Reference is Reference Time

Week 1 Begins on 1st Sunday NO If NO, then week containing Jan. 1

Disable Daylight Savings Time NO

Daylight Savings
Begins Last Sunday in March NO If NO, then Second Sunday as per 2007 DST Law

TOD Weekly/Yearly

	Weekly Program Numbers										
	1	2	3	4	5	6	7	8	9	10	
Sunday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Monday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Tuesday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Wednesday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Thursday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Friday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Saturday . .	1	1	1	1	1	1	1	1	1	1	Program No.

	Week of Year																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prog	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Prog	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	

Holiday Programs

Holiday	Type	Month	Day of Week/ Day of Month	Week of Year/ Year	Program
1	Fixed	0	0	0	0
2	Fixed	0	0	0	0
3	Fixed	0	0	0	0
4	Fixed	0	0	0	0
5	Fixed	0	0	0	0
6	Fixed	0	0	0	0
7	Fixed	0	0	0	0
8	Fixed	0	0	0	0
9	Fixed	0	0	0	0
10	Fixed	0	0	0	0
11	Fixed	0	0	0	0
12	Fixed	0	0	0	0
13	Fixed	0	0	0	0
14	Fixed	0	0	0	0
15	Fixed	0	0	0	0
16	Fixed	0	0	0	0
17	Fixed	0	0	0	0
18	Fixed	0	0	0	0
19	Fixed	0	0	0	0
20	Fixed	0	0	0	0
21	Fixed	0	0	0	0
22	Fixed	0	0	0	0
23	Fixed	0	0	0	0
24	Fixed	0	0	0	0
25	Fixed	0	0	0	0
26	Fixed	0	0	0	0
27	Fixed	0	0	0	0
28	Fixed	0	0	0	0
29	Fixed	0	0	0	0
30	Fixed	0	0	0	0
31	Fixed	0	0	0	0
32	Fixed	0	0	0	0
33	Fixed	0	0	0	0
34	Fixed	0	0	0	0
35	Fixed	0	0	0	0
36	Fixed	0	0	0	0

NIC Program Steps

Step	Program	Step Begins	Pattern	Override
------	---------	-------------	---------	----------

TOD Program Steps

Configuration

```

-----
                Controller Sequence Priority
                1     2     3     4     5     6     7     8     9     10    11    12
Ring 1 Phases . . 1     2   | 3     4   | 9    10   | 0     0     0     0     0     0
Ring 2 Phases . . 5     6   | 7     8   |11    12   | 0     0     0     0     0     0

                Phase
                1     2     3     4     5     6     7     8     9     10    11    12
In Use. . . . . X     X     .     .     .     X     .     X     .     .     .     .
Exclusive Ped . . . . . .     .     .     .     .     .     .     .     .     .     .     .
Direction . . . . .

                Overlap
                A     B     C     D
Direction . . .
    
```

Load Switch Channel/Driver Group Assign (Info Only):

Load Switch (MMU) Channel	Driver Phase/Ovlap	Signal Group Ped
1	3	.
2	2	.
3	3	.
4	4	.
5	5	.
6	6	.
7	7	.
8	8	.
9	2	X
10	4	X
11	6	X
12	8	X
13	A	.
14	B	.
15	C	.
16	D	.

Configuration Continued

Event Enabling	Alarm Enabling
Critical RFE'S (MMU/TF) X	ALARM 1 X
Non-Critical RFE'S (DET/TEST) . . X	ALARM 2 X
Detector Errors X	ALARM 3 X
Coordination Errors X	ALARM 4
MMU Flash Faults. X	ALARM 5
Local Flash Faults. X	ALARM 6
Preempt X	ALARM 7
Power On/Off. X	ALARM 8
Low Battery X	ALARM 9
	ALARM 10.
	ALARM 11.
	ALARM 12.
	ALARM 13.
	ALARM 14.
	ALARM 15.
	ALARM 16.

Supervisor Access Code. . . ****
 Data Change Access Code . . ****

MMU Compatibility Program (Info Only)

Channel	Is Allowed to Time With Channel														
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
1
2
3
4
5
6
7
8
9
10.
11.
12.
13.
14.
15.

Version Info:		
Software Assy.	Part No.	Version
Boot	27831	2.83
Program	45561	7.9
Application		. 3
Help	27891	6.23
Configuration	27908	C000r

Ped Carryover

Ped Start Phase	Carry Over Phase
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0

Power Start, Remote Flash

	Phase															
	1	2	3	4	5	6	7	8	9	10	11	12				
Power Start.	X	.	.	.	X	.	.	.	.	.	.
External Start	X	.	.	.	X	.	.	.	.	.	.
Into Remote Flash.	X	.	.	.	X	.	.	.	.	.	.
Exit Remote Flash.	X	.	.	.	X	.	.	.	.	.	.	Overlap			
Remote Flash Yellow.	A	B	C	D
Flash Together	X	.	X	.	X	.	X	.	X	.	X	.	X	.	X

Initialization Interval:

Power Start Yellow
 External Start. Yellow

Power Start All Red Time. 0
 Power Start Flash Time. 0

Remote Flash Options:

Out of Flash Yellow NO
 Out of Flash All Red. NO
 Minimum Recall. NO
 Alternate Flash NO
 Flash Thru Load Switches. NO
 Cycle Through Phases. NO

Option Data

	Phase											
	1	2	3	4	5	6	7	8	9	10	11	12
Guaranteed Passage
Call To NonActuated 1	X	.	.	.	X	.	.	.	.	.	.
Call To NonActuated 2	X	.	.	.	X	.	.	.	.
Dual Entry.	X	.	X	.	X	.	X	.	X	.	X
Conditional Service	X	.	X	.	X	.	X	.	X	.	X	.
Conditional Reservice
Actuated Rest in Walk
Flashing Walk

Enable Programmable Options

Dual Entry.	OFF	Backup Protection Group 1	OFF
Conditional Service	OFF	Backup Protection Group 2	OFF
Ped Clearance Protection.	OFF	Backup Protection Group 3	OFF
Special Preempt Overlap Flash	OFF	Simultaneous Gap Group 1.	OFF
Cond Service Det Cross Switch	OFF	Simultaneous Gap Group 2.	OFF
Lock Detectors in Red Only.	OFF	Simultaneous Gap Group 3.	OFF

Five Section Left Turn Control

Phases: 5-2 7-4 1-6 3-8 11-10 9-12

Left Turn Head.
-------------------------	---	---	---	---	---	---

Detector Type/Timers

Det.	Locking	Log	Timers		Don't	Reset	Type
	Memory	Enable	Extend	Delay	Extend		
1	NO	NO	0.0	0	.	0	- Normal
2	NO	NO	0.0	0	.	0	- Normal
3	NO	NO	0.0	0	.	0	- Normal
4	NO	NO	0.0	7	.	1	- Extend/Delay
5	NO	NO	0.0	0	.	0	- Normal
6	NO	NO	0.0	0	.	0	- Normal
7	NO	NO	0.0	0	.	0	- Normal
8	NO	NO	0.0	5	.	1	- Extend/Delay
9	NO	NO	0.0	0	.	0	- Normal
10	NO	NO	0.0	0	.	0	- Normal
11	NO	NO	0.0	0	.	0	- Normal
12	NO	NO	0.0	0	.	0	- Normal
13	NO	NO	0.0	0	.	0	- Normal
14	NO	NO	0.0	0	.	0	- Normal
15	NO	NO	0.0	0	.	0	- Normal
16	NO	NO	0.0	0	.	0	- Normal
17	NO	NO	0.0	0	.	0	- Normal
18	NO	NO	0.0	0	.	0	- Normal
19	NO	NO	0.0	0	.	0	- Normal
20	NO	NO	0.0	0	.	0	- Normal
21	NO	NO	0.0	0	.	0	- Normal
22	NO	NO	0.0	0	.	0	- Normal
23	NO	NO	0.0	0	.	0	- Normal
24	NO	NO	0.0	0	.	0	- Normal
25	NO	NO	0.0	0	.	0	- Normal
26	NO	NO	0.0	0	.	0	- Normal
27	NO	NO	0.0	0	.	0	- Normal
28	NO	NO	0.0	0	.	0	- Normal
29	NO	NO	0.0	0	.	0	- Normal
30	NO	NO	0.0	0	.	0	- Normal
31	NO	NO	0.0	0	.	0	- Normal
32	NO	NO	0.0	0	.	0	- Normal

Detector Names

Det 1: Detector 1	Det 17: Detector 17
Det 2: Detector 2	Det 18: Detector 18
Det 3: Detector 3	Det 19: Detector 19
Det 4: Detector 4	Det 20: Detector 20
Det 5: Detector 5	Det 21: Detector 21
Det 6: Detector 6	Det 22: Detector 22
Det 7: Detector 7	Det 23: Detector 23
Det 8: Detector 8	Det 24: Detector 24
Det 9: Detector 9	Det 25: Detector 25
Det 10: Detector 10	Det 26: Detector 26
Det 11: Detector 11	Det 27: Detector 27
Det 12: Detector 12	Det 28: Detector 28
Det 13: Detector 13	Det 29: Detector 29
Det 14: Detector 14	Det 30: Detector 30
Det 15: Detector 15	Det 31: Detector 31
Det 16: Detector 16	Det 32: Detector 32

Detector Type/Timers

```

-----
33    NO      NO      0.0    0      .      0 - Normal
34    NO      NO      0.0    0      .      0 - Normal
35    NO      NO      0.0    0      .      0 - Normal
36    NO      NO      0.0    0      .      0 - Normal
37    NO      NO      0.0    0      .      0 - Normal
38    NO      NO      0.0    0      .      0 - Normal
39    NO      NO      0.0    0      .      0 - Normal
40    NO      NO      0.0    0      .      0 - Normal
41    NO      NO      0.0    0      .      0 - Normal
42    NO      NO      0.0    0      .      0 - Normal
43    NO      NO      0.0    0      .      0 - Normal
44    NO      NO      0.0    0      .      0 - Normal
45    NO      NO      0.0    0      .      0 - Normal
46    NO      NO      0.0    0      .      0 - Normal
47    NO      NO      0.0    0      .      0 - Normal
48    NO      NO      0.0    0      .      0 - Normal
49    NO      NO      0.0    0      .      0 - Normal
50    NO      NO      0.0    0      .      0 - Normal
51    NO      NO      0.0    0      .      0 - Normal
52    NO      NO      0.0    0      .      0 - Normal
53    NO      NO      0.0    0      .      0 - Normal
54    NO      NO      0.0    0      .      0 - Normal
55    NO      NO      0.0    0      .      0 - Normal
56    NO      NO      0.0    0      .      0 - Normal
57    NO      NO      0.0    0      .      0 - Normal
58    NO      NO      0.0    0      .      0 - Normal
59    NO      NO      0.0    0      .      0 - Normal
60    NO      NO      0.0    0      .      0 - Normal
61    NO      NO      0.0    0      .      0 - Normal
62    NO      NO      0.0    0      .      0 - Normal
63    NO      NO      0.0    0      .      0 - Normal
64    NO      NO      0.0    0      .      0 - Normal

```

Detector Names

```

Det 33: Detector 33
Det 34: Detector 34
Det 35: Detector 35
Det 36: Detector 36
Det 37: Detector 37
Det 38: Detector 38
Det 39: Detector 39
Det 40: Detector 40
Det 41: Detector 41
Det 42: Detector 42
Det 43: Detector 43
Det 44: Detector 44
Det 45: Detector 45
Det 46: Detector 46
Det 47: Detector 47
Det 48: Detector 48
Det 49: Detector 49
Det 50: Detector 50
Det 51: Detector 51
Det 52: Detector 52
Det 53: Detector 53
Det 54: Detector 54
Det 55: Detector 55
Det 56: Detector 56
Det 57: Detector 57
Det 58: Detector 58
Det 59: Detector 59
Det 60: Detector 60
Det 61: Detector 61
Det 62: Detector 62
Det 63: Detector 63
Det 64: Detector 64

```


Ped/SD Local Assign,Log Interval

	Phase Ped Detector											
	1	2	3	4	5	6	7	8	9	10	11	12
Is Ped Detector No. . . .	1	2	3	4	5	6	7	8	9	10	11	12

	*Local System Detector No.															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Is Local Detector No. . .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Detector Log Interval . . 0

*NOTE: System master designations cross referenced to local system detector numbers are:

- SDA1 = 1 & 9
- SDA2 = 2 & 10
- SDB1 = 3 & 11
- SDB2 = 4 & 12
- SDC1 = 5 & 13
- SDC2 = 6 & 14
- SDD1 = 7 & 15
- SDD2 = 8 & 16

Diagnostic Plans/Fail Action

Plan		Detector															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Plan		Detector															
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*NOTE: 0 = No Action, 1 = Min Recall, 2 = Max Recall in Effect
 3 = Detector Fail Max Time from By-Phase Timing Data

Diagnostic Plans/Fail Action

Plan		Detector															
		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Plan		Detector															
		49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
1	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
3	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
7	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8	Diagnostic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Scaling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	*Fail Action	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

*NOTE: 0 = No Action, 1 = Min Recall, 2 = Max Recall in Effect
 3 = Detector Fail Max Time from By-Phase Timing Data

Detector Diagnostic Intervals

Diagnostic Number	*No-Activity Diagnostic Interval	*Max Presence Diagnostic Interval	Erratic Counts
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0

*NOTE: Scaling is specified in each detector diagnostic plan.

Speed Detectors

	Local Speed Detector							
One Detector Speed:	1	2	3	4	5	6	7	8
Local Detector Number.	0	0	0	0	0	0	0	0
Vehicle Length	0	0	0	0	0	0	0	0
Loop Length.	0	0	0	0	0	0	0	0
Two Detector Speed:								
Local Detector Number.	0	0	0	0	0	0	0	0
Speed Trap Length.	0	0	0	0	0	0	0	0

	Local Speed Detector							
One Detector Speed:	9	10	11	12	13	14	15	16
Local Detector Number.	0	0	0	0	0	0	0	0
Vehicle Length	0	0	0	0	0	0	0	0
Loop Length.	0	0	0	0	0	0	0	0
Two Detector Speed:								
Local Detector Number.	0	0	0	0	0	0	0	0
Speed Trap Length.	0	0	0	0	0	0	0	0

Units. Inches

NOTE: Speed Detector 1 = STA, Speed Detector 2 = STB

Coordinator Manual Command and Options

```

-----
Manual Enable . . . . . Pattern . . . . . 0

Split Units . . . . . Percent          OffsetUnits . . . . . Percent
Interconnect Format . STD              Interconnect Source . NIC
Transition. . . . . SMOOTH            Dwell Period. . . . . 0
Resync Count. . . . . 0

```

```

Actuated Coord Phase . . . . . Actuated Walk Rest . . . . .
Inhibit Max Timing . . . . . Max 2 Select . . . . .
Floating Force Off . . . . . Multisync. . . . .

```

Split Demand: Call	Time	Cyc	Count	Phase												
				1	2	3	4	5	6	7	8	9	10	11	12	
Demand 1	0		0	.	.	.	.	.	.	.	.	.	.	.	.	.
Demand 2	0		0	.	.	.	.	.	.	.	.	.	.	.	.	.

Auto Permissive Min Green .	Phase											
	1	2	3	4	5	6	7	8	9	10	11	12
	0	0	0	0	0	0	0	0	0	0	0	0

Free Alternate Sequence . .	Phase					
	A	B	C	D	E	F

Coordination Patterns

Preemptors

Preemptor 1

Active Det Lock. Ped Dark
Priority Preemption. Yel-Red To Grn. Ped Active
Outputs Only During Hold Flash All Outputs Zero Ped Clr Time.
Terminate Overlap ASAP Terminate Phases. Ped Clr Thru Yel
Don't Override Flash Duration Time. 0
Flash During Hold. Delay Time 0
No CVM in Flash. Inhibit Time 0
Fast Flash Grn on Hold Phase. Min Ped Clear. 0
Enable Max Time. Max Time 0
Exit Max 0
Min Hold Time. 0
Hold Delay Time. 0

	Green	Yellow	Red
Minimum	0	0.0	0.0
Track Clear	0	0.0	0.0
Hold.		0.0	0.0

	Phase/Overlap	1	2	3	4	5	6	7	8	9	10	11	12/	A	B	C	D
Terminate Overlap																	
Track Clearance Phase																	
Hold Phases																	
Exit Phases																	
Exit Calls on Phase																	

Out of Flash Color for Exit Phases Green

Preemptor 2

Active Det Lock. Ped Dark
Priority Preemption. Yel-Red To Grn. Ped Active
Outputs Only During Hold Flash All Outputs Zero Ped Clr Time.
Terminate Overlap ASAP Terminate Phases. Ped Clr Thru Yel
Don't Override Flash Duration Time. 0
Flash During Hold. Delay Time 0
No CVM in Flash. Inhibit Time 0
Fast Flash Grn on Hold Phase. Min Ped Clear. 0
Enable Max Time. Max Time 0
Exit Max 0
Min Hold Time. 0
Hold Delay Time. 0

	Green	Yellow	Red
Minimum	0	0.0	0.0
Track Clear	0	0.0	0.0
Hold.		0.0	0.0

	Phase/Overlap	1	2	3	4	5	6	7	8	9	10	11	12/	A	B	C	D
Terminate Overlap																	
Track Clearance Phase																	
Hold Phases																	
Exit Phases																	
Exit Calls on Phase																	

Out of Flash Color for Exit Phases Green

Linked Preemptor 0

NIC/TOD Clock/Calendar

Manual NIC Program Step 0

Manual TOD Program Step 0

NIC Resync Time 0000

Sync Reference is Reference Time

Week 1 Begins on 1st Sunday NO If NO, then week containing Jan. 1

Disable Daylight Savings Time NO

Daylight Savings
Begins Last Sunday in March NO If NO, then Second Sunday as per 2007 DST Law

TOD Weekly/Yearly

	Weekly Program Numbers										
	1	2	3	4	5	6	7	8	9	10	
Sunday . . .	2	1	1	1	1	1	1	1	1	1	Program No.
Monday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Tuesday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Wednesday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Thursday . .	1	1	1	1	1	1	1	1	1	1	Program No.
Friday . . .	1	1	1	1	1	1	1	1	1	1	Program No.
Saturday . .	2	1	1	1	1	1	1	1	1	1	Program No.

	Week of Year																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Prog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prog	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Prog	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	

Holiday Programs

Holiday	Type	Month	Day of Week/ Day of Month	Week of Year/ Year	Program
1	Fixed	0	0	0	0
2	Fixed	0	0	0	0
3	Fixed	0	0	0	0
4	Fixed	0	0	0	0
5	Fixed	0	0	0	0
6	Fixed	0	0	0	0
7	Fixed	0	0	0	0
8	Fixed	0	0	0	0
9	Fixed	0	0	0	0
10	Fixed	0	0	0	0
11	Fixed	0	0	0	0
12	Fixed	0	0	0	0
13	Fixed	0	0	0	0
14	Fixed	0	0	0	0
15	Fixed	0	0	0	0
16	Fixed	0	0	0	0
17	Fixed	0	0	0	0
18	Fixed	0	0	0	0
19	Fixed	0	0	0	0
20	Fixed	0	0	0	0
21	Fixed	0	0	0	0
22	Fixed	0	0	0	0
23	Fixed	0	0	0	0
24	Fixed	0	0	0	0
25	Fixed	0	0	0	0
26	Fixed	0	0	0	0
27	Fixed	0	0	0	0
28	Fixed	0	0	0	0
29	Fixed	0	0	0	0
30	Fixed	0	0	0	0
31	Fixed	0	0	0	0
32	Fixed	0	0	0	0
33	Fixed	0	0	0	0
34	Fixed	0	0	0	0
35	Fixed	0	0	0	0
36	Fixed	0	0	0	0

NIC Program Steps

Step	Program	Step Begins	Pattern	Override
------	---------	-------------	---------	----------

Appendix E

Level of Service Definitions

Level of Service Definitions

Signalized Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Extremely favourable progression with most vehicles arriving during the green phase. Most vehicles do not stop and short cycle lengths may contribute to low delay.
B	> 10 and ≤ 20	VERY GOOD. Very good progression and/or short cycle lengths with slightly more vehicles stopping than LOS "A" causing slightly higher levels of average delay.
C	> 20 and ≤ 35	GOOD. Fair progression and longer cycle lengths lead to a greater number of vehicles stopping than LOS "B".
D	> 35 and ≤ 55	FAIR. Congestion becomes noticeable with higher average delays resulting from a combination of long cycle lengths, high volume-to-capacity ratios and unfavourable progression.
E	> 55 and ≤ 80	POOR. Lengthy delays values are indicative of poor progression, long cycle lengths and high volume-to-capacity ratios. Individual cycle failures are common with individual movement failures also common.
F	> 80	UNSATISFACTORY. Indicative of oversaturated conditions with vehicular demand greater than the capacity of the intersection.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

Appendix F

Peak Hour Factor Calculations

Peak Hour Factor Calculation from TMC Reports

Intersection	AM			PM		
	Peak 15 Min	Peak 60 Min	PHF	Peak 15 Min	Peak 60 Min	PHF
Brock Road South at McLean Road	421	1490	0.88	410	1552	0.95
Brock Road South at Nicholas Beaver Road	431	1582	0.92	465	1621	0.87

Appendix G

2023 Existing Synchro and SimTraffic Reports

Lanes, Volumes, Timings

1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

EX AM

08/08/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	17	108	27	2	12	91	435	39	36	692	26
Future Volume (vph)	5	17	108	27	2	12	91	435	39	36	692	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.98		0.99								
Frt		0.870			0.869				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1289	1141	0	1107	1106	0	1180	3167	1468	1626	3282	1615
Flt Permitted	0.747			0.537			0.257			0.471		
Satd. Flow (perm)	1014	1141	0	622	1106	0	319	3167	1468	806	3282	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		123			14				109			109
Link Speed (k/h)		60			50			70				70
Link Distance (m)		130.5			239.4			456.3				124.5
Travel Time (s)		7.8			17.2			23.5				6.4
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	0%
Adj. Flow (vph)	6	19	123	31	2	14	103	494	44	41	786	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	6	142	0	31	16	0	103	494	44	41	786	30
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0				6.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

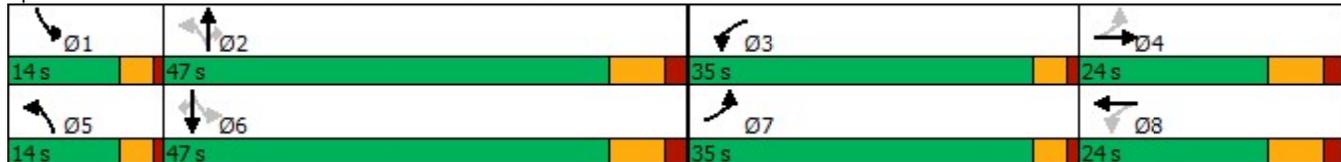


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	22.8	15.1		26.2	21.0		56.8	48.2	48.2	53.0	42.0	42.0
Actuated g/C Ratio	0.25	0.16		0.28	0.23		0.61	0.52	0.52	0.57	0.45	0.45
v/c Ratio	0.02	0.49		0.14	0.06		0.37	0.30	0.05	0.08	0.53	0.04
Control Delay	22.2	16.1		24.1	16.7		12.5	15.8	0.1	9.0	21.2	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	16.1		24.1	16.7		12.5	15.8	0.1	9.0	21.2	0.1
LOS	C	B		C	B		B	B	A	A	C	A
Approach Delay		16.4			21.6			14.2			19.9	
Approach LOS		B			C			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	92.5
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.53
Intersection Signal Delay:	17.5
Intersection LOS:	B
Intersection Capacity Utilization:	75.0%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

EX AM
08/08/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	115	88	474	88	147	670
Future Volume (vph)	115	88	474	88	147	670
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			0.99		1.00	
Frt		0.850	0.976			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1480	1357	2873	0	1703	3034
Flt Permitted	0.950				0.376	
Satd. Flow (perm)	1480	1357	2873	0	672	3034
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		96	23			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				3	3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Adj. Flow (vph)	125	96	515	96	160	728
Shared Lane Traffic (%)						
Lane Group Flow (vph)	125	96	611	0	160	728
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

EX AM
08/08/2023

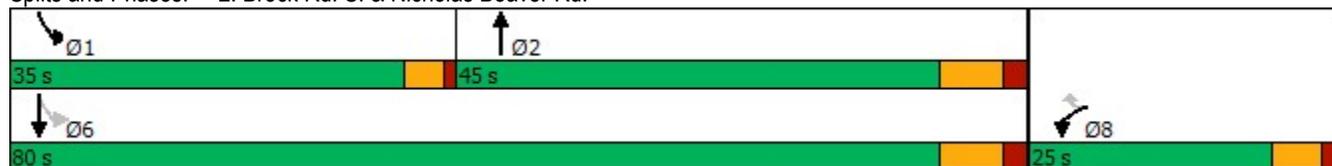


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.5	16.5	58.7		76.5	73.5
Actuated g/C Ratio	0.16	0.16	0.57		0.74	0.71
v/c Ratio	0.53	0.32	0.37		0.26	0.34
Control Delay	48.2	10.9	12.7		5.1	6.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.2	10.9	12.7		5.1	6.2
LOS	D	B	B		A	A
Approach Delay	32.0		12.7			6.0
Approach LOS	C		B			A

Intersection Summary

Area Type: Other
 Cycle Length: 105
 Actuated Cycle Length: 103
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.53
 Intersection Signal Delay: 11.7
 Intersection Capacity Utilization 64.2%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	7.9	40.7	32.7	18.1	58.6	35.0	37.1	15.0	22.5	61.6	41.1	9.6
Average Queue (m)	0.6	17.1	8.2	2.9	25.3	15.0	16.0	3.4	6.6	32.0	16.8	2.4
95th Queue (m)	4.5	33.0	23.0	11.8	50.7	29.3	32.5	11.0	17.6	53.0	36.3	8.4
Link Distance (m)		103.4		220.8		433.7	433.7			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		0								0		
Queuing Penalty (veh)		0								0		

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	64.4	27.5	51.7	39.5	34.0	48.8	50.4
Average Queue (m)	29.4	12.2	22.8	14.3	18.8	17.8	24.4
95th Queue (m)	56.2	22.8	43.9	30.5	33.3	41.2	46.0
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1				8	3	
Queuing Penalty (veh)	1				26	5	

Network Summary

Network wide Queuing Penalty: 32

Lanes, Volumes, Timings

1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

EX PM

08/04/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	4	89	53	19	31	132	698	15	10	452	15
Future Volume (vph)	34	4	89	53	19	31	132	698	15	10	452	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99		1.00			1.00					0.98
Frt		0.856			0.907				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1263	0	1347	1515	0	1626	3471	1272	1203	3374	1272
Flt Permitted	0.722			0.560			0.430			0.372		
Satd. Flow (perm)	1294	1263	0	792	1515	0	735	3471	1272	471	3374	1240
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		94			33				109			109
Link Speed (k/h)		60			50			70			70	
Link Distance (m)		130.5			239.4			456.3			124.5	
Travel Time (s)		7.8			17.2			23.5			6.4	
Confl. Peds. (#/hr)			1	1			1					1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
Adj. Flow (vph)	36	4	94	56	20	33	139	735	16	11	476	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	36	98	0	56	53	0	139	735	16	11	476	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0			6.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

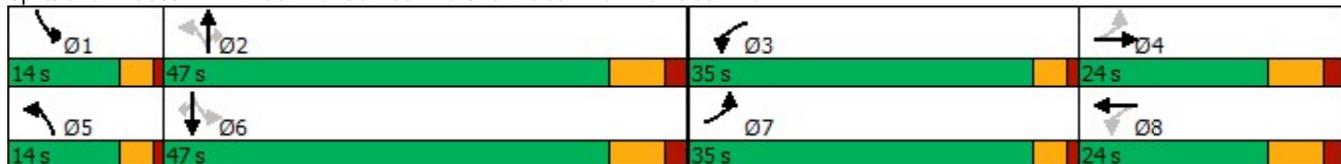


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	22.7	15.2		25.9	18.9		60.4	57.3	57.3	55.4	44.3	44.3
Actuated g/C Ratio	0.24	0.16		0.28	0.20		0.65	0.62	0.62	0.60	0.48	0.48
v/c Ratio	0.10	0.34		0.20	0.16		0.24	0.34	0.02	0.03	0.30	0.02
Control Delay	22.9	12.8		24.4	19.4		10.4	13.9	0.1	9.5	18.8	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	12.8		24.4	19.4		10.4	13.9	0.1	9.5	18.8	0.1
LOS	C	B		C	B		B	B	A	A	B	A
Approach Delay		15.5			22.0			13.1			18.0	
Approach LOS		B			C			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	93
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.34
Intersection Signal Delay:	15.4
Intersection LOS:	B
Intersection Capacity Utilization:	68.1%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
 2: Brock Rd. S. & Nicholas Beaver Rd.

EX PM
 08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	131	135	725	24	45	561
Future Volume (vph)	131	135	725	24	45	561
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1656	1524	3324	0	1504	3252
Flt Permitted	0.950				0.275	
Satd. Flow (perm)	1656	1524	3324	0	435	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		155	4			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Adj. Flow (vph)	151	155	833	28	52	645
Shared Lane Traffic (%)						
Lane Group Flow (vph)	151	155	861	0	52	645
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

EX PM
08/04/2023

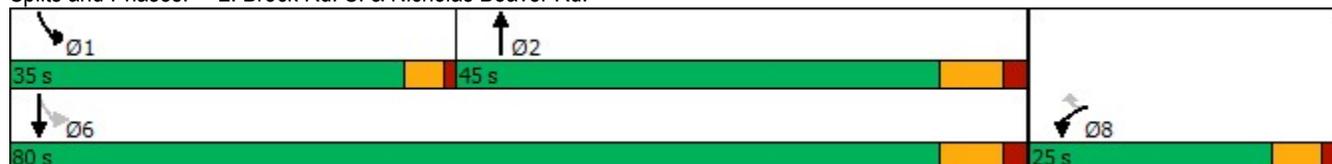


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.9	16.9	63.4		77.7	74.7
Actuated g/C Ratio	0.16	0.16	0.61		0.74	0.71
v/c Ratio	0.57	0.41	0.43		0.12	0.28
Control Delay	48.9	9.6	12.6		4.6	5.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.9	9.6	12.6		4.6	5.8
LOS	D	A	B		A	A
Approach Delay	29.0		12.6			5.8
Approach LOS	C		B			A

Intersection Summary

Area Type: Other
 Cycle Length: 105
 Actuated Cycle Length: 104.6
 Natural Cycle: 80
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 12.7
 Intersection Capacity Utilization 60.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	25.0	28.1	41.3	25.4	47.6	52.2	61.8	15.2	17.7	44.2	33.6	16.5
Average Queue (m)	6.1	10.5	11.9	7.3	18.4	21.4	25.8	1.7	2.6	21.9	9.5	2.0
95th Queue (m)	16.1	21.6	28.2	18.2	36.0	43.4	49.1	8.1	11.7	38.5	24.5	9.7
Link Distance (m)		103.4		220.8		433.7	433.7			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)			0				0					
Queuing Penalty (veh)			0				0					

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

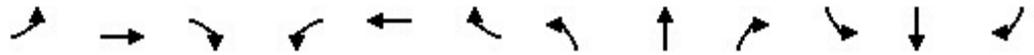
Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	58.9	35.5	49.4	42.9	29.7	41.4	42.6
Average Queue (m)	28.2	14.0	24.6	14.7	8.2	14.5	18.4
95th Queue (m)	51.5	26.8	43.3	33.4	21.2	32.5	38.0
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0	0			1	2	
Queuing Penalty (veh)	0	0			3	1	

Network Summary

Network wide Queuing Penalty: 5

Appendix H

2026 Future Background Synchro and SimTraffic Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	18	111	28	3	13	93	444	40	37	706	27
Future Volume (vph)	6	18	111	28	3	13	93	444	40	37	706	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.98		0.99								
Frt		0.871			0.875				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1289	1143	0	1107	1096	0	1180	3167	1468	1626	3282	1615
Flt Permitted	0.746			0.532			0.250			0.466		
Satd. Flow (perm)	1012	1143	0	616	1096	0	310	3167	1468	798	3282	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		126			15				109			109
Link Speed (k/h)		60			50			70				70
Link Distance (m)		130.5			239.4			456.3				124.5
Travel Time (s)		7.8			17.2			23.5				6.4
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	0%
Adj. Flow (vph)	7	20	126	32	3	15	106	505	45	42	802	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	146	0	32	18	0	106	505	45	42	802	31
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0				6.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

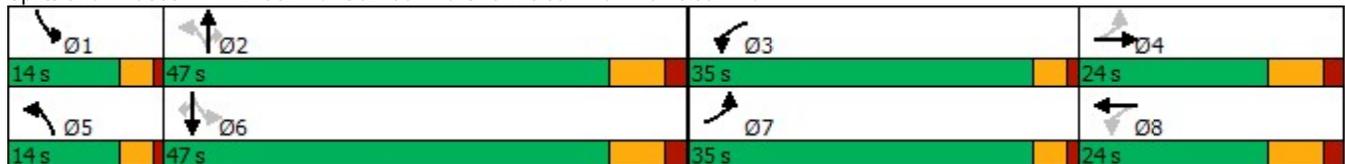


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	22.9	15.2		26.3	21.1		56.7	48.1	48.1	52.8	41.7	41.7
Actuated g/C Ratio	0.25	0.16		0.28	0.23		0.61	0.52	0.52	0.57	0.45	0.45
v/c Ratio	0.03	0.50		0.14	0.07		0.38	0.31	0.06	0.08	0.54	0.04
Control Delay	22.2	16.2		24.1	16.9		12.9	16.0	0.1	9.1	21.5	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	16.2		24.1	16.9		12.9	16.0	0.1	9.1	21.5	0.1
LOS	C	B		C	B		B	B	A	A	C	A
Approach Delay		16.5			21.5			14.4			20.2	
Approach LOS		B			C			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	92.4
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	17.7
Intersection LOS:	B
Intersection Capacity Utilization:	75.0%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
 2: Brock Rd. S. & Nicholas Beaver Rd.

2024 FB AM
 08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	118	90	484	90	150	684
Future Volume (vph)	118	90	484	90	150	684
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			0.99		1.00	
Frt		0.850	0.976			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1480	1357	2873	0	1703	3034
Flt Permitted	0.950				0.369	
Satd. Flow (perm)	1480	1357	2873	0	660	3034
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		98	23			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				3	3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Adj. Flow (vph)	128	98	526	98	163	743
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	98	624	0	163	743
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

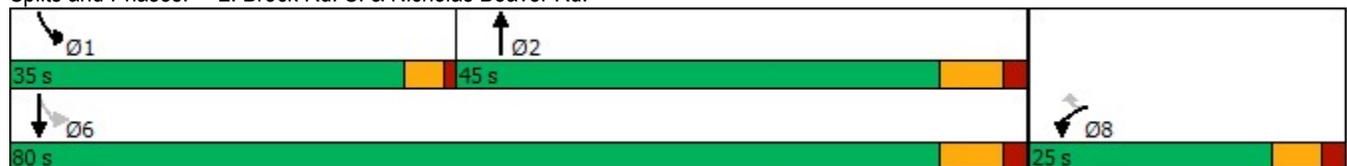


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.6	16.6	58.4		76.3	73.3
Actuated g/C Ratio	0.16	0.16	0.57		0.74	0.71
v/c Ratio	0.54	0.33	0.38		0.27	0.34
Control Delay	48.4	10.8	12.9		5.2	6.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.4	10.8	12.9		5.2	6.3
LOS	D	B	B		A	A
Approach Delay	32.1		12.9			6.1
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	102.9
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	11.9
Intersection LOS:	B
Intersection Capacity Utilization:	64.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	13.6	45.9	29.6	16.9	64.4	37.4	47.7	17.4	22.5	62.4	46.8	11.2
Average Queue (m)	1.6	17.6	8.3	3.8	25.0	14.5	17.1	3.1	5.9	30.3	18.1	2.9
95th Queue (m)	7.8	34.5	21.6	13.0	49.0	29.0	36.1	10.5	16.2	53.1	39.9	9.6
Link Distance (m)		103.4		220.8		433.7	433.7			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		0								0	0	
Queuing Penalty (veh)		0								0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	63.4	50.9	50.9	38.2	34.6	53.6	56.4
Average Queue (m)	27.3	13.3	22.7	12.8	18.2	18.2	24.4
95th Queue (m)	50.8	29.7	41.6	27.8	32.1	43.4	48.9
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			7	3	
Queuing Penalty (veh)	1	0			25	4	

Network Summary

Network wide Queuing Penalty: 30



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	5	91	55	20	32	135	712	16	11	462	16
Future Volume (vph)	35	5	91	55	20	32	135	712	16	11	462	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99		1.00			1.00					0.98
Frt		0.857			0.907				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1265	0	1347	1516	0	1626	3471	1272	1203	3374	1272
Flt Permitted	0.721			0.559			0.423			0.367		
Satd. Flow (perm)	1292	1265	0	791	1516	0	723	3471	1272	465	3374	1240
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		96			34				109			109
Link Speed (k/h)		60			50			70				70
Link Distance (m)		130.5			239.4			456.3				124.5
Travel Time (s)		7.8			17.2			23.5				6.4
Confl. Peds. (#/hr)			1	1			1					1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
Adj. Flow (vph)	37	5	96	58	21	34	142	749	17	12	486	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	37	101	0	58	55	0	142	749	17	12	486	17
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0				6.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

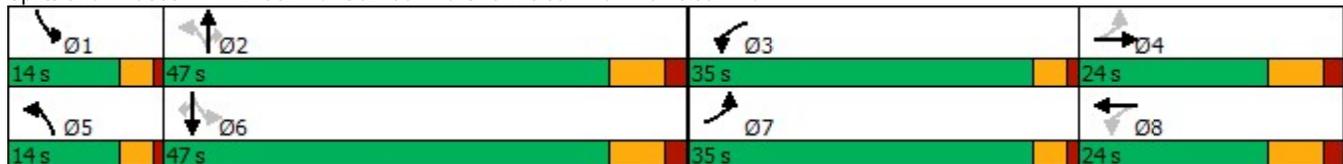


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	22.7	15.2		26.0	18.9		60.2	57.1	57.1	55.2	44.0	44.0
Actuated g/C Ratio	0.24	0.16		0.28	0.20		0.65	0.62	0.62	0.59	0.47	0.47
v/c Ratio	0.10	0.35		0.20	0.16		0.25	0.35	0.02	0.04	0.30	0.03
Control Delay	22.9	13.0		24.4	19.4		10.5	14.0	0.1	9.6	19.0	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	13.0		24.4	19.4		10.5	14.0	0.1	9.6	19.0	0.1
LOS	C	B		C	B		B	B	A	A	B	A
Approach Delay		15.6			22.0			13.2			18.1	
Approach LOS		B			C			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	92.8
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.35
Intersection Signal Delay:	15.5
Intersection LOS:	B
Intersection Capacity Utilization:	68.3%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
 2: Brock Rd. S. & Nicholas Beaver Rd.

2024 FB PM
 08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	134	138	740	25	46	573
Future Volume (vph)	134	138	740	25	46	573
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1656	1524	3323	0	1504	3252
Flt Permitted	0.950				0.267	
Satd. Flow (perm)	1656	1524	3323	0	423	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		159	4			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Adj. Flow (vph)	154	159	851	29	53	659
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	159	880	0	53	659
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

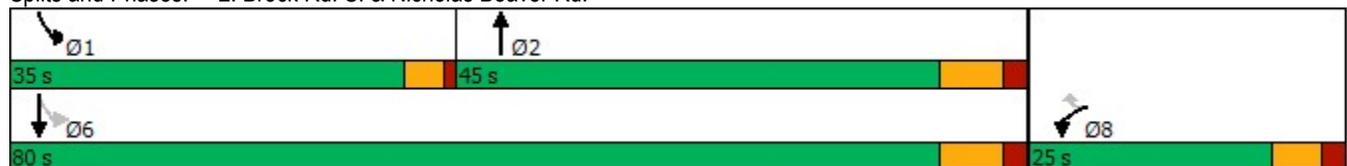


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.9	16.9	63.3		77.6	74.6
Actuated g/C Ratio	0.16	0.16	0.61		0.74	0.71
v/c Ratio	0.58	0.42	0.44		0.13	0.28
Control Delay	49.2	9.7	12.8		4.6	5.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	49.2	9.7	12.8		4.6	5.9
LOS	D	A	B		A	A
Approach Delay	29.1		12.8			5.8
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	104.5
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.58
Intersection Signal Delay:	12.9
Intersection LOS:	B
Intersection Capacity Utilization:	61.6%
ICU Level of Service:	B
Analysis Period (min):	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

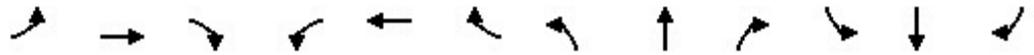
Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	19.3	31.5	36.2	22.5	45.5	48.6	52.8	15.7	17.3	45.4	36.7	16.7
Average Queue (m)	5.7	11.7	13.6	7.6	20.6	23.0	25.0	1.9	2.8	23.7	12.5	2.1
95th Queue (m)	14.9	23.9	30.9	18.3	37.2	40.1	43.3	8.6	11.6	38.9	29.2	9.5
Link Distance (m)		103.4		220.8		433.7	433.7			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)											0	
Queuing Penalty (veh)											0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	53.2	39.7	49.6	44.8	31.6	43.4	51.4
Average Queue (m)	26.2	14.6	25.2	15.9	9.8	15.8	19.2
95th Queue (m)	46.0	28.1	42.2	34.4	24.4	35.2	40.7
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0	0			2	3	
Queuing Penalty (veh)	0	0			5	1	

Network Summary

Network wide Queuing Penalty: 7



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	20	122	31	3	14	103	490	44	41	780	30
Future Volume (vph)	6	20	122	31	3	14	103	490	44	41	780	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.98		0.99								
Frt		0.871			0.874				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1289	1144	0	1107	1099	0	1180	3167	1468	1626	3282	1615
Flt Permitted	0.745			0.500			0.210			0.443		
Satd. Flow (perm)	1011	1144	0	579	1099	0	261	3167	1468	758	3282	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		139			16				109			109
Link Speed (k/h)		60			50			70			70	
Link Distance (m)		130.5			239.4			456.3			124.5	
Travel Time (s)		7.8			17.2			23.5			6.4	
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	0%
Adj. Flow (vph)	7	23	139	35	3	16	117	557	50	47	886	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	7	162	0	35	19	0	117	557	50	47	886	34
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0			6.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

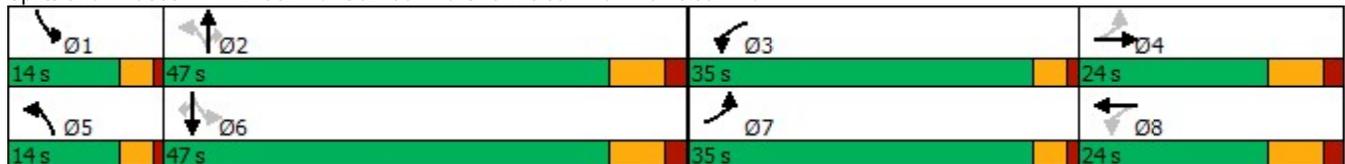


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	23.0	15.3		26.6	21.4		56.3	47.6	47.6	52.0	40.9	40.9
Actuated g/C Ratio	0.25	0.17		0.29	0.23		0.61	0.52	0.52	0.56	0.44	0.44
v/c Ratio	0.03	0.53		0.16	0.07		0.46	0.34	0.06	0.09	0.61	0.04
Control Delay	22.0	16.5		24.4	16.1		15.2	16.6	0.1	9.4	23.2	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	16.5		24.4	16.1		15.2	16.6	0.1	9.4	23.2	0.1
LOS	C	B		C	B		B	B	A	A	C	A
Approach Delay		16.8			21.5			15.3			21.7	
Approach LOS		B			C			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	92.2
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.61
Intersection Signal Delay:	18.8
Intersection LOS:	B
Intersection Capacity Utilization:	75.0%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

2029 FB AM
08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	130	100	534	100	166	755
Future Volume (vph)	130	100	534	100	166	755
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			0.99			
Frt		0.850	0.976			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1480	1357	2873	0	1703	3034
Flt Permitted	0.950				0.337	
Satd. Flow (perm)	1480	1357	2873	0	604	3034
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		109	23			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				3	3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Adj. Flow (vph)	141	109	580	109	180	821
Shared Lane Traffic (%)						
Lane Group Flow (vph)	141	109	689	0	180	821
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

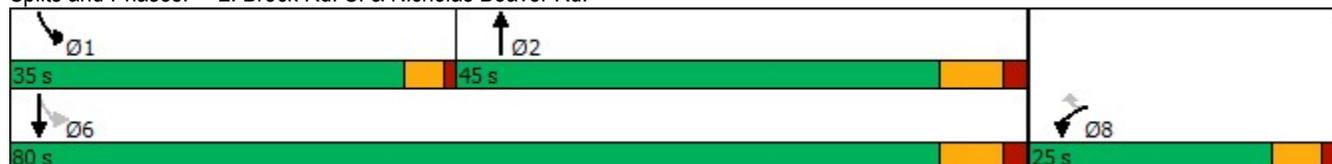


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.9	16.9	57.9		76.1	73.1
Actuated g/C Ratio	0.16	0.16	0.56		0.74	0.71
v/c Ratio	0.58	0.35	0.42		0.32	0.38
Control Delay	50.1	10.6	13.8		5.7	6.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	50.1	10.6	13.8		5.7	6.7
LOS	D	B	B		A	A
Approach Delay	32.8		13.8			6.5
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	103
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.58
Intersection Signal Delay:	12.5
Intersection LOS:	B
Intersection Capacity Utilization:	65.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	11.4	53.4	36.2	21.7	75.2	39.2	43.0	17.4	25.6	68.3	59.2	10.0
Average Queue (m)	1.6	19.8	9.5	4.3	31.5	16.8	18.3	4.2	7.7	36.7	24.5	3.0
95th Queue (m)	8.5	38.7	25.9	15.3	60.9	32.8	36.1	12.7	19.3	59.1	50.4	9.8
Link Distance (m)		103.4		220.8		433.7	433.7			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)		0								0	0	
Queuing Penalty (veh)		0								0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

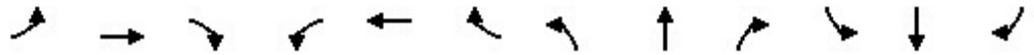
Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	62.6	28.2	50.4	35.4	34.8	67.1	63.9
Average Queue (m)	27.7	12.9	22.6	14.7	19.8	24.9	30.1
95th Queue (m)	50.1	24.4	42.9	30.8	34.8	53.1	57.0
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1				8	5	
Queuing Penalty (veh)	1				30	9	

Network Summary

Network wide Queuing Penalty: 40



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗		↘	↗		↘	↑↑	↗	↘	↑↑	↗
Traffic Volume (vph)	39	5	101	60	22	35	149	787	17	12	510	17
Future Volume (vph)	39	5	101	60	22	35	149	787	17	12	510	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99		1.00			1.00					0.98
Frt		0.857			0.907				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1265	0	1347	1517	0	1626	3471	1272	1203	3374	1272
Flt Permitted	0.718			0.574			0.382			0.337		
Satd. Flow (perm)	1287	1265	0	812	1517	0	653	3471	1272	427	3374	1240
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		106			37				109			109
Link Speed (k/h)		60			50			70			70	
Link Distance (m)		130.5			239.4			456.3			124.5	
Travel Time (s)		7.8			17.2			23.5			6.4	
Confl. Peds. (#/hr)			1	1			1					1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
Adj. Flow (vph)	41	5	106	63	23	37	157	828	18	13	537	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	111	0	63	60	0	157	828	18	13	537	18
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0			6.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

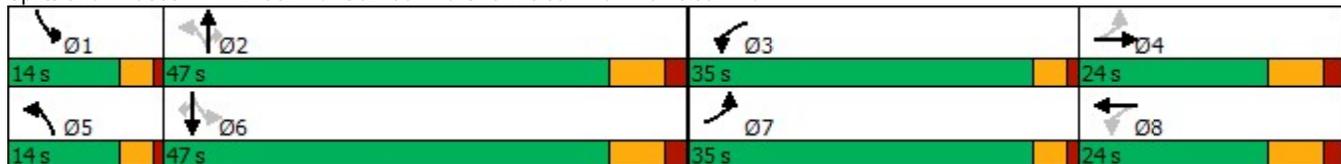


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	25.5	15.0		28.9	18.9		57.3	52.4	52.4	52.1	41.1	41.1
Actuated g/C Ratio	0.27	0.16		0.30	0.20		0.60	0.55	0.55	0.54	0.43	0.43
v/c Ratio	0.11	0.39		0.21	0.18		0.32	0.44	0.02	0.04	0.37	0.03
Control Delay	22.9	12.9		24.4	19.4		11.4	15.6	0.1	9.8	20.6	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	12.9		24.4	19.4		11.4	15.6	0.1	9.8	20.6	0.1
LOS	C	B		C	B		B	B	A	A	C	A
Approach Delay		15.6			21.9			14.7			19.7	
Approach LOS		B			C			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	95.7
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.44
Intersection Signal Delay:	16.8
Intersection LOS:	B
Intersection Capacity Utilization:	69.1%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

2029 FB PM
08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	148	153	817	28	51	632
Future Volume (vph)	148	153	817	28	51	632
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1656	1524	3323	0	1504	3252
Flt Permitted	0.950				0.234	
Satd. Flow (perm)	1656	1524	3323	0	371	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		176	4			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Adj. Flow (vph)	170	176	939	32	59	726
Shared Lane Traffic (%)						
Lane Group Flow (vph)	170	176	971	0	59	726
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

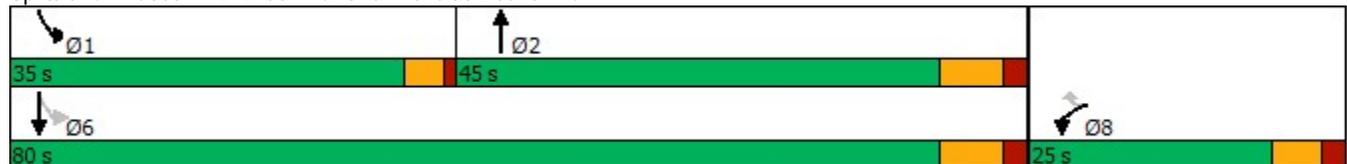


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	17.1	17.1	62.7		77.0	74.0
Actuated g/C Ratio	0.16	0.16	0.60		0.74	0.71
v/c Ratio	0.62	0.44	0.48		0.15	0.31
Control Delay	51.1	9.6	13.5		4.9	6.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	51.1	9.6	13.5		4.9	6.2
LOS	D	A	B		A	A
Approach Delay	30.0		13.5			6.1
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	104.1
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	13.5
Intersection LOS:	B
Intersection Capacity Utilization	64.2%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	19.2	31.0	44.2	27.5	54.7	56.1	61.3	17.2	17.8	55.1	45.8	14.2
Average Queue (m)	6.3	12.5	13.3	9.2	25.8	26.9	30.6	2.5	2.9	26.4	15.0	2.3
95th Queue (m)	15.3	24.8	32.3	21.4	47.7	48.8	52.8	10.3	12.3	45.9	34.9	10.2
Link Distance (m)		103.4		220.8		433.7	433.7			105.8	105.8	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)			0				0			0	0	
Queuing Penalty (veh)			0				0			0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	55.7	50.8	55.1	50.4	34.5	46.1	51.0
Average Queue (m)	30.1	15.9	28.1	17.4	10.5	17.3	21.2
95th Queue (m)	49.8	31.4	47.0	37.4	24.7	36.8	40.9
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0	0			2	3	
Queuing Penalty (veh)	1	0			7	2	

Network Summary

Network wide Queuing Penalty: 9

Appendix I

ITE Trip Generation Manual Excerpts

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	934								
Land Use	Fast-Food Restaurant with Drive-Through Window								
Setting	General Urban/Suburban								
Time Period	Weekday PM Peak Period								
# Data Sites	11								
Average Pass-By Rate	55%								
	Pass-By Characteristics for Individual Sites								
					Non-Pass-By Trips				
GFA (000)	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Primary (%)	Diverted (%)	Total (%)	Adj Street Peak Hour Volume	Source
1.3	Kentucky	1993	—	68	22	10	32	2055	2
1.9	Kentucky	1993	33	67	24	9	33	2447	2
2.8	Florida	1995	47	66	—	—	34	—	30
2.9	Florida	1996	271	41	41	18	59	—	30
3	Kentucky	1993	—	31	31	38	69	4250	2
3.1	Florida	1995	28	71	—	—	29	—	30
3.1	Florida	1996	29	38	—	—	62	—	30
3.2	Florida	1996	202	40	39	21	60	—	30
3.3	—	1996	—	62	—	—	38	—	21
4.2	Indiana	1993	—	56	25	19	44	1632	2
4.3	Florida	1994	304	62	—	—	38	—	30

Vehicle Pass-By Rates by Land Use

Source: ITE Trip Generation Manual , 11th Edition

Land Use Code	944								
Land Use	Gasoline/Service Station								
Setting	General Urban/Suburban								
Time Period	Weekday PM Peak Period								
# Data Sites	17								
Average Pass-By Rate	57%								
Pass-By Characteristics for Individual Sites									
Vehicle Fueling Positions	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
					Primary (%)	Diverted (%)	Total (%)		
6	Maryland	1992	18	61	6	33	39	2510	25
6	Maryland	1992	26	58	11	31	42	1020	25
8	Maryland	1992	47	62	23	15	38	2635	25
8	Kentucky	1993	83	52	8	40	48	4965	2
8	Kentucky	1993	60	53	20	27	47	1491	2
8	Kentucky	1993	—	72	7	21	28	2657	2
8	Maryland	1992	36	67	14	19	33	3095	25
8	Maryland	1992	46	46	11	43	54	3770	25
8	Maryland	1992	35	54	3	43	46	7080	25
10	Kentucky	1993	—	57	19	24	43	1812	2
10	Kentucky	1993	—	55	16	29	45	2657	2
12	Maryland	1992	52	38	10	52	62	3835	25
12	Pennsylvania	2009	—	66	—	—	34	—	19
12	Pennsylvania	2009	—	51	—	—	49	—	19
12	Pennsylvania	2009	—	40	—	—	60	—	19
12	Pennsylvania	2009	—	61	—	—	39	—	19
12	New Jersey	2009	—	73	—	—	27	—	19

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	944								
Land Use	Gasoline/Service Station								
Setting	General Urban/Suburban								
Time Period	Saturday Midday								
# Data Sites	5								
Average Pass-By Rate	49%								
	Pass-By Characteristics for Individual Sites								
		Survey		Pass-By	Non-Pass-By Trips			Adj Street Peak	
Vehicle Fueling Positions	State or Province	Year	# Interviews	Trip (%)	Primary (%)	Diverted (%)	Total (%)	Hour Volume	Source
12	Pennsylvania	2009	—	60	—	—	40	—	19
12	Pennsylvania	2009	—	30	—	—	70	—	19
12	Pennsylvania	2009	—	55	—	—	45	—	19
12	Pennsylvania	2009	—	37	—	—	63	—	19
12	New Jersey	2009	—	65	—	—	35	—	19

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	945									
Land Use	Convenience Store/Gas Station									
Setting	General Urban/Suburban									
Time Period	Weekday AM Peak Period									
# Data Sites	16 Sites with between 2 and 8 VFP					28 Sites with between 9 and 20 VFP				
Average Pass-By Rate	60% for Sites with between 2 and 8 VFP					76% for Sites with between 9 and 20 VFP				
Pass-By Characteristics for Individual Sites										
GFA (000)	VFP	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
						Primary (%)	Diverted (%)	Total (%)		
2	8	Maryland	1992	46	87	13	0	13	2235	25
2.1	6	Maryland	1992	26	58	23	19	42	2080	25
2.1	6	Maryland	1992	26	58	23	19	42	2080	25
2.2	8	Maryland	1992	31	47	34	19	53	1785	25
2.2	< 8	Indiana	1993	79	56	6	38	44	635	2
2.2	8	Maryland	1992	35	78	9	13	22	7080	25
2.3	6	Maryland	1992	37	32	41	27	68	2080	25
2.3	< 8	Kentucky	1993	58	64	5	31	36	1255	2
2.3	6	Maryland	1992	37	32	41	27	68	2080	25
2.4	< 8	Kentucky	1993	—	48	17	35	52	1210	2
2.6	< 8	Kentucky	1993	—	72	15	13	28	940	2
2.8	< 8	Kentucky	1993	—	54	11	35	46	1240	2
3	< 8	Indiana	1993	62	74	10	16	26	790	2
3.6	< 8	Kentucky	1993	49	67	4	29	33	1985	2
3.7	< 8	Kentucky	1993	49	66	16	18	34	990	2
4.694	12	Maryland	2000	—	72	—	—	28	2440	30
4.694	12	Maryland	2000	—	78	—	—	22	1561	30
4.694	12	Maryland	2000	—	79	—	—	21	2764	30
4.848	12	Virginia	2000	—	55	—	—	45	1398	30
5.06	12	Pennsylvania	2000	—	84	—	—	16	3219	30
5.242	12	Virginia	2000	—	74	—	—	26	1160	30
5.242	12	Virginia	2000	—	71	—	—	29	548	30
5.488	12	Delaware	2000	—	80	—	—	20	—	30
5.5	12	Pennsylvania	2000	—	85	—	—	15	2975	30
4.2	< 8	Kentucky	1993	47	62	19	19	38	1705	2
4.694	16	Maryland	2000	—	90	—	—	10	2278	30
4.694	16	Delaware	2000	—	74	—	—	26	2185	30
4.694	16	Delaware	2000	—	58	—	—	42	962	30
4.694	16	Delaware	2000	—	84	—	—	16	2956	30
4.694	16	New Jersey	2000	—	79	—	—	21	1859	30
4.694	20	Delaware	2000	—	84	—	—	16	3864	30
4.848	16	Virginia	2000	—	68	—	—	32	2106	30
4.848	16	Virginia	2000	—	85	—	—	15	2676	30
4.848	16	Virginia	2000	—	75	—	—	25	3244	30
4.848	16	Virginia	2000	—	71	—	—	29	1663	30
4.993	16	Pennsylvania	2000	—	75	—	—	25	1991	30
5.094	16	New Jersey	2000	—	86	—	—	14	1260	30
5.5	16	Pennsylvania	2000	—	82	—	—	18	1570	30
5.543	16	Pennsylvania	2000	—	84	—	—	16	1933	30
5.565	16	Pennsylvania	2000	—	77	—	—	23	2262	30
5.565	16	Pennsylvania	2000	—	68	—	—	32	2854	30
5.565	16	New Jersey	2000	—	58	—	—	42	1253	30
5.565	16	New Jersey	2000	—	79	—	—	21	1928	30
5.565	16	New Jersey	2000	---	84	---	---	16	1953	30

Vehicle Pass-By Rates by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	945									
Land Use	Convenience Store/Gas Station									
Setting	General Urban/Suburban									
Time Period	Weekday PM Peak Period									
# Data Sites	12 Sites with between 2 and 8 VFP					28 Sites with between 9 and 20 VFP				
Average Pass-By Rate	56% for Sites with between 2 and 8 VFP					75% for Sites with between 9 and 20 VFP				
Pass-By Characteristics for Individual Sites										
GFA (000)	VFP	State or Province	Survey Year	# Interviews	Pass-By Trip (%)	Non-Pass-By Trips			Adj Street Peak Hour Volume	Source
						Primary (%)	Diverted (%)	Total (%)		
2.1	8	Maryland	1992	31	52	13	35	48	1785	25
2.1	6	Maryland	1992	30	53	20	27	47	1060	25
2.2	< 8	Indiana	1993	115	48	16	36	52	820	2
2.3	< 8	Kentucky	1993	67	57	16	27	43	1954	2
2.3	6	Maryland	1992	55	40	11	49	60	2760	25
2.4	< 8	Kentucky	1993	—	58	13	29	42	2655	2
2.6	< 8	Kentucky	1993	68	67	15	18	33	950	2
2.8	< 8	Kentucky	1993	—	62	11	27	38	2875	2
3	< 8	Indiana	1993	80	65	15	20	35	1165	2
3.6	< 8	Kentucky	1993	60	56	17	27	44	2505	2
3.7	< 8	Kentucky	1993	70	61	16	23	39	2175	2
4.2	< 8	Kentucky	1993	61	58	26	16	42	2300	2
4.694	12	Maryland	2000	—	78	—	—	22	3549	30
4.694	12	Maryland	2000	—	67	—	—	33	2272	30
4.694	12	Maryland	2000	—	66	—	—	34	3514	30
4.848	12	Virginia	2000	—	71	—	—	29	2350	30
5.06	12	Pennsylvania	2000	—	91	—	—	9	4181	30
5.242	12	Virginia	2000	—	70	—	—	30	2445	30
5.242	12	Virginia	2000	—	56	—	—	44	950	30
5.488	12	Delaware	2000	—	73	—	—	27	—	30
5.5	12	Pennsylvania	2000	—	84	—	—	16	4025	30
4.694	16	Maryland	2000	—	89	—	—	11	2755	30
4.694	16	Delaware	2000	—	73	—	—	27	1858	30
4.694	16	Delaware	2000	—	59	—	—	41	1344	30
4.694	16	Delaware	2000	—	72	—	—	28	3434	30
4.694	16	New Jersey	2000	—	81	—	—	19	1734	30
4.694	20	Delaware	2000	—	76	—	—	24	1616	30
4.848	16	Virginia	2000	—	67	—	—	33	2.954	30
4.848	16	Virginia	2000	—	78	—	—	22	3086	30
4.848	16	Virginia	2000	—	83	—	—	17	4143	30
4.848	16	Virginia	2000	—	73	—	—	27	2534	30
4.993	16	Pennsylvania	2000	—	72	—	—	28	2917	30
5.094	16	New Jersey	2000	—	86	—	—	14	1730	30
5.5	16	Pennsylvania	2000	—	90	—	—	10	2616	30
5.543	16	Pennsylvania	2000	—	87	—	—	13	2363	30
5.565	16	Pennsylvania	2000	—	81	—	—	19	2770	30
5.565	16	Pennsylvania	2000	—	76	—	—	24	3362	30
5.565	16	New Jersey	2000	—	61	—	—	39	1713	30
5.565	16	New Jersey	2000	—	86	—	—	14	1721	30
5.565	16	New Jersey	2000	---	81	---	---	19	2227	30

Appendix J

Future Total Synchro and SimTraffic Reports

Lanes, Volumes, Timings

2024 FT AM

1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

08/04/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	19	125	28	5	13	197	375	40	41	738	27
Future Volume (vph)	95	19	125	28	5	13	197	375	40	41	738	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.98		0.99								
Frt		0.870			0.893				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1289	1141	0	1107	1070	0	1180	3167	1468	1626	3282	1615
Flt Permitted	0.511			0.653			0.222			0.504		
Satd. Flow (perm)	693	1141	0	756	1070	0	276	3167	1468	863	3282	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		142			15				109			109
Link Speed (k/h)		60			50			70				70
Link Distance (m)		130.5			239.4			456.3				124.5
Travel Time (s)		7.8			17.2			23.5				6.4
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	0%
Adj. Flow (vph)	108	22	142	32	6	15	224	426	45	47	839	31
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	164	0	32	21	0	224	426	45	47	839	31
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0				6.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

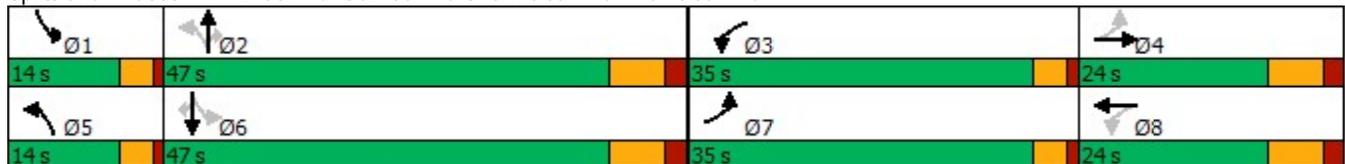


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	28.6	17.4		18.6	15.2		56.4	47.8	47.8	51.6	40.4	40.4
Actuated g/C Ratio	0.30	0.18		0.20	0.16		0.60	0.51	0.51	0.55	0.43	0.43
v/c Ratio	0.33	0.50		0.17	0.11		0.86	0.27	0.06	0.09	0.60	0.04
Control Delay	26.6	14.7		28.3	23.6		46.0	17.2	0.1	10.6	24.6	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	14.7		28.3	23.6		46.0	17.2	0.1	10.6	24.6	0.1
LOS	C	B		C	C		D	B	A	B	C	A
Approach Delay		19.4			26.4			25.4			23.0	
Approach LOS		B			C			C			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	94.3
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.86
Intersection Signal Delay:	23.5
Intersection LOS:	C
Intersection Capacity Utilization:	80.3%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

2024 FT AM
08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	118	100	509	90	161	719
Future Volume (vph)	118	100	509	90	161	719
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.977			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1480	1357	2877	0	1703	3034
Flt Permitted	0.950				0.356	
Satd. Flow (perm)	1480	1357	2877	0	638	3034
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		109	21			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				3	3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Adj. Flow (vph)	128	109	553	98	175	782
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	109	651	0	175	782
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

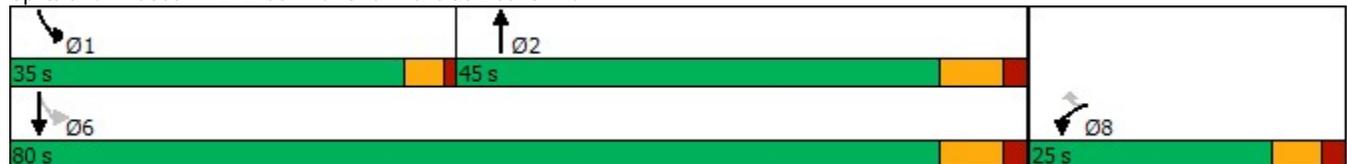


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effect Green (s)	16.6	16.6	58.0		76.0	73.0
Actuated g/C Ratio	0.16	0.16	0.57		0.74	0.71
v/c Ratio	0.54	0.35	0.40		0.30	0.36
Control Delay	48.3	10.7	13.3		5.4	6.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.3	10.7	13.3		5.4	6.5
LOS	D	B	B		A	A
Approach Delay	31.0		13.3			6.3
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	102.6
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.54
Intersection Signal Delay:	11.9
Intersection LOS:	B
Intersection Capacity Utilization	64.8%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Lanes, Volumes, Timings
3: Brock Rd.S. & Site Access

2024 FT AM
08/04/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	145	0	482	770	144
Future Volume (vph)	0	145	0	482	770	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Fr _t		0.865			0.976	
Fl _t Protected						
Satd. Flow (prot)	0	1611	0	3539	3454	0
Fl _t Permitted						
Satd. Flow (perm)	0	1611	0	3539	3454	0
Link Speed (k/h)	30			70	70	
Link Distance (m)	62.9			124.5	196.3	
Travel Time (s)	7.5			6.4	10.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	158	0	524	837	157
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	158	0	524	994	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	41.5%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

3: Brock Rd.S. & Site Access

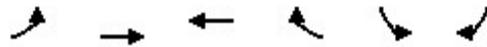
2024 FT AM
08/04/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↓	
Traffic Volume (veh/h)	0	145	0	482	770	144
Future Volume (Veh/h)	0	145	0	482	770	144
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	158	0	524	837	157
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)	124					
pX, platoon unblocked	0.93					
vC, conflicting volume	1178	497	994			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1045	497	994			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	70	100			
cM capacity (veh/h)	209	519	692			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	158	262	262	558	436	
Volume Left	0	0	0	0	0	
Volume Right	158	0	0	0	157	
cSH	519	1700	1700	1700	1700	
Volume to Capacity	0.30	0.15	0.15	0.33	0.26	
Queue Length 95th (m)	10.2	0.0	0.0	0.0	0.0	
Control Delay (s)	15.0	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	15.0	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	1.4					
Intersection Capacity Utilization	41.5%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
4: Mclean Rd. W. & Site Access

2024 FT AM
08/04/2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	133	122	106	106	6
Future Volume (vph)	9	133	122	106	106	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.937		0.992	
Flt Protected		0.997			0.955	
Satd. Flow (prot)	0	1857	1745	0	1765	0
Flt Permitted		0.997			0.955	
Satd. Flow (perm)	0	1857	1745	0	1765	0
Link Speed (k/h)		60	60		30	
Link Distance (m)		135.1	130.5		72.2	
Travel Time (s)		8.1	7.8		8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	145	133	115	115	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	155	248	0	122	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	27.3%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
4: Mclean Rd. W. & Site Access

2024 FT AM
08/04/2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	9	133	122	106	106	6
Future Volume (Veh/h)	9	133	122	106	106	6
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)	10	145	133	115	115	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)			130			
pX, platoon unblocked	0.93				0.93	0.93
vC, conflicting volume	248				356	190
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	161				276	99
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				83	99
cM capacity (veh/h)	1326				662	894
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	155	248	122			
Volume Left	10	0	115			
Volume Right	0	115	7			
cSH	1326	1700	672			
Volume to Capacity	0.01	0.15	0.18			
Queue Length 95th (m)	0.2	0.0	5.3			
Control Delay (s)	0.6	0.0	11.5			
Lane LOS	A		B			
Approach Delay (s)	0.6	0.0	11.5			
Approach LOS			B			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			27.3%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	49.7	52.0	31.7	18.4	148.9	307.9	298.8	15.1	20.6	79.1	61.8	8.6
Average Queue (m)	20.1	20.9	9.3	4.5	119.4	138.7	124.5	3.5	7.5	39.5	28.3	2.4
95th Queue (m)	41.9	40.7	25.0	14.2	182.4	398.8	373.1	10.8	17.6	66.3	52.3	8.2
Link Distance (m)		101.6		220.8		433.7	433.7			105.5	105.5	
Upstream Blk Time (%)						1	0					
Queuing Penalty (veh)						4	0					
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	0			36	7				1	0	
Queuing Penalty (veh)	0	0			68	14				0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	60.7	46.0	64.1	44.7	34.9	64.0	60.4
Average Queue (m)	28.9	14.7	25.5	13.7	22.6	23.8	27.0
95th Queue (m)	53.5	32.2	49.6	31.6	38.1	54.0	53.0
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			14	5	
Queuing Penalty (veh)	1	0			50	7	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	24.5
Average Queue (m)	13.2
95th Queue (m)	21.0
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	8.2	21.3
Average Queue (m)	0.4	11.4
95th Queue (m)	3.6	18.2
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

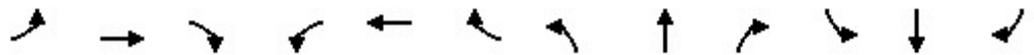
Network wide Queuing Penalty: 146

Lanes, Volumes, Timings

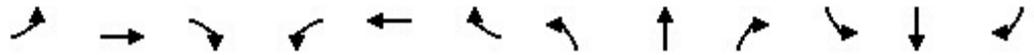
2024 FT PM

1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

08/04/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	6	100	55	25	32	274	616	16	12	483	16
Future Volume (vph)	162	6	100	55	25	32	274	616	16	12	483	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99		1.00			1.00					0.98
Frt		0.858			0.915				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1267	0	1347	1539	0	1626	3471	1272	1203	3374	1272
Flt Permitted	0.533			0.685			0.391			0.406		
Satd. Flow (perm)	955	1267	0	969	1539	0	668	3471	1272	514	3374	1240
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		105			34				109			109
Link Speed (k/h)		60			50			70			70	
Link Distance (m)		130.5			239.4			456.3			124.5	
Travel Time (s)		7.8			17.2			23.5			6.4	
Confl. Peds. (#/hr)			1	1			1					1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
Adj. Flow (vph)	171	6	105	58	26	34	288	648	17	13	508	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	111	0	58	60	0	288	648	17	13	508	17
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0			6.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

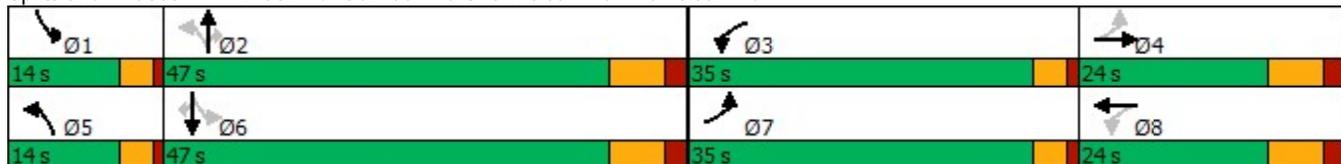


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	33.9	19.3		24.2	15.1		57.1	52.2	52.2	51.4	40.3	40.3
Actuated g/C Ratio	0.34	0.19		0.24	0.15		0.57	0.53	0.53	0.52	0.41	0.41
v/c Ratio	0.38	0.34		0.21	0.23		0.60	0.36	0.02	0.04	0.37	0.03
Control Delay	25.7	11.2		23.8	24.0		19.2	16.7	0.1	11.8	23.0	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	11.2		23.8	24.0		19.2	16.7	0.1	11.8	23.0	0.1
LOS	C	B		C	C		B	B	A	B	C	A
Approach Delay		20.0			23.9			17.1			22.0	
Approach LOS		C			C			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	99.4
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.60
Intersection Signal Delay:	19.4
Intersection LOS:	B
Intersection Capacity Utilization:	79.2%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

2024 FT PM
08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	134	150	772	25	49	600
Future Volume (vph)	134	150	772	25	49	600
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1656	1524	3325	0	1504	3252
Flt Permitted	0.950				0.254	
Satd. Flow (perm)	1656	1524	3325	0	402	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		172	3			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Adj. Flow (vph)	154	172	887	29	56	690
Shared Lane Traffic (%)						
Lane Group Flow (vph)	154	172	916	0	56	690
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

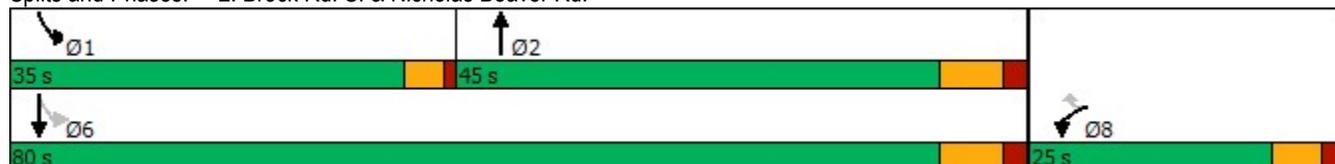


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.9	16.9	63.0		77.3	74.3
Actuated g/C Ratio	0.16	0.16	0.60		0.74	0.71
v/c Ratio	0.57	0.44	0.46		0.14	0.30
Control Delay	49.1	9.6	13.0		4.7	6.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	49.1	9.6	13.0		4.7	6.0
LOS	D	A	B		A	A
Approach Delay	28.2		13.0			5.9
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	104.2
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.57
Intersection Signal Delay:	12.8
Intersection LOS:	B
Intersection Capacity Utilization	64.1%
ICU Level of Service	C
Analysis Period (min)	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Lanes, Volumes, Timings
3: Brock Rd.S. & Site Access

2024 FT PM
08/04/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	85	0	809	487	83
Future Volume (vph)	0	85	0	809	487	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Fr _t		0.865			0.978	
Fl _t Protected						
Satd. Flow (prot)	0	1611	0	3539	3461	0
Fl _t Permitted						
Satd. Flow (perm)	0	1611	0	3539	3461	0
Link Speed (k/h)	30			70	70	
Link Distance (m)	62.9			124.5	196.3	
Travel Time (s)	7.5			6.4	10.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	92	0	879	529	90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	92	0	879	619	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	28.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 3: Brock Rd.S. & Site Access

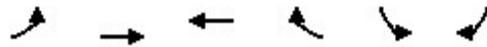
2024 FT PM
 08/04/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑↑	↑↗	
Traffic Volume (veh/h)	0	85	0	809	487	83
Future Volume (Veh/h)	0	85	0	809	487	83
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	0	879	529	90
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)	124					
pX, platoon unblocked	0.89					
vC, conflicting volume	1014	310	619			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	763	310	619			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	87	100			
cM capacity (veh/h)	302	686	957			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	92	440	440	353	266	
Volume Left	0	0	0	0	0	
Volume Right	92	0	0	0	90	
cSH	686	1700	1700	1700	1700	
Volume to Capacity	0.13	0.26	0.26	0.21	0.16	
Queue Length 95th (m)	3.7	0.0	0.0	0.0	0.0	
Control Delay (s)	11.1	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.1	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.6					
Intersection Capacity Utilization	28.0%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
4: Mclean Rd. W. & Site Access

2024 FT PM
08/04/2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	6	130	170	146	136	10
Future Volume (vph)	6	130	170	146	136	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.938		0.991	
Flt Protected		0.998			0.956	
Satd. Flow (prot)	0	1859	1747	0	1765	0
Flt Permitted		0.998			0.956	
Satd. Flow (perm)	0	1859	1747	0	1765	0
Link Speed (k/h)		60	60		30	
Link Distance (m)		135.1	130.5		72.2	
Travel Time (s)		8.1	7.8		8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	141	185	159	148	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	148	344	0	159	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

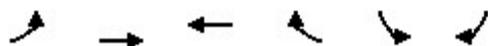
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	32.7%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

4: Mclean Rd. W. & Site Access

2024 FT PM
08/04/2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Traffic Volume (veh/h)	6	130	170	146	136	10
Future Volume (Veh/h)	6	130	170	146	136	10
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)	7	141	185	159	148	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)	130					
pX, platoon unblocked	0.90				0.90	0.90
vC, conflicting volume	344				420	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	218				301	129
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				76	99
cM capacity (veh/h)	1219				619	830
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	148	344	159			
Volume Left	7	0	148			
Volume Right	0	159	11			
cSH	1219	1700	630			
Volume to Capacity	0.01	0.20	0.25			
Queue Length 95th (m)	0.1	0.0	8.0			
Control Delay (s)	0.4	0.0	12.6			
Lane LOS	A		B			
Approach Delay (s)	0.4	0.0	12.6			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			32.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	48.0	41.0	41.7	26.2	110.7	72.0	53.6	15.8	20.6	57.6	38.5	15.7
Average Queue (m)	22.5	14.1	12.3	8.6	46.2	22.0	25.2	1.7	3.1	25.7	15.8	2.1
95th Queue (m)	40.3	31.3	29.2	20.2	85.3	48.4	43.1	8.5	13.5	44.4	32.7	9.4
Link Distance (m)		101.6		220.8		433.7	433.7			105.5	105.5	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	0	0		1		0			0		
Queuing Penalty (veh)	0	0	0		2		0			0		

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	58.7	52.5	56.1	50.0	28.1	43.9	48.8
Average Queue (m)	28.8	16.1	28.2	15.0	9.5	15.2	18.2
95th Queue (m)	50.4	33.1	48.7	35.8	22.4	35.2	38.7
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	0	0			2	3	
Queuing Penalty (veh)	1	0			7	1	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	17.1
Average Queue (m)	9.5
95th Queue (m)	15.7
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	8.0	1.3	29.6
Average Queue (m)	0.5	0.1	13.5
95th Queue (m)	4.0	1.3	22.7
Link Distance (m)	128.6	101.6	63.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 11

Lanes, Volumes, Timings

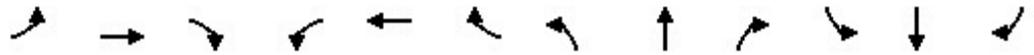
2029 FT AM

1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

08/04/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	21	136	31	5	14	207	421	44	45	812	30
Future Volume (vph)	95	21	136	31	5	14	207	421	44	45	812	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.98		0.99								
Frt		0.870			0.891				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1289	1141	0	1107	1073	0	1180	3167	1468	1626	3282	1615
Flt Permitted	0.511			0.644			0.187			0.479		
Satd. Flow (perm)	693	1141	0	746	1073	0	232	3167	1468	820	3282	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		155			16				109			109
Link Speed (k/h)		60			50			70				70
Link Distance (m)		130.5			239.4			456.3				124.5
Travel Time (s)		7.8			17.2			23.5				6.4
Confl. Peds. (#/hr)			3	3								
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	40%	12%	47%	63%	100%	42%	53%	14%	10%	11%	10%	0%
Adj. Flow (vph)	108	24	155	35	6	16	235	478	50	51	923	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	179	0	35	22	0	235	478	50	51	923	34
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0				6.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

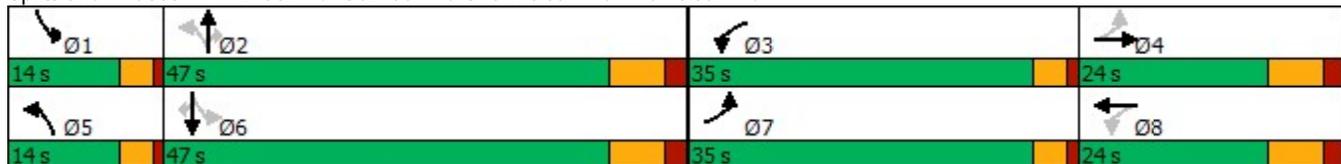


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	28.7	17.2		18.8	15.2		56.4	47.8	47.8	51.7	40.4	40.4
Actuated g/C Ratio	0.30	0.18		0.20	0.16		0.60	0.51	0.51	0.55	0.43	0.43
v/c Ratio	0.33	0.53		0.19	0.12		0.98	0.30	0.06	0.10	0.66	0.05
Control Delay	26.6	15.1		28.7	23.2		73.0	17.6	0.2	10.7	25.9	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	15.1		28.7	23.2		73.0	17.6	0.2	10.7	25.9	0.1
LOS	C	B		C	C		E	B	A	B	C	A
Approach Delay		19.4			26.6			33.5			24.3	
Approach LOS		B			C			C			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	94.4
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	27.0
Intersection LOS:	C
Intersection Capacity Utilization:	80.9%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

2029 FT AM
08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	130	110	559	100	177	790
Future Volume (vph)	130	110	559	100	177	790
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.977			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1480	1357	2877	0	1703	3034
Flt Permitted	0.950				0.324	
Satd. Flow (perm)	1480	1357	2877	0	581	3034
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		120	22			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				3	3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	22%	19%	22%	22%	6%	19%
Adj. Flow (vph)	141	120	608	109	192	859
Shared Lane Traffic (%)						
Lane Group Flow (vph)	141	120	717	0	192	859
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

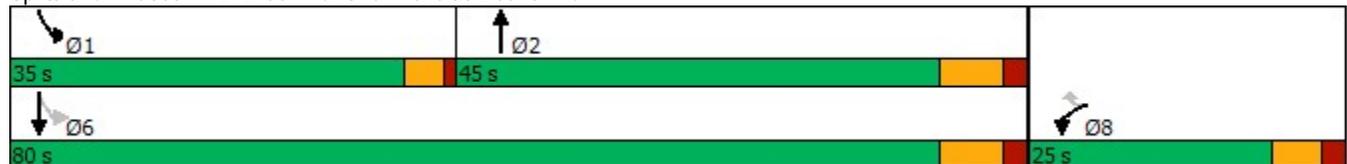


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effct Green (s)	16.9	16.9	57.7		76.1	73.1
Actuated g/C Ratio	0.16	0.16	0.56		0.74	0.71
v/c Ratio	0.58	0.37	0.44		0.35	0.40
Control Delay	50.1	10.5	14.3		6.0	6.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	50.1	10.5	14.3		6.0	6.9
LOS	D	B	B		A	A
Approach Delay	31.9		14.3			6.7
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	103
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.58
Intersection Signal Delay:	12.6
Intersection LOS:	B
Intersection Capacity Utilization:	65.6%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Lanes, Volumes, Timings
3: Brock Rd.S. & Site Access

2029 FT AM
08/04/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	145	0	530	850	144
Future Volume (vph)	0	145	0	530	850	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Fr _t		0.865			0.978	
Fl _t Protected						
Satd. Flow (prot)	0	1611	0	3539	3461	0
Fl _t Permitted						
Satd. Flow (perm)	0	1611	0	3539	3461	0
Link Speed (k/h)	30			70	70	
Link Distance (m)	62.9			124.5	196.3	
Travel Time (s)	7.5			6.4	10.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	158	0	576	924	157
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	158	0	576	1081	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	43.7%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis

3: Brock Rd.S. & Site Access

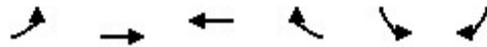
2029 FT AM
08/04/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	145	0	530	850	144
Future Volume (Veh/h)	0	145	0	530	850	144
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	158	0	576	924	157
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)	124					
pX, platoon unblocked	0.92					
vC, conflicting volume	1290	540	1081			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1141	540	1081			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	67	100			
cM capacity (veh/h)	179	486	641			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	158	288	288	616	465	
Volume Left	0	0	0	0	0	
Volume Right	158	0	0	0	157	
cSH	486	1700	1700	1700	1700	
Volume to Capacity	0.33	0.17	0.17	0.36	0.27	
Queue Length 95th (m)	11.2	0.0	0.0	0.0	0.0	
Control Delay (s)	15.9	0.0	0.0	0.0	0.0	
Lane LOS	C					
Approach Delay (s)	15.9	0.0		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay	1.4					
Intersection Capacity Utilization	43.7%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
4: Mclean Rd. W. & Site Access

2029 FT AM
08/04/2023



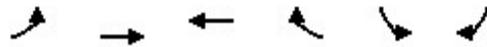
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	9	147	135	106	106	6
Future Volume (vph)	9	147	135	106	106	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.941		0.992	
Flt Protected		0.997			0.955	
Satd. Flow (prot)	0	1857	1753	0	1765	0
Flt Permitted		0.997			0.955	
Satd. Flow (perm)	0	1857	1753	0	1765	0
Link Speed (k/h)		60	60		30	
Link Distance (m)		135.1	130.5		72.2	
Travel Time (s)		8.1	7.8		8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	160	147	115	115	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	170	262	0	122	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	28.0%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
4: Mclean Rd. W. & Site Access

2029 FT AM
08/04/2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	147	135	106	106	6
Future Volume (Veh/h)	9	147	135	106	106	6
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)	10	160	147	115	115	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)			130			
pX, platoon unblocked	0.93				0.93	0.93
vC, conflicting volume	262				384	204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	163				296	101
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				82	99
cM capacity (veh/h)	1311				639	884
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	170	262	122			
Volume Left	10	0	115			
Volume Right	0	115	7			
cSH	1311	1700	650			
Volume to Capacity	0.01	0.15	0.19			
Queue Length 95th (m)	0.2	0.0	5.5			
Control Delay (s)	0.5	0.0	11.8			
Lane LOS	A		B			
Approach Delay (s)	0.5	0.0	11.8			
Approach LOS			B			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization		28.0%		ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	57.5	64.9	36.7	28.2	149.5	404.2	398.7	13.4	28.2	71.9	58.5	12.7
Average Queue (m)	20.2	24.1	12.0	6.2	140.3	291.9	237.5	3.0	9.1	41.6	30.6	2.6
95th Queue (m)	42.1	49.0	29.0	19.7	179.0	545.9	510.5	9.7	21.4	65.0	54.2	9.1
Link Distance (m)		101.6		220.8		433.7	433.7			105.5	105.5	
Upstream Blk Time (%)						13	4					
Queuing Penalty (veh)						45	12					
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0	0	0		72	16				1	0	
Queuing Penalty (veh)	0	0	0		151	32				0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	66.0	50.2	145.2	132.5	34.8	86.5	84.2
Average Queue (m)	29.7	17.6	55.7	44.2	23.9	33.3	34.4
95th Queue (m)	55.7	35.0	161.6	146.4	38.8	73.2	68.2
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			23	5	
Queuing Penalty (veh)	1	0			91	10	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB	SB
Directions Served	R	TR
Maximum Queue (m)	23.7	1.9
Average Queue (m)	12.9	0.1
95th Queue (m)	20.4	1.3
Link Distance (m)	50.7	188.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	8.3	23.9
Average Queue (m)	0.8	11.0
95th Queue (m)	5.2	18.8
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 344

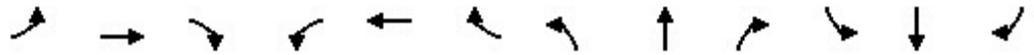
Lanes, Volumes, Timings

2029 FT PM

1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

08/04/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	166	6	110	60	27	35	288	691	17	13	531	17
Future Volume (vph)	166	6	110	60	27	35	288	691	17	13	531	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	54.0		0.0	55.0		0.0	142.0		66.0	62.0		62.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	48.0			50.0			7.5			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.99		1.00			1.00					0.98
Frt		0.857			0.915				0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1265	0	1347	1539	0	1626	3471	1272	1203	3374	1272
Flt Permitted	0.530			0.679			0.360			0.375		
Satd. Flow (perm)	950	1265	0	960	1539	0	615	3471	1272	475	3374	1240
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		116			37				109			109
Link Speed (k/h)		60			50			70				70
Link Distance (m)		130.5			239.4			456.3				124.5
Travel Time (s)		7.8			17.2			23.5				6.4
Confl. Peds. (#/hr)			1	1			1					1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	25%	27%	34%	5%	19%	11%	4%	27%	50%	7%	27%
Adj. Flow (vph)	175	6	116	63	28	37	303	727	18	14	559	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	175	122	0	63	65	0	303	727	18	14	559	18
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			6.0				6.0
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.8			4.8			4.8				4.8
Two way Left Turn Lane								Yes				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	1		1	1		0	0	0	0	0	0
Detector Template												
Leading Detector (m)	10.0	10.0		10.0	10.0		0.0	0.0	0.0	0.0	0.0	0.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	10.0	10.0		10.0	10.0		2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Detector Phase	7	4		3	8		5	2	2	1	6	6
Switch Phase												

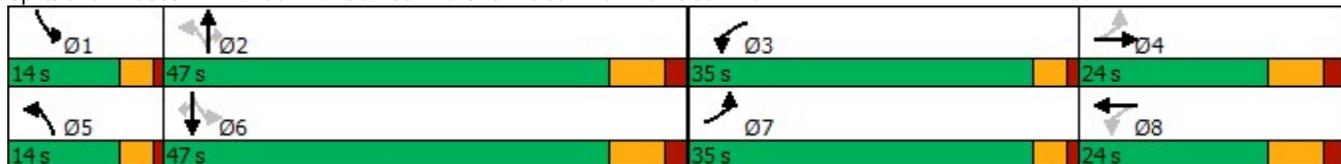


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	15.0		5.0	15.0		8.0	40.0	40.0	8.0	40.0	40.0
Minimum Split (s)	9.0	22.0		9.0	22.0		12.0	47.0	47.0	12.0	47.0	47.0
Total Split (s)	35.0	24.0		35.0	24.0		14.0	47.0	47.0	14.0	47.0	47.0
Total Split (%)	29.2%	20.0%		29.2%	20.0%		11.7%	39.2%	39.2%	11.7%	39.2%	39.2%
Maximum Green (s)	31.0	17.0		31.0	17.0		10.0	40.0	40.0	10.0	40.0	40.0
Yellow Time (s)	3.0	5.0		3.0	5.0		3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	7.0		4.0	7.0		4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	5.0	3.0		5.0	3.0		3.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	None	None		None	None		None	Max	Max	None	Max	Max
Walk Time (s)		5.0			5.0			5.0	5.0		5.0	5.0
Flash Dont Walk (s)		7.0			7.0			7.0	7.0		7.0	7.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	34.0	19.2		24.5	15.1		57.1	52.2	52.2	51.4	40.3	40.3
Actuated g/C Ratio	0.34	0.19		0.25	0.15		0.57	0.52	0.52	0.52	0.40	0.40
v/c Ratio	0.39	0.36		0.23	0.25		0.67	0.40	0.03	0.05	0.41	0.03
Control Delay	25.8	11.1		24.0	24.1		22.4	17.3	0.1	12.0	23.6	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.8	11.1		24.0	24.1		22.4	17.3	0.1	12.0	23.6	0.1
LOS	C	B		C	C		C	B	A	B	C	A
Approach Delay		19.8			24.0			18.5			22.6	
Approach LOS		B			C			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	99.6
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	20.2
Intersection LOS:	C
Intersection Capacity Utilization:	80.2%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.



Lanes, Volumes, Timings
2: Brock Rd. S. & Nicholas Beaver Rd.

2029 FT PM
08/04/2023



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	148	165	849	28	54	659
Future Volume (vph)	148	165	849	28	54	659
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	56.0	0.0		0.0	21.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	26.0				14.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor			1.00			
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1656	1524	3325	0	1504	3252
Flt Permitted	0.950				0.222	
Satd. Flow (perm)	1656	1524	3325	0	352	3252
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		190	3			
Link Speed (k/h)	50		70			70
Link Distance (m)	521.7		370.3			456.3
Travel Time (s)	37.6		19.0			23.5
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	9%	6%	6%	67%	20%	11%
Adj. Flow (vph)	170	190	976	32	62	757
Shared Lane Traffic (%)						
Lane Group Flow (vph)	170	190	1008	0	62	757
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		6.0			6.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane			Yes			Yes
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	0		0	0
Detector Template						
Leading Detector (m)	10.0	10.0	0.0		0.0	0.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	10.0	10.0	0.6		2.0	0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						

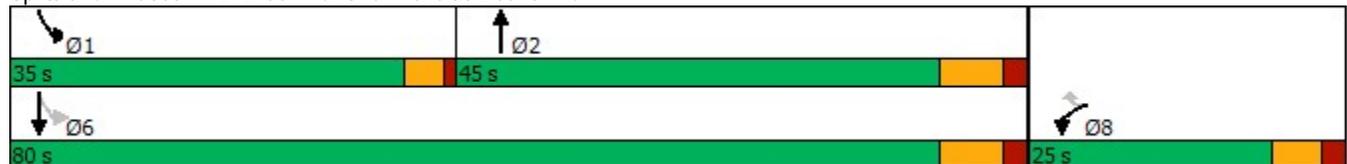


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	15.0	15.0	35.0		10.0	35.0
Minimum Split (s)	21.0	21.0	42.0		14.0	42.0
Total Split (s)	25.0	25.0	45.0		35.0	80.0
Total Split (%)	23.8%	23.8%	42.9%		33.3%	76.2%
Maximum Green (s)	19.0	19.0	38.0		31.0	73.0
Yellow Time (s)	4.0	4.0	5.0		3.0	5.0
All-Red Time (s)	2.0	2.0	2.0		1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	7.0		4.0	7.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	5.0	5.0	0.2		5.0	0.2
Recall Mode	None	None	Max		None	Max
Walk Time (s)	3.0	3.0	5.0			5.0
Flash Dont Walk (s)	7.0	7.0	7.0			7.0
Pedestrian Calls (#/hr)	0	0	0			0
Act Effect Green (s)	17.1	17.1	62.5		76.8	73.8
Actuated g/C Ratio	0.16	0.16	0.60		0.74	0.71
v/c Ratio	0.62	0.46	0.50		0.17	0.33
Control Delay	51.0	9.5	13.8		5.0	6.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	51.0	9.5	13.8		5.0	6.3
LOS	D	A	B		A	A
Approach Delay	29.1		13.8			6.2
Approach LOS	C		B			A

Intersection Summary

Area Type:	Other
Cycle Length:	105
Actuated Cycle Length:	103.9
Natural Cycle:	80
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	13.5
Intersection LOS:	B
Intersection Capacity Utilization:	64.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 2: Brock Rd. S. & Nicholas Beaver Rd.



Lanes, Volumes, Timings
3: Brock Rd.S. & Site Access

2029 FT PM
08/04/2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	85	0	890	538	83
Future Volume (vph)	0	85	0	890	538	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Fr _t		0.865			0.980	
Fl _t Protected						
Satd. Flow (prot)	0	1611	0	3539	3468	0
Fl _t Permitted						
Satd. Flow (perm)	0	1611	0	3539	3468	0
Link Speed (k/h)	30			70	70	
Link Distance (m)	62.9			124.5	196.3	
Travel Time (s)	7.5			6.4	10.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	92	0	967	585	90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	92	0	967	675	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	29.4%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

3: Brock Rd.S. & Site Access

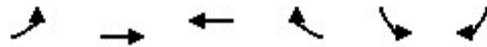
2029 FT PM
08/04/2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	85	0	890	538	83
Future Volume (Veh/h)	0	85	0	890	538	83
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	92	0	967	585	90
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)	124					
pX, platoon unblocked	0.87					
vC, conflicting volume	1114	338	675			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	830	338	675			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	86	100			
cM capacity (veh/h)	268	658	912			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	92	484	484	390	285	
Volume Left	0	0	0	0	0	
Volume Right	92	0	0	0	90	
cSH	658	1700	1700	1700	1700	
Volume to Capacity	0.14	0.28	0.28	0.23	0.17	
Queue Length 95th (m)	3.9	0.0	0.0	0.0	0.0	
Control Delay (s)	11.4	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	11.4	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay	0.6					
Intersection Capacity Utilization	29.4%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings
4: Mclean Rd. W. & Site Access

2029 FT PM
08/04/2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	6	144	187	146	136	10
Future Volume (vph)	6	144	187	146	136	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.941		0.991	
Flt Protected		0.998			0.956	
Satd. Flow (prot)	0	1859	1753	0	1765	0
Flt Permitted		0.998			0.956	
Satd. Flow (perm)	0	1859	1753	0	1765	0
Link Speed (k/h)		60	60		30	
Link Distance (m)		135.1	130.5		72.2	
Travel Time (s)		8.1	7.8		8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	157	203	159	148	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	164	362	0	159	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	33.6%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
4: Mclean Rd. W. & Site Access

2029 FT PM
08/04/2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	144	187	146	136	10
Future Volume (Veh/h)	6	144	187	146	136	10
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)	7	157	203	159	148	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)	130					
pX, platoon unblocked	0.89				0.89	0.89
vC, conflicting volume	362				454	282
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	227				330	138
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				75	99
cM capacity (veh/h)	1199				591	814
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	164	362	159			
Volume Left	7	0	148			
Volume Right	0	159	11			
cSH	1199	1700	603			
Volume to Capacity	0.01	0.21	0.26			
Queue Length 95th (m)	0.1	0.0	8.4			
Control Delay (s)	0.4	0.0	13.1			
Lane LOS	A		B			
Approach Delay (s)	0.4	0.0	13.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			33.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Brock Rd. S./Brock Rd.S. & Mclean Rd. W./Mclean Rd.W.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (m)	48.8	33.6	38.8	28.5	138.8	131.1	127.7	15.8	24.5	57.6	51.2	17.3
Average Queue (m)	22.7	13.5	13.3	11.0	86.3	48.1	43.6	1.8	4.1	31.7	21.4	2.7
95th Queue (m)	41.3	26.8	29.0	22.1	152.8	149.7	127.2	8.9	16.4	52.1	43.6	10.6
Link Distance (m)		101.6		220.8		433.7	433.7			105.5	105.5	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	54.0		55.0		142.0			66.0	62.0			62.0
Storage Blk Time (%)	0		0		10	0	0			0	0	
Queuing Penalty (veh)	0		0		33	1	0			0	0	

Intersection: 2: Brock Rd. S. & Nicholas Beaver Rd.

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	60.9	52.8	56.8	49.0	31.0	49.6	48.0
Average Queue (m)	30.0	16.5	31.4	17.1	11.8	17.9	21.7
95th Queue (m)	51.8	33.1	49.8	37.5	25.7	42.0	45.1
Link Distance (m)		505.0	361.3	361.3		433.7	433.7
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	56.0				21.0		
Storage Blk Time (%)	1	0			3	4	
Queuing Penalty (veh)	1	0			11	2	

Intersection: 3: Brock Rd.S. & Site Access

Movement	EB
Directions Served	R
Maximum Queue (m)	19.9
Average Queue (m)	10.4
95th Queue (m)	17.7
Link Distance (m)	50.7
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Mclean Rd. W. & Site Access

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	8.2	24.4
Average Queue (m)	0.4	13.2
95th Queue (m)	3.8	21.2
Link Distance (m)	128.6	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 49

Appendix K

Township of Puslinch's Comprehensive Zoning By-Law No. 023-18 Relevant Excerpts



TOWNSHIP OF PUSLINCH

COMPREHENSIVE ZONING BY -LAW No. 023-18

COUNCIL ADOPTED: APRIL 2018

LPAT ORDER: JANUARY 23, 2020 – PL180505

CONSOLIDATED MAY 2021

5.0 PARKING AND LOADING REGULATIONS

5.1 LOADING AND UNLOADING SPACE REGULATIONS

5.1.1 Loading Spaces Required

- a. The **owner** of any **lot, building or structure** used or **erected** for any purpose involving the receiving, shipping, loading or unloading of goods, wares, merchandise, or raw materials, other than an **agricultural use**, shall provide and maintain, on the same **lot**, facilities comprising one or more **loading spaces** in accordance with the provisions of this Section.

5.1.2 Loading Space Requirements

- a. The number of **loading spaces** required on a **lot** shall be based on the total **net floor area** of all the uses on the said **lot** for which **loading spaces** are required by Subsection 5.1.1, in accordance with Table 5.1 below.

Table 5.1 Number of **Loading Spaces** Required

NET FLOOR AREA OF BUILDING OR STRUCTURE	MINIMUM NUMBER OF LOADING SPACES REQUIRED
Less than 250 m ²	0
Between 250 m ² and 2,500 m ²	1
Greater than 2,500 m ² and less than 5,000 m ²	2
Greater than 5,000 m ²	3 + 1 additional space for each 10,000 m ² in excess of 5,000 m ²

5.1.3 Dimensions of Loading Spaces

- a. The minimum dimensions of a **loading space** shall be 3.5 metres in width and 10 metres in length, with a minimum vertical clearance of four (4) metres.

5.1.4 Location of Loading Spaces

- a. Required **loading spaces** shall:
 - i. be provided on the same **lot** occupied by the **building or structure** for which the said **loading spaces** are required;
 - ii. abut the **building** for which the **loading space** is provided; and

- iii. shall not form a part of any **street** or **lane**.

5.1.5 Yards Where Permitted

- a. **Loading spaces** shall not be permitted:
 - i. closer than three (3) metres to any **lot line**;
 - ii. in any **front yard**;
 - iii. in any minimum **required yard**;
 - iv. between the exterior closest to the **exterior lot line** and the **exterior lot line**; and
 - v. closer than 7.5 metres to any Residential **Zone** boundary, except if it is located entirely within a **building** or **structure** or located in a Residential **Zone**.

5.1.6 Access to Loading Spaces

- a. Access to **loading spaces** shall be by means of a **driveway** at least six (6) metres wide contained within the **lot** on which the **loading spaces** are located.

5.1.7 Addition to Existing Use

- a. When a **building** or **structure** has insufficient **loading spaces** on the date of passing of this By-Law to comply with the requirements herein, this By-Law shall not be interpreted to require that the deficiency be made up prior to the construction of any addition, provided that any additional **loading spaces** required by this By-Law for such addition are provided in accordance with all provisions hereof respecting **loading spaces**.

5.1.8 Exemption for C1 and CMU Zone

- a. Notwithstanding any other provision hereof to the contrary, no **loading spaces** shall be required for any **building, structure**, or use located within a C1 or CMU **Zone**.

5.2 PARKING REGULATIONS

5.2.1 General Parking Provisions

- a. No person shall use any **premises** in any **zone** for any purpose permitted by this By-law, unless the minimum number of **parking spaces** required are provided as specified by this By-law.
- b. Where the minimum number of **parking spaces** is calculated on the basis of a rate or ratio,

the required number of **parking spaces** shall be rounded up to the next whole number.

- c. The parking requirements for more than one use on a **lot** or for a **building** containing more than one use, shall be the sum total of the parking requirements for each of the component uses, unless otherwise specified in this By-law.
- d. All required **parking spaces** shall be unobstructed and available for general parking purposes and used for that purpose at all times, unless otherwise specified in this By-law.

5.2.2 Parking Spaces Required

- a. Except as otherwise provided herein, the **owner** of any **lot, building, or structure** used or **erected** for any of the purposes set forth in Tables 5.2 and 5.3 of this Subsection, shall provide and maintain for the sole use of the **owner** or other persons entering upon or making use of the said **lot, building or structure** from time to time, one or more **parking spaces** in accordance with the provisions of this Subsection.

Table 5.2 Residential **Parking Space** Requirements

USE	MINIMUM PARKING SPACE REQUIREMENT
Accessory apartment	1 per dwelling unit , in addition to the requirement for the principal dwelling unit
Bed and breakfast	1 per guest room, in addition to the requirement for the principal dwelling unit
Boarding, lodging, or rooming house	1 per guest room, in addition to the requirement for the principal dwelling unit
Dwelling, duplex	2 per dwelling unit
Dwelling, multiple	1.5 per dwelling unit and 0.25 per unit for visitor parking spaces
Dwelling, semi-detached	2 per dwelling unit
Dwelling, Single detached	2 per dwelling unit
Dwelling, townhouse	2 per dwelling unit
Dwelling unit in mixed-use building	1 per dwelling unit
Garden suite	1 per dwelling unit
Group home	2 per dwelling unit
Home business	1 for any employee that is not a resident in the dwelling unit in addition to the required parking for the dwelling unit

Home industry	1 for any employee that is not a resident in the dwelling unit in addition to the required parking for the dwelling unit
Private home day care	The minimum parking space requirement for the principal dwelling unit
Retirement home	0.5 spaces per unit.

Table 5.3 Non-residential Parking Space Requirements

USE	MINIMUM PARKING SPACE REQUIREMENT (BASED ON NET FLOOR AREA UNLESS OTHERWISE NOTED)
Agricultural use	No requirement
Agriculture-related use	1 per 100 m ²
Agricultural service and supply establishments	1 per 40 m ²
Agricultural animal clinic	1 per 50 m ²
Animal clinic	1 per 20 m ²
Art gallery	1 per 30 m ²
Artisan studio	1 per 30 m ²
Asphalt plant	1 per 30 m ² for office component
Assembly hall	1 per 5 persons seating capacity or 1 per 10 m ² GFA where there are no seats
Auction sales establishment	1 per 15 m ²
Motor vehicle body shop	3 per service bay
Motor vehicle sales and rental establishment	1 per 30 m ² for office component
Motor vehicle service establishment	3 per service bay or 1 per 100 m ² or whichever is greater
Motor vehicle washing establishment	1 plus 6 waiting spaces per wash bay
Building supply store	1 per 100 m ²
Business or professional office	1 per 40 m ²
Caterer's establishment	1 per 40 m ²
Commercial mall	1 per 20 m ²
Commercial school or studio	1 per 30 m ²
Commercial self-storage facility	1 per 100 m ²
Community garden	1 per 100 m ² of area used for community garden purposes
Contractor's yard	1 per 50 m ²
Day care centre	1 per 40 m ²
Dry cleaning plant	1 per 40 m ²
Dry cleaning depot	1 per employee and 2 additional spaces for pickup / loading
Factory outlet	1 per 20 m ²
Farm related business	1 per 40 m ²
Farm greenhouse	No requirement
Financial institution	1 per 20 m ² or 1 per 30 m ² if the financial institution has a drive-through service facility

USE	MINIMUM PARKING SPACE REQUIREMENT (BASED ON NET FLOOR AREA UNLESS OTHERWISE NOTED)
Funeral establishment	1 per 20 m ²
Gas bar	1 per gas bar pump
Garden centre	1 per 35 m ²
Golf course	5 per hole
Golf driving range	1.5 per tee
Hospital	4 per bed
Hotel or motel	1 per guest room plus 1 per 20 m ² of floor area of each refreshment room or dining room
Industrial use	1/100 m ² for the first 10,000 m ² of floor area and 1/200 m ² for any floor area after the first 10,000 m ²
Kennel	1 per 30 m ² for office component
Laundromat	1 per 30 m ²
Long term care facility	1 per 4 beds and 1 per 2 employees
Marina	0.5 per boat slip and 1/20 m ² of total retail floor area
Medical office	1 per 25 m ²
Miniature golf course	1.5 per tee
Museum	1 per 30 m ²
Personal service establishment	1 per 20 m ²
Place of entertainment	1 per 20 m ²
Place of worship	1 per 4 persons seating capacity or 1 per 10 m ² , whichever is greater
Postal or courier outlet	1 per 30 m ²
Private club	1 per 4 persons seating capacity or 1 per 10 m ² , whichever is greater
Private school	1.5 per classroom for elementary schools 5.0 per classroom for secondary schools
Public buildings	1 per 30 m ²
Public school	1.5 per classroom for elementary schools 5.0 per classroom for secondary schools
Recreational vehicle sales or rental establishment	1 per 30 m ² for office component
Equipment rental establishment	1 per 50 m ²
Restaurant	1 per 10 m ² including outdoor patio area
Retail store	1 per 20 m ²
Salvage yard	1 per 20 m ²
Service or repair establishment	1 per 50 m ²
Short term accommodation	0.5 parking spaces per occupant or 1.0 parking space per guest room used for sleeping, whichever is the greater
Trade service establishment	1 per 50 m ²
Transport terminal	1 per 100 m ²
Warehouse	1 per 200 m ²
Any outdoor storage area involving the	1 per 100 m ² of net floor area and outdoor

USE	MINIMUM PARKING SPACE REQUIREMENT (BASED ON NET FLOOR AREA UNLESS OTHERWISE NOTED)
display and sale of goods and materials, including vehicles	storage area
Any other use permitted by this by-law other than those listed above	1 per 20 m ² of net floor area
Any other place of assembly permitted by this by-law other than those listed above	1 per permitted Fire Code Capacity

5.2.3 Dimensions of Parking Spaces

- a. A **parking space** required hereby shall have minimum rectangular dimensions of three (3) by six (6) metres, except that:
 - i. the minimum width of a **parking space** accessory to a **single detached, semi-detached or townhouse dwelling** shall be 2.5 metres; and,
 - ii. where the **principal** access to a **parking space** is provided on the longest dimension of such **parking space**, the minimum dimensions of the said **parking space** shall be three (3) by 6.7 metres.

5.2.4 Shared Parking Spaces

- a. Where more than one of the uses listed in Table 5.3 are located on the same **lot**, **parking spaces** may be shared between the uses, and the cumulative total of **parking spaces** required for all the uses on the **lot** may be reduced from that required in Table 5.4.
- b. To calculate the required parking using Table 5.4:
 - A. Determine the parking requirement for each use;
 - B. Calculate the parking requirement for each use;
 - C. Multiply the required parking by the percentage of peak period for each time period;
 - D. Calculate the total required parking for all uses in each time period, for both weekdays and Saturdays (excluding Sundays); and
 - E. The time period with the highest total parking requirement is the required parking for the **lot**.

Table 5.4 Percentage of Required Parking Permitted to be shared

USE	PERCENTAGE OF PEAK PERIOD							
	WEEKDAY				SATURDAY			
	Morning	Noon	Afternoon	Evening	Morning	Noon	Afternoon	Evening
Business or professional office	100	80	100	10	10	10	10	5
Financial institution	100	100	100	15	20	20	20	5
Hotel or motel	70	70	70	100	70	70	70	100
Place of entertainment or theatre	10	10	25	80	40	70	80	100
Restaurant	20	90	30	100	30	90	50	100
Retail store	75	80	90	90	80	100	100	50

5.2.5 Location of Parking Spaces

- a. All required **parking spaces** shall be provided on the same **lot** occupied by the **building, structure,** or use for which such **parking spaces** are required, and shall not form a part of any **street** or **lane**.
- b. **Parking spaces** shall not extend into any part of a **lot** that is required to be used for **planting strips** as specified by this By-law.

5.2.6 Parking in Residential Zones

- a. The maximum width of a **driveway** leading to a **private garage** or carport in the **front** or **exterior side yards** shall be:
 - i. Six (6) metres for a **lot** having a **lot frontage** of 12 metres or less;
 - ii. Equal to 50 percent of the **lot frontage** on a **lot** having greater than 12 metres and less than 18 metres of **lot frontage**; or
 - iii. Nine (9) metres for a **lot** having a **lot frontage** equal to or greater than 18 metres.
- b. The width of the **lot** specified in subsection (a) above is the horizontal distance between the **interior side** and/or **exterior side lot lines**, with such distance being measured perpendicularly to the line joining the mid-point of the **front lot line** with the mid-point of the **rear lot line** at a point on that line six (6) metres from the **front lot line**.

- c. The width of the **private garage** specified in subsection (a) above is the width of interior wall(s). In the case of a carport, the width is measured from the wall of the **principal building** to the outside of the post supporting the roof of the carport.
- d. Where a **private garage** is detached from the **principal building** and is accessed by a **driveway** crossing the **front lot line**, the **driveway** shall be located no closer to the **interior side lot line** than the minimum setback required for **accessory buildings or structures**.
- e. Where a **private garage** is detached from the **principal building** and is accessed by a **driveway** crossing the **exterior side lot line**, the **driveway** shall be located no closer to the **rear lot line** than the minimum setback required for **accessory buildings or structures**.
- f. Notwithstanding subsections (b) and (c) above, the setback for the **driveway** may be less to match the setback of a **private garage** that existed on the effective date of this By-law.

5.2.7 Yards Where Permitted

- a. Except as otherwise provided herein, uncovered surface **parking areas** shall be permitted in any part of any **yard**, provided that any part of a **parking area** located within a **required yard** shall be separated from any **lot lines** adjacent to such **required yard** by a **planting strip** no less than one (1) metre in width. This provision does not apply to a **parking area** accessory to a **single detached dwelling**.

5.2.8 Parking Structures

- a. Parking **structures** shall comply with the provisions for the **principal building** in accordance with this By-law.
- b. No setbacks or **yards** shall be required for any portion of a parking **structure** that is entirely below **grade**. This exemption also applies to external ventilation shafts, stairwells, landings, and other similar facilities.

5.2.9 Access to Parking Areas and Structures

- a. Access to **parking areas** shall be provided from a **street** by means of one or more unobstructed **driveways**, provided that no **lot** shall have more than two **driveways** for the first 30 metres of **street** line thereof plus one **driveway** for each additional 30 metres of **street** line.
- b. **Driveways** that are accessory to a single **dwelling unit** shall not exceed six (6) metres in width, and any other **driveway** shall not exceed 10 metres in width, measured parallel to the said **street**, at any point on the **lot** closer to the said **street** than the **street** setback required therefrom.

- c. **Driveways** and **parking aisles** shall have a minimum unobstructed width of six (6) metres where two-way traffic is permitted and three (3) metres **driveway** where only one-way direction of traffic flow is permitted and is clearly indicated by signs, pavement markings or both, except that the minimum width required for any **driveway** accessory to a **single detached, semi-detached** or **townhouse dwelling** shall be 2.5 metres.

5.2.10 Surfacing of Parking Areas, Driveways and Loading Spaces

- a. All **parking areas, driveways, and loading spaces** in any **zone** other than a Parks and Open Space **Zone**, an Industrial **Zone**, or an Agricultural **Zone** shall be provided and maintained with a stable treated surface so as to prevent the raising of dust or loose particles, such surface to be constructed of: asphalt, concrete, brick, interlocking brick, permeable paving, cement, or other similar hardscape surface, sufficient to provide stability, prevent erosion, be usable in all seasons, and provide adequate drainage facilities.

5.2.11 Addition to Existing Use

- a. Where an **existing** use has insufficient **parking spaces** on the date of passing of this By-Law to conform to the requirements herein, this By-Law shall not be interpreted to require that the deficiency be made up prior to the construction of any addition or a change of use, provided that any additional **parking spaces** required by this By-Law for such addition or change of use are provided in accordance with all provisions hereof respecting **parking spaces** and **parking areas**.

5.2.12 Parking of Commercial Motor vehicles in Residential Zones

- a. The following provisions apply to the parking of **commercial motor vehicles** in Residential **Zones**:
 - i. Only one (1) **commercial motor vehicle** may be parked on a **lot**;
 - ii. Only a permanent resident of the dwelling unit may park a **commercial motor vehicle** on the **lot**;
 - iii. The **commercial motor vehicle** shall be parked in a **private garage** or on a **driveway**;
 - iv. A **commercial motor vehicle** shall not be permitted on any **lot** unless the principal dwelling has been constructed on that same **lot**;
 - v. The **commercial motor vehicle** shall be no more than 7.5 metres in length (exclusive of hitch/tongue); and
 - vi. The **commercial motor vehicle** shall be no more than 3.2 metres in **height**, measured from the ground to the highest point of the **commercial motor vehicle**.

5.2.13 Parking of Recreational Vehicles and Boats

- a. The following provisions apply to the outdoor parking or storage of any **recreational vehicle** or boat in a Residential **Zone**:

- i. The **recreational vehicle** or boat shall not be used for human habitation purposes while parked on the **lot**;
- ii. A total of one **recreational vehicle** and one boat shall be permitted on a **lot**;
- iii. The **recreational vehicle** or boat shall be parked in the **interior** or **rear yards**, or in a **yard** between a **building** and a lake or watercourse deemed to be a **front yard**, and/or on a **driveway** extending from a **private garage** or carport;
- iv. A **recreational vehicle** and a boat shall not be parked on the same **driveway**.
- v. A **recreational vehicle** or boat shall not occupy required **parking spaces**.
- vi. A **recreational vehicle** or boat, if located on the **driveway**, shall be located no closer than 0.5 metres from the edge of the **lot** line.

5.2.14 Barrier-Free Parking

- a. Where the parking requirement for any use is 4 or more spaces, **barrier-free parking spaces** shall be provided in accordance with the following:
 - i. Each **barrier-free parking space** shall have a minimum width of 3.6 metres and minimum depth of 6.0 metres;
 - ii. Each **barrier-free parking space** shall be hard-surfaced and level;
 - iii. Each **barrier-free parking space** shall be located near and accessible to an entrance; and,
 - iv. Each **barrier-free parking space** shall be appropriately identified for its intended use by persons with limited mobility or other disabilities
- b. The number of **barrier-free parking spaces** shall be determined in accordance with Table 5.5 below.

Table 5.5 **Barrier-Free Parking Space** Requirements

TOTAL NUMBER OF PARKING SPACES REQUIRED ON THE LOT	MINIMUM NUMBER OF REQUIRED PARKING SPACES DEDICATED AS BARRIER-FREE
3-25	1
26-100	1 + 3% of total number of parking spaces on lot

TOTAL NUMBER OF PARKING SPACES REQUIRED ON THE LOT	MINIMUM NUMBER OF REQUIRED PARKING SPACES DEDICATED AS BARRIER-FREE
101-200	4 + 2% of total number of parking spaces on lot
201 or greater	8 + 2% of total number of parking spaces on lot

5.2.15 Bicycle Parking

- a. Bicycle parking spaces shall be required for the uses listed in Table 5.6 below in addition to any required **parking spaces**.
- b. Each bicycle parking space shall be a minimum of 60 centimetres wide and 1.8 metres long.

Table 5.6 Bicycle Parking Space Requirements

USE	REQUIRED PARKING STANDARDS (PER NET FLOOR AREA)
Retail, personal, institutional	The greater of 2 spaces or 1 space /1000 m ²
Industrial	2 /1,000 m ²
Long term care facility, retirement home	The lesser of 5 or 0.25 per bed or dwelling unit
Public and private school	1 /10 students of design capacity & 1 space/35 employees
Dwelling units or mixed-use buildings with more than 6 dwelling units	2 spaces for the first 6 dwelling units plus 2 spaces for each additional 6 dwelling units or fraction thereof

**FUNCTIONAL SERVICING & STORMWATER
MANAGEMENT REPORT**

**7456 MCLEAN ROAD WEST &
197 BROCK ROAD SOUTH**

**TOWNSHIP OF PUSLINCH
COUNTY OF WELLINGTON**

PREPARED FOR:

BLACK-HART CONSTRUCTION INC.

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4**

OCTOBER 2023

CFCA FILE NO. 2377-6556

The material in this report reflects best judgment in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. C.F. Crozier & Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



Revision Number	Date	Comments
Rev. 0	October 20, 2023	Issued for 1 st Submission (ZBA)

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	SITE DESCRIPTION	1
3.0	SOIL AND GROUNDWATER EVALUATION	2
4.0	WATER SERVICING	3
4.1	Water Supply	3
4.2	Fire Flow Calculations	4
5.0	SANITARY SERVICING.....	4
5.1	Sanitary Design Flow	5
5.2	Proposed Sanitary Servicing	5
6.0	EXISTING STORMWATER SERVICING.....	7
7.0	DRAINAGE CONDITIONS	7
7.1	Existing Drainage Conditions	7
7.2	Proposed Drainage Conditions	8
8.0	STORMWATER MANAGEMENT	9
8.1	Stormwater Quantity Control	9
8.2	Stormwater Quality Control.....	11
9.0	EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION	12
10.0	CONCLUSIONS & RECOMMENDATIONS.....	12

LIST OF TABLES

Table 1:	Estimated Daily Water Demand
Table 2:	Fire Storage Volume Requirements
Table 3:	Total Maximum Daily Design Sewage Flow
Table 4:	Pre-Development Catchment Area Parameters
Table 5:	Post-Development Catchment Parameters
Table 6:	Peak Flow Summary (Discharge towards McLean Road West Storm Sewer)
Table 7:	Peak Flow Summary (Discharge towards the Adjacent Western Lands)

LIST OF APPENDICES

Appendix A:	Grain Size Analysis
Appendix B:	Water Servicing Calculations
Appendix C:	Sanitary Servicing Calculations
Appendix D:	As-Constructed Drawings & Background Material
Appendix E:	Stormwater Servicing Calculations

LIST OF DRAWINGS

Drawing C101:	Preliminary Erosion, Sediment Control, and Removals Plan
Drawing C102:	Preliminary Site Servicing Plan
Drawing C103:	Preliminary Site Grading Plan

LIST OF FIGURES

Figure 1:	Preliminary Pre-development Drainage Plan
Figure 2:	Preliminary Post-development Drainage Plan

1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Black-Hart Construction Inc. to prepare a Functional Servicing and Stormwater Management Report in support of the Zoning By-Law Amendment for the proposed mixed-use commercial development located at 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch (the site). The purpose of this report is to demonstrate the proposed development is feasible from a servicing and stormwater management perspective and conforms with the requirements of the Township of Puslinch (Town) and County of Wellington (County).

This report has been completed in accordance with the appropriate design guidelines and Township of Puslinch Pre-consultation Comment Summary dated November 21, 2022. The relevant background studies and reports used in preparation of this report include:

- Ministry of the Environment Design Guidelines for Drinking-Water Systems (2008).
- Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).
- The Ontario Building Code (2012).
- The City of Guelph – Development Engineering Manual Version 2.0 (January 2019)
- The Township of Puslinch - Municipal Development Standards (September 2019).
- The Township of Puslinch - Stormwater Management Report Carrol Pond Municipal Drain (March 2007)
- The Ministry of Transportation Drainage Management Manual (1997).
- Well Record Database, Ministry of the Environment, Conservation and Parks, accessed July 2023.

This report has been prepared to support the first submission of the Zoning By-Law Amendment for the proposed mixed-use commercial development located at 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch.

2.0 Site Description

The site encompasses an area of approximately 1.62 ha and currently consist of two adjacent properties (7456 McLean Road and 197 Brock Road South). The site is comprised of vegetated/landscaped areas and is bounded by Dufferin Aggregates (aggregate pit) to the north, Brock Road South (Wellington Road 46) to the east, McLean Road West to the south, and St. Mary's Cement Inc. (aggregate pit) to the west. Per review of the Conservation Authority Regulation Mapping, the site is not located within a Grand River Conservation Authority regulated area.

According to the Site Plan prepared by ATA Architects Inc. dated October 4, 2023, the proposed mixed-use commercial development will consist of the following elements:

- A 1-storey convenience store (235 sq.m).
- A 1-storey drive-thru restaurant (379 sq.m).
- A 4-pump car gas bar and a 6-pump truck gas bar.
- 41 standard parking spaces (including 3 accessible parking spaces and 4 electric vehicle charging spaces) and 8 transport truck parking spaces.
- Internal paved areas including access to McLean Road West and Brock Road South.

The existing vegetated and landscaped areas will be removed to accommodate the proposed mixed-use commercial development.

3.0 Soil and Groundwater Evaluation

A Geotechnical Investigation was conducted by CMT Engineering Inc. (CMT) in April 2023, which included the advancement of seven (7) to depths between 5.18 to 12.19 meters below ground surface (mbgs). The following surficial materials (in stratigraphic order) were generally encountered onsite:

- Topsoil
- Fill on the eastern portion of the site, primarily consisting of sand, silty sand, and gravel fill with wood pieces
- Sandy silt/silty sand
- Sand and gravel

Refer to the Geotechnical Investigation Report (CMT, September 2023) for additional details.

Monitoring wells were installed in three (3) of the boreholes (BH4/MW4-23, BH5/MW5-23, and BH6/MW6-23), and three (3) existing monitoring wells were identified at the time of the geotechnical investigation (MW1-21, MW2-21, and MW3-21). Groundwater levels were measured on April 19, 2023 and ranged from approximately 0.38 to 5.47 mbgs (321.43 to 325.87 masl). A Hydrogeological Assessment Report was prepared by Crozier (October 2023) to support the Zoning By-Law Amendment application for the site. Refer to this report for additional details and analyses regarding on-site groundwater.

In addition, Crozier completed a site investigation on June 7, 2023 to characterize the soil and groundwater conditions in potential areas for a leaching bed. A mini-excavator was used to excavated three (3) test pits to a maximum depth of 2.1 mbgs. The test pit locations are illustrated on the Preliminary Site Servicing Plan (Drawing C103). The general soil stratigraphy encountered was consistent with the findings from the Geotechnical Investigation (CMT, September 2023). No free groundwater was encountered in TP-1 or TP-3 to the maximum depth of investigation (2.1 mbgs). Groundwater seepage was identified at approximately 1.2 mbgs at TP-2. Refer to the Hydrogeological Assessment Report (Crozier, October 2023) for additional details.

A representative sample was collected from TP-3 and submitted to Chung & Vander Doelen (CVD) Engineering Ltd. for a particle size distribution analysis. The laboratory test results are presented in Appendix A. Referring to Supplementary Standard SB-6 of the 2012 Ontario Building Code (OBC) and the results of the particle size distribution analysis for the soil sample obtained from TP-3, the predominant soil is classified as SM soil as described by the Unified Soil Classification System. An SM soil is a silty sand, or sand silt mix with a percolation rate ranging from 8 min to 20 min/cm. Based on the percentage of sand in the soil sample, a percolation rate of 15 min/cm has been assigned for this sewage system design.

4.0 Water Servicing

4.1 Water Supply

The site is located in the Township of Puslinch and there is no municipal water supply available to service the proposed development. Based on the review of the MECP Well Records, properties in the vicinity of the site are serviced with private water supply wells with similar anticipated demands. Therefore, the proposed development will be serviced with a water supply well.

The water demand for the proposed development was calculated from the maximum daily sewage flows as noted in Section 5.1 and using the appropriate MECP peaking factors. Table 1 summarizes the anticipated water demand and Appendix B contains the detailed water demand calculations.

Table 1: Estimated Daily Water Demand

Average Day Demand (L/min)	Maximum Day Demand (L/min)	Peak Hour Demand (L/min)
6.94	13.89	27.78

One (1) water supply well was identified on-site by Crozier. Refer to the Preliminary Site Servicing Plan (Drawing C103) for the well location. This well appears to be associated with the well record for Well ID 6707585. According to the well record, this well was installed in 1981 to a depth of 29 m below ground surface (mbgs) within limestone bedrock. The well is a 6-inch steel cased well in a well pit. Initial testing of the well indicated that the well can produce 8 gallons per minute (GPM) or 30.3 liters per minute (LPM).

As shown on the Preliminary Erosion, Sediment Control, and Removals Plan (Drawing C101), the well conflicts with the proposed development plans. Therefore, this well will be decommissioned, and a new well is proposed to service the development. The existing well will be decommissioned in accordance with Ontario Regulation (O.Reg. 903) by a licensed Well Contractor. The well should be decommissioned prior to any site alteration activities.

A water supply assessment was completed as part of the Hydrogeological Assessment by Crozier (under separate cover) to assess if the proposed development can be serviced with a water supply well. The water supply assessment concluded that it is expected that there is sufficient groundwater supply in the area for a water supply well. Refer to the Hydrogeological Assessment Report (October 2023) for further details.

The proposed well location is shown on the Preliminary Site Servicing Plan (Drawing C103). The well will be constructed in accordance with O. Reg. 903.

4.2 Fire Flow Calculations

Preliminary calculations were completed to estimate the required fire storage volume for the proposed development, as there is no municipal water supply for firefighting purposes. The fire storage volume was calculated using the Ontario Fire Marshalls Fire Protection Water Supply Guideline (1999), as is required in Part 3 of the Ontario Building Code. The fire storage volume calculation was based on the following criteria which were confirmed with ATA Architects Inc. on July 19, 2023.

- Building type – E Classification
- Water Supply Coeff (k) – 17
 - Building is of non-combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns, and arches.
- Building Height – 6 meters

The estimated fire storage requirements are used to estimate the fire cistern size required to service the proposed development. Table 2 below summarizes the preliminary fire storage volumes calculated for the proposed development.

Table 2: Fire Storage Volume Requirements

Building Classification	Total Area ¹ (m ²)	Height (m)	Volume (m ³)	K ¹	S _{side} ²	Required Fire Storage Volume, Q (L)
D	572	6.0	3,432	17	1.0	58,344

As outlined in Table 2, a storage volume of 58,344 L is the required minimum fire storage volume, and it must be supplied at a rate of 30 L/s for a duration of 0.5 hours. Refer to Appendix B for preliminary fire storage volume calculations.

It should be noted the fire flows determined from the Ontario Building Code fire flow method is a conservative estimate for comparison purposes only. The Mechanical Engineer for the development will complete the required analysis for fire protection and the Architect will design fire separation methods per the determined fire flow rate at the Site Plan Approval and Building Permit stage.

A fire cistern has been provided to supply the required fire storage volumes for the proposed development similar to other developments in the area. The location of the fire cistern can be referenced on the Preliminary Site Servicing Plan (Drawing C103) and will be confirmed through consultation with the Fire Chief and the Township throughout the design process.

5.0 Sanitary Servicing

The site is located in the Township of Puslinch and there are no municipal sanitary services available to service the proposed development. Therefore, the proposed development will be serviced with an onsite sewage system.

5.1 Sanitary Design Flow

The total daily design sewage flow was calculated for the proposed development in accordance with Table 8.2.1.3.B of the Ontario Building Code (OBC), part 8, as shown below in Table 3. Detailed sewage flow calculations are included in Appendix C.

Table 3: Total Maximum Daily Design Sewage Flow

Establishment	Area (m ²)	Unit	Unit Flow (L/day)	Number of Units	Total Flow (L/day)
Convenience Store	235	per m ² floor area, or	5	238	1,175
		per water closet	1,230	2	2,460
Restaurant, 24-hr	379	per seat	200	40	8,000
Car Gas Bar	n/a	fuel outlet	560	8 ¹	4,480
Truck Gas Bar	n/a	fuel outlet	560	6 ²	3,360
Total Daily Design Sewage Flow:					18,300
Design Sewage Flow:					20,000

¹. Two (2) fuel outlets/nozzles per pump

². One (1) fuel outlet/nozzle per pump

As shown in Table 3, the total maximum day sanitary sewage flow for the proposed development is 20,000 L/day. Properties with a total daily design sewage flow exceeding 10,000 L/day are subject to Section 53 of the Ontario Water Resources Act and require an Environmental Compliance Approval (ECA) issued by the Ministry of the Environment, Conservation and Parks (MECP). Given that the total daily design sewage flow is 20,000 L/day, an ECA will be required for the sewage works.

5.2 Proposed Sanitary Servicing

An onsite sewage system, consisting of an advanced treatment system with subsurface disposal via leaching bed is proposed for the site. Refer to the Preliminary Site Servicing Plan (Drawing C103) for the layout of the onsite sewage system.

5.2.1 Proposed Advanced Treatment System

As noted above, the total daily design sewage flow is 20,000 L/day. Given the relatively constrained space available for subsurface disposal, advanced treatment of the sewage prior to discharge to the leaching bed will be required. A Level IV treatment unit meeting the effluent objectives as noted in Table 8.6.2.2 of the OBC is recommended.

According to the Hydrogeological Assessment Report (Crozier, October 2023), significant denitrification of the effluent will also be required to meet the MECP's "Reasonable Use" guideline as outlined in Chapter 22 of the MECP Design Guidelines for Sewage Works (2008). An effluent objective of 3 mg/L is recommended for the advanced treatment system. Refer to the Hydrogeological Assessment Report for further details.

There are several technologies available on the market that can achieve the anticipated level of treatment required for this site, including Waterloo Biofilter, the MBBR-IQ system as designed and supplied by BNA Inc., and others. Design of the treatment system will be completed during detailed design stages. A preliminary location for the treatment tanks has been indicated on the Preliminary Site Servicing Plan (Drawing C103).

5.2.2 Proposed Leaching Bed

Treated effluent from the advanced treatment stage will be dosed to a Type A dispersal bed designed in accordance with the OBC for final polishing and dispersal of effluent. As described in Section 3.0, the soils in the proposed leaching bed are sandy soils with an anticipated T-time of 15 min/cm. The proposed Type A dispersal bed will include a sand and stone layer as sized and described below as per OBC 8.7.7.

A stone layer composed of septic stone meeting the criteria outlined in Table 8.7.3.3.A., Division B of the OBC will be installed to accommodate the effluent distribution piping. The minimum stone area is calculated using the following equation.

$$A = \frac{Q}{50}$$

Where:

A = the contact area between the base of the stone layer and the imported sand layer.

Q = the total design sewage flow in L/d.

Given a total daily design flow of 20,000 L/day, a minimum stone area of 400 m² is required. The proposed stone area is 420 m², which will be equipped with four (4) cells of distribution piping. Each cell will be equipped with nine (9) runs of 9 m length of 75 mm perforated distribution pipes placed at 1.0 m centers. Effluent will be conveyed to the proposed dispersal bed by a 50 mm sanitary force main and distributed to each of the cells in the leaching bed via an automatic distribution valve.

The minimum sand area is calculated using the formula below:

$$A = \frac{QT}{850}$$

Where:

A = the contact area in m² between the base of the sand layer and the native soil.

Q = the total design sewage flow in L/d.

T = the percolation time of the underlying soil in min/cm to a maximum of 15 min/cm.

Given a total daily design flow of 20,000 L/day and a percolation time of 15 min/cm for the underlying soils, the minimum size of the sand area required for the leaching bed is calculated to be 353 m². An area of 420 m² is proposed to ensure a consistent sand layer beneath the stone layer. The sand layer will be constructed of imported sand with a T-time of 6 – 10 min/cm and no more than 5% passing the No.200 sieve. The sand layer will be a minimum of 300 mm thick below the stone layer and in all other areas.

Refer to the Preliminary Site Servicing Plan (Drawing C103) for the layout, orientation, and details of the proposed leaching bed.

6.0 Existing Stormwater Servicing

The existing stormwater servicing infrastructure close to the site includes:

- A 300 mm diameter concrete storm sewer transitioning to a 375 mm diameter concrete sanitary sewer on McLean Road West running west to east at a minimum slope of approximately 0.3% (Reconstruction of Wellington Road 46 As-constructed Drawing No. 06).
- Two 300 mm diameter concrete storm sewers which daylight within the McLean Road West roadside ditch directly south of the site. These storm sewers collect runoff from the site and direct it the McLean storm sewer network.
- A 300 mm diameter concrete storm sewer transitioning to a 375 mm diameter concrete sanitary sewer on Brock Road South running north to south at a minimum slope of approximately 0.75% (Reconstruction of Wellington Road 46 As-constructed Drawing No. 04).

Runoff from a portion of the proposed development (0.81 ha) collects in the McLean Road West storm sewer network and is directed to Brock Road South network prior to outletting to Carrol Pond. Carrol Pond is located approximately 600 m south of the proposed development on Brock Road South and provides stormwater quantity and quality controls for the surrounding area. It should be noted the quantity and quality controls within Carrol Pond were designed for the site under pre-development conditions and any development will require on-site controls. Excerpts from the Stormwater Management Report Carrol Pond Municipal Drain (March 2007) have been provided in Appendix D along with the as-constructed drawings of the surrounding area.

7.0 Drainage Conditions

The drainage conditions for the site in both pre-development and post-development conditions are outlined in the following sections.

7.1 Existing Drainage Conditions

According to the topographic survey (Tarasick McMillan Kubicki Limited, November 3, 2022), the site currently consists of vegetated/landscaped areas. The site has a drainage split which divides the site into an eastern and western catchment based on the topographic survey.

The western catchment (Catchment 101) consists primarily of vegetated/landscaped areas and generally slopes east to west. Runoff from Catchment 101 is directed via sheet flow to the adjacent property to the west.

The eastern catchment (Catchment 102) consists primarily of vegetated/landscaped areas and generally slopes west to east. Runoff from Catchment 101 is directed via sheet flow to the McLean Road West ditch where it collects in two 300 mm diameter sewers on McLean Road West prior to outletting to Carrol Pond.

Table 4 summarizes the pre-development catchment areas which were delineated based on the Stormwater Management Report - Carrol Pond Municipal Drain (Township of Puslinch, March 2007).

Table 4: Pre-Development Catchment Area Parameters

Catchment ID	Land-Use Description	Impervious Area (ha)	Pervious Area (ha)	Runoff Coefficient	Outlet
101	Vegetated and landscaped area	-	0.81	0.25	Adjacent Western Lands
102		-	0.81	0.25	McLean Road Sewer

Refer to the Preliminary Pre-Development Drainage Plan (Figure 1) for existing drainage patterns of the site.

7.2 Proposed Drainage Conditions

Based on the Site Plan (ATA Architects Inc., October 4, 2023), the proposed development will consist of a one-storey convenience/restaurant building, car and truck gas bars, parking areas, and two site accesses from Brock Road South and McLean Road West.

The proposed site grading divides the site into three (3) post-development drainage catchment areas with two outlets, as shown on the Post-Development Drainage Plan (Figure 2):

- Catchment 201 consists of uncontrolled drainage from the landscaped areas along the southern and western property boundaries of the site. All storm events from this catchment will continue to be conveyed overland via sheet flow to the neighbouring property to the west consistent with pre-development conditions.
- Catchment 202 consists of drainage from the proposed commercial building, gas bars, and internal paved areas. The minor system stormwater will be collected and conveyed to the proposed underground stormwater management storage tank by the internal storm sewer system. The underground storage tank will be located below the surface parking area at the southeastern limit of the development and sized to store the 100-year storm event. The major system stormwater (greater than the 100-year storm event) will be conveyed overland to the McLean Road West right-of-way. Each system will ultimately drain to Carroll Pond.
- Catchment 203 consists of uncontrolled drainage from the landscaped areas along the eastern property boundaries of the site. All storm events from this catchment will continue to be conveyed overland via sheet flow to the McLean Road West and Brock Road South right-of-ways; ultimately draining towards Carroll Pond, consistent with existing conditions.

Upon development, the minor system will be conveyed from the site to the proposed stormwater management storage tank through the internal storm sewer network consisting of storm sewer and catchbasins. The stormwater management storage tank will provide quantity control for runoff prior to being treated by the proposed oil-grit separator located downstream of the storage tank. Following quantity and quality control, the minor system stormwater will be conveyed through the proposed 300 mm diameter storm lateral to the existing 300 mm storm sewer within McLean Road West, consistent with the existing site conditions.

Table 5 provides details of the catchment areas and runoff coefficients for the post-development conditions.

Table 5: Post-Development Catchment Parameters

Catchment ID	Description	Impervious Area (ha)	Pervious Area (ha)	Runoff Coefficient	Outlet
201	Landscaped area.	-	0.19	0.25	Adjacent Western Lands
202	Proposed building, gas bar, and paved areas.	1.20	0.16	0.82	McLean Road Sewer
203	Landscaped area.	-	0.08	0.25	McLean Road Sewer

Refer to the Preliminary Post-Development Drainage Plan (Figure 2) and the Preliminary Site Grading Plan (Drawing C102) which illustrate the proposed site drainage and servicing plans.

8.0 Stormwater Management

Stormwater management and site drainage for the proposed development must adhere to the policies and standards of the Township of Puslinch and Ministry of Environment, Conservation, and Parks (MECP).

The stormwater management criteria for the development have been summarized below:

Water Quantity Control

According to the Township of Puslinch Municipal Development Standards (September 2019), water quantity controls are required for the site. The water quantity requirements include controlling the post-development peak runoff rates to the pre-development peak runoff rates for storms up to and including the 100-year event (i.e. 2, 5, 10, 50, 100-year return period).

Water Quality Control

At least 80% removal of Total Suspended Solids will be provided with "Enhanced Protection" as outlined in the Ministry of Environment Stormwater Management Planning and Design Manual (2003).

Water Balance

Infiltration facilities shall be designed to ensure that under post-development conditions, infiltration volumes match the pre-development condition.

8.1 Stormwater Quantity Control

As discussed in Section 6.0, stormwater quantity control requirements for the site should include on-site controls to control the post-development flows to the pre-development flows. All storm events greater than the 100-year event are to be released uncontrolled.

McLean Road West - Outlet

Using the City of Guelph intensity-duration-frequency (IDF) data, the Modified Rational Method was used to determine the pre-development and post-development flows from the site. The peak flow target for the site is based on the pre-development flows for the 2-year storm event. The pre-development and post-development flow rates as well as the required storage are summarized below in Table 6.

Table 6: Peak Flow Summary (Discharge towards McLean Road West Storm Sewer)

Storm Event (yr)	Peak Flow (L/s)						Required Storage (m ³)	Total Provided Storage (m ³)
	Q _{pre-102}	Q _{post-202} (uncontrolled)	Q _{post-203} (uncontrolled)	Q _{post} (target)*	Q _{post-202} (controlled)	Q _{post} (controlled)		
2	46	256	5	41	41	46	206	805
5	62	346	6	56		48	339	
10	76	423	8	68		49	434	
25	88	490	9	79		50	559	
50	100	555	10	90		51	633	
100	112	619	11	100		53	760	

*Target = Q_{pre 102} – Q_{post 203}

Based on the modified rational method and orifice sizing calculations, a 134 mm orifice plate will be required to control the 100-year post-development storm event to the 2-year pre-development flow rates. A total storage volume of 760 m³ will be required to provide quantity control for the 100-year storm event. An underground stormwater storage tank has been proposed to provide 805 m³ of stormwater storage. The modified rational and orifice sizing calculations can be referenced in Appendix E.

Adjacent Western Lands - Outlet

The drainage from Catchment 201 consists of sidewalk and landscape runoff from the western extents of the proposed development. The stormwater runoff from Catchment 201 will drain uncontrolled to the western lands consistent with the pre-development runoff conditions. To ensure the uncontrolled flows to the western lands were not increased under post-development conditions, the rational method was used to determine the pre-development and post-development flows. The pre-development and post-development uncontrolled flows for Catchment 201 are outlined in Table 7 below:

Table 7: Peak Flow Summary (Discharge towards the Adjacent Western Lands)

Storm Event (yr)	Pre-Development C102 (L/s)	Post-Development C201 (L/s)	Difference (L/s)
2	46.0	9.7	-35.3
5	62.2	13.1	-47.8
10	76.1	16.0	-58.5
25	88.1	18.5	-67.7
50	99.9	21.0	-76.8
100	111.4	23.4	-85.6

As per the rational calculations, the uncontrolled flows directed to the western lands from the site are reduced for all storm events up to and including the 100-year storm event. Therefore, quantity controls have not been provided for Catchment 201.

8.2 Stormwater Quality Control

Stormwater quality controls for the site must incorporate measures to provide "enhanced protection" as outlined by the Township of Puslinch Municipal Development Standards. Enhanced water quality protection involves the removal of at least 80% of the total suspended solids (TSS) from 90% of the annual runoff volume.

Water quality control for Catchment 202 will be provided using an oil-grit separator (Stormceptor EFO6 or approved equivalent). The oil-grit-separator, located downstream of the underground stormwater storage unit, will provide quality control for runoff before discharging towards the McLean Road West storm sewer network. Details of the proposed oil-grit separator can be referenced in Appendix E.

Catchments 201 and 203 will remain relatively unchanged between pre-development and post-development conditions with no hard surfaces, producing only clean runoff (i.e., landscaped and woodlot areas). Therefore, quality controls have not been provided for these catchments.

8.3 Water Balance

Crozier completed a water balance as part of the Hydrogeological Assessment Report (Crozier, October 2023, under separate cover) for the proposed development. The water balance parameters were established based on the climate data from the Environment Canada Waterloo Wellington A Climate Station (Number 6149387) for the period 1981-2010, as well as the site topography, soil type, and land cover infiltration factors. The results of the water balance indicate that there is an infiltration deficit of approximately 205 mm/year due to an increase in impervious surfaces. The detailed water balance calculations can be referenced in Hydrogeological Assessment Report (Crozier, October 2023).

LID strategies have not been proposed as the major use of the proposed development will be a gas station and LID features could cause hydrocarbons to infiltrate into groundwater. Should the Township require LID's to be implemented within the property to meet the infiltration deficit we will assess the following LID opportunities during the detailed design process:

Rainwater Harvesting

With minimal pre-treatment, the captured rainwater within an outdoor cistern can be used for outdoor non-potable water uses such as irrigation, or in the buildings as gray water.

Enhanced Topsoil

Enhanced topsoil provides water quality benefits in addition to water balance storage which will reduce the infrastructure required to store the required water balance volume. Enhanced topsoil's can be placed in all landscape area to help promote infiltration.

9.0 Erosion and Sediment Controls During Construction

The design of the erosion and sediment controls can be referenced on the Preliminary Erosion, Sediment Control, and Removals Plan (Drawing C101). The erosion and sediment controls will be required to be installed prior to the beginning of any construction activities. They will be maintained until the site is stabilized or as directed by the Site Engineer and/or Township of Puslinch. Controls will be inspected after each significant rainfall event and maintained in proper working condition.

Silt Sacks in Catchbasins

A silt sack will be installed in each new catchbasin as they are installed. The silt sack will provide sediment control to prevent silt and sediment from entering the storm water system. Silt sacks will also be installed on the existing catchbasins during construction to prevent sediment from entering the existing storm sewer pipe.

Sediment Control Silt Fence

Sediment Control Silt Fence will be installed on the perimeter of the site to intercept sheet flow. Additional Sediment Control Silt Fence may be added based on field decisions with the Site Engineer and Owner prior to, during, and following construction.

Mud Mat

A rock mud mat will be installed at the entrance to the construction zone to prevent mud tracking from the site onto surrounding lands and the perimeter roadway network. All construction traffic will be restricted to this access only.

The Removals, Erosion and Sediment Control Plan will be refined throughout the planning application process with consultation with the Township to ensure potential environmental hazards during construction are minimized.

10.0 Conclusions & Recommendations

This report was prepared in support of the Zoning By-Law Amendment for the property located at 7456 McLean Road and 197 Brock Road South in the Township of Puslinch. The proposed development can be serviced for water, sanitary, and stormwater management in accordance with the Township of Puslinch and County of Wellington requirements and standards. Our conclusions and recommendations include:

Proposed Water Services

- The domestic peak hourly water demand for the proposed development is 27.78 L/min. Water servicing will be provided via a private water supply well.
- A minimum storage volume of 58,344 L is the required for fire storage, and it must be supplied at a rate of 30 L/s for a duration of 0.5 hours. The design/location of the fire cistern will be confirmed through consultation with the Fire Chief and the Township throughout the design process.

Proposed Sanitary Services

- The total daily design sewage flow for the proposed development is 20,000 L/day. Sanitary servicing will be provided via an onsite sewage system, consisting of an advanced treatment system with discharge of treated effluent to a Type A dispersal bed sized for 20,000 L/day.

Stormwater Management

- The site's stormwater runoff from the developable area (Catchment 202) will be collected in the proposed stormwater system which includes storm sewer, an underground storage tank, and an oil-grit separator. The underground storage tank and the oil-grit separator will provide the required quantity and quality controls for the proposed development prior to outletting to the existing sewer on McLean Road West. Stormwater runoff the undeveloped catchments (Catchment 201 and 203) will flow uncontrolled towards to their respective outlet.

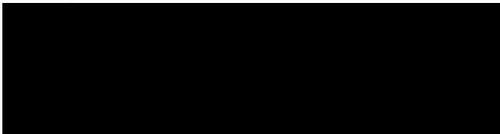
Erosion and Sediment Controls

- Erosion and sediment controls will be implemented prior to construction and maintain to the satisfaction of the Township and Site Engineer until the site is stabilized.

Based on the above conclusions, we recommend the approval of the Zoning By-Law Amendment for the proposed development from the perspective of servicing and stormwater management.

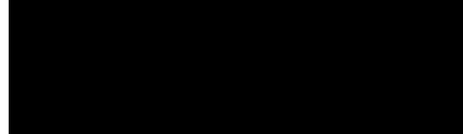
Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Jessica Doherty, P. Eng.
Project Manager

C.F. CROZIER & ASSOCIATES INC.



Brendan Walton, P.Eng.
Project Manager

C.F. CROZIER & Associates Inc.



Brett Pond, E.I.T.
Engineering Intern

BP/jp

J:\2300\2377 - Black-Hart Construction\6556- 7456 McLean Road and 197 Brock Road South\Reports\Civil\2023.10.17 FSRSWM_FINALjp.docx

APPENDIX A

Grain Size Analysis



CHUNG & VANDER DOELEN
ENGINEERING LTD.

311 VICTORIA STREET NORTH
KITCHENER / ONTARIO / N2H 5E1
519-742-8979

July 4, 2023

File No.: M22543 (2377-6556)

Attn: Katherine Rentsch, P.Eng.
Crozier Consulting Engineers
2800 High Point Drive, Suite 100
Milton, Ontario
L9T 6P4

RE: Grain Size Analysis Test Result
7456 Mclean Road
Puslinch, Ontario

Chung & Vander Doelen Engineering Ltd. (CVD) is pleased to submit the enclosed grain size analysis test results for the above noted project.

Should you have any questions, please contact our office at your convenience.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

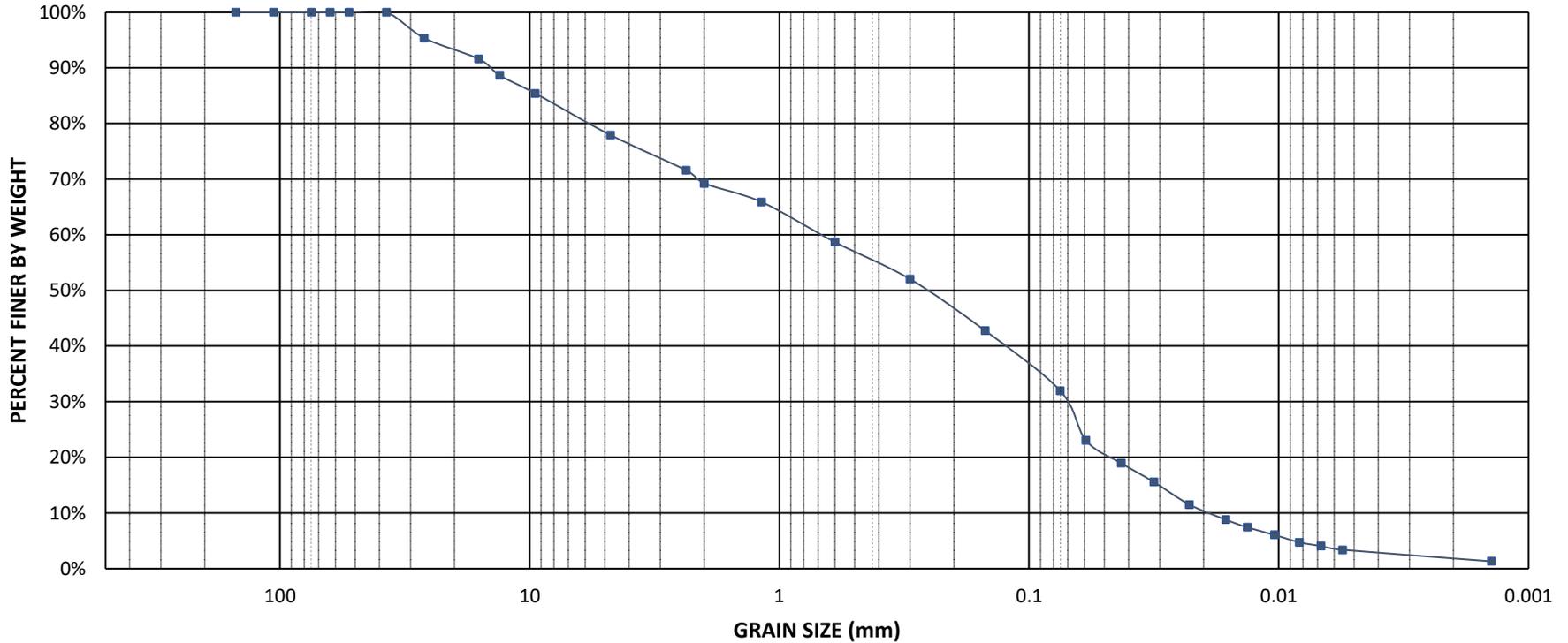


Hugh Arthur
Laboratory Supervisor

GEOTECHNICAL / CONSTRUCTION INSPECTION / MATERIALS TESTING
ENVIRONMENTAL SERVICES / WASTEWATER ENGINEERING / HYDROGEOLOGY

GRAIN SIZE DISTRIBUTION

Unified Soil Classification System						
COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



LL	PL	PI	Cc	Cu	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	% Gravel	% Sand	% Silt	% Clay
			0.39	35.8	37.5	0.68	0.071	0.019	22.1%	45.9%	32.0%	

 CHUNG & VANDER DOELEN ENGINEERING LTD.	SAMPLE INFORMATION		PROJECT INFORMATION	
	Material Type:	Silty Gravelly Sand, trace Clay	Project:	7456 Mclean Road
	Lab No.:	771	Location:	Puslinch, Ontario
Sampled From:	TP3B (0.7 m - 1.3 m)	Client:	Crozier Consulting Engineers	
Sample No.:	1	File No.:	M22543 (2377-6556)	
Date Sampled:	-	Encl. No.:	1	
Sampled By:	Client			
Date Tested:	Wednesday, June 21, 2023			

APPENDIX B

Water Servicing Calculations



Project: 7456 McLean Road W & 197 Brock Road S
Project NO.: 2377-6556
Date: 8/22/2023
Designed By: BP
Checked By: BW

Adequate Water Supply Calculations (OFM Version)
Part 3 Fire Protection, Occupant Safety and Accessibility of the Ontario Building Code

Building: E 572 m²

References

1. Part 3 of the Ontario Building Code (2012)
2. Fire Protection Water Supply Guideline For Part 3 Of The Ontario Building Code, TG-03-1999 (October 1999)
3. Site Plan, ATA Architects Inc. (May 24, 2023)
4. Building type and water supply coefficient confirm with ATA Architects Inc. via. email correspondence on July 19, 2023.

Equation

$$Q = KVS_{Total}$$

Q Minimum supply of water in litres.
 K Water supply coefficient based upon building occupancy.
 V Total building volume in cubic metres.
 S_{TOT} Total of spatial coefficient values from property line exposures on all sides

Minimum Supply of Water

K = 17.0 E Classification (reference 1.)
 V = 3432 m³
 S_{TOT} = 1.0

Exposure	Distance (m)	S _{side}
North	N/A	0.0
East	150.0	0.0
South	80.0	0.0
West	N/A	0.0

Q = 58,344 L

Minimum Water Flow Supply Flow Rate

Required minimum water supply flow rate (L/min) (reference 2.)

Floor area ≤ 600 m²: Yes
 1800 L/min Required flow rate
 0.5 hr Required duration

Q = 54,000 L

Conclusion

Therefore, the minimum water supply for proposed Building is **58,344 L**



Project: 7456 McLean Road W &
197 Brock Road S

Created By: JD
Checked By: JD

Date: 2023.08.22
Updated: 2023.08.23

Project No.: 2377-6556

Domestic Water Demand - Ontario Building Code

Peak Sewage Flow	20,000	L/day
-------------------------	--------	-------

Avg. Daily Demand =	10000	L/day
	6.94	L/min

Peaking Factors

Max Day =	2.00	
Peak Hour =	4.00	
 Average Day =	 6.94	 L/min
Max Day =	13.89	L/min
Peak Hour =	27.78	L/min

Notes & References

Ontario Building Code - Table 8.2.1.3.B

24-hr day

Based on MECP suggested range between 2 and 4 for industrial uses.

Max Day = (Average Day Demand) * (Max Day Factor)
Peak Hour = (Average Day Demand) * (Peak Hour Factor)

Criteria	Average Daily Water Demand (L/min)	Max Day Demand (L/min)	Peak Hourly Demand (L/min)
OBC and MECP Design Guidelines	6.94	13.89	27.78

APPENDIX C

Sanitary Servicing Calculations



ONSITE SEWAGE SYSTEM NON-RESIDENTIAL CALCULATION SHEET

Project Name: 7456 McLean Rd &
 197 Brock Rd S
Project Number: 2377-6556

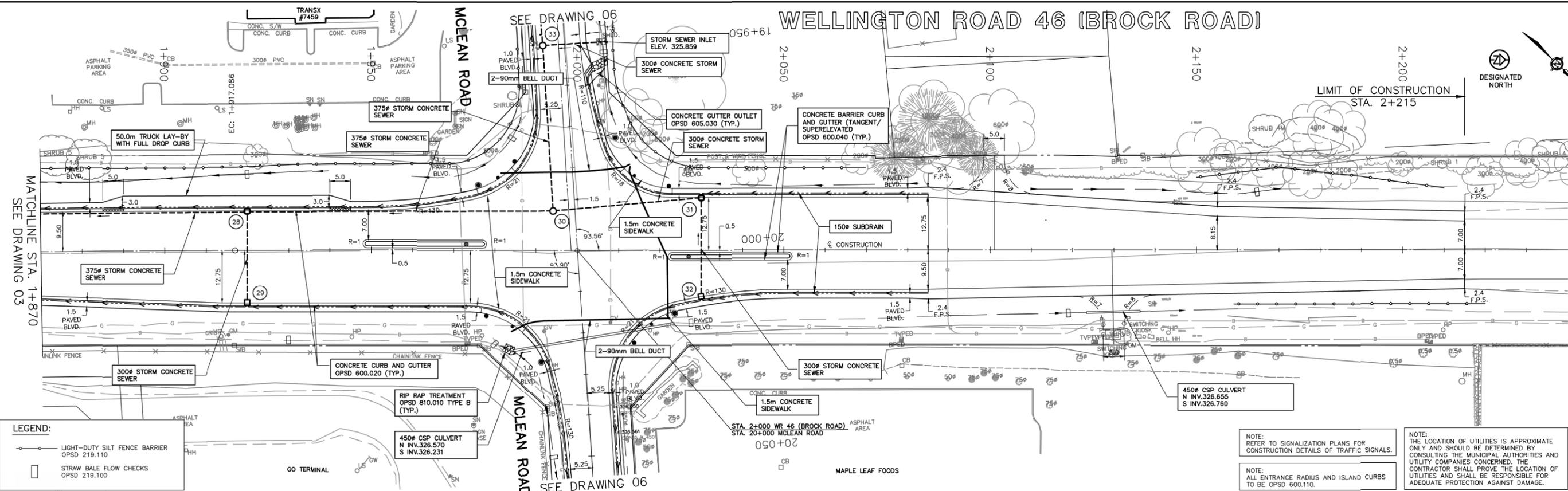
Date: 08.22.2023
Designed By: JD
Checked By: KR

PRELIMINARY FLOW ESTIMATES						##### input required	References/Notes		
Description	Area (m ²)	Unit	Unit Flow	Number of Units	Total Flow (L/day)				
Convenience Store	238	per m ² floor area, or	5	238	1,190	Assume 2 nozzles per pump Assume 1 nozzle per pump			
	n/a	water closet	1230	2	2,460				
Restaurant, 24-hr	325	per seat	200	40	8,000				
Service Station									
Car Gas Bar	n/a	fuel outlet	560	8	4,480				
Truck Gas Bar	n/a	fuel outlet, and	560	6	3,360				
					18,300				
Design Sewage Flow:					20,000				
Pre-Treatment Options									
Required septic tank size =	60000	L minimum							
Propose Level IV Treatment (Y/N):	Y								
Native Percolation time, T =	15	min/cm							
Imported Percolation time =	10	min/cm							
Type A Dispersal Bed									
Stone area required =	400 m ²								
Sand area required =	353 m ²								

APPENDIX D

As-Constructed Drawings & Background Material

WELLINGTON ROAD 46 (BROCK ROAD)



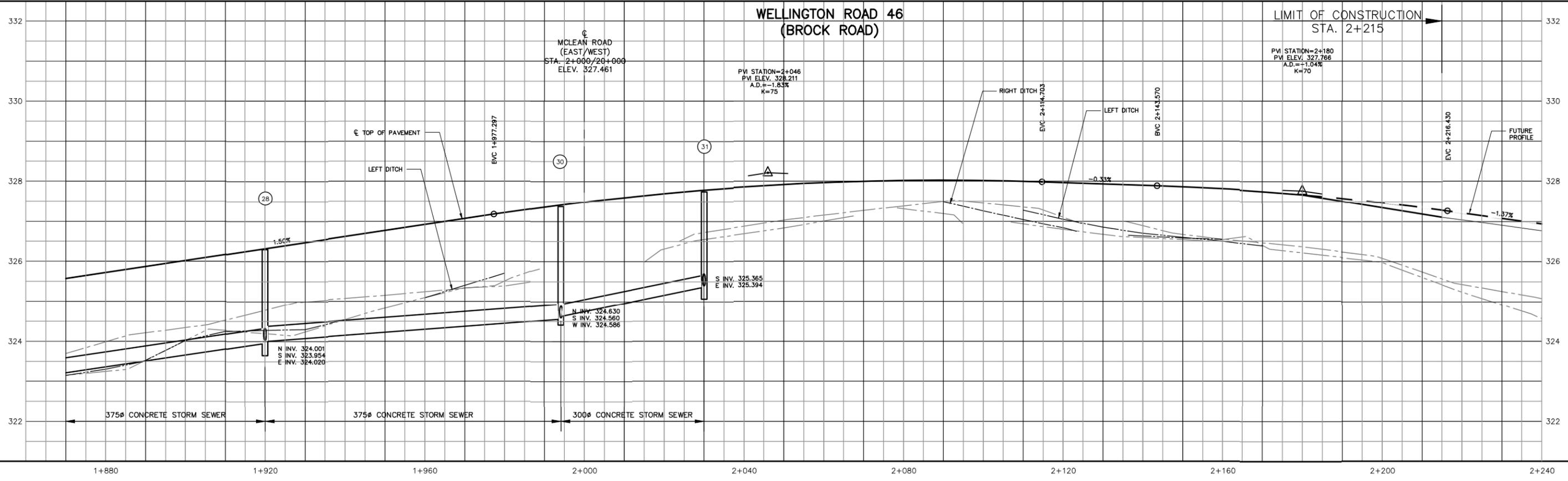
LEGEND:

	LIGHT-DUTY SILT FENCE BARRIER OPSD 219.110
	STRAW BALE FLOW CHECKS OPSD 219.100

NOTE: REFER TO SIGNALIZATION PLANS FOR CONSTRUCTION DETAILS OF TRAFFIC SIGNALS.

NOTE: ALL ENTRANCE RADIUS AND ISLAND CURBS TO BE OPD 600.110.

NOTE: THE LOCATION OF UTILITIES IS APPROXIMATE ONLY AND SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION AGAINST DAMAGE.



NOTES

04	SEPT 2016	REVISED AS RECORDED	H.W.W.
03	FEB 2016	INTERSECTION REVISED MCLEAN WEST	H.W.W.
02	SEPT 2015	ISSUED FOR CONSTRUCTION	H.W.W.
01	JULY 2015	ISSUED FOR TENDER	H.W.W.
No	DATE	REVISION	INITIAL

RECONSTRUCTION OF
WELLINGTON ROAD 46
FROM
HWY 401 TO NORTH OF MCLEAN ROAD

COUNTY OF WELLINGTON
74 WOOLWICH STREET
GUELPH, ONTARIO N1H 3T9

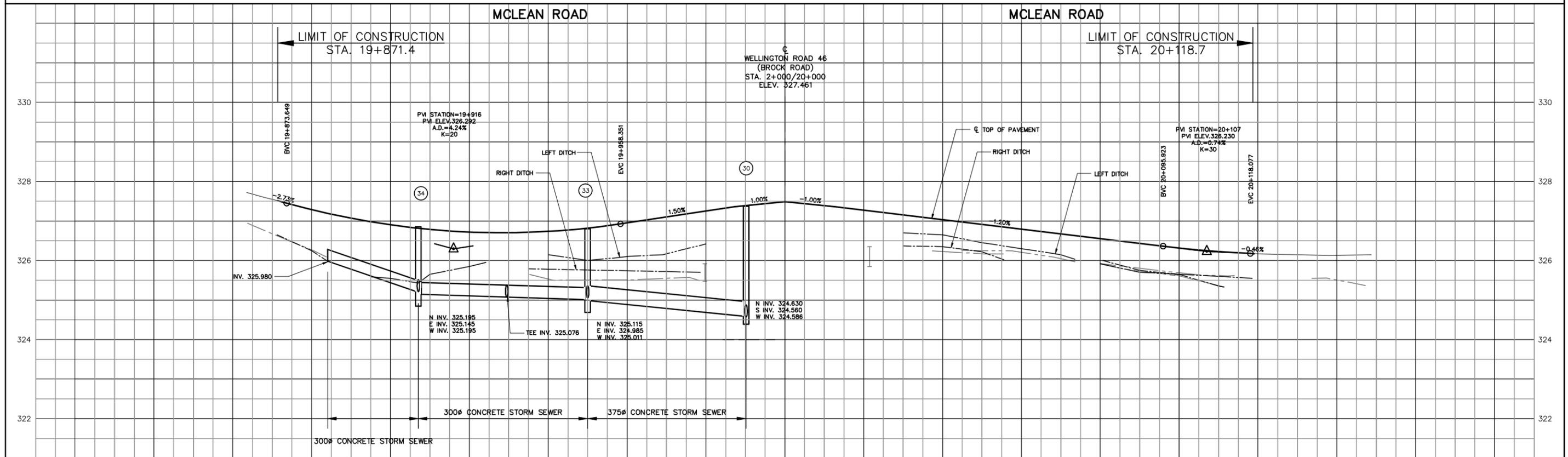
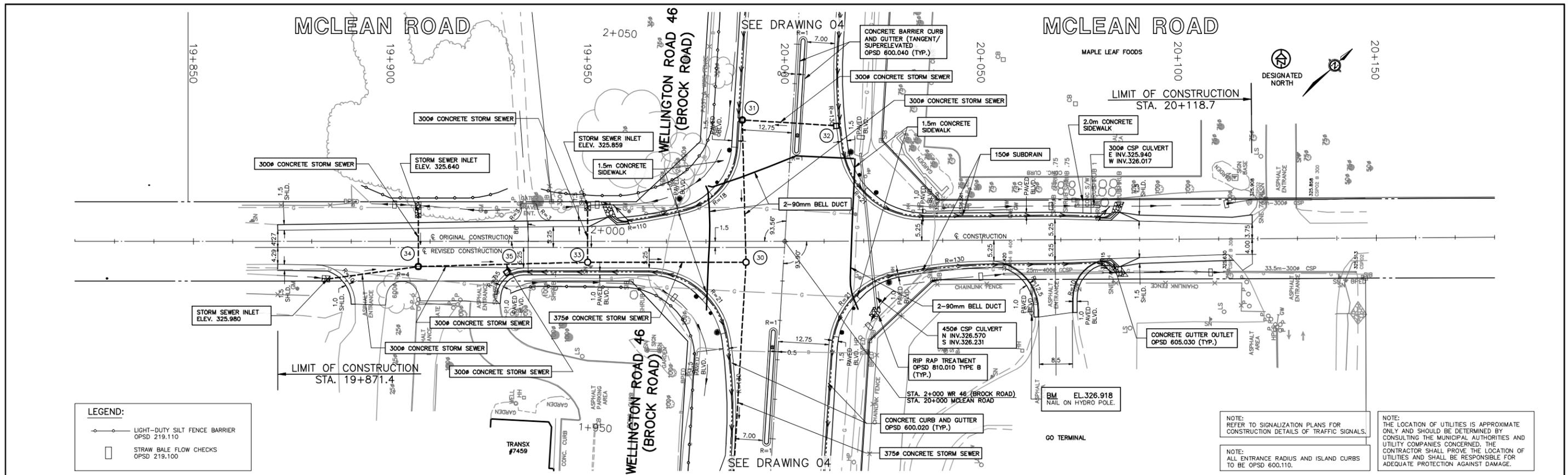
CONSTRUCTION PLAN AND PROFILE
STA. 1+870 TO STA. 2+240

PROJECT No:	CW2015-039
TRITON FILE No:	M6386
DRAWN BY:	K.J.G.
CHECKED BY:	G.J.K.
APPROVED BY:	H.W.W.
DATE:	APRIL 2015



SCALES

1:500	1:50
HORIZONTAL	VERTICAL
DRAWING NUMBER	04



No	DATE	REVISION	INITIAL
04	SEPT 2016	REVISED AS RECORDED	H.W.W.
03	FEB 2016	INTERSECTION REVISION MCLEAN WEST	H.W.W.
02	SEPT 2015	ISSUED FOR CONSTRUCTION	H.W.W.
01	JULY 2015	ISSUED FOR TENDER	H.W.W.

RECONSTRUCTION OF WELLINGTON ROAD 46 FROM HWY 401 TO NORTH OF MCLEAN ROAD

COUNTY OF WELLINGTON
74 WOOLWICH STREET
GUELPH, ONTARIO N1H 3T9

CONSTRUCTION PLAN AND PROFILE
STA. 19+840 TO STA. 20+160

PROJECT No. CW2015-039
TRITON FILE No. M6386
DRAWN BY: K.J.G.
CHECKED BY: G.J.K.
APPROVED BY: H.W.W.
DATE: APRIL 2015

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

SCALES
1:500 1:50
HORIZONTAL VERTICAL

DRAWING NUMBER
06

Carroll Pond Municipal Drain
Stormwater Management Report
Township of Puslinch



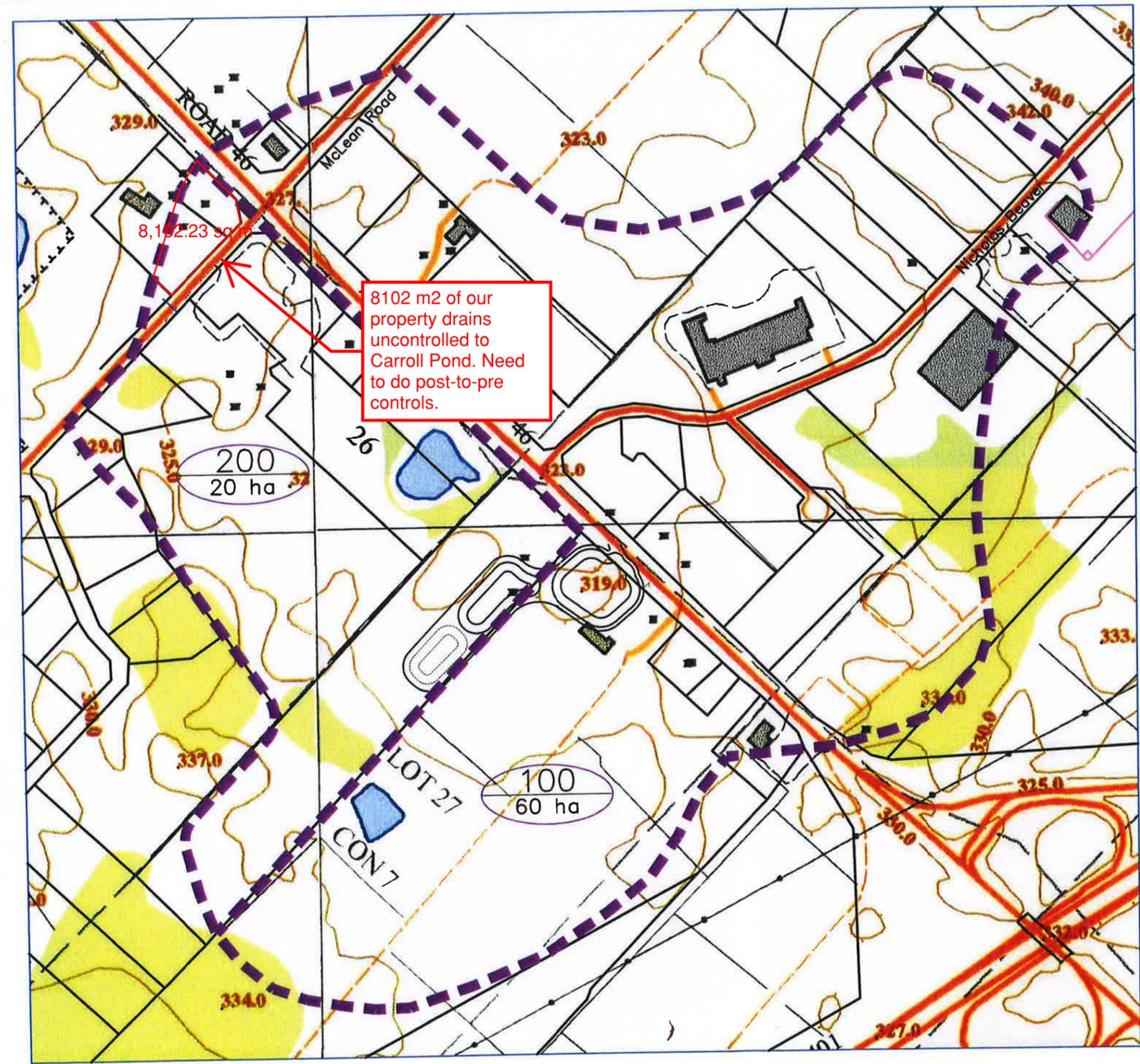
LEGEND

-  DRAINAGE CATCHMENT BOUNDARY
-  CATCHMENT
-  APPROXIMATE DRAINAGE AREA

SCALE = 1:5000
MARCH 2007

DRAINAGE CATCHMENTS

Figure No. 1



APPENDIX E

Stormwater Servicing Calculations



Project: 7456 McLean Road W
Project No.: 2377-6556
Created By: BP
Checked By: BW
Date: 10/18/2022
Updated: 10/16/2023

Modified Rational Calculations - Input Parameters

Storm Data: **Guelph** (per City of Guelph Standards)

Time of Concentration: $T_c = 10$ min (per Township of Puslinch)

Return Period	A	B	C	I (mm/hr)
2 yr	743	6	0.7989	81.10
5 yr	1593	11	0.8789	109.68
10 yr	2221	12	0.9080	134.16
25 yr	3158	15	0.9355	155.47
50 yr	3886	16	0.9495	176.19
100 yr	4688	17	0.9624	196.54

Note: Rainfall Intensity statistics per City of Guelph IDF Curve. (City of Guelph - Development Engineering Manual (January 2019))

Pre-Development Conditions

Catchment	Impervious Area (m ²)	Pervious Area (m ²)	Total Area (m ²)	Runoff Coefficient C	Outlet
101	0	8,099	8,099	0.25	Adjacent Western Lands
102	0	8,102	8,102	0.25	McLean Road Sewer
Total	0	16,201	16,201	-	-

*Runoff coefficients taken from Design Chart 1.07 of the Ministry of Transportation Drainage Manual 1997

**Pre-development catchment areas per the Stormwater Management Report - Carroll Pond Municipal Drain (Township of Puslinch, March 2007)

Post - Development Conditions

Catchment	Impervious Area (m ²)	Pervious Area (m ²)	Total Area (m ²)	Runoff Coefficient C	Outlet
201	0	1,875	1,875	0.25	Adjacent Western Lands
202	11,872	1,633	13,505	0.82	McLean Road Sewer
203	0	821	821	0.25	McLean Road Sewer
Total	11,872	4,329	16,201	-	-

*Runoff coefficients taken from Design Chart 1.07 of the Ministry of Transportation Drainage Manual 1997

**Post-development catchment areas per Crozier Grading Plan dated August 2023.

Equations:

$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i(T_d) \cdot A$$

Peak Flow

$$I = \frac{A}{(t_c + B)^c}$$

Intensity

Rational Calculations - Peak Flows Summary

Pre-Development Flows of Development Area (L/s)		
Return Period	Q ₁₀₁	Q ₁₀₂
2 yr	46.0	46.0
5 yr	62.2	62.2
10 yr	76.1	76.1
25 yr	88.1	88.2
50 yr	99.9	99.9
100 yr	111.4	111.5

Post-Development Flows of Development Area (L/s)			
Return Period	Q ₂₀₁	Q ₂₀₂	Q ₂₀₃
2 yr	10.6	251.9	4.7
5 yr	14.4	340.7	6.3
10 yr	17.6	416.7	7.7
25 yr	20.4	482.9	8.9
50 yr	23.1	547.3	10.1
100 yr	25.8	610.5	11.3

Peak Flows Summary (L/s)			
Return Period	Q _{Pre Total}	Q _{Post Total}	Net Change (Post-to-Pre)
2 yr	92.0	267.2	175.2
5 yr	124.4	361.4	237.0
10 yr	152.1	442.0	289.9
25 yr	176.3	512.2	335.9
50 yr	199.8	580.5	380.7
100 yr	222.9	647.5	424.7

Equations:

$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i(T_d) \cdot A$$



Project: 7456 McLean Road W
Project No.: 2377-6556
Created By: BP
Checked By: BW
Date: 10/18/2022
Updated: 10/18/2023

Modified Rational Calculations - Summary

Outlet to McLean Road Sewer - Controlled

Storm Event (yr)	Peak Flow (L/s)						Required Storage (m ³)	Total Provided Storage (m ³)
	Q _{pre-102}	Q _{post-202} (uncontrolled)	Q _{post-203} (uncontrolled)	*Q _{post} (target)	Q _{post-202} (controlled)	Q _{post} (controlled)		
2	46.0	251.9	4.7	41.3	41.2	45.9	206	805
5	62.2	340.7	6.3	55.9		47.5	339	
10	76.1	416.7	7.7	68.4		48.9	434	
25	88.2	482.9	8.9	79.2		50.2	559	
50	99.9	547.3	10.1	89.8		51.3	633	
100	111.5	610.5	11.3	100.2		52.5	760	

*Q_{post} Target = Q_{pre102} - Q_{post-203} to determine the controlled flow rate for Catchment 202.

Outlet to Western Property - Uncontrolled

Storm Event (yr)	Pre- Development (L/s)	Post- Development (L/s)	Difference (L/s)
	101	201	
2	46.0	10.6	-35.3
5	62.2	14.4	-47.8
10	76.1	17.6	-58.5
25	88.1	20.4	-67.7
50	99.9	23.1	-76.8
100	111.4	25.8	-85.6



Project: 7456 McLean Road W
Project No.: 2377-6556
Created By: BP
Checked By: BW
Date: 10/18/2022
Updated: 10/16/2023

Orifice Plate Design Summary

Orifice Type =	Orifice Plate	
Invert Elevation =	325.27	m
Diameter of Orifice =	134	mm
Area of Orifice (A) =	0.01	sq.m
Orifice Coefficient (Cd) =	0.64	

Notes

Based on underground storage tank invert.

Calculation of Head

Centroid Elevation =	325.34	m
Water Elevation =	326.40	m
Upstream Head (h) =	1.06	m

Based on lowest CB Grade.

$Q_a =$	$(Cd)(A)(2gh)^{0.5}$	
Actual Controlled Discharge, $Q_a =$	0.04	cms
Actual Controlled Discharge, $Q_a =$	41.22	L/s



Project: 7456 McLean Road W
 Project No.: 2377-6556
 Created By: BP
 Checked By: BW
 Date: 10/18/2022
 Updated: 10/16/2023

Modified Rational Calculations - 100-Year Storm Event

Control Criteria

100 yr: Control Post-Development Peak Flows to Orifice Controls

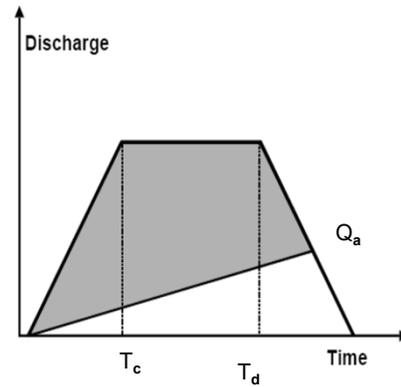
Post Development Conditions (100 Year Storm Event)

Inputs	
Weighted Runoff Coefficient	0.82
Area (ha)	1.35
Q_{post} (m ³ /s)=	0.61

Target Flows (2-year event) - Orifice Control

Q_{target} =	0.041 m ³ /s
----------------	-------------------------

Storage Volume Determination				
T_d (min)	i (mm/hr)	T_d (sec)	Q_{Uncont} (m ³ /s)	S_d (m ³)
5	239.35	300	0.743	204.5
10	196.54	600	0.610	341.5
15	166.89	900	0.518	435.6
20	145.13	1200	0.451	503.8
25	128.46	1500	0.399	555.2
30	115.28	1800	0.358	595.1
35	104.59	2100	0.325	626.6
40	95.75	2400	0.297	651.9
45	88.31	2700	0.274	672.5
50	81.95	3000	0.255	689.5
55	76.47	3300	0.238	703.4
60	71.69	3600	0.223	715.0
65	67.47	3900	0.210	724.6
70	63.74	4200	0.198	732.6
75	60.40	4500	0.188	739.1
80	57.40	4800	0.178	744.5
85	54.69	5100	0.170	748.9
90	52.23	5400	0.162	752.4
95	49.98	5700	0.155	755.1
100	47.93	6000	0.149	757.1
105	46.03	6300	0.143	758.6
110	44.29	6600	0.138	759.5
115	42.67	6900	0.133	760.0
120	41.17	7200	0.128	760.0
125	39.78	7500	0.124	759.7
Required Storage Volume:				760.0



Peak Flow $Q_{post} = 0.0028 \cdot C_{post} \cdot i(T_d) \cdot A$
--

Storage $S_d = Q_{post} \cdot T_d - Q_{target} (T_d + T_c) / 2$
--

Stormceptor® EF Sizing Report

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

10/17/2023

Province:	Ontario
City:	Township of Puslinch
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34

Project Name:	7456 McLean Road West
Project Number:	2377-6556
Designer Name:	Brett Pond
Designer Company:	C.F. Crozier & Associates
Designer Email:	bpond@cfcrozier.ca
Designer Phone:	226-567-9393
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Site Name:	7456 McLean Road West
------------	-----------------------

Drainage Area (ha):	1.35
---------------------	------

Runoff Coefficient 'c':	0.82
-------------------------	------

Particle Size Distribution:	Fine
-----------------------------	------

Target TSS Removal (%):	80.0
-------------------------	------

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	41.94
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	42.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	1091

Net Annual Sediment (TSS) Load Reduction Sizing Summary	
Stormceptor Model	TSS Removal Provided (%)
EFO4	69
EFO6	82
EFO8	89
EFO10	93
EFO12	97

Recommended Stormceptor EFO Model: **EFO6**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **82**

Water Quality Runoff Volume Capture (%): **> 90**



Stormceptor® **EF** Sizing Report

THIRD-PARTY TESTING AND VERIFICATION

► Stormceptor® EF and Stormceptor® EFO are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

► Stormceptor® EF and EFO remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

► The Canadian ETV PSD shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5



Stormceptor® EF Sizing Report

Upstream Flow Controlled Results

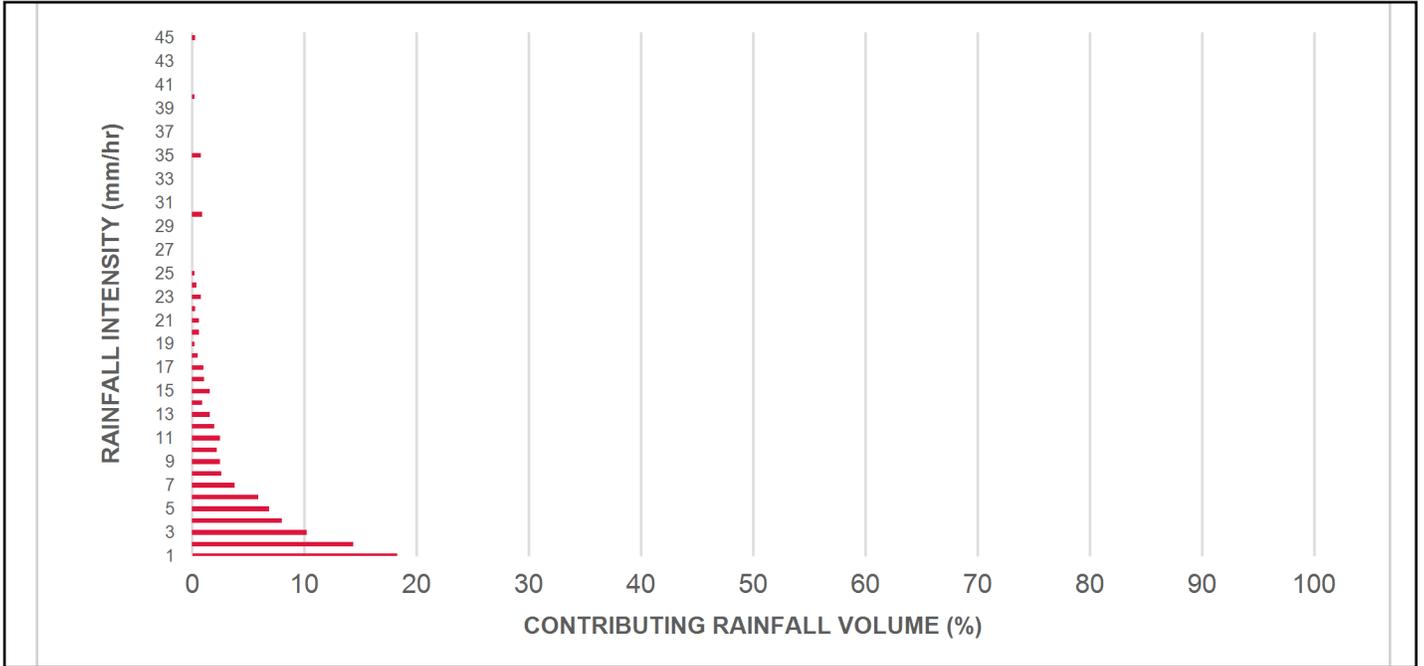
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	1.54	92.0	35.0	100	8.5	8.5
1.00	18.3	26.8	3.08	185.0	70.0	100	18.3	26.8
2.00	14.4	41.3	6.15	369.0	140.0	91	13.1	39.9
3.00	10.2	51.5	9.23	554.0	211.0	83	8.4	48.4
4.00	8.0	59.5	12.31	739.0	281.0	79	6.4	54.7
5.00	6.9	66.4	15.39	923.0	351.0	76	5.3	60.0
6.00	5.9	72.3	18.46	1108.0	421.0	73	4.3	64.3
7.00	3.8	76.1	21.54	1293.0	491.0	70	2.6	66.9
8.00	2.6	78.7	24.62	1477.0	562.0	66	1.7	68.6
9.00	2.5	81.1	27.70	1662.0	632.0	64	1.6	70.2
10.00	2.2	83.3	30.77	1846.0	702.0	64	1.4	71.6
11.00	2.5	85.8	33.85	2031.0	772.0	63	1.6	73.2
12.00	2.0	87.8	36.93	2216.0	842.0	63	1.3	74.4
13.00	12.2	100.0	40.01	2400.0	913.0	62	7.6	82.0
14.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
15.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
16.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
17.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
18.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
19.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
20.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
21.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
22.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
23.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
24.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
25.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
30.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
35.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
40.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
45.00	0.0	100.0	42.00	2520.0	958.0	62	0.0	82.0
Estimated Net Annual Sediment (TSS) Load Reduction =								82 %

Climate Station ID: 6149387 Years of Rainfall Data: 34

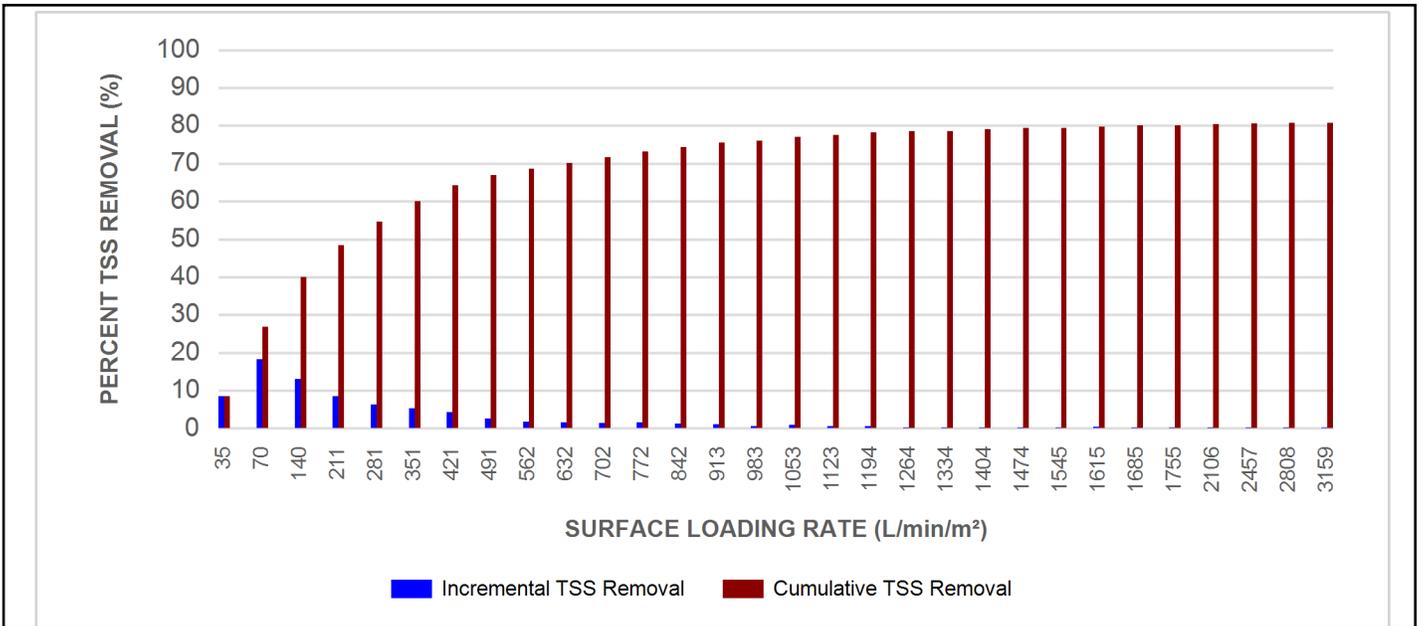


Stormceptor® EF Sizing Report

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® **EF** Sizing Report

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

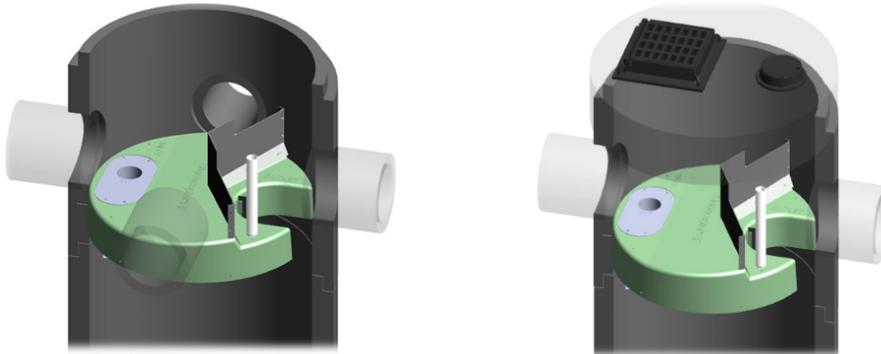
► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

DESIGN FLEXIBILITY

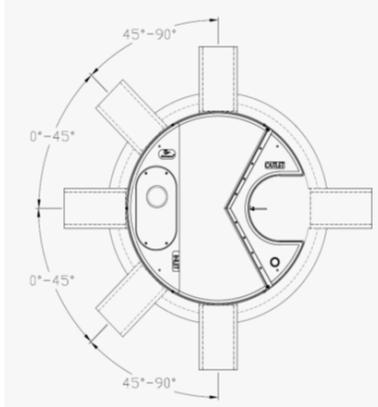
► Stormceptor® EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, Stormceptor® EFO has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure.

The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m ³ sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

Stormceptor® EF Sizing Report

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

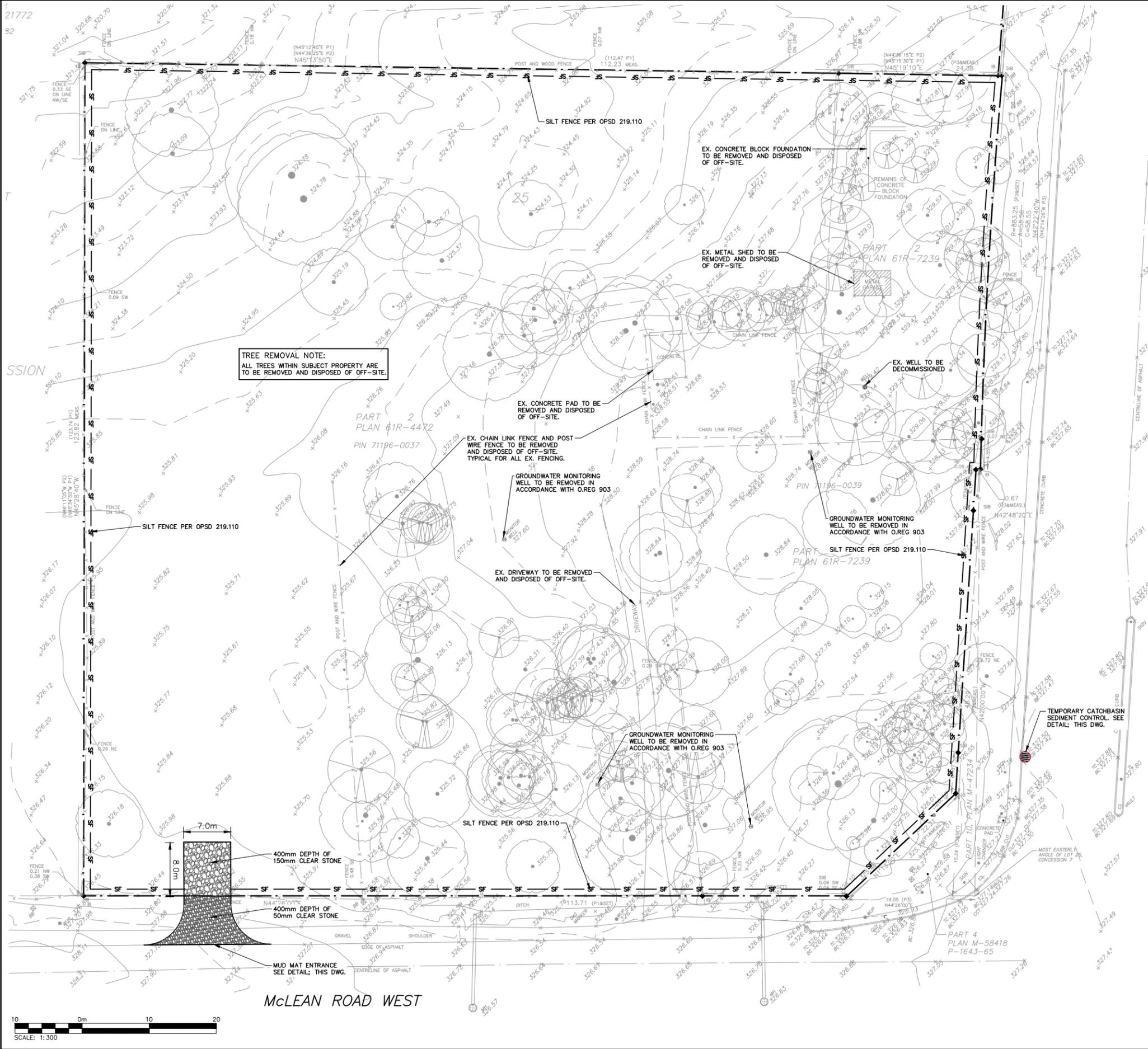
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

Stormceptor® **EF** Sizing Report

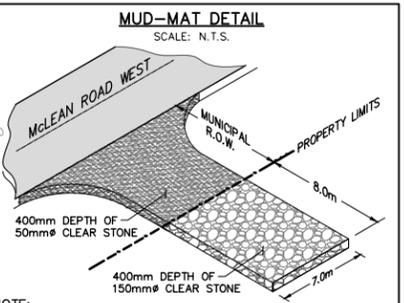
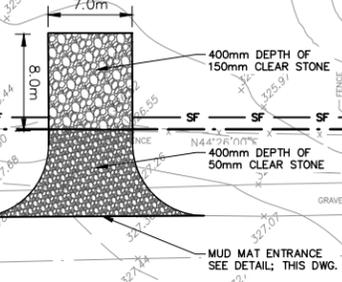
assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

DRAWINGS



TREE REMOVAL NOTE:
ALL TREES WITHIN SUBJECT PROPERTY ARE TO BE REMOVED AND DISPOSED OF OFF-SITE.



NOTE:
GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUAL) TO BE PLACED AS SEPARATION BARRIER BETWEEN EXISTING GROUND AND CLEAR STONE.

EROSION & SEDIMENT CONTROL NOTES:

1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.



LEGEND

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING CONTOUR (1.0m)
- - - EXISTING FENCE
- - - EXISTING GRADE
- MUD-MAT; SEE DETAIL
- SF SILT FENCE; SEE DETAIL
- PROPOSED SEDIMENT CONTROL DEVICE IN EX. CATCHBASIN PER

0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM COVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.522

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR7 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH

Drawing
PRELIMINARY EROSION, SEDIMENT CONTROL AND REMOVALS PLAN

NOT FOR CONSTRUCTION

Stamp
FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

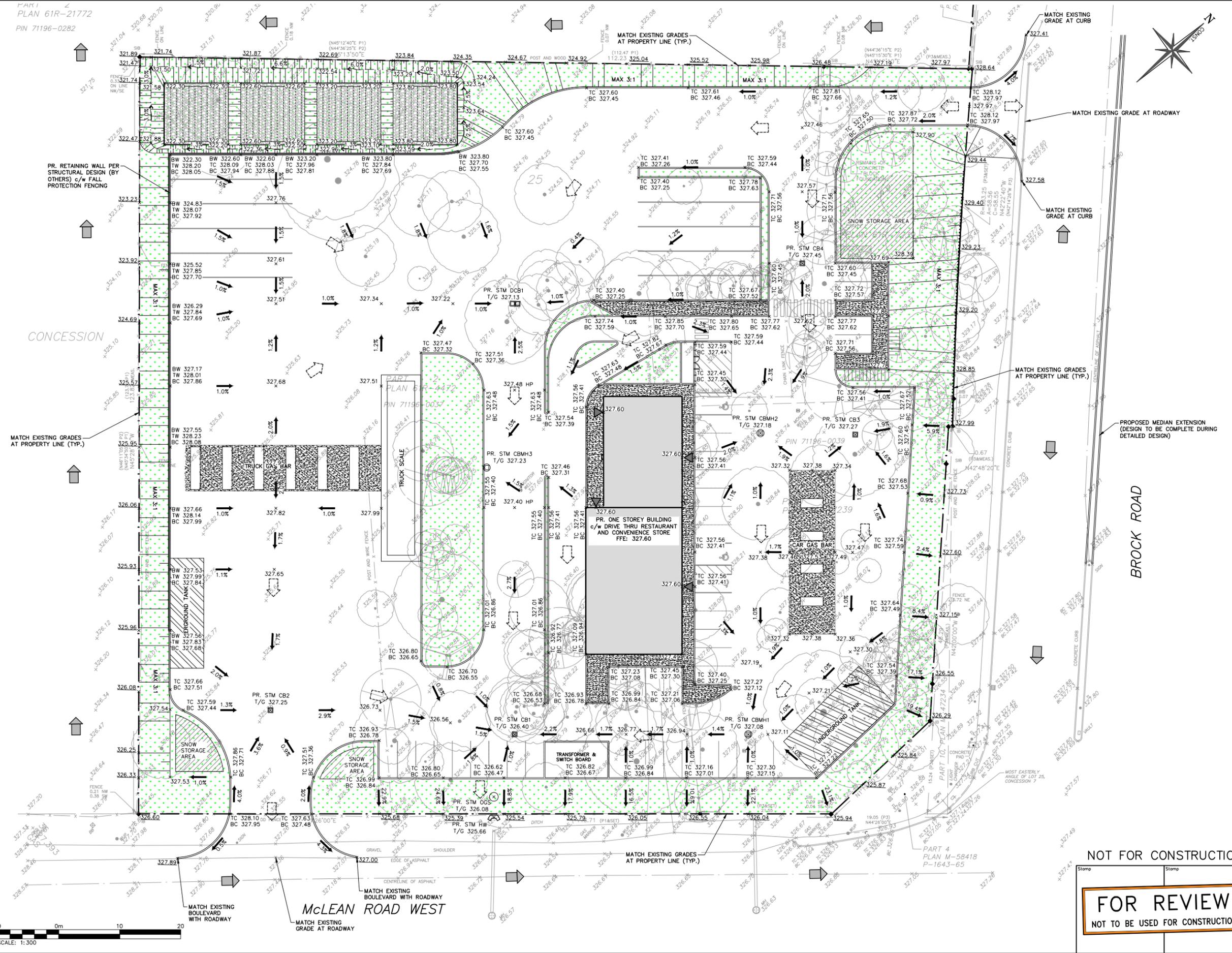
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 101



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED GRADE (TO MATCH EXISTING)
- PROPOSED MINOR FLOW DIRECTION
- PROPOSED GRASSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION



0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
 ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM COVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.592

BEARING NOTE:
 BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
 SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR7 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
 DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
 THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
 THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH

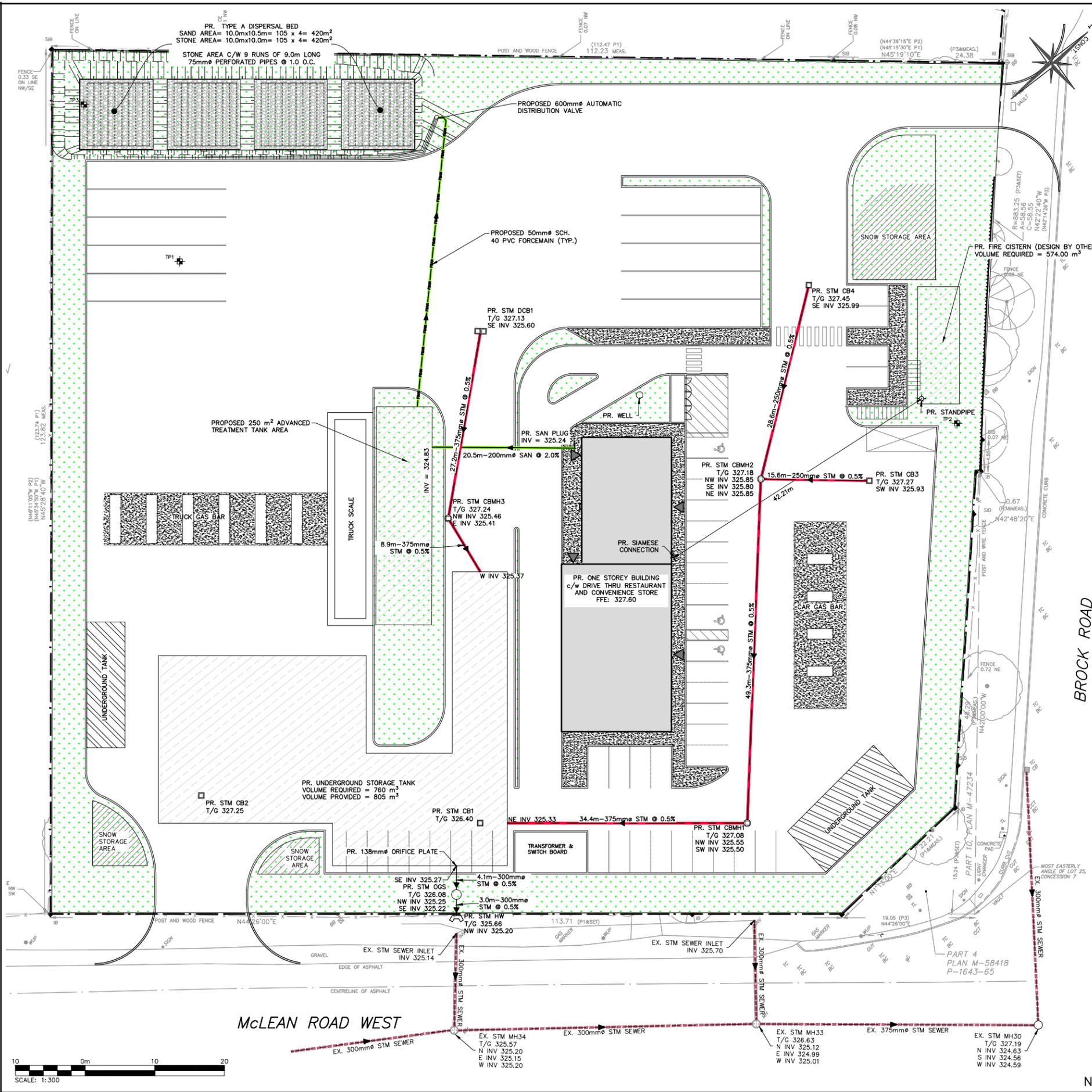
Drawing
PRELIMINARY SITE GRADING PLAN

NOT FOR CONSTRUCTION
FOR REVIEW
 NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
 2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn: M.I.M. Design: B.W. Project No: **2377-6556**
 Check: S.C. Scale: 1:300 Dwg: **C 102**





SEWAGE SYSTEM NOTES

1. PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
2. INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ON-SITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
3. THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
4. CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWAGE WORKS PRIOR TO CONSTRUCTION.
5. ALL COMPONENT LOCATIONS SHALL BE FIELD VERIFIED WITH THE ENGINEER PRIOR TO INSTALLATION.
6. ALL EARTHWORKS, INCLUDING PLACEMENT OF FILL ARE TO BE UNDERTAKEN WITH TRACK MOUNTED EQUIPMENT TO KEEP COMPACTION TO A MINIMUM. KEEP ALL TRAFFIC IN THE AREA OF THE PROPOSED LEACHING BED TO A MINIMUM.
7. ALL TOPSOIL AND ORGANICS TO BE REMOVED FROM LEACHING BED AREA.
8. IF HIGH GROUNDWATER CONDITIONS ARE EVIDENT AT THE TIME OF CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. ALL VERTICAL CLEARANCE DISTANCES AS REQUIRED BY THE ONTARIO BUILDING CODE MUST BE MAINTAINED.
9. GRAVITY SEWERS TO HAVE MINIMUM 0.6 M COVER AND SHALL BE INSULATED WHERE LESS THAN 1.0M COVER IS PROVIDED. FORCE MAIN SHALL BE INSULATED WHERE LESS THAN 1.5 M COVER IS PROVIDED. BEDDING, COVER AND BACKFILL TO BE IN ACCORDANCE WITH OPSS.
10. UNLESS OTHERWISE NOTED PE FORCE MAIN TO BE HDPE SERIES 100 OR DR 13.5 PE AND PVC FORCE MAIN TO BE SCHEDULE 40. GRAVITY SEWERS TO BE SDR-35. FORCE MAIN TO BE PROVIDED WITH TRACER WIRE, SECURED TO THE TOP OF THE PIPE WITH WATER PROOF TAPE OR ZIP TIES.
11. ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
12. ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GALVANIZED OR STAINLESS STEEL.
13. ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR WATER TIGHT SEAL. ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH CAST IN RUBBER BOOT FOR WATER TIGHT SEAL. UNLESS OTHERWISE NOTED ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH TEES.
14. ALL TANKS TO BE PROVIDED WITH PRECAST CONCRETE OR PVC ACCESS RISERS TO GRADE. HATCHES TO BE BOLTED AND GASKETED AND ACCESSIBLE AT GRADE. ALL CIRCULAR HATCHES TO BE 600 MM DIAMETER POLYLOK RISER WITH CAST IN ADAPTOR. ALL SQUARE ACCESS OPENINGS TO BE EQUIPPED WITH CONCRETE RISERS. VENTED HATCHES TO BE PROVIDED ON TANKS CONTAINING PUMPS.
15. A TANK SHALL NOT BE COVERED BY SOIL OR LEACHING BED FILL HAVING A DEPTH GREATER THAN THE MAXIMUM DEPTH OF BURIAL THAT THE TANK IS DESIGNED TO WITHSTAND.
16. EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
17. WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
18. ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL.
19. ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95%.
20. ALL DISTURBED AREAS TO BE TOPSOILED (100MM MINIMUM) AND SEEDING COMPLETE WITH FERTILIZER AND MULCH IN ACCORDANCE WITH OPSS.
21. THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSL/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
22. UNLESS OTHERWISE NOTED, ALL LEVEL IV TREATMENT UNITS SHALL BE PROVIDED FROM A MANUFACTURER THAT IS CERTIFIED BY CAN/BNO 3680-600 TO PROVIDE A LEVEL OF TREATMENT IN ACCORDANCE WITH OBC TABLE 8.6.2.2 PROVIDING AN EFFLUENT CRITERIA OF 10mg/L SUSPENDED SOLIDS, AND 10mg/L OF CBOD5.
23. ALL TREATMENT UNITS THAT CONTAIN MECHANICAL COMPONENTS SHALL BE EQUIPPED WITH AN AUDIBLE AND VISUAL WARNING ALARM, LOCATED TO WARN THE OCCUPANTS OF THE BUILDING SERVED OR THE OPERATOR OF THE TREATMENT UNIT OF A MALFUNCTION IN THE OPERATION OF THE TREATMENT UNIT.
24. THE CONTRACTOR WILL ENSURE THAT EVERY OPERATOR OF A TREATMENT UNIT SHALL OBTAIN, FROM THE MANUFACTURER OR DISTRIBUTOR OF THE TREATMENT UNIT, LITERATURE THAT DESCRIBES THE UNIT IN DETAIL AND PROVIDES COMPLETE INSTRUCTIONS REGARDING THE OPERATION, SERVICING, AND MAINTENANCE REQUIREMENTS OF THE UNIT AND ITS RELATED COMPONENTS NECESSARY TO ENSURE THE CONTINUED PROPER OPERATION IN ACCORDANCE WITH THE ORIGINAL DESIGN AND SPECIFICATIONS.
25. ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
26. SEWAGE SYSTEM HAS BEEN DESIGNED TO RECEIVE DOMESTIC STRENGTH WASTEWATER. ALL SANITARY WASTEWATER FROM THE BUILDINGS MUST MEET THE APPLICABLE SEWER USE BYLAW LIMITS PRIOR TO DISCHARGE TO ADVANCED TREATMENT SYSTEM.



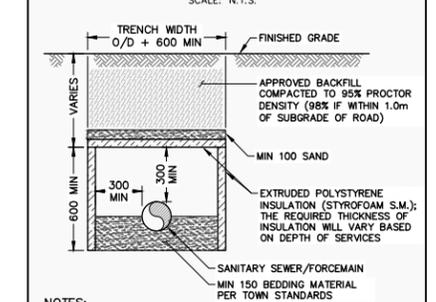
LEGEND

- PROPERTY LINE
- EXISTING STORM SEWER & MANHOLE
- EXISTING SINGLE / DOUBLE CATCHBASIN
- PROPOSED WATERMAIN & GATE VALVE
- PROPOSED STANDPIPE
- PROPOSED SIAMESE CONNECTION
- PROPOSED WELL
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- TEST PIT LOCATION

ON-SITE SEWAGE DESIGN

DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 20,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPERSAL BED STONE AREA	Q/50 = 20,000/50 REQUIRED = 400 m ² PROVIDED = 420 m ²
TYPE A DISPERSAL BED SAND AREA	QT/850 = 20,000*15/850 REQUIRED = 352 m ² PROVIDED = 420 m ²

INSULATION FOR SHALLOW SANITARY SERVICES



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
 2. 50mm OF INSULATION IS REQUIRED FOR EVERY 600mm OF COVER DEFICIENCY.
 3. MINIMUM COVER REQUIREMENTS: - SANITARY SEWER 1.0m

ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPRT COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project: **7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH**

Drawing: **PRELIMINARY SITE SERVICING PLAN**

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

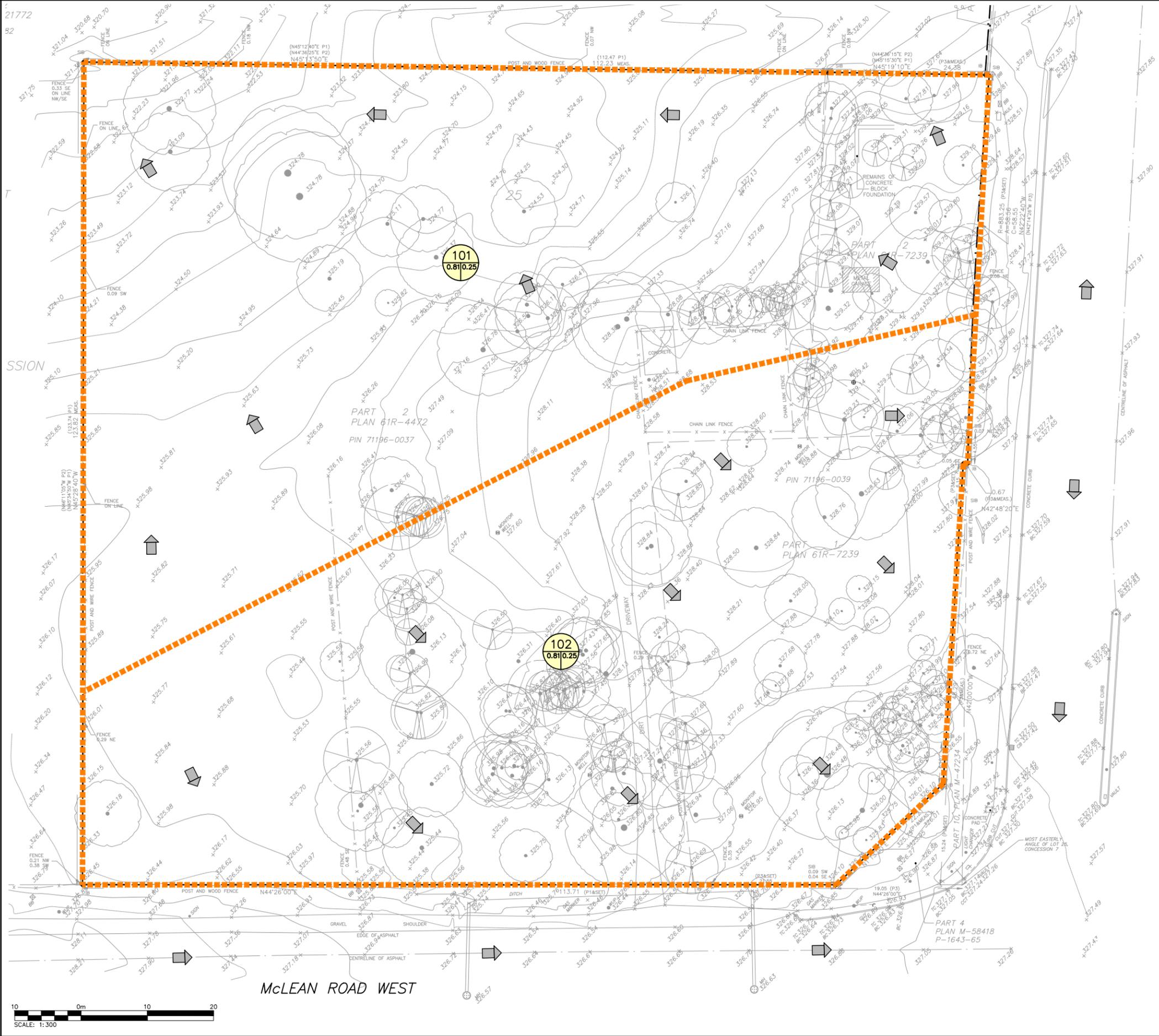


Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 103



NOT FOR CONSTRUCTION

FIGURES



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PRE-DEVELOPMENT STORM DRAINAGE CATCHMENT AREA
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT

PRE-DEVELOPMENT CATCHMENT AREAS PER THE STORMWATER MANAGEMENT REPORT - CARROLL POND MUNICIPAL DRAIN (TOWNSHIP OF PUSLINCH, MARCH 2007)

0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR7 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH

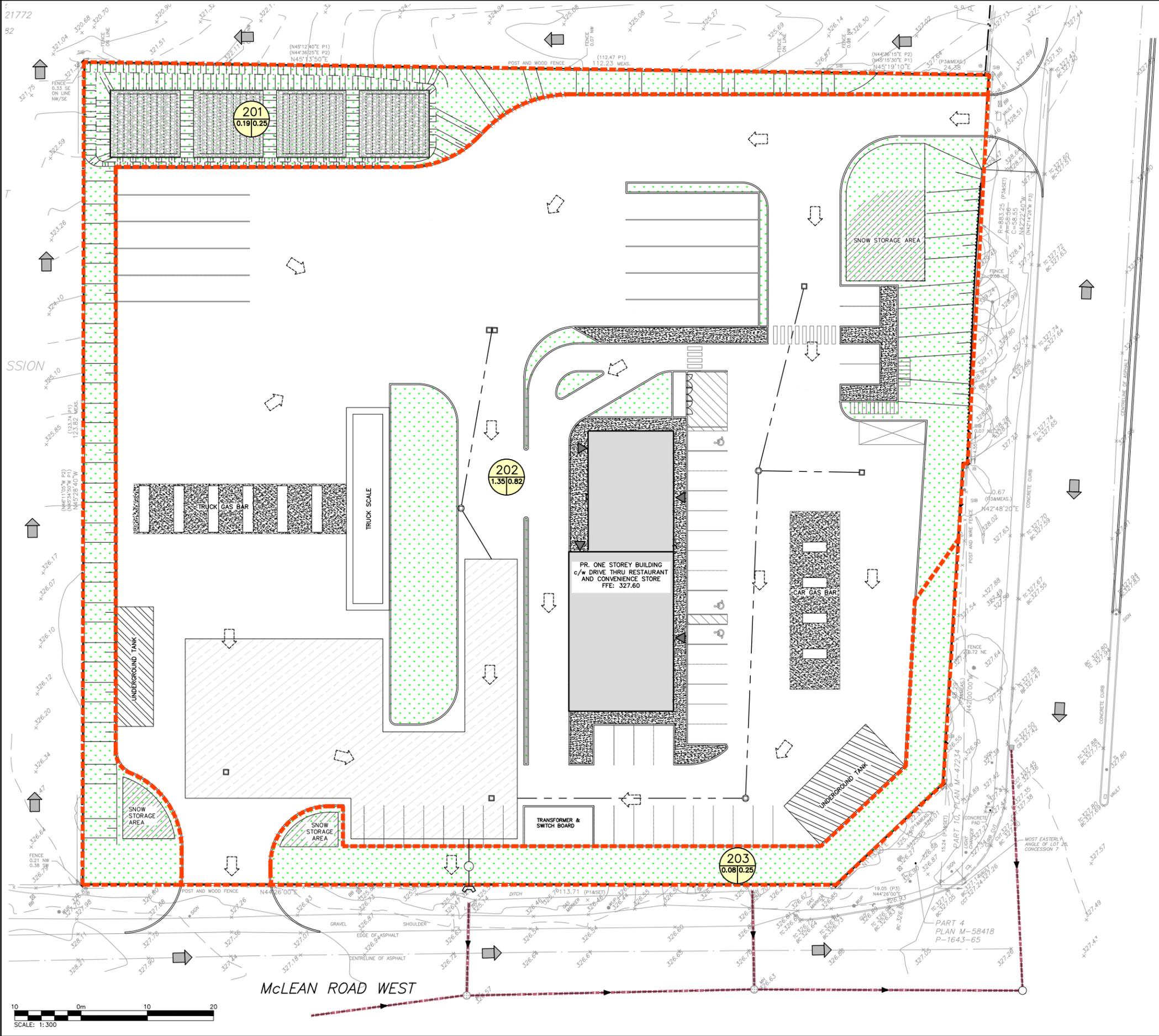
Drawing
PRELIMINARY PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

<p>CROZIER CONSULTING ENGINEERS</p> <p>2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA</p>	Design	B.W.	Project No.	2377-6556	
	Drawn	M.I.M.	Scale	1:300	
Check	S.C.	Check	B.W./K.R.	Dwg.	FIG 1





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SINGLE / DOUBLE CATCHBASIN
- POST-DEVELOPMENT CATCHMENT AREA
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT

0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52.

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED.
PROJECT FILE No. 9625-SRPR
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC.
DATED: OCTOBER 04, 2023
DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
**7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWN OF PUSLINCH**

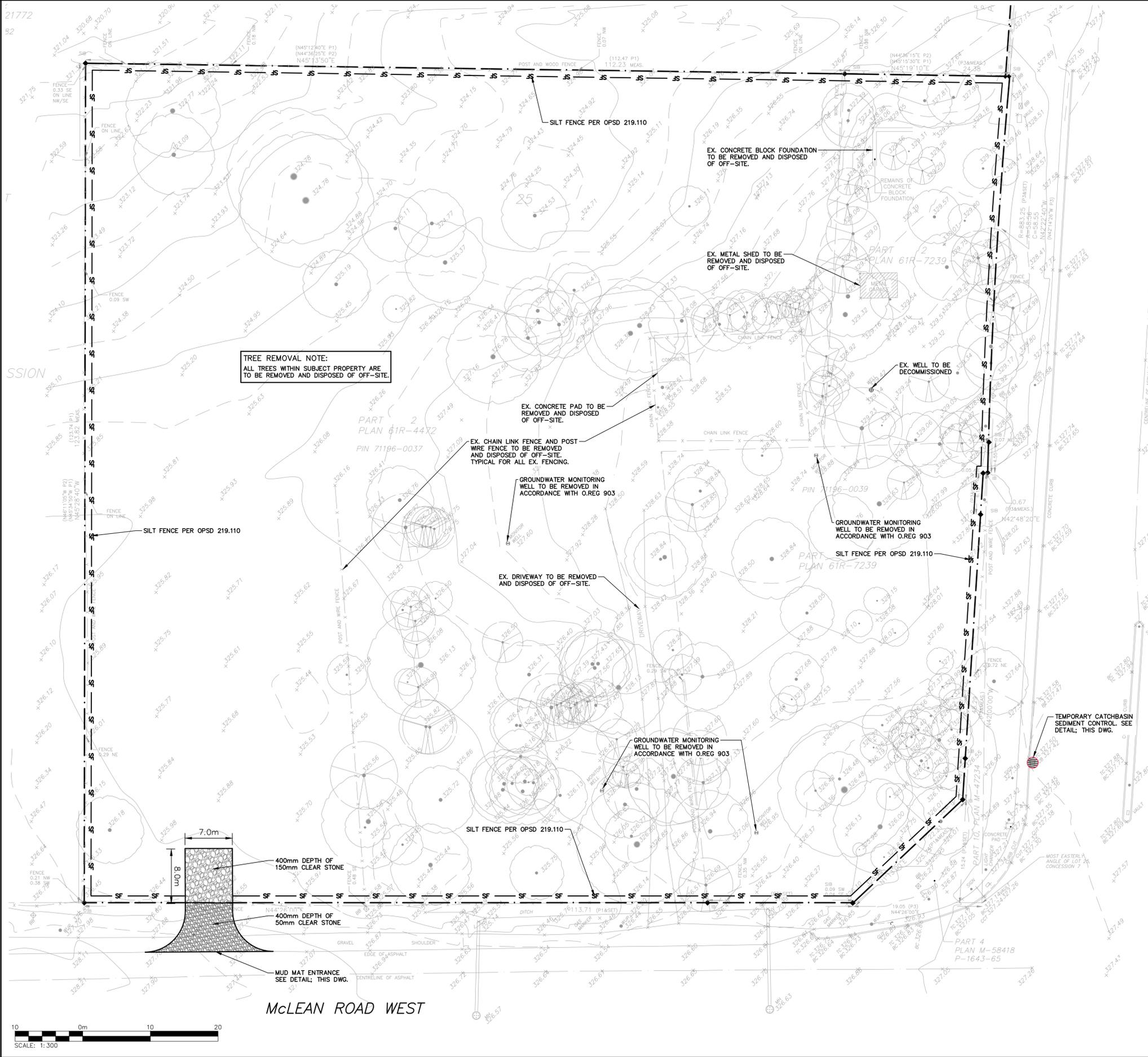
Drawing
**PRELIMINARY POST-DEVELOPMENT
DRAINAGE PLAN**

NOT FOR CONSTRUCTION
FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

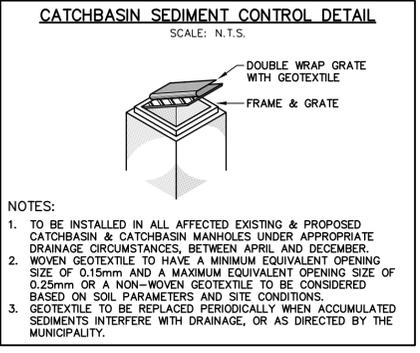
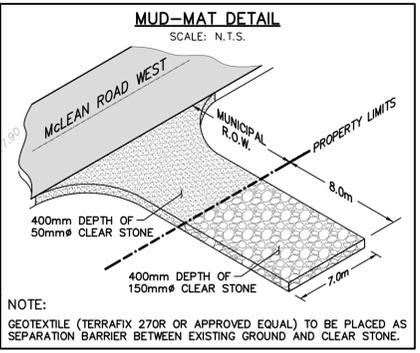
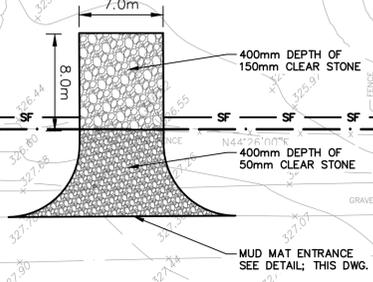
CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	FIG 2





TREE REMOVAL NOTE:
ALL TREES WITHIN SUBJECT PROPERTY ARE TO BE REMOVED AND DISPOSED OF OFF-SITE.



- EROSION & SEDIMENT CONTROL NOTES:**
1. EROSION & SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
 2. EROSION & SEDIMENT CONTROLS MUST BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY RAIN FALL EVENT, AND MUST BE MAINTAINED AND REPAIRED IN A TIMELY MANNER TO PREVENT SEDIMENT FROM LEAVING THE SITE.
 3. EXISTING AND PROPOSED CATCHBASINS ARE TO BE PROTECTED WITH FILTER CLOTH AND 150mm OF 50mm STONE COVER DURING CONSTRUCTION.
 4. IT IS REQUIRED TO STABILIZE ALL AREAS THAT WILL REMAIN DISTURBED FOR MORE THAN 30 DAYS.
 5. MUD MAT, SILT FENCE, AND CATCHBASIN PROTECTION ARE NOT TO BE REMOVED UNTIL COMPLETION OF CONSTRUCTION.

BROCK ROAD



LEGEND

- PROPERTY LINE
- - - EXISTING CONTOUR (0.5m)
- - - EXISTING CONTOUR (1.0m)
- - - EXISTING FENCE
- - - EXISTING GRADE
- MUD-MAT; SEE DETAIL
- SF SILT FENCE; SEE DETAIL
- PROPOSED SEDIMENT CONTROL DEVICE IN EX. CATCHBASIN PER

0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52

BEARING NOTE:
BEARINGS ARE ASTROMONIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR1 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH

Drawing
PRELIMINARY EROSION, SEDIMENT CONTROL AND REMOVALS PLAN

NOT FOR CONSTRUCTION

FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

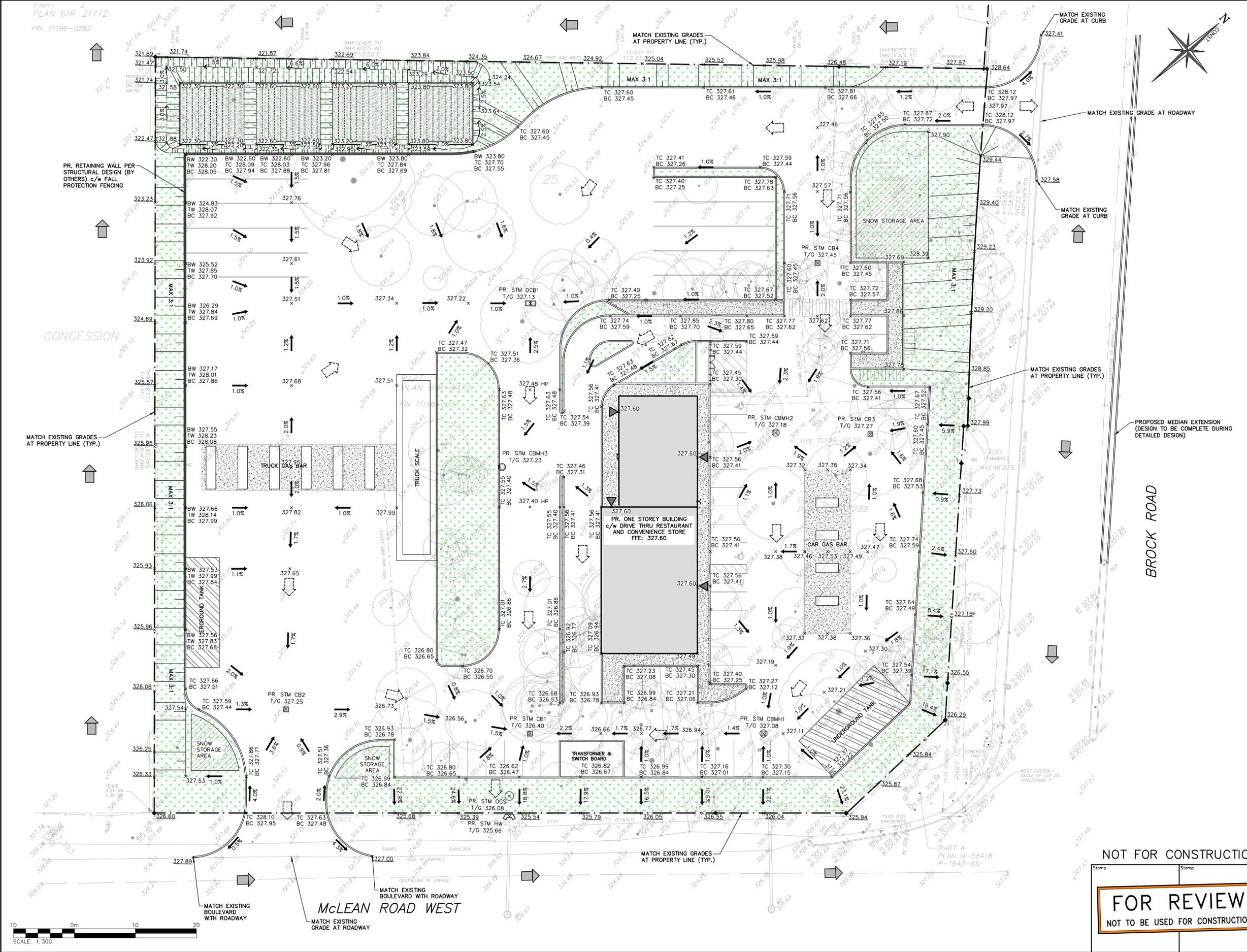
Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 101





LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING DITCH
- EXISTING FENCE
- EXISTING GRADE
- PROPOSED GRADE
- PROPOSED GRADE (TO MATCH EXISTING)
- PROPOSED MINOR FLOW DIRECTION
- PROPOSED GRASSED SWALE
- PROPOSED RETAINING WALL
- PROPOSED SLOPE (3:1 MAX.)
- PROPOSED MAJOR OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION



0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED.
PROJECT FILE No. 9625-SRPR7
COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC.
DATED: OCTOBER 04, 2023
DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
**7456 McLEAN ROAD WEST AND
197 BROCK ROAD SOUTH
TOWN OF PUSLINCH**

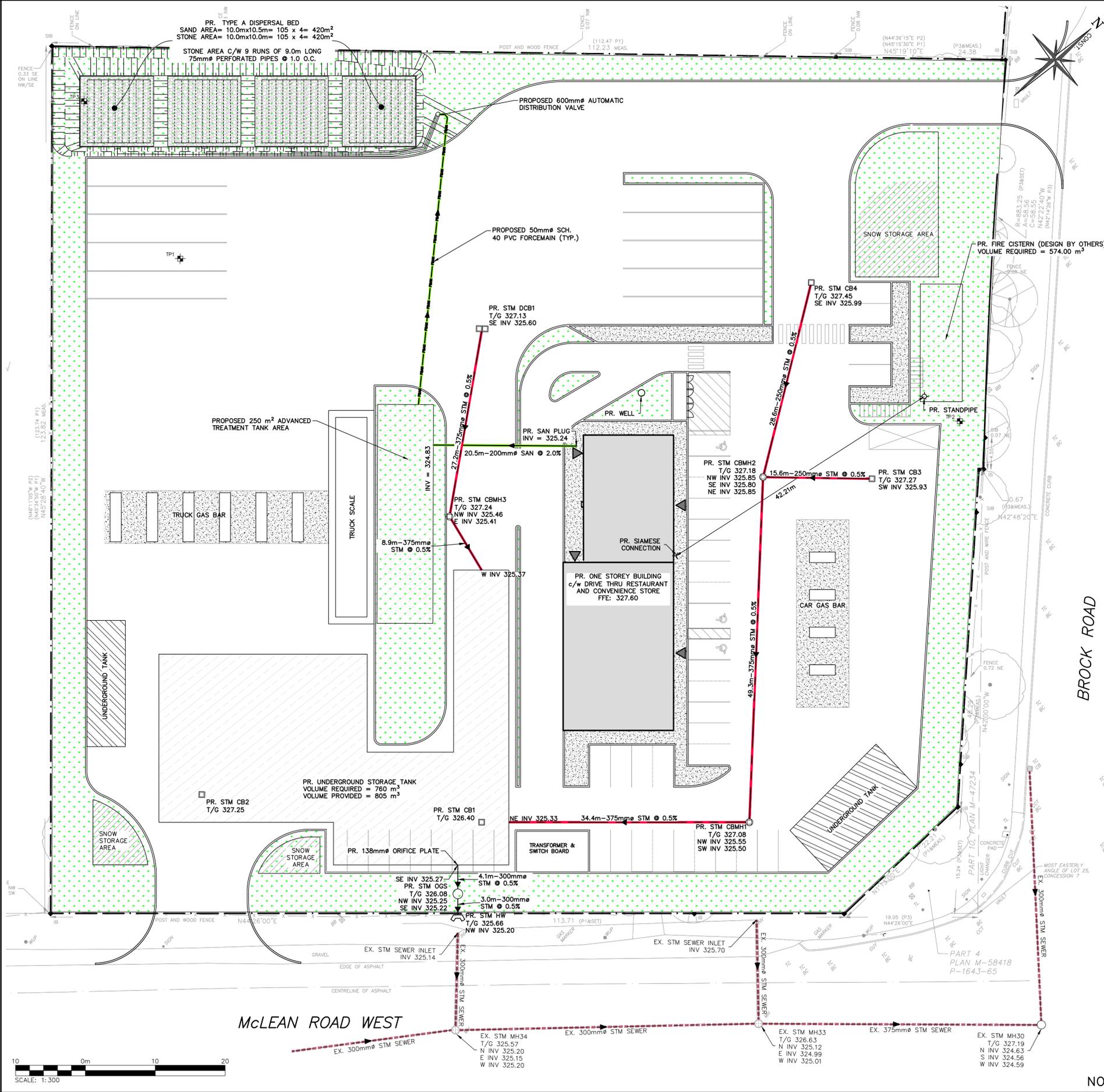
Drawing
PRELIMINARY SITE GRADING PLAN

NOT FOR CONSTRUCTION
FOR REVIEW
NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 102





SEWAGE SYSTEM NOTES

- PROPOSED SEWAGE SYSTEM CONSTRUCTION TO BE UNDERTAKEN IN ACCORDANCE WITH THE ONTARIO BUILDING CODE, ONTARIO MINISTRY OF ENVIRONMENT, AND THE MANUFACTURER'S RECOMMENDATIONS.
- INSTALLATION OF ALL COMPONENTS OF THE SEWAGE SYSTEM TO BE COMPLETED BY A LICENSED AND REGISTERED ON-SITE SEWAGE SYSTEM INSTALLER IN THE PROVINCE OF ONTARIO.
- THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL NECESSARY INSPECTIONS WITH THE TOWN AND OTHER AUTHORITIES PERTAINING TO THE INSTALLATION OF THEIR WORK.
- CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES AND EXISTING SEWER WORKS PRIOR TO CONSTRUCTION.
- ALL COMPONENT LOCATIONS SHALL BE FIELD VERIFIED WITH THE ENGINEER PRIOR TO INSTALLATION.
- ALL EARTHWORKS, INCLUDING PLACEMENT OF FILL ARE TO BE UNDERTAKEN WITH TRACK MOUNTED EQUIPMENT TO KEEP COMPACTION TO A MINIMUM. KEEP ALL TRAFFIC IN THE AREA OF THE PROPOSED LEACHING BED TO A MINIMUM.
- ALL TOPSOIL AND ORGANICS TO BE REMOVED FROM LEACHING BED AREA.
- IF HIGH GROUNDWATER CONDITIONS ARE EVIDENT AT THE TIME OF CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY. ALL VERTICAL CLEARANCE DISTANCES AS REQUIRED BY THE ONTARIO BUILDING CODE MUST BE MAINTAINED.
- GRAVITY SEWERS TO HAVE MINIMUM 0.6 M COVER AND SHALL BE INSULATED WHERE LESS THAN 1.0M COVER IS PROVIDED. FORCEMAIN SHALL BE INSULATED WHERE LESS THAN 1.5 M COVER IS PROVIDED. BEDDING, COVER AND BACKFILL TO BE IN ACCORDANCE WITH OPSS.
- UNLESS OTHERWISE NOTED PE FORCEMAIN TO BE HDPE SERIES 100 OR DR 13.5 PE AND PVC FORCEMAIN TO BE SCHEDULE 40. GRAVITY SEWERS TO BE SDR-35. FORCE MAIN TO BE PROVIDED WITH TRACER WIRE, SECURED TO THE TOP OF THE PIPE WITH WATER PROOF TAPE OR ZIP TIES.
- ALL PIPES SUBJECT TO VEHICULAR TRAFFIC SHALL BE ADEQUATELY PROTECTED.
- ALL METAL IN TANKS OR PUMP CHAMBERS TO BE GALVANIZED OR STAINLESS STEEL.
- ALL JOINTS BELOW THE HIGH WATER LEVEL IN PRECAST TANKS TO BE SEALED WITH MASTIC SEALANT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR WATER TIGHT SEAL. ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH CAST IN RUBBER BOOT FOR WATER TIGHT SEAL. UNLESS OTHERWISE NOTED ALL TANK INLETS AND OUTLETS TO BE EQUIPPED WITH TEES.
- ALL TANKS TO BE PROVIDED WITH PRECAST CONCRETE OR PVC ACCESS RISERS TO GRADE. HATCHES TO BE BOLTED AND CASKETS AND ACCESSIBLE AT GRADE. ALL CIRCULAR HATCHES TO BE 600 MM DIAMETER POLYLOK RISER WITH CAST IN ADAPTOR. ALL SQUARE ACCESS OPENINGS TO BE EQUIPPED WITH CONCRETE RISERS. VENTED HATCHES TO BE PROVIDED ON TANKS CONTAINING PUMPS.
- A TANK SHALL NOT BE COVERED BY SOIL OR LEACHING BED FILL HAVING A DEPTH GREATER THAN THE MAXIMUM DEPTH OF BURIAL THAT THE TANK IS DESIGNED TO WITHSTAND.
- EXISTING SOILS SHALL BE SCARIFIED AT A RIGHT ANGLE TO THE DIRECTION OF LATERAL SEWAGE FLOW IN THE LEACHING BED PRIOR TO IMPORTING FILL OR INSTALLING DISTRIBUTION PIPE STONE LAYER.
- WHEN THE IMPORTATION OF FILL IS REQUIRED, FILL SHOULD BE END-DUMPED AND GRADED PROGRESSIVELY OVER THE PREPARED SITE AREA WITH TRACK MOUNTED EQUIPMENT.
- ALL ELEVATIONS TO BE VERIFIED PRIOR TO BACKFILL.
- ALL FILL MATERIAL PLACED BENEATH TANKS TO BE COMPACTED TO 95%.
- THE INSTALLING CONTRACTOR SHALL INSTALL THE SEWAGE SYSTEM USING A TRANSIT/LEVEL AND SHALL PROVIDE SAME FOR INSPECTION OF ANY COMPONENT.
- UNLESS OTHERWISE NOTED, ALL LEVEL IV TREATMENT UNITS SHALL BE PROVIDED FROM A MANUFACTURER THAT IS CERTIFIED BY CAN/BNO 3680-600 TO PROVIDE A LEVEL OF TREATMENT IN ACCORDANCE WITH OBC TABLE 8.6.2.2 PROVIDING AN EFFLUENT CRITERIA OF 10mg/L SUSPENDED SOLIDS, AND 10mg/L OF CBOD5.
- ALL TREATMENT UNITS THAT CONTAIN MECHANICAL COMPONENTS SHALL BE EQUIPPED WITH AN AUDIBLE AND VISUAL WARNING ALARM, LOCATED TO WARN THE OCCUPANTS OF THE BUILDING SERVED OR THE OPERATOR OF THE TREATMENT UNIT OF A MALFUNCTION IN THE OPERATION OF THE TREATMENT UNIT.
- THE CONTRACTOR WILL ENSURE THAT EVERY OPERATOR OF A TREATMENT UNIT SHALL OBTAIN, FROM THE MANUFACTURER OR DISTRIBUTOR OF THE TREATMENT UNIT, LITERATURE THAT DESCRIBES THE UNIT IN DETAIL AND PROVIDES COMPLETE INSTRUCTIONS REGARDING THE OPERATION, SERVICING, AND MAINTENANCE REQUIREMENTS OF THE UNIT AND ITS RELATED COMPONENTS NECESSARY TO ENSURE THE CONTINUED PROPER OPERATION IN ACCORDANCE WITH THE ORIGINAL DESIGN AND SPECIFICATIONS.
- ALL IMPORTED SAND FILL TO HAVE A T-TIME OF 6 TO 10 MIN/CM AND A SILT/CLAY CONTENT OF NO MORE THAN 5% AND SHALL BE VERIFIED IN WRITING BY A SOIL TESTING FIRM AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
- SEWAGE SYSTEM HAS BEEN DESIGNED TO RECEIVE DOMESTIC STRENGTH WASTEWATER. ALL SANITARY WASTEWATER FROM THE BUILDINGS MUST MEET THE APPLICABLE SEWER USE BYLAW LIMITS PRIOR TO DISCHARGE TO ADVANCED TREATMENT SYSTEM.



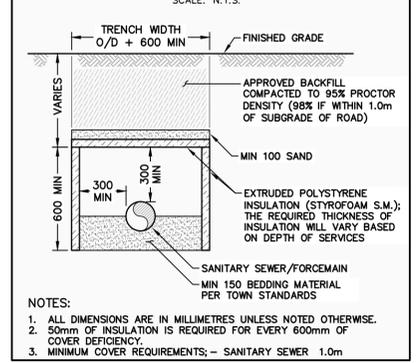
LEGEND

	PROPERTY LINE
	EXISTING STORM SEWER & MANHOLE
	EXISTING SINGLE / DOUBLE CATCHBASIN
	PROPOSED WATERMAIN & GATE VALVE
	PROPOSED STANDPIPE
	PROPOSED SIAMESE CONNECTION
	PROPOSED WELL
	PROPOSED STORM SEWER & MANHOLE
	PROPOSED SINGLE / DOUBLE CATCHBASIN
	PROPOSED SANITARY SEWER
	PROPOSED SANITARY FORCEMAIN
	TEST PIT LOCATION

ON-SITE SEWAGE DESIGN

DAILY DESIGN FLOW REFER TO FSR REPORT FOR DETAILS	TOTAL DESIGN FLOW = 20,000 L/DAY
ADVANCED TREATMENT SYSTEM	TO BE DETERMINED DURING DETAILED DESIGN
SOIL PERCOLATION RATE	T = 15 min/cm (DETERMINED BY C.F. CROZIER)
TYPE A DISPERSAL BED STONE AREA	Q/50 = 20,000/50 REQUIRED = 400 m ² PROVIDED = 420 m ²
TYPE A DISPERSAL BED SAND AREA	QT/850 = 20,000*15/850 REQUIRED = 352 m ² PROVIDED = 420 m ²

INSULATION FOR SHALLOW SANITARY SERVICES



ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
 ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.52

BEARING NOTE:
 BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
 SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR1 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
 DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
 THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
 THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH

Drawing
PRELIMINARY SITE SERVICING PLAN

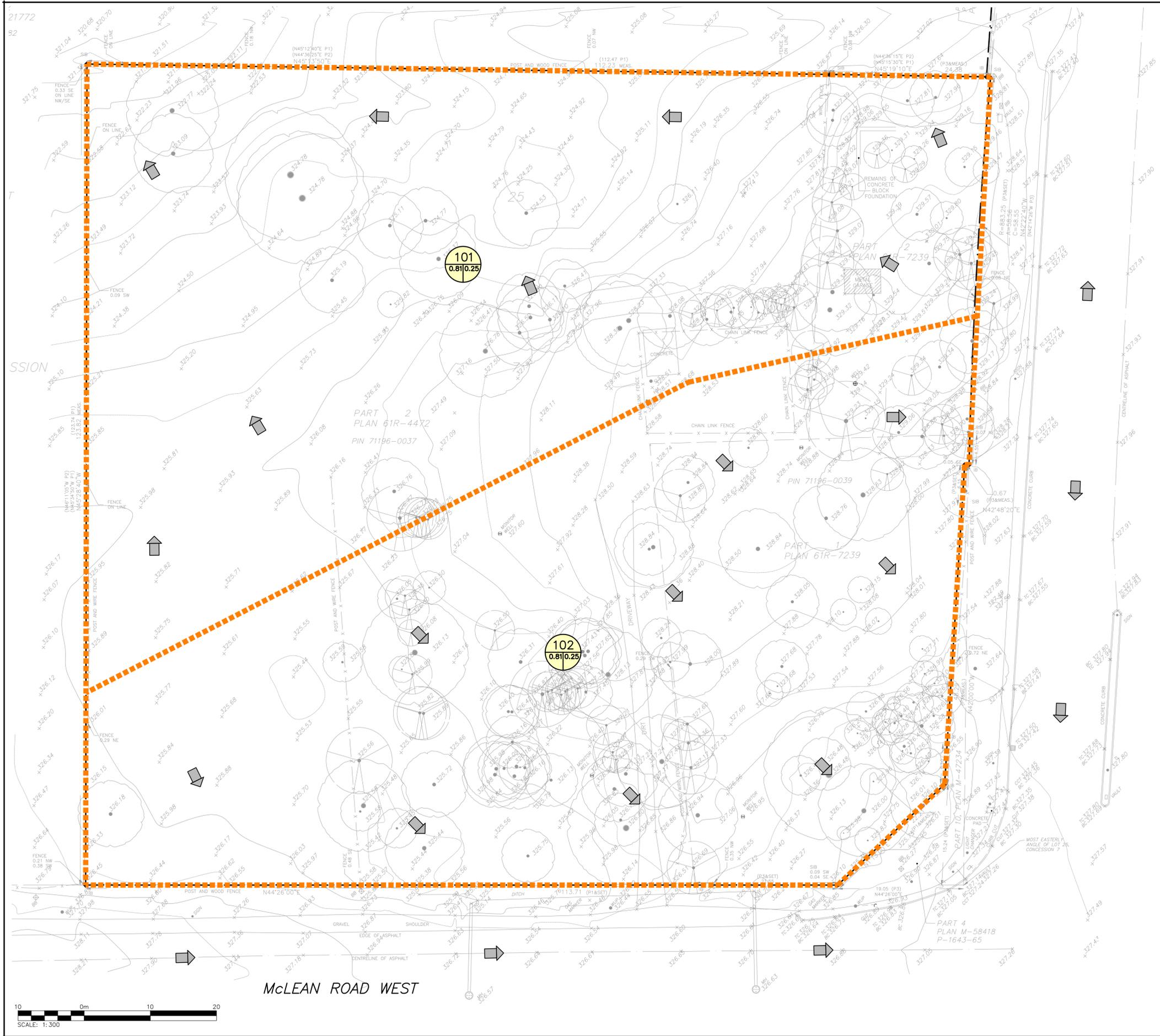
FOR REVIEW
 NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS
 2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	C 103



NOT FOR CONSTRUCTION



LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (0.5m)
- EXISTING CONTOUR (1.0m)
- EXISTING GRADE
- EXISTING OVERLAND FLOW DIRECTION
- PRE-DEVELOPMENT STORM DRAINAGE CATCHMENT AREA
- CATCHMENT I.D.
- AREA (ha) | RUNOFF COEFFICIENT

PRE-DEVELOPMENT CATCHMENT AREAS PER THE STORMWATER MANAGEMENT REPORT - CARROLL POND MUNICIPAL DRAIN (TOWNSHIP OF PUSLINCH, MARCH 2007)

0	ISSUED FOR FIRST SUBMISSION (ZBA)	2023/OCT/20
No.	ISSUE / REVISION	YYYY/MM/DD

ELEVATION NOTE:
ELEVATIONS ARE REFERRED TO CANADIAN GEODETIC VERTICAL DATUM CGVD2878, AND WERE DERIVED FROM TOWNSHIP OF PUSLINCH BENCHMARK 0081968105, HAVING A PUBLISHED ELEVATION OF 317.592

BEARING NOTE:
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHWESTERLY LIMIT OF McLEAN ROAD WEST AS SHOWN ON PLAN 61R-4472, HAVING A BEARING OF N44°26'00"E

SURVEY NOTES:
SURVEY COMPLETED BY TARASICK McMillan KUBICKI LIMITED. PROJECT FILE No. 9625-SRPR1 COMPLETED OCTOBER 20, 2022

SITE PLAN NOTES:
DESIGN ELEMENTS ARE BASED ON SITE PLAN BY ATA ARCHITECTS INC. DATED: OCTOBER 04, 2023 DRAWING No. A001

DRAWING NOTES:
THIS DRAWING IS THE EXCLUSIVE PROPERTY OF C.F. CROZIER & ASSOCIATES INC. AND THE REPRODUCTION OF ANY PART OF IT WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT. DO NOT SCALE THIS DRAWING.
ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

Project
7456 McLEAN ROAD WEST AND 197 BROCK ROAD SOUTH TOWN OF PUSLINCH

Drawing
PRELIMINARY PRE-DEVELOPMENT DRAINAGE PLAN

NOT FOR CONSTRUCTION

FOR REVIEW

NOT TO BE USED FOR CONSTRUCTION

CROZIER CONSULTING ENGINEERS

2800 HIGH POINT DRIVE SUITE 100 MILTON, ON L9T 6P4 905-875-0026 T 905-875-4915 F WWW.CFCROZIER.CA

Drawn	M.I.M.	Design	B.W.	Project No.	2377-6556
Check	S.C.	Check	B.W./K.R.	Scale	1:300
				Dwg.	FIG 1





3-5 Edinburgh Road South
Guelph . Ontario
N1H 5N8

519.822.6839

info@aboutdng.com

www.aboutdng.com

URBAN FORESTRY

ARBORIST REPORTS
FOREST MANAGEMENT PLANS
TREE PRESERVATION PLANS
TREE RISK ASSESSMENT
GIS TREE INVENTORIES
TREE APPRAISALS
MONITORING

ECOLOGICAL RESTORATION

NATURAL SYSTEMS DESIGN
HABITAT RESTORATION
EDGE MANAGEMENT PLANS
RAVINE STEWARDSHIP PLANS
NATURALIZATION PLANS
INTERPRETIVE DESIGN
MONITORING
CONTRACT ADMINISTRATION

ENVIRONMENTAL STUDIES

SUBWATERSHED STUDIES
ENVIRONMENTAL IMPACT
STATEMENTS
ECOLOGICAL LAND
CLASSIFICATION
WETLAND EVALUATION
VEGETATION ASSESSMENT
BOTANICAL INVENTORIES
WILDLIFE SURVEYS
MONITORING

LANDSCAPE ARCHITECTURE

MASTER PLANNING
RESIDENTIAL COMMUNITIES
COMMERCIAL/INDUSTRIAL
HEALTHCARE AND EDUCATION
STREETSCAPES
PARKS AND OPEN SPACES
TRAIL SYSTEMS
GREEN ROOFS
CONTRACT ADMINISTRATION

EXPERT OPINION

OLT TESTIMONY
SMALL CLAIMS
PEER REVIEW
RESEARCH
EDUCATION

May 31, 2023

Sent by email: lbanks@puslinch.ca

Lynne Banks, Development & Legislative Coordinator
Township of Puslinch
7404 Wellington Road 34
Guelph, ON N0B 2J0

**Re: Requirement for an Environmental Impact Study
7456 McLean Road W and 197 Brock Road S Proposed Development
Township of Puslinch**

Dear Ms. Banks:

This letter is sent regarding the proposed development of a transport terminal, gas bar, and drive-through restaurant at 7456 McLean Road W & 197 Brock Road S in the Township of Puslinch. An ecological review for the pre-consultation application by Dougan & Associates dated June 23, 2022 stated that the subject lands are within 120 m of a Provincially Significant Wetland (PSW), identified by the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) as a marsh forming part of the Mill Creek Puslinch Wetland Complex. Due to the presence of this PSW and the inclusion of PSWs in the Core Greenlands natural heritage feature of the County of Wellington's Official Plan, Dougan & Associates stated that an Environmental Impact Study (EIS) was required for this development.

However, it is evident from aerial photography that this marsh feature no longer exists on the lands adjacent to the proposed development. Aerial photography shows that the PSW was present in 2010 (*Figure 1*). By 2015 this wetland has been lost due to the expansion of an aggregate pit southwest of the study area (*Figure 2*). Confirmation of this loss is also shown in aerial photography from 2018 (*Figure 3*). Additionally, the Grand River Conservation Authority (GRCA) online mapping service does not identify the presence of this wetland, as evidenced by their pre-consultation comments stating that there were no environmental features of interest to the GRCA present on the subject property.

A review of the GRCA 1 m contour mapping also identifies that the site generally slopes from east to west, with a significant grade change from the proposed development site to the active aggregate operation, indicating that standing water or hydric soils are unlikely to be present within the area of the former wetland community (*Figure 3*).

A site visit was conducted on May 19, 2023, and it was apparent that while regeneration within the approximate wetland area is occurring, it is dominated by invasive species that are not wetland obligate. The wetland area is dominated by Phragmites, with occasional trees along the edge. No standing water was observed, as the entire site is well above grade of features, which are down within a valley's area. Without site access, limits and soils cannot be investigated. Photographs of this area are shown in *Appendix A*.

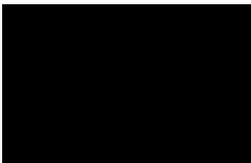
The subject lands consist of open woodland, dominated by Black Walnut and Norway Maple, with instances of Silver Maple and a Curly Willow, with open grassy areas, and several snags, which were too decayed to provide suitable habitat for endangered bat species. Habitat for two SAR (Yellow-banded Bumble Bee and Eastern Meadowlark) were identified in the study area (*Appendix B*). Grassy areas may provide Monarch habitat, but no Milkweed was observed during the site visit. An investigation of Significant Wildlife Habitat (SWH) for Ecoregion 6E during the site visit found that there was no SWH present.

Given that the PSW as originally delineated no longer exists, and regeneration has been only partial and dominated by invasive, non-wetland obligate species, we feel that that there is no policy requirement for an EIS for this project.

Please contact the undersigned should you require additional information of the above.

Yours truly,

ABOUD & ASSOCIATES INC.



Heather Dixon, PhD
Aquatic Ecologist
heather@aboudtng.com

List of Figures:

- Figure 1. Study area using 2010 aerial imagery
- Figure 2. Study area using 2015 aerial imagery
- Figure 3. Study area using 2018 aerial imagery

List of Appendices:

- Appendix A. Site Photographs
- Appendix B. SAR Habitat Assessment



LEGEND

- STUDY AREA
- SUBJECT LANDS
- PROVINCIALIY SIGNIFICANT WETLAND
- UNEVALUATED WETLAND

Information Sources:

1. Orthophotography provided by First Base Solutions Accessed March, 2023.
2. Wetlands and roads provided by Land Information Ontario. Accessed March, 2023.

Title:

STUDY AREA IN 2010

Project:

**7456 MCLEAN ROAD W
AND 197 BROCK ROAD S
TOWNSHIP OF PUSLINCH**



Date: MARCH 2023

Project: AA22-209A

Scale: 1 : 2500



ABOUD & ASSOCIATES INC.
Consulting Arborists • Ecologists • Landscape Architects
14 Edouard Road East, Guelph, Ontario, N1W 9A8 519.822.8239 www.aboudco.com

Figure No:

1



LEGEND

- STUDY AREA
- SUBJECT LANDS
- PROVINCIALLY SIGNIFICANT WETLAND
- UNEVALUATED WETLAND

Information Sources:
 1. Orthophotography provided by First Base Solutions Accessed March, 2023.
 2. Wetlands and roads provided by Land Information Ontario. Accessed March, 2023.

Title:
STUDY AREA IN 2015

Project:
**7456 MCLEAN ROAD W
 AND 197 BROCK ROAD S
 TOWNSHIP OF PUSLINCH**



Date: MARCH 2023
 Project: AA22-209A
 Scale: 1 : 2500

ABOUT & ASSOCIATES INC.
 Consulting Arborists • Ecologists • Landscape Architects
 14 Edinger Road East, Guelph, Ontario, N1W 5M8 519.822.8239 www.aboutinc.com

Figure No:
2



- LEGEND**
- STUDY AREA
 - SUBJECT LANDS
 - PROVINCIALLY SIGNIFICANT WETLAND
 - UNEVALUATED WETLAND
 - GRCA 1M CONTOURS

Information Sources:

1. Orthophotography provided by Google Satellite. Accessed March, 2023.
2. Wetlands and roads provided by Land Information Ontario. Accessed March, 2023.
3. Contours provided by Grand River Information Network 2019.

Title:
STUDY AREA IN 2018

Project:
7456 MCLEAN ROAD W AND 197 BROCK ROAD S TOWNSHIP OF PUSLINCH



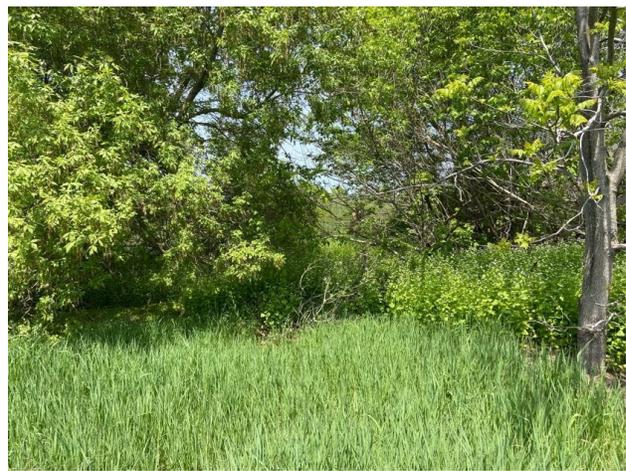
Date: MAY 2023
 Project: AA22-209A
 Scale: 1 : 2500



Figure No:
3



Photos showing limited wetland regeneration in the area of the former PSW.





Photos showing other habitat present in the subject lands

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Amphibians	END	END	S2	MNDMNRFSpecies Occurrence Mapping, ORAA (2017)	Adults are found within upland deciduous or mixed forest habitat with suitable breeding ponds, such as kettle ponds, natural basins and limestone sink holes, which can be permanent or ephemeral, and include appropriate egg attachment sites and lack of predatory fish (COSEWIC 2010).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Jefferson Salamander (<i>Ambystoma jeffersonianum</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 38 pp.
Unisexual Ambystoma, Jefferson dependent population	' <i>Ambystoma laterale</i> - (2) <i>jeffersonianum</i>	Amphibians	END	END	S2	MNDMNRFSpecies Occurrence Mapping	Unisexual ambystoma share the same habitat requirements as Jefferson salamander, as they rely on Jefferson salamander for sperm donation to breed (COSEWIC 2016).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2016. COSEWIC assessment and status report on the unisexual Ambystoma, (<i>Ambystoma laterale</i>), Small-mouthed Salamander–dependent population, Jefferson Salamander–dependent population and the Blue-spotted Salamander– dependent population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxii + 61 pp.
Western Chorus Frog – Great Lakes / St. Lawrence - Canadian Shield Population	<i>Pseudacris triseriata</i> pop. 2	Amphibians	NAR	THR	S4	MNDMNRFSpecies Occurrence Mapping	Generally found in lowland communities, such as swamps, inhabiting lowland shrubs and grasses in the community, near breeding habitat. Breeding occurs in lowland, ephemeral ponds, devoid of predatory fish species (COSEWIC 2008a).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2008. COSEWIC assessment and update status report on the Western Chorus Frog (<i>Pseudacris triseriata</i>) Carolinian population and Great Lakes/St. Lawrence – Canadian Shield population in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 47 pp.
Monarch	<i>Danaus plexippus</i>	Butterflies, bees, damselflies, dragonflies & insects	SC	SC	S2N, S4B	MNDMNRFSpecies Occurrence Mapping, OBA (2022)	Requires milkweed for larval feeding, other wildflower species are also important for adult feeding when milkweed is not in flower; often found in abandoned farmland, along roadsides, and other open spaces (COSEWIC 2010b)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Monarch (<i>Danaus plexippus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 43 pp.
Rusty-patched Bumble Bee	<i>Bombus affinis</i>	Butterflies, bees, damselflies, dragonflies & insects	END	END	S1	MNDMNRFSpecies Occurrence Mapping	Uses a variety of open or semi-open habitat, including meadows, agricultural land, and savannah habitat for foraging. Nests are often found underground, in old rodent burrows (COSEWIC 2010c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Rusty-patched Bumble Bee (<i>Bombus affinis</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 34 pp.
West Virginia White	<i>Pieris virginensis</i>	Butterflies, bees, damselflies, dragonflies & insects	SC	NAR	S3	MNDMNRFSpecies Occurrence Mapping, OBA (1999)	Found in rich deciduous and mixed forests and swamps with a poorly vegetated shrub layer. The larvae feed only on the leaves of a few host plants, including the Two-leaved Toothwort (<i>Cardamine diphylla</i>) and cut-leaved toothwort (Burke 2013).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Peter S. Burke. 2013. Management Plan for the West Virginia White (<i>Pieris virginensis</i>) in Ontario. Ontario Management Plan Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. v + 44 pp.
Yellow-banded Bumble Bee	<i>Bombus terricola</i>	Butterflies, bees, damselflies, dragonflies & insects	SC	SC	S3S5	MNDMNRFSpecies Occurrence Mapping	Occur in a diverse range of habitat, including mixed woodlands, farmlands, urban areas, montane meadows, prairie grasslands and boreal habitats. Queens overwinter underground and in decomposing organic material such as rotting lots (COSEWIC 2015)	Habitat matching criteria identified in study area.	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2015. COSEWIC assessment and status report on the Yellow-banded Bumble Bee (<i>Bombus terricola</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 60 pp. *rank considered out of date

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Bank Swallow	<i>Riparia riparia</i>	Birds	THR	THR	S4B	MNDMNRF Species Occurrence Mapping, OBBA	Breeds in a variety of natural and artificial bank type habitat, such as bluffs, stream and river banks, sand and gravel pits, piles of sand, topsoil and other material. Nests are typically in vertical or near-vertical surfaces (COSEWIC 2013b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2013. COSEWIC assessment and status report on the Bank Swallow (<i>Riparia riparia</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 48 pp.
Barn Swallow	<i>Hirundo rustica</i>	Birds	SC	THR	S5B	MNDMNRF Species Occurrence Mapping, OBBA	Occurs in farmland, along lake/river shorelines, in wooded clearings and in urban populated areas. Nesting may occur inside or outside buildings; under bridges and in road culverts (COSEWIC 2011a).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2011. COSEWIC assessment and status report on the Barn Swallow (<i>Hirundo rustica</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 37 pp.
Barn Owl	<i>Tyto alba</i>	Birds	END	END	S1	MNDMNRF Species Occurrence Mapping	Requires open habitat for foraging, such as old fields and pastures, that provide habitat for rodents, and uses a variety of natural and man-made structures for nesting (COSEWIC 2010e)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Barn Owl (<i>Tyto alba</i>) (Eastern population and Western population) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 34 pp.
Black Tern	<i>Chlidonias niger</i>	Birds	SC	NAR	S3B	OBBA	Breeds in large, freshwater marshes, with emergent vegetation, and large areas of open water. Nests are typically within 6 meters of the water, on low emergent vegetation (Burke 2012).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Peter S. Burke. 2012. Management Plan for the Black Tern (<i>Chlidonias niger</i>) in Ontario. Ontario Management Plan Series. Prepared for the Ontario Ministry of Natural Resources (OMNR), Peterborough, Ontario. vi + 47 pp.
Bobolink	<i>Dolichonyx oryzivorus</i>	Birds	THR	THR	S4B	MNDMNRF Species Occurrence Mapping, OBBA, NHIC	Nest in grassland habitats, including hayfields and meadows with a mixture of grasses and broad-leaved forbs with a high litter cover. Area Sensitive, with increased density in grasslands greater than 10ha (Renfrew et. al. 2015)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Renfrew, R., A.M. Strong, N.G. Perlut, S.G. Martin and T.A. Gavin. 2015. Bobolink (<i>Dolichonyx oryzivorus</i>), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Birds of North America Online: http://bna.birds.cornell.edu/bna/species/176
Canada Warbler	<i>Wilsonia canadensis</i>	Birds	SC	THR	S4B	MNDMNRF Species Occurrence Mapping	Prefers wet coniferous, deciduous and mixed forest types, with a dense shrub layer (COSEWIC 2008b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2008. COSEWIC assessment and status report on the Canada Warbler (<i>Wilsonia Canadensis</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp. (www.sararegistry.gc.ca/status/status_e.cfm).
Cerulean Warbler	<i>Setophaga cerulea</i>	Birds	THR	END	S3B	MNDMNRF Species Occurrence Mapping	Occur in older, mature, deciduous forests, preferentially oak-maple composition, with a full, to partially open canopy, and little to no understory cover. Often in bottomland forests, or adjacent to treed swamplands (COSEWIC 2010f).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Cerulean Warbler (<i>Dendroica cerulea</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 40 pp.
Chimney Swift	<i>Chaetura pelagica</i>	Birds	THR	THR	S4B, S4N	MNDMNRF Species Occurrence Mapping, OBBA	Typically nests in traditional chimneys of older buildings, which also provide roosting sites for many individuals during spring and fall migration (MNR 2013).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	MNR, 2013. General Habitat Description for the Chimney Swift (<i>Chaetura pelagica</i>). Ontario Ministry of Natural Resources and Forestry. July 2, 2013.
Common Nighthawk	<i>Chordeiles minor</i>	Birds	SC	THR	S4B	MNDMNRF Species Occurrence Mapping, OBBA	Breeds in open habitat, on the ground, in areas with no vegetation, including sand dunes, burned areas, open forests, railways, and gravel rooftops. Eggs are laid directly on the ground (COSEWIC 2007b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2007. COSEWIC assessment and status report on the Common Nighthawk (<i>Chordeiles minor</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Eastern Meadowlark	<i>Sturnella magna</i>	Birds	THR	THR	S4B	MNDMNRFSpecies Occurrence Mapping, OBBA, NHIC	Nest in grassland habitats, including hayfields, pasture, savannahs, and other open areas. Preferential habitat includes areas with good grass and thatch (litter) cover (Jaster et. al. 2012).	Habitat matching criteria identified in study area.	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Jaster, Levi A., William E. Jensen and Wesley E. Lanyon. (2012). Eastern Meadowlark (<i>Sturnella magna</i>), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/easmea
Eastern Whip-poor-will	<i>Caprimulgus vociferus</i>	Birds	THR	THR	S4B	MNDMNRFSpecies Occurrence Mapping	Often found breeding in semi-open habitats, with little ground cover, and canopy openings allowing light to penetrate the forest floor, often associated with pine or oak, savannahs and barrens, early-successional poplar stands and open conifer plantations (COSEWIC 2009a)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2009. COSEWIC assessment and status report on the Whip-poor-will (<i>Caprimulgus vociferus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 28 pp.
Eastern Wood-Pewee	<i>Contopus virens</i>	Birds	SC	SC	S4B	MNDMNRFSpecies Occurrence Mapping, OBBA, NHIC	Associated with mid-age mixed and deciduous forest stands, often dominated by Maple (Acer), Elm (Ulmus) or Oak (Quercus), and include areas with clear-cuts, openings or forest edges. Also prefers forest stands with little to no understory vegetation (COSEWIC 2012a).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2012. COSEWIC assessment and status report on the Eastern Wood-Pewee (<i>Contopus virens</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 39 pp.
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Birds	SC	SC	S4B	MNDMNRFSpecies Occurrence Mapping	Breeding habitat includes open, mature mixed wood forests, where fir species and/or White Spruce are dominant, and Spruce Budworm is abundant (COSEWIC 2016)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2016. COSEWIC assessment and status report on the Evening Grosbeak (<i>Coccothraustes vespertinus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 64 pp.
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Birds	SC	THR	S4B	MNDMNRFSpecies Occurrence Mapping	Nests in early successional shrub habitat, with adjacent forest edges for singing perches, often in hydro cut-overs, recently logged areas and beaver marshes (COSEWIC 2006a).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2006. COSEWIC assessment and status report on the Golden-winged Warbler (<i>Vermivora chrysoptera</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 30 pp.
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Birds	SC	SC	S4B	MNDMNRFSpecies Occurrence Mapping, OBBA	Prefers moderately open grasslands and prairies with patchy bare ground; avoids grasslands with extensive shrub cover (Vickery 1996).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Vickery, Peter D. 1996. Grasshopper Sparrow (<i>Ammodramus savannarum</i>), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/239
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Birds	END	END	SHB	MNDMNRFSpecies Occurrence Mapping	Breeds in grassland habitat and is area sensitive. Grasslands with tall, dense cover a thick thatch layer, and are greater than 30ha, but preferentially larger than 100ha are preferred (COSEWIC 2011b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2011. COSEWIC assessment and status report on the Henslow's Sparrow (<i>Ammodramus henslowii</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 37 pp.
Least Bittern	<i>Ixobrychus exilis</i>	Birds	THR	THR	S4B	MNDMNRFSpecies Occurrence Mapping, OBBA	Breeds in large marshes (>5ha) with emergent vegetation, typically cattails, with at least 50% open water, and relatively stable water levels (COSEWIC 2009b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2009. COSEWIC assessment and update status report on the Least Bittern (<i>Ixobrychus exilis</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Birds	END	END	S2B	MNDMNRF Species Occurrence Mapping	Nests in open, low, grassy habitat with scattered shrubs. Presence of thorny shrubs, such as hawthorn, or barbwire fencing required for impaling prey. Only two recent areas of breeding in the province (Carden Plain and Napanee Plain) (Environment Canada 2015).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Environment Canada. 2015. Recovery Strategy for the Loggerhead Shrike, <i>migrans</i> subspecies (<i>Lanius ludovicianus migrans</i>), in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vii + 35 pp.
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Birds	SC	THR	S3B	MNDMNRF Species Occurrence Mapping	Nests along headwater streams and associated wetlands which occur within large tracts of mature forest especially mixed wood forests with a component of hemlock. Nests are in stream bank niches, under mossy logs, and within the roots of fallen trees (COSEWIC 2006b)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2006. COSEWIC assessment and update status report on the Louisiana Waterthrush (<i>Seiurus motacilla</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 26 pp.
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Birds	SC	THR	S4B	MNDMNRF Species Occurrence Mapping	Associated with natural forest openings (usually conifer or mixed), and edges of forests adjacent wetlands or watercourses, will also use open and semi-open forests and clear-cuts. Presence of tall snags and residual live trees required for nesting and foraging (COSEWIC 2007c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2007. COSEWIC assessment and status report on the Olive-sided Flycatcher (<i>Contopus cooperi</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 25 pp.
Prothonotary Warbler	<i>Protonotaria citrea</i>	Birds	END	END	S1B	MNDMNRF Species Occurrence Mapping	Occupies large, mature and semi-mature, deciduous swamp forest and riparian floodplains. Permanent and semi-permanent pools of open water are characteristics, and nests are typically situated over standing or slow-moving water (COSEWIC 2007)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2007. COSEWIC assessment and update status report on the Prothonotary Warbler (<i>Protonotaria citrea</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 31 pp.
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Birds	END	THR	S4B	MNDMNRF Species Occurrence Mapping, OBBA	Found in a variety of open areas, with a high density of dead or dying trees, particularly forests dominated by oak or beech (COSEWIC 2007d).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2007. COSEWIC assessment and update status report on the Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 27 pp.
Short-eared Owl	<i>Asio flammeus</i>	Birds	THR	SC	S2N, S4B	MNDMNRF Species Occurrence Mapping	Breeds in open habitats, including grasslands, old pasture marshes, bogs, and sand-sage. Nests are scrapes, located on the ground (COSEWIC 2008c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2008. COSEWIC assessment and update status report on the Short-eared Owl (<i>Asio flammeus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24 pp.
Wood Thrush	<i>Hylocichla mustelina</i>	Birds	SC	THR	S4B	MNDMNRF Species Occurrence Mapping, OBBA	Prefers second growth moist deciduous forests, with tall trees, and a dense understory of low saplings and an open forest floor with decaying leaf litter. Often nests in saplings, shrubs or occasionally dead stumps (COSEWIC 2012b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2012. COSEWIC assessment and status report on the Wood Thrush (<i>Hylocichla mustelina</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 46 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Yellow-breasted Chat	<i>Icteria virens</i>	Birds	END	END	S1B	MNDMNRFSpecies Occurrence Mapping	Shrub specialist, nesting in early successional, dense, low-shrub habitat, including old fields, hydro-cutovers and forest edges experiencing regeneration (COSEWIC 2011c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2011. COSEWIC assessment and status report on the Yellow-breasted Chat <i>auricollis</i> subspecies (<i>Icteria virens auricollis</i>) and the Yellow-breasted Chat <i>virens</i> subspecies (<i>Icteria virens virens</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 51 pp.
Eastern Small-footed Myotis	<i>Myotis leibii</i>	Mammals	END	NA	S2S3	MNDMNRFSpecies Occurrence Mapping	Associated with hilly or mountainous terrain, in or near coniferous or deciduous forest habitat. Maternity roosts located in cracks and crevices of talus slopes and rocky outcrops, or, occasionally in bridges, old buildings, hollow trees (or loose bark) and caves and mines during the maternity season. Hibernates singly or in small clusters in mines and caves (NatureServe, 2015).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2013. COSEWIC assessment and status report on the Little Brown Myotis (<i>Myotis lucifugus</i>), Northern Myotis (<i>Myotis septentrionalis</i>) and Tri-colored Bat (<i>Perimyotis subflavus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiv + 93 pp.
Little Brown Myotis	<i>Myotis lucifugus</i>	Mammals	END	END	S3	MNDMNRFSpecies Occurrence Mapping, OMA	Hibernates in Caves; maternity colonies located in warm sites, often associated with human habitation; including attics, old buildings, under bridges, rock crevices and cavities in canopy trees in wooded areas (COSEWIC, 2013c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2013. COSEWIC assessment and status report on the Little Brown Myotis (<i>Myotis lucifugus</i>), Northern Myotis (<i>Myotis septentrionalis</i>) and Tri-colored Bat (<i>Perimyotis subflavus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiv + 93 pp.
Northern Myotis	<i>Myotis septentrionalis</i>	Mammals	END	END	S3	MNDMNRFSpecies Occurrence Mapping	Hibernates in Caves; maternity colonies usually located in trees, and are closely associated with specific tree characteristics and density of suitable trees. Characterized by tall, large diameter trees in early stages of decay, located in openings in mature forest canopies (COSEWIC, 2013c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2013. COSEWIC assessment and status report on the Little Brown Myotis (<i>Myotis lucifugus</i>), Northern Myotis (<i>Myotis septentrionalis</i>) and Tri-colored Bat (<i>Perimyotis subflavus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiv + 93 pp.
Tri-colored Bat	<i>Perimyotis subflavus</i>	Mammals	END	END	S3?	MNDMNRFSpecies Occurrence Mapping	Hibernates in caves, abandoned mines, wells, and tunnels. Summer roosts include clumps of dead foliage and lichens, typically found in forested habitat close to water sources. May also use anthropogenic structures such as barns for maternity roosts. Foraging habitat includes forested riparian areas over water in relatively open areas (Environment Canada.2015).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Environment Canada. 2015. Recovery Strategy for Little Brown Myotis (<i>Myotis lucifugus</i>), Northern Myotis (<i>Myotis septentrionalis</i>), and Tri-colored Bat (<i>Perimyotis subflavus</i>) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. ix + 110 pp
Blanding's Turtle	<i>Emydoidea blandingii</i>	Reptiles	THR	THR	S3	MNDMNRFSpecies Occurrence Mapping, ORAA (2008)	Use a variety of eutrophic wetland habitat types, including lakes, ponds, watercourses, marshes, man-made channels, farm fields, coastal areas and bays. Seasonal overland terrestrial movements up to 2.5 km occur to reach nesting and overwintering areas, generally through wooded coniferous or mixed forest habitat. Nests are usually laid in loose sand or organic soil (COSEWIC 2005b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2005. COSEWIC assessment and update status report on the Blanding's Turtle (<i>Emydoidea blandingii</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 40 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	Reptiles	NL	SC	S4	MNDMNRFSpecies Occurrence Mapping, ORAA (2019), NHIC	Occupy slow moving, relatively shallow and well-vegetated wetlands and water bodies with abundant basking sites and organic substrate. Found in association with submergent aquatic plants, which are used for cover and feeding. Semi -tolerant of human-altered landscapes, occasionally found occupying urban ponds and lands subject to anthropogenic disturbance. Suitable nesting habitat includes open, often south-facing, and sloped areas with sandy-loamy and/or gravel substrate usually within 1200 m of aquatic active season habitats. Overwinter in shallow water with deep sediment (COSEWIC 2018).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2018. COSEWIC assessment and status report on the Midland Painted Turtle (<i>Chrysemys picta marginata</i>) and the Eastern Painted Turtle (<i>Chrysemys picta picta</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xvi + 107 pp.
Northern Map Turtle	<i>Graptemys geographica</i>	Reptiles	SC	SC	S3	MNDMNRFSpecies Occurrence Mapping, ORAA (1976)	Highly aquatic species, found in deep, large waterbodies, including Lakes and large rivers, with abundant basking sites. Emerge onto land only during nesting, which occurs in soft sand or soil. Waterbodies with slow currents, soft mud bottoms and abundant aquatic vegetation are preferred (COSEWIC, 2002b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2002. COSEWIC assessment and status report on the Northern Map Turtle (<i>Graptemys geographica</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 34 pp.
Snapping Turtle	<i>Chelydra serpentina</i>	Reptiles	SC	SC	S4	MNDMNRFSpecies Occurrence Mapping, ORAA (2019), NHIC	Inhabit slow-moving waters with soft, muck bottom and dense aquatic vegetation. Ponds, sloughs and shallow bays are all often used as summering and overwintering habitat (COSEWIC 2008d).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2008. COSEWIC assessment and status report on the Snapping Turtle (<i>Chelydra serpentina</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 47 pp.
Spotted Turtle	<i>Clemmys guttata</i>	Reptiles	END	END	S2	MNDMNRFSpecies Occurrence Mapping	Found in wetlands with high organic content, including bogs, fens, marshes, woodland streams, sedge meadows, and shallow bays. Only one population is known from Wellington County, in Luther Marsh. Preferential to unpolluted shallow water with aquatic vegetation and soft substrates. Presence of Sphagnum moss, sedge tussocks, cattails and water lilies, may be important to Canadian populations (COSEWIC, 2002b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2004. COSEWIC assessment and update status report on the Spotted Turtle (<i>Clemmys guttata</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 27 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Wood Turtle	<i>Glyptemys insculpta</i>	Reptiles	END	THR	S2	MNDMNRFSpecies Occurrence Mapping	Generally found in forested landscapes, associated with clear freshwater streams and associated floodplains. Preferential to streams with year-round current, with sandy or gravelly-sandy bottoms. Streams used are typically meandering with frequent oxbows. Overwintering associated with stable, high concentration dissolved oxygen in pools, under mud or under overhanging banks. Nesting occurs in open areas with high sun exposure, typically within 10 to 50m of aquatic habitat. Home ranges are typically linear, following streams (Environment Canada, 2016).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Environment Canada. 2016. Recovery Strategy for the Wood Turtle (<i>Glyptemys insculpta</i>) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. v + 48 pp.
Butler's Gartersnake	<i>Thamnophis butleri</i>	Reptiles	END	END	S2	MNDMNRFSpecies Occurrence Mapping	Occupies open areas with dense grass and thatch cover, including tall grass prairie, old fields, abandoned sites in urban areas, drainage swales and seasonally dry marshes. only one population is known from Wellington County, in Luther Marsh. Artificial cover features such as plywood, concrete, shingles, metal sheets etc., increases probability of encounters, but is not essential (COSEWIC, 2010h).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Butler's Gartersnake (<i>Thamnophis butleri</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 51 pp.
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	Reptiles	SC	SC	S4	MNDMNRFSpecies Occurrence Mapping, ORAA (2019)	A semi-aquatic species that inhabits dense, low- vegetation, edges of ponds, streams, marshes, fens and bogs, with open sunlit areas for basking (COSEWIC 2002c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2002. COSEWIC assessment and status report on the Eastern Ribbonsnake (<i>Thamnophis sauritus</i>). Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24 pp.
Milksnake	<i>Lampropeltis triangulum</i>	Reptiles	SC	SC	S4	MNDMNRFSpecies Occurrence Mapping, ORAA (2019)	Habitat generalists often associated with edge habitat, meadows, prairies, pastures, rocky outcrops and human disturbances such as hydro corridors and railway embankments. Habitat is usually close to a water source. Hibernation occurs in a variety of natural and man-made features, including rotting logs, old foundations, basements and burrows (COSEWIC 2014).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2014. COSEWIC assessment and status report on the Eastern Milksnake (<i>Lampropeltis Triangulum</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 61 pp.
Massasauga Rattlesnake	<i>Sistrurus catenatus</i>	Reptiles	SC	THR	S3	MNDMNRFSpecies Occurrence Mapping	Only historic observations of Masassauga in the north western portion of Wellington County. Found in wet prairies, old fields, peatlands, rock barrens and coniferous forests, with open-areas, and areas of dense shrub cover. Hibernate in damp areas below the frost line (COSEWIC, 2012b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2012. COSEWIC assessment and status report on the Massasauga (<i>Sistrurus catenatus</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 84 pp.
American Ginseng	<i>Panax quinquefolius</i>	Vascular plants	END	END	S2	MNDMNRFSpecies Occurrence Mapping	Occur in moist, rich, undisturbed, mature Sugar Maple dominated deciduous woodlands. Often, colonies are located at the bottom of south facing slopes (COSEWIC, 2000).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2000. COSEWIC assessment and update status report on the American Ginseng (<i>Panax quinquefolius</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 17 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
American Water-willow	<i>Justicia americana</i>	Vascular plants	THR	THR	S2	MNDMNRF Species Occurrence Mapping	Found along the shores of rivers, streams and shallow lakes on a substrate of gravel, sand or organic material. Can survive in zones that are highly exposed to the action of waves and is limited to open habitats offering little or no competition from other species (Parks Canada Agency 2011)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	Parks Canada Agency. 2011. Recovery Strategy for the American Water-willow (<i>Justicia americana</i>) in Canada. Species at Risk Act Recovery Strategy Series, Parks Canada Agency, Ottawa. vi + 36 pp.
Blue Ash	<i>Fraxinus quadrangulata</i>	Vascular plants	THR	THR	S2?	MNDMNRF Species Occurrence Mapping	Found in 3 habitat types; floodplains and river valleys where Blue Ash grows in rich soils in association with other tree species; shallow soils on alvar and limestone on the Lake Erie islands; and stabilized beaches at Point Pelee National Park, and Fish Point on Pelee Island (COSEWIC 2014)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2014. COSEWIC assessment and status report on the Blue Ash (<i>Fraxinus quadrangulata</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 58 pp.
Butternut	<i>Juglans cinerea</i>	Vascular plants	END	END	S2?	MNDMNRF Species Occurrence Mapping	Occur in rich moist sites, that are well-drained, often found along stream banks or gravelly sites. Butternut is shade intolerant (COSEWIC, 2003b).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2003. COSEWIC assessment and status report on the butternut (<i>Juglans cinerea</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 32 pp.
Common Hoptree	<i>Ptelea trifoliata</i>	Vascular plants	THR	SC	S3	MNDMNRF Species Occurrence Mapping	Occurs nearly entirely along or near the Lake Erie shoreline. Often found in areas of natural disturbance where it forms part of the outer edge of shoreline woody vegetation (COSEWIC 2015)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2015. COSEWIC assessment and status report on the Common Hoptree (<i>Ptelea trifoliata</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 33 pp.
Dense Blazing Star	<i>Liatris spicata</i>	Vascular plants	THR	THR	S2	MNDMNRF Species Occurrence Mapping	Occurs in open tallgrass prairies. It can grow in a range of moisture regimes from dry to very moist (COSEWIC 2010)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2010. COSEWIC assessment and status report on the Dense Blazing Star (<i>Liatris spicata</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 23 pp.
Hill's Pondweed	<i>Potamogeton hillii</i>	Vascular plants	SC	SC	S2S3	MNDMNRF Species Occurrence Mapping	Occur in cold clear calcareous streams, ponds, and ditches, which are alkaline in nature (COSEWIC 2005c).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2005c COSEWIC assessment and update status report on the Hill's Pondweed (<i>Potamogeton hillii</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp.
Lakeside Daisy	<i>Tetranneuris herbacea</i>	Vascular plants	SC	THR	S3	MNDMNRF Species Occurrence Mapping	Commonly found in alvar habitats, but occasionally occurs in prairies and cliffs. Habitat is seasonally wet in spring and fall and moderately drought-like in the summer (COSEWIC 2002)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2002. COSEWIC assessment and status report on the Lakeside Daisy (<i>Hymenoxys herbacea</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 24 pp.
Smooth Yellow False Foxglove	<i>Aureolaria flava</i>	Vascular plants	THR	THR	S2?	MNDMNRF Species Occurrence Mapping	Inhabits a variety of dry upland woods including escarpment slopes, oak hummocks, oak woodlands, and oak savannas. Primarily associated with Oak species. (COSEWIC 2018)	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC. 2018. COSEWIC assessment and status report on the Yellow False Foxglove Bundle, Smooth Yellow False Foxglove (<i>Aureolaria flava</i>), Fern-leaved Yellow False Foxglove (<i>Aureolaria pedicularia</i>) and the Downy Yellow False Foxglove (<i>Aureolaria virginica</i>), in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xx + 100 pp.

Common name	Scientific name	Group	SARO	Cosewic	S-rank	Background sources	Habitat requirements	Suitable habitat in study area	Field studies completed/ required	Observed by AA	Reference
Tuberous Indian Plantain	<i>Arnoglossum plantagineum</i>	Vascular plants	SC	SC	S2	MNDMNRF Species Occurrence Mapping	Habitat includes open, sunny areas in wet calcareous soils, including wet meadows and shoreline fens (COSEWIC 2002).	No habitat matching criteria identified in study area	The study area was investigated during a site visit on May 19, 2023. No further studies required.	None observed.	COSEWIC 2002. COSEWIC assessment and update status report on the tuberous Indian-plantain (<i>Arnoglossum plantagineum</i>) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 11 pp.

References:

Cadman, M.D.,D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier. 2007. The Atlas of the Breeding Birds Ontario 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto,xxii + 706pp. (Available online here: <http://www.birdsontario.org/atlas/datasummaries.jsp>)

Colin Jones, Ross Layberry, and Alan Macnaughton. Ontario Butterfly Atlas Online. (Available online here: Toronto Entomologists' Association: http://www.ontarioinsects.org/atlas_online.htm)

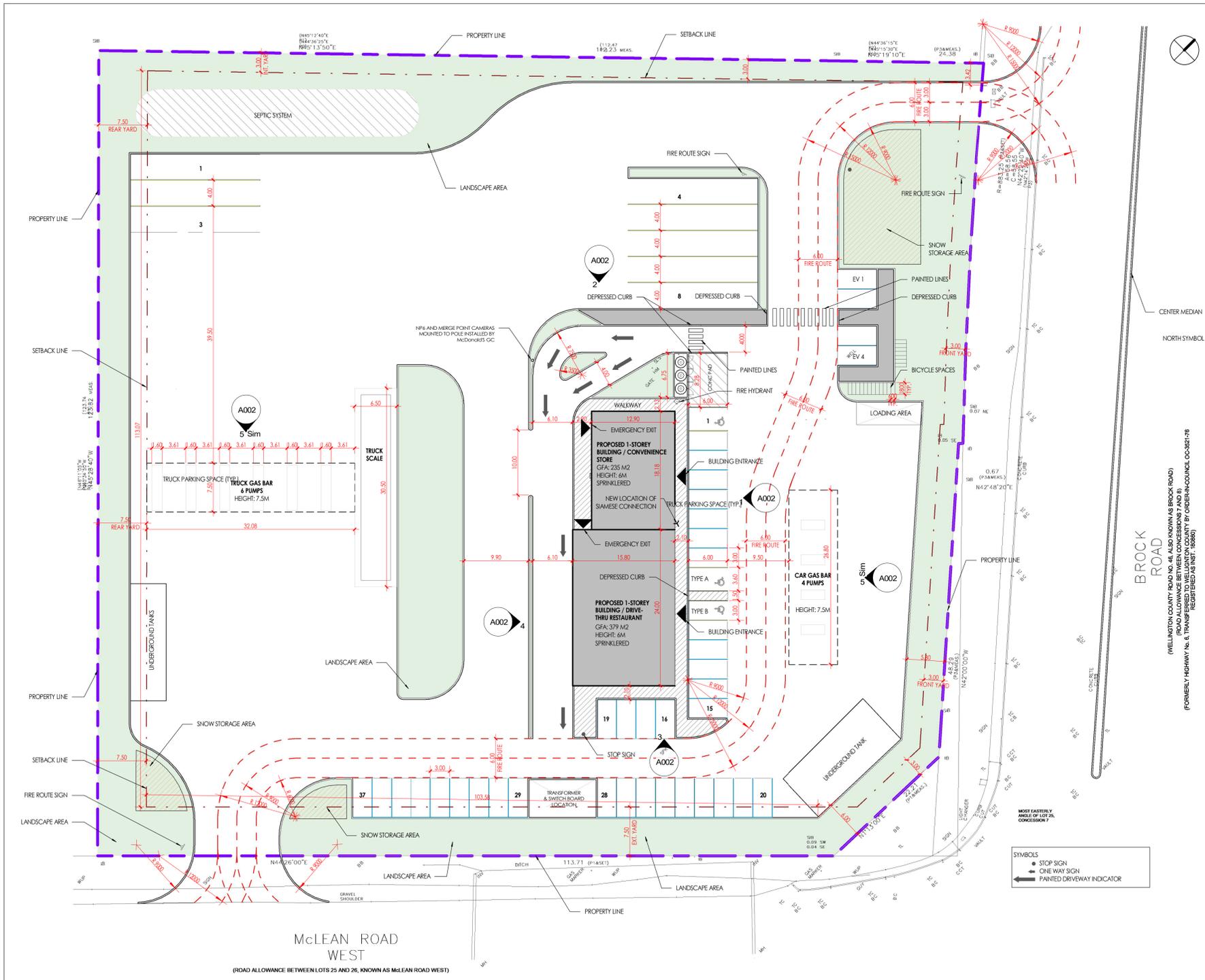
Dobbyn, J. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists, Altona Manitoba, Canada. (Available online here: <http://www.ontarionature.org/discover/resources/publications.php>)

MNRF, 2015. Wellington County Upper Tier Species at Risk. Ministry of Natural Resources and Forestry. Provided February 10, 2015.

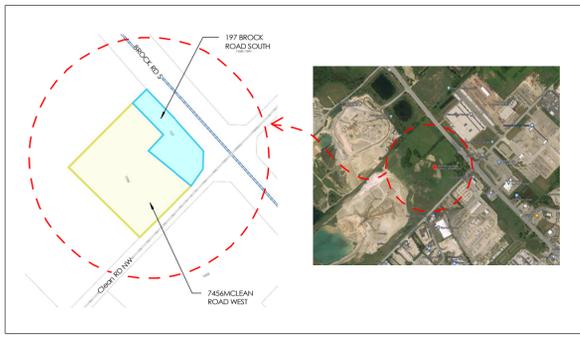
NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>.

NHIC, 2015. MNRF Make a map: Natural Heritage Areas. (Available online: <http://www.ontario.ca/environment-and-energy/make-natural-heritage-area-map>)

Ontario Nature. 2015. Ontario Reptile and Amphibian Atlas: a citizen science project to map the distribution of Ontario's reptiles and amphibians. Ontario Nature, Ontario. (Available online here: <http://www.ontarionature.org/atlas>)



1 00 - SITE PLAN
1:350



KEY PLAN
1:100

HC ZONE REQS	REQUIRED	PROPOSED
PERMITTED USES	SEE TABLE 8.1 ZONING BY LAW	GAS BAR(S), CONVENIENCE STORE AND RESTAURANT
LOT AREA (MIN)	0.4 HA	1.62 HA
LOT FRONTAGE (MIN)	20 M	101 M
FRONT YARD (MIN)	3 M	3 M
INTERIOR SIDE YARD (MIN)	3 M	3 M
EXTERIOR SIDE YARD (MIN)	7.5 M	7.5 M
REAR YARD (MIN)	7.5 M	3 M
RESTAURANT AREA		379 m ²
CONVENIENCE STORE		235 m ²
GAS BAR CANOPY (CARS)		201 m ²
GAS BAR CANOPY (TRUCKS)		241 m ²
TOTAL BUILDINGS / STRUCTURE AREA		1,056 m ²
LOT COVERAGE (MAX)	45%	6.5%
LANDSCAPED OPEN SPACE	25%	24%
PARKING SPACES:		
GAS BAR(S) - CARS	(1 PER PUMP) = 4	REFER TO PARKING SCHEDULE BELOW
GAS BAR(S) - TRUCKS	(1 PER PUMP) = 6	8
CONVENIENCE STORE	(1 PER 20 M ²) = 12	REFER TO PARKING SCHEDULE BELOW
RESTAURANT	(1 PER 10 M ²) = 38	REFER TO PARKING SCHEDULE BELOW
TOTAL	60	49

PARKING SCHEDULE	
TYPE OF PARKING SPACE	PROVIDED PARKING SPACE
ACCESSIBLE PARKING - TYPE A	2
ACCESSIBLE PARKING - TYPE B	1
TRUCK PARKING SPACE	8
TYPICAL PARKING SPACE	38
TOTAL:	49

5.2.15 BICYCLE PARKING

A. BICYCLE PARKING SPACES SHALL BE REQUIRED FOR THE USES LISTED IN TABLE 5.6 BELOW (FROM ZONING BY LAW) IN ADDITION TO ANY REQUIRED PARKING SPACES.

B. EACH BICYCLE PARKING SPACE SHALL BE A MINIMUM OF 60 CENTIMETERS WIDE AND 1.8 METERS LONG.

REQUIRED BICYCLE BY ZONING: 16
PROPOSED BICYCLE IN SITE PLAN: 19

USE	REQUIRED PARKING STANDARDS (PER NET FLOOR AREA)
Retail, personal, institutional	The greater of 2 spaces or 1 space /1000 m ²
Industrial	2 /1,000 m ²
Long term care facility, retirement home	The lesser of 5 or 0.25 per bed or dwelling unit
Public and private school	1 /10 students of design capacity & 1 space/35 employees
Dwelling units or mixed-use buildings with more than 6 dwelling units	2 spaces for the first 6 dwelling units plus 2 spaces for each additional 6 dwelling units or fraction thereof

2 SITE STATISTICS & TABLES
1:120

NOTE:
THE ARCHITECTURAL SITE PLAN IS FOR GENERAL ARRANGEMENT ONLY. REFER TO THE LANDSCAPE DRAWINGS, THE CIVIL ENGINEERING DRAWINGS AND THE SURVEY FOR LANDSCAPING, GRADING AND SERVING DETAILS.

REVISION

NUMBER	DATE	REMARKS
005	2023 10 04	FOR CLIENT REVIEW
004	2023 09 27	FOR CLIENT REVIEW
003	2023 08 28	FOR CLIENT REVIEW
002	2023 05 24	FOR CLIENT REVIEW
001	2023 01 05	DRAFT SITE PLAN

CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS AND CONDITIONS ON THE PROJECT AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK. DRAWINGS ARE NOT TO BE SCALED.

CONTRACT DOCUMENTS ARE THE COPYRIGHT OF THE CONSULTANTS AND SHALL NOT BE USED OR REPRODUCED WITHOUT AUTHORIZATION. DOCUMENTS ARE TO BE RETURNED UPON COMPLETION OF THE PROJECT.

ATA ARCHITECTS
ATA ARCHITECTS INC.
BURLINGTON OFFICE:
3221 NORTH SERVICE ROAD, SUITE 101
BURLINGTON, ONTARIO, L7N 3G2.
T 905 849 6888 F 905 849 4369
E admin@ataarchitectsinc.com

SEALS

PROJECT

PROPOSED GAS BARS,
RETAIL STORE &
DRIVE-THRU RESTAURANT
7456 MCLEAN ROAD W,
PUSLINCH, ON NOB 2JO

DRAWING

SITE PLAN & KEYPLAN

DRAWN

AA

SCALE

As indicated

DATE

2023 10 04

CHECKED

AT

PROJECT

#TBD

DRAWING

A001

ZONING BY-LAW AMENDMENT to By-law 023/18

for

DAAZ Inc.

7456 Mclean Road West & 197 Brock Road South, Puslinch

Township Rezoning Application D14/DAZ

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER _____

**A BY-LAW TO AMEND BY-LAW NUMBER 023/18, AS AMENDED,
BEING THE ZONING BY-LAW OF THE TOWNSHIP OF PUSLINCH**

WHEREAS, the Council of the Corporation of the Township of Puslinch deem it appropriate and in the public interest to amend By-Law Number 023/18 pursuant to Sections 34 of the Planning Act, R.S.O. 1990 as amended;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWNSHIP OF PUSLINCH ENACTS AS FOLLOWS:

1. That Schedule "A" of By-law 023/18 is hereby amended by rezoning the lands municipally referred to as 7456 Mclean Road West and 197 Brock Road South, from a Special Provision Industrial (IND(sp54)) ZONE and Holding Industrial (IND(h5)) ZONE to a site specific **Highway Commercial (HC(sp_)) ZONE**, as shown on schedule "A" of this By-law.
2. That Section 14 Site-Specific Special Provisions is amended by adding the following site specific provision:

No.	Zone Designation	Additional Permitted Uses	Prohibited Uses	Site Specific Special Provision
	HC	N/A	N/A	LANDSCAPED OPEN SPACE (MINIMUM): 20.0% PARKING SPACE REQUIREMENT RESTAURANT (MINIMUM): 1 per 20m ² including outdoor patio area.

3. That the subject land as shown on Schedule "A" to this By-Law shall be subject to all applicable regulations of Zoning By-Law 023/18, as amended.
4. This By-law shall become effective from the date of passage by Council and come into force in accordance with the requirements of the Planning Act, R.S.O. 1990, as amended.

READ A FIRST AND SECOND TIME THIS _____ OF _____, 20__.

MAYOR

CLERK

READ A THIRD TIME AND PASSED THIS _____ OF _____, 20__.

MAYOR

CLERK

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

BY-LAW NUMBER _____

Schedule "A"

INSERT MAP

Highlighted area to be rezoned from **"IND(sp54) & IND(h5)" Zone** to a site specific **"HC(sp_)" Zone**

This is Schedule "A" to By-law No. _____

Passed this ____ day of _____, 20__.

MAYOR

CLERK

THE CORPORATION OF THE TOWNSHIP OF PUSLINCH

EXPLANATION OF BY-LAW NO. _____

By-law Number _____ amends the Township of Puslinch Zoning By-law 23/18 by rezoning the lands municipally referred to as 7456 Mclean Road West and 197 Brock Road South from a Special Provision Industrial (IND(sp54)) ZONE and a Holding Industrial (IND(h5)) ZONE to a Special Provision Highway Commercial (HC(sp_)) ZONE to permit a gas bar, associated retail/convenience store, and drive through restaurant.

The subject property is approximately 1.62 hectares (4.0 acres) in size and is currently vacant/undeveloped.

Within the County's Official Plan, the subject lands are designated as "Rural Employment". This designation permits such commercial uses that will be service focused, with limited accessory retails, including both small scale restaurants and automobile services.

Subject: !"#%&'()*+,-./:0\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/:,0\$;,<=,/>,.?\$.<@5/.,?=-
A>9-*?7?B0C\$5,DB@5,>,.?EFGGHHI3FJ
Date:)/.0-CK\$LB,.\$'K\$GIGM\$-?&&#&I#G&\$8)\$"-:?.5.\$;-C=@NO?7-<@.N\$P@>,
From: P/00\$Q,==
To: +C.,\$4-.6:
CC: RO5@:S.-\$T=-5
Attachments: @>-N,IIGU9.NK\$@>-N,I2U9.N

V@\$+C..K

\$

A\$O-<,\$5,<@,W,0\$?O,\$5,<@:0\$5,9/5?XC\$FX/B?Y\$F::/*@-?,:\$.0\$-N5,,\$W@?O\$?O,@5\$*/.*=B:@
./?\$X,\$5,DB@5,0\$0B,\$?/?\$O,\$-X:.,*,\$/Z\$-.C\$Z,-?B5,:/\$5\$9/=.*C\$?5@NN,5:U

\$

PO,\$-99=@*-S/.\$:O/B=0\$,:B5,\$?O,C\$-5,\$@.\$*/>=@-.*,\$W@?O\$?O,\$R/B.?C\$/Z\$1,==@.N?/.\$4CH-
R/,:5<-S/.\$-0\$7B:?-@.-X=,\$\,\$/Z\$1//0=-.0:\$EJ9:#^9B:=@.*OU*^W9H*/.?.?^B9=-/0:^GI23^22^Z/5,:
*/.:5<-S/.HXCH=-WU9UJ

\$

PO,\$-99=@*-S/.\$:O/B=0\$-:/Z/==/W@.N\$S>@.N\$5,:?5@*S/..Z/5\$<,N,?-S/.\$5,>/<=-\$-:\$0B,\$0@=@
2U\$O,\$)@N5-?/5C\$4@50\$R/.,S/.\$F*?E)4RFJK

GU\$O,\$79,*@,:\$-?#!@:6F*?E7F!FJ\$5,N-50@.N\$X-?5\$//:S.N\$-.0K

MU\$O,\$Q@:O\$-.0\$1@=0=@Z,\$F*?EQ1FJ\$5,N-50@.N\$X-?5\$//:S.NU

\$

A\$?5B:?\$B5\$5,<@,W\$-.0\$5,*/>,>,.0-S/.\$-5,\$?/?\$O,\$-S:Z-*S/.\$/Z\$?O,\$P/W.:O@9U\$8=-,.\$=\$,?>,\$6.
-::@:?\$ZB5?O,5\$/.?O@:\$_=,U

\$

8=-,.\$0\$/.?SO,:@?-?,\$?/\$*/.-*?>,\$W@?O\$-.C\$DB,:S/.\$/5\$*/>,>,.?:U

\$

4,:?\$,N-50:K

\$

My working hours and your working hours may be different. Please do not feel obligated to reply outside your normal

\$

Todd Felthe(him)OALA, CSLA, CERP
Principal, Landscape Architect, Restoration Ecologist

DOUGAN & ASSOCIATES - Ecological Consulting & Design
NETWORK OF NATURE Canada's Plant Database
3 - 7 Edinburgh Rd S, Guelph, ON N1H 5N8
W 519.822.1609 C 519.242.8800@dougan.ca

* Please

note our email response time will be delayed during Dougan's field season between the months of Aug while our staff are working at capacity and in remote settings. Thank you for your patience.

\$

From:\$V,-?O,5\$;@`/\$aV,-?O,5b-X/B0?.NU*/>c\$

Sent:\$1,0,:0-CK\$)-C\$M2K\$GIGM\$2#G3\$8)

To:\$P/00\$Q,==\$ad,==b0/BN-.U*-ce\$X-.6:b9B:=@.*OU*-e\$RO5@:S.-\$T=-5\$a*/=-5b0/BN-.U*-c

Cc:\$RO,5C=HF...,\$/:::\$aRO,5C=b-X/B0?.NU*/>ce\$6,.bX=-*6O-5?*/.:?5B*S/.U*/>

Subject:\$!"#%&'()*+,-./:0\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/:,0\$;,<=,/>,.?\$.<@5/.,?=-\$A>9-*?7?E
5,DB@5,>,.?EFGGHHI3FJ

\$

'' '' ''

V,==/\$-==K

\$

8=-,,:\$,\$-]*O,0\$Z/5\$?O,\$5,<@:0\$>, >/\$5,N-50@.N\$?O,\$95/9/:0\$0,<= /9>,.?-\$?%&'(\$)*+,-. \$!/-0\$1\$ 23%\$45/*6\$!/-0\$7U\$8=-,,:\$=,?\$>,\$6./W\$@Z\$C/B\$O-<,\$-.C\$DB,:S/:U

\$

)-.C\$?O-.6:K

\$

Heather Dixon, PhD (she/her) . Aquatic Ecologist
ABOUT & ASSOCIATES INC. 3-5 Edinburgh Road South . Guelph . Ontario . N1H 5N8
519.781.1581 www.aboudtng.com . heather@aboudtng.com

\$

About & Associates Inc. is located within the Between the Lakes Purchase (Treaty 3); the treaty lands and territory of the Mississaugas of the Credit.

\$

From: \$P/00\$Q,=~~\$a~~b0/BN-.U* c\$

Sent: \$POB5:0-CK\$)-C\$2fK\$GIGM\$G#I(\$8)

To: \$V,-?O,5\$;@`/.\$a?O.5b-X/B0?.NU*/> ce\$X-.6:b9B:=@.*Ole\$RO5@:S.-\$T#-5\$ a0/BN-.U*-c

Cc: \$RO,5C=HF..., \$!/:.\$a,5C=b-X/B0?.NU* ce\$.bX=-*6O-5?/*.:?5B*S/.U*/>

Subject: \$!#\$%&'(\$)*+,-. \$!/-0\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/:0\$;,<= /9>,.?\$.<@5/.,.?=\$A>9-*?7?E 5,DB@5,>,.? \$EFFGGHGI3FJ

\$

PO-.6:\$V,-?O,5K

\$

1,\$=//6\$Z/5W-50\$?/\$5,<@,W@.N\$?O,\$5,<@:0\$>, >/U

\$

!,N-50:K

\$

My working hours and your working hours may be different. Please do not feel obligated to reply outside your normal

\$

Todd Fell(he/him)OALA, CSLA, CERP
Principal, Landscape Architect, Restoration Ecologist

DOUGAN & ASSOCIATES - Ecological Consulting & Design
NETWORK OF NATURE Canada's Plant Database
3 - 7 Edinburgh Rd S, Guelph, ON N1H 5N8
W 519.822.1609 C 519.242.6900 td@dougan.ca

* Please note our email response time will be delayed during Dougan's field season between the month of August

while our staff are working at capacity and in remote settings. Thank you for your patience.

\$

From: \$V,-?O,5\$;@`/.\$a?O.5b-X/B0?.NU*/> c\$

Sent: \$POB5:0-CK\$)-C\$2fK\$GIGM\$22#MG\$F)

To: \$X-.6:b9B:=@.*Ole\$P/00\$Q,=~~\$a~~b0/BN-.U* ce\$RO5@:S.-\$T#-5\$ a0/BN-.U*-c

Cc: \$RO,5C=HF..., \$!/:.\$a,5C=b-X/B0?.NU* ce\$.bX=-*6O-5?/*.:?5B*S/.U*/>

Subject: \$!#\$%&'(\$)*+,-. \$!/-0\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/:0\$;,<= /9>,.?\$.<@5/.,.?=\$A>9-*?7?E 5,DB@5,>,.? \$EFFGGHGI3FJ

\$

V,==/\$-==K

\$

Fg,5\$/*.:B=?-S/.\$W@?O\$;/BN-.\$-.0\$F::/*@-?,:K\$FX/B0\$W@==\$<@:@?O,\$:@?,\$?/\$*O-5-*?,5@h, -:::\$WO,?O,5\$?O,\$W,?=-.0\$@:\$S==95,,:?U\$1,\$W@==?O,\$5,<@:,\$/B\$95,<@/B:\$>,\$/?/\$@.* ?O,\$:@?,\$<@:@?=\$/N:@0,\$?O,\$5,:B=?:\$/Z/B\$5\$5,>/?,0\$,6?/9\$:B5<,C\$?/\$:??,\$WO,?O,5\$?O,5\$ WO@*O\$9/= @*C\$*-.\$-*?\$/K\$-.0\$95/<@0,\$?O,\$>,\$/?/\$?O,\$P/W.:O@9\$-.0\$;/BN-.U

\$

)-.C\$?O-.6:K

\$

Heather Dixon, PhD (she/her) . Aquatic Ecologist
ABOUD & ASSOCIATES INC. 3-5 Edinburgh Road South . Guelph . Ontario . N1H 5N8
519.781.1581 www.aboudtng.com . heather@aboudtng.com

\$

About & Associates Inc. is located within the Between the Lakes Purchase (Treaty 3); the treaty lands and territory of the Mississaugas of the Credit.

\$

From: \$P/00\$Q,=~~de~~ \$a-b0/BN-.U* c\$

Sent: \$1,0.,:0-CK\$)-C\$MK\$GIGM\$2I#&'\$F)

To: \$V,-?O,5\$;@`/.\$a-?O.5b-X/B0?.NU*/> ce\$RO5@:S.-\$T#-5\$ a0/BN-.U*-c

Cc: \$RO,5C=HF...,!/:.\$a.5C=b-X/B0?.NU*/> ce\$.bX=-*6O-5?/*/:?5B*S/U*/> e\$X-6:b9B:=@.*OU*-

Subject: \$!"#%&'(\$)*+,-.\$!/-\$0\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/;0\$;,<=9>,.?\$.<@5/;.,?-\$A>9-*\$7?E
5,DB@5,>,.?\$EFFGGHGI3FJ

\$

V@\$V,-?O,5K

\$

Ai==X,\$/j\$B.S=\$)/.0-C\$-g,5\$?/0-CU\$+;?*\$/*,..*?\$.`?\$W,,6U

\$

RO,,5:K

\$

My working hours and your working hours may be different. Please do not feel obligated to reply outside your normal

\$

Todd Fell(he/him) OALA, CSLA, CERP
Principal, Landscape Architect, Restoration Ecologist

DOUGAN & ASSOCIATES - Ecological Consulting & Design
NETWORK OF NATURE Canada's Plant Database
3 - 7 Edinburgh Rd S, Guelph, ON N1H 5N8
W 519.822.1609 C 519.242.6900 690@dougan.ca

* Please note our email response time will be delayed during Dougan's field season between the month of August while our staff are working at capacity and in remote settings. Thank you for your patience.

\$

From: \$V,-?O,5\$;@`/.\$a-?O.5b-X/B0?.NU*/> c\$

Sent: \$1,0.,:0-CK\$)-C\$MK\$GIGM\$3#&'\$M\$F)

To: \$P/00\$Q,=~~de~~ \$a-b0/BN-.U* ce\$RO5@:S.-\$T#-5\$ a0/BN-.U*-c

Cc: \$RO,5C=HF...,!/:.\$a.5C=b-X/B0?.NU*/> ce\$.bX=-*6O-5?/*/:?5B*S/U*/> e\$X-6:b9B:=@.*OU*-

Subject: \$!,\$\$%&'(\$)*+,-.\$!/-\$0\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/;0\$;,<=9>,.?\$.<@5/;.,?-\$A>9-*\$7?B
5,DB@5,>,.?\$EFFGGHGI3FJ

\$

V@\$P/00K\$

\$

Ai>\$@.\$>,.S.N:\$-==\$>/5.@.NU\$;/C/B\$O-<,\$\$>,\$?/>/55/Wk

\$

)-.C\$?O-.6:K

\$

V,-?O,5

\$

Heather Dixon, PhD (she/her) . Aquatic Ecologist
ABOUD & ASSOCIATES INC. 3-5 Edinburgh Road South . Guelph . Ontario . N1H 5N8
519.781.1581 www.aboudtng.com . heather@aboudtng.com

\$

About & Associates Inc. is located within the Between the Lakes Purchase (Treaty 3); the treaty lands and territory of the Mississaugas of the Credit

\$

)-.C\$?O-.6:K

\$

Heather Dixon, PhD (she/her) . Aquatic Ecologist
ABOUT & ASSOCIATES INC. 3-5 Edinburgh Road South . Guelph . Ontario . N1H 5N8
519.781.1581 www.aboudtng.com . heather@aboudtng.com

\$

About & Associates Inc. is located within the Between the Lakes Purchase (Treaty 3); the treaty lands and territory of the Mississaugas of the Credit.

\$

From: \$P/00\$Q,=~~5a~~b0/BN-.U*-c\$
Sent: \$PB,:0-CK\$)-C\$GK\$GIGM\$G#12\$8)
To: \$V,-?O,5\$;@`/.\$a-?O,5b-X/B0?.NU*/> ce\$RO5@:S.-\$T*=-5\$ba0/BN-.U*-c
Cc: \$RO,5C=HF...\$!/:.\$a,5C=b-X/B0?.NU* ce\$.bX=-*6O-5?/*.:?5B*S/.U*/> e\$X-6:b9B:=@.*OU*
Subject: \$!#"#\$%&'(\$)*+,-.!/-\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/:,0\$;,<=,/>,.\$?<@5/>.,?-=A>9-*?7?E
5,DB@5,>.,?\$EFFGGHGI3FJ

\$

n//0\$Fg,5.//.\$V,-?O,5K

\$

F9/=N@:.\$Z/5\$?O,\$0,=-C,0\$5,:9/.,U\$P/\$>C\$B.0,5:?.0@.NK\$?O,\$-99=@*-.?\$O-:./?\$:BX>@],0\$-\$9
-99=@*-S/.\$Z/5\$,,@?O,5\$:@?,\$9=-.\$-995/<=-\$/5\$h/.@.N\$->.,0>.,?U\$4-:,0\$/\$?O,\$-@5\$90/?/\$,<@0,
:@?,\$<@:@?@\$@:./?\$=@6,*B\$B@?50\$B=0\$X,\$95,>-?B5,\$?/\$:*O,0B=-.\$-C?O@.N\$-?7?O@:\$S>,\$5
?O,\$Z,-?B5:.\$-99,-5\$?/\$O-<,\$X,,.\$95,.,?\$/.\$?O,\$-0o*.,?95/9,5?C\$-.0\$-**,:\$W/B=0\$.,,0\$?/\$X,\$-55-
?O,\$-99=@*-.?U\$7O/B=0\$FX/B0\$X,\$5,?-@.,,0\$?/\$ZB5?O,5\$:B99/5?C\$O,\$99=@*.,?C/B/\$X?-.@.\$-.
:BX>@?/\$=-.N\$W@?O\$?O,\$9=-..@.N\$-99=@*-S/./.\$95,<@/B:=C\$>-99,0\$Z,-?B5:.\$W/B=0\$X,\$/Z\$-:

\$

4,:?\$,N-50:K

\$

My working hours and your working hours may be different. Please do not feel obligated to reply outside your normal

\$

Todd Felthe(him)OALA, CSLA, CERP
Principal, Landscape Architect, Restoration Ecologist

DOUGAN & ASSOCIATES - Ecological Consulting & Design
NETWORK OF NATURE Canada's Plant Database
3 - 7 Edinburgh Rd S, Guelph, ON N1H 5N8
W 519.822.1609 C 519.242.6600 660@dougan.ca

!

* Please note our email response time will be delayed during Dougan's field season between the month of August while our staff are working at capacity and in remote settings. Thank you for your patience.

\$

From: \$V,-?O,5\$;@`/.\$a-?O,5b-X/B0?.NU*/> c\$
Sent: \$PB,:0-CK\$F95@=\$2fk\$GIGM\$G\$8)
To: \$P/00\$Q,=~~5a~~b0/BN-.U*-c ce\$RO5@:S.-\$T*=-5\$ba0/BN-.U*-c
Cc: \$RO,5C=HF...\$!/:.\$a,5C=b-X/B0?.NU* ce\$.bX=-*6O-5?/*.:?5B*S/.U*/> e\$X-6:b9B:=@.*OU*
Subject: \$%&'(\$)*+,-.!/-\$1\$-.0\$23%\$45/*6\$!/-0\$7\$85/9/:,0\$;,<=,/>,.\$?<@5/>.,?-=A>9-*?7?B0C
5,DB@5,>.,?\$EFFGGHGI3FJ

\$

;-5\$):U\$T=-5\$-.0\$)5U\$Q,==K

\$

1,\$*/.?-*?,0\$?O,\$P/W.:O@9\$/Z\$8B:=@.*O\$=-:?\$>/.?O\$W@?O\$?O,\$-]*O,0\$=,]5\$5,N-50@.N\$?O,\$9
0,<=,/>.,?\$-?%&'(\$)*+,-.!/-\$1\$-.0\$23%\$45/*6\$!/-0\$7\$K\$Z/5\$W0@*O\$C/B\$95/<@0,0\$-.\$*/=/N@*
0-?,0\$LB.,\$GMK\$Z/5\$8\$O,\$95,H*/.:B=?-S/.\$-99=@*-S/.\$Z/5\$?O@:\$0,<=,/>.,?U\$1,\$W/B=0\$=@6,\$?
@? \$W -6\$?/\$O ? \$- @ \$W O ? O 5\$? O \$95 / - @ * @ - - C \$ @ N @ * ? \$ W ? - 0 \$ @ 0 \$ 0 \$ @ \$ C / B \$

From: [Township of Puslinch](#)
To: [Lynne Banks](#)
Subject: New Entry: Application for Zoning By-law Amendment
Date: Wednesday, October 25, 2023 8:07:02 AM

Type of Amendment

Site specific

Purpose of and reasons for the proposed amendment(s)

To rezone the subject site (7456 McLean Road W & 197 Brock Road S) from the IND (sp54) Zone and the IND(h5) Zone to the Highway Commercial (HC) Zone to permit a small-scale multi-tenant commercial development with a Gas Bar, Convenience Store and Drive-Through Restaurant.

How many registered owners are on title?

1

Registered Owner's Name (Person one)

DAAZ Inc.

Registered Owner's Email Address (Person one)

[REDACTED]

Registered Owner's Phone Number (Person one)

[REDACTED]

Property Subject of the Zoning By-law Amendment

7456 McLean Road W & 197 Brock Road S
Puslinch, ON
N0B2J0

Applicant (Agent) Name

Michael Davis (Siv-ik Planning & Design Inc.)

Agent Address

14 Glendale Avenue North
Hamilton, ON
L8L 7J3

Agent Email Address

mdavis@siv-ik.ca

Agent Phone Number

+19059219029

Agent Fax Number

+19059219029

Name, address, and phone number of all persons having any mortgages, charges, or encumbrances on the property

None

Send correspondence to

Agent

Send invoices to

Agent

When did the current owner acquire the subject land?

July 14, 2022

What does the amendment cover?

The "entire" property

Municipal Address

7456 McLean Road W & 197 Brock Road S
Puslinch, AB
N0B2J0

Concession

7

Lot

PT Lot 25

Registered Plan Number

PARTS 1 & 2 61R7239

Area in Hectares

1.62

Area in Acres

4.00

Depth in Meters

135.2

Depth in Feet

443.5

Frontage in Meters

101

Frontage in Feet

331.3

Is the application to amend the zoning by-law consistent with the Provincial Policy Statement?

Yes

Is the subject land within an area of land designated under any provincial plan or plans?

Places to Grow

If yes, does the application conform to and not conflict with the application provincial plan or plans?

Yes

What is the current County Official Plan designation of the subject property?

Rural Employment

List land uses permitted by the current Official Plan designation

Dry industrial and commercial uses requiring large lots, major road access or proximity to rural resources are permitted in rural employment areas. Areas designated Rural Employment in Puslinch are permitted to have the following additional uses: complementary commercial uses such as automotive uses, restaurants, motels and limited retail; offices, including a head office and/or research centre.

How does the application conform to the Official Plan?

The proposed ZBA will enable the development of a range of "complementary" commercial uses that will support the function of the broader employment area between 401 & Aberfoyle. The site is limited in size and the development can be serviced by private on-site services (see Functional Servicing Report)

If the application is to implement an alteration to the boundary of an area of settlement or to implement a new area of settlement, provide details of the Official Plan or Official Plan amendment that deals with the matter.

N/A

If the application is to remove land from an area of employment, provide details of the Official Plan or Official Plan amendment that deals with the matter.

N/A

If the subject land is within an area where zoning with conditions may apply, provide an explanation of how the application conforms to the Official Plan policies relating to zoning with conditions.

N/A

What is the current zoning of the property?

IND(sp54) & IND(h5)

What uses are permitted?

Industrial

If the subject land is within an area where zoning with conditions may apply, provide an explanation of how the application conforms to the Official Plan policies relating to zoning with conditions.

N/A

If the subject land is within an area where the municipality has pre-determined minimum and maximum density requirements or the minimum and maximum height requirements provide a statement of these requirements.

N/A

What is the "existing" use(s) of the subject land?

Vacant/Undeveloped

How long has the "existing" use(s) continued on the subject land?

N/A

What is the "proposed" use(s) of the subject land?

Gas Bar(s), Convenience Store & Drive-Through Restaurant.

Existing Type of buildings or structure(s)

N/A

Proposed Type of buildings or structure(s)

Commercial

Existing Building Date of Construction

October 25, 2023

Proposed Building Date of Construction

October 24, 2024

Existing Building Height

0m

Proposed Building Height

6m

Existing Number of Floors

0

Proposed Number of Floors

1

Existing Total Floor Area

0

Proposed Total Floor Area

614m²

Existing Ground Floor Area (exclude basement)

0

Proposed Ground Floor Area (exclude basement)

614m²

Existing distance from the building/structure to the front lot line

0

Proposed distance from the building/structure to the front lot line

15.8m

Existing distance from the building/structure to the side lot line

0

Proposed distance from the building/structure to the side lot line

52.3m

Existing distance from the building/structure to the side lot line (other side)

0

Proposed distance from the building/structure to the side lot line (other side)

17.1m

Existing distance from the building/structure to the rear lot line

0

Proposed distance from the building/structure to the rear lot line

7.5m

Existing percentage of lot coverage

0

Proposed percentage of lot coverage

8%

Existing number of parking spaces

0

Proposed number of parking spaces

51

Existing number of loading spaces

0

Proposed number of loading spaces

0

What is the access to the subject property?

Continually maintained municipal road

What is the name of the road or street that provides access to the subject property?

McLean Road W & Brock Road S

Applicable water supply and sewage disposal: Communal Well

Existing

Applicable water supply and sewage disposal: Private well

Proposed

Applicable water supply and sewage disposal: Provincial Water Taking Permit

Existing

Applicable water supply and sewage disposal: Water sewers

Existing

Applicable water supply and sewage disposal: Communal Septic

Existing

Applicable water supply and sewage disposal: Private septic

Proposed

Applicable water supply and sewage disposal: Provincial Waste Water System

Existing

If the application would permit development on privately owned and operated individual or communal septic systems, would more than 4500 litres of effluent be produced per day as a result of the development being completed?

Yes

Servicing options report

[2023.10.20-FSRSWM_FINAL.pdf](#)

A hydrogeological report

[2023.10.20_Hydrogeological-Assessment-Report_FINAL.pdf](#)

How is storm drainage provided?

Storm Sewers

Official Plan Amendment

No

Zoning By-Law Amendment

No

Minor Variance

No

Plan of Subdivision

No

Consent (Severance)

No

Site Plan Control

No

Has the subject land ever been the subject of a Minister's Zoning Order?

No

Please list the titles of any supporting documents: (e.g. Environmental Impacts Study, Hydrogeological Report, Servicing Options Report, Traffic Study, Market Area Study, Aggregate Licence Report, Stormwater Management Report, etc.)

Conceptual Site Plan
Planning Justification Report
Functional Servicing Report
Hydrogeological Report
Transportation Impact Assessment
EIS Memo

Parcel register for property

- [Planning-Justification-Report-7456-McLean-Road-197-Brock-Road-S-DAAZ-Inc.pdf](#)
 - [2023.10.20-7456-McLean-and-197-Brock-TIS.pdf](#)
 - [6556_C102_11x17.pdf](#)
 - [6556_C102.pdf](#)
 - [Zoning-By-law-Amendment-Application-FINAL-7456-McLean-Rd-W.pdf](#)
 - [Updated-Comment-Summary-7456-McLean-Rd-W-192-Brock-Rd-S_Redacted.pdf](#)
 - [EIS-Correspondence.pdf](#)
 - [AA22-209A-EIS-Requirement-Memo.pdf](#)
 - [WC679098-Transfer_3705920-1.PDF](#)
-

Application Drawing

- [Conceptual-Site-Plan-7456-McLean-Rd-Site-plan-PDF.pdf](#)
-

The Agent/Solicitor is different than the owner

Yes

Owners Name (Person one)

Daaz Inc

Owners Address (Person one)

8290 17th Sideroad E
Acton, ON
L7J2M1

I (we) authorize this person to act as my agent in this application

Michael Davis

Owners Signature (Person one)



For the purpose of public notification and staff identification,

I agree to erect a sign in accordance with the Township of Puslinch's sign requirements within one week of the date Township staff has deemed that the application is complete, and remove the sign when the application has been given final approval.

For the purpose of public notification and staff identification, I agree to erect a sign in accordance with the Township of Puslinch's sign requirements within one week of the date Township staff has deemed that the application is complete, and remove the sign when the application has been given final approval.

Furthermore, for the purposes of processing this application, I permit staff/representatives of the Township of Puslinch to enter onto my lands and inspect my property at the following times (please check one of the following boxes):

Any and all times

Zoning By-law Amendment must be commissioned

I understand that prior to the Zoning By-law Amendment being deemed complete it must be commissioned by all registered owners or the agent responsible for the application,



7456 MCLEAN ROAD W AND 197 BROCK ROAD S

PLANNING JUSTIFICATION **REPORT**

Zoning By-law Amendment Application

[siv-ik] PLANNING
/ DESIGN



VERSION 1.0

ISSUED

09.20.2023

PREPARED BY

Dan Murphy, MA, BAA
519.852.9983
dmurphy@siv-ik.ca

PREPARED FOR

Black-Hart Construction Inc. (on behalf of DAAZ Inc.)

COPYRIGHT NOTICE

Copyright © 2023 by Siv-ik Planning and Design Inc. The content of this document is the intellectual property of Siv-ik Planning and Design Inc. Reproduction or redistribution of this document by the Approval Authority or other stakeholders through the planning application process is permitted. Reproduction or redistribution of any portion of this document or use of the intellectual ideas contained within it for any other purpose is prohibited without the consent of Siv-ik Planning and Design Inc.

CONTENTS

1.0 Intro	01
2.0 Site Context	03
3.0 Policy & Regulations	05
4.0 The Proposal	11
5.0 Planning Analysis	15
6.0 Conclusions	19
Appendices	20

1.0 INTRODUCTION

This report has been prepared by Siv-ik Planning & Design Inc. for Black-Hart Construction (representing the registered owner DAAZ Inc.) in support of a Zoning By-law Amendment application for the properties municipally known as 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch. This report provides an independent professional analysis and opinion regarding the merits of the proposed Zoning By-law Amendment and has been prepared, in part, to satisfy the Municipality's complete application requirements. The report explains how the proposed Zoning By-law Amendment aligns with the objectives of the Provincial Policy Statement (2020), the County Official Plan, represents sound planning and is in the public interest.

The purpose of the proposed Zoning By-law Amendment is to facilitate the development of a multi-tenant commercial development (approximately 6,000 sf of gross floor area) on the project site. From a technical perspective, the proposed Zoning By-law Amendment seeks to rezone the lands from the Industrial IND(sp54) and IND(h5) Zones to the Highway Commercial (HC) Zone to allow for an appropriate range of commercial uses to support the travelling public and the overall function of the broader Aberfoyle Industrial Park. The proposed by-law also includes special provisions relating to minor reductions in parking counts and landscaped open space.

Figure 1: Site Overview



The subject site is municipally identified as 7456 McLean Road West and 197 Brock Road South in the Township of Puslinch. It is located in the *Aberfoyle Industrial Park*, at the intersection of Brock Road South (County Road) and McLean Road (Local Road), approximately 700m southeast of the Secondary Urban Centre of Aberfoyle, and 1.25km north of Highway 401. The site is approximately 1.62 hectares (4.0 acres) in size, irregular in shape, consisting of two existing parcels, and is currently vacant and undeveloped.

Additional details about the site and the context are summarized in *Table 1* below.

Table 1: Site Statistics

Project Site Attributes		
Site Area	1.62 hectares (4.0 acres)	
Frontage	101.0 metres (Brock Road South) 113.7 metres (McLean Road West)	
Depth	135.2 metres	
Existing Use(s)	Vacant/Undeveloped	
Servicing	<ul style="list-style-type: none"> • Private On-Site Water and Sanitary Services. • Existing Storm Sewers on McLean Road West 	
Existing Zoning	7456 McLean Road West	197 Brock Road South
	IND(sp54)	IND(h5)
Official Plan (County of Wellington)	Rural Employment Area	

Note: A “Site Plan” has been prepared by ATA Architects Inc and is attached as Appendix ‘A’ to this report for further reference. The existing conditions information has been prepared based on publicly available data from the County of Wellington, on-site observation and a legal/topographic survey prepared Tarasick McMillan Kubicki Limited, dated November 2022.

2.0 SITE CONTEXT

2.1 Surrounding Land Use

As noted in Section 1.0 of this report, the site is located within the *Aberfoyle Industrial Park* in Puslinch Township, a specialized area of rural commercial/industrial land south of the Secondary Urban Centre of Aberfoyle and north of Highway 401. The Industrial Park was established to create a central logistics hub that is intended to serve the Greater Toronto Area (GTA) and Southwestern Ontario, taking advantage of the proximity to major urban centres and Highway 401. The area is primarily developed with large-scale industrial and employment uses however there are a collection of commercial developments along Brock Road that serve and cater to the function of the employment area. Within 800 metres of the project site there are numerous large scale logistics terminals and distribution centres on lots of considerable size, a collection of auto-oriented services and shops such as gas bars and drive-thru restaurants focused along Brock Rd, and active aggregate extraction operations. A GO Transit Park and Ride Station is located on the southeast corner of the intersection of Brock Rd S and McLean Rd W, which generates significant commuter traffic along Brock Rd. The project site is located 1.25km north of Highway 401, connecting the industries within the *Aberfoyle Industrial Park* north towards the GTA, and south to Waterloo Region. It is expected that *Aberfoyle Industrial Park* will continue to grow, as several large scale industrial and logistics facilities have been proposed recently in the area, including a new freight operations headquarters located north of the site at 128 Brock Rd.

Figure 2: Surrounding Land Use Map (800m)



Employment	Aggregate Extraction	Vacant	Site Boundary
Commercial	Transit	Open Space	

2.2 Site Analysis

The site analysis graphic below represents the existing physical characteristics of the site and the lands immediately surrounding the site. The site consists of two legally titled parcels, with frontage on Brock Road South (Wellington Road 46) and McLean Road West. The site is generally flat, though it is divided by a drainage split into east and west catchment areas, largely comprised of landscaped and vegetated areas. No buildings currently exist on the site, however remnants of a former farmstead are visible including an overgrown vehicular access along McLean Road West.

Brock Road South, identified in the County of Wellington Official Plan as a Major Arterial/County Road, consists of a 4-lane cross section with a paved shoulder with no sidewalks or active transportation facilities. McLean Road, a Local Road currently operates as a rural 2-lane cross section, with paved shoulders on both sides, with no sidewalks or active transportation facilities.

From a servicing perspective, there is no municipal water or sanitary servicing available to service the site, although it has been identified that private water and sanitary systems are being utilized by surrounding properties with similar anticipated demands. Existing stormwater servicing infrastructure is located within the Brock Road S and McLean Road right-of-ways.

Figure 3: Site Analysis



LEGEND

- | | | |
|--------------------|-------------------------|-----------------|
| ◄► Existing Access | ○ Signaled Intersection | ■ Local Road |
| ● Vegetation | ■ County Road | — Site Boundary |

3.0 POLICY AND REGULATORY FRAMEWORK

The following section of this report provides an overview of the applicable planning policy & regulatory framework that currently guides land use and development on the subject site. In this case, the key applicable statutory documents include the Provincial Policy Statement (2020), the County of Wellington Official Plan, and Township of Puslinch Zoning By-law 23-2018. The following policies and regulations inform and guide the professional analysis of the proposal provided in Section 5.0 below.

3.1 Provincial Policy Statement, 2020:

The Provincial Policy Statement (PPS) provides policy direction on matters of Provincial interest regarding land use planning and development. The PPS is issued under Section 3 of the Planning Act. Section 3 of the Planning Act requires that land use planning decisions be consistent with the PPS, ensuring that matters of provincial interest, as identified in Section 2 of the Planning Act, are addressed. The PPS is a broad provincial policy document that is generally implemented through local municipal planning documents.

Although it is to be interpreted broadly, the following policy guidance is important to consider in the context of the Zoning By-law Amendment application for 7456 McLean Road West and 197 Brock Road South. Commercial and industrial development within the Municipality is generally provided for in the Municipality's Urban Settlement Areas. The site represents a special exception to this pattern in that it is within a specialized specifically planned and designated for industrial/employment uses outside of Wellington County's existing urban settlement areas.

The PPS provides that rural areas are important to the economic success of the Province and our quality of life. Rural areas are a system of lands that may include rural settlement areas, rural lands, prime agricultural areas, natural heritage features and areas, and other resource areas. Rural areas and urban areas are interdependent in terms of markets, resources and amenities. It is important to leverage rural assets and amenities and protect the environment as a foundation for a sustainable economy.

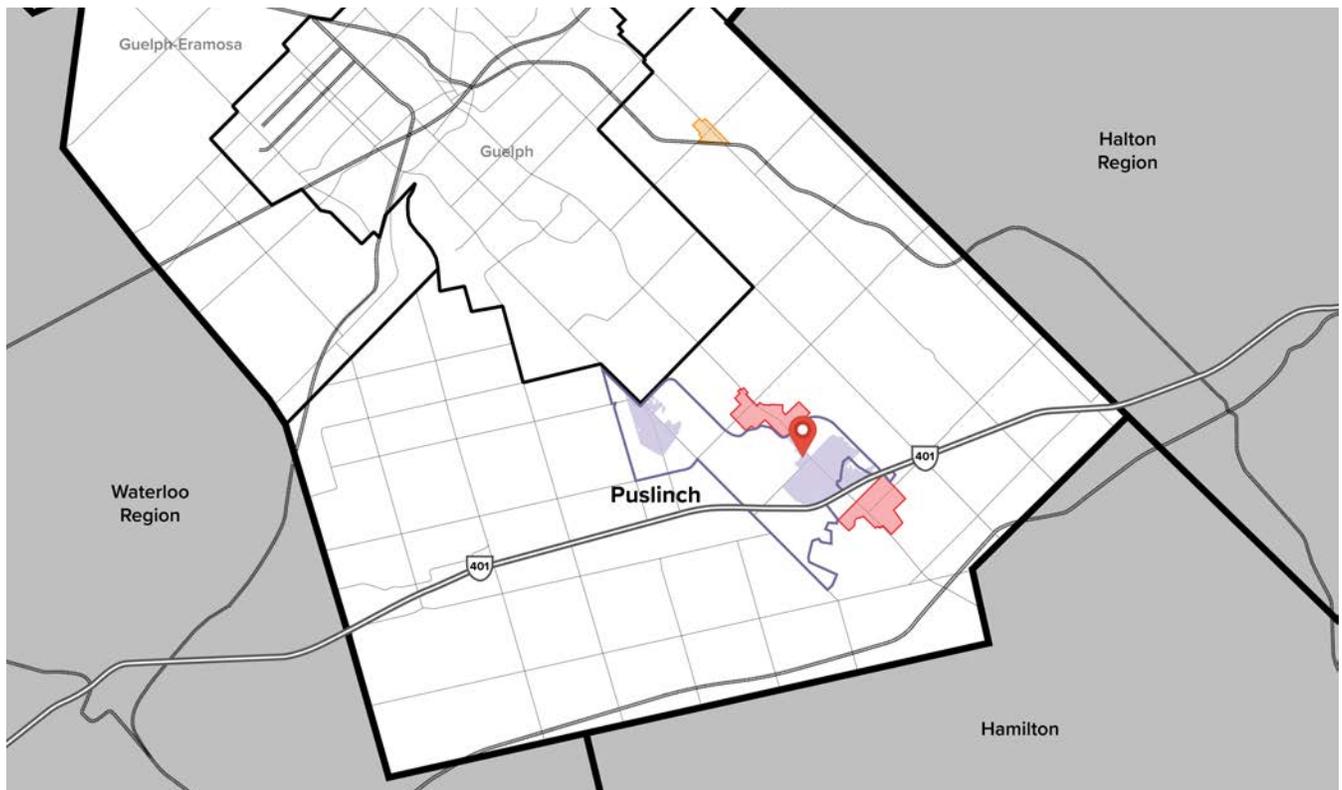
- Section 11.4.1 of the PPS, *Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns* directs that Healthy, integrated and viable rural areas should be supported by building upon rural character, and leveraging rural amenities and assets promoting diversification of the economic base and employment opportunities through goods and services, including value-added products and the sustainable management or use of resources.
- Section 11.5.4 of the PPS, *Rural Lands in Municipalities* promotes development that is compatible with the rural landscape and that can be sustained by rural service levels.
- Section 1.3 provides that planning authorities shall promote economic development and competitiveness by: a) providing for an appropriate mix and range of employment, institutional, and broader mixed uses to meet long-term needs; b) providing opportunities for a diversified economic base, including maintaining a range and choice of suitable sites for employment uses which support a wide range of economic activities and ancillary uses, and take into account the needs of existing and future businesses.

In view of the PPS policies noted above, the proposed Zoning By-law Amendment will serve to enhance the viability and utility of an existing rural commercial site. The rezoning of the site to Highway Commercial (HC) Zone will support the viability of the local economic base and the function of the Aberfoyle Industrial Area and can be supported by the available "rural" servicing options as detailed in the August 2023 Functional Servicing Report prepared by Crozier & Associates Inc. The use of the subject land for a small-scale service oriented commercial development is consistent with the policies of the PPS.

3.2 County of Wellington Official Plan:

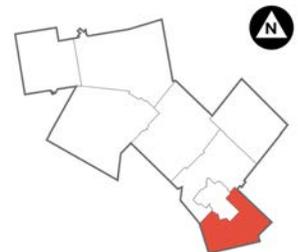
Figure 4 represents the site's positioning relative to Wellington County's overall land use structure. The purpose of the Wellington County Official Plan is to provide direction and a policy framework for managing growth and land use decisions in the County over a 20-year period. The Plan establishes a broad, upper-tier policy framework that provides guidance to local municipalities in the preparation of their own local Official Plans, Official Plan Amendments and Zoning By-laws. Sections 2.6 & 2.7 of the Plan sets out the hierarchy of Settlement Patterns and land use categories that apply in the County and the conditions under which development may be permitted within those various areas.

Figure 4: County of Wellington Official Plan Settlement Areas



LEGEND

- Rural Employment Area
- Secondary Urban Centre
- Regionally Significant Economic Development Study Area
- Hamlet



Land Use Structure:

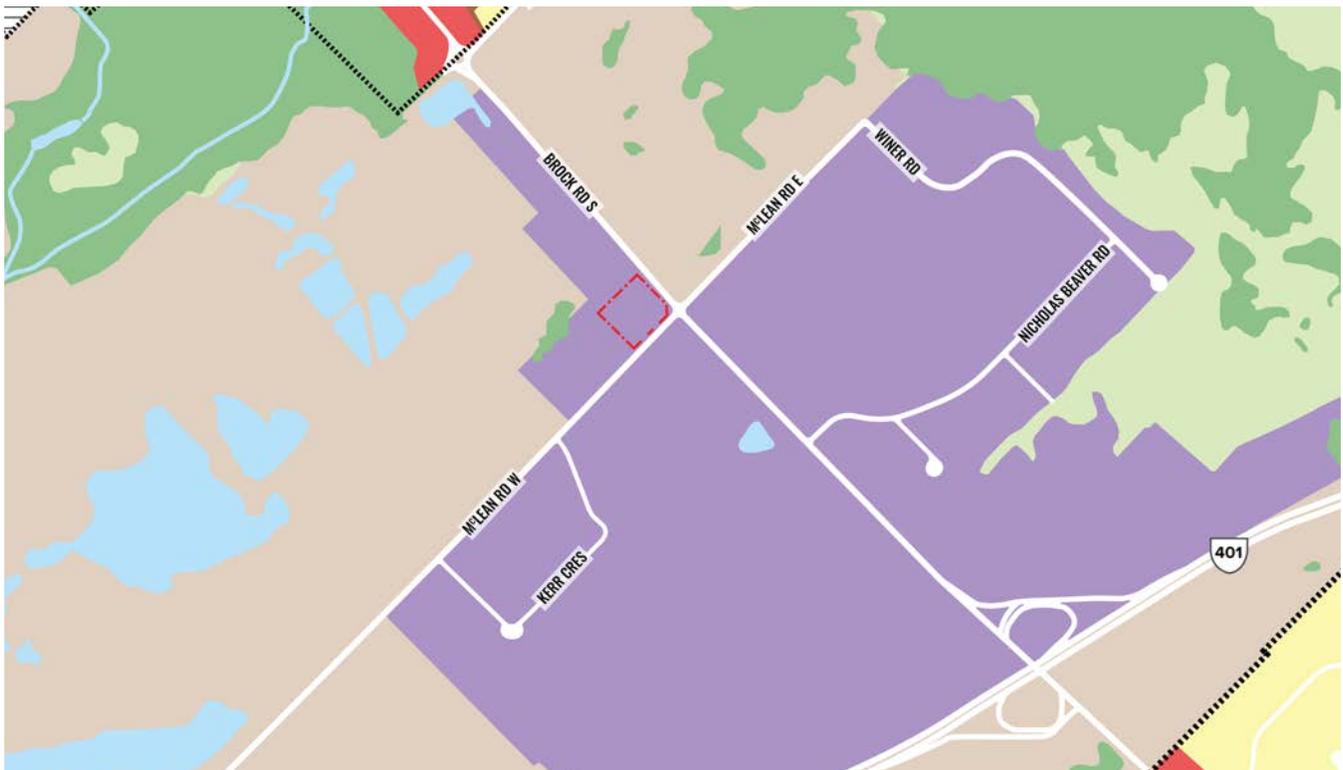
The project site and the surrounding lands are not identified as a settlement area on the County Official Plan Mapping. In fact, these lands are identified as being within a Rural Employment Area as per Schedule A7 - Community Growth Structure - Puslinch in the Official Plan. Notwithstanding the overall Secondary Agricultural designation of the broader area, the site and adjacent lands located along the Brock Road South Corridor between Aberfoyle and Morriston are identified as location for non-farm commercial and industrial uses in the Official Plan (see below) as part of the Rural Employment Area designation and Regionally Significant Economic Development Study Area.

Policies detailing the Regionally Significant Economic Development Study Area are found within Section 9.8.4 of the County of Wellington Official Plan. This area applies to a significant portion of Puslinch Township, extending from Guelph’s southern boundary to Aberfoyle, Highway 401, and Morriston. This area is predominantly made up of Secondary Agricultural Lands that are anticipated for future employment uses, in addition to the lands designated as Rural Employment Areas. Future study initiated by the Township will further develop strategies on how these lands will be built out.

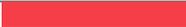
Land Use Designations:

The applicable land use designation mapping is shown in Figure 5 below. The subject site is designated Rural Employment Area on Schedule B7 - Land Use - Puslinch of the County of Wellington Official Plan. The Official Plan land use designation provides the most direct/specific policy guidance for consideration of redevelopment of the project site and other lands along the Brock Road South corridor and adjacent lands.

Figure 4: County of Wellington Official Plan Land Use Designations



- LEGEND**
- Rural Employment
 - Secondary Agricultural
 - Residential
 - Central Business District
 - Residential Transition
 - Core Greenlands
 - Greenlands
 - Future Development
 - Site Boundary



Rural Employment Designation:

Section 6.8 of the Official Plan pertains to Rural Employment Areas. These areas represent a significant collection of lands set aside for dry industrial and commercial uses, often requiring large lots, which benefit from a rural location due to proximity to rural resources and/or major transportation routes, among others. In any case, developments within Rural Employment Areas are to be “dry,” therefore not requiring significant amounts of water in their operations, nor producing significant amounts of effluent, such that private water and sewage systems can be utilized. In this regard, a Functional Servicing Report has been prepared by Crozier & Associates which details the servicing strategy for the proposed development and supports conformity with the policies of Section 6.8.

Section 6.8.2 – Permitted Uses – permits such commercial uses that will be service focused, with limited accessory retail, including both small scale restaurants and automobile services. More intense retail commercial uses that are more commonplace in an urban setting is not permitted in Rural Employment Areas. A significant number of commercial and industrial operations exist in this Rural Employment Area, taking advantage of access to major roads (Brock Road South and Highway 401), aggregate resources, and large lots. Additionally, Section 9.8.3 – Puslinch Industrial Policy – identifies the additional permitted uses within areas designated Rural Employment including complementary commercial uses such as automotive uses, restaurants and limited retail.

Section 6.8.2 and 9.8.3 collectively establish a policy framework to support the development of a mixed commercial development on the project site. The applicable policies (6.8) do require that development occurring in Rural Employment Areas be “dry” given the lack of availability of municipal water and sanitary services. In light of this policy requirement, a detailed function servicing report has been prepared by Crozier & Associates in support of the application. The FSR outlines the specific servicing demands for the proposal and the applicable requirements for private on-site water and sanitary services along with stormwater quality and quantity controls. Based on the Crozier report, the proposed development can be effectively serviced by rural servicing options.

Lastly, Section 13.10 of the Official Plan establishes that all lands within the County of Wellington are hereby established as a site plan control area. Future development of the site will be required to obtain Site Plan Control approval which will provide a planning process to address technical/detailed aspects of the site development such as site layout, site servicing design, landscape design, etc.

3.4 Township of Puslinch Comprehensive Zoning By-law 023-2018:

The subject site is currently divided into two legally titled parcels, each with different existing zoning provisions. 7456 McLean Road W is currently zoned Industrial (IND(sp54)) Zone with special provisions in the Township of Puslinch Zoning By-law 023-2018. The special regulations applied to the site relate to additional parking requirements for uses within a multi-tenanted building, at 1 space per 50m² of net floor area. 197 Brock Road South is zoned Holding Industrial (INC(h5)). Removal of the holding provision requires the submission and approval of a Site Plan Approval application for development of the site.

The IND Zone provides for a wide range of industrial land uses. The IND zone provides regulations regarding setbacks, heights, and other lot requirements, mainly intended for large scale industrial development on large lots. The existing applicable zoning regulations are listed in Table 2. The IND Zone is generally intended to implement the industrial policies across the Township of Puslinch, as well as the Rural Employment Area designation outlined in Section 6.8 of the County of Wellington Official Plan. While a restaurant use is permitted, the IND Zone is limited in its permissions for commercial land uses, namely gas bars.

The surrounding lands, as depicted in Figure 6 below, are zoned via a combination of IND and the Highway Commercial (HC) Zone variations which provide for a similar and compatible range of rural commercial and industrial uses. Other developments along Brock Road South containing drive-through restaurants and/or gas bars with associated retail stores are zoned HC and are on similarly sized smaller lots.

Figure 5: Township of Puslinch Zoning Mapping (023-2018)

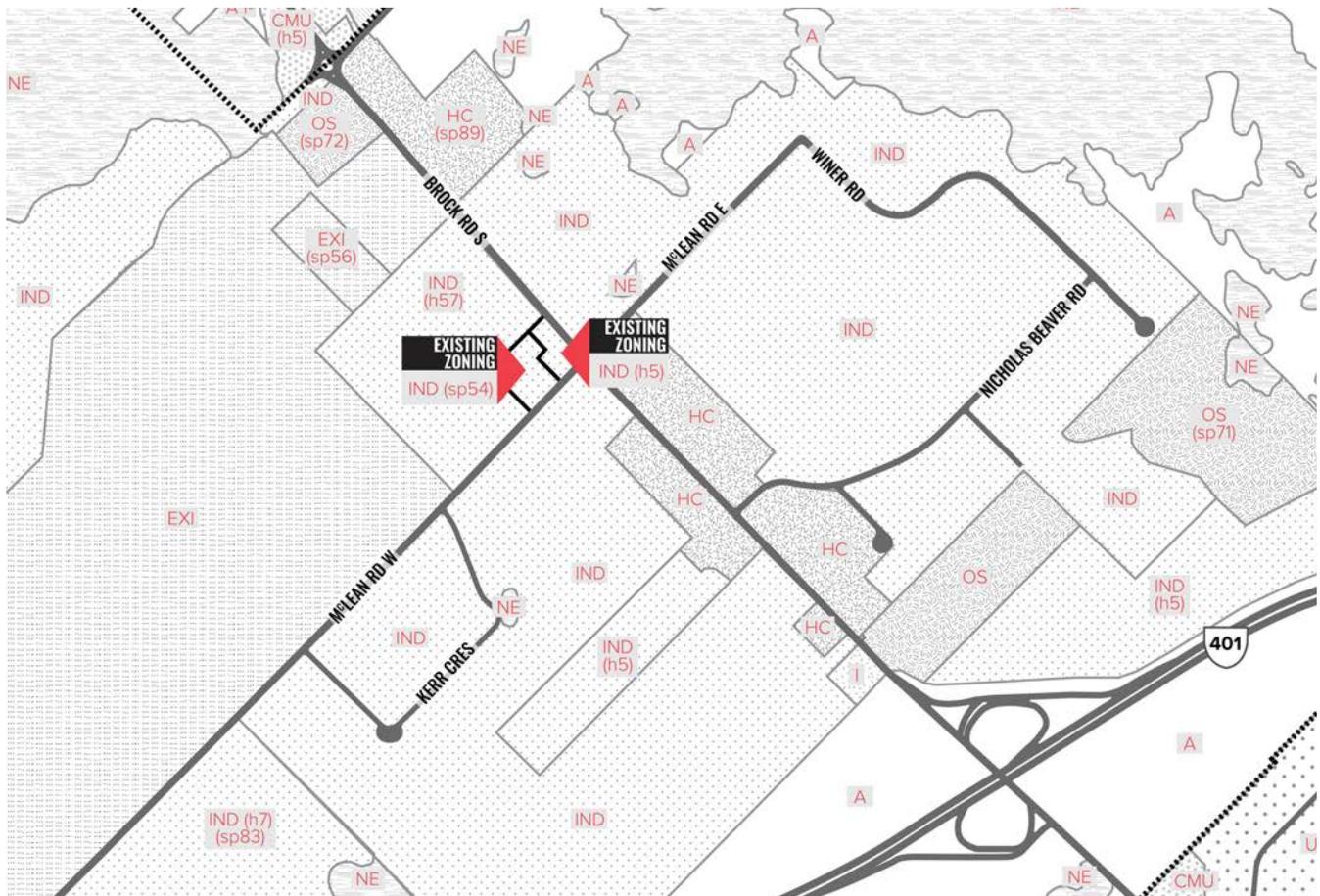


Table 2: Existing IND Zone Regulations

Regulation	IND Zone
Permitted Uses	See Section 9.2 Special Provisions for Restaurant Use: Permitted only as an accessory use. All accessory uses shall occupy a combined maximum of 30 percent of the floor area of the principal use.
Lot Area (min.)	0.4ha
Lot Frontage (min.)	30.0m
Front Yard Depth (min.)	6.0m
Interior Side Yard (min.)	5.0m
Rear Yard Depth (min.)	7.5m
Lot Coverage (max.)	75%
Landscaped Open Space (min.)	15%
Height (max.)	25.0m
Gross Floor Area (max.)	N/A

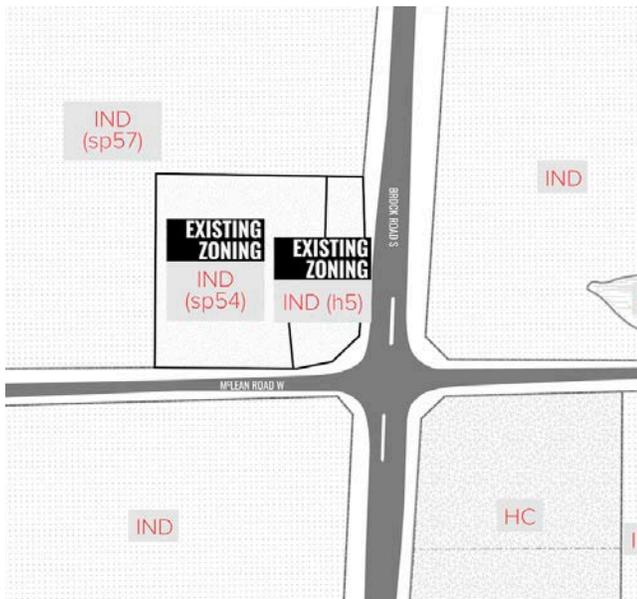
4.0 THE PROPOSAL

4.1 Zoning By-law Amendment:

The proposed Zoning By-law Amendment will provide a framework for auto-oriented, mixed-use commercial development in the form of a multi-tenant commercial development with uses that are intended to support the function of the broader Aberfoyle Industrial Park. The western portion of the site includes a 6-pump gas bar and truck scale intended for commercial motor vehicles and a tractor-trailer parking/staging area with 10 dedicated stalls. The conceptual design accommodates truck stacking and turnarounds on-site which minimizes traffic impacts on McLean Road W. The proposed Highway Commercial (HC) Zone includes some minor special regulations to account for the unique context of the project site and the specific development concept being proposed. These include site-specific special regulations for vehicular parking and landscaped open space.

The proposed zone and special regulations are structured to facilitate the development of the concept plan prepared by ATA Architects Inc., attached as Appendix A to this report. In this regard, the proposed Zoning By-law Amendment will “lock-in” key development and built form standards but will also allow for a degree of flexibility to address site and building design details through the future Site Plan Control application process.

EXISTING ZONING



PROPOSED ZONING



Table 3: Proposed Zoning By-law Regulations

By-law Regulation	HC	Proposed HC(sp_)
Permitted Uses	See Section 8.2	-
Lot Frontage (min.)	20.0m	-
Front Yard Depth (min.)	3.0m	-
Interior Side (min.)	3.0m	-
Exterior Side Yard (min.)	7.5m	-
Rear Yard Depth (min.)	3.0m	-
Lot Coverage (min.)	45%	-
Landscaped Open Space (min.)	45%	21%
Height (max.)	N/A	-
Vehicle Parking (min.)	Gas Bar: 1 per gas bar pump Restaurant: 1 per 10m ² including outdoor patio area Retail Store: 1 per 20m ² Total Required: 50	Restaurant: 1 per 20m ²

-: indicates no change proposed to existing HC regulations

The primary purpose of the proposed Zoning By-law Amendment is to allow for the gas bar use, which is not a permitted use in the existing IND Zone. As detailed in Table 3 above, site-specific special regulations for landscaped open space and parking are proposed in order to enable the development concept. Further details on the proposed development statistics are found in Table 4 in the following section of this report and on the Zoning Data Table included in Appendix 'A'. The Zoning By-law Amendment application is a precursor to a future Site Plan Control application that will address the detailed/technical aspects of the development including building and site layout, site servicing and lot grading, tree protection/landscape design, etc.

4.2 Development Concept

The proposed concept plan envisions a multi-tenant commercial development with uses that are intended to support the function of the broader Aberfoyle Industrial Park. The western portion of the site includes a 6-pump gas bar and truck scale intended for commercial motor vehicles and a tractor-trailer parking/staging area with 10 dedicated stalls. The conceptual design accommodates truck stacking and turnarounds on-site which minimizes traffic impacts on McLean Road W. Access and internal circulation has been planned comprehensively across the proposed development.

The eastern portion of the site is proposed to be developed with a 4-pump car gas bar (for regular motor vehicles), an associated retail/convenience store (approx. 238m² GFA), and a drive through restaurant (approx. 334m² GFA). A total of 41 parking stalls (including 4 electric vehicle charging stations) have been provided to serve this portion of the planned development. A significant landscape strip/buffer area (6 metres) has been incorporated along all portions of the site abutting both Brock Road S and McLean Road W.

Access to the site is provided via a full turns access from McLean Road W and a right-in-right-out only restricted access from Brock Road S. Access and internal circulation has been planned comprehensively across the proposed development. The shared internal circulation network allows for both truck and car traffic to utilize both access points while also minimizing potential conflicts between motor vehicles and tractor-trailers within the site.

The key statistics regarding the proposed development concept are summarized in Table 4 below. For detailed evaluation of the development concept, the Preliminary Site Plan prepared by ATA Architects Inc. and attached as Appendix 'A' to this report should be referred to.

Figure 6: Simplified Conceptual Site/Landscape Plan

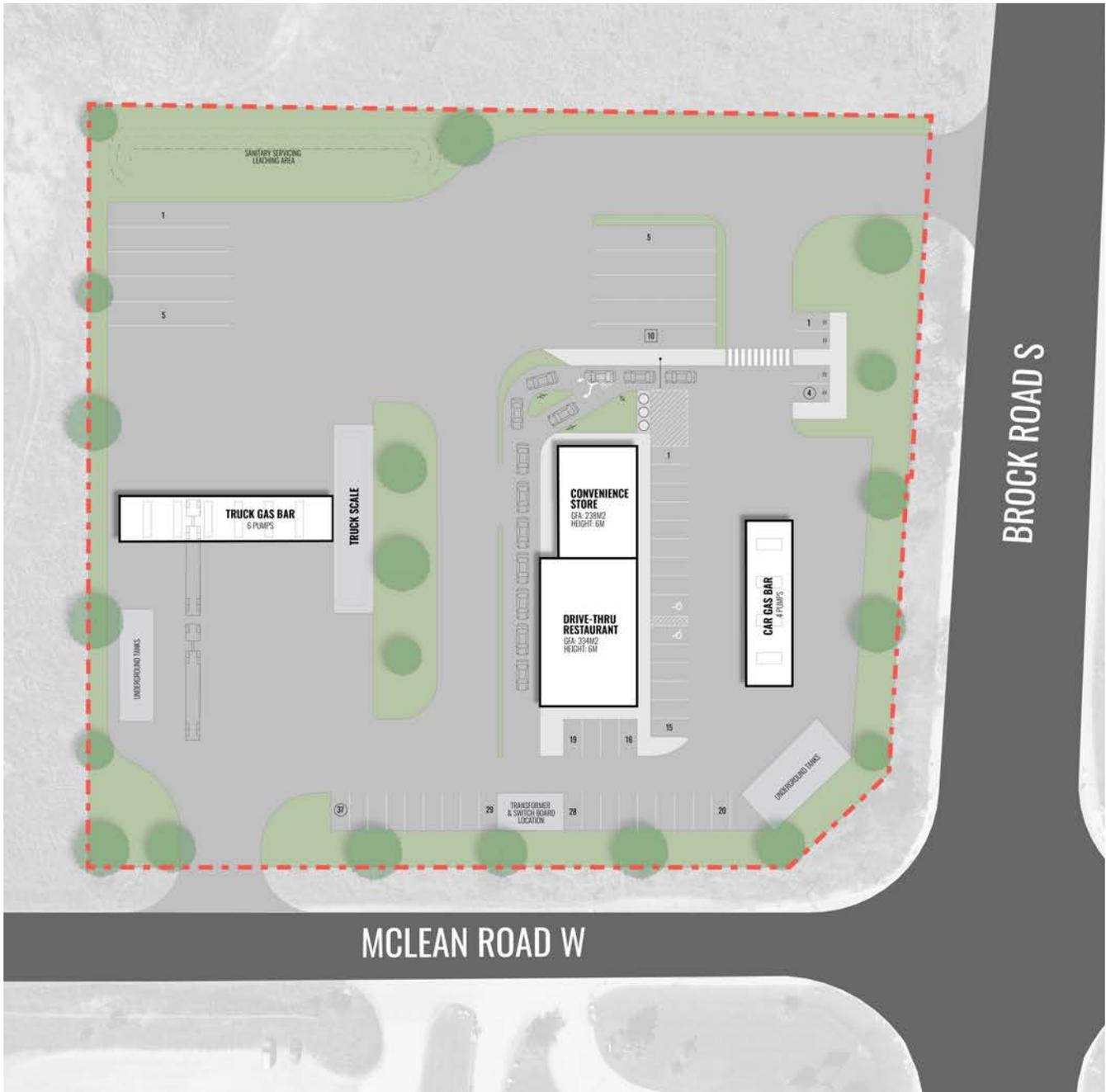


Table 4: Proposed Development Statistics

Concept Plan Data Table		
Use	Gas Bar, Drive-Through Restaurant & Convenience Store	
Buildings/Structures	3	
Height	Gas Pumps - 7.5m (1-Storey) Restaurant/Convenience Store - 6.0 m (1-Storey)	
Parking	37 standard (including 3 accessible parking stalls) 4 electric vehicle charging stalls 10 transport trailer parking stalls	
Coverage	8%	
Landscaped Open Space	21%	
Setbacks	North (Interior)	52.3m
	East (Front)	15.8m (to car gas bar canopy) 41.0m (to building)
	West (Rear)	3.0m (to truck gas bar canopy) 74.3m (to building)
	South (Exterior)	17.1m

5.0 PLANNING ANALYSIS

The following analysis examines the impacts/implications of the proposed Zoning By-law Amendment with respect to use, intensity, form and function. As explained in Section 4.0 - Proposal - of this report, the proposed Zoning By-law Amendment is intended to rezone the project site to the Highway Commercial (HC) Zone to allow for a small-scale multi-tenant commercial development (commercial Gas Bar, Convenience Store and Drive-Through Restaurant) along Brock Road S that will serve an ancillary function to support the viability of the broader Aberfoyle Industrial Area. The proposed amendment also included special provisions to alter other regulations and/or development standards in the HC Zone, including required parking rates and landscaped open space. The scope of the analysis will be focused on the technical issues and impacts arising from the change in land use and associated special provisions.

It is important to note that any future development as envisioned by the landowner would be subject to the Municipality's Site Plan Control By-law. The Site Plan Control process would provide an opportunity to review the detailed design and servicing plans for the site and also address any other technical considerations deemed relevant by Municipal Planning Authorities.

5.1 Land Use:

Section 6.8 of the County of Wellington Official Plan describes the intended function and purpose of the "Rural Employment Lands" designation.

As described in 6.8.2, it is the intention that the uses allowed in areas designated "Rural Employment Lands" are to be industrial or commercial uses, that may benefit from larger lot sizes, major road access, and proximity to rural resources. Furthermore, commercial uses in this land use designation shall be service focused, which may include uses like small-scale restaurants and automobile services. The Highway Commercial (HC) Zone implements the commercial components outlined in the Rural Employment Lands designation in the Official Plan, by providing a framework for auto-oriented, service based commercial land uses. This section also directs new development to be dry due to lack of availability of municipal services. Dry uses are to require significant amounts of water in their operation, while not producing similar levels of effluent. The proposed development is considered a dry use, not requiring substantial water usage, and is proposed to be utilize private water and sanitary services, similar to other developments in the area.

The project site is 1.62 ha (4.0 acres) in total size, a relatively small site in comparison to the larger lots that make up the majority of the Aberfoyle Industrial Park. Given the contextual size and scale of adjacent industrial operations in the area, it is unlikely that the project site is of sufficient size to accommodate industrial development as described in Section 6.8.2 of the Official Plan and is better suited for smaller scale commercial development. Significantly larger parcels than the subject site and more suitable for industrial land uses.

The project site is located at the intersection of Brock Road South (a County Road) and McLean Road. Given the site's proximity to Highway 401 and major industrial and logistics facilities in the Aberfoyle Industrial Park, there is opportunity to provide freight and automobile supportive commercial uses that take advantage of the site's strategic access to major transportation routes.

Section 6.8.3 states that any new development in Rural Employment Areas is to be compatible with existing uses. The proposed uses of a gas bar and accessory retail store, and drive-thru restaurant are compatible with existing land uses along Brock Road South and the Aberfoyle Industrial Park. The existing automobile sales establishments, logistics and freight operations, aggregate resource extraction facilities, and other industrial uses would generally benefit from the services proposed on the subject site, specifically the proposed transport truck-only gas bar and dedicated transport trailer parking areas. There are several existing gas bars and drive-thru restaurants currently operating along Brock Road South on small lots, indicating that there is a strong demand for such uses in the area.

Section 9.8.3 – Puslinch Industrial Policy – within the Official Plan permits lands designated Rural Employment to have additional uses, namely automotive uses, and restaurants. There are additional policies contained within Section 9.8.6.PA7-1 – Puslinch Economic Development Area stating that the area is intended to service the Township by providing locations for economic activity and employment opportunities. There is clear policy direction within the Official Plan that small-scale commercial land use that is supportive of existing industrial facilities in the Rural Employment land use designation.

5.2 Parking & Access:

The proposed multi-tenant commercial development is proposed to be accessed through a full moves site access from McLean Road West, and a restricted right-in-right-out access from Brock Road South. A Transportation Impact Assessment (TIA) was prepared by C.F. Crozier & Associates Inc, dated August 2023. The TIA reviewed the impact of the proposed development as well as the viability of the proposed access locations. Based on the proposed use and the site's location along Brock Road South, access via the County Road is critical to the development. Through the TIA, the Brock Road access was deemed supportable due to its distance away from the signalized intersection of Brock Road and McLean Road (105m) and that it is a restricted right-in-right-out access. The subject site is expected to generate 148 two-way (75 inbound and 73 outbound) trips during the weekday a.m. peak hour, and 139 (72 inbound and 67 outbound) primary trips during the weekday p.m. peak hour. Additionally, no challenges to capacity or storage issues are expected. Therefore, the accesses are expected to operate efficiently with minimal delays and reserve capacity to accommodate future increases in traffic volumes.

The proposed commercial development includes 41 parking spaces, broken up into four (4) electric vehicle charging stalls, and thirty-seven (37) standard parking spaces. Ten (10) truck parking spaces are provided on the west side of the property. Based on Section 5.5.2 of the Township of Puslinch Zoning By-law, the required amount of parking for this development is fifty (50) car parking stalls, based on the number of car gas pumps (4) and the gross floor areas of the restaurant and retail components. Given the context of the site, and the auto-oriented and drive-thru nature of the uses proposed on-site, a significant portion of expected users of the development are not anticipated to park for extended periods of time. The restaurant use is smaller, forming part of the convenience store building, and is expected to operate differently than a traditional restaurant, thus a reduced parking demand can be justified. A rate of 1 parking space per 20m² of restaurant gross floor area is proposed, resulting in 17 parking spaces required for the restaurant use.

Ten (10) transport truck parking spaces are provided, representing a surplus of four (4) stalls in truck parking based on the 1 stall per gas pump as per the Zoning By-law. Many of the existing gas bars along this section of Brock Road South do not have truck parking capabilities due to site size, limiting maneuverability.

5.3 Landscaped Open Space:

The Highway Commercial (HC) Zone in the Township of Puslinch Zoning By-law requires a minimum of 25% landscaped open space on new developments. The proposed development on the subject site in its current configuration contains approximately 21% landscaped open space, largely through 3.0-6.0 metre landscape buffers along the perimeter of the site. This area of land includes snow storage areas for the site, as well as providing visual amenity for the property. The proposed development is deficient 4% landscaped open space as per the HC Zone. This is driven by the amount of asphalt required for the manoeuvring of transport trucks throughout the site so that they are able to utilize the truck-only gas bar, and park in the proposed truck parking spaces.

5.4 Puslinch Design Guidelines:

The project site is subject to the Puslinch Design Guidelines, which are intended to guide development to respect and be sensitive towards the local area, both planned and existing. The Guidelines are organized into three main categories; Enhancing the Streetscape, Promoting Quality Development, and Respecting Established Character.

The project site located in Area A3: Aberfoyle to Highway 401. Regarding the streetscape, the Guidelines have been implemented on the proposed concept plan through the provision of a 6.0m landscaped strip along Brock Road for tree planting. Landscaped islands have been incorporated at appropriate intervals through internal parking areas. A detailed landscape plan will be completed and provided for the Municipality's review through the site plan process. Driveway accesses have been designed to the minimum necessary width to maintain a consistent streetscape as per A3.3 of the Guidelines.

As the project site is a corner site and commercial land uses are proposed, Sections B1 and B2 of the Guidelines apply. These sections call for the provision of architectural detailing such as variations in colour and materials, enhanced landscaping, as well as ensuring primary building entrances are visible from the highest order street. A detailed building design package meeting the design objectives will be provided as part of the Site Plan Control process.

Section C5 - Site Landscaping of the Guidelines apply to the site, and will be taken into account during the completion of detailed landscaped plans in subsequent phases of the planning process.

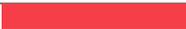
5.5 Site Servicing:

Section 6.8 of the Official Plan states that land development that occurs within the Rural Employment Lands designation is to be a dry-use, requiring minimal water use while not producing significant effluent, consistent of with rural servicing levels that exist in the Aberfoyle Industrial Park. A Functional Servicing & Stormwater Management Report dated August 2023 was prepared by C.F. Crozier & Associates Inc. in support of the Zoning By-law Amendment.

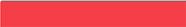
There is no existing municipal water systems that are available to service the site. The project site is expected to be serviced through a private water supply well. The existing well, identified as ID 67070585, is proposed to be decommissioned prior to site alteration occurring. A new well is proposed along the south property line, adjacent to McLean Road, within the landscaped strip. An underground storage tank (minimum 58,344L) is required for fire prevention on the site, of which the design and location will be confirmed through consultation with the local fire department.

No sanitary services exist in the area. Sanitary servicing for the development is proposed to occur through an on-site sewage system with treatment occurring on-site before effluent flows towards a leaching bed, located in the northwest corner of the site.

Lastly, stormwater management for the proposed development is designed to flow towards the existing stormwater sewers in the Brock Road S and McLean Road W right-of-ways. An oil/grit separator and underground storage tank are proposed to provide quality and quantity controls prior to outletting into the existing storm sewers. For undeveloped and landscaped areas, the flow will be uncontrolled towards their respective outlets.



THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK



6.0 CONCLUSIONS

The proposed HC zoning that is being sought for the site effectively implements the policies of the Rural Employment designation outlined in Section 6.8 of the County of Wellington Official Plan. The proposed Zoning By-law Amendment will provide for an appropriate zoning framework to guide land use and development at 7456 McLean Road West and 197 Brock Road South that preserves the overall intended function of the lands, seeking to add a desirable and compatible commercial permitted use that aligns with the applicable land use policies in the Official Plan. The proposed site-specific parking rate will recognize the specific nature of the intended land use and the context of the area and work to ensure there is appropriate provisions for on-site parking without regulating an oversupply. The site and the intended form of development are subject to Site Plan Control under Section 41 of the Planning Act which will provide an outlet to ensure any/all site development issues such as layout, servicing, landscaping, etc. are addressed and meet municipal standards. Overall, the proposal will enhance the rural industrial economic base in this unique portion of the Township of Puslinch and will ultimately be serviceable by rural service levels.

In light of the foregoing, the proposed Zoning By-law Amendment represents sound land use planning, is in the public interest and implements the applicable municipal planning framework.

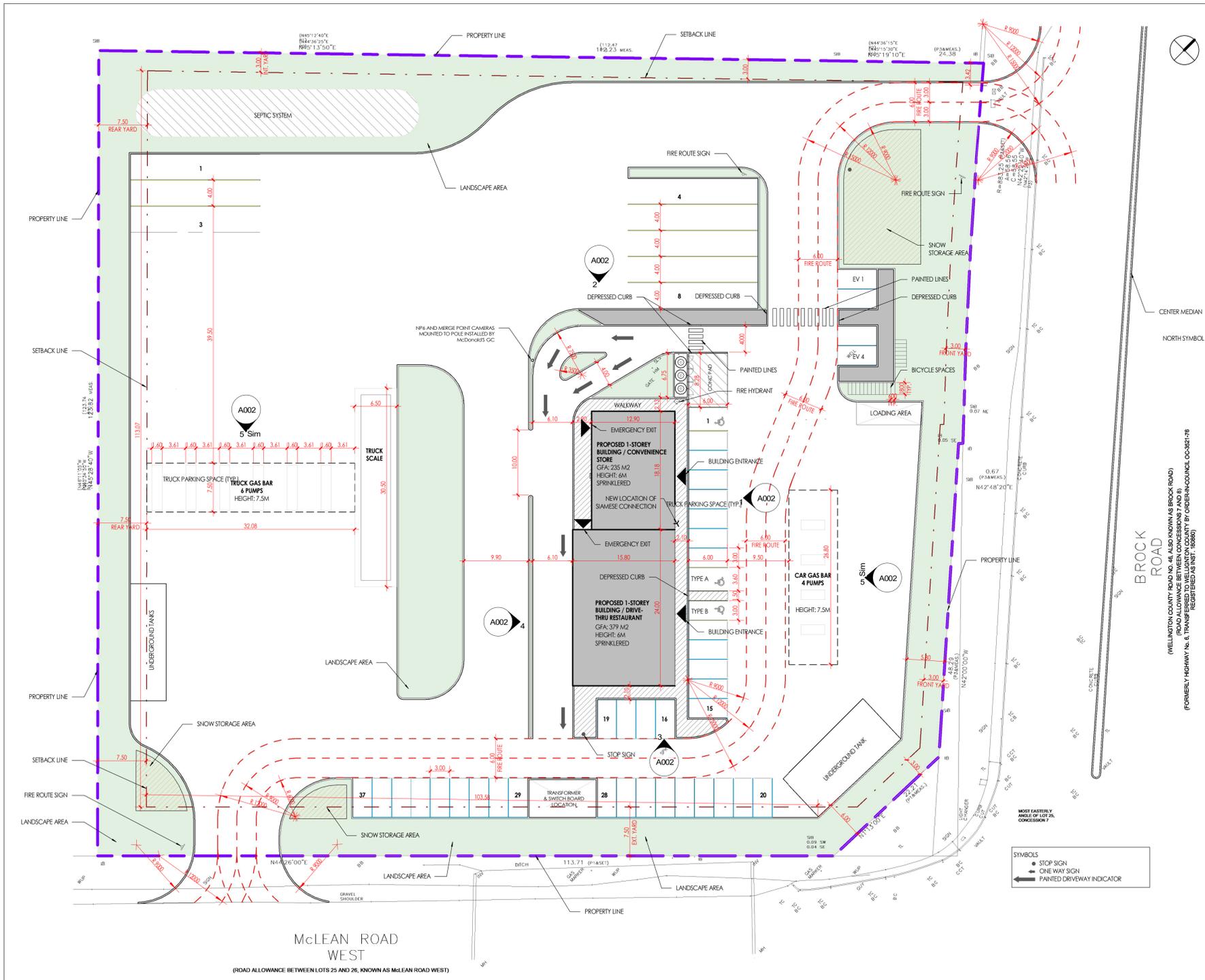
Dan Murphy, MA, BAA

APPENDICES

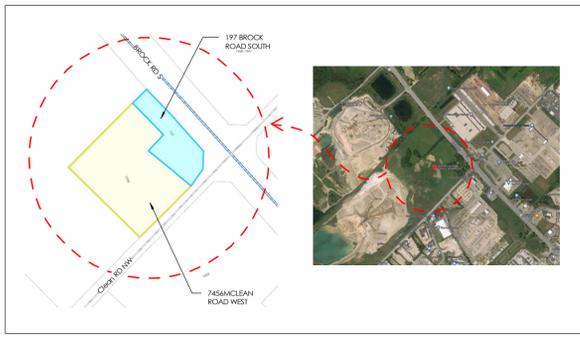
Site Concept Plan	A
<hr/>	
Draft Zoning By-law	B
<hr/>	



APPENDIX A: SITE CONCEPT PLAN



1 00 - SITE PLAN
1:350



KEY PLAN
1:100

HC ZONE REQS	REQUIRED	PROPOSED
PERMITTED USES	SEE TABLE 8.1 ZONING BY LAW	GAS BAR(S), CONVENIENCE STORE AND RESTAURANT
LOT AREA (MIN)	0.4 HA	1.62 HA
LOT FRONTAGE (MIN)	20 M	101 M
FRONT YARD (MIN)	3 M	3 M
INTERIOR SIDE YARD (MIN)	3 M	3 M
EXTERIOR SIDE YARD (MIN)	7.5 M	7.5 M
REAR YARD (MIN)	7.5 M	3 M
RESTAURANT AREA		379 m ²
CONVENIENCE STORE		235 m ²
GAS BAR CANOPY (CARS)		201 m ²
GAS BAR CANOPY (TRUCKS)		241 m ²
TOTAL BUILDINGS / STRUCTURE AREA		1,056 m ²
LOT COVERAGE (MAX)	45%	6.5%
LANDSCAPED OPEN SPACE	25%	24%
PARKING SPACES:		
GAS BAR(S) - CARS	(1 PER PUMP) = 4	REFER TO PARKING SCHEDULE BELOW
GAS BAR(S) - TRUCKS	(1 PER PUMP) = 6	8
CONVENIENCE STORE	(1 PER 20 M ²) = 12	REFER TO PARKING SCHEDULE BELOW
RESTAURANT	(1 PER 10 M ²) = 38	REFER TO PARKING SCHEDULE BELOW
TOTAL	60	49

PARKING SCHEDULE	
TYPE OF PARKING SPACE	PROVIDED PARKING SPACE
ACCESSIBLE PARKING - TYPE A	2
ACCESSIBLE PARKING - TYPE B	1
TRUCK PARKING SPACE	8
TYPICAL PARKING SPACE	38
TOTAL:	49

5.2.15 BICYCLE PARKING

A. BICYCLE PARKING SPACES SHALL BE REQUIRED FOR THE USES LISTED IN TABLE 5.6 BELOW (FROM ZONING BY LAW) IN ADDITION TO ANY REQUIRED PARKING SPACES.

B. EACH BICYCLE PARKING SPACE SHALL BE A MINIMUM OF 60 CENTIMETERS WIDE AND 1.8 METERS LONG.

REQUIRED BICYCLE BY ZONING: 16
PROPOSED BICYCLE IN SITE PLAN: 19

USE	REQUIRED PARKING STANDARDS (PER NET FLOOR AREA)
Retail, personal, institutional	The greater of 2 spaces or 1 space / 1000 m ²
Industrial	2 / 1,000 m ²
Long term care facility, retirement home	The lesser of 5 or 0.25 per bed or dwelling unit
Public and private school	1 / 10 students of design capacity & 1 space/35 employees
Dwelling units or mixed-use buildings with more than 6 dwelling units	2 spaces for the first 6 dwelling units plus 2 spaces for each additional 6 dwelling units or fraction thereof

2 SITE STATISTICS & TABLES
1:120

NOTE:
THE ARCHITECTURAL SITE PLAN IS FOR GENERAL ARRANGEMENT ONLY. REFER TO THE LANDSCAPE DRAWINGS, THE CIVIL ENGINEERING DRAWINGS AND THE SURVEY FOR LANDSCAPING, GRADING AND SERVING DETAILS.

REVISION

NUMBER	DATE	REMARKS
005	2023 10 04	FOR CLIENT REVIEW
004	2023 09 27	FOR CLIENT REVIEW
003	2023 08 28	FOR CLIENT REVIEW
002	2023 05 24	FOR CLIENT REVIEW
001	2023 01 05	DRAFT SITE PLAN

CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS AND CONDITIONS ON THE PROJECT AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK. DRAWINGS ARE NOT TO BE SCALED.

CONTRACT DOCUMENTS ARE THE COPYRIGHT OF THE CONSULTANTS AND SHALL NOT BE USED OR REPRODUCED WITHOUT AUTHORIZATION. DOCUMENTS ARE TO BE RETURNED UPON COMPLETION OF THE PROJECT.

ATA ARCHITECTS
ATA ARCHITECTS INC.
BURLINGTON OFFICE:
3221 NORTH SERVICE ROAD, SUITE 101
BURLINGTON, ONTARIO, L7N 3G2.
T 905 849 6888 F 905 849 4369
E admin@ataarchitectsinc.com

SEALS

PROJECT

PROPOSED GAS BARS,
RETAIL STORE &
DRIVE-THRU RESTAURANT
7456 MCLEAN ROAD W,
PUSLINCH, ON NOB 2JO

DRAWING

SITE PLAN & KEYPLAN

DRAWN

AA

SCALE

As indicated

DATE

2023 10 04

CHECKED

AT

PROJECT

#TBD

DRAWING

A001



APPENDIX B: DRAFT ZONING BYLAW

The Corporation of the Township of Puslinch

BY-LAW NUMBER _____

WHEREAS, the Council of the Corporation of the Township of Puslinch deem it appropriate and in the public interest to amend By-Law Number 023/2018 pursuant to Section 34 of the Planning Act, R.S.O. 1990 as amended;

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWNSHIP OF PUSLINCH ENACTS AS FOLLOWS:

1. THAT Schedule 'A' (Map A-4) of Zoning By-law 023/2018 is hereby amended by rezoning Parts 1 & 2, Concession 7, from INDUSTRIAL (IND(h5)) and INDUSTRIAL (IND(sp54)) to a site specific **HIGHWAY COMMERCIAL (HC(spXX)) ZONE**, as shown on Schedule "A" of this By-law.
2. That section 14.0 SPECIAL PROVISIONS is amended by adding the following new exception:

HC(spXX) Parts 1 & 2, Concession 7

Notwithstanding any provisions of this By-law to the contrary, for lands zoned HC(spXX) on Schedule 'A' hereto, the following special provisions shall apply:

LANDSCAPED OPEN SPACE (MINIMUM): 20.0%

PARKING SPACE REQUIREMENT

RESTAURANT (MINIMUM): 1 per 20m² including outdoor patio area

3. This By-law shall become effective from the date of passage by Council and come into force in accordance with the requirements of the Planning Act, R.S.O. 1990, as amended.



Office Use Only	
Roll Number:	_____
File Number:	_____
Submission Date:	_____
WHPA, IPZ, ICA:	_____
Vulnerability Score:	_____

Drinking Water Source Protection Screening Form

Find out if you live in a vulnerable drinking water area at www.wellingtonwater.ca

For assistance in completing this form, please refer to the “Explanatory Guide” beginning on page 6.

Please note that you may still need to contact the applicable Conservation Authority, as this is not considered correspondence on their behalf.

1. Property Information

Municipal Address of Subject Property: 7456 McLean Road West and 197 Brock Road South, Puslinch

Assessment Roll Number of Subject Property: 2301000006119900000 & 2301000006120000000

Property Owner: DAAZ Inc.

2. Proposal (Please check all that apply to this application):

Building	
<input checked="" type="checkbox"/>	New Structure
<input type="checkbox"/>	Expansion or Conversion of an Existing Structure
<input checked="" type="checkbox"/>	New Septic System
<input type="checkbox"/>	Replacement Septic System
<input type="checkbox"/>	Geothermal System (Transport Pathway)
<input type="checkbox"/>	Change of Use

Planning	
<input type="checkbox"/>	Minor Variance
<input type="checkbox"/>	Official Plan Amendment
<input type="checkbox"/>	Consent Application
<input checked="" type="checkbox"/>	Zoning By-law Amendment Application
<input type="checkbox"/>	Subdivision/Condominium Application
<input type="checkbox"/>	Site Plan Application

Brief Description of the Proposed Use of Land, Proposed Buildings or Structures. If constructing a geothermal, please provide construction details including depth, vertical or horizontal, closed loop or open loop.

The proposed mixed-use commercial development will include a 1-storey convenience store (234 sq. m.), a 1-storey drive-thru restaurant, a 4-pump car gas bar and a 6-pump truck gas bar with associated parking areas and internal paved areas. The proposed development will be serviced by an onsite sewage system and water supply well.

3. Potential Threat Activities Associated with the Application

Please check all applicable activities that may be associated with the development proposal:

3.1 Fuel Handling and Storage greater than 250 litres

	Existing	Proposed	Greater than 2,500L	Underground Storage Tank	Aboveground Storage Tank	Inside Home	Outside Home
Liquid Fuel (i.e. gasoline or diesel)	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>		
Fuel oil (home heating)	<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	<input type="radio"/>
Waste oil (heating)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		

3.2 Chemical Handling and Storage

	Yes	If Yes, please indicate the type(s) of chemicals if known:		If Yes, please estimate the total amount
		3.2.1 Dense Non-Aqueous Phase Liquids (DNAPLs), including chlorinated solvents	3.2.2 Organic Solvents	
Paints and other coatings (including stains, enamels, lacquers, rust paint)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Dry cleaning chemicals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Automotive repair/maintenance and/or industrial manufacturing and processing (e.g. degreasers, automotive fluids, oils, furniture stripping products, chemical solvents, adhesives)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Solvent based degreasers or liquids for washing metal parts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

3.3 Road Salt Application and/or Outdoor Storage

	Covered	Uncovered	Estimated Volume Stored on Property (m ³)	Estimated Application Area (m ²) including private roads, parking lots, and sidewalks
Road Salt Storage	<input type="radio"/>	<input type="radio"/>		
Road salt application (private roads, parking lots, sidewalks, etc.)				

3.4 Snow Storage (see guide)

	Above Grade	Below Grade (buried)	Approximate Storage Area greater than:		
			0.01 ha (double driveway)	0.5 ha (1 soccer field)	1 ha (2 soccer fields)
Snow Storage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.5 Waste Storage or Disposal (see guide)

	Yes
3.5.1 Storage and/or application of raw, untreated liquids and solids that are pumped out of septic systems and holding tanks (not including septic tanks)	<input type="checkbox"/>
3.5.2 Storage and/or disposal of oils (does not include restaurant oil or grease); hazardous waste; liquid industrial waste; industrial and commercial waste; or PCB waste	<input type="checkbox"/>

3.6 Storm Water Management/Industrial Sewage

	Yes
Stormwater management facility (treatment, retention, infiltration, recharge or control of stormwater)	<input checked="" type="checkbox"/>
Car or truck washing facility	<input type="checkbox"/>
Oil and Water Separator	<input type="checkbox"/>
Sediment control (i.e. Stormceptor)	<input checked="" type="checkbox"/>

3.7 Septic Systems

	Existing	Proposed	
		New	Replacement
Septic system for residential or small-scale commercial/industrial/institutional use (Ontario Building Code)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Septic system (Greater than 10,000 litres per day) for commercial/industrial/institutional use (note an Environmental Compliance Approval would be required)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

3.8 Water Taking

	Proposed	Existing	If Existing, please provide the following:			
			Drilled	Dug	Well Not In Use*	Approx. Construction Date
3.8.1 Private Well (<i>*Please note that if there is an existing well that is not in use, Section 3.9 must also be checked</i>)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.8.2 Greater than 50,000 litres per day of water being used (note a Permit to Take Water may be required)	<input type="checkbox"/>	<input type="checkbox"/>				

3.9 Transport Pathway (see guide)

	Yes
Creation of aggregate pits, geothermal systems, non-residential or large residential caissons/building piers, or utilities/excavation within fractured bedrock and underground parking garages	<input type="radio"/>
Existing private well not in use	<input checked="" type="radio"/>

3.10 Recharge Reduction

	Yes
Creation of impervious surfaces (including large roofed areas, pavement, etc.) – only applies within Town of Erin	<input type="radio"/>

3.11 Agricultural

	Application	Storage	Product Name(s)
3.11.1 Fertilizers	<input type="radio"/>	<input type="radio"/>	
3.11.2 Pesticides	<input type="radio"/>	<input type="radio"/>	
3.11.3 Agricultural source material (i.e. manure)	<input type="radio"/>	<input type="radio"/>	
3.11.4 Non-agricultural source material (i.e. biosolids, commercial food wastes, etc.)	<input type="radio"/>	<input type="radio"/>	

	Yes	Estimated Number of Animals	Type of Animals
3.11.5 Grazing and Pasturing of livestock	<input type="radio"/>		
3.11.6 Outdoor Confinement Yard	<input type="radio"/>		
3.11.7 Nutrient Management Plan or Strategy, NASM Plan applies to or is registered for the property	<input type="radio"/>		
Environmental Farm Plan	<input type="radio"/>		

3.12 None of the above are applicable

Check off this box only if none of the above sections have been checked	<input type="radio"/>
---	-----------------------

4. Declaration (Owner or Applicant) or Person Engaged in Activity

Owner

I, Ishwinderpreet Wadhwa, declare that the information contained in this application and all attached documentation is true to the best of my knowledge.

October 3, 2023)

Date


Signature

Applicant or Authorized Agent

I, Michael Davis (Siv-ik Planning & Design Inc), declare that the information contained in this application and all attached documentation is true to the best of my knowledge.

September 21, 202

Date


Signature

Information is collected pursuant to the *Municipal Freedom of Information and Protection of Privacy Act*, R.S.O. 1990, c. M.56 and the *Clean Water Act*, 2006, S.O. 2006, c. 22 for the administration and enforcement of the *Clean Water Act*. Please note that business identity information is not considered personal information pursuant to the *Municipal Freedom of Information and Protection of Privacy Act*.

For any inquiries about the collection of this information, please contact the Risk Management Official, Wellington Source Water Protection, 7444 Wellington Road 21, Elora, ON, N0B 1S0, 519-846-9691 ext. 362.

Explanatory Guide for Completing the Drinking Water Source Protection Screening Form

Your property is located within a municipal well head protection area or intake protection zone and therefore may be subject to the *Clean Water Act, 2006*. The Wellhead Protection Area (WHPA) is the area around a municipal well where land use activities have the potential to affect the quality and quantity of water that flows into the wellhead. For more information, refer to www.wellingtonwater.ca or contact 1-844-383-9800.

To assist staff in determining whether your property and/or application is subject to the Act, the Drinking Water Source Protection Screening Form is completed to inventory the activities that are proposed on your property. The following sections explain the form.

Section 1 – Property Information:

Please fill out the municipal address and property owner for the subject property.

Section 2 – Proposal:

Please check all that apply to the application and provide a brief explanation of the proposed development and/or construction details if construction a geothermal (such as depth, vertical r horizontal, closed loop or open loop).

Section 3 – Potential Threat Activities Associated with Proposed Application:

Within this section please fill out all that apply to your application. If there is a circle provided in the table, please provide a check mark; if there is a blank space in the table please write in the applicable information.

3.1 Liquid Fuel Handling and Storage:

Fill out this section if on the property there is liquid fuel storage or handling greater than 250 litres (1 gal = 3.785 L). This can be located in land uses for residential, agricultural, gas, commercial, industrial or institutional purposes and includes gasoline, diesel or home heating oil. It does not include propane or natural gas.

3.2 Chemical Handling and Storage:

Fill out this section if the application is regarding one of the listed chemical handling or storage activities on the form.

3.2.1 Known DNAPLs:

Fill out this section only if applicant is aware of a Dense Non-Aqueous Phase Liquid (DNAPL) on the property. DNAPLs are chemicals that are denser than water and therefore have the ability to contaminate the groundwater easily. The specific DNAPLs that pose a potential threat are poly-aromatic hydrocarbons (PAHs), 1, 4-dioxane, trichloroethylene, tetrachloroethylene or perchloroethylene (PCE or PERC) and Vinyl Chloride.

- **Vinyl Chloride:** Used to make polyvinyl chloride (PVC) pipes, wire coatings, vehicle upholstery and plastic kitchen ware
- **PAHs:** Used in wood preservatives, pharmaceuticals, dyes and asphalt products.

- **1,4-dioxane:** Used as a degreasing solvent or solvent stabilizer in various manufacturing processes.
- **Tetrachloroethylene** (PCE or PERC): Used in dry cleaning, metal cleaning and as an intermediate in manufacturing processes.
- **Trichloroethylene** (TCE): Mainly used for degreasing of metal parts in the automotive and metal industries and also found in some household products such as adhesives, paint removers, paints, rug cleaning fluids, and metal cleaners.

3.2.2 Known Organic Solvents:

Fill out this section if the applicant is aware of Organic Solvents on the property. Organic Solvents are liquid organic compounds with the ability to dissolve solid, gases or liquids and therefore have the ability to contaminate drinking water sources. Organic Solvents that are of potential concern include Carbon Tetrachloride, Chloroform, Dichloromethane and Pentachlorophenol (PCP).

- **Carbon Tetrachloride:** Once used widely in fire extinguishers, as a cleaning agent, in the manufacture of refrigerants as well as an industrial solvent and metal degreasing agent is a banned substance in Ontario since 1999. The only permitted uses of the chemical are in research laboratories or in the manufacturing process where the product is converted to an alternative product which does not contain a class of ozone-depleting substances.
- **Chloroform:** commonly used in a laboratory setting, and in the production of pharmaceuticals, dyes and pesticides.
- **Dichloromethane** (also known as methylene chloride): used as a solvent in paint strippers and removers. It is used as a process solvent in the manufacture of drugs, pharmaceuticals and film coatings. It is also used as a metal cleaning and finishing solvent in electronics manufacturing, aerosol propellant and as an agent in urethane foam blowing.
- **Pentachlorophenol** (PCP): used as an herbicide, insecticide, fungicide, algacide and disinfectant, and as an ingredient in antifouling paint. Its use has significantly declined due to its high toxicity. Today it is used industrially as a wood preservative and is not manufactured in Canada.

3.3 Road Salt Application, Handling and Storage:

Fill out this section if there will be road salt storage on the property or road salt application on a private road, parking lot, or sidewalk located on the property. Please provide estimates in m³ for volume and m² for area.

3.4 Snow Storage:

Fill out this section if there will be snow storage (above or below grade) on the property and indicate whether the storage will be greater than 0.01 hectare (0.03 acre or 10 metres by 10 metres), greater than 0.5 hectares (1.24 acres or 50 metres by 50 metres), or greater than 1 hectare (2.5 acres or 100 metres by 100 metres). For reference, 0.01 hectare is roughly the size of a double driveway, 0.5 hectares is roughly the size of one soccer field, and 1 hectare is roughly the size of two soccer fields.

3.5.1 Waste Storage or Disposal - Septic Tank Pump outs

Fill out this section only if application is involved in the pumping out or disposal/treatment of raw sewage or septage, porta potties or holding tanks.

3.5.2 Waste Storage or Disposal - Storage and/or Disposal of Hazardous Waste:

Fill out this section if there is hazardous waste or liquid industrial waste stored on the property including waste oil, solvents, and automotive fluids. Please note storage or disposal of oil does not include restaurant oil or grease. Storage of hazardous waste or liquid industrial waste includes wastes requiring registration with the Ontario Hazardous Waste Information Network (HWIN), if applicable. Disposal of waste on site includes landfilling and incineration. Typically, this will only be at commercial or industrial properties.

3.6 Storm Water Management/Industrial Sewage:

Fill out this section if one of the listed storm water management or industrial sewage activities is planned or present. For reference, a storm water management facility may include a retention or detention pond (wet or dry), catch basins, sediment control, recharge systems (such as infiltration galleries), swales and ditches.

3.7 Septic Systems:

Fill out this section if the property will be serviced by a septic system. Please indicate whether the septic system is existing or proposed. If the existing or proposed septic system has a design capacity of less than 10,000 litres, it is regulated under the Ontario Building Code (OBC). A building permit, obtained through the municipality, is required by the OBC for installation of a new septic system and for the repair/replacement of an existing system. If the existing or proposed septic system has a design capacity of greater than 10,000 litres a day, a provincial Environmental Compliance Approval may be required under the Ontario Water Resources Act. Please contact the local Ontario Ministry of the Environment and Climate Change office for more information.

3.8.1 Water Taking - Private well installed:

Fill out this section if there is an existing well present or a new well being installed on the property. This includes private drinking water wells, environmental test wells, geotechnical wells, irrigation wells, etc. Please indicate whether the well is proposed or existing, and fill out the rest of the section (dug or drilled as well as the approximate construction date) for existing wells only.

3.8.2 Water Taking - Greater than 50,000 litres per day

Fill out this section if more than 50,000 litres per day is being withdrawn from a well or a water body (1 gal = 3.785 gal).

3.9 Transport Pathway

Transport pathways are human constructed pathways through soil and bedrock that may increase the vulnerability of groundwater to certain contaminants.

Please check the first circle if your application will be installing a vertical geothermal system, installation of caissons or building piers for a non-residential application or for a large residential application, aggregate project, or installation of utilities or excavation within fractured bedrock. A road occupancy permit application could indicate when fracture bedrock excavation occurs. If geothermal, please provide construction details including depth, vertical or horizontal, closed loop or open loop in the space provided in Part 2 (on the first page of this document). A large residential application includes multi-story, multi-unit residential developments.

Please check the second circle if there is an existing private well that is not in use. Private wells include environmental and / or geotechnical monitoring wells and domestic wells. If you filled out Section 3.8.1 as private well not in use, Section 3.9 should also be completed.

3.10 Recharge Reduction:

Fill out this section if there is going to be an increase in impervious surfaces on the property. For example, asphalt (driveways and parking areas) and covered areas (roofs, decks and structures). If building within current building envelope then it is not an increase. Please note this box only applies within the Town of Erin.

3.11.1 Fertilizers and/or 3.11.2 Pesticides:

Fill out this if there is storage or use of fertilizer or pesticides for agricultural or commercial use. Do not fill out this section if used only for personal use.

3.11.3 Agricultural - Application, handling and storage of agricultural (i.e. manure) and/or 3.11.4 non-agricultural source material (bio solids):

Fill out this section if there is application, handling or storage of Agricultural Source Material (ASM) (manure) or Non-Agricultural Source Material (NASM) on the property. ASM and NASMs include; manure (ASM) and biosolids, commercial food waste, etc. For more information on NASMs and ASMs please look at fact sheet number 4, available on our website, www.wellingtonwater.ca

3.11.5 Agricultural - Grazing and pasturing of livestock:

Fill out this section if there is any grazing, pasturing or housing of one or more livestock on the property excluding household pets. Livestock can include cows, horses, sheep, goats and other animals. If unsure, please contact Wellington Source Water Protection for clarification. Please give an estimation of the number of animals, as well as the type of animal(s).

3.11.6 Outdoor Confinement Yard:

Fill out this section if there are any livestock including cows, horses, sheep, goats and other animals housed in an outdoor confinement yard on the property. If unsure, please contact Wellington Source Water Protection for clarification. Please give an estimation of the number of animals, as well as the type of animal(s).

3.11.7 Prescribed Instruments

Fill out this section if there are any provincially prescribed instruments that apply to or are registered for the property. This includes Nutrient Management Strategies, Nutrient Management Plans and Non-Agricultural Source Material Plans.

3.12 None of the above are applicable:

Check that none of the above sections in Part 3 are applicable to the application. This section should only be checked if none of the other sections have been checked.

Section 4 - Declaration:

Either the owner or the applicant must sign and date the form.



Township of Puslinch
7404 Wellington Road 34,
Puslinch, ON, N0B 2J0
T: (519) 763 – 1226
F: (519) 763 – 5846
www.puslinch.ca

Zoning By-law Amendment Application

Date submitted: _____

The Amendment:

Type of amendment:

Site specific:

Other (specify):

N/A

Purpose of and reasons for the proposed amendment(s):

To rezone the subject site (7456 McLean Road W & 197 Brock Road S) from the IND (sp54) Zone and the IND(h5) Zone to the Highway Commercial (HC) Zone to permit a small-scale multi-tenant commercial development with a Gas Bar, Convenience Store and Drive-Through Restaurant.

General Information:

1. Applicant Information:

Registered Owner's Name(s): DAAZ Inc.

Address: _____

City: _____

Postal Code: _____

Email Address: _____

Telephone Number: _____

Fax: _____

Applicant (Agent) Name(s): Siv-ik Planning & Design Inc. (c/o Michael Davis)

Address: 14 Glendale Avenue N

City: Hamilton, ON.

Postal Code: L8L7J3

Email Address: mdavis@siv-ik.ca

Telephone Number: 905-921-9029

Fax: _____

Other Name(s): N/A

Address: _____

City: _____

Postal Code: _____

Email Address: _____

Telephone Number: _____

Fax: _____

Name, address, and phone number of all persons having any mortgages, charges, or encumbrances on the property.

None.

Send correspondence to: Owner: Agent: Other: _____

When did the current owner acquire the subject land? Date: July 14, 2022

4. What does the amendment cover?

The "entire" property:

A "portion" of the property:

(This information should be illustrated on the required drawing under item 24 of this application)

5. Provide a description of the "entire" property:

Municipal address: 7456 McLean Road W & 197 Brock Road S

Concession: 7 Lot: PT Lot 25

Registered Plan Number: PARTS 1 & 2 61R7239

Area: 1.62 ha Depth: 135.2 m Frontage: 101 m
_____ ac _____ ft. _____ ft.

6. Provide a description of the area to be amended if only a "portion" of the property:

Area: _____ ha Depth: _____ m Frontage: _____ m
_____ ac _____ ft. _____ ft.

7. Is the application to amend the zoning by-law consistent with the Provincial Policy Statement?

Yes: No:

8. Is the subject land within an area of land designated under any provincial plan or plans?

Greenbelt Plan: Places to Grow: Other: (specify): _____

If yes, does the application conform to and not conflict with the application provincial plan or plans?

Yes: No:

9. County Official Plan

What is the current County Official Plan designation of the subject property?

Rural Employment

List land uses permitted by the current Official Plan designation:

Dry industrial and commercial uses requiring large lots, major road access or proximity to rural resources are permitted in rural employment areas. Areas designated Rural Employment in Puslinch are permitted to have the following additional uses: complementary commercial uses such as automotive uses, restaurants, motels and limited retail; offices, including a head office and/or research centre.

How does the application conform to the Official Plan?

The proposed ZBA will enable the development of a range of "complementary" commercial uses that will support the function of the broader employment area between 401 & Aberfoyle. The site is limited in size and the development can be serviced by private on-site services (see Functional Servicing Report)

If the application is to implement an alteration to the boundary of an area of settlement or to implement a new area of settlement, provide details of the Official Plan or Official Plan amendment that deals with the matter.

N/A

If the application is to remove land from an area of employment, provide details of the Official Plan or Official Plan amendment that deals with the matter.

N/A

If the subject land is within an area where zoning with conditions may apply, provide an explanation of how the application conforms to the Official Plan policies relating to zoning with conditions.

N/A

10. Zoning:

What is the current zoning of the property? IND(sp54) & IND(h5)

What uses are permitted? Industrial

If the subject land is within an area where zoning with conditions may apply, provide an explanation of how the application conforms to the Official Plan policies relating to zoning with conditions.

N/A

If the subject land is within an area where the municipality has pre-determined minimum and maximum density requirements or the minimum and maximum height requirements provide a statement of these requirements.

N/A

Existing and Proposed Land Uses and Buildings:

11. What is the "existing" use(s) of the subject land?

Vacant/undeveloped.

12. How long has the "existing" use(s) continued on the subject land?

N/A

13. What is the "proposed" use(s) of the subject land?

Gas Bar(s), Convenience Store & Drive-Through Restaurant.

14. Provide the following details for all buildings or structures on the subject land: More space required - see detailed breakdown on pg. 12-13 of PJR.

Building Details	Existing		Proposed	
Type of Building(s) or structures				
Date of construction				
Building height	m	ft	m	ft
Number of floors				
* Total floor area	m ²	ft ²	m ²	ft ²
Ground floor area (exclude basement)	m ²	ft ²	m ²	ft ²
Distance from building structure to the:				
Front lot line	m	ft	m	ft
Side lot line	m	ft	m	ft
Other side lot line	m	ft	m	ft
Rear lot line	m	ft	m	ft

Building Details	Existing		Proposed	
*Percentage lot coverage				
*Number of parking spaces				
*Number of loading spaces				

Existing and Proposed Services:

15. What is the access to the subject property?

- Provincial Highway:
- Continually maintained municipal road:
- Right-of-way:
- Seasonally maintained municipal road:
- Water access:
- Other (please specify):

16. What is the name of the road or street that provides access to the subject property.

McLean Road W & Brock Road S

17. If access is by water only, please describe the parking and docking facilities used or to be used and the approximate distance of these facilities from subject land to the nearest public road.

N/A

(This information should be illustrated on the required drawing under item 24 of this application)

18. Indicate the applicable water supply and sewage disposal:

Water Supply	Existing		Proposed	
Municipal water				

Water Supply	Existing	Proposed
Communal water		
Private well		<input checked="" type="checkbox"/>
Other water supply		
Water sewers		
Municipal sewers		
Communal sewers		
Private septic		<input checked="" type="checkbox"/>
Other sewage disposal		

19. If the application would permit development on privately owned and operated individual or communal septic systems, would more than 4500 litres of effluent be produced per day as a result of the development being completed?

Yes: No:

If yes, the following reports are required:

Servicing options report

A hydrogeological report

20. How is storm drainage provided?

Storm Sewers:

Ditches:

Swales:

Other: (explain below)

On-site quantity and quality control systems are proposed. Stormwater will outlet to existing sewers located on McLean Road W. See the Functional Servicing Report prepared by Crozier & Associates for further details.

Other Related Planning Applications:

21. Has the current owner (or any previous owner) made application for any of the following, either on the subject property or within 120 metres of the subject lands?

Planning Application	Yes	No	*File Number	Approval Authority	Subject Lands	Purpose	*Status
Official Plan Amendment							
Zoning By-Law Amendment							
Minor Variance							
Plan of Subdivision							
Consent (Severance)							
Site Plan Control							

22. Has the subject land ever been the subject of a Minister's Zoning Order?

Yes: No:

If yes, provide the Ontario Regulation number of that order, if known: N/A

Other Supporting Information

23. Please list the titles of any supporting documents: (e.g. Environmental Impacts Study, Hydrogeological Report, Servicing Options Report, Traffic Study, Market Area Study, Aggregate Licence Report, Stormwater Management Report, etc.)

1. Planning Justification Report; 2. Transportation Impact Study; 3. Functional Servicing Report; 4. Hydrogeological Report; 5. Scoped EIS Review; 6. Sourcewater Screening Form; 7. Conceptual Site Plan.

Application Drawing

24. Please provide an accurate drawing of the proposal, preferably prepared by a qualified professional. In some cases, it may be more appropriate to submit additional drawings at varying scales a lot better illustrate the proposal. The drawing must include the following information (see on following page):

- Owner/applicant's names;
 - Legal description of the property;
 - Boundaries and dimensions of the subject and its current land use;
 - Dimensions of area of amendment (if not, the entire property);
 - The size and use of all abutting land;
 - All existing and proposed parking and loading areas, driveways, and lanes;
 - The location and nature of any easements or restrictive covenants on the property;
 - The location of any existing drains or award drains;
 - Woodlots, forested areas, ANSIs, ESAs, wetlands, floodplain, and all natural watercourses (rivers, stream banks, etc.);
- The location, size , and type of all existing and proposed buildings and structures on the subject land , indicating their distance from the front lot line, rear lot line, and side lot lines;
- The name, location, and width of each abutting public or private road, unopened road allowance or right-of-way;
- If access to the subject land is by water only, provide the location of the parking and docking facilities to be used;
 - Other features both on site or nearby that in the opinion of the applicant will have an effect on the application (such as bridges, railways, airports, roads, drainage ditches, wells, septic systems, springs, slopes, gravel pits); and
 - The drawing should also include the scale, north arrow, and date when the drawing was prepared.

Authorization for Agent/Solicitor to act for Owner

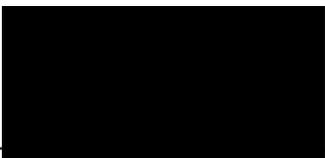
(If affidavit is signed by an Agent/Solicitor on Owner's behalf, the Owner's written authorization below shall be completed)

I (we) ISHWINDERPREET (HARRY) WADHWA (of Daaz Inc.) of the

Town of Acton County/Region of

Wellington do hereby authorize

Siv-ik Planning & Design Inc. (Michael Davis) to act as my agent in this application.



← SIGN HERE

Signature of Owner(s)

October 3, 2023

Date

Affidavit

I (we) Michael Davis of the

City of Hamilton County/Region of

Hamilton solemnly declare that all the statements

contained in this application are true, and I, (we), make this solemn declaration

conscientiously believing it to be true, and knowing that it is of the same force and effect

as if made under oath and by virtue of the CANADA EVIDENCE ACT. DECLARED

before me at the city of Orleans in the

County/Region of Ontario this 22nd day of

September, 2023.

[Redacted Signature]

Signature of Owner or authorized
solicitor or agent

September 22, 2023

Date

[Redacted Signature]

Signature of Commissioner



September 22, 2023

Date

Agreement to Post Sign and Permit Site Visits

For the purpose of public notification and staff identification, I agree to erect a sign in accordance with the Township of Puslinch's sign requirements within one week of the date Township staff has deemed that the application is complete, and remove the sign when the application has been given final approval.

Furthermore, for the purposes of processing this application, I permit staff/representatives of the Township of Puslinch to enter onto my lands and inspect my property at the following times (please check one of the following boxes):

Any and all times: Certain days as specified: By appointment only:

[Redacted Signature]

Signature

September 22, 2023

Date

born remotely by Michael stated as being located in the city of Hamilton in the province of Ontario, before me, Fatima Farooq, 606S, in Orleans, ON on the 22nd day of September, 2023, in accordance with Reg 431/20 administering Oath Declaration remotely.

For Administrative Purposes Only:

Application fee of \$ _____ received by the municipality

Date Fee Received: _____

Date Application Filed: _____

File Number: _____

Application deemed complete:

Signature of Municipal Employee

Date

Personal information on this form is collected under the authority of the Planning Act. The information is used for the purpose of processing this application and administering the legislation and is maintained in accordance with the Municipal Freedom of Information and Protection of Privacy Act. Questions regarding the collection of this information may be directed to the Township Clerk's office.

The Township of Puslinch is committed to providing accessible formats and communication supports for people with a disability. If another format would work better for you, please contact the Township Clerk's office for assistance.